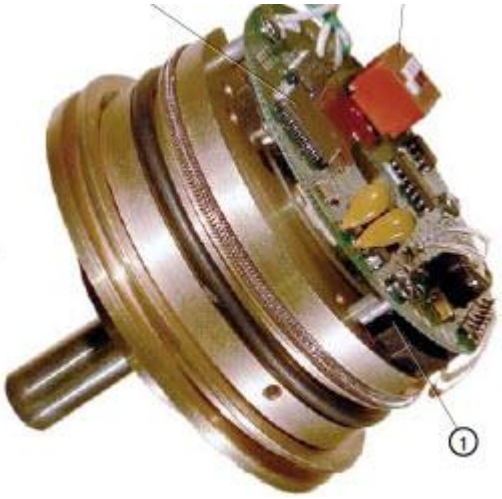
GROUP SIX

Allied Motion

Computer Optical Products, Inc.



COPI 800 & 900 ENCODERS

- Incremental
- Absolute
- Sinusoidal

Contact Us! 800-433-3434 USA
Email info@grp6.com

Purchase Source: GROUP SIX
info@grp6.com 800-433-3434

CP-800/900 Series Size-25 Housed Rotary Optical Encoders

Solid or hollow shaft , incremental, sine/cosine, or absolute format

Allied Motion's CP-800/900 series are size-25 (2.5 in. (63.5mm)) rotary optical encoders, available as solid or hollow shaft models with incremental, sine/cosine, absolute (single- or multi-turn) encoding formats. These rugged units have their own bearing system, and are fully enclosed in a metal housing sealed up to IP66.

CP-800 models have a solid shaft and are offered with either a square or servo flange. CP-900 models have a hollow shaft design with a hub-shaft accepting up to 0.5"(12.7 mm) shafts. A face mounted spring absorbs installation misalignment.

CP-800/900 encoders offer exceptional resolution of up to 5 million counts per rev. or 16-bit absolute (24-bit multi-turn absolute), enabling their use in high precision positioning applications. Custom designs are available to suit special requirements.

Features & Benefits

- Industry-standard size-25 fits/ retrofits easily in many applications
- Both solid– and hollow-shaft models for application flexibility
- Incremental, sine/cosine, single– and multi-turn absolute versions
- Shielded ABEC-7 bearings for smooth, long-life operation
- Rugged aluminum housing with IP65-rated protection
- Choice of side or rear-exit connector or cable

Options

- Special line counts and index
- Custom connector or cable version
- Sealed bearings (IP65) and housing (IP66)
- Extended temperature range: -25°C to +100°C

- Robust solid– or hollow-shaft size-25 rotary optical encoders
- Up to 5 million counts/revolution (max frequency response 4 MHz)
- Absolute single turn resolution up to 16-bit

