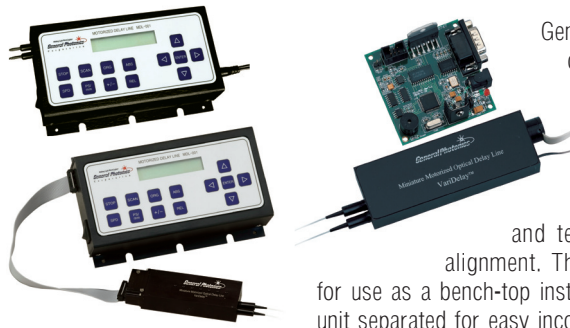


Timing/Delay Modules

Motorized Variable Optical Delay Line – VariDelay™ II



General Photonics' motorized variable optical delay line provides precision optical path length adjustment of up to 560 ps, single-pass. Driven by a DC motor with an integrated encoder, the MDL-002 has a resolution of less than 0.3 μ m (1 fs). In addition, its advanced motion design guarantees longevity for long-term continuous operation. Low insertion loss and high reliability make this device ideal for integration in optical coherence tomography (OCT) systems, network equipment and test instruments for precision optical path length control or timing alignment. The MDL-002 is available in three configurations: 1) an integrated unit for use as a bench-top instrument for laboratory applications, 2) with the optical head and control unit separated for easy incorporation into other equipment, and 3) an OEM version with a miniature controller board. All three versions can be remote controlled by a PC or a micro-processor through an RS-232 interface. The delay line is available with either single mode or PM fiber pigtailed.

Specifications:

Operating Wavelength ¹	SM: 1260 to 1650 nm PM or double-pass: 1310 \pm 50 or 1550 \pm 50 nm	1060 \pm 50nm
Optical Delay Range ²	0 – 330 ps (single-pass model) 0 – 560 ps (single-pass model) 0 – 1120 ps (double-pass model)	0 – 330 ps (single-pass model) 0 – 560 ps (single-pass model)
Position Accuracy ³	\pm 3 μ m (single-pass) \pm 6 μ m (double-pass)	\pm 3 μ m (single-pass)
Position Repeatability ³	\pm 3 μ m (single-pass) \pm 6 μ m (double-pass)	\pm 3 μ m (single-pass)
Insertion Loss	1.0 dB nominal (single-pass) 1.5 dB nominal (double-pass)	1.5 dB nominal (single-pass)
Insertion Loss Variation	\pm 0.3 dB over entire range for 330 ps models \pm 0.5 dB over entire range for 560 ps model \pm 0.7 dB over entire range for 1120 ps model	\pm 0.3 dB over entire range for 330 ps models \pm 0.5 dB over entire range for 560 ps model
Optical Delay Resolution	0.3 μ m or 1 fs per encoder count (single-pass) 0.6 μ m or 2 fs per encoder count (double-pass)	
PDL	0.1 dB max for single-mode fiber	
Return Loss	50 dB	
Extinction Ratio	> 18 dB for PM model	
Optical Damage Power Threshold	300 mW	
Power Supply	12 VDC / 1A max.	
Control Mode	Panel keypad and RS-232 interface	
Display	2 x 16 character LCD	
Operating Temperature	0 °C to 40 °C	
Storage Temperature	-20 °C to 60 °C	
Fiber Type	SMF-28 or PM Panda fiber	HI1060 or PM 980 Panda fiber
Dimensions (Control Unit/Integrated Version)	330 ps model: 7" (L) x 4" (W) x 1.6" (H) 560 ps or 1120 ps models: 9" (L) x 4.4" (W) x 1.6" (H)	330 ps model: 7" (L) x 4" (W) x 1.6" (H) 560 ps model: 9" (L) x 4.4" (W) x 1.6" (H)
Dimensions (Optical Head)	330 ps model: 5.20" (L) x 1.46" (W) x 0.7" (H) 560 ps or 1120 ps models: 6.18" (L) x 1.46" (W) x 0.7" (H)	330 ps model: 5.20" (L) x 1.46" (W) x 0.7" (H) 560 ps model: 6.18" (L) x 1.46" (W) x 0.7" (H)
Dimensions (Mini Controller Board)	2.56" (L) x 2.56" (W) x 0.85" (H)	

Notes: Values in table are valid over a 1060 \pm 50, 1310 \pm 50 or 1550 \pm 50nm range for a device without connectors.

1. Other wavelengths, also available.

2. The 1120 ps model is a double-pass device. Since input and output signals travel on the same pigtail, a circulator or PBS may be necessary to separate input and output signals for some applications. Double-pass versions not available for 1060nm.

