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Operating Instructions
Acton Research Corporation
FA-2448 SIX POSITION Filter Wheel



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I. Description

The FA-2448 is a series of filter wheel assemblies which are available with and without installed order sorting filters and with and without remote position control. This manual covers the following models:

FA-2448	Six position filter wheel. Manual sample indexing or operation with SP-2000 series monochromators. Holds 6 samples or filters, each 1 inch diameter. Does not include filters.
FA-2448-1	Order sorting filter assembly. Manual sample indexing or operation with SP-2000 series monochromators. 320nm, 590nm, 665nm, and 715nm order sorting filters mounted in the FA-2448 filter wheel assembly.
FA-2448-2	Motorized six position filter wheel with stepping motor and FA-2448-4 controller. Enables computer controlled filter indexing through RS-232 and USB ports. Does not include filters. Requires computer or terminal with RS-232 or USB port for external control.
FA-2448-3	Motorized order sorting filter assembly. Same as FA-2448-2, except with order sorting filters installed.
FA-2448-4	Controller retrofit unit. For use with FA-2448 and FA-2448-1 manual filter assemblies to allow computer control through USB or RS-232.

* Positions of order sorting filters in FA-2448-1 and FA-2448-3:

- Position 1: Open
- Position 2: 320nm cut-off filter
- Position 3: 590nm cut-off filter
- Position 4: 665nm cut-off filter
- Position 5: 715nm cut-off filter

II. FA-2448 Series Filter Assembly Specifications

- Six position wheel
- One inch (1" ± 0.005) diameter filters, maximum thickness = 0.200"

Controller specifications:

- Control from computer or terminal through USB or RS-232 port at 9600 baud, no parity, 8 data bits, 1 stop bit and 1 start bit.
- Time required for filter change = 2.5 seconds for adjacent filter positions.

III. Installation

A. Mounting to Monochromator

The filter assembly is 3/4 of an inch thick. Therefore, if using a light source that is designed to mount directly on the entrance slit housing and to focus the light on the entrance slit, it is recommended that the filter assembly be mounted on the exit slit housing. If it is necessary to install or change filters, do so before mounting the filter wheel to the SpectraPro (refer to step C).

The filter assembly is designed to mount directly to the SpectraPro slit housings or to be mounted between the light source or detector and the slit housing. The filter assembly is attached to the slit housing with three screws. The fourth screw is not used with the filter assembly. Assure that the (3) 8-32 mounting screws extend approximately 0.25 inch (6mm) beyond the filter assembly housing. Orient the filter assembly so that the aperture slot is vertical and the motor is away from the instrument housing. Mount the filter assembly or light source/detector to the desired slit housing with (3) 8-32 screws.

B. Connecting Control Unit

A power supply is provided with each control unit which must be connected to 100-250 VAC and the control unit. Attach the supplied 15 pin connector cable to the control unit and the filter wheel assembly. For computer operation of the filter assemblies, each control unit must be connected to separate RS-232 ports of a computer or terminal or a computer USB port or hub. Acton Research Corporation offers the following connecting cables:

CC-499-2	Cable for IBM-PC/AT or compatible computer, 9 pin female connector to 9 pin male connector	(standard)
3650-USB-06	USB cable Type A to Type B	(optional)

If none of the above cable assemblies are compatible with your computer or terminal, contact Acton Research Corporation for a custom cable or one may be constructed using a standard DE-9P connector at the filter controller end with the following connections:

pin #	description
1	open
2	RD received data to the computer
3	TD transmitted data from the computer
4	open
5	ground
6	open
7	open
8	open
9	open



POWER	Power connection +5 and +24 Volts
USB HUB	USB Hub 1.1 compatible.
USB	USB connection to computer.
RS-232	RS-232 connection to computer.
READY	Ready light is on when power is on. (Light comes on after the Filter Wheel initializes.)
COM	Com light flashes when communicating with the computer.
FILTER	Filter driver connection for ARC FA-2448 Filter Wheel.

C. Installing and Changing Filters

To install or remove filters or samples, the following procedure is recommended:

- 1) If the filter assembly is mounted to the SpectraPro, remove it and disconnect the cable, if attached.
- 2) Place the filter assembly on a clean surface with the motor down. Refer to Figure 1.
- 3) Using the 1/16" allen wrench supplied, remove the eight screws securing the cover plate to the filter assembly (refer to Figure 1). While pushing on the end of the shaft with a pencil, carefully remove the cover plate by lifting straight off the shaft. Caution: A spacer is located on the filter wheel shaft between the filter wheel and cover. If this spacer comes off with the cover, place it back onto the shaft. Refer to Figure 2.
- 4) The six filter positions are now visible, refer to Figure 2. The filters are held in with split rings. Determine the filters to be removed or the location for the filters to be installed. The filter positions are marked 1 thru 6 on the wheel. Remove the split rings. Remove or install filters as required. Replace the split ring assuring it is pushed firmly against the filters.
- 5) Assure that the spacer is on the filter wheel shaft and attach the cover plate with the eight screws. The filter assembly is now ready for mounting to the SpectraPro.

