

The CLPC Closed Loop Position Control is used to improve positioning accuracy on Posidyne Clutch/Brakes and Posistop Motor Brakes beyond what can be achieved with just a limit switch, or a PLC control system. The CLPC is a closed loop positioning control, which looks at the stopping position and continually makes adjustments if any “Stopped Position” errors begin to occur. This is particularly important during a cold start to hot run, and if changes that occur on the line such as changes in load, speed or temperature.

**CLPC™ Control Model LC**  
Closed Loop Position Control

Force Control Industries, Inc.  
Fairfield, Ohio  
(513) 866-0900  
www.forcecontrol.com

110 / 220 VAC  
100 Watts  
INPUT POWER

Line / L1  
Neutral / L2  
Earth Ground

**OUTPUTS**  
System Interface  
and Interlocks

**INPUTS**  
System Interface  
and Interlocks

+24V  
+24V Return

**24 VDC SOLENOID  
CONTROL VALVE**  
(Air or Hydraulic)

**CLPC™ CONTROL Model LC**

**24 VDC SOLENOID  
CONTROL VALVE**

**INCREMENTAL  
ENCODER**

**Posidyne CLUTCH  
BRAKE UNIT**

**INCREMENTAL ENCODER**

Home (Channel Z)  
Home (Channel Z)  
Channel A  
Channel A  
Channel B  
Channel B  
Ground  
Sensor Power

**CLPC™ Control**

**Model LC**  
Closed Loop Position Control

☐ A Channel  
☐ B Channel  
☐ X Channel  
☒ Clutch On  
☒ Fault

Force Control Industries, Inc.  
Fairfield, Ohio  
(513) 864-0800  
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**Dimensions:**

- Overall Width: 6.10"
- Overall Height: 7.00"
- Mounting Stud Spacing (Typical): .38"
- Mounting Stud Diameter: (8) #6-32 MNTG. STUDS
- Front Panel Thickness: .268"
- Internal Width: 5.63"
- Internal Height: 5.80"
- Internal Depth: .56"
- Bottom Mounting Flange Width: 1.80"
- Bottom Mounting Flange Height: 2.00"
- Bottom Mounting Flange Spacing: 3.00"



Force Control Industries, Inc.  
3660 Dixie Highway Fairfield, Ohio 45014 USA  
Phone: 513-868-0900 Fax: 513-868-2105

## The CLPC Control Model LC

The basic **CLPC Control Model LC** is designed to operate a standard Posidyne Clutch/Brake in an indexing application. The **CLPC-LC** is programmed for the desired index distance (encoder counts). The **CLPC-LC** will energize the clutch valve until the trigger point, de-energize the valve and stop in position. The trigger point is self compensating to actuate the brake at the proper time to consistently stop in position and will float as conditions change. The **CLPC Control Model LC** is a single direction single clutch drive control.

### The CLPC Control Model LC has numerous features such as:

- **Universal Supply Input** - 85-264 VAC, 47-63 Hz.
- **Interface** - All functions adjustable with a simple menu through a display panel.
- **Program Lockout** - via external cold contact.
- **Eleven Internally Tested Functions** - Error Codes with descriptions displayed to identify Faults.
- **Compact Design** - Door Mount or Panel Mount.
- **Always Ready** - No calibration required.
- **Stall Detection** - Detects a jam (no rotation of the encoder) before reaching the desired stop position and disengages the clutch.
- **Watch Dog Timer** - Adjustable (100 milliseconds to 1 minute) timer which will disengage the clutch if timed out before reaching the desired stop position. Used to protect against jams which may stop or slow down the drive.
- **Encoder Resolution Settings** - X1, X2 and X4.
- **Manual Adjustment** - Allows a positive or negative adjustment from the home sensor position. Used to align the machine position with the home sensor
- **Emergency/Fault Stop** - Abort Input allows the control to react to an external request to stop the index or prevent any further indexes from occurring.
- **In Position Output** - An output to indicate when the drive has reached position. A plus or minus count can be set as an allowable in position window.
- **Optional (MIP/PLS)** - Multiple Indexing Parameter groups - Capable of storing up to 16 different groups (Index Distances). Programmable Limit Switch—Capable of 4 Programmable Outputs based on position



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## CLPC LC Specifications

### Electrical

**Input Power:** 85-264 VAC, 47-63 Hz., Single phase, 100 watts max., Fused @ 4 amps.

**Encoder Input:** Six Signals: A, A', B, B', Z and Z'; 7.2 kHz max.; 0-3 VDC (Low), 2-12 VDC (High)

**Auxiliary Supply:** 12 VDC, 1 amp, Current limited, Short circuit protected. Used for Encoder and Home Switch.

**Solid State Inputs:** Three: 120 VAC and 24 VDC standard, Fused @ 1/16 amps, - Start Cycle, Fault Reset and Abort Cycle.

