Safety Tests

Electrical safety testing is not required for the Avalon CL base station. The base station has the same status as a connected wired transducer. The base station is either connected to the red fetal sensor socket (FM20/FM30, FM40/FM50), or the black rear telemetry socket (FM40/FM50 only).

CAUTION

The correct and accurate functioning of the equipment is ensured by the successful completion of the safety tests, performance test, and the system test.

Please refer to the Service Guides of the FM20/FM30 and FM40/FM50 for the detailed description of required safety tests for the fetal monitors.

System Test

The Avalon CL base station does not function independently, and can only be operated if it is connected to a fetal monitor. Therefore all system tests are done with the connected fetal monitor. Please refer to the Service Guides of the FM20/30 and the FM40/50 for a detailed description of the required system tests.

Preventive Maintenance Procedures

Please refer to the Service Guide Cableless Measurements for a detailed description of the required NBP performance testing for the CL NBP Pod.

Battery Check

The CL transducers use a Lithium Ion battery (part no. 453564107871).

The cableless transducers have a multi-color LED that indicates the status of the transducer with specific colors. This LED remains visible when the transducer is correctly attached to the transducer belt (Philips standard belt).

1 LED

LED Status	Meaning
White	The LED lights up to identify the transducer among other transducers, and to easily verify the correct transducer assignment (transducer finder). The transducer finder LED is controlled by the fetal monitor. Press the numerics to identify the corresponding transducer. The LED also lights up when the mother is paged with the **Call Patient** SmartKey.
White one short blink	The LED shortly lights up to indicate that the transducer successfully opened a radio communication with the base station and that it is ready to use.
Green	The LED lights up green when the transducer is fully charged and docked at the base station.
Yellow	The LED lights up yellow when the transducer is charging and docked at the base station.
Red	The LED flashes red when the transducer is out of battery and has to be recharged.
Cyan	The LED lights up cyan to indicate a technical problem that needs your attention. Check your fetal monitor for a related INOP.

To check the status of the transducer batteries open:

1 In the Service Mode the **Main Setup**, **Tele Info** window at the fetal monitor, and view the status of the transducers assigned to the connected base station.

Active cableless equipment information is displayed at the begin of the list inside the window. Displayed information per active device is:

- Device symbol
- Assigned parameter label(s) (OBR equipment) or Equipment ID (SRR equipment)
- Radio link quality indicator
- Battery status symbol
- Remaining operating time (HH:MM)

Battery Cycle

Battery replacement is recommended after 500 charge/discharge cycles *2), or if the battery is older than 4 years whatever is reached first. If the battery of a CL transducer has aged and an exchange of the battery is highly recommended, a prompt message is displayed at the fetal monitor for ca. 60 seconds. The prompt is repeated whenever the **Tele Info** window is opened until the battery is replaced.

Depending on the transducer type the following messages are displayed:

cl US battery has aged. Replacement strongly recommended

cl Toco battery has aged. Replacement strongly recommended

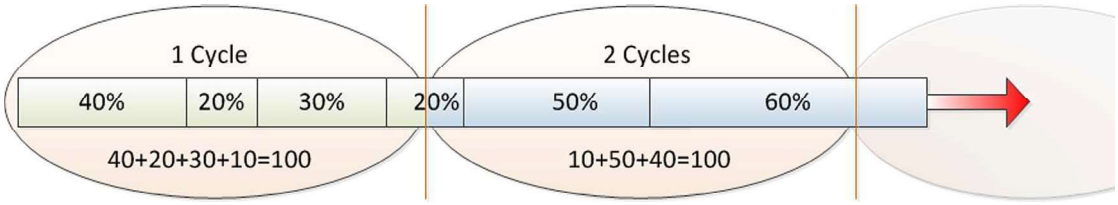
cl ECG/IUP batt has aged. Replacement strongly recommended

The date of manufacture and number of charge/discharge cycles can be inquired on the connected fetal monitor.

For the battery cycle and battery life specification of the CL Pods (NBP and SpO_2) please refer to the Service Guide of the Cableless Measurements.

Charge Cycle

The CL transducer batteries are designed for frequent recharging. A complete charging cycle is only reached and counted, when all recharging periods equal a 100% charge (900 mAh equal 8 hours continued operation).



