





# EOVE-70

# SECRETION MANAGEMENT DEVICE

# **TECHNICAL MANUAL**

102-035 Rev DG \_ 13/09/2022 \_ Apply from API39 Version

### Current version: API39

| PAGES   | CHANGES AND MODIFICATIONS  |
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| 83-84   | Preventive maintenance alarms  |
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# INTRODUCTION

# **1** Warnings

## 1.1 Warnings and safety rules

This manual is specific to the EOVE-70 (ref EO70) Secretion Management Device (SMD). It provides information for maintenance technicians and operators.

Anyone who installs or conducts maintenance operations on the device must be qualified and trained and must have read and understood the entire manual before beginning any operations. Any temporary personnel or those in training must be supervised by a qualified technician.

For other warnings or safety rules, refer to the user manual.

# 1.2 Responsibilities

**EOVE** will not be responsible for damages or injuries caused by non-compliance with safety instructions and other instructions in this manual or by negligence during servicing, maintenance or repair of the ventilator.

## 1.3 Maintenance and guarantee

The guarantee of the appliance will only apply if maintenance is performed in strict compliance with the instructions in this manual. Maintenance of the appliance is compulsory.

Maintenance and replacement components are guaranteed and delivered by **EOVE**. In case of use of incorrect replacement components, **EOVE** cannot certify and ensure the proper functioning of the ventilator and the safety of the user and their entourage.

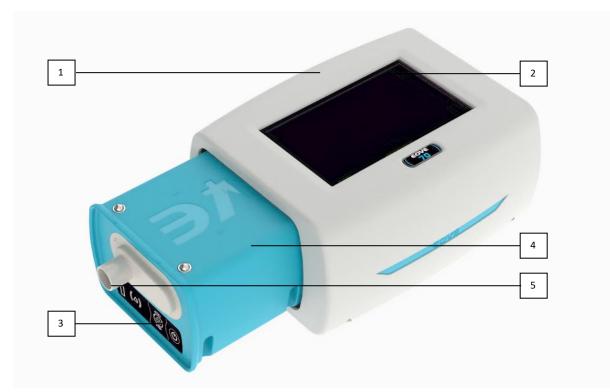
Replacement components are available from the **EOVE** catalogue and the **EOVE** Spare Parts List.

# 2 General information

The EOVE 70 (ref EO70) Secretion Management Device (SMD) provides treatment for patients not able to manage their secretions on their own. It provides Insufflation – Exsufflation mode for adults and pediatric patients as prescribed by an attending doctor.

## 2.1 Technical description

The EOVE-70 SDM consists of a ventilation module and a housing unit.



## FRONT PANEL

EOVE-70 – Removable module

| 1. EO-Display housing unit | 2. Display screen |
|----------------------------|-------------------|
| 3. Keyboard                | 4. SDM module     |
|                            | 5. Circuit port   |

#### **REAR PANEL**



| 1. Air inlet/outlet filters cover | 2. SpO2 plug           |
|-----------------------------------|------------------------|
| 3. DC Power plug                  | 4. Remote control plug |
| 5. Standby button                 | 6. USB port 1          |
| 7. USB port 2                     |                        |

## **REAR VIEW OF DEVICE WITHOUT DOCKING STATION**

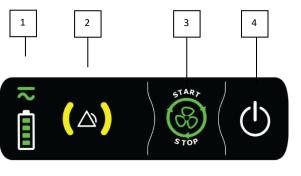


| 1. USB port                  | 2. Electrical connection to housing unit |
|------------------------------|--|
| 3. DC Car charger connection |  |



#### VIEW FROM BELOW OF EOVE-70 SMD MODULE

| 1. | Module label with serial number | 2. Battery flap |
|----|---------------------------------|-----------------|
|    |                                 |                 |



5

# KEYBOARD

- Power source indicator
   Alarm indicators
- 3. Treatment start / stop button
- 4. Power on/off button
- 5. Battery level indicator

### **EO-DISPLAY HOUSING UNIT**

The EO-Display housing permits to control the EOVE-70 SMD module when it is inserted inside. The screen of the unit displays various information from the EOVE-70 SMD module and enables to set the different parameters.



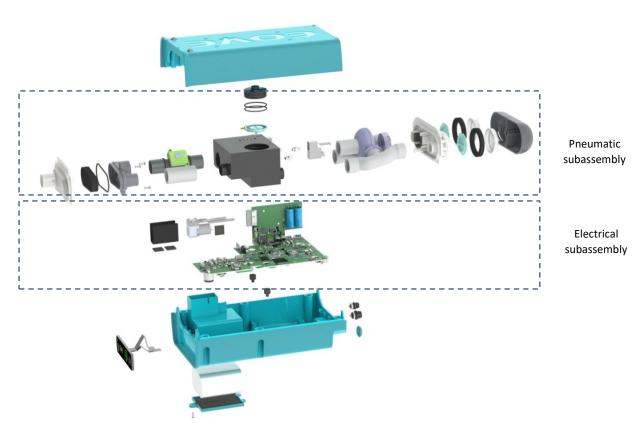
EO-Display housing unit – Inputs and outputs

| 1. DC Plug             | 4. USB connector  |
|------------------------|-------------------|
| 2. On/Off button       | 5. Display screen |
| 3. Micro USB connector |                   |

### 2.2 The Technical data

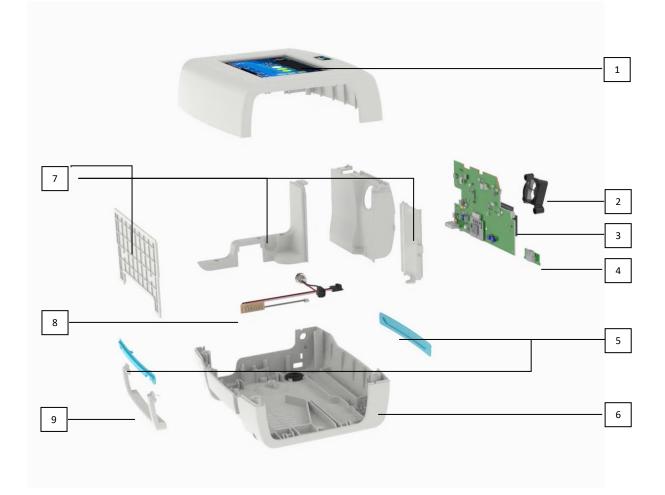
For technical data, refer to the **EOVE-70** user guide.

- 2.3 Structure and operation
- 2.3.1 EOVE-70 SMD module structure



EOVE-70 SMD module architecture

# 2.3.2 EO-Display housing unit structure



# EO-Display Housing unit architecture

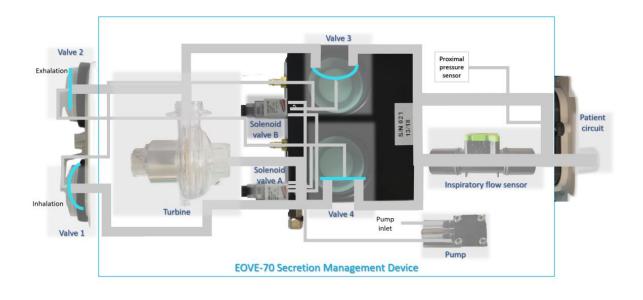
| 1. Upper shell & display screen | 6. Lower shell                      |
|---------------------------------|-------------------------------------|
| 2. Cooling fan                  | 7. Covers                           |
| 3. EO-Display CPU board         | 8. Connection board & DC plug cable |
| 4. USB board                    | 9. Handle                           |
| 5. Insert                       |                                     |

# 2.3.3 Operation of EOVE-70 SMD module

The operation of the EOVE-70 secretion management device is based on a closed control loop of the proximal pressure. There are two distribution mode, automatic and manual. In both modes, a pressure set point is send to the main actuator, the turbine. This pressure set point affects directly turbine speed which is proportional to pressure evolution. A high pressure set point will increase the turbine speed. This pressure is measured by the proximal pressure sensor. Thus, the determination of distribution parameters, especially the flow ramp rate affects the level of the turbine acceleration at the start of each phase of respiratory cycle.

At the same time, the two solenoid valves control the four valves to manage phases of respiratory cycles. A solenoid valve controls two valves during inhalation phase and the other one, the two others during exhalation phase.

The measurement of inspiratory flow completes the system to calculate the peak flow and the tidal volume on each respiratory cycle.

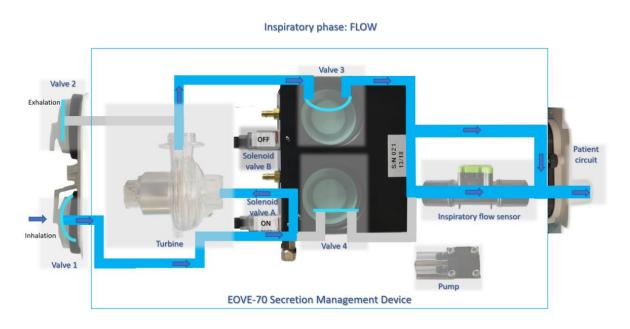


**NOTE:** When the EOVE-70 SMD is switched on but the ventilation is off, the turbine stills operate to remain cool. There are two speeds for cooling during standby. Below 45°C the turbine speed is low, and above the temperature threshold, the speed is higher. That is why there is always a low ambient noise when the device is on.

## Operation of EOVE-70 SMD during inspiratory phase

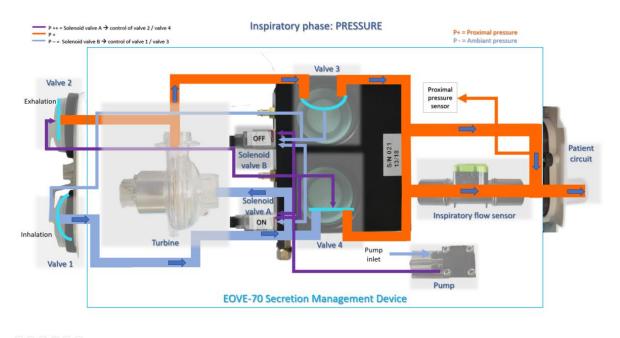
During inspiratory phase, the EOVE-70 secretion management device provides positive pressure to the patient. This pressure value depends on the set point configurated by the user and is proportional to the turbine speed.

The air is inhaled through valve 1, and flows toward the turbine, then the valve 3 and the inspiratory flow sensor.



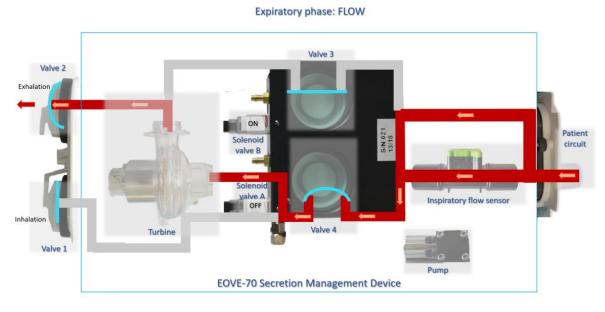
During inspiratory phase, the low pressure (blue circuit on the drawing below) is equal to the atmospheric pressure. The high pressure (orange circuit) provided by the turbine is equal to the proximal pressure received by the patient. The difference of pressure between the two circuits is positive.

Meanwhile, the pump enables to provide additional pressure to the two solenoid valves to control the four valves. The solenoid valve A switches on to close valve 2 and valve 4. The solenoid valve B is turned off, so the valves 1 and 3 are opened to permit the air to flow toward the patient.



Operation of EOVE-70 SMD during expiratory phase

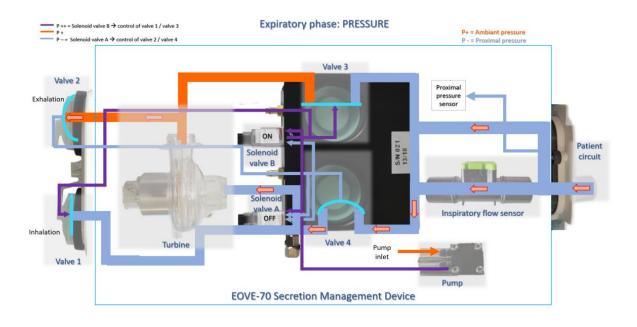
During the expiratory phase, the EOVE-70 secretion management device creates a suction to assist the patient when he coughs. The air flows through the inspiratory flow sensor, the valve 4, then the turbine and is exhaled by the valve 2.



-----

During the expiratory phase, the low pressure is equal to the proximal pressure and the high pressure is equal to atmospheric pressure. The difference of pressure between the two circuits is negative.

The pump still provides additional pressure to the two solenoid valves to control the four valves. However, during the expiratory phase, the solenoid valve B turns on to close the valve 1 and the valve 3 and the solenoid valve A switches off to open the valve 4 and the valve 2 to permit the exhalation.



# **EOVE-70 MANAGEMENT**

# 3 EOVE-70 Interface

## 3.1 Main menu

The home screen displays various information about current settings, pressure of treatment, power supply mode, etc... It is reachable from all other menus by pressing



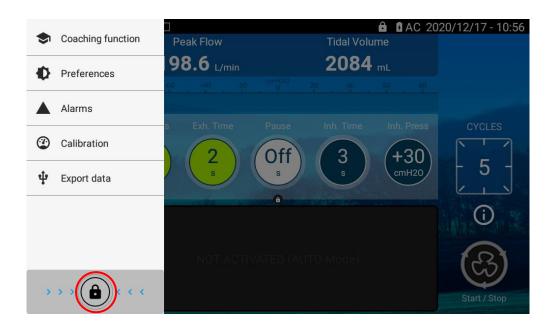
Home screen

| 1. Main menu access                               | 2. Presets configurated                               |
|---|---|
| 3. Power off button                               | 4. Access to Help interface                           |
| 5. Current treatment mode                         | 6. Access to clinical settings                        |
| 7. Treatment monitoring                           | 8. Battery life indicator & current power source mode |
| 9. Wi-Fi connected                                | 10. Date  |
| 11. Time  | 12. Airway pressure indicator                         |
| 13. Main settings bar                             | 14. Start/Stop treatment button                       |
| 15. Touch pad (manual treatment)                  | 16. Cycles counter                                    |
| 17. Access to current settings information pop-up | 18.   |

**NOTE:** Clinical settings and maintenance menu access are locked by default. To unlock both menus, reach the main menu and press on unlock button, then validate.

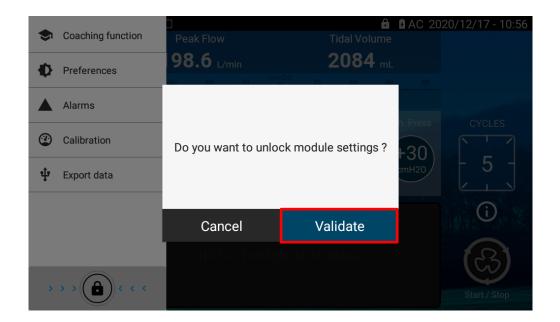
- To reach the main menu, click on from the home screen

- Hold unlock button until the validation popup appears



#### Main menu

#### - Validate



#### 3.2 Preferences

Preferences menu enables to set up different parameters and to access to some information about the EOVE-70 SMD and its interface.

- From the main menu, click on Preferences

| Mode: INEX (Auto) |       | AC 2020/05/05 - 10:46 |
|-------------------|-------|-----------------------|
| ← Preferences     |       |                       |
| Options           |       |                       |
| 180° rotation     |       | •                     |
| Settings as list  |       | •                     |
| Brightness        |       | • 80 %                |
| Transitions beep  |       | •                     |
| Date and time     |       |                       |
| 2020/05/05        |       | ¢                     |
| 11:43             |       | ۵                     |
|                   | ≡ 🧐 🔒 |                       |

From this menu, the user can adjust the following settings of the device.

| Rotation of screen | Allows the screen to be rotated 180°. Press the small circle to rotate the screen.  |
|--------------------|---|
| Settings as list   | Select the display mode of the settings menu. To display the settings as list, press the small circle. The circle and the bar will become blue. |

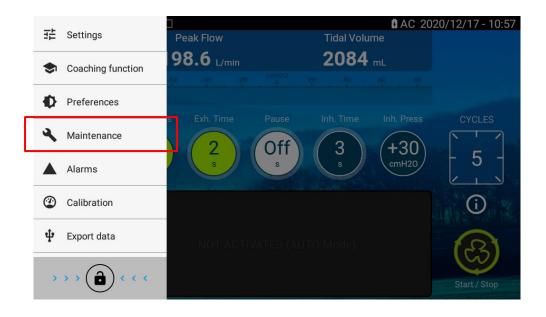
| Current Date | Sets the current day, month and year. To set the date, click on the wheel<br>and choose the date from the calendar. Press ok when completed.                     |
|--------------|--|
| Current Time | Sets the current time on 24h clock. To set the time, click on the wheel at<br>the end of the line and choose the time from the dial. Press ok when<br>completed. |

Or display some information about tablet status or software versions.

| Mode: INEX (Auto)        | AC 2020/05/05 - 10:47 |
|--------------------------|-----------------------|
| ← Preferences            |                       |
| 2020/05/05               | <b>*</b>              |
| 11:44                    | \$                    |
|                          |                       |
| Information              |                       |
| Operating system version | eove-eodisplay-1.4.0  |
| User interface version   | 2.0.0                 |
| Module serial number     | EO0700718026          |
| CPU version              | C070000401            |
| POWER version            | P150000400            |
| GAUGE version            | 5                     |
|                          |                       |

#### 3.3 Maintenance menu

#### 3.3.1 Maintenance menu interface



To access to the maintenance menu, a pin code is required.

#### PIN CODE FOR ALL DEVICES: 6666

#### WARNING: DO NOT GIVE THE PIN CODE TO THE PATIENT.

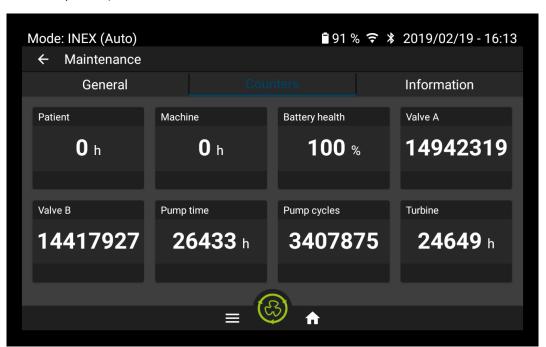
| 로 Settings        |                         |          |                   | AC 2020/12/17 - 10:59 |
|-------------------|-------------------------|----------|-------------------|-----------------------|
| Coaching function | Enter your pin cod      | Counters |                   | Information           |
| Preferences       |                         |          |                   |                       |
| Aintenance        |                         |          |                   | •                     |
|                   | 1                       | 2 авс    | 3 def             |                       |
|                   | <b>4</b> <sub>GHI</sub> | 5 JKL    | 6 мно             |                       |
|                   | 7 PORS                  | 8 тич    | 9 <sub>wxyz</sub> |                       |
|                   | ×                       | 0.       |                   |                       |
|                   | $\nabla$                |          |                   |                       |

The Maintenance menu is split in three tabs:

- "General" tab:
  - Accessories control
  - Language selection
  - Connectivity
  - Interface app and Operating system versions management

| Mode: INEX (Auto)      |          | AC 2020/12/17 - 11:02 |
|------------------------|----------|-----------------------|
| ← Maintenance          |          |                       |
|                        | Counters | Information           |
|                        |          |                       |
| Interface              |          |                       |
| Automatic Lock         |          | •                     |
| Use SPO2 sensor        |          | •                     |
| Inverted control pedal |          | •                     |
| Language               |          | English 🌞             |
| EOZ password           |          | <b>⊙</b> /            |
| Help                   |          | ••                    |
| Dationt                |          |                       |
|                        | ≡ 🧐 🔒    |                       |

- "Counters" tab: Display operation time of every component concerned by the preventive maintenance operations



- Display of various counters (battery ageing – turbine – solenoid valve – machine – patient)

- "Information" tab:
  - Display of serial number
  - Display of the current software versions
  - Display of the operating system information

| Mode: INEX (Auto) | A        | C ᅙ 🗚 2018/07/25-11:53 |
|-------------------|----------|------------------------|
| ← Maintenance     |          |                        |
| General           | Counters |                        |
| Serials           |          |                        |
| Module            |          | EO0700718026           |
| Blower board      |          | 0000FB025214           |
| Blower            |          | 000018022036           |
| Valve A           |          | 0000000017X            |
| Valve B           |          | 0000000017X            |
| Pneumatic block   | <u>a</u> | 000021-13/18           |
|                   |          |                        |
|                   |          |                        |

#### 3.4 EOVE-70 interface servicing

#### 3.4.1 Interface software update

**WARNING :** THE FOLLOWING PROCEDURE ONLY CONCERN THE INSTALLATION OF THE CLINICAL APP ON THE EO-DISPLAY HOUSING UNIT.

NOTE: Interface update of the EO-Display must not be done while ventilation module is operating.

Copy the interface software version required on a USB Drive and plug it to the USB port 1 of the EO-Display housing unit.

Warning: Only one interface software version must be copied on the USB stick

Note: Use a USB Drive formatted FAT32 / 32Go max / Class 10 / 1 partition



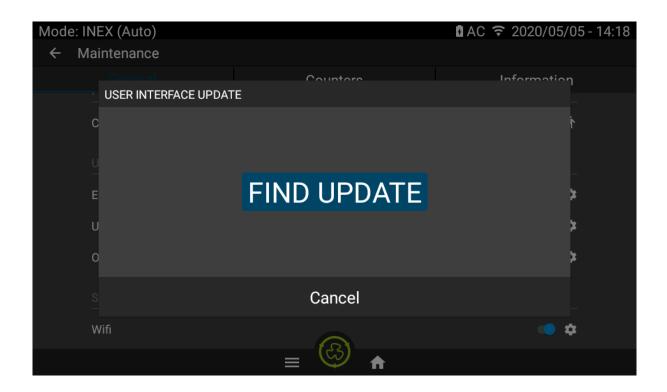
- Click on EO70 user interface

| Mode: INEX (Auto)   |          | 🖪 AC 훅 2020/05/05 - 14:11 |
|---------------------|----------|---------------------------|
| ← Maintenance       |          |                           |
| General             | Counters | Information               |
| Clear patient data  |          | Clear 🛉                   |
| Update              |          |                           |
| EO70 user interface |          | •                         |
| User manual         |          | \$                        |
| Operating system    |          | \$                        |
| System              |          |                           |
| Wifi                |          | • <b>¢</b>                |
|                     | ≡ 🧐 🔒    |                           |

- Check module autonomy and plug the AC if necessary
- Click on Continue

| Mode: INEX (Auto)  |  | 🛿 AC 🗢 2020/05/05 - 14:17 |
|--------------------|--|---------------------------|
| ← Maintenance      |  |                           |
|                    | Countors   | Information               |
| UPDATE INFORMATION |  |                           |
| <b>c</b><br>U      |  | ŕ                         |
|                    | erface update can take several n                                       |                           |
|                    | -display to AC or check that your<br>igher than 1h before to start upd |                           |
| U                  | 5  | ×                         |
| o                  |  | 2                         |
|                    |  |                           |
| s Cance            | el Co  | ontinue                   |
| Wifi               |  | <b>• ‡</b>                |
|                    |  |                           |

#### - Click on *Find Update*



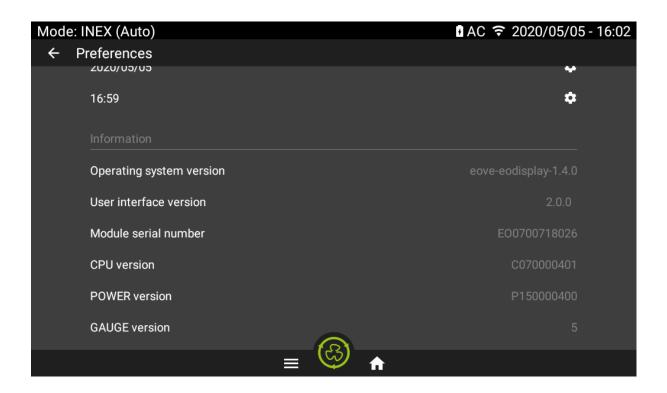
- Verify the version available matches with the one required and click on Install

| Mode: PRM                |                           | <b>■</b> +AC 2010/05/05 - 14:47 |
|--------------------------|---------------------------|---------------------------------|
| $\leftarrow$ Maintenance |                           |                                 |
| General                  | Countara                  | Information                     |
| USER INTERFACE UPDAT     | TE                        |                                 |
| с                        |                           | ŕ                               |
| <u>u</u>                 |                           |                                 |
| E                        | eo70app-2.0.0-d2891fc.apk | *                               |
| U                        |                           | *                               |
| O                        |                           | *                               |
| s Cance                  | 11 le                     | ISTALL                          |
| Wifi                     |                           | • ‡                             |
|                          |                           |                                 |

#### - Wait for the installation until tablet reboot is complete

| Mode: PRM           |                                      | ∎+AC 2010/05/05 - 14:48 |
|---------------------|--------------------------------------|-------------------------|
| ← Maintenance       |                                      |                         |
| General             | Countara                             | Information             |
| USER INTERFACE UPDA | ТЕ                                   |                         |
| C<br>U              | nstalling (Application will restart) | 4                       |
| F                   |                                      |                         |
|                     | $\bigcirc$                           | ſ                       |
| U                   | Ŭ                                    | *                       |
| o                   |                                      | *                       |
|                     |                                      |                         |
| S<br>—              |                                      |                         |
| Wifi                |                                      | • *                     |
|                     |                                      |                         |

- Check in PREFERENCES menu that the interface version installed is the one required

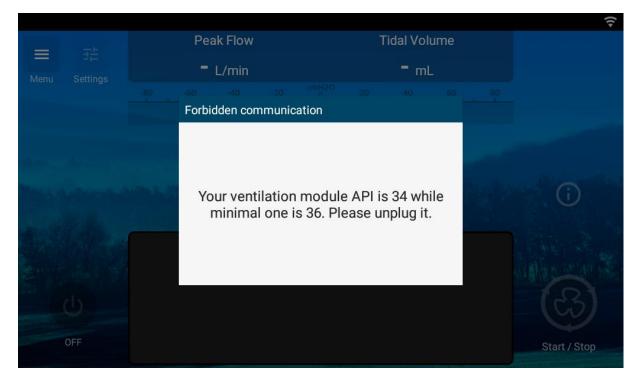


#### 3.4.2 API version change

The device can operate only if the CPU software and the interface are in same API version. In case of API version change, update all the software in the following order:

- Upgrade of the CPU software,
- Upgrade of the interface software.

To keep communication between ventilation module and EO-Display, their software must be in same API version. Otherwise the following popup appears.



#### 3.4.3 Android system update

- Copy the OS version on a USB flash driver with same specifications as those required for the interface update

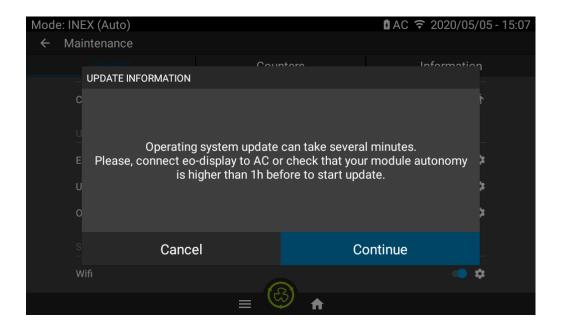
| Name  | Date modified    | Туре               | Size       |
|---|------------------|--------------------|------------|
| LOST.DIR  | 5/5/2020 2:28 PM | File folder        |            |
| eodisplay-1.4.0-user-devkeys-eo70app-2.0.0-update.zip | 5/5/2020 3:37 PM | Archive WinRAR ZIP | 308,559 KB |
| eodisplay-manifest.xml                                | 5/5/2020 3:31 PM | XML Document       | 1 KB       |

**WARNING:** Keep OS version and its manifest together and copy them on the USB Drive. Do not modify the manifest which is dedicated to one single version of the OS.

