



Azeer Home Ventilation

EN Additional information for hospital staff for devices from serial number 20,000



VENTIllogic LS

VENTIllogic plus

Ventilation Device

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Introduction

Please note

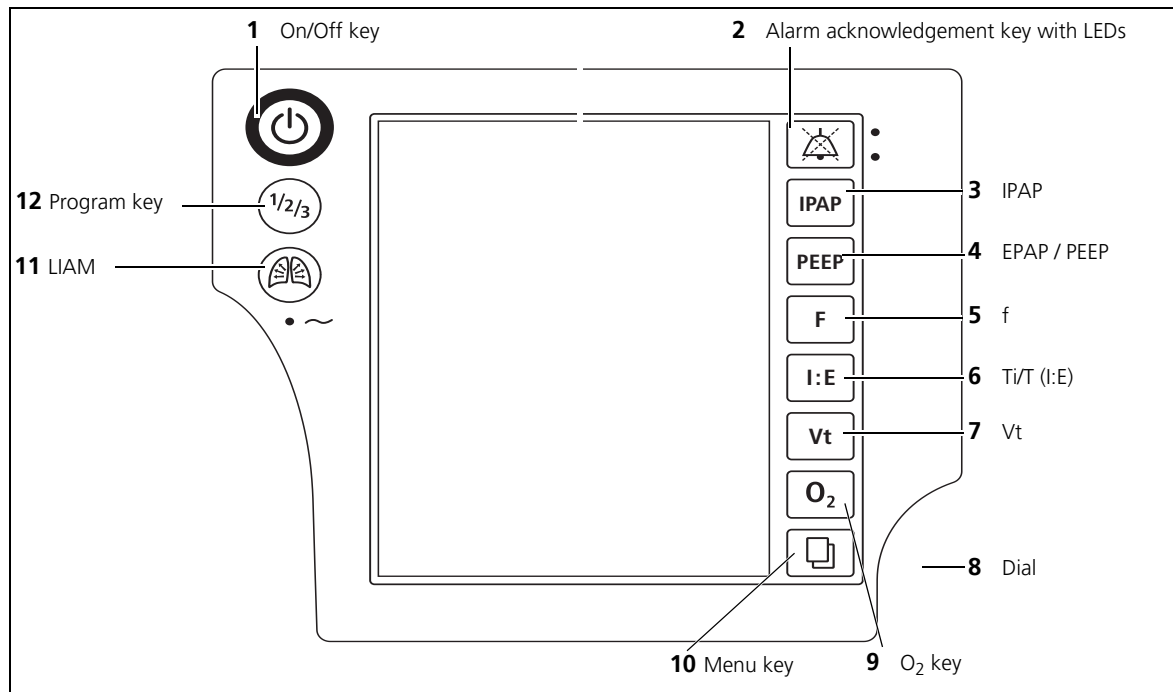
This document is not a complete set of instructions for use. It serves as supplementary material for hospital staff. The following information can be found in the patient's instructions for use:

- complete overview of all types of device and all accessories
- device description and intended use
- safety instructions
- device setup
- hygiene treatment if there is no change of patient
- function check
- servicing
- scope of supply
- technical data
- warranty
- declaration of conformity

1. Overview

This overview describes the most important functions for hospital staff. A complete overview of all device variants and accessories can be found in the patient's instructions for use.

1.1 Operating panel

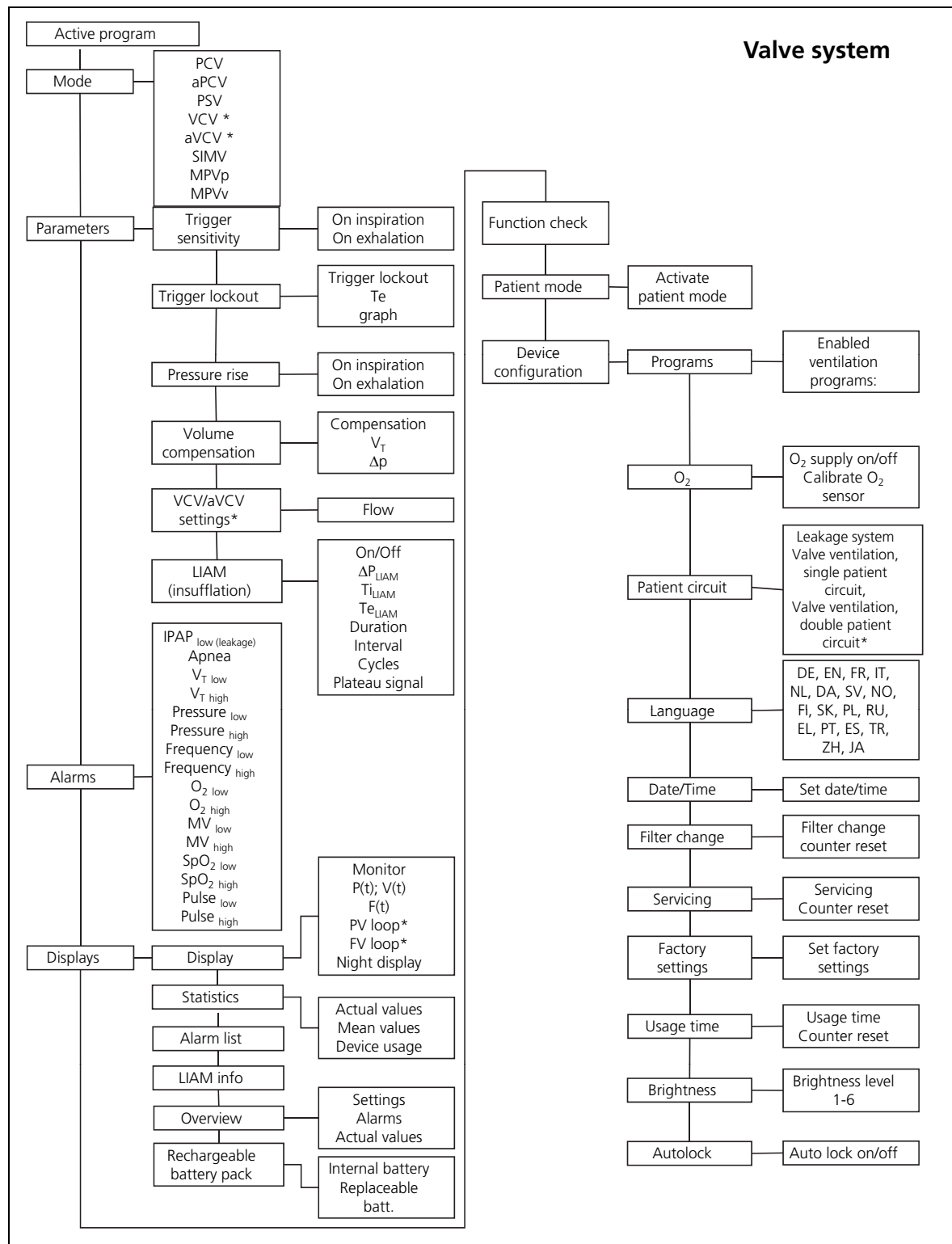


Key

Element	Function
1 On/Off key	Switches the therapy device on or off.
2 Alarm acknowledgement key with LEDs	For the temporary muting of alarms. LEDs are for displaying alarms visually.
3 IPAP	For making quick settings for IPAP. Locked in Patient mode.
4 EPAP / PEEP	For making quick settings for EPAP / PEEP. Locked in Patient mode.
5 f	For making quick settings for respiratory frequency. Locked in Patient mode.
6 Ti/T (I:E)	For making quick settings for the proportion of inspiration time in a respiratory cycle. Locked in Patient mode. On this therapy device, the I:E ratio is changed by specifying the percentage proportion of inspiration time (Ti) of the entire respiratory cycle (T).
7 Vt	For making quick settings for tidal volume. Locked in Patient mode.
8 Dial	Central control of the therapy device. For navigating in the menu.
9 O ₂ key	Allows rapid access to the functions below. • If clinical functions are enabled: Device configuration menu > O₂ usage (see "O₂" on page 37). • In Patient mode: Calibrate O₂ sensor
10 Menu key	For switching from the default display to the menu and back.
11 LIAM	Triggers the LIAM coughing aid function (insufflation).
12 Program key	For switching to one of the three pre-configured programs manually.

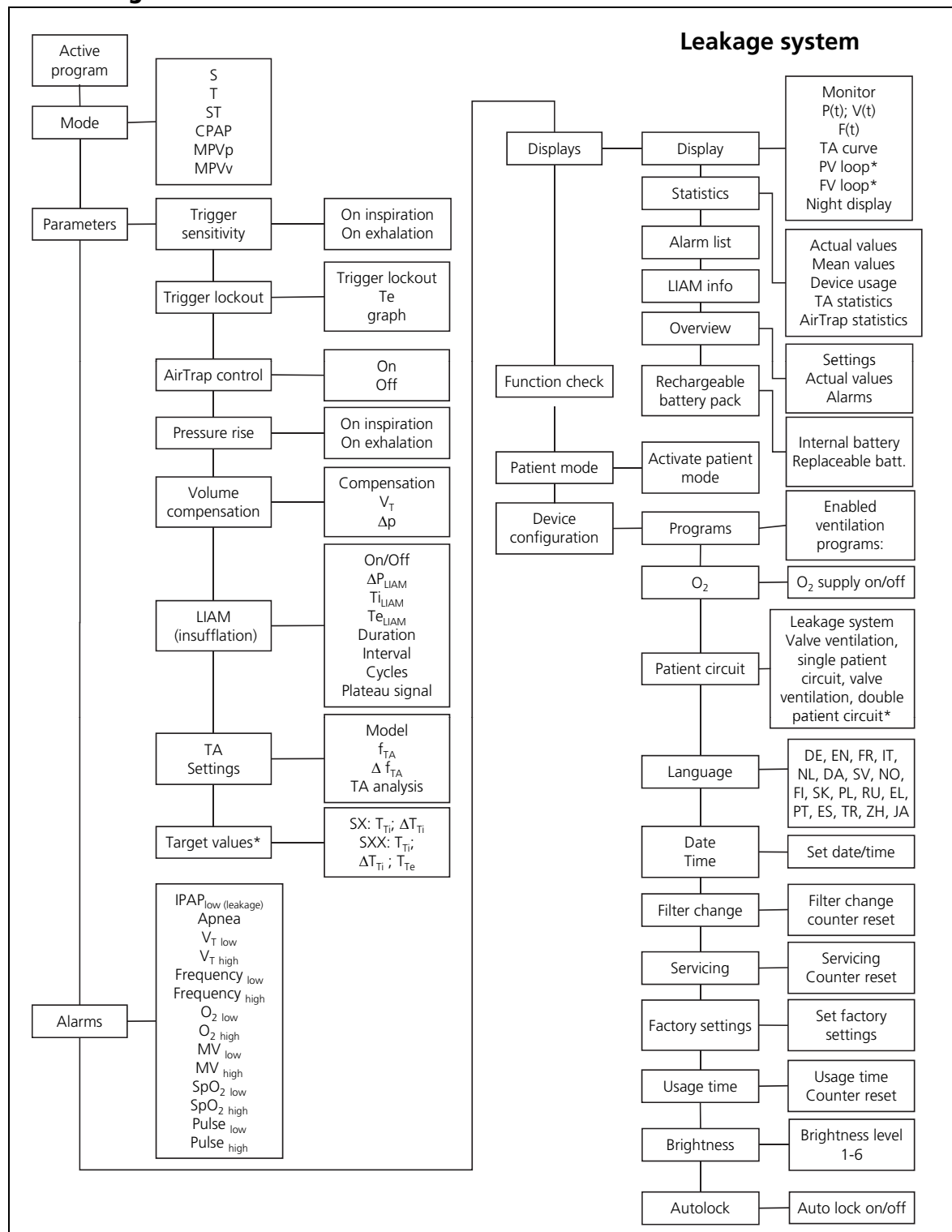
1.2 Menu structure

1.2.1 Valve ventilation



* These modes/settings are only available on VENTI/logic LS.

1.2.2 Leakage ventilation



* These modes/settings are only available on VENTI/logic LS.

1.3 Mode summary

Note

The ventilation modes available depend on the patient circuit installed (see "2.6 Convert device" on page 16 and "3.5.3 Patient circuit" on page 37).

1.3.1 Valve ventilation

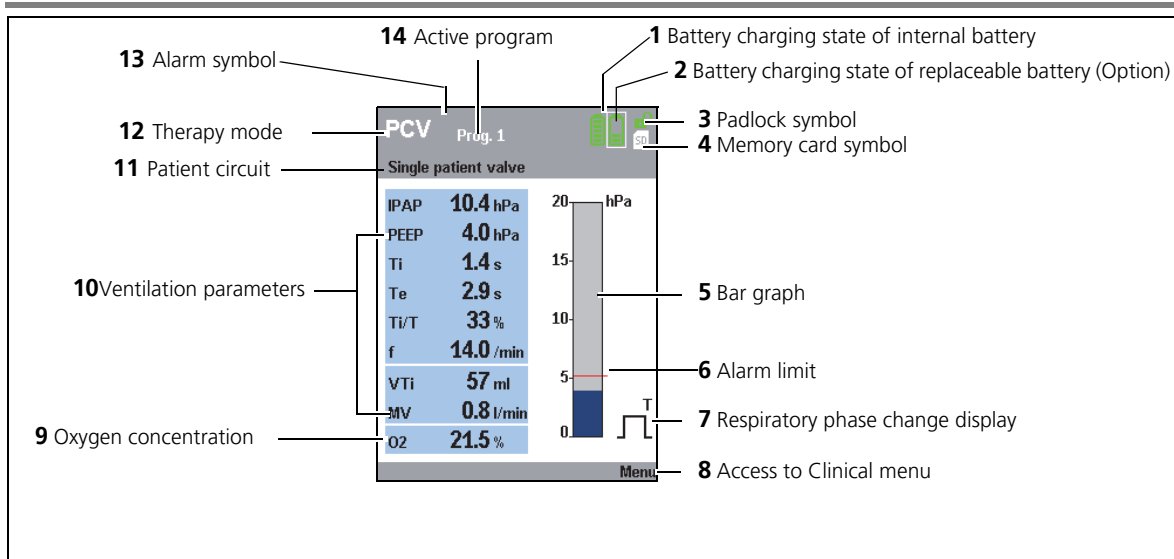
Mode	Adjustable before activation	Trigger sensitivity	Trigger lockout	Pressure rise	Volume compensation	LIAM (insufflation)	VCV/aVCV settings*
PCV	– IPAP – PEEP – f – Ti/T			•	•	•	
aPCV	– IPAP – PEEP – f – Ti/T	•	•	•	•	•	
PSV	– IPAP – PEEP – f – Ti/T	•	•	•	•	•	
VCV*	– V_T – f – Ti/T – PEEP – Flow					•	•
aVCV*	– V_T – f – Ti/T – PEEP – Flow	•	•			•	•
SIMV	– P_{SIMV} – IPAP – PEEP – f_{backup} – Ti/T_{ba} – f_{SIMV} – T_{apnea}	•	•	•			
MPVp	– IPAP – Ti	•	•	•		•	
MPVv	– IPAP – V_T	•	•	•		•	

* These modes/settings are only available on VENTIllogic LS.

