ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *VIAVI Solutions / JDSU VA5B* at our website: *Click HERE*

# VA5B AND VA6B SERIES
# PRECISION VARIABLE ATTENUATORS

**User's Manual**

JDS Uniphase

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# Contents


**Safety Information, Instructions, and Symbols ..... 1**

Safety Instructions ..... 1
Before Initializing and Operating the Unit ..... 1
Operating the Unit ..... 1
Safety Symbols ..... 3

**General Information and Specifications ..... 4**

General Information ..... 4
Optics ..... 5
Attenuation ..... 5
Linearity ..... 5
Insertion Loss ..... 5
Key Features ..... 5
Applications ..... 5
Standard Accessories ..... 6
Optional Accessories ..... 6
Specifications ..... 6

**Getting Started ..... 8**

Before Initializing and Operating the Unit ..... 8
Initial Inspection ..... 8
Operating Environment ..... 9
Temperature ..... 9
Humidity ..... 9
Storing and Shipping ..... 9
Claims and Repackaging ..... 9
Returning Shipments to JDS Uniphase ..... 9
Cleaning Connectors ..... 10

**Operating and Maintenance Instructions ..... 13**

External Description ..... 13
Using the Attenuator ..... 13
Displaying Total Attenuation ..... 15
Using the Attenuator at Other Wavelengths ..... 15
Attenuation Multipliers Based on Wavelength ..... 16
Using the Attenuator with Other Fibers ..... 21
Operating the Attenuator without a Battery ..... 22
Maintaining the Attenuator ..... 22
Cleaning the Connectors ..... 22
Cleaning Universal Connector Adapters ..... 22
Replacing the Battery ..... 23





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

*For sales and service information,*
*contact JDS Uniphase or your local representative.*

**JDS Uniphase Corporation**
**570 West Hunt Club Road**
**Nepean, Ontario, Canada**
**K2G 5W8**
**Phone: 613 727-1303**
**Fax: 613 727-8284**
**E-mail: sales@jdsunph.com**
**Website: http://www.jdsunph.com**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# PRODUCT WARRANTY

JDS Uniphase Inc. warrants only to the original Buyer that all products, other than Software, made by JDS Uniphase Inc. are free from defects in material and workmanship for a period of one (1) year from the date of shipment. The Furukawa Electric Co., Ltd., ("FEC") and Seikoh Giken Co. Ltd. ("SG") guarantee their products sold by JDS Uniphase Inc., to be free from defects in material and workmanship for a period of one (1) year from the date of shipment from JDS Uniphase Inc. All other products sold by JDS Uniphase Inc. as distributor carry only the original manufacturer's warranty.

Under warranty, JDS Uniphase Inc. will repair returned products or provide a replacement product at its sole option, for any product made by it, which upon inspection by JDS Uniphase Inc. and in the sole opinion of JDS Uniphase Inc., is determined to be defective in workmanship or material and has in fact failed. JDS Uniphase Inc. will accept for repair, replacement or credit under warranty products made by FEC and SG, and products made by third parties if authorized to do so. All products repaired or replaced under warranty are only warranted for the remaining unexpired period of time in the original warranty for the particular defective product. JDS Uniphase Inc., FEC and SG all reserve the right, at their sole option, to issue a credit note for any defective product as an alternative to repair or replacement. These warranties shall extend to any product which has proved defective and has failed through normal use, but excludes and does not cover any products or parts thereof which have been accidentally damaged, disassembled, modified, misused, used in applications which exceed their specifications or ratings, neglected, improperly installed or otherwise abused. Buyer must claim under the warranty in writing not later than thirty (30) days after the claimed defect is discovered. All claims under this warranty must be made by the Buyer and no claim will be accepted from any third party.

JDS Uniphase Inc. will only accept returns for which an approved Return Material Authorization (RMA) has been issued by JDS Uniphase Inc. Defective products shall be returned prepaid and insured to JDS Uniphase Inc. at the address shown herein. All products which have been returned to JDS Uniphase Inc. but which are found to meet all previously applicable specifications for such products, shall be subject to JDS Uniphase Inc.'s standard examination charge in effect at the time, which shall be charged to the Buyer. All products returned to JDS Uniphase Inc. which are not accompanied by an itemized statement of defects, shall be returned to the Buyer at the Buyer's expense and no evaluation of such products shall be carried out by JDS Uniphase Inc.

