Slim Encoder with Diameter of 50 mm

E6C3-A

Rugged Rotary Encoder

- Absolute model.
- External diameter of 50 mm.
- Resolution of up to 1,024 (10-bit).
- IP65 (improved oil-proof protection with sealed bearings)
- Optimum angle control possible in combination with PLC or Cam Positioner.



CE

Be sure to read *Safety Precautions* on page 7.

Ordering Information

Encoders [Refer to Dimensions on page 8.]

Power supply voltage	Output configu- ration	Output code	Resolution (pulses/rotation)	Connection method	Model
		Grov	256, 360, (720) *2	Pre-wired Connector Model (1 m)	E6C3-AG5C-C (resolution) 1M Example: E6C3-AG5C-C 256P/R 1M
	Open-collector	Gray	256, 360, 720, 1,024		E6C3-AG5C (resolution) 1M Example: E6C3-AG5C 256P/R 1M
	output (NPN)	Binary	32, 40		E6C3-AN5C (resolution) 1M Example: E6C3-AN5C 32P/R 1M
12 to 24 VDC		BCD	6, 8, 12		E6C3-AB5C (resolution) 1M Example: E6C3-AB5C 6P/R 1M
	Open-collector output (PNP)	Gray	256, 360, 720, 1,024	Pre-wired Model (1 m) *1	E6C3-AG5B (resolution) 1M Example: E6C3-AG5B 256P/R 1M
		Binary	32, 40		E6C3-AN5B (resolution) 1M Example: E6C3-AN5B 32P/R 1M
		BCD	6, 8, 12		E6C3-AB5B (resolution) 1M Example: E6C3-AB5B 6P/R 1M
5 VDC	Voltago output Binon/		256]	E6C3-AN1E 256P/R 1M
12 VDC	Voltage output	Binary	200		E6C3-AN2E 256P/R 1M

*1. Standard models are also available with 2-m cables. When ordering, specify the cable length at the end of the model number (example: E6C3-AG5C 360P/R 2M). *2. When connecting to the H8PS, use the E6C3-AG5C-C 256, 360, 720P/R. (Only a 2-m cable is available for the 720P/R Model.)

For the 360/720 resolutions, 2-m cables are standard in-stock.

Accessories (Order Separately)

[Dimensions: Refer to *Accessories* on page 8 for Extension Cable dimensions and *Accessories* for the dimensions of other accessories.]

Name	Model	Remarks				
Couplings	E69-C08B					
Couplings	E69-C68B	Different end diameter (6 to 8 mm)				
Flanges	E69-FCA03					
Flanges	E69-FCA04	E69-2 Servo Mounting Bracket provided.				
Servo Mounting Bracket	E69-2	Provided with E69-FCA04 Flange.				
	E69-DF5	5 m				
Extension Cable	E69-DF10	10 m Applicable to the E6C3-AG5C-C. Models are also available with 15-m and 98-m cables.				
	E69-DF20	20 m				

Refer to Accessories for details.

