Air Liquide HEALTHCARE

EO-150

Clinical
Pocket guide

English

EOVE

Summary

Introduction 4
Quick Start 5
The EO-150 device 6
Circuit Configuration 8
Turn ON/OFF the device 10
Access the Clinical Menu 11
Access the Patient Configuration 13
Circuit Calibration 14
Configure the Settings and Alarms view 15
Settings and Alarms Configuration 16
Ventilation modes configuration 17
- ST Mode 18
- VTS Mode 19
- PAC Mode 20
- CPAP Mode 21
- C-Flow Mode 22
- (A)VCV and (A)PCV Mode 24
- PSV Mode 25
- PSV VT Mode 26
- V-SIMV and P-SIMV Mode 27
- MPV and MPP Mode 28

Ventilation settings configuration 29
- Expiratory Trigger 30
- Pressurisation Ramp 31
- Volume Target Speed 32
- Inspiratory Time 33

Presets Configuration 34
Monitoring and Waveforms 35
Supplemental Oxygen 36
Advanced Monitoring (FiO_2 / SpO_2 / $tcCO_2$) 37
Data Download 38
External battery 39

Introduction

The EO-150 ventilator device provides continuous or intermittent ventilation support for pediatric and adult patients weighing at least 3.5 kg (8 lbs) who require mechanical ventilation. The device is intended to be used in home, institution and hospital, for both invasive and non-invasive ventilation.

Clinicians are advised to read the User Manual (Clinician) before using the EO-150 ventilator.

The information in the Pocket Guide is not intended to exceed the instructions in the medical prescription and User Manual.

The EO-150 ventilator is considered strictly medical device and is intended to be used by trained and qualified personnel under medical supervision.

If any operating and maintenance problems are identified, the local representative should be contacted.

An alternative source of ventilation should be available for dependent patients. Failure to do this may result in patient injury or death.

Quick Start

In case of emergency, the ventilation module can be directly turned on simply by pressing the button on the module keyboard.

2

To start ventilation
Click on on the keyboard.

1

Press on the front panel keyboard to turn on the device. The home screen displays.

The EO-150 device

1. Air inlet and filter
2. AC / DC Power connector
3. USB port
4. O_2 input
5. FiO_2/SpO_2 connector
6. Remote Alarm connector

1. Display screen
2. Ventilation module
3. Proximal pressure, valve, and proximal flow connectors
4. EO device housing unit
5. Inspiratory / Circuit Port
6. ON / OFF switch
7. Power source indicator
8. High priority alarm indicator
9. Technical alarm indicator
10. Circuit alarm indicator
11. Ventilation start / stop
12. Physiological alarm indicator
13. Medium priority alarm indicator
14. Alarm reset
15. Battery level indicator

The home screen

1. Patient Trigger Indicator
2. Patient Profile Indicator
3. Circuit configuration
4. Ventilation Mode
5. Alarm signal
6. Alarm indicators
7. Clinical mode status
8. Battery life indicator
9. Power source indicator
10. Time
11. Alarm tab
12. Alarm inhibition
13. Active settings information
14. Preset selector
15. Airway pressure indicator
16. Help button
17. Power Off button
18. Time and date
19. Event log
20. Menu button
21. Settings short cut

Circuit Configuration

Connect a patient circuit without flow sensor on the exhalation line

Single limb circuit with leak or mouth piece

Single limb circuit with expiratory valve
(without proximal flow sensor)

Use only circuits components compatibles for use with the EO-150.
It is recommended to perform the calibration at each switch of circuit type.

Connect a patient circuit with flow sensor on the exhalation line

Single limb circuit with expiratoy valve (with proximal flow sensor)

Double limb circuit (with adapter)

Turn ON the device

Ensure that the device has been charged prior to use or connect to AC power or DC connector inlet.

1. Insert AC connector into power inlet.
2. Turn the screw lock clockwise to secure.
3. Device will turn on automatically. If starting on battery, press on front panel keyboard to power on the ventilator.

Turn OFF the device using the Touch Screen

1. Press and hold until the circle becomes red.
2. Validate.

The ventilator turns off and the Home Screen turns into sleep mode.

To start ventilation using the Home Screen

1. Press on the touch screen.
2. Ventilation starts.

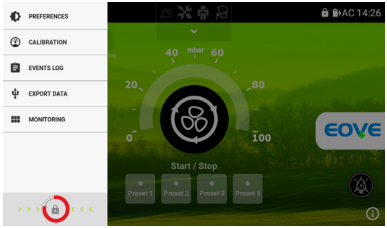
To stop ventilation using the Home Screen

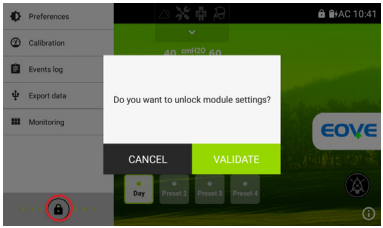
1. Press and hold until:
   - The red line around the Start/Stop key completes a full circle.
2. Validate the displayed stop ventilation confirmation pop-up.
3. Ventilation stops.

