FLUKE®

FEV350

EV Charging Station Analyzer

Users Manual

42024 (English)

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Introduction

The Fluke FEV350 Electric Vehicle (EV) Charging Station Analyzer (the Product or Analyzer) is a handheld test instrument to test ac electric vehicle (EV) charging stations (the Station or EVSE). Use the Product with a Type 2 plug to test a Station with a fixed cable or socket-outlet connector. Use the Product with a Type 1 plug to test a Station with a fixed cable connector. The Product verifies the safety and functionality of the Station through a preset test sequence, including Control Pilot (CP) charge state analysis. The product is designed to test ac electric vehicle charging stations in accordance with industry standards.

The Product allows for full installation certification in combination with a compatible multi-function tester (MFT) such as the Fluke 1664 FC. See the users manual for the MFT for instructions on how to set up, zero, and use the MFT.

The Product shows images on a high-visibility, industrial-quality LCD screen. The Product saves data to the internal memory. Use TruTest™ desktop software to transfer the saved results from the Product to the TruTest software through a Bluetooth connection.

Use TruTest software to generate professional reports and update the firmware of the Product. To download TruTest software, go to: https://www.fluke.com/en-us/support/software-downloads/trutest-software-downloads.

This Users Manual shows English screens in examples.

Contact Fluke

Fluke Corporation operates worldwide. For local contact information, go to our website: www.fluke.com. +1-425-446-5500 fluke-info@fluke.com

To register your product, or to view, print, or download the latest manual or manual supplement, go to our website.

Safety Information

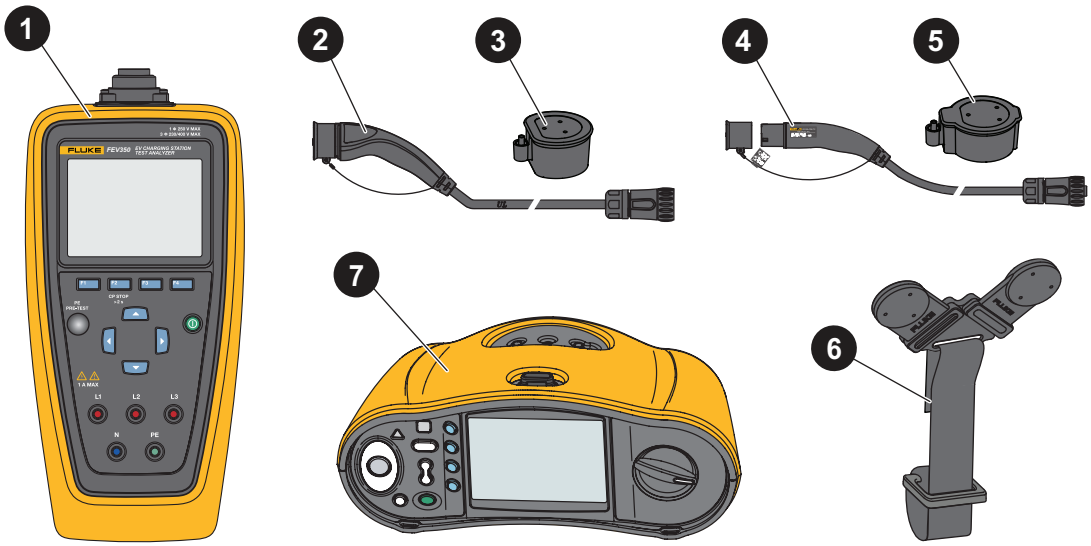
General Safety Information is in the printed Safety Information document that ships with the Product and at www.fluke.com. More specific safety information is listed where applicable.

A **Warning** identifies hazardous conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

Product

Table 1 shows the items included with the Product as part of a kit or purchased separately.

Table 1. Product



Item	Description	Function
1	FEV350	The Product
2	TY1 Type 1 plug	Use with a station with a fixed cable connector.
3	Type 1 zero adapter	Attach to a Type 1 plug to zero the connector or the test leads.
4	TY2 Type 2 plug	Use with a station with a socket-outlet or a fixed cable connector.

Table 1. Product (cont.)

Item	Description	Function
❺	Type 2 zero adapter	Attach to a Type 2 plug to zero the connector or the test leads.
❻	TPAK Magnetic strap	Use to attach the Product to a station with metal housing. See Figure 2.
❼	Fluke 1664 FC Multi-function tester (MFT)	Use with the Product for specific tests. See Table 7.
--	Carrying case	Not shown.

Features

Table 2 shows the features of the Product.

Table 2. Features

Item	Description	Function
❶	Plug connection port	Use to connect a Type 1 or Type 2 plug to the Product.
❷	Display	See *Display*.

Table 2. Features (cont.)

Item	Description	Function
❸	**PE PRE-TEST** sensor	Use to verify the station is properly grounded. See *PE Pre-Test*.
❹	Measurement terminals	Use to connect test leads to the Product. • L1, L2, L3: Three line voltage phases • N: Neutral • PE: Protective earth or ground
❺	Arrow buttons / / /	Use to navigate the menu to highlight a selection or change a numerical value.
❻	Power button	Turns on and off the Product.
❼	Function buttons F1 (F1), F2 (F2), F3 (F3), F4 (F4)	Do the action that shows on the display above the function button.

