



OP415

Polarity Analyzer

Instruction Manual

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MnOP415-RevA

OP415



online resources

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Overview

The OP415 is designed to analyze the polarity and output quality of MTP®/MPO cable assemblies of up to 24 fibers. Individual power meters allow for testing 24 fiber polarity in 1.5 seconds and fewer channel counts in fractions of that time. The unit comes pre-loaded with 12 and 24 fiber types A, B, and C; along with the ability to create and store new types. In addition, the unit is able to check the quality of a cable and store test results, with internal storage for up to 256 cable types and test results.

The full color touchscreen display, compact design, and lightning fast test time make the OP415 Polarity Analyzer the ideal test solution for environments where MTP/MPO cables are manufactured or utilized.

The OP415 is able to analyze polarity for:

- Type A (12, 24)
- Type B (12,24)
- Type C (12,24)
- 8,12,16, 24 fiber
- Custom Fiber Mappings

Initial Preparation

Unpacking and Inspection

The unit was carefully inspected; mechanically, electrically, and optically before shipment. When received, the shipping carton should contain the items listed in Standard Contents; account for and inspect each item. In the event of a damaged instrument, write or call OptoTest Corp, California.

Note: Be aware that accessories such as detector adapters, remote head detectors, and high performance reference cables will be located inside a small box labeled "Accessories Inside". If this box is not included with the original shipment, contact OptoTest or their nearest distributor.

Please retain the shipping container in case re-shipment is required for any reason.

Damaged In Shipment

All instruments are shipped F.O.B. Camarillo when ordered from OptoTest. If you receive a damaged instrument you should:

1. Report the damage to your shipper immediately.
2. Inform OptoTest Corporation.
3. Save all shipping cartons.

Failure to follow this procedure may affect your claim for compensation.

Standard Contents

1. Model OP415 Polarity Analyzer
2. 9V Power Supply and Power Cord
3. USB A-B cable
4. Certificate of Conformance
5. Instruction Manual
6. USB drive with applicable software and documentation (if ordered)

Definition of Specifications

Dynamic Range

The dynamic range, or measurement range, of the optical power meter spans from the maximal power level the instrument can measure, without major saturation to the detector, to the minimal power level where the thermal noise of the detector becomes greater than the current produced by the incident light. For accurate power measurements, it is NOT recommended to measure power levels at either end of the dynamic range (see Linearity). The dynamic range is measured by comparing the absolute measured power against a reference power. When the difference between the two exceeds 1dB either end of the dynamic range has been reached.

Linearity

Photodetectors are, by nature, very linear over a wide range of optical input powers, but the power meter electronics can affect the overall system linearity. The power meter linearity is characterized and specified to know the measurement accuracy and linearity over the full dynamic range. For accurate insertion loss measurements only power levels that fall within the range with the best linearity ($\pm 0.05\text{dB}$ or better) should be measured.

Calibration Wavelength

The calibration wavelengths are the nominal wavelengths of the instrument's calibration points. The exact wavelength of each particular calibration is stated in the Certificate of Calibration.

Calibration Traceability

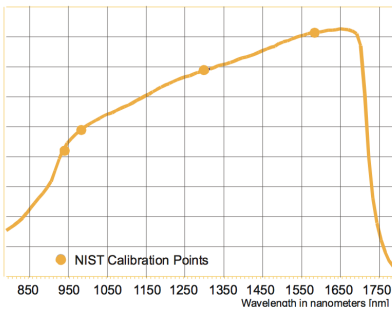
The detector's absolute calibration data is directly traceable to N.I.S.T. at the specified calibration wavelength and the specified power level, typically -10dBm .

Definition of Specifications

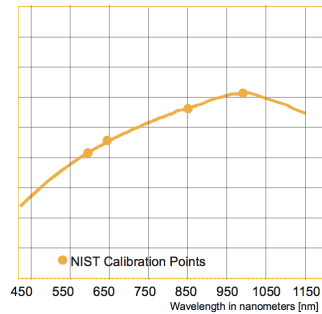
Spectral Responsivity

Depending on the detector type, InGaAs (Indium Gallium Arsenide) or Silicon the spectral responsivity, the efficiency of the detector to convert optical power into electrical current, changes with wavelength.

Responsivity of InGaAs Detectors



Responsivity of Silicon Detectors



Note that other detector types are available such as IN5 (5mm InGaAs) IN10 (10mm InGaAs) as well as WSR (wide spectral range) and might exhibit a different spectral responsivity.

