

74041-M

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MOTORIZED FILTER WHEEL SYSTEM MODEL 74041

Please read these instructions completely before operating this equipment. If there are any questions or problems regarding the use of this equipment, please contact: ORIEL INSTRUMENTS - or - the representative from whom this equipment was purchased.

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I. INTRODUCTION TO THIS INSTRUMENT

The 74041 is a 6 position motorized filter wheel system. The wheel holds up to six 1.0 inch (25.4 mm) diameter filters or other optical components. The filter wheel can be controlled remotely, by a PC using either IEEE-488 (GPIB) or RS-232 interfaces, or manually, via the control box front panel.

II. UNPACKING AND SETTING UP

Carefully unpack the Motorized Filter Wheel System. You should save the packaging in case you need to transport or ship the instrument.

Inside the package you should find the following:

1. Motorized Filter Wheel Head
2. Control Box
3. 8 ft (2.4 m) long cable to connect the two components
4. Utility Software CD
5. Power cord appropriate for your country
6. 6 filter holders
7. Filter wrench
8. Light blocking element
9. This instruction manual

III. GETTING STARTED

III-1. CONFIGURING THE FILTER WHEEL

You may operate the Motorized Filter Wheel System manually, via the control box front panel, or remotely from a PC. We describe both methods of operation, but first cover filter insertion.

Inserting Filters

1. Assemble the following:
 1. Filter Wheel Head
 2. The 6 filter holders
 3. Filter wrench
 4. Your optical components (and the light blocking element, if you intend to use it)
 5. A pen and paper
2. Mount your optical components into the individual filter holders, making note of which optic is in which filter holder. To mount the optic, use the special filter wrench to unscrew the retaining ring from the back of the filter holder, insert the optic and screw the retaining ring so the optic is held firmly in place.
3. Once all the optical components are mounted in their holders, remove the top cover from the filter wheel head by unscrewing the two thumbscrews on the ends of the cover (use the middle thumbscrew as a handle). Place top cover and thumbscrews aside.
4. The wheel inside the Filter Wheel Head has six slots to receive the mounted optical components. The wheel can be manually rotated; position it so a slot is facing the opened top, and "snap" your first mounted optical element into the slot. You will hear a snap. This indicates the optical element is firmly in place.
5. Jot down the optical element that is in this position. The position number is engraved on the edge of the wheel.
6. Repeat steps 4 and 5 for the other five optical components.
7. Store your paper with the positions of each optical component in a safe but accessible location near the Filter Wheel System.
8. Replace the top cover of the Filter Wheel Head and screw it down. You are now ready to operate the Filter Wheel System. Even if you are going to operate the system remotely, we recommend that you first test it manually, following the procedure described in Section IIIc.

Mounting Filter Wheel Head

You can mount the Filter Wheel Head one of two ways: directly to an Oriel component (i.e. light source or monochromator) via the male or female 1.5 Inch Series flange, or to an optical rod.

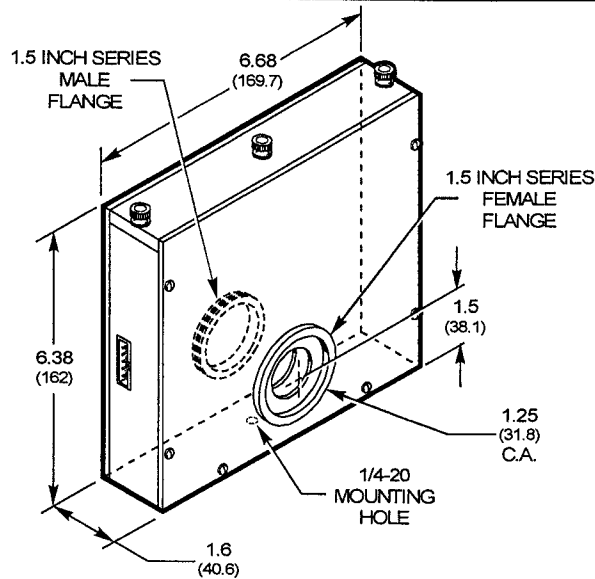


Fig. 1 Dimensional diagram of 74041 Filter Wheel Head.

