



## FW-2000 Motorized Filter Wheel Operating Instructions



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## Introduction

The FW-2000 is an automated or manually controlled motorized filter wheel that can introduce any one of eight 25.4 mm filters or transmissive windows in series with an optical path. Applications include photography, fluorescence microscopy, and photometry.

The 104 mm filter wheels are easily interchangeable and can accommodate filter/window thicknesses from 1 to 8 millimeters. The clear aperture diameter is 23 mm. The aperture may be rotated continuously through 360 degrees about the motor axis in order to provide the user maximum flexibility in a given optical setup.

The unit may be controlled locally by means of two push buttons (CW, CCW) or remotely by means of the unit's USB 2.0 interface. The current position of the wheel is indicated by a seven segment LED display. Windows™ compatible application software is provided that allows the user to determine status, command selection of any filter and also program a filter sequence to be followed with selectable dwell times.

The unit has numerous provisions for mounting. It may be mounted to a standard optical bench with the base provided or it may be post-mounted using a number of standard threaded posts (8-32, M-3, 1/4-20 or M6).

Operating power is supplied by a wall mount supply that automatically accommodates line voltages of 95 to 260 VAC, 50-60 Hz. Four mains adaptors are supplied to accommodate North American, Continental Europe, British and Australian standards.

## Unpacking Unit

Prior to shipment this instrument was inspected and found to be free of mechanical and electrical defects. Upon acceptance by the carrier he assumes responsibility for its safe arrival. After unpacking, examine the unit for any evidence of shipping damage. Should you receive this instrument in a damaged condition, apparent or concealed, it must be noted on the freight bill or express receipt and signed by the carrier's agent. Failure to do so could result in the carrier refusing to honor the claim. Upon filing a claim TTI should be notified.

## Powering the Unit

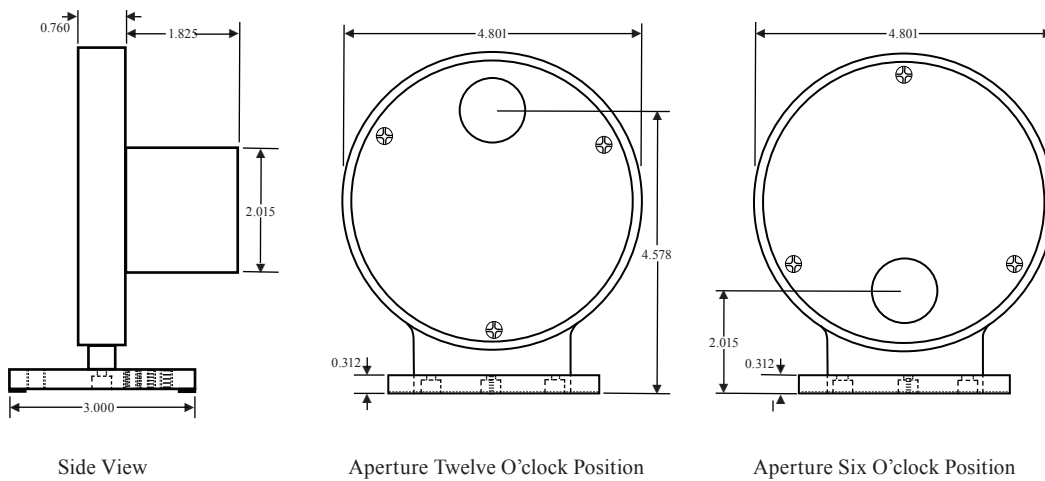
The FW-2000 is equipped with a universal 9 volt regulated power supply that operates from 95 to 260 VAC, 50-60 Hz. Each unit is supplied with four interchangeable power plugs that equip the unit for use in North America, Europe, Great Britain or Australia. Simply snap on the appropriate mains connector and plug the 2.1 mm coaxial plug into the receptacle located in the lower center of the back panel and plug the power supply into a power outlet. The unit will then turn the wheel slowly to locate its home position and then go to the last position it was in when power was last removed. At this time the display will turn on.