- Plug the USB stick to the EO-Diplay housing unit
- Go to the Maintenance menu and select Operating System

| Mode: INEX (Auto)   |          | AC 秺 2020/05/05 - 15:06 |
|---------------------|----------|-------------------------|
| ← Maintenance       |          |                         |
| General             | Counters | Information             |
| Clear patient data  |          | Clear 🛉                 |
| Update              |          |                         |
| EO70 user interface |          | \$                      |
| User manual         |          | \$                      |
| Operating system    |          | \$                      |
| System              |          |                         |
| Wifi                |          | <b>• •</b>              |
|                     | ≡ 🧐 🔒    |                         |

#### - Follow update recommendations and press Continue



- Click on Find Update

| EoveUpdater          |                              |
|----------------------|------------------------------|
|                      | FIND UPDATE                  |
| eove-eodisplay-1.4.1 | Will wipe userdata and cache |
|                      |                              |
|                      |                              |
|                      |                              |
|                      |                              |
|                      |                              |
|                      |                              |
|                      |                              |
| $\triangleleft$      |                              |

- Check that the version displayed is the one required and click on it to launch the update

| EoveUpdater          |             |                              |
|----------------------|-------------|------------------------------|
|                      | FIND UPDATE |                              |
| eove-eodisplay-1.4.1 |             | Will wipe userdata and cache |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
|                      |             |                              |
| $\bigtriangledown$   |             |                              |
|                      |             |                              |

- Wait until the installation is complete and the display screen reboots
- Verify in PREFERENCES menu the Operating System version

| Mode: INEX (Auto)        | 🛚 AC 훅 2020/05/05 - 14:49             |
|--------------------------|---------------------------------------|
| ← Preferences            |                                       |
| 2020/05/05               | · · · · · · · · · · · · · · · · · · · |
| 15:47                    | *                                     |
| Information              |                                       |
| Operating system version | eove-eodisplay-1.4.1                  |
| User interface version   | 2.0.0                                 |
| Module serial number     | E00700718026                          |
| CPU version              | C070000401                            |
| POWER version            | P150000400                            |
| GAUGE version            | 5                                     |
|                          |                                       |

#### 3.4.4 Help interface and user manual update

NOTE: The user manual must be updated in the language selected in the interface

- Download the user manual version in the language required
- Copy it onto a USB stick

| Name                             | Date modified    | Туре               | Size     |
|----------------------------------|------------------|--------------------|----------|
| 🚖 manual_eove_70_en_US RevDA.pdf | 05/05/2020 15:22 | Adobe Acrobat Docu | 1 644 Ko |
| 🗟 manual_eove_70_fr_FR RevDA.pdf | 05/05/2020 15:22 | Adobe Acrobat Docu | 1 702 Ko |

- Go to the maintenance menu and launch the update of the user manual

| Mode: INEX (Auto)   |          | AC 穼 2020/05/05 - 16:12 |
|---------------------|----------|-------------------------|
| ← Maintenance       |          |                         |
| General             | Counters | Information             |
| Clear patient data  |          | Clear 🛉                 |
| Update              |          |                         |
| EO70 user interface |          | \$                      |
| User manual         |          | •                       |
| Operating system    |          | \$                      |
| System              |          |                         |
| Wifi                |          | <b>• •</b>              |
|                     | ≡ 🧐 🔒    |                         |

- Click on "Find Update"

| Mode: INEX (Auto)   |             | 🛿 AC 훅 2020/05/05 - 16:14 |
|---------------------|-------------|---------------------------|
| ← Maintenance       |             |                           |
|                     | Countara    | Information               |
| USER MANUALS UPDATI | E           |                           |
| с                   |             | ŕ                         |
|                     |             |                           |
| E                   | FIND UPDATE | ×                         |
| U                   |             | ×                         |
| o                   |             | *                         |
|                     | Cancel      |                           |
| Wifi                |             | <b>• •</b>                |
|                     |             |                           |

- Select the file required and click on "Update"

| Mode: PRM     |                                    |       | <b>■</b> +AC 2010/05, | /05 - 14:52 |
|---------------|------------------------------------|-------|-----------------------|-------------|
| ← Maintenance |                                    |       |                       |             |
|               | Co                                 | atoro | Informatio            | า           |
| USER MANUALS  | UPDATE                             |       |                       |             |
| с             | manual_eove_70_<br>manual_eove_70_ |       |                       | ŕ           |
|               |                                    |       |                       |             |
| E             |                                    |       |                       | *           |
| U             |                                    |       |                       | ×           |
| O             |                                    |       |                       | *           |
|               | Cancel                             | U     | PDATE                 |             |
| Wifi          | E.                                 | 2     | •                     | \$          |
|               | $\mathcal{P} \equiv \mathcal{Q}$   | ジ 🔒   |                       |             |

# - Wait until the end of the update

| Mode: PRM           |                   | ∎+AC 2010/05/05 - 14:52 |
|---------------------|-------------------|-------------------------|
| ← Maintenance       |                   |                         |
| General             | Countare          | Information             |
| USER MANUALS UPDATE | 1                 |                         |
| С                   |                   | ŕ                       |
|                     |                   |                         |
| U<br>-              |                   |                         |
| E                   | Update succeeded. | *                       |
| U                   |                   | *                       |
|                     |                   |                         |
| 0                   |                   | *                       |
| s                   | Close             |                         |
|                     | Close             |                         |
| Wifi                |                   | • ¢                     |
|                     | ≡ 😳 🔒             |                         |

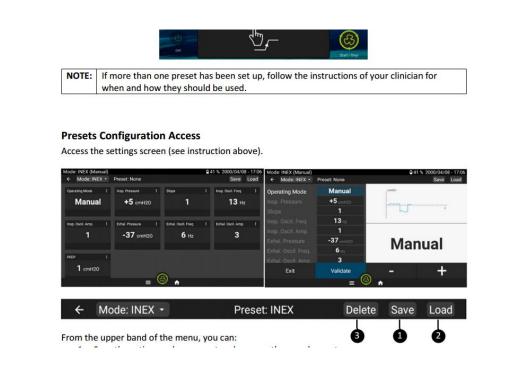
- Activate the Help interface

|                 | mation |
|-----------------|--------|
| Module          |        |
| E00700718026    | \$     |
| Interface       |        |
| Automatic Lock  | •      |
| Use SPO2 sensor | •      |
| Locale Engli    | sh 🌣   |
| Help            |        |
|                 |        |

- Mode: INEX (Auto) AC 2020/12/17 - 10:55 Tidal Volume Peak Flow 퍎  $\equiv$ 198.6 L/min 2084 mL CYCLES 3 +30 -30 Off 2 5 cmH20 9 cmH20 S Preset 2  $(\mathbf{i})$ (l)?) OFF Start / Stop
- Check that the Help shortcut is displayed and click on it

-

- Look for the information required



# 3.4.5 Language selection

| Mode | e: INEX (Auto)         |          | AC 🗢 2020/05/05 - 15:50       |   |
|------|------------------------|----------|-------------------------------|---|
| ÷    | Maintenance            |          |                               |   |
|      |                        | Counters | Information                   |   |
|      | Interface              |          |                               |   |
|      | Automatic Lock         |          | •                             |   |
|      | Use SPO2 sensor        |          | •                             |   |
|      | Inverted control pedal |          | Current language              | ; |
|      | Language               |          | English 😧 — Language settings | ; |
|      | Help                   |          | ••                            |   |
|      | Patient                |          |                               |   |
|      | Clear patient data     |          | Clear 🛧                       |   |
|      |                        |          |                               |   |

- Add a language then slide it up to the top

| Language preferences      | : |
|---------------------------|---|
| 1 English (United States) | • |
| 2 Italiano (Italia)       |   |
| + Add a language          |   |
|                           |   |
|                           |   |
|                           |   |
| $\triangleleft$           |   |

- Click on return button, the application will restart automatically.
- NOTE: The default language is English.

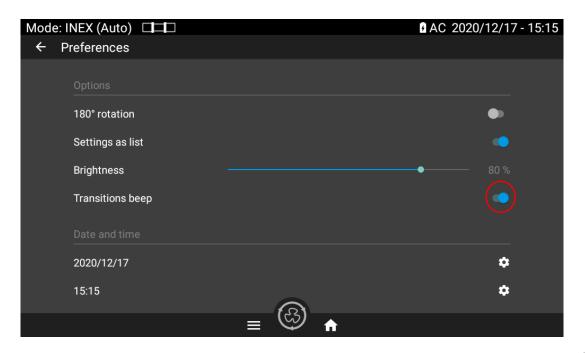
# 3.4.6 Brightness of the screen

- Go to Preferences menu
- Slide the cursor to adapt the brightness

| Mode: | INEX (Auto)      |       | AC 2020/12/17 - 15:15                         |
|-------|------------------|-------|---|
| ← F   | Preferences      |       |   |
|       |                  |       |   |
|       | Options          |       |   |
|       | 180° rotation    |       | •   |
|       | Settings as list |       | •   |
|       | Brightness       |       | <b>●</b> ──────────────────────────────────── |
|       | Transitions beep |       | •   |
|       | Date and time    |       |   |
|       | 2020/12/17       |       | \$  |
|       | 15:15            |       | \$  |
|       |                  | ≡ 🖾 🛧 |   |

#### 3.4.7 Transition Beep

- Go to Preferences menu
- Enable *transitions beep* to allow module to always trigger a beep when a transition between inspiration and expiration occurs.



# 3.5 Clear patient data

To reset patient data, click on Clear, then Validate

| Mode: INEX (Auto)   |          | 🛿 AC 훅 2020/05/05 - 15:56 |
|---------------------|----------|---------------------------|
| ← Maintenance       |          |                           |
| General             | Counters | Information               |
| Patient             |          |                           |
| Clear patient data  |          | Clear                     |
| Update              |          |                           |
| EO70 user interface |          | \$                        |
| User manual         |          | \$                        |
| Operating system    |          | ٠                         |
| System              |          |                           |
|                     | ≡ 🙆 🔒    | <u> </u>                  |

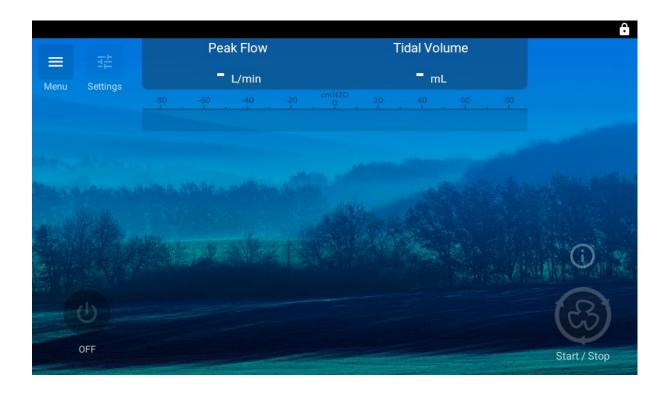
| Mode: INEX (Auto)        |                      |                    | A    | C 훅 2020/05/05 - 15:5 | 7 |
|--------------------------|----------------------|--------------------|------|-----------------------|---|
| $\leftarrow$ Maintenance |                      |                    |      |                       |   |
| General                  | Cou                  | nters              |      | Information           |   |
| Patient                  |                      |                    |      |                       |   |
| Clear patient data       |                      |                    |      | Clear 🕇               |   |
| Update                   | Do you really want t | o clear patient da | ata? |                       |   |
| EO70 user interface      |                      |                    |      | \$                    |   |
| User manual              |                      |                    |      | \$                    |   |
| Operating system         | Cancel               | Validate           |      | \$                    |   |
| System                   |                      |                    |      |                       |   |
| 1100                     |                      | 3)                 |      | <u> </u>              |   |

**WARNING:** A CLEAR PATIENT DATA RESETS PATIENT COUNTER AND ERASES ALL THE EVENTS FROM THE SMD MODULE MEMORY. IT RETURNS THE DEVICE TO FACTORY CONFIGURATION.

# 4 SMD management

## 4.1 Communication

Physical connection between EO-70 SMD module and its EO-Display housing unit is carried out by the connection board, so, while the module is inserted into the housing unit.



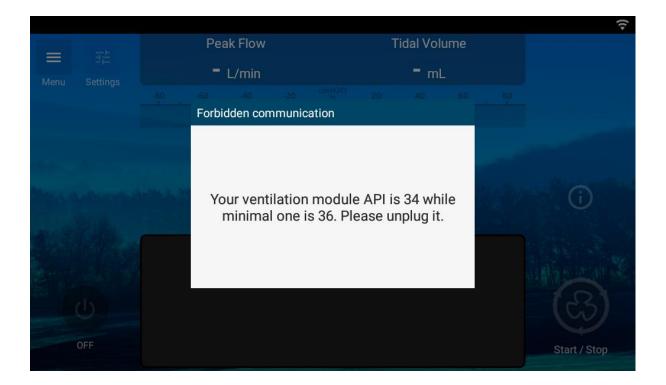
- To connect the display screen to the EOVE-70 SMD module, insert the module into the EO-Display housing unit and switch it on.



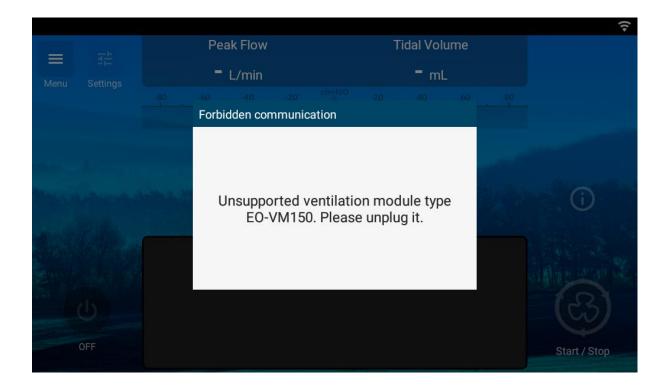


- Check that the module is connected, and information are displayed on the screen

NOTE: API version must match between interface software version and the CPU software version of the ventilation module. Otherwise, a popup appears, and communication fails.



**WARNING:** EO-Display housing unit dedicated to EO-70 SMD use is not compatible with another ventilation module type such as EO-150 ventilator.

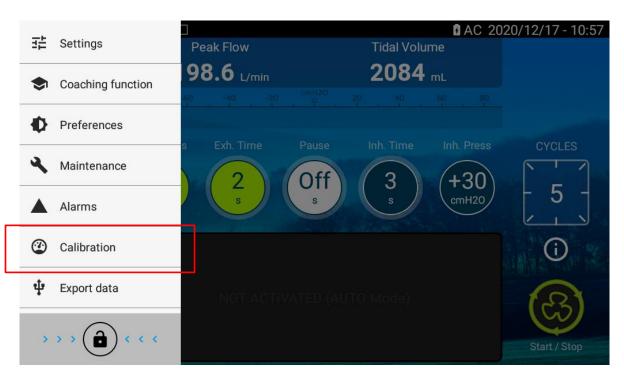


# **5** Calibration

The patient circuit must be calibrated to provide performances in accordance with EOVE70 SMD specifications.

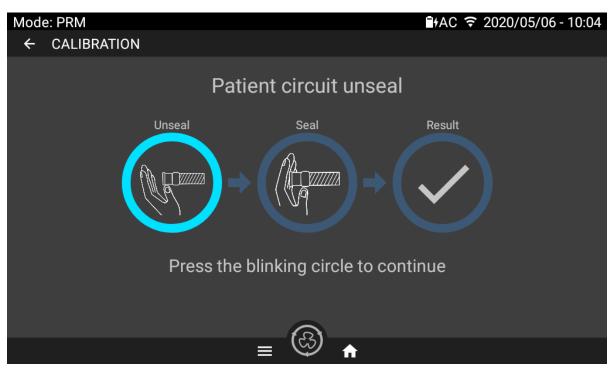
The process detailed below includes two steps which corresponds to the IPPB mode. If the INEX mode is selected, only the first step will be performed.

- Select the mode required and connect the proper circuit and accessories (without patient interface)



- Go to the calibration menu

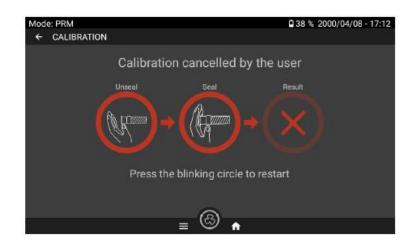
- Launch calibration by pressing "Start"



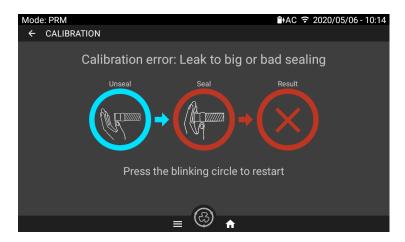
- Unseal the patient circuit extremity and click on the blinking circle
- Wait until the circle is complete
- Seal the patient circuit extremity and click on the blinking circle
- Wait until the circle is complete
- Reset the calibration menu by pressing on "Validate"



Calibration can be aborted at any moment if necessary (by pressing on "abort", starting the treatment, or selecting another menu) and data collected during the calibration in progress won't be saved.



In case of error during the seal or unseal phases, an error informing about the error will be displayed (image below shows an example during Seal step):



Then click on "abort" to restart the calibration process

# 6 EOVE-70 SMD Servicing

### 6.1 EO-Toolkit presentation & settings

#### EO-Toolkit is a servicing software which enables to:

- Download the event logs
- Update module software versions
- Manage the counters and serial numbers

### Configuration of EO-TOOLKIT

| EO-VM70 31.00             | MAIN WAVEFORMS TR      | ACES STREAMINGS | Ventilation mode | e   |           |            | <    |     |                   |                           |         | ٠ |  |
|---------------------------|------------------------|-----------------|------------------|-----|-----------|------------|------|-----|-------------------|---------------------------|---------|---|--|
| atabase<br>B_MEASUREMENTS | MEAS_BAT_TEMPERATURE_s | ≡+              |                  | Se  | earch a d | iatabase i | item |     | E00700<br>E0-VM70 |                           |         |   |  |
| EAS_BAT_TEMPERATURE_s     | 24 °C                  | 240             | ~                | c + | + -       |            |      | ·y0 | Туре              | EO-VM70                   |         |   |  |
| AD_DAT_TEMPERATURE_S      | 24 0                   | 240             |                  | 6 4 | + -       | •          |      | 30  | Serial            | E00700718026              |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | CPU               | 00:04:3e:9b:bf:d5         |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | API               | C070000103 (7224<br>31.00 | 660)    |   |  |
|                           |                        |                 |                  |     |           |            |      |     | POWER             | P150000300                |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | GAUGE             | 5                         |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Clock             | 2018-07-31T09:11:         | 01.000Z |   |  |
|                           |                        |                 |                  |     |           |            |      |     | COU               | NTERS                     | SERIALS |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Battery           | 0                         |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Battery Ageing    | 100                       |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Machine           | 0.20 hours (12 min        | utes)   |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Patient           | 0.23 hours (14 mini       | utes)   |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Pump Cycle        | 27                        |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Pump Time         | 0.20 hours (12 min        | utes)   |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Turbine           | 0.17 hours (10 mini       | utes)   |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Valve A           | 102                       |         |   |  |
|                           |                        |                 |                  |     |           |            |      |     | Valve B           | 98                        |         |   |  |

### Configuration of EO-Toolkit

- Launch EO-Toolkit
- Click on Settings

| 📵 eo-toolkit - main | – <del>a</del> × |
|---------------------|------------------|
| File                |                  |
|                     | CONNECT 4        |
|                     | Entrop .         |

- Choose two consecutive usb ports lower than 10

- Select the API file required. It must be accordance with software version which might be updated

| Main USB port (CPU) Secondary USB por<br>COM6 - COM5 | t (Power) Auto Detect USB Ports                | 1  |  |
|--|--|--|--|
| Auto Select API File     D:\eo70\eo70-api31-00.jso   | n  | 7  |  |
| API descriptor file                                  |  |  |  |
|  |  |  |  |
| Streamings displayed duration (s)                    | C:\Users\Lucas.delplan                         |  |  |
| Streamings displayed duration (s)                    | C:\Users\Lucas.delplan<br>Streamings directory |  |  |
|  |  | Samples/seconds: 100.00<br>Sample delay: 10 ms |  |
| 12<br>Streamings sample delay (ms)                   | Streamings directory Streamings filter ratio   | Samples/seconds: 100.00                        |  |
| 12<br>Streamings sample delay (ms)<br>10             | Streamings directory Streamings filter ratio   | Samples/seconds: 100.00                        |  |

### 6.2 Events Log menu / Data retrieval

## 6.2.1 Events log

The EO-Toolkit log permits to retrieve EOVE-70 SMD technical data until 10 000 events. Thanks to the Auto refresh feature, it is also possible to display the events in live.

- First connect the device to the computer and launch EO-Toolkit
- Go in settings and select the file path required to save the events logs

| ED-VM70                   | 93.99 | PRINCIPAL COURS         | ES TRACES STREAMINGS LOG   | INEX 👻 🥠 🌲   |   |   |
|---------------------------|-------|-------------------------|--|--|---|---|
| 3                         | 8 ×   | Auto refresh January 3  | 23rd 09:43 pm January 24th 04:30 am Log r                        | name Category Q  |   | Permittee   |
| DATETIME                  | INDEX | NAME                    | CATEGORY   | DETAILS  | 2019-01-2410.055.02.0002<br>LOG_START_VENTIL  |   |
| 2019:01:24<br>4:30:16.000 | 139   | LOG_SERIES              | Paramètres   |  | Under 126)<br> <br>  "details": (   |   |
| 2019:01:24<br>4:30:16.000 | 138   | LOG_STOP_VENTIL         | Port US8 principal (CPU) Port US8 se                             | condeire (Alim.)   | <pre>"additionalLogElements";<br/>"enumEntriesRames"; [];<br/>"modifectings"; {}<br/>};<br/>"snapshot"; {</pre>                   | -07   |
| 2019:01:24<br>4:30:15.000 | 137   | LOG_SETTINGS_INFO       | /dev/tty.usbserial-145301 👻 /dev/tty.                            |  | <pre>"magenot" {     {         *divider": 1,         *enumValue*: *SET_INEX*         *div * * ****</pre>                          |   |
| 2019:01:24<br>4:30:15.000 | 136   | LOG_START_VENTIL        | Sélection Auto. du fichier API                                   |  | "isInTntegrityCHC"; tro<br>"name"; "SIT Mode",<br>"rawWike"; 0<br>"value": 0  | n,  |
| 2019:01:24<br>4:27:45.000 | 135   | LOG_DEVICE_CONNECTED    | /Users/nicolasm/Work/Eove/eo70-c;<br>Fichier descripteur de IXPI | pu-software/Sc   | ),<br>{<br>"dividec": 10,   |   |
| 2019:01:24<br>4:27:32.000 | 134   | LOG_DEVICE_DISCONNECTED |  | /Users/nicolasm  | "Nor" 1/9"1",<br>"NarregitzgORC": fai<br>"narre": "NOR BATE_ut,<br>"rasValue": 32787,<br>"unit": "UNIT & PER_MIS<br>"value": nall | еа,<br>ЮТЕЧ,                                      |
| 2019:01:24<br>1:55:35.000 | 133   | LOG_SERIES              |  | noles Streamings de fittage des Streamings Echantillons/seconde: 25.00 | ).<br>[<br>"divider": 100,<br>"(d": "10.7".   |   |
| 2019:01:24<br>1:55:35.000 | 132   | LOG_STOP_VENTIL         | 40 1   | Délai d'échantillonnage: 40 ms   | "isinintegrityCSVC"; fol<br>"name"; "XXXV I; TIME_U",<br>"raxValue"; 29,<br>"unit"; "NNT_SIC",<br>"value"; 0.29                   | 90,   |
| 2019:01:24<br>1:55:07.000 | 131   | LOG_SETTINGS_INFO       |  |  | ),<br> <br>*divider*: 180,  |   |
| 2019:01:24<br>1:55:07.000 | 130   | LOG_START_VENTIL        | Users/nicolasm/Documents   |  | "id": "19-4",<br>"isInIntegrizyCRC": fol<br>"name": "MORE_TIME_u",<br>"umivElue": 32767,<br>"umivElue": TVNIE_BACC,               | se,   |
| 2019:01:24<br>1:55:04.000 | 129   | LOG_SERIES              |  |  | "value": null<br>);<br>(<br>*divider": 180,   |   |
| 2019:01:24<br>1:55:04.000 | 128   | LOG_STOP_VENTIL         | LOG_CAT_SYSTEM   |  | "10": "19-2",<br>"11ThTneprisyCPC": fal<br>"namo": "9000 P.TTNE_u",<br>"nawValue": 6,   | ,   |
| 2019:01:24<br>1:55:02.000 | 127   | LOG_SETTINGS_INFO       | LOG_CAT_HIDDEN   |  | "usio": "Usir_SIC",<br>"value": 0<br>);<br>{  |   |
|                           |       |                         |  |  | Erve Too  | blið v1.0.31 - dévelaggá avas 4 gar l'ágaiga Eove |

- Click on LOG to display the events

| 1 2                   | 3 4                      | 5 6           |                                 |        |       |              |   |
|-----------------------|--------------------------|---------------|---------------------------------|--------|-------|--------------|---|
| eo-toolkit - log      |                          |               |                                 |        |       | -            | ٥ |
| Eore Toolhit          |                          | HOME          |                                 |        |       | DISCONNECT 4 | ŝ |
| to x                  | Auto update              |               |                                 |        |       |              |   |
|                       | Auto upuste              |               |                                 |        |       |              | - |
| 01/01/1970 12:00 AM   | 01/01/2099 12:00 AM Name | Category Q    | 5                               |        |       |              |   |
| DATETIME              | NAME                     | CATEGORY      | DETAILS                         | SUPPLY | VENT. |              |   |
| 2019/02/19 - 16:59:05 | Stop ventilation         | System event  |                                 | 0      | * =   |              |   |
| 019/02/19 - 16:58:57  | Start ventilation        | System event  |                                 | 0      | 5     |              |   |
| 019/02/19 - 16:12:52  | Stop ventilation         | System event  |                                 | 0      | 5     |              |   |
| 019/02/19 - 16:12:24  | Start ventilation        | System event  |                                 | 0      | *     |              |   |
| 2019/02/19 - 15:53:15 | Stop ventilation         | System event  |                                 | ۵      | *     |              |   |
| 019/02/19 - 15:53:08  | Start ventilation        | System event  |                                 | 0      | *     |              |   |
| 019/02/19 - 15:46:36  | Modification setting     | Setting event | Mode changed from 1 to 0        | 0      | *     |              |   |
| 019/02/19 - 15:40:58  | Event station detection  | System event  | Module removed from the station | ۵      | 4     |              |   |
| 019/02/19 - 15:40:24  | Stop ventilation         | System event  |                                 | 0      | 4     |              |   |
| 2019/02/19 - 15:40:14 | Start ventilation        | System event  |                                 | ٥      | 5     |              |   |
| 019/02/19 - 15:39:03  | Event station detection  | System event  | Module inserted in the station  | *      | 5     |              |   |
| 019/02/19 - 15:39:00  | Device started           | System event  |                                 |        | 5     |              |   |
| 019/02/07 - 11:26:13  | Device stopped           | System event  |                                 |        | 5     |              |   |
| 019/02/07 - 10:34:29  | AC back                  | System event  |                                 |        | 5     |              |   |
| 019/02/07 - 10:32:30  | Modification setting     | Setting event | Mode changed from 0 to 1        | 0      | 5     |              |   |
| 019/02/07 - 10:11:31  | AC back                  | System event  |                                 |        | 5     |              |   |
| 2019/02/07 - 10:11:26 | Event station detection  | System event  | Module inserted in the station  | 8      | 30 -  |              |   |

Eove Toolkil v1.3.1 - developed with \* by the Eove leam

1. Refresh

2. Clean the current log

4. Auto refresh

- 3. Export the current log in an Excel file
- 5. Generate the event log

6. Filters

#### 6.2.2 Export Clinical data from EO-Display

Observance until one year of use can be downloaded and displayed in Clinical Software

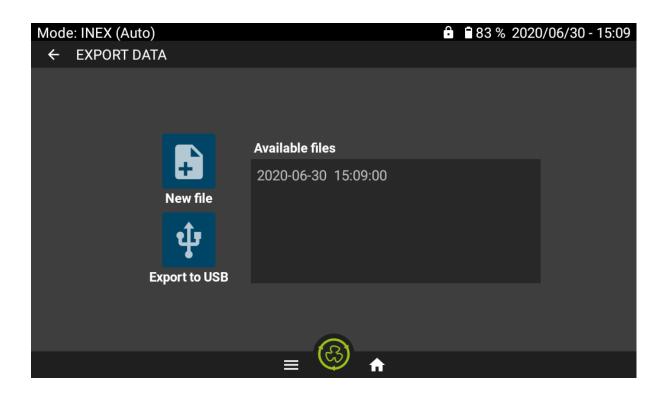
• Connect an USB key to the EO-Display

Note: Use a USB Drive formatted FAT32 / 32Go max / Class 10 / 1 partition

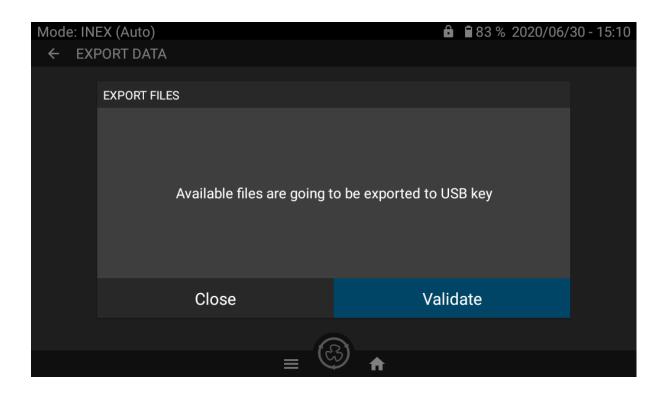
• Go to "Export Data" menu

| Coaching function      | D<br>Peak Flow    | Tidal Volu      |            | 20/12/17 - 10:56 |
|------------------------|-------------------|-----------------|------------|------------------|
| Preferences            | <b>98.6</b> L/min | 2084            |            |                  |
| Alarms                 |                   |                 |            |                  |
| Calibration            | s Exh. Time       | Pause Inh. Time | Inh. Press | CYCLES           |
| 🜵 Export data          | s                 | S S             | cmH20      |                  |
|                        |                   | 8               |            | <b>(</b> )       |
|                        | ΝΟΤ ΑΟΤΙVΑ        |                 |            | B                |
| > > > <b>(a)</b> < < < |                   |                 |            | Start / Stop     |

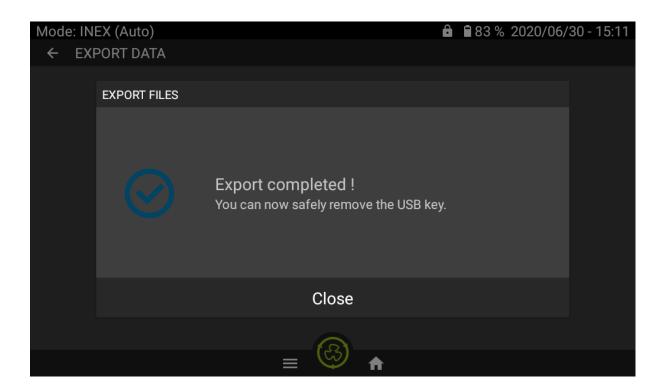
• Generate a new file if necessary, then click on Export to USB



• Click on Validate



• Wait until the export is complete



#### 6.2.3 Download Clinical data from EO-Toolkit

- Launch EO-Toolkit and connect the EO-70 SMD module to the computer by USB
- Click on settings



- Select the folder where you want to save data then click on OK

| ia eo-toolkit - home<br>File |   |                     |          |      |                  |           | - 1 | × |
|------------------------------|---|---------------------|----------|------|------------------|-----------|-----|---|
| : Evre Toolkit               |   |                     |          |      |                  | CONNECT 4 | \$  |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              | Settings                                    |                     |          |      |                  |           |     |   |
|                              | CONNECTION                                  | CHECK MODULE        | FIRMWARE | DATA | LOG              |           |     |   |
|                              | Data export directory C:\Users\Lucas.delpla | n\Desktop\LOGS E070 |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      |                  |           |     |   |
|                              |   |                     |          |      | OK EXPORT IMPORT |           |     |   |

- Click on Connect

| 🞾 eo-toolkit - home | _ |   | × |
|---------------------|---|---|---|
| File                |   |   |   |
| Eove Toolkit        | Ŕ | 3 |   |

# - Click on the dropdown menu

| 🞾 eo-toolkit - home<br>File |                  | - 🗆 X            |
|-----------------------------|------------------|------------------|
| : Eove Toolkit              | HOME             | DISCONNECT 🌵 🐯 📑 |
| DIAGNOSIS                   | MEASUREMENTS     | E00700718026     |
| Start a di                  | agnosis. 💽 START | EO-VM70          |

- Click on create EOZ.

| E00700718026         |   |
|----------------------|---|
| 00:04:3e:9b:bf:d5    |   |
| C070000401 (f3fb3c5) |   |
| 36.00                |   |
| P150000400           |   |
| 5                    |   |
| 2020-05-06 10:12:46  | /   |
| 6666                 |   |
| SERIALS              | 3   |
| 100                  | i /   |
| 1.24 h (an hour)     |   |
| 1.27 h (an hour)     | 1 Z   |
| 3408007              | 1 Z   |
| 26433.85 h (3 years) | i /   |
| 24649.66 h (3 years) | i /   |
| 14942824             | î /   |
| 14418354             | i /   |
|                      | 00:04:3e:9b:bf:d5<br>C070000401 (f3fb3c5)<br>36.00<br>P150000400<br>5<br>2020-05-06 10:12:46<br>6666<br>SERIALS<br>100<br>1.24 h (an hour)<br>1.27 h (an hour)<br>3408007<br>24649.66 h (3 years)<br>14942824 |

# 6.3 Display the observance

- Launch Clinical Software (from v1.5.0)



- Import a file and select the appropriate patient. Possibility to add a new patient if necessary (refer to user manual)

| Import file New patient Organisation Patient search | New patient<br>Organisation | Ø | • |  |
|---|-----------------------------|---|---|--|
| Organisation  | Organisation                |   |   |  |
|   |                             |   |   |  |
|   |                             |   |   |  |
| Patient search                                      | Patient search              |   |   |  |
|   |                             |   |   |  |