SPECIFICATIONS — INCREMENTAL ENCODERS

Model	CP-800/900	CP-850/950	CP-870/970	CP-850/950-HHC
Type	Incremental, sine/cosine	Incremental, digital	Incremental, digital, line driver	Incremental, digital, high count
Format	A quad B, index	A quad B, index, inverses	A quad B, index, inverses	A quad B, index, inverses
Resolution (in cycles/rev) 1 cycle/rev = 4 counts/rev	96, 100, 110, 120, 128, 155, 192, 200, 210, 220, 240, 254, 256, 280, 288, 300, 310, 360, 384, 400, 480, 500, 576, 600, 720, 800, 850, 1000, 1024, 1100, 1250, 1800, 2000, 3600, 5000, 5625, 6000	16, 32, 50, 96, 100, 110, 120, 128, 155, 192, 200, 210, 220, 240, 254, 256, 280, 288, 300, 310, 360, 384, 400, 480, 500, 508, 512, 560, 576, 600, 720, 768, 800, 850, 960, 1000, 1152, 1200, 1440, 1700, 2000, 2048, 3600, 4000, 4096, 5000, 7200, 8192, 10000, 11250, 12000, 16384	16, 32, 50, 96, 100, 110, 120, 128, 155, 192, 200, 210, 220, 240, 254, 256, 280, 288, 300, 310, 360, 384, 400, 420, 480, 500, 508, 512, 560, 576, 600, 720, 768, 800, 850, 960, 1000, 1024, 1152, 1200, 1440, 1700, 2000, 2048, 3600, 4000, 4096, 5000, 7200, 8192, 10000, 11250, 12000, 16384	25k, 25.6k, 31.25k, 32k, 50k, 51.2k, 62.5k, 64k, 90k, 100k, 102.4k, 112.5k, 125k, 128k, 156.25k, 180k, 200k, 204.8k, 225k, 250k, 256k, 312.5k, 360k, 400k, 409.6k, 450k, 500k, 512k, 625k, 720k, 819.2k, 900k, 1000k, 1024k, 1250k
Frequency Response	100 kHz	300 kHz	300 kHz	4 MHz
Accuracy	± 12 arcsec (typ.)			
Repeatability	1 arc sec	± 1 count	± 1 count	± 1 count
Output	Op amp (TIL084)	TTL/74LS04	Line driver	Line driver*
Power Supply (VDC)	+5, +12 (50 mA max. ea.)	+5 (100 mA max.)	+8 to +30 (150 mA max.)	+5 (250 mA max.)

* Recirculating quadrature counter recommended as receiving device (e.g., HP HCTL-2000, -2016, -2020, or LSI 7166)

Incremental Encoder Connections (Connector: MS3102R-18-1P)

Connection	A	A inv	B	B inv	Index	Index inv	+5 VDC	Common	Shield
Connector Pin	A	G	B	H	C	I	E	F	J

Specifications subject to change without notice

Purchase Source: GROUP SIX
info@grp6.com 800-433-3434

Optical Encoders

CP-800/900 Series Size-25 Housed Rotary Encoders

SPECIFICATIONS — ABSOLUTE ENCODERS

Model	CP-850/950-12GC	CP-850/950-14GC	CP-850/950-12NB	CP-850/950-12GC/3600	CP-850/950-12BD	CP-850/950-12ANx
Type	Absolute, 12-bit	Absolute, 14-bit	Absolute, 12-bit	Absolute, 0.1° step	Absolute, BCD	Absolute, analog
Format	Parallel Gray code	Parallel Gray code	Parallel natural binary	Parallel Gray code, 12-bit excess 248	Parallel BCD	12 bits (4096 steps)
Freq. Response	100 kHz min. word rate					50µs latency
Output	TTL compatible					0 - 10 V (std.), 4-20 mA (opt.)
Direction input	N/A	N/A	TTL/CMOS (5V)	N/A	N/A	TTL/CMOS (5V)
Power Supply	+5 VDC ± 10%, (100 mA max.)					+12.6 to +16.6, (100 mA max.)

Absolute Encoder Connections

Connector

KPT00A-14-19P										MS3102R-16S-1P	
Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin
G0	A	G0	P	B0	A	G0	A	B1	A	I_{OUT}	A
G1	B	G1	S	B1	B	G1	B	B2	B	I_{OUT} (rtn.)	B
G2	C	G2	A	B2	C	G2	C	B4	C	V_{OUT}	C
G3	D	G3	B	B3	D	G3	D	B8	D	V_{OUT} (rtn.)	D
G4	E	G4	C	B4	E	G4	E	B10	E	Direction	E
G5	F	G5	D	B5	F	G5	F	B20	F	+15 VDC	F
G6	G	G6	E	B6	G	G6	G	B40	G	Common	G
G7	H	G7	F	B7	H	G7	H	B80	H	GND	H
G8	J	G8	G	B8	J	G8	J	B100	J		
G9	K	G9	H	B9	K	G9	K	B200	K		
G10	M	G10	J	B10	M	G10	M	B400	M		
G11	N	G11	K	B11	N	G11	N	B800	N		
+5 VDC	V	G12	M	Direction	L	+5 VDC	V	B1000	P		
Common	T	G13	N	+5 VDC	V	Common	T	B2000	R		
GND	S	+5 VDC	V	Common	T	GND	S	B4000	U		
		Common	T	GND	S			Direction	L		
		GND	shield					+5 VDC	V		
								Common	T		
								GND	S		