Absolute Accuracy

The absolute accuracy specification includes the total measurement uncertainties involved in the calibration process including the transfer of the absolute power standard from N.I.S.T. (Contact OptoTest for the detailed chain of uncertainties)

Optical Power Meter, Channel Performance

For multichannel instruments, the power meter circuit converts and digitizes the optical power level with the given sampling interval. Changes in light levels such as modulation will be averaged within that sampling interval.

Instrument, Warm-up Time

Optical power meters, in general, do not need any warm-up time unless the instrument has to acclimate to a changing environment. In order to calibrate the instrument or to perform stable measurements, the instrument should be acclimated for 15 minutes for each 5°C of temperature differential. For example, if the instrument was stored at 18°C and brought into an environment of 28°C the instrument should be allowed to warm-up for 30 minutes.

Definition of Specifications

Recommended Recalibration Period

This is the recommended time period for re-calibration in order to maintain accuracy specifications. The recommendation is made based upon statistics on detector aging. However, it is up to the metrology policies and procedures within each company to define the calibration cycles on optical power meters.

Optical Power Meter, Fiber Compatibility

The amount of areal coverage of the detector, or the portion of the light emitted from the fiber being measured, depends on the mechanical features of the optical interface, the active area of the detector and the numerical aperture (NA) of the fiber. A fiber with a large NA, for example 100/140 multimode fiber, may not under fill a small area detector hence the absolute power reading will be less than actual.

Reference Cable

The reference cable is the cable with which the DUTs will be measured against. Typically reference cables are required to be of a defined quality with a specified connector/endface polish.

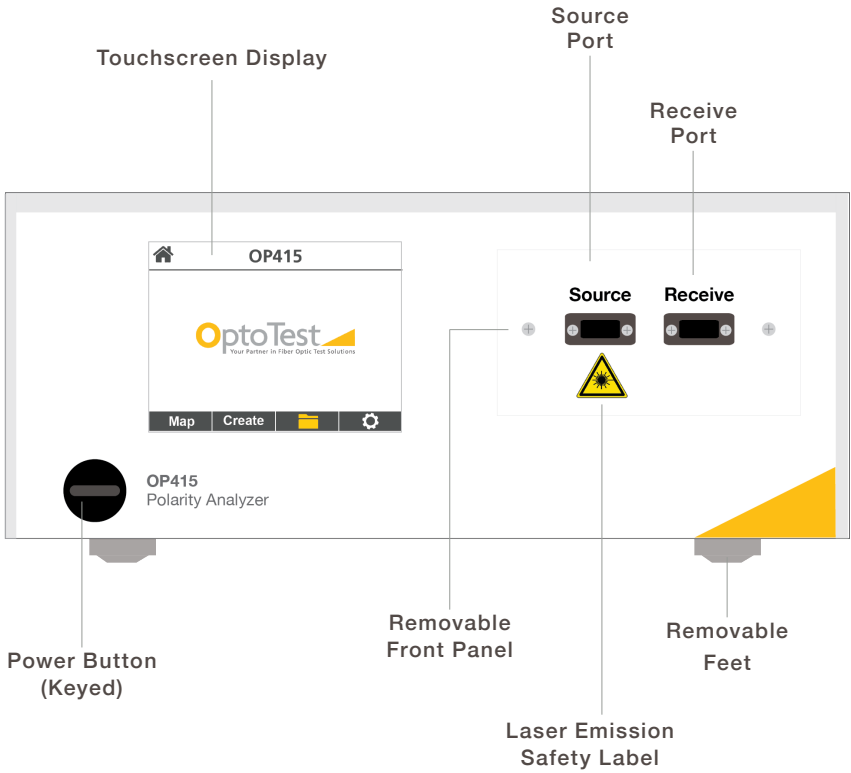
Instrument, Environmental

Operating Temperature: This is the temperature range in which the instrument will conform to the specifications after the specified warm-up time.

Storage Temperature: This is the temperature range at which the instrument can be stored with the power off without any damage or any loss of specification to the instrument. It is required that the instrument be brought back to within the operating temperature range before it is turned on.

Humidity: The relative non-condensing humidity levels allowed in the operating temperature range.