**Program Interlock:** External cold contact switch required.

**Solid State Outputs:** Two: 115 VAC standard (7 to 60 VDC available), Fused @ 3 amps, N.O. - Fault and In Position,

**Clutch/Brake Output:** One: 24 VDC, 1 amp max., Fused @ 3 amps.

**Displays:** 16 characters by 2 lines, .22" character height, Backlit

**LED Status Indicators:** Five: Channel A, Channel B, Z Channel, Clutch On, Fault.

**Diagnostics:** Eleven: Internally tested functions. Error codes and description displayed to identify faults.

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### Mechanical

**Enclosure:** Aluminum/Stainless, Black anodized, NEMA 1, IP20 Enclosure. NEMA 4, IP66 when door mounted with gasket

**Weight:** 3.5 Lbs.

**Dimensions:** 6" x 6" Face x 5-3/4" Deep

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### Environmental

**Operating Temperature:** 32° - 140° F (0 - 60° C)

**Storage Temp Temperature:** 0° - 186° F (-18° - 85° C)

**Ambient Humidity** 90% non-condensing max.

**Vibration** 2.5 g's, 30 to 200 Hz.

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### Programmability

**Interface:** All functions adjustable through display panel push buttons. Some of these Functions include:

**Index Count** Up to 65,535 pulses.

**Manual Adjust**  $\pm 1/4$  of maximum count.

**Encoder Input Control** x1, x2 and x4 operation.

**Watch Dog Timer** Off, 100 ms to 1 min. in 16 increments.

**Push Buttons** Five: Program, Menu Back, Menu Forward (Fault Reset), Increment and Decrement.

**Optional (MIP/PLS)** Multiple Indexing Parameter Groups - Capable of storing up to 16 different groups. Programmable Limit Switch - Capable of 4 Programmable Outputs based on position.



## CLPC LC How to Order

CLPC	a	b	1	2	3	4	5	6	7	8																																																			
<p>(a, b) Model _____</p> <table border="1"><tr><td>1</td><td>4</td><td>= Model LC</td></tr></table> <p>(1) Overlay _____</p> <table border="1"><tr><td>B</td><td>=Door Mount</td></tr><tr><td></td><td>=Other (<i>Consult Factory</i>)</td></tr></table> <p>(2) Chassis Options _____</p> <table border="1"><tr><td>S</td><td>=Door Mount</td></tr><tr><td>P</td><td>=Panel Mount</td></tr></table> <p>(3) In Position Output _____</p> <table border="1"><tr><td>N</td><td>=None</td></tr><tr><td>A</td><td>=115 VAC</td></tr><tr><td>D</td><td>=24 VDC</td></tr><tr><td>1</td><td>=240 VAC</td></tr></table> <p>(4) Fault Output _____</p> <table border="1"><tr><td>N</td><td>=None</td></tr><tr><td>A</td><td>=115 VAC</td></tr><tr><td>D</td><td>=24 VDC</td></tr><tr><td>1</td><td>=240 VAC</td></tr></table> <p>(5) Input Power _____</p> <table border="1"><tr><td>A</td><td>=115 VAC to 230 VAC</td></tr></table> <p>(6) Unused _____</p> <table border="1"><tr><td>A</td><td>=None</td></tr></table> <p>(7) Unused _____</p> <table border="1"><tr><td>A</td><td>=None</td></tr></table> <p>Options _____</p> <table border="1"><tr><td>N</td><td>=None</td></tr><tr><td>1</td><td>=115 VAC (PLS)</td></tr><tr><td>2</td><td>=24 VDC (PLS)</td></tr><tr><td>3</td><td>=115 VAC MIP</td></tr><tr><td>4</td><td>=24 VDC (MIP)</td></tr><tr><td>5</td><td>=115 VAC (PLS) + =115 VAC MIP</td></tr><tr><td>6</td><td>=24 VDC (PLS) + =115 VAC MIP</td></tr><tr><td>7</td><td>=115 VAC (PLS) + =24 VDC MIP</td></tr><tr><td>8</td><td>=24 VDC (PLS) + =115 VAC MIP</td></tr></table> <p>PLS=Programmable Limit Switch MIP=Multiple Index Parameters</p>											1	4	= Model LC	B	=Door Mount		=Other ( <i>Consult Factory</i> )	S	=Door Mount	P	=Panel Mount	N	=None	A	=115 VAC	D	=24 VDC	1	=240 VAC	N	=None	A	=115 VAC	D	=24 VDC	1	=240 VAC	A	=115 VAC to 230 VAC	A	=None	A	=None	N	=None	1	=115 VAC (PLS)	2	=24 VDC (PLS)	3	=115 VAC MIP	4	=24 VDC (MIP)	5	=115 VAC (PLS) + =115 VAC MIP	6	=24 VDC (PLS) + =115 VAC MIP	7	=115 VAC (PLS) + =24 VDC MIP	8	=24 VDC (PLS) + =115 VAC MIP
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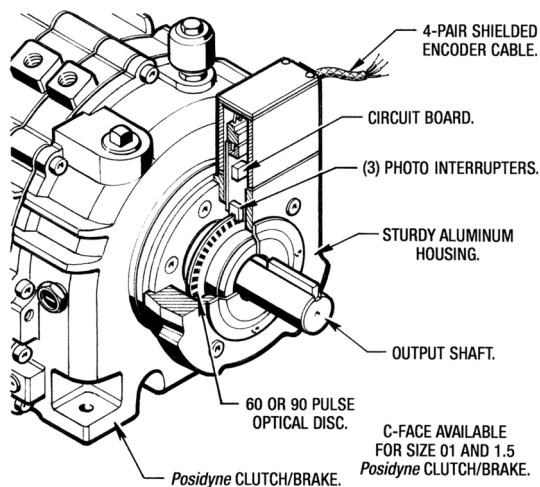
## Optical Encoders