⚠ Access the Clinical Menu

Unlock the Clinical Menu

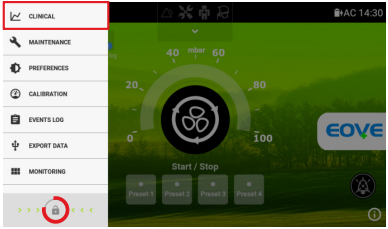
1. Click on the Menu icon .
2. Hold down the button until the red circle is complete.
3. Click on Validate.





NOTE:
Access to the Clinical Menu is reserved for the responsible clinician.

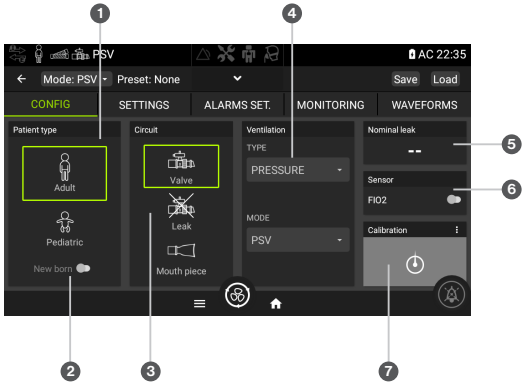
Access the Clinical Menu



The Clinical Menu could be accessible by Menu CLINICAL or by Home Screen .
After 15 minutes the Menu will be locked automatically.

Access the Patient Configuration

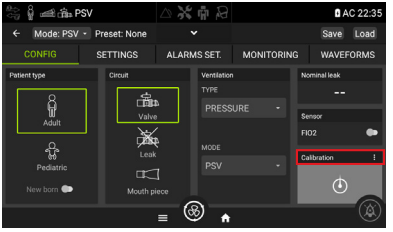
1. Patient profile: Adult or Pediatric
2. Newborn Option
3. Circuit type: Valve, Leak or Mouth Piece
4. Ventilation type: Volume or Pressure
5. **If the Nominal Leak is configured, the Leak can be set between 0 and 100 LPM or AUTO (40 LPM). Considering IPAP of 15 cmH_2O.***
6. Activation of the FiO_2 sensor
7. Perform circuit calibration



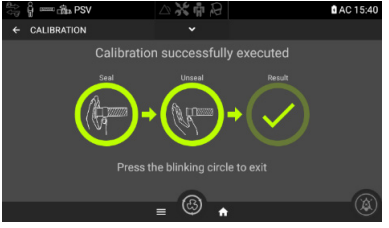
* In the case of NIV, check the Leak in the manual for each mask in advance.

Circuit Calibration

From this screen, you can select the configuration and perform a calibration. Simply press on the calibration button in the grey area.



Follow the 2 steps calibration process when prompted and press on “Result” to go back to the home page.



NOTE:

- A calibration must be completed for each new circuit configuration
- Complete the calibration with all circuit components (circuits, filters, humidificator), but without the patient interface.

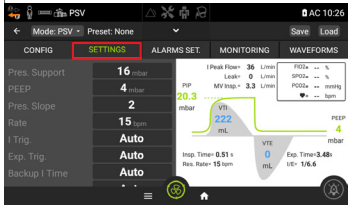
Configure the Settings and Alarms view

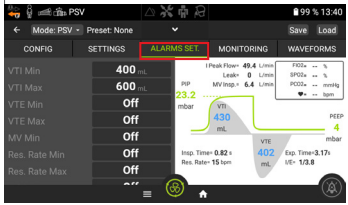
To configure the settings and alarms in list format (settings + monitoring on the same page), access the Preferences menu and activate “Settings in list format”.

1 Settings

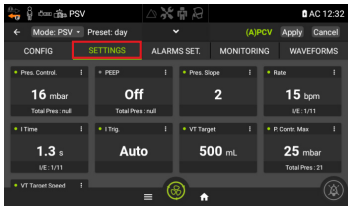
2 Alarms

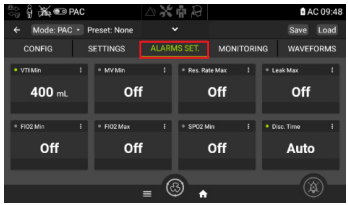
Display option when List is ON





Display option when List is OFF



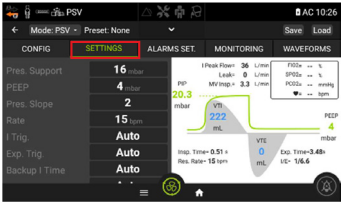


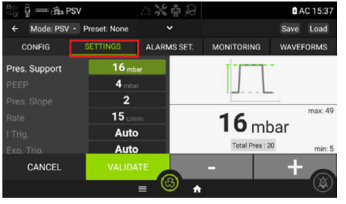
Settings and Alarms Configuration

Settings and Alarms tabs

These tabs allow to set the parameters for the ventilation settings and the alarm settings.