SPECIFICATIONS — MECHANICAL

Model	CP-800 Series	CP-900 Series
Shaft Diameter, in. (mm)	0.3745/0.3748 (9.512/9.520)	0.5 (12.7) max.
Shaft Play, in. (mm)	0.05 (1.27) axial; 0.005 (0.127) radial	
Shaft Loading, lb (N)	40 (178) axial; 35 (156) radial	
Shaft Runout, T.I.R., in. (mm)	0.0005 (0.0127)	
Shaft Material	416 stainless steel	
Shaft Rotation	Continuous, reversible	
Bearing Type	ABEC-7	
Starting Torque, oz-in (mNm)	1.5 (10.6) max. at 20 °C	
Inertia, oz-in-s^2 (kgm^2)	4.1E-4 (2.9E-6)	
Slew Speed, RPS (RPM)	160 (9600)	
Shock, g	50 at 11 ms	
Vibration, Hz	5 - 2000 Hz at 20g	
Operating Temp., °C	-20 to +90	
Humidity	98% without condensation	
Protection Rating	Without shaft seal: IP54 (with shaft seal: IP65)	
Housing Material	Aluminum (flange and cover)	
Weight, lb (kg)	13 (0.369)	

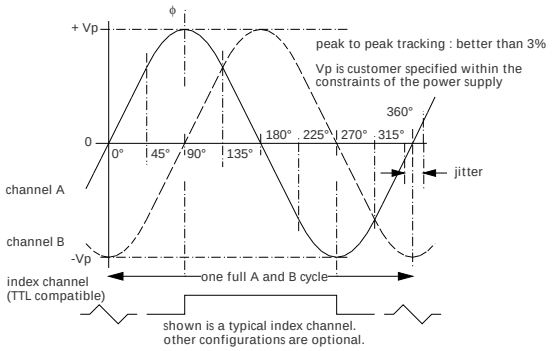
Purchase Source: GROUP SIX
info@grp6.com 800-433-3434