E6C

Ratings and Specifications

Item	Model	E6C3- AG5C-C	E6C3- AG5C	E6C3- AN5C	E6C3- AB5C	E6C3- AG5B	E6C3- AN5B	E6C3- AB5B	E6C3- AN1E	E6C3- AN2E
Power supply	voltage	12 VDC -109	% to 24 VDC +	15%, ripple (p	-p): 5% max.				5 VDC ±5%	12 VDC ±10%
Current consu	mption*1	70 mA max.							1	
Resolution*2 (pulses/rotatio	n)	256, 360, 720	256, 360, 720, 1,024	32, 40	6, 8, 12	256, 360, 720, 1,024	32, 40	6, 8, 12	256	
Output code		Gray code	i.	Binary	BCD	Gray code	Binary	BCD	Binary	
Output configu	iration	NPN open-co	ollector output		i.	PNP open-ce	ollector output	-i	Voltage outp	out
		Applied voltage: 30 VDC max. Sink current: 35 mA max. Residual voltage: 0.4 V max. (at sink current of 35 mA)					ent: 35 mA max		Output re- sistance: 2.4 kΩ	Output re- sistance: 8.2 kΩ
Output capacit	у					Residual voltage: 0.4 V max. (at source current of 35 mA)			Sink current: 35 mA max. Residual voltage: 0.4 V max. (at sink current of 35 mA)	
Rise and fall times of output		1 μs max. (C	able length: 2	m, Sink curren	it: 35 mA)				Rise: 3 μs max., Fall: 1 μs max.	Rise: 10 μs max., Fall: 1 μs max.
Maximum resp frequency*3	onse	20 kHz							10 kHz	
Logic		Negative logic (high = 0, low = 1) Positive logic (high = 1, low = 0)					(= 0)	- U		
Direction of ro	tation*4	Output code increases for CW (as viewed from end of shaft).						Switched using rotation di- rection input.		
Strobe signal		None Supported				None Supported			None	
Positioning sig	Inal	None Supported			Supported	None Supported			None	
Parity signal		None		Supported (even)						
Starting torque)	10 mN·m max. at room temperature, 30 mN·m max. at low temperature								
Moment of ine	rtia	$2.3 \times 10^{-6} \text{ kg} \cdot \text{m}^2$								
Shaft loading	Radial	80 N								
Shart loading	Thrust	50 N								
Maximum pern	nissible speed	5,000 r/min								
Ambient tempe	erature range	Operating: -10 to 70°C (with no icing), Storage: -25 to 85°C (with no icing)								
Ambient humi	lity range	Operating/Storage: 35% to 85% (with no condensation)								
Insulation resist	stance	20 M Ω min. (at 500 VDC) between current-carrying parts and case								
Dielectric stren	ngth	500 VAC, 50/60 Hz for 1 min between current-carrying parts and case								
Vibration resis	tance	Destruction: 10 to 500 Hz, 150 m/s ² or 2-mm double amplitude for 11 min 3 times each in X, Y, and Z directions								
Shock resistance		Destruction: 1,000 m/s ² 3 times each in X, Y, and Z directions								
Degree of prot	ection	IEC 60529 IP65, in-house standards: oilproof								
Connection me	ethod	Connector Models *6 Pre-wired Models (Standard cable length: 1 m)								
Material		Case: Aluminum, Main unit: Aluminum, Shaft: SUS303								
Weight (packe	d state)	Approx. 300 g								
• •		Instruction manual Note: Coupling, mounting bracket and hex-head spanner are sold separately.								

turned ON. *2. The code is as follows:

Output code	Resolu- tion	Code No.
	32	1 to 32
Binary	40	1 to 40
	256	0 to 255
	6	0 to 5
BCD	8	0 to 7
	12	0 to 11
	256	0 to 255
Grav	360	76 to 435 (gray after 76)
Gray	720	152 to 871 (gray after 152)
	1,024	0 to 1,023

*3. The maximum electrical response speed is determined by the resolution and maximum response frequency as follows:

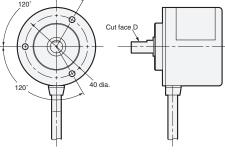
This means that the Rotary Encoder will not operate electrically if its speed exceeds the maximum electrical response speed.

*4. For the E6C3-AN1E and E6C3-AN2E, the rotation direction input (wire color: pink) can be connected to high (Vcc) to increase the output code for CW rotation and connected to low (0 V) to decrease the output code for CW rotation. 120 E6C3-AN1E: High = 1.5 to 5 V, Low = 0 to 0.8

