Veralase Tunable Fiber Coupled Laser User Instructions

www.veralase.com

Model Number: 202

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Warning

1. Only authorized personnel can use this **class 4 laser** device.
2. Authorized personnel MUST wear laser safety glass before using the laser. Laser safety glasses can be found at www.thorlabs.com or www.newport.com
3. Lasers can produce serious injury to the eyes if not handled with care.
4. The default Passcode 1234. It is recommended that this password be changed immediately.

Packaging

1) Veralase laser device console
    i. 2W 1260-1290nm tunable laser, 105um 0.2NA
2) Power supply
    i. 100-240V to 12V 5A
3) Collimation package (optional)
4) Optical patch cable
    i. 2m, 200um, 0.22NA SMA-SMA

System Specifications

	Symbol	Typical (1)	Units
Optical			
Output Power (CW)	P_o	0-2	Watts
Accuracy		0-5% (0.1W-2W)	
Wavelength (1)	λ_c	1260nm-1290nm	nm
Spectral Width	$\Delta\lambda$	8	nm 3dB
Wavelength Temp. Co-eff.	λ_{coef}	0.5	nm/C
Standard Optical Output with collimation package		Dia. 6.2	mm
(1) Other models are available for different wavelength, contact Veralase for more information			
Electrical / Data			
Power Adapter Input		100 - 240	VAC
		50-60	Hz
Power Adapter Output		12	VDC
		5	A
Program Parameters			
Current Level - Up to 6 settings		Level 1, 2, 3, 4,5, Manual	Power level
Time on/ Pulse		0 to 1000	ms
Time off/ Pulse		0 to 1000	ms
Pulses/Trigger		1000	Pulse
Temperature Control			
Operating Temperature		0-40	C
Laser Temperature protection range		0-75	C
Laser Temperature control range(2)		15-60	C
(2) Veralase recommends using the temperature at this range			

Device Setup

1. Connect the fiber patch cable (1) to SMA fiber adaptor on the front panel (2)
2. Connect the collimation package (3) to fiber patch cable (1)
3. Insert the power supply barrel connector (4) into barrel socket on the right side of the device (5)
4. Plug the power supply (6) into wall socket (100-240)

How to Use

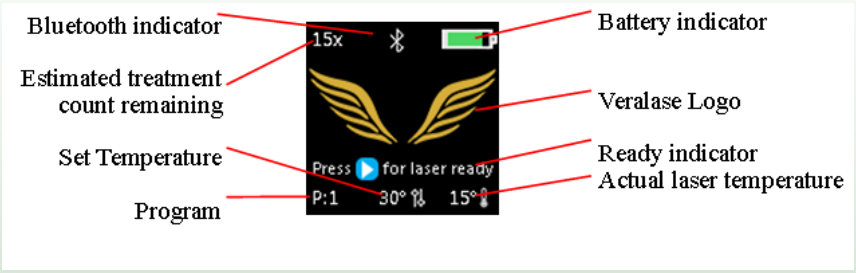
1. Turn on/ Turn off the device

   - Press the Power Button for 1 second to turn on the device
   - Press and hold the Power Button for 2 seconds to turn off the device

2. Passcode screen

   - Enter the passcode by touch screen, the default passcode is **1234**. Change the passcode by selecting the Menu Button, then pressing the Change Password icon with your finger and follow the directions.
   - Successfully inputting the password will open the main screen

3. Main screen



- Estimated treatment count remaining provides user an estimate of how many treatment cycles are left based on current battery. Note the temperature tuning only works when the laser is plugged into external power, and thus, we only recommend using the device when plugged into external power.
- Bluetooth indicator shows when Bluetooth is enabled on the device.
- Program shows which program is currently active. The program options are 1, 2, 3, 4, 5 and M for Manual. User can adjust the program by clicking the Power Button repeatedly to cycle through the program options.
- Set temperature displays the temperature the device will adjust to once the laser program is started.
- Actual temperature indicates the current laser diode temperate.

4. Menu screen

- Press Menu Button to go to menu screen. Press again to go to second menu page, then press again to exit back to Main screen. The menu icons on the screen are touch- sensitive. Simply press the menu item with your finger to select. To exit a given menu, simply press the Menu or Start/Stop Button.
- Volume icon is for sound volume setting. Touching volume icon on the screen actives the sound page, the plus and minus buttons are used to adjust the volume.
- User can check Statistics information by touching Statistics icon. Statistics shows the usage statistics of the device.

