



Motorized Optical Delay Line Controller

Operation Manual

DLC-1700

Version: 1.5

Table of Contents

Section 1.Overview.....	2
Section 2.Device Description.....	3
2.1 Dimensions.....	3
2.2 Connector pin assignment.....	3
2.3 Power supply.....	4
2.4 Conversion Formula.....	4
2.5 Connection Diagram.....	5
Section 3.Device Operation.....	6
3.1 Initialization.....	6
3.2 Basic operation and example.....	6
3.3 Function introduction.....	8
3.3.1 Inching mode (0.Inching).....	8
3.3.2 Scanning Mode (1.Scan).....	9
3.3.3 Motion control (2. Motion).....	9
3.3.4 Initial state (3. Power on Auto).....	11
3.3.5 Settings (4. Settings).....	11
3.4 Remote Operation.....	13
3.4 Error Codes.....	14
Section 4.Technical Support.....	14

Section 1.Overview

Optowaves' motorized variable optical delay line provides precision optical path length adjustment and delay scanning functionality. A stepper motor with high accuracy leading screw and one or two sensitive position sensors ensure precise delay control. Low insertion loss and high reliability make this device ideal for integration in optical coherence alignment.

This controller (DLC-1700) is specially designed to be used in combination with all the models of Optowaves' delay line. The control unit contains the microprocessor, rotary knob, LCD display panel, power supply and control signal adapters. The information of the device is displayed on the LCD panel. All the operation could be performed by using the rotary knob or connecting to the computer via a RS-232 or USB port.

Section 2. Device Description

2.1 Dimensions

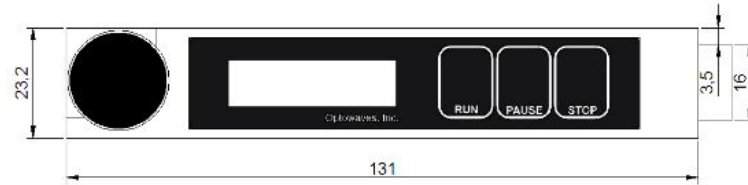


Figure 1 .Control Panel

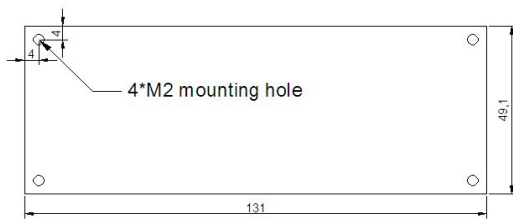


Figure 2 .Bottom view

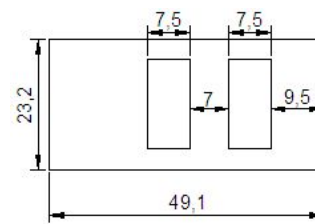


Figure 3 .Outlet

2.2 Connector pin assignment

There are two 10-pin connectors on the right side of the unit. J2 is close to the LCD panel. J1 is far from the LCD panel.

J2

(TTL signal) RXD	6	1	GND
Not connected	7	2	Vcc
Not connected	8	3	Not connected
GND	9	4	Not connected
Not connected	10	5	TXD (TTL signal)

J1

(Motor Control) A+	6	1	Limit Position
Zero Position	7	2	GND
Scanning Signal	8	3	B- (Motor Control)
GND	9	4	B+ (Motor Control)
GND	10	5	A- (Motor Control)

bottom

2.3 Power supply

The delay line controller is required a 12~24VDC/1A power supply. Optowaves will provide the AC/DC adapter with the device.

2.4 Conversion Formula

Pulse count is used as the standard unit of this device. The conversion formula between delay value and pulse count is shown as below:

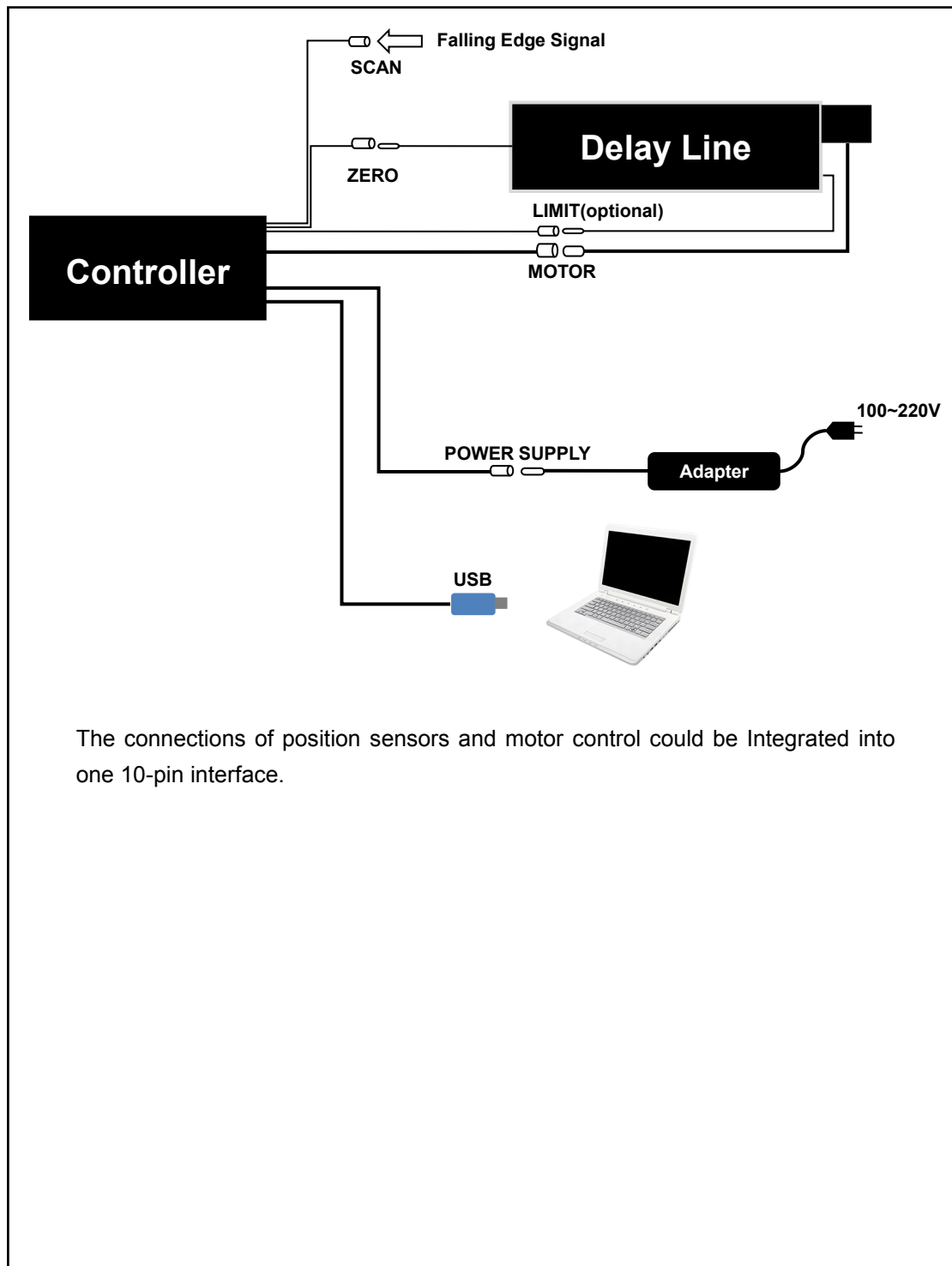
$$\text{Delay value} = \frac{\text{Pulse count} \times \text{Screw lead}}{\text{Pulse per revolution(ppr)} \times \text{Micro-stepping number}}$$

e.g.

Pulse count=10000, Screw lead=1.00mm, ppr=200, Micro-stepping number=4

Delay value(single pass)=10000×1.00/(200×4)mm = 12.5mm

2.5 Connection Diagram



The connections of position sensors and motor control could be Integrated into one 10-pin interface.

Section 3. Device Operation

Note: Please check all the connections before power on (according to “2.2 Connector pin assignment list” and “2.5 Connection Diagram”).

3.1 Initialization

1) Power on. The initialization settings will be loaded. The LCD displays:

**Welcome DLC-1700
Optowaves, Inc.**

2) When the initialization has been completed successfully, the pilot lamp "pause" will be on. The LCD displays "OK" as shown below:

**Welcome DLC-1700
Optowaves OK ;**

3.2 Basic operation and example

All the operations can be performed simply by using the rotary knob. There are two basic operation methods of the rotary knob:

- 1) Rotation (clockwise or anticlockwise)
- 2) Press

Example:

If the user wants to change the screw lead, please follow the operation as below:

1) Rotate the knob to switch the options. Stop rotating when the LCD displays:

**4, Setting
4.1, vm020000um/s;**

2) Press the knob to enter the submenu. The cursor shows as below:

**4, Setting
4.1, vm020000um/s;**

3) Rotate the knob until the LCD displays the message as shown below:

**4, Setting
4.9, Lead=0.2700;**

4) Press the knob and the cursor displays on the first digit of data area.

**4, Setting
4.9, Lead=0.2700;**

5) Rotate the knob to change the value.

4, Setting
4.9, Lead=1.2700;

6) Press the knob to move the cursor position.

4, Setting
4.9, Lead=1.2700;

7) When the changes have been completed, press the knob several times to move the cursor back to "4.9 Lead".