Display

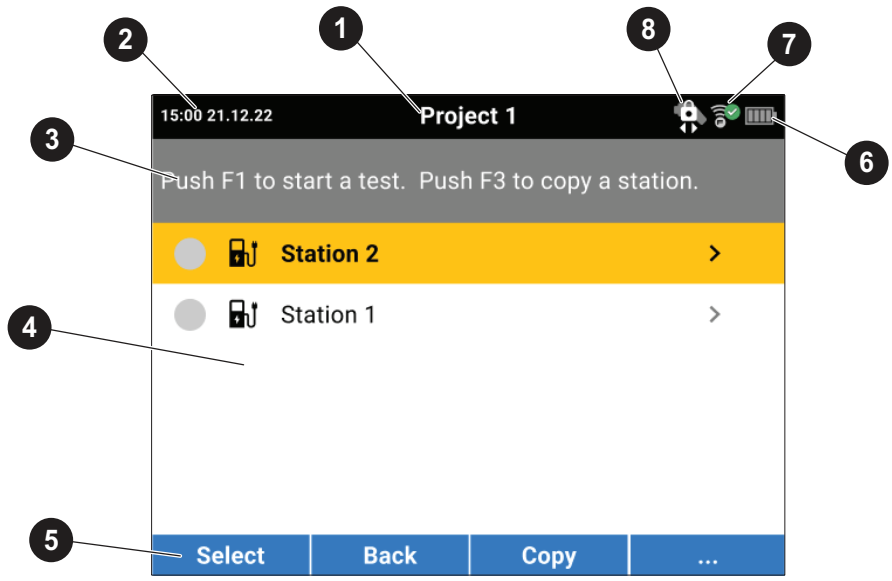
When you turn on the Product for the first time, the language selection screen shows on the display.

To select a language:

1. Push / to highlight a language.
2. Push F1 (**Select**) to select the language for the user interface (UI).

Table 3 shows the items on the display.

Table 3. Display



Item	Description	Function
❶	Name of the screen	Name of the screen you are in.
❷	Time and date	The time and date.
❸	Instruction subheader	Shows the instructions for the screen.
❹	Screen content	Main body of the screen.
❺	Soft keys	Use with the function buttons to interact with the UI.
❻	Battery status icon	Shows the status of battery power. : Batteries have full power. : Replace batteries.

Table 3. Display (cont.)

Item	Description	Function
❼	Bluetooth connection indicator.	Indicates the status of a Bluetooth connection between the Product and TruTest software on a PC or to a compatible MFT.  : The Product is connected.  : The Product is not connected.
❽	Control pilot status indicator	Indicates when it is safe to disconnect the Plug from the Station. See Table 9.

Main Menu

Table 4 lists the submenus available on the Main menu.

Table 4. Main Menu

Submenu		Function
	Test	Select to add, view, or set up a project to do a test. See *Test Menu*.
	Settings	Select to set user preferences and view information about the Product. See *Settings Menu*.
	Manual CP	Use to manually select states and values to troubleshoot a Station. See *Manual CP Menu*.
	TruTest™ Software	Use Bluetooth to connect the Product to TruTest software on a PC. See *TruTest™ Software Menu*

Menu Controls

Use the menu controls to navigate the menus, change settings, set up a project, and do a test. Table 5 lists the functions of the menu controls.

Some menus contain a scroll bar on the right side to indicate there are additional options or rows. To view additional options, push ▲ / ▼. The scroll bar indicates the location in the menu. The scroll bar is not a control.

Note

The arrow and function buttons, especially the F1 button, do different things based on where you are in the UI. Follow the directions carefully, or you might not configure the station as you intended. For example, some tests are not available or the results are adversely affected.

To change settings:

1. Push ▲ / ▼ to highlight a menu.
2. Push F1 (**Select**) to open an option menu.
3. Push ▲ / ▼ to highlight a selection.

   To change a setting that uses a toggle button, follow the directions carefully based on where you are in the UI.
4. Push F1 (**Select**) to set the selection and go back to the previous screen, or push F2 (**Back**) to cancel the changes and go back to the previous screen.

Table 5. Menu Controls

Item	Control	Function
Additional menu, test, or step indicator	›	Indicates there is another menu or test. With a submenu or option menu highlighted, push F1 (**Select**) to open the menu to adjust a setting, start a test, or to follow the on-screen instructions to connect the Product to an MFT or to TruTest software..
Bold text	--	With a row highlighted, the selected option shows in bold text. For example: **Connection Points** 1 **2** indicates there are two connection points selected. Push ◄ / ► to bold and select an option.

Table 5. Menu Controls (cont.)

Item	Control	Function
Toggle switch		Turns a feature on or off. Push ◀ / ▶ to toggle a feature. Indicates a feature is on or enabled. Indicates a feature is off or disabled.
Radio button selection indicator		Indicates an option is selected. Indicates an option is not selected.

Test Menu

Use the Test menu to set up and do tests.

Set up a Test

To set up a test, use the project list menu to create a project, the project menu to add a station to a project, and the station configuration menu to configure a station.

Project List Menu

Use the Project List menu to manage projects.

Create a Project

To create a project:

1. Highlight the Test menu, and push F1 (**Select**).

   The Project List menu shows with **Add Project** highlighted.

2. Push F1 (**Select**) to create a new project.

Add a Project

To add a project:

1. Highlight the Test menu, and push F1 (**Select**).

   The Project List menu shows.

2. With at least one project created, push F3 (**Add**) to add a another project with the next sequential project number. The Project List can contain a maximum of 10 projects.

Delete a Project

To delete a project:

1. Go to **Test** > **Project List**.

   The Project List menu shows.

2. Push ▲ / ▼ to highlight a project to delete.

3. Push F4 (**...**) and highlight **Delete**.

4. Push F1 (**Select**) to delete the project.

5. Follow the on-screen instructions to confirm you want to delete the project.

Enter Project Client and Site Codes

To enter project client and site codes for a project:

1. Go to **Test** > **Project List**.

   The Project List menu shows.

