Incremental 25-mm-dia. Rotary Encoder

E6A2-C

CSM_E6A2-C_DS_E_7_1

Compact Encoder with External Diameter of 25 mm

- Incremental model
- External diameter of 25 mm.
- Resolution of up to 500 ppr.

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

Be sure to read *Safety Precautions* on page 3.

Ordering Information

Encoders [Refer to *Dimensions* on page 4.]

Power supply voltage	Output configuration	Output phases	Resolution (pulses/rotation)	Model
5 to 12 VDC	Voltage output	Phases A, B, and Z	100, 200, 360	**E6A2-CWZ3E (resolution) 0.5M** Example: E6A2-CWZ3E 100P/R 0.5M
			500	
	Open-collector output (NPN output)		100, 200, 360	**E6A2-CWZ3C (resolution) 0.5M** Example: E6A2-CWZ3C 100P/R 0.5M
			500	
12 to 24 VDC			100, 200, 360	**E6A2-CWZ5C (resolution) 0.5M** Example: E6A2-CWZ5C 100P/R 0.5M
			500	
5 to 12 VDC	Voltage output	Phases A and B	100, 200, 360	**E6A2-CW3E (resolution) 0.5M** Example: E6A2-CW3E 100P/R 0.5M
			500	
	Open-collector output (NPN output)		100, 200, 360	**E6A2-CW3C (resolution) 0.5M** Example: E6A2-CW3C 100P/R 0.5M
			500	
12 to 24 VDC			100, 200, 360	**E6A2-CW5C (resolution) 0.5M** Example: E6A2-CW5C 100P/R 0.5M
			500	
5 to 12 VDC	Voltage output	Phase A	10, (20) *, 60, 100, 200, 300, 360	**E6A2-CS3E (resolution) 0.5M** Example: E6A2-CS3E 10P/R 0.5M
			500	
	Open-collector output (NPN output)		10, 20, 60, 100, 200, 300, 360	**E6A2-CS3C (resolution) 0.5M** Example: E6A2-CS3C 10P/R 0.5M
			500	
12 to 24 VDC			10, 20, 60, 100, 200, 300, 360	**E6A2-CS5C (resolution) 0.5M** Example: E6A2-CS5C 10P/R 0.5M
			500	

* Only a 2-m cable is available for the 20P/R Model.

Accessories (Order Separately) [Refer to *Dimensions* on *Rotary Encoder Accessories*.]

Name	Model	Remarks
Coupling	**E69-C04B**	Provided with the product.
Servo Mounting Bracket	**E69-1**	Provided with the E6A2-CWZ□.

Refer to *Accessories* for details.

