

Delay Lines (MDL/VDL, ODG)

Q. Is there any special gas in the variable delay line package that might influence interferometer applications?

A. There is no special gas in the standard package.

Q. What is the minimum (zero-state) delay of the manual and motorized variable optical delay lines?

A. The minimum delay is on the order of 170 picoseconds, excluding contributions from pigtailed. Each meter of the fiber pigtail will add approximately 5 nanoseconds to the delay.

Q. How do I read the delay setting on a delay line?

A. The VDL-001 manual delay line has a scale that reads in millimeters, with a movable vernier. The increments on the vernier correspond to 0.1 mm, which is equivalent to approximately 0.67 ps delay.

The VDL-002 manual delay line has a magnetic pointer that can be used to give an approximate delay readout on the scale, but because of the requirements of the waterproof housing, it is not as accurate as the VDL-001.

The MDL-002 motorized delay line versions with the control box display the delay setting on the LCD display. The MDL-002 with OEM control board does not have an external readout, but the delay setting can be queried via RS-232.

The MDL-003 motorized delay line uses a stepper motor directly driven by the user. The delay state can be derived from the sensor signal and the step count.

Q. What is the delay per turn for the manual delay lines (VDL-001 and VDL-002)?

A. It is about 1.8 ps/turn for single-pass models, and about 3.6 ps/turn for double-pass models.

Q. How much fiber is in the delay line? How much dispersion is expected to occur?

A. The actual optical delay path is mostly free space, so dispersion effects should be minimal. If dispersion is a concern, the fiber pigtail length can be minimized.

Q. Is driver software available for the motorized delay line?

A. For the MDL-002, there is no control program, but a remote control command list is provided in the user manual. Windows HyperTerminal or a similar program can be used to send ASCII code to the RS-232 serial port for delay control.

The MDL-003 does not have a remote control interface.

Q. What is the operating wavelength range for the MDLs and VDLs?

A. Standard single-pass SM MDLs and VDLs are dual-window and function at 1310 ± 50 nm and 1550 ± 50 nm. PM and double-pass versions are single-window and function at either 1550 ± 50 nm or 1310 ± 50 nm. Other wavelengths may also be available by special request.

Q ■ Is there a separate encoder output enabling tracking of MDL position without using serial commands?

A ■ This can be done for the MDL-002. Please request it when ordering. The MDL-003 uses a stepper motor, so there is no encoder output.

Q ■ Are the variable delay lines bidirectional?

A ■ Yes.

Q ■ What are the differences between the different models of MDL/ VDLs?

A ■ The differences are mainly in delay range, control method, and purpose. The VDL-001 is a longer-range delay line designed for lab use. It is easy to adjust and to read out the delay. The VDL-002 is a smaller delay line for OEM applications. It has a durable package and a set screw that allows it to be locked in place after adjustment.

The MDL-002 is a longer range delay line that can be configured for lab or OEM use. It uses a DC motor and encoder and allows the user to set delay values or scan parameters directly from a front panel interface or via remote control commands. The MDL-003 is a more compact, smaller range OEM delay line that uses a stepper motor.

Q ■ What is the difference between single pass and double pass models of MDL/ VDLs?

A ■ A single-pass delay line is a transmission device. The light signal enters from an input pigtail, passes through the device, and exits on a separate output pigtail. In a double-pass device, the output collimator is replaced with a Faraday mirror. The light signal enters, passes through the device, is reflected by the Faraday mirror, passes through the device again, and exits on the same pigtail. The double-pass device therefore has twice the range, but half the resolution/accuracy of its single-pass counterpart. In addition, since the input and output beams travel on the same pigtail, a separator may be required to separate them. For SM systems, a 3-port circulator can be used to separate the input and output signals. The input signal should be connected to port 1 of the circulator, the delay line to port 2, and the output to port 3. For PM systems, an SM common port PBS can be used to separate the input and output. The SM common port of the PBS is connected to the delay line. The input can be connected to one of the single-polarization ports of the PBS, and the output to the other single-polarization port of the PBS.

Q ■ What are the principal differences between the MDL/ VDLs and the programmable optical delay generator (ODG)?

A ■ The MDLs and VDLs provide continuous optical delay variation of up to 1200 ps, with a free-space optical path. The ODG provides digitally variable optical delay of up to 500µs, single pass, with a fiber delay path.