R-LS-450 Rack-mount Blue LED Pulsed Light Source

The **R-LS-450 BLUE LED PULSED LIGHT SOURCE** is a compact, low-cost light-emitting diode that produces pulsed or continuous spectral output at 470 nm -- the blue region -- for high-sensitivity emission fluorescence measurements. The R-LS-450 is the rack mount version of the LS-450. The R-LS-450 can be configured to operate in continuous wave mode through manual operation and through the software. It can also be configured to operate in pulsed mode through manual operation and through the software.

The R-LS-450 is shipped with the following pins jumpered: Jumper over pins in JP1, a jumper over the Manual pins in JP3, and a jumper over the 2^{10} pins in JP2 for the fastest pulse rate available.

Operation with the R-LS-450 Board

You can configure the lamp's performance through a switch and three jumper blocks on the circuit board of the R-LS-450 and, if desired, through one jumper block on the circuit board of the S2000 spectrometer. The following lists the many different choices you have for configuring the R-LS-450 for your application. You need to determine the best mode of operation for your setup and configure your system appropriately.

S1 Switch

The S1 Switch is a three-position switch on the R-LS-450. The switch can be positioned in continuous wave operation, no operation, and pulsed operation.

Jumper Block 1 (JP1)

There is only one set of pins in JP1. If other jumper blocks are configured correctly, a jumper over JP1 allows you to turn the R-LS-450 on and off via the Strobe Enable feature in OOIBase32 software and to even control the pulse rate through the Flash Delay feature in OOIBase32 software. This feature is only available with a "J" or later version of the S2000. (To find out if you have a J-series or later S2000,.see the third letter in your S2000 serial number).

Jumper Block 2 (JP2)

There are nine sets of pins in JP2. The number of pulses per second of the R-LS-450 depends on the pins you jumper on JP2. However, the pulses per second are also dependent upon the master frequency of your A/D converter.

- A jumper over the CW pins makes the R-LS-450 continuously on, which means that there is no pulsing of the light source. Other jumper blocks must be configured correctly.
- A jumper over the 2^{16}, 2^{15}, 2^{14}, 2^{13}, 2^{12}, 2^{11} and 2^{10} pins controls the pulse rate per second of the R-LS-450, depending on the A/D converter you are using to interface to your S2000. (See table below for pulse rates.)
- A jumper over the CS pins allows you to control the pulse rate via the OOIBase32 software. (See **Using JP3 on the S2000** on the next page for more information.)

Pins on the JP2	Function	DAQ700 Frequency (Hz)	ADC500 / SAD500 Frequency (Hz)	ADC1000 Frequency (Hz)
CW	Continuous Mode	0	0	0
2^{16}	Divide by 2^{16}	1.5	7.6	15.2
2^{15}	Divide by 2^{15}	3.1	15.2	30.4
2^{14}	Divide by 2^{14}	6.1	30.0	60.8
2^{13}	Divide by 2^{13}	12.2	60.8	122.0
2^{12}	Divide by 2^{12}	24.0	122.0	244.0
2^{11}	Divide by 2^{11}	48.0	244.0	488.0
2^{10}	Divide by 2^{10}	98.0	488.0	976.0
CS*	Continuous Strobe	N/A	N/A	Software Controlled

Jumper Block 3 (JP3)

There are two sets of pins in JP3. The jumper position here determines the source of control for the R-LS-450: manual or remote control. A jumper over the Remote pins means that you can control the R-LS-450 through the software (if other jumper blocks are configured correctly).

R-LS-450 Operating Matrix

This matrix will help you configure the jumper blocks on the R-LS-450.

S1 Switch	JP1	JP3	LED Status
Off	No jumper	No jumper	Off
CW	No jumper	No jumper	Continuously on
CW	Jumpered	Jumper Remote pins	Continuous wave mode controlled by software (see **Continuous Wave Mode with the S2000's JP3** for more information)
CW	Jumpered	Jumper Manual pins	Continuously on
Pulsed	No jumper	No jumper	Pulse rate determined by JP2 on the R-LS-450 board (see the JP2 table for pulse rates)
Pulsed	Jumpered	Jumper Remote pins	Pulsed mode controlled by software (see **Pulsed Mode with the S2000's JP3** for more information)
Pulsed	Jumpered	Jumper Manual pins	Pulse rate determined by JP2 on the R-LS-450 board (see the JP2 table for pulse rates)

Using JP3 on the S2000

You can also have functionality of the R-LS-450 by utilizing Jumper Block 3 (JP3) on the S2000 circuit board. The S2000's JP3 allows you to control the R-LS-450 through the OOIBase32 software.

Continuous Wave Mode with the S2000's JP3

You can control the turning on and off of the R-LS-450 while it is in continuous wave mode through the Strobe Enable function in the OOIBase32 software if

- The switch is turned to continuous wave mode
- There is a jumper over the pins in JP1 of the R-LS-450
- There is a jumper over the CW pins in JP2 of the R-LS-450
- There is a jumper over the Remote pins in JP3 of the R-LS-450
- There is a jumper over the 2 pins in JP3 of the S2000 board

Pulsed Mode with the S2000's JP3

Another way you can control the pulses per second of the R-LS-450 is if

- The switch is turned to pulsed mode
- There is a jumper over the pins in JP1 of the R-LS-450
- There is a jumper over the CS pins in JP2 of the R-LS-450
- There is a jumper over the over the Remote pins in JP3 of the R-LS-450
- There is a jumper over pins labeled /16, /14, /12, or /10 in JP3 of the S2000, depending on the pulse rate you need. The pulses per second are also dependent upon the frequency of your A/D card. See the table below for choices.

Pins on the S2000's JP3	DAQ700	ADC500, SAD500	ADC1000
/16	1.5	7.6	15.2
/14	6.1	30.4	60.8
/12	24.0	122.0	244.0
/10	98.0	488.0	976.0

You can control the pulses per second of the R-LS-450 through the Flash Delay function in the OOIBase32 software if:

- The switch is turned to pulsed mode
- There is a jumper over the pins in JP1 on the R-LS-450 board
- There is a jumper over the pins labeled CS in JP2 on the R-LS-450 board
- There is a jumper over the pins labeled Remote in JP3 on the R-LS-450 board
- There is a jumper over the pins labeled 2 in JP3 on the S2000 board

Setting the Integration Time

When using any of the pulsed modes for the R-LS-450, you need to ensure that a constant number of flashes occur for every integration cycle. This achieves a continuous and stable signal. The integration time is set in the OOIBase32 software. To achieve a constant number of flashes per integration cycle, the integration time must be a multiple of those shown in the following table, according to the A/D converter being used:

Pins on the JP3 (of the S2000)	Integration time for DAQ700 must be multiple of	Integration time for ADC500 / SAD500 must be multiple of	Integration time for ADC1000 must be multiple of
/16	512	128	64
/14	128	32	16
/12	32	8	4
/10	8 (with a min. value of 24 ms)	4	4
2	N/A	N/A	N/A