3. Accuracy and repeatability specifications given for mechanical position of reflector at static position setting.



Motorized Variable Optical Delay Line – VariDelay™ II

Features:

- Compact
- High resolution
- Low backlash
- Low insertion loss
- High stability
- Highest delay to length ratio
- Long delay: more than 560 ps

Applications:

- Optical Coherence Tomography (OCT)
- Optical Fourier spectrum analysis
- Optical interferometry
- Delay generation and measurement
- Optical time division multiplexing (OTDM)
- Fiber sensors

Typical Performance Data:

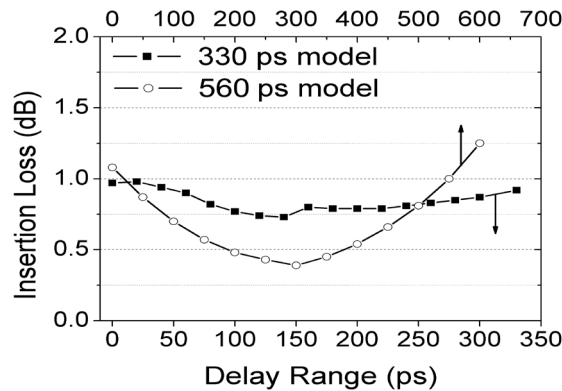
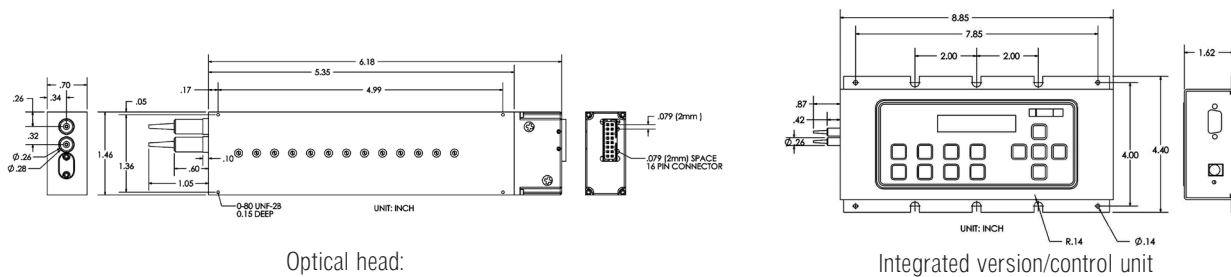
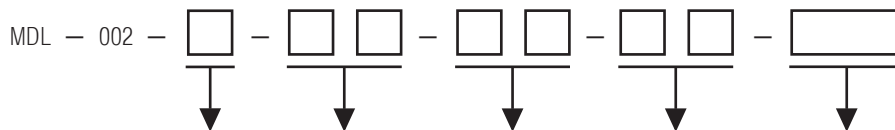


Figure 1. Insertion loss vs. optical delay.

Dimensions: (Representative drawings: 560 ps version, in inches)



Ordering Information:



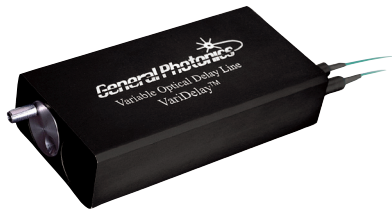
Configuration:	Wavelength:	Delay Range:	Fiber Type:	Connector Type:
I = integrated	10 = 1060 nm	33 = 330 ps	SS = SM	FC/PC, FC/APC
D = Remote head/ standard controller	13 = 1310 nm	56 = 560 ps	PP = PM Panda	SC/PC, SC/APC or
O = Remote head/ mini controller board	15 = 1550 nm	11 = 1120 ps		NC = no connectors
	35 = 1310 & 1550 nm			Others specify

Configuration Notes:

1. For SM pigtails, the default configuration is 3mm jacketed. For PM pigtails, the default configuration is 900µm loose tube jacketed.
2. Wavelength: 35 option (dual window 1310/1550nm) is available only for SM single-pass devices (330 and 560 ps). PM or double-pass devices are single-window (1310 or 1550nm) only.
3. Double-pass only available with SM fiber.
4. Double-pass not available for 1060nm.

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Manual Variable Optical Delay Line – VariDelay™ I



General Photonics' manual variable optical delay line provides precision optical path variation of more than 18 cm (600 ps). The compact, rugged design makes the device ideal for integration in network equipment, test instruments, and optical coherence tomography (OCT) systems for precision optical path length or timing alignment.

Specifications:

Operating Wavelength Range ¹	SM: 1260 to 1650 nm PM or double-pass: 1310 ± 50 or 1550 ± 50 nm
Optical Delay Range ²	0 – 330 ps (single-pass model) 0 – 600 ps (single-pass model) 0 – 1200 ps (double-pass model)
Readout Scale Resolution	0.05 mm
Insertion Loss	1.0 dB nominal (single-pass) 1.5 dB nominal (double-pass)
Insertion Loss Variation	±0.3 dB over entire range for 330 ps model ±0.5 dB over entire range for 600 ps model ±0.7 dB over entire range for 1200 ps model
Return Loss	50 dB
Extinction Ratio	> 18 dB for PM model
Optical Power Handling	300 mW min.
Operating Temperature	0 to 40 °C
Storage Temperature	-40 to 60 °C
Fiber Type	SMF-28, or PM Panda fiber
Dimensions	330 ps model: 4.2" (L) × 2.1" (W) × 1.0" (H) 600 or 1200 ps models: 6.0" (L) × 2.1" (W) × 1.0" (H)

Notes: Values in table are valid over a 1310 ± 50 or 1550 ± 50nm range for a device without connectors

1. Other wavelengths, such as 1064 nm, also available.

2. The 1200 ps model is a double-pass device. Since input and output signals travel on the same pigtail, a circulator or PBS may be necessary to separate input and output signals for some applications.