5. Set temp

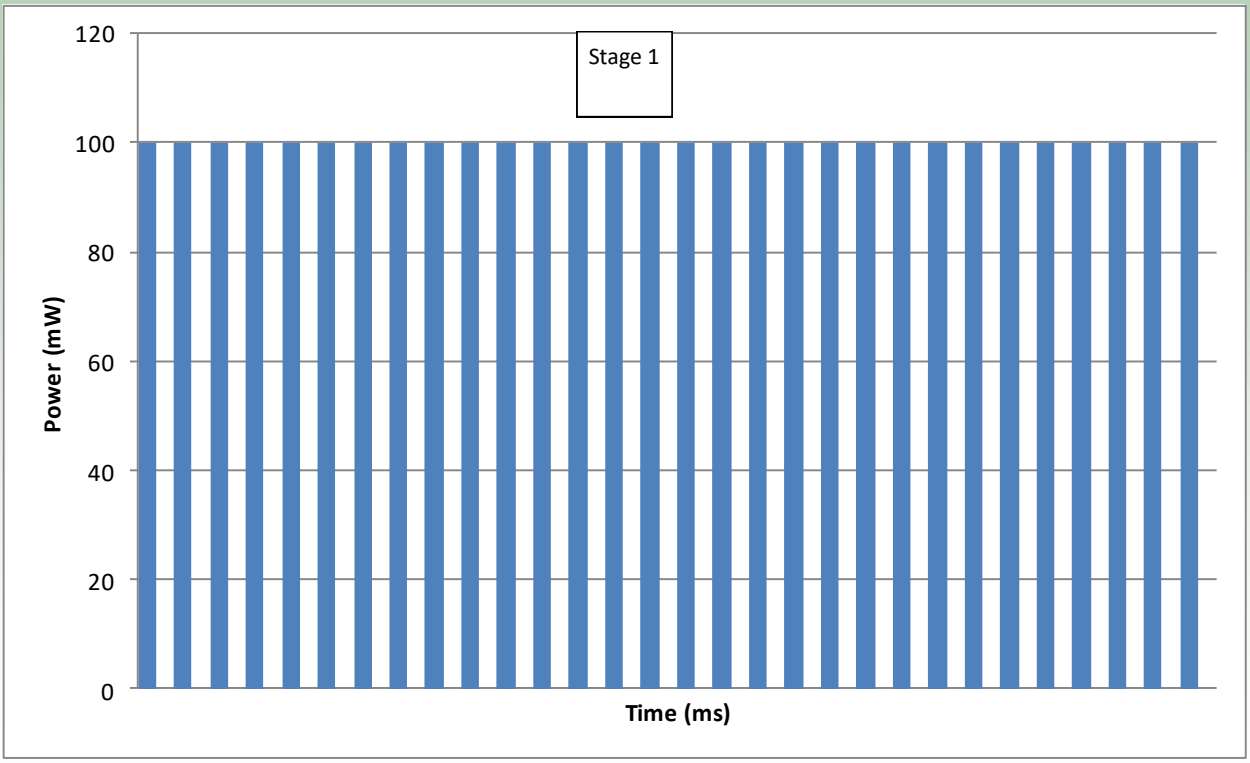
- User can use set temp to adjust the target temperature, use plus or minus to adjust temperature. Once temperature is adjusted, user can see the new set temperate on the bottom of main screen. Adjusting the temperature is done to shift the laser wavelength to the desired wavelength output. Refer to the supporting Excel spreadsheet to see what temperature is required for each wavelength and settings of interest.

6. Power setting

- Program setting allows users to view and edit 6 setting programs. User can tap their finger on any parameter and use the plus and minus buttons to adjust the values for each program parameter. Alternatively, users can press the Menu button to move down through each program setting and use the plus and minus buttons to adjust the selected parameter. Each program has five stages where laser power profile varies from stage 1 ,2, 3, 4 to 5 with four parameters:

