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Encoder Installation Manual

Dynapar™ brand

Series M15 Modular Encoder For Stepper & Small Servo Motors

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The Dynapar brand M15 modular encoder provides high-performance, cost effective feedback for stepper and servo motor controls. Using industry standard package dimensions, the M15 is easily installed onto the motor without time-consuming adjustments or special tools. Its unique mechanical design automatically centers and gaps the disc during installation.

For Brushless DC (BLDC) servo control, optional 3 phase commutation tracks replace the traditional Hall Effect sensors. These optically-generated signals provide higher accuracy and reliability, improving the performance and reliability of the servo system.

Dynapar Exclusive: The M15 design operates up to 120°C. The high temperature plastics, phased array sensor, and low current requirements stabilize the output signals over a wide range of input voltage, ambient temperature, or output frequencies.

Dynapar Exclusive: The M15 provides 30 degrees of adjustment to align the signal outputs to the shaft position. Using an industry standard Size 15 modular mounting pattern, the index mark on the disc hub can be coarse aligned to the index sensor position on the housing. The housing rotates to allow further adjustment of the index or fine alignment of the commutation channels to the BLDC motor windings.

Dynapar Exclusive: The M15 enclosure is dirt-tight, rated NEMA 1 / IP40. The cover is gasketed to seal the disc and optics from contamination. Additionally, the base can be sealed to the motor for further environmental protection.

Dynapar Exclusive: The M15 outputs are protected from short circuits, and operate on 5 or 12 VDC power.

SPECIFICATIONS**STANDARD OPERATING CHARACTERISTICS****Code:** Incremental, Optical**Resolution:** (pulses/revolution)

Incremental: 200 to 1024 PPR;

Commutation: 4, 6, or 8 pole

Accuracy:

Incremental: ±5 arc-mins. max. edge to edge;

Commutation: ±6 arc-mins. max.

Sense: (viewing encoder mounting surface)

Incremental: A leads B by 90° for CCW rotation of motor shaft;

Commutation: U leads V, V leads W by 120° for CW rotation of motor shaft

Phasing:

Incremental: 90° ±18° electrical

Commutation: 8 Pole: 30°; 6 Pole: 40°; 4 Pole: 60° mechanical

Index to U Channel: ±1° mechanical - Index center to U channel edge

Symmetry:

Incremental: 180° ±18° electrical

Commutation: 8 Pole: 45°; 6 Pole: 60°; 4 Pole: 90° mechanical

Index: 180° ±36° electrical (Gated with B low) standard**ELECTRICAL****Input Power Requirements:**

Incremental: 5 or 12 VDC ±10% at 100 mA max.

(excluding output load);

Incremental w/Commutation: 5 or 12 VDC ±10% at 120 mA max. (excluding output load)

Output Signals:

7272 Line Driver: 40 mA sink/source max.;

Open Collector w/2.0 kΩ pull-ups: 16 mA sink max.

Frequency Response: 200 kHz min.**Noise Immunity:** Conforms to EN50082-1 Light

Industrial for Electro-Static Discharge, Radio

Frequency Interference, Electrical Fast Transients,

and Magnetic Fields (for models or applications

with shielded cable)

Termination:

Connector: PCB mounted dual row head with 0.1" x

0.1" pin spacing, 10 pins (incremental only),

14 pins (w/commutation);

Cable: conductors - 28 AWG, stranded (7/36),

insulation - black, PVC; Shield: aluminum/polyester

foil plus tinned, copper drain wire (28 AWG, 7/36)

MECHANICAL**Dimensions:**Outside Diameter: 1.60" (40.7 mm) max. w/cover,
1.50" (38.2 mm) max. without cover;Height: 1.27" (32.3 mm) max. (w/cover, excluding
connector);

Emitter to Detector Gap: 0.070" (1.8 mm) min.

