

# Hollow Shaft Servomotor + Encoder

## CM-900 Series Size 25

### 10 mm hollow shaft motor with integral optical encoder

The CM-900 Series hollow shaft motor is a high performance brushless DC servomotor with an integral digital, absolute or sine/cosine encoder. It was specifically designed for high speed/high resolution scanning and positioning applications.

Using a low friction bearing design and the very low distortion sinusoidal encoder output allows interpolation of up to 10 bits for resolutions of 1,024,000 full quadrature cycles per revolution (4,096,000 discrete measuring points). The motor is characterized by a very high torque to inertia to optimize high frequent scanning or positioning rates.

### Features & Benefits

- Compact motor & encoder design with a 10mm bore hollow shaft
- Brushless DC motor with 33 Oz-in (0.23Nm) max. rated torque
- Incremental, sine/cosine, absolute encoder output signals

### Options

- Custom motor specifications up to 68 Oz-in (0.48Nm) max rated torq.
- High resolution positioning up to 4 Million pulses/rev

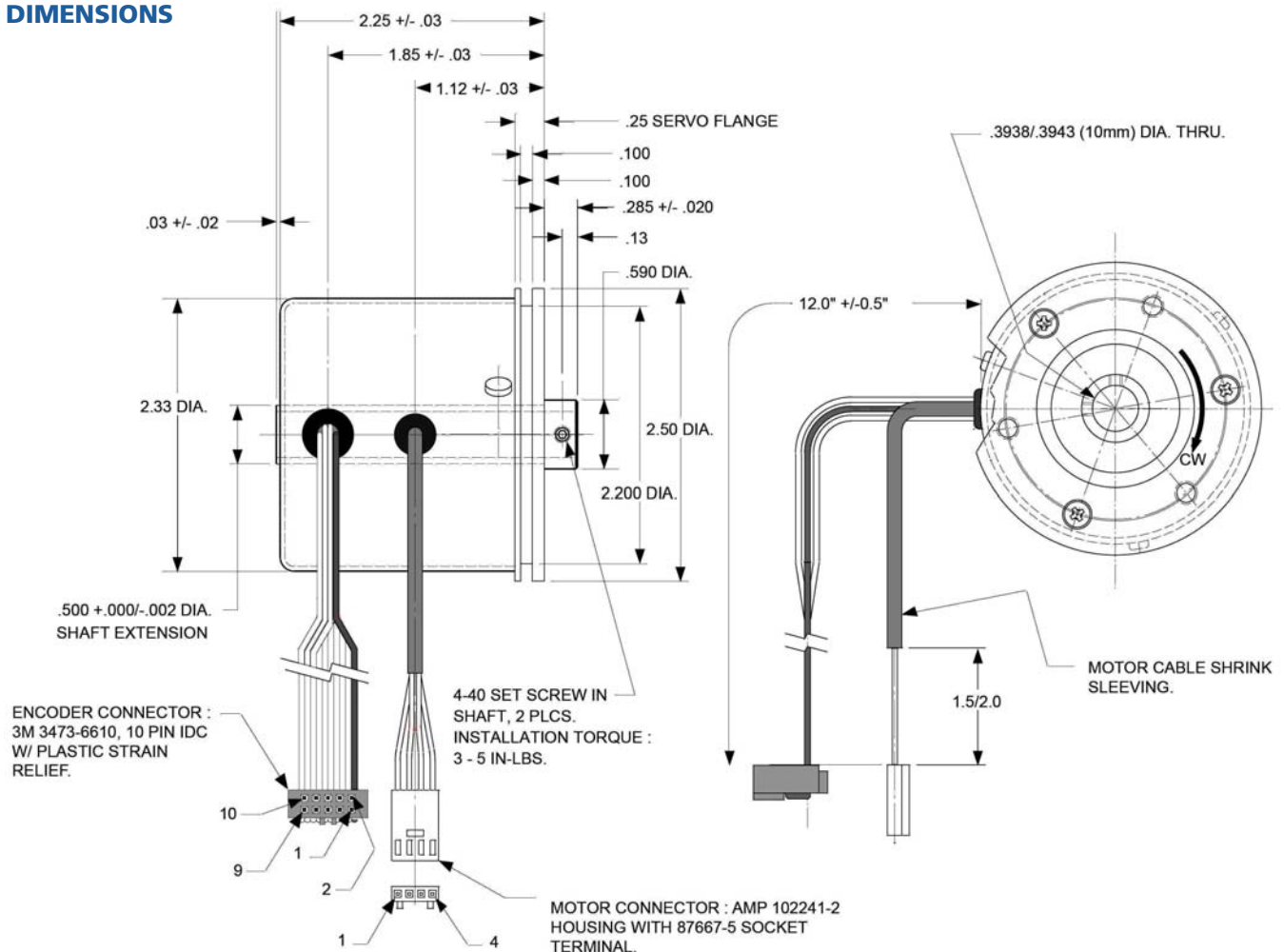
### Typical Applications:

- Steering laser beams using optical prism or optical diffraction gratings
- Spectrum analyzer, monochromator, antenna/radars and other direct drive applications



- Up to 10mm through hollow-shaft BLDC motor & encoder
- High resolution positioning
- Compact motor/encoder design

## DIMENSIONS



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### SPECIFICATIONS

#### MECHANICAL

shaft loading :	8 lbs Axial, 4 lbs Radial
shaft runout :	.0003 TIR.
starting torque :	0.50 oz-in Maximum
shaft rotation :	Continuous and Revec 3, Mo- bil 28 W 15% Fill
Bearings : Weight :	13 Oz Approx. 416 Cres

#### ENVIROMENTAL

Operating Temperature :	0 Deg C to +70 Deg C
Storage Temperature :	-20 Deg C to +85 Deg C
Shock :	50 G's for 11Ms
Vibration :	5-2,000 Hz @ 20G's 98% Rh No Condensation.

### SPECIFICATIONS — MOTOR

#### Size Constants @ 20°C ambient:

PARAMETER	symbol	UNITS	3 phase	2 phase
maximum rated torque	Tr	in.oz mNm	33 232	17 120
max. continuous stall torque	Tc	in-oz mNm	4.4 31	3.7 26
maximum continuous output power	Pout Smpo	watts RPM	19.9 8,600	15.8 7,904
motor constant	Km	oz.in/√W mNm/√W	1.7 12	1.5 10
electrical time constant	Te	msec.	0.26	.22
mechanical time constant	Tm	msec.	4.46	5.81
thermal resistance*	TPR	°C/W	7	7
maximum cogging torque	Tf	oz.in mNm	0.14 .99	0.14 .99
viscous damping		in-oz/rpm Nm/rpm	$5.1 \times 10^{-5}$ $3.6 \times 10^{-7}$	$5.2 \times 10^{-5}$ $3.7 \times 10^{-7}$
hysteresis drag torque		in-oz mNm	0.15 1.1	.15 1.1
rotor inertia		in-oz-sec <sup>2</sup> Kg.m <sup>2</sup>	$8.9 \times 10^{-5}$ $6.3 \times 10^{-7}$	$8.9 \times 10^{-5}$ $6.3 \times 10^{-7}$
motor weight		oz Kg	7.6 0.2148	7.6 0.2148
number of poles		P	6	6

#### 24V Winding Constants @ 20°C ambient:

parameter	symbol	units	3 phase	2 phase
peak torque, ± 25%	Vp	in-oz mNm	18 130	12 80
peak current, ± 15%	Tp	Amps	5.1	2.7
torque sensitivity, ± 10%	Kt	in/oz/Amp mNm/Amp	3.65 26	4.37 31
no load speed, ± 15%	Snl	rpm rad/sec	8,600 901	7,099 743
voltage constant, ± 10%	Kb	v/Krpm v/rad/sec	2.70 0.026	3.23 0.031
terminal resistance, ± 12%	Rm	Ohms	4.73	8.9
terminal inductance, ± 30%	Lm	mH	1.23	1.95
continuous power output @ 75°C temperature rise	power	Watt mHP	17.2 23	10.9 15
	torque	in-oz mNm	3.5 25	3.2 23
	speed	rpm	6,600	4,553
	current	Amperes	1.16	0.88
	efficiency	percent	61.6	51.6