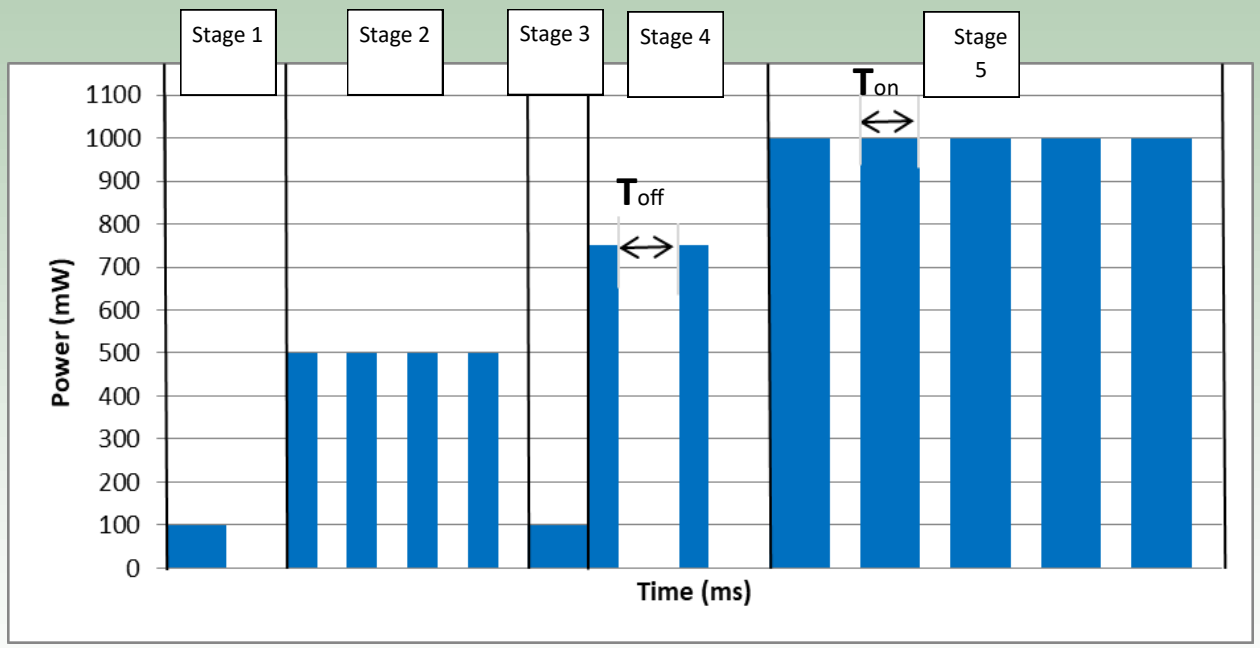
    - Power (mW): Peak power setting
    - Time on/pulse (ms): time on in each cycle
    - Time off/pulse (ms): time off in each cycle
    - Pulses/trigger: number of cycles to repeat

A simple example of the program setting can be seen on the next page. All four parameters have been set to zero for stages 2-5 with stage 1 being the only stage in operation. For stage one, the Power has been set to 100 mW, the Time on/pulse has been set to 1000 ms (or 1 second), the Time off/pulse has been set to 1000 ms (or 1 second), and the Pulses/trigger has been set to 30. This results in the laser firing 30 times, each at 100 mW, over a minute interval. A representation of the programming can be seen on the next page as well as the respective parameters.



Stage	Power (mW)	Time on/pulse (ms)	Time off/pulse (ms)	Pulses/trigger
1	100	1000	1000	30
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0

This example is extremely simple and is only utilizing a single stage. A more complex example of the 5-stage programming system can be seen on the next page. Stage 1 has a max power of 100 mW, an operation time of 1000 ms (or 1 second), a pause of 1000 ms (or 1 second), and has 1 pulse. Any of these parameters can be changed to create a different scenario in each stage as shown below. All stages can be identical or all can be different; as long as the values fall within the following ranges: Power (0-2000 mW), Time on/pulse (0-1000ms), Time off/pulse (0-1000ms), and Pulses/trigger (0-10000). The values for all parameters within each stage can be seen in the table below.

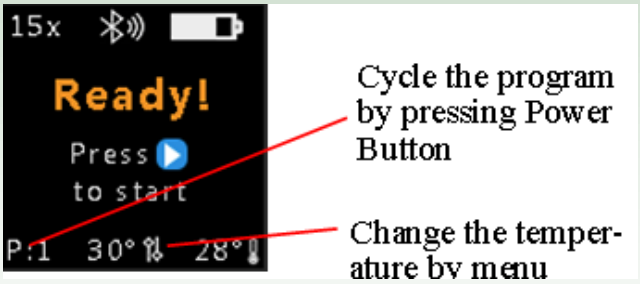


Stage	Power (mW)	Time on/pulse (ms)	Time off/pulse (ms)	Pulses/trigger
1	100	1000	1000	1
2	500	500	500	4
3	100	1000	0	1
4	750	500	1000	2
5	1000	1000	500	5

- After programming one stage, the user may press the green Stage button to go to the next stage. Pressing the stage button will cycle through all 5 stages and back to the beginning.
- When programming is complete, press the Start/Stop Button to confirm the changes and exit the laser setting. Once the programming is set, the system will keep these setting stored indefinitely. User can program all 6 programs as he/she sees fit.