Ratings and Specifications

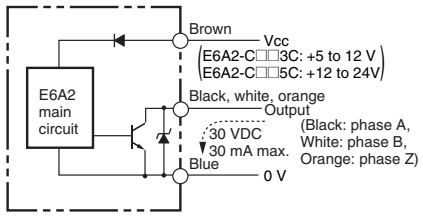
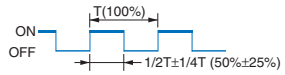
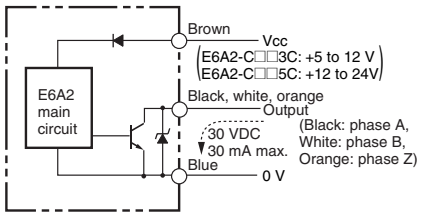
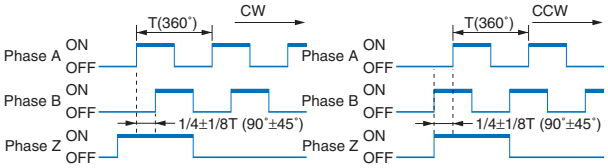
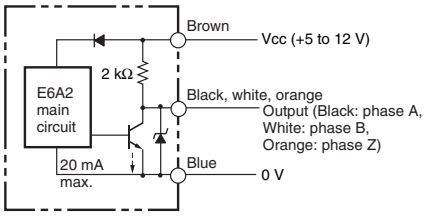
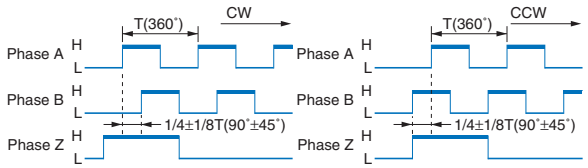
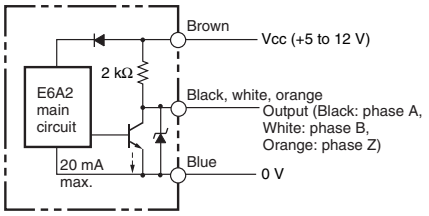
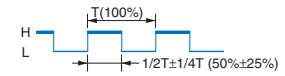
Item / Model	E6A2-CWZ3E	E6A2-CWZ3C	E6A2-CWZ5C	E6A2-CW3E	E6A2-CW3C	E6A2-CW5C	E6A2-CS3E	E6A2-CS3C	E6A2-CS5C
Power supply voltage	5 VDC −5% to 12 V +10% ripple (p-p): 5% max.		12 VDC −10% to 24 VDC +15%, ripple (p-p): 5% max.	5 VDC −5% to 12 V +10%, ripple (p-p): 5% max.		12 VDC −10% to 24 VDC +15%, ripple (p-p): 5% max.	5 VDC −5% to 12 V +10%, ripple (p-p): 5% max.		12 VDC −10% to 24 VDC +15%, ripple (p-p): 5% max.
Current consumption*1	50 mA max.	30 mA max.		30 mA max.	20 mA max.		30 mA max.	20 mA max.	
Resolution (pulses/ rotation)	100, 200, 360, 500						10, 20, 60, 100, 200, 300, 360, 500		
Output phases	Phases A, B, and Z			Phases A and B			Phase A		
Output configuration	Voltage output	NPN open-collector output		Voltage output	NPN open-collector output		Voltage output	NPN open-collector output	
Output capacity	Output resistance: 2 kΩ Output current: 20 mA max. Residual voltage: 0.4 V max. (Output current: 20 mA max.)	Applied voltage: 30 VDC max. Sink current: 30 mA max. Residual voltage: 0.4 V max. (at sink current of 30 mA)		Output resistance: 2 kΩ Output current: 20 mA max. Residual voltage: 0.4 V max. (Output current: 20 mA max.)	Applied voltage: 30 VDC max. Sink current: 30 mA max. Residual voltage: 0.4 V max. (at sink current of 30 mA)		Output resistance: 2 kΩ Output current: 20 mA max. Residual voltage: 0.4 V max. (Output current: 20 mA max.)	Applied voltage: 30 VDC max. Sink current: 30 mA max. Residual voltage: 0.4 V max. (at sink current of 30 mA)	
Maximum response frequency*2	30 kHz								
Phase difference between outputs	Phase difference between phases A and B: 90°±45°						---		
Output duty factor	---						50±25%		
Rise and fall times of output	1.0 μs max. (Cable length: 500 mm, Sink current: 10 mA)	1.0 μs max. (Cable length: 500 mm, Control output voltage: 5 V, Load resistance: 1 kΩ)		1.0 μs max. (Cable length: 500 mm, Sink current: 10 mA)	1.0 μs max. (Cable length: 500 mm, Control output voltage: 5 V, Load resistance: 1 kΩ)		1.0 μs max. (Cable length: 500 mm, Sink current: 10 mA)	1.0 μs max. (Cable length: 500 mm, Control output voltage: 5 V, Load resistance: 1 kΩ)	
Starting torque	1 mN·m max.								
Moment of inertia	1×10^{-7} kg·m² max.								
Shaft loading: Radial	10 N								
Shaft loading: Thrust	50 N								
Maximum permissible speed	5,000 r/min								
Ambient temperature range	Operating: −10 to 55°C (with no icing), Storage: −25 to 80°C (with no icing)								
Ambient humidity range	Operating/storage: 35% to 85% (with no condensation)								
Insulation resistance	20 MΩ min. (at 500 VDC) between current-carrying parts and case								
Dielectric strength	500 VAC, 50/60 Hz for 1 min between current-carrying parts and case								
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions								
Shock resistance	Destruction: 500m/s² 3 times each in X, Y, and Z directions								
Degree of protection*3	IEC 60529 IP50								
Connection method	Pre-wired Models (Standard cable length: 500 mm)								
Material	Case: Aluminum alloy, Main unit: Aluminum, Shaft: SUS420J2, Mounting Bracket: Galvanized iron								
Weight (packed state)	Approx. 35 g								
Accessories	Coupling, Servo Mounting Bracket (provided with the E6A2-CWZ□), Hexagonal wrench, Instruction manual								

*1. An inrush current of approximately 9 A will flow for approximately 0.3 ms when the power is turned ON.
*2. The maximum electrical response speed is determined by the resolution and maximum response frequency as follows:

$$\text{Maximum electrical response speed (rpm)} = \frac{\text{Maximum response frequency}}{\text{Resolution}} \times 60$$

This means that the E6A2-C Rotary Encoder will not operate electrically if its speed exceeds the maximum electrical response speed.
*3. No protection is provided against water or oil.

I/O Circuit Diagrams

Model/Output Circuits	Output mode	Connection
E6A2-CS3C **E6A2-CS5C** 	Output transistor  (The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.)	
E6A2-CW3C **E6A2-CW5C** **E6A2-CWZ3C** **E6A2-CWZ5C** 	Output transistor Direction of rotation: CW (as viewed from end of shaft) Direction of rotation: CCW (as viewed from end of shaft)  Note: Phase A is 1/4 T ± 1/8 T faster than phase B. Note: Phase A is 1/4 T ± 1/8 T slower than phase B. (The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.)	
E6A2-CW3E **E6A2-CWZ3E** 	Output transistor Direction of rotation: CW (as viewed from end of shaft) Direction of rotation: CCW (as viewed from end of shaft)  Note: Phase A is 1/4 T ± 1/8 T faster than phase B. Note: Phase A is 1/4 T ± 1/8 T slower than phase B. ("H" and "L" in the diagrams are the output voltage levels of phases A, B, and Z.)	
E6A2-CS3E 	Output transistor  ("H" and "L" in the diagrams are the output voltage levels.)	