E6C3-AN2E: High = 2.2 to 12 V, Low = 0 to 1.2 V

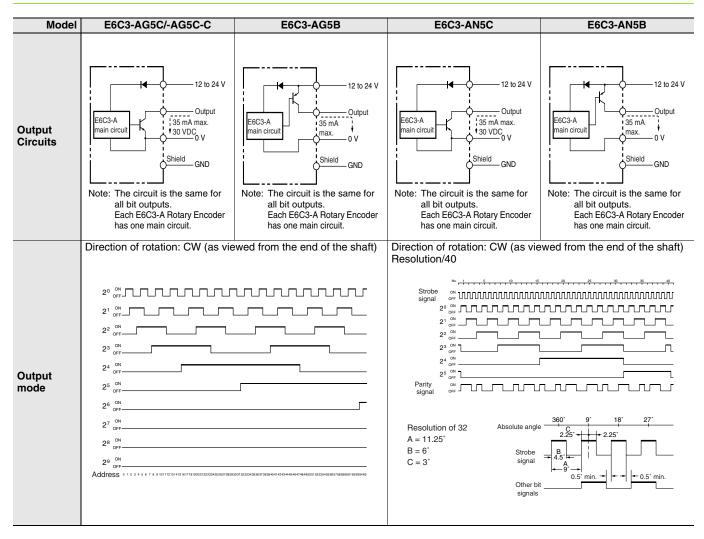
Read the code 10 μs or more after the LSB (2^{0}) of the code changes for the E6C3-AN1E or E6C3-AN2E.

- *5. The minimum address of the absolute code is output when cut face D on the shaft and the cable connection direction are as shown in the diagram at the right (output position range: ±15°).
- *6. Resolution of 360 or 720: Standard cable length: 2 m Resolution of 256: Standard cable length: 1 m



E6C3-A

I/O Circuit Diagrams



Connection Specifications

Connector Models

Model		E6C3-AG5C-C					
		Output signal					
Pin No.	8-bit (256)	9-bit (360)	10-bit (720)				
1	Connected	Not connected	2 ⁹				
2	f internally	2 ⁸	2 ⁸				
3	2 ⁵	2 ⁵	25				
4	2 ¹	2 ¹	2 ¹				
5	2 ⁰	2 ⁰	2 ⁰				
6	27	2 ⁷	27				
7	2 ⁴	2 ⁴	24				
8	2 ²	2 ²	2 ²				
9	2 ³	2 ³	2 ³				
10	2 ⁶	2 ⁶	2 ⁶				
11	Shield (ground)						
12		12 to 24 VDC					
13	0 V (common)						

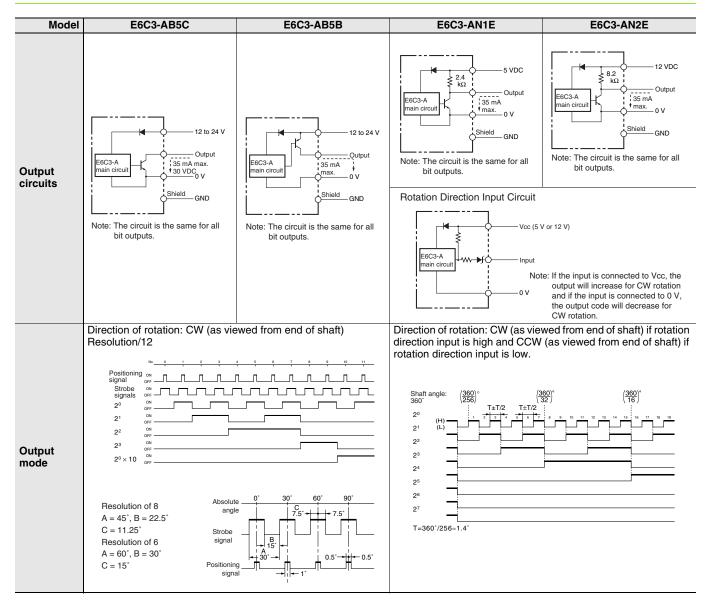
* Connector: RP13A-12PD-13SC (Hirose Electric Co., Ltd.) Note: Normally connect GND to 0 V or to an external ground.