# - Display the observance

| ≡                          | Ø 🗑   | <b>\$</b> - ( |       |   | Event Month 👻 |                           |        |      | X      |
|----------------------------|---|---------------|-------|---|---------------|---------------------------|--------|------|--------|
| Import file                | First name EOVE                                     | 6/2/20        | 21 💌  | June 2021   | 6/2/2021 - >  | Statistics comments       |        |      |        |
| + New patient              | Last name PATIENT<br>Organisation All organisations |               |       | Observance  |               | Observance:               | 2/6/21 | >    | 2/6/21 |
| Organisation               |   | 12            |       |   |               |                           | Total  | IPPB | INEX   |
| Patient search             | Address<br>Area code<br>City                        | 10            |       |   |               | Duration (Total)          | 2 min  | 0 s  | 2 min  |
| EOVE PATIENT<br>2000-01-01 | Country France<br>Cell phone<br>Home                | 8             |       | Date: 2/6/2021<br>Duration (Total): 2 min                         |               | Duration (day)            | 2 min  | 0 s  | 2 min  |
|                            | Birth day 2000-01-01<br>Sex Male                    | - 6           |       | Treat. (Total): 10<br>Duration (INEX): 2 min<br>Treat. (INEX): 19 |               | Treatments                | 19     | 0    | 19     |
|                            | Weight<br>Height                                    | 4             |       |   |               | Average time              | 6 s    | 0 s  | 6 s    |
|                            | Administrative                                      | 2             |       |   |               |                           |        |      |        |
|                            | Hospital<br>Diagnostic code                         | o             |       | 2   |               | ∯ Observance - Use        |        |      |        |
|                            | Insurance<br>Insurance code                         |               |       | Use by day  |               | # of days of use          | 1      | 0    | 1      |
|                            | Devices   | 5             |       |   |               | # of days of use > 5 min  | o      | 0    | 0      |
|                            | <ul> <li>E00700718027</li> <li>E0070</li> </ul>     | 4             | Total |   |               | % of use > 5 min          | 0      | 0    | 0      |
|                            | VentilData-E00700718027_2021-0                      | (intes)       |       |   |               |                           |        |      |        |
|                            |   | tion (m       |       |   |               | ₿ Observance - Treatments |        |      |        |
|                            |   | 2 -           |       |   |               | # of days > 5 treatments  | 1      | 0    | 1      |
|                            |   | 1             |       |   |               | % of use > 5 treatments   | 100.0  | 0    | 100.0  |
|                            |   | 0             |       | 2   |               |                           |        |      |        |

#### - Display the events

| =                          |  | / 🗑                          | 🌣 - 🖨               |               |                       | E fount                              | h - |                                    | ×                   |
|----------------------------|--|------------------------------|---------------------|---------------|-----------------------|--------------------------------------|-----|------------------------------------|---------------------|
| Import file                | First name                               | EOVE                         | Date 🔻              | Category      | Туре                  | Description                          | -   | Monitoring Seriel Numbers comments |                     |
| New patient                | Last name<br>Organisation                | PRTIENT<br>All organisations | 03/06/2021 12:44:35 | System event  | AC back               |                                      |     | Dote                               | 02/06/2021 11:02:02 |
| Organisation               |  |                              | 03/06/2021 12:44:33 | Alarm event   | Alarm deactivated     | BATTERY < 20% (Supply)               | Ц   | Mode                               | INEX                |
| Patient search             | Address<br>Area code<br>City             |                              | 03/06/2021 12:44:01 | Alarm event   | Alarm activated       | BATTERY < 20% (Supply)               |     | Res. Rate                          | 10 c/min            |
| EDVE PATIENT<br>2000-01-01 | Country<br>Cell phone<br>Home            | France                       | 03/06/2021 12:43:49 | System event  | Device started        |                                      |     | Insp. Time                         | 3 1                 |
|                            | Birth day<br>Sex                         | 2000-01-01<br>Male           | 02/06/2021 11:02:57 | System event  | Device stopped        |                                      |     | Exp. Time                          | 2.6                 |
|                            | Weight<br>Height                         |                              | 02/06/2021 11:02:52 | System event  | Stop ventilation      |                                      |     | MON_P_TIME_U                       | 0.42 s              |
|                            | Physician                                |                              | 02/06/2021 11:02:28 | System event  | Start ventilation     |                                      |     | VTI                                | 813 mL              |
|                            | Hospital<br>Diagnostic code<br>Insurance |                              | 02/06/2021 11:02:28 | Setting event | Modification setting  | Exhal. Pressure -60cmH20 ->-30cmH20  |     | MON_FLOW_MIN_S                     | -137.3 L/min        |
|                            | Insurance code                           |                              | 02/06/2021 11:02:28 | Setting event | Modification setting  | Insp. Pressure +60cmH20> +30cmH20    |     | \$P02                              | - %                 |
|                            | E007007                                  | 718027                       | 02/06/2021 11:02:28 | Setting event | Modification setting  | Operating Mode Auto -> Manual        |     | Pulse Rate                         | - c/min             |
|                            | E0070                                    |                              | 02/06/2021 11:02:26 | System event  | Stop ventilation      |                                      |     | Supply                             | AC                  |
|                            |  |                              | 02/06/2021 11:02:02 | System event  | Start ventilation     |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:02:02 | Setting event | Modification setting  | Exhal, Pressure -40cmH20 -> -60cmH20 |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:02:02 | Setting event | Modification setting  | Insp. Pressure +40cmH20> +60cmH20    |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:59 | System event  | Stop ventilation      |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:35 | System event  | Start ventilation     |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:29 | System event  | Calibration successed |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:17 | System event  | AC back               |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:15 | Alarm event   | Alarm deactivated     | BATTERY < 20% (Supply)               |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:02 | System event  | Calibration requested |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:01 | System event  | Exit maintenance mode |                                      |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:00 | Settingevent  | Modification setting  | Exhal. Pressure -30cmH20 -> -40cmH20 |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:00 | Setting event | Modification setting  | Preset Applied Preset 1→No preset    |     |                                    |                     |
|                            |  |                              | 02/06/2021 11:01:00 | Setting event | Modification setting  | Insp. Pressure +30cmH20 -> +40cmH20  |     |                                    |                     |
| EOVE                       | Note :                                   |                              | 02/06/2021 11:00:48 | Alarm event   | Alarm activated       | BATTERY < 20% (Supply)               |     |                                    |                     |
| COVE                       |  |                              | 0100/0011100/10     | Series and    | Entor moletonomo mode |                                      | *   |                                    |                     |

#### 6.4 Software update

**WARNING:** After an API change, the clinical settings might be lost. We recommend saving settings and trends before performing an update which require an API change.

**WARNING:** The device can only operate if the CPU software and the interface have the same API version.

- Upgrade of the CPU software,
- Upgrade of the interface software.

#### Procedure from TOOLKIT

WARNING: WINDOWS 10 IS RECOMMENDED.

WARNING : MAKE SURE TO CONNECT THE VENTILATOR TO A PORT WHOSE NUMBER IS LESS THAN 10

- Launch EO-Toolkit software
- Connect the EOVE-70 module to AC power
- Connect the EOVE-70 module to the computer by usb

# - Click on Settings

-

| ila eo-tolik - home<br>File | - a ×         |
|-----------------------------|---------------|
| ree<br>Eave Toolhit         | сомиест 🜵 🍘 🗷 |
|                             | Service .     |

#### - Go to "Firmwares" tab

| Go to Think                                       |                                    |               |         |                    | - 0 ×                |
|---|------------------------------------|---------------|---------|--------------------|----------------------|
| Fichier   |                                    |               |         |                    | CONNEXION 🌵 🍪 🎫      |
| Descentres  |                                    |               |         |                    | _                    |
| Paramètres  |                                    |               |         |                    |                      |
| CONNEXION   | CONTRÔLE MODULE                    | FIRMWARE      | DONNÉES | INTERFACE          | JOURNAL              |
| Paquet pour EO-VM70 Z:\preproduction_binaries\re  | eleases\eo70\default\eo-pkg\eo70-d | lefault.eopkg | ■       |                    |                      |
| Paquet pour EO-VM150 Z:\production_binaries\relea | ases\eo150\default\eo-pkg\eo150-d  | efault.eopkg  |         |                    |                      |
|   |                                    |               |         |                    |                      |
|   |                                    |               |         |                    |                      |
|   |                                    |               |         |                    |                      |
|   |                                    |               |         |                    |                      |
|   |                                    |               |         |                    |                      |
|   |                                    |               |         |                    | OK EXPORTER IMPORTER |
|   |                                    |               |         | EOVE co-toolhit v2 |                      |

Select the software package required for the update.

| CONNECTION CHECK MODULE FIRMWARE   | DATA | INTERFACE | LOG | STREAMINGS |
|--|------|-----------|-----|------------|
| Package file for E0-VM70 C:\Users\E0VE\Documents\Software E070\e070-app-v2.0.0-C070000401-P150000400-5.eopkg |      |           |     |            |
| Package file for EO-VM150  |      |           |     |            |

NOTE: The package files include the ventilator software (CPU) and power software (PIC)

| The CPU software file is always named <b>C07</b> | 7000XXX_apiXX.H86   |
|--|---------------------|
|  | File extension      |
| CPU '  |                     |
| Ver  | ntilator            |
| n  | name API version    |
|  | Version             |
|  |                     |
| The PIC software file is always named P150       | 0000 <u>XXX.hex</u> |
|  | File extension      |
| PIC  |                     |
| Vent   | tilator Version     |
| 2  | ame                 |
| lia  |                     |

- To update CPU and PIC, click on "Update firmwares"

| i es-boollat | CONNECT | ψ | \$   | )          |
|--------------|---------|---|------|------------|
|              |         |   | <br> | - <b>1</b> |

- Connect the module to the computer by usb
- Connect the AC power to the ventilation module

| i w-bookit   | CONNECT | Ψ         | 鐐                  | E C           |
|--|---------|-----------|--------------------|---------------|
| C Updating firmwares   |         |           |                    |               |
| Firmware update  1. Connect an USB cable from the computer to the module  2. Connect AC external power supply to the module  0. CANCEL |         |           |                    |               |
| EOVE of the state  | 0       | developed | with <b>v</b> by t | the Eore team |

- Switch off the device then click on OK

| i co-loolhil |  |           | I                      | CONNECT | ψ 🕸            |                  |
|--------------|--|-----------|------------------------|---------|----------------|------------------|
|              | Updating firmwares   |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              | Firmware update CPU will be flashed with version: C070000401 |           |                        |         |                |                  |
|              | 1. Switch off the module                                     | OK CANCEL |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           |                        |         |                |                  |
|              |  |           | COVC                   |         |                |                  |
|              |  |           | EOVE co-foolkit v2.8.1 | 0de     | reloped with 🔻 | by the Eove team |

# Checking

## Once the update performed:

- Pair the EOVE-70 module to the docking station
- Go to Information tab of Maintenance menu or go to Preferences menu to check that the software versions are updated and displayed properly.

| Mode: IPPE |                        |         | Ĥ | AC 2020/12/17        | - 15:56 |
|------------|------------------------|---------|---|----------------------|---------|
| ← Prefe    | erences                |         |   |                      |         |
| 202        | 20/12/17               |         |   | *                    |         |
| 15:        | 56                     |         |   | \$                   |         |
|            |                        |         |   |                      |         |
| Info       | prmation               |         |   |                      |         |
| Ope        | erating system version |         |   | eove-eodisplay-1.5.0 |         |
| Use        | er interface version   |         |   | 2.3.0 (eodisplay)    |         |
| Мо         | dule serial number     |         |   | E00700000DFV         |         |
| CPU        | U version              |         |   | C070000604           |         |
| PO         | WER version            |         |   | P150000400           |         |
| GA         | UGE version            |         |   |                      |         |
|            |                        | <u></u> |   |                      |         |
|            |                        | ≡ 🧐 🔒   |   |                      |         |

#### 6.5 Serial numbers management

All critical components are tracked by serial number since manufacturing. The serial number must be updated in device memory if the component is replaced during maintenance operation.

NOTE: If the motherboard is changed, it's necessary to read all the serial numbers and update them in the new board.

|  | Mode: INEX (Auto)<br>← Maintenance | 0 A      | C 🗢 ¥ 2018/07/25-11:53  |                  |
|--|------------------------------------|----------|---|------------------|
|  | General                            | Counters | Information   |                  |
|  | Serials                            |          |   |                  |
|  | Module                             |          | E00700718026  |                  |
| disid.   | Blower board                       |          | 0000FB025214  |                  |
|  | Blower                             |          | 000018022036  |                  |
|  | Valve A                            |          | 0000000017X   |                  |
| and a second | Valve B                            |          | 0000000017X   | Ø (0°). M        |
|  | Battery                            |          | 00109/231801  |                  |
| [YLAD]   | Motherboard                        |          | 00FB025214  |                  |
| Der Tenn Der G.N.CC  | Pump                               |          | 0018040062  |                  |
|  | Flow sensor                        |          | 0018190137  |                  |
|  | Keyboard                           |          | 127-217463  |                  |
|  | Versions                           | 0        |   |                  |
|  |                                    | ≡ 🖾 🖬    |   |                  |
|  |                                    |          | Counters         Information           E00700718026         0000FB025214           000018022036         0000000017X           00000000017X         00109/231801           00FB025214         0018040062           0018190137         127-217463 |                  |
| -  |                                    |          |   |                  |
|  |                                    |          |   | (ˆ (△) ) (ⓐ) (ⓓ) |

- Launch EO-Toolkit
- Connect the EOVE-70 module to the computer by usb
- Click on "Connect"

| 🕘 eo-toolkit - main<br>File |  |  |           | - o | × |
|-----------------------------|--|--|-----------|-----|---|
|                             |  |  | CONNECT 4 | •   |   |
|                             |  |  |           | -   |   |

- Click on the dropdown menu to display device information

| 🐻 eo-toolkit - main<br>File |                       |            |                              |                        |    |                         | - ø ×        |
|-----------------------------|-----------------------|------------|------------------------------|------------------------|----|-------------------------|--------------|
| E0-VM70 31.00               | MAIN WAVEFORMS TRACES | STREAMINGS | SET_INEX<br>Ventilation mode | • الم                  | <  | II >                    | DISCONNECT 4 |
| Database                    | Item ;=+              |            |                              | Search a database item |    | E00700718026<br>E0-VM70 | $\bigcirc$   |
| MEAS_BAT_TEMPERATURE_S      | 24 °C                 | 240        | ~ c                          |                        | УО |                         |              |
|                             |                       |            |                              |                        |    |                         |              |

- Click on "Serials"

| EO-VM70 31.00         | MAIN WAVEFORMS TRA | ACES STREAMINGS | SET_INEX<br>Ventilation mode | - Jr 1            | L <   |                | DISCONNE                                 | ा 🖞 🌣 🛛 |
|-----------------------|--------------------|-----------------|------------------------------|-------------------|-------|----------------|--|---------|
| atabase T             | tem 👻              | =+              |                              | Search a database | eitem |                | 700718026<br><sup>11/70</sup><br>E0-VM70 | ,       |
| EAS_BAT_TEMPERATURE_S | 24 °C              | 240             | ~ c                          | + - #             |       | y0 Serial      | E00700718026                             |         |
|                       |                    |                 |                              |                   |       | MAC            | 00:04:3e:9b:bf:d5                        |         |
|                       |                    |                 |                              |                   |       | CPU            | C070000103 (722488d)                     |         |
|                       |                    |                 |                              |                   |       | API            | 31.00                                    |         |
|                       |                    |                 |                              |                   |       | POWER          | P150000301                               |         |
|                       |                    |                 |                              |                   |       | GAUGE          | 5<br>2018-07-31T11:45:39.000Z            |         |
|                       |                    |                 |                              |                   |       |                | COUNTERS SEI                             | RIALS   |
|                       |                    |                 |                              |                   |       | Battery        | 0  | /       |
|                       |                    |                 |                              |                   |       | Battery Ageing | 100                                      | /       |
|                       |                    |                 |                              |                   |       | Machine        | 0.20 hours (12 minutes)                  | /       |
|                       |                    |                 |                              |                   |       | Patient        | 0.23 hours (14 minutes)                  | /       |
|                       |                    |                 |                              |                   |       | Pump Cycle     | 27                                       | /       |
|                       |                    |                 |                              |                   |       | Pump Time      | 0.20 hours (12 minutes)                  | /       |
|                       |                    |                 |                              |                   |       | Turbine        | 0.17 hours (10 minutes)                  | /       |
|                       |                    |                 |                              |                   |       | Valve A        | 102                                      | /       |
|                       |                    |                 |                              |                   |       | Valve B        | 98                                       |         |

- ٥ × 0 SET\_INEX <u>→</u> 4 < II → MAIN WAVEFORMS TRACES STREAMINGS DISCONNECT 🜵 🏟 📰 31.00 E00700718026 E0-VM70 đ, • =+ ÷ Type Serial MAC EO-VM70 E00700718026 00:04:3e:9b:bf:d5 c + - 🗈 🗹 24 °C MEAS\_BAT\_TEMPERATURE\_S 240 y0 CPU API C070000103 (722488d) 31.00 POWER P150000301 GAUGE 2018-07-31T11:45:39.000Z 1 Battery Blower 000018022036 Blower Board 0000FB025214 Flow Sensor 0018190137 127-217463 Keyboard Mother Board 00FB025214 1 Pneumatic Block 000021-13/18 1 0018040062 Pump ı Change Blower serial Valve A 00000000172 / Valve B 0000000017X Blowe 000018022036 ок CANCEL Check in Information tab of Maintenance menu that the serial number changed is properly updated Mode: INEX (Auto) AC 🗢 🖇 2018/07/25 - 11:53 ← Maintenance General Counters Module Blower board Blower Valve A Valve B Pneumatic block
- Change the serial number required for the update and click on ok

### 6.6 Counters management

Operating time of critical components concerned by preventive maintenance must be updated in the Counters tab after a replacement.

- Launch EO-Toolkit
- Connect the EOVE-70 module to the computer by usb
- Click on "Connect"

| 🕘 eo-toolkit - main | - <del>o</del> × |
|---------------------|------------------|
| File                |                  |
|                     | соллест 🖞 🏟 🖽    |
|                     | Sampa            |

- Click on the dropdown menu to display device information

| 🝘 eo-toolkit - main<br>File |                       |            |                                     | - 0 | × t |
|-----------------------------|-----------------------|------------|-------------------------------------|-----|-----|
| E0-VM70 31.00               | MAIN WAVEFORMS TRACES | STREAMINGS | SET_INEX Vertilation mode           | Ф Ф |     |
| Detabase                    |                       |            | Search a database item E00700718026 | (   | Ľ   |
| MEAS_BAT_TEMPERATURE_S      | 24 °C                 | 240        | ✓ C + - ∎ 🗹 y0                      |     |     |

- Change the counter value required

| eo-toolkit - main      |                           |                    |            |                              |     |                |          |            |                   |                       |                                 |            | -   | ø          | ×        |
|------------------------|---------------------------|--------------------|------------|------------------------------|-----|----------------|----------|------------|-------------------|-----------------------|---------------------------------|------------|-----|------------|----------|
| Fie<br>E0-VM70 31.00   | MAIN                      | AVEFORMS TRACES ST | REAMINGS   | SET_INEX<br>Ventilation mode | Ŧ   | da l           | • <      |            | 11                |                       |                                 | DISCONNECT | ψ   | ¢          |          |
| Database               | ltem                      | <b>↓</b> =+        |            |                              | Se  | earch a databa | ise item |            |                   | 00700718026<br>0-VM70 |                                 |            |     |            | ^        |
| MEAS_BAT_TEMPERATURE_s | 3                         | 24 °C              | 240        | ~ (                          | , . | + -            | •        | уO         | Type<br>Serial    |                       | D-VM70<br>D0700718026           |            |     |            |          |
|                        |                           |                    |            |                              |     |                |          | <u> </u>   | MAC               |                       | 00700718026<br>0:04:3e:9b:bf:d5 |            |     |            | /        |
|                        |                           |                    |            |                              |     |                |          |            | CPU               |                       | 070000103 (72248                | (8d)       |     |            |          |
|                        |                           |                    |            |                              |     |                |          |            | API               |                       | 1.00                            |            |     |            |          |
|                        |                           |                    |            |                              |     |                |          |            | POWER             | P                     | 150000301                       |            |     |            |          |
|                        |                           |                    |            |                              |     |                |          |            | GAUGE             | 5                     |                                 |            |     |            |          |
|                        | Change Pump Cycle counter |                    |            |                              |     |                | Clock    | 20         | 018-07-31T14:42:4 | 0.000Z                |                                 |            | /   |            |          |
|                        |                           |                    |            |                              |     |                |          |            |                   | COUNTERS              |                                 | SERIAL     | S   |            |          |
|                        |                           |                    | Pump Cycle |                              |     |                |          |            | Battery           | 0                     |                                 |            |     |            | / ii     |
|                        |                           |                    | 27         |                              |     |                |          |            | Battery Agei      | ng 10                 | 00                              |            |     |            | / 1      |
|                        |                           |                    |            |                              | -   |                |          |            | Machine           | 0.                    | 20 hours (12 minut              | tes)       |     |            | Z 11     |
|                        |                           |                    |            |                              |     |                |          |            | Patient           | 0.                    | 23 hours (14 minut              | tes)       |     |            | / 1      |
|                        |                           |                    |            |                              |     |                | Pum      | Pump Cycle | 27                | 7                     |                                 |            |     | / 1        |          |
|                        |                           |                    |            |                              |     | OK CANCEL      |          |            | Pump Time         | 0.                    | 20 hours (12 minut              | tes)       |     |            | / 1      |
|                        |                           |                    |            |                              |     |                |          |            | Turbine           | 0.                    | 17 hours (10 minut              | tes)       |     |            | / 1      |
|                        |                           |                    |            |                              |     |                |          |            | Valve A           | 10                    | 02                              |            |     |            | 2 II S   |
|                        |                           |                    |            |                              |     |                |          |            | Valve B           | 98                    | 3                               |            | Che | inge Valve | A courte |
|                        |                           |                    |            |                              |     |                |          |            |                   |                       |                                 |            |     |            |          |

**NOTE:** The battery ageing is measured by the battery gauge and updated after a full cycle of battery charge and discharge.

- Check in Counters tab of Maintenance menu that the value is correctly updated

| Mode: INEX (Auto)<br>← Maintenance |            | €fAC 🗢         | \$ 2018/07/25 - 12:10 |  |  |  |  |
|------------------------------------|------------|----------------|-----------------------|--|--|--|--|
| General                            |            |                | Information           |  |  |  |  |
| Patient                            | Machine    | Battery cycles | Battery health        |  |  |  |  |
| <b>0</b> h                         | <b>0</b> h | 0              | 100 %                 |  |  |  |  |
|                                    |            |                |                       |  |  |  |  |
| Valve A                            | Valve B    | Pump time      | Pump cycles           |  |  |  |  |
| 87                                 | 84         | <b>0</b> h     | 23                    |  |  |  |  |
|                                    |            |                |                       |  |  |  |  |
| Turbine                            |            |                |                       |  |  |  |  |
| $\equiv \heartsuit$                |            |                |                       |  |  |  |  |

Technical Manual

# MAINTENANCE OPERATIONS

# 7 Conditions and procedures of the EOVE-70 maintenance

## 7.1 Preventive maintenance requirements

Preventive maintenance procedures refer to maintenance which must performed regularly. These operations are performed according to the maintenance schedule defined by the manufacturers and **EOVE**.

Any other maintenance operation can be added depending on your own maintenance procedures.

Noncompliance with maintenance recommendations can result in loss of performance, excessive overheating or loss of some features and, in the long term, could undermine the potential sustainability of the ventilator.

## 7.2 Repair requirements in case of EO-70 SMD failure

In case of failure the device must be returned to the technical service, authorised, and certified by **EOVE**, to perform the troubleshooting and replace the defective components according to the component replacement procedures.

# 8 Cleaning and disinfection

## 8.1 Surface disinfection

Cleaning and disinfection of the device should be performed regularly and before any maintenance operation.

- Wipe the exterior of the device with a damp cloth using a mild cleaning solution.
- Inspect the connections and circuit adapters for any moisture or contaminants.
- Replace and clean as necessary using appropriate cleaning solutions.

For all circuit components and hoses, follow the manufacturer's recommendations for cleaning and maintenance.

# 8.2 Keredusy disinfection

Keredusy is a device allowed for the disinfection of the internal air-conducting parts of the EO70SMD when surface disinfection is not enough. As disinfectant, the Keredusy uses a solution composed of ozone and hydrogen peroxide which will be distributed by the air flow of the EO-70 SMD.



It permits to disinfect the returned EO70SMD in accordance to a validated procedure of Keredusy Manufacturer\* before using the device again on patient.

Moreover, it limits the risk of contamination while the technical staff repairs or maintains the ventilator.

Keredusy can only be used on EO-70 SMD after a request of authorization given by EOVE sales department. Furthermore, a maximum number of 5 disinfections can be performed on the EO70SMD.

NOTE: the kit Keredusy EO70 (*ref SP-KRDUSY70*), mainly composed of the turbine, filters and various sealing rings, must be replaced after each disinfection.

\* This procedure is under the responsibility of the Keredusy manufacturer. EOVE is not responsible of the disinfection performances

**WARNING:** As disinfectant the Keredusy uses ozone (O3) as well as hydrogen peroxide solution which will be distributed by the air flow of the respirator. The ozone & hydrogen peroxide solution used is a dangerous and toxic gas for the humans, animals and the environment. For such disinfection process, the rules of safety and cautions defined by the manufacturer shall be formally followed. We recommend minimizing Ozone & hydrogen peroxide solution release by ensuring the complete sealing of the Keredusy installation. Moreover, prevent inhalation by tools and solutions adapted to the risks. In general, it is suitable to control air concentration and use a gas vacuum system at the gas supply as well as general ventilation of the premises.

**WARNING:** Never perform Keredusy disinfection while EO-70SMD is opened and/or internal pneumatic circuit disconnected.

**WARNING:** After a Keredusy disinfection process, the waste of the ozone & hydrogen peroxide solution shall be managed in a way to reduce the impact and risk for the environment. The rules defined by the manufacturer shall be formally followed.

In case Keredusy disinfection is not possible, the following part must be replaced to reuse the device on patient:

- SP-PNEUBLOCK-001: pneumatic bloc and patient outlet
- SP-PNEUTUB-001: tubes and sealing rings
- SP-INSFLOWSENS-001 inspiratory flow sensor
- SP-KRDUSY70: Kit Keredusy EOVE-70

## 8.3 Guarantee of the cleanliness of the appliance

After each cleaning operation, the technician must affix a mark on the device to ensure the user that it is clean and ready for use.

# 9 Periodical controls

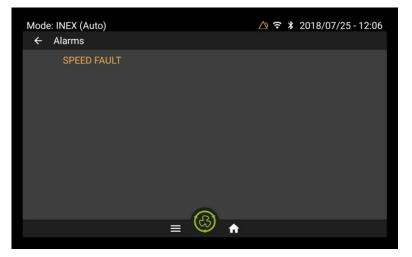
Periodical controls are recommended every year:

- Apply cleaning and disinfection recommendations
- Inspect the condition of the connections and circuit adapters for any moisture or contaminants
- Replace the two air filters (replace earlier if dirty or dusty)

| $\Lambda$ | CAUTION                                     |
|-----------|---|
|           | The air filters cannot be washed or reused. |



• Control among the alarms & the events that nothing is unusual



- Check the status condition of the battery. Replace it if there is any sign of impacts or damage.
- Make the EOVE-70 SMD operate on battery mode and AC power source. Full charge the battery if necessary
- Check the software versions and update them if necessary

# **10 Preventive maintenance operations**

The EOVE-70 should be regularly serviced by an authorized EOVE technician according to the following schedule. The SMD device will provide safe and reliable functioning for 10 years provided that it is operated and maintained in accordance with the instructions given in this manual. As with all electrical devices, if any problem arises with your EO 70 device, you should exercise caution, and have it inspected by an authorized EOVE technician.

## 10.1 Preventive maintenance schedule

|  |                     | Back to<br>technical |  |
|--|---------------------|----------------------|--|
| Preventive maintenances                              | Periodicity         |                      |  |
|  |                     | service              |  |
| Storage period                                       | 6 months            | YES                  |  |
| Cleaning and disinfection                            | 6 months            | NO                   |  |
| Replacement of the air filter                        | 1 year              | NO                   |  |
| Spare parts - battery storage (battery disconnected) | 6 months            | YES                  |  |
| Replacement of internal filter and valves            | 2 years             | YES                  |  |
| Replacement of the battery (EOVE1 and EOVE3)         | 70 % ageing         | YES                  |  |
| Replacement of the pump                              | 1000 hours          | YES                  |  |
| Dusting of EO-Display fan and heatspreader           | 2 years             | YES                  |  |
| Replacement of sealing rings and hoses               | 2 years (OPTIONNAL) | YES                  |  |
| Replacement of internal flow sensor                  | 4 years (OPTIONNAL) | YES                  |  |
| Replacement of the solenoid valves                   | 100 millions cycles | YES                  |  |
| Replacement of the turbine                           | 20 000 hours        | YES                  |  |

# 10.2 List of required preventive maintenance

**WARNING**: EOVE is not responsible for the proper recycling of your maintenance waste. Recycling procedures must be strictly followed in compliance with laws in effect in the distributed country. Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability. Batteries, turbines, electro-valves, and other plastic parts must follow appropriate collection and recycling process in compliance with country regulations.

## 10.2.1 1-year servicing operation

- Cleaning and disinfection of the device exterior
- Replacement of the two air filters
- Perform periodical controls

#### 10.2.2 2 years maintenance operation

- Replacement of internal filter and the 4 valves

OPTIONAL: Replacement of the tubes and sealing rings (depending on device operating time, cleanliness of tubes which must not be becoming yellow, number of disinfections performed).

#### 10.2.3 4 years maintenance operation

- Replacement of internal flow sensor
- 2 years maintenance

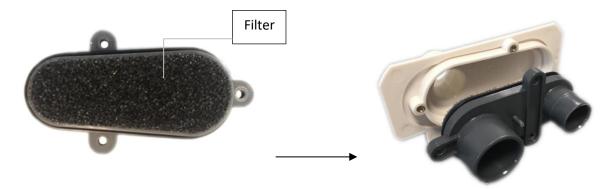
#### 10.2.4 Other maintenance operation

- Replacement of the pump after 1000 hours
- Replacement of the turbine after 20 000 hours
- Replacement of the 2 solenoid valves after 100 million cycles

**NOTE:** It is recommended to replace the 2 solenoid valves as soon as one of them reaches the cycles limit.

#### 10.3 Filter and valves

The filter and the 4 valves must be changed at least every 2 years.

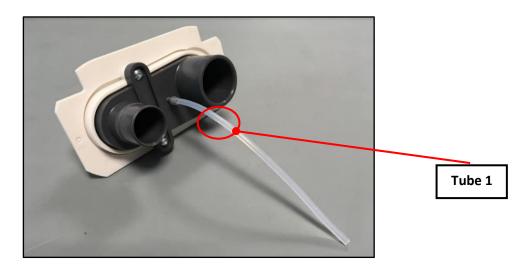


The filters can get clogged more quickly depending on the environment of use. Change the filter more frequently if necessary.

**WARNING:** The filter cannot be washed or reused.

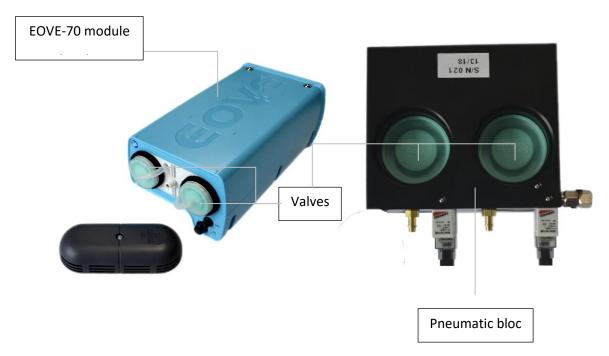
## 10.3.1 Control the pneumatic sealing of the patient circuit port

- Without any port plugged, apply a pressure on the tube 1.
- Check that the pressure drops



- Plug the various ports with Sealing Test Plugs (SP-SEALPLUG-001) and apply a pressure of 100mbar
- Check that pressure does not drop





#### 10.3.2 Inhalation & Exhalation valves

## 10.4 Battery

## 10.4.1 Internal battery information

EOVE-70 SDM which reach a storage period exceeding six months could have undergone degradation on internal battery.

