

785NM RAMAN PROBE ACCESSORIES

Operation and Installation Manual



NEED TECHNICAL SUPPORT?

Scan the QR-code or visit www.avantes.com/support

We are happy to help you!

Table of Content

1	Product Summary	2
2	Explanation of Symbols Used In This Manual & On Module	2
3	Laser Safety	3
4	Included Components	4
5	Laser Start-Up (controlling output power via front panel)	4
5.1	Laser Start-Up (External Power Control Mode)	9
5.2	Laser Shut Down	9
6	System Specifications	10
7	Dimensions	11
8	Warranty	12
9	Technical Support Contact Information	14



**Read Manual
Before Use**






1 Product Summary

The 785nm Integrated Raman Probe includes an integrated wavelength stabilized laser source with Raman filter packs, beam shaping optics and high efficiency Raman spectra collection optics.

The laser unit is a Class 3B laser product with laser emission at 785 nm and output power levels exceeding 350 mW. Extreme care should be taken when operating this unit to avoid potentially hazardous exposure to both eyes and skin. Users should wear eye protection when operating this unit and should avoid exposure to the output beam.

2 Explanation of Symbols Used In This Manual & On Module

The following table details the symbols placed on the module and in this manual, and their meanings:

Symbol	Description
	Identifies important information that should be read and thoroughly understood before operating the equipment.
	Laser Warning Label
	Explanatory label – Documents important information about equipment specifications and features.
	General Information Label – Provides information that may be helpful and documents IEC 60825-1 & FDA Compliance information
O	Symbol indicating “Off” position on a switch
I	Symbol indicating “On” position on a switch
	Protective Ground Symbol

3 Laser Safety

- ⚠ Caution – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- ⚠ Do not point laser or allow laser light to be directed or reflected toward other people or reflective objects.
- ⚠ Do not modify unit or remove protective covers or housings
- ⚠ Laser light emitted from this equipment may be sufficient to ignite some materials and initiate fire
- ⚠ Never operate laser if unit is defective or if safety covers, interlocks, and labels are damaged or missing.

This Laser Product is designated as Class 3B during all procedures of operation, maintenance and service.

Non Accessible Internal Laser Parameters:

Wavelength	785 nm
Laser Power for Classification	>350 mW
Beam Diameter	Focused Beam
Divergence	~12 degrees (after focus)
TE Mode / Beam profile	Multi-spatial mode
Mode of Operation	CW or Quasi CW if external modulation is applied

The use of laser safety goggles is required when operating this product.

Laser Safety Eyewear specifications:

- Optical density: ND5 or higher at 785 nm
- ND 1 or lower at 600 nm
- Top and side shield protection
- CE certified

- ⚠ Failure to wear appropriate eye protection may result in permanent eye damage

Suggested sources and model #'s:

- ThorLabs, Model #: LG9
- NoIR Lasershield, Model #: DI2, Model #: CYN or Model #: YAD

INVISIBLE LASER RADIATION

Additional helpful information may be found in ANSI Z136.1 “Standard For Safe Use of Lasers”. This document can be obtained at www.rli.com or www.laserinstitute.org

4 Included Components

The 785nm Integrated Raman Probe comes complete with an internal 350 mW spectrum stabilized laser module that contains an integral Thermo-Electric Cooler (TEC) and thermistor for monitoring the internal temperature of the laser platform. The unit comes complete with a laser enable switch for safety, an LED readout, an output power control dial, a safety key lockout, a remote interlock, and an emergency shut-off switch, Raman filter packs, beam shaping optics and high efficiency Raman spectra collection optics and a custom fiber optic cable with a FC/PC termination. Additionally the 785nm Integrated Raman Probe comes complete with a UL/CE, and IEC compliant control box providing a variety of power control options including TTL, analog, and USB.

5 Laser Start-Up (controlling output power via front panel)

The following steps and illustrations should be followed when starting the 785nm Integrated Raman Probe.

Caution—use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

1. Connect the DC power supply provided with the unit to the back of the control box.



2. Plug in the DC power supply into a standard 100 V – 240 V AC electrical outlet making sure that the Master Power key is set to the off (Vertical) position.



