

APPENDIX E

Interfacing an Encoder

Factory Mounted Encoder

The MDrivePlus Microstepping are available with a factory-mounted magnetic encoder. Available line counts are: Encoders are available in both single-end and differential configurations. All encoders have an index mark. Use of the encoder feedback feature of this product requires a controller such as an IMS MicroLYNX or PLC. The encoder has a 100 kHz maximum output frequency.

Line Count	DIFFERENTIAL ENCODER	SINGLE-END ENCODER
	Part Number	Part Number
100	EAL	E1
200	EBL	E2
250	ECL	E3
256	EWL	EP
400	EDL	E4
500	EHL	E5
512	EXL	EQ
1000	EJL	E6
1024	EYL	ER

Table E1: Available Encoder Line Counts and Part Numbers

General Specifications

	Min	Typ	Max	Units
Supply Voltage (VDC)	-0.5		7	Volts
Supply Current	30	57	85	mA
Output Voltage	-0.5		V _{cc}	Volts
Output Current (Per Channel)	-1.0		5	mA
Maximum Frequency				100kHz
Inertia		0.565 g-cm ² (8.0 x 10 ⁻⁶ oz-in-sec ²)		
Temperature				
Operating			-40 to +100°	C
Storage			-40 to +100°	C
Humidity			90%	(non-condensing)

Pin Configuration

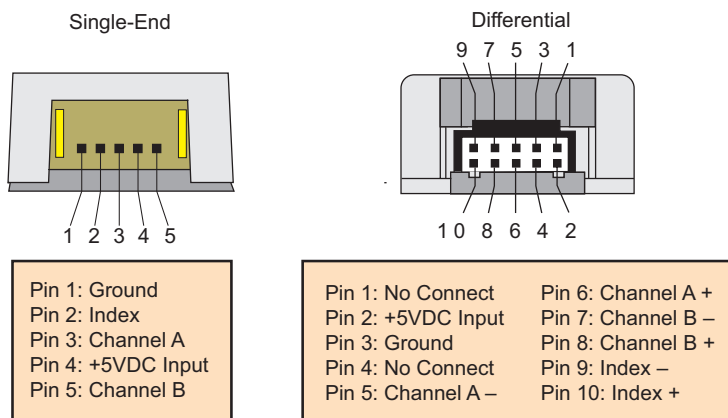


Figure E.1: Single-End and Differential Encoder Pin Configuration

Encoder Signals

Single-End Encoder

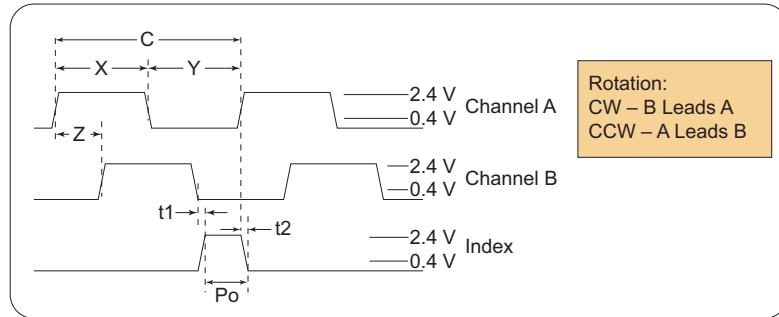


Figure E.2: Single-End Encoder Signal Timing

Differential Encoder

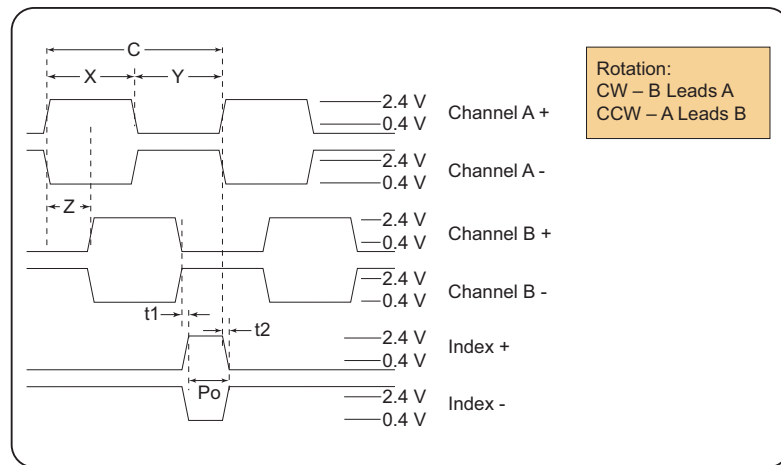


Figure E.3: Differential Encoder Signal Timing

Note: Rotation is as viewed from the cover side.

- (C) One Cycle: 360 electrical degrees ($^{\circ}e$)
- (X/Y) Symmetry: A measure of the relationship between X and Y, nominally $180^{\circ}e$.
- (Z) Quadrature: The phase lag or lead between channels A and B, nominally $90^{\circ}e$.
- (Po) Index Pulse Width: Nominally $90^{\circ}e$.

Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Cycle Error			3	5.5	$^{\circ}e$
Symmetry		130	180	230	$^{\circ}e$
Quadrature		40	90	140	$^{\circ}e$
Index Pulse Width	Po	60	90	120	$^{\circ}e$
Index Rise After CH B or CH A fall	t1	-300	100	250	ns
Index Fall After CH A or CH B rise	t2	70	150	1000	ns

Over recommended operating range. Values are for worst error over a full rotation.

