# E6F-A

## **Rugged Rotary Encoder**

- Absolute model.
- External diameter of 60 mm.
- Resolution of up to 1,024 (10-bit).
- IP65 oil-proof protection.
- Strong shaft. Radial: 120 N, Thrust: 50 N



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.



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page 5.

#### Encoders [Refer to Dimensions on page 6.]

Be sure to read Safety Precautions on

Power supply voltage	Output configuration	Output code	Resolution (divisions)	Connection method	Model
5 to 12 VDC		BCD	360	Pre-wired Model	E6F-AB3C 360P/R 2M *2
	– NPN open collector			Pre-wired Connector Model (2 m)	E6F-AB3C-C 360P/R 2M *2
12 to 24 VDC				Pre-wired Model	E6F-AB5C 360P/R 2M
				Pre-wired Connector Model (2 m)	E6F-AB5C-C 360P/R 2M
	PNP open collector			Pre-wired Model	E6F-AB5B 360P/R 2M
	NPN open collector	Gray code	256, 360, 720	Pre-wired Connector Model (2 m)	E6F-AG5C-C (resolution) 2M *1 Example: E6F-AG5C-C 256P/R 2M
			256, 360, 720, 1,024	Pre-wired Model	E6F-AG5C (resolution) 2M Example: E6F-AG5C 256P/R 2M
	PNP open collector	1			E6F-AG5B (resolution) 2M Example: E6F-AG5B 256P/R 2M

\*1. The E6F-AG5C-C is designed for connection to Cam Positioners (H8PS). \*2. Models are also available with 5-m cables.

## Accessories (Order Separately)

[Dimensions: Refer to Accessories for coupling dimensions and to page 6 for the dimensions of other accessories.]

Name	Model	Remarks				
	E69-C10B	Provided with E6F Pre-wired Models.				
Couplings	E69-C610B	Different end diameter				
	E69-C10M	Metal construction				
Servo Mounting Bracket	E69-2	vith the product. (Three brackets in a set.)				
	E69-DF5	5 m				
Extension Cable	E69-DF10	10 m	Models are also available with 15-m and 98-m cables.			
	E69-DF20	20 m				

Refer to Accessories for details.

## **Ratings and Specifications**

Item	Model	E6F- AB3C-C	E6F- AB3C	E6F- AB5C-C	E6F- AB5C	E6F- AB5B	E6F- AG5C-C	E6F- AG5C	E6F- AG5B
Power sup	ply voltage	5 VDC –5% t +10%, ripple	o 12 VDC (p-p): 5% max.	12 VDC -109	6 to 24 VDC +	15%, ripple (p-	p): 5% max.		1
Current co	nsumption*1	60 mA max.		4					
Resolution (pulses/rot		360				256, 360, 720	256, 360, 72	0, 1024	
Output cod	le	BCD					Gray code	1	
Output configuration		NPN open-collector output				PNP open- collector output	NPN open-collector output collector		PNP open- collector output
Output cap	pacity	Sink current:	ge: 30 VDC ma 35 mA max. age: 0.4 V max		ent of 35 mA)	Source cur- rent: 35 mA max. Residual voltage: 0.4 V max. (at source current of 35 mA)	Applied volta max. Sink current: Residual volt max. (at sink curre	35 mA max. age: 0.4 V	Source cur rent: 35 mA max. Residual voltage: 0.4 V max. (at source current of 35 mA)
Maximum i frequency*		10 kHz					20 kHz		
Logic		Negative logic (high = 0, low = 1)				Positive log- ic (high = 1, low = 0)	Negative logic (high = 0, low = 1) $\begin{array}{c} \text{Positive logic} \text{ (high = 0,} \\ \text{low = 0)} \end{array}$		
Direction o	f rotation	Output code i	incremented by	CW (as view	ed from the en	d of the shaft)	4		
Rise and fall times of output		1 μs max. (E6F-AB3C, A $\Box$ 5C: Load voltage: 5 V, Load resistance: 1 kΩ, Output cable: 2 m max.; E6F-A $\Box$ 5B: Power supply voltage: 12 V, Load resistance: 1 kΩ, Output cable: 2 m max.)							
Starting torque		9.8 mN·m max. at room temperature, 14.7 mN·m max. at low temperature							
Moment of	nt of inertia $1.5 \times 10^{-6}$ kg m <sup>2</sup> max.								
Shaft	Radial	120 N							
loading	Thrust	50 N							
Maximum   speed	permissible	5000 r/min							
Ambient te range	mperature	Operating: -1	0 to 70°C (with	n no icing), Sto	orage: -25 to 8	0°C (with no ic	ing)		
-	umidity range	Operating: 35	5% to 85% (with	h no condensa	tion), Storage	: 35% to 95% (	with no conder	nsation)	
Insulation			at 500 VDC) be					,	
Dielectric s			60 Hz for 1 mi						
Vibration r	<u> </u>						and Z direction	S	
Shock resistance		10 to 500 Hz, 2-mm double amplitude for 11 min 3 times each in X, Y, and Z directions Destruction: 1,000 m/s <sup>2</sup> 3 times each in X, Y, and Z directions							
Degree of			65, in-house s						
Connection method		Connector ModelsPre-wired ModelsConnector ModelsConnector ModelsConnector ModelsPre-wired Models (Stan- dard cable length: 2 m)Connector ModelsPre-wired Models (Stan- dard cable length: 2 m)Pre-wired Models (Stan- dard cable length: 2 m)							
Material		Case: Zinc al	loy, Main unit:	Aluminum, Sh	aft: SUS420J2	, Mounting Bra	acket: Galvaniz	ed iron	
Weight (pa	cked state)	Approx. 500 g	g						
	es	Servo Mounting Bracket, Coupling (provided with Pre-wired Models only), Hexagonal wrench (provided with Pre- wired Models only), Instruction manual							

