

3 Maintenance and checkout

To help ensure the equipment remains in proper operational and functional order, adhere to a good maintenance schedule.

Corrective maintenance

Service personnel shall perform the following checkout procedure after any corrective maintenance, before taking the module back into clinical use:

Performed service activity	Required checkout procedure		
	Visual inspections (section 3.1)	Electrical safety test (section 3.2)	Functional check (section 3.3)
Module casing opened either for troubleshooting purpose or for replacing any of the internal parts.	All steps	All steps	All steps
Front cover, or an other external part, replaced.	All steps	Not applicable	Not applicable

Planned maintenance

Service personnel shall perform the following checkout procedure completely every 12 months after installation:

1. [3.1. Visual inspections](#)
2. [3.2. Electrical safety tests](#)
3. [3.3. Functional check](#)

3.1 Visual inspections

Detach the module from the module slot and check that:

- the front cover is intact
- all connectors are intact and attached properly
- the module box and latch are intact
- the module and the applied parts are clean

The cleaning precautions, cleaning requirements, cleaning procedures, and recommended cleaning solutions for the monitor are described in the patient monitor's user's manual. For details about cleaning, disinfecting and sterilizing the accessories, see the instructions for use in the accessory package.

NOTE: Mark this task as complete on the checkout form.

3.2 Electrical safety tests

Complete the Electrical safety tests found in the CARESCAPE monitor technical manual, chapter Installation checkout. Perform Patient leakage current tests, Patient (source) leakage current test and Patient (sink) leakage current test.

Record the values of the tests on the "[Maintenance check form](#)" on page 6-17

3.3 Functional check

Turn the monitor on. Wait until the normal monitoring screen appears.

3.3.1 Test setup

Required tools

- P/N 2021087-001, Masimo SpO₂ Tester kit, model 1795 (note: the kit includes a SpO₂ interface cable)
- Masimo SpO₂ interface cable

NOTE: See the CARESCAPE monitor supplemental information manual for compatible accessories.

Connections

1. Ensure that the module is connected to the monitor.
2. Connect the SpO₂ cable to the SpO₂ connector in the module.
3. Connect the Masimo SpO₂ tester to the SpO₂ interface cable.

Monitor configuration

1. Configure the SpO₂ waveform field to the monitor screen with adequate priority.
2. Select the **SpO₂** tab in the **SpO₂ Setup** menu and configure:
Show Pulse Rate: On

3.3.2 SpO₂ test procedure

1. Check that the plethysmographic waveform field appears to the screen.
2. Check that the SpO₂ reading is between 78 - 84% and the PR is between 60 and 62 bpm.

NOTE: You can verify the functionality of a pulse oximeter probe and monitor with a functional SpO₂ tester but you cannot evaluate their accuracy with such a device. However, if a particular calibration curve is accurate for the combination of a pulse oximeter monitor and probe, a functional tester can measure the contribution of a monitor to the total error of a monitor/probe system. The functional tester can then measure how accurately a particular pulse oximeter monitor is reproducing that calibration curve.

3. Mark this task as complete on the checkout form.

3.3.3 Test completion

Select **Discharge patient** or **Reset case** to discard any changes made to the monitor configuration during checkout.

4. Complete on the "Maintenance check form" on page 6-17.

6 Disassembly and reassembly

6.1 Disassembly guidelines

Field service of the module is limited to replacing faulty circuit boards or mechanical parts only (see chapter 7. [Service parts](#) for details).

WARNING Attempting a field repair on a PCB or a factory sealed component or assembly could jeopardize the safe and effective operation of the module, and void the warranty.

NOTE: Only a qualified service technician should perform field replacement procedures.

NOTE: Perform the checkout procedure described in chapter 3. [Maintenance and checkout](#) after you have disassembled and reassembled the module.

6.1.1 ESD precautions

All external connectors of the module are designed with protection from ESD damage. However, if the module requires service, exposed components and assemblies inside are susceptible to ESD damage. This includes human hands, non-ESD protected work stations or improperly grounded test equipment. The following guidelines may not guarantee a 100% static-free workstation, but can greatly reduce the potential for failure of any electronic assemblies being serviced:

- Discharge any static charge you may have built up before handling semiconductors or assemblies containing semiconductors.
- A grounded, antistatic wristband or heel strap should be worn at all times while handling or repairing assemblies containing semiconductors.
- Use properly grounded test equipment.
- Use a static-free work surface while handling or working on assemblies containing semiconductors.
- Do not remove semiconductors or assemblies containing semiconductors from antistatic containers until absolutely necessary.
- Do not slide semiconductors or electrical/electronic assemblies across any surface.
- Do not touch semiconductor leads unless absolutely necessary.
- Semiconductors and electronic assemblies should be stored only in antistatic bags or boxes.
- Handle all PCB assemblies by their edges.
- Do not flex or twist a circuit board.

6.1.2 Before disassembly

- Note the positions of any wires or cables. Mark them if necessary to ensure that they are re-assembled correctly.
- Save and set aside all hardware for reassembly.

6.1.3 Required tools



- torx screwdriver, T10
- flat blade screwdriver
- pincers
- antistatic wristband

6.2 Disassembly and reassembly procedure

Disassembling the E-MASIMO Module (see the exploded view of the module in chapter 7. [Service parts](#)):

6.2.1 To replace the front cover

1. Detach the front cover of the module by releasing the snaps that hold the front cover to the front chassis unit by using a small flat blade screwdriver. There are 2 snaps on both sides of the module and 1 snap on the top.

6.2.2 To replace the Masimo SpO₂ board or Masimo interface board

1. Remove the two screws (T10) from the back of the module.
2. While pressing the release latch, pull the module casing slowly backwards and remove it from the main body.
3. Detach the screw and the three nylon posts that secure the Masimo SpO₂ board to the Masimo interface board. Detach the Masimo SpO₂ board.
4. Detach the front cover (see 6.2.1).
5. Detach the Masimo interface board by removing the two screws located near the front chassis unit. Disconnect the SpO₂ connector cable from the SpO₂ interface board and pull out the front chassis unit.

6.2.3 Reassembling the module

Reverse the order of the disassembly steps.

NOTE: When reassembling the module, make sure that the pin connector on the Masimo SpO₂ board connects properly to the connector on the Masimo interface board underneath.

Check that:

- screws are tightened properly
- cables are connected properly
- there are no loose objects inside the module
- ferrite of the flex cable is attached properly