

Measuring electrical leakage on HUR-devices



Revision 1.2

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1 Introduction

This document will give short guidelines for how to measure the leakage currents on HUR-machines in a repeatable way.

Leakage tests are performed to ensure the electrical safety of the machine to avoid any health hazards. The machines are tested according to the international IEC60601 standard before leaving the factory.

Once installed, HUR recommend that the machine is tested according to IEC60601 or alternatively to IEC62353 using direct measurement with an additional patient leakage measurement. The leakage tests should only be done by a person with the required training and knowledge for the task.

We recommend that the leakage test is performed:

- In conjunction with scheduled maintenance or at least in 36months cycles.
- Whenever the machine is serviced/repaired.

2 Test instructions

This section will explain how to conduct the leakage measurements on the HUR- machines and show the suggested connection points on different machines.

Before any electrical tests are started a visual examination of the machine must be conducted to verify that the machine is not modified. If any faults are found, they must be repaired in a way according to HUR's service manual before the leakage tests are conducted.

HUR's medical certificated machines are Class II devices with type BF applied parts. The Class can be determined by checking the machines documents or the power supply markings. A type BF applied part sticker should exist next to the serial number on all medical machines.

The power switch must be set to ON position before the test is conducted.



CAUTION!

During test "mains to applied parts" there is a risk of electrical shock, do not touch device under test.



Figure 1, At the factory the machines are tested using a Fluke ESA620 controlled by the Biomedical Test View software.

2.1 General instructions for all machines

The general idea is to measure different user touchable conducting parts that might not be properly floating. Because the base is made of welded steel it can be assumed that any measured point on the base is at the same potential and therefore only one point is needed to measure. Moving or attached parts can still be in different potential from each other and should therefore be measured if possible.

General patient leakage current measurement points:

- Display mounting screw.
- Base aluminum sheets.
- Lever joint bolt where available or otherwise lever assembly bolt
- Seat frame assembly bolt.

As ground point connector with ground marking shown in picture 2 should always be used because this exists on all machines and is also the connection point for the machines ground wires.



Figure 2, Ground reference connector with marking.



Figure 3, One of the display's fixing screws is used as one measurement point.

One of displays fastening screws should be loosened to allow alligator clamp to clamp around it. The screw should be used as one measurement point during the leakage measurements. Remember to tighten the screw after the measurement is finished.

The patient leakage test leads should be connected in the same order that they appear in the pictures to allow comparison between the annual tests.

2.2 Testing machines with two independent handles/levers

This section covers machines with two independent handles or levers.

2.2.1 5140 Chest Press Rehab

Leakage testing points on Chest Press:



Figure 4, Attachment at the base plate and at the display



Figure 5, Attachment at seat motor bolt and at lever arm bolt.

2.2.2 5160 Pec Deck Rehab

Refer to general instructions.

2.2.3 5175 Optimal Rhomb Rehab

Leakage testing points on Optimal Rhomb:



Figure 6, Attachment at the base plate and at the display.



Figure 7, Attachment at seat motor bolt and handles bolts.

2.2.4 EA9110 Biceps / Triceps Easy Access

Refer to general instructions.

2.2.5 EA9130 Delta / Lat Easy Access

Refer to general instructions.

2.2.6 EA9140 Chest Press Easy Access

Refer to Chest Press Rehab instructions.

2.2.7 EA9150 Lat Pull Easy Access

Leakage testing points on Lat Pull EA:



Figure 8, Attachment at the base plate and at the display.



Figure 9, Attachment at the chest support steering pin.

2.2.8 EA9160 Pec Deck Easy Access

Refer to general instructions.

2.2.9 EA9175 Optimal Rhomb Easy Access

Refer to Optimal Rhomb Rehab instructions.

2.2.10 5510 Body Extension Rehab

Refer to general instructions.

2.2.11 5520 Adduction / Abduction Rehab

Leakage testing points on Adduction / Abduction:



Figure 10, Attachment at the base plate and at the display.



Figure 11, Attachment at the bumper pin and lever arm fixing point for force meter.

2.2.12 5530 Leg Extension / Curl Rehab

Leakage testing points on Leg Extension / Curl:



Figure 12, Attachment at the base plate and at the display.



Figure 13, Attachment at seat motor bolt and levers motor bolt.

2.2.13 5540 Leg Press Rehab

Leakage testing points on Leg Press:



Figure 14, Attachment at the base plate and at the display.



Figure 15, Attachment at seat motor bolt and levers fastening bolt.

2.3 Testing machines with one single handle/lever

This section covers machines with one sole handle or lever.

2.3.1 5120 Push Up / Pulldown Rehab

Leakage testing points on Push Up / Pull Down:



Figure 16, Attachment at the base plate and at the display.



Figure 17, Attachment at seat motor bolt and levers cylinder bolt.

2.3.2 EA9120 Push Up / Pull Down Easy Access

Refer to Push Up / Pull Down Rehab instructions.

2.3.3 EA9125 Dip / Shrug Easy Access

Refer to general instructions.

2.3.4 5310 Abdomen / Back Rehab

Leakage testing points on Push Up / Pull Down:



Figure 18, Attachment at the base plate and at the display.

Figure 19, Attachment at seat motor bolt and lever arm fastening bolt.



