TECH NOTES

New options for easy control of the Sutter Lambda VF-1 and VF-5 variable filter systems

By Jack Belgum, Ph.D.

The Lambda VF-1 and VF-5 allow easy selection of any available wavelength through keypad control or through the computer interfaces (USB and RS232). Many existing imaging programs are not designed to select between hundreds of wavelengths, so the control firmware has been extended to offer two additional control modes that allow selection of new wavelengths without having to modify existing software.

Triggered mode

The Lambda VF-1 and VF-5 run on specially programmed versions of the Lambda 10-B. The 10-B has a TTL level input and an output that are used to control the shutter when the controller is used in our standard filter-wheel systems. Since the VF-5 and VF-1 systems do not include a shutter, we can use the TTL level signals to allow selection of wavelength by using the TTL input as a trigger signal. New keypad menu options now allow the user to select a sequence of wavelengths which can then be stepped through using the TTL input. Initially this mode will be supported only for the VF-1, since the very fast selection of new wavelengths is better supported with this device.

The sequence of wavelengths can either be up to 100 specified wavelengths in any order, or increasing or decreasing wavelength steps of a specified size starting and ending at specific wavelengths selected by the user.

Using filter selection commands to get user defined wavelengths

The popular series of 10 position filter wheels made by Sutter is supported by most microscope imaging systems. The Lambda VF-5 controller currently accepts Lambda 10 series filter selection commands as a means of selecting the filter that is located in the optical port, although the preferred mode of operation is to select the desired wavelength and allow the controller to decide the correct filter and tilt angle.

A new option, which can be selected via the keypad menu, allows the user to redefine the 10 filter position commands so that they each select a specific wavelength available in the VF-5 system. In this mode, when a filter command is received, the controller will select the correct combination of filter position and tilt to produce the wavelength configured for that filter value by the user. Thus existing software that supports our filter-wheel products may be used to select from up to 10 specific wavelengths within the range of the VF-5. As needs change, the selection of wavelengths can be easily changed through the keypad menu on the controller.

It is important to note that the time required to complete these moves will vary depending on the need to change the actual filter and the change in tilt required. If the control software is carefully checking the time when the command is sent and return of the response that indicates the move is complete, the software might decide that an error has occurred. If the software offers control over the speed for filter changes it is worth trying a slower speed (bigger speed number) with the hope that the software will allow more time for each move before declaring that there is an error.

Support for the VF-1 and VF-5 added to the Lambda 10-3 Controller

The Lambda 10-B has been the only controller that included support for the Lambda VF-5 and VF-1 filter systems. We are now pleased to report that the Lambda 10-3 also supports these filter systems. The Lambda 10-3 has 5 motor drivers as compared to the Lambda 10-B, which has only 2. The 10-B is attractive for situations where you only need control for a single VF-5 or two VF-1 units, but the Lambda 10-3 can support these devices while still offering additional channels for filter wheels or the *Smart*Shutter™. These features will only be available on specially programmed units.

The Lambda VF-5 system has two motors while the VF-1 has only one. Filter wheels have a single motor as does the *Smart*Shutter. Filter wheels with a built in *Smart*Shutter have, as you might expect, two motors. With some limitations, you can control just about any combination of these products from a single Lambda 10-3 controller so long as it has the special programming and the number of motors to be controlled is 5 or less.

The new control features for the Versachrome® products mentioned above have been added to the specially programmed Lambda 10-3. The Lambda 10-3 version has the added capability of having 3 TTL level inputs available for triggered wavelength changes. These trigger inputs can be used to control independent sequences for channels A, B and C. Another enhancement available on the new 10-3 version is control for a compensating window that can counter the shift of the optical axis produced by the tilt of the Versachrome filters. The compensation channel will tilt a window of the same thickness as the filter at the same angle, but in the opposite direction.

For more information, please contact us at info@sutter.com.