Battery Report

You can generate a battery report for all docked CL devices at the Avalon CL base station. The battery report lists:

For the fetal monitor:

- Product number
- Serial number
- Software revision
- OBR band and current channel configured

For the Avalon CL base station

- Firmware version
- Serial number
- OBR band

For the Avalon CL transducers:

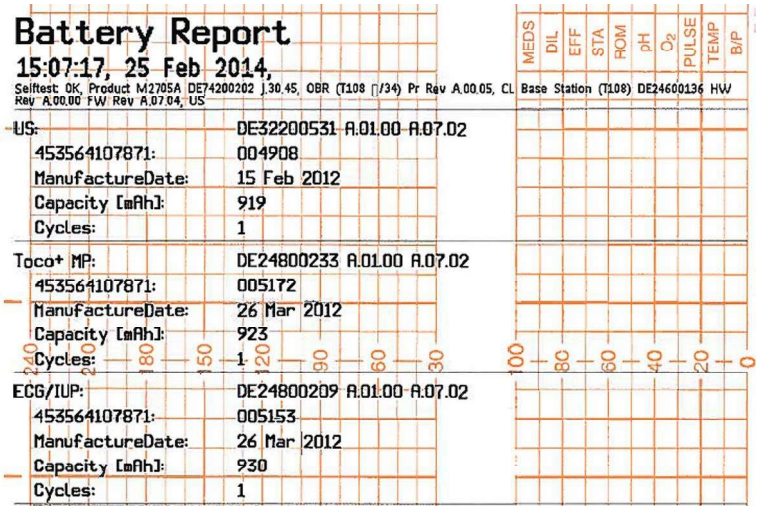
- Serial number
- Firmware version
- Manufacture date
- Capacity (mAh)
- Charge cycles

1 To generate a battery report switch to the Service Mode.

2 Open the **Tele Info** window either by selecting **Main Setup**, **Tele Info**, or the **Tele Info** SmartKey (configurable), or selecting the

symbol on the monitor display.

3 Select the **Battery Report** SmartKey. The recorder prints out a battery report.



Battery Exchange

If the CL transducer battery requires replacement, use the transducer battery kit. This contains:

- a replacement battery
- a special tool for removing the battery drawer
- an instruction sheet

For details on how to replace the battery, see the Instruction Sheet "Removing and Replacing the Transducer Battery" that accompanies the battery replacement kit, or refer to "Disassembly CL Transducer Battery" on page 67 in this guide.

For details how to exchange the battery of a CL Pod (NBP and SpO_2) refer to the Service Guide of the Cableless Measurements.

Battery Storage

Battery recharging period within Philips' factories and warehouses

The CL transducer and battery replacement kits require recharge within:

- 12 months for the transducer (with battery integrated), starting with the date of manufacture of the battery, as shown in the battery report on the fetal monitor or on the battery label (yww).
- 18 months for a replacement battery, starting with the date of manufacture shown after the LOT number on the battery replacement kit label (yyyy-ww) or on the replacement battery label (yww).

Battery recharging requirements during storage outside of Philips

Stored batteries and stored CL transducers should be partially charged to 40%—50% of their capacity every 6 months.

Battery Disposal

Batteries should be disposed of in an environmentally-responsible manner. Consult the hospital administrator or your local Philips representative for local arrangements.

Discharge the batteries and insulate the terminals with tape before disposal. Dispose of used batteries promptly and in accordance with local recycling regulations.

Performance Assurance Test

This tests the entire signal path from the individual CL transducers connected via radio frequency, through the CL base station, to the fetal monitor with artificially generated test signals. We recommend you perform this test once a day, and whenever you doubt the reliability of the measurements. The parameter test does not test the transducers themselves, there is a separate test for this (see "CL Transducers Functional Tests" on page 89).

For details on the performance assurance test of a CL Pod (NBP and SpO_2) refer to the Service Guide of the Cableless Measurements.

Testing Alarms

Details of how to test alarms is given in the Instructions for Use.

