Variable Optical Delay – Motor Driven

(High Precision 0.5μm, High Speed , Dealy Up To 4000ps, 500- 2000nm SM, PM, MM, Bidirectional)

DATASHEET

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Features

- Low Cost
- Low Loss
- Fast
- Wide Range
- High Resolution
- High Reliability
- Easy to Use

Applications

- PMD Compensation
- OCT
- Interferometer
- Spectroscopy
- Lab use

The MDTD Series of Variable Optical Time Delay uses a highly stable moving stage with a novel backlash prevention mechanism and incorporates proprietary optical encoders, offering submicron repeatability, long delay range, low loss, high speed, and compatibility with all wavelengths and all type fibers including SM, MM, and PM. It consists of two specially designed low-loss collimators, through which light from an input fiber is projected into free space, reflected by a movable retroreflector, and collected by an output fiber collimator. The variable time delay is achieved by adjusting the distance the light travels in free space. A precision step motor with adjustable speed moves the retroreflector. Conveniently, the device can be controlled via a computer using a USB cable interface, with graphical control software provided for intuitive operation.

The unit features an all-in-one design with integrated driving electronics housed inside, making it compact and easy to deploy.

Specifications

Parameter		Min	Typical	Max	Unit
Operation Central Wavelength		500	1550	2000	nm
Wavelength Range			±50		nm
Insertion Loss [1][2]	330ps		1.0	1.6	dB
	660ps		1.0	1.8	
	1200ps		1.5	2.8	
	4000ps		5.5	7	
Return Loss [2]		55			dB
Loss Change			0.3	0.5	dB
PDL (SM Fiber)				0.2	dB
Max Speed [3]	330ps		~67		ps/s
	660ps		~130		
	1200ps		~240		
	4000ps		~450		
Position Repeatability/Accuracy		±0.5	±0.7	±1	μm
Polarization Extinction Ratio (PM Fiber)		18	22	40	dB
Delay Resolution		±0.1	±0.2	±0.3	μm
Optical Power Handling			0.5 [4]	5	W
Durability (Life cycle)		10^6			
Operating Temperature		0		70	°C
Storage Temperature		-40		85	°C
Fiber Type		SM, PM, MM			

Notes:

[1]. Excludes connectors, Measured at 1550 nm

[2]. Tested with SM and PM fiber version only. For MM version, IL highly depends on CPR of light source and delay range, minimum RL 35dB.

[3]. Speed Variable with GUI setting

[4]. For fiber core size >9 μm. For fiber core size <9 μm, the power handling reduces. High Power version available upon request

Equation to convert delay time to free space length:

