The Right fit test.
Right now.

3M E-A-Rfit Dual-Ear Validation System
User Manual
3M™ E-A-Rfit™ Dual-Ear Validation System

Dangers, Warnings, Cautions & Battery

Warning!

To avoid the risk of electric shock, which if not avoided could result in serious injury or death:
• Do not immerse the 3M E-A-Rfit Dual-Ear Validation System in any liquid.
• Use indoors only.
• Disconnect power cord before cleaning.
• Clean the exterior surface of the speaker with a clean anti-static cloth. Do not attempt to clean the interior components.
• There are no user serviceable parts.
  • The 3M E-A-Rfit Dual-Ear Validation System must be returned to the manufacturer for repair.

Caution!

General
• To avoid possible environmental contamination, dispose of the 3M E-A-RFit Dual-Ear Validation System according to applicable governmental regulations.
• Substitution of components may impair the accuracy of the instrument. Repair should be performed by authorized service personnel only.
• Read the manual before operation.

Hearing Protection and Measurements
Test results, PAR values and hearing protector sufficiency determinations are based upon data entered by the operator and from the employee’s test results at a given 3M E-A-Rfit Dual-Ear Validation System testing session.
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Introduction
The 3M™ E-A-Rfit™ Dual-Ear Validation System is comprised of hardware and software that enables the operator to test and record the personal attenuation rating (PAR) of many hearing protection products by 3M. (See Appendix B, “Model, Parts and Accessories” for details.)

Getting Started
The 3M E-A-Rfit Dual-Ear Validation System contains the components illustrated below. Please follow the illustrated quick set-up guide in the lid of the case to assemble your hardware.

![Figure 1: 3M E-A-Rfit Dual-Ear Validation System kit contents](image)

Install 3M E-A-Rfit Dual-Ear software
1. Insert the 3M E-A-Rfit flash drive into your computer’s USB drive.

![Figure 2: Installing USB Drive into the Computer](image)

2. Run the setup.exe file by double-clicking the file.
3. Follow the screens prompts by clicking **Next** through the wizard and click **Finish** to complete the installation.
Hardware setup: speaker stand assembly and cable connection

1. After removing the items from the case, lay the speaker down on a table and thread the stand post to the bottom of the speaker (see Figure 3-A). Then attach the stand base to the stand post by threading clockwise (see Figure 3-B). Set upright on table (see Figure 3-C).

![Figure 3-A: Thread stand post to bottom of speaker](image1)

![Figure 3-B: Thread stand post to bottom the stand base](image2)

![Figure 3-C: Assembled](image3)

**Figure 3: Speaker Stand Assembly**

2. To attach all the necessary cords, remove the power cord, the microphone assembly, and the USB cord from the grey compartments of the kit.

   - After plugging the power cord into a power outlet, attach the other end of the power cord into the top socket on the back of your speaker. A green light will illuminate.
   - Insert the microphone assembly into the middle socket on the back of the speaker being careful to align the microphone plug into the socket.
   - Hang both microphones by their integrated clips to the clip on the front of the speaker.
   - Attach the USB cord into the bottom socket on the back of the speaker and insert the other end of the USB cord in the computer’s USB port.
   - A device driver message appears in the task bar when connecting the speaker component to the USB.

   ![3M EARFit 5](image4)

   - A flashing red light will illuminate and then go dark when the speaker is successfully connected.

![Figure 4A: Connecting Hardware](image5)

![Figure 4B: Hardware Connected](image6)
Software Start-up

The home screen is used to perform an E-A-Rfit validation test. The start-up parameters entail the selection of the language, operator, and company. It may also be used to begin testing, review hearing protection fit-tests, and access the data manager (see following sections for details).

Tip: At any point in the subsequent E-A-Rfit testing screens, click icon or the **EArfit** logo to return to the home screen.

Home Screen

1. Open the E-A-Rfit software by double-clicking on the icon.

2. In the **Home screen**, select the language, operator, and company information. (Please refer to 1a – 1c.)

![Figure 5: Start Page](image)

a. **Language field**: The language field is saved as the default language once selected.

- To **select the Language**, click on the drop down box and begin typing while noting the text will highlight. Press **Enter** to select. You may also use the slider bar to scroll and click the desired language. The software will save the selected language as the default for subsequent uses.

![Figure 5a: Home Page: Selecting Language](image)
b. Operator field: The person conducting the test is the operator.

- To add an operator, click on the button and enter the last and first name fields (required) and any other applicable fields. Click Save to store or click "x" to close.

- To edit an operator, click on the button and enter the appropriate fields. **Note:** the light gray button indicates the button is not accessible until an operator is added to the software.

![Add Operator](image)

![Edit Operator](image)

Figure 5b: Add and Edit Operator Dialog Boxes

c. Company field: Basic company information is stored in this dialog box and may be used in reports. **Company Exposure Limit** pertains to the maximum level of noise a company wishes to protect an employee’s exposure. This number is up to the discretion of the operator but may be either the legal limit or a number between 80 to 90 dB.

In the **Company screen**, there are three optional **Label fields** which allow you to customize the name that appears in the software and in the reports. The fields include the Employee ID, Employee Section, and the Employee Function. For example, if the company you are working with has “Departments” instead of “Sections”, you may add the alternative name, and it will appear in the Employee records and in the reports.

➢ To add or edit a company record, click on the **Add** icon. Enter the appropriate fields and click **Save**. Note the asterisk fields are required prior to saving.