Where Goods contain software ("Software"), JDS Uniphase Inc. does not transfer ownership but only grants the Buyer a perpetual, non-exclusive license to use Software but restricted only to use related to the operation of the products. Such license is transferable only with the transfer of ownership of the product in which it is used. Except for backup copies as permitted by law, Buyer shall not (i) modify, reproduce, copy, reverse engineer, decompile or disassemble all or any portion of the Software, (ii) distribute, market, disclose, rent, lease or sublicense the use of the Software to any third party, or (iii) permit or authorize anyone within Buyer's reasonable control to do any acts in (i) or (ii). JDS Uniphase Inc. warrants that Software under normal use and service as originally delivered to Buyer will function substantially in accordance with the functional description set out in the product specification and/or user manual supplied with the Software for a period of 90 days from the date of shipment. JDS Uniphase Inc.'s sole liability and Buyer's sole remedy for a breach of this warranty shall be JDS Uniphase Inc.'s good faith efforts to rectify the nonconformity or, if after repeated efforts JDS Uniphase Inc. is unable to rectify the non-conformity, JDS Uniphase Inc. shall accept return of the Software and shall refund to you all amounts paid in respect thereof. This warranty is void if failure of the Software has resulted from accident, misuse, abuse, misapplication or modification.

SD000031 Rev. H July 1999

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Safety Instructions

The following safety instructions must be observed whenever the unit is operated, serviced, or repaired. Failure to comply with any of these instructions or with any precaution or warning contained in the user's manual is in direct violation of the standards of design, manufacture, and intended use of the unit. JDS Uniphase assumes no liability for the customer's failure to comply with any of these safety requirements.

### *Before Initializing and Operating the Unit*

☑ Inspect the unit for any signs of damage, and read the user's manual thoroughly.

☑ Install the unit as specified in the **Getting Started** section.

☑ Ensure that the unit and any devices or cords connected to it are properly grounded.

### *Operating the Unit*



**Warning**

To avoid the risk of injury or death, always observe the following precautions before initializing the unit:

- Never look into the end of an optical cable connected to an optical output device that is operating. Laser radiation is invisible, and direct exposure can severely injure the human eye. For more information, see the user's manual of the laser source in use.
- Turning off the power to the device does not always block the externally supplied radiation to the connector at the output of the unit.
- Do not use the unit outdoors.
- To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.
- Do not operate the unit when its covers or panels have been removed.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| | |
|---|---|
| | • Unless absolutely necessary, do not attempt to adjust or perform any maintenance or repair procedure when the unit is opened and connected to a power source.<br>• Repairs are to be carried out only by a qualified professional.<br>• Do not attempt any adjustment, maintenance, or repair procedure to the unit's internal mechanism if immediate first aid is not accessible.<br>• Do not perform any operating or maintenance procedure that is not described in the user's manual.<br>• Some of the unit's capacitors can be charged even when the unit is not connected to the power source. |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Safety Symbols

The following symbols and messages can be marked on the unit (Table 1). Observe all safety instructions that are associated with a symbol.

**Table 1: Safety Symbols**

| Symbol | Description |
|---|---|
|  | Laser safety. See the user's manual for instructions on handling and operating the unit safely. |
|  | See the user's manual for instructions on handling and operating the unit safely. |
|  | Electrostatic discharge (ESD). See the user's manual for instructions on handling and operating the unit safely. |
|  | Frame or chassis terminal for electrical grounding within the unit. |
|  | Protective conductor terminal for electrical grounding to the earth. |
| **WARNING** | **The procedure can result in serious injury or loss of life if not carried out in proper compliance with all safety instructions. Ensure that all conditions necessary for safe handling and operation are met before proceeding.** |
| **CAUTION** | The procedure can result in serious damage to or destruction of the unit if not carried out in compliance with all instructions for proper use. Ensure that all conditions necessary for safe handling and operation are met before proceeding. |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## General Information

This user's manual for the VA5B and VA6B Series Precision Variable Attenuators contains complete operating instructions. The inspection report and a description of any customer-requested information are found in the **Customized Features and Test Data** section.

The VA5B and VA6B Series Precision Variable Attenuators are portable instruments for system testing in the field as well as test and development applications in the laboratory (Figure 1). These attenuators provide highly accurate, continuously variable attenuation of 50 to 70 dB with calibration wavelengths of 830, 1300, or 1550 nm. Single-mode and multimode versions are available.



**Figure 1: VA6B Attenuator**

The VA5B attenuator is equipped with 3 mm cable pigtails, with or without connectors, of which most major types are available. The VA6B attenuator has the same package as the VA5B attenuator but has panel-mounted PC or APC universal connectors adapters (UCAs) supporting FC/PC, SC/PC and ST/PC, or FC/APC and SC/APC connector types.

The VA5B and VA6B Series attenuators are available with an analog option with high return loss and low spectral ripple for CATV AM systems. Attenuators with this option have extra-smooth wavelength response to avoid causing distortion, and they also have >60 dB return loss.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### *Optics*

The attenuators are based on JDS Uniphase's ultra-linear attenuator prism and highly reliable microlens technology, combined with a micrometer and electronic display of attenuation. The result is highly accurate, continuously variable attenuation, combined with low insertion loss and excellent return loss. The internal optics consist of two microlenses and an attenuating prism. The optics are bidirectional; therefore, either fiber port can be used as the input.