Flange Mounting

Fig. 1 shows a diagram of the Filter Wheel Head. One side has a 1.5 Inch Series Female flange, the other side has a 1.5 Inch Series male flange. You can mount the wheel directly to an Oriel instrument or component via one of the flanges. To flange mount the Filter Wheel Head:

1. Identify the flange of the Oriel component/instrument to which you will mate the Filter Wheel.
2. If you are using the Filter Wheel Head's female flange, loosen the set screws on this flange. If you are using the Filter Wheel Head's male flange, loosen the set screws on the mating component's female flange.
3. Fit the flanges of the two components together and tighten the set screws.

Rod Mounting

Rod mounting lets you place the Filter Wheel Head almost anywhere on an optical table with 1/4-20 hole pattern. To rod mount the Filter Wheel Head:

1. Turn the Filter Wheel Head upside-down, and remove the center set screw on the bottom plate (refer to Fig. 1).
2. Attach a 1/4-20 optical rod and insert the rod mounted Filter Wheel Head into a rod holder which should already be secured to your optical table or baseplate.

III-2. MANUAL OPERATION OF THE 74041 FILTER WHEEL SYSTEM

1. Make certain the Filter Wheel power switch is off (switch is located on back panel of control box); connect the 12-pin cable between the Filter Wheel Head and the Control Box.
2. Plug the female end of the power cord into the receptacle marked AC Input on the back of the control box, and the male end into your wall outlet.
NOTE: the 74041 power supply is "universal input" so that mains voltage selection is not required
3. Turn the control box on; the filter wheel will automatically go to the last position before power off; the position will be displayed on the LED.
4. Depress the "FORWARD" button to advance the filter wheel to the next position. One depression of the "FORWARD" button advances the filter wheel by one position. NOTE: You cannot operate the Filter Wheel in the reverse direction from the panel. To go down a position, you must rotate the wheel in the forward direction until you reach your desired position. The current filter position is always displayed by the LED. If the wheel is in-between positions when turned on (this can occur when you insert or remove optical components), the wheel will go to Position 1 when the "FORWARD" button is pushed.

III-3. SETTING UP FOR COMPUTER OPERATION OF THE 74041 FILTER WHEEL SYSTEM

1. Make certain the Filter Wheel power switch is off (switch is located on back panel of control box); connect the 12-pin cable between the Filter Wheel Head and the Control Box.
2. Connect the remote device, a PC via IEEE-488 or RS-232 or the Oriel 74009 hand controller, to the appropriate connector on the 74041 rear panel.
3. Plug the female end of the power cord into the power cord receptacle, and the male end into your wall outlet.
NOTE: the 74041 power supply is "universal input" so that mains voltage selection is not required
4. Turn the control box on; the filter wheel will automatically go to the last position before power off; the position will be displayed on the LED.
5. Refer to the sections III-4 and III-5 for details on operation. The controller LED will display the wheel position.

III-4. GETTING STARTED WITH IEEE-488 COMMUNICATIONS

IEEE-488 communication (also called GPIB) offers the greatest versatility for integrating your 74041 Filter Wheel into a larger system since you may connect up to 30 different devices to the same controller card. However, this versatility brings with it some complication in setting up each device.

Oriel designs all of its IEEE-488 products to be completely compatible with National Instruments' GPIB controller cards. Likewise, most of our IEEE-488 software requires National Instruments' device drivers to run on your PC. We strongly recommend National Instruments' controller cards. Since there are differences between IEEE-488 implementations among the various manufactures, we cannot support them all. Therefore, Oriel will only provide communication and software support for IEEE-488 systems that use National Instruments controller cards.

NOTE: At power on, after a two second startup delay the filter wheel will be re-homed to position 1 then repositioned to wherever the controller position was set to at power down. The 74041 determines whether it communicates via RS232 or IEEE-488 by whichever port receives the first command after power on. It cannot switch ports until it is powered down and up again.

Physical Connections

First, install your National Instruments control card and software in your PC computer. Run their diagnostic tools to make sure the card is working properly.

Next, be sure the 74041 power switch is off, then attach your IEEE-488 cable to the appropriate connector on the back panel. Attach the other end to the National Instruments' control card and secure the screws on both sides. Now turn on the 74041. In order to limit possible address conflicts, we recommend that you turn off all other IEEE-488 instruments while checking your 74041 for the first time. Note: the 74041 default GPIB primary address is 4.

Verify Communications

Check your IEEE-488 communications by running the Filter Wheel Utility Software application. The software installation and operating instructions are in section V.

If you cannot get a response from your 74041 130 at this point you may have a connection problem. Check all the cables (including the line cord), make sure the 74041 is turned on, and make sure the Hand Controller is off. PLEASE NOTE: if the Hand Controller is active (the display is lit and information fills the screen), you cannot command the 74041 via either RS-232 or IEEE-488. Press the LOCAL key on the Hand Controller to deactivate it, allowing PC communications.