Hub Diameters: 1/8", 1/4", 3/8", 3/16", 6 mm,
8 mm, 10 mm nominal**Hub Dia. Tolerance:** +0.001"/-0.000" (+0.026 mm/-
0.000 mm)**Mating Shaft Length:** 0.45" (12 mm) min.; 0.85" (22
mm) max. inside cover**Mating Shaft Runout:** 0.002" (0.05 mm) max.(Includes
shaft perpendicularity to mounting surface)**Mating Shaft Endplay:** +0.015"/-0.015" (+0.38
mm/-0.38 mm) nominal ("+" indicates away from
mounting face)**Mounting:**Base: (2) #4-40 (M2.5) #1 Phillips fillister head cap
Dynapar™ brandscrew on 1.812" (46 mm) B.C., or (2) #2-56 (M2.0)
hex socket cap screw on 1.28" (32.5 mm) B.C.;

0.01" (0.254 mm) true position to shaft.

Shaft: split hub w/collar clamp, #2-56 hex socket
cap screw (5/64" hex wrench included)**Electrical/Mechanical Alignment Range:** ±15°
mechanical**Acceleration:** 100,000 rad/sec.2 max.**Velocity:** 12,000 RPM max.**Moment of Inertia:** 3.40 x 10⁻⁵ in-oz sec.2 (2.4
gcm²)**Material:**Base, Housing, & Cover: high temperature, glass
filled polymer;

Hub: Aluminum; Disk: 0.030" thick glass

Finish:

Base & Housing: black;

Cover: RAL 7010 (dark grey)

Weight:

Connector: 0.8 oz. (23 gm) typ.

Connector w/cover: 1.0 oz. (28 gm) typ.

Cable: 1.3 oz (37 gm) typ.

Cable w/cover: 1.5 oz. (43 gm) typ.

ENVIRONMENTAL**Operating Temperature:** 0° to 120°C**Storage Temperature:** -40° to 85°C**Shock:** 50 G's for 11 msec duration**Vibration:** 2.5 G's at 5 to 2000 Hz**Relative Humidity:** Up to 90% (non-condensing)**Enclosure Rating:** NEMA 1 / IP40 dirt-tight (for
models with cover)

IMPORTANT ENCODER INSTALLATION INFORMATION

1. Mounting the Encoder: The encoder's design includes EXCLUSIVE mechanical alignment features to ensure proper electrical performance. PLEASE FOLLOW THE INCLUDED INSTALLATION INSTRUCTIONS. The encoder should be mounted such that these integral alignment features can locate the housing properly. The alignment features should be retracted so the motor shaft can rotate freely. All fasteners should be tightened as specified.

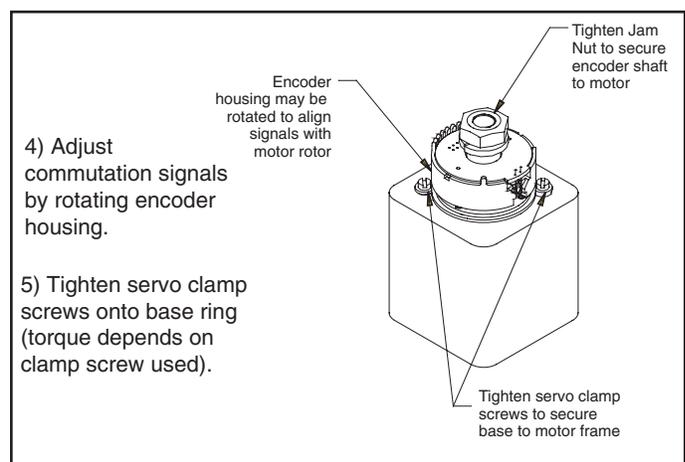
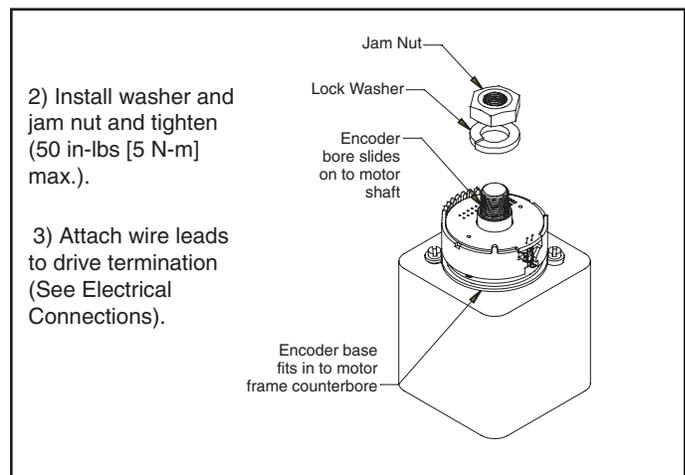
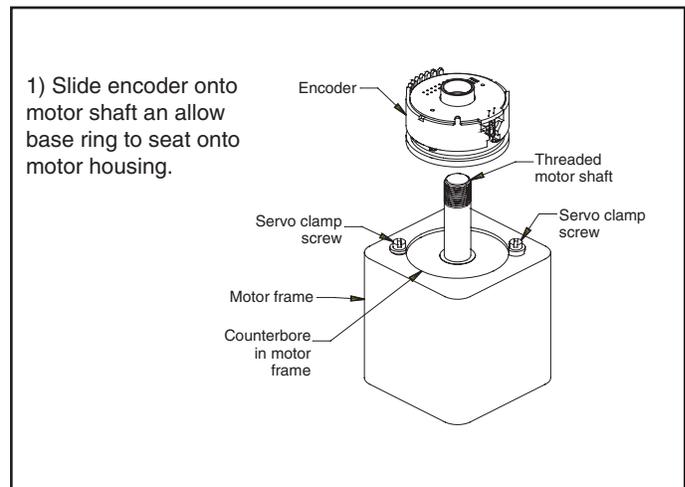
CAUTION: Improper installation or excessive housing deflection may cause the encoder to electrically malfunction or mechanically fail.