2. Push ▲ / ▼ to highlight a project.

3. Push F4 (**...**) and highlight **Enter Code**.

4. Push F1 (**Select**).

   The Project List Enter Client and Site Code option menu shows.

5. Push ◀ / ▶ to highlight a numerical field.
6. Push ▲ / ▼ to increase or decrease a numerical value.
7. With all fields complete, push F1 (**Select**) to save the codes and go back to the Project List menu.

Project Menu

Use the project menu to configure and manage stations.

Add a Station

To add the first station to a project:

1. Go to **Test** > **Project List**.

   The Project List menu shows.

2. Highlight a project, and push F1 (**Select**) to open the project.

   The Project menu shows with **Add Station** highlighted.

3. Push F1 (**Select**) to create a new station.

   The Station Configuration menu shows.

4. Configure the station. See *Configure a Station*.

Copy a Station

To copy a station:

1. Go to **Test** > **Project List**.

   The Project List menu shows.

2. Highlight a project, and push F1 (**Select**) to open the project.

   The Project menu shows.

3. Push ▲ / ▼ to highlight a station to copy.

   Note

   Fully configure the original station before you copy the station.

4. Push F3 (**Copy**) to create a new station with the next sequential station number and the same configuration settings as the original station. A project may contain a maximum of 20 stations.

Edit a Station

To edit the configuration of a station:

1. Go to **Test** > **Project List**.

   The Project List menu shows.

2. Highlight a project, and push F1 (**Select**) to open the project.

   The Project menu shows.

3. Push ▲ / ▼ to highlight a station to edit.

4. Push F4 (**...**) and highlight **Edit**.

5. Push F1 (**Select**) to edit the station.

   The Station Configuration menu shows.

6. Configure the station as needed for the test. See *Configure a Station*.

Delete a Station

To delete a station:

1. Go to **Test** > **Project List**.

   The Project List menu shows.

2. Highlight a project, and push F1 (**Select**) to open the project.

   The Project menu shows.

3. Push ▲ / ▼ to highlight a station to delete.

4. Push F4 (**...**) and highlight **Delete**.

5. Push F1 (**Select**) to delete the station.

6. Follow the on-screen instructions to confirm you want to delete the station.

Configure a Station

To configure a station:

1. Add a new station or select a station to edit.

   The Station Configuration menu shows.

2. Configure the Station as needed for the test.

   a. Set the Station Type first.

   b. Then, set the other settings in order from the top to the bottom of the list.

   Table 6 is a list of the settings to configure a station.

⚠ Caution

A setting that is incompatible with a previously selected setting causes a change to the previous setting. Some settings can reduce the options available in other settings and the availability of some tests. Before you save the configuration, review all the settings.

3. With the station configured, push F3 (**Save**) to save the station configuration settings and return to the project menu.

Table 6. Station Configuration Menu

Setting	Description
Station Type	Set the station type. The default setting is **Type 2 with cable**. **Type 1 with cable**: • L2 and L3 measurements are not available on tests. • **3 Φ** is not available as a Voltage Supply option. • Uses **32 A** Max Charge Current for Proximity Pilot tests. • **Max Cable Ampacity** is not available on tests. **Type 2 with cable**: • Uses **Max Cable Ampacity** for Proximity Pilot tests. **Type 2 with socket**: • **Max Cable Ampacity** is not available on tests.

Table 6. Station Configuration Menu (cont.)

Setting	Description
Connection Points	Set the number of socket-outlet or fixed cable connection points (the Connection Points) on the station. The maximum connection points on a station is two. The default setting is **Connection Point 1**. *Note* *You cannot change the number of connection points in another menu. If only one connection point is selected on a station with two connection points, you need to configure the station again and do all the tests again.*
Protection Class	Set the protection class of the housing of the station. The default setting is **Protection Class I**. With **Protection Class II** selected: • In the Earth Bond Limits menu, Test Point does not show as an option. • In a station test menu, **Earth Bond Housing** test does not show, and the Product does not do a Earth Bond Housing test.
Earth Bond Limit	Set the limit in ohms to use on an earth bond test. See *Earth Bond Configuration*. The default setting is **0.3 Ω**. • **Test Point:** Use with an MFT to do an Earth Bond Housing test on the station. With **Protection Class II** selected, Test Point does not show. • **Connection Point**: Use with an MFT to do an Earth Bond Connection Point test. Shows the number of connection points set.
Mains System	Set the mains type of the station. The default setting is **TN**. The mains type of the station works together with the voltage set in **Voltage Supply** to define the current limits used in a Loop/Line Impedance and time limits used in a 30 mA RCD Trip tests. See *Loop/Line Impedance Test* and *30 mA RCD Trip Test*.

Table 6. Station Configuration Menu (cont.)

Setting	Description
Voltage Supply	Set the voltage value and number of phases of the voltage supply of the station. The default setting is **230 / 400 V 3 Φ**. With **1 Φ** selected, L2 and L3 measurements are not available on tests. See *Insulation Input or Output Tests*, *Loop/Line Impedance Test*. and *Mains Voltage/Phase Sequence Test*. The Product uses the voltage value to determine the results of: ● Mains Voltage/Phase Sequence tests. See *Mains Voltage/Phase Sequence Test*. ● 30 mA RCD Trip tests. *30 mA RCD Trip Test*.
Fuse Type and Rating	Set the fuse type of the station. Then set the fuse rating of the fuse type. The default fuse type is **LS C**. The default fuse rating is **20 A**. *Note* *If the fuse type or rating of the station does not show in the list, select the most appropriate fuse type or rating to use for tests.* Use with an MFT to do a Loop/Line Impedance test on a connection point. The fuse type and rating uses standards to determine the limit for Loop/Line Impedance tests. See *Loop/Line Impedance Test*.
Max Charge Current	Set the maximum charge current of the station. The default setting is **16 A**. *Note* *If the max charge current of the station does not show in the list, select the most appropriate max charge current to use for tests.* The max charge current setting is used to determine: ● The test measurements and results in a Proximity Pilot test. See *Proximity Pilot Test*. ● The reported station amperage in a Control Pilot test. See *Control Pilot Test*.