CL Transducers Functional Tests

If any of the following tests fail, repeat the test using another CL transducer. If the second CL transducer passes the tests, confirming that the first CL transducer is defective, exchange the defective CL transducer.

If the second CL transducer also fails the tests, contact your Philips Service Engineer or Response Center.

CL Ultrasound Transducer Functional Check

CAUTION

Use of ultrasound gel that is not approved by Philips may reduce signal quality and may damage the CL transducer. This type of damage is not covered by warranty.

To test the CL ultrasound transducer:

1 Switch on the monitor and the recorder.

2 Connect the Avalon CL base station to the fetal monitor.

3 Remove the charged CL US transducer from its docking slot at the base station.

4 Select the fetal heart sound for this channel.

5 Increase the loudspeaker volume to an audible level.

6 Set the transducer into the CL transducer opening tool.

7 The CL ultrasound transducer contains seven piezoelectric crystals. Basic functioning of each can be verified by holding a flat bottomed pen or similar above each crystal and moving it up and down as shown. A sound should be heard for each crystal tested. The pen should be held two to three centimeters from the CL transducer surface when the test is carried out.

8 A sound should also be heard when the CL transducer is moved back and forth over a solid surface, or the hand as shown.

CL Toco+ MP Transducer Functional Check

To test a CL Toco$^+$ MP transducer:

1 Switch on the monitor and the recorder.

2 Connect the Avalon CL base station to the fetal monitor.

3 Remove the charged CL Toco$^+$ MP transducer from its docking slot at the base station.

4 Press the Toco baseline key to re-adjust the Toco display to 20±1.

5 Turn the CL transducer over so that the Toco sensor is resting on the flat surface. You should see a marked increase in the value of the Toco numeric in the Toco display.

6 Press the Toco Baseline Key to re-adjust the Toco display to 20±1.

7 Turn the transducer over again. You should see a marked decrease in the value of the Toco numeric in the Toco display.

CL ECG/IUP and CL Toco+ MP with DECG Check

1 Switch on the monitor and the recorder.

2 Connect the Avalon CL base station to the fetal monitor.

3 Remove the charged CL transducer from its docking slot at the base station.

4 Attach the DECG adapter cable M1362B to the socket on the CL ECG/IUP or CL Toco$^+$ MP transducer.

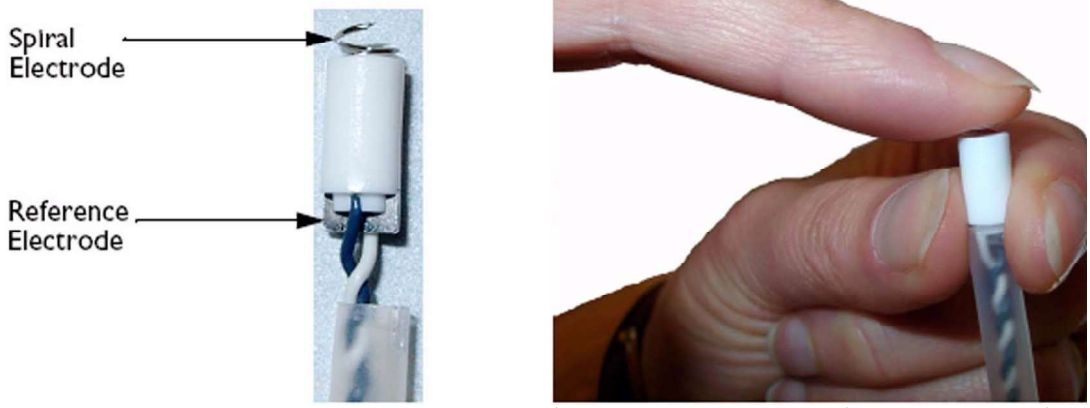
5 Ensure that the DFHR channel display on the fetal monitor shows the **DFHR** x **Leads Off** INOP with the DECG adapter cable attached.

6 Take a Fetal Scalp Electrode, and connect it to the DECG adapter cable.

7 Either hold the reference electrode between the thumb and index finger of one hand, and touch the spiral electrode with the index finger of the other hand, as illustrated below. This makes a short between the spiral electrode and the reference electrode (it is best to wet your fingers first). Use a **sterile** Fetal Scalp Electrode.