Nomenclature



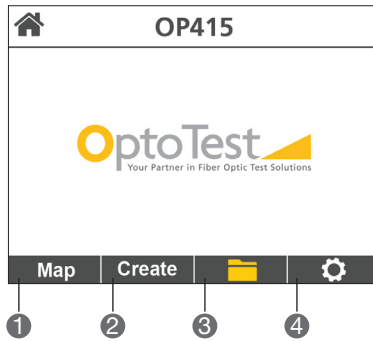
How to Navigate the User Interface

The OP415 is equipped with a full color touchscreen display, eliminating the need for physical buttons and allowing for increased functionality through the front panel.

Home Screen

At startup, the unit loads the **Home screen**. From here the user can select the **Map screen**, **Create screen**, **File screen** or the **Settings screen**.

Note: There is an option in the Settings to go directly to the **Map screen** at power up.

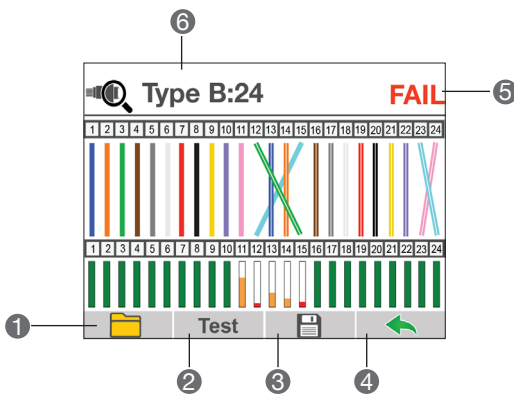







 1	Map Screen
 2	Create Screen
 3	File Screen
 4	Settings Screen

Front Panel Operation

Map Screen

In the **Map screen** the user can select a cable type to test, run the test, and save test results to the unit. There are four possible test results to obtain on this screen: **Pass**, **Mapping Fail**, **Connection Fail**, and **Power Level Fail**. If a cable has a mapping failure, the unit can determine if the mapping matches a different cable type than the one selected for the test, provided the mapping is known to the unit.



	①	Brings up a list of types
	②	Runs a test
	③	Saves test results
	④	Returns to the previous screen
FAIL	⑤	Displays a Pass or Fail after a test
	⑥	Shows the type of cable being tested. If a fail occurs but the cable matches a different cable type, the match found will be displayed in red

Front Panel Operation

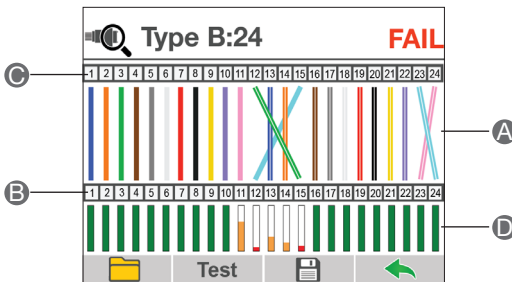
Map Screen (cont.)

The Fiber Map area **A** will normally show straight lines if the cable is wired the same as the selected type. If there is a mismatch the lines will show which fibers are misrouted and where they are actually connected.

If a line is straight but only goes up part way, this indicates the fiber is not connected.

The **bottom numbers B** indicate the fiber position of the source side. These are always numbered in order.

The **top numbers C** show the correct destination for the type of cable selected. This is why the lines will be straight up and down if the cable is correctly made.



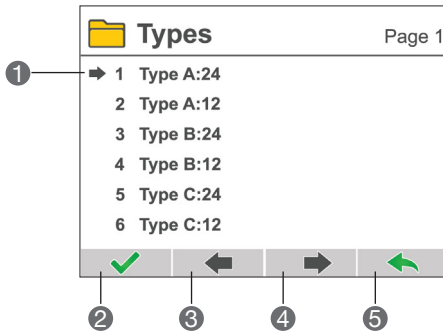
The Power area **D** indicates the relative power detected for the fiber just above it. The power level is also color coded depending on how low the power is. If it is **green** this indicates the power level is good. If it is **orange** this indicates the power level is in the caution range. If it is **red** this indicates it is very low or non-existent.






The power level is relative to a reference power stored for each type of cable. This reference level is established by testing a known good cable on the **Reference screen** located on page 2 of the settings. Once the reference for a type of cable is saved, it will be used whenever that type of cable is selected on the **Map screen**.

Front Panel Operation

Map Screen (cont.) - Types Screen

Selecting the **Folder icon** brings up the Types screen. The first 6 types in the list are built-in and any additional types are created by the user manually or by scanning a known cable and saving the mapping (see page 22).