CP-800/900 Series Size-25 Housed Rotary Encoders

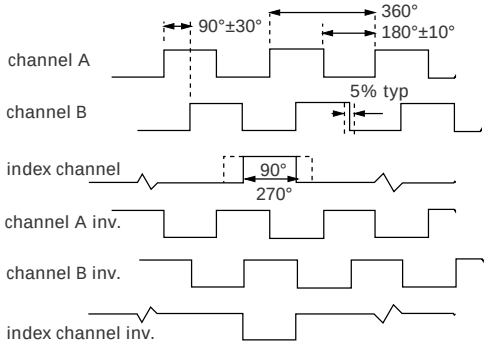
OUTPUT WAVEFORMS

Note: All waveforms shown for CW rotation viewed from encoder shaft end

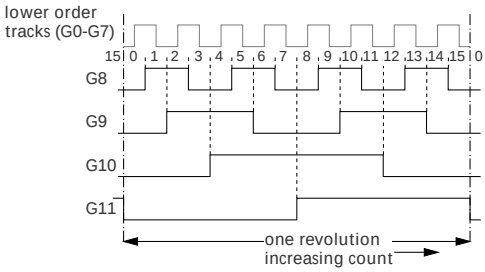
CP-800/900



CP-850/950, CP-850/950-HHC, CP-870/970

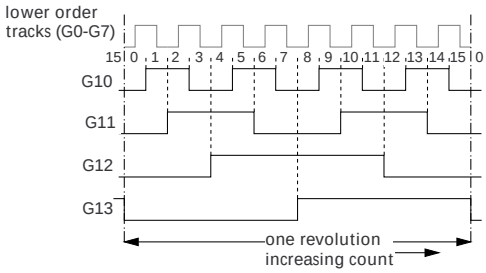


CP-850/950-12GC, CP-850/950-12GC/3600

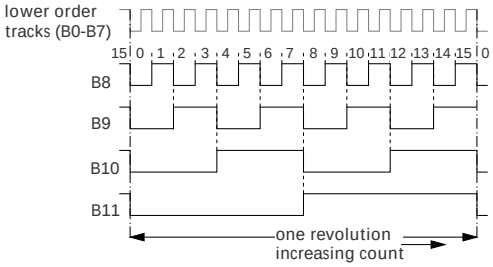