CAUTION

The tip of the spiral electrode is sharp. Take care not to injure your fingers.



Or cut off the plastic tip of the fetal scalp electrode (containing the spiral and reference electrodes) from the end of the wires. Strip the insulation from the end of the wires, and connect them to a patient simulator.

NOTE

We do not recommend the use of a specific patient simulator. The use of a patient simulator does not allow checking the specification of the ECG-functionality; it allows only a check of the general function.

1 Result: the **DFHR** x **Leads Off** INOP should disappear.

2 Viewing the ECG wave: when configured, you can view the DECG wave on the screen, and any noise will be visible as additional verification of the effectiveness of the test.

If the test results are not as outlined above, repeat the test with another ECG transducer. If this does not solve the problem, try the following:

3 Check all connections.

4 If the **DFHR** x **Leads Off** INOP is still displayed, the DECG adapter cable may be defective. Replace the adapter cable.

5 If the problem persists, replace the CL transducer.

CL ECG/IUP and CL Toco+ MP with MECG Check

1 Switch on the monitor and the recorder.

2 Connect the Avalon CL base station to the fetal monitor.

3 Remove the charged transducer from its docking slot at the base station.

4 Attach the MECG adapter cable M1363A to the red color-coded socket on the CL ECG/IUP or CL Toco^{+}MP transducer.

5 Either attach electrodes to the M1363A adapter cable, and apply the electrodes to the skin (for example on the wrists), or attach the M1363A adapter cable to a patient simulator.

NOTE

We do not recommend the use of a specific patient simulator. The use of a patient simulator does not allow checking the specification of the ECG-functionality; it allows only a check of the general function.

6 Result: You should see MECG values displayed on the maternal display, or annotated on the recorder trace.

If the test results are not as outlined above, repeat the test with another ECG/IUP transducer. If this does not solve the problem:

7 The MECG adapter cable may be defective. Replace the adapter cable, and repeat the test.

8 Check all connections.

CL ECG/IUP and CL Toco+MP with IUP Check

To test the IUP functionality of the CL ECG/IUP or the CL Toco^{+} MP transducer, you need the following:

1 Three lengths of silicone tubing with a 'T' adapter

2 Expansion chamber

3 Manometer

4 CL ECG/IUP transducer

5 IUP adapter cable

6 IUP catheter

1 Switch on the monitor and the recorder.

2 Connect the Avalon CL base station to the fetal monitor.

3 Remove the charged CL transducer from its docking slot at the base station.

4 Attach the IUP adapter cable (989803143931) to the socket on the CL ECG/IUP or CL Toco^{+} MP transducer.

5 Cut the sensor tip off an IUP catheter (M1333A).

6 Connect the catheter to the IUP adapter cable.

7 Connect the silicone tubing to the test volume chamber and the manometer as shown in the picture.

8 Connect the cut end of the catheter to the silicone tubing.

9 Apply a pressure of 80 mmHg ± 5 mmHg with the manometer. Check that the value on the display and on trace corresponds to this pressure. Slowly release the pressure, and check that the value on the display and on trace shows this change in pressure.

Reporting of Test Results

Philips recommends all test results are documented in accordance with local laws. Authorized Philips personnel report the test result back to Philips. While hospital personnel (biomedical engineers or technicians) do not need to report results to Philips, Philips recommends that they record and store the test results in accordance with local laws.

Refer to the Service Guide FM20/FM30 and FM40/FM50 to record the test results in the empty column in the Test and Inspection Matrix.

The following is a guide as to what your documentation should include:

- Identification of the testing body (for example, which company or department carried out the tests).
- Name of the person(s) who performed the tests and the concluding evaluation.
- Identification of the device(s) and accessories being tested (serial number, etc.).
- The actual tests (incl. visual inspections, performance tests, safety and system tests) and measurements required.
- Date of testing and of the concluding evaluation.
- A record of the actual values of the test results, and whether these values passed or failed the tests.
- Date and confirmation of the person who performed the tests and evaluation.

The device under test should be marked according to the test result: passed or failed.

Other Regular Tests

No other regular tests are required except visual inspection and Power on tests.