When settings are displayed as a list, the right part of the screen displays the monitored data in real time.





1. From the SETTINGS, click on one of the settings values.
2. Adjust the setting with **+** and **–**.
3. Press on VALIDATE to apply the changes.

Some settings could be turned to AUTO or OFF, according to need.

Ventilation modes configuration

Depending on the type of circuit selected, the following ventilation modes are available

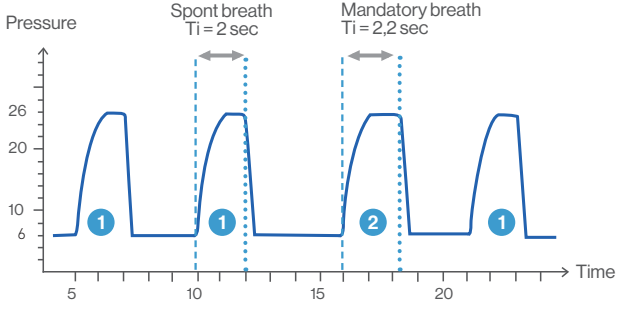
S(T)	Spontaneous Timed (with leak)
VTS	Volume Target Spontaneous (with leak)
PAC	Pressure Assisted/Controlled (with leak)
CPAP	Continuous Positive Airway Pressure (with leak)
C-FLOW	Continuous Flow (with leak)
(A)VCV	Volume Assisted Controlled Ventilation (with expiration valve)
(A)PCV	Pressure Assisted/Controlled Ventilation (with expiration valve)
PSV	Pressure Support Ventilation (with expiration valve)
PSV VT	Pressure Support Ventilation Volume regulated (with expiratory valve)
V-SIMV	Volume Synchronized Intermittent Mandatory Ventilation (with expiratory Valve)
P-SIMV	Pressure Synchronized Intermittent Mandatory Ventilation (with expiratory valve)
MPV	Mouthpiece Volume Ventilation (with expiration valve and leak)
MPP	Mouthpiece Pressure Ventilation (with expiration valve and leak)

The modes available in the leakage circuits

ST Mode: Spontaneous Timed

EPAP = 6 mbar
IPAP = 25 mbar
RR = 10 bpm

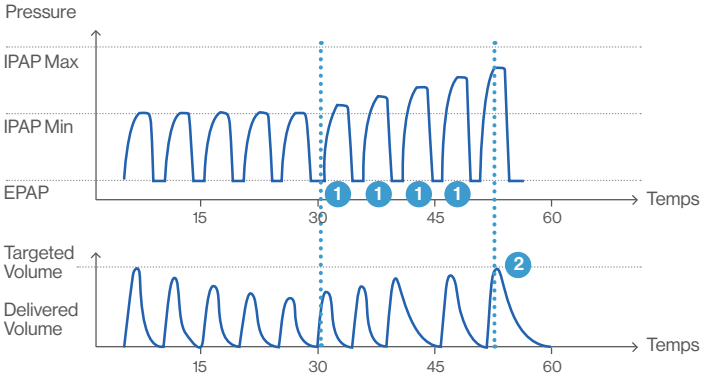
1 = Assisted breath triggered and cycled by the patient
2 = Mandatory breath triggered by backup respiratory rate



VTS Mode: Volume Target Synchronised

EPAP = 6 mbar
IPAP min = 15 mbar
IPAP max = 25 mbar
Vol. Target = 500 ml
RR = 10 bpm

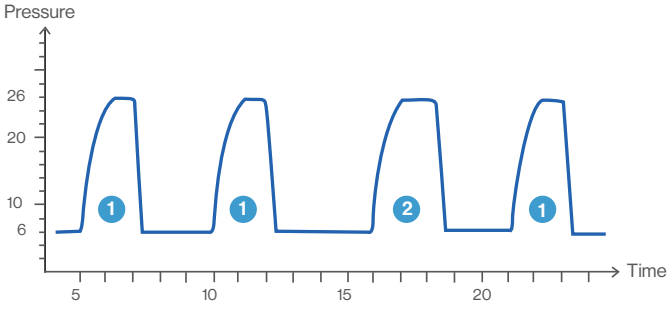
1 = Pressure increment breath by breath
2 = Targeted volume reached