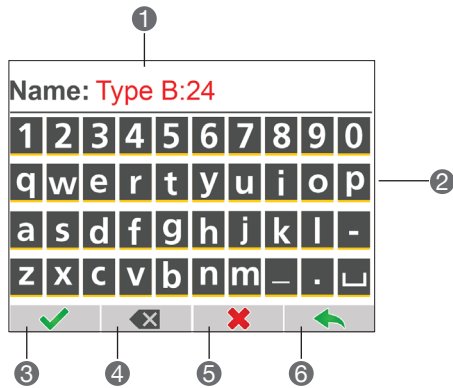


	1	Select a type by pressing on the name. When this is done the arrow on the left will move to the selected name
	2	Press the check mark to confirm selection
	3	Returns to the previous page of options
	4	Advances to the next page of options
	5	Returns to previous screen without any selection

Front Panel Operation

Map Screen (cont.) - Save Screen

The Save screen is used to save the test results. It will bring up the Keyboard allowing a file name to be entered. By default, the file names auto-increment numerically. The user may edit the name and press the check mark to confirm and save.

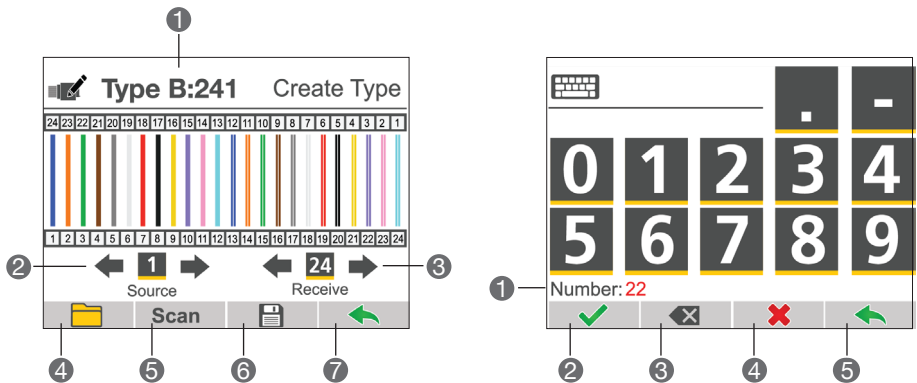









Name: ①	Displays the name typed
p ②	Letters and numbers used to type the file name desired
✓ ③	Confirms and saves the file name typed
✕ ④	Deletes text—one letter/number at a time
✕ ⑤	Deletes all the text
➡ ⑥	Exits the screen without saving the file





Front Panel Operation

Create Type Screen

The Create Type screen is accessed by pressing the **Create icon** on the home page, and it is used to create new cable types or view existing types. Once a type is saved, it is available in the list of saved types, accessible through the **Folder icon** on various screens. The **Folder icon** on the home screen displays both saved types and test results.



 ①	Displays the cable type
 ②	Press the arrow keys on either side of the source box, or press the source box and select the number with the numeric keyboard to select a Connection (Source)
 ③	Press the arrow keys on either side of the receive box, or press the receive box and select the number with the numeric keyboard to change the destination (Receive)
 ④	Displays a list of available types
 ⑤	Scans and shows the connectivity of the cable, and inputs power reference values
 ⑥	Brings up the keyboard allowing a file name to be entered
 ⑦	Exits the screen without saving the file

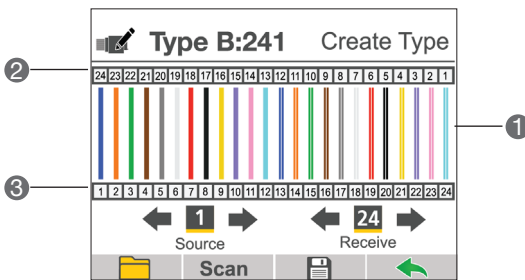
Number: ①	Displays typed-in channel
 ②	Confirms and saves the file name typed
 ③	Deletes text—one letter/number at a time
 ④	Deletes all the text
 ⑤	Exits the screen without saving the file

Front Panel Operation

Create Type Screen (cont.)

Unlike the Test screen, the lines on this screen ① will always be straight up and down, and the top row of numbers ② will indicate the connection to the source in the bottom row ③. A 0 in the top row indicates there is no connection.

Note: The top row of numbers ② will change when you change the destination.



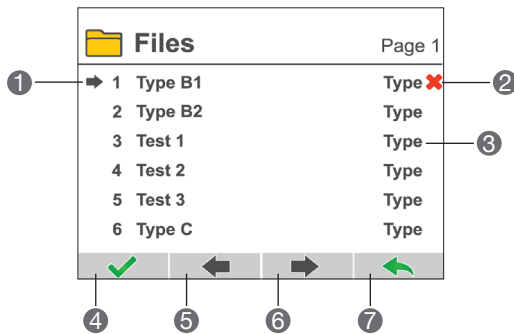
Although a scan is the easiest way to create a new type, it is possible to manually create a type by using the edit functions on this screen. You should select a type from the folder icon which is closest to the type you are going to edit.







Note: If edits are done instead of a Scan, the power reference values for this type cable are not valid. You must use the reference screen found in page 2 of the settings (see page 17) to update the references.

Front Panel Operation

Files Screen

The Files screen is accessed by pressing the **Folder icon** on the home page.

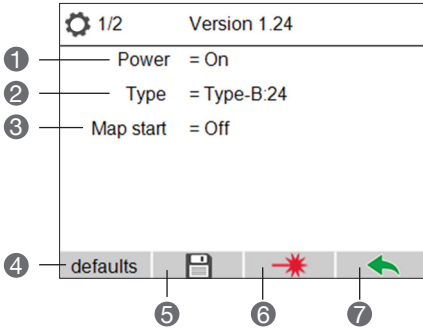


	①	Select a type by pressing on the name
	②	Deletes a file
Type	③	Indicates the type of file—Type or Test
	④	Displays the file selected
	⑤	Moves left through the directory a page at a time
	⑥	Moves right through the directory a page at a time
	⑦	Exits the screen without selecting a file

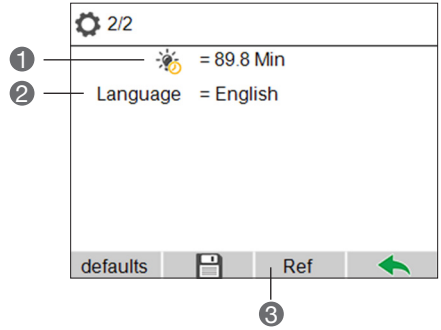
Front Panel Operation

Settings Screen

Page 1



Page 2



Page 1/2

Power = ①	Activates/deactivates the power level check
Type = ②	Select defaultt cable type to test
Map start = ③	Select if the unit boots up in the map screen (on) or the home screen (off)
defaults ④	Restores default settings
⑤	Saves changes
⑥	Access the Laser Screen
⑦	Exits the screen without saving

Page 2/2

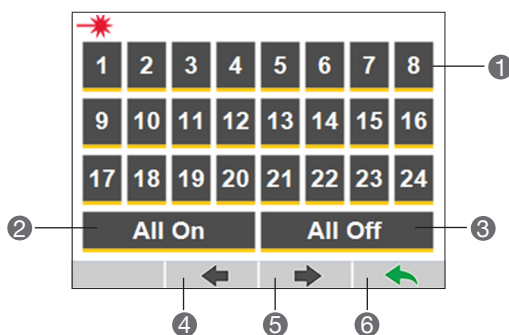
= ①	Set a time limit after which the front panel dims; Value Entry Screen
Language = ②	Select language for the front panel. Options: English, Spanish, French, German, Italian, Polish
Ref ③	Access the Ref Screen

Front Panel Operation

Settings Screen - Laser Screen

The Laser screen is accessed by pressing the **Laser icon** on page 1 of the settings. This screen is used to select laser sources and turn them on. This can be useful to build or debug cables.

Be very careful not to look at the emitted laser light as each laser will emit 5mW of power. All lasers on will emit 120mW of power. It is strongly recommended you wear protective goggles when using this screen. Do not allow other personnel to be directly or indirectly exposed to this laser light.



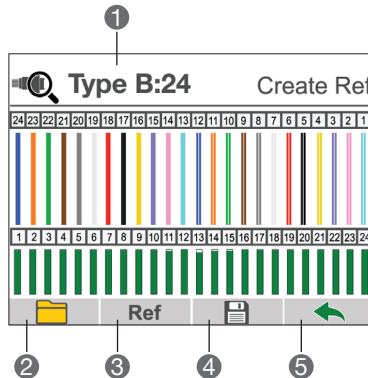
1 ①	Pressing a number will turn that laser source on or off. If it is on, the yellow strip under the number will turn red
All On ②	Pressing All On will turn all lasers on
All Off ③	Pressing All Off will turn all the lasers off
← ④	Cycles through the lasers in descending order. Only one laser is on when the arrow keys are used
→ ⑤	Cycles through the lasers in ascending order. Only one laser is on when the arrow keys are used
← ⑥	Returns to previous screen





Front Panel Operation

Settings Screen - Create Reference Screen

The Create Reference screen is accessed by the **Ref icon** on page 2 of the settings. The purpose of this screen is to setup the power references for a cable type. When testing cables on the Map screen the references in the selected type are compared to the power readings for each fiber. The power bars show the difference between the reference and the power read. These results are also stored in the file when a test is saved. This way a report done on an uploaded test will show the loss of power through the tested cable compared to the reference cable.

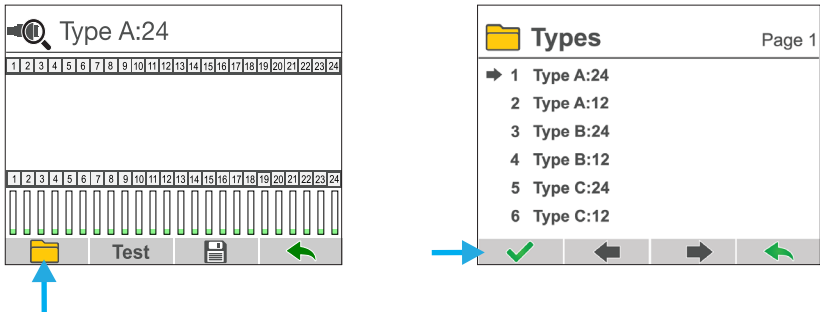
Note: Built-in types must also be referenced before being used for the first time.



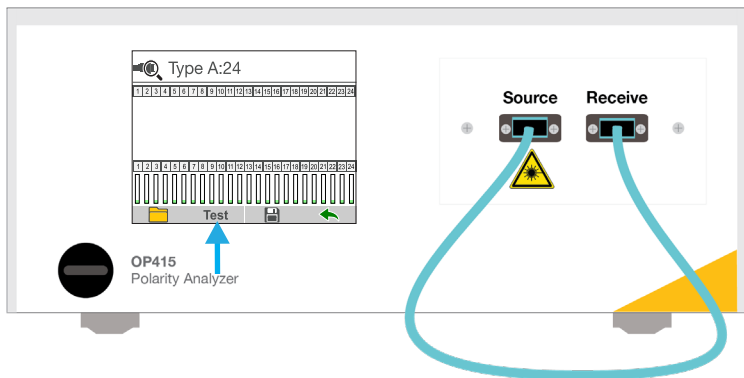
	1	Displays the selected type
	2	Displays a list of types
Ref	3	Inputs the power references
	4	Saves the result
	5	Exits the screen without saving

Example 1: Running a Test

To begin a test, select the cable polarity to test for by pressing the **Folder icon**. This brings up the list of cable types stored in the unit, including any created by the user. In the settings screen, the user can set a default type for the Map screen to start up with.



Connect the cable to be tested to the source and receive ports of the OP415. Once the cable is connected, pressing the **Test icon** activates the lasers and performs the test.



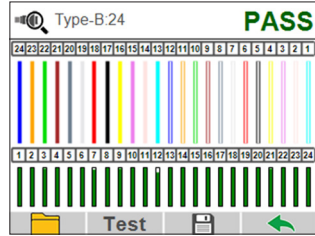
Once the test is completed, the user can save the results to the unit by pressing the **Save icon**.

Example 1: Running a Test (cont.)

The results of the test will display as pass, mapping fail, connection fail, or power level fail.

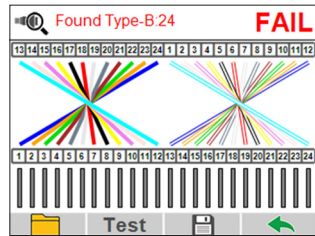
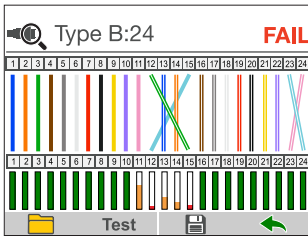
Pass

The test will give a passing result if the mapping is correct for the type being tested and if there is sufficient output power through each fiber.



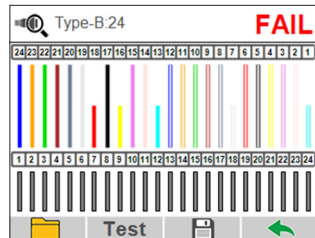
Mapping Fail

If the cable mapping does not match the mapping of the type being tested, the results will show where fibers are crossed and give a failing result. If the unit detects that the mapping of the failed cable matches a different type that is known to the unit, the suggested type will display at the top of the screen.



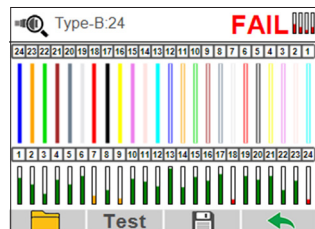
Connection Fail

If there are fibers in the cable that fail to make contact or otherwise are completely unable to output power from the source port to the receive port, the affected fibers will only populate halfway up the display and the test will give a failing result.



Power Level Fail

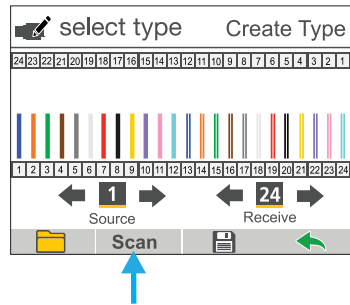
If the mapping is correct but the output power is low, the test will give a failing result. This type of failure will only appear if the type being tested has a reference associated with it and if the power level test is enabled.



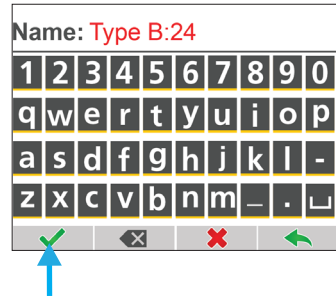
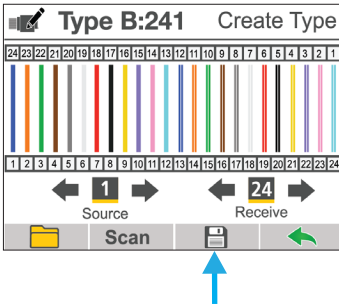
Example 2: Create a New Type

The user has two options for creating new types and saving them to the unit: **scanning** and **manual entry**.

To learn a new cable type by scanning, connect a cable with a known mapping to the source and receive ports of the OP415. Once connected, pressing the **Scan icon** activates the lasers to determine the mapping, which is then displayed on the front panel.



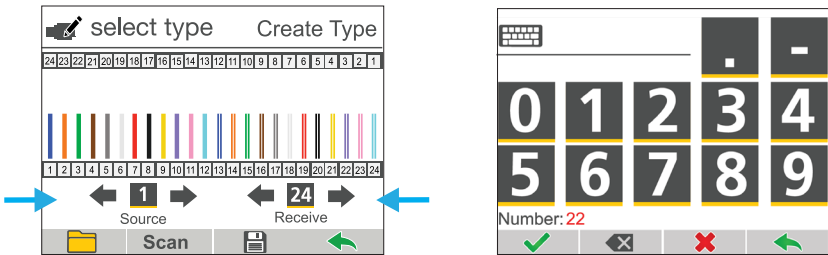
From there, pressing the **Save icon** brings up the keyboard screen to give the new mapping a name.



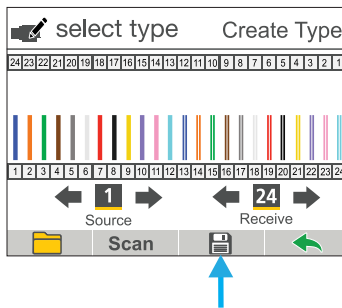
The new type is saved to the unit and accessible by pressing the **Folder icon**.

Example 2: Create a New Type (cont.)

To create a new type manually, use the left and right arrows to assign the source and corresponding receive channels, or tap the number in between the arrows to type in the desired channel. The user may select an existing type to start off with.



Once the source and receive channels are assigned, pressing the **Save icon** will bring up the keyboard screen to name the new type. From there the new type is saved to the unit.

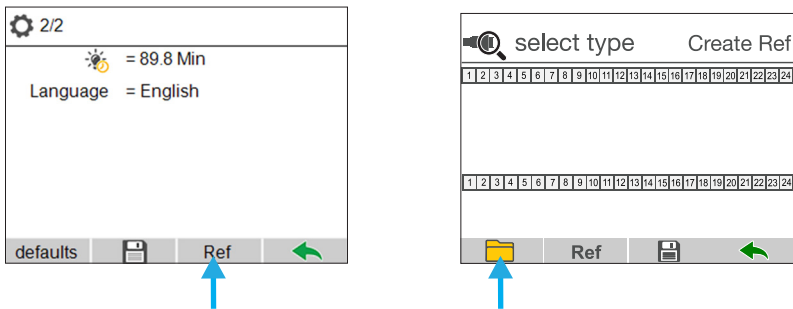


If the user intends to test both polarity and output power using created cable types, an output power reference is needed.

