



RPF6
FILTER WHEEL
User Manual

April 2005

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Revision 1.0 dated 28/04/2005

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INTRODUCTION

RPF6 is a motorized filter wheel, which has six different holders for filters of 1¼" diameter. It has been designed to be driven directly from ViSTA, the DTA software that manages the cameras, but it is also supplied with a separated control program for all Windows systems. There are two different connection systems: by means of RS232 or by means of the parallel port. It is possible to set the rotation speed and a different stop position for each filter.

The motor hold current is user adjustable.

This product can be customized specifying different size, number of filters, input or output adapters.

The typical applications are Photometry, Microscopy and colour sequences.



THE STANDARD SYSTEM INCLUDES:

- assembled unit in light alloy with threaded 31.75 input
- RS232/Parallel interface
- 2.5 m PC parallel link cable
- managing software for Windows 95/98/ME
- 230V power supply
- case, manual with test report and 24 months of warranty

INSTALLATION OF HARDWARE AND SOFTWARE

Hardware and software installation of this instrument is particularly simple and intuitive. You must conform to the following steps:

1. Insert the SDK CD, provided with the filter wheel.
2. Copy the files RPF6.EXE and RPF6.INI in a directory.
3. Connect the feeder to the instrument and to the PC serial port (**this operation must be performed before turning on the computer**).
4. Turn on the computer and start up Windows.
5. Feed the instrument.
6. Now the instrument is working and it selects the first filter automatically.
7. Start the RPF6.EXE program. Thanks to simple graphic interface it makes possible to:
 - Show the serial or parallel port by which the filter wheel has been connected to the computer
 - Choose the angular velocity of the filter wheel
 - Attribute a name and colour to each filter
 - Calibrate the wheel
 - Select each filter

SOFTWARE OPERATION

When you activate RPF6.EXE it will appear the following window:

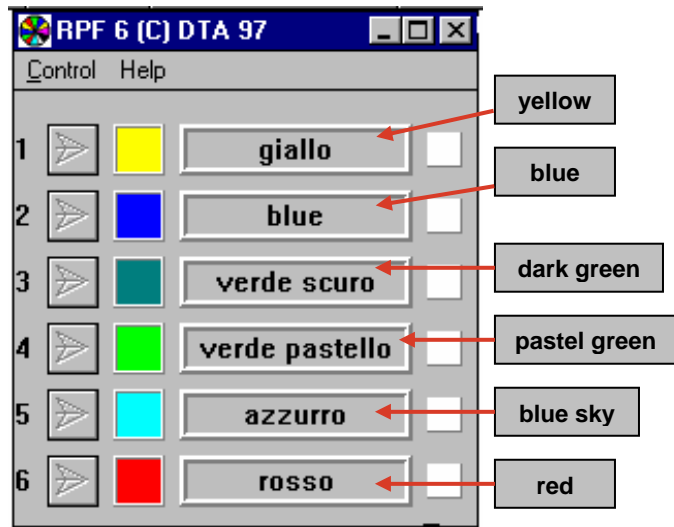


fig.1

If you select *Port Setup* from the *Control* menu it is possible to specify the input/output port which the filter wheel is connected on:

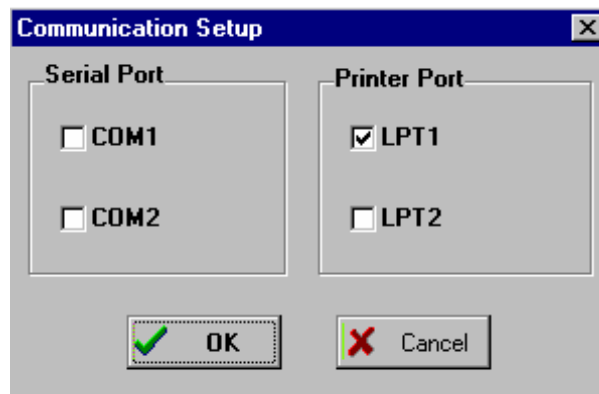


fig.2

Using *Start* from the *Control* menu, RPF6 program verifies if the filter wheel connection is correct. If so, it will appear the following window which differs from fig.1 because now buttons 1 to 6 are enabled.



fig.3

Now it is possible to choose each filter by clicking with the mouse one of the six buttons or by pressing the function keys 'F1' ... 'F6' to select filters '1' ... '6' respectively.