## FW-2000 Specifications

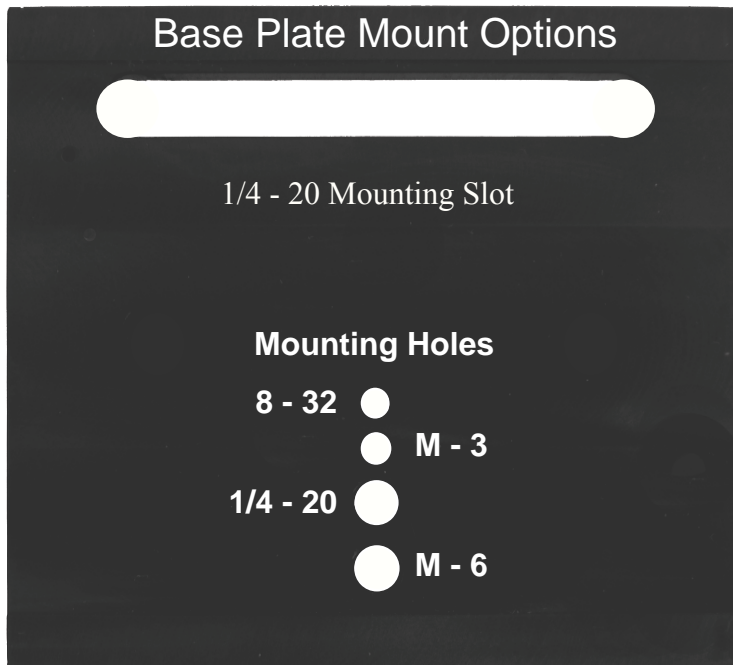
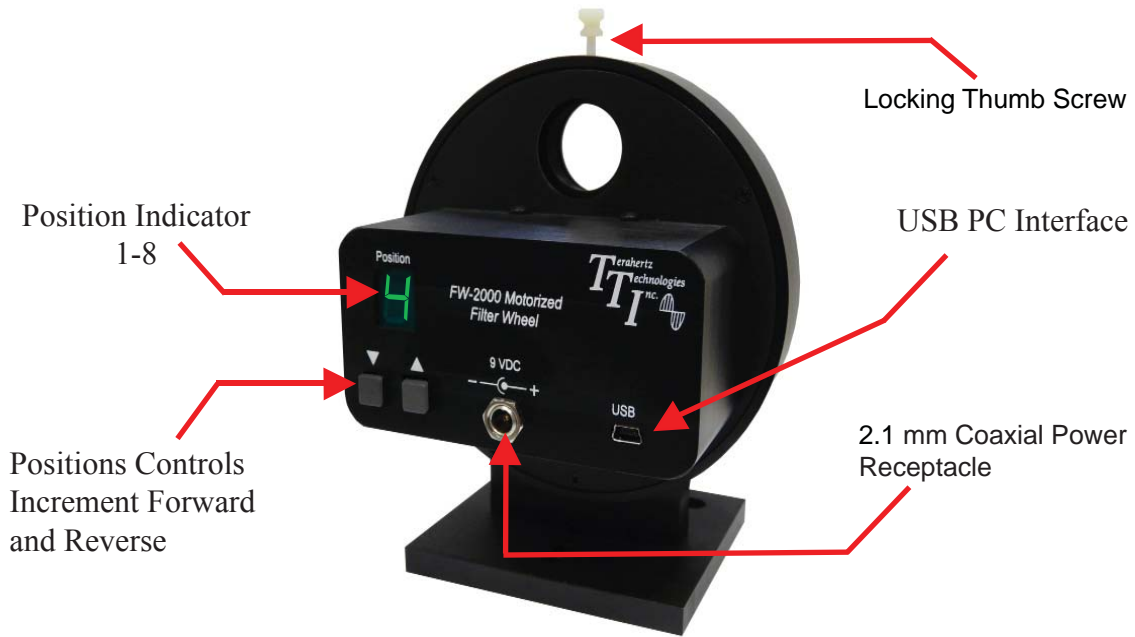
Filter Accepted	Up to eight 1" Dia. windows or filters
Filter Settling Time	< 0.25 sec. to adjacent location, <0.62 sec. to move 4 locations
Aperture Placement	May be rotated 360° about the units axis, may be as close as 42 mm above mounting surface
Display and Controls	7 segment green LED display of position, CW and CCW buttons
Computer Interface	USB 2.0
Power Requirements	<10vA, 95-260VAC, 50-60Hz
Mounting	Thru hole plate for optical bench plus 1/4-20, 8-32, M4 and M6 threaded holes
Mains Connectors Supplied	North America, Continental Europe, Great Britain and Australia
Dimensions (mm)	4.8" Dia., 5.5"H, wheel house 0.75" thick
Weight	1.5 lbs.
Operating Temperature Range	0-40C
Accessories Supplied	USB Cable, wall mount power supply, 8 retaining rings, manual and application software