3. Connect the DB9 I/O cable of the probe into the front panel on the control box and secure with the thumbscrews.



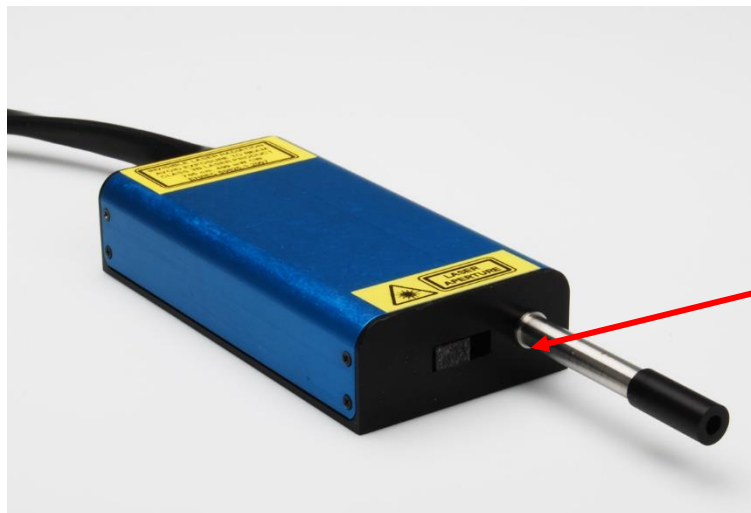
4. Insert the fiber optic cable from the probe into the FC/PC port of your spectrometer. Do not fully tighten the connector because you will need to rotate the fiber later.



5. If measuring solid samples attach the distance regulator to the tip of the probe shaft. This will reduce the working distance to ~0.5mm, allowing contact measurements.



6. Open the laser shutter.



**Open Laser
Shutter**

7. Place solid sample in contact with the distance regulator, or if using a liquid sample position the sample in front of the probe and adjust the position so that the liquid is ~9mm from the end of the probe shaft (without distance regulator).

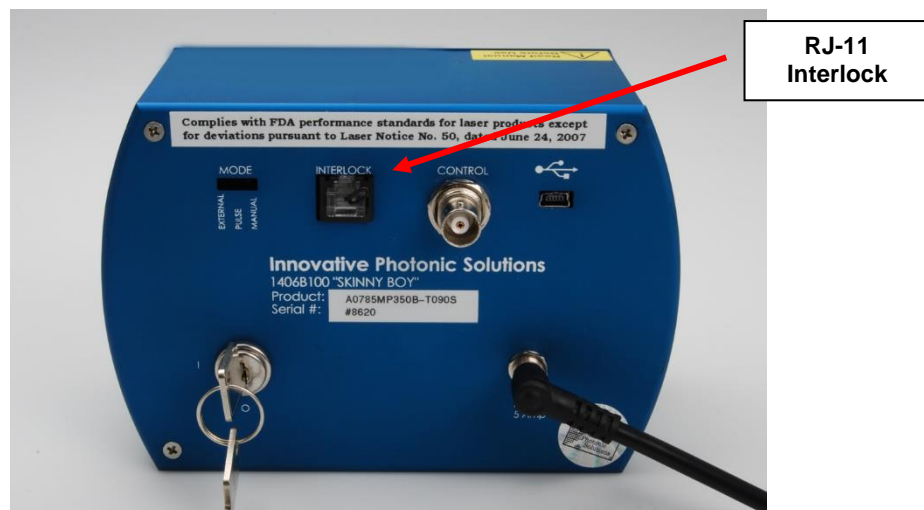


**Point Probe
at Sample**

8. Turn the key in the back of the unit to the on position, turn the dial on the front of the control box to the desired laser power (Note: the readout on the unit is in current, not power) and press the laser enable button to turn on the laser inside of the probe.



Note that this laser is configured with a remote interlock. IPS has provided an RJ-11 (4-pin telephone jack) that is pre-wired to provide a closed loop connection for the interlock. Removal of the RJ-11 connector or break in the closed loop circuit provided will result in a laser interrupt and the system will be reset to standby mode. Users may reconfigure the RJ-11 connector to provide a closed loop that interactively couples with their system or facility by replacing the short length of wire with longer closed loop connections if desired.



5.1 Laser Start-Up (External Power Control Mode)

Note: The laser unit is normally designed for operation by interacting with front panel controls, however users may wish to modulate or adjust the output power of the laser module in some circumstances. The unit is equipped with an external DC bias port located on the back panel of the module. The following steps should be taken if the user wishes to control the laser output power remotely via a signal generator or computer:

Caution—use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- 1) Ensure that the laser is not operating by pressing the laser ON switch and assuring that the laser on LED is not illuminated.
- 2) Switch the mode selection switch located on the back panel to the “External” position (the Amber operating mode LED labeled “External” will be illuminated).
- 3) Connect a BNC cable to the port labeled “Control” on the back panel. The user may apply a DC bias between 0 and 1.0 V to modulate the laser or to adjust the laser’s output power. 0 V corresponds to 0 power, 1.0 V corresponds to full power. The unit can be modulated at rates up to approximately 1 KHz.
- 4) Turn on the laser by momentarily depressing the Laser On switch on the front panel. The laser will now output a variable amount of output power that is dependent upon the DC bias voltage that has been applied to the Control port on the back panel.
- 5) The unit can also be controlled via USB using our LCU software with a graphical computer interface allowing the laser to be turned on and off. It also allows a percentage of the power to be set from 10 to 100%. The power is set by pulse width modulation (PWM) at around 1000 Hz.