7. Start to treat

- To start the treatment, the user needs to mount the laser device properly then put the laser into ready mode. Press the Start/Stop Button to set the laser into ready mode, and then press Start/Stop Button again to start the laser program treatment. Note the device may first adjust the temperature of the laser then automatically run the laser program.



8. Charging

- It is strongly recommended that the laser device be plugged in at all times during programming and laser operation. The device does have internal batteries that allow for wireless use, however, the temperature and wavelength tuning only work when the device is plugged in.

SN500 Temperature vs Wavelength Graph

SN 500	Power level 1		Power level 2		Power level 3		Power level 4		Power level 5	
Power Targert	100mW		500mW		1000mW		1500mW		2000mW	
Temperature	Wavelenght (nm)	Real Temperature	Wavelenght (nm)	Real Temperat	Wavelenght (nm)	Real Temperature	Wavelenght (nm)	Real Temperature	Wavelenght (nm)	Real Temperature
10	1262	14	1263	14	N/A	N/A	N/A	N/A	N/A	N/A
15	1264	18	1265	18	1266	18	1269	19	1271	20
20	1269	22	1269	23	1271	23	1272	23	1273	24
25	1270	26	1271	26	1272	26	1273	27	1274	28
30	1272	31	1272	31	1273	31	1274	31	1275	32
35	1275	35	1274	35	1275	35	1277	36	1278	37
40	1276	40	1277	40	1277	40	1279	40	1280	41
45	1279	45	1278	45	1279	45	1282	46	1283	46
50	1280	50	1281	50	1283	50	1284	51	1286	51
55	1283	55	1284	55	1284	55	1287	55	1289	56
60	1285	59	1286	59	1288	60	1290	60	1292	60

Wavelength pickup table refers to excel SN500 pickup table Excel link

The following table allows for the user to determine the necessary operating temperature given the desired inputs. Filling in the ***green cells*** with the desired inputs will return the optimal operating temperature for the user within the ***blue cell***. (See spreadsheet for more information)

WaveLength (nm)
1275

Stage	Power (mW)	Time on/pulse(ms)	Time off/pulse(ms)	Pulses/trigger
1	100	1000	0	1
2	500	1000	0	1
3	1000	1000	0	1
4	1500	1000	0	1
5	2000	1000	0	1

Temperature
32.6

Fill in the table for all green cells

This the temperature the device should be set to

SN500 Spot Size

No collimation												
SN	Power (mW)	Distance (mm)	fwhm	**1/e2**	1%	Distance (mm)	fwhm	1/e2	1%	half angle (FWHM)	**half angle (1/e2)**	half angle(1%)
500	100	110	35.12	**56.69**	92.04	278	82.47	131.6	186.3	8.021449809	**12.56834295**	15.67070519
500	500	110	39.07	**59.89**	96.63	278	86.57	133.8	192.5	8.046528657	**12.40579201**	15.92489885
500	1500	110	39.23	**60.91**	99.5	278	96.61	135.8	193.5	9.691130498	**12.56509394**	15.62959559

F220SMA-C												
SN	Power (mW)	Distance (mm)	fwhm	**1/e2**	1%	Distance (mm)	fwhm	**1/e2**	1%	half angle (FWHM)	**half angle (1/e2)**	half angle(1%)
500	100	108	3.975	**6.469**	10.42	276	5.529	**9.72**	14.48	0.264991091	**0.554353473**	0.692290311
500	500	108	4.29	**6.98**	10.63	276	5.536	**9.97**	14.45	0.212470875	**0.509850771**	0.651370382
500	1500	108	4.139	**6.811**	10.68	276	5.433	**9.98**	14.58	0.220655869	**0.54037185**	0.665010434

The target spot size is dia. 6 mm. the full divergent angel is 1.02 degree (1/e2)

The ideal distant from object is **53 mm**

The spot size verification is dia. **6.2mm** @53mm distance

Power distribution