

User Notes for

PE50BB-DIF-C (P/N 7Z02947), PE50BB-DIF-C with 5m cable (P/N 7Z02947B)
PE50-DIF-ER-C (P/N 7Z02948), PE50-DIF-ER-C with 5m cable (P/N 7Z02948B)
PE100BF-DIF-C (P/N 7Z02942), PE100BF-DIF-C with 5m cable (P/N 7Z02942B)
PE100BF-DIF-C with 10m cable (P/N 7Z02942C) with Diffuser

1. Operating range and scales:

This pyroelectric sensor is designed to operate with both medium energy lasers having large beam diameters, such as excimer lasers, and high energy lasers with smaller beam diameters such as Holmium or Neodymium YAG lasers.

The sensor can be operated either with the diffuser removed for lower energy density lasers or with the diffuser installed for the higher energy density lasers. When the diffuser is installed, the energy impinging on the absorber is approximately 20% of the incident energy and the beam is spread as well.

2. Operation:

In addition to the normal functions described in the instrument instruction manual, when the above sensors are connected, the instrument has an additional setting to deal with the diffuser being in or out.

First of all make sure the diffuser is installed or not depending on what operating conditions you wish. Now set up the instrument to the corresponding condition as follows:

2.1 Setting Diffuser in/out

For Nova Meter ⁽³⁾:

Press the "menu" button twice and then press "setup". Press "select" until the DIFFUSER choice is highlighted. Press "value" to choose filter in or out. Press exit. Insure that the diffuser is attached to / removed from sensor. If you wish to save your choice as the permanent startup default, do as follows:

Press the "menu" button twice and press "more". Select "config" and press "go". Press "exit" and press "all" to save all current settings. The current choice of filter setting as well as other current settings will be saved.

For Laserstar Meter:

Press the "menu" button and then select "configure". Press "go" and select "Diffuser:". Press "value" to choose diffuser in or out. Press "exit" and "esc". Insure that the diffuser is attached to / removed from sensor. If you wish to save your choice as the permanent startup default, then press "save" before exiting.

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For Nova II / Vega Meters:

Press "OUT / IN" button and then press "Change". Insure that the diffuser is attached to / removed from sensor. Press "OK". If you wish to save your choice as the permanent startup default, do as follows:

Select "Menu" and choose "Configure". Go to "Diffuser" and select "OUT / IN". Press "Save". The current choice of filter setting as well as other current settings will be saved.

For StarLite Meter:

Press the "Setup" softkey and then select "Diffuser" using the down arrow (↓). Press the enter arrow (↵). Select "OUT / IN" using the down arrow. Insure that the diffuser is attached to / removed from sensor. Press "OK" and "Exit".

For Juno / USBI / Pulsar / Quasar Interfaces:

Open the StarLab application.

In the "Settings" screen open the dropdown of "Diffuser" and choose "OUT / IN".

Insure that the diffuser is attached to / removed from sensor. If you wish to save your choice as the permanent startup default, then press "save" before exiting.

NOTE (1): When the setting is for filter out, the energy scales are 10J, 2J, 200mJ etc. When the filter setting is "IN", the scales are correspondingly higher, 40J, 8J, 800mJ etc. (or 40J, 20J, 2J, 200mJ etc.)

NOTE (2): The instrument will not give correct readings if the diffuser setting does not correspond to the actual condition of the diffuser being in or out

NOTE (3): The PE-C series will only operate with Nova meter with an additional adapter Ophir P/N 7Z08272.

2.2 Laser Wavelengths:

The sensor calibration wavelengths and use wavelengths are listed below. The ***D laser settings are for diffuser in and the others are for diffuser out.

Type	Diffuser	Laser setting	Calibration wavelength	Wavelength range of use
PE50BB-DIF-C	out	532	532nm	0.19 – 0.8µm ⁽¹⁾
	out	1064	1064nm	0.8 – 3µm ⁽¹⁾
	in	532D	532nm	532nm
	in	1064D	1064nm	1064nm
	in	2.1D	2100nm	2100nm
PE50-DIF-ER-C	out	532	532nm	532nm
	out	1064	1064nm	1064nm
	in	1064D	1064nm	1064nm
	in	2.1D	2.1µm	2.1 um, holmium laser
	in	2.9D	2.94µm	2.94um erbium laser
PE100BF-DIF-C	out	532	532nm	532nm
	out	1064	1064nm	1064nm
	in	532D	532nm	532nm
	in	1064D	1064nm	1064nm
	in	1.5D	1550nm	1550nm

Notes: (1) Since the BB coating is flat spectrally, with diffuser out the sensor is calibrated for a wide range of wavelengths.