1.3.2 Leakage ventilation

Mode	Adjustable before activation	Trigger sensitivity	Trigger lockout	AirTrap Control	Pressure rise	Volume compensa- tion	LIAM (insufflation)
S	– IPAP – EPAP	•			•	•	•
T	– IPAP – EPAP – f – Ti/T (I:E)			•	•	•	•
ST	– IPAP – EPAP – f – Ti/T (I:E)	•	•	•	•	•	•
CPAP	– CPAP						
MPVp	– IPAP – Ti	•	•		•		•
MPVv	– IPAP – V_T	•	•		•		•

1.4 Display in Clinical menu



Key

Element	Function
1 Battery charging state of internal battery	Indicates the charging state of the internal rechargeable battery. If the battery is being charged, the segments are shown in succession.
2 Battery charging state of replaceable battery (Option)	Displays the charging state of the replaceable battery available as an option. If the battery is being charged, the segments are shown in succession.
3 Padlock symbol	Appears when clinical functions are enabled. Faded out in Patient mode.
4 Memory card symbol	Appears if a memory card is present and there is data saved on the memory card.
5 Bar graph	Indicates the pressure curve on inspiration and exhalation. Note: 1.01973 hPa correspond to 1 cm H ₂ O.
6 Alarm limit	Displays the specified alarm limit for IPAP low.
7 Respiratory phase change display	Indicates whether the current respiratory phase was triggered spontaneously by the patient (S) or by the device (T). Switches from left (inspiration) to right (exhalation) depending on respiratory phase. Diagram: inspiration triggered by the device. Also indicates whether the trigger for inspiration is blocked due to an activated trigger lockout time at the start of expiration B .
8 Access to Clinical menu	The key next to this menu item enables you to switch to the menu and back to the default display.
9 Oxygen concentration	Is displayed in % if an oxygen sensor is connected.
10 Ventilation parameters	Indicates the ventilation parameters currently set.
11 Patient circuit	Indicates the patient circuit (valve or leakage ventilation) currently set and the current configuration (double or single patient circuit).
12 Therapy mode	Indicates therapy mode currently set. Is overwritten by LIAM and shown next to it in subscript if LIAM is activated.
13 Alarm symbol	Indicates the current setting for alarms (in this case: all physiological alarms deactivated).
14 Active program	Indicates the ventilation program currently active. The value in brackets show the total number of enabled programs.

1.5 Symbols used in the display

Symbol	Significance
Status line:	
	Filter change required
	Servicing required
	Acoustic signal of alarms muted for 120 seconds
	All physiological alarms deactivated (exception for VENTIlogic LS: In VCV and aVCV modes, the Pressure high and Pressure low alarms cannot be deactivated)
	Blower off (standby mode)
	Battery display green (2-5 segments): battery capacity over 25 %
	Battery display orange: battery capacity below 25 %
	Battery display red: battery capacity below 10 %
	Segments are displayed in succession: device operated by power supply, battery charging
	Battery not present
	Battery not ready for use: – battery defective or – battery too cold or – battery too hot
	Battery not recognized as a genuine battery. Replace battery.
	Device in internal battery mode
	Measured values are written to the SD card
	SD card is write-protected or defective. No data can be recorded.
Alarm window:	
	Low-priority alarm triggered
	Medium-priority alarm triggered
	High-priority alarm triggered
Main window	
	Plateau signal switched on
	Plateau signal switched off

1.6 Abbreviations used in the display

Symbol	Significance
Status line:	
S	S mode active
ST	ST mode active
T	T mode active
CPAP	CPAP mode active
PCV	PCV mode active
PSV	PSV mode active
aPCV	aPCV mode active
VCV	VCV mode active (VENTI <i>logic</i> LS only)
aVCV	aVCV mode active (VENTI <i>logic</i> LS only)
SIMV	SIMV mode active
MPVp	MPVp mode active
MPVv	MPVv mode active
+V	Volume compensation activated (after mode: e.g. PCV^{+V})
+A	AirTrapControl activated (after mode: e.g. ST ^{+A})
+LIAM	LIAM enabled: displayed under the current mode, e.g.: PCV +LIAM
LIAM	LIAM (Lung Insufflation Assist Maneuver) active
Prog.	Active ventilation program
Main window (Monitor):	
IPAP	Inspiration pressure
EPAP / PEEP	Exhalation pressure
P_{SIMV}	Specifies the inspiration pressure level of the back-up ventilation (SIMV mode only)
hPa	Pressure given in hectopascals; 1.01973 hPa corresponds to 1 cm H ₂ O.
f	Respiratory frequency
S	Respiratory phase switch triggered - spontaneous
T	Respiratory phase switch triggered - mandatory
B	Trigger for inspiration blocked during expiration
Ti/T	Proportion of inspiration time in a respiratory cycle
VT	Tidal volume
VTi	Tidal volume on inspiration
VT_e	Tidal volume on exhalation
Ti	Inspiration time
Te	Exhalation time
O₂ (21%)	Mean oxygen concentration Shown in brackets: measuring cell not calibrated, perform oxygen calibration
SpO₂ (%)	Oxygen saturation
bpm	Pulse beats per minute
Tapnoe	Time since patient's last spontaneous breath (only in MPVv and MPVp modes)

2. Operation

This section describes the most important operating functions for hospital staff. A complete description of the device and its operation can be found in the patient's instructions for use.



Caution!

Risk of injury when changing patients.

On a change of patient, the settings for the previous patient may lead to the current patient being ventilated incorrectly.

When changing patients, always reset all device parameters to the factory settings (see "3.5.8 Factory Settings" on page 38).



Note on using Intersurgical® patient circuits

When using Intersurgical® patient circuits ref. 5183064 and ref. 5083 (and other single-patient circuits in which Intersurgical valves from the patient circuits mentioned are used) the volume display on the device may deviate. The volume displayed may deviate from that actually delivered by up to 105 ml.

- Be aware of this potential display deviation when setting alarm limits and parameters.
- Use patient circuit WM 27181 from the manufacturer to avoid this deviation in the display.

Note

All clinical functions are also available in Standby (with fan switched off). Therefore, you do not need to activate the fan until immediately before the start of therapy.

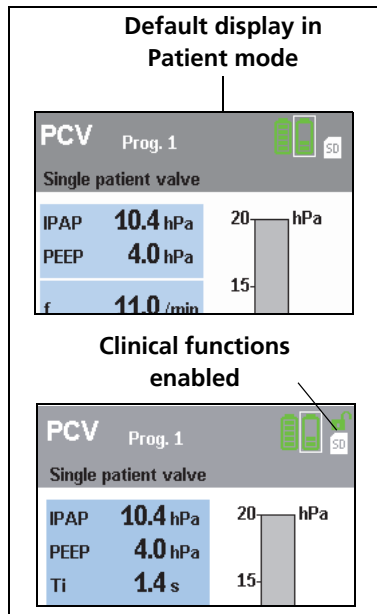
2.1 New delivery



As soon as the device is connected to a power supply, it starts up in patient mode. First use the dial to select the language in which you wish to operate the device.

If you wish to use the device again after prolonged storage, see the section entitled "4. Hygiene treatment on change of patient" on page 41.

2.2 Enable and lock clinical functions



If the device is in Patient mode or if no settings have been made in the Clinical menu for 15 minutes with autolock activated, Clinical functions are locked. To enable the clinical functions again, proceed as follows:

1. Press the **IPAP** and **PEEP** keys for 4 seconds until there is the message **Clinical menu locked!** (Patient mode: **only available in Clinical menu!**) is no longer shown.

Note

In Patient mode, the clinical functions cannot be enabled from the menu. If necessary, press the menu key in order to switch to the default display in Patient mode. Then keep the **IPAP** and **PEEP** keys depressed as described above.

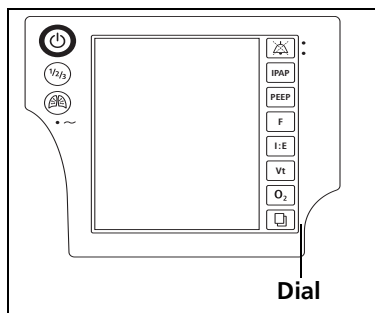
You can also deactivate the clinical functions again.

Press the **IPAP** and **PEEP** keys again for 4 seconds, until the message **Clinical menu locked!** appears. To switch the device to Patient mode, proceed as described in "Activate patient mode" on Page 15.

You can also deactivate the automatic lock of the clinical functions after 15 minutes (see "Autolock" on page 40).

2.3 Controls

2.3.1 Navigate with the dial



This is the central control of the therapy device. You can use the dial to select menu items, navigate in the menu windows and set values for individual menu items.

Select menu items

- Move the dial clockwise to move the selection bar down in the display.
- Move the dial anticlockwise to move the selection bar up in the display.
- Press the dial to confirm selection of a menu item and open the relevant submenu, or to select a value you wish to change.

Set values

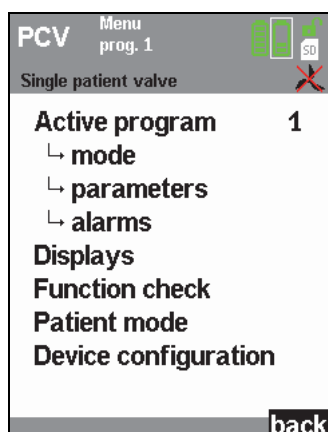
- Move the dial clockwise to increase a value.
- Move the dial anticlockwise to decrease a value.
- Press the dial to store a value.

Exit menu item

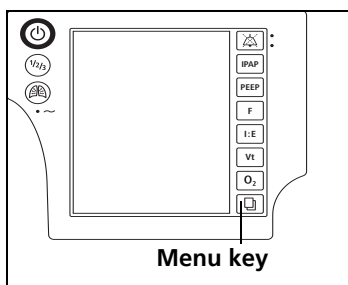
Move the dial clockwise until the selection bar in the display is on **back**, **cancel** or **close**, depending on context. Then press the dial. The display switches back to the menu one level above. Alternatively, you can exit a menu item by pressing the menu key  (**back**, **cancel** or **close** appears in the display to the left of the menu key depending on context).

Rapid access

If you press the dial during therapy, the device switches straight to the Displays > Display menu. You can now select the various types of display or activate the night display (see "Display" on Page 19).



2.3.2 Menu key



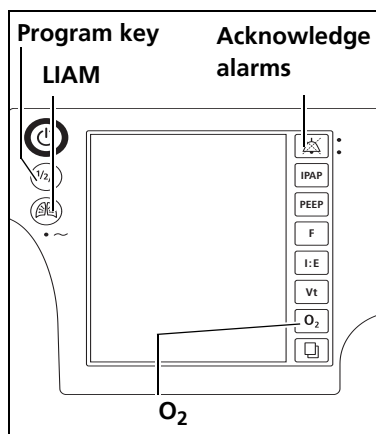
Use the Menu key to switch from **Monitor** to **Menu** (in the display, you will see to the left of the key: **Menu**).

Current values during therapy are shown in the **Monitor** display. In **Menu**, you can make settings on the device.

The menu key has other functions assigned to it as a function of context (e.g. **back**). The current function in each case is shown in the display to the left of the Menu key.

You can navigate within the menu using the dial, as described in „2.3.1 Navigate with the dial“.

2.3.3 Function keys



You can call up some functions directly by pressing the relevant key on the device. When these keys are pressed, the relevant menu appears in the display.

- **IPAP**
- **EPAP / PEEP**
- **f**
- **Ti/T (I:E)**
- **Vt**

If you press the  key, you initiate LIAM (insufflation).

If you press the program key , you can choose between the 3 pre-configured programs.

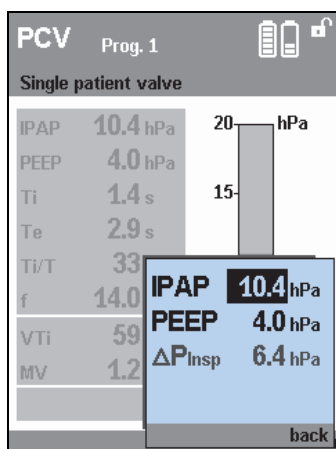
Pressing the **O₂** key gives you rapid access to the functions below.

- If clinical functions are enabled: **Device configuration** > menu **O₂ usage** (see “O₂” on page 37).
- In Patient mode: **Calibrate O₂ sensor** menu

If you press the  key, you acknowledge an acoustic alarm and mute it for 120 seconds.

2.4 Set ventilation parameters

2.4.1 Set IPAP



1. To change the therapy pressure for inspiration, press the **IPAP** key. The current settings for IPAP and EPAP are displayed.

The selection bar is on the IPAP value.

2. Change the IPAP value using the dial. Press the dial to confirm the new value.

The selection bar switches to **IPAP**.

3. To set the **EPAP / PEEP** value as well, use the dial to select **EPAP / PEEP**. Press the dial to confirm your selection.

4. Change the **EPAP / PEEP** value using the dial. Press the dial to confirm the new value.

The selection bar switches to **EPAP / PEEP**.

2.4.2 Set EPAP / PEEP

To change the therapy pressure for exhalation, press the **EPAP** key. Then proceed as described in „2.4.1 Set IPAP“.

2.4.3 Set respiratory frequency

To change respiratory frequency, press the **f** key. Then proceed as described in „2.4.1Set IPAP“.

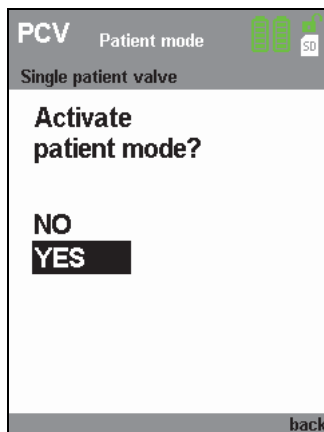
2.4.4 Set inspiration time

To change the proportion of inspiration time in the respiratory cycle, press the **I:E** key. Then proceed as described in „2.4.1Set IPAP“.

2.4.5 Set tidal volume

Use the **Vt** button to set the respiratory volume (single patient circuit) or the tidal volume (double patient circuit, VENTIllogic LS only). Then proceed as described in „2.4.1Set IPAP“.

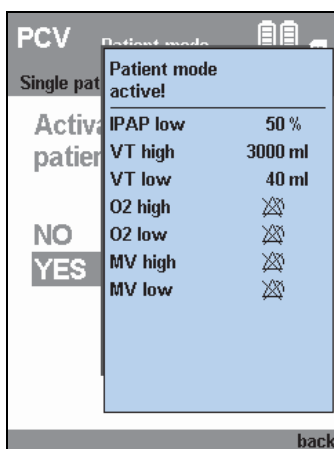
2.5 Activate patient mode



Before you pass the set device to a patient, you must switch it to Patient mode. This prevents the patient - deliberately or inadvertently - changing the therapy parameters or device configuration.

Proceed as follows to activate Patient mode.

1. Ensure that clinical functions are enabled (see "Enable and lock clinical functions" on page 13).
2. Use the dial to select the menu item **Patient mode** and confirm your selection by pressing the dial.
3. The message **Activate Patient mode?** appears in the display. Use the dial to select **YES** and confirm your selection by pressing the dial.



Patient mode is now activated. The message **Patient mode active!** appears in the display. The current settings for the physiological alarms (**on/off** or the relevant alarm limits) are displayed. After approx. 4 seconds, the device switches to the default display for the patient.

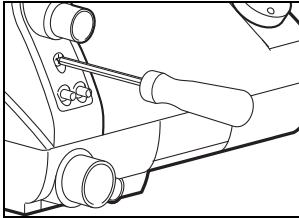
2.6 Convert device

The therapy device can be operated with both leakage and valve ventilation.

Depending on the patient circuit, various functions and connection options are available for accessories. This is clearly marked in the corresponding sections.

2.6.1 Convert device for operation with leakage ventilation

To convert the device from valve ventilation to leakage ventilation, proceed as follows.



1. Use a hex socket wrench (size 3) to undo the screw on the adapter.
2. Remove the adapter for valve ventilation.
3. Plug on the adapter for leakage ventilation and tighten the screw hand-tight.
4. If present, remove the exhalation block on the bottom of the device and replace it with the corresponding panel.

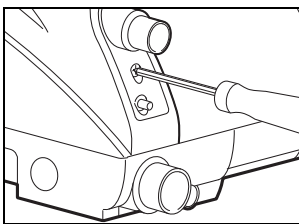
Note

It is not essential to remove the exhalation block for operation in a hospital environment.

5. In the **Device configuration** menu, set leakage ventilation.
6. Perform a function check (see "7. Function check" on page 53).

Convert device for operation with leakage adapter for standard tapered connector

For leakage operation, an adapter is available as an option to allow tubes with sleeves with an internal diameter of Ø 22 mm and a pressure-measuring tube with an internal diameter $\leq$ Ø 5 mm to be used. Proceed as outlined below to convert the device.



1. Loosen the screw on the adapter on the device using a size 3 hex socket wrench.
2. Remove the adapter.
3. Push on the leakage adapter for standard tapered connector and hand-tighten the screw.
4. If present, remove the exhalation block on the underside of the device and replace it with the corresponding panel.

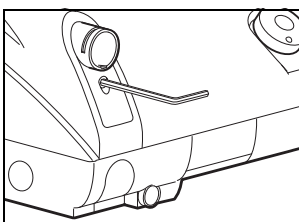
Note

It is not essential to remove the exhalation block for operation in a hospital environment.

