Fiber Fabry-Perot Tunable Filter | **FFP-TF2**

First Time User Manual

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Congratulations on the purchase of your Micron Optics tunable filter. Our patented, high performance filter incorporates the highest optical and mechanical resolution available while maintaining the most reliable all-fiber platform.

This document was prepared for first-time users of the FFP-TF2. Additional critical information can be found online at www.micronoptics.com.

As a first time user, you should find this handbook valuable in helping you get the most out of your filter as soon as possible. System designers requiring a more in-depth understanding of filter operation and characteristics may find our "FFP-TF2 Technical Reference" helpful. This document is also available online at our website.

All of us at Micron Optics thank you for purchasing our products.

GETTING STARTED

(1) Carefully unpack the filter from the special shipping case, taking extra care to avoid breaking the optical fiber (fig. 1). NOTE: the filter is shipped with a loose-tube jacket to provide added protection to the fiber pigtails. Pulling on the fiber while holding onto the jacket can break the fiber inside the filter enclosure and destroy the filter. Always wrap several coils of the pigtail around a 1-inch diameter mandrel to strain relief the fiber before stripping the buffer from the ends of the fiber.

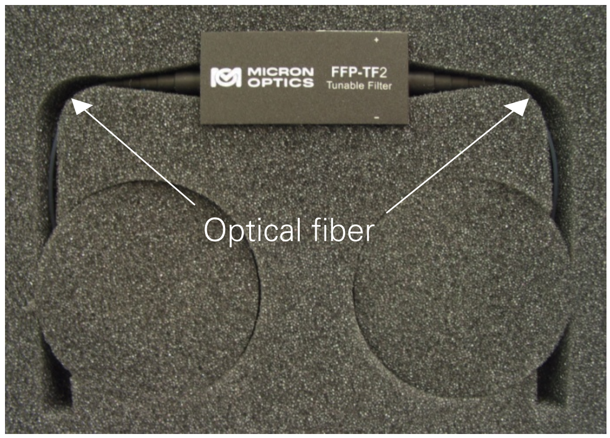


Figure 1 Tunable filter packed in special shipping case.

(2) Carefully remove the shorting wire from the actuator terminals.

(3) Unpack the FFP-C controller and follow these quick-setup directions:
   (a) Verify that the supply voltage selector on the rear panel is correct for your local voltage.

Figure 2. Power supply voltage selector, power cord connection, and on/off switch.

   (b) Turn the SCAN AMPLITUDE and the SCAN FREQUENCY knobs fully counterclockwise.

Figure 3. FFP-C front panel.

(c) Plug the AC power cord into the rear panel of the FFP-C unit and turn the power on.

(d) Connect the FFP cable to the controller. Attach the red clip lead to the (+) terminal and the black lead to the (-) terminal.

WARNING: *Reversing the polarity can permanently damage the FFP filter!*

Figure 4. FFP-C controller.