*TTI reserves the right to change specifications without notice*

## Schematic Diagram



# Physical Characteristics



# Filter Wheel/Filter Window Replacement

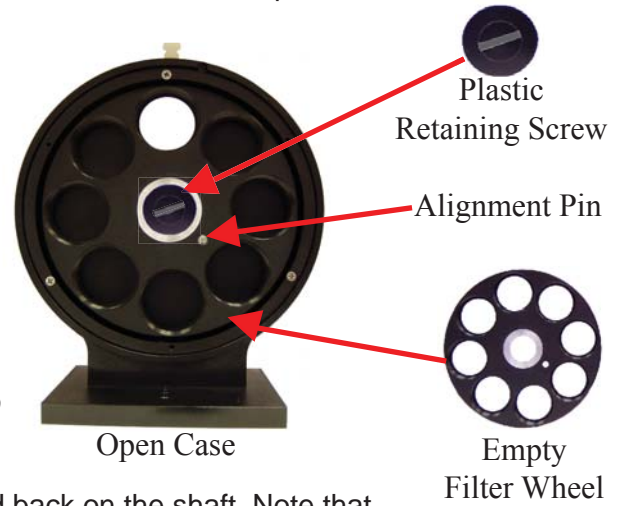


1. Remove the three 2-56 flat head Phillips screws from the front panel.
2. Remove plastic retaining screw may be removed by means of a suitable coin or flat blade screwdriver.
3. Pull the wheel straight off of the shaft.

*Located in each window of the wheel is a threaded retaining ring that holds the filter or window securely in the wheel. There are two slots on the ring to allow tightening of the ring against the filter.*

4. Remove retaining ring and place filter or window into receptacle. Replace retaining ring and use screwdriver or tweezers to tighten. DO NOT OVER TIGHTEN as windows are fragile.

5. Once the filter wheel has been filled the wheel may be placed back on the shaft. Note that there is a guide pin on the hub that fits into a hole in the filter holder. Make sure that these are properly aligned. Replace the plastic retaining screw and cover. The unit is now ready for use.



## Operating Considerations

### Rotating the Aperture

There is a white nylon thumb screw at the top of the unit that serves to lock the filter wheel assembly to the mounting ring. Loosen this thumbscrew and the entire filter wheel assembly may be freely rotated throughout 360 degrees about the motor axis. Set the aperture to the desired position by grasping the rear electronics housing and rotating it. Lock the thumbscrew lightly when this is accomplished.