5.2 Laser Shut Down

The following steps should be followed when shutting down the Laser Module.

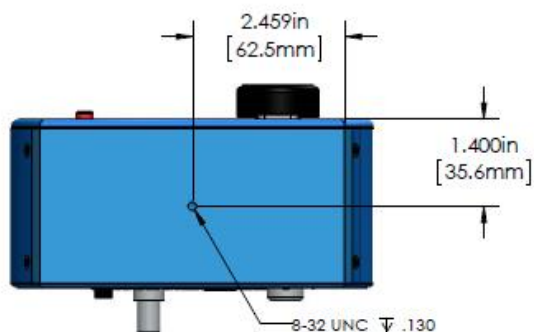
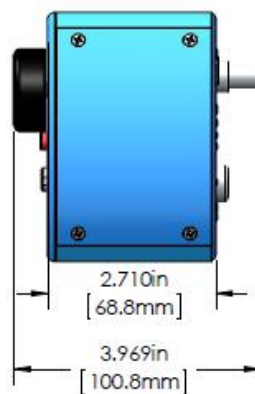
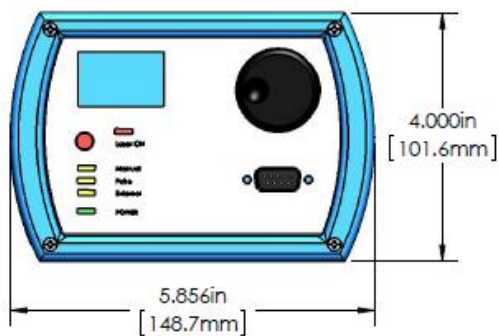
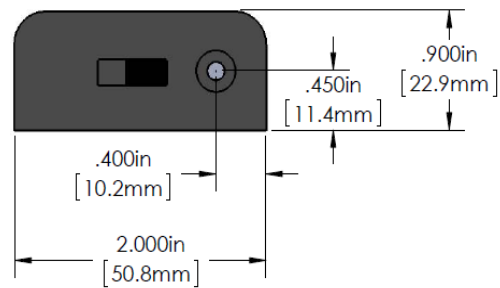
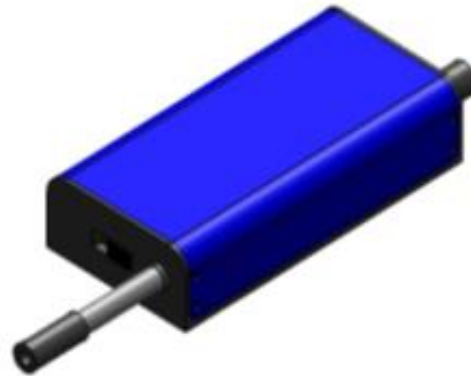
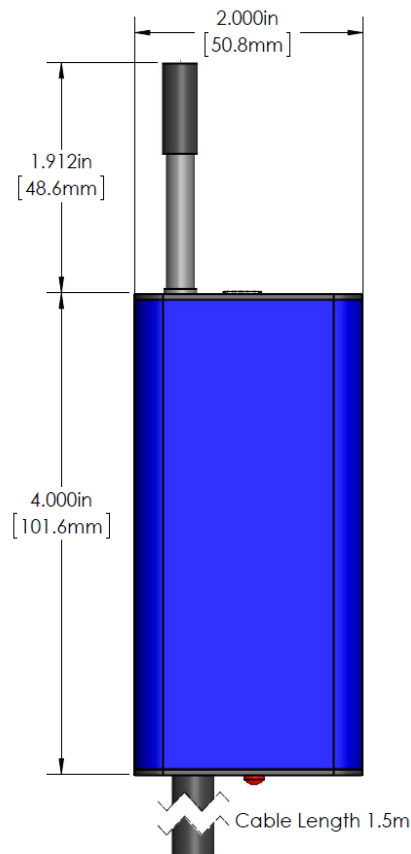
- 1) Depress the Laser On button on the front panel and assure that the Laser On LED is not illuminated.
- 2) Turn the master power key switch on the back panel counter clockwise from the horizontal “On” position to the vertical “Off” position.
- 3) Disconnect fiber patch cord and power cables as needed.