PAC Mode: Pressure Assisted/Controlled

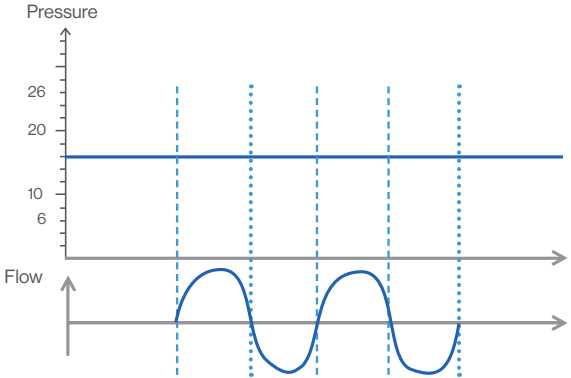
EPAP = 6 mbar
IPAP = 25 mbar
RR = 10 bpm

1 = Assisted breath triggered by patient and cycled by ventilator
2 = Mandatory Breath triggered by respiratory rate



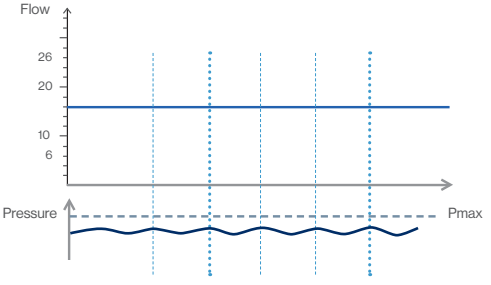
CPAP Mode: Continuous Positive Airway Pressure

In the Continuous Positive Airway Pressure (CPAP) mode, the device delivers a continuous pressure to the patient at all times. All breaths in this mode are spontaneous breaths.



C-Flow Mode: Continuous flow

This mode delivers continuous flow to the patient. The set flow (Flow) is delivered continuously through the humidifier and nasal cannula. All breaths in this mode are spontaneous breaths.



Settings	Flow (l/min)
Adult	10-60
Pediatric	2-25

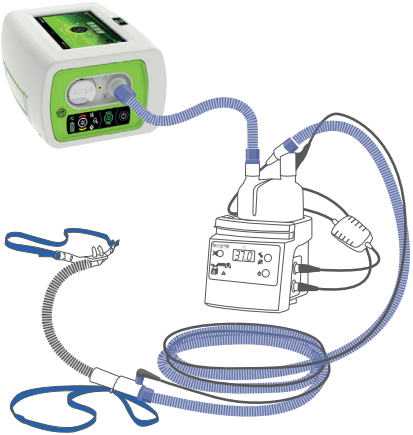
Gas mixure concentration (in % of FiO_2)

FiO_2 % theoretical value	C-Flow setting (L/min)							
		10	15	20	30	40	50	60
O_2 Flow (L/min)	4	53	42	37	32	29	27	26
	8	84	63	53	42	37	34	32
	12	-	84	68	53	45	40	37
	16	-	-	84	63	53	46	42
	20	-	-	-	74	61	53	47
	25	-	-	-	87	70	61	54
	30	-	-	-	-	80	68	61
	40	-	-	-	-	-	84	74
	50	-	-	-	-	-	-	87

O_2 concentration is given by :

$$\%\ O_2 = \frac{O_2\ \text{Flow} \times 100 + (\text{Flow setting} - O_2\ \text{Flow}) \times 21}{\text{Flow setting}}$$

⚠ C-Flow mode needs to be used with a humidifier

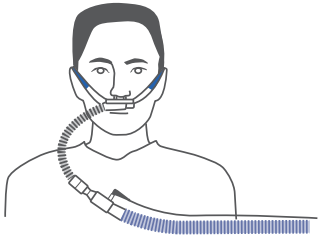


How to set up from the humidifier:

1. Connect the short circuit to the inspiratory port of the ventilator.
2. Connect the heat circuit, temperature probes and electric adapter.
3. Place de nasal cannula.

* Use the leak adapter (cap) included into the starter kit **(EO LMP2)**.