### Manual Control

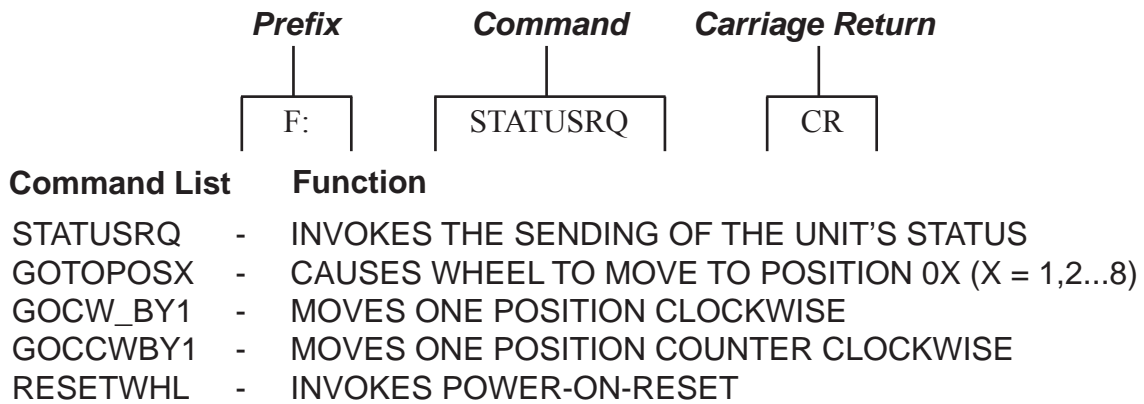
There are two push buttons on the back panel. The button below the UP arrow causes the wheel to move one position CCW as viewed from the front and will increment the display setting. Similarly the button under the DOWN arrow will cause the wheel to move one step CW as viewed from the front and will decrement the display by one. The current position of the wheel is indicated by a seven segment LED Display.



# Software Operation

Using the USB Interface - The filter wheel may be controlled by an external computer and its status may be determined as well. The Mini-B USB peripheral connector at the back of the unit may be connected to the controlling computer by means of the USB cable provided with the unit.

The computer will address the filter wheel as if it were using a "COM Port". Using a communications program (such as Windows Hyperterminal), set the appropriate communications parameters. The protocol is 9600 N 8 1, i.e. Baud Rate of 9600 Baud, no parity bit, 8 data bits, and one stop bit. The command structure is as follows: e.g.



CR is Carriage Return, hex 0D, or Enter on a PC keyboard. The significance of the characters is as shown above. A correct command will be met with the response: "OK".

An incorrect command will be met with the response: "Invalid Command".

The free Windows compatible software supplied with each unit has a control program that allows the user to design a sequence of filter selections and set the dwell time of each filter. The sequence can be repeated indefinitely or it may be set to execute the sequence a single time and stop.

## **Repair Information**

Products manufactured by Terahertz Technologies Inc. are designed and fabricated to provide reliable performance. However, in the event that service is required, both telephone technical assistance and factory repair services are available. Call (315) 736-3642 for information.

For IN-WARRANTY REPAIRS, call us to obtain a Returned Material Authorization number, (RMA Number). All products are to be returned to TTI with freight charges pre-paid. Those products sent under warranty will be returned to our customers pre-paid. We cannot be responsible for returned products that do not reference the TTI RMA number.

For OUT-OF-WARRANTY repairs, services are billable for both time and materials.

### ***LIMITED WARRANTY***

**TERAHERTZ TECHNOLOGIES INC. ( TTI ) WARRANTS THAT TO THE FIRST PURCHASER, FOR A PERIOD OF TWO YEARS FROM THE DATE OF RECEIPT, THAT THIS PRODUCT (THE PRODUCT) WILL BE FREE FROM DEFECTS IN MATERIALS AND MANUFACTURING. THE FOREGOING WARRANTY IS THE ONLY WARRANTY, EXPRESS OR IMPLIED, GIVEN BY TTI, I.E., THERE IS NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. TTI HEREBY DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY OTHER THAN THE WARRANTY IN THE FIRST SENTENCE TO THE FULLEST EXTENT PERMITTED BY LAW.**

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