

# AN-116

## Performing Insertion Loss and Return Loss Measurements Using a Single-Channel OP940

### Overview

OptoTest's OP940 allows operators to test Insertion Loss and Return Loss of fiber optic cables accurately and efficiently. Once Insertion Loss and Return Loss references are completed, the unit will automatically update test results on the screen in real-time.

### Performing a Reference Measurement

#### Return Loss Reference

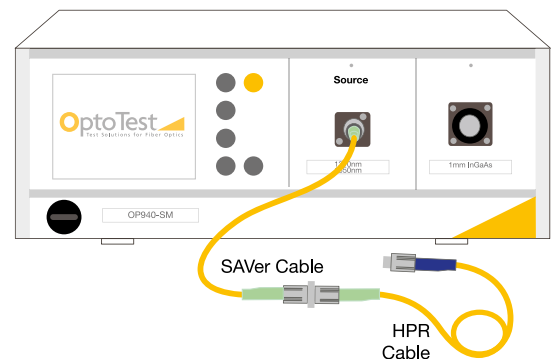
The OP940 references Return Loss by searching for the first large reflection in the reference cable. After such a reflection is found, measurements begin at a distance from the front panel to the unmated end of the cable. It is recommended that an unmated PC connector be used for RL reference (for more information see our White Paper) and that the number of connections between the front panel and the reference connector be minimized to reduce loss and reflectors to the OP940 front panel. The open PC connector should yield approximately 14dB reflection.

*NOTE: It is strongly recommended that the reference cable and DUT each be at least 3 meters in length. It is also strongly recommended that a short SAVER cable should be used to prevent damage to the front panel connector. For more information on SAVER cables, please see our Application Notes: [AN-132 SAVER Cable Short Instructions](#), and [AN-137 Preventing Damage to Optical Connectors](#).*

#### Referencing and Measuring Return Loss

To take the reference for a return loss measurement, connect the APC side of the reference cable to the front panel connector on the source port; alternatively, connect the reference cable to the SAVER cable if one is being used.

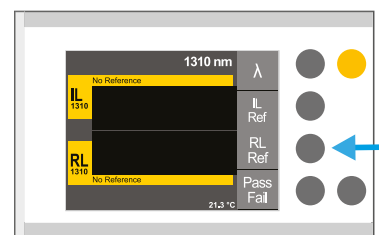
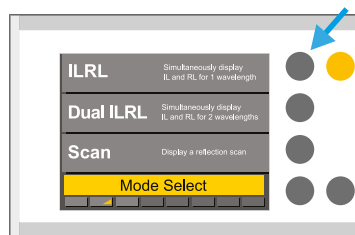
**Note:** *If the reference cable is APC-to-APC, other methods must be employed to perform a proper reference due to the lack of a reflection associated with an APC connector. For more information on these methods, please see [Application Note AN-114 Testing APC Cables](#).*



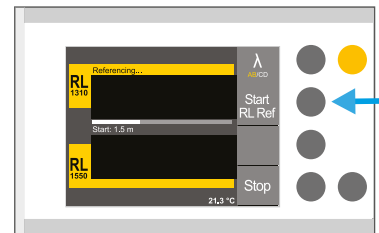
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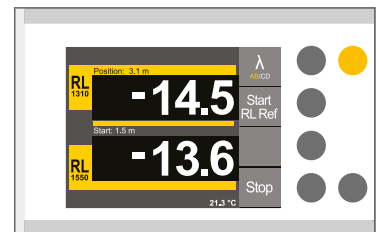
Select the desired mode screen, such as **ILRL**, and then select the **RL Ref** option.



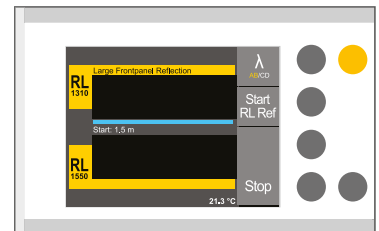
On the proceeding screen, select the **Start RL Ref** option. The instrument will begin scanning for the first large reflection and will store that reference position. This process may take a few seconds.



If the reference is good, the OP940 will display the reference distance and RL value, along with a yellow progress bar. Typical RL values are -14dB for an open UPC connector.



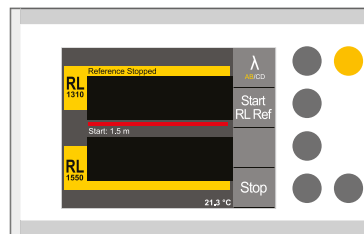
If a large reflection is present at the front panel, the progress bar will turn blue.