### *Attenuation*

As a function of displacement, the attenuation of the VA5B and VA6B attenuators is extremely linear, typically better than ± 0.02 dB above 3.0 dB. The nonlinear region found below 3.0 dB occurs when light from the input fiber only partially overlaps the attenuation region of the prism.

The attenuation of the prism results entirely from absorption; no reflection, scattering, or vignetting is employed. However, the attenuation is wavelength dependent.

### *Linearity*

The linearity of the attenuation is not affected by wavelength or environmental factors, such as temperature or humidity (non-condensing), within specified limits.

### *Insertion Loss*

The attenuation of the VA5B and VA6B attenuators does not include insertion loss.

### *Key Features*

- Highly precise attenuation
- 0.01 dB resolution
- Low insertion loss
- Return loss >60 dB
- Portable
- Long battery life
- UCAs available

### *Applications*

- Precise power control
- Receiver testing



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Field system testing
- Power meter linearity checks

***Standard Accessories***

- User's manual

***Optional Accessories***

- Carrying case

## Specifications

The following optical specifications describe the warranted characteristics of the unit (Table 2). Supplementary specifications describe the typical non-warranted performance of the unit (Table 3).

**Table 2: Optical Specifications**

| Parameter | 830 nm | 1300 nm | 1550 nm |
|---|---|---|---|
| Wavelength range[1]<br>SM<br>MM | <br>750–1000 nm<br>750–1700 nm | <br>1200–1700 nm<br>750–1700 nm | <br>1200–1700 nm<br>1200–1700 nm |
| Attenuation range[2]<br>SM<br>MM | <br>40 dB<br>70 dB | <br>60 dB<br>50 dB | <br>60 dB<br>60 dB |
| Insertion loss[2,3,4] | ≤1.5 dB | | |
| Return loss[3]<br>SM<br>SM, analog<br>MM, 50/125<br>MM, other | <br>>45 dB<br>>60 dB<br>>35 dB<br>>30 dB | | |
| Maximum optical input power | 200 mW | | |
| Attenuation resolution[2] | 0.01 dB | | |
| Attenuation accuracy[2,5,6] | ±0.1 dB or ±0.02 dB/dB, whichever is greater | | |
| Polarization dependent loss | ≤0.08 dB | | |

(table continued)



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Parameter | 830 nm | 1300 nm | 1550 nm |
|---|---|---|---|
| Repeatability | 0.02 dB | | |
| Connectors<br>VA5B<br>VA6B | pigtail mounted<br>bulkhead mounted universal PC or APC | | |
| Recalibration period (recommended) | two years | | |

[1] Recommended wavelength range for acceptable insertion loss and attenuation slope.
[2] At calibration wavelength.
[3] Not including connectors, if installed.
[4] Including bulkhead-mounted UCA, the VA6B unit has an insertion loss of ≤2.5 dB.
[5] Except below 3 dB attenuation, measured with a laser source.
[6] At constant temperature.

**Table 3: Other Specifications**

| | |
|---|---|
| **Electrical** | |
| Battery | 3 V lithium, type CR2 battery |
| Battery lifetime[1] | >6000 h |
| **Environmental** | |
| Operating temperature | 0 to 50 °C |
| Storage temperature | -40 to 60 °C |
| Humidity | maximum 95% RH up to 40 °C, 60% above 40 °C |

[1] With continuous display use.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The VA5B and VA6B Series Precision Variable Attenuators consists of the attenuator units with pigtails or connectors, depending on the model. A carrying case is optional.

### Before Initializing and Operating the Unit

☑ Inspect the unit for any signs of damage.

☑ Read the user's manual thoroughly, and become familiar with all safety symbols and instructions to ensure that the unit is operated and maintained safely.

### Initial Inspection



**Warning**

To avoid electrical shock, do not initialize or operate the unit if it bears any sign of damage to any portion of its exterior surface, such as the outer cover or panels.

Check that the unit and contents are complete:

1. Wear an anti-static wrist strap, and work in an electrostatic discharge (ESD) controlled area.
2. Inspect the shipping container for any indication of excessive shock to the contents, and inspect the contents to ensure that the shipment is complete.
3. Inspect the unit for structural damage that can have occurred during shipping.
4. Keep the packaging.

Immediately inform JDS Uniphase and, if necessary, the carrier if the contents of the shipment are incomplete, if the unit or any of its components are damaged or defective, or if the unit does not pass the initial inspection.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Operating Environment

In order for the unit to meet the warranted specifications, the operating environment must meet the following conditions for temperature and humidity.