4, Setting
4.9, Lead=1.2700;

8) If the user wants to save the current settings as default, rotate the knob to "4.10 Save" and press it to save the changes.

4, Setting
4.10, Save;

Note:

- a) The change of settings will be effective immediately.
- b) Unsaved settings will be lost when turn off the power.

9) Press the knob to exit the current option. Rotate to "4.13 Back " and press again to return to the parent menu.

4, Setting
4.13, Back;

3.3 Function introduction

3.3.1 Inching mode (0.Inching)

Description: The user could change the delay value by rotating the knob. Adjusting rate and delay value of each rotation could be set.

Function List

0. Inching	Inching adjustment
0.1 Round	Inching operation
0.2 PPS=xxxxxx/s	Set the delay value of each rotation
0.3 v=xxxxxx um/s	Set the adjusting rate
0.4 Back	Return to the parent menu

3.3.1.1 "0.1 Round "

1) Rotate the knob to "0. Inching".

0, Inching
0.1, Round;

2) Press the knob to enter the submenu.

0, Inching
0.1, Round;

3) Press again to set the device at "Inching Mode". The cursor should be displayed as below:

0, Inching
0.1, Round;

4) Rotate the knob to change the delay value.

Clockwise: increase the delay value

Anticlockwise: decrease the delay value

5) Press again to exit the current option.

Note: The position sensors will not be effective in this mode. Please set the delay value of each rotation reasonably. If the delay line has moved out of the limit range, please reset the zero position according to "Section 3.3.3.2".

3.3.1.2 "0.2 PPS=xxxxxx/s"

Change "xxxxxx" (the number of pulses) to set the delay value of each rotation.

Note: Please refer to Section 2.4 "Conversion Formula".

3.3.1.3 "0.3 v=xxxxxx um/s"

Change "xxxxxx" to set the adjusting rate.

1) Please contact Optowaves if the user wants to change the rate faster than the default value.

2) Execute "Option 0.1 Round" several times after changing the adjusting rate.

3) Execute "Option 4.10 Save" to save the rate as default if necessary.

3.3.1.4 "0.4 Back"

Press the knob to return to the parent menu.

3.3.2 Scanning Mode (1.Scan)

Description: The user could input a signal to record the current delay value when the delay line scanning.

Function List

1. Scan	Scanning Mode
1.1 Run	Scanning
1.2 Adj=+/-xxxxxp	Set the adjusting value
1.3 Back	Return to the parent menu

3.3.2.1 "1.1 Run xxxxxx"

- 1) Rotate the knob to "1. Scan".
- 2) Press the knob to enter the submenu "1.1 Run".

1, Scan <u>1</u>.1, Run;

- 3) Press again and the delay line will start scanning one time.
- 4) When the controller receives a falling edge signal (the user can input a TTL signal at any time during the delay line scanning from Zero Position to Limit Position), the delay value will be record immediately. Then the delay line will be stopped at this position.
Only one input signal will be received during a scanning cycle. The trigger signal can be also customized.
- 5) When the scanning stops, the current delay value will be displayed on LCD panel.

1, Scan 1.1, Run xxxxxx;
--

- 6) Press the knob to exit the scanning.
- 7) Execute "Option 4.10" to save the delay value if necessary.

3.3.2.2 "1.2 Adj=+/-xxxxxp"

The user could set an adjustment value to compensate the delay value if necessary.

3.3.2.3 "1.3 Back"

Press the knob to return to the parent menu.

3.3.3 Motion control (2. Motion)

Description: The user could control the delay line to move to the specified delay value.

Function List

2. Motion	Motion control
2.1 Return L0 L1	*Internal testing function
2.2 Centre	Move to the specified delay value
2.3 L1	*Internal testing function
2.4 Zero	Move to the zero position
2.5 Limit	Move to the limit position
2.6 Tw=xxxxx	*Internal testing function
2.7 Zero-Limit	Scanning from "zero" to "limit" position one time
2.8 Return L Z	Scanning between "zero" and "limit" position continuously
2.9 Back	Return to the parent menu

3.3.3.1 "2.2 Centre"

1) Press the knob and the delay line will start to move to the specified delay value (Default: half of the max delay range). The delay value will be displayed on LCD panel.

2) When the pilot lamp "pause" is on, press the knob again to exit the current option.

Note: The delay value could be set in "Setting 4.12 L2".

3.3.3.2 "2.4 Zero"

1) Press the knob and the delay line will start to move to "Zero" position.

2) When the pilot lamp "pause" is on, press the knob again to exit the current option.

3.3.3.3 "2.5 Limit"

1) Press the knob and the delay line starts to move to "Limit" position. The delay value will be displayed on LCD panel.

2) When the pilot lamp "pause" is on, press the knob again to exit.