For –12GC/3600: 0.1°/step: 0-1799, then 2296 to 4095

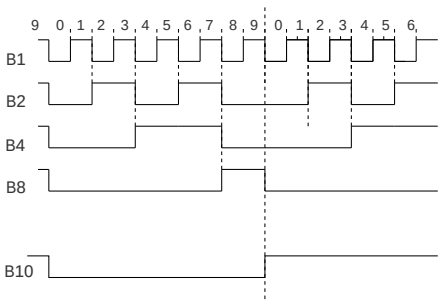
CP-850/950-14GC



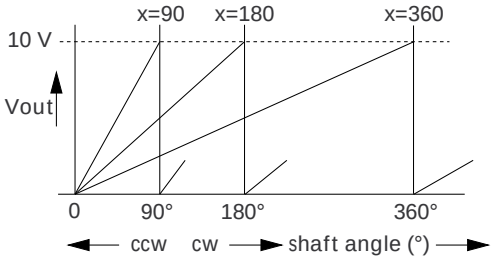
CP-850/950-12NB



CP-850/950-12BD



CP-850/950-12NB



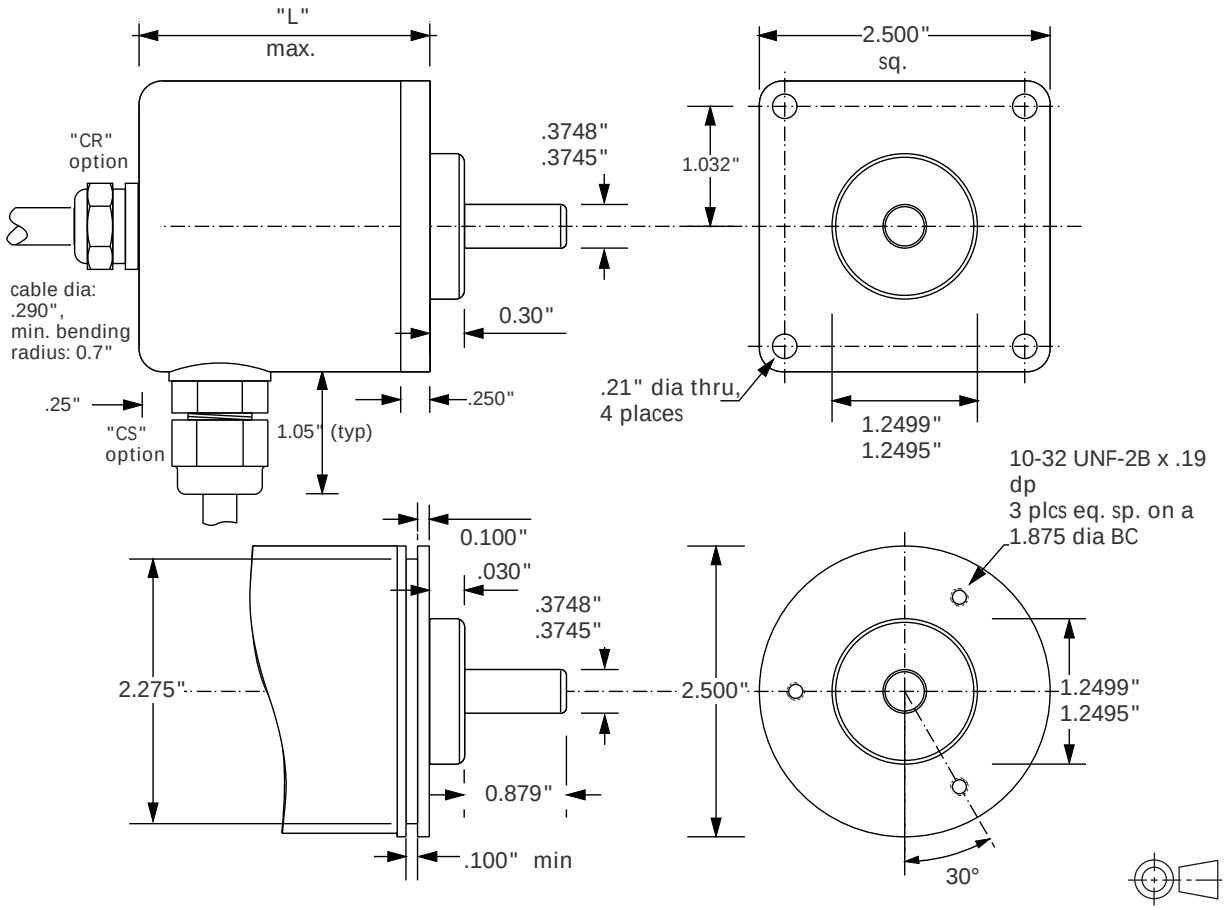
Options	x= 90	x= 180	x = 360
Rotation	90°	180°	360°
Resolution	5.28 arc min.		
mV/step	9.77 mV	4.88 mV	2.44 mV