### *Temperature*

The unit can be operated in the temperature range of 0 to 50 °C.

### *Humidity*

The unit can be operated in environments with up to 95% humidity (0 to 40 °C) and up to 60% humidity above 40 °C. Do not expose it to any environmental conditions or changes to environmental conditions that can cause condensation to form inside the unit.



**Warning**

- Do not use the unit outdoors.
- To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.

## Storing and Shipping

To maintain optimum operating reliability, do not store the unit in locations where the temperature falls below -40 °C or rises above 60 °C. Avoid any environmental condition that can result in internal condensation. Ensure that these temperature and humidity requirements can also be met whenever the unit is shipped.

### *Claims and Repackaging*

Immediately inform JDS Uniphase and, if necessary, the carrier, if

- The contents of the shipment are incomplete
- The unit or any of its components are damaged or defective
- The unit does not pass the initial inspection

In the event of carrier responsibility, JDS Uniphase will allow for the repair or replacement of the unit while a claim against the carrier is being processed.

### *Returning Shipments to JDS Uniphase*

JDS Uniphase only accepts returns for which an approved Return Material Authorization (RMA) has been issued by JDS Uniphase



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

sales personnel. This number must be obtained prior to shipping any material to JDS Uniphase. The owner's name and address, the model number and full serial number of the unit, the RMA number, and an itemized statement of claimed defects must be included with the return material.

Ship return material in the original shipping container and packing material. If these are not available, packaging guidelines are as follows:

1. Wear an anti-static wrist strap and work in an ESD controlled area.
2. Wrap the unit in anti-static packaging. Use anti-static connector covers, if applicable.
3. Pack the unit in a reliable shipping container.
4. Use enough shock-absorbing material (10 to 15 cm or 4 to 6 in on all sides) to cushion the unit and prevent it from moving inside the container. Pink poly anti-static foam is the best material.
5. Seal the shipping container securely.
6. Clearly mark FRAGILE on its surface.
7. Always provide the model and serial number of the unit and, if necessary, the RMA number on any accompanying documentation.
8. Ship the unit only to the address given at the beginning of this document.

## Cleaning Connectors



**Caution**

- Connecting damaged or dirty fibers to the unit can damage the connectors on the unit.
- Never force an optical connector. Some connectors have a ceramic ferrule that can easily be broken.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Optical cable ends need to be cleaned before using them with the unit

The following items are required for cleaning:

- Filtered compressed air or dusting gas (for example, Tech Spray Envi-Ro-Tech Duster 1671 gas, available from http://www.techspray.com/1671.htm)
- Lint-free pipe cleaners (for example, from 3M[1]) or lint-free swab
- Lint-free towels (for example, 10 x 10 cm or 4 x 4 in HydroSorb III wipers, available from http://www.focenter.com/acctech/hydrosobr_wipers.htm)
- Optical grade isopropyl alcohol or optical grade 200° ethanol (do not use rubbing alcohol, which contains 30% water)

To clean the connectors:

1. Blow the sleeve with filtered compressed air (Figure 2).

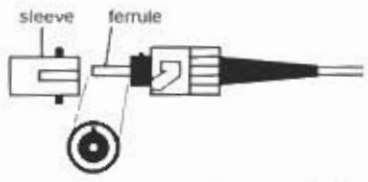



**Figure 2: Connector Cleaning (connector type can vary)**

2. Apply optical grade isopropyl alcohol or optical grade ethanol (do not use rubbing alcohol) to a small area of a lint-free towel and rub the end of the ferrule over the wet area.
3. Wipe the ferrule on a dry area of the lint-free towel.
4. Using the dusting gas or compressed air, blow the end of the ferrule.
5. Apply the alcohol or ethanol to a lint-free pipe cleaner or swab and wipe off the remaining parts of the connector.
6. With the other end of the pipe cleaner or swab, dry the areas cleaned.

[1] 3M is a trademark of 3M.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7. Using the dusting gas or compressed air, blow the areas cleaned.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## External Description

The unit is shown in Figure 3.