2. Important Wiring Instructions: Use of shielded cable is recommended for all encoder installations. The shield should be connected to signal-ground at the receiving device only. Connecting the shield at both ends can cause grounding problems that degrade system performance. If possible, run the encoder cable through a dedicated conduit (not shared with other wiring). Use of conduit will protect the cable from physical damage and provide a degree of electrical isolation. Do not run the cable in close proximity to other conductors that carry current to heavy loads such as motors, motor starters, contactors, solenoids, etc. This practice can induce electrical transients in the encoder cable, potentially interfering with reliable data transmission. Refer to Electrical Connections table for wiring information. To avoid possible damage, do not connect or disconnect the encoder connector or wiring while power is applied to the system.

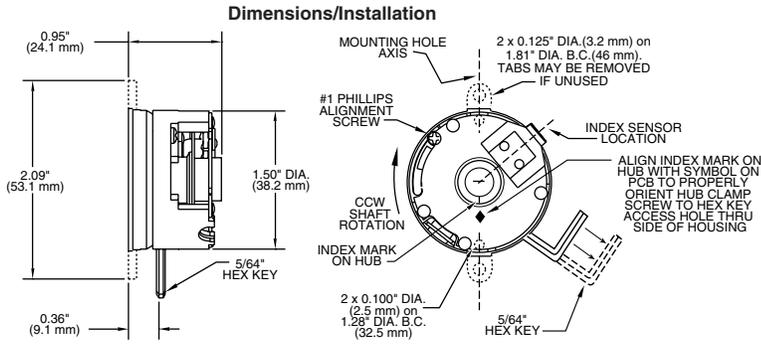
3. Refer to Electrical Connections table for wiring information. To avoid possible damage, do not connect or disconnect the encoder connector or wiring while power is applied to the system.

CAUTION: Unused encoder signal wires must be individually insulated and under no circumstances be in contact with ground, voltage sources, or other signal lines.

INSTALLATION INSTRUCTIONS (See figures Below)

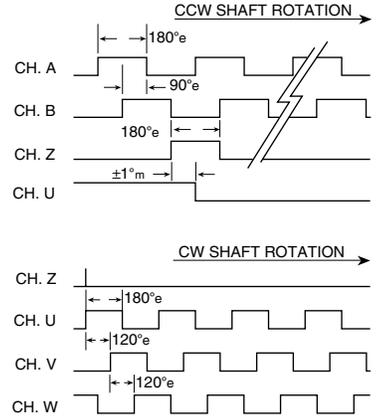


DIMENSIONS - Inches [mm]



Installation Instructions:
 Incremental only models: Drawing #200638-0001
 Commutation models: Drawing #200638-0002

Output Waveforms (For clarity, compliments are not shown.)