2.3.5 EA9310 Abdomen / Back Easy Access

Refer to Abdomen / Back Rehab instructions.

2.4 Testing other exercise machines

This section covers the other exercise machines that does not fit into the previous groups.

2.4.1 5340 Twist Rehab

Leakage testing points on Twist Rehab:



Figure 20, Attachment at the base plate and at the display.



Figure 21, Attachment at seats index plate.

2.4.2 EA9330 Twist Easy Access

Leakage testing points on Twist EA:



Figure 22, Attachment at the base plate and at the display.

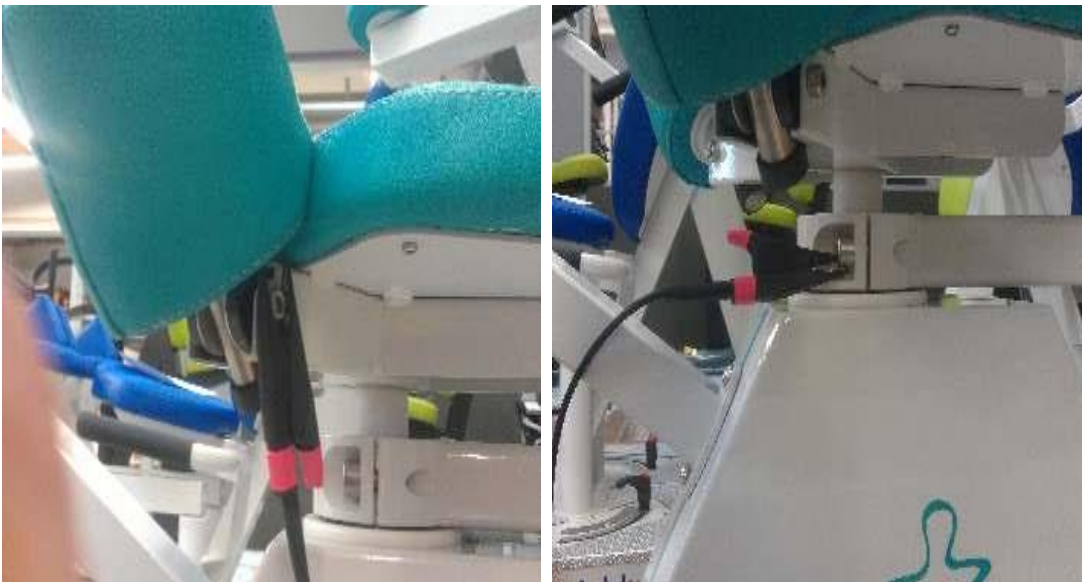


Figure 23, Attachment at the gantries fastening bolt and at the supports fastening bolts.

2.4.3 5546 Leg Press Incline Rehab

Leakage testing points on Leg Press Incline:



Figure 24, Attachment at display bolt and press plates fastening bolt.

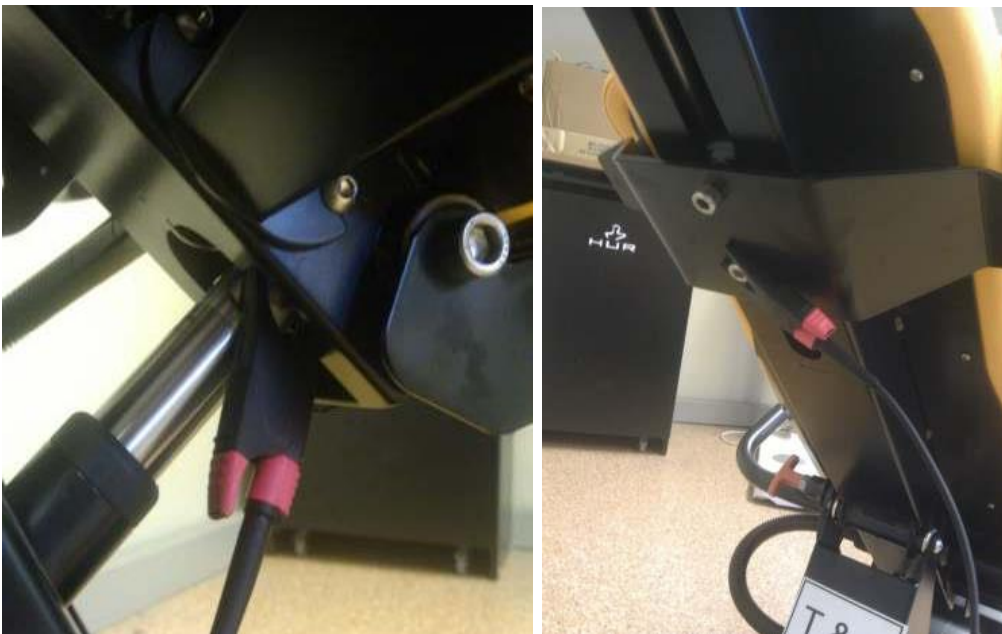


Figure 25, Attachment at seat motor bolt and shoulder roller fastening bolt.

2.4.4 Pulley

Refer to general instructions.

2.4.5 5549 Leg Press CC

Leakage testing points on Leg Press CC:



Figure 26, Attachment at back support adjuster motor bolt and display



Figure 27, Attachment at seat fixing and bar fixing bolt.



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