Select **“invasive mode”** on the humidifier (according to the models)

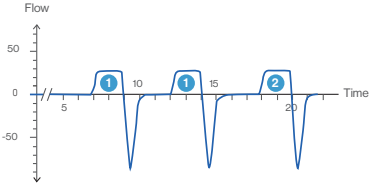


(A)VCV Mode: Volume Assisted/Controlled Ventilation

Circuits with an Expiratory Valve

VT = 600 ml
PEEP = OFF
RR = 12 bpm
Ti = 2 sec
Flow Ramp = 1 Square

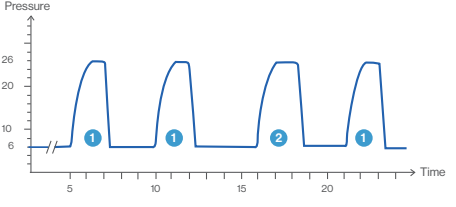
1 = Assisted breath triggered by the patient and cycled by the ventilator
2 = Mandatory breath based on respiratory rate



(A)PCV Mode: Pressure Assisted/Controlled Ventilation

Pres. Control. = 20 mbar
PEEP = 6 mbar
Pres. Slope = 2
RR = 10 bpm

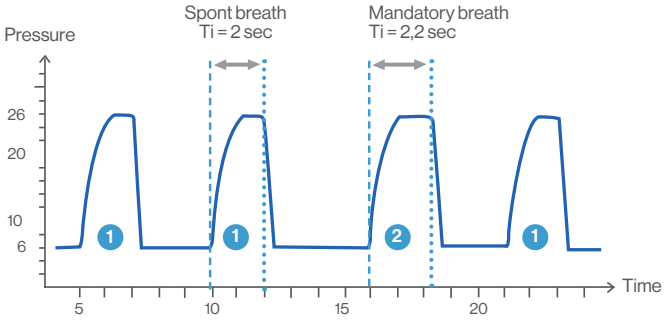
1 = Assisted breath triggered by the patient and cycled by the ventilator
2 = Mandatory breath triggered by respiratory rate



PSV Mode: Pressure Support Ventilation

Pres. Support = 20mbar
PEEP = 6mbar
RR = 10 bpm

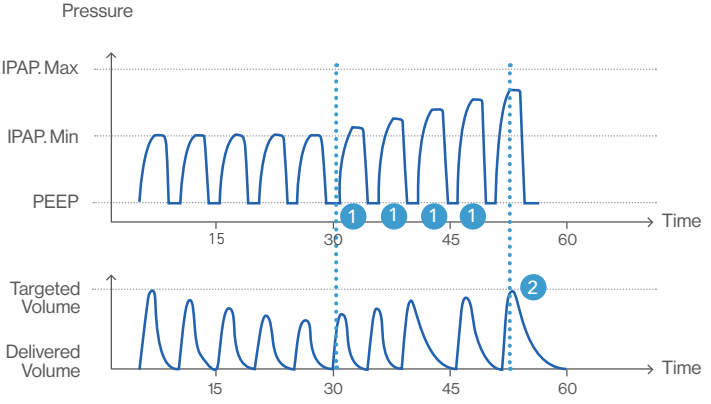
1 = Assisted breath triggered and cycled by the patient
2 = Mandatory breath triggered by back up respiratory rate



PSV VT Mode: Pressure Support Ventilation Volume Regulated

Vol. Target = 600 ml
Pres. Sup min = 20 mbar
Pres. Sup max = 35 mbar
RR = 10 bpm
PEEP = 6 mbar

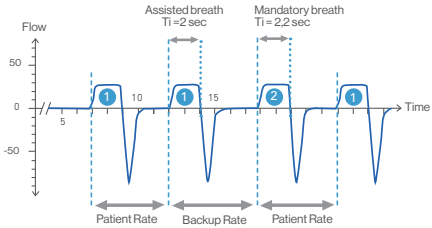
1 = Pressure increment breath by breath
2 = Targeted volume reached



V-SIMV Mode:
Volume Synchronized Intermittent Mandatory Ventilation

VT = 600 ml
PEEP = 6 mbar
RR = 10 bpm

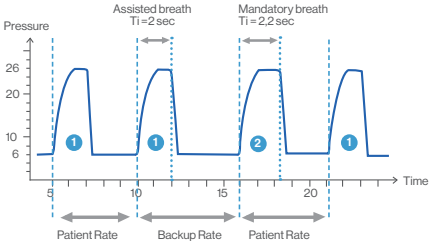
1 = Assisted breath triggered by the patient
2 = Mandatory breath based on respiratory rate but synchronized with patient



P-SIMV Mode:
Pressure Synchronized Intermittent Mandatory Ventilation

IPAP = 25 mbar
EPAP = 6 mbar
RR = 10 bpm

1 = Assisted breath triggered by the patient
2 = Mandatory breath based on respiratory rate but synchronized with patient

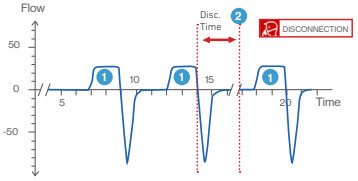


MPV Mode: Mouth Piece Volume Ventilation

VT = 600 ml
RR = OFF
Min.Pres = 5 mbar

1 = Breath triggered by the patient
2 = Disconnection alarm

Setting	Positive Trigger (±0.2 mb)	Negative Trigger (±0.2 mb)
Auto	0.4	-0.7
1	0.3	-0.4
2	0.4	-0.7
3	0.6	-1.2
4	0.8	-1.8
5	1.0	-2.4