Output code	Resolution	Code No.	
BCD	360	0 to 359	
	256	0 to 255	
Gray code	360	76 to 435 (gray after 76)	
Gray code	720	152 to 871 (gray after 152)	
	1024	0 to 1023	

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

Maximum electrical response speed (rpm) = <u>
Maximum response frequency</u> <u>
Resolution</u> × 60

Resolution

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

## I/O Circuit Diagrams



## **Connection Specifications**

#### **Connector Models\***

Model	E6F-AB3C-C/ -AB5C-C	E6F-AG5C-C					
	Output signal	Output signal					
Pin No.	10-bit (360)	8-bit (256)	9-bit (360)	10-bit (720)			
1	2 <sup>0</sup>	Connected in-	Not connected	2 <sup>9</sup>			
2	2 <sup>1</sup>	ternally	2 <sup>8</sup>	2 <sup>8</sup>			
3	2 <sup>2</sup>	2 <sup>5</sup>	2 <sup>5</sup>	25			
4	2 <sup>3</sup>	2 <sup>1</sup>	2 <sup>1</sup>	2 <sup>1</sup>			
5	$2^{\circ} \times 10$	2 <sup>0</sup>	2 <sup>0</sup>	2 <sup>0</sup>			
6	$2^1  imes 10$	27	27	27			
7	$2^{2} \times 10$	2 <sup>4</sup>	2 <sup>4</sup>	24			
8	$2^3  imes 10$	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>			
9	$2^{0} \times 100$	2 <sup>3</sup>	2 <sup>3</sup>	2 <sup>3</sup>			
10	$2^1  imes 100$	2 <sup>6</sup>	2 <sup>6</sup>	2 <sup>6</sup>			
11	Shield (ground)						
12	-AB3C-C: 5 to 12 VDC, -AB5C- C: 12 to 24 VDC		12 to 24 VDC				
13	0 V (common) 0 V (common)						

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

## **Connection Example**

### **H8PS Cam Positioner Connection**



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		

#### **Pre-wired Model**

Model	E6F-AB3C/ -AB5C/-AB5B	E6F-AG5C/-AG5B				
	Output signal	Output signal				
Wire color	10-bit (360)	8-bit (256) 9-bit (360)		10-bit (720,1024)		
Brown	2 <sup>0</sup>	2 <sup>0</sup>	2 <sup>0</sup>	2 <sup>0</sup>		
Orange	2 <sup>1</sup>	2 <sup>1</sup>	2 <sup>1</sup>	2 <sup>1</sup>		
Yellow	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>		
Green	2 <sup>3</sup>	2 <sup>3</sup>	2 <sup>3</sup>	2 <sup>3</sup>		
Blue	2 <sup>0</sup> × 10	2 <sup>4</sup>	24	24		
Purple	2 <sup>1</sup> × 10	2 <sup>5</sup>	25	2 <sup>5</sup>		
Gray	$2^{2} \times 10$	2 <sup>6</sup>	2 <sup>6</sup>	2 <sup>6</sup>		
White	2 <sup>3</sup> × 10	27	27	27		
Pink	2 <sup>0</sup> × 100	Not connected	2 <sup>8</sup>	2 <sup>8</sup>		
Light blue	$2^1  imes 100$	Not connected	Not connected	2 <sup>9</sup>		
	Shield (ground)	Shield (ground)				
Red	-AB3C: 5 to 12 VDC, -AB5C: 12 to 24 VDC		12 to 24 VDC			
Black	0 V (common)	0 V (common)				

#### **Specifications**

Rated voltage	24 VDC
Cam precision	$0.5^{\circ}$ (for 720 resolution), $1^{\circ}$ (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 resolution800 r/min max. (600 r/min when ad- vance compensation is set for four cams or more)
Additional functions Additional functions Additional functions Additional functions Additional functions Addition direction switching Angle display switching Pulse output Angle/number of rotations display switching Puncture Angle advance Number of rotations alarm output Setting with support software (order separately) *	

Note: For 16-point and 32-point output types only

## **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.

#### Adjustment

#### **Reading the Output Code**

Read the code after the LSB (output 2°) of the code changes for the E6F-AB3C and E6F-AB3C-C.

#### • Wiring

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.

## E6F-A

(Unit: mm)

#### **Dimensions**

#### Encoder



### Accessories (Order Separately)

#### **Servo Mounting Bracket**





Note: 1. The E69-DF5 (5 m) is also available with the following cable lengths: 10 m, 15 m, 20 m, and 98 m.

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 Cable can be extended to 100 m when the H8PS Cam Positioner is connected.

#### Couplings

E69-C10B E69-C610B E69-C10M Refer to Accessories for details.

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