Pre-wired Models

Model	E6C3-AG5C/E6C3-AG5B					
	Output signal					
Wire color	8-bit (256)	9-bit (360)	10-bit (720 or 1,024)			
Brown	2 ⁰	2 ⁰	2 ⁰			
Orange	2 ¹	2 ¹	2 ¹			
Yellow	2 ²	2 ²	2 ²			
Green	2 ³	2 ³	2 ³			
Blue	24	2 ⁴	2 ⁴			
Purple	2 ⁵	2 ⁵	2 ⁵			
Gray	2 ⁶	2 ⁶	2 ⁶			
White	27	27	27			
Pink	Not connected	2 ⁸	2 ⁸			
Light blue	Not connected	Not connected	2 ⁹			
	Shield (ground)					
Red		12 to 24 VDC				
Black	0 V (common)					

E6C3-A

I/O Circuit Diagrams



Connection Specifications

Pre-wired Models

Model	E6C3-AN5C/-AN5B	E6C3-AB	5C/-AB5B	E6C3-AN1E/-AN2E	
	Output signal	Output	t signal	Output signal 8-bit (256)	
Wire color	6-bit (32 or 40)	3-bit (6 or 8)	5-bit (12)		
Brown	2 ⁰	2 ⁰	2 ⁰	2 ⁰	
Orange	2 ¹	2 ¹	2 ¹	2 ¹	
Yellow	2 ²	2 ²	2 ²	2 ²	
Green	2 ³	Not connected	2 ³	2 ³	
Blue	2 ⁴	Not connected	2 ⁰ × 10	24	
Purple	2 ⁵	Not connected	Not connected	2 ⁵	
Gray	Parity	Positioning	Positioning	2 ⁶	
White	Strobe	Strobe	Strobe	2 ⁷	
Pink	Not connected	Not connected	Not connected	Rotation Direction Input	
Light blue	Not connected	Not connected	Not connected	Not connected	
		(ground)			
Red	12	to 24 VDC		5 or 12 VDC	
Black		0 V (cc	ommon)		

Note: Normally connect GND to 0 V or to an external ground.

Connection Example

H8PS Cam Positioner Connection Example



Ordering Information
Model
H8PS-8A
H8PS-8AP
H8PS-8AF
H8PS-8AFP
H8PS-16A
H8PS-16AP
H8PS-16AF
H8PS-16AFP
H8PS-32A
H8PS-32AP
H8PS-32AF
H8PS-32AFP

Sp	ecif	icati	ions

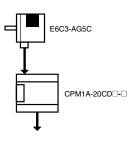
Rated voltage	24 VDC			
Cam precision	0.5° (for 720 resolution), 1° (for 256/360 resolution)			
No. of output points	8-point output type: 8 cam outputs, 1 RUN output, 1 pulse output 16-point output type: 16 cam outputs, 1 RUN output, 1 pulse output 32-point output type: 32 cam outputs, 1 RUN output, 1 pulse output			
Encoder response	RUN mode, test mode: 256/360 resolution 1,600 r/min max. (1,200 r/min when advance compensation is set for four cams or more) 720 resolution			
Additional functions	 Origin compensation (zeroing) Rotation direction switching Angle display switching Teaching Pulse output Angle/number of rotations display switching Puncture * Angle advance Number of rotations alarm output Setting with support software (order separately) * 			

* For 16-point and 32-point output types only

Programmable Controller Connection Example

Connection to the CPM1A

(720 Resolution)



Wiring between the E6C3-AG5C and CPM1A

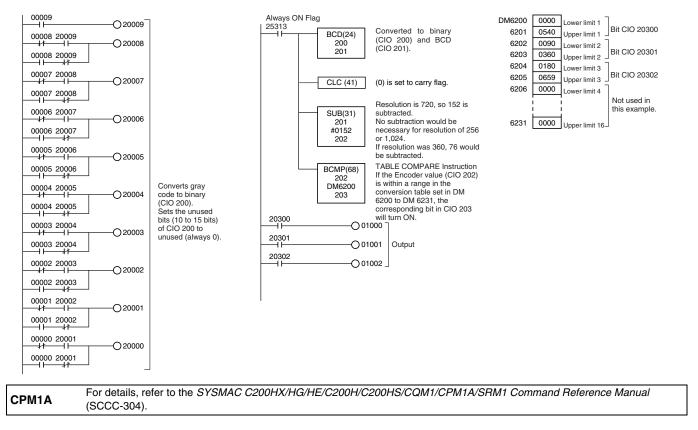
CPM1A input signal
00000
00001
00002
00003
00004
00005
00006
00007
00008
00009