Purchase Source: GROUP SIX
info@grp6.com 800-433-3434

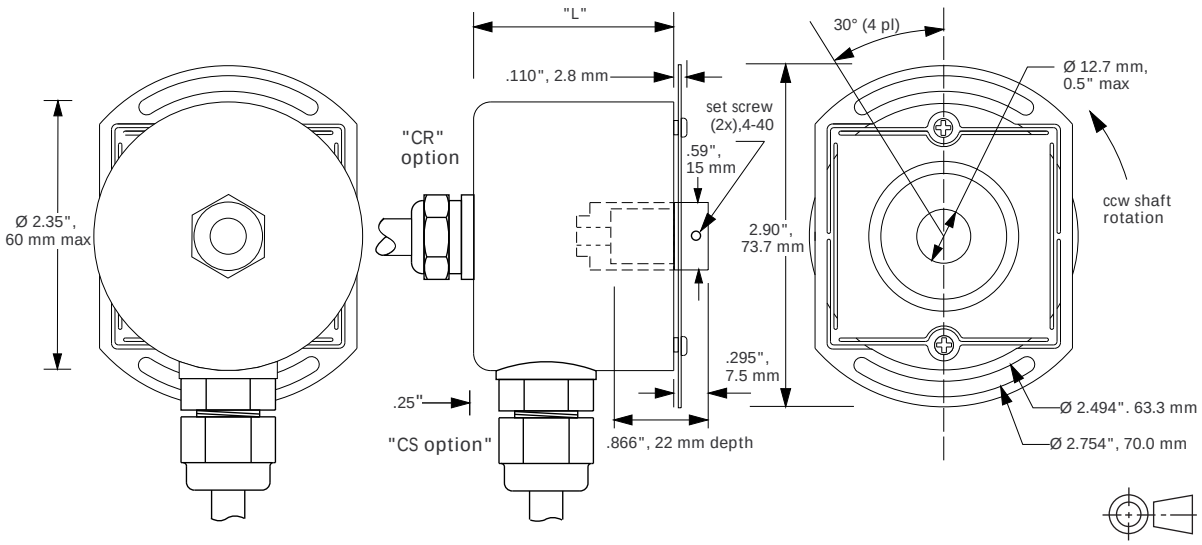
Optical Encoders

CP-800/900 Series Size-25 Housed Rotary Encoders

DIMENSIONS — CP-800 SOLID-SHAFT

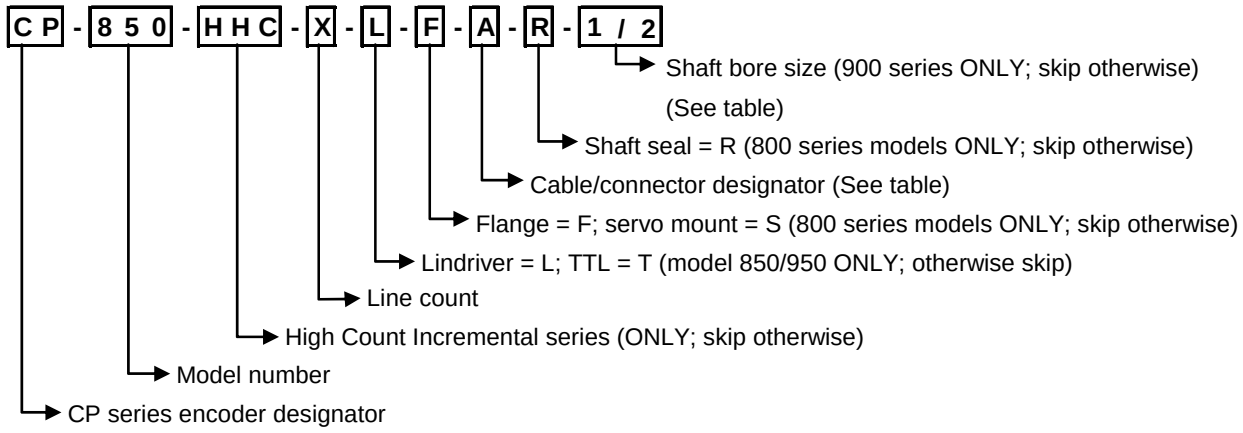


DIMENSIONS — CP-900 HOLLOW-SHAFT



CP-800/900 Series Size-25 Housed Rotary Encoders

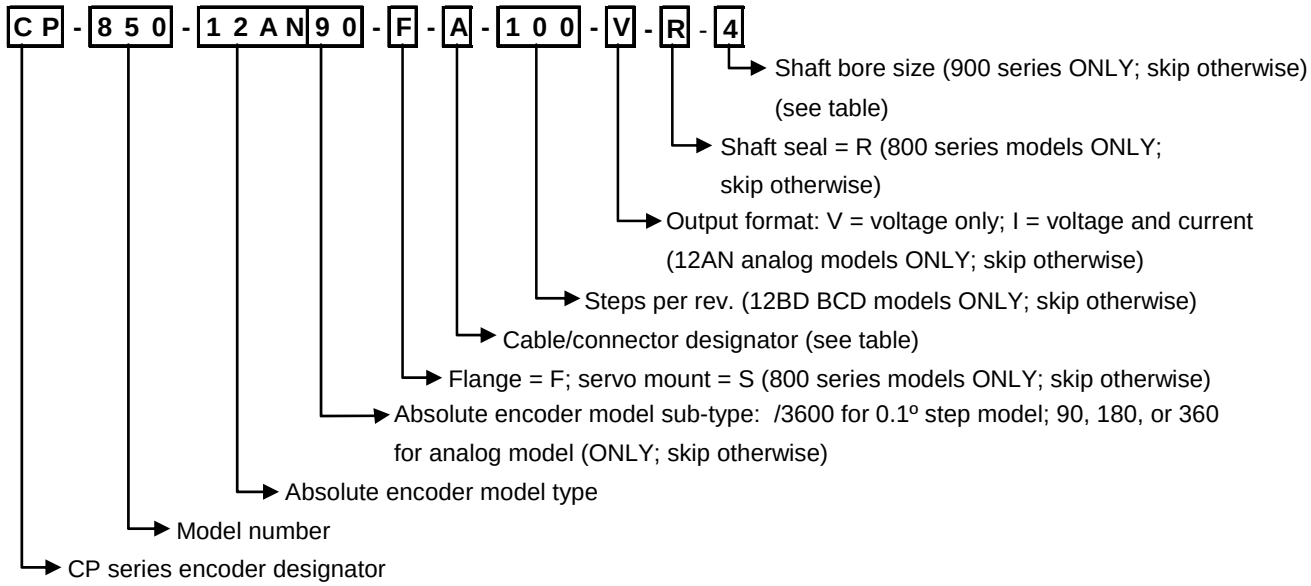
MODEL NUMBERING — INCREMENTAL ENCODERS



Cable/Connector
A = rear cable
B = side cable
C = rear connector
D = side connector

Shaft Bore Size
Enter bore size as inch fraction or whole number for metric (mm): Inch: 3/32, 3/16, 1/4, 5/16, 3/8, 1/2 Metric: 4, 5, 6, 8, 10, 11, 12 (mm)

MODEL NUMBERING — ABSOLUTE ENCODERS



Cable/Connector
A = rear cable
B = side cable
C = rear connector
D = side connector

Shaft Bore Size
Enter bore size as inch fraction or whole number for metric (mm): Inch: 3/32, 3/16, 1/4, 5/16, 3/8, 1/2 Metric: 4, 5, 6, 8, 10, 11, 12 (mm)

Purchase Source: GROUP SIX
info@grp6.com 800-433-3434

Allied Motion