![Add Company](image)

![Edit Company](image)

Figure 5c: Home page: Add and Edit Operator Dialog Boxes
2. Click on **Begin Testing** button to start testing with the 3M™ E-A-Rfit™ Dual-Ear Validation System.

**Tip:** for reporting, click on **Data Manager** button. (See Data manager section for details.)

**Tip:** for test results, click on **Review Tests** button. (See Review Tests section for details.)

![Begin Testing: Select to get started with fit-testing](image)

**Tools/support icons**

**3M Hearing Protection media links**

**Figure 6: Begin Test and Quick Tools Explained on Start Page**

<table>
<thead>
<tr>
<th><strong>Quick Support Tools and 3M HPD media links</strong></th>
<th><strong>Explanation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Verify Microphone</strong></td>
<td>Used to verify microphone is functioning correctly. See Figure 2-A for screen example.</td>
</tr>
<tr>
<td><strong>Screen Capture</strong></td>
<td>Provides the capability to capture a screen for user support purposes.</td>
</tr>
<tr>
<td><strong>Settings</strong></td>
<td>Provides a link to database folder storage options and reporting settings. (See Settings section for more information.)</td>
</tr>
<tr>
<td><strong>User Support</strong></td>
<td>Used to send a technical support question with the ability to attach a screen capture. (See User support section page xxx.)</td>
</tr>
<tr>
<td><strong>Speaker not connected</strong></td>
<td>Displays a red “x” speaker icon indicating the Speaker is not connected. (Check speaker cables and USB is connected to the computer.)</td>
</tr>
<tr>
<td><strong>Speaker connected</strong></td>
<td>Displays a speaker icon when connected appropriately for Fit-Testing.</td>
</tr>
<tr>
<td><strong>or Speaker and Microphone calibration</strong></td>
<td>Speaker and Microphone calibration icon notice. When you mouse over, a pop text appears explaining the due dates for speaker and microphone calibration.</td>
</tr>
<tr>
<td><strong>Facebook</strong></td>
<td>3M Hearing Protection on Facebook link provides dialog with work and friends through the online social media when signed in.</td>
</tr>
<tr>
<td><strong>Linked In</strong></td>
<td>3M Hearing Conservation LinkedIn Community business collaboration group.</td>
</tr>
<tr>
<td><strong>Video</strong></td>
<td>3M Hearing Protection video training links you to 3M™ E-A-R™ Hearing videos.</td>
</tr>
</tbody>
</table>

**Table 1: Support and 3M HPD Media Links**

**Microphone Verification**

The microphone speaker serial number, sensitivity and speaker serial number and firmware version will automatically be detected and stored in the software under the system details section of the user support screen.

Before you can begin testing employees, you will verify the microphone and speaker are in good working order.

➢ **To start the verification, please follow below:**

1. Slide the right (red) and left (blue) microphones into the speaker clip as illustrated on the microphone verification screen in the software.
2. Click the **Start Verification** button (see Figure 7).

   - A warning statement will appear indicating E-A-Rfit will store the baseline data as the new response. Click Ok.

     ✓ **Note:** The microphone verification process must be conducted before you begin testing each time the software is launched. You may re-check the microphone by going back to the home screen by clicking on the microphone icon.

     ![Figure 7: Microphone Placement and Start Verification Button](image)

     **Figure 7:** Microphone Placement and Start Verification Button

2. Click **Continue to Testing** button (when connected properly) in the microphone verification screen appear. (See below for details.)

   ✓ If microphone is functioning correctly, the **Verified** icon will appear. Click **Continue to Testing** button (see Figure 8-A).

   ✓ If connected incorrectly, **Verification Failed** icon will appear. Please unconnect and reconnect microphones to speaker and press **Try Again** button (see Figure 8-B). See troubleshooting section.

     ![Figure 8-A: Microphone Verification Verified](image)
     ![Figure 8-B: Verification Failed Prompt](image)

     **Figure 8-A:** Microphone Verification Verified  **Figure 8-B:** Verification Failed Prompt

3. (Optional) Click **Show Results** button to view the verification test results. Click **Show Results** button to view graph details.
• The verification graph will display four curves (explained in the table below) of the 7 tested octave band frequency levels.

<table>
<thead>
<tr>
<th>Verification test results</th>
<th>Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>Indicates the upper boundary of proper operation.</td>
</tr>
<tr>
<td>Baseline Response</td>
<td>Plots the first response curve for the microphone. This will be used through the life of the microphone to monitor changes.</td>
</tr>
<tr>
<td>Today's Response</td>
<td>The last response curve for the microphone.</td>
</tr>
<tr>
<td>Minimum</td>
<td>Indicates the minimum boundary of proper operation.</td>
</tr>
</tbody>
</table>

Table 2: Verification test results

Figure 9A: Verification Test Results with Legend

Figure 9B: Verification Test Results without Legend
Run Test Overview

How it works?
The 3M™ E-A-Rfit™ Dual-Ear Validation System encompasses a specially designed loudspeaker that allows for an accurate presentation of the test signal and real-time communication between the microphones, speaker and software. The dual-element microphones make it possible to measure the sound level simultaneously inside and outside the hearing protector.

The external microphone measures the level of the test signal outside the ear. The internal microphone is connected to one of the specially modified 3M™ Hearing Protectors Probed Earplugs to allow measurement of the sound level inside the wearer’s ear canal while the earplug is worn.

The difference between the outside and inside microphone levels is used to calculate the Personal Attenuation Rating for each employee; the amount of noise reduction in decibels obtained by that individual with the specific model and size of hearing protector being worn. The PAR is an indication as to whether or not the standard version of that model of hearing protector, without the test probe attached, will provide sufficient attenuation for the noise exposure in the workplace.