The Optical Encoder provides the pulse counting system for the CLPC Closed Loop Position Control using a disc with precision holes and photo interrupters placed in the correct position. By sending a pulse when the interrupter sees the edge of a hole, an accurate count is made. Using two interrupters improves the resolution and the direction of rotation is also known. A third interrupter is used to establish a home position. The home position is used as a starting point for the count, which eliminates the possibility of accumulated error.

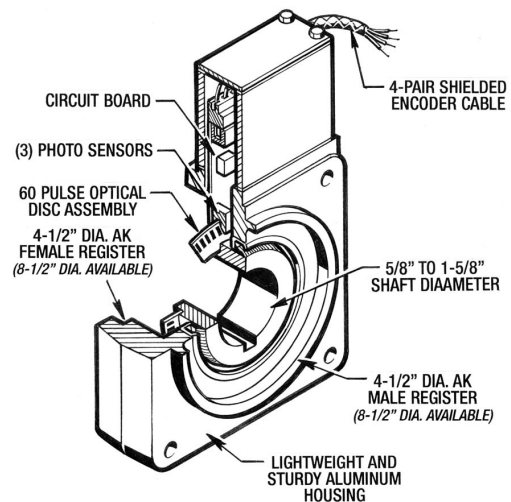
### The (2) basic types of Optical Encoders are:

1. **Posidyne Mounted Encoders** - are directly mounted to the output housing and output shaft of the Posidyne Clutch/Brake Unit. They are available for all sizes of Single Clutch and Dual Clutch Posidyne Units. *(See each specific section for dimensions and see this section for all specifications, additional information and ordering information.)*
2. **Double C-Face Encoders** - could also be mounted on the output end of the Posidyne Unit or Motor and then be C-Face mounted to a gear reducer or mounted on the back end of a Brake Motor between the motor and the brake. These C-Face Encoders come with a 4-1/2" AK register. They can accept a 5/8" Dia. and 7/8" Dia. Shaft. *(See this section for additional information and ordering information.)*

## Posidyne Mounted Encoders



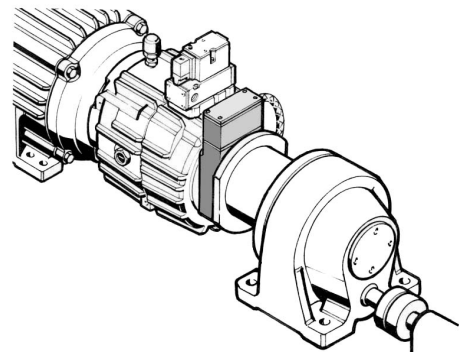
## Double C Face Encoders



### Double C Face Example

This type of Encoder can be used in any applications where NEMA standard C-Face Motors and Gear Reducers are used.

This application shows a double C-Face Encoder sandwiched between a 1.5 Posidyne Clutch/Brake and a Reducer which is operating a swing plate to divert shingle direction.