IV. Operation

A. Operation from Controller Unit

Connect the motor drive cable from the filter wheel to the filter wheel controller. Connect the controller to the power supply and the power supply to an AC line of the voltage listed on the back of the power supply. Assure the detent screw is backed away from the filter wheel when using motor control. (The filter positions of each filter wheel can be controlled manually using the knob on the filter wheel motor when the detent screw engages the filter wheel.)

B. Operation with RS-232 or USB

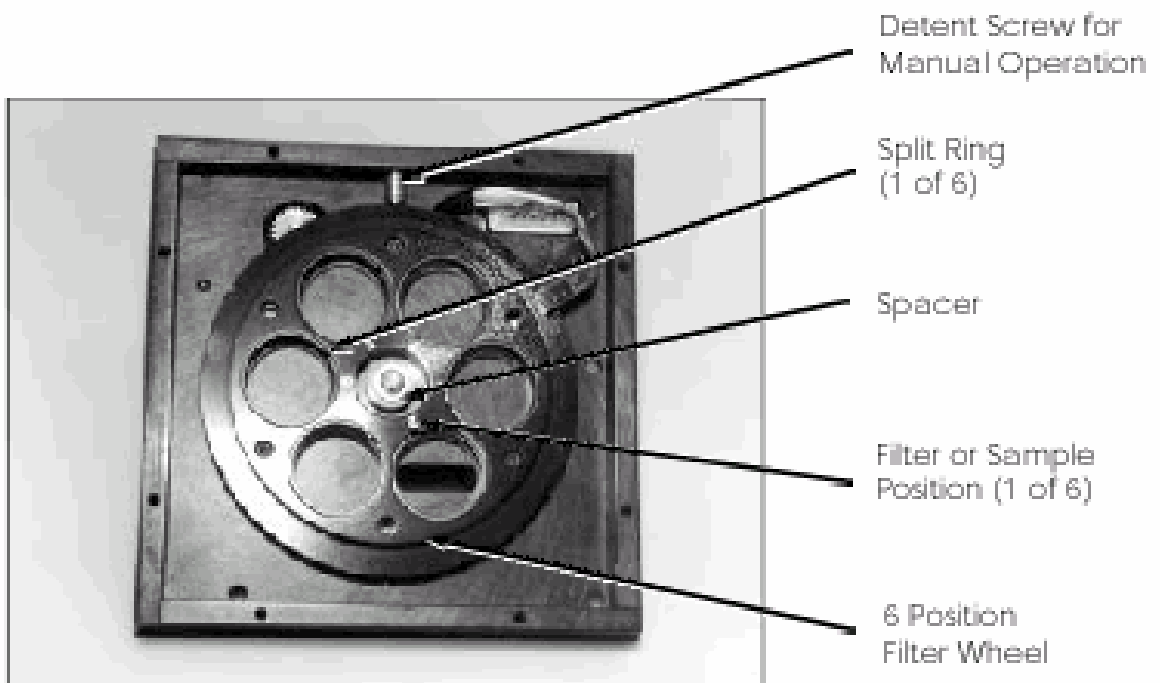
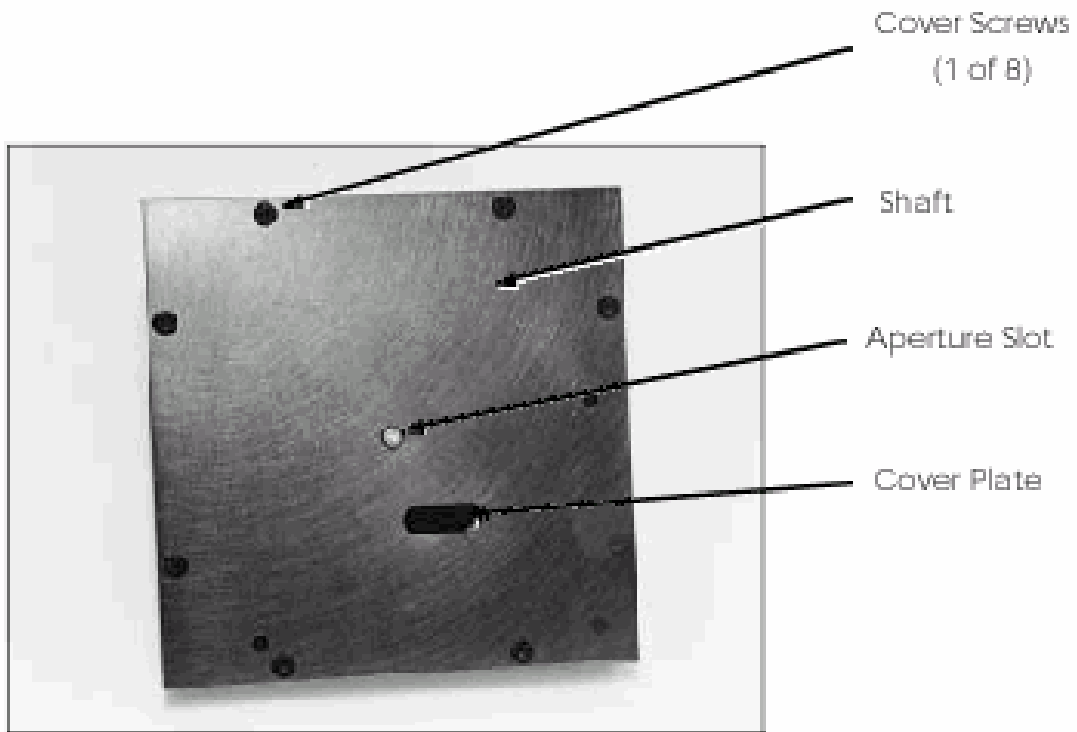
Connect the controller to a computer with either the RS-232 output or the USB output. See section III-B for cable installation instructions. Windows compatible filter control software is provided on the enclosed CD.