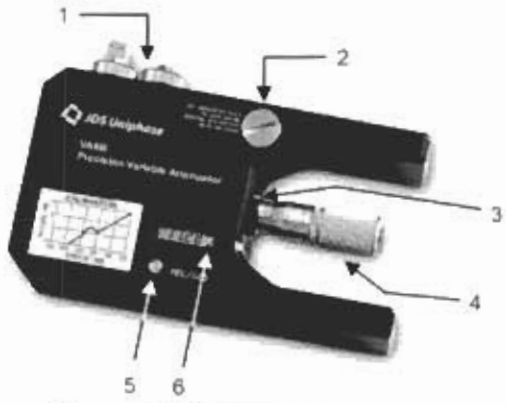



**Figure 3: VA6B Attenuator Details**

1. Input/output connectors or pigtails
2. Battery cover—provides access to the battery
3. Locking ring—locks the micrometer spindle
4. Micrometer spindle—sets the attenuation level
5. REL/ABS selection button—sets the displayed reading to a relative zero reading or sets the display to an absolute reading
6. Digital LCD—display is turned on by any movement of the micrometer spindle and automatically turns off after 30 minutes if the spindle is not moved

The attenuation level can only be changed by turning the micrometer spindle.

## Using the Attenuator

The VA5B and VA6B attenuators are designed to be used with a user-supplied light source.

The calibration label attached to the attenuator indicates minimum attenuation setting for that particular attenuator. For example, in the sample calibration curve shown in Figure 4, the minimum attenuation is -1 dB.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

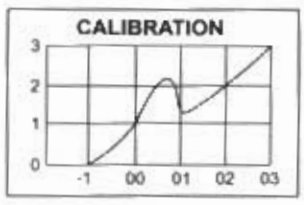



**Figure 4: Sample Calibration Label**

To incorporate the attenuator into the test system:

1. Connect the input and output ports as required (Figure 5).

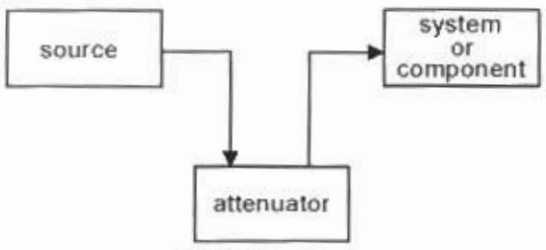



**Figure 5: Setup**

2. Route fiber cables in such a way as to avoid creating bends with a radius of less than 10 cm (4 in), for example, do not lay cables along sharp corners, and do not tie bundles of cables together tightly.

3. To set the attenuation to a level of 3.0 dB or greater, turn the micrometer spindle to the required setting.



**Caution**

Do not turn the micrometer spindle past a reading of 70 dB.

4. To set the attenuator to a level below 3.0 dB, refer to the correction curve on the calibration label attached to the attenuator (an example is shown in Figure 4).

5. To set the displayed reading to zero, press and hold the REL/ABS button for less than one second. The display is set to zero after a delay of one or two seconds. Setting the displayed



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

reading to zero enables relative measurements to be made without the need to subtract the starting backreflection value.

6. To return the display to the absolute value reading, press and hold the REL/ABS button for more than one second. The display resets after a delay of one or two seconds, and the message ABS is displayed.

Absolute attenuation is still available on the micrometer thimble (see the **Operating the Attenuator without a Battery** section).

### *Displaying Total Attenuation*

When the insertion loss is known, total attenuation (including insertion loss) can be displayed:

1. Set the display to ABS, dialing in the negative of the insertion loss, and then setting the display to relative (the ABS disappears and the display reads zero). Total attenuation is then accurately indicated on the display for values above the sum of the insertion loss plus the linearity point. The linearity point is the value on the calibration label above which the attenuation equals the indicated attenuation.

## Using the Attenuator at Other Wavelengths

The attenuating prism of the VA5B and VA6B attenuators is calibrated for use at 830 nm, 1300 nm, or 1550 nm and has an attenuation range of 0 dB to 50 dB or 60 dB. The attenuators can be used over a much wider wavelength range; however, both the attenuation and insertion loss vary with wavelength.

The wavelength multipliers for the various VA5B and VA6B attenuators (for example, 1300 nm single-mode, 1300 nm multimode) are listed in table format (see the **Attenuation Multipliers Based on Wavelength** section).

To correct for a wavelength other than the calibration wavelength:

1. Multiply the displayed reading by the multiplier for that wavelength (see Table 4).

For example, assuming that a single-mode attenuator with a calibration of 1550 nm is set at 10.0 dB and the wavelength of the light is 1300 nm, then the actual attenuation is 10.0 x 1.043, or



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

10.43 dB. If the attenuator is set at 20.0 dB (still using 1300 nm light), then the actual attenuation is 20.86 dB.

The insertion loss is approximately constant from 1300 to 1600 nm, but gradually increases as the wavelength is reduced to 830 nm.

### *Attenuation Multipliers Based on Wavelength*

The attenuating prism of the VA5B and VA6B attenuators is calibrated for use at 830 nm, 1300 nm, or 1550 nm. The attenuators can be used over a much wider wavelength range using the wavelength multipliers listed in Table 4. These multipliers are followed by curves showing the relationships (Figure 6 to Figure 9).