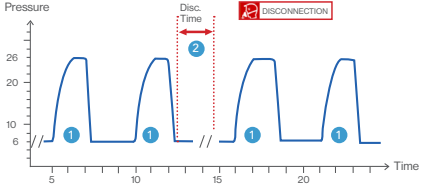
IT'S POSSIBLE TO SWITCH OFF THE DISCONNECTION ALARM AND THE RR.

In MPV and MPP modes, triggers in pressure can be negative or positive, the increase of the bias flow will promote the positive trigger. The bias flow "OFF" setting only promotes the negative trigger.

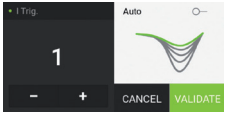
MPP Mode: Mouth Piece Pressure ventilation

Pres. Control = 25 mbar
RR = OFF
Min.Pres = 5 mbar

1 = Triggered cycle
2 = Disconnection alarm



Ventilation settings configuration



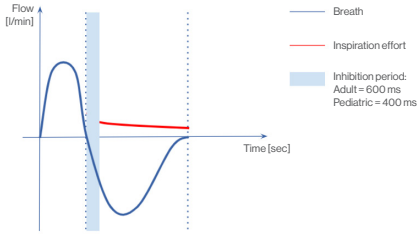
Inspiratory Trigger: Manual setting adjustement

The sensitivity levels can be adjusted from 1 to 5 (1 = Most sensitive – 5 = Less sensitive)

Trigger sensitivity is adapting to the exhalation patient's flow curve for more comfort:

1. Beginning of the exhalation: Inhibition time based on previous inspiration characteristics trigger to safely detect early triggering.

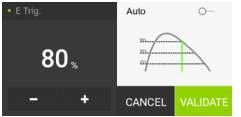
2. Optimal trigger: Dynamic sensitivity optimization adapting to the patient's waveform to allow breath triggering in optimal conditions.



Trigger setting	1	2	AUTO	3	4	5
Sensitivity threshold	1,2 - 0,5	1,3 - 0,6	1,4 - 0,7	1,4 - 0,7	1,5 - 0,8	1,6 - 0,9

Adult minimum inhibition time = 600 ms
Pediatric minimum inhibition time = 400 ms

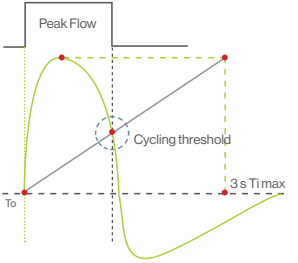
Expiratory Trigger: Manual setting adjustement

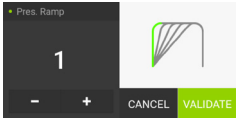


Cycling threshold to expiration is based on % of peak flow. When the inspiratory flow decreases and reaches a percentage of the peak flow (green line), expiration phase is activated.

Expiratory Trigger: Auto setting

In Auto mode the cycling threshold is computed according to 2 parameters: Peak Flow and given Ti max. When flow decreases and cross the line between T0 and Ti max, expiration phase is activated.

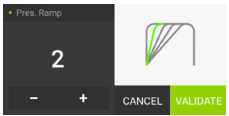


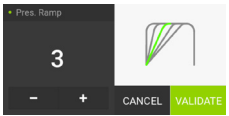


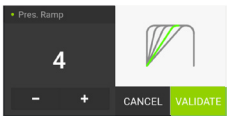
Rise time: Manual setting adjustment

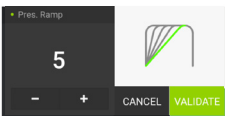
Pressurisation Ramp levels can be adjusted from 1 to 5
(1 = Fastest– 5 = Slowest)

	Setting	1	2	3	4	5
Adult	Duration (ms)	100	200	300	400	500
Pediatric	Duration (ms)	50	100	150	200	250





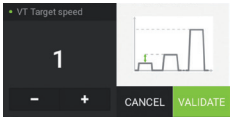


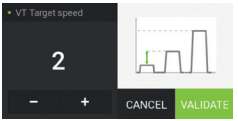


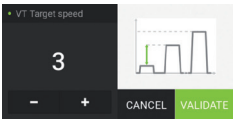
Volume Target Speed: Manual setting adjustment

This parameter sets the pressure increment to reach the Target Volume.
The sensitivity levels can be adjusted from 1 to 3 (1 = Slowest – 3 = Fastest)
Two increments are implemented from each setting:

Setting	Volume > 80% of Target Volume	Volume < 80% of Target Volume
1	0.5 mbar	0.5 mbar
2	0.5 mbar	1 mbar
3	0.5 mbar	2 mbar







Inspiratory Time: Manual and AUTO setting adjustment

The inspiratory time can be adjusted from 0.3 to 2.5 seconds.