$$T = L/C = L\ (m)/(2.9996 \times 10^8 m/s)$$

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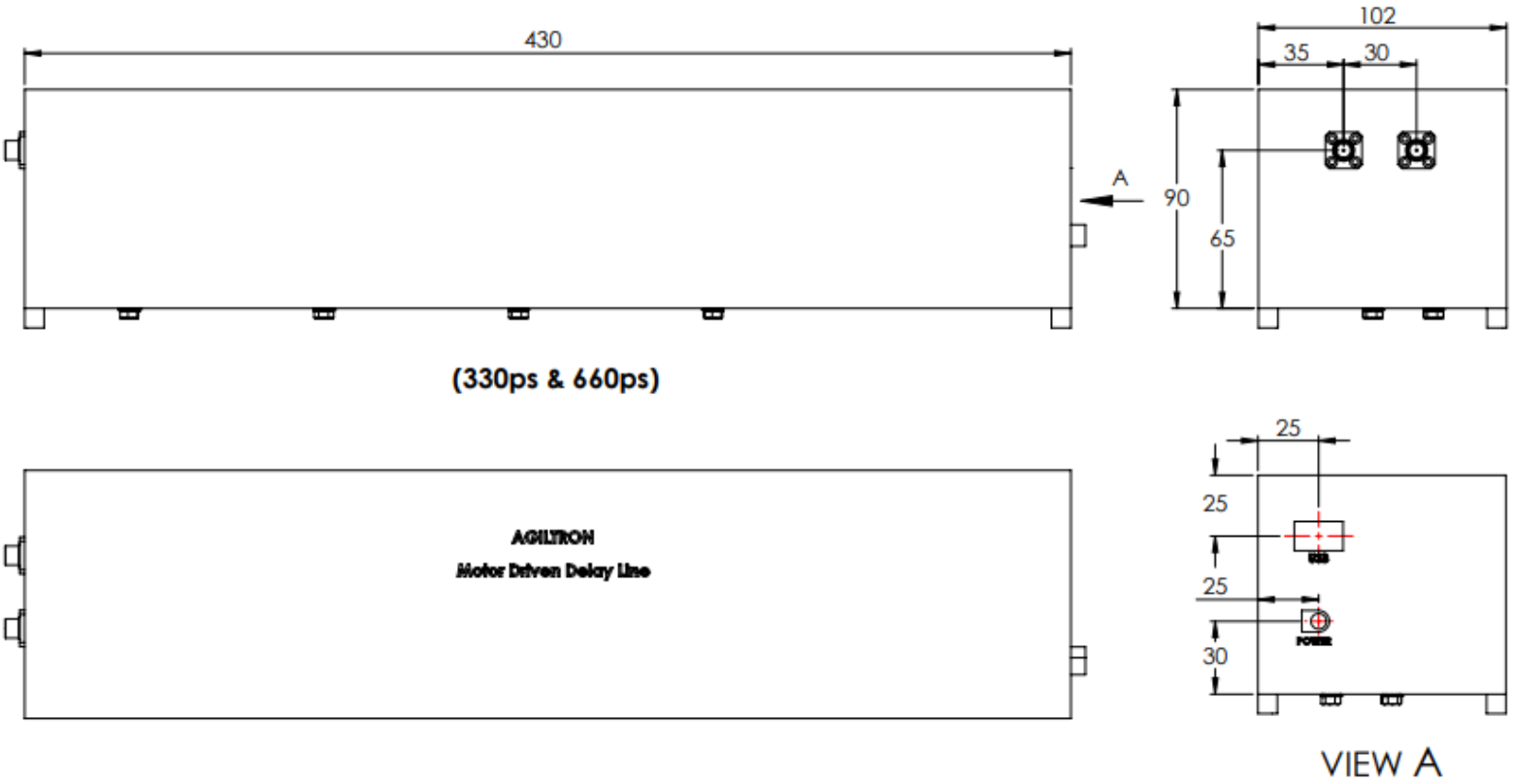
Electrical Driving Requirement

USB and RS232 interfaces and Windows™ GUI software. A wall pluggable 12V DC power supply is provided.

Mechanical Dimensions (Unit: mm) (330&660ps)



(330ps & 660ps)

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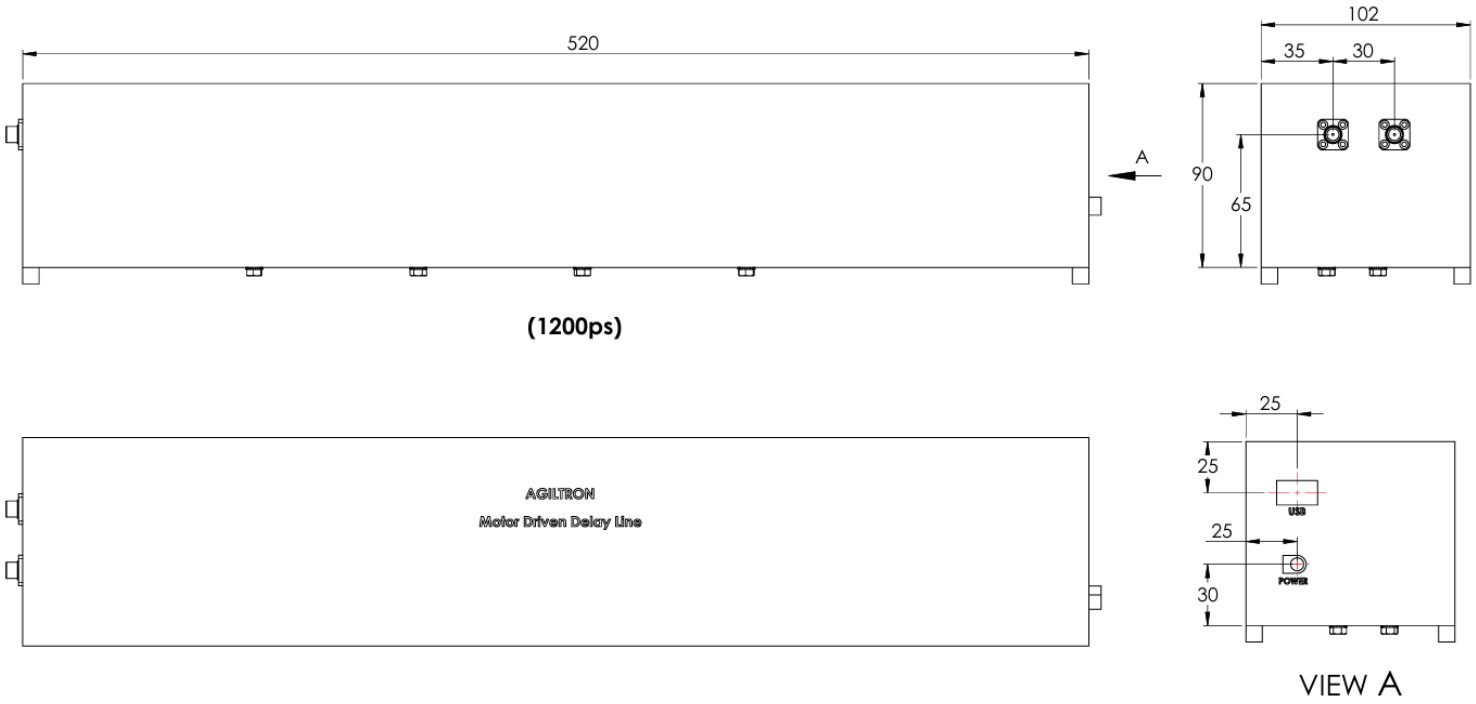
Mechanical Dimensions (Unit: mm) (1200ps version)