ENCODER CABLES



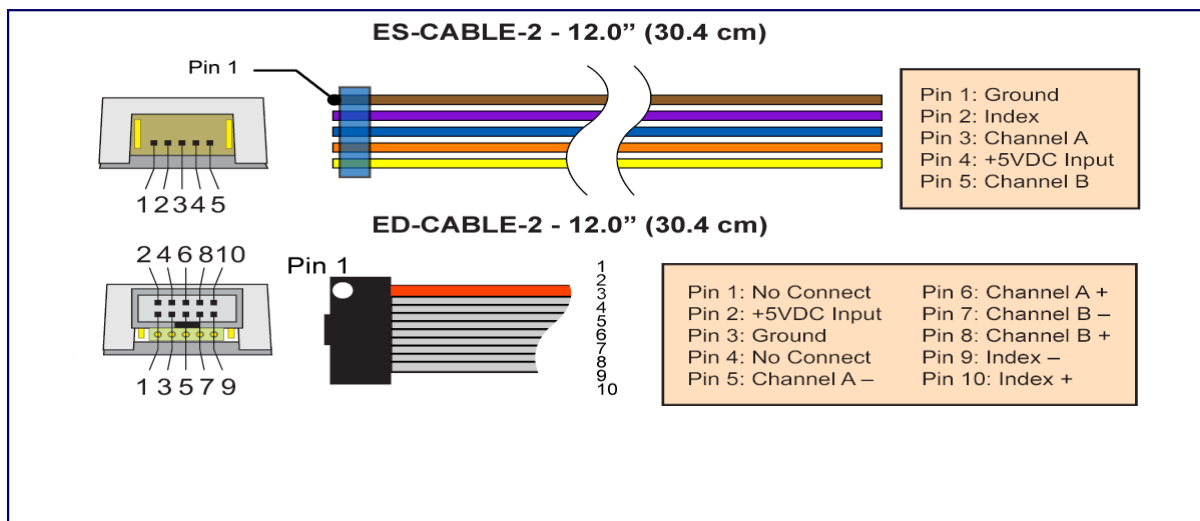
Description

The following Encoder Cables are available for the MDrivePlus Microstepping when configured with a factory-mounted optical encoder:

1. Single-End: ES-Cable-2 (12.0" / 30.4 cm)
2. Differential: ED-Cable-6 (6.0' / 1.8m)

Applicable MDrivePlus Products

1. MDrive17Plus Microstepping
2. MDrive23Plus Microstepping
3. MDrive34Plus Microstepping



Optional Internal Differential Encoder

Pin Assignment - Factory Mounted Encoder	
Encoder Pin	Function — Differential Encoder
Pin 1	Ground
Pin 2	Channel A +
Pin 3	Channel A –
Pin 4	Channel B+
Pin 5	Channel B –
Pin 6	Index +
Pin 7	Index –
Pin 8	No Connect
Pin 9	No Connect
Pin 10	No Connect

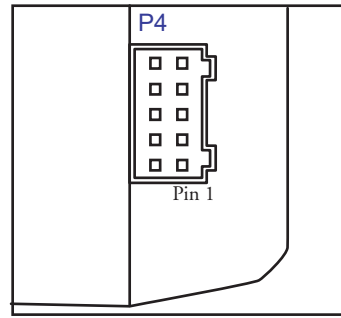


Figure E.4: P4 — 10-Pin Locking Wire Crimp

Table E.2: P4 — Pin Assignment, Internal Differential Encoder
MDM17Plus Only

Encoder Cable ED-CABLE-JST10

This 6' (1.8m) cable interfaces the 10-pin locking wire crimp connector located at P4 to the controller via flying leads.

Wire Color Code			
Pair Number (Cable/Pair)	Color Combination	Interface Signal	MDrive P4 Pin Number
1/1	White/Blue	Index +	6
	Blue/White	Index –	7
1/2	White/Orange	Channel B +	4
	Orange/White	Channel B –	5
1/3	White/Green	Channel A +	2
	Green/White	Channel A –	3
1/4	White/Brown	Ground	1
	Brown/White	N/C	8

Table E.3: ED-CABLE-JST10 Wire Color Codes

Encoder Cables

IMS offers assembled cables for both the Single-End and Differential Encoders. The IMS Part Numbers are listed below.

External Encoder

Single-End Encoder Cable (12" leads)..... ES-CABLE-2
Differential Encoder Cable (6'/1.8 m)..... ED-CABLE-6

Internal Encoder

Cable (6'/1.8 m)..... ED-CABLE-JST10

Recommended Encoder Mating Connectors

IMS recommends the following mating connectors (or equivalent) if you make your own cables.

Single-End Encoder

Tyco Electronics 5 Pin Connector Shell 1-87175-2
Pins* (5 required) AMP Part Number 87165-1
*For AWG 22 to 28 wires.

Tyco Electronics MTA 0.1 IDC Loaded Connector

AWG 22 (Red) 640440-5
AWG 24 (Natural) 640441-5
AWG 26 (Blue) 640442-5
AWG 28 (Green) 640443-5

Differential Encoder

Molex 10-pin Connector Shell..... 15-04-5104
Molex 5-Pin* IDC Inserts (2 required) 14-60-0058
*For AWG 22 to 26 wires.