After properly setting up the fit-test and running the test, the software will quickly measure the noise reduction or attenuation of the earplugs the employee is wearing. The results can be used to retrain the worker to select and wear hearing protection more effectively and provide positive reinforcement when they do so.

Below explains the steps to run a test once the employee is seated and has the probed hearing protectors inserted. (For a live demo of 3M E-A-Rfit Validation System and fit testing, please refer to http://earfit.3m.com.)

Run Test
1. Welcome the employee to sit in a chair in front of the speaker. Explain the fit test process.

2. In the software, select the employee via the drop arrow. Begin typing and press enter to select an employee. If adding an employee, click the icon to Add (refer to step 2).

Figure 10: Select an Employee
Once selected, these buttons will appear: Select Product, Run Test, Run Test, Test Instructions.

3. When adding or editing, enter the appropriate fields by clicking and highlighting the pre-populated text, if applicable. (See Table 2 for details.) Click Save button when complete.

- To Edit an employee select the icon when visible after an employee is added to the software.
- Highlight and/or type over the appropriate text and click Save button. This will return you to the run test screen.

<table>
<thead>
<tr>
<th>Employee fields</th>
<th>Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure Level field</td>
<td>Enter in the employee’s A-weighted Sound Pressure Level (dBA) or the employee’s A-weighted exposure level over an 8 hour period (also noted as TWA) if applicable.</td>
</tr>
<tr>
<td>Exposure data not available checkbox</td>
<td>Check this box when hearing exposure levels are unknown.</td>
</tr>
<tr>
<td>Employee ID</td>
<td>(Optional, user-customizable field used to correspond to the users’ needs.)</td>
</tr>
<tr>
<td>Section</td>
<td>(Optional, user-customizable field used to correspond to the users’ needs.)</td>
</tr>
<tr>
<td>Function</td>
<td>(Optional, user-customizable field used to correspond to the users’ needs.)</td>
</tr>
</tbody>
</table>

4. Fit testing is conducted with the employee and operator. Click the Test instructions button for an illustration of fit test setup.

![Figure 11: Add and/or Edit Employee Record](image)

![Table 3: Add/Edit Employee Explained](image)

![Figure 12: Employee Selected in Run Test Screen](image)
5. Click **Select Product** and/or **Change Product** button to add and/or change a product for new/prevously tested employees.

- To navigate and/or select a product, expand the selector arrows by clicking on an arrow(s). Using the right-hand scroll bar, drag up/down accordingly. To select, click on a product type and it will appear on the run test page.

![Product Selector Dialog Box](image)

**Figure 13: Product Selector Dialog Box**

6. With the employee properly positioned, click on the **Run Test** button. You will hear a short test signal from the loud speaker.

- **Employee History** column displays the products previously tested and shows the PAR value, the date and time tested, and if it passed or failed.

![Run Test Screen](image)

**Figure 14: Run Test Screen**
7. Once the test signal ends, the tests results page will display the measured attenuation. The results can be used to retrain the worker to wear hearing protection more effectively and provide positive reinforcement when conducted.

8. (Optional) **Test another product** or **Retest Product** using the **Test Another Product** or **Retest Product** buttons.

9. Once completed with the employee’s fit test, click the end session button ( ). Note: the session timer will start and stop when a different/new employee is selected, or the session is ended by the operator, or when the software is closed.

---

**Test Results**

The hearing protection fit-test results are displayed on the tabs entitled Quick View, Protected Exposure, Attenuation Graph, and Detail View. The action buttons are repeated in each tab and are identified in Table 3 below. (Please refer to Table 1 for the repeated tool support icons and 3M™ Hearing Protection Links.)

**Quick View**

The **Quick View Tab Results** main components detail the PAR results from the fit-test, the values in the left and right ear, the type of hearing protector, Baseline and Assigned check boxes, the Session Duration, and the Test History column.

When you visit this view, the **Baseline** and **Assigned** checkboxes may be assigned or selected. The **Baseline** indicates the benchmark or target of the measurement. The **Assigned** checkbox may be used when the employee achieves adequate hearing protection, and the operator recommends wearing this hearing protector while working in a noise environment. If these are assigned, this information will appear in the test history column with the hearing protection product, the PAR value, and the date and time of the test. It will also appear on the company and employee reports.

- **Note:** a data export may be exported into a report or to Excel. (See Data Manager for additional details.)
Measurements and hearing protection product

When viewing this screen, you can review the test results and give guidance to the employee. The measurements and the test results symbols are identified below:

- The PAR is displayed for both the left and right ears as well as a binaural. The values have the uncertainty subtracted and displayed on this tab. The Binaural is calculated using the lowest PAR value per octave band for each ear.

- The checkmark indicates the measurement passed, denoting the employee’s binaural PAR minus the uncertainty is equal or above the target minimum attenuation (TMA). TMA is the employee’s exposure minus the company exposure limit. For example, if you enter the employee’s exposure of 95 dBA and the company exposure limit is entered as 80 dBA, then the TMA is 15 dB. The employee’s binaural PAR minus the uncertainty must be 15 dB or above in order to “Pass”. The operator may mark the measurements that Pass as a baseline and assign the hearing protector if desired.

- The checkmark indicates the employee’s binaural PAR minus uncertainty failed to meet the target minimum attenuation. Although you may mark a failed measurement as a baseline, you will not be able to assign a hearing protector that has failed. Note: the uncertainty is displayed in the Detail View Tab.