Features:

- Space Efficient
- Highest delay to length ratio
- Long delay: more than 600 ps
- Low insertion loss variation
- Rugged design

Applications:

- Optical Coherence Tomography (OCT) systems
- Passive time division multiplexing
- TDM bit alignment
- Fiber interferometers

Accessories:

NoTail™ Isolator	p. 91
NoTail™ Polarizer	p. 90
NoTail™ Circulator	p. 92

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Typical Performance Data:

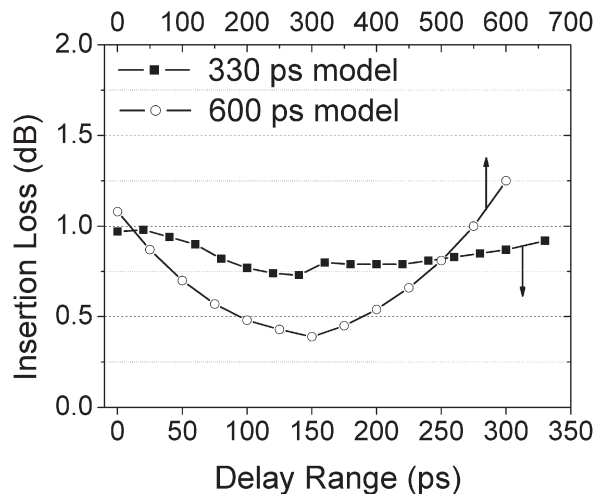
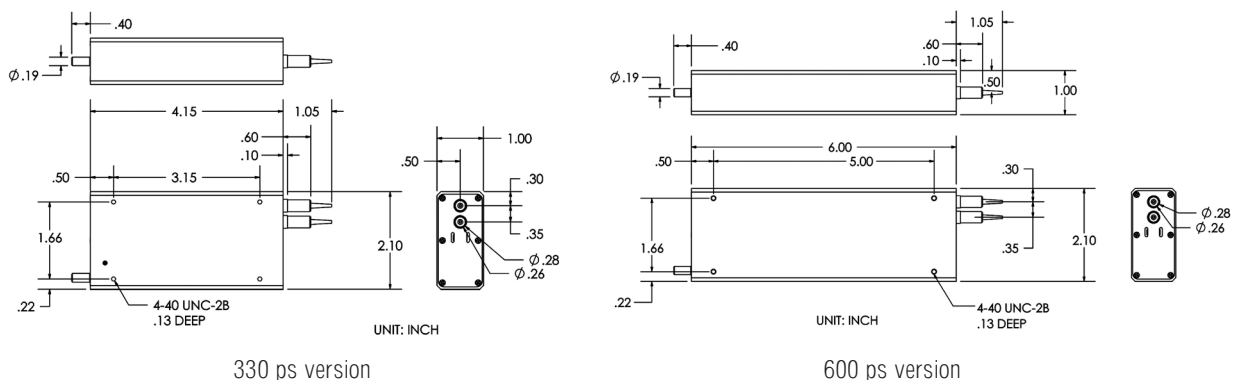
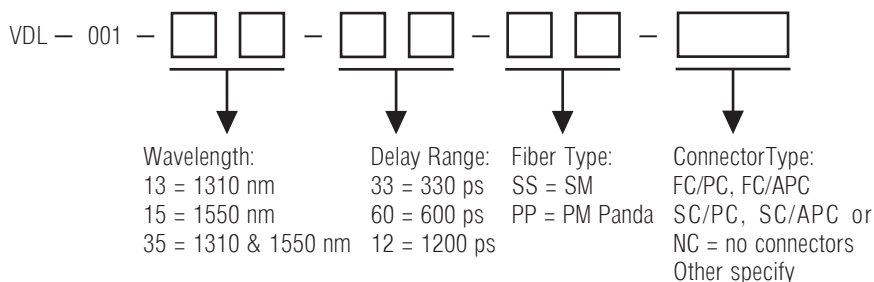


Figure 1. Insertion loss vs. optical delay.

Dimensions (in inches):



Ordering Information:



Notes:

- For SM pigtails, the default configuration is 3mm jacketed. For PM pigtails, the default configuration is 900µm loose tube jacketed.
- Wavelength: 35 option (dual window 1310/1550nm) is available only for SM single-pass devices (330 and 600 ps). PM or double-pass devices are single-window (1310 or 1550nm) only.
- Double pass only available with SM fiber.