That is why we hardly recommend to fully charging the module at least every six months during a period of inactivity. That will avoid a total discharge and irreversible damages on the battery.

Note that the battery must reach a full charge before storing the device for

6 months.





Internal batteries EOVE1 and EOVE3 (*ref SP-INTBATT-001 and SP-INTBATT-002*) must be replaced when their ageing reaches 70%.

The battery ageing is available in the "Counters" tab.

**WARNING:** The disposal of defective batteries should be done in compliance with the laws in effect in your country. Lithium-Ion battery, when defective, might present explosion or combustion risks. Used batteries must be stored in closed ratified boxes with appropriate protection (like vermiculite) against impacts and overheating propagation.

Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

**WARNING:** Environmental accidents such as earthquakes, floods, hurricanes, tsunamis, and safety risks they can cause onto the device on the maintenance center, have no environmental impact except fire. Indeed, Lithium-Ion battery combined with heat exposure may increase fire and explosion risks, and release dangerous and toxic gas for the humans, animals and the environment. Store the batteries away from sun exposure and flammable materials, on a non-combustible surface.

**WARNING:** Spare parts batteries must only be provided by EOVE.

Batteries supplied as spare parts are shipped with a charge of 30%. They can be stored for 6 months if they are not connected.

In case of a battery replacement, the ageing resets after a full cycle of charge and discharge.

**NOTE:** After a discharge, we recommend to fully charge the battery before storing the ventilator. Even if the device must be serviced, that will save the battery life.

**NOTE:** We recommend using sometimes the ventilator on battery mode to increase battery life.

#### 10.4.2 Configuration of the new battery

**NOTE:** The following operations detail the steps of the internal battery replacement.

**WARNING:** According to the S/N and the battery model, EO-Toolkit wizard performs the recovery or programming of the appropriate battery gauge.

- Connect the module to the computer by usb
- Start EO-Toolkit and click on "Connect"
- Click on the top left corner and select Module Repairs

| olkit - home                    |                              |   |                        |            |   |   | 0 |
|---------------------------------|------------------------------|---|------------------------|------------|---|---|---|
| Module Insight                  | HOME                         |   |                        | DISCONNECT | ψ | 墩 | Ξ |
| Module Check DIAGNO             | S                            | MEASUREMENTS                                    | E0070071802<br>E0-VM70 | 26         |   |   | ~ |
| Module Repairs                  | Start a diagnosis. START     |   | 20-4470                |            |   |   |   |
|                                 |                              |   |                        |            |   |   |   |
|                                 |                              |   |                        |            |   |   |   |
| - Select Cha                    | nge battery                  |   |                        |            |   |   |   |
|                                 | the operation, click on Sta  | art operation                                   |                        |            |   |   |   |
| olkit - home                    |                              |   |                        |            |   | - | 0 |
|                                 |                              |   |                        |            |   | - |   |
| -toolkit                        |                              |   |                        |            | ψ | 鐐 |   |
| E00700718026                    |                              |   |                        |            |   |   |   |
| EO-VM70                         | D-there exists 00100/0016    |   |                        |            |   |   |   |
| Denning executions              | Battery serial: 00109/2318   | 01  |                        |            |   |   |   |
| Repairs operations              | 1 Connection                 |   |                        |            |   |   |   |
| Change mother board             | Plug an USB cable            | between the computer and the ventilation module |                        |            |   |   |   |
| Change battery                  | Click next when do           |   |                        |            |   |   |   |
| START OPERATION                 |                              |   |                        |            |   |   |   |
| START OPERATION                 | NEXT                         |   |                        |            |   |   |   |
| Serial E00700718026             | 2 Battery type selection     |   |                        |            |   |   |   |
| MAC 00:04:3e:9b:bf:d5<br>(BT33) | Battery type selection       |   |                        |            |   |   |   |
| CPU C070000605<br>(741165a)     | Enter the new battery serial | number  |                        |            |   |   |   |
|                                 |                              |   |                        |            |   |   |   |
| API 39.01                       | Change battery               |   |                        |            |   |   |   |
| API 39.01<br>POWER P150000400   |                              |   |                        |            |   |   |   |
|                                 |                              |   |                        |            |   |   |   |
| POWER P150000400                | 5 Battery configuration      |   |                        |            |   |   |   |

#### - Select the battery model

| eo-toolkit - home                 |                                     |   | - | 0       | × |
|-----------------------------------|-------------------------------------|---|---|---------|---|
| le                                |                                     |   |   |         |   |
| eo-toolkit                        |                                     | ψ | 鐐 | <b></b> |   |
| E00700718026<br>E0-VM70           | Change battery                      |   |   | _       |   |
| EC-AMALO                          | Battery serial: 00109/231801        |   |   |         |   |
| Repairs operations                | Connection                          |   |   |         |   |
| O Change mother board             |                                     |   |   |         |   |
| Change battery                    | 8 Battery type selection            |   |   |         |   |
| STOP OPERATION                    |                                     |   |   |         |   |
| Serial E00700718026               | the cove ce                         |   |   |         |   |
| MAC 00:04:3e:9b.bf:d5<br>(8T33)   |                                     |   |   |         |   |
| CPU C070000605<br>(741165a)       | € EOVE3                             |   |   |         |   |
| API 39.01                         | O EOVE1                             |   |   |         |   |
| POWER P150000400                  |                                     |   |   |         |   |
| GAUGE 5 (EOVE1)                   |                                     |   |   |         |   |
| Clock 03/21/2022 2:57:43          |                                     |   |   |         |   |
| Station<br>maintenance6666<br>PIN |                                     |   |   |         |   |
|                                   | NEXT                                |   |   |         |   |
|                                   |                                     |   |   |         |   |
|                                   | Enter the new battery serial number |   |   |         |   |
|                                   | Change battery                      |   |   |         |   |
|                                   | Battery configuration               |   |   |         |   |

**NOTE:** The 2 batteries models have their own references. Refer to the *Appendix 4: Spare Parts List* to get the references.

- Enter the new serial number of the battery and click on Next

| olkit  | візсомнест 🖞 🎕                      | 1 |
|--|-------------------------------------|---|
| E00700718026<br>E0-VM70                                | Change battery                      | _ |
| Repairs operations                                     | Battery serial: 00109/231801        |   |
| O Change mother board                                  | Ī                                   |   |
| Change battery   | Statery type selection              |   |
| STOP OPERATION   | Enter the new battery serial number |   |
| Serial E00700718026<br>MAC 00:04:38:9b:bf:d5           | Battey serial<br>VCA2027199         |   |
| (BT33)<br>CPU C07000605<br>(741165a)                   | NEXT                                |   |
| API 39.01<br>POWER P150000400                          | Change battery                      |   |
| GAUGE 5 (EOVE1)  | Battery configuration               |   |
| Clock 03/21/2022 3:07:08<br>Station<br>maintenance6666 |                                     |   |
| PIN  |                                     |   |

**NOTE:** To get the correct serial number, refer to the labels of the batteries detailed in the *Appendix 3: Components serial numbers* 

**WARNING:** Before the next operation, disconnect the ventilator from the AC power source.

- Replace the battery by the new one
- Plug AC to the ventilation
- Connect the ventilation module to the computer by USB

- 0 ×

| Cli     | ick on Next                       |                                      |   | _ | 0 | > |
|---------|-----------------------------------|--------------------------------------|---|---|---|---|
|         |                                   |                                      |   |   |   |   |
| loolkit |                                   |                                      | ψ | 鐐 |   |   |
|         | E00700718026                      | Change battery                       |   |   | _ |   |
|         | EO-VM70                           | Battery serial : 00109/231801        |   |   |   |   |
|         | Repairs operations                | ✓ Connection                         |   |   |   |   |
|         | O Change mother board             |                                      |   |   |   |   |
|         | Change battery                    | Sattery type selection               |   |   |   |   |
|         | STOP OPERATION                    | Senter the new battery serial number |   |   |   |   |
|         | Serial E00700718026               |                                      |   |   |   |   |
|         | MAC 00:04:3e:9b:bf:d5<br>(BT33)   | Change battery                       |   |   |   |   |
|         | CPU C070000605<br>(741165a)       | Battery configuration                |   |   |   |   |
|         | API 39.01                         | Configuring battery                  |   |   |   |   |
|         | POWER P150000400                  |                                      |   |   |   |   |
|         | GAUGE 5 (EOVE1)                   |                                      |   |   |   |   |
|         | Clock 03/21/2022 3:07:40          |                                      |   |   |   |   |
|         | Station<br>maintenance6666<br>PIN |                                      |   |   |   |   |

- During the next step, the wizard proceeds to the "configuring battery"

| Var eo-toolkit - home<br>File   |  |                            |                              | -             | 0  | × |
|---|--|----------------------------|------------------------------|---------------|----|---|
| i co-boollit  |  |                            | DISCONNECT                   | ¢ 🕸           | 11 |   |
| t αr-fasilit<br>E00700718026<br>E0-VAT0<br>Repairs operations<br>○ Change mother board<br>③ Change mother board<br>④ Change battery<br>STOP OPERATION<br>Serial E00700718026<br>MAC 00143 €900145<br>(01300<br>CPU C0700718026<br>MAC 00143 €900145<br>CPU C0700718026<br>CPU C070070718026<br>CPU C07007070707<br>CP | Battery serial: 00VCA2027199<br>Connection<br>Battery type selection<br>Criter the new battery serial number<br>Change battery<br>Battery configuration<br>Configuring battery | Change battery             | RECORDECT                    | * *           |    |   |
|   |  |                            |                              |               |    |   |
|   | Info O<br>Battery gauge updated  | EOVE 👳 🖨 er-broßiel val.to | <ol> <li>develope</li> </ol> | d with ¥ by t |    | m |

**NOTE:** During this operation, the battery gauge configuration is performed, and the battery ageing resets.

**NOTE:** A notification appears when the battery gauge update is successful.

# 10.5 Pump

The lifetime of the pump is 1000 hours and an alarm triggers when this duration is reached.



The pump counter is available in the "Counters" tab of Maintenance menu.

## 10.6 Turbine

The lifetime of the turbine is 20 000 hours and an alarm triggers when this duration is reached.



The turbine counter is available in the "Counters" tab of Maintenance menu.

## 10.7 Solenoid valve

The two solenoid valves must be replaced after 100 million cycles and an alarm triggers when this duration is reached.



Solenoid valves counters are displayed in the "counters" tab of the maintenance menu (valve A and valve B).

## 10.8 Inspiratory flow sensor

The inspiratory flow sensor can be replaced after 4 years of operating time depending on sensor conditions (dust, offset, water traces). We recommend checking cleanliness of its external filters and the accuracy of the measure by performing the 2-year maintenance operation with device performance controls.

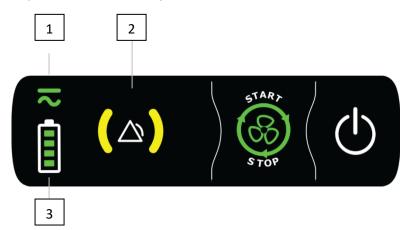


# **11** Curative maintenance

# 11.1 Alarms

## 11.1.1 Failure warning alarm

An alarm, lights on the keyboard and a warning message on the display screen warns the patient when there is a technical problem. The user must immediately contact a technician certified by EOVE and the repair should be performed as soon as possible.



- 1. Power source indicator
- 3. Battery level indicator

- 2. Keyboard alarm indicator
- 4. Interface alarm indicator



## 11.1.2 Alarms conditions

| Alarm            | Condition / Cause   | Action   |
|------------------|---|--|
| Speed Fault      | Speed < 1000 rpm<br>during ventilation                        | <ul> <li>Check CPU software version</li> <li>Check the connection between the blower board and the motherboard</li> <li>Check the inspiratory flow sensor conditions</li> <li>Control vent. Performances</li> <li>Replace the defective part according to your inspection</li> </ul>   |
| Supply Fail      | Communication lost wit<br>h power system                      | <ul> <li>Try to update PIC &amp; CPU software versions</li> <li>Control device operation on the different power modes (battery and AC)</li> <li>Replace the motherboard if the alarm still triggers</li> </ul>   |
| Battery Fail     | Battery doesn't charge<br>properly or battery out<br>of order | <ul> <li>Check software versions and update if necessary</li> <li>Replace the battery</li> </ul>   |
| CPU Fail         | Internal failure  | - Replace the motherboard  |
| Check Settings   | Discount all values<br>by default (voluntarily)               | <ul> <li>Restart the device and check that the alarm disappeared</li> <li>Control that settings have not been erased after a software update</li> <li>Set the patient configuration</li> </ul>   |
| Memory Fail      | Lost setting value or<br>Loss of memorized<br>value           | <ul> <li>Restart the device and check that the alarm disappeared</li> <li>If not, replace the motherboard</li> </ul>   |
| Prox. Fail       | Sensor out of service   | - Replace the motherboard  |
| Keyboard fail    | Button pressed longer than 20 seconds                         | <ul> <li>Check that the keyboard operates properly (LEDs + buttons)</li> <li>If not, replace the keyboard</li> </ul>   |
| Bat. Temp High   | Battery temperature<br>out of range during<br>discharge       | <ul> <li>Stop using the device on battery mode</li> <li>Let the SMD cool down for 1 hour</li> <li>Check PIC software version and update if necessary</li> <li>Check that the blower turbine isn't too high and so overheats the battery</li> <li>Start a new treatment</li> <li>Replace the battery if the alarm still triggers</li> </ul> |
| Turbine Overheat | Blower temperature<br>>80°C                                   | <ul> <li>Check on SDM inlet/outlet that there is no obstruction</li> <li>Return the device to technical service</li> <li>Open SMD and check pneumatic block sealing</li> <li>Check that there is no leak on internal tubes</li> <li>Control vent. performances</li> <li>Replace the turbine if it still overheats</li> </ul>               |

| Turbine Fail                | Blower temperature  | - Check CPU software version  |
|-----------------------------|---|---|
|                             | Blower temperature<br>out of range or<br>temperature not in<br>accordance with speed<br>measure | <ul> <li>Check CPO software version</li> <li>Return the device to technical service</li> <li>Open SMD and check pneumatic block sealing</li> <li>Check that there is no leak on internal tubes</li> <li>Check the connection between the blower board and the motherboard</li> <li>Check the inspiratory flow sensor conditions</li> <li>Control vent. Performances</li> <li>Replace the defective part according to your inspection</li> </ul>   |
| Insp. Flow Fail             | Sensor out of<br>service (3 attempts<br>to reinit sensor<br>unsuccessful)                       | <ul> <li>Check software versions and update if necessary</li> <li>Replace the inspiratory flow sensor</li> </ul>  |
| Abs. Pressure Fail          | Sensor out of service   | - Replace the motherboard   |
| High Pressure               | Pressure >80 mbar   | <ul> <li>Check on SDM inlet/outlet that there is no obstruction</li> <li>Return the device to technical service</li> <li>Check that the two solenoid valves operate properly</li> <li>Check that the inhalation/exhalation valves operate properly</li> <li>Check that there is no obstruction within the pneumatic block and tubes</li> <li>Check the offset value from EO-Toolkit</li> <li>Control vent. Performances</li> <li>Replace the motherboard if the problem still occurs</li> </ul> |
| Bat. Charge Pause (T<br>°>) | Temperature<br>>45° or <0°c<br>during charge  | <ul> <li>Check ambient environment and let the SMD cool down in a cooler place</li> <li>Check software versions and update if necessary</li> <li>Replace the battery if the problem still occurs in charge</li> </ul>   |
| Pressure fault              | Difference between<br>pressure measured and<br>pressure expected                                | <ul> <li>Check on SDM inlet/outlet that there is no obstruction</li> <li>Return the device to technical service</li> <li>Check that the two solenoid valves operate properly</li> <li>Check that the inhalation/exhalation valves operate properly</li> <li>Check that there is no obstruction within the pneumatic block and tubes</li> <li>Control vent. Performances</li> <li>Replace the motherboard if the problem still occurs</li> </ul>   |
| BATTERY < 20%               | Battery < 20%   | - Connect AC external power supply  |
| BATTERY < 10%               | Battery < 10%   | - Connect AC external power supply  |
| GAUGE COM. FAIL             | Battery Gauge not<br>functional   | <ul> <li>Plug AC power</li> <li>Reboot the SMD</li> <li>If the problem still occurs, replace the internal battery</li> <li>If the problem occurs again, replace the CPU Board</li> </ul>  |
| Battery<br>Maintenance      | Battery ageing < 70%  | <ul> <li>Replacement of internal battery during preventive<br/>maintenance</li> </ul>   |
|                             |   | 00  |

| Turbine              | Turbine counter >                      | - | Replacement of turbine during preventive maintenance                  |
|----------------------|--|---|---|
| Maintenance          | 20 000 hours                           |   |   |
| Valve<br>Maintenance | Valve counter ><br>100 millions cycles | - | Replacement of exhalation control valve during preventive maintenance |
| Pump<br>Maintenance  | Pump counter ><br>1000h                | - | Replacement of pump during preventive maintenance                     |

# 11.2 EO-Toolkit Event log

| Love Toolkit          |                                     | HOME LOG      |  |        |       | DISCON | чест 🜵 | 繱 |
|-----------------------|-------------------------------------|---------------|--|--------|-------|--------|--------|---|
| 5 × E                 | Auto update 1/01/2099 12:00 AM Name | Category      | ۹ <b>۲</b>   |        |       |        |        |   |
| DATETIME              | NAME                                | CATEGORY      | DETAILS  | SUPPLY | VENT. |        |        |   |
| 2019/02/19 - 18:11:45 | Alarm activated                     | Alarm event   | BATTERY FAIL   |        | 35 î  |        |        |   |
| 2019/02/19 - 18:11:27 | AC back                             | System event  |  |        | 35    |        |        |   |
| 2019/02/19 - 18:11:27 | Device started                      | System event  |  |        | 35    |        |        |   |
| :019/02/19 - 18:11:27 | Modification setting                | Setting event | SET_SERIAL_Gauge_Version_0 change<br>from 5 to 65535 | ed     | 35    |        |        |   |
| 019/02/19 - 18:11:05  | Device stopped                      | System event  |  | 0      | 35    |        |        |   |
| 2019/02/19 - 18:02:43 | Device started                      | System event  |  |        | 35    |        |        |   |
| 2019/02/19 - 17:33:04 | LOG_AUTO_STOP_DEVICE                | System event  |  | ۵      | 35    |        |        |   |
| 019/02/19 - 16:59:05  | Stop ventilation                    | System event  |  | 0      | 55    |        |        |   |
| 2019/02/19 - 16:58:57 | Start ventilation                   | System event  |  | ۵      | 35    |        |        |   |
| 2019/02/19 - 16:12:52 | Stop ventilation                    | System event  |  | 0      | 35    |        |        |   |
| 2019/02/19 - 16:12:24 | Start ventilation                   | System event  |  | ۵      | 35    |        |        |   |
| 2019/02/19 - 15:53:15 | Stop ventilation                    | System event  |  | ۵      | 35    |        |        |   |
| 2019/02/19 - 15:53:08 | Start ventilation                   | System event  |  | 0      | 35    |        |        |   |
| 2019/02/19 - 15:46:36 | Modification setting                | Setting event | Mode changed from 1 to 0                             | 0      | 55    |        |        |   |
| 019/02/19 - 15:40:58  | Event station detection             | System event  | Module removed from the station                      | 0      | 55    |        |        |   |
| 2019/02/19 - 15:40:24 | Stop ventilation                    | System event  |  | 0      | *     |        |        |   |
| 2019/02/19 - 15:40:14 | Start ventilation                   | System event  |  | 0      | 30 -  |        |        |   |

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# 11.3 Troubleshooting

#### 11.3.1 Troubleshooting trees

Check alarms conditions (\$9.1.2) and the troubleshooting trees for additional information about the trigger of an alarm and the action to perform.

#### 11.3.2 EO-Toolkit troubleshooting assistance

EO-Toolkit can provide technical assistance in case of alarm triggering. The diagnosis feature launches a scan among the event and look for all the alarms which triggered and their occurrence. Then it suggests some actions you might perform to solve the issue.

- Connect the EOVE70 SMD to the computer by usb and switch it on
- Start EO-Toolkit and click on connect
- Click on START to launch a diagnosis

| 🚾 eo-toolkit - home<br>File |                    |                     |      | -     | ٥  | × |
|-----------------------------|--------------------|---------------------|------|-------|----|---|
| File                        |                    |                     |      |       |    |   |
| Eove Toolkil HO             | LOG                | DISCON              | NECT | र्भ इ | ٤ć |   |
|                             | DIAGNOSIS          | Iodule informations |      |       |    | ~ |
| Start a c                   | diagnosis. 💽 START | 0-VM70              |      |       |    |   |

- Check the alarm didn't trigger during some tests or is not an old alarm remaining in the event log
- Check the alarm reason is in accordance with device failure or the failure can be reproduced
- Check if the alarm is triggered by an issue different from the problem reported for the maintenance operation

| 📾 eo-toolkit - home<br>File |   |  |            | -    | ٥  | ×   |
|-----------------------------|---|--|------------|------|----|-----|
| Eove Toolkit                | HOME  |  | DISCONNECT | ψ \$ | \$ |     |
|                             | DIAGNOSIS   | E00700718026<br>E0-VM70                                    |            |      |    | ^   |
|                             | Start a diagnosis                                 | Type         EQ-VM70           Serial         E00700718026 |            |      |    |     |
|                             |   | Serial E00700718026<br>MAC 00:04:3e:9b:bf:d5               |            |      |    | /   |
|                             | DETECTED ISSUES                                   | UNDETECTABLE ISSUES CPU C070000201 (4cddd                  | 14)        |      |    |     |
|                             | DETECTED ISSUES                                   | UNDETECTABLE ISSUES API 34.00                              |            |      |    |     |
|                             |   | POWER P150000400   |            |      |    |     |
| 1 ALARM_BATTERY_FA          | Equind 1  | GAUGE 5  |            |      |    |     |
|                             | t charge properly or battery out of order         | Clock 2019-02-20T16:30:3                                   | 9.000Z     |      |    | 1   |
| Occurences:                 | Actions:  | COUNTERS   | SERIAL     | S    |    |     |
| - 2019/02/19 - 18:11:45     | - Check software versions and update if necessary | Battery Ageing 100   |            |      | F  | 1 / |
|                             | - Replace the battery                             | Machine 0.42 h (25 minutes)                                |            |      |    |     |
|                             |   | Patient 0.45 h (27 minutes)                                |            |      | P  | 11  |
|                             |   | Pump Cycles 3407879  |            |      | F  | i / |
|                             |   | Pump Time 26432.88 h (3 years)                             |            |      | P  | 82  |
|                             |   | Turbine 24648.83 h (3 years)                               |            |      |    | 1 Z |
|                             |   | Valve A 14942324   |            |      | F  | 1 / |
|                             |   | Valve B 14417929   |            |      | F  | i / |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |
|                             |   |  |            |      |    |     |

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- Perform the actions advised to fix the issue

# 11.3.3 Common SMD failure

Regarding EOVE-70 SMD operation, some failure associated to critical components such as the turbine, the motherboard or the battery must trigger alarms, but some breakdowns might not. These breakdowns can cause an unexpected noise or degrade SMD performances. This is a low priority incident but when the user notes something wrong about device operation, it is recommended to return it to technical service to be controlled and fixed if necessary.

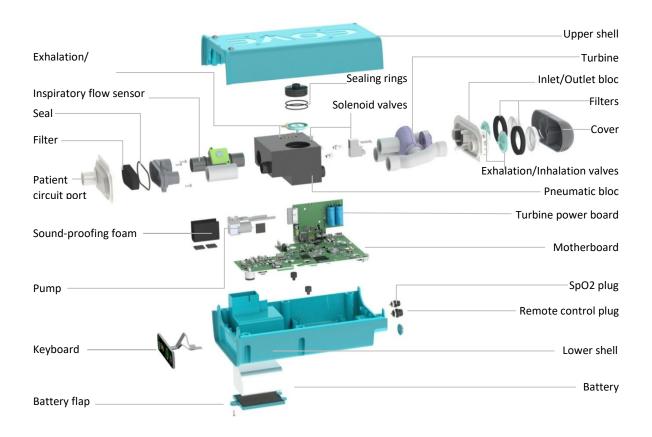
| DESIGNATION  | CAUSE   | INCIDENCE   | ACTION  |
|--|---|---|---|
| Solenoid valve A<br>electrical default               | wires or connector<br>damaged   | Solenoid valve A can't operate. No<br>positive pressure and unexpected<br>noise during inhalation phase<br>which can't be satisfactory.   | Replace solenoid valve<br>A<br><b>NOTE</b> : We recommend<br>replacing both solenoid<br>valve if you must<br>change one.  |
| Solenoid valve B<br>electrical default               | wires or connector<br>damaged   | Solenoid valve B can't operate. No<br>negative pressure and unexpected<br>noise during exhalation phase<br>which can't be satisfactory.   | Replace solenoid valve<br>B.<br><b>NOTE</b> : We recommend<br>replacing both solenoid<br>valve if you must<br>change one. |
| Solenoid valve A<br>pneumatic default                | tube disconnected,<br>leak or exhalation<br>valve blocked.                    | Device noisier during inhalation<br>phase and exhalation valve doesn't<br>operate. The EOVE-70 SMD can<br>operate but turbine overheats<br>quickly and need several minutes<br>after treatment stop to cool down. | Replace the defective tube or reconnect it  |
| Solenoid valve B<br>pneumatic default                | tube disconnected,<br>leak or inhalation<br>valve blocked                     | Device can't operate  | Replace the defective tube or reconnect it  |
| Error of<br>inhalation/exhalati<br>on valves control | tubes between<br>inhalation/exhalation<br>valves and pneumatic<br>bloc mixed. | Device can't operate. Solenoid<br>valves don't control the correct<br>inhalation/exhalation valves  | Refer to pneumatic<br>drawing to connect<br>properly the tubes on<br>the right position                                   |
| Pump pneumatic<br>default                            | Pump backflow tube disconnected, not seal or pinched                          | Insufficient pressure during<br>inhalation phase  | Replace or reconnect<br>the pump backflow<br>tube   |
| Pump electrical<br>default                           | Pump electrical<br>power disconnected<br>or damaged (wires or<br>connector).  | Insufficient pressure to control the valves. Device doesn't operate properly  | Replace the pump  |

# 12 EO-70 SMD module: Replacement procedures

# 12.1 List of components

## 12.1.1 EOVE-70 SMD module structure

Refer to spare parts list to get the references of components.



#### EOVE-70 SMD module architecture

**WARNING:** BEFORE ANY REPLACEMENT OPERATION, DISCONNECT THE BATTERY AND DISCONNECT THE EOVE-70 SMD FROM THE POWER SOURCE.

**WARNING:** AFTER REPLACING A COMPONENT, YOU SHOULD FILL THE NEW SERIAL NUMBER IN THE SMD MEMORY.

To ensure the proper functioning of the eove-70 secretion management device and the safety of the user and their entourage, the procedures described below must be strictly applied.

The device must be clean before any maintenance operation.

# 12.2 Air Filter

- Unscrew the cover and remove it
- Disconnect the two tubes from the inhalation/exhalation valves
- Remove the two old filters and replace them by new ones
- Connect back the tubes

WARNING: Pay attention to connect the correct tube on the right position

- Place back the cover and screw it



# 12.3 Battery

2

- Remove the module from the housing unit and turn it over.
- Remove the fixing screw (1) from the battery flap (2).
- Remove the battery flap and clean it.
- Remove the battery (3) and disconnect it from the extension cable.



- Place the new battery carefully in its housing with the battery facing in the correct direction (label providing battery technical data on the upper side. Label providing serial numbers on the opposite side).

1

- Position the cover and the fixing screw.
- Check the device is operational on internal battery and perform a battery cycle of charge and discharge.

**WARNING:** THE BATTERIES MUST BE HANDLED WITH CARE. CHECK THE CONDITION OF THE NEW BATTERY. DO NOT USE IF THERE IS ANY SIGN OF DAMAGE.

**NOTE:** The new battery must charge for 5 hours before use.

Check the condition of protective foams and replace if necessary.

NOTE: The EO70 SMD can be equipped by the battery model EOVE 001 (SP-INTBATT-001, yellow) or the battery model EOVE3 (SP-INTBATT-002, black) depending on the manufacturing batch.



3

The battery model EOVE3 (ref SP-INTBATT-002), colored black, is coming in substitution of the battery model EOVE1 (ref SP-INTBATT-001) to overcome its obsolescence.

The disposal of defective batteries should be done in compliance with the laws in effect in each country.

Batteries bought in spare-parts are sent with a charge of 30%. They can be stored for 6 months if they are not connected. In case of a battery replacement, the ageing resets after a full cycle of charge and discharge.

**NOTE:** After replacing an internal battery, you should fill the new serial number to the SMD memory during the "set serial numbers" test of the performance controls via EO-Toolkit

Refer to the labels of the batteries detailed in the Appendix 5: Components serial numbers

**NOTE:** After a discharge, we recommend to fully charge the battery before storing the device. Even if the device must be serviced, that will save the battery life.

**NOTE:** Keep the original EOVE-70SMD screw. Pay attention to not exchange it with the one from EOVE-150VNT which is different.

## 12.4 Module disassembly

Some maintenance operations require to open the EOVE-70 SMD. Be sure to strictly observe EOVE opening and closing instructions.

**WARNING:** Any operation which requires to open the module must be performed by a qualified technician.

#### 12.4.1 Opening the module

- Remove the module from the docking station
- Turn the module over (lower shell (1) to the top), remove the filter cover and the 6 screws



- Turn the module over again (upper shell (3) to the top) by holding the two shells in position
- Open the module by removing the upper shell

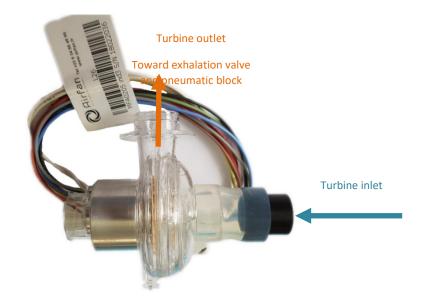
#### 12.4.2 Closing the module

- Place back the upper shell by centering it on the lower shell
- Turn the device over by holding the two shells in position and replace the screws
- Place back the filter cover

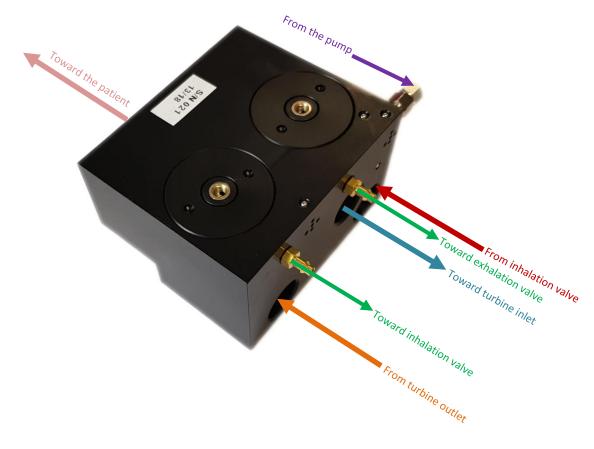
# 12.5 Pneumatic subassembly

Some maintenance operations require the removal and installation of the tubes. Be sure to strictly observe the installation and removal instructions of the various components by referring to the following instructions.