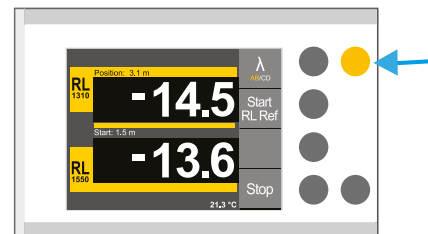
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If the RL reference fails or is stopped, the progress bar will turn red.



After referencing return loss, the unit will begin to display the return loss readings for both wavelengths in real-time. To return to the measurement screen, press the **Home Button**.

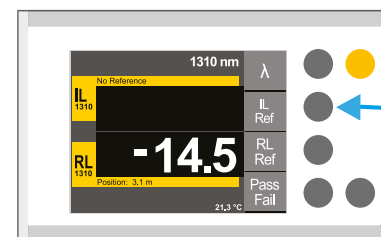
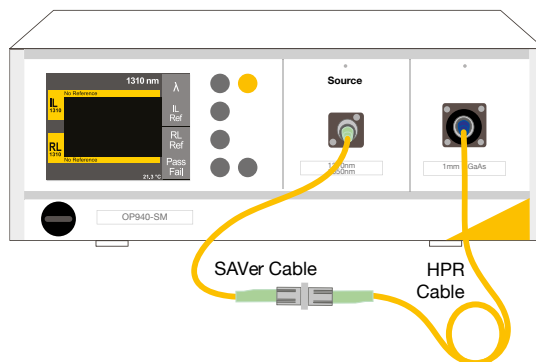


**Note:** It is important that the Return Loss reference is performed where the device-under-test, or DUT will be connected. If a receive cable is being used during measurement, it should not be included in the RL reference.

### Insertion Loss Reference

To take the reference for an insertion loss measurement, connect the reference cable from the source directly to the detector port of the instrument.

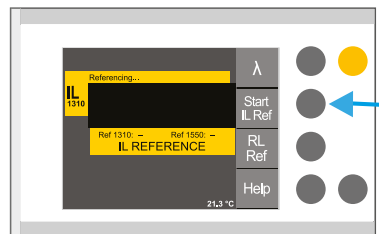
Next, select the **IL Ref** option.



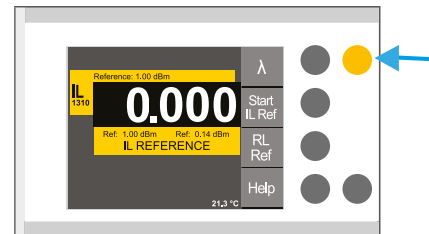
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## Performing Insertion Loss and Return Loss Measurements Using a Single-Channel OP940

On the proceeding screen, select the **Start IL Ref** option. The instrument will select each of the sources, measure their absolute power, and store the reference accordingly. The process may take a few seconds.

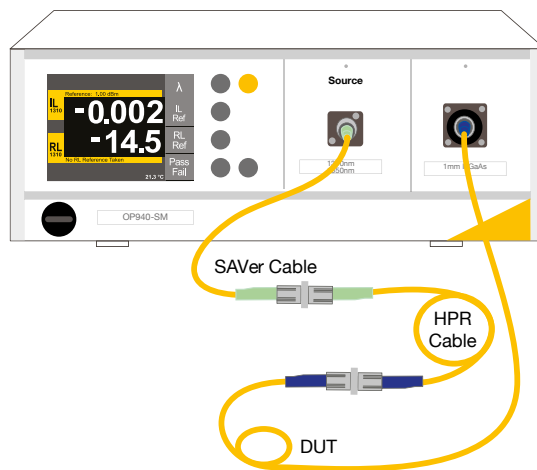


After referencing insertion loss, the unit will begin to display the relative power in real time. After referencing insertion loss, press the **Home Button** to return to the measurement screen.

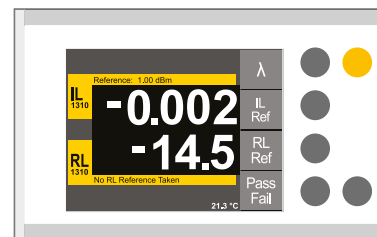


### Testing

The OP940 will begin continuously taking measurements for Insertion Loss and Return Loss, depending on which mode the unit is in. Connect the DUT to the unmated connector of the reference cable and the other endface to the detector port to begin taking real-time measurements for the DUT.



The unit will begin displaying live results.



From the measurement screen, press the **Pass/Fail Button** to display live test results based on the user-configurable settings.