3) This option will not be effective if the delay line has no "Limit" position sensor.

3.3.3.4 "2.7 Zero- Limit"

1) Press the knob and the delay line will start to scan from "Zero" position to "Limit" position one time.

2) When the pilot lamp "pause" is on, the max effective delay range will be displayed on LCD panel.

2, Motion
2.7, Zero-L xxxxxx;

3) Press the knob to exit.

3.3.3.5 "2.8 Return L Z"

1) Press the knob and the delay line will start to scan between "Zero" and "Limit" position continuously.

2) When the pilot lamp "pause" is on, rotate the knob immediately to stop scanning.

3) Press the knob to exit.

3.3.3.6 "2.9 Back"

Press the knob to return to the parent menu.

3.3.4 Initial state (3. Power on Auto)

Description: The user could set the initial state of delay line when power on.

Function List

3. Power on Auto	Initial state
3.1 ZERO	Move to the "zero" position
3.2 LIMIT	Move to the "limit" position
3.3 Centre	Move to the specified delay value
3.4 ZERO-LIMIT	Scanning from "zero" to "limit" position one time
3.5 Return L0 L1	*Internal testing function
3.6 Return L Z	Scanning between "zero" and "limit" position continuously
3.7 NOR	Keep the current position
3.8 Back	Return to the parent menu

e.g.

If the user wants the delay line will be moved to the "zero" position when power on, please follow the operation as below:

1) Select the option "3.1 Zero"

<p>3, Power on Auto 3.1, Zero</p>

2) Press the knob and the delay line will be moved to the "zero" position when power on.

3) Press again to exit.

4) Execute option "Setting 4.10 Save" to save the settings.

3.3.5 Settings (4. Settings)

Function List

4. Settings	Settings
4.1 Vm xxxxxx um/s	Continuous delay adjusting rate
4.2 a xxxxxx um/s ²	Acceleration
4.3 L0=xxxxxxp	*Internal testing setting
4.4 L1=xxxxxxp	*Internal testing setting
4.5 Zero=no/nc	*Internal testing setting
4.6 Slave ID=xxx	*Internal testing setting

4.7 ppr=xxx	*Internal testing setting
4.8 Mstep=xxx	Micro-stepping number of motor
4.9 Lead=x.xxxx	Screw lead
4.10 Save	Save current settings as default
4.11 Tw=xxxxxs	*Internal testing setting
4.12 L2=xxxxxpx	Set the delay value "Centre"
4.13 Back	Return to the parent menu

Note:

- 1) Please contact Optowaves if the user wants to change the default settings.
- 2) The value "L2" should **not** be larger than the max delay adjusting range.

3.4 Remote Operation

Optowaves provide the TTL-232 Serial to USB adapter to connect the control unit with the USB interface of a computer.

The control commands should be according to the list as below:

Description	Command									
		ID								
Move to Zero position	3a	xx	5a	xx	xx	xx	xx	xx	xx	0a
Move to Limit position	3a	xx	4c	xx	xx	xx	xx	xx	xx	0a
Set the delay value from Zero position	3a	xx	50	30	30	30	30	30	30	0a
				~	~	~	~	~	~	
				39	39	39	39	39	39	
Increase delay value from the current position	3a	xx	55	30	30	30	30	30	30	0a
				~	~	~	~	~	~	
				39	39	39	39	39	39	
Decrease delay value from the current position	3a	xx	44	30	30	30	30	30	30	0a
				~	~	~	~	~	~	
				39	39	39	39	39	39	
Scan (Option 1.1)	3a	xx	53	xx	xx	xx	xx	xx	xx	0a
Move from L0 to L1 point	3a	xx	52	xx	xx	xx	xx	xx	xx	0a
Move from Zero to Limit	3a	xx	54	xx	xx	xx	xx	xx	xx	0a
Move to the Centre(L2)	3a	xx	44	30	30	30	30	30	30	0a
				~	~	~	~	~	~	
				39	39	39	39	39	39	
pilot lamp Check & Enable Signal	3a	xx	42	(off)	30	30	30	30	xx	xx
					~	~	~	~	~	~
				(on)	31	31	31	31	xx	xx
					(run)	(pause)	(stop)	(Enable)		

Note: The commands will not be received when the delay line is scanning.

3.4 Error Codes

One of five error codes (Err0 ~ Err4) might be displayed on the LCD panel. Each error message is related to the mechanical or sensor problems. If either of these messages appears, power off the device and check whether the electrical connectors have been securely connected. If the error message still persists, please contact Optowaves immediately.

Section 4. Technical Support

Optowaves, Inc. is committed to high quality standards and customer satisfaction. For any questions regarding the quality and use of the devices, or future suggestions, please contact us. Optowaves will respond to all customer questions promptly.