- The caution symbol is displayed under two different conditions. In both conditions, a pop-up will alert the operator. The first condition is when the PAR value is less than 10 dB at 125 Hz. The second condition is when there is a 15 dB or more difference between the left and right PAR measurements. In both cases, the pop-up will suggest that the hearing protector be retested after adjusting how it is worn. Although you may mark a cautioned measurement as a baseline, you will not be able to assign a hearing protector when a caution symbol is present.

- A gray symbol is displayed if the employee record does not have a noise exposure level included. Without an employee exposure value, protection sufficiency cannot be determined. Although you may mark a grey measurement as a baseline, you will not be able to assign a hearing protector where protection sufficiency cannot be determined.

- The tested hearing protection is identified (see 2) and stored as History in the Test History column (See 4).

- The Left and Right Values are the computed results from the fit-test for each ear with the uncertainty value subtracted. (See 3.) (See Detail View for additional details.)

Figure 16: Quick View Tab Results
The table below explains the actions you may perform in the test results screens. (Note: See Table 1 for explanation of the tool support icons, located on bottom right-side of screen, and the 3M Hearing Protection media icons, located on left-side of screen.)

<table>
<thead>
<tr>
<th>Action buttons</th>
<th>Explained</th>
</tr>
</thead>
</table>
| Session Duration and End Session button | Session Duration is the length of time the employee was fit-tested for each hearing protection product (if more than one is tested). The session timer will start and stop when a different employee is selected, or the session is ended by the operator, and/or when the software is closed.  
To end the session, click on the button.                                                                                   |
| Retest product button                 | Retest Product button will immediately run a new test of the same product.                                                                 |
| Test another product button           | Test another product button opens the product selector to allow changing to a different 3M™ Hearing Protector product.                     |
| Baseline                              | (Optional): Check the baseline is used to set a benchmark when the employee is first tested. Once checked, it will store and display in the history column. |
| Assigned                              | (Optional): Assigned feature may be used when the employee achieves adequate hearing protection, and the operator recommends wearing this hearing protector while working in noise. Once checked, it will appear in the history column and store in the database as the primary hearing protector. |
| Create Report                         | Create a report opens a window to view two types of reports, Employee Report and Company Report.  
✓ To view, click buttons. Note that the View buttons toggle between Employee Report and Company Reports when selected.  
✓ To print, click on the button depending on which one appears. Toggle between Print Employee and Print Company Reports via the View buttons. Print the report that appears, if desired. |
| Delete                                | The delete icon allows you to delete a fit-test when selected from the Test History column.  
• To delete, first select a product from the test history column. Then select the icon. Confirm the prompt Okay or Cancel to return without deleting the measurement. |
| Change employee/ Edit employee icons  | Change employee icon allows you to return back to the run test screen and select a different employee.  
Edit employee icon allows you to change the employee record information.                                                                 |
| Notes                                 | Add employee text to the notes field when applicable. These will appear on the Company Report and store in the E-A-Rfit software. Notes can be edited at any time. |
| Home E-A-Rfit logo                    | Home icon is displayed to provide a quick return to the home screen when applicable.  
Earfit logo, when clicked, will also return you to the home screen.                                                            |

Table 4: Test Results User Actions
Protection Results

The Protection Tab Results shows the employee's protected exposure as it compares to the European Union guidance document EN 458 and in regulatory documents in other parts of the world. Table 1 identifies the screen icons and action buttons.

- **Tip:** How is protected exposure calculated? The protected exposure is calculated by subtracting the binaural PAR (minus the uncertainty) from the employee's exposure.

Looking at the Safety guide, the "you are here indicator and dB Level" indicates if the employee's fit-test results are insufficient, acceptable, good, acceptable, or at risk of overprotection.

The Fitting Gauge is a rough estimate of where the employee's PAR value compares to what can be achieved with this hearing protector. (See 2 below.)

- **How to view percentage detail on fitting gauge?** Roll your mouse-over the green needle and a pop-up window explains your fitting percentage fit compared to the laboratory population. Also, roll your mouse over the "Your Fit" and a pop-up appears with the PAR value (See 3).

![Figure 17: Protection Tab Results](image-url)
Attenuation Graph

The **Attenuation Graph Results Tab** plots the PAR at each of the seven octave bands for the left ear (blue) and the right ear (red). (See 1 and 2.) The PAR values for left, right, and binaural are values carried over from the Quick View tab. (See 3.) This information allows the operator to analyze the shape of the curve and look for abnormalities.

**Figure 18: Attenuation Graph Results Tab**

**Detail View**

In the **Detail View Tab Results**, the full value of the PARs are displayed for Left, Right, and Binaural along with associated uncertainty values.

In the middle of the screen, the formula for the protected exposure is displayed and calculated providing the results for the recommended user protected exposure. The formulas are provided below:

- **Protected Exposure**: employee exposure (inputted via the add/edit icons) subtracting the binaural PAR (minus uncertainty) equals the protected exposure.

- **Maximum Protection**: company exposure limit plus the binaural PAR (minus the uncertainty) equals the protected maximum.

**Figure 19: Detail View Tab Results**
Reports
There are two types of reports used to either view online, save as a file, and/or print.

Employee Report
The employee report provides a basic personalized fit-test report. When the button is selected from the Test results page, the employee report will appear as a mid-size pop-window. To view the report, select the right-hand slider bar to scroll through the details.

The employee report actions are identified in Table 5.