Motion Solutions that Raise the Bar

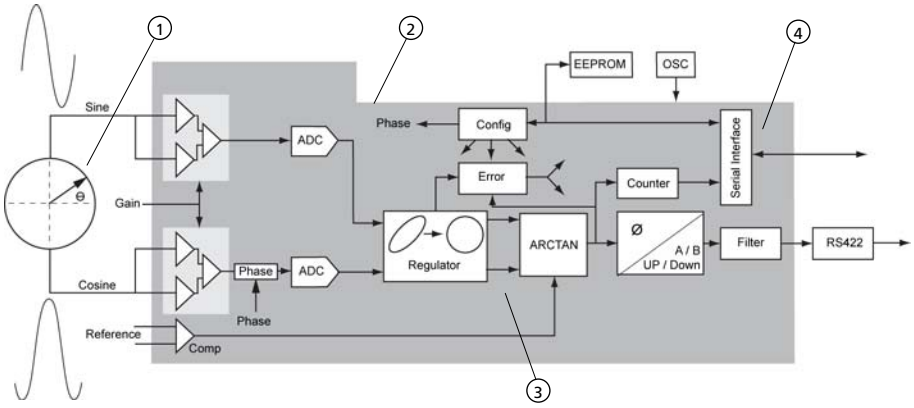
www.alliedmotion.com

Specifications subject to change without notice

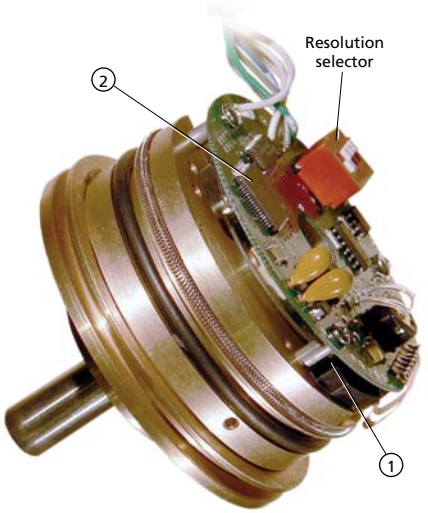
Purchase Source: GROUP SIX
info@grp6.com 800-433-3434

Allied Motion Technology Overview

High Resolution Incremental Encoders



Item	Description
1	High fidelity base sinewave encoder
2	Digital interpolator
3	Signal correction
4	16-bit asynchronous or synchronous serial output



CP-850-HHC high resolution encoder less cover

High Resolution Incremental Encoder Technology

Very high resolution incremental encoders are used in many high precision positioning and measuring systems. One technique for achieving high resolution is that employed by Allied Motion, which enables up to 2,250,000 incremental A/B cycles per revolution. Conventional "edge detection" multiplication can then be employed to raise the resolution to 9,000,000 measuring points per revolution with repeatability of better than one arc second.