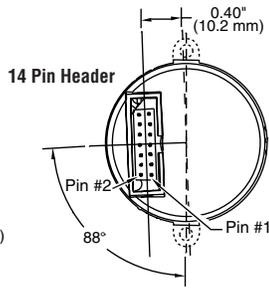
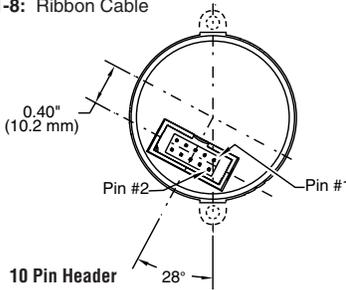
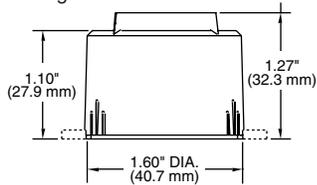


Code 6: Terminations (Not all signals present on all models)

0: Pin Header 1-8: Ribbon Cable

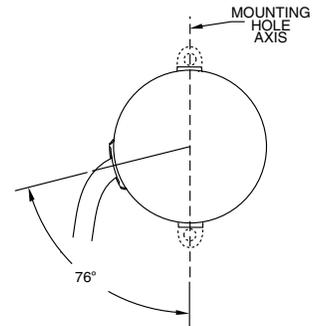
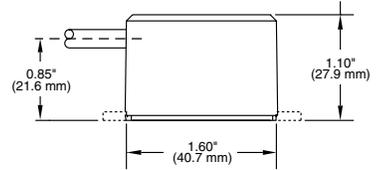
Pin	10 Pin		14 Pin
	O.C.	L.D.	
1	A	—	Vcc
2	Vcc	Vcc	U
3	GND	GND	U'
4	—	—	V
5	—	A'	V'
6	—	A	W
7	—	B'	W'
8	B	B	A'
9	—	Z'	A
10	Z	Z	B
11	—	—	B'
12	—	—	Z
13	—	—	GND
14	—	—	Z'

Mating Cable Assembly:
 10 pin, 109524-000x
 14 pin, 110527-000x
 x= length in feet



Function	Wire Color	
	Incr. Only	Incr. & Comm.
Vcc com	—	RED/WHT
Vcc Inc	RED	RED
GND Inc	BLK	BLK
GND com	—	BLK/WHT
A'	RED/BLK	BLU/BLK
A	GRN	BLU
B'	WHT/BLK	GRN/BLK
B	ORN	GRN
Z'	BLU	VIO/BLK
Z	WHT	VIO
U'	—	BRN/BLK
U	—	BRN
V'	—	GRY/BLK
V	—	GRY
W'	—	WHT/BLK
W	—	WHT

A-H: Shielded Cable



Ordering Information

To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: PPR, Poles	Code 3: Cover	Code 4: Electrical	Code 5: Hub	Code 6: Termination
M15	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ordering Information						
M15	Size 15 Commutating Modular	Incremental channels only	0 No cover	0 5V in, open collector out incremental only	0 1/4 in.	Available when Code 4= 0, 1, 3, 6 or 9
		Incremental plus Commutation channels	1 Enclosed, end-of-shaft mount	1 12V in, open collector out incremental only	1 3/8 in.	
			2 Through shaft	3 5V in, line driver out incremental only	4 6 mm	1-8 Mating ribbon cable included; 1=1 ft., 2=2 ft., etc.
				Available when Code 2 is XXXX/4, XXXX/6, or XXXX/8	5 8 mm	Available when Code 4= 0 - 9
				6 5V in, line driver out incr.; 5V in, open collector out comm.	6 10 mm	A-H Shielded cable; A=1 ft., B=2 ft., etc.
				7 5V in, line driver out incr.; 12V in, open collector out comm.	8 3/16 in.	
				9 5V in, line driver out incr.; 5V in, line driver out comm.	9 1/8 in.	