3. Calibrating one of the *D settings to a user selected wavelength:
(For PE50BB-DIF-C. For PE50-DIF-ER-C, see para. 4.)**

It may be the case that the user wants to use the diffuser-in setting for a wavelength different from the ones which are factory calibrated, e.g. 1064nm, 532nm and 2100nm. The following method can be used by the user to calibrate the instrument to any user selected wavelength on one of the diffuser-in settings.

1. Remove the diffuser and set the laser to an energy density level which will not damage the black broadband absorber. Use the test glass supplied to test that no damage occurs. (Note that slight cosmetic changes on the surface are not considered damage and will not effect calibration).
2. Turn on the instrument and set the "laser" setting to 532 or 1064 depending on the wavelength being calibrated.
3. Set the "diffuser" in/out setting to "out" as follows:

For Nova Meter ⁽³⁾: from the main screen, press the "menu" button twice and press "setup". Press "select" and highlight the DIFFUSER setting. Select "out" and press exit.

For Laserstar Meter: from the main screen, press "menu" and select "configure". Press "go". Use the arrow keys to select the diffuser setting. Press value to select "out" and press "exit" and "esc".

For Nova II / Vega Meters: to change the setting to "OUT"; press the "IN" softkey and then press "Change" and "OK".

For StarLite Meter: press the "Setup" softkey and then select "Diffuser" using the down arrow (↓). Press the enter arrow (↵). Select "OUT" using the down arrow and press "OK" and "Exit"

For Juno / USBI / Pulsar / Quasar Interfaces: open the StarLab application. In the "Settings" screen open the dropdown of "Diffuser" and choose "OUT".

4. Read and note down the average energy.
5. Now install the diffuser and set the "laser" setting to either 106D, 532D or 2.1D depending on which setting you wish to change (You should use a wavelength which you do not need to measure because after changing it, it will no longer be calibrated at that wavelength). Follow the instructions in paragraph 3 to set the diffuser setting to "in" (substitute "OUT" with "IN").
6. Read and note down the average energy.
7. Note down the ratio of the reading without and with the diffuser. e.g. if the reading without the diffuser is 124mJ and with the diffuser is 155mJ then the ratio is $124/155=0.8$.
8. Now enter the calibration screen of the instrument and change the calibration as follows:

I. For Nova Meter ⁽³⁾:

- a. Press the "menu" button twice and press "more".
- b. Select "CAL" and press "GO". Press "Change this only".
- c. Make sure the diffuser-in wavelength you are changing is selected. If not press "SELECT" until the wavelength function is highlighted and press "VALUE" until the correct ***D setting appears. Press "GO".
- d. Note down the value of "COEF:". Press "up"/"down" to change this value to a new value = (old value) x [the ratio found in (7) above]. e.g., if the coefficient is 1.6 and the ratio is 0.8 then change the value of the coefficient to $1.6 \times 0.8 = 1.28$.
- e. Now press "EXIT" and "SAVE" and new value will be saved. The correctness of the calibration can be checked by measuring the laser energy (below damage threshold!) with diffuser in and out with appropriate "laser" settings.

II. For Laserstar Meter:

- a. Press the "menu" button and select "advanced". Press "go". Select "CALIBRATE" and press "go". Press "Change this λ only". Make sure the diffuser-in wavelength you are changing is selected. If not press "select" until the "laser" function is highlighted and press "value" until the correct ***D appears.
- b. Note down the value of "Coeff:". Press "up"/"down" to change this value to a new value = (old value) x [the ratio found in (7) above]. e.g., if the coefficient is 1.6 and the ratio is 0.8 then change the value of the coefficient to $1.6 \times 0.8 = 1.28$.
- c. Now press "exit" and "save" and new value will be saved. The correctness of the calibration can be checked by measuring the laser energy (below damage threshold!) with diffuser in and out with appropriate "laser" settings.

III. For Nova II / Vega Meters:

- a. Press the "Menu" button, select "Calibrate" and press enter. Go to "Adj:" press enter and select "Specific: this laser only". Make sure the diffuser-in wavelength you are changing is selected. If not go to "Laser" and choose the correct ***D.
- b. Note down the value of "Factor". Press enter and a screen with "Modify", "Original" and "Updated" will appear. In "Modify" use the navigation up/down keys to change this value to a new value = (old value) x [the ratio found in (7) above]. e.g., if the coefficient is 1.6 and the ratio is 0.8 then change the value of the coefficient to $1.6 \times 0.8 = 1.28$.
- c. Now press "save" and the new value will be saved. The correctness of the calibration can be checked by measuring the laser energy (below damage threshold!) with diffuser in and out with appropriate "Laser" settings.

IV. For StarLite Meter:

StarLite does not have the "Calibrate" option which enables correcting the calibration factor manually.

V. For Juno / USBI / Pulsar / Quasar Interfaces:

- a. Open the StarLab application
 In the "Settings" screen open the dropdown of "Laser" and choose the wavelength you are changing "***D".
 In the top toolbar press "Advanced Functions". Select "Calibrate" from the dropdown.
 An "Adjust Calibration Factors" screen will appear.

- Make sure the diffuser-in wavelength you are changing appears in "Current Laser".
- b. Note down the value of "Laser Specific Factor". Use the box or the bar to change this value to a new value = (old value) x [the ratio found in (7) above]. e.g., if the coefficient is 1.6 and the ratio is 0.8 then change the value of the coefficient to $1.6 \times 0.8 = 1.28$.
 - c. Now press "save" and the new value will be saved. The correctness of the calibration can be checked by measuring the laser energy (below damage threshold!) with diffuser in and out with appropriate "Laser" settings.

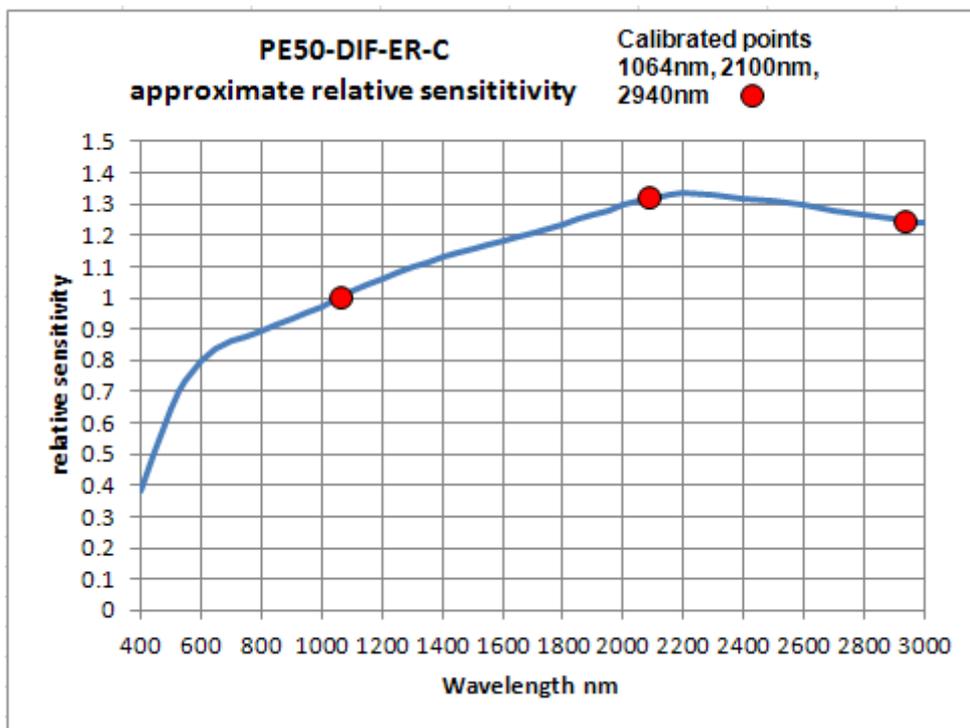
NOTE: AFTER YOU HAVE CHANGED THE CALIBRATION OF A PARTICULAR ***D SETTING, IT WILL NOT GIVE CORRECT READINGS ANYMORE AT ITS ORIGINAL WAVELENGTH

4. Using the PE50-DIF-ER-C at a different wavelength than the calibrated one.

It is possible to choose one of the unused wavelengths of the PE50-DIF-ER-C and change its calibration to give approximately correct readings at a different wavelength. In this case, we cannot measure the energy accurately with the diffuser out as described in section 3 however given below is an approximate graph of the sensitivity of the PE50-DIF-ER-C with diffuser in as a function of wavelength. We can use this information to give approximate (additional error $\pm 5\%$) calibration at the new wavelength in the wavelength range 1064nm – 2940nm.

The graph below shows the approximate sensitivity of the PE50-DIF-ER-C as a function of wavelength.

Now suppose we want to use the 106D setting to measure 1320nm. As can be seen, the sensor has a sensitivity at 1320nm 1.10 times the sensitivity at 1064nm. So we have to adjust the sensitivity for the setting 106D downwards by the ratio $1/1.10 = 0.91$. So we use the exact same method of adjustment described in para. 3 where in the example above the factor was 0.8 instead of 0.91.



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