#### 12.5.1 Turbine



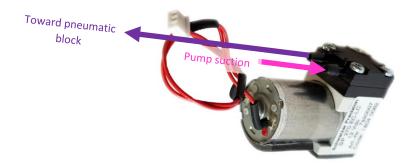
12.5.2 Pneumatic block



## 12.5.3 Patient circuit port



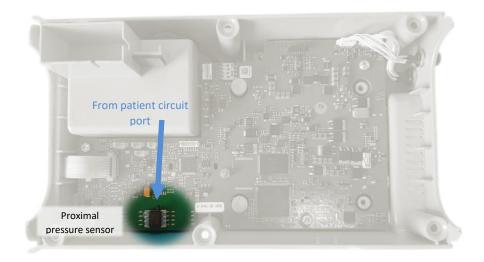
## 12.5.4 Pump

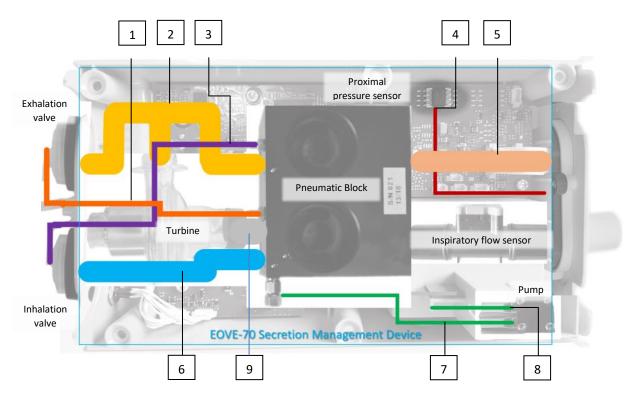


# Toward pneumatic block Toward pneumatic block Toward pneumatic

# 12.5.5 Inhalation/exhalation valves block

## 12.5.6 Motherboard





## 12.6 Pneumatic connections

| Référence | Colour | Designation                              | Size              |
|-----------|--------|--|-------------------|
| 1         |        | Silicone tube Ø 3x6mm                    | 145mm             |
| 2         |        | Curved tube of turbine output            | 3 connect. points |
| 3         |        | Silicone tube Ø 3x6mm                    | 155mm             |
| 4         |        | Silicone tube Ø 1x3mm                    | 100mm             |
| 5         |        | Tube of patient output Ø 15x21mm         | 45mm              |
| 6         |        | Inhalation tube                          | 2 connect. points |
| 7         |        | Silicone tube Ø 2x4mm                    | 115mm             |
| 8         |        | Silicone tube Ø 2x4mm                    | 65mm              |
| 9         |        | Straight tube of turbine input Ø 15x21mm | 31mm              |

# 12.6.1 Left view of pneumatic block assembled



# 12.6.2 Right view of pneumatic block assembled



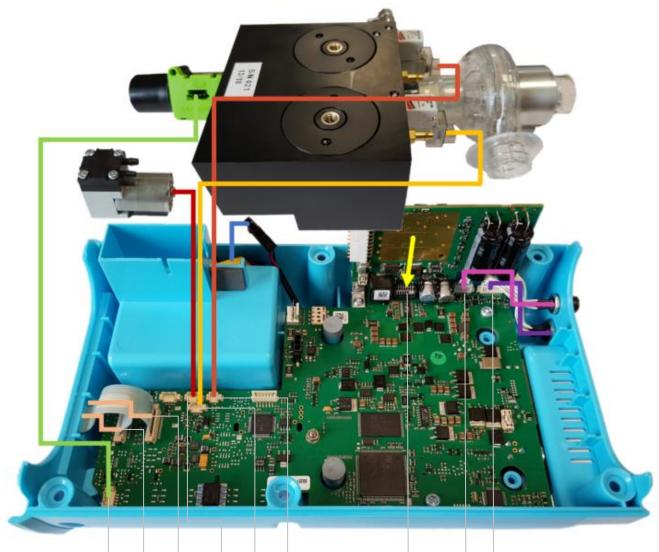
Pneumatic connections between:

| 1. Solenoid valve A and exhalation valve    | 2. Pneumatic block and exhalation valve                                   |
|---|---|
| 3. Solenoid valve B and inhalation valve    | <ol> <li>Patient circuit port and proximal<br/>pressure sensor</li> </ol> |
| 5. Pneumatic block and patient circuit port | 6. Inhalation valve and pneumatic block                                   |
| 7. Pump and pneumatic block                 | 8. Pump suction   |

# 12.7 Electrical wiring

Some maintenance operations require the removal and installation of the cable harnesses. Be sure to strictly observe the installation and removal instructions of the various components by referring to the following instructions.

## 12.7.1 Motherboard electrical connections



|   |   |   |   |   | J |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |

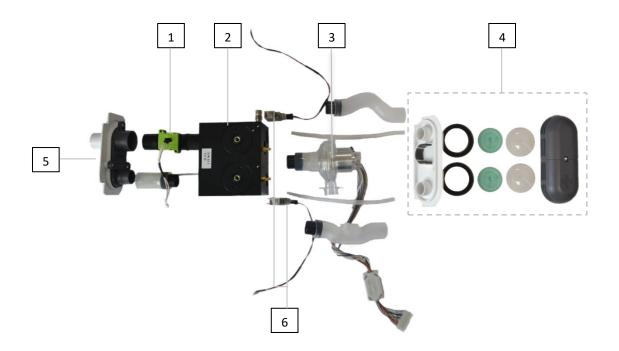
| I   |   |
|-----|---|
| 7 8 | 9 |

#### Electrical connections to motherboard:

| 1. Inspiratory flow sensor                | 2. Keyboard LEDs    |
|---|---------------------|
| 3. Keyboard buttons and battery indicator | 4. Pump             |
| 5. Solenoid valve B                       | 6. Solenoid valve A |
| 7. Turbine board                          | 8. SpO2 connector   |
| 9. Remote control connector               |                     |

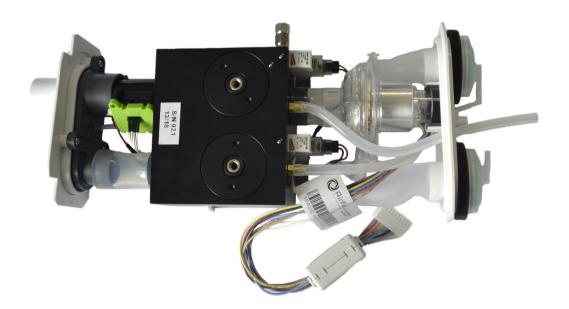
# 12.8 Internal pneumatic circuit

The internal pneumatic circuit is composed of the turbine, the inspiratory flow sensor, the pneumatic block with the two solenoid valves, the inhalation exhalation valves block and all the tubes.



| 1. Inspiratory flow sensor | 2. Pneumatic block  |
|----------------------------|---|
| 3. Turbine                 | <ol> <li>Inhalation / exhalation valves block<br/>dismantled</li> </ol> |
| 5. Patient circuit port    | 6. Solenoid valves A & B  |

NOTE: For any replacement operation, it is recommended to remove the entire circuit

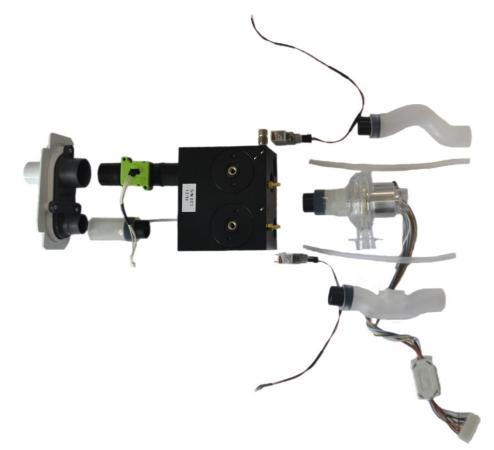


To remove the internal pneumatic circuit:

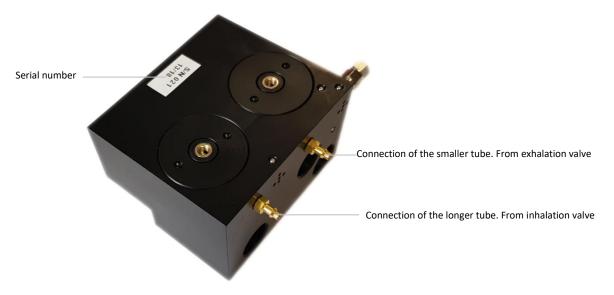
- Disconnect all the cable harnesses from the motherboard
- Disconnect the turbine from the turbine board the and the tube from the proximal pressure sensor on the motherboard

#### 12.9 Pneumatic block

- Remove the internal pneumatic circuit
- Disconnect all the six tubes from the pneumatic block
- Remove the turbine and the inspiratory flow sensor
- Unscrew the two solenoid valves and remove them



- Replace the pneumatic block and note the serial number



- Position the two solenoid valves and screw them

- Connect the inspiratory flow sensor and pay attention to put it in the proper direction (arrow toward patient circuit port)
- Connect the turbine and the 6 tubes (pay attention to the two tubes connected to inhalation/exhalation valves. The longer is connected to Solenoid valve B and inhalation valve)

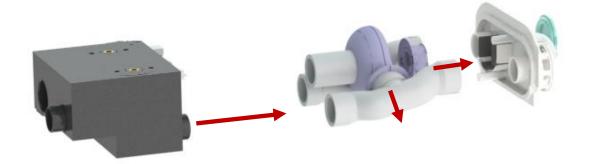
# 12.10 Turbine

- Disconnect the turbine from the turbine board

**NOTE:** Turbine serial number is written on the label affixed on turbine harness

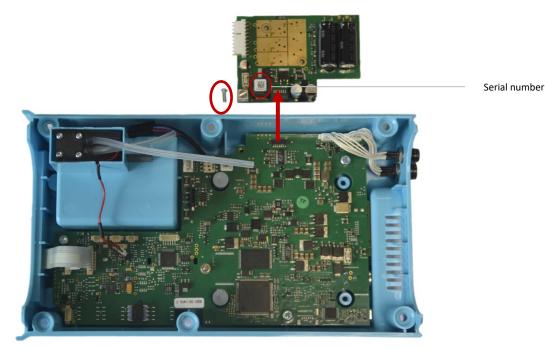
- Disconnect the turbine from the pneumatic block
- Remove the inhalation/exhalation valves block
- Disconnect the tube at the turbine outlet





# 12.11 Turbine board

- Remove the internal pneumatic circuit
- Disconnect the turbine electrical connection from the turbine board
- Unscrew the turbine board from the motherboard
- Disconnect the turbine board from the motherboard



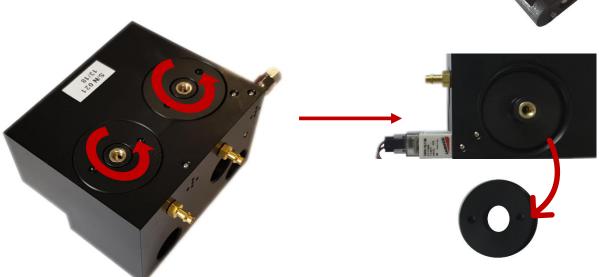
NOTE: Turbine board serial number is written on the label affixed on the front face

**NOTE:** Keep the original EOVE-70SMD screw. Pay attention to not exchange it with the one from EOVE-150VNT which is different.

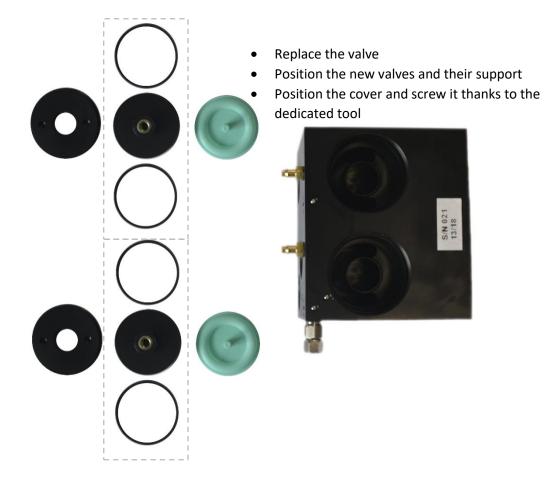
# 12.12 Inhalation / exhalation valves

#### 12.12.1 Inhalation / exhalation valves installed in pneumatic block

- Unscrew the two covers on the top of the pneumatic block thanks to the dedicated tool and remove them

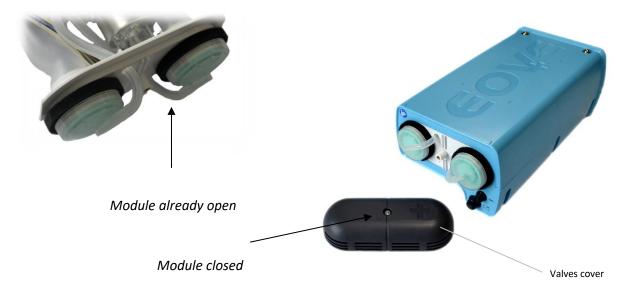


- Remove the valve support with its two sealing rings thanks to the dedicated tool, and the valve for each hole



# 12.12.2 Inhalation / exhalation valves installed in valves block

**NOTE:** Replacement of inhalation and exhalation valves at the rear of the device can be performed with or without a module opening.



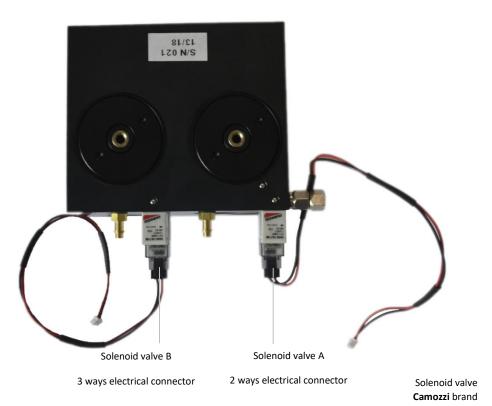
- Unscrew the cover and remove it if necessary
- Remove the tubes connectors
- Replace the valves



| 1. Inhalation / exhalation valves block | 2. Air filters      |
|---|---------------------|
| 3. Inhalation / exhalation valves       | 4. Tubes connectors |
| 5. Cover                                |                     |

# 12.13 Solenoid valves

**NOTE:** We recommend replacing both solenoid valves if the replacement of one of them is required.



- Disconnect the electrical harnesses from the motherboard
- Gently unscrew the solenoid valve. Pay attention to not damage the screw thread.
- Remove the solenoid valve
- Position the new solenoid valve
- Gently screw it and pay attention to not damage the screw thread
- Pay attention to the balance of tightening torque between the two screws to keep an efficient sealing
- Note the serial number of the new solenoid valve to update it in device memory
- Connect the electric harnesses (refer to electrical wiring \$10.7)

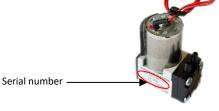




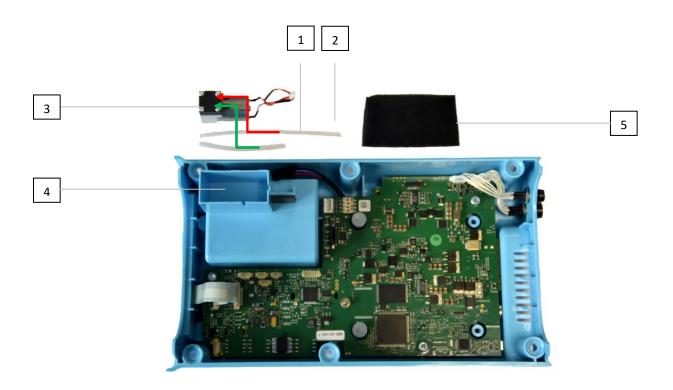
Solenoid valve Clippard brand

# 12.14 Pump

- Disconnect the electrical harness from the motherboard
- Disconnect the tube from the pneumatic block
- Remove the pump from its slot
- Note the serial number of the new pump

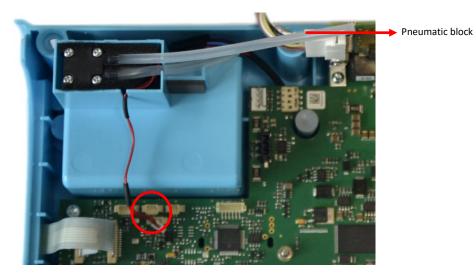


- Connect the two tubes (refer to the image below)



| 1. Pump suction        | 2. Pump backflow (outlet) |
|------------------------|---------------------------|
| 3. Pump                | 4. Pump slot              |
| 5. Sound-proofing foam |                           |

- Position the sound-proofing foam within the slot
- Position the pump in its sound-proofing foam



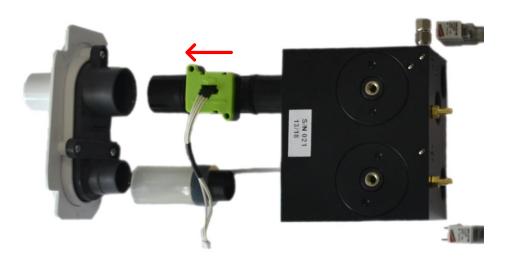
- Connect the electrical harness on the motherboard (refer to electrical wiring \$10.7)

- Connect the tube of the outlet (backflow) to the pneumatic block

NOTE: Position the two tubes so that block them in the shell groove

# 12.15 Inspiratory flow sensor

- Disconnect the electrical harness from the motherboard
- Disconnect the inspiratory flow sensor from the patient circuit port
- Disconnect the inspiratory flow sensor from the pneumatic block



Top view

- Note the serial number of the new sensor
- Pay attention to the direction (arrow toward the patient circuit port) and connect the inspiratory flow sensor to the pneumatic block



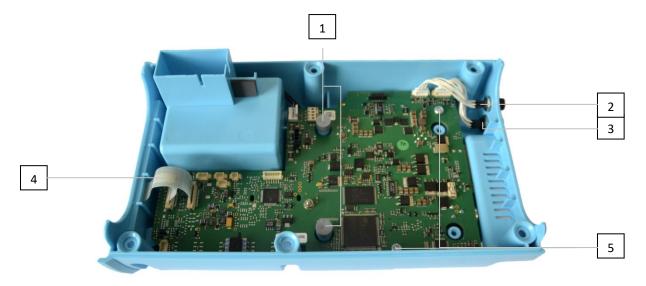
Front view

- Connect it to the patient circuit port
- Connect the electrical harness on the motherboard (refer to electrical wiring \$10.7)

# 12.16 Motherboard

6

- Remove the internal pneumatic circuit and the turbine board then disconnect the pump, the SpO2 and remote-control harnesses from the motherboard
- Disconnect the keyboard and remove the two turbine feet and the three screws

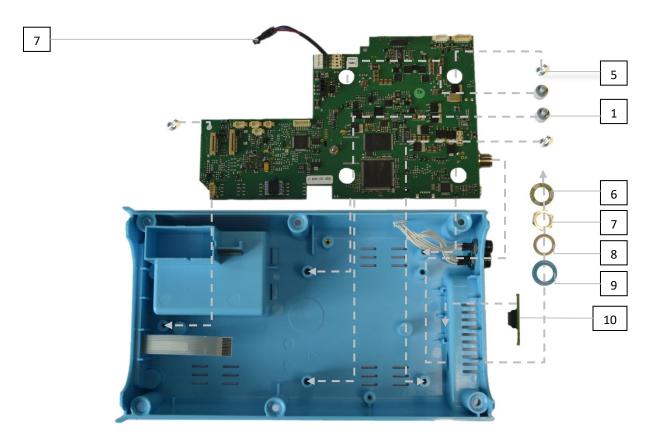


- Remove the insulating washer and the nut from DC connector



- Gently lift (A) the motherboard on the left side then pull it to the left (B). Pay attention to not coil the docking station connection card





| 1. Turbine feet             | 2. SpO2 connector                    |
|-----------------------------|--------------------------------------|
| 3. Remote control connector | 4. Keyboard harnesses                |
| 5. Screws                   | 6. Insulating washer                 |
| 7. Nut                      | 8. Washer                            |
| 9. Lock washer              | 10. Docking station connection board |

- Note the serial number
- Position the new mother board in its slot
- Place the washers and the nut of the power source connecter and gently screw it (no more than 1Nm)
- Put the three screws and the two turbine feet
- Connect the new motherboard (refer to electrical wiring \$10.7)
- Position the turbine board and screw it
- Position the internal pneumatic circuit

**NOTE:** After replacing the motherboard, update the serial numbers and counters values of all the other components.

## 12.17 Keyboard

- Disconnect the keyboard from the motherboard
- Remove the keyboard from the lower shell
- Note the serial number of the new keyboard
- Stick the new keyboard on the lower shell
- Connect it to the motherboard

# **13** Performances controls via EO-Toolkit

## 13.1 Materials requirement

To perform an EOVE-70 SMD final controls, use the materials in the following list or equivalent.

| MATERIAL   | PROVIDER      | REFERENCE         | SPECIFICATIONS     | REQUIREMENT |
|--|---------------|-------------------|--------------------|-------------|
| Flow analyzer  | IMT medical   | PF300 / Citrex H4 | Air BTPS mode      | Necessary   |
| EO-Testing cable if final control is<br>performed via EO-Toolkit | EOVE          | SP-TESTCBL-001    | N/A                | Necessary   |
| Power Supply   | Aim-TTi       | EX4210R           | 42V / 10A          | Necessary   |
| Aplus precision test lung  | GaleMed       | 6011              | RP5                | Necessary   |
| Circuit test adulte  | Intersurgical | Ref 5804000       | D22mm /<br>L=180cm | Necessary   |
| Screwdriver T10  | N/A           | N/A               | T10                | Necessary   |
| SpO2 sensor  | Nonin         | 8000AA            | N/A                | Necessary   |
| Xpod cable   | Eove          | EO-SPO2CBL        | N/A                | Necessary   |
| Remote control   | Eove          | EO-70FSWITCH      | N/A                | Necessary   |



**WARNING:** This chapter details how to run an automatic test via EO-Toolkit. Nevertheless, the following list of controls is non-exhaustive. Refer to the instructions listed in the popups which appear during the test. All the tests must pass to consider the device in accordance with specifications.

## 13.2 Performance controls

Full performance tests must be performed after each preventive maintenance operation which requires the opening of the ventilation module, or after each repair. It should be performed at least once a year and/or according to your internal quality policy.

- Connect the EO150 ventilation module to the computer by usb
- Connect the flow analyser with the **appropriate cable** to another usb port of the computer

NOTE: EO-Toolkit is only compatible with flow analyser PF300 and Citrex H4. If not possible to use one of these flow analysers, refer to the manual process of performance controls.

NOTE: To run the automatic test, the flow analyser must be connected on the appropriate port using the dedicated cable. Refer to the spare parts & tools list to get the reference.



PF300 Cable ref: SP-TESTCBL-001



CITREX H4 Cable ref: SP-TESTCBL-002

NOTE: Connect the testing cable (*SP-TESTCBL-001*) to the Flow Analyser PF300 RS232 port.



# 13.2.1 EO-Toolkit Configuration

NOTE: Full installation process is detailed in appendix 2.

- Launch the EO Toolkit
- Click on settings

\_\_\_\_

| 🖙 eo-toolkit - home | - 0 ×           |
|---------------------|-----------------|
| File                |                 |
| : Eave Toolkit      | CONNECT 4 (8) E |
|                     | Settings        |

• Configurate/check the different settings before beginning a new performance control

| 1   | [                       | 2           |      | 3   |           |
|---|-------------------------|-------------|------|-----|-----------|
| Settings                                  |                         |             |      |     |           |
| CONNECTION                                | CHECK MODULE            | FIRMWARE    | DATA | LOG | STREAMING |
| Tester name                               | Tester                  | e-mail      |      |     |           |
| Mister Blue                               |                         | sav@eove.fr |      |     |           |
| Check type category Customer              |                         |             |      |     |           |
| Instruction reference<br>E070 Technical n | nanual rev DB           |             |      |     |           |
| Test reports directory C:\Users\ Miste    | r Blue \Documents\New f | older       |      |     |           |
| Flow analyzer USB port                    |                         |             |      |     |           |
| Enable sound                              |                         |             |      |     |           |
| 4   | 5                       | 6           |      |     |           |

| 1- Technician   | 2- User e-mail address  |
|---|---|
| 3- Documentation associated                                   | 4- On/Off test sound  |
| 5- Choice of Flow Analyzer USB port (must be connected first) | <ul> <li>6- Destination folder to save Process Value<br/>tests</li> </ul> |

## • Select the software package required

## Settings

| CONNECTION                                    | CHECK MODULE          | FIRMWARE            | DATA                     | LOG | STREAMING |
|---|-----------------------|---------------------|--------------------------|-----|-----------|
| Package file for EO-VM70 C:\Users\Lucas.d     | elplan\Downloads\eo70 | app-1.6.3-C07000040 | 1-P150000400-fixed.eopkg | I   |           |
| Package file for EO-VM150<br>D:\eo150app-2.1. | 1-C150000606-P150000  | )400.eopkg          |                          |     |           |

- Click on OK to save the configuration
- Select Module Check

| Ver ec-toolkit - home<br>File | - Ø X         |
|-------------------------------|---------------|
| : Earre Toolkit               | CONNECT & B   |
| ka e-tooliit - home<br>File   | – Ø X         |
| > Module Insight              | CONNECT 🌵 🎲 🖽 |
| Module Check                  |               |

## • Choose the performance control required then click on START CHECK

| 🕼 eo-toolkit - home                                    |           |                  |   | -               | o ×     |
|--|-----------|------------------|---|-----------------|---------|
| File   |           |                  |   |                 |         |
| : Eove Toolkit   |           |                  |   | CONNECT 🌵       | ¢ 🗉     |
|  | NOT RUN   |                  | E070 Technical manual rev<br>D8         | B<br>Mister Blu | ue      |
| Device type Check type                                 | : 🕟 G     | Generate module  | snapshot                                |                 |         |
| <ul> <li>eo70</li> <li>Customer final check</li> </ul> | : 🕞 U     | Update firmware  | 3                                       |                 |         |
|  |           | Set clock        |   |                 |         |
| o eo150 O Customer endurance che                       | eck 🗄 🕑 S | Set serial numbe | \$                                      |                 |         |
| START CHECK  | : 🕞 т     | Test             |   |                 |         |
| GENERATE REPORT  |           | : )              | LEDs and keyboard                       |                 | ~       |
| GENERATE REPORT  |           | : )              | Electrical interfaces and communication |                 | ~       |
|  |           | : )              | Security and blower performances        |                 | · · · ] |
|  |           | : )              | Performance                             |                 | ~       |
|  | : 🕞 P     | Prepare for endu | ance                                    |                 |         |

• Select the test and click on start

| 🖙 eo-toolkit - home                                    |             |   |                            | - a ×            |
|--|-------------|---|----------------------------|------------------|
| File   |             |   |                            |                  |
| : Eove Toolkit   |             |   |                            | СОЛЛЕСТ 🌵 🎊 🏬    |
|  | NOT RUN     | EO70 Technical manual rev<br>DB -       | Checking an EO-VM70 device | e<br>Mister Blue |
| Device type Check type                                 | : 💿 Genera  | rate module snapshot                    |                            |                  |
| <ul> <li>eo70</li> <li>Customer final check</li> </ul> | 🗄 💽 Update  | te firmwares                            |                            |                  |
|  | 🗄 💽 Set clo | lock                                    |                            |                  |
| O eo150 O Customer endurance che                       | 🗄 💽 Set se  | erial numbers                           |                            |                  |
| STOP CHECK   | : 💽 Test    |   |                            |                  |
| GENERATE REPORT  | : 💽         | LEDs and keyboard                       |                            | ~                |
| GENERALE REPORT  | : 💽         | Electrical Interfaces and communication | n                          | ~                |
|  | : 💽         | Security and blower performances        |                            | ~                |
|  | : 💽         | Performance                             |                            | ~                |
|  | 🗄 💽 Prepar  | are for endurance                       |                            |                  |

NOTE: If the full performance controls is required, start from the first test "generate module snapshot".

If only ventilation performance controls are expected, start the test from "Security and Blower performances".

It is possible to play a unique test by clicking on Start Single Activity

| 🖙 eo-toolkit - home<br>File |                            |                  |   |                            | - 6              | 0 × |
|-----------------------------|----------------------------|------------------|---|----------------------------|------------------|-----|
| : Eove Toolkit              |                            |                  |   |                            | соллест 🜵 🀯      |     |
|                             |                            | NOT RUN          | E070 Technical manual rev<br>DB         | Checking an EO-VM70 device | e<br>Mister Blue |     |
| Device type                 | Check type                 | 🗄 💽 Generate mod | lule snapshot                           |                            |                  |     |
| eo70                        | Customer final check       | : 💿 Update firmw | ares                                    |                            |                  |     |
| O eo150                     | O Customer endurance check | E Set clock      | ibers                                   |                            |                  |     |
|                             | STOP CHECK                 | : • Test         |   |                            |                  |     |
| ſ                           | GENERATE REPORT            | : 💿              | LEDs and keyboard                       |                            |                  | ~   |
| l                           | CENERATE REPORT            | : 💿              | Electrical interfaces and communication | on                         |                  | ~   |
|                             |                            | : 💿              | Security and blower performances        |                            |                  | ~   |
|                             |                            | : 💿              | Performance                             |                            |                  | ~   |
|                             |                            | Prepare for er   | durance                                 |                            |                  |     |

**WARNING:** After a maintenance operation, full performance controls are necessary.

#### 13.2.2 Generate a snapshot

The first test permits to generate an events log file and a snapshot of device condition including software versions, components S/N and counters.

| Name   | Date modified     | Туре                | Size   |
|--|-------------------|---------------------|--------|
| 📴 EO0700718026_logs_2020-06-08-11-16-04.xlsx   | 6/8/2020 11:16 AM | Feuille de calcul M | 169 KB |
| EO0700718026_snapshot_2020-06-08-11-16-04.json | 6/8/2020 11:16 AM | JSON File           | 3 KB   |

| <u> </u> | 007007  | 18026_sr  | apshot_   | 202  | 0-06-08   | -11-16   | -04.jso   | n - Not       | epad     |  |
|----------|---------|---|---|--|---|--|---|---------------|----------|--|
| ile      | Edit    | Format  | View  | He   | lp  |  |   |               |          |  |
|          | "ider   | tifica<br>device<br>apiVer<br>apiMir  | ation<br>Type<br>sion   |  | {<br>"EO-V<br>"36",   |  |   |               |          |  |
|          |         | apimir  | lorver  | .21  | on :  | 00   |   |               |          |  |
|          | },<br>" | al": '  |   | -00  | 10000   |  |   |               |          |  |
|          | "seri   | als":<br>venti.<br>blower<br>blower<br>valve/<br>valve/<br>valve/<br>pneuma<br>cpuSo<br>commAg<br>mother<br>pump"<br>flowSo | {<br>lation<br>PBOard<br>PBOard<br>A": "(<br>A": "()"()"()"()"()"()"()"()"()"()"()"()"()" | hMo<br>d"::<br>000<br>000<br>000<br>000<br>000<br>000<br>000<br>000<br>000 | dule"<br>"000<br>01802<br>00000<br>00000<br>k": "<br>109/2<br>crsion<br>Versi<br>n": "<br>"00F<br>40062 | : "EC<br>0FB02<br>2036'<br>017X'<br>00002<br>31801<br>": "C<br>on":<br>36",<br>B0252 | 25214<br>,<br>,<br>21-13<br>[",<br>20700<br>"P15<br>214", | /18"<br>0040: | ,<br>1", |  |
|          |         | 'keyboa<br>'mac":   | ard":   | "1   | 27-21   | 7463'  |   |               |          |  |
|          |         | gauge   |   |  |   | ς,   |   |               |          |  |
|          | },      |   |   |  |   |  |   |               |          |  |
|          |         | "po   | nt":  <br>alue":<br>ositio  | : 1<br>on"   | .3108<br>: 109<br>NIT_H   | ,  | 3333  | 333,          |          |  |
|          | :       | machin<br>"va<br>"po<br>"un<br>batten<br>"va  | alue"<br>ositio<br>nit":<br>ryAge:<br>alue"   | : 1<br>on"<br>"U<br>ing<br>: 1   |   | ,<br>OUR"  | 55555   | 556,          |          |  |
|          |         |   |   |  | NIT_P   |  | IT"   |               |          |  |

This test can be played alone when the device is returned for servicing and a save is necessary before performing any operation.