For RS-232 operation, the port set-up is 9600 baud, 8 data bits, 1 stop bit and no parity. All commands or strings of commands must be terminated with a carriage return (0D hex). The control unit responds to a command when the command has been completed by returning the characters **OK** followed by a carriage return and line feed (hex ASCII sequence 20 6F 0D 0A). The default condition is to echo each character that is sent to the control unit. If no echo is desired, the command NO-ECHO will suppress the echo. The command ECHO will return the controller to the default echo state.

The filter wheel with controller responds to commands from the computer or terminal in the form of ASCII strings. The following commands are used for controlling the filter position:

FILTER	Controls the filter position and is used as follows: 3 FILTER <enter> sets filter wheel to position 3. Filter positions 1 - 6 may be selected. Note that there must be a space after the number and the command must be terminated with the enter or carriage return key. The filter will go to the specified position in the direction which requires the shortest move.
?FILTER	Returns the current filter position. Typing ?FILTER <enter> will cause the current filter position to be returned to the computer and displayed.
FHOME	Initializes the filter wheel to the first filter position. This command is automatically executed at power-up. The filter wheel controller keeps track of filter position as long as power is applied. It should not be necessary to execute this command under normal circumstances, although it is available if desired. This command follows the same format as in FILTER above for entry and response.

V. Figures



VI. Appendix A: Connector Wiring

Filter Wheel Drive Cable

J1 Filter Wheel

Pin #	
1	Motor phase 1A
2	Motor phase 1C
3	Motor phase 1B
4	open
5	Motor phase 2A
6	Motor phase 2C
7	Motor phase 2B
8	open
9	open
10	Interrupter module OUT
11	Interrupter module GND
12	Interrupter module LED cathode
13	Interrupter module LED anode
14	Interrupter module +5vdc
15	Shield

NOTES:

The filter connector type is D-15S. The controller connector type is HD-15P.

2. Pins 8 and 13 are connected inside the controller connector housing.

3. Cable is 24 AWG with overall shield.

VII. Warranty

Certification

Acton Research Corporation (ARC) certifies that this instrument was thoroughly tested and inspected and found to meet the specifications furnished by ARC when it was shipped from the factory.

Warranty

Acton Research Corporation (ARC) instruments and accessories are warranted for a period of one full year from date of delivery to be free from defects in material and workmanship and to conform to the specifications furnished by ARC. The corporation's obligation under this warranty is limited to servicing or adjusting an instrument returned to the factory, prepaid, and to repairing or replacing at the factory any part or parts thereof. All purchased items carry the original manufacturer's guarantee.

Acton Research Corporation shall not be liable for consequential damages resulting from accident, alteration, misuse, improper installation, operation on low or excessive voltages or any use in violation of the operating instructions furnished by ARC.

If any defect appears within the warranty period, the purchaser shall promptly notify ARC. No material will be accepted for repair or replacement without prior authorization from ARC. Upon such authorization and in accordance with instructions of Acton Research Corporation, parts, materials or equipment for which repair or replacement is requested shall be returned to ARC for examination, with shipping charges prepaid by the purchaser. Final determination as to whether a product or part is actually defective rests with Acton Research Corporation.

In such cases where necessary repairs are not covered by this warranty, an estimate of repair charges will be submitted to the purchaser before servicing the equipment.

Acton Research Corporation reserves the right to make changes or improvements upon its products without imposing any obligations upon itself to install the same upon its products previously manufactured.

This warranty is expressly in lieu of all other obligations or liabilities on the part of ARC, and ARC neither assumes, nor authorizes any other person to assume for them, other obligations or liability in connection with the sale of equipment manufactured by Acton Research Corporation.