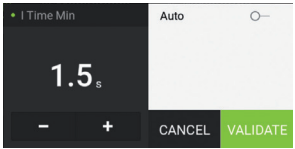
In AUTO mode, minimum inspiratory time is set at:

I. Time Min = Pressure ramp time +100 ms

Maximum inspiratory time is set at:

$$\text{I. Time Max} = \frac{30}{\text{Given respiratory rate}}$$

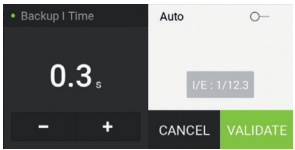
in order to avoid Inspiration/Expiration reversed settings



Backup Inspiratory Time: Manual and AUTO setting adjustment

The backup inspiratory time can be adjusted from 0.3 to 2.5 seconds.

In AUTO mode, auto Expiratory Trigger is applied.

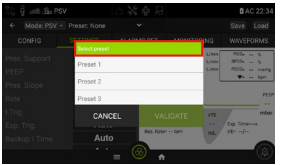


Presets Configuration

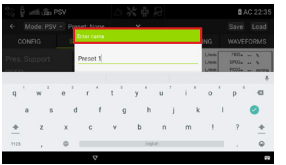
It is possible to configure different Presets by selecting different types of circuit, ventilation modes and alarm settings, which could be altered during ventilation.

From the upper band of the clinical menu, you can:

1. Save the active mode as preset and rename the saved preset.
2. Load a previously saved preset (to visualize the settings contained in the preset).
3. Delete the applied preset.



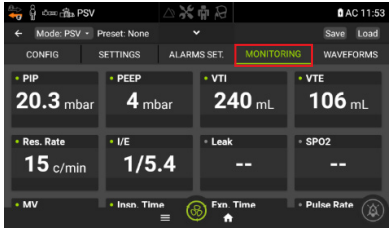
Select a preset



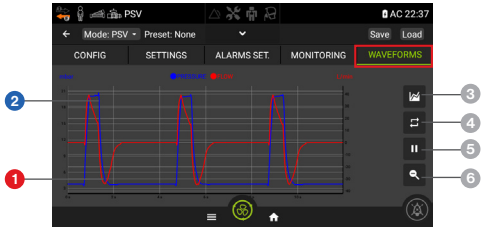
Rename a preset

Monitoring and Waveforms

Monitoring



Waveforms



1. Flow in red
2. Pressure in blue
3. Curve selection: pressure, flow and volume
4. Switch between waveforms and loopgraph
5. Pause/Play
6. Zoom reset

A zoom can be done by using pinch-to-zoom (touch two fingers on the surface, and while continuing to touch the surface, move them apart to zoom in or together to zoom out.)

Supplemental Oxygen

To add supplemental oxygen:

1. Unlock the oxygen input at the rear of the device by pushing up on the locking clip.
2. Plug in the oxygen adaptor (supplied with the EO 150) to the oxygen input.
3. Attach the end of the oxygen supply tube (provided with the EO 150) to the oxygen adaptor.
4. Attach the other end of the oxygen supply tube to the oxygen source.
5. Start ventilation.
6. Turn on the oxygen and adjust for the prescribed flow rate or FiO_2 level.

To remove supplemental oxygen:

1. Turn off the oxygen source.
2. Unlock the low flow oxygen input at the rear of the device by pushing up on the locking clip.
3. Remove the oxygen adaptor from the oxygen input.

ATTENTION

- **Use only medical grade oxygen.**
- **Ventilator must be started and stopped after oxygen supply has been turned off.**
- **Oxygen can be added up to a maximum flow of 20 l/min.**

Advanced Monitoring (FiO_2 / SpO_2 / $tcCO_2$)

One of the advantages of the EO-150 is that it enables advanced ventilation monitoring. It is possible to attach Optional Accessories for monitoring FiO_2, Pulse Oximetry and Transcutaneous Capnography.

Monitoring FiO_2

ATTENTION

The optional FiO_2 sensor should be used to ensure the concentration of oxygen delivered to the patient, providing alarms for maximum and minimum oxygen concentrations.

To connect the FiO_2 sensor:

1. Plug the FiO_2 cable into the FiO_2 port.
2. Plug the FiO_2 sensor into the other end of the FiO_2 cable.
3. Attach the T-adaptor to the Inspiratory Patient Port.
4. Plug the FiO_2 sensor into the T-adaptor.