#### 13.2.3 Update software versions

- Connect the module to the external power source
- Follow the various information which appear in the pop-up

| i eo-toolkit - home<br>File            |  | - 0 ×         |
|--|--|---------------|
| : Evve Toolkit                         |  | соннест ф 🕸 🕕 |
|  | PASS (incompleto) D8 - Checking an EO VM70 device  | Mister Blue   |
| Device type Check type                 |  |               |
| eo70     eo70     Customer final check | 🕴 🔳 Update firmwares Starting firmware update  |               |
| G care G careful marched               | 1 💿 Set clock  |               |
| O eo150 O Customer endurance check     | 1 💿 Set serial numbers   |               |
| STOP CHECK                             | j 🕖 Test   |               |
|  | 2 O LEDs and keyboard  | ~             |
| CRAREATE REPORT                        | Electrical Interfaces and communication  | ~             |
|  | E Security and blower performances   | ~             |
|  | 10   | ~             |
|  | : O Prepare for end Firmware update  |               |
|  | 1. Connect an USB cable from the computer to the module<br>2. Connect AC external power supply to the module |               |
|  | OK CANCEL  |               |

**NOTE:** During performance controls, software update operates by package. If that test is run, both VM software will be updated, the PIC and the CPU.

| 🖙 eo-toolkit - home<br>File |                                   |             |                     |                                      |                                 | - 1              | o >    |
|-----------------------------|-----------------------------------|-------------|---------------------|--------------------------------------|---------------------------------|------------------|--------|
| : Eove Toolkit              |                                   |             |                     |                                      |                                 | DISCONNECT 🜵 😫   |        |
|                             | E00700718026<br>E0-VM70           | PASS (in    | complete)           | E070 Technical manual rev<br>DB      | Checking an EO-VM70 device      | e<br>Mister Blue |        |
| Device ty                   | rpe Check type                    | : )         | Generate module s   | napshot                              |                                 |                  | Î.     |
| eo70                        | Customer final check              | 1 B ( 1 B ( | Update firmwares    |                                      | Checking CPU and POWER versions |                  | (      |
|                             |                                   |             | Set clock           |                                      |                                 |                  |        |
| O eo15                      | 50 O Customer endurance check     | : 🕑         | Set serial numbers  |                                      |                                 |                  |        |
|                             | ()                                | : 🕞         | Test                |                                      |                                 |                  |        |
|                             | STOP CHECK                        |             | : 🕑 LE              | Ds and keyboard                      |                                 |                  | ~      |
|                             | GENERATE REPORT                   |             | : 🕑 El              | ectrical interfaces and communicatio | n                               |                  | ~      |
|                             | Type EO-VM70                      |             | : 🕑 Se              | curity and blower performances       |                                 |                  | $\sim$ |
|                             | Serial E00700718026               |             | : 🕑 🛛 Pé            | rformance                            |                                 |                  | $\sim$ |
|                             | MAC 00:04:3e:9b:bf:d5<br>(?)      | : )         | Prepare for endurat | ice                                  |                                 |                  |        |
|                             | CPU C070000401<br>(f3fb3c5)       |             |                     |                                      |                                 |                  |        |
|                             | API 36.00                         |             |                     |                                      |                                 |                  |        |
|                             | POWER P150000400                  |             |                     |                                      |                                 |                  |        |
|                             | GAUGE 5                           |             |                     |                                      |                                 |                  |        |
|                             | Clock 2020-06-08<br>11:30:09      |             |                     |                                      |                                 |                  |        |
|                             | Station<br>maintenance6666<br>PIN |             |                     |                                      |                                 |                  |        |

**NOTE:** If the update fails, check the usb ports in settings, restart the EO150 VM and try the test again.

| CONNECTION CHECK MODULE                        | FIRMWARE | DATA | LOG | STREAMING     |
|--|----------|------|-----|---------------|
| List USB Ports SCAN                            |          |      |     |               |
| Main USB port (CPU) Secondary USB port (Power) |          |      |     |               |
| Auto Select API descriptor file                |          |      |     |               |
| hard delet in Factorized the                   |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      |     |               |
|  |          |      | OK  | EXPORT IMPORT |

WARNING: Use 2 consecutive USB serial COM ports lower than 10.

## 13.2.4 Test of the LEDs and the keyboard

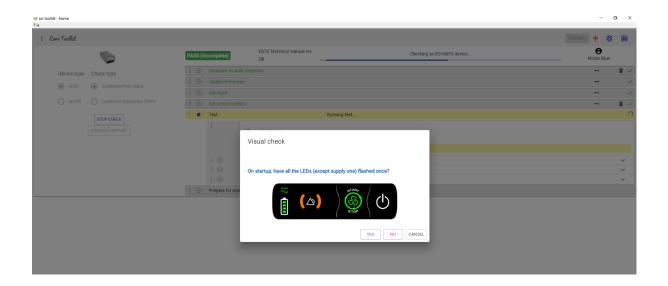
Main purpose of this test is to control that the keyboard operates properly.

Every time an action is required by the technician, a popup appears and details the operations to perform in the proper order.

Follow the instructions step by step. If a test fails, stop the ventilation, restart the EO70 SMD and try the test again.



Popups with instructions in blue expect the operator to check something; LED, buzzer, etc..



### 13.2.5 Electrical interfaces and communication

This test permits to check that the ventilation module is operating correctly on the different power modes:

- AC from the external power source
- Battery mode
- DC power from the external battery
- When the module is inserted in the EO-Display

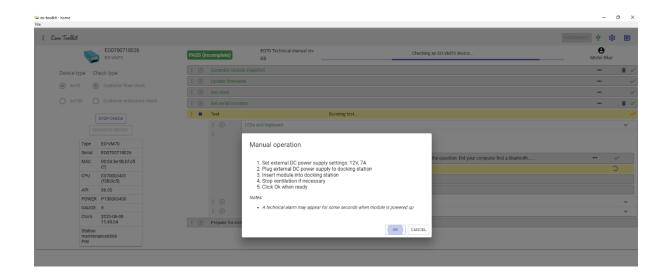
#### **Operation on 12VDC external power source**

During this test, the external power supply can be replaced by an external battery EO-BATPCK

OR





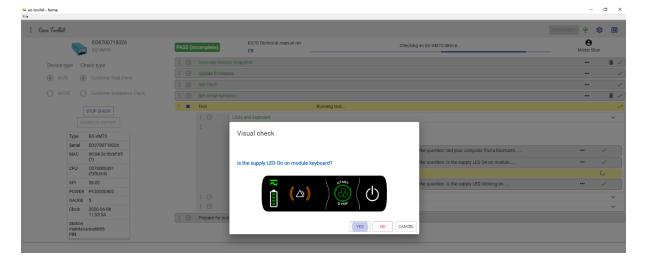


• Check the device is operating on DC power mode

| 🖙 eo-toolkit - home<br>File  |   |                         |     |           |  |   |            | -                   | 0 × |
|--|---|-------------------------|-----|-----------|--|---|------------|---------------------|-----|
| : Eove Toolkit   |   |                         |     |           |  |   | DISCONNECT | , ¢                 |     |
|  |   | E00700718026<br>E0-VM70 | PAS | S (incomj | plete)                                   | E070 Technical manual rev Checking an E0-VIATO Gevice |            | <b>9</b><br>er Blue |     |
| Device type  | e Che   | ck type                 |     |           |  |   |            |                     | 1   |
|  |   |                         |     |           |  |   |            |                     |     |
| Contraction of the second  |   |                         |     |           |  |   | -          |                     |     |
| O eo150  |   |                         |     |           |  |   |            |                     | 1   |
|  |   | TOP CHECK               | 1.1 | Test      | t  | Running test  |            |                     |     |
|  |   |                         |     |           | D LE                                     | Ds and keyboard                                       |            |                     | ~   |
|  |   |                         |     |           |  | Visual check  |            |                     |     |
|  |   |                         |     |           |  | VISUAI CITECK   |            |                     |     |
| -  |   |                         |     |           |  | the question: Did your computer find a bluetooth      |            |                     |     |
| Fie<br>Construction<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Field<br>Fiel |   |                         |     |           | Is the supply LED On on module keyboard? |   |            |                     |     |
| c  | • CONDECTION         CONTOCTION           • Control         Control           • Control         Control           • Control         • Control |                         |     |           |  |   |            |                     |     |
| A  | API S   | 36.00                   |     |           |  | STAR  |            |                     |     |
|  |   |                         |     |           | •  |   |            |                     | ~   |
|  |   |                         |     |           | •  | STOP  |            |                     | ~   |
| c  |   |                         |     | Prep      | pare for end                             |   |            |                     |     |
| n  | naintenan   | ce6666                  |     |           |  | VE NO CANCEL  |            |                     |     |

**Operation on AC power source** 

• Control the device is charging its internal battery while inserted in the EO-Display



## **Operation on internal battery**

• Disconnect the external power source from the EO-Display and check that the device is operating correctly on this power mode

| : Eove Toolkit | e                         |                          |      |                     |  |  |               | \$ |     |
|----------------|---------------------------|--------------------------|------|---------------------|--|--|---------------|----|-----|
|                | 6                         | E00700718026             | PASS | incomplete)         | E070 Technical manual rev DB                   | Checking an EO-VM70 device                       | e<br>Mister i |    |     |
|                | type Cl                   | neck type                |      |                     |  |  |               |    | ĩ ~ |
| eo7            |                           |                          |      |                     |  |  |               |    |     |
| 0 607          |                           |                          |      |                     |  |  |               |    |     |
|                |                           |                          |      |                     |  |  |               |    | ī ~ |
|                |                           |                          |      | Test                | Running test                                   |  |               |    |     |
|                |                           | STOP CHECK               |      |                     |  |  |               |    | ~   |
|                |                           |                          |      |                     |  |  |               |    |     |
|                | Туре                      | EO-VM70                  |      |                     | Visual check                                   |  |               |    |     |
|                | Serial                    | E00700718026             |      |                     |  | the question: Did your computer find a bluetooth |               |    |     |
|                | MAC                       | 00:04:3e:9b:bf:d5<br>(?) |      |                     |  |  |               | ~  |     |
|                | CPU                       | C070000401               |      |                     | is the supply LED blinking on module keyboard? | the question: Is the supply LED On on module     |               |    |     |
|                | API                       | (f3fb3c5)<br>36.00       |      |                     | STAR   | the question: Is the supply LED On on module     |               |    |     |
|                |                           | P150000400               |      |                     |  |  |               |    |     |
|                | GAUGE                     |                          |      |                     |  |  |               |    | ~   |
|                | Clock                     | 2020-06-08<br>11:53:54   |      | :<br>Prepare for en | STOP STOP                                      |  |               |    | ~   |
|                | Station<br>mainter<br>PIN | ance6666                 |      | Prepare for en      | YES  | NO CANCEL  |               |    |     |

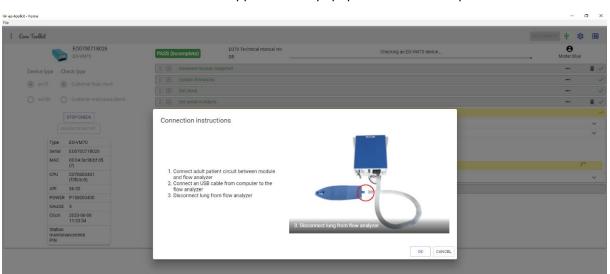
## 13.2.6 Performance and turbine tests

• Connect a short adult circuit (60cm) between the EO70 SMD and the flow analyser

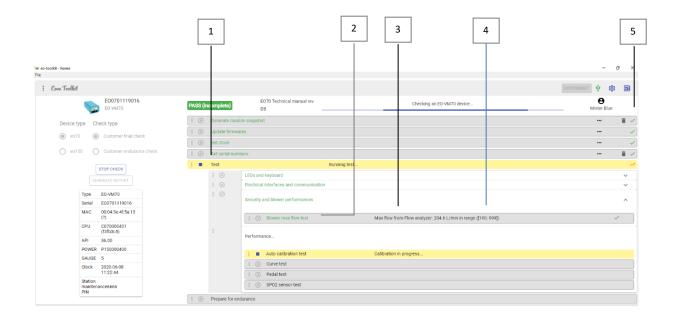


• Connect a 1L adult test lung to the outlet of the flow analyser





• Follow the instructions which appear on the popup to check turbine performances



| 1- Test suite  | 2- Unit test |
|----------------|--------------|
| 3- Measure     | 4- Range     |
| 5- Test result |              |

#### • Calibrate step by step according to EO-Toolkit popup

| Ver eo-toolkit - home<br>File       |   |                            | - a ×            |
|-------------------------------------|---|----------------------------|------------------|
| : Evre Toolkit                      |   |                            | DISCONNECT 🖞 🕸 🖩 |
| E00701119016<br>E0-VM70             | PASS (incomplete) DB E070 Technical manual re | Checking an EO-VM70 device | e Mister Blue    |
| Device type Check type              |   |                            | 🔳 🗸              |
| eo70     Customer final check       |   |                            | <b></b> \        |
|                                     |   |                            | ••• 🗸            |
| O eo150 O Customer endurance check  | E Set serial numbers                          |                            |                  |
| STOP CHECK                          | Manual operation                              |                            | A.               |
| GENERATE REPORT                     | manaar operation                              |                            | × .              |
|                                     |   |                            | × .              |
| Type E0-VM70<br>Serial E00701119016 |   |                            | × .              |
| MAC 00:04:3e:4f:5a:13               |   |                            |                  |
| (?)<br>CPU C070000401               |   |                            | 0                |
| (f3fb3c5)                           | 1. Unseal patient circuit                     |                            |                  |
| API 36.00                           |   |                            |                  |
| POWER P150000400<br>GAUGE 5         |   |                            |                  |
| Clock 2020-06-08                    |   | 1. Unseal patient circuit  |                  |
| 13:44:30<br>Station                 |   | (                          |                  |
| station<br>maintenance6666<br>PIN   | Click Yes when ready (No to abort)            |                            |                  |
|                                     |   | YES NO CANCEL              |                  |
|                                     |   |                            |                  |

• Continue the test step by step following the operations expected by EO-Toolkit

NOTE: In case of failure, if additional information about a test result are necessary, click on to display the measures

| 🖙 eo-toolkit - home<br>File |  |      |                |   |  | -  | 6 ×        |
|-----------------------------|--|------|----------------|---|--|--|------------|
| : Eove Toolkil              |  |      |                |   |  | різсоннест 🖞 🚳   |            |
|                             | E00701119016<br>E0-VM70                  | FAIL |                | E070 Technical manual rev<br>DB         | Checking an EO-VM70 device                                 | Hister Blue  |            |
| Device type                 | Check type                               | : 💿  | Generate mod   | ule snapshot                            |  |  | 1          |
|                             |  | : •  | Update firmw   | ares                                    |  |  | ~          |
| eo70                        | <ul> <li>Customer final check</li> </ul> | : •  | Set clock      |   |  |  | ~          |
| O e0150                     | O Customer endurance check               | : •  | Set serial nun | ibers                                   |  |  | <b>i</b> < |
|                             |  | : •  | Test           |   |  |  | ×          |
|                             | STOP CHECK                               |      | : •            | LEDs and keyboard                       |  |  | ~          |
|                             | GENERATE REPORT                          |      | : •            | Electrical interfaces and communication |  |  | ~          |
| ту                          | pe EO-VM70                               |      | : 💿            | Security and blower performances        |  |  | ~          |
| Se                          | erial E00701119016                       |      | : 💿            |   |  |  |            |
| M                           | AC 00:04:3e:4f:5a:13<br>(?)              |      |                | Performance                             |  |  | ^          |
| CF                          | PU C070000401<br>(f3fb3c5)               |      |                | : () Auto calibration test              | Calibration was successful                                 | ~  | ~ )        |
| AF                          | PI 36.00                                 |      |                | :      Curve test                       | Vti from Ventilation module: 899 mL in range ([837; 1023]) | ()   | ×          |
| PC                          | OWER P150000400                          |      |                | : 💿 Pedal test                          |  | • / Vti from Ventilation module:   |            |
|                             | AUGE 5                                   |      |                | I () SPO2 sensor test                   |  | <ul> <li>vti from ventilation module:<br/>range ([837; 1023])</li> </ul>   | 899 mL in  |
| Cle                         | lock 2020-06-08<br>13:44:30              |      | Prepare for er |   |  | <ul> <li>Vti from Flow analyzer: 862 n<br/>range ([837; 1023])</li> </ul>  |            |
| Sta<br>mi<br>PII            | ation<br>aintenance6666<br>N             | : •  | Prepare for er | igurance.                               |  | Peak flow from Ventilation m     155.3 L/min in range ([150; 999     Peak flow from Flow analyzer  | 9])        |
|                             |  |      |                |   |  | <ul> <li>Feak now from Flow analyzes</li> <li>L/min not in range ([150; 999])</li> <li>Peak pressure from Flow ana<br/>62.3 mBar in range ([53; 67])</li> <li>Plateau pressure from Flow at</li> </ul> | alyzer:    |

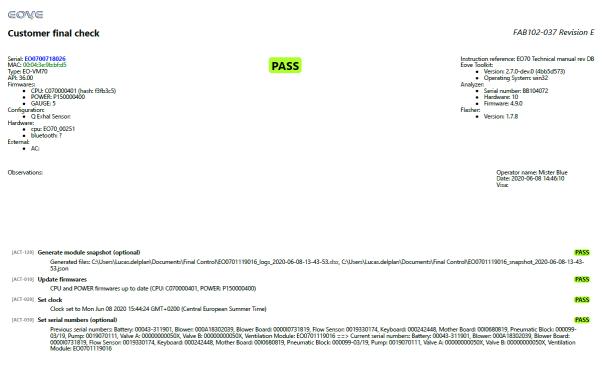
| 😝 eo-toolkit - home<br>File  |   |   | - o ×           |
|--|---|---|-----------------|
| : Eave Toobhil   |   |   | олсоннаст ф 🕸 🖩 |
| E00700718026<br>E0-VM70  | PASS (incomplete) E070 Technical manual rev<br>DB   | Checking an EO-VM70 device  | Hister Blue     |
| Device type Check type  exercise control of the con |   |   | •• •• •• •• ••  |
| eo150 Costomer endurance check   | 1 () Set block  |   |                 |
| STOP CHECK<br>CENERATE REPORT  | Manual operation  |   | ~               |
| Type         EO-VM/70           genal         E00790718020           MAC         000 43 eVb bit d5           CPU         C070000401           (1010000000000000000000000000000000000   | <ol> <li>Use the pedal to run an exhalation and an<br/>inhalation. Click Ok when done.</li> </ol> | I. Use the pedal to run en exhalation and on inhalation. Click OK | ×<br>×<br>      |

• Connect the accessories (footswitch remote control, SpO2 sensor) as required

At the end of the test, a Process Value report is generated, and the device is set into endurance configuration.

|              | 🔺 Warning 🔺  |
|--------------|--|
| he module is | ready for endurance test. You can:   |
| 2. Generate  | ther module: Be carefull, this will erase all current results<br>report: This will generate a report with the current results<br>This will ony close this popup, keeping the current results |
|              |  |

**NOTE:** A report can be generated anytime during the test



#### 13.2.7 Battery charge control

- Connect the module to AC power and check that the charge is in progress on the battery indicator (keyboard
- Connect the EO70 SMD to EO-Toolkit to verify that the charge is complete before 8 hours.

| 🖙 eo-toolkit - home<br>File |                          |                     |                                 |                            | - 0 ×            |
|-----------------------------|--------------------------|---------------------|---------------------------------|----------------------------|------------------|
| : Eove Toolkit              |                          |                     |                                 |                            | CONNECT 🔿 🏟 🔳    |
|                             | 5                        | NOT RUN             | EO70 Technical manual rev<br>DB | Checking an EO-VM70 device | e<br>Mister Blue |
| Device type                 | Check type               | : Test              |                                 | Connecting to module       | 0                |
| eo70                        | O Customer final check   | I                   | Endurance                       |                            |                  |
| O eo150                     | Customer endurance check |                     | Battery charge duration test    | Starting test              |                  |
|                             | GENERATE REPORT          | : ③ Reset to factor | ry defaults                     |                            |                  |

At the end of data analysis, EO-Toolkit generates a second report with the results of the endurance test.

# **14** Manual performance controls

## 14.1 Inspection sheet

After each maintenance operation, we recommend performing a final control of the EOVE-70 SMD. Refer to the following procedure and fill the inspection sheet below after each operation (full size available in annex 3).

|   | INSPECTION                            | SHEET EO | VE-070 | SAV100-12 RE<br>A |
|---|---------------------------------------|----------|--------|-------------------|
| Serial number:  | Customer:<br>Intervention:            |          |        |                   |
| DOCUMENTS/APPEARANCE  |                                       | Result   | Comm   | ents              |
| Verification of work sheet  |                                       |          |        |                   |
| General appearance inspection: filet, co  | wer, shell, fastenings                |          |        |                   |
| Labels: power source, USB, SpO2, remo   | te control, SN                        |          |        |                   |
| OP1: SOFTWARES CONTROL  | s                                     | Result   | Comm   | ents              |
| PIC software version  |                                       |          |        |                   |
| CPU software version  |                                       |          |        |                   |
| Interface software version  |                                       |          |        |                   |
| OP2: LEDs & KEYBOARD (ba<br>OP2-1: 28VDC/4A: Lighting control of th<br>battery LED  | e LEDs power source and the red       | Result   | Comm   | ents              |
| OP2-1: Control of the button ON/OFF &<br>LED  | control of the alarm LED, ventilation |          |        |                   |
| OP2-2: Connect the battery  |                                       |          |        |                   |
| OP3: ELECTRICAL INTERFACT<br>WITH DOCKING STATION                                   |                                       | Result   | Comm   | ents              |
| OP3-1: 12VDC/7A: Functionning on extension) & lighting indicator                    |                                       |          |        |                   |
| OP3-2: EOVE Power supply: Functionnir<br>docking station) & lighting indicator      | ng on AC power source (outside the    |          |        |                   |
| OP3-3: Functionning on internal battery   | (into the docking station) & lighting |          |        |                   |
| indicator   |                                       |          |        |                   |
| OP3-3: Switching from battery mode to   |                                       |          |        |                   |
| OP3-3: Communication with docking st  |                                       |          | _      |                   |
| OP4: PERORMANCE CONTRO  |                                       | Result   | Comm   | ents              |
| OP4.1: Peak Flow (monitored on int  |                                       |          |        |                   |
| OP4.1: Tidal volume (monitored on   |                                       |          |        |                   |
| OP4.1: SpO2 (monitored on interfac  |                                       |          |        |                   |
| OP4.1: P.peak (monitored on Flow a  |                                       |          |        |                   |
| OP4.1: Pplateau (monitored on Flow<br>OP4.1: PF Exp. (monitored on Flow :<br>5 ±10% |                                       |          |        |                   |
| OP4.1: Vti: 880 mL ±10%   |                                       |          |        |                   |
| OP4.2: Trigger control  |                                       |          |        |                   |
| OP4.3: Remote control operation   |                                       |          |        |                   |
| OP4.4: Turbine performance control  | ls: Flow 200 L/min ±10%               |          |        |                   |
| OP5: BATTERY CHARGE CON   | ITROL                                 | Result   | Comm   | ents              |
| OP5-1: Control that the battery is fully o  | charged < 8h                          |          |        |                   |
| OP6: DOCKING STATION  |                                       | Result   | Comm   | ents              |
| Setting of clock / date / language  |                                       |          |        |                   |
| General appearance inspection: shell, d   | isplay screen                         |          |        |                   |
|   |                                       |          |        |                   |
| Labels: power source, serial number   |                                       |          |        |                   |

## 14.2 OP1: Software controls

Procedure from TOOLKIT

- -
- Launch EO-Toolkit software
- Connect the EOVE-70 module to AC power
- Connect the EOVE-70 module to the computer by usb

#### - Click on Settings

| iar eo-toolikt - home<br>File | - 5 X         |
|-------------------------------|---------------|
| : Eave Toolkit                | солнест 🕂 🔞 🗷 |
|                               | Settrop       |

#### - Go on "Firmwares" tab

| eo-loolkil  |                                     |                         |      |           |     | CONNECT 🌵 🎊 🔠    |
|---|-------------------------------------|-------------------------|------|-----------|-----|------------------|
|   |                                     |                         |      |           |     |                  |
| Settings  |                                     |                         |      |           |     |                  |
| CONNECTION  | CHECK MODULE                        | FIRMWARE                | DATA | INTERFACE | LOG | STREAMINGS       |
| Package file for EO-VM70 C:\Users\EOVE\Documents\Sc | oftware E070\eo70-app-v2.0.0-C07000 | 0401-P150000400-5.eopkg |      |           |     |                  |
| Package file for EO-VM150                           |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
|   |                                     |                         |      |           |     |                  |
| ۱   |                                     |                         |      |           |     | OK EXPORT IMPORT |

- Select the software package required for the update.

| Settings  |                                  |                           |      |           |     |            |
|---|----------------------------------|---------------------------|------|-----------|-----|------------|
| CONNECTION  | CHECK MODULE                     | FIRMWARE                  | DATA | INTERFACE | LOG | STREAMINGS |
| Package file for EO-VM70 C:\Users\EOVE\Documents\Se | ftware EO70\eo70-app-v2.0.0-C070 | 000401-P150000400-5.eopkg |      |           |     |            |
| Package file for EO-VM150                           |                                  |                           |      |           |     |            |

NOTE: The package files include the ventilator software (CPU) and power software (PIC

- To update CPU and PIC, click on "Update firmwares"



- Connect the module to the computer by usb

# - Connect the AC power to the ventilation module

| i eo-bolkit  | CONNEC    | π Ψ          | \$      | E (           |
|--|-----------|--------------|---------|---------------|
| Updating firmwares   |           |              |         |               |
| Firmware update<br>1. Connect an USB cable from the computer to the module<br>2. Connect AC external power supply to the module<br>OK CANCEL |           |              |         |               |
| EOVE and   | Belance D | developed of | Harle H | la Para bara  |
|  |           | mas diges w  | an of a | Caller Caller |

## - Switch off the device then click on OK

| i w-twikit   | CONNECT | ψ          | 鐐                     |             |
|--|---------|------------|-----------------------|-------------|
| Updating firmwares   |         |            |                       |             |
| Firmware update<br>CPU will be flashed with version: C070000401<br>1. Switch off the module<br>OK CANCEL |         |            |                       |             |
| EOVE and definition  | 8.1 🚺de | weloped wi | th <del>v</del> by th | e Eove team |

# Checking

Once the update performed:

- Insert the EOVE-70 module into the EO-Display housing unit
- Go to Information tab of Maintenance menu or go to Preferences menu to check that the software versions are updated and displayed properly.

| Mode: IPPB               | 🔒 🛿 AC 2020/12/17 - 15:56 |
|--------------------------|---------------------------|
| ← Preferences            |                           |
| 2020/12/17               | <b>*</b>                  |
| 15:56                    | <b>\$</b>                 |
| Information              |                           |
| Operating system version |                           |
| User interface version   |                           |
| Module serial number     |                           |
| CPU version              |                           |
| POWER version            |                           |
| GAUGE version            | 5                         |
|                          | ≡ 🛞 ♠                     |

## 14.3 OP2: Control of keyboard LEDs and buttons

- Module switched off, the keyboard must appear like the image below



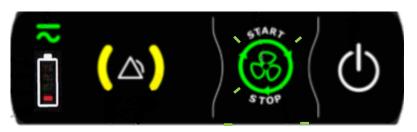
Keyboard turned off

## 14.3.1 OP2-1: Turn on and configurate external DC power on 28V - 4A.

- Disconnect the internal battery
- Connect DC power to the module and check that all the keyboard LEDs switch on but not AC indicator, blink once when the module starts



- Then control that AC indicator switch on and battery charge indicator increments
- Check that after 20 seconds, the battery red LED and the alarm indicator are switched on and the ventilation LED blinks



#### 14.3.2 OP2-2: Press the ventilation button on the keyboard

- This LED stops blinking and stays on and the ventilation starts 🚱
- Press the button 🚱 en a beep sounds, and ventilation stops
- Connect the battery
- 14.4 OP3: Control of electrical interfaces and communication with docking station

#### 14.4.1 OP3-1: Operation on 12VDC power

- Switch on external DC power and set it on 12V 7A.
- Connect the external DC power to the docking station then insert the module inside
- Control module operation by checking the following LEDs



- Start the ventilation to control module operation on this power source
- Stop the ventilation

#### 14.4.2 OP3-2 : Operation on AC power

- Connect AC power on the docking station

NOTE: We recommend using the AC charger provided with the EOVE-70 SMD to control it at the same time.