# Optical Encoder Specifications

## Electrical Specifications (*All Optical Encoders*)

### Input

- **Voltage** 5 to 15 VDC.
- **Current** 100 mA max. (with No Line Loading).
- **Ripple** 2% peak to peak @ 5 VDC input.
- **Regulation**  $\pm 5\%$  for 5 VDC power supply.

### Output

- **Type** Quadrature (A & B) with zero ref. (Z) plus 1 spare channel. All with differential line driven square wave outputs.
- **PPR** Posidyne C-Face Encoder - 60 count for sizes 1.5 to 10 Posidyne 90 count for sizes 11, 14 and 20 Posidyne
- **Current** Sinking, 250 mA open drain (Collector).
- Sourcing, 250 mA open source (Emitter)
- No pull ups or downs.
- **Circuit** TC1 428 Dual High Speed Mosfet Driver.
- Latchup Protection: Will withstand 500 mA reverse output current.
- ESD Protection to  $\pm 2000$  volts.
- High Output Peak Voltage: 1.2A peak.
- High Capacitance Load: 1000pF in 38nS. Output voltage swing to within 25mV to ground or the control voltage.
- Low Output Impedance: 8 ohms.
- **Freq. Response** 250K CPS.
- **Symmetry** 180 electrical degrees  $\pm 18^\circ$ .
- **Quad. Phasing** 90 electrical degrees  $\pm 36^\circ$ .
- **Rise Time** Less than 1 microsecond.
- **Accuracy** Within  $\pm 0.1^\circ$  from one pulse to next pulse, or 60 arc min.
- **Electrical Connection** 10 pin Phoenix 1827787

## Environmental Specifications (*All Optical Encoders*)

- **Operating Temp.**  $0^\circ$  to  $70^\circ$  C.
- **Storage Temp.**  $-25^\circ$  to  $85^\circ$  C.
- **Humidity** 95% RH Non-Condensing.
- **Vibration** 10 G's @ 50 to 500 CPS.
- **Shock** 50 G's @ 10 mS duration.

Mechanical Specifications (Posidyne Mounted)	Mechanical Specifications (Double C Face Mounted)
Max. Operating Speed = 3600 rpm Inertia = .00916 Lb. Ft. <sup>2</sup> NEMA Rating = 12	Max. Operating Speed = 3600 rpm Inertia = .00916 Lb. Ft. <sup>2</sup> NEMA Rating = 12 Register = 4-1/2"AK or 8-1/2" AK



## Optical Encoder How to Order

<b>E</b>	1	2	3	4	5	6
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(1,2) Encoder Type

<b>P</b>	<b>M</b>	=Posidyne Mounted (Standard)
<b>C</b>	<b>4</b>	= Double C Face 4 1/2" AK

(4,5) Resolution

<b>6</b>	<b>0</b>	=60 PPR ( <i>Pulses per revolution</i> ) (5/8" to 1 3/4" Shaft Diameter)
<b>9</b>	<b>0</b>	=60 PPR ( <i>Pulses per revolution</i> ) (2 3/8" to 2 3/4" Shaft Diameter)

(3) Mounting Position

<b>T</b>	<b>R</b>	<b>B</b>	<b>L</b>	<b>N</b>
				Does Not Apply
Top	Right	Bottom	Left	

*Mounting Position only applies when encoder is Posidyne*

(6) Shaft Size

<b>A</b>	=5/8" Dia.*
<b>C</b>	=7/8" Dia.*
<b>D</b>	1 1/8" Dia.
<b>E</b>	1 3/8" Dia.
<b>F</b>	1 5/8" Dia.
<b>G</b>	1 3/4" Dia.
<b>H</b>	2 3/8" Dia.
<b>J</b>	2 3/4" Dia.

*\*Available Shaft Sizes for Double C Face Encoders*

### Posidyne Mounted Shaft Size Availability

Shaft Size	Posidyne Size								
	1.5	02	2.5	03	05	10	11	14	30
5/8" Dia.	X	...	...	...	...	...	...	...	...
7/8" Dia.	X	...	...	...	...	...	...	...	...
1 1/8" Dia.	X	X	...	...	...	...	...	...	...
1 3/8" Dia.	...	...	X	X	...	...	...	...	...
1 5/8" Dia.	...	...	...	...	X	...	...	...	...
1 3/4" Dia.	...	...	...	...	...	X	...	...	...
2 3/8" Dia.	...	...	...	...	...	...	X	X	...
2 3/4" Dia.	...	...	...	...	...	...	...	...	X