Output Timing

	E6C3-AG5C angle						
0	90	180		360		540	659
	i i	i.	i	i.			ii –
01000							- 1 1
Ē	-	!	1	-	1	-	
01001					1	- i	11
		i					
01002							

DM Area Setting Example for Comparison Table

Ladder Programming Example



Safety Precautions

Refer to Warranty and Limitations of Liability.

🔥 WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



Precautions for Correct Use

Do not use the Encoder under ambient conditions that exceed the ratings.

• Wiring

Connections

Cable Extension Characteristics

- Conditions will change according to frequency, noise, and other factors. As a guideline, use a cable length of 10 m* or less.
- * Recommended Cable Conductor cross section: 0.2 mm²
- Spiral shield

Conductor resistance: 92 Ω/km max. (20°C) Insulation resistance: 5 Ω /km min. (20°C)

- The output waveform startup time changes not only according to the length of the cable, but also according to the load resistance and the cable type.
- Extending the cable length not only changes the startup time, but also increases the output residual voltage.

Connection

Spurious pulses may be generated when power is turned ON and OFF. Wait at least 0.1 s after turning ON the power to the Encoder before using the connected device, and stop using the connected device at least 0.1 s before turning OFF the power to the Encoder. Also, turn ON the power to the load only after turning ON the power to the Encoder.

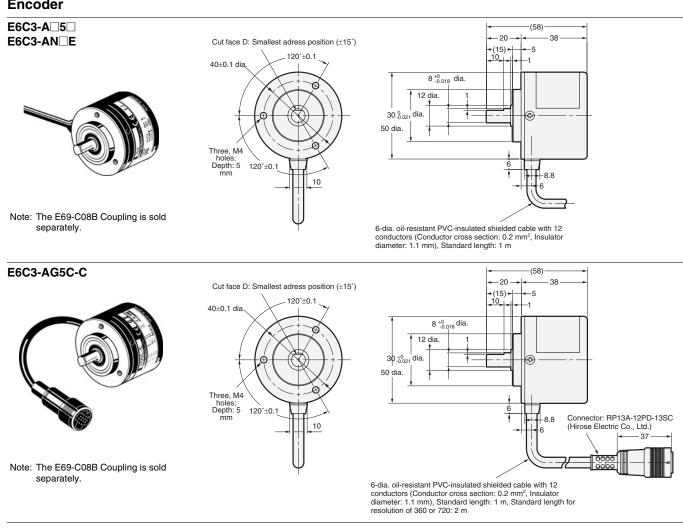
E6C3-

(Unit: mm)

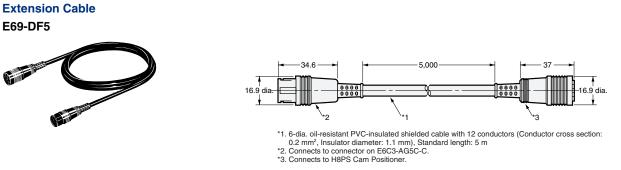
Dimensions

Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

Encoder



Accessories (Order Separately)



Note: 1. The E69-DF5 (5 m) is also available with the following cable lengths: 10 m, 15 m, 20 m, and 98 m. 2. Cable can be extended to 100 m when the H8PS Cam Positioner is connected.

Couplings
E69-C08B
E69-C68B
Refer to Accessories for details.

Flanges E69-FCA03 E69-FCA04 Servo Mounting Bracket E69-2

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