- Control module operation by checking the following LEDs



- Start the ventilation to control module operation on this power source
- Stop the ventilation

## 14.4.3 OP3-3 : Operation on internal battery

- Disconnect AC power source from the docking station
- Control module operation by checking the following LEDs



- Start the ventilation to control module operation on this power source
- Stop the ventilation
- Connect AC power on docking station and check that the module switches properly on AC mode
- Pair the docking station with the module and check the connectivity
- Set date and time
- Remove the module from the docking station

#### OP4: Performance controls

#### 14.4.4 OP4-1: Set point ± 60 mbar in automatic mode

- Set the following configuration
  - Mode: INEX
  - Operating Mode: Auto
  - Insp. Pressure: + 60 mbar
  - Ramp: 2
  - Insp. Time: 3 s
  - Trigger: Off
  - Pause: 1 s
  - PEEP: 4 mbar
  - Exhal. Pressure: 60 mbar
  - Exhal. Time: 2 s
  - Oscillation On: Off
  - Cycles Nb. : 5

| Mode: INEX (Auto) |                  | <b>■</b> 76% ¥ | 2018/08/10 - 17:51 |
|-------------------|------------------|----------------|--------------------|
| ← Mode: INEX ▼    | Preset           | : None         | Save Load          |
| Operating Mode :  | Insp. Pressure : | катр :         | Insp. I ime :      |
| Auto              | +60 mbar         | 2              | <b>3</b> s         |
|                   |                  |                |                    |
| Trigger <b>:</b>  | Pause :          | PEEP :         | Exhal. Pressure    |
| Off               | <b>1</b> s       | 4 mbar         | -60 mbar           |
|                   |                  |                |                    |
| Exhal. Time :     | Oscillations :   | Cycles Nb.     |                    |
| <b>2</b> s        | Off              | 5              |                    |
|                   | = ℃              | シ 🔒            |                    |
|                   |                  |                |                    |

- Connect a short single limb (60cm) circuit between EOVE-70 module and the flow analyzer
- Connect the back of the flow analyzer to an adult test lung
- Connect a SpO2 sensor to the dedicated connector of the module and activate the function on the interface
- Set the following configuration on the flow analyzer:
  - o Go in Menu then Trigger
  - o In **Details**, set the following parameters

| Trigger         |                      |
|-----------------|----------------------|
| Resp. Mode:     | ACOULS               |
| Measured throug | gh High Flow channel |
| Back Deta       | ils Change Numerical |





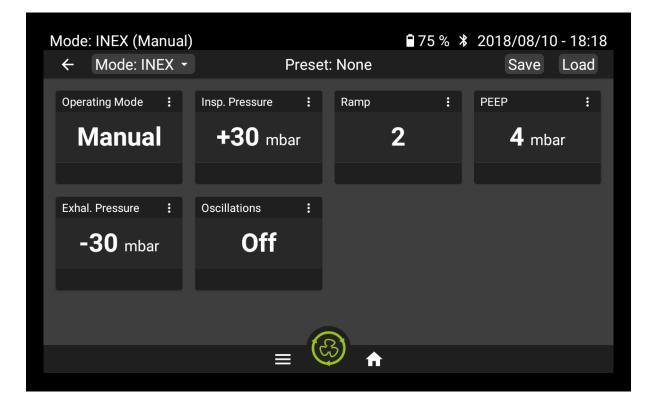
- Start the ventilation from the interface
- From the third cycle of operating, read the following measures on the interface
  - Peak Flow
  - Tidal Volume
  - o **SpO2**
- Read the following measures on the flow analyzer
  - o Ppeak
  - o Pplateau
  - PF Exp (Peak Flow Exp)
  - o Vti

#### 14.4.5 OP4-2: Inspiratory trigger control

- Be sure that during previous operations there wasn't any inspiratory auto-trigger
- Stop the ventilation

## 14.4.6 OP4-3: Set point ± 60 mbar in manual mode

- Set the following configuration
  - Mode: INEX
  - Operating Mode: Manual
  - Insp. Pressure: + 30 mbar
  - Ramp: 2
  - PEEP: 4 mbar
  - Exhal. Pressure: 30 mbar
  - Oscillation On: Off



- Connect the remote-control pedal or equivalent at the back of the module on the dedicated connector



- Disconnect the SpO2 sensor



- Start ventilation from the interface
- Switch the manual remote control from a side to another and check the correct operation of the module respiratory phases

## 14.5 OP4-4: Turbine performance controls

- Disconnect the patient circuit connected at the rear of the flow analyzer
- Switch the manual remote control to a side
- Read the flow measure on PF300
- Stop the ventilation and switch the treatment into automatic mode

## 14.6 OP5: Battery charge control

- OP5-1: Connect the module to AC power and check that the charge is in progress on the battery indicator (keyboard
- Control that the charge is complete before 8 hours.

# **15** Test of the pneumatic block

# 15.1 Pneumatic sealing control

- Plug the pump connector and the tube 2



- Press the red button of the solenoid valve A with a screwdriver or something similar and apply a 100mbar pressure from a pressure gauge on the tube 1



- Check that the pressure doesn't drop down
- Perform the same test on the solenoid valve B

## 15.2 Solenoid valves electrical operation

- ternal power support
- Connect an external power source (29Vdc/0,5A) on each connector of the solenoid valves

- Release the power and check that the solenoid valves are closed, and their LED switched on
- Check the solenoid valve controlled is closed by applying a 100mbar pressure like during the previous test.

# **16 Test of rear valves block**

# 16.1 Pneumatic sealing of the rear valves block subassembly

• Apply a pressure of 100mbar on each valve cap thanks to a pressure gauge



- Check that the pressure remains steady during at least 5 seconds
- Increase the pressure by pressing on the gauge 4 or 5 times and verify that the cap stays on position

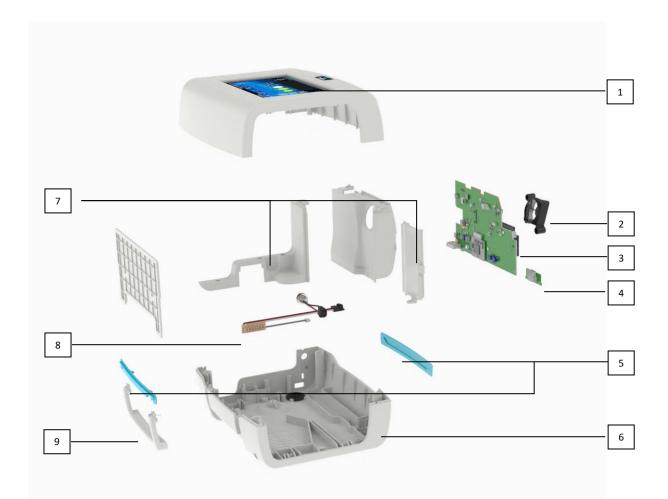
# 17 EO-Display housing unit: replacement procedures

# 17.1 Opening and closing the EO-Display housing unit

Maintenance operations on the housing unit require opening the device. Be sure to strictly observe the opening and closing instructions of the various components by referring to the following instructions.

**WARNING**: Any operation that requires opening the docking station must be performed by a qualified technician.

## 17.1.1 Docking station structure



#### EO-Display Housing unit architecture

| 1. | Upper shell & display screen | 6. Lower shell                      |
|----|------------------------------|-------------------------------------|
| 2. | Cooling fan                  | 7. Covers                           |
| 3. | EO-Display CPU board         | 8. Connection board & DC plug cable |
| 4. | USB board                    | 9. Handle                           |
| 5. | Insert                       |                                     |

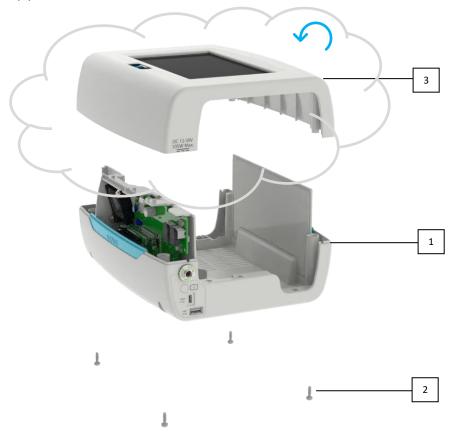
## 17.1.2 EO-Display Opening

Be sure to strictly observe the opening and closing recommendations of the various components by referring to the following instructions.

**WARNING**: Any operation that requires opening the EO-Display should be performed by a qualified technician.

- Remove the module from the EO-Display housing unit.
- Turn over the unit (lower shell (1) to the top) and remove the four screws (2).
- Turn the device over again (upper shell above) by holding the two shells in position.

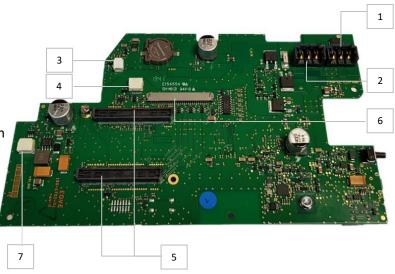
Flip the upper shell (3) on the left side.



WARNING: Pay attention to the cables connecting the upper shell to the CPU board (left side).

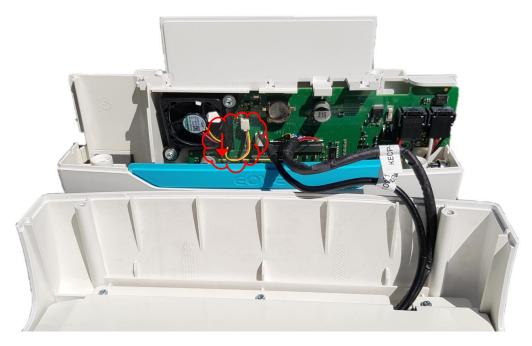
## 17.1.3 EO-Display CPU Board electrical connections

- 1. Pistons board connection
- 2. DC power plug connection
- 3. Cooling fan connection
- 4. Touch screen cable connection
- 5. SOM connection
- 6. LVDS cable connection
- 7. USB board connection

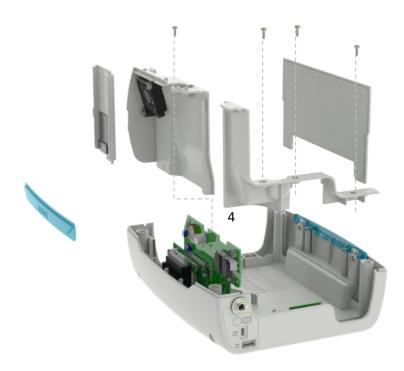


## 17.1.4 Electronic boards removal

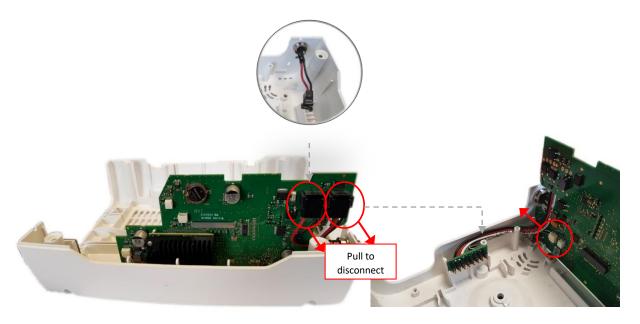
- Disconnect the cable of the cooling fan from the CPU board
- Then, disconnect the touch screen cable and the LVDS cable



- Remove the three screws of the cover (4).
- Remove the four covers.



- Disconnect the 2 cables of the connection (pistons) board from the CPU board
- Disconnect the cable of the DC power plug from the CPU board



- Remove the connection (pistons) board
- Unscrew the CPU board then gently remove it from its slot



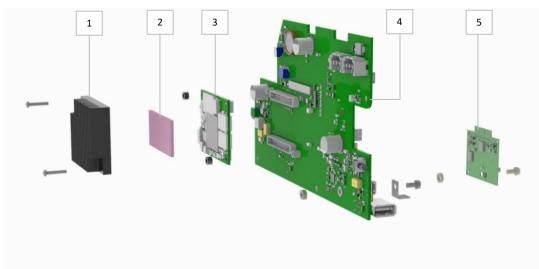
WARNING: Be careful, the USB board is still fitted in its slot and connected to the CPU board

- Disconnect the USB board from the CPU board



- Remove the CPU board and the USB board

## 17.1.1 EO-Display CPU board assembly



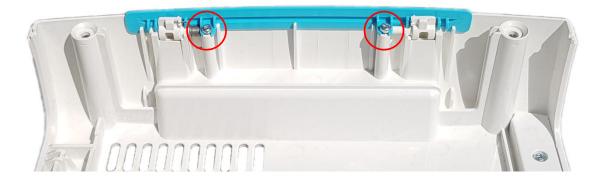
## Composition of the EO-Display CPU board

0

| 1. Heatspreader           | 1. CPU board               |
|---------------------------|----------------------------|
| 2. Thermal pad            | 2. Wi-Fi board (OPTIONNAL) |
| 3. SOM (System On Module) |                            |

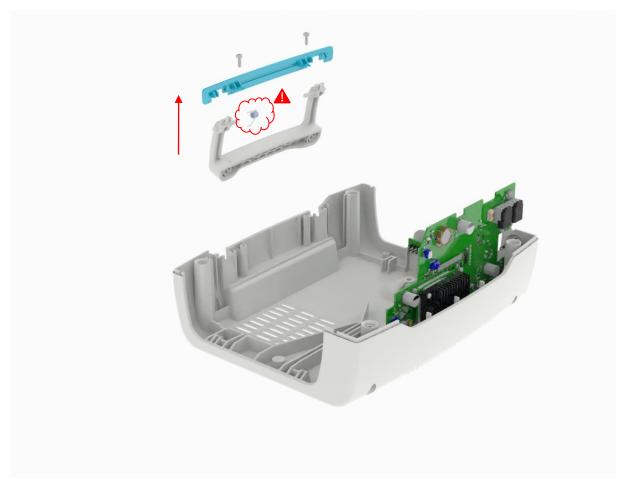
#### 17.1.2 EO-Display handle removal

- Unscrew the green insert from the lower shell



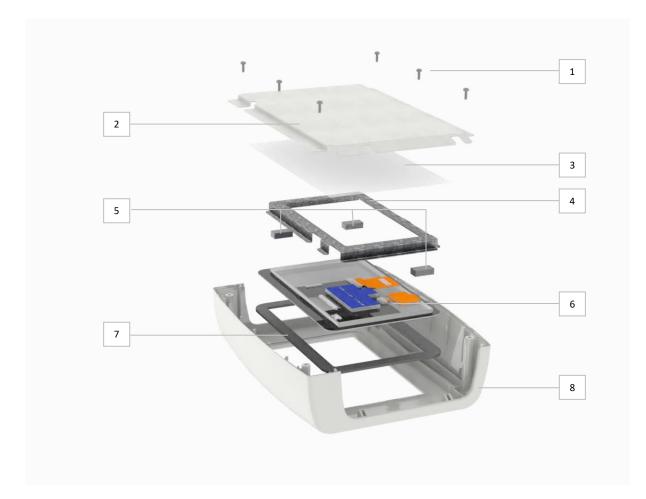
Lift the insert then the handle

\_



WARNING: Pay attention to not lose the spring when you remove the handle

## 17.1.3 EO-Display screen connections

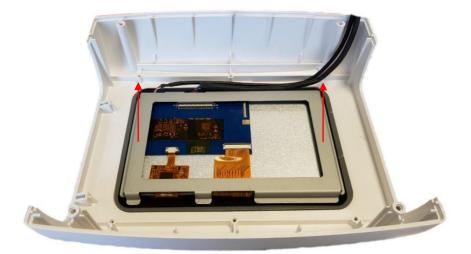


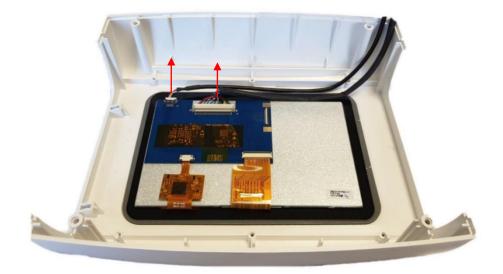
EO-Display upper shell architecture

| 1. M3x8 screws          | 2. Screen metal protection |
|-------------------------|----------------------------|
| 3. ESD sheet protection | 4. Frame                   |
| 5. Frame foams          | 6. Display screen          |
| 7. Screen foam          | 8. Upper shell             |

- Remove the 6 screws from the screen metal protection

- Remove the screen frame





- Disconnect the touch screen cable and the LVDS cable

## 17.1.4 Cooling fan removal

- Remove the 2 screws with their washer



- Remove the cooling fan suspension



## 17.1.5 EO-Display keyboard replacement

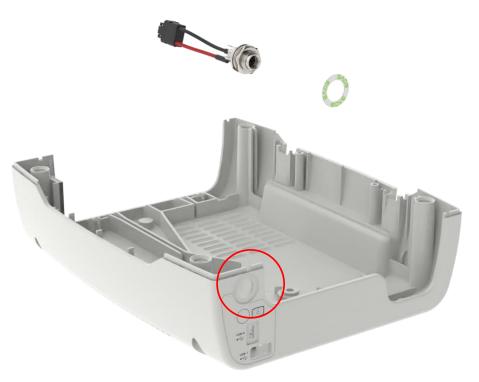
- Unstick the keyboard from the lower shell
- Clean the keyboard slot with an appropriate surface cleaning solution
- Stick the new keyboard on the dedicated slot



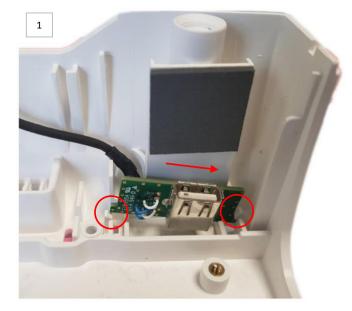
## 17.2 EO-Display assembly

#### 17.2.1 EO-Display peripheral connections

- Screw the DC power plug on the dedicated slot of the lower shell and respect a tightening torque of 1N.m



- Put the USB board in place, in two steps

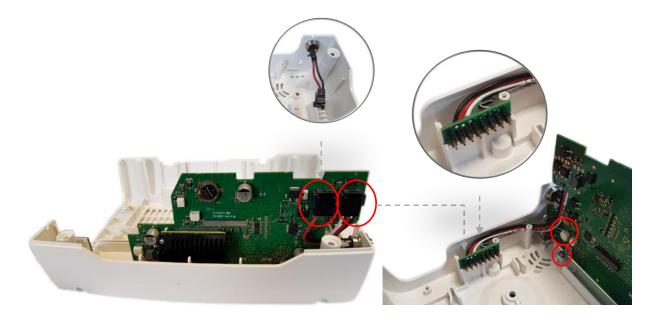




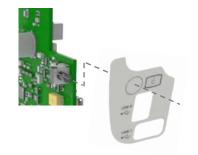
- Connect the USB board to the CPU board



- Position the CPU board an connect the pistons board and the DC plug cable on it
- Check that the CPU board is properly on position and screw it into the lower shell



**WARNING:** You must hold the CPU board when you screw it to keep a good contact between the On/Off button and the Keyboard.



#### 17.2.2 EO-Display handle assembly

- Position the spring on the handle and position it onto the lower shell
- Screw the insert and verify the handle move properly







- Position the pistons board cover and screw it (x3)



#### 17.2.3 EO-Display screen assembly

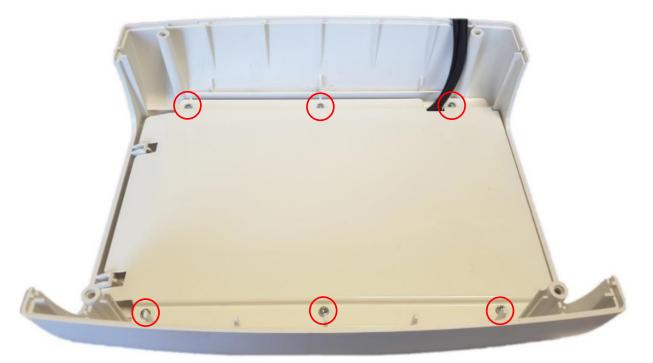
- Connect the touch screen cable and LVDS cable to the display screen



#### - Position the screen frame



- Screw the screen metal protection (x6)



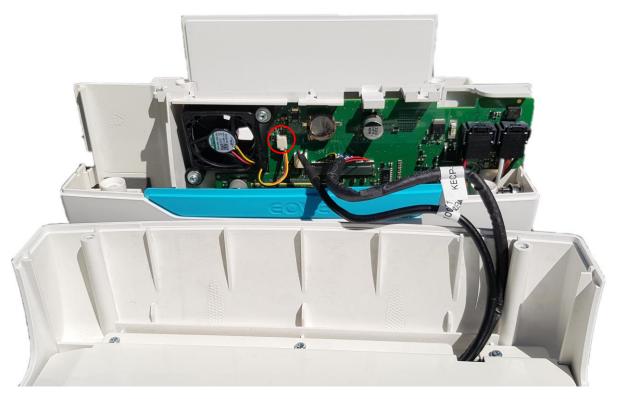
- Connect the touch screen cable and the LVDS cable (1) to the CPU board
- Position the insert (2) and the handle cover on the lower shell



#### 17.2.4 EO-Display fan assembly

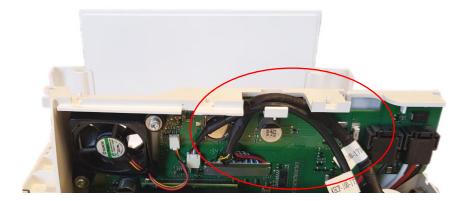
- Put the cooling fan and its suspension in place





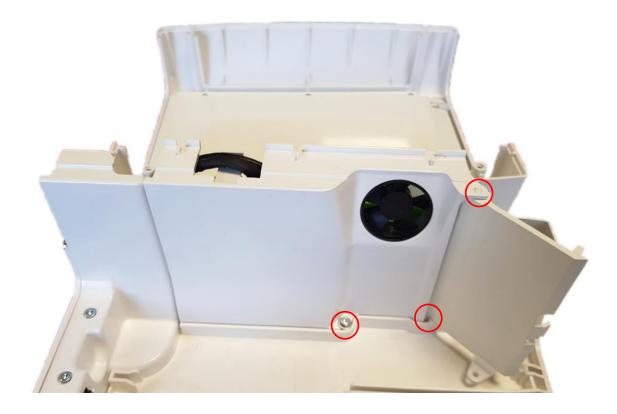
- Position the fan cover and connect the cooling fan to the CPU board

**NOTE:** the touch screen cable and the LVDS cable must be held by the fan cover as done on the picture below.



#### 17.2.5 EO-Display closing

- Position the USB board flap then screw the fan cover



**NOTE**: We advise keeping the USB board flap opened and close it only when the EO-Display is completely assembled.

- Spin the upper sheel and lift it above the lower shell

**WARNING:** Be careful to not catch cables between the two shells when you close the EO-Display.



- Flip the EO-Display and screw the lower shell to the upper shell

## **18 EO-Display housing unit: Performance controls**

18.1 OP6-1: Operation on power source and charge control

- Turn off the EO-Display housing unit
- Connect the housing unit to the AC power source
- Start the housing unit by pressing the On/Off button at the rear
- Check that the EO-Display boots properly

#### 18.2 OP6-2: Software versions

- Go in Preferences menu and check OS and Interface versions
- Update them if necessary

| Mode: IPPB               | 🔒 🛿 AC 2020/12/17 - 15:56 |
|--------------------------|---------------------------|
| ← Preferences            |                           |
| 2020/12/17               | <b>~</b>                  |
| 15:56                    | \$                        |
|                          |                           |
| Information              |                           |
| Operating system version | eove-eodisplay-1.5.0      |
| User interface version   | 2.3.0 (eodisplay)         |
| Module serial number     | E0070000DFV               |
| CPU version              | C070000604                |
| POWER version            | P150000400                |
| GAUGE version            | 5                         |
|                          |                           |

- Switch off the EO-Display housing unit

#### 18.3 OP6-3: Test of the communication with the module

- Start a charged module and place it in the housing unit
- Once the display screen boot complete, verify that the communication with the EO-70 SMD module is established and information are displayed



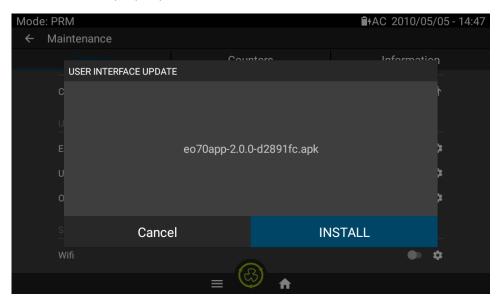
#### 18.4 OP6-4: Operation on internal battery of EO-70 SMD module

- Disconnect AC power source
- AC power indicator must disappear **CAC** in the top right corner of the screen and it must display the remaining charge of the EO-70 SMD module



#### 18.5 OP6-5: Check USB ports

- Connect a USB stick embedded with the interface software version, onto the dedicated port of the EO-Display keyboard
- Go to the maintenance menu / General tab and select EO70 user interface to check that the USB stick is properly detected



#### 18.6 OP6-6: Wi-Fi feature test (optional)

- If the Wi-Fi option is activated on the EO-Display, go to the Maintenance menu and verify that the local Wi-Fi signal is detected

#### 18.7 OP6-7: Interface setting

#### Check date, time and language

| Mode: INEX (Auto)<br>← Preferences |       | 10                            | 00 % 훅 2020/05/06 - 15:22 |
|------------------------------------|-------|-------------------------------|---------------------------|
| Settings as list                   |       |                               |                           |
| Brightness                         | _     |                               |                           |
| Transitions beep                   |       |                               |                           |
| Date and time                      | 10.10 | <b>9</b> 21 15 <b>3</b>       |                           |
| 2020/05/06                         | 16:19 | <sup>20</sup><br>8 19 18 17 4 | \$                        |
| 16:20                              |       |                               | \$                        |
| Information                        |       | CANCEL OK                     |                           |
| Operating system ver               |       |                               |                           |
| Lloor interface version            |       |                               |                           |
|                                    |       |                               |                           |

#### 18.8 OP6-8: EO-Display switch off from EO-70 SMD module

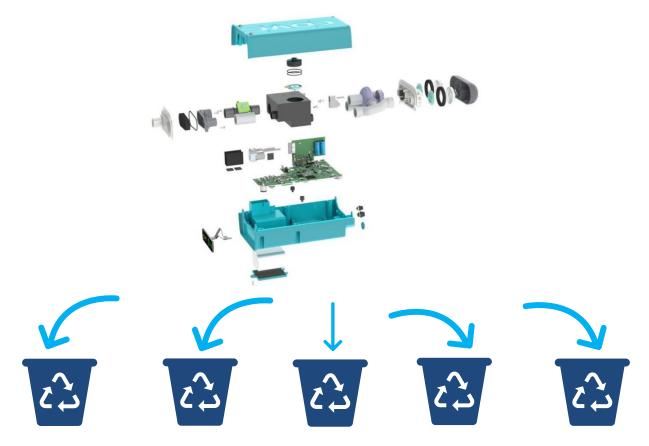
- Press around 10s the On/Off button at the rear of the EO-Display housing unit
- Verify that the EO-Display turns off

#### 18.9 OP6-9: Visual inspection

Proceed to a visual inspection of the shells, covers, labels

## 19 EO-70SMD disposal

The disposal of the EO-70SMD must be done by dismantling the device according to EOVE procedure (refer to \$11 EO-70 SMD module: Replacement procedures & \$14 Housing unit: replacement procedures) in order to split the parts and send them toward the appropriate recycling channel.



| Lithium Ion<br>Batteries | Electronic boards | Electronic waste | Plastic / shells | Foams/tubes/sealing<br>rings |
|--------------------------|-------------------|------------------|------------------|------------------------------|
|                          |                   |                  |                  | 0                            |
|                          |                   |                  |                  |                              |
|                          |                   |                  |                  |                              |
|                          | Q                 |                  |                  |                              |

#### 19.1 Use of dangerous substance

Lithium Ion battery is considered as dangerous good. Manufacturing, transport, storage and disposal of Lithium Ion batteries are strictly followed by safety process.

The disposal of defective batteries should be done in compliance with the laws in effect in your country. Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

Lithium Ion technology of the internal battery requires a secure design. That is why, only batteries developed under EOVE control and provided by EOVE are suitable and allowed for EO-70SMD operation.

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD ventilator out of service and reduce the use of dangerous substances, recycling procedures must be strictly followed in compliance with laws in effect in the distributed country.

#### 19.2 Emissions in the air

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service and reduce the emissions in the air, recycling procedures must be strictly followed in compliance with laws in effect in the distributed country. Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

Device must be dismantled and battery, turbine & motor, solenoid valves, electronic parts, display screen and other plastic parts must follow appropriate collection and recycling process in compliance with country regulations.

#### 19.3 Rejects in surface water and groundwater table

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service and reduce the rejects in surface water and groundwater table, recycling procedures must be strictly followed in compliance with laws in effect in the distributed country. Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

Device must be dismantled and battery, turbine & motor, solenoid valves, electronic parts, display screen and other plastic parts must follow appropriate collection and recycling process in compliance with country regulations.

#### 19.4 Waste, especially dangerous substance

Waste of the EO-70SMD which contain dangerous substance only concern the internal battery and the tablet battery (Lithium Ion technology) with a periodical replacement every 2 years.

The disposal of defective batteries should be done in compliance with the laws in effect in your country. Lithium Ion Battery, when defective, might present explosion or combustion risks. Used

batteries must be stored in closed ratified boxes with appropriate protection (like vermiculite) against impacts and overheating propagation.

Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service and reduce the final wastes of dangerous substances (after incineration for exemple), recycling procedures must be strictly followed in compliance with laws in effect in the distributed country.

#### 19.5 Use of raw material, energy

EOVE is not responsible for the proper recycling of your EO-70SMD ventilators park. To put the EO-70SMD out of service and reduce the use of raw material, energy (during incineration, transformation), recycling procedures must be strictly followed in compliance with laws in effect in the distributed country.

#### 19.6 Noise, vibrations, smell, dust, electromagnetic field

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service and reduce the noise, vibrations, smell, dust, electromagnetic field (during incineration, transformation), recycling procedures must be strictly followed in compliance with laws in effect in the distributed country.

#### 19.7 Transportation

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service and reduce the transportation of wastes, recycling procedures must be strictly followed in compliance with laws in effect in the distributed country.

Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

#### 19.8 Risks caused by environmental accidents

Environmental accidents such as earthquakes, floods, hurricanes, tsunamis, and safety risks they can cause onto the wastes and treatment center of the wastes (incineration, transformation), can have huge environmental impact.

EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service and reduce the risks caused by environmental accidents, recycling procedures of wastes must be strictly followed in compliance with laws in effect in the distributed country.

#### 19.9 Biosphere contamination

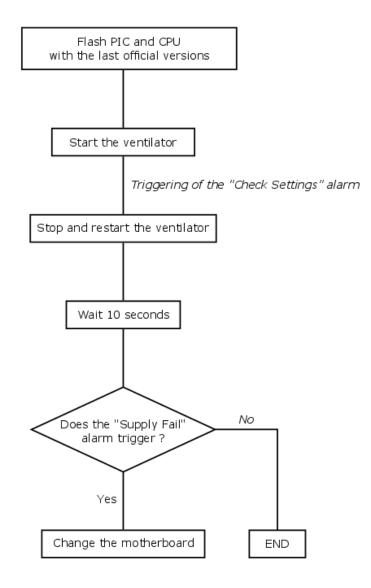
EOVE is not responsible for the proper recycling of your EO-70SMD park. To put the EO-70SMD out of service, and reduce the biosphere contamination, recycling procedures must be strictly followed in compliance with laws in effect in the distributed country. Collection toward a recycling center, must be done by accredited channels able to provide certificate and traceability.

Device must be dismantled and battery, turbine & motor, solenoid valves, electronic parts, display screen and other plastic parts must follow appropriate collection and recycling process in compliance with country regulations.

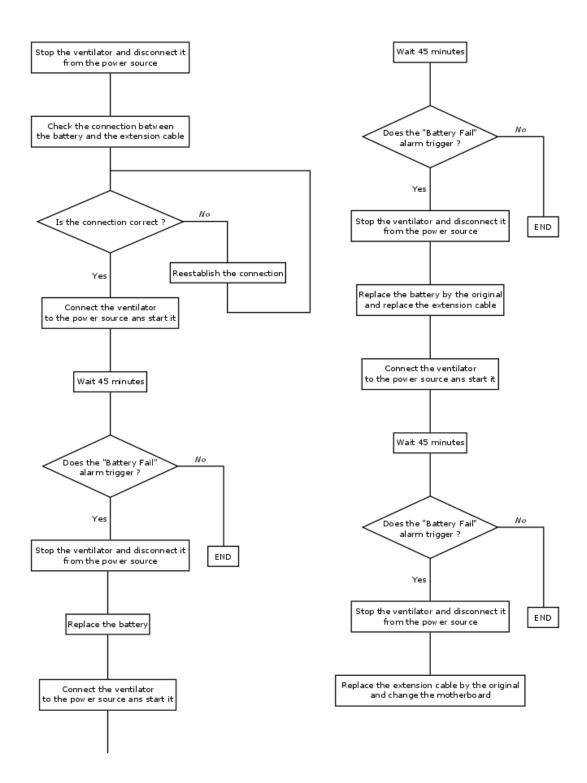
# **APPENDIX**

## **20** APPENDIX 1: Troubleshooting trees

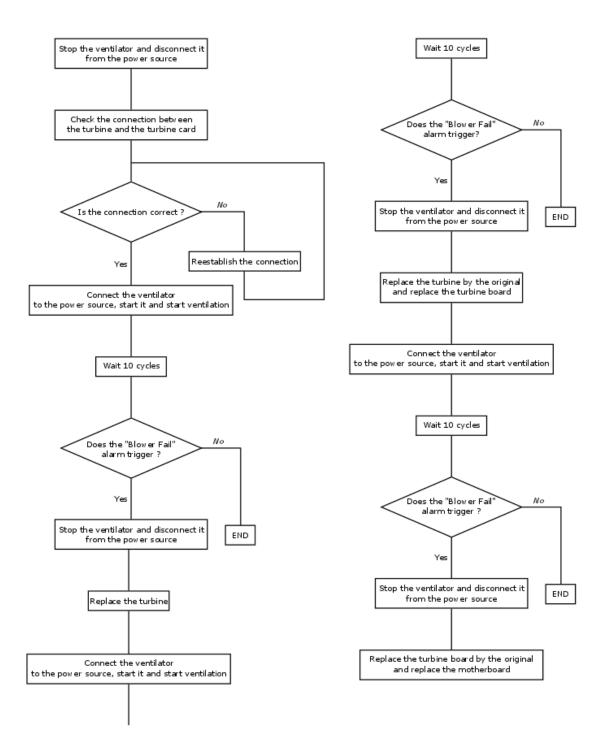
#### 20.1 Supply Fail



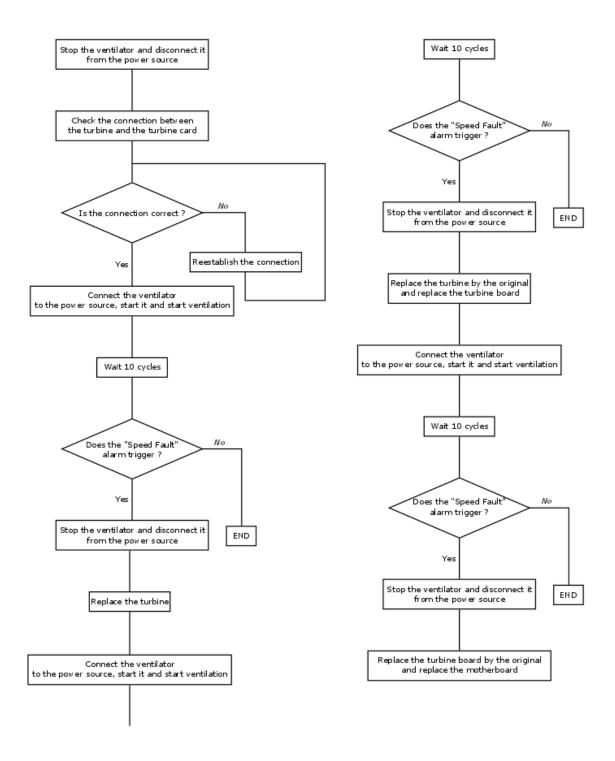
#### 20.2 Battery Fail



#### 20.3 Turbine Fail

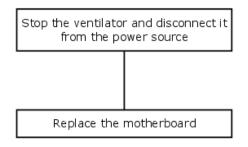


#### 20.4 Speed Fault

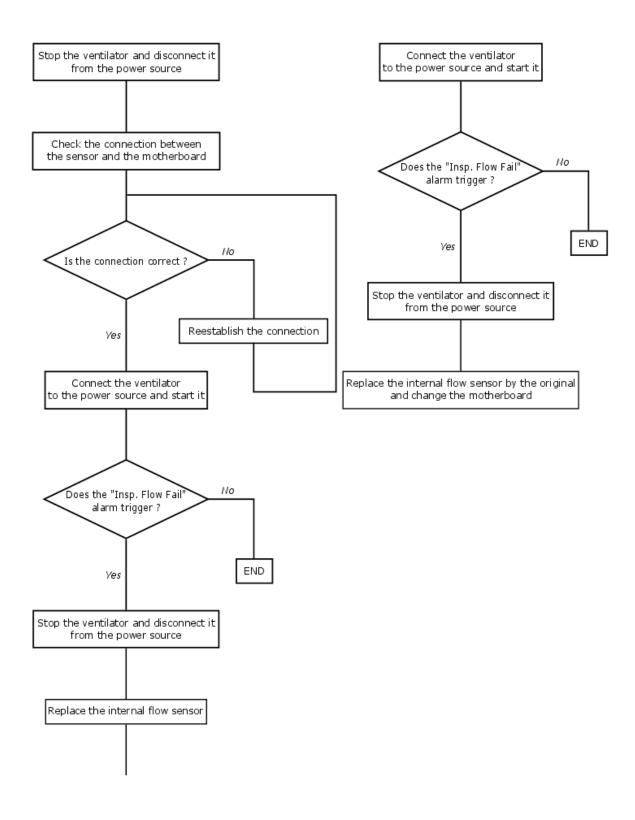


172

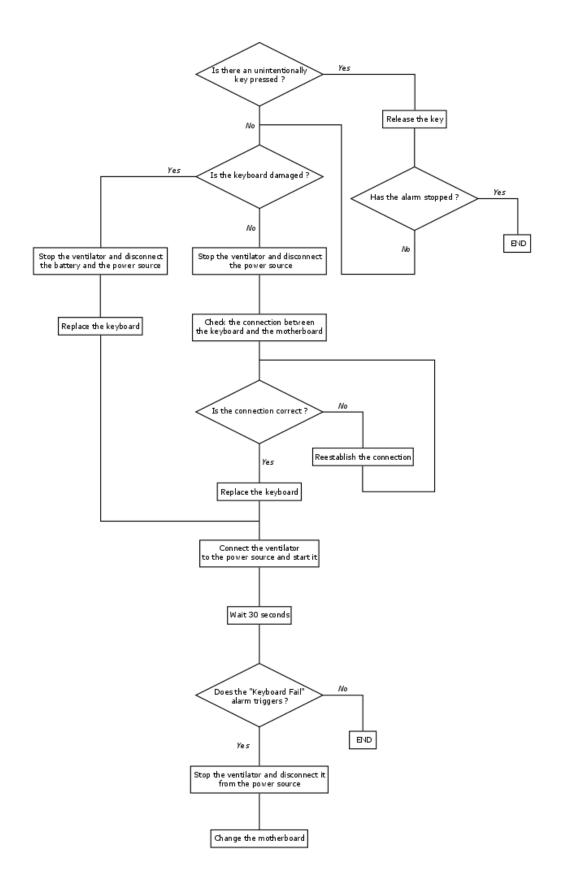
## 20.5 Sensors failure / CPU Fail / Memory Fail / Device information lost



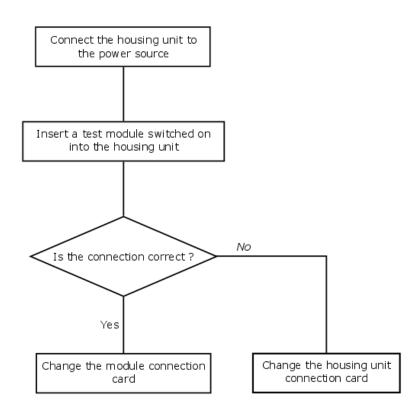
#### 20.6 Insp. Flow Fail



#### 20.7 Keyboard Fail



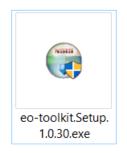
#### 20.8 No communication between the unit and the ventilator



## 21 APPENDIX 2: Software installation

#### 21.1 EO TOOLKIT

- Download EO-Toolkit .exe file from the maintenance portal of EOVE website (http://eove.fr/cms/en/produits-et-support/maintenance/eo-70-cough-assist)
- Install EO-Toolkit



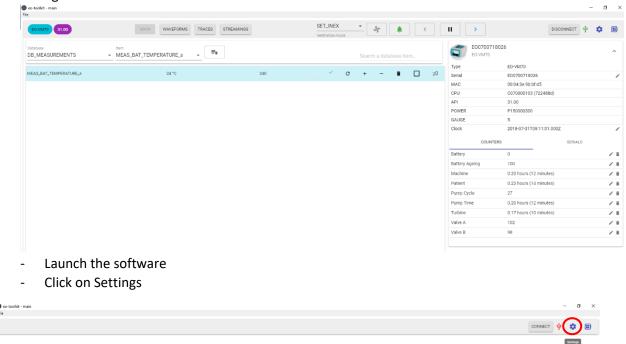
NOTE: FTDI drivers must be updated/installed from Windows Update or the following links:

Windows 32 bits

https://www.ftdichip.com/Drivers/CDM/CDM%20v2.12.28%20WHQL%20Certified.zip

Windows 64 bits

https://www.ftdichip.com/Drivers/CDM/CDM%20v2.12.28%20WHQL%20Certified.zip



- Configurate EO-TOOLKIT

- Connect an EOVE-70 module by usb to the computer
- Choose two consecutive usb ports lower than 10

- Select the API file required. It must be accordance with software version which might be updated. By default, enable Auto Select API descriptor

| Settings                  |                |          |      |     |           |
|---------------------------|----------------|----------|------|-----|-----------|
| CONNECTION                | CHECK MODULE   | FIRMWARE | DATA | LOG | STREAMING |
| List USB Ports            | SCAN           |          |      |     |           |
| ain USB port (CPU) Second |                |          |      |     |           |
| Auto Select API de        | peorinter file |          |      |     |           |
| Auto Select AFT de        | scriptor nie   |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      |     |           |
|                           |                |          |      | ОК  | EXPORT    |

- Click on OK

**WARNING:** Make sure to use two consecutive usb ports lower than 10.

• If you run the automatic performance controls via EO-Toolkit, complete the check module settings as bellow

| 1   |                        | 2          |      | 3   |           |
|---|------------------------|------------|------|-----|-----------|
| Settings                                  |                        |            |      |     |           |
| CONNECTION                                | CHECK MODULE           | FIRMWARE   | DATA | LOG | STREAMING |
| Tester name                               | Tester e               |            |      |     |           |
| Mister Blue                               | 🗹 s                    | av@eove.fr |      |     |           |
| Check type category Customer              |                        |            |      |     |           |
| Instruction reference<br>E070 Technical m | anual rev DB           |            |      |     |           |
| Test reports directory                    |                        |            |      |     |           |
|   | Blue \Documents\New fo | lder       |      |     |           |
| Flow analyzer USB port                    |                        |            |      |     |           |
| Enable sound                              |                        |            |      |     |           |
| 4   | 5                      | 6          |      |     |           |

1- Technician

\_

- 3- Documentation associated
- 5- Choice of Flow Analyzer USB port (must be connected first)
- 2- User e-mail address
- 4- On/Off test sound
- 6- Destination folder to save Process Value tests

## - Click on update firmwares

| CONNECTION              | CHECK MODULE           | FIRMWARE               | DATA                      | LOG STRE                |
|-------------------------|------------------------|------------------------|---------------------------|-------------------------|
| ckage file for EO-VM70  |                        |                        |                           |                         |
| \\WALL-E\eove-sh        | ared\preproduction_bin | aries\eo-display_asset | s\eo070\default\eo70app-2 | 2.0.0-C070000401-P15000 |
| ckage file for EO-VM150 |                        |                        |                           |                         |
| D:\eo150app-2.1.1       | -C150000606-P150000    | 400.eopkg              |                           |                         |
|                         |                        |                        |                           |                         |
|                         |                        |                        |                           |                         |
|                         |                        |                        |                           |                         |
|                         |                        |                        |                           |                         |
| kit - main              |                        |                        |                           | -                       |
|                         |                        |                        |                           | CONNECT 🜵               |
|                         |                        |                        |                           |                         |
| - Select path           | file to executable     | PIC and CPU soft       | ware                      |                         |
| beleet pati             |                        |                        |                           |                         |
| Update Fi               | mwares                 |                        |                           |                         |
| opuatern                | mwares                 |                        |                           |                         |
| D:\eo70\C0              | 70000103-api3          | 1-722488d0.H8          | 36                        | UPDATE CPU              |
| CPU firmware            |                        |                        |                           |                         |
| CFU IIIIIWale           |                        |                        |                           |                         |
|                         |                        |                        | E0000200 hav              |                         |
| D:\eo70\eo              | 070\default\mo         | dule\power\P           | 1 30000300.nex            | UPDATE POWER            |

| $\sim$ |     | ~ | 0 | -  |
|--------|-----|---|---|----|
| 1 3    | . ( |   | 5 | ⊢. |
|        | -   | 0 | 0 | _  |

## 22 APPENDIX 3: Inspection sheet

| New Medical Inspirațion | INSPECTION SHEET EOVE-070 | SAV100-<br>12 REV D<br>06/05/20 |
|-------------------------|---------------------------|---------------------------------|

| OP6: EO-DISPLAY TEST                                       | Result | Comments |
|--|--------|----------|
| OP6-1: Operation & charging with external power source     |        |          |
| OP6-2: Software versions                                   |        |          |
| OP6-3: Communication with module                           |        |          |
| OP6-4: Operation on internal battery of ventilation module |        |          |
| OP6-5: USB ports verification                              |        |          |
| OP6-6: Wi-Fi feature (Optionnal)                           |        |          |
| OP6-7: Setting of clock / date / language                  |        |          |
| OP6-8: Switch off from ventilation module                  |        |          |
| OP6-9: Labels: power source, serial number                 |        |          |

|   | Charger module S/N: |           |
|---|---------------------|-----------|
| EQUIPMENTS<br>External battery EO-BAT9 S/N: |                     |           |
| COMMENTS                                    |                     |           |
|   | DATE PLACE          | SIGNATURE |

## APPENDIX 4: Spare parts list

| Spare Parts List EO-70SMD                  |                                  |             |                 |                                       |  |  |  |   | Rev \<br>10/9/202                                   |          |                      |  |
|--|----------------------------------|-------------|-----------------|---------------------------------------|--|--|--|---|---|----------|----------------------|--|
| PRODUCT DESCRIPTION                        | Note: To order a spa<br>EOVE P/N | ALMS P/N    | EOVE<br>PRICE   | reference in EOVE                     | Photo         UST OF COMPONENTS         COMMENTS         PRODUCT         I |  |  |   |   |          |                      |  |
| Tablet Battery Kit E01X0-03                | SP-TABBAT-003                    | KY732636    | 153.00 ¢        |                                       |  |  |  | Z380M Tablet battery + support          | From manufactured device<br>S/N > EO1X002180115     | <b>1</b> | ~                    |  |
| Docking Lower Shell EO1X0                  | SP-DOCKLOSHEL-001                | KY732645    | 51.00 <b>¢</b>  |                                       |  |  |  | DCK Lower Shell + 4 DCK Feet + SN Label | Provide S/N to edit the label                       | 📚 🍫      | ~                    |  |
| Insulating Washer                          | SP-INWASH-001                    | KY732628    | 24.48 €         | O<br>x20                              |  |  |  | 20 pieces                               |   | <b>*</b> | ~                    |  |
| DCK Power Connector Spinning<br>Prevention | SP-SPINPREV-001                  | In progress | 48.96 <b>€</b>  | 00000000<br>x8                        |  |  |  | 8 pieces                                |   | <b>*</b> | ~                    |  |
| Inspiratory Flow Sensor                    | SP-INSFLOWSENS-001               | KY732637    | 183.60 <b>€</b> | -                                     |  |  |  |   |   | <b>1</b> | ~                    |  |
| Internal Battery Pack Li-Ion               | SP-INTBATT-002                   | KY732930    | 255.00 €        | 9                                     |  |  |  |   |   | <b>*</b> | ~                    |  |
| Display data cable EO1X0                   | SP-DISPDATACBL-002               | KY732623    | 30.60 <b>€</b>  | )                                     |  |  |  |   | From manufactured device<br>S/N > E01X001170515     | <b>1</b> | ~                    |  |
| FiO2/SpO2 Cable + Connector                | SP-FIO2SPO2CBL-002               | KY732626    | 40.80 €         | · · · · · · · · · · · · · · · · · · · |  |  |  |   | From manufactured device<br>S/N > E01500518022B     | <b>1</b> | ~                    |  |
| Remote Alarm Cable + Connector             | SP-REMALCBL-002                  | KY732647    | 51.00 <b>€</b>  |                                       |  |  |  |   | From manufactured device<br>S/N > E015005180228     | <b>1</b> | ~                    |  |
| Turbine EO-70                              | SP-TURB70-001                    | KY732673    | 459.00 €        | \$                                    |  |  |  |   |   | <b>N</b> | ~                    |  |
| Solenoid valve Clippard EO70               | SP-SOLVALVE-002                  | KY732676    | 76.50 €         |                                       |  |  |  |   |   | <b>*</b> | ~                    |  |
| Solenoid valve Camozzi EO70                | SP-SOLVALVE-003                  | KY732675    | 86.70 €         | Ŵ                                     |  |  |  |   |   | *        | ~                    |  |
| Pneumatic Block EO70                       | SP-PNEUBLOCK-002                 | KY732657    | 387.60 €        |                                       |  |  |  |   |   | <b>*</b> | ~                    |  |
| Valve Support E070                         | SP-VALSUP-001                    | KY732672    | 61.20 <b>€</b>  |                                       | *** <b>#</b>   |  |  |   |   |          | ~                    |  |
| Pneumatic Block Cover EO70                 | SP-PNEUCOV-001                   | KY732658    | 20.40 <b>€</b>  | <u>.</u>                              |  |  |  |   |   |          | <ul> <li></li> </ul> |  |
| Exhalation/Inhalation valve E070           | SP-EXHVALVE-002                  | KY732674    | 30.60 €         | <b>1</b> .20                          |  |  |  |   | Do not use ref SP-EXHVALVE-<br>001 for EO70 purpose | <b>N</b> | ~                    |  |
| Blower Control PCB E070                    | SP-BLOWRPCB-002                  | KY732664    | 183.60 <b>€</b> |                                       |  |  |  |   |   | <b>A</b> | ~                    |  |

| SP-CPU70-001      | KY732661   | 1,173.00 <b>¢</b>   |   |   |  |  |  |  | <b>*</b>   | ~  |
|-------------------|--|---|---|---|--|--|--|--|--|--|
| SP-MODULKEYBD-002 | KY732663   | 91.80 €   | (10) (B) (B)  |   |  |  |  |  | <b>*</b>   | ~  |
| SP-PUMP-001       | KY732669   | 122.40 €  | S.  |   |  |  |  |  | <b>*</b>   | <ul> <li></li> </ul>   |
| SP-CIRPORT-001    | KY732670   | 20.40 €   | <b>1990</b>   |   |  |  |  |  | <b>*</b>   | ~  |
| SP-PMKIT-001      | KY732668   | 40.80 €   | 0   |   |  | - Co   |  |  | <b>*</b>   | ~  |
| SP-AIRFILT-001    | In progress  | 51.00 €   | 0   |   |  |  |  |  | <b>*</b>   | ~  |
| SP-LOSHEL-002     | KY732665   | 249.90 €  |   | -   |  | -  | Lower Shell + Remote Alarm & SpO2<br>Connectors + Foams + 2 Spring Buttons +<br>Keyboard + Battery Flap + SN Label   |  | <b>*</b>   | ~  |
| SP-UPSHEL-002     | KY732667   | 76.50 €   | 1   |   |  |  | Upper Shell + Foams + 2 Spring Buttons   |  | <b>*</b>   | ~  |
| SP-VALCOV-001     | KY732660   | 15.30 <b>€</b>  |   |   |  |  |  |  | <b>*</b>   | ~  |
| SP-DOCKPWR-004    | KY732662   | 153.00 <b>€</b>   | 0 % V   |   |  |  |  |  |  | ~  |
| SP-DOCKDISPL-002  | KY732671   | 464.10 €  |   |   |  |  |  |  | <b>*</b>   | <ul> <li></li> </ul>   |
| SP-DOCKCOV-002    | KY732659   | 20.40 €   |   | 5.4   | -  | 5.4  | 3 DCK Covers + 2 DCK Inserts   |  | <b>A</b>   | ~  |
| SP-DOCKUPSHEL-002 | KY732666   | 45.90 <b>€</b>  |   |   |  |  | DCK Upper Shell + EO70 Label + Adhesive<br>to past the tablet  |  | <b>*</b>   | ~  |
| SP-LVDSCBL-001    | In progress  | 20.40 €   | P,  |   |  |  |  |  | <b>Ö</b>   | $\sim$   |
| SP-TOUCHCBL-001   | In progress  | 15.30 <b>€</b>  | $\subseteq$   |   |  |  |  |  | 🎓 爹  | $\sim$   |
| SP-PISTBOARD-001  | In progress  | 122.40 €  | F   |   |  |  |  |  | ۱ الله الله  | $\sim$   |
| SP-DCPLUG-001     | In progress  | 40.80 €   |   |   |  |  |  |  | 📚 🍏  | $\sim$   |
| SP-UPDISPLAY-002  | In progress  | 234.60 €  | -   |   |  |  | Display screen + Upper shell   |  |  | ~  |
| SP-TIMBAT-001     | In progress  | 20.40 €   |   |   |  |  |  |  | 🏷 爹  | $\sim$   |
| SP-CPUDISP-001    | In progress  | 510.00 €  | <u> </u>  |   |  |  | CPU + SOM + HEATSPREADER   |  | ۵ می   | $\sim$   |
|                   | SP-MODULKEYBD-002           SP-FUMP-001           SP-CIRPORT-001           SP-CIRPORT-001           SP-AMRFILT-001           SP-LOSHEL-002           SP-UPSHEL-002           SP-DOCKPWR-004           SP-DOCKDISPL-002           SP-DOCKDUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-002           SP-DOCKLUSPL-001           SP-TOUCHCEL-001           SP-POCPLUG-001           SP-DCPLUG-001           SP-TIMBAT-002 | SP-MODULKEYBD-002         KY732663           SP-YUMP-001         KY732669           SP-CIRPORT-001         KY732660           SP-CIRPORT-001         KY732668           SP-AIRFILT-001         In progress           SP-LOSHEL-002         KY732667           SP-VALCOV-001         KY732667           SP-DOCKPWR-004         KY732667           SP-DOCKDISPL-002         KY732662           SP-DOCKDUSPL-002         KY732667           SP-DOCKDUSPL-002         KY732667           SP-DOCKDUSPL-002         KY732667           SP-DOCKDUSPL-002         KY732667           SP-DOCKDUSPL-002         KY732667           SP-DOCKLUSPL-002         KY732667           SP-DOCKLUSPL-002         KY732667           SP-DOCKLUSPL-002         In progress           SP-DOCKLUSHEL-002         In progress           SP-TOUCHCBL-001         In progress           SP-POCPLUG-001         In progress           SP-UPDISPLAY-002         In progress           SP-TIMBAT-001         In progress | SP-MODULKEYBD-002         KY732663         91.80 €           SP-PUMP-001         KY732663         122.40 €           SP-CIRPORT-001         KY732663         20.40 €           SP-CIRPORT-001         KY732663         40.80 €           SP-AIRFILT-001         IN progress         51.00 €           SP-AIRFILT-001         IN progress         249.90 €           SP-LOSHEL-002         KY732667         76.50 €           SP-VALCOV-001         KY732667         15.30 €           SP-DOCKDYPR-004         KY732667         15.30 €           SP-DOCKDISPL-002         KY732667         153.00 €           SP-DOCKDISPL-002         KY732667         20.40 €           SP-DOCKDISPL-002         IN progress         12.40 €           SP-TOUCHCBL-001         In progress         234.60 €           SP-UPDISPLAY-002         In progress         234.60 € | SP-MODULKEYBD-002         KY732663         91.80 c         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | SP-MODULKEYBD-002         KY732663         91.80 c         Immerie           SP-PUMP-001         KY732669         122.40 c         Immerie         Immerie           SP-PUMP-001         KY732669         122.40 c         Immerie         Immerie           SP-PUMP-001         KY732669         122.40 c         Immerie         Immerie           SP-PUMP-001         KY732669         120.40 c         Immerie         Immerie           SP-PMKIT-001         Improgress         S1.00 c         Immerie         Immerie           SP-AIRFILT-001         Improgress         S1.00 c         Immerie         Immerie           SP-UPSHEL-002         KY732667         76.50 c         Immerie         Immerie           SP-UPSHEL-002         KY732667         15.30 c         Immerie         Immerie           SP-DOCKDVP010         KY732667         15.30 c         Immerie         Immerie           SP-DOCKDUPSHE-002         KY732657         15.30 c         Immerie         Immerie           SP-DOCKDUPSHE-002         KY732657         20.40 c         Immerie         Immerie           SP-DOCKDUPSHE-002         KY732657         20.40 c         Immerie         Immerie           SP-DOCKDUPSHE-002         KY732657         20.40 c< | SP-MODULKEYBD-002         KY732663         91.80 C         Intermediate         Intermediate           SP-PUMP-001         KY732669         122.40 C         Image: Comparing the strength s | SP-MODULEXTED-002         KY732663         91.80 c         America         America         America         America           SP-PUMP-001         KY732663         122.40 c         America         Image: Comparison of Comparison | Image: Market in the second | Image: Section of the secti | P# MODULATION 000         KY732643         91.85 (         Image: state stat |

| EO-Display SOM                   | SP-DISPSOM-001    | in progress | 306.00 ⊄ |          |   |   |                              | 📚 🥎      | $\sim$ |
|----------------------------------|-------------------|-------------|----------|----------|---|---|------------------------------|----------|--------|
| EO-Display Fan Suspension        | SP-FANSUSP-001    | In progress | 10.20 €  | Д        |   |   |                              | 📡 💸      | $\sim$ |
| EO-Display Cooling Fan           | SP-COOLFAN-001    | In progress | 30.60 €  | 2        |   |   |                              | 🍥 🏠      | $\sim$ |
| EO-Display Assembled Cooling Fan | SP-ASSFAN-001     | In progress | 40.80 €  | <u>s</u> |   |   | Fan suspension + Colling Fan | 📚 🥎      | $\sim$ |
| EO-Display USB board             | SP-USBRD-001      | In progress | 66.30 €  |          |   |   |                              | 📚 🥎      | $\sim$ |
| EO-Display inserts EO70          | SP-DISPINSRT-002  | in progress | 5.10 €   |          |   |   |                              | <b>*</b> | ~      |
| EO-Display Covers                | SP-DISPCOVRS-001  | In progress | 25.50 €  |          | - | _ |                              | 📚 📚      | $\sim$ |
| EO-Dîsplay Handle                | SP-DISPHANDL-001  | In progress | 10.20 €  | <b></b>  |   |   |                              | 📚 🍫      | $\sim$ |
| EO-Display Screws Kit            | SP-SCREWSKIT-001  | In progress | 10.20 €  |          |   |   | Screws + Washers             | 📚 🍫      | $\sim$ |
| EO-Dîsplay Keyboard              | SP-DISPKEYBRD-001 | In progress | 20.40 €  | <u>a</u> |   |   |                              | 🗳 🍏      | $\sim$ |
|                                  |                   |             |          |          |   |   |                              |          |        |
|                                  |                   |             |          |          |   |   |                              |          |        |
|                                  |                   |             |          |          |   |   |                              |          |        |
|                                  |                   |             |          |          |   |   |                              |          |        |

| New Medical Insolration                | Rev V<br>10/9/2021 |             |               |       |  |   |
|--|--------------------|-------------|---------------|-------|--|---|
| PRODUCT DESCRIPTION                    | EOVE P/N           | ALMS P/N    | EOVE<br>PRICE | рното | LIST OF COMPONENTS   | COMMENTS  |
| EO1X0-VNT Testing cable PF300          | SP-TESTCBL-001     | In progress | 102.00€       | 8     | Cable RS232/microUSB for final control -<br>PF300/ventilation module     |   |
| EO1X0-VNT Testing cable CITREX H4      | SP-TESTCBL-002     | In progress | 153.00€       | 0     | Cable R5232/microUSB for final control - Citrex<br>H4/ventilation module |   |
| FiO2 testing connector                 | SP-TESTFIO2-001    | In progress | 36.72 €       | ۲     |  |   |
| Reconditioning Tool for device AC Plug | SP-PLUGTOOL-001    | In progress | 91.80 €       |       |  |   |
| Remote alarm test cable                | SP-REMCBL-001      | In progress | 81.60 €       | 0     |  |   |
| Battery life test circuit              | SP-BATESTCIR-001   | In progress | 20.40 €       |       |  |   |
| Tablet pattern EO1X0-001               | SP-TABPAT-001      | In progress | 204.00€       | 5     | For tablet model ME176   | Until Docking station S/N < EO1X001170515                                   |
| Tablet pattern EO1X0-002               | SP-TABPAT-002      | In progress | 204.00€       | 5     | For tablet model Z370C   | Docking station manufactured between<br>E01X00117051S < S/N < E01X00218011s |
| Tablet pattern EO1X0-003               | SP-TABPAT-003      | In progress | 204.00€       | 5     | For tablet model Z380M   | From docking station 5/N > EO1X002180115                                    |
| Tablet repair tool EO1X0               | SP-TABTOOL-001     | In progress | 30.60 €       | /     |  | Tool to open the tablet   |
| EO70 Pneumatic bloc Tool               | SP-PNEUTOOL-001    | In progress | 153.00€       | -     |  |   |
| EO70 Sealing test plugs                | SP-SEALPLUG-001    | In progress | 357.00€       | X3    |  |   |
| Double limb circuit 22mm               | SP-DBLCIRCT22-001  | In progress | 20.00 €       |       |  |   |
| Double limb circuit 15mm               | SP-DBLCIRCT15-001  | In progress | 25.00 €       |       |  |   |

| EO70 short single limb circuit 22mm | SP-SGLCIRCT22-001 | In progress | 15.00 € | ** |  |
|-------------------------------------|-------------------|-------------|---------|----|--|
| OM70 Tool                           | SP-OM70-001       | In progress | 102.00€ |    |  |

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## 24 Appendix 5: Components serial numbers



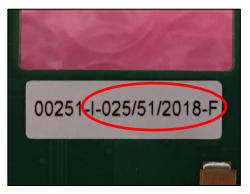
Pneumatic block



Solenoid valve



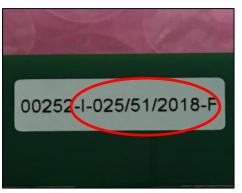
Inspiratory flow sensor



CPU board



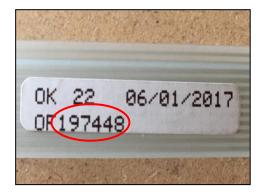
EOVE1 Battery S/N (ex: 17-351501)



Turbine board



EOVE3 Battery S/N (ex : VCA2027182)



Keyboard



Turbine



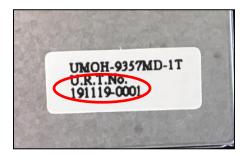
CPU board EO-Display



Wifi board EO-Display



USB board EO-Display



Screen S/N EO-Display