<table>
<thead>
<tr>
<th>Employee report</th>
<th>Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General information</td>
<td>At the top of the report, the employee’s general information is provided along with the tested hearing protector, reported exposure (this is the inputted value via the add/edit employee data), the calculated maximum exposure limit, and assigned checkbox. The date and time and optional company logo is presented in the report header.</td>
</tr>
<tr>
<td>2. Summary</td>
<td>The PAR minus the uncertainty is displayed with the hearing protector product type. The left and right PAR values are also displayed.</td>
</tr>
<tr>
<td>3. Educational messages</td>
<td>Educational messages rotate through to increase hearing loss prevention awareness.</td>
</tr>
<tr>
<td>4. Action buttons</td>
<td>Allows you to save the file in a local directory. Used to toggle between company and employee reports. Note that these buttons change when clicked. “View” toggles between employee and company. “Print” enables you to print the viewed report and will toggle based on the “View”.</td>
</tr>
<tr>
<td>5. Slider bar</td>
<td>Select the slider bar to scroll up/down through the report (see 7).</td>
</tr>
</tbody>
</table>

Table 5: Employee Report Explained
Company Report

The company report provides additional fit test detail desired for company record-keeping. A signature line is available for companies who wish to have employees sign after they have been tested. The company report actions are identified in Table 6.

![Company Report Example](image)

### Table 6: Company Report Explained

<table>
<thead>
<tr>
<th>Company report</th>
<th>Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee and Hearing Protector Information</td>
<td>At the top of the report, the employee’s general information is provided and includes: hearing protector type, the reported exposure, company exposure limit, targeted minimum, maximum attenuation calculations, and if the baseline and/or assigned were selected during the testing.</td>
</tr>
<tr>
<td>2. Measurement data</td>
<td>The company test results summary displays the PAR minus uncertainty values for left, right, and binaural as well as the attenuation graph.</td>
</tr>
<tr>
<td>3. Notes field</td>
<td>Operator’s notations are displayed here.</td>
</tr>
<tr>
<td>4. System information</td>
<td>The system information includes the operator’s name, software version, speaker serial number, date and time calibration occurred of the last factory calibration, and the serial numbers for the left and right microphones.</td>
</tr>
<tr>
<td>5. Signatures</td>
<td>The employee and operator signatures may be hand signed after printing.</td>
</tr>
<tr>
<td>6. Action buttons</td>
<td><img src="image" alt="" /> allows you to save the file in a local directory. <img src="image" alt="" /> Used to toggle between company and employee reports. Note that these buttons change when clicked. “View” toggles between employee and company. “Print” enables you to print the viewed report and will toggle based on the “View”.</td>
</tr>
<tr>
<td>7. Slider bar</td>
<td>The slider bar is used to scroll up and/or down the report.</td>
</tr>
</tbody>
</table>
Data Manager

The data manager is used as a user support portal to manage the company, employee, and operator data without having to have hardware connected. Additionally, reports can be generated, fit-test data can be exported and data from 3M™ E-A-Rfit™ 4 database files can be imported. The following sections outline how to use these operator tools.

Company records

In lieu of the home page, the **Company Tab** may be used to modify, add, or delete company data or records. The required fields are noted by an asterisk which include the name, country and company exposure limit. The company exposure limit is a required value and is used to compute the the target minimum attenuation, the protected exposure and protection maximum value.

- **Tip**: to change the field labels for the employee ID, employee section, and/or employee function you may enter in a different field descriptors, if desired. When saved, these will appear in the **E-A-Rfit** software screens and in the reports.

  - **To add, edit, and delete a company**, do one of the following:

    1. **To add a company**, click on the **Add** icon. Fill in the appropriate fields noting the company is a required field with red outline shading. Use the drop down arrow and type the first few letters to quickly find and then click to **Save** button.

    2. **To Delete a company record**, click on the **Delete** icon.

    3. **To Edit a company**, click on a specific company name (see below). Type over or highlight and the delete the text. Then enter the new information. Click **Save** button.

- **Note**: to cancel, click the Home icon or select a different tab without saving.

![Data Manager - Company Tab](image)

**Figure 22: Data Manager - Company Tab**

**Important: Responsibility for Data Privacy and Security**

Purchaser is solely responsible for complying with all privacy and security-related laws and regulations applicable to the collection, storage, use, import and export of all data (personally-identifiable or otherwise) entered into, or generated by, the 3M™ E-A-Rfit™ Dual-Ear Validation System. Access to the 3M E-A-Rfit Dual-Ear System is not password-controlled. Purchaser should implement all necessary administrative, physical and technical safeguards it determines are necessary to ensure the integrity, confidentiality and security of the data against both internal (e.g., access by unauthorized personnel, misuse of data) and external threats (e.g., "hacking").
Employee records

The Employee Tab of the data finder page may be used to add, edit, delete, and import employees into the 3M™ E-A-Rfit™ Dual-Ear Validation System database. The first name, last name, country and the employee's exposure level are the required fields when completing these records. If there is no employee's exposure level available, you may click the "exposure data not available" check box. However, if not selected, this will affect the protected exposure results displayed in the Detail View of the Test Results page.

➢ To add, edit, and delete employee, do one of the following:

1. To add an employee, click on the Add icon. Fill in the appropriate fields noting the company is a required field with an astircks. Use the drop down arrow and type the first few letters to quickly find and then click the button.

2. To Delete an employee record, click on an employee's name in the employees name box and then click on the icon.

3. To Edit an employee, click on a specific company name (see below). Type over text (or highlight, delete, and enter text) with new information. Click the button.

