

# SERIES M53

**Dynapar™ brand**

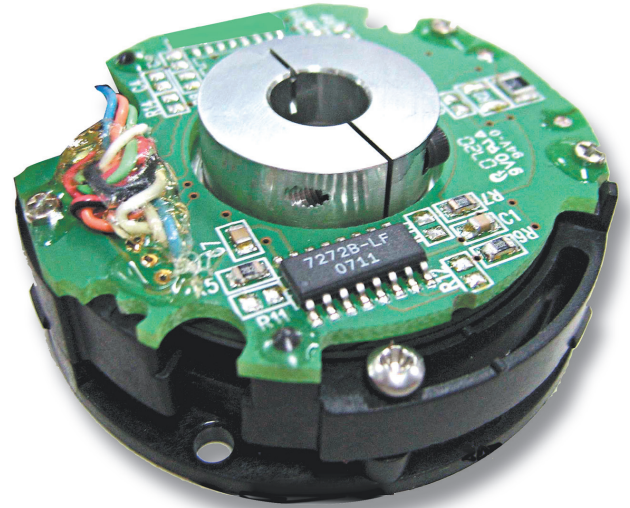
## For Stepper & Small Servo Motors

### Key Features

- **2.0" Diameter Modular Encoder with Easy Installation Requiring No Special Gapping Tools or Parts**
- **Phased Array Sensor Technology Allowing .020" Axial Shaft Play**
- **Up to 2048 PPR with Commutation Tracks**



**NEW!**



## SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental

**Resolution:** (pulses/revolution)

Incremental: 500 to 2048 PPR

Commutation: 4, 6 or 8 pole

**Accuracy:**

Incremental:  $\pm 5$  arc-mins. max. edge to edge;

**Sense:** (viewing encoder mounting surface)

Incremental: A leads B by  $90^\circ$  for CCW rotation of motor shaft;

Commutation: U leads V, V leads W by  $120^\circ$  for CW rotation of motor shaft

**Phasing:**

Incremental:  $90^\circ \pm 18^\circ$  electrical

Commutation: 8 Pole:  $30^\circ$ ; 6 Pole:  $40^\circ$ ; 4 Pole:  $60^\circ$  mechanical

Index to U Channel:  $\pm 1^\circ$  mechanical - Index center to U channel edge

**Symmetry:**

Incremental:  $180^\circ \pm 18^\circ$  electrical

Commutation: 8 Pole:  $45^\circ$ ;

6 Pole:  $60^\circ$ ; 4 Pole:  $90^\circ$  mechanical

**Index Pulse Width:**  $90^\circ \pm 36^\circ$  electrical (Gated with A high and B low)

### ELECTRICAL

**Input Power Requirements:**

Incremental: 5 VDC or 12 VDC  $\pm 10\%$  at

100 mA max. (excluding output load);

Commutation: 5 VDC or 12 VDC  $\pm 10\%$  at 75 mA max. (excluding output load)

**Output Signals:**

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

Open Collector w/2.0 k $\Omega$  pull-ups: 16 mA sink max.

**Frequency Response:** 200 kHz min.

**Termination:**

Connector: PCB mounted dual row head with 0.1" x 0.1" pin spacing, 10 pins (incremental only), 16 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)

**Noise Immunity:** Conforms to EN50082-1 Light Industrial for Electro-Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted Interference, and Magnetic Fields (for models or applications with shielded cable)

### MECHANICAL

**Weight:**

Connector: 1 oz. (28 gm) typ.

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

Cable: 2.5 oz (71 gm) typ.

Cable w/cover: 3 oz. (85 gm) typ.

**Dimensions:**

Outside Diameter: 2.1" (53 mm) max. w/cover, 2.0"

(51 mm) max. without cover; Height: 0.8" (20.3

mm) (w/cover, excluding connector);

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

**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)

**Moment of Inertia:**  $6.64 \times 10^{-6}$  in-oz sec.<sup>2</sup> (4.7 gm-cm<sup>2</sup>)

**Hub Diameters:** 1/4", 3/8", 7/16", 1/2", 6 mm, 8 mm, 10 mm, 12 mm nominal

**Hub Dia. Tolerance:**  $+0.001"/-0.000"$  ( $+0.026$  mm/ $-0.000$  mm)

**Mating Shaft Length:** 0.45" (12 mm) min. blind hub clamp screw, 0.65" (16.5 mm) exposed hub

clamp screw; 0.75" (19 mm) max. inside cover

**Mating Shaft Runout:** 0.002" (0.05 mm) max. (In-

cludes shaft perpendicularity to mounting surface)

**Mating Shaft Endplay:**  $+0.011"/-0.008"$  ( $+0.30$  mm/ $-0.21$  mm) nominal ("+" indicates away from

mounting face)

**Mounting:**

Base: (2) #4-40 (M2.5) #1 Phillips fillister head cap screw on 1.812" (46 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:**  $\pm 15^\circ$  mechanical