Color	Signal
Brown	Vcc
Black	Phase A
White	Phase B
Orange	Phase Z
Blue	0 V (common)

Note: 1. The white and orange wires of Single Models (E6A2-CS□□) do not output signals (no connection).
2. The white and orange wires of Single Models (E6A2-CS□□) do not output signals (no connection).
3. Voltage Output Models are capable of sinking a maximum current of 20 mA.

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

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.

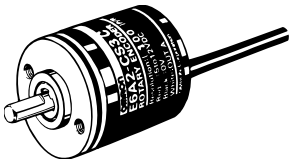
(Unit: mm)

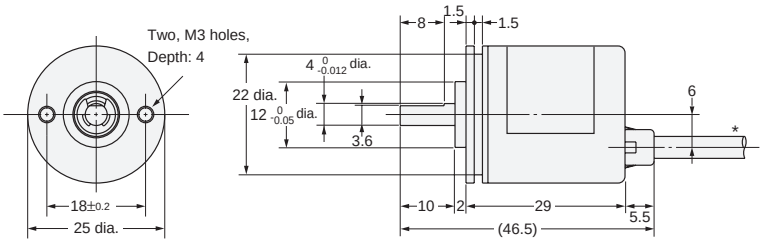
Dimensions

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

Encoder

E6A2-C





* 4-dia. vinyl-insulated round cable with 5 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 0.9 mm), Standard length: 500 mm

Accessories (Order Separately)

Coupling	Servo Mounting Bracket
E69-C04B	**E69-1**

Refer to *Accessories* for details.

Terms and Conditions Agreement

Read and understand this catalog.
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.
(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
(b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE
PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.
Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.
See http://www.omron.com/global/ or contact your Omron representative for published information.

Limitation on Liability; Etc.
OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.
Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.
Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.
NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.
Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.
Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.
Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.
Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

2014.1

In the interest of product improvement, specifications are subject to change without notice.

OMRON Corporation
Industrial Automation Company

http://www.ia.omron.com/

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Omron:

E69-1 E6A2-CS3C 100P/R 0.5M E6A2-CS3C 10P/R 0.5M E6A2CS3C 200P/R 0.5M E6A2-CS3C 200P/R 2M E6A2-CS3C 300P/R 0.5M E6A2-CS3C 360P/R 0.5M E6A2-CS3C 360P/R 2M E6A2-CS3C 500P/R 0.5M E6A2-CS3C 60P/R 0.5M E6A2-CS3E 100P/R 0.5M E6A2-CS3E 10P/R 0.5M E6A2-CS3E 200P/R 0.5M E6A2-CS3E 300P/R 0.5M E6A2-CS3E 360P/R 0,5M E6A2-CS3E 60P/R 0.5M E6A2-CS5C 100P/R 0.5M E6A2-CS5C 100P/R 2M E6A2-CS5C 10P/R 0.5M E6A2-CS5C 10P/R 2M E6A2-CS5C 200P/R 0.5M E6A2-CS5C 300P/R 0.5M E6A2-CS5C 360P/R 0.5M E6A2-CS5C 500P/R 0.5M E6A2-CS5C 60P/R 0.5M E6A2-CS5C 60P/R 2M E6A2-CW3C 100P/R 0.5M E6A2-CW3C 100P/R 2M E6A2-CW3C 200P/R 0.5M E6A2-CW3E-100P/R 0.5M E6A2-CW3E 200P/R 0.5M E6A2-CW5C 100P/R 0.5M E6A2-CW5C100 P/R 2M E6A2-CW5C 200P/R 0.5M E6A2-CW5C 200P/R 2M E6A2-CWZ3C 100P/R 0.5M E6A2-CWZ3C 100P/R 2M E6A2-CWZ3C 200P/R 0.5M E6A2-CWZ3E 100P.R 0.5M E6A2-CWZ3E 200P/R 0.5M E6A2-CWZ5C 360P/R 0.5M E6A2-CW3C 200P/R 2M E6A2-CW5C 500P/R 0.5M E6A2-CWZ5C 500P/R 0.5M E6A2-CS3E 360P/R 2M E6A2-CW5C 360P/R 0.5M E6A2-CWZ5C 100P/R 0.5M E6A2-CWZ3C 500P/R 0.5M E6A2-CS3C 200P/R 0.5M E6A2-CW5C-100P/R 2M E6A2CS3C200P/R0.5M E6A2-CS5C200P/R2M E6A2-CW3E200P/R2M E6A2-CWZ5C200P/R0.5M E6A2-CS3C100P/R2M E6A2-CS5C360P/R2M