Note: to cancel, select a different tab or click on the home screen.

Figure 23: Data Manager - Employee Tab
Operator records

In the Operator Tab of the Data Manager, you may add, edit, and delete operator/safety personnel information. The operator information is saved and is presented in “system information” section of the Company Report.

➢ To add, edit, delete, and or view operator information, follow below:

1. Click the button to add an operator. Fill in the appropriate fields noting the first and last names are the required fields. Use the drop down arrow and type the first few letters to quickly find and then click the button.

2. To Edit and/or Delete an Operator, do one of the following:

   • In the operator’s window, select an operator. To Edit/Change the information, click in desired fields and enter new information. Click the button.

   • To Delete, click on a name from the Operators section and select the button.

Figure 24: Data Manager - Operator Tab: Adding

Figure 25: Data Manager - Operator Tab: Edit and/or Delete
**Reports Tab**

In the **Reports Tab** of the data manager, you can generate the hearing protector fit test reports.

- To create reports, do one of the following:
  1. Select a **Company** from the drop-down list.
  2. In the employee selection, click in one of the following: select latest visits, select dates, select all, and/or unselect all.
  3. Select either Employee Report or Company Report by clicking in the appropriate radio button.
  4. Click **Generate Reports** button. The selected reports will appear on your screen to view, save as .pdf, and/or for printing.

![Figure 26: Data Manager - Reports Tab](image)
Export Tab

In the Export Tab of the data manager, you may run an export or data query of the stored fit-test data.

There are three Export options which are illustrated and explained below.

- **Employees due for testing** – this data query will provide a list of employees due for testing for a given company. The query can be filtered by a selected cut-off date parameter. The query results will display the employee name, the employee ID, their function and section, and the last known test date.

- **To run this export**: double click on the “Employees Due for Testing”. Select the company and date parameters. Click Accept. The following will be displayed.

- **Export Data** – this data query will provide all fit-test data information when filtered by company, by all employees or by specific employee. (Note: use the horizontal slider bar at the bottom of the export window to view all the data fields.)

- **To run this export**: double click on the “Export Data”. Select the range, employees, company, employee (if applicable) and date parameters. Click Accept. The following will be displayed.
• **Hearing Protector Assignment** — this data query filters by company and will display the company, all employees fit-tested, the fit-test visit dates, the product tested, and the left PAR, the right PAR, and the Binaural PAR values.

• To run this export: double click on the “Hearing Protector Assignment”. Select the company and click Accept. The following will be displayed.

✓ **Note:** If there is a data query you would like customized, please contact the technical services as outlined in the “User Support” section at the end of the user manual.
Import 3M™ E-A-Rfit™ 4 Data Import

This feature is used to Import EARfit 4 data into the 3M™ E-A-Rfit™ Dual-Ear Validation System software.

1. To Import E-A-Rfit4 database files, click on the button.

2. Select the files from your computer's directory and click Open.

3. The files will appear in the Selected Files listing (see 1) of the Data Manager screen. Click the button. The program will display when the import completed importing the files (see 2).

Figure 30: Import E-A-Rfit 4 Data Tab
Settings

Database folder location option
In the "Database" tab, you can determine where you wish to store your test results, either on the local hard drive or remotely to a SQL Server of your choice. You may also store your test results on a remote server not on your local hard drive (without using SQL). By default, the data is stored on the local hard drive on your computer. Note: be sure to consult your company IT department before proceeding.

1. To change the database location, click on the icon and select the button.

2. Select a mapped location and click Ok.
   - Click the button to revert back to the default saved location.

3. Advanced user option: click store results remotely to SQL server checkbox. Then, enter a SQL Server Connection String and click Test. Click Save.
   - Note: this allows the database to run in a different mode while prohibiting software updates. For software updates, please refer to the ear.3m.com website.

![Figure 31: Import Data Screen](image)

Reporting Tab
In the Reporting Tab, you can select the location of the Report Queries folder via the button or click to allow the local drive default location.

In the Reporting Tab, the company logo image on the reports can be customized via the button. Reset to return back to the 3M Company logo which is set as the default.

![Figure 32: Settings - Report Tab](image)
Software updates
Software update messages will appear on the bottom of the home screen.

- To update: Click on the message box. Click **Run** button.

![Software Update Prompt Example](image)

**Figure 33: Software Update Prompt Example**

- **Note:** you will have to close the E-A-Rfit screen behind the small wizard box. Click **X** as displayed below. Follow the install wizard prompts by selecting **Next** through each screen. Click **Finish** at the last screen. **Reopen** the software.

![Install Shield Wizard for Software Updates](image)

**Figure 34: Install Shield Wizard for Software Updates**
Appendix A: Specifications

Standards/Directives/References


- CE mark. European Conformity. (Conformité Européenne.)

US Patents

3M.com/patent

Measurements Computed

<table>
<thead>
<tr>
<th>Octave band data computed in:</th>
<th>125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz, 8000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAR</td>
<td>Personal attenuation rating</td>
</tr>
<tr>
<td>Frequency weighting</td>
<td>A</td>
</tr>
</tbody>
</table>

Mechanical Specifications

<table>
<thead>
<tr>
<th>Speaker housing</th>
<th>Aluminum, black material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker size</td>
<td>6.5” long x 3.75” width x 6” depth; 2.54cm long x 9.5cm width x 15.24cm depth</td>
</tr>
<tr>
<td>Speaker Weight</td>
<td>3.1 lbs; 1406.1 grams</td>
</tr>
<tr>
<td>Speaker Status Indicators</td>
<td>LED Red blinking indicator light – signifies USB is not connected. It will disappear when connected successfully. LED Green Indicator light – signifies power is on.</td>
</tr>
</tbody>
</table>

Power Supply and Operating Conditions

<table>
<thead>
<tr>
<th>Voltage</th>
<th>120 to 240VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>50-60 Hertz</td>
</tr>
<tr>
<td>Current</td>
<td>250 mA</td>
</tr>
</tbody>
</table>

Environmental Operating Conditions

<table>
<thead>
<tr>
<th>Altitude</th>
<th>3000 (maximum) meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>5 °C to 40 °C (41 °F to 140 °F)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>80% for temperatures up to 31°C (87.8 °F); decreasing linearity to 50% at 40°C (140 °F)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Voltage Range</td>
<td>12 Volts DC</td>
</tr>
<tr>
<td>Transient overvoltage</td>
<td>Impulse withstand (overvoltage) category II. Rated pollution degree 2.</td>
</tr>
</tbody>
</table>

**User Interface requirements: ports and connectors**

- AC/DC output (power)
- 2 LED indicators
- USB connector
- Power connector

**Software requirements**

- **Screen Resolution**: 1024 X 768 pixels (minimum)

- **Operating System**: Microsoft Windows 7 Professional, 32-bit and 64-bit
  - Microsoft Windows 8, 32-bit and 64-bit
  - Microsoft .NET Framework: Net4Full 4.5.51209, Net4Client

- **USB Port**: 1 USB port available

- **Pointing Device**: If the screen is not a touch screen, a pointing device, such as a mouse is required.

- **Internet connection**: Internet is required for some features such as Software Updates and How-To Videos.

- **MicroProcessor Required**: 1 GHz or faster 32-bit (x86) or 64-bit (x64) processor

- **Memory Required**: 1 GB RAM (32-bit) or 2 GB RAM (64-bit)

- **Additional Disk Space**: 100 MB
Appendix B: model, parts, and accessories

Kit Components

<table>
<thead>
<tr>
<th>3M ID</th>
<th>3M E-A-R™ Dual-Ear Validation System Kit Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-0716-7411-6</td>
<td>3M™ E-A-Rfit™ Dual-Ear, Enclosure Speaker Assembly (073-783); Dual-Ear Microphone/Cable Assembly (073-781); Dual-Ear ½&quot;-20 to 5/8&quot;-27 Speaker Stand Adaptor (073-096); Test plug kit (693-1000); 3M™ SecureFit™ Protective Eyewear (70-0716-7682); Microphone stand (393-0003); USB cable (393-0007); Power cord/supply (053-825); 3M™ Model (319-1003); 3M™ Earring (85099-00000); Tweezers (073-092); USB flash drive with software install and user manual (093-411); antistatic ziplock bag (293-0008); Removable microphone clip (2) (073-100); Carrying case assembly (073-784).</td>
</tr>
</tbody>
</table>

3M™ Probed Test Hearing Protectors Accessories (Sold Separately)

The following 3M™ Hearing Protector Test Probes are used for testing and may be purchased through a 3M distributor.

<table>
<thead>
<tr>
<th>Probed Product image</th>
<th>Product Number</th>
<th>3M Stock ID Number</th>
<th>UPC Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>393-2000-50</td>
<td>70071562741</td>
<td>10080529190731</td>
<td>3M™ E-A-Rsoft™ Yellow Neon™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2001-50</td>
<td>70071562758</td>
<td>10080529190748</td>
<td>3M™ E-A-R™ UltraFit™ Probed Test Plugs 50 EA/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2002-50</td>
<td>70071562766</td>
<td>10080529190755</td>
<td>3M™ E-A-R™ Push-Ins™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2003-50</td>
<td>70071562774</td>
<td>10080529190762</td>
<td>3M™ E-A-R™ Classic™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2004-50</td>
<td>70071562782</td>
<td>10080529190779</td>
<td>3M™ E-A-R™ Express™ Pod Plugs™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2005-50</td>
<td>70071562790</td>
<td>10080529190786</td>
<td>3M™ E-A-R™ E-Z-fit™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2006-50</td>
<td>70071562808</td>
<td>10080529190793</td>
<td>3M™ E-A-R™ TaperFit™ 2 Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2007-50</td>
<td>70071562816</td>
<td>10080529190809</td>
<td>3M™ Classic™ Small Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2008-50</td>
<td>70071562725</td>
<td>10080529190816</td>
<td>3M™ E-A-R™ Express™ Pod Plugs™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2009-50</td>
<td>70071562733</td>
<td>10080529190823</td>
<td>3M™ Classic™ Plus Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2010-50</td>
<td>70071577772</td>
<td>10080529190871</td>
<td>3M™ 1100 Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2011-50</td>
<td>70071647740</td>
<td>10093045937124</td>
<td>3M™ Tri-Flange™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
<tr>
<td></td>
<td>393-2012-50</td>
<td>70071647757</td>
<td>10093045937131</td>
<td>3M™ Skull Screws™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
</tr>
</tbody>
</table>
## Appendix B: Model, Parts, and Accessories