PLEASE ALSO NOTE: The 74041 selects either RS-232 or IEEE-488 communications based upon the first command received after power up. When you send an IEEE-488 command, or initialize your IEEE-488 software, the RS-232 link will be ignored until 74041 power is turned off and on again.

Low Level Communications

The 74041 Utility Program is a LabVIEW application built on National Instruments' IEEE-488 device drivers. In some cases, it may be desirable to send commands directly to the 74041 through the National Instruments Interactive Control or through another simple interface. To establish low level communications with 74041 you will have to first open the device. Using the National Instruments' drivers the correct command is: `ibdev 0 4 0 13 0 0x140a`
The timeout code "13" allows 30 seconds to read responses back from 74041. In most cases 300 msec is sufficient (timeout code 10), however, the longer period guarantees success on all commands. The end of string code "0x140a" terminates a read when the linefeed character is received from the instrument. All 74041 responses end with carriage return and linefeed. Likewise, all messages sent to 74041 must end with the linefeed character.

Refer to the detailed discussion of section IV. FUNCTIONS AND CONTROLS for further information on direct low level communications, message syntax, and parameters.

III-5. GETTING STARTED WITH RS-232 COMMUNICATIONS

RS-232 connections are a simple means of communicating between your PC and your instruments. However, you are limited in that each instrument must have its own dedicated communication port at the computer. Most PC's come standard with COM1 and COM2, although COM1 is occasionally used by a serial mouse. Additional communication port hardware can be added and the corresponding drivers must be added to your Windows™ software. Please review your computer setup to determine what physical connections are available to you. Again, due to the variety of hardware and software options that are available Oriel cannot provide support for PC configuration.

NOTE: At power on, after a two second startup delay the filter wheel will be re-homed to position 1 then repositioned to wherever the controller position was set to at power down. The 74041 determines whether it communicates via RS232 or IEEE-488 by whichever port receives the first command after power on. It cannot switch ports until it is powered down and up again.

Physical Connections

First, make sure that the COM port you would like to use for 74041 is recognized by Windows™ and is working properly.

Next, be sure the 74041 power switch is off, then attach your RS-232 cable to the appropriate connector on the back panel. Attach the other end to the COM port connection on your PC. Note that RS-232 cables come in two types: modem and null-modem. The modem cable is a pin-to-pin cable. That is, each pin at one end connects directly to the corresponding pin at the other end: 1 to 1, 2 to 2, 3 to 3, etc. The modem cable is the correct cable for communicating with 74041.

Now turn on the 74041. You are ready to communicate with the instrument. The hardware communication parameters, including baud rate, are fixed inside 74041, so setup your COM port as follows:

Baud Rate:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None

Verify Communications

Check your RS-232 communications by running the Filter Wheel Utility Software application. The software installation and operating instructions are in section V.

If you cannot any response from your 74041 130 at this point you may have a connection problem. Check all the cables (including the line cord), make sure the 74041 is turned on, and make sure the Hand Controller is off. PLEASE NOTE: if the Hand Controller is active (the display is lit and information fills the screen), you cannot command the 74041 via either RS-232 or IEEE-488. Press the LOCAL key on the Hand Controller to deactivate it, allowing PC communications. PLEASE ALSO NOTE: 74041 selects either RS-232 or IEEE-488 communications based upon the first command received after power up. When you send an RS-232 command, or initialize your RS-232 software, the IEEE-488 link will be ignored until 74041 power is turned off and on again.

Low Level Communications

The 74041 Utility Program LabVIEW™ application. In some cases, it may be desirable to send commands directly to 74041 through a terminal emulation program, such as the HyperTerminal™ provided with Windows™. Once your terminal program is open and running you will have to first select a COM port and configure it according to the parameters listed on the previous page of this manual (9600, 8, N, 1, None). Additionally, you should set the terminal to "Send line ends with line feeds". There is no reason to turn on the local echo since 74041 will automatically echo each character as it is typed. All 74041 responses end with carriage return and linefeed. Likewise, all messages sent to 74041 must end with the linefeed character.

Again, refer to the detailed discussion of section IV. FUNCTIONS AND CONTROLS for further information on direct low level communications, message syntax, and parameters.