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Ordering Information

	0 1	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Speed**	**Power**	**Fiber Type**	**Fiber cable ***	**Max Delay**	**Connector**
MDTD-	Motorized = 01	488 = 4 532 = 5 650 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = C 2000 = 2 Special = 0	<10mm/s = 1 >70mm/s = 2	0.5W = 1 5W = 2 10W = 3	SMF-28 = 1 Hi1060 = 2 PM1550 = B 50/125 = 5 62.5/125 = 6 780HP = 7 PM780 = C SM800 = 8 SM980 = 9 PM980 = D SM1950 = A PM1950 = E	Non = 1 900um tube = 3 3mm jacket = 4 Special = 0	330ps = 1 660ps = 2 1200ps = 3 3000ps = 4 4000ps = 5	FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = 8 LC/UPC = U Special = 0

* Default is two connectors on the box. Fiber cables are paired, each 1m in length, both ends with the same connector type
Use “0” for special needs and describe all details clearly in the PO.

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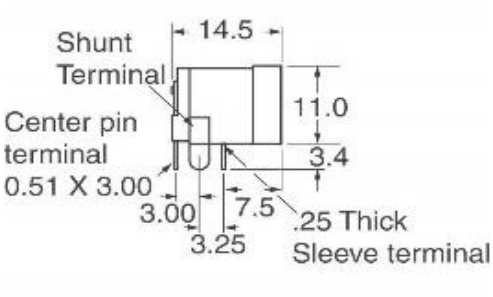
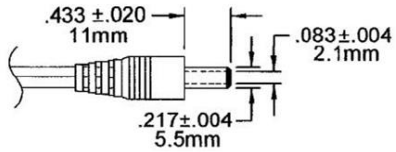
Power Connector

P/N:
Power Barrel Connector Jack 2.00mm ID (0.079"), 5.50mm OD (0.217") Through Hole, Right Angle