The foundation of Allied Motion's high resolution encoding technology is an optimized sinewave encoder with servo-controlled light source to maintain illumination quality level.

This is combined with an electronic interpolator with signal correction technology that outputs digital incremental A and B signals, plus an index channel.

Allied Motion's high resolution encoders can be used as any incremental encoder would be, but with a much higher resolution potential and bandwidth (up to 4 MHz).

Advantages of High Resolution Encoders

Allied Motion's high resolution encoders offer benefits for many positioning and measuring applications:

- Extremely fine resolution per revolution of up to 0.52 arc sec* along with excellent temperature characteristics
- High repeatability to allow "mapping" system error to achieve absolute accuracy of better than two arc seconds
- A high resolution technology that enables a more cost-effective solution than alternate methods
- An encoder disc that is more robust than those employed in typical high-count encoders
- A compact encoder package without the need for additional interpolation electronics included elsewhere in the system

* ~0.13 arc sec with edge detection

High Resolution Encoder Applications

Below are representative applications that benefit from the advantages of high resolution encoders:

- Azimuth and elevation encoders for 3D scanners
- Spectrum analyzers for the communication industry
- Spectrum analyzers for chemical analysis equipment
- Medical gas chromatography
- High definition facial recognition surveillance cameras
- Tunable lasers for communication system instrumentation
- Optical spectrum wavemeters
- Missile seeker heads
- High precision theodolites
- Optical trackers
- 3D printers

High Resolution Incremental Encoders

	Size [mm (in)]	Resolution [cycles/r]	Output	Voltage Supply [VDC]	Speed* [RPM]	Shaft or Bore, D x L [mm (in)]	Options
CP-250-HHC 	45.2 x 63 (1.78 x 2.48)	5000 to 125000	Linedriver, RS-422 levels, 4 MHz	+ 5 ± 5%	1920 up to 4800 RPM	Up to 10 mm (0.39) hub	• Cable and connector
CP-850-HHC 	"Size 25" 63.5 Ø (2.5) solid shaft	25000 to 1250000	Linedriver, RS-422 levels, 4 MHz	+ 5 ± 10%	192 up to 9,600 RPM	9.52 x 22.3 (0.3848 x 0.879)	• Flange, face or servo mount • Rear or side connector or cable exit
CP-950-HHC 	"Size 25" 63.5 Ø (2.5) hollow shaft	25000 to 1250000	Linedriver, RS-422 levels, 4 MHz	+ 5 ± 10%	192 up to 9,600 RPM	12.7 x 22 (0.5 x 0.866)	• Spring mount (shown) • Rear or side connector or cable exit • Up to 0.5" hollow shaft ID
CP-2650-HHC 	67.3 Ø, 19 ID (2.65 Ø, 0.748" ID) hollow shaft	25000 to 1250000	Linedriver, RS-422 levels, 4 MHz	+ 5 ± 10%	192 up to 9,600 RPM	0.748" (19 mm) hollow shaft	• Cable and connector
CP-3750-HHC 	95.3 Ø, 50.8 ID (3.75 Ø, 2 ID) hollow shaft	50000 up to 2250000	Linedriver, RS-422 levels, 4 MHz	+ 5 ± 10%	106 up to 4800 RPM	2" (50.8 mm) hollow shaft	• Cable and connector

* Speed depends upon resolution: N_{max} =2.4 E8 ÷ Linecount

Purchase Source: GROUP SIX
info@grp6.com 800-433-3434