On the contrary, if there are connection problems, after few seconds it will appear on the screen the error message: **RPF Don't Send ACK.**

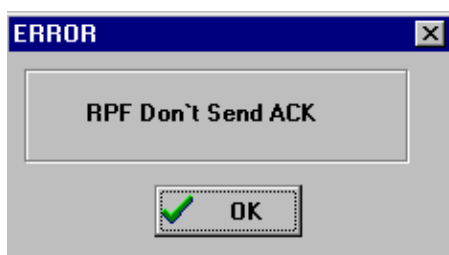


fig.4

In this case you must press OK and verify that:

1. The instrumy is properly fed.
2. The serial (or parallel) cable has been correctly connected.
3. The input/output port specified by the *Port Setup* control is the right one.

By means of the *Filter Name* control from the *Control* menu it is possible to associate a name and a colour to each filter (selecting them between the possible ones on the colour palette).

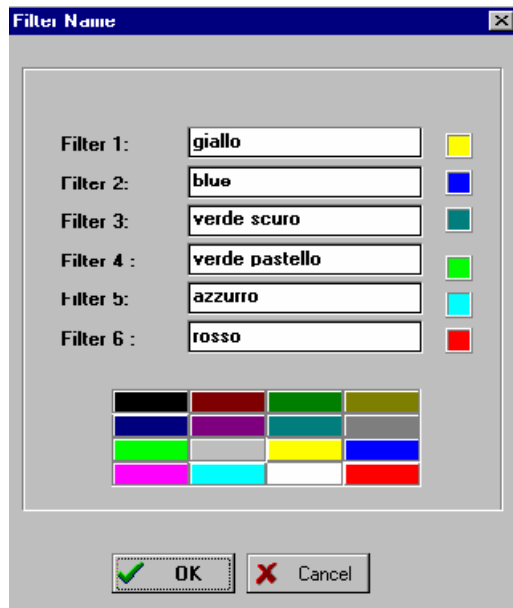


fig.5

Once you have made these changes, let's press OK.

If necessary, the Autozero control from the Control menu enables the instrument to autocalibrate itself (for example if the perfect alignment of the filter on telescope axis has been lost).

Calibration from the Control menu enables to specify the steps number between one filter and the other, to select the offset and the torque motor.

Each step is equivalent to a 1.25 degrees rotation and there are 48 steps between a filter and the other.

On the contrary, the offset enables to calibrate the alignment between the filter wheel axis on the instrument axis.

Varying the torque, it is possible to choose the torque motor while it is not running. If the filter wheel is not subject to particular vibrations or shoves, you can choose the Min Torque or Zero Torque function. Otherwise, if the filter wheel is subject to vibrations, it would be better to select the value MidTorque or Max Torque function.

Finally, in order to control the angular velocity of the filter wheel, it is sufficient to choose Speed from the Control menu and to vary the velocity using the proper buttons.

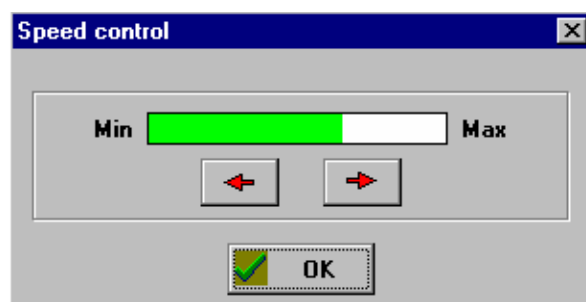
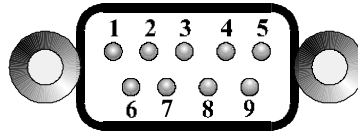


fig.6

DETAIL OF THE RPF6 CONNECTOR

The filter wheel can be connected to the PC either by means of the serial interface or the parallel one. Nevertheless, using the serial interface you will obtain the better connection, because it enables to use very long connection cables .

CONNECTOR'S NUMERATION



SIGNALS ON THE CONNECTOR

PIN	SIGNAL	COMMENT
1	READY	Parallel port Handshake
2	TxD	Serial Transmission
3	RxD	Serial Reception
4	D3	Parallel Bit 3
5	GND	Ground
6	D2	Parallel Bit 2
7	D1	Parallel Bit 1
8	D0	Parallel Bit 0
9	VDD	Feed 12V 500 mA

FILTER WHEEL'S SOFTWARE MANAGEMENT.