III-6. THE ORIEL MODEL 74009 HAND CONTROLLER

The 74009 Hand Controller is intended for use with the Oriel series 74000 monochromators, but, if it is available, it is a fast and easy way to begin immediate communications with the 74041.

Physical Connections

Please note: None of the 74041 accessories are designed to be connected or disconnected with power on. Always turn off the instrument using the power switch on the back panel before you connect or remove the filter wheel or any communications cable (including the Hand Controller).

To get started with 74009 Hand Controller, simply connect the black communications cable by snapping the RJ-11 connector into the receptacle on top of the controller and snapping the other end into the matching connector on the back panel of your 74041.

Activating the Hand Controller

With the Hand Controller connected, turn on power to the 74041. You will see a horizontal cursor in the upper left corner of the display. Press the LOCAL key to activate communications through the Hand Controller. Please note that if the Hand Controller is active (the display is lit and information fills the screen), you cannot command the 74041 via either RS-232 or IEEE-488. Press the LOCAL key again to deactivate the Hand Controller, allowing PC communications.

Yellow "Shifted" Keys

Some keys are divided into top and bottom halves. The function for the yellow top half is called a "shifted" function. To activate these commands press the SHIFT key in the bottom left corner and then press the function key.

Entering Parameters- the Numeric Keypad

Many of the 74041 commands require a numeric parameter. First press the function key for your command. The bottom line of the LCD display will then show an abbreviated form of the command and the current parameter. There is no need to erase this number, simply typing the first key for your desired parameter will overwrite the current value. To execute the command press the ENTER key in the bottom right corner.

While entering parameters, if you mistype one digit press SHIFT and then DEL (above the decimal point in the numeric keypad); this will move backward one display position and delete that character.

Key Reference (From top of the controller to the bottom, left to right)

ABORT- If you accidentally press a function key or enter a bad parameter you may press the ABORT key to clear that command before it executes. The ABORT key has no effect on most functions once the command is executed (by pressing ENTER). However, wavelength motion will stop immediately upon ABORT and the display will update to show the wavelength where motion was halted.

FILTER- Move the 74010 Filter Wheel accessory to the specified position. Press FILTER, then type the number 1, 2, 3, 4, 5, or 6 indicating the desired position, then finally press ENTER to execute the move.

SHIFT LABEL- This key (located directly above FILTER) provides access to the filter label. These labels are eight character alpha-numeric fields, used for information only. You can use the keypad to type any number, then press ENTER to accept that new value. The Hand Controller display only shows the first four digits of the label, and you can only enter numbers.

LOCAL- Use this key to toggle between "local" communications through the Hand Controller and "remote" communication with a computer. Please note that if you press LOCAL to activate the Hand Controller (the display is lit and information fills the screen), you also lock out PC communications. You cannot command the 74041 via either RS-232 or IEEE-488 while the Hand Controller is active.

IV. FUNCTIONS AND CONTROLS

IV-1. COMMAND AND QUERY SYNTAX

For the purposes of this discussion we will divide communications with the instrument into two parts. First, the messages that you send to 74041 will be called "Statements". Second, the messages that you receive from 74041 will be called "Responses". When communicating with 74041 you will use two types of Statements: "Commands" and "Queries". A Command causes some physical action or sets an internal parameter. Queries ask some question of the instrument and automatically return a Response. Fundamentally, the syntax is the same for all messages.

Termination

Both Statements and Responses end with a carriage return (ASCII character code 13 decimal) and linefeed (ASCII character code 10 decimal). This manual will show the termination as [cr][lf]. Please note, you may find it more convenient to end Statements with only the linefeed [lf]; this is also acceptable.

Capitalization

Statements may be sent in upper case, in lower case, or in any combination of the two. Responses will always be returned in upper case. For clarity throughout this manual, Statements will be shown in upper case (ie. STATEMENT) and Responses will be shown in upper case italics (ie. RESPONSE).

Parameters

Some Statements will require a parameter. In this manual numeric parameters will be shown as "XX"; each X will fill a numeric position and decimals are used to indicate where floating point number should be expected. Numeric notation is not strict and integers can be substituted for floating point numbers as desired. There are some specific cases where alpha-numeric values or exponential notation may be required; these special Statements will be detailed in the sections that follow.

IV-1-A. Standard mode

Most normal communication with 74041, especially communication handled inside closed application software, is done in Standard Mode. This mode follows all of the rules on the previous page plus there are some additional features for error handling.