**3M™ Probed Test Hearing Protectors Accessories (Sold Separately)**

<table>
<thead>
<tr>
<th>Probed Product Image</th>
<th>Product Number</th>
<th>3M Stock ID Number</th>
<th>UPC Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>393-2014-50</td>
<td>70071650249</td>
<td>10078371659490</td>
<td>3M™ E-A-Rsoft™ Yellow Neons™ Large Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2015-50</td>
<td>70071650298</td>
<td>10078371660397</td>
<td>3M™ E-A-R™ Push-Ins™ with Grip Rings Probed Test Plugs/50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2013-50</td>
<td>70071650231</td>
<td>10093045937483</td>
<td>3M™ No Touch™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2016-50</td>
<td>70071654423</td>
<td>10078371664838</td>
<td>3M™ 1260/1270/1271 Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2017-50</td>
<td>70071673142</td>
<td>10078371666085</td>
<td>3M™ Pomp Plus Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2018S-50</td>
<td>70071674132</td>
<td>10078371667570</td>
<td>3M™ Combat Arms™ 4.0 Probed Test Plugs - Small 50PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2018M-50</td>
<td>7007167327-4</td>
<td>10078371667587</td>
<td>3M™ Combat Arms™ 4.0 Probed Test Plugs-Medium 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2018L-50</td>
<td>7007167414-0</td>
<td>10078371667594</td>
<td>3M™ Combat Arms™ 4.0 Probed Test Plugs-Large 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-2020-50</td>
<td>70071674157</td>
<td>10078371667600</td>
<td>3M™ E-A-Rcaps™ Model 200 Hearing Protector Test Pods 50 PR/Case (5 bags of 10 pair each)</td>
<td></td>
</tr>
<tr>
<td>393-3001-2</td>
<td>70071691110</td>
<td>10078371668341</td>
<td>3M™ PELTOR™ Earmuffs X1/X2 Probed Test Cushions, 2PR/CS</td>
<td></td>
</tr>
<tr>
<td>393-3003-2</td>
<td>70071691128</td>
<td>10078371668358</td>
<td>3M™ PELTOR™ Earmuffs X3 Probed Test Cushions, 2PR/CS</td>
<td></td>
</tr>
<tr>
<td>393-3005-2</td>
<td>70071691136</td>
<td>10078371668365</td>
<td>3M™ PELTOR™ Earmuffs X4/X5 Probed Test Cushions, 2PR/CS</td>
<td></td>
</tr>
</tbody>
</table>

*Table B-1: 3M™ Hearing Protector Test Probes*
**Contacting 3M™ E-A-Rfit™ Dual-Ear Validation System**

**User Support (US)**
Should your 3M equipment need to be returned for repair or for recalibration, please contact the one of the following in the United States:

- **Technical Support:** 1-800-243-4630
- **Customer Service and/or Service:** 1-800-245-0779
- **Direct Government Orders:** 1-800-752-3623
- **User support website:** [EARfit.3M.com](http://EARfit.3M.com)

**Outside US Customers**
Please contact your local 3M Technical Service person to coordinate the service or repair.

**Guidelines for Calibration/Repair Return:**

1. Contact Customer Service and/or Service as stated above in “User Support”.
2. Package the unit(s) in accordance with the shipping guidelines.
3. Once the shipment is received, the Service Center will complete the requested calibration or Diagnostic Analysis.

**Shipping Guidelines**

1. All material must be packaged in an appropriate container that will ensure undamaged delivery. Options include double corrugated cardboard boxes or shipment in original E-A-Rfit case.
2. Ensure all parts within the box are packed in such a way to prevent movement within the box.
3. Speakers returned for calibration that include a microphone clip fastened to the grill must be protected with an appropriate wrapping for protection (if not returned in the original E-A-Rfit case).
   - Contact the 3M Customer Service (800-245-0779) for additional assistance, if needed.
   - Please refer to the following for additional information: [3M™ E-A-Rfit™ Repair Service Guide](http://Earfit.3m.com) via Earfit.3m.com

**Calibration**

A calibration once every two years is recommended. For additional details please refer to: [Calibration Policies for 3M™ E-A-Rfit™ Validation Systems](http://EARfit.3M.com)
Warranty

3M warrants our instruments to be free from defects in materials and workmanship for 90 days under normal conditions of use and service. For United States customers, we will replace or repair (our option) defective instruments at no charge, excluding batteries, abuse, misuse, alterations, physical damage, or instruments previously repaired by other than 3M. Microphones, sensors, printers, and chart recorders may have shorter or longer warranty periods. This warranty states our total obligation in place of any other warranties expressed or implied. Our warranty does not include any liability or obligation directly resulting from any defective instrument or product or any associated damages, injuries, or property loss, including loss of use or measurement data.

Limitation of Liability: 3M takes no responsibility and shall bear no liability for use or misuse of individual or personally identifiable data. All responsibility for such data resides with the purchaser and/or employer.

For warranty outside the United States, a minimum of 90 day warranty applies subject to the same limitation and exceptions as above with service provided or arranged through the authorized 3M distributor or our 3M European Service Laboratory. Foreign purchasers should contact the local 3M authorized sales agent for detail.

Responsibility for Data Privacy and Security

Purchaser is solely responsible for complying with all privacy and security-related laws and regulations applicable to the collection, storage, use, import and export of all data (personally-identifiable or otherwise) entered into, or generated by, the 3M™ E-A-Rfit™ Dual-Ear Validation System. Access to the 3M E-A-Rfit Dual-Ear System is not password-controlled. Purchaser should implement all necessary administrative, physical and technical safeguards it determines are necessary to ensure the integrity, confidentiality and security of the data against both internal (e.g., access by unauthorized personnel, misuse of data) and external threats (e.g., "hacking").
The Right fit test. Right now.

3M™ E-A-Rfit™ Dual-Ear Validation System.