\*motor mounted to aluminum heat sink 3.2" x 3.2" x 0.25" thick

Other motor specifications available on request

#### 3 PHASE MOTOR CABLE FUNCTIONS

WIRE COLOR	FUNKTION
RED	Phase A
WHITE	Phase B
BLACK	Phase C
GREEN	Chase ground

#### 2 PHASE MOTOR CABLE FUNCTIONS

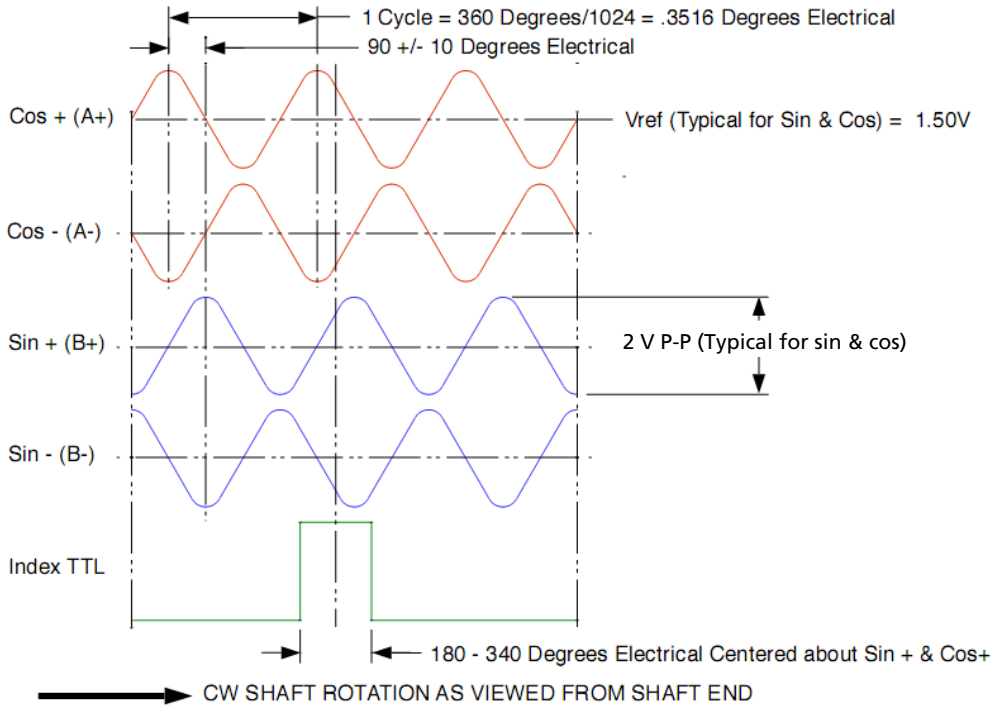
WIRE COLOR	FUNKTION
BLUE	Phase 1 -
RED	Phase 1 +
WHITE	Phase 2 -
YELLOW	Phase 2 +
GREEN	Shield ground

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### SPECIFICATIONS — SINE/COSINE ENCODER

#### ENCODER OUTPUT PHASING DIAGRAM :



#### ELECTRICAL

Input Power : +5 Vdc +/- 10% @ 50 mA Max.  
 Output Format : Incremental  
 Frequency Response : Flat up to 75 KHz @ 20 Deg C  
 Output Levels : Sin/cos analog 2V P-P, Index TTL 5V  
 1024, 2048, 4098 others on request  
 Line Count : 48 - 52% (On Time) Data 'A' (Sin)  
 Duty Cycle : and 'B' (Cos)

Digital and absolute output signals are available on request.  
 For further information see our CP-900 encoder series.

ENCODER CABLE FUNCTIONS		
CONNECTOR PIN	WIRE COLOR	FUNKTION
1	RED STRIPE	+5VDC
2	GRY	GROUND
3	N/C	-
4	N/C	-
5	GRY	COS- (A-)
6	GRY	COS+ (A+)
7	GRY	INDEX
8	N/C	-
9	GRY	SIN+ (B+)
10	GRY	SIN- (B-)

#### ORDER INFORMATION

**CM-920-(linecount):** 3 phase motor, commutation signals, incremental, differential sine/cosine, digital index  
**CM-935-(linecount):** 3 phase motor, no commutation signals, incremental, differential sine/cosine, digital index  
**CM-950-(linecount):** 3 phase motor, no commutation signals, incremental, digital complementary linedriver outputs.

Please contact manufacturer for detailed specification.