Typical Oscilloscope Configuration

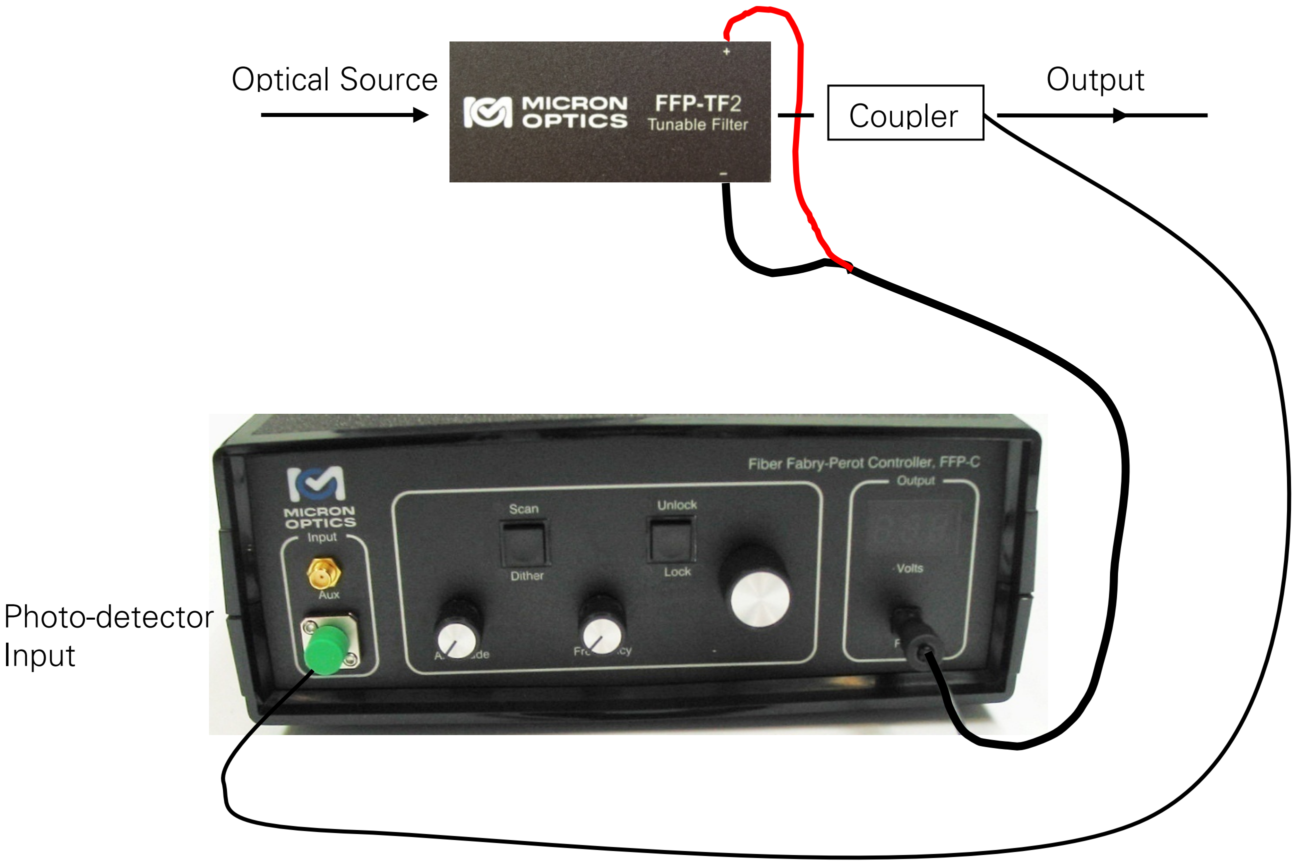
(1) Connect the FFP-C PZT, Test, and Sync output BNC connections to your oscilloscope channels 1, 2, and external trigger respectively.

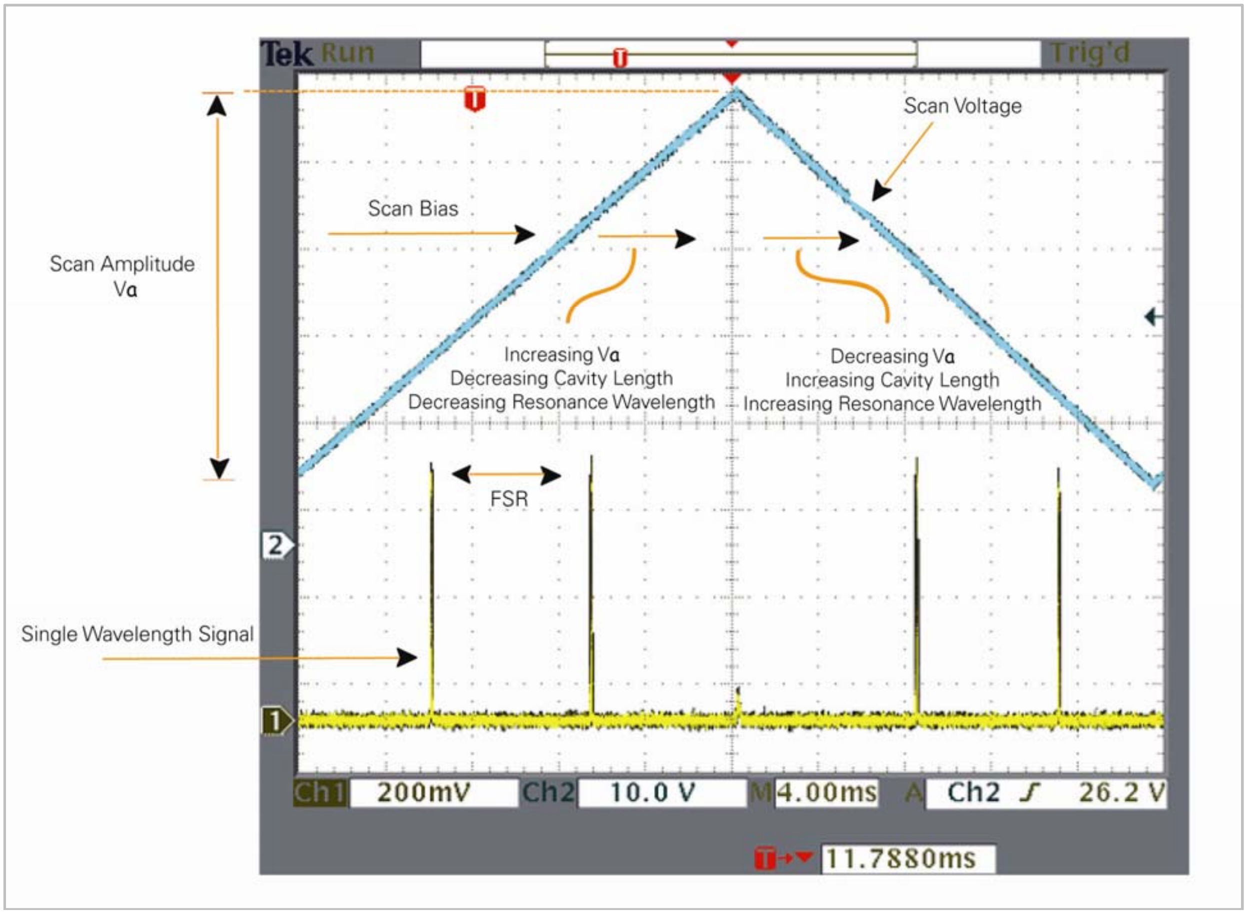
Figure 5. FFP-C rear panel.