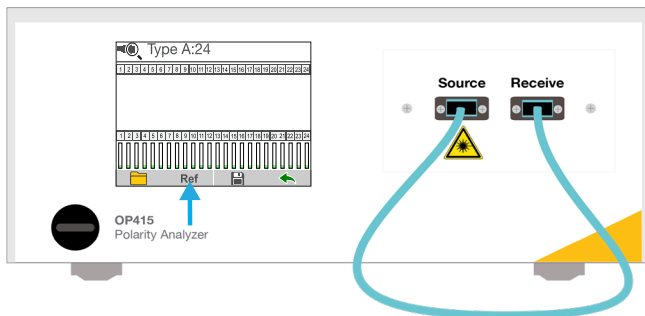
Example 3: Create Power Level Reference

In order to use the output power analysis feature of the OP415, each cable type must be referenced to establish a power level to compare against. This must be done for both the standard types and any user-created types.

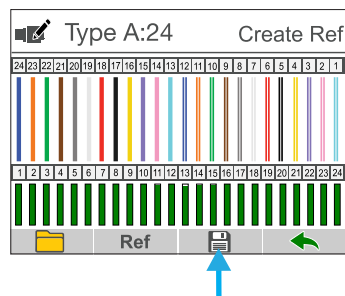
The reference screen can be accessed from the Settings menu (Page 2). Once there, select the cable type to reference by pressing the **Folder icon**.



Next, connect the known cable to the source and receive ports of the OP415. Press the **Ref icon** to input the power references.



Make sure all the lines are straight up and down. If any of them are crossed, then the cable does not match the selected mapping. Save the results using the **Save icon** and make sure the name matches the file type before saving.



Example 4: Testing 12-Fiber Polarity

The OP415 was designed with a removable front panel that allows the user to make the necessary hardware changes for 12 fiber testing without compromising the rest of the unit.

To remove the front panel, first locate the screws that fasten the panel to the front of the unit. They are located to the left of the source port and the right of the receive port. A small Phillips-head screwdriver is needed to remove the screws.

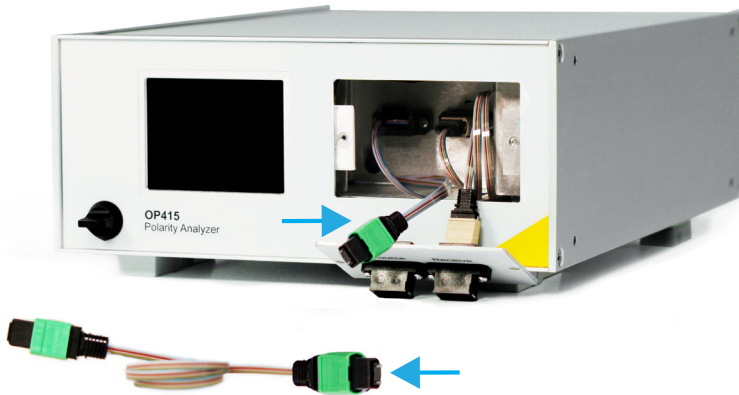


Once the screws are removed, carefully pull the entire panel from the front of the unit, being mindful of anything currently connected.



Example 4: Testing 12-fiber Polarity (cont.)

Once the removable panel and front compartment of the unit are accessible, conversion cables may be inserted to convert from 24 source output to 12. The conversion cables are female on one end and male on the other. Coil the conversion cable so that it fits neatly inside the unit. The female end connects inside the unit, and the male end connects to the front panel.



Carefully reattach the removable portion of the front panel and begin testing 12 fiber polarity.

Warranty Information

See our [Terms and Conditions](#) at www.optotest.com for warranty information.

NOTE: Do not send instruments for any reason without contacting OptoTest headquarters first. To request an RMA contact OptoTest at +1.805.987.1700 or customerservice@optotest.com.

Notes

Notes

For Application Notes, more detailed Testing Instructions, and the most up-to-date OptoTest News go to www.optobuzz.com





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