Power Source : 12VDC/1A



Application Notes

Fiber Core Alignment
Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness
Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power
Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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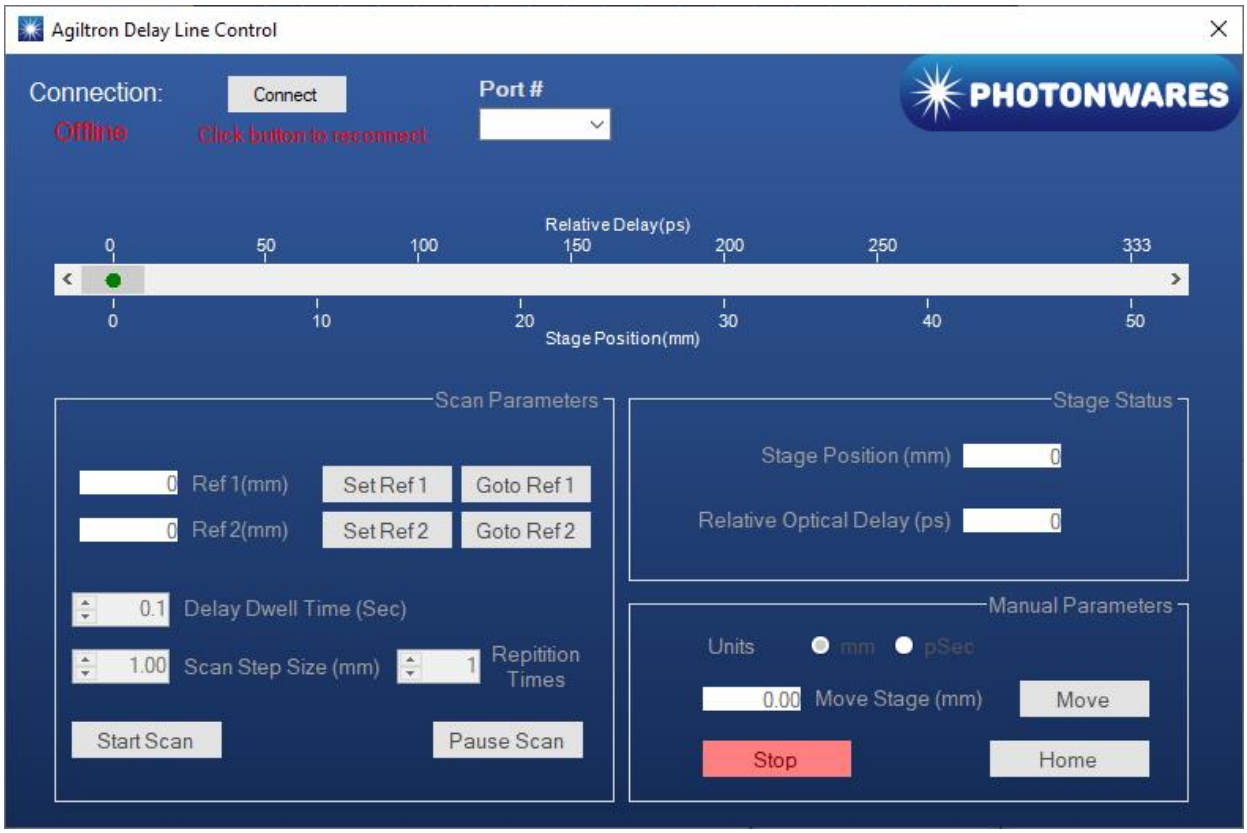
Delay Line Control (via Windows GUI):



Control via Windows GUI:

1. Set Target Position(mm/pSec)
   Simply enter the exact number of position(mm) or delay time(pSec) in the text box or drag the slider. Then, click on “Move” button to move the device to target position.

2. Homing the device
   If the number is not correct, the device needs a homing calibration. Simply click on “Home” button.

3. Scan Function
   Drag the slider to the target position/delay time, then click on “Set Ref x”(x = 1,2). Ref x (x = 1,2) will be set.

“Goto Ref x” Button will allow you to move the device to Ref x.

You can decide the step length for this scan and delay dwell time for each step. Repetition times can also be set. Click on “Start Scan” will start current scan process. “Pause Scan” will pause current scan, and you can resume the scan after it being paused.

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Delay Line Control (via UART command (in HEX))

Control via UART command (in HEX):

The baud rate setting is 9600-N-8-1.

1. Set Motor Stage Target Position
   CMD: 0x01 0x14 <Pos highest byte> <Pos higher byte> <Pos lower byte> <Pos lowest byte>
   RTN: 0x01 0x14 <Pos highest byte> <Pos higher byte> <Pos lower byte> <Pos lowest byte>

   Example: 0x01 0x14 0x00 0x01 0x38 0x80 -> set device to 80000 position

   For 330 ps device, the position range is 0-80000. 0 means relative 0 psec. 80000 means relative 333 psec.
   For 660 ps device, the position range is 0-160000. 0 means relative 0 psec, 160000 means relative 666 ps.
   For 1200 ps device, the position range is 0- 288000. 0 means relative 0 psec, 288000 means relative 1200 ps.

2. Read Motor Stage Target Position
   CMD: 0x01 0x15 0x00 0x00 0x00 0x00
   RTN: 0x01 0x15 <Pos highest byte> <Pos higher byte> <Pos lower byte> <Pos lowest byte>

3. Check Motor Stage Current Position
   CMD: 0x01 0x16 0x00 0x00 0x00 0x00
   RTN: 0x01 0x16 <CurP highest byte> <CurP higher byte> <CurP lower byte> <CurP lowest byte>

4. Homing Calibration
   CMD: 0x01 0x20 0x00 0x00 0x00 0x00
   RTN: 0x01 0x20 0x00 0x00 0x00 0x00

5. Check Homing Status
   CMD: 0x01 0x21 0x00 0x00 0x00 0x00
   RTN: 0x01 0x21 0x00 0x00 0x00 <Status Byte>

<Status Byte>: 0 – Homing complete, 1 – Homing incomplete