(2) Set oscilloscope channel 1 (PZT) sensitivity to 5 or 10 volts per division. Set channel 2 (Test) sensitivity to 0.1 volts per division. Set the sweep to 1 millisecond per division. Set the trigger source (Sync) to external and set the slope to +.

(3) Insert the filter into the optical path, as shown on the next page. Note: Input and Output isolation may be required to prevent optical reflection instabilities.

Typical Optical Configuration





Note: This is a representative oscilloscope display of the scan voltage and the corresponding filter response.

Modes of Operation: Manual vs. Scan vs. Dither

The tunable filter and controller can operate in one of three modes: (1) Manual, (2) Scan, and (3) Dither (or locked). In *Manual mode*, the amplitude and frequency knobs are turned completely counter-clockwise. The offset knob adjusts the DC voltage applied to the filter PZT actuator, thereby adjusting the resonance wavelength in the Fabry-Perot cavity.

In *Scan mode*, the FFP-C supplies a simple triangular voltage waveform output to the FFP connection. The triangular wave amplitude can be adjusted from zero to >50 volts peak to peak. The frequency of the triangular wave can be adjusted from 20 to 100 Hz. The DC offset can be adjusted from less than 5 volts, to over 50 volts. We recommend setting the Offset to 30 volts (the center of the controller supply voltage range). *Scan mode* is used primarily for sweeping the filter through a range of wavelengths for applications such as (un-calibrated) optical spectrum analysis and WDM channel equalization monitoring. Either the internal photo-detector or an external photo-detector can be used to monitor the filtered optical signal in Scan mode.

Dither (locked) mode, on the other hand, requires using the internal FFP-C photo-detector input for closed loop operation. *Dither mode* is utilized for locking the FFP-TF or the FFP-SI to a particular narrow line source, and is required to achieve optimum tuning stability and to compensate for electrical, thermal, and mechanical variations in the FFP-TF and the input light source. In *Dither mode*, the controller supplies a low-voltage 2 KHz dither frequency to the FFP device for optimum error correction within the feedback loop. Note that the feedback circuit was designed for slowly varying wavelength shifts due to thermal drift in both the source and the filter.

Note: The controller is not designed to operate in the dither (locked) mode with high Finesse (> 750) filters.

Frequently asked questions and answers

(Q.1) What is the recommended Maximum Drive Voltage for the filter?

(A.1) *As the voltage on the PZT increases, the PZT expands causing the optics to move closer together. It is important that the filter drive voltage remain below 70 volts to ensure that the optics are not damaged.*

(Q.2) What is the recommended Maximum Drive Frequency for the filter?

(A.2) *To avoid overheating the PZT, and to avoid complex compensation and dampening circuitry, we recommend that the filter be driven at less than 300 Hz if using the complete voltage range (0 – 50 volts). A higher drive frequency can be utilized if the drive voltage is reduced.*

(Q.3) *How do I eliminate optical instabilities due to reflections from the FFP-TF?*

(A.3) *Place an optical isolator between the laser and the FFP-TF to avoid reflection instabilities in the light source. Recall that all out-of-band (non resonant) energy is reflected back to the source and can damage a laser if not properly isolated. An isolator may also be required after the filter to eliminate down-stream reflection.*

(Q.4) *How much optical power can the FFP-TF2 handle without damage?*

(A.4) *Our Finesse-200 filters have been tested to 200 mW (23 dBm) in band of average power without any damage to the optical coatings. Since the damage threshold scales inversely with finesse rating of the filter; the lower finesse filters can withstand higher optical power.*

For more information on this or any other Micron Optics product, please contact us at:

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