6 System Specifications

General Specifications	
Excitation	Integral 785nm wavelength stabilized laser with <0.15nm FWHM bandwidth
Collection	1.5m long, proprietary high throughput fiber with FC/PC male connector
Cut-on	200cm ⁻¹ cut-on
Electronic Connection	DB9 cable with safety interlock
Power Control	Manual power adjustment knob, Analog / TLL modulation via BNC connector, or MicroUSB
Power Supply	3 A, 5VDC
Shaft	1.6inch (40.5 mm) length by 0.25inch (6.35mm) diameter 316L Stainless Steel
Working Distance	9mm from shaft, or 0.5mm from distance regulator.
Operating Temperature	10 ⁰ C to 40 ⁰ C
Storage Temperature	-20 ⁰ C to 80 ⁰ C
Humidity	0 - 80% non-condensing

Parameter	Unit	Min	Typ	Max	Notes
Laser Optical output power	mW	350	450	495	
Output power stability	%		± 1		
Peak wavelength	nm	784.5	785	785.5	
3 dB bandwidth (FWHM)	nm		0.1	0.15	
Operating Temperature Range (Case)	Deg C	10		40	Case Temperature
Power Consumption	W		3	7	Case temp between 10 and 40 deg C
Wavelength Stability	Seconds			180	Cold Start - to < 1 wavenumber
				1	Warm Start - to < 1 wavenumber
				3	Warm Start - to < 0.1 wavenumber
Absolute Maximum Ratings					
Laser Module Operational Current	A		1	3	
Laser Module Operational Voltage	V	4.9	5	5.1	Compliance

7 Dimensions



8 Warranty

The unit is warranted against defects in materials and workmanship for a period of one year from date of shipment. During the warranty period, Avantes will, at its option, either repair or replace products which prove to be defective.

The unit does not contain any user serviceable components and does not require any preventative maintenance operations during the device lifetime. Opening, modification and or servicing of this unit is expressly prohibited and will result in nullification of product warranty. All necessary service and repair will be made at the Avantes facility upon request of a Return Material Authorization (RMA) request and return of the unit.

This warranty is in lieu of all other guarantees expressed or implied and does not cover incidental or consequential loss or improper operation/handling by operator.

Laser Safety and Compliance Labels:

1) Laser warning and Aperture label:

- Identifies location of output beam

Is located on the front panel of the module, immediately adjacent to the FC/PC bulkhead connector.



2) Class 3B laser explanatory label: The label detailing:

- Laser exposure warnings
- Laser wavelength and maximum output power levels
- Laser classification

is located on the top of the module in the front left hand corner.



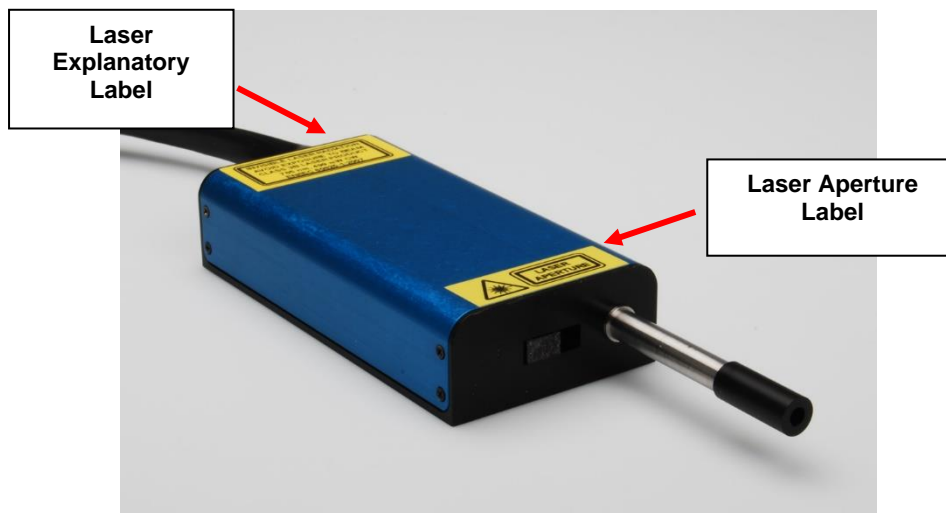
- 3) Manufacturers ID label : The label detailing:
Manufacturer's address & the date of manufacture of item
is located on the left hand panel of the module

INNOVATIVE PHOTONIC SOLUTIONS
4250 U.S. HIGHWAY 1, SUITE 1
Monmouth Junction, NJ 08852, USA

Manufactured: September 2010

- 4) Certification statement label: The label detailing:
- Compliance with FDA performance standards is located on the top center of the rear panel.

Complies with FDA performance standards for laser products except
For deviations pursuant to Laser Notice No. 50, dated June 24, 2007



- 5) Labeling indicating compliance with FDA performance standards can be found on the top section of the rear panel on the laser module above the master power key switch.
6) Labeling indicating model #, and Serial # of the unit is located on the back panel above the BNC modulation input port connector.

- 7) Labeling indicating date and location of manufacture can be found on the removable side panel (left hand side of the module when front panel faces forward)



9 Technical Support Contact Information

Questions regarding the use or operation of this product may be directed to:

Avantes BV
Email: support@avantes.com
Phone: +31 313 670 170