Table 6. Station Configuration Menu (cont.)

Setting	Description
Max Cable Ampacity	With the station type set as **Type 2 fixed cable**, set the maximum amperage or current capacity of the cable. The default setting is **32 A**. The Product uses the maximum cable ampacity to determine the test measurements and results of a Proximity Pilot test. See *Proximity Pilot Test*.
RCD Type	Set the RCD type to enable the subtests in a 30 mA RCD Trip test. The default setting is **Type A/F 30 mA**. With the RCD type set to **None**, the 30 mA RCD Trip test does not show. The RCD type can affect RCD test steps and the shape of the RCD test current.
RDC-DD	Disable () the feature if the station does not have a 6 mA RDC-DD. With the feature disabled, the 6 mA RDC-DD test does not show in the test menu. Enable () the feature if the station has a 6 mA RDC-DD. With the feature enabled, the 6 mA RDC-DD test shows in the test menu. The default setting is enabled. With RDC-DD enabled, The RCD type affects RCD test steps and the shape of the RCD test current.
Ventilation required	When disabled, the Product uses Control Pilot states A, B, and C as the active charge state. Control Pilot state D shows as an error. The default setting is disabled. When enabled, the Product uses Control Pilot states A, B, and D as the active charge states.

Earth Bond Configuration

Set the limit to use on Earth Bond Housing tests. Copy a test point to assign each metal piece on the station housing an individual test point. The maximum number of earth bond housing test points is 10. The default number of test points is one. If needed, delete a test point. Use the first Earth Bond Housing test point to measure the earth bond connection between the Station and the distribution panel.

Set the limit to use on Earth Bond Connection Point tests. To change the number of socket-outlet or vehicle connection points on the station, see **Connection Points** in Table 6.

To configure a station to do an Earth Bond test:

1. Go to **Test** > **Project List**.
2. Select a project, select a station, and highlight **Earth Bond Limits**.
3. Push F1 (**Select**).

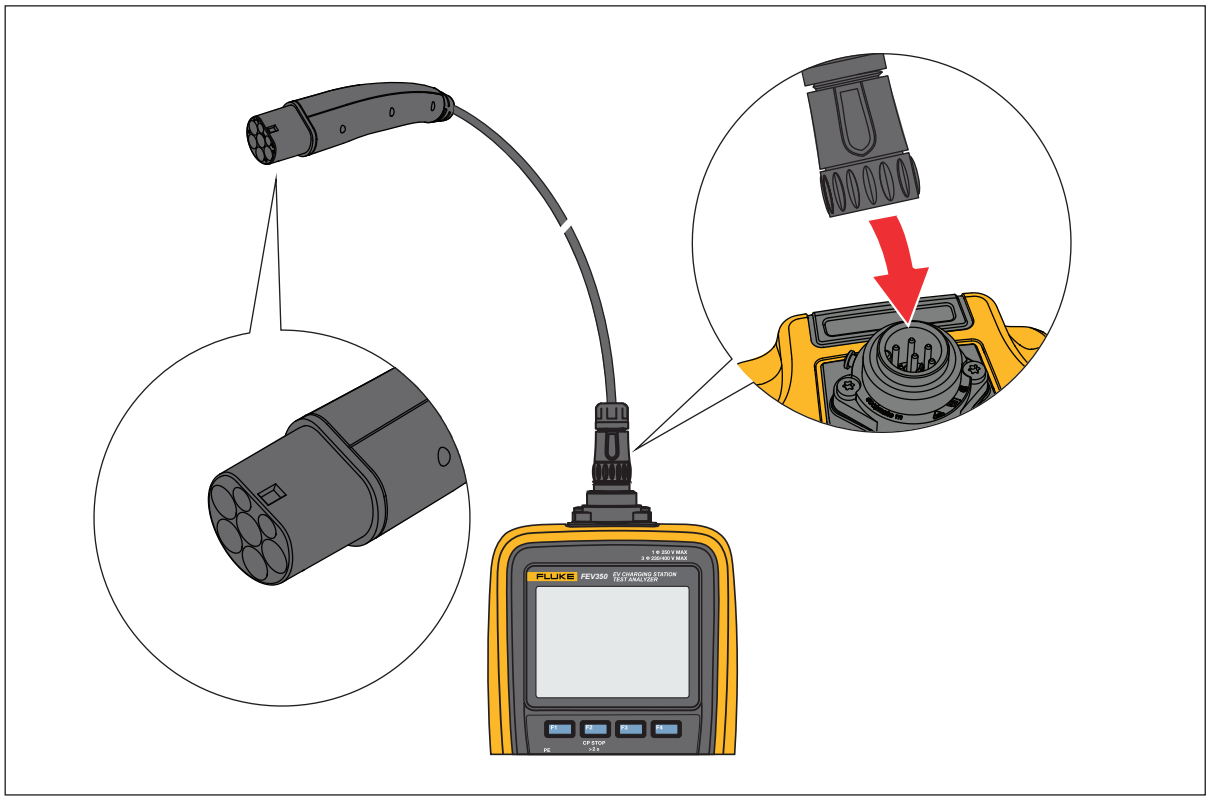
   The Earth Bond Limits menu shows.
4. Push ▲ / ▼ to highlight a test point or a connection point.
5. Push F1 (**Select**).