5. In the **Device configuration** menu, set the leakage system.
6. Note that maximum flow rate and the accuracy of dynamic pressure may deviate if you are not using tubes from the manufacturer.
7. Perform a function check (see "7. Function check" on page 53).

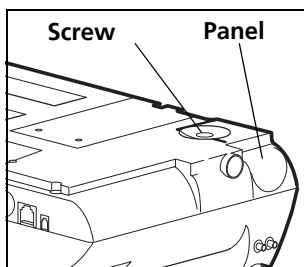
2.6.2 Convert device for operation with valve ventilation

Convert leakage ventilation to a single patient circuit with patient valve

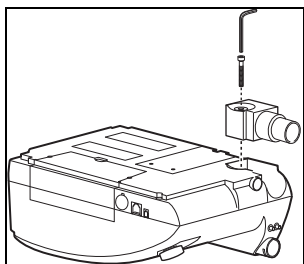


1. Use a hex socket wrench (size 3) to undo the screw on the adapter.
2. Remove the adapter for leakage ventilation.
3. Plug on the adapter for valve ventilation and tighten the screw hand-tight.
4. In the **Device configuration** menu, set the single patient circuit or double patient circuit depending on the patient circuit being used (see "Patient circuit" on page 37).
5. Perform a function check (see "7. Function check" on page 53).

Additional preparations for double patient circuit with patient valve (VENTIlogic LS only)



1. Turn the device over.
2. Use a hex socket wrench (size 3) to undo the screw on the panel and remove the panel.
3. Insert the exhalation block and tighten the screw hand-tight.
4. Turn the device back up the right way.
5. In the **Device configuration** menu, set the single patient circuit or double patient circuit depending on the patient circuit being used (see "Patient circuit" on page 37).
6. Perform a function check (see "7. Function check" on page 53).



2.7 Connect device to remote alarm

Caution!

The remote alarm connection is designed to switch protective low voltages. The device can be damaged by excessive voltages.

2.7.1 Connecting cable for nurse call system

The connecting cable from the therapy device to the in-hospital nurse call system has a bayonet fitting on one end for connecting it to the therapy device. The cable is open at the other end. To connect the connecting cable, proceed as follows.

1. Connect the connector of the connecting cable to the therapy device and latch it with the bayonet fitting.
2. Connect the cables at the other end of the connecting cable to the in-hospital nurse call system. To do so, see the brief instructions for use for the connecting cable.

2.7.2 VENTIremote alarm

For operation with the VENTIremote alarm remote alarm box, see the associated instructions for use.

2.8 Use with nebulizers

You can use the therapy device with pneumatic nebulizer sets made by other manufacturers. A prerequisite for this is that the nebulizer is designed by the manufacturer for use in combination with a ventilator.

General information

- When using the device in conjunction with nebulizers, be sure to adhere to the cleaning intervals for the patient circuit and even reduce these if necessary, as residues of medication can impair valve function.
- When used with a double patient circuit, the exhalation block for measuring flow on exhalation must be cleaned after use of the nebulizer.
- It is essential to follow the instructions for use for the therapy device and for the nebulizer used.
- The manufacturer is unable to make any statements in relation to medication dosages and the efficacy of aerosol therapy. Contact the manufacturer of the nebulizer used for information on this.

Pneumatic nebulizers

When pneumatic nebulizers are used, deviations in respiratory volume and oxygen concentration may occur between the values displayed and those actually administered. The ventilator may exhibit modified trigger characteristics depending on the amount of deviation in respiratory volume.

In this case, it will be necessary to reset ventilation parameters and alarm settings before and, if appropriate, during administration of the medication. The patient needs close monitoring during use. As a result, pneumatic nebulizers may only be used in combination with the therapy device in a hospital environment.

Our experience shows that pneumatic nebulizer sets may only be used with the therapy device at a maximum supply flow of up to 8 l/min and with the corresponding flow controller.

Nebulizer ref. 8-4026-100 from B+P and the Oxinova Nebulizer II from Carbueros Medica have been tested.

Micropump nebulizers

We recommend the Aeroneb Solo/Pro nebulizers from Aerogen. These can also be used in a domestic environment.

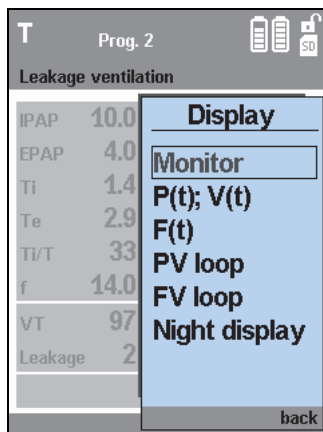
3. Clinical menu

This section describes the Clinical menu and the parameters which can be set. A description of the Patient menu can be found in the instructions for patients.

3.1 Displays

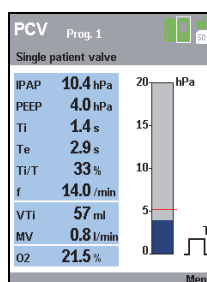
Whilst the patient is receiving therapy, if the Clinical menu is enabled you can use the function keys of the therapy device to correct ventilation parameters and have the progress of ventilation displayed in the form of curves. You can also acknowledge alarms.

3.1.1 Display

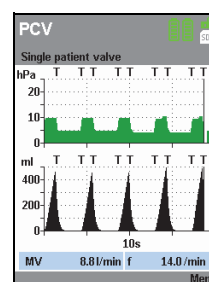


During therapy, ventilation parameters are displayed in **Monitor**.

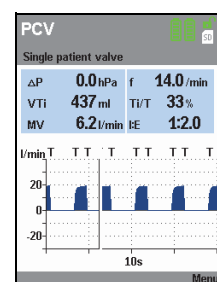
You can select the following other types of display.



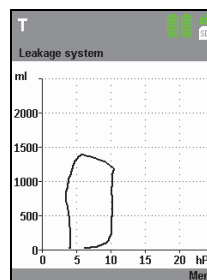
Monitor



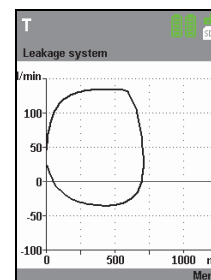
P(t), V(t)



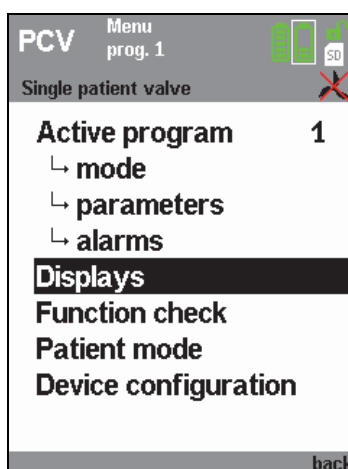
F(t)



PV loop
(VENTIlogic LS only)



FV loop
(VENTIlogic LS only)



When you activate the night display, the display reduces its brightness to the lowest level but remains legible. In Patient mode, you can also switch off the display completely. To do this, press the dial in Patient mode during therapy.

Proceed as follows to switch from **Monitor** to other types of display.

1. Press the dial or press the Menu key and then use the dial to select the menu item **Displays > Display**.

The **Display** selection list appears.

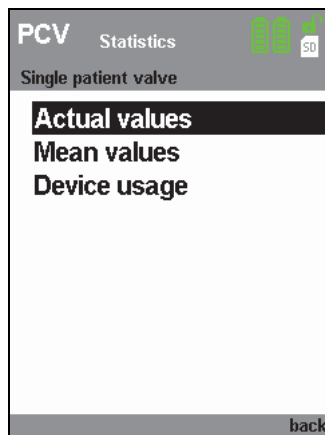
2. Use the dial to select a type of display. Confirm the selection by pressing the dial. The display switches to the desired type of display.
3. To change the type of display again or to return to **Monitor**, repeat Step 1.

The display automatically switches back to the main window set if the keys or dial are not operated again within 15 minutes.

Note

If you wish to close the **Display** selection list without making any changes, press the Menu key. Alternatively, you can also move the dial clockwise until the selection bar is on **back**. Then confirm your selection by pressing the dial.

3.1.2 Statistics



In the **Clinical menu** you can make detailed settings (e.g.: ventilation modes, pressure rise, volume compensation) to optimize the device for the therapy of the patient in question.

In the **Statistics** menu, you can have actual values, mean values and device usage displayed.

The **Actual values** display shows current values. The values are updated with each breath.

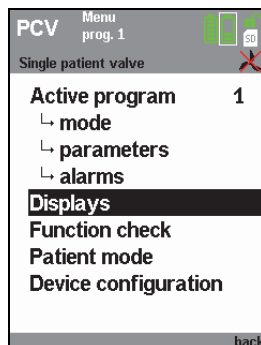
The **Mean values** display shows mean values since the device was last started. The values are updated with each breath.

The **Device usage** display provides information about usage of the device by the patient in question.

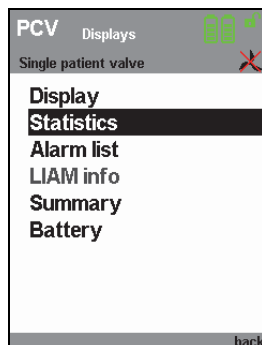
The **AirTrap Statistics** display shows the mean values for the AirTrap Control parameter.

Select a statistic

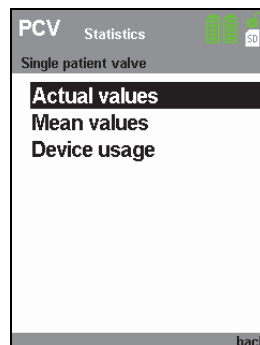
1. Enable Physician functions as described in the section entitled "Enable and lock clinical functions" on page 13.
2. Press the menu key.



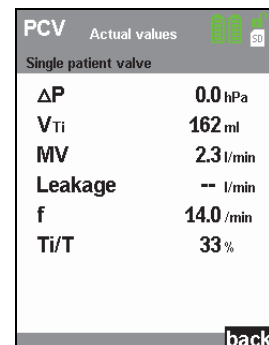
3. Confirm your selection by pressing the dial.



4. Use the dial to select **Statistics** and confirm your selection by pressing the dial.



5. Use the dial to select the desired statistic and confirm your selection by pressing the dial.



6. Press the Menu key to reach the menu one level up.
7. To call up the statistics for mean values and device usage, repeat Steps 5 and 6 for the desired menu item.

3.1.3 Alarm list

For information on this, see the section entitled "Alarms" on page 32.

3.1.4 LIAM info

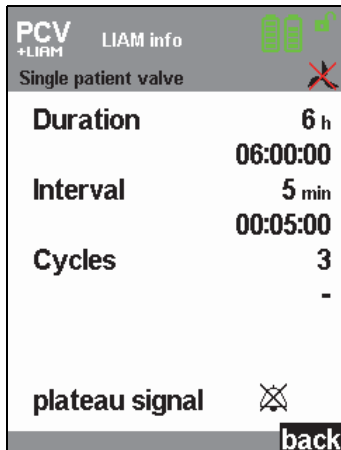
Note

A detailed explanation of the LIAM function can be found in the section entitled "3.3.6 LIAM (Lung Insufflation Assist Maneuver)" on page 28.

1. In the Clinical menu, use the dial to select the menu item **Displays > LIAM info**.
2. Confirm your selection by pressing the dial.

You will find the following values and their residual running times under **LIAM info**:

- **Duration**
- **Interval**
- **Cycles**
- **Plateau signal** (activated or deactivated)

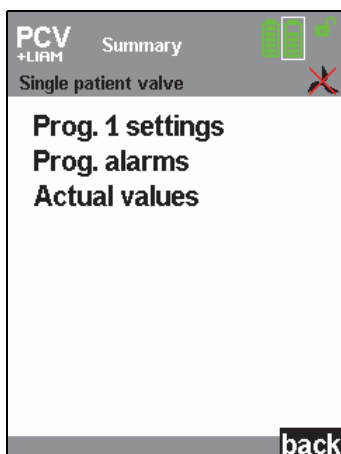


Activate/deactivate plateau signal

You can switch the plateau signal on or off under the **LIAM info** menu item:

1. In the **LIAM info** menu, use the dial to select the plateau signal.
2. Confirm your selection by pressing the dial.
3. Use the dial to select the status plateau signal on  or plateau signal off .
4. Confirm your selection by pressing the dial.

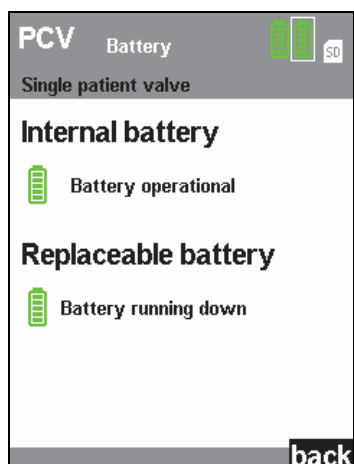
3.1.5 Overview



Under the menu item **Displays > Overview**, you can view the current settings and alarms of the respectively configured programs as well as the actual values:

1. In the Clinical menu, use the dial to select the menu item **Displays > LIAM info**.
2. Confirm your selection by pressing the dial.
3. Use the dial to select the desired submenu:
 - **Settings** (summary of current ventilation settings)
 - **Actual values** (summary of current patient values; updated on every breath)
 - **Alarms** (summary of alarm settings)
4. Confirm your selection by pressing the dial.

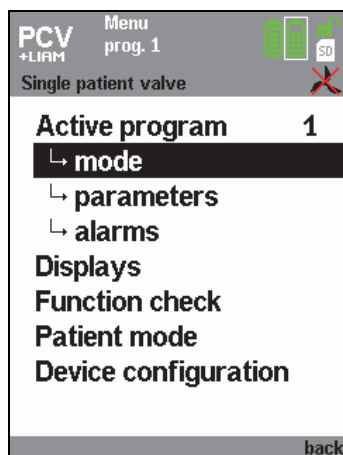
3.1.6 Battery



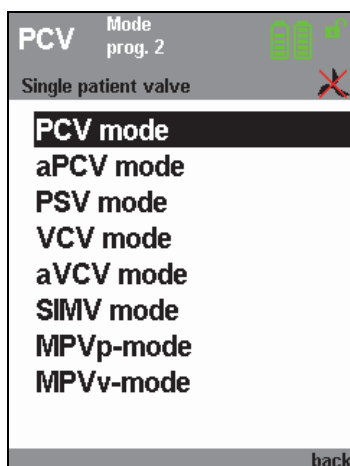
This menu gives you a summary of the state of any batteries present:

- Internal battery: always present and supplies the device with power in an emergency.
- Replaceable battery: available as an option and allows mobile use of the device independent of an electricity supply.
- The accuracy of the display depends on the load on the device (load due to patient breathing, current operating temperature). The display is continuously updated.

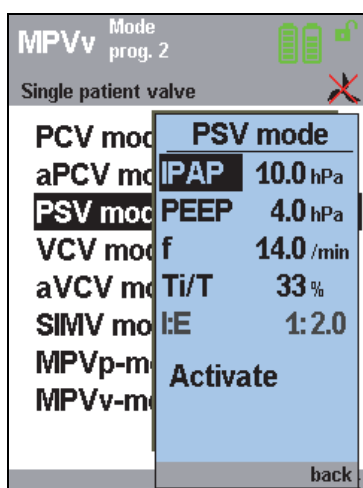
3.2 Set mode



1. Enable Physician functions as described in the section entitled "2.2 Enable and lock clinical functions" on page 13.
2. Press the menu key.
3. Use the dial to select the menu item **Mode** and confirm your selection by pressing the dial.



4. Use the dial to select the desired mode and confirm your selection by pressing the dial.



A window is displayed in which you can set the ventilation parameters for the mode in question.

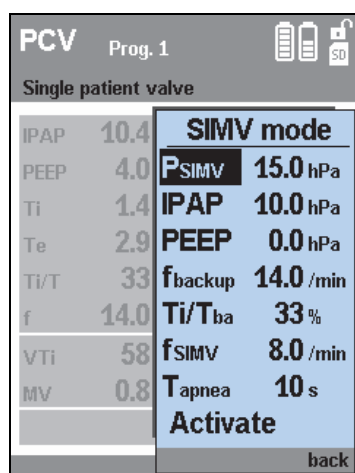
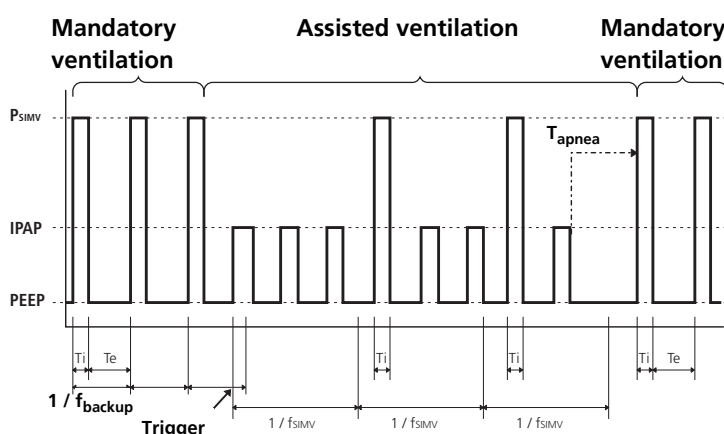
1. Use the dial to select the parameters to be set and confirm your selection by pressing the dial.
2. Use the dial to change the parameters to be set (turn to the right = increase value, turn to the left = reduce value) and confirm your selection by pressing the dial.
3. If desired, repeat Steps **2.** and **3.** with further parameters.
4. Turn the dial clockwise until the selection bar is on **Activate**. Then confirm your selection by pressing the dial.
5. The message **... mode active!** appears in the display. The display then changes to Monitor (if the device is switched on) or to Standby (if the device is switched off). The set values become active from the next inspiration stroke.
6. To exit the menu without changing the parameters, select back and press **ENTER**.

3.2.1 Description of SIMV mode

SIMV mode (synchronized intermittent mandatory ventilation) is a mixture of mandatory and assisted ventilation.

If there is no spontaneous respiration the device will mandatorily ventilate the patient once the T_{apnea} time has elapsed at a respiratory frequency of f_{backup} , a ratio of Ti/T_{ba} (backup) and an inspirational pressure level of P_{SIMV} .

In the case of spontaneous respiration the device switches to assisted ventilation using the set IPAP value. The pressure level will then fluctuate cyclically at a frequency of f_{SIMV} a ratio of Ti/T_{ba} and an inspirational pressure level of P_{SIMV} . The respiratory frequency in this case is dictated by the patient.



You can set the SIMV mode parameters within the following limits:

Parameter	Lowest value	Highest value
P_{SIMV}	6.0 hPa	45.0 hPa
IPAP	6.0 hPa	45.0 hPa
PEEP	0.0 hPa	$- IPAP - 2.0 \text{ hPa}^{(2)}$ $- P_{SIMV} - 2.0 \text{ hPa}^{(2)}$ $- 20.0 \text{ hPa}^{(2)}$
f_{backup}	4 1/min	45 1/min
Ti/T_{ba}	15 %	67 %

f_{SIMV}	2 1/min	22 1/min or $f_{backup} - 2^{(2)}$
T_{apnea} (sec)	3 sec ⁽¹⁾ or 30 / $f_{backup}^{(1)}$	15 sec ⁽²⁾ or 180 / $f_{backup}^{(2)}$

(1) The highest value is limited

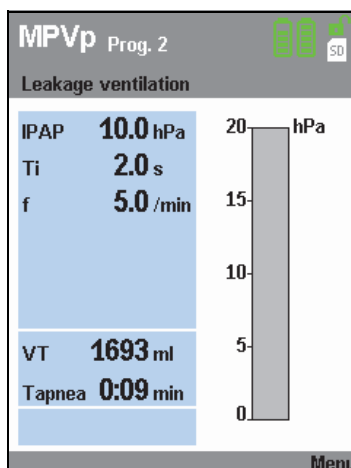
(2) The lowest value is limited

3.2.2 Description of MPV modes (mouthpiece ventilation)



Warning!

Ventilation modes MPVp and MPVv for mouthpiece ventilation may only be used on patients with a spontaneous independent respiratory drive.



Ventilation modes MPVp and MPVv are a pressure-controlled and a volume-controlled mode for patients with spontaneous breathing who are not subject to invasive ventilation. The MPV modes are typically used with a mouthpiece. The patient has to be capable of closing his or her lips adequately for this purpose.

The MPV modes allow breathing as required and are available for leakage ventilation, single patient circuit ventilation and double patient circuit ventilation systems. The MPV modes have no background frequency. A ventilation stroke is delivered only if the patient triggers inspiration.

Trigger sensitivity, trigger lockout time and pressure rise can all be set individually. LIAM can also be switched on and can be activated via the LIAM key.

The MPV modes have an adjustable apnea alarm. In MPVv mode, a VT_{low} alarm can also be set. The VT_{low} alarm occurs if the set volume is not achieved in three consecutive inspirations.

If the patient would like to breathe back into the tubing system, a tubing system with an active exhalation valve must be used.

3.3 Parameters

Different parameters can be set depending on the patient circuit and ventilation mode selected.

Parameter	Ventilation mode											
	Leakage ventilation				Valve ventilation							
	S	T	ST	CPAP	PCV	aPCV	PSV	VCV*	aVCV*	SIMV	MPVv	MPVp
Trigger sensitivity	•	-	•	-	-	•	•	-	•	•	•	•
Trigger lockout	-	-	•	-	-	•	•	-	•	•	•	•
AirTrap Control	-	•	•	-	-	-	-	-	-	-		
Pressure rise	•	•	•	-	•	•	•	-	-	•	•	•
Volume compensation	•	•	•	-	•	•	•	-	-	-		
LIAM (insufflation)	•	•	•	-	•	•	•	•	•	-	•	•
(a)VCV settings*	-	-	-	-	-	-	-	•	•	-		
Target values*	-	-	-	-	-	-	-	-	-	-		
Auto switch-on (can only be adjusted in patient mode)	•	•	•	•	-	-	-	-	-	-		

* These modes/settings are only available on VENTIllogic LS.

3.3.1 Trigger sensitivity

In order to be able to switch from exhalation to inspiration in modes S, ST, PSV, aPCV, aVCV (VENTI*logic* LS only), MPVp, MPVv and SIMV to suit the patient's breathing, the therapy device analyzes the absolute value and course of the flow signal.

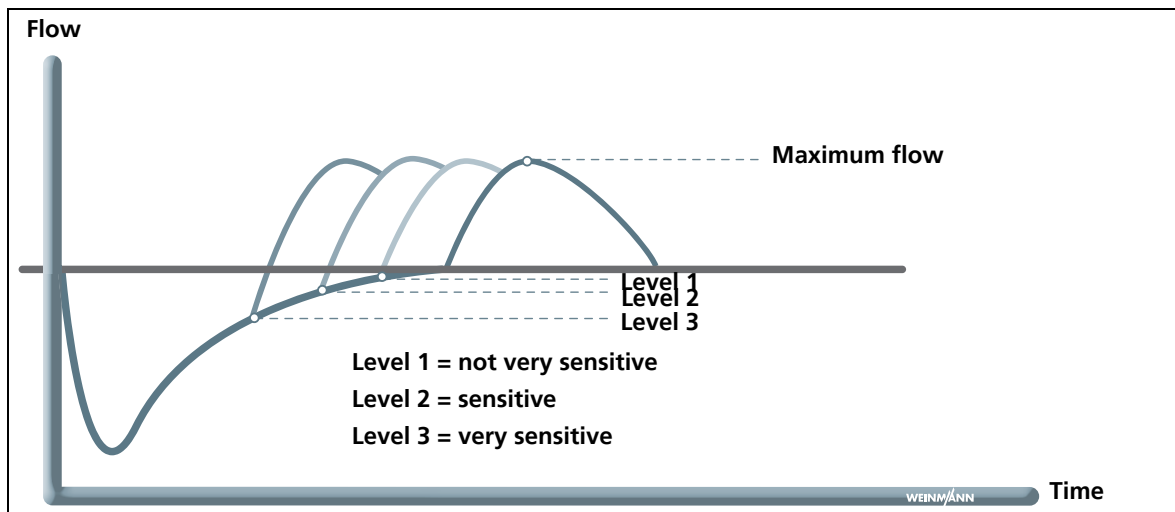


Diagram: Levels for trigger on inspiration

The sensitivity of the trigger on inspiration can be adjusted on 8 levels and the trigger on exhalation (if present) on 14 levels. For the trigger on exhalation, trigger sensitivity is displayed as a percentage of maximum flow in addition to levels 1 to 8. 5 % of maximum flow corresponds to minimum sensitivity, level 8 at 95 % of maximum flow corresponds to maximum sensitivity.

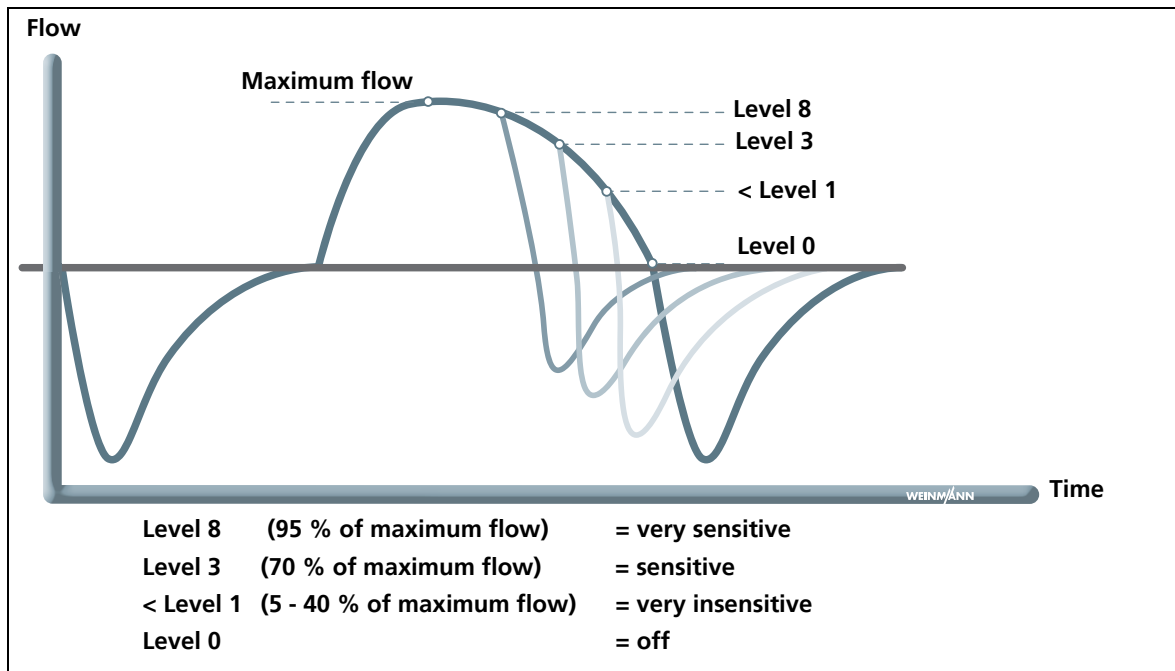


Diagram: Levels for trigger on exhalation

Levels 0 to 6 correspond to the trigger sensitivity levels of the VENTI*motion*/VENTI*logic*; levels 7 and 8 are also present for VENTI*logic* LS/VENTI*logic* plus.

Note

Selection of trigger sensitivity on exhalation may have an effect on the tidal volume of the patient.

Note

The trigger on exhalation can be switched off in ST mode. If you switch from ST mode to S mode with the trigger on exhalation switched off, Stage 3 is automatically set for the trigger on exhalation. If you switch to ST mode again, switch the trigger on exhalation off again if necessary (see "3.3 Parameters" on page 24).

The sensitivity levels of the trigger on exhalation correspond approximately to the percentage proportions of maximum flow shown below:

Trigger stage on exhalation	0	<						1	2	3	4	5	6	7	8
Percentage of maximum flow	Off (ST mode only)	5	10	15	20	30	40	50	60	70	80	86	90	93	95

3.3.2 Trigger lockout

If ventilation is performed with the trigger switched on, faulty triggering may occur in the event of pressure fluctuations during exhalation.

The therapy device therefore provides the option of completely blocking the inspiration trigger during trigger lockout time in ST, PSV, aPCV, aVCV (VENTI*logic* LS only), MPVp, MPVv and SIMV modes. Once this adjustable trigger lockout has elapsed, the inspiration trigger detects the patient's respiratory effort on inspiration at the set sensitivity as before.

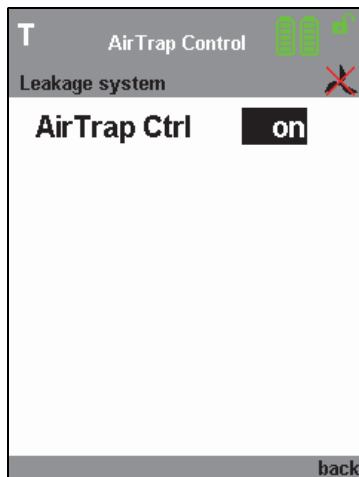
Trigger lockout consequently provides the option of fading out a range of exhalation critical for faulty triggering on inspiration for the same high trigger sensitivity and thus of achieving a high degree of stability in the spontaneous respiration pattern.

The device displays the mandatory expiration time and set trigger lockout time in the form of a diagram at the bottom of the menu. In this diagram, the device also displays the current respiratory phase change using either the symbol **S** (spontaneous, triggered), **T** (mandatory, timed) or **B** (triggering blocked during trigger lockout).

Note

A trigger lockout as long as the mandatory exhalation time T_e set blocks the trigger on inspiration completely! However, maximum trigger lockout is 5 seconds. In this case, the patient is ventilated for a mandatory exhalation time T_e which is determined by frequency and T_i/T . Be aware of this if you wish to change the settings for frequency and/or T_i/T . The device will not automatically adopt any modification of lockout to suit a changed mandatory exhalation time.

3.3.3 AirTrap Control



AirTrap Control monitors ventilation with regard to possible air-trapping to prevent overinflation of the lung or dynamic hyperinflation.

This function is particularly suitable for supplementing therapy in the case of obstructive clinical pictures (e.g. COPD).

If breath curves indicate air-trapping and a rise in intrinsic PEEP, frequency is reduced, with inspiration time remaining constant.

To prevent the patient being under-supplied, AirTrap Control is equipped with a safety limit which cannot be undershot. This limit corresponds to an exhalation extended by a maximum of 50 %/0.8 s.

Even if AirTrap Control is activated, there is always a reaction to the patient's inspiration efforts (in T mode always once the mandatory exhalation time defined via f and I:E has elapsed) and a switch to inspiration to avoid dyspnea or asynchronicity.

The trigger stages set (see "3.3.1 Trigger sensitivity" on page 25) are used in both modes.

You can set the values below for AirTrap Control.

- Off: switches off AirTrap Control.
- On: switches on AirTrap Control.

If volume compensation is activated, AirTrap Control is switched off and cannot be activated.

Note

We recommend checking the effect on respiratory minute volume with AirTrap Control switched on. Monitor respiratory minute volume by selecting alarm limits suitable for the patient for alarms **MV_{high}** and **MV_{low}**.

3.3.4 Speed of pressure rise

Note

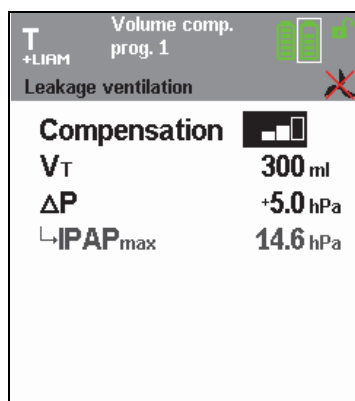
Pressure rise time cannot be set in aVCV (VENTI/Logic LS only), VCV (VENTI/Logic LS only) and CPAP modes.

By changing the speed of pressure rise, you determine how fast the therapy device is to reach therapy pressure in the inspiration/exhalation phase.

The speed of pressure rise can be set for pressure on inspiration and pressure on exhalation (speed of pressure drop) in six stages in each case. At Stage 1, therapy pressure is reached quickly, at Stage 6, therapy pressure is reached slowly.

With valve ventilation, the speed of pressure drop on exhalation is permanently set to Level 1.

3.3.5 Volume compensation



Activating volume compensation ensures that the patient is supplied a minimum volume. To this end, the tidal volume determined for the patient is compared to a set minimum volume.

The following parameters can be set:

- **Compensation:** switches off volume compensation or specifies one of three stages at which volume compensation is reached:
 - **off:** switches off volume compensation.
 - **Slow** : the device checks after 8 breaths whether the target volume has been reached and changes the pressure by 0.5 hPa. If the pressure reaches a corridor around the target volume, the device switches to precise control.
 - **Medium** : the device checks after 5 breaths whether the target volume has been reached and changes the pressure by 1.0 hPa. If the pressure reaches a corridor around the target volume, the device switches to precise control.
 - **Fast** : the device checks after every breath whether the target volume has been reached and changes the pressure by 1.5 hPa. If the pressure reaches a corridor around the target volume, the device switches to precise control.
- **ΔP:** specifies the maximum pressure
- **VT:** specifies the target volume

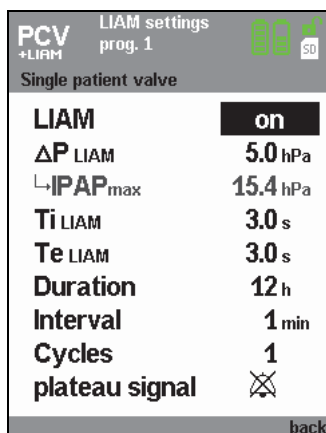
This function is not available in CPAP, VCV (VENTI/logic LS only), aVCV (VENTI/logic LS only), MPVp, MPVv and SIMV modes.

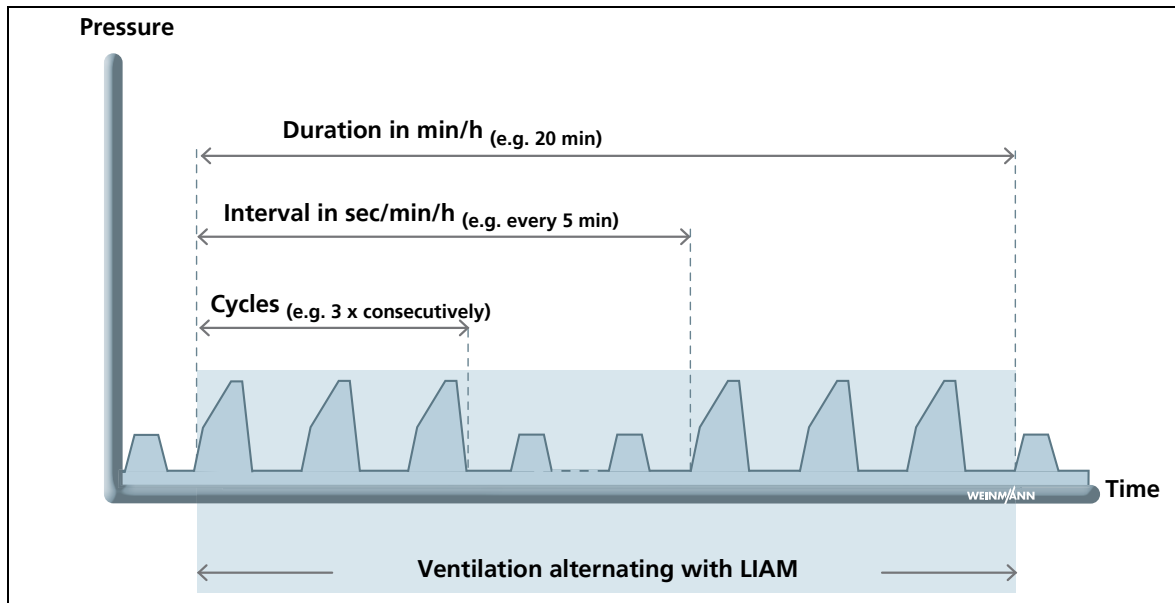
3.3.6 LIAM (Lung Insufflation Assist Maneuver)

LIAM is a pressure-controlled hyper-insufflation maneuver with the aim of administering an increased tidal volume which can be used in all ventilation modes except CPAP and SIMV. LIAM can be used to support coughing or for alveolar recruitment (similar to ventilation on sighing). In the case of neuromuscular diseases, in particular, LIAM can be useful in expanding both thorax and lung. With regular use, there can accordingly be a positive impact on the course of vital capacity. There is no requirement for air stacking (and consequently for closure of the glottis) by the patient for hyper-insufflation.

LIAM can be used to support a coughing maneuver by initially expanding lung and thorax for hyper-insufflation. This makes more air available for the subsequent cough. At the same time, optimized initial tensioning of the lung and thorax increases the effectiveness of the cough on exhalation.

The maneuver parameters can be defined in the menu under **Parameters > LIAM (insufflation)** independently of normal ventilation parameters. The level of maneuver pressure at the end of inspiration **IPAP_{max}** is set via **ΔP_{LIAM}** (**IPAP_{max} = IPAP + ΔP_{LIAM}**). The duration of insufflation and subsequent passive exhalation are defined via the parameters **Ti_{LIAM}** and **Te_{LIAM}**.



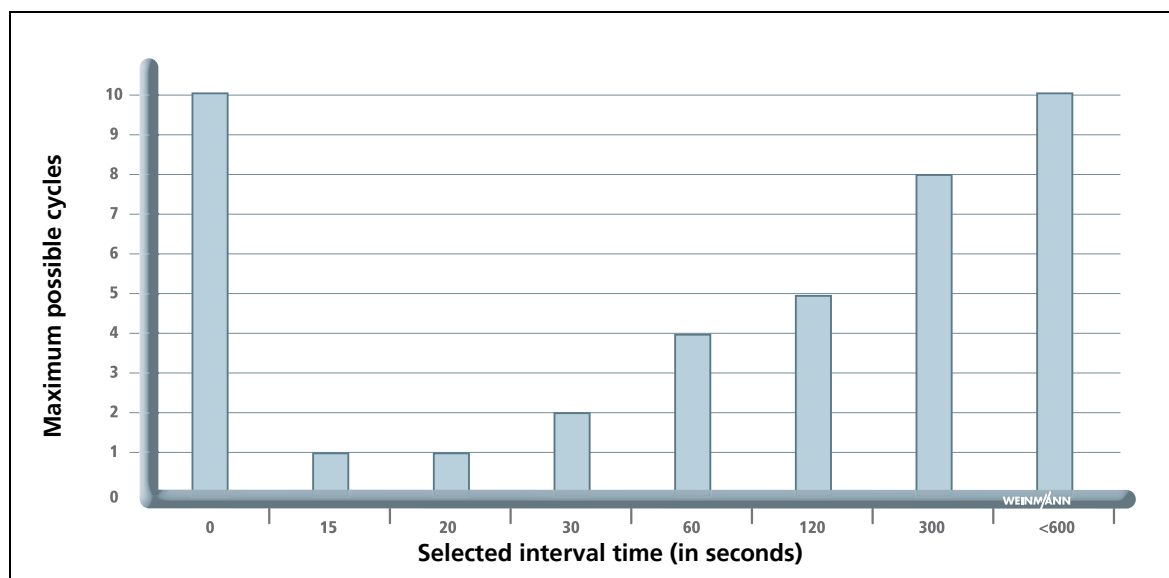


There are several options available for automatically repeating the maneuver.

1. Simple repetition of several consecutive LIAM strokes:
no **Duration** and no **Interval** need to be set for this. A value between 1 and 10 can be selected for the parameter "Cycles". The number of consecutive LIAM strokes set in the "Cycles" parameter is administered.
2. Repetition of the maneuver for a set **Duration** in the context of ventilation:
the parameter **Duration** is used to specify the period for which LIAM is administered. The parameter Interval is used to specify the intervals at which LIAM will be repeated. Within one interval, either one LIAM stroke (**Cycles** = 1) or up to 10 consecutive LIAM strokes are executed.

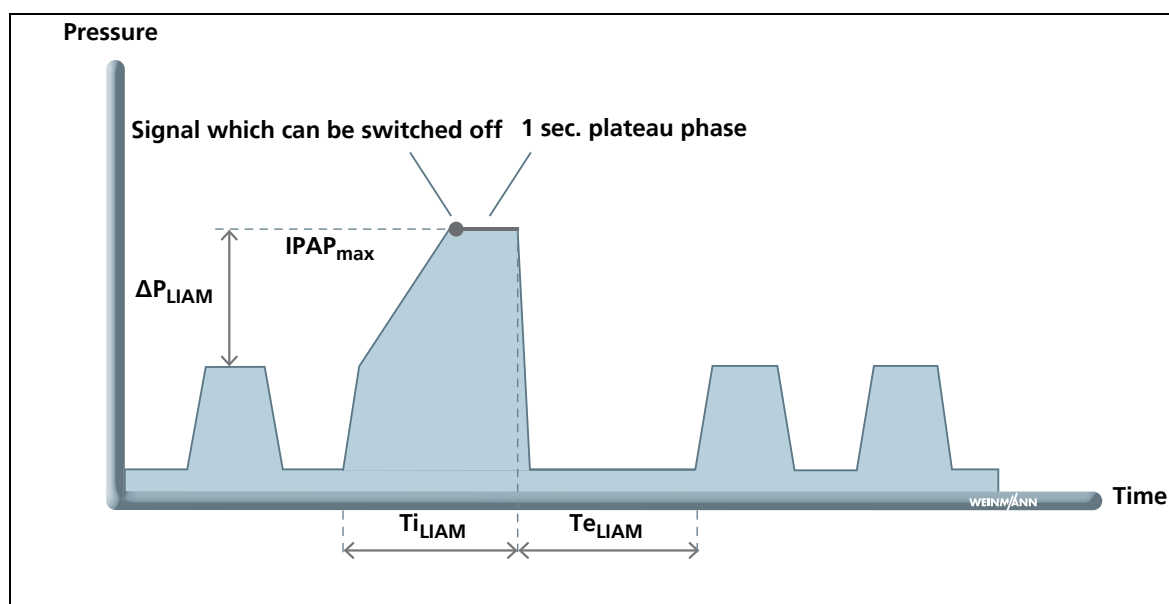
An automatic repeat can be used for sigh-indicated ventilation, as physiotherapy for lung and thorax or in the context of intensive cough training.

In order to guarantee a successful and reliable repeat of LIAM strokes, only certain settings are possible for the values "Duration", "Interval" and "Cycles". For "Duration", a value of between 1 minute and infinity (∞) can be selected.



The permitted value range for the "Interval" parameter depends on the duration set and can be a maximum of 24 hours. The specified number of consecutive LIAM strokes is executed once during each interval. The permitted value range for "Cycles" depends on the interval and is between 1 and 10.

When the function is triggered by the  key, the maneuver is executed depending on the preset - in each case synchronized with ventilation.



Initially, the pressure curve within the individual LIAM stroke is comparable with a normal ventilation stroke. When the IPAP pressure level is reached, however, pressure continues to rise in linear form to maximum pressure $IPAP_{max}$ ($IPAP + \Delta P_{LIAM}$) and is maintained for one second (**plateau phase**). The plateau phase at the end of insufflation is to facilitate the coordination (closure of the glottis) of a coughing maneuver.

The start of the plateau phase is audibly emphasized by an optional **plateau signal**. This plateau signal can be switched on and off in the menu under **Displays > LIAM-Info** (3.1.4, page 21) or under **Parameters > LIAM (Insufflation)** (3.3.6, page 28). You can also have

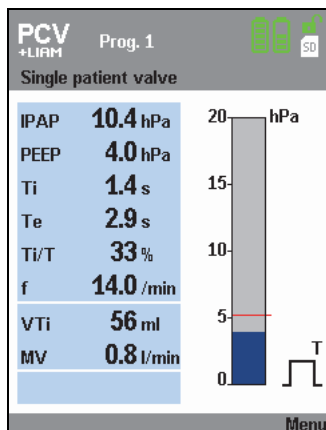
displayed under **LIAM Info** the values set for **Duration**, **Interval** and **Cycles**.

Exhalation then takes place at the set **EPAP** or **PEEP** for the time **Te_{LIAM}**.

As long as LIAM is activated, the abbreviation **LIAM** appears in the status line. As soon as the maneuver has been administered for the preselected duration, this display disappears automatically.

Note

- **VENTI/logic LS only:** when LIAM (insufflation) is used in VCV and aVCV modes, a value of 15 hPa is always assumed as basic pressure. Under VCV/aVCV, therefore, maximum LIAM pressure **IPAP_{max}** results as follows, regardless of actual ventilation pressures:
IPAP_{max} = 15 hPa + ΔP_{LIAM}.
- If LIAM (insufflation) and volume compensation are active simultaneously, the maximum maneuver pressure **IPAP_{max}** for the insufflation maneuver is calculated **ONLY** from ventilation pressure **IPAP** and **ΔP_{LIAM}**. The selected **ΔP** from volume compensation is not taken into account when performing LIAM.
- When using LIAM (insufflation) to assist coughing, wait for the end of insufflation and the switch to EPAP / PEEP or for the **plateau** to be reached before coughing.
- If the maneuver is used for recruitment or thorax expansion, an adequately long exhalation time should be provided to prevent overinflation.



Interrupt LIAM

LIAM can be interrupted at any time. Press the  key to do this. LIAM is interrupted and the device switches back to the set ventilation mode. If LIAM is to be executed again, start the maneuver by pressing the  key again.

3.3.7 VCV-/aVCV settings (VCV and aVCV modes only)

This menu item gives you the opportunity of setting the flow curve (**Flow**) for volume-controlled ventilation.

You can select between three flow profiles:

- rectangular = constant flow
- rising curve (accelerating) = rising from minimal flow to maximum flow
- falling curve (decelerating) = falling from maximum flow to minimum flow.

Note

The **Pressure_{high}** alarm simultaneously limits maximum pressure on inspiration. In the Alarms menu (see Section 3.4.2, page 33), set the **Pressure_{high}** alarm limit individually for each patient.

3.4 Alarms

3.4.1 Physiological alarms



Warning!

The alarm will not work if the wrong alarm settings are used in VCV and aVCV modes on VENTIlogic LS!

Depending on the settings in VCV or aVCV ventilation modes, the **Pressure_{high}** and **Pressure_{low}** alarms will not be triggered. If these alarms are not triggered the patient may be put at risk.

- Make absolutely certain that the **Pressure_{high}** and **Pressure_{low}** alarms have been set to meaningful values in the VCV and aVCV ventilation modes.

Note:

Bear in mind that, when enabling several ventilation programs, the set alarm parameters are part of the active program and must be individually adjusted to each program.

In the **Alarms** menu you can make settings (depending on patient circuit) for the physiological alarms below.

- The **IPAP_{low}** alarm is triggered if the therapy device is unable to reach set IPAP pressure due to a leak (e.g. patient/ventilator interface has slipped out of position). A percentage of the set IPAP therapy pressure is set for this purpose.
- The **VT_{low}** alarm is triggered if supply of a minimum volume to the patient can no longer be guaranteed (e.g. if lung impedance changes). A minimum volume is set for this purpose. In MPVv mode, this alarm is triggered if the set minimum volume is not achieved within the specified time.
- The **VT_{high}** alarm is triggered if the volume administered exceeds the set limit. This prevents the lung "over-expanding".
- The **Frequency_{low}** alarm is triggered if spontaneous respiratory frequency drops below the set minimum value and the patient is thus under-supplied.
- The **Frequency_{high}** alarm is triggered if spontaneous respiratory frequency rises above the set maximum value and the patient is hyperventilating.
- The **O₂_{low}** alarm is triggered if oxygen concentration drops below the set minimum value and the patient is thus under-supplied.
- The **O₂_{high}** alarm is triggered if oxygen concentration rises above the set maximum value and the patient is thus threatened with oxygen poisoning.
- The **SpO₂_{high}** alarm is triggered when the oxygen saturation of the patient exceeds the set maximum value.
- The **SpO₂_{low}** alarm is triggered when oxygen saturation drops below the set minimum value so that the patient is inadequately supplied.
- The **Pulse_{high}** alarm is triggered when the pulse frequency exceeds the set alarm limit, thus indicating that the patient is at risk due to an elevated heart rate.
- The **Pulse_{low}** alarm is triggered when the pulse rate falls below the set alarm limit, thus indicating that the patient is at risk due to a heart rate which is too low.

- **VENTIlogic LS only:** The **Pressure_{low}** is triggered if the therapy pressure remains below the set limit through the entire inspiration in VCV and aVCV modes.
- **VENTIlogic LS only:** The **Pressure_{high}** alarm is triggered if the therapy pressure exceeds the set limit during inspiration in VCV and aVCV modes. In these modes, the set **Pressure_{high}** alarm limit simultaneously limits pressure on inspiration.
- The **Tapnea** alarm is triggered if the patient's last spontaneous breath undershoots the set alarm limit (MPVv and MPVp modes only).

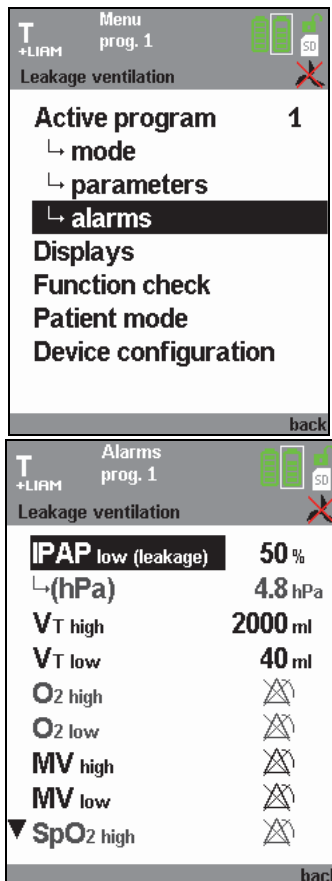
low alarms are triggered if the relevant alarm limit has been undershot in at least three of the previous five breaths. The alarms are automatically reset as soon as the relevant alarm limit is exceeded again in at least three of the five subsequent breaths.

high alarms are accordingly triggered and reset when the alarm limit is exceeded.

The following settings can be made for the issuing of signals.

- Symbol : the physiological alarm is activated
- Symbol : the physiological alarm is deactivated (the symbol only appears in the status line as well if all physiological alarms have been deactivated. Exception on VENTIlogic LS: not all alarms can be deactivated in VCV and aVCV modes).
- Symbol : muting; the acoustic signal of an alarm (physiological or technical) has been muted with the aid of the alarm acknowledgement key , i.e. no signal sounds for 120 seconds. However, the alarms are shown in the display, are added to the alarm list and the alarm LED flashes/continues to be illuminated.

3.4.2 Set alarms



In the **Alarms** menu, you can switch each alarm on or off or specify the alarm limit for the alarm in question. It is not possible to switch all alarms on or off on a general basis.

Caution!

Ensure that the alarm limits are set at sensible levels, otherwise the alarm system may not protect the patient from danger in the event of a fault.

1. Ensure that Physician functions are enabled. Then press the Menu key to call up the **Menu**.
2. Use the dial to select the menu item **Alarms**.

3. Change the settings using the dial.

Note

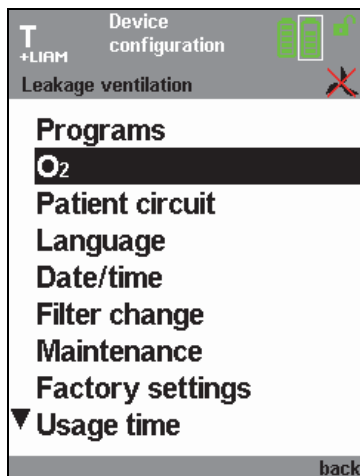
- The limit pressure resulting from the percentage for **IPAP_{low}** is always shown grayed out – it cannot be entered directly.
 - The alarms **Pressure_{low}** and **Pressure_{high}** alarms cannot be switched off on VENTIlogic LS.
4. To exit the **Menu**, press the Menu key (**back**) until **Monitor** is displayed or select **back** with the dial and confirm your choice by pressing the dial.

The default alarm setting is as shown below.

IPAP_{low} (leakage)	50 %
VT_{low}	40 ml
VT_{low} (in MPVv mode)	700 ml
VT_{high}	2000 ml
Frequency_{low}	5/min
Frequency_{high}	45/min
Pressure_{low}	2 hPa
Pressure_{high}	50 hPa
O₂_{low}	Deactivated
O₂_{high}	Deactivated
MV_{low}	Deactivated
MV_{high}	Deactivated
SpO₂_{low}	Deactivated
SpO₂_{high}	Deactivated
Pulse_{high}	Deactivated
Pulse_{low}	Deactivated
Apnea	Deactivated
Apnea (MPV)	Deactivated
Leakage (only with leakage ventilation and with double patient circuit valve ventilation)	Activated

If the factory settings are restored (see "Factory Settings" on page 38), then the standard alarm settings will also be restored.

3.5 Device configuration



1. Ensure that clinical functions are enabled. Then press the Menu key to call up the **Menu**.
2. Use the dial to select the item **Device configuration** and confirm your selection by pressing the dial.

In the **Device configuration** menu you can make the following basic settings for the device:

- Enable programs (Programs)
- settings for oxygen supply (**O₂**) Calibrate O₂ sensor
- patient circuit selection (**Patient circuit**)
- language selection (**Language**)
- set date/time (**Date/time**)
- reset counter for filter change (**Filter change**)
- reset counter for service interval (service indicator) (**Maintenance**)
- reset therapy parameters to factory settings (**Factory settings**)
- reset usage time of device (**Usage time**)
- Control the brightness of the display (**Brightness**)
- Activate and deactivate the automatic lock for the Clinical menu (**Autolock**)

3.5.1 Programs

In the Device configuration menu you can enable up to 3 programs for one patient:

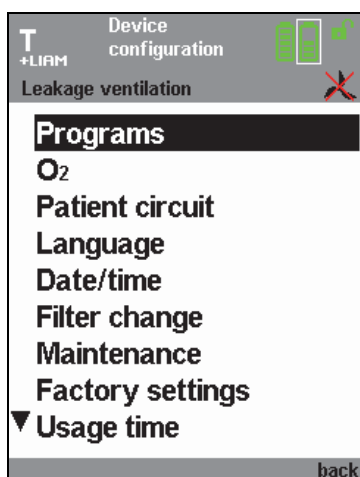
Caution!

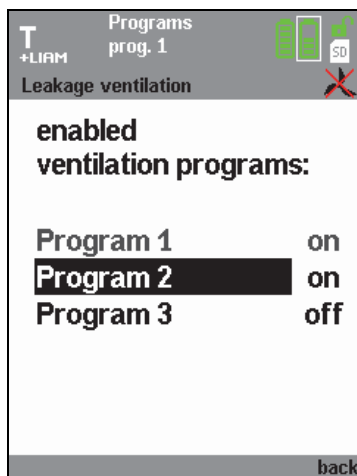
Risk of injury from programs being enabled incorrectly

If the wrong programs are set for a patient, the patient is free to select these. This can lead to incorrect therapy and put the patient at risk.

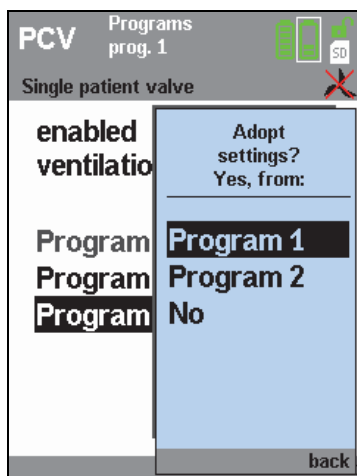
- Ensure that only those programs which should be accessible for the respective patient are enabled.
- Ensure that the user and the patient are briefed in how to adjust and use the programs.
- Make sure when changing patient that you return the device to factory settings and deactivate those programs which are not intended for the patient.

1. Using the dial, select the Programs submenu in order to enable more than one program.



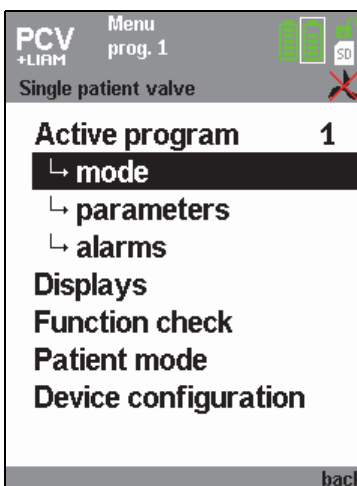


2. Select a program using the dial and confirm your selection by pressing the dial.



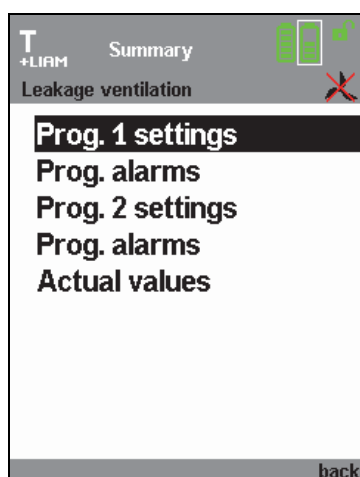
3. Once a program has been enabled, you can adopt the start-up settings from another program. Use the dial to select an enable program or "No".

If "No" is selected initially, the factory settings are adopted.



In the menu you can select the activated programs and choose the treatment settings for these (mode, parameters and alarms). During ventilation, the status line of the display shows the program currently in use and the total number of enabled programs (value in brackets).

You can also select from the enabled programs directly via the program key $\frac{1}{2}/\frac{2}{3}$.



Under the menu item **Displays > Overview**, you can view the current settings and alarms of the respectively configured programs as well as the actual values (see "Overview" on page 21).

3.5.2 O₂

Caution!

If a compressed gas system is used instead of an oxygen concentrator, an overpressure valve (e.g. pressure reducer or flow meter) must be present.

The menu item **O₂** is accessible from both the Patient and the Clinical menus. In the Clinical menu, you will find **O₂** in the **Device configuration** menu. To obtain rapid access to the menu, press the O₂ key on the device. In the Patient menu, you will find **O₂** on the top level of the menu.

Under **O₂**, you can enable or lock the internal oxygen valve. The setting in question is retained if the device is on standby or switched off.

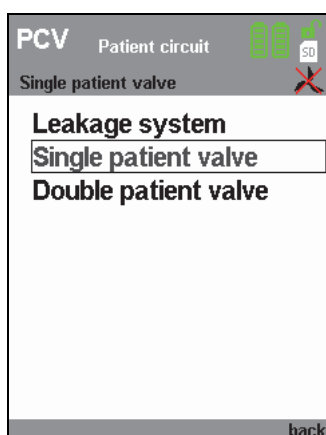
It may make sense to block the oxygen valve completely in order to increase the service life of the rechargeable battery in mobile operation or to save electricity. You can also carry out the calibration of the oxygen sensor in this menu item.

If valve ventilation is used, you can also calibrate the oxygen sensor in this menu item. This is required if the weather is changeable (air pressure, temperature) or if therapy pressure is changed. There is no automatic adaptation to suit barometric pressure.

3.5.3 Patient circuit

Note

The patient circuit used must be identical to the patient circuit set on the device, otherwise the function check will not run properly following the switch to Patient mode and transfer to the patient. The setting for the patient circuit can only be changed with the device on standby.



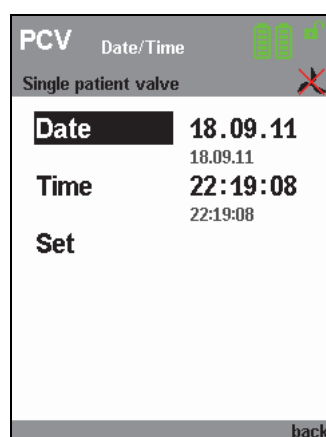
1. To set the patient circuit, first ensure that the device has been correctly converted for the desired patient circuit and that the patient circuit is correctly assembled (see patient's instructions for use).
2. Then in this menu, select the configuration for the patient circuit you have connected.
3. Use the dial to select the **Patient circuit** submenu and confirm your selection by pressing the dial.
4. If you wish to operate the device with leakage ventilation, use the dial to select the menu item **Leakage system** and confirm your selection by pressing the dial.
If you wish to operate the device with a patient circuit with patient valve, use the dial to select one of the two patient circuits with patient valve. Confirm your selection by pressing the dial.
5. The device then automatically switches back to the **Device configuration menu**.

3.5.4 Language



1. Use the dial to select the **Language** submenu and confirm your selection by pressing the dial.
2. Use the dial to select the desired language and confirm your selection by pressing the dial.
3. The device then automatically switches back to the **Device configuration** menu.

3.5.5 Date/time



Note

Date and time can only be set or altered with the device on standby. If appropriate, switch the device to standby to change the settings.

1. Use the dial to select the **Date/Time** submenu and confirm your selection by pressing the dial.
2. Use the dial to select the **Date** menu item and confirm your selection by pressing the dial.
3. Set the day, month and year. Use the dial to select the desired value in each case and confirm your selection by pressing the dial.
4. Repeat Steps 2 and 3 for the time.
5. Select **Set** and confirm your selection by pressing the dial. The settings are adopted and the display switches to the **Device configuration** menu.

3.5.6 Filter change

For the procedure for resetting the filter change indicator, see the patient's instructions for use.

3.5.7 Servicing

Have the counter for the service indicator reset as part of servicing only by an authorized specialist dealer.

3.5.8 Factory Settings

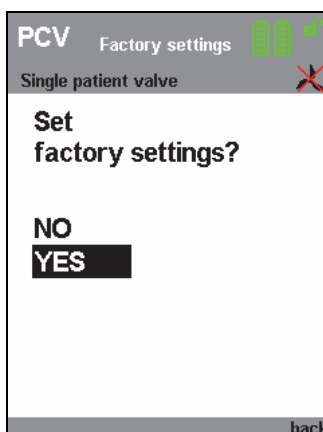
Note

The factory settings can only be restored in standby mode. Switch the device to standby in order to restore the factory settings.

You can use this menu item to reset all therapy parameters to factory settings, patient data are retained.

Caution!

Only reset therapy parameters if you are sure that the therapy parameters set on the device are no longer required or are stored externally (via VENTViews).



1. Ensure that the device is on standby.
2. Use the dial to select the **Factory settings** submenu and confirm your selection by pressing the dial.
3. The message **Set factory settings?** appears in the display. Use the dial to select **YES** and confirm your selection by pressing the dial.
4. The message **Really set factory settings?** appears in the display. Use the dial to select **YES** and confirm your selection by pressing the dial.
5. All parameters are now reset. The message **Factory settings set!** appears in the display. The device automatically switches back to the **Device configuration** menu.

3.5.9 Usage time

Usage time can only be reset with the device on standby.

If the therapy device is to be passed on to another patient, you can reset usage time via this menu item. All patient data (compliance times, device usage, alarm list and the data from the memory card) are deleted.

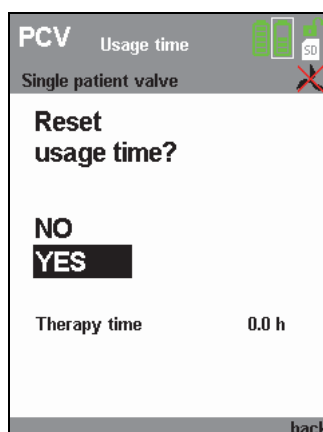
Note

Data can only be deleted from an SD card if this SD card has previously been recognized by the therapy device. See patient's instructions for use, WM 67551, on this.

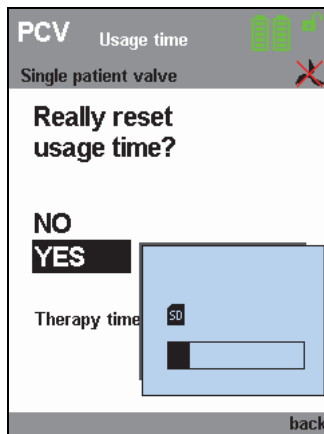
For how to proceed on a change of patient, see the section entitled "4. Hygiene treatment on change of patient" on page 41.

Caution!

- Only reset usage time if you are sure that the data on the device are no longer required or are stored externally (via VENTiviews).
- The memory card may not be removed whilst its contents are being deleted, otherwise this will lead to the memory card becoming defective. As a consequence, you should only ever remove the card when the window **Usage time reset!** appears.



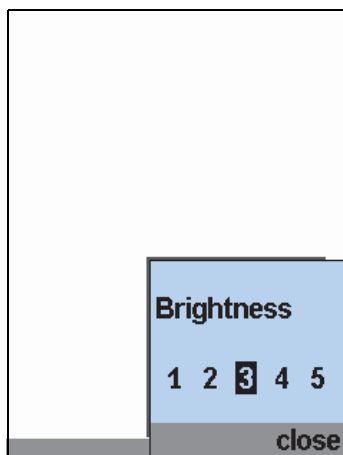
1. Use the dial to select the **Usage time** submenu and confirm your selection by pressing the dial.
2. The message **Reset usage time?** appears in the display. Use the dial to select **YES** and confirm your selection by pressing the dial.
3. The message **Really reset usage time?** appears in the display. Use the dial to select **YES** and confirm your selection by pressing the dial.



A progress bar appears in the display whilst the data on the memory card are being deleted. Once the bar is completely full, the deleting process is over.

- Usage time is now reset. The message **Usage time reset!** appears in the display. The device automatically switches back to the **Device configuration** menu.

3.5.10 Brightness



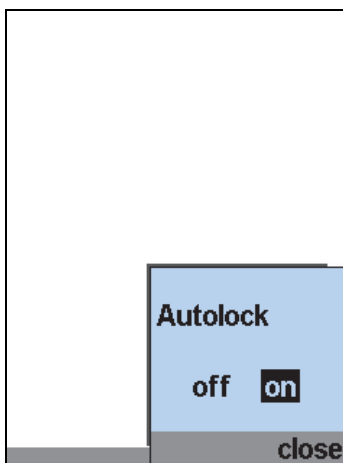
You can change the brightness of the display.

- Use the dial to select the **Brightness** submenu.
- Select the desired brightness level using the dial.
- Confirm your selection by pressing the dial.

Tips

- To switch the display to the night display, press the dial during therapy and select **Night display**. The display goes dark until any key is pressed again.
- In Patient mode, you can also switch the display to the night display during therapy. To do this, press the dial in Patient mode during therapy. Switch the display back on by pressing the dial again.

3.5.11 Autolock



If the device is in Patient mode or if no settings have been made in the Clinical menu for 15 minutes with autolock activated, clinical functions are locked. In this menu you can deactivate the lock so that the device remains in the Clinical menu.



Warning!

Risk of injury from therapy device being set incorrectly

If the autolock of the therapy device is deactivated, the clinical functions remain freely accessible and the patient can adjust values. This can lead to incorrect therapy and put the patient at risk.

- Only deactivate the autolock when the patient is under supervision and not adjusting values independently.
- Ensure that the device is only operated by qualified staff when in this state.

- Use the dial to select the Autolock submenu.
- Use the dial to select **off** or **on**.
- Confirm your selection by pressing the dial.

4. Hygiene treatment on change of patient

This section describes the hygiene treatment required on a change of patient. A description of the hygiene treatment when there is no change of patient can be found in the patient's instructions for use.

If you are operating the device **with** bacteria filter, please note the following:

- valve ventilation: change bacteria filter WM 27591

or:

- leakage ventilation: sterilize bacteria filter WM 24148 and change the particulate filter inside it.

If you want to use the device for a different patient **without** using a bacteria filter, you must subject the device to a hygiene treatment beforehand. This must be performed by the manufacturer or by a specialist dealer.

- Change the coarse and fine dust filters as well as the fan filter (WM 15706 maintenance set).
- Change the patient circuit or sterilize the multi-way patient circuit.

The procedure for the hygiene treatment is described on the servicing sheet and in the Servicing and Repair Instructions for the therapy devices.

Perform the measures below on each change of patient.

- Reset the device to factory settings (see ["3.5.8 Factory Settings" on page 38](#)).
- Reset usage time (see ["3.5.9 Usage time" on page 39](#)).
- Replace the memory card.
- Perform a function check (see ["7. Function check" on page 53](#)).
- Set the device for the new patient.

5. Troubleshooting

Caution!

If you are unable to remedy faults with the aid of the table, or in the event of unexpected operation or an incident, contact the manufacturer or your authorized specialist dealer. To avoid exacerbating the damage, do not continue operating the device.

Fault/fault message	Cause of fault	Remedy
Device cannot be switched on by a breath being taken into it	Auto switch-on not activated	Activate auto switch-on (leakage ventilation only; see patient's instructions for use).
	Valve ventilation connected	None; auto switch-on only works with leakage ventilation
Change filter	Filter dirty	Press alarm acknowledgement key, Clean/change filter as quickly as possible (see patient's instructions for use).
Filter change indicator  appears		Clean/change filter as quickly as possible (see patient's instructions for use).
Battery discharged	Internal battery of device exhausted	Press alarm acknowledgement key, have battery replaced by a specialist dealer so that course of therapy is recorded correctly.
Clock not set	Internal clock not set	Press alarm acknowledgement key and set clock so that course of therapy is recorded correctly
Arrange maintenance	Servicing interval has elapsed	The device must be examined or serviced by the manufacturer or a specialist dealer as soon as possible
Service indicator  appears		
Calibrate O ₂ sensor	Initial contact with oxygen sensor	Calibrate oxygen sensor
	Last calibration performed over 24 h ago	
	Device switched off completely beforehand	
Blower failure	Blower no longer working	Have device repaired
Internal battery not charging due to excessive temperature	Battery too hot	Protect device from direct sunlight, do not operate near a radiator
Internal battery not charging due to inadequate temperature	Battery too cold	Ensure that the device is operated within the permitted temperature range
Replaceable battery not recognized	Battery defective	Have device repaired
	An unapproved battery is being used	Use a genuine battery
	Using the WM 27998 battery with a firmware version < 2.9.0	Update the firmware to version 2.9.0 or above
Replaceable battery is hard to push in or jams	Particles of dust in guide rails	Clean guide rails on replaceable battery and lower part of housing
Device cannot be switched on (battery operation)	Transport securing device for battery is active.	The battery fitted is deactivated for transport purposes. Before using for the first time, connect the power supply and charge battery.

Fault/fault message	Cause of fault	Remedy
Device system implausible	– Function check performed incorrectly – Device defective – Incorrect patient circuit set	Acknowledge message, switch device off completely (see patient's instructions for use). Change patient circuit or correct settings. Perform another function check. If the fault occurs again, have device repaired.
SpO ₂ measurement disconnection	SpO ₂ sensor has slipped out of place or come loose from the fingertip	Attach the SpO ₂ sensor to the fingertip properly
SpO ₂ signal weak	Nail varnish, dirty fingers	Check SpO ₂ sensor and fingertip and clean if need be
	Patient shock	Check patient condition

6. Alarms



Danger!

Increased resistance in the patient circuit can cause the alarm to fail!

Attaching an accessory can increase the resistance in the patient circuit. Depending on the settings, this could prevent life-saving alarms from being triggered. For example, if the **Disconnection** alarm fails then the patient is placed at great risk.

- Make absolutely certain that the **V_T low** and **V_T high** alarms are working.
- Ensure that appropriate values are used for the **V_T low** and **V_T high** alarms.
- Check that the alarms are working.
- Carry out an alarm check every time an accessory is changed.

A distinction is made between two types of alarm:

- **physiological alarms** are alarms which directly affect ventilation of the patient.
- **technical alarms** are those which affect the configuration of the device.

The alarms are divided into three priority levels:

- low-priority alarms, indicated by the symbol  in the alarm window, a **continuous** yellow LED and an acoustic alarm (buzzer).
- medium-priority alarms, indicated by the symbol  in the alarm window, a **flashing** yellow LED and an acoustic alarm (buzzer).
- high-priority alarms, indicated by the symbol  in the alarm window, a **flashing** red LED and an acoustic alarm (buzzer).

6.1 Deactivate alarms



Warning!

Danger to patients due to deactivated or muted alarms during life-support ventilation!

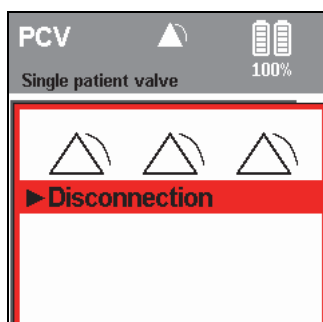
Deactivating or muting vital alarms can place the patient in danger.

- Never deactivate or mute alarms while patients are receiving life-support ventilation.

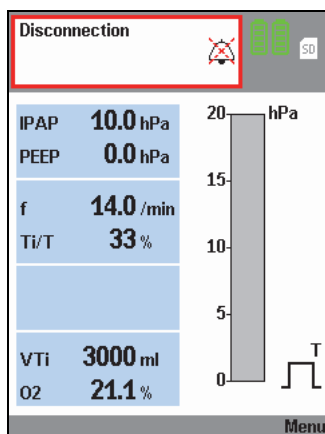
Individual alarms can be deactivated if necessary (exception: **Pressure_{low}** and **Pressure_{high}** on VENTIlogic LS). If this is the case, the symbol  appears next to the relevant alarm in the **Alarms** menu (see “Physiological alarms” on Page 46).

If all physiological alarms have been deactivated, the symbol  also appears in the status line of the display (Exception on VENTIlogic LS: not all alarms can be deactivated in VCV and aVCV modes).

6.2 Acknowledge alarms



If an alarm is triggered by a fault (in this case, disconnection alarm), you can pause the acoustic alarm for approx. 120 seconds by pressing the alarm acknowledgement key .



Once the acoustic alarm has been acknowledged, the default display appears again. The fault which has not yet been eliminated continues to be displayed in the status line and the alarm LED flashes (or is on) until the fault is eliminated.

If the fault is not eliminated within 120 seconds of the acknowledgement, the acoustic alarm (buzzer) sounds again.

For assistance with troubleshooting, see the tables below.

6.3 Sequence of displays when alarms are triggered simultaneously

If several alarms are triggered simultaneously, they are displayed in accordance with the hierarchy outlined below.



1. High-priority alarms



2. Medium-priority alarms



3. Low-priority alarms

If a new higher-priority alarm occurs after an alarm has been displayed, the alarm display switches to the higher priority. The low-priority alarm is retained and is displayed again once the higher-priority alarm has been eliminated, if it still applies.

6.4 Physiological alarms

Display	Alarm	Cause of fault	Remedy
IPAP _{low} (Leakage)  (pressure-controlled only)	Minimum therapy pressure undershot. Medium priority	Filter dirty	Clean/change filters
		Patient/ventilator interface leaking	Adjust headgear/head strap so that the patient/ventilator interface does not leak, replace if necessary
		Patient/ventilator interface defective	Replace patient/ventilator interface
		Settings implausible	Check settings and correct if necessary
VT _{low} 	Minimum respiratory volume undershot. High priority	Filter dirty	Clean/change filters
		Patient/ventilator interface leaking	Adjust headgear/head strap so that the patient/ventilator interface does not leak, replace if necessary
		Patient/ventilator interface defective	Replace patient/ventilator interface
		Settings implausible	Check settings and correct if necessary
		In MPVv mode: minimum volume is not reached within the specified time	Check settings and correct if necessary
VT _{high} 	Maximum tidal volume exceeded. High priority	Leak with single patient circuit (only with patient circuit with patient valve)	Find and eliminate leak, replace patient circuit if necessary
		Patient breathing as well	Check settings and correct if necessary
O ₂ high 	Maximum oxygen concentration exceeded at device outlet port. Medium priority	Excessive oxygen supply as a result of oxygen flow rate being set incorrectly	Check whether the oxygen flow rate prescribed is correctly set at the oxygen source. Check settings and correct if necessary
		Oxygen sensor incorrectly calibrated	Calibrate oxygen sensor
O ₂ low 	Minimum oxygen concentration undershot at device outlet port. Medium priority	Oxygen flow rate set too low	Check whether the oxygen flow rate prescribed is correctly set at the oxygen source. Check settings and correct if necessary
		Leak	Look for the leak and eliminate it
		Oxygen supply interrupted	Check oxygen supply and connections
		Oxygen sensor incorrectly calibrated	Calibrate oxygen sensor

Display	Alarm	Cause of fault	Remedy
SpO ₂ low 	Patient's oxygen saturation levels have fallen below the minimum limit.	Ventilator interface faulty or defective	Check ventilator interface and replace if necessary
		Oxygen supply faulty or inadequate	Check oxygen supply and correct if necessary
		Ventilation parameter settings (pressure, volume, frequency, I:E) not suitable	Check ventilation parameter settings and adjust if need be
		Alarm settings implausible	Check alarm settings and correct if necessary
SpO ₂ high 	Maximum alarm setting of patient's oxygen saturation exceeded	Settings implausible	Check settings and correct if necessary
Pulse low 	Patient's pulse rate fallen below the minimum limit	Therapeutic or pathophysiological causes	Check treatment and patient state
		Alarm settings implausible	Check alarm settings and correct if necessary
Pulse high 	Patient's maximum pulse rate exceeded	Ventilation parameter settings (pressure, volume, frequency, I:E) not suitable	Check ventilation parameter setting (pressure, volume, frequency, I:E) and adjust if need be
		Therapeutic or pathophysiological causes	Therapeutic or pathophysiological causes
		Alarm settings implausible	Check alarm settings and correct if necessary
Frequency low* 	Minimum respiratory frequency undershot. Low priority	Apnea in spontaneous respiratory mode	Check settings and correct if necessary
Frequency high* 	Maximum respiratory frequency exceeded. Low priority	Patient hyperventilating	Calm patient and guide towards a "normal" respiratory frequency
Pressure high Volume is not reached. (VENTIlogic LS only) 	Maximum pressure exceeded. Low priority, rises to medium priority after 10 breaths	Various causes possible, e.g. reduction in lung impedance	Check settings and correct if necessary

Display	Alarm	Cause of fault	Remedy
Pressure _{low} (VENTI ^{logic} LS only) 	Minimum therapy pressure undershot. Medium priority	Filter dirty	Clean/change filters
		Patient/ventilator interface leaking	Adjust headgear/head strap so that the patient/ventilator interface does not leak, replace if necessary
		Patient/ventilator interface defective	Replace patient/ventilator interface
		Settings implausible	Check settings and correct if necessary
Minute volume _{low} [*] 	High priority	Respiratory frequency has dropped.	Check ventilation situation and correct settings if necessary.
		Tidal volume has dropped	
Minute volume _{high} [*] 	Medium priority	Respiratory frequency has risen	Check ventilation situation and correct settings if necessary.
		Tidal volume has risen	
Apnea 	Low priority	No spontaneous breathing for at least 3 breaths	Check ventilation situation.
Apnea  (Only in MPVv and MPVp modes)	High priority	No spontaneous breathing within set time	Check ventilation situation.

* These alarms are only activated 2 minutes after ventilation starts.

6.5 Technical alarms

Caution!

If you are unable to remedy faults with the aid of the table, or in the event of unexpected operation or an incident, contact the manufacturer or your authorized specialist dealer. To avoid exacerbating the damage, do not continue operating the device.

Display	Alarm	Cause of fault	Remedy
Battery capacity critical 	Medium priority	Battery discharged (less than 25 % capacity remaining)	Restore power connection and charge the battery. In the event of a prolonged power outage, connect the replaceable battery (accessory) or have an alternative ventilation option to hand.
Battery capacity highly critical 	High priority	Battery discharged (less than 10 % capacity remaining)	Restore power connection and charge the battery. In the event of a prolonged power outage, connect the replaceable battery (accessory) or have an alternative ventilation option to hand.
Internal battery defective 	High priority	Device defective	Have device repaired.
		Rechargeable battery defective	
Internal battery not detected 	Low priority	Battery defective	Have device repaired.
		An unapproved battery is being used	
		Using the WM 27998 battery with a firmware version < 2.9.0	Update the firmware to version 2.9.0 or above
Have replaceable batt maintained 	High priority	Capacity value of replaceable battery implausible	Maintain replaceable battery or replace replaceable battery. For maintenance of the battery, see the section entitled "Servicing" in the patient's instructions for use.
Have internal batt maintained 	High priority	Capacity value of internal battery implausible	Maintain internal battery or have internal battery replaced. For maintenance of the battery, see the section entitled "Servicing" in the patient's instructions for use.
Battery temperature critical 	High priority	Battery too hot	Allow device to cool down, find a more suitable location to set it up. Use alternative ventilation option
Internal batt. off due to temperature 	High priority	Battery too hot	Allow device to cool down, find a more suitable location to set it up. Use alternative ventilation option
Replaceable battery defective 	High priority	Device defective	Have device repaired.
		Battery defective	
Replaceable battery off due to temperature 	High priority	Battery too hot	Allow device to cool down, find a more suitable location to set it up. Use alternative ventilation option

Display	Alarm	Cause of fault	Remedy
Fault in power supply Change device 	High priority	Device defective	Have device repaired. Use alternative ventilation option
O ₂ measurement defective 	Medium priority	Sensor disconnected, exhausted or defective	Check oxygen sensor and replace if necessary
SpO ₂ measurement defective 	Medium priority	SpO ₂ sensor defective or slipped out of place	Check SpO ₂ sensor and, if need be, have it changed or attach SpO ₂ sensor to the fingertip properly.
		Disruptions from other light sources	Avoid exposure to light from other light sources.
O ₂ valve failure 	Medium priority	Safety valve defective, no oxygen supply possible	Have device repaired.
Excessive pressure 	High priority	Pressure sensor defective	Have device repaired.
Disconnection 	High priority	Patient circuit not connected to the device correctly or not connected at all.	Check tubing
		Device being operated with open patient/ventilator interface (mask not put on)	Put on patient/ventilator interface or switch off device
Excessive temperature 	High priority Device switches off.	– Device overheating, for example as a result of direct sunlight or other heat source – Device being operated outside permitted temperature range	Allow device to cool down, find a more suitable location to set it up. Use an alternative ventilation option
Excessive temperature 	Medium priority		Allow device to cool down, find a more suitable location to set it up. Keep alternative ventilation option to hand
Display vanished	Acoustic signal for at least 120 seconds, no display. High priority	No power supply and internal rechargeable battery discharged	Check power cord is securely connected. If necessary, check the function of the socket using a different device (e.g. a lamp). Connect device to an electrical socket and charge internal rechargeable battery
		Device defective	Have device repaired.
Fault in tube system 	Medium priority	Exhalation tube not connected	Check tubing and replace patient circuit if necessary
		Incorrect patient circuit connected	
		Device defective	Have device repaired.
		The patient circuit selected in the menu does not correspond to the patient circuit connected	Change patient circuit or correct settings
Control pressure high 	High priority	The patient circuit selected in the menu does not correspond to the patient circuit connected	Change patient circuit or correct settings
		Valve control tube and pressure measurement tube switched	Check tubing

Display	Alarm	Cause of fault	Remedy
Control pressure low 	High priority	The valve control tube between the device and the patient valve is incorrectly connected	Check valve control tube for damage, replace patient circuit if necessary Connect valve control tube
		Valve control tube and pressure measurement tube switched	Check tubing
		The patient circuit selected in the menu does not correspond to the patient circuit connected	Change patient circuit or correct settings
Pressure permanently low 	High priority	The valve control tube between the device and the patient valve is incorrectly connected	Check valve control tube for damage, replace patient circuit if necessary Connect valve control tube
		Device defective	Have device repaired.
		Implausible ventilation settings	Check settings and correct if necessary.
		Permanent large leak	Check patient circuit and patient/ventilator interfaces and replace if necessary
		Filter dirty	Clean/change filters
VT permanently low 	High priority	Permanent large leak	Check patient circuit and patient/ventilator interfaces and replace if necessary
		Device defective	Have device repaired.
EPAP high 	High priority	Pressure drop on exhalation is inadequate (possible cause: pressure drop at patient valve too slow)	Ensure that exhaled air can escape freely at the patient valve
			Check tubing
Continuous pressure 	High priority	Device defective	Disconnect the device from the power supply and switch it off. Check tube connections. Restore power supply and perform function check. If the fault continues to occur, have device repaired
Control voltage failure 	Medium priority	RS485 incorrectly connected	Use only converter cable USB/RS485 WM 93318 or converter box WM 93316
		Internal fault	Have device repaired.
Device start error 	High priority	Parameters could not be loaded	Have device repaired.
	High priority Device switches off.	Blower does not switch back on following power outage	
IPC failure: change device 	High priority Device switches off.	Device defective	Have device repaired.
Sensor system failure: Change device 	High priority Device switches off.	Sensor system defective	Have device repaired.
System monitoring failure 	Low priority	Voltage monitoring system failed	Have device repaired.

Display	Alarm	Cause of fault	Remedy
No power supply 	Low priority	Power supply failed	Have alternative ventilation option to hand. Check power cord is securely connected. If necessary, check the function of the socket using a different device (e.g. a lamp)
Blower failure Change device 	High priority Device switches off.	Device defective	Have device repaired.
CPU failure Change device 	High priority Device switches off.	Internal processing defective, device defective	Have device repaired.
I ² C failure 	Medium priority	Device defective	Have device repaired
Warning: Device switched off! 	High priority	Device has been switched off	Turn the device on again
			Acknowledge alarm
Unknown device 	High priority	Device defective	Have device repaired

6.6 Store alarms

All types of alarm listed in the tables "Physiological alarms" and "Technical alarms" are recorded in an alarm list with date, time and duration once the alarm threshold is reached. Up to 200 alarms can be stored. After that, the oldest alarm in each case is overwritten. You or the patient can call up the alarm list.

The alarm list is retained even if the entire power supply fails (electricity supply and internal rechargeable battery fail). In this case, the data can be called up for up to two years. The alarm list is overwritten after two years or following a service.

Alarms are always stored in the event of a power outage.

6.7 Transfer of alarms

All device alarms of high and medium priority are switched to a remote alarm connection in parallel. The only low-priority alarm passed to this connection is the **No power supply** alarm.

If the device is operated in a hospital, the therapy device can be connected to the hospital's nurse call system via the remote alarm connection.

In the case of home ventilation, the therapy device can also be connected to the VENTi*remote alarm* alarm box via the remote alarm connection. The remote alarm box is for the remote transmission and amplification of the acoustic and visual alarm signals issued by the therapy device. It is of particular assistance to nursing staff and relatives when looking after patients at home.

7. Function check

7.1 Intervals

Perform a function check on the device monthly. An exception to this is the oxygen sensor; this needs calibrating daily.

We recommend checking battery capacity every time you restart the device.

If you find faults during the function check, you may not use the therapy device again until the faults have been eliminated.

7.2 Method

1. Assemble the therapy device so it is operational.
2. Seal the opening of the patient circuit, e.g. with a sealing plug. For hygiene reasons, suitable disposable gloves should be worn if you seal the opening of the patient circuit with your thumb or hand.
3. Switch on the device by pressing the On/Off key . If the device is working perfectly, two different acoustic signals should sound after the device is switched on and both LEDs next to the alarm acknowledgement key should come on.
4. Depending on the operating mode set, now check the functions below.

Mode/ function	CPAP	S	T	ST	PCV	VCV*	PSV	aPCV	aVCV*	SIMV	MPVv	MPVp
Triggering	–	•	–	•	–	–	•	•	•	•	•	•
Flow sensor/ pressure sensor	•	•	•	•	•	•	•	•	•	•	•	•
Alarms	•	•	•	•	•	•	•	•	•	•	•	•
Oxygen supply	•	•	•	•	•	•	•	•	•	•	–	–

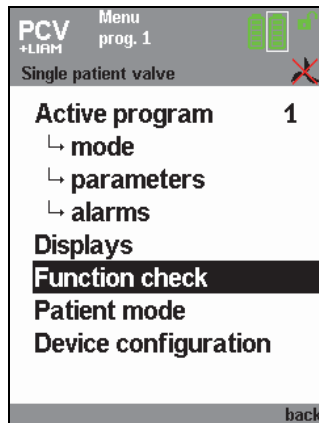
* These modes/settings are only available on VENTIllogic LS.

If the values/functions below are not met, send the device to your specialist dealer or to the manufacturer for repair.

7.2.1 Check flow measurement and/or flow sensors/pressure sensors (leakage ventilation)

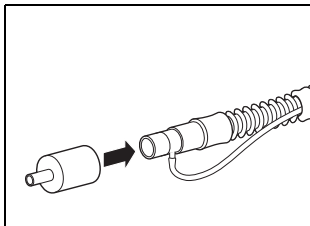
Note

The function check for flow sensors/pressure sensors can only be performed with the device on standby.



1. Plug the red drying adapter supplied onto the device outlet port.
2. Ensure that the patient circuit set in the device is identical to the patient circuit actually in use.
3. Press the menu key  to access Clinical menu.
4. Use the dial to select the menu item **Function check** and confirm your selection by pressing the dial.
The message window **Function check running!** opens. The remaining time for the function check is displayed.
5. Once the function check has been successfully completed, the message **Function check OK!** appears and the device returns to the default display.

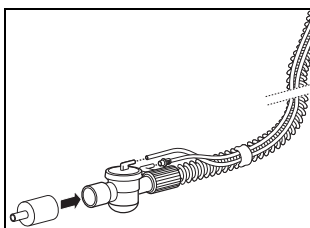
7.2.2 Check flow measurement and/or flow sensors/pressure sensors (leakage system with leakage adapter for standard tapered connector)



1. Connect the patient circuit to the device.
2. Plug the test adapter supplied onto the patient connection.
3. Carry out the next steps as described in "7.2.1 Check flow measurement and/or flow sensors/pressure sensors (leakage ventilation)" on page 54 **from step 2**.

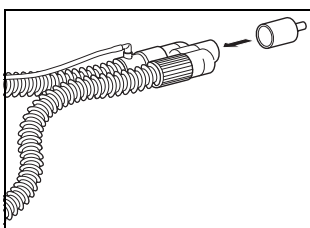
7.2.3 Check flow measurement and/or flow sensors/pressure sensors (valve ventilation)

Function check using a single patient circuit with patient valve:



1. Connect the patient circuit to the device.
2. Plug the test adapter supplied for valve ventilation onto the patient connection.
3. Perform the subsequent steps are described in "Check flow measurement and/or flow sensors/pressure sensors (leakage ventilation)" on Page 54 **from Step 2**.

Function check using a double patient circuit with patient valve (VENTIllogic LS only):



1. Connect the patient circuit to the device.
2. Plug the test adapter supplied for valve ventilation onto the patient connection.
3. Perform the subsequent steps are described in "Check flow measurement and/or flow sensors/pressure sensors (leakage ventilation)" on Page 54 **from Step 2**.

7.2.4 Alarms

When the On/Off key  is pressed, the therapy device performs a self-test of the sensor system. This checks that the alarm system is working. If a fault occurs during the self-test, an error message appears in the main screen (see also "5. Troubleshooting" on page 42).

1. Check buzzer and LEDs

Ensure every time you switch on that two different acoustic signals sound one after the other and that the yellow and red LEDs come on at the same time.

2. Check the **No power supply** alarm (power outage alarm):

Start up the therapy device. Now disconnect the power cord from the socket. The internal battery starts supplying power, both buzzers sound and the yellow LED comes on. The low-priority **No power supply** alarm window appears. Plug the power cord into the power socket again. The alarm should no longer be displayed.

7.2.5 Oxygen supply

Caution!

If a compressed gas system is used instead of an oxygen concentrator, an overpressure valve (e.g. pressure reducer or flow meter) must be present.

Note

A function check can only be performed on the oxygen valve if the oxygen supply has been activated beforehand (flow meter or oxygen concentrator) (see "3.5.1 Programs" on page 35).

In order to carry out a function check on the oxygen supply, proceed as follows:

1. Start up the therapy device.
2. Connect the oxygen source to the therapy device and start it up.
3. Set the oxygen flow rate on the oxygen source to the prescribed value.
4. Depending on whether or not you are using an oxygen sensor, select your method from those below.

With oxygen sensor

Ensure that the oxygen sensor is correctly connected and has been calibrated beforehand. The oxygen supply is functioning properly if an oxygen concentration of > 21 % is shown on the display and the oxygen flow rate prescribed can be set on the oxygen source.

Without oxygen sensor

The oxygen supply is functioning properly if the oxygen flow rate prescribed can be set on the oxygen source.

7.3 Calibrate oxygen sensor

7.3.1 General

If oxygen is supplied during therapy, oxygen concentration is measured at the device outlet port in order to ensure that the patient is always supplied with adequate oxygen.

To ensure the accuracy of this measurement, calibration must be performed daily. Calibration is necessary in the case of

- changeable weather (air pressure, temperature) or
- changes to therapy pressure.

Always perform calibration when the device has warmed up (approx. 20 minutes after switching on).

Calibrate the oxygen sensor once a day to prevent the weather affecting measuring results. The device will remind you of this daily with the relevant message about performing calibration. This message also appears when the device is restarted or switched on or if the oxygen sensor is electrically isolated from the device and then reconnected.

Note

The sensor is calibrated at a fraction of 21 % oxygen (ambient air). Turn off the oxygen supply on the oxygen source (flow meter or oxygen concentrator) for this.

7.3.2 Precautions

Take the following precautions for calibration.

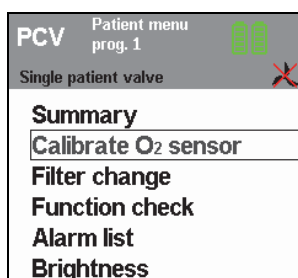
1. Block off the oxygen source.
2. Operate the device without an oxygen supply for approx. two minutes to flush out the oxygen remaining in the device.

7.3.3 Perform calibration

To calibrate the device, proceed as follows:

1. Ensure that the oxygen sensor is connected.
2. Press the menu key . The Clinical menu appears in the display.
3. Select the **Device configuration** menu item using the dial and confirm your selection by pressing the dial.
4. Select the **O₂** menu item using the dial and confirm your selection by pressing the dial.
5. In the Patient menu, press the O₂ key or the menu key . The selection bar is on **Calibrate O₂ sensor**. Confirm your selection by pressing the dial.
The calibration process is started.
The device then automatically switches back to the Physician menu.
Remaining calibration time is displayed.

Check the display. The oxygen sensor is functioning correctly if the mean oxygen concentration is 21 %.



7.3.4 Service life of the oxygen sensor

The service life of the oxygen sensor depends on the oxygen concentration supplied, on ambient temperature, on usage time and on device settings. Under normal conditions (ambient temperature 21 °C, 40 % oxygen concentration), the sensor lasts 6 months.

Note

The sensor becomes exhausted even if it is not connected.

7.3.5 Change oxygen sensor

Connect a new oxygen sensor as described in the patient's instructions for use, WM 67551.

Note

Depending on storage time and temperature, the sensor requires a little time for measured values to stabilize. After unpacking the sensor from the original packaging and connecting it, you should therefore wait about 30 minutes before calibrating the new sensor.

7.4 SpO₂ module

Using the optional, non-invasive SpO₂ *module*, oxygen saturation levels (SpO₂), heart rate and alarms can be measured, showed on the display of the device and saved to the SD-card.

The SpO₂ and heart rate parameters can each be monitored using upper and lower alarm limits, synchronized using VENTlviews software and represented on a computer screen with other ventilation data.

Note

The SpO₂ *module* supports diagnosis and patient monitoring. The SpO₂ *module* may only be used for diagnosis in conjunction with other indications of disease and symptoms. No clinical assessment may be made solely on the basis of SpO₂ *module* results.

Note

Use only SpO₂ sensors from the manufacturer to measure oxygen saturation.

7.5 Energy supply

7.5.1 Power supply

Connect the device to the power supply.

The power supply is working perfectly if the green power supply LED is permanently on and the standby screen appears in the display.

7.5.2 Internal rechargeable battery and power outage alarm

1. If present: remove the replaceable battery.
2. For what to do for the function check of the **No power supply** alarm, see the section entitled "Alarms" on Page 55.

If the power supply is not taken up by the rechargeable battery without interruption, this or the therapy device is defective. In this case, have the device including its internal rechargeable battery checked by an authorized specialist dealer.

3. Check rechargeable battery capacity (displayed in the status line of the display).

If fewer than three segments are displayed in the battery symbol, the battery is not fully charged. In this case, charge the battery by connecting the device to the electricity supply.

For care of rechargeable batteries, see the section entitled "Servicing" in the patient's instructions for use.

7.5.3 Replaceable battery (if present)

1. Push the replaceable battery into the device until you hear the latch engage.

The symbol for the replaceable battery appears on the right next to the internal battery in the status line and a beep sounds.

2. Check battery capacity (shown in the status line of the display).

If fewer than three segments are displayed in the battery symbol, the battery is not fully charged. In this case, charge the battery by connecting the device to the electricity supply.

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**Löwenstein Medical
Technology GmbH + Co. KG**
Kronsaalsweg 40
22525 Hamburg, Germany
T: +49 40 54702-0
F: +49 40 54702-461
www.loewensteinmedical.de