**Acceleration:** 100,000 rad/sec.<sup>2</sup> max.

**Velocity:** 12,000 RPM max.

### ENVIRONMENTAL

**Operating Temperature:**  $0^\circ$  to  $120^\circ\text{C}$

**Storage Temperature:**  $-40^\circ$  to  $85^\circ\text{C}$

**Shock:** 50 G's for 11 msec duration

**Vibration:** 2.5 G's at 5 to 2000 Hz

**Relative Humidity:** 90% non-condensing

**Enclosure Rating:** NEMA 1 / IP50 dirt-tight (for

models with cover)



Headquarters: 1675 Delany Road • Gurnee, IL 60031-1282 • USA

### Customer Service:

Tel.: +1.800.873.8731

Fax: +1.847.662.4150

custserv@dynapar.com

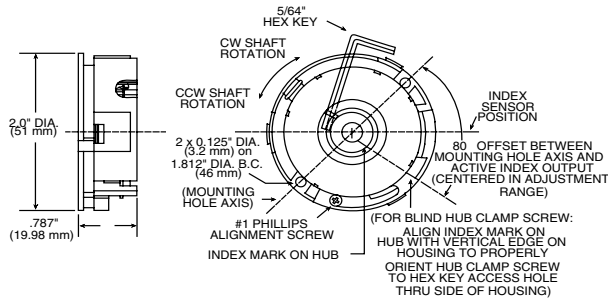
### Technical Support

Tel.: +1.800.234.8731

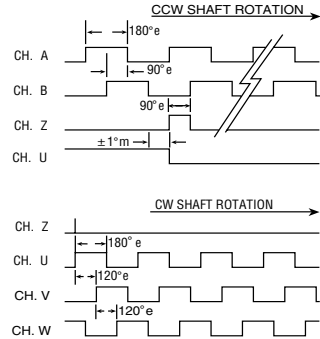
Fax: +1.847.662.4150

northstar.techsupport@dynapar.com

Dimensions/Installation



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

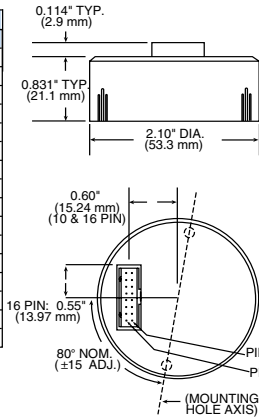


Code 6: Terminations (Not all signals present on all models)

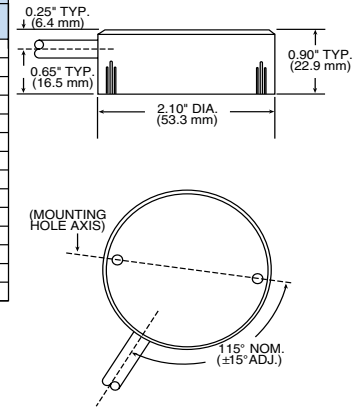
0: 16 Pin JST connector 1-8: Shielded Cable with JST connector

A-H: Shielded Cable

Pin	16 Pin
1	Vcc
2	U
3	GND
4	V
5	A
6	W
7	A'
8	NC
9	B
10	U'
11	B'
12	V'
13	Z
14	W'
15	Z'
16	NC



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



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
<b>M53</b>	<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

M53 Size 20 Commutating Modular	Incremental channels only	<b>0</b> No cover <b>1</b> Radial exit cover (for shielded cable) <b>2</b> Axial exit (for shielded cable with JST connector)	<b>0</b> 5V in, open collector out incremental only <b>1</b> 12V in, open collector out incremental only <b>3</b> 5V in, line driver out incremental only <b>A</b> 12V in, 5V line driver out incremental only <b>B</b> 12V in, 12V line driver out incremental only Available when Code 2 is XXXX/4, XXXX/6, or XXXX/8 <b>6</b> 5V in, line driver out incremental open collector out Comm <b>9</b> 5V in, line driver out incremental line driver out Comm <b>C</b> 12V in, 5V line driver out incremental, open collector <b>D</b> 12V in, 12V line driver out incremental, open collector <b>E</b> 12V in, 5V line driver out incremental, 5V line driver out Comm out Comm out Comm <b>F</b> 12V in, 12V line driver out incremental, 12V line driver out Comm	Exposed hub clamp screw: <b>A</b> 1/4 in. <b>B</b> 3/8 in. <b>C</b> 7/16 in. <b>D</b> 1/2 in. <b>E</b> 6 mm <b>F</b> 8 mm <b>G</b> 10 mm <b>H</b> 12 mm	<b>0</b> JST connector Available when Code 3 is 2: <b>1-8</b> Shielded cable with connector; 1=1 ft., 2=2 ft., etc. Available when Code 3 is 1: <b>A-H</b> Shielded cable; A=1 ft., B=2 ft., etc.
	Incremental plus Commutation channels	<b>0500/4 1024/4</b> <b>0500/6 1024/6</b> <b>0500/8 1024/8</b> <b>0512/8 2000/4</b> <b>2000/6</b> <b>1000/4 2000/8</b> <b>1000/6 2000/8</b> <b>1000/8 2048/4</b> <b>2048/6</b> <b>2048/8</b> <b>2048/8</b>			