74041 stores errors internally in a status byte and an error byte, where each bit has a specific meaning. This structure should be very familiar to programmers working with IEEE-488 communication since the 74041 status and error bytes are based on definitions in the 488.2 IEEE standard. Details of the status and error bytes can be found in this manual under section IV-4 ERROR CODES. For now, we will simply cover the syntax necessary to send Statements and receive Responses in this communication mode.

In all cases, Statements must be terminated properly with [lf] for 74041 to take any action. Statements that are not understood or parameters that are unacceptable will generate an error code in the status byte, ie. status byte 0. Moreover, the status byte must be explicitly read, it is not returned after general Statements. Correct Statements are handled as follows:

Commands

Under RS-232, Statements are echoed back to the PC. Thus, after sending a Command you should read back this echo. There is no further response to a Command.

For example: Send: FILER 2[lf] Response: FILER 2[lf]

Under IEEE-488, there is no echo. There is no automatic response to a Command.

For example: Send: FILTER 2[lf] Response: {none}

Queries

Under RS-232, Statements are echoed back to the PC. Additionally, there will be an explicit response to that query. Thus, after sending a Query you should read back the echo and the answer together.

For example: Send : FILTER?[lf] Response: FILTER?[lf]2[cr][lf]

Under IEEE-488, there is no echo. Thus, you can read back the Response by itself.

For example: Send : FILTER?[lf] Response: 2[cr][lf]

ABORT

[ABORT]

Simply stops any command in process.

{INFO?}

[LOCAL]

Query for basic instrument information. Generates the same response as the GPIB specific *IDN? That response is "Oriel Instruments, Model 74000 Cornerstone 130, SNXXX, VYY.YY.YY" where XXX is the unit's serial number and YY.YY.YY is the version number for internal firmware. This information is displayed for 3 seconds when [LOCAL] is pressed on the Hand Controller.

HANDSHAKE X

{HANDSHAKE?}

This command turns Handshake Mode on and off. Setting the parameter "X" to "1" causes 74041 to acknowledge command completion according to the description given in Section IV-1-B. HANDSHAKE MODE. Setting the parameter to "0" returns 74041 to normal operation according to the description given in Section IV-1-A STANDARD MODE. The response to the query HANDSHAKE? is the single integer describing the current mode, "0" or "1".

{STB?}

Use this query to check for 74041 error conditions. The response will be "32" when an error occurred or "00" when no error is present. Reading this code clears the status byte. Further information can be obtained using the ESR? query below. A detailed discussion of error handling is given in section IV-4.

{ESR?}

Use this query to check for 74041 error or power on events. The response will be "00" for no event. Reading this code clears the byte. A detailed discussion of error handling is given in section IV-4.

ADDRESS XX

Use this command to change the IEEE-488 primary address for 74041 if the default address (4) conflicts with another instrument in your laboratory. You should turn off the other instrument, establish communication with 74041, and send this command with the integer parameter from 1 to 30. If successful, the address change takes place immediately and any further communication using the old address will cause a IEEE-488 error. If unsuccessful an error will be reported in the Status byte.

IV-4. ERROR CODES WITH DESCRIPTIONS

74041 errors are stored internally in the Status byte and Error code. The Status byte is usually empty (decimal value 0) but if an error condition occurs, bit 6 of the Status byte will be set (decimal value 32). By checking this byte all error conditions can be checked at once. Further information is provided in the individual error codes. There is a detailed list of error codes later in this section. There are two ways to check for errors. First, you can explicitly query the Status Byte. This method is used for most communication and programming and is described in Section IV-1-A STANDARD MODE. Use the query "STB?" to get the decimal value of the Status Byte, either "00" or "32". The Event Status Register will have more information on the error and is read via the ESR? command. NOTE: Reading the Status Byte or the event status register resets them back to "0".

You can also check errors immediately in Handshake Mode. Turn this mode on with the command "HANDSHAKE 1[lf]". Handshaking causes 74041 to respond to every Statement with the Status byte. The exact syntax is discussed in Section IV-1-B HANDSHAKING MODE. Likewise, the Status is cleared after it is reported as the handshake.

Read Status Byte with STB?

Response: 00 indicates no error
 32 decimal ; 20 Hex / bit5 ; indicate an error condition

Read Event Status Register with ESR?

ESR Hex code/ bit	
80 / b7	The 74041 has been power on reset since last read
20 / b5	The 74041 has received an illegal command
10 / b4	The 74041 had a problem with the filter wheel, ("Filter?" command will return a 0 for device missing)

V. MOTORIZED FILTER WHEEL UTILITY SOFTWARE.

The Filter Wheel Utility Software is a program written in National Instruments LabVIEW language. To load and run the software you should have a Pentium based PC compatible computer, with 16MB of RAM, running Windows 95/98/NT, and CD-ROM drive. The program controls filter position via RS232 or GPIB.

1. Software installation

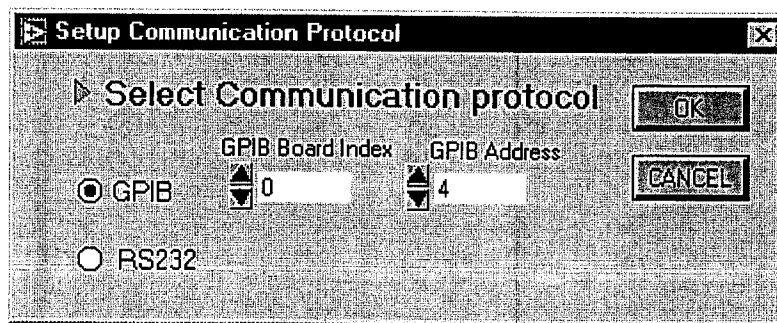
- Put the Utility Software CD-ROM into your computer drive
- Open the Control Panel window from Start/Settings menu and select the Add/Remove Programs icon.
- Click the 'Install' button.
- Continue installation by following instructions on the screen. The 'Run Installation Window' will have a text box named 'Command line for installation program' and 'Browse' button. If the text box doesn't point to the installation setup use browser to locate the Setup.exe on the CD-ROM. Click 'Finish' to proceed with installation process.
- The program icon is placed in Windows Start Menu under Programs: Filter Wheel. The executable file can be found in C:\ProgramFiles\Oriol Instruments\FILTER Wheel directory.

2. Running the program

Before you launch the program make sure the 6 Position Filter Wheel Controller is connected to your PC. For RS232 communication use COM port and for IEEE-488 connect the Filter Wheel Controller to the GPIB controller card.

2.1 Selecting communication type.

When program is started for the first time a 'Select communication protocol' dialog window will pop up. First select communication type by clicking one of the two radio buttons, and then set the COM port number (1 or 2) or GPIB address (4 default). Click 'OK' button to activate the communication.



Setup communication dialog window.

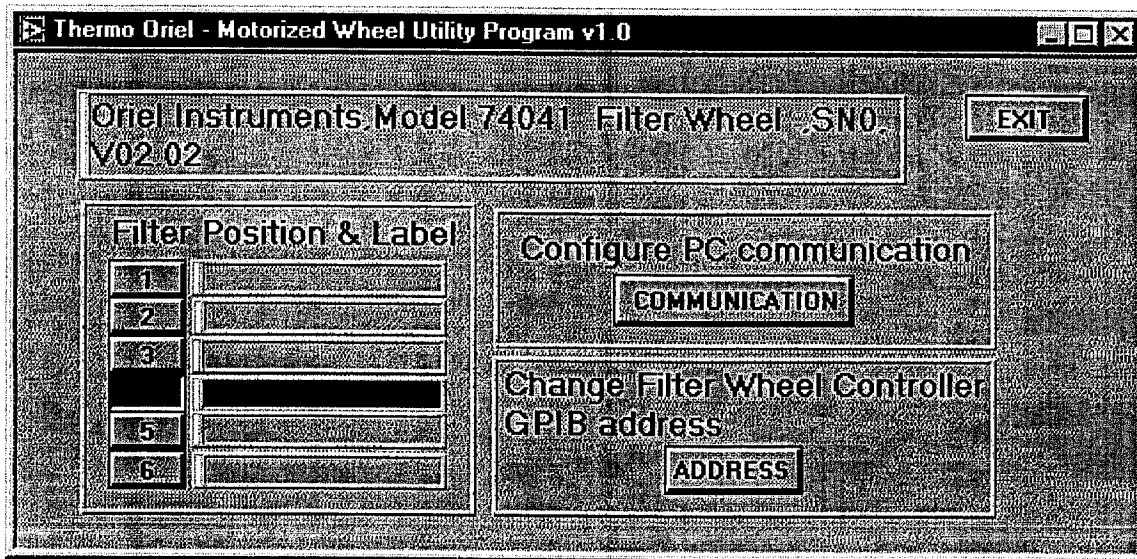
If you want to change communication type or communication settings click the COMMUNICATION button, provide physical connection, power and power up the Filter Wheel Controller when asked. The Setup Communication dialog will point to the current communication protocol. Change to the new setup and click OK or click CANCEL to return to previous setup.

PLEASE NOTE: The controller will always configure itself for the communication type based upon the first command received after power up.

If you receive message "Filter Wheel Communication Error!" try the following:

- power down and up the Filter Wheel Controller
- check the physical connection
- make sure the COM Port or GPIB address is correct.

2.2 Selecting filter position.

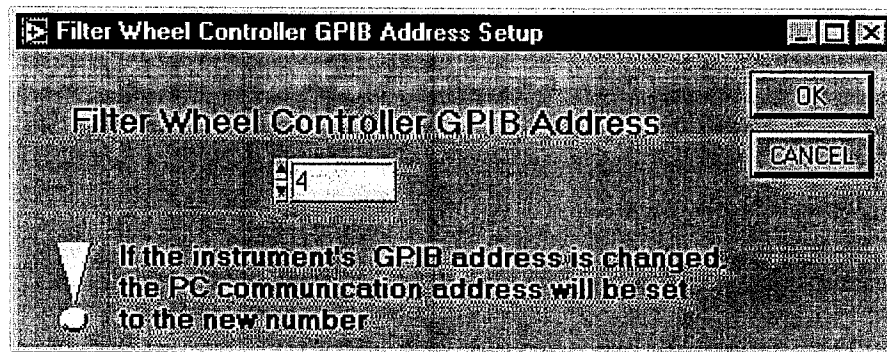


The Filter Wheel Controller utility software user interface.

To change the filter position click one of the 6 numbered buttons. The active filter position will be highlighted (green color). The program will also update filter position in response to the use of a hand controller or Filter Wheel controller front panel (manual control).

2.1 Changing Filter Wheel Controller GPIB address.

The default Filter Wheel Controller GPIB address is 4. If this address is not available you can reconfigure the communication for another address. You need to use the default (last set number) GPIB address (or RS232 communication) to be able to write the new address to Filter Wheel Controller memory. To call the procedure click the ADDRESS button. This procedure will update also the PC GPIB communication setup.



Filter Wheel Controller GPIB address setup.

V-1. USING TWO OR MORE 74041 MOTORIZED FILTER WHEELS

V-1-A. Setting up for two or more filter wheels via IEEE-488 (GPIB)

To use two or more filter wheels with IEEE-488 communications requires you to set each 74041 to a different, non-conflicting, GPIB address; the default is address 4.

The procedure is as follows:

1. Turn all the 74041 units off except the one that you wish to change the address of.
2. Change the 74041's internal GPIB address via the Utility Software detailed in section 4. You may also use the "ADDRESS" command detailed in section 4.2.
3. Turn the 74041 that you have set the address off.
4. Make sure the software's application is set to use the new GPIB address for this 74041.
5. Confirm communication with the new address.
6. Go back to step 1 to change the address of another unit.

Note: The 74041 GPIB address can also be changed via sending the ADDRESS command via RS232 or using the RS232 mode of the Utility software. You can then turn the 74041 off and on and now communicate via IEEE-488 using the new address.

V-1-B. Using two or more filter wheels via RS232

Each 74041 must have a dedicated serial port on the computer.

NOTE: The 74041 Utility Software can only communicate with one filter wheel at a time. The communication configuration dialog box can be brought up to switch between controllers by resetting the communication port and/or address.

VI. SPECIFICATIONS

Filter Wheel Head

Number of positions:	6
Filter size:	1 inch (25.4) diameter, 0.4 inch (10.2 mm) thk., max., 0.1 inch (2.5 mm) thk., min.*
Clear aperture:	0.8 inch (20 mm)
Input/output ports:	1.5 Inch Series male and female flange, 1 each
Speed:	<2 s per position
Size:	6.68 x 6.38 x 1.60 inches (169.7 x 162 x 40.6 mm)
Mounting:	By input/output flange or rod mount (1/4-20 tapped hole on bottom)

Control Box

Size (W x D x H):	7.0 x 6.0 x 4.5 inch (178 x 152 x 114 mm)
Connectors:	
Filter Wheel:	12 pin male (2 x 6)
IEEE-488	standard
RS-232	9 pin D-sub female
Hand controller	RJ-12 female
Mains:	IEC
Operating voltage:	95 - 264 VAC, 50/60 Hz
Fuses:	2 x ½ A @ 95-132 VAC 2 x ¼ A @ 190-264 VAC

*For Filters less than 2.5 mm thick, you need the 77366 Filter Spacer.

VII. REPLACING FUSES

The fuse box is located on the back panel of the control box. The 74041 uses two 0.5 A slow-slow fuses (for 115 VAC operation) or 0.25 A time delayed fuses (for 230 VAC operation). The fuse box will accommodate either 5 x 20 mm or 1.25 x 0.25" fuses.

To replace the fuses:

1. Use the flat tip of a screwdriver to pop open the black cover of the fuse box (located just above the power cord receptacle).
2. Pull out the red fuse box, taking note of the position of the fuses and the orientation of the fuse box.
3. Remove the old fuses and insert the new ones in the same position as the old.
4. Replace the fuse box and cover. Ensure that you replace the fuse box in the same orientation as when it was removed.

WARRANTY AND RETURNS

WARRANTY

Oriel Instruments warrants that all goods described in this manual (except consumables such as lamps, bulbs, filters, ellipses, etc.) shall be free from defects in material and workmanship. Such defects must become apparent within the following period:

1. All products described here, except spare and repaired parts: one (1) year or 3000 hours of operation, whichever comes first, after delivery of the goods to buyer.
2. Spare parts: ninety (90) days after delivery of goods to buyer.
3. Repaired items: ninety (90) days after delivery of goods to buyer.

Oriel Instruments' liability under this warranty is limited to the adjustment, repair and/or replacement of the defective part(s). During the above listed warranty period, Oriel Instruments shall provide all materials to accomplish the repaired adjustment, repair or replacement. Oriel Instruments shall provide the labor required during the above listed warranty period to adjust, repair and/or replace the defective goods at no cost to the buyer ONLY IF the defective goods are returned, freight prepaid, to an Oriel Instruments designated facility.

Oriel Instruments shall be relieved of all obligations and liability under this warranty if:

1. The user operates the device with any accessory, equipment or part not specifically approved or manufactured or specified by Oriel Instruments unless buyer furnishes reasonable evidence that such installations were not a cause of the defect.
2. The goods are not operated or maintained in accordance with Oriel's instructions and specifications.
3. The goods have been repaired, altered or modified by other than Oriel authorized personnel.
4. Buyer does not return the defective goods, freight prepaid, to an Oriel repair facility within the applicable warranty period.

IT IS EXPRESSLY AGREED THAT THIS WARRANTY SHALL REPLACE ALL WARRANTIES OF FITNESS AND MERCHANTABILITY. BUYER HEREBY WAIVES ALL OTHER WARRANTIES, GUARANTIES, CONDITIONS OR LIABILITIES, EXPRESSED OR IMPLIED, ARISING BY LAW OR OTHERWISE, WHETHER OR NOT OCCASIONED BY ORIEL'S NEGLIGENCE.

This warranty shall not be extended, altered or varied except by a written document signed by both parties. If any portion of this agreement is invalidated, the remainder of the agreement shall remain in full force and effect.

CONSEQUENTIAL DAMAGES -

Oriel Instruments shall not be responsible for consequential damages resulting from misfunctions or malfunctions of the goods described in this manual. Oriel's total responsibility is limited to repairing or replacing the malfunctioning or malfunctioning goods under the terms and conditions of the above described warranty.

INSURANCE -

Persons receiving goods for demonstrations, demo loan, temporary use or in any manner in which title is not transferred from Oriel, shall assume full responsibility for any and all damage to the goods while they are in their care, custody and control. If damage occurs which is unrelated to the proper and warranted use and performance of the goods, then the recipient of the goods accepts full responsibility for restoring the goods to their condition upon original delivery, and for assuming all costs and charges.

RETURNS

Before returning equipment to Oriel for repair, please call the Customer Service Department at (203) 377-8282. Have your purchase order number available before calling Oriel. The Customer Service Representative will give you a Return Material Authorization number (RMA). Having an RMA will shorten the time required for the repair, because it ensures that your equipment will be properly processed. Write the RMA on the returned equipment's box. Equipment returned without a RMA may be rejected by the Oriel Receiving Department. Equipment returned under warranty will be returned with no charge for the repair or shipping. Oriel will notify you of the cost of repairs not covered by warranty before starting out of warranty repairs.

Please return equipment in the original (or equivalent) packaging. You will be responsible for damage incurred from inadequate packaging, if the original packaging is not used.

Include the cables, connector caps and antistatic materials sent and/or used with the equipment, so that Oriel can verify correct operation of these accessories.