**Table 4: Wavelength Multipliers**

| Wavelength<br>nm | SM Cal.<br>at 1300 nm | MM Cal.<br>at 1300 nm | SM and MM Cal.<br>at 1550 nm | SM and MM Cal.<br>at 830 nm |
|---|---|---|---|---|
| 750 | | 1.74 | | 1.214 |
| 760 | | 1.701 | | 1.175 |
| 770 | | 1.665 | | 1.139 |
| 780 | | 1.631 | | 1.105 |
| 790 | | 1.598 | | 1.072 |
| 800 | | 1.581 | | 1.055 |
| 810 | | 1.562 | | 1.036 |
| 820 | | 1.545 | | 1.019 |
| 830 | | 1.526 | | 1 |
| 840 | | 1.51 | | 0.984 |
| 850 | | 1.5 | | 0.974 |
| 860 | | 1.49 | | 0.964 |
| 870 | | 1.481 | | 0.955 |
| 880 | | 1.475 | | 0.949 |
| 890 | | 1.47 | | 0.944 |
| 900 | | 1.466 | | 0.94 |
| 910 | | 1.461 | | 0.935 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Wavelength<br><br>nm | SM Cal.<br><br>at 1300 nm | MM Cal.<br><br>at 1300 nm | SM and MM Cal.<br><br>at 1550 nm | SM and MM Cal.<br><br>at 830 nm |
|---|---|---|---|---|
| 920 | | 1.46 | | 0.934 |
| 930 | | 1.455 | | 0.929 |
| 940 | | 1.454 | | 0.928 |
| 950 | | 1.448 | | 0.922 |
| 960 | | 1.442 | | 0.916 |
| 970 | | 1.437 | | 0.911 |
| 980 | | 1.433 | | 0.907 |
| 990 | | 1.426 | | 0.9 |
| 1000 | 0.761 | 1.419 | 0.804 | 0.893 |
| 1010 | 0.764 | 1.413 | 0.807 | 0.887 |
| 1020 | 0.767 | 1.407 | 0.81 | 0.881 |
| 1030 | 0.771 | 1.399 | 0.814 | 0.873 |
| 1040 | 0.776 | 1.39 | 0.819 | 0.864 |
| 1050 | 0.783 | 1.38 | 0.826 | 0.854 |
| 1060 | 0.791 | 1.369 | 0.834 | 0.843 |
| 1070 | 0.801 | 1.358 | 0.844 | 0.832 |
| 1080 | 0.812 | 1.348 | 0.855 | 0.822 |
| 1090 | 0.823 | 1.337 | 0.866 | 0.811 |
| 1100 | 0.836 | 1.324 | 0.879 | 0.798 |
| 1110 | 0.85 | 1.312 | 0.893 | 0.786 |
| 1120 | 0.865 | 1.298 | 0.908 | 0.772 |
| 1130 | 0.88 | 1.284 | 0.923 | 0.758 |
| 1140 | 0.895 | 1.268 | 0.938 | 0.742 |
| 1150 | 0.909 | 1.253 | 0.952 | 0.727 |
| 1160 | 0.925 | 1.238 | 0.968 | 0.712 |
| 1170 | 0.939 | 1.224 | 0.982 | 0.698 |
| 1180 | 0.952 | 1.208 | 0.995 | 0.682 |
| 1190 | 0.964 | 1.192 | 1.007 | 0.666 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Wavelength<br><br>nm | SM Cal.<br><br>at 1300 nm | MM Cal.<br><br>at 1300 nm | SM and MM Cal.<br><br>at 1550 nm | SM and MM Cal.<br><br>at 830 nm |
|---|---|---|---|---|
| 1200 | 0.977 | 1.176 | 1.02 | 0.65 |
| 1210 | 0.988 | 1 159 | 1.031 | 0.633 |
| 1220 | 0.998 | 1.142 | 1.041 | 0.616 |
| 1230 | 1.005 | 1.124 | 1.048 | 0.598 |
| 1240 | 1.01 | 1.107 | 1.053 | 0.581 |
| 1250 | 1.014 | 1.09 | 1.057 | 0.564 |
| 1260 | 1.015 | 1.073 | 1.058 | 0.547 |
| 1270 | 1.014 | 1.055 | 1.057 | 0 529 |
| 1280 | 1.012 | 1.036 | 1.055 | 0.51 |
| 1290 | 1.006 | 1.018 | 1.049 | 0.492 |
| 1300 | 1 | 1 | 1.043 | 0.474 |
| 1310 | 0.993 | 0.983 | 1.036 | 0.457 |
| 1320 | 0.984 | 0.965 | 1.027 | 0.439 |
| 1330 | 0.976 | 0.948 | 1.019 | 0.422 |
| 1340 | 0.967 | 0.932 | 1.01 | 0.406 |
| 1350 | 0.96 | 0.915 | 1.003 | 0.389 |
| 1360 | 0.954 | 0.9 | 0.997 | 0.374 |
| 1370 | 0.951 | 0.885 | 0.994 | 0.359 |
| 1380 | 0.949 | 0.871 | 0.992 | 0.345 |
| 1390 | 0.948 | 0.859 | 0.991 | 0.333 |
| 1400 | 0.95 | 0.846 | 0.993 | 0.32 |
| 1410 | 0.951 | 0.833 | 0.994 | 0.307 |
| 1420 | 0.954 | 0.821 | 0.997 | 0.295 |
| 1430 | 0.961 | 0.811 | 1.004 | 0.285 |
| 1440 | 0.967 | 0.8 | 1.01 | 0.274 |
| 1450 | 0.972 | 0.79 | 1.015 | 0.264 |
| 1460 | 0.977 | 0.78 | 1.02 | 0.254 |
| 1470 | 0.981 | 0.771 | 1.024 | 0.245 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Wavelength<br><br>nm | SM Cal.<br><br>at 1300 nm | MM Cal.<br><br>at 1300 nm | SM and MM Cal.<br><br>at 1550 nm | SM and MM Cal.<br><br>at 830 nm |
|---|---|---|---|---|
| 1480 | 0.981 | 0.763 | 1.024 | 0.237 |
| 1490 | 0.981 | 0.756 | 1.024 | 0.23 |
| 1500 | 0.983 | 0.749 | 1.026 | 0.223 |
| 1510 | 0.98 | 0.743 | 1.023 | 0.217 |
| 1520 | 0.973 | 0.739 | 1.016 | 0.213 |
| 1530 | 0.97 | 0.734 | 1.013 | 0.208 |
| 1540 | 0.963 | 0.729 | 1.006 | 0.203 |
| 1550 | 0.957 | 0.725 | 1 | 0.199 |
| 1560 | 0.95 | 0.722 | 0.993 | 0.196 |
| 1570 | 0.945 | 0.72 | 0.988 | 0.194 |
| 1580 | 0.94 | 0.718 | 0.983 | 0.192 |
| 1590 | 0.936 | 0.717 | 0.979 | 0.191 |
| 1600 | 0.935 | 0.716 | 0.978 | 0.19 |
| 1610 | 0.9353 | 0.7153 | 0.9783 | 0.1893 |
| 1620 | 0.9362 | 0.7142 | 0.9792 | 0.1882 |
| 1630 | 0.9388 | 0.7143 | 0.9818 | 0.1883 |
| 1640 | 0.9445 | 0.7143 | 0.9875 | 0.1883 |
| 1650 | 0.9519 | 0.7139 | 0.9949 | 0.1879 |
| 1660 | 0.96 | 0.7141 | 1.003 | 0.1881 |
| 1670 | 0.9681 | 0.7148 | 1.0111 | 0.1888 |
| 1680 | 0.977 | 0.7164 | 1.02 | 0.1904 |
| 1690 | 0.9854 | 0.718 | 1.0284 | 0.192 |
| 1700 | 0.9939 | 0.7201 | 1.0369 | 0.1941 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com