It is possible to check the RPF6 filter wheel by programming the serial interface. These are the statements to be respected:

- bit-rate : 4800
- no parity bit
- 8 characters plot
- 1.5 bit stop

The following controls are available:

1. "F" < filter number > <CR>
2. "N" < filter number > <steps > <CR>
3. "R" <CR>
4. "E" <CR>
5. "V" <velocity> <CR>
6. "Z" <CR>
7. "D" <duty cicle> <CR>
8. "D" <CR>
9. "O" <offset> <CR>

CONTROL DESCRIPTION

1. "F" < filter number > <CR>

Let suppose we want to set filter number 2; it will be enough to send:

- a) character "F";
- b) character "2";
- c) carriage return.

(<CR> indicates carriage return, whose ascii code is 13).

After sending the control, in case of not transmission errors, the filter wheel will set the specified filter (in our example, filter number 2) and, once the operation is concluded, it will transmit us: "ACK"<CR>. Otherwise, if there have been transmission errors, no one operation will be implemented and it will transmit: "NACK"<CR>.

2. "N" < filter number> <steps > <CR>

Let suppose we want to vary the steps number between filter 2 and filter 3 and increase them to 50; it is sufficient to transmit:

- a) character "N";
- b) character "2";
- c) a character whose ascii code is equivalent to the steps number (in this case a character whose ascii code is 50);
- d) carriage return.

Even in this case, in case of not transmission errors, the filter wheel will transmit: "ACK"<CR>. Otherwise, no one operation will be implemented and it will transmit: "NACK"<CR>.

3. **"R" <CR>**

This control enables us to know the present position of the filter wheel.
Let suppose that presently it is selected filter number 3, then if we transmit:

- a) character "R";
- b) carriage return.

the filter wheel will transmit: "3ACK"<CR> if there have been no transmission errors, and NACK"<CR> if there are errors.

4. **"E" <CR>**

This control enables us to know the firmware version.

Transmitting:

- a) character "E";
- b) carriage return.

the filter wheel will answer: <2 byte> "ACK"<CR>.

For example if the firmware version is 1.0, we will receive: "10ACK"<CR>.

Even in this case, if there have been transmission errors, the filter wheel will transmit "NACK" <CR>.

5. **"V" <velocity> <CR>**

It is possible to change the wheel angular velocity by transmitting:

- a) character "V";
- b) a character whose ascii code indicates the velocity (velocity range gets from 220 for high angular velocity to 180 for low ones);
- c) carriage return.

The filter wheel will transmit: "ACK"<CR> if there have been no transmission errors; "NACK"<CR> on the contrary.

6. **"Z" <CR>**

If we want to have a perfect alignment between the telescope axis and each filter axis, it will be enough to transmit:

- a) character "Z";
- b) carriage return.

The filter wheel will implement the alignment, if there have not been transmission errors, it will set filter number 0 and will transmit "ACK"<CR>. In case of transmission errors, it will transmit "NACK"<CR>.

7. **“O” <offset> <CR>**

With this control we can choose the initial offset by which the RPF will set itself as soon as we give it the zero setting control. The syntax is clear and the wheel answer will be:

ACK<CR>
and NACK <CR>.

8. **“D” <duty – cicle > <CR>**

To change the duty cycle it is sufficient to send:

- a) character "D";
- b) a character included within 0 and 3 (0 = void torque; 1 = minimum torque; 2 = medium torque; 3 = maximum torque)
- c) <CR>

This point the wheel will answer ACK<CR> or NACK <CR>, as in the other cases.

9. **“D” <CR>**

This control enables us to know the present duty cycle of the microcontroller. The answer will be: <duty-cicle> ACK <CR> oppure NACK<CR>.

NOTE:

Between a character and the other it would be better to insert a waiting cycle of about 10 ms to enable the RPF microcontroller to process correctly the input data.

SPECIFICATIONS

POSITIONING SPEED

0.2 s

NUMBER OF POSITIONS

6

STANDARD MOUNT

1¼"

SPEED CONTROL

Yes

SERIAL INTERFACE

RS232 9600 Baud

PARALLEL INTERFACE

4 bit input, 1 bit output

MAXIMUM FILTER THICKNESS

8 mm

BACKFOCUS

30 mm

POWER SUPPLY

12V 500mA

DIMENSIONS

Φ 140 mm

OPTIONS

RGB-6

31.7 mm RGB interference filter kit

NIK-6

Adapter for Nikon lens

MIN-6

Adapter for 42x1 mm lens

ARH-6

Adapter for HiRes

ARI-6

Adapter for DISCOVERY, iCAM

PAR-6

Standard parallel port link cable

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