   The Earth Bond Limit menu shows.
6. Manually set the limit:
   a. Push ◀ / ▶ to highlight a field.
   b. Push ▲ / ▼ to increase or decrease the numeric value.
   c. Push F1 (**Select**) to set the limit.
7. If necessary, add another Earth Bond Housing test point:
   a. Push ▲ / ▼ to highlight a test point to copy.
   b. Push F3 (**Copy**) to create another test point with the same limit setting as the original test point.
8. To delete an Earth Bond Housing test point, highlight a test point, and push F4 (**Delete**).

Connect the Plug

Figure 1 shows how to connect the Type 2 Plug or the Type 1 Plug to the Product.

Figure 1. Connect the Plug



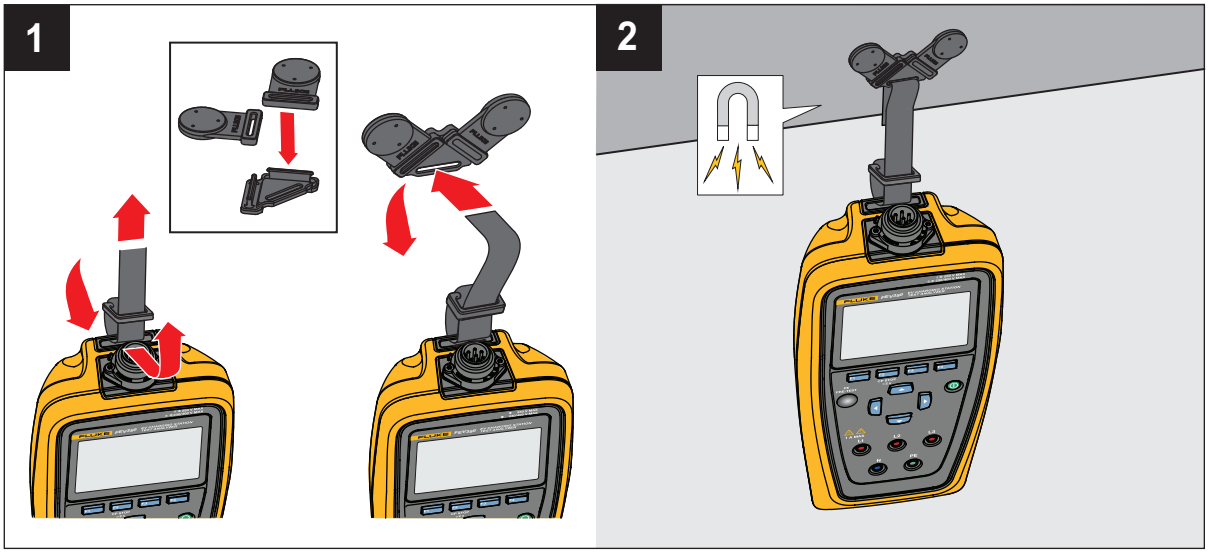
Connect the TPAK Strap

⚠⚠ Warning

Configure a station and do a PE Pre-Test and visual inspection test before you attach the TPAK strap to the station housing. See *Do a Test*.

Figure 2 shows how to connect the TPAK magnetic strap.

Figure 2. Connect the TPAK Strap



Station and Connection Point Tests

⚠⚠ Warning

Configure a station and do a PE Pre-Test and visual inspection test before you touch the station housing or do any other station or connection point tests.

Table 7 lists the Station and Connection Point tests the Product can do and notes which test requires an MFT to do the test. To connect the Product to an MFT, see Table 11.

Table 7. Tests

Test	Requires an MFT
Station Test	
PE Pre-Test	
Visual Inspection	
Earth Bond Housing	●
Insulation Input	●
Connection Point Test	
Earth Bond Connection Point	●
Insulation Output	●
Loop / Line Impedance	●
30 mA RCD Trip	
6 mA RDC-DD Trip	
Mains Voltage / Phase Sequence	
Control Pilot	
Proximity Pilot	
Error Test	