**Figure 6: Single-Mode 1300 nm Mulitpliers**




**Figure 7: Multimode 1300 nm Multipliers**




**Figure 8: Single-Mode and Multimode 1550 nm Multipliers**

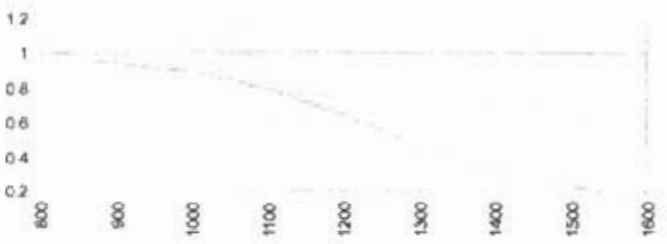



**Figure 9: Single-Mode and Multimode 830 nm Multipliers**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Using the Attenuator with Other Fibers

Multimode VA5B and VA6B attenuators can be connected to fibers other than the installed fiber provided that the fiber that transmits the light to the attenuator is larger in either core diameter or NA than the internal fiber of the attenuator.

If the fiber connected to the output of the attenuator has either a smaller core or smaller NA than the internal fiber, then the resulting mismatch makes the insertion loss appear higher than normal. The opposite conditions, for example, a smaller input fiber or larger output fiber reduces the insertion loss slightly or has no affect on the insertion loss, respectively.

Connecting to other fiber types generally does not affect the calibration and accuracy of the attenuator, except in the region between 0 dB and 3 dB. In this range, increasing the NA of the light going into the attenuator (by using a large NA input fiber) generally smooths the curve. Restricting the NA of the light passing through the attenuator (by using a low NA input) generally makes the curve less smooth.