NOTE:

- In order to display the FiO_2 measurements and to set the alarms, activate FiO_2 monitoring in the Patient/Circuit configuration menu. *(See. page 13)*
- A 5 minutes delay after the beginning of ventilation is recommended to ensure that FiO_2/SpO_2 recording is correct.
- Use the FiO_2 Kit Cable + FiO_2 cell + Cell T Piece Adaptor.

Monitoring Pulse Oximetry (SpO_2)

ATTENTION

Only use compatible NONIN finger pulse sensors.

To connect the pulse oximeter:

1. Connect the Nonin finger sensor selected on the Nonin XPOD cable.
2. Connect the plug of the Nonin XPOD cable to the SpO_2 connector at the rear of the device.
3. Connect the sensor to the selected patient finger.

Monitoring CO_2 Transcutaneos

ATTENTION

For the monitoring of $tcCO_2$ use the Sentec PCO_2 monitor and accessories.

To connect the Sentec PCO_2 monitor is necessary:

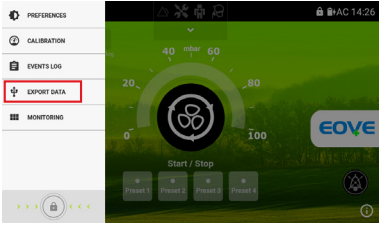
1. RS323 / USB converter cable (for more technical information check the User's Manual).
2. $tcCO_2$ sensor according to patient profile: Only use compatible SENTEC sensors.

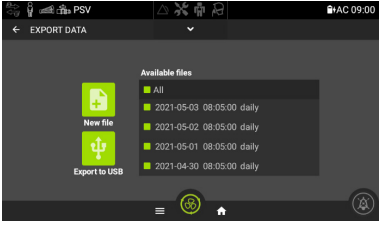
These are optional accessories, check the user manual for more information.

Data Download

USB stick Specs:
- FAT32
- 32 GB max
- Class 10 max
- 1 partition

1. Insert a USB key in the USB port at the rear of EO-150
2. In the Menu tab, select «EXPORT DATA»
3. Create a new file if required
4. Select one or more files
5. Export the selected files
6. Import the data for EOVE Clinical Software



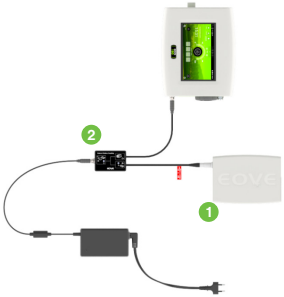


NOTE:

- The EO-150 saves a data file each day. It's possible to manually save a new file by pushing on the "New file" button.
- Each file contains the last 24 hours of detailed waveforms data and up to one year of trends.
- The EO-150 memory is able to store up to 32 files.
- Selecting "Export USB" will automatically transfer all data stored on the USB key. You can select a single file or multiple files.
- For access to the EO-150 Clinical Software, please contact your local representative.
- For Telemonitoring, please contact your local representative to check the avaibility for each region.

External Battery

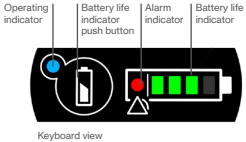
For extra mobility, the EO-150 ventilator provides external batteries as an optional accessory.



MATERIAL NEEDED:

1. EO-150 BATTERY PACK (EO-BATPCK - include External Battery (EO-BAT9), Battery Cable, Power Source Cable)
2. BATTERY Y CABLE (EO-EXTBATCBL)
3. EO-150 TRAVEL BAG (EO-TRVELBAG1X0-EVO)
4. BATTERY BAG (EO-BATBAG)

The BATTERY PACK COUPLING CABLE (EO-CPLPACK) could be used instead of the BATTERY Y CABLE (EO-EXTBATCBL), losing the possibility to recharge the device and the battery. It is possible to connect 2 External Batteries simultaneously if necessary.



Keyboard view

The BATTERY Y CABLE (EO-EXTBATCBL) could be used to recharge both the device and the external battery.

Travel bag

Battery bag

EXTERNAL BATTERY (EO-BAT9) rear view

Manufactured by

EOVE
Helioparc
4, Boulevard Lucien Favre
64000 Pau
France
www.eove.fr

EO-150 provides continuous or intermittent ventilation support for adults and children weighing at least 3.5 kg needing mechanical ventilation, at home, in a facility or hospital, and in portable environments, for invasive or non-invasive ventilation.

Medical device class IIb - CE 0459 - Manufactured by EOVE. Please read the user manual.

YN23168_IND 1_2024-06_Homecare ventilation_EN_Clinical Guide EO-150_ - Photos: © ALMS - Création CHANH THI