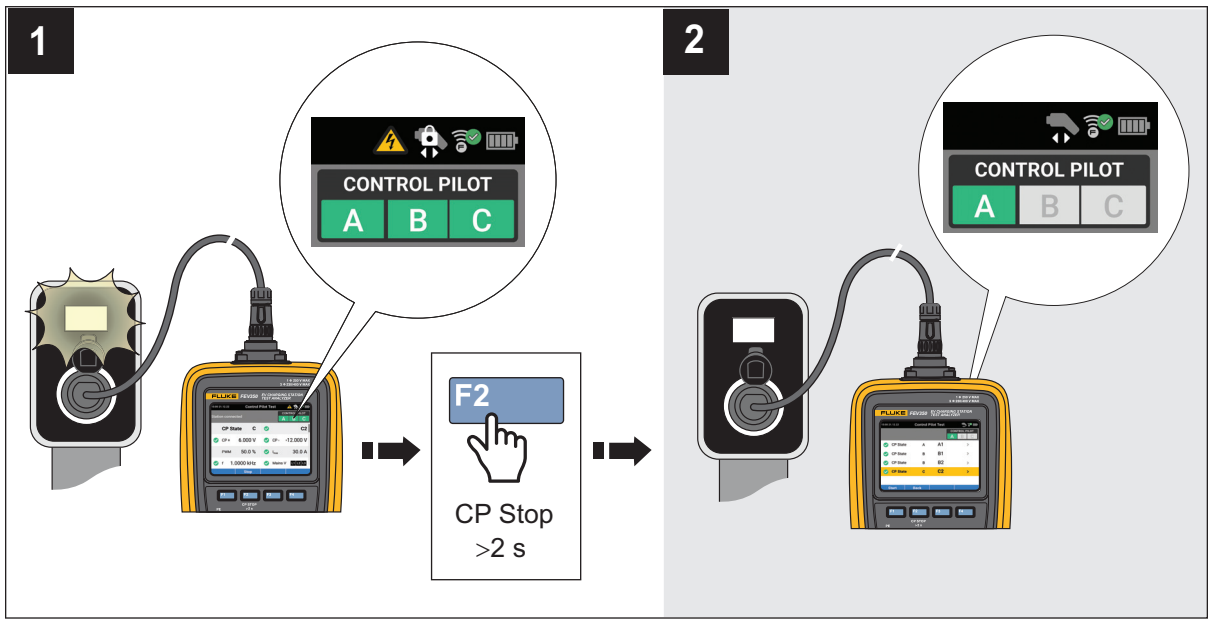
Function Buttons in Tests

Table 8 shows some of the actions the function buttons may do. Not all functions are available in all tests.

Table 8. Function Buttons in Tests

Button	Function
F1 (F1)	• **Select**: With a test highlighted, push to open the main menu of the test. • **Start**: Push to start a test. • **Next**: Push to do the next step of a test.
F2 (F2)	• **Back**: Push to go back to the previous screen and not save changes or test results. • **Stop**: Push to stop the test, go back to the main menu of the test to do the test again, and not save the results. • **Exit**: Push to stop the test, go back to the station test menu., and not save the results. • **CP Stop >2 s**: Push and hold for >2 s to turn off the control pilot, go back to the station test menu on the Product, turn off the Station, and not save the results. See Figure 3.
F3 (F3)	• **Results**: Push to view the results of a test.
F4 (F4)	• **...**: Push to show additional options. • ⊖: Push to indicate a test is not applicable.

Figure 3. CP Stop



Symbols on Test Screens

Table 9 describes the symbols that can be on a test screen.

Table 9. Symbols on Test Screens

Symbol	Description
Test visibility	
^	Indicates a Station or Connection Point test menu is not open. Push F1 to open the menu to view the tests.
v	Indicates a Station or Connection Point test menu is open. Not all tests may show on the display. Push F1 to hide the tests and see more items on the display.
MFT required	
	Indicates a test requires a compatible MFT. To connect the Product to an MFT, see Table 11.

Table 9. Symbols on Test Screens (cont.)

Symbol	Description
Test status	
	A test is not started, or a test is in process and not completed.
	A test passed.
	A test failed.
	A test is not applicable.
Waveform indicator	
	An ac test that starts at 0°.
	An ac test that starts at 180°.
	A halfwave test that starts at 0°.
	A halfwave test that starts at 180°.
	A dc test that starts at 0°.
	A dc test starts at 180°.
	An RCD or RDC-DD ramp current test that may start at 0° or 180°.
RCD circuit status	
	Indicates an RCD or RDC-DD device has not been tripped.
Phase direction indicators	
	Indicates clockwise rotation.
	Indicates counter-clockwise rotation.
Earth bond test current indicator	
Ω±	Indicates an earth bond test was taken with positive and negative test current. The Product shows the result of the one with the greatest resistance value.
Voltage detection indicator	
L1	Indicates the Product detects phase L1.
L2	Indicates the Product detects phase L2.
L3	Indicates the Product detects phase L3.

Table 9. Symbols on Test Screens (cont.)

Symbol	Description
Control Pilot state indicator	
	Shows the state of the control pilot. • Gray indicates the control pilot signal is off for the CP state. • Green indicates the control pilot signal is within the limits for the CP state. • Red indicates the control pilot signal is not within the limits for the CP state.
CP activity status	
	Control Pilot is in state B, C, or D. Do not disconnect the plug from the Station.
	Control Pilot is in state A. You may disconnect the plug from the station.
High voltage indicator	
	WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.

Do a Test

⚠⚠ Warning

Configure a station and do a PE Pre-Test and visual inspection test before you touch the station housing or do any other station or connection point tests.

PE Pre-Test

⚠⚠ Warning

Do not touch the housing of the charging station until the results show ≤50 V.

The PE Pre-Test is a safety feature of the Product. Do a PE Pre-Test to verify the protective earth (PE) conductor connects to the station and ground correctly before you do any other test.

The PE Pre-Test detects the presence of hazardous voltage on the Station housing and PE, but the test may not detect an open PE. An open PE is a PE connection that is not connected to ground and may be hazardous. An open PE can happen when the PE conductor is connected to phase or when PE is disconnected.

With incorrect connection to ground (for example, isolated placement of your body), the test result might not be accurate. Do not wear gloves.

To do a PE Pre-Test:

1. Set up and select a station.
2. Connect the Product to the charging station.
3. Highlight **PE Pre-Test**.
4. Push F1 (**Select**) to open the Test menu.
5. Touch and hold a bare finger to the **PE PRE-TEST** sensor ( ) for 3 s.
6. Push F1 (**Select**) to view the result.

⚠⚠ Warning

If the result shows >50 V, stop the test immediately. There may be hazardous voltage present at the PE terminal and metal parts of the charging station.

Note

It might be important to do this test again after the mains voltage to the Station turns on.

Visual Inspection Test

Make sure a PE Pre-Test passes, before you do a Visual Inspection test. Use a checklist to visually inspect a station for signs of damage or hazardous conditions that might need repair before you do other tests. The visual inspection list on the Product is an example of items you can inspect. See the documentation provided by the manufacturer of the Station for specific visual inspection requirements.

⚠⚠ Warning

If a checklist item fails, make sure there are no hazardous conditions and that repairs are complete before you do any other station or connection point tests.

To do a visual inspection test:

1. Push ▲ / ▼ to highlight **Visual Inspection Test**.
2. Push F1 (**Select**) to start the test.

3. Push ▲ / ▼ to highlight an item.
4. Push the appropriate button to set an item on the checklist to pass, fail, or not applicable for a station. See Table 10.

Table 10. Checklist Item Functionality

Button	Description
F1	Push to set a single item on the checklist to pass. Push and hold >2 s to set all items on the checklist to pass.
F3	Push to set a single item on the checklist to fail. Push and hold >2 s to set all items on the checklist to fail.
F4	Push to set a single item on the checklist to not applicable. Push and hold >2 s to set all items on the checklist to not applicable.

How to do Tests

To do a test:

1. If not done previously:
   a. Set up and select a station.
   b. Do a PE Pre-Test and a visual inspection test. See *PE Pre-Test* and *Visual Inspection Test*.
2. If needed for the test, pair the Product with an MFT. See Table 11.

⚠⚠ Warning

For tests that use an MFT, connect the test leads to the MFT and then to the Product.

Note

For tests that use an MFT, the Product shows the settings to use on the MFT in red. The settings on the Product change to green when the settings are set correctly on the MFT.

3. Push ▲ / ▼ to highlight a Station or Connection Point test.
4. Push F1 (**Select**) to open a test menu to do a test.

   A test screen shows on the display.

5. If necessary, highlight a test.
6. Push F1 (**Start**) to start the test and overwrite existing results if ✓ or ✗.
7. Follow the instructions on the display to do the test.

   If necessary while in a test, push F2 (**Back**) to go back to the previous screen, or push F2 (**Stop**) to stop the test and go back to the project and station test menu.

Earth Bond Tests

The tests require a compatible MFT and uses the limit set in the station configuration menu. See *Configure a Station*.

An earth bond housing test measures the resistance of the earth from the ground pin of the mains supply of the Station to the housing of the Station.

An earth bond connection point test measures the resistance of the PE connection from the mains supply of the Station to the Connection Points of the Station.

Insulation Input or Output Tests

An insulation input test measures the integrity of the insulation of the wires from the mains into the Station. An insulation output test measures the integrity of the insulation of the wires from the Station to the Product. The tests require a compatible MFT.

The tests use a fixed limit of 1 MΩ to determine the results.

Loop/Line Impedance Test

Loop and line impedance tests measure the impedance of the electrical system. The test measures the impedance and calculates the prospective fault current and earth fault current in the system to make sure sufficient current flows to open a breaker or fuse.

The test uses the limit set in the station configuration menu based on the fuse type and rating. See *Configure a Station*.

With RDC-DD set to ○, the Product may run a loop and line impedance test.

With RDC-DD set to ●, the Product runs a line test only.

With RDC-DD set to ●, a loop impedance test causes the circuit of the RDC-DD to open.

30 mA RCD Trip Test

Trip Time: The test applies a ground fault or current imbalance to make sure a 30 mA RCD opens the circuit in the time listed in the standard based on the Mains System, Voltage Supply, and RCD Type set in the Station Configuration menu. See *Configure a Station*.

Trip Current: The test applies ground faults or current imbalance of different current levels to make sure a 30 mA RCD opens the circuit at the sufficient current listed in the standard based on the settings in the station configuration menu. See *Configure a Station*.

6 mA RDC-DD Trip Test

Trip Time: The test applies a ground fault or current imbalance to make sure a 6 mA RDC-DD opens the circuit in the time listed in the standard.

Trip Current: The test applies ground faults or current imbalance of different current levels to make sure a 6 mA RDC-DD opens the circuit at the sufficient current listed in the standard.

Mains Voltage/Phase Sequence Test

The mains voltage test measures the voltage and frequency the Station outputs to the Connection Points of the Station. In a test of a three phase system, the test also determines if the phase rotation is in the correct sequence.

Control Pilot Test

The Control Pilot test makes sure the Control Pilot signal from the Station has the correct voltage, frequency, and duty cycle for the Station Type set in the station configuration menu. See *Configure a Station*.

The test measures the CP signal of the Station while the Station changes from CP state A to CP state C and makes sure the signal meets the limit in the standard.

The test converts the duty cycle to I_{max}. The Product saves up to 10 changes in CP state and output voltage L1/L2/L3.

With a test complete, the display shows a summary list of the events.

To see more information about the results:

1. To see the details of each event, push F3 (**Results**).
2. To view the results in a table or as a curve diagram, push ▲ / ▼.

Proximity Pilot Test

For a Station with a charge cable that is attached to the Station, a Proximity Pilot (PP) test makes sure the current coding resistors or auxiliary switch with resistors are the correct values and the resistors work properly in the charge cable of the Station.

For a Station with a socket-outlet connection, the Product will simulate the current capability of different cable assemblies. The test makes sure the indicated charge current on the Control Pilot signal does not exceed the maximum allowable current of the simulated charge cable or the max charge current of the Station set in the station configuration menu. See *Configure a Station*.

A proximity pilot test shows the max output current of the Station and makes sure the output current and power are in the allowable range required by the electrical energy provider.

Error Test

The test applies various error states to the Control Pilot signal to make sure the Station recognizes the errors and disconnects voltage and power until the error is resolved.

After an error is applied, you might need to turn off the Station and then turn on the Station again. Refer to the documentation of the Station.

Settings Menu

Table 11 is a list of the options available in the Settings menu. When the Product is turned off and back on, the Product uses the last saved settings.

To change settings:

1. Push ▲ / ▼ to highlight the Settings menu.
2. Push F1 (**Select**) to open an option menu.
3. Push ▲ / ▼ to highlight a selection.
4. For options with toggles, push ◀ / ▶ to toggle the feature.
5. Push F1 (**Select**) to set the selection and go back to the previous screen, or push F2 (**Back**) to cancel the changes and return to the previous screen.

Table 11. Settings Menu

Option	Description
Pair with MFT	Follow the instructions on the display to pair the Product with a Fluke MFT. With more than one MFT on and in FC mode, the Product pairs with the MFT with the strongest signal. To pair with a specific MFT, turn off all MFTs except for the MFT you want to pair to.
Firmware Version	Shows the firmware version of the Product.
Hardware Version	Shows the hardware version of the Product.
Serial Number	Shows the serial number of the Product.
Display Settings	Use to set the brightness level of the display.
Auto Power Off	Use to set the time until the Product turns off automatically.
Sounds	Use to turn on or off: • Basic sound settings such as sounds that indicate button pushes. • Pass and Fail condition sounds such as when a test fails based on the requirements for the test.
Factory Reset	Deletes all settings and test results, and resets the Product to the factory default settings.
Product Registration	Shows a QR code to scan to register the Product.
Product Information	View some of the product specifications, all the radio approved certificates, and the last calibration date of the Product. For the complete product specifications, see the FEV350 Product Specifications document on fluke.com.
Language	Use to select a language.

Manual CP Menu

Use the Manual CP screen to troubleshoot a station. The test uses the Voltage Supply value set in the Station Configuration menu. See *Configure a Station*. The results cannot be saved to TruTest software.

To manually troubleshoot a station:

1. Push ▲ / ▼ to highlight **Manual CP**.
2. Push F1 (**Select**) to open the test menu.

   The Manual CP screen opens. The Product uses default settings to do a test automatically, and the results show on the display.

   The default settings are:

   - CP State: **A**
   - Value: **-**
   - PP: **32 A**
   - Error: **None**

   With CP State A selected, Value cannot be set. To set the Value to Low, Nominal, or High, select CP State B, C, or D.

To change settings and do a test:

a. Push F3 (**Edit**) to open the Manual CP settings menu.

b. Push F1 (**Select**) to open a submenu.

c. Push ▲ / ▼ to highlight a selection.

d. Push F1 (**Select**) to set the selection.

e. With the selections set, push F3 (**Apply**) to use the selections to do a test.

TruTest™ Software Menu

Use Bluetooth to connect the Product to TruTest software on a PC. To download TruTest software, go to: https://www.fluke.com/en-us/support/software-downloads/trutest-software-downloads.

To connect the Product to TruTest software:

1. Push ▲ / ▼ to highlight the TruTest menu.
2. Push F1 (**Select**) to open the menu.
3. Follow the on-screen instructions to connect the Product to TruTest software.

Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury:

- **Do not open the case. You cannot repair or replace parts in the case.**
- **Remove the input signals before you clean the Product.**
- **Have an approved technician repair the Product.**

Clean the Product

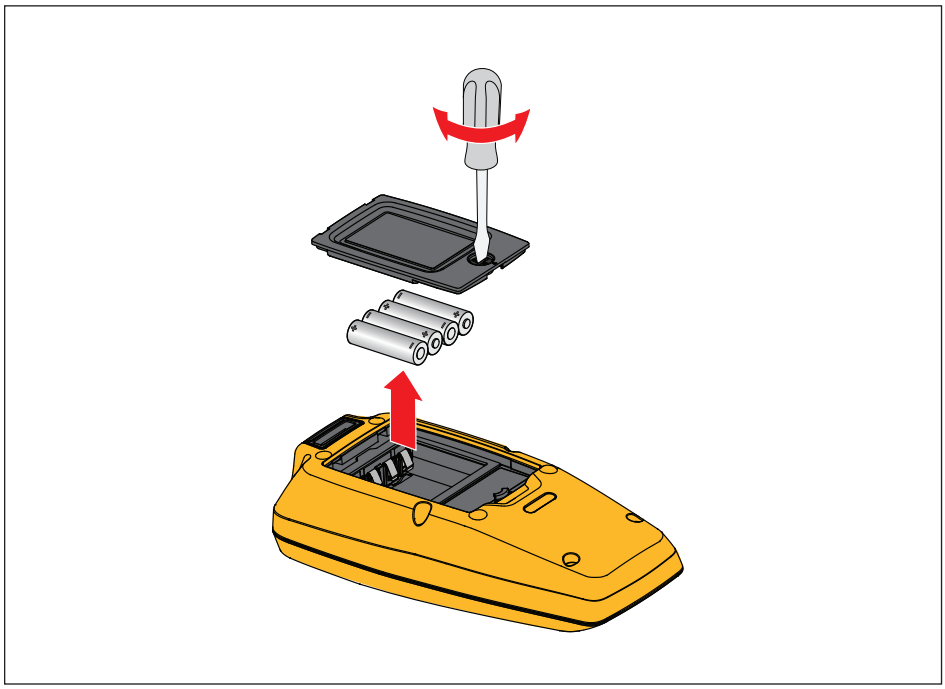
Clean the case and display with a soft cloth dampened with water and a mild soap solution. Do not use solvents, isopropyl alcohol, or abrasive cleansers.

To clean the ports, use a pressurized can of air or a dry nitrogen-ion gun, if available, to blow the particulates from the ports.

Battery Replacement

Figure 4 shows how to replace the batteries.

Figure 4. Battery Replacement



Product Disposal

Dispose of the Product in a professional and environmentally sound manner:

- Delete personal data on the Product before disposal.
- Remove batteries that are not integrated into the electrical system before disposal and dispose of batteries separately.
- If this Product has an integral battery, put the entire Product in the electrical waste.