Using mismatched fibers can lead to modal noise effects. Modal noise can result either from modes being partially excluded or from light being selectively coupled into a different mode.

Mode exclusion occurs when all of the light from the input fiber is not coupled into the output fiber. Typically, this exclusion occurs at a large-to-small fiber transition or from a lossy coupling between two identical fibers. Mode coupling occurs when the modes in an underfilled fiber are coupled into higher order modes. An underfilled fiber generally results from a small-to-large fiber transition.

With the existence of either of these conditions, otherwise unnoticeable physical perturbations can cause a change in the amount of light that finally reaches the detector, resulting in noise. The most likely symptom of this effect in low-speed systems is a change in the power level at the receiver when the output fiber is touched or moved.

In high-speed systems, the symptoms can be fluctuations in received power or an increase in receiver noise. Both effects can be enhanced by downstream connectors and tend to be more noticeable at higher bit rates. These effects can be minimized by ensuring that all fibers are immobilized and placed in a quiet area away from any source of vibration.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Modal noise effects can result anytime two dissimilar fibers are connected together and are not due to the attenuator in particular.

## Operating the Attenuator without a Battery

The VA5B and VA6B attenuators can be operated without a battery:

1. Set the micrometer spindle to the required attenuation level.
2. Multiply the micrometer spindle reading by 100.

The zero setting (0.000) on the micrometer spindle is equal to 0 on the calibration curve chart.

## Maintaining the Attenuator

The connectors need to be cleaned regularly.

### *Cleaning the Connectors*

Clean all connector plugs with a lint-free tissue and denatured alcohol before every mating. See the **Cleaning Connectors** section.

### *Cleaning Universal Connector Adapters*

Clean the UCAs periodically:

1. Remove each UCA:
   - Rotate the collar counterclockwise 45° until it comes into contact with the stop (Figure 10).
   - Pull the adapter out of the center of the collar. There can be some resistance due to the alignment sleeve gripping the ferrule of the inner connector. If so, insert a connector.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

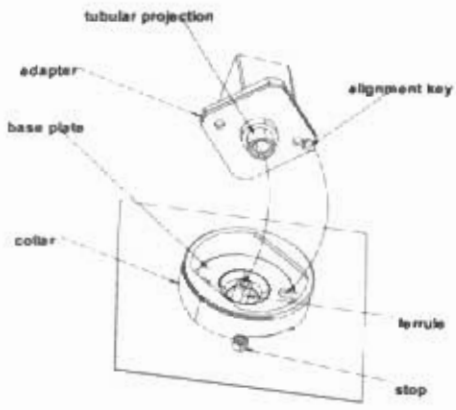



**Figure 10: UCA**

2. Clean the adapter and the ferrule:
   - Push a lint-free swab dampened with denatured alcohol through the adapter.
   - Wipe all sides of the ferrule and its endface with a lint-free tissue dampened with denatured alcohol.

3. Reinstall the UCA:
   - Lift and rotate the collar counterclockwise until it comes into contact with the stop.
   - Align the key on the bottom surface of the adapter with the slot on the outer edge of the base plate inside the collar.
   - Guide the tubular projection over the exposed end of the UCA ferrule and fully insert it. Ensure that the key is seated in the slot.
   - Rotate the collar 45° clockwise.

## Replacing the Battery

The VA5B and VA6B attenuators are powered by one 3 V, lithium, type CR2 battery. With continuous use, the expected lifetime of the battery is approximately 6000 hours. Power-saving circuitry extends this period to about two years if the instrument is used only occasionally. The LCD begins to dim as the battery loses power. When this occurs, replace the battery.

The actual attenuation is not affected by a low or dead battery.

To replace the battery:



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1. Set the micrometer spindle to a reading of 0.000. This action sets the prism to its calibrated zero position.

2. Lock the micrometer spindle by rotating the locking ring clockwise (when viewed from the end of the micrometer spindle).

3. Remove the battery cover.

4. Remove the used battery and replace it with a new battery, ensuring that the positive end of the battery faces down.

5. Reinstall the battery cover. If ABS 00.00 dB is not displayed within 10 seconds, repeat steps 3, 4, and 5 until this message is displayed.

6. Unlock the micrometer spindle.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Test Data

Date: June 13, 2001

Model Number: VA5B71+1KFP0

Serial Number: ME029642

| | 1550 nm | Units |
|---|---|---|
| Insertion Loss | - 1.25 | dB |
| Maximum Attenuation | >60.0 | dB |
| Return Loss | >45.0 | dB |

Inspection: *Shirley Wilkinson*



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP