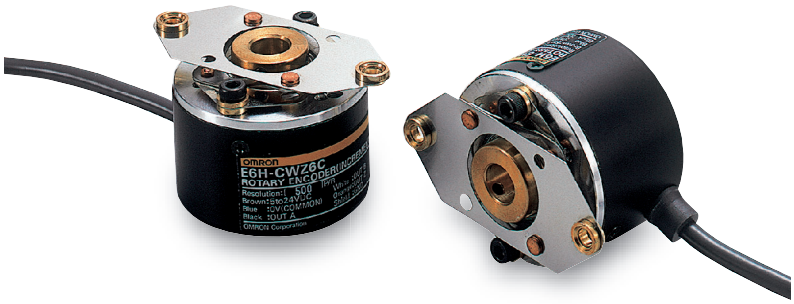
Hollow-shaft Encoder with Diameter of 40 mm

E6H-C

CSM_E6H-C_DS_E_3_1

Hollow Shafts Eliminate the Need for a Coupling. Compact, High-resolution, General-purpose Rotary Encoder.



- Power supply voltage from 5 to 24 VDC (for Models with Open-collector Output).
- Resolution of up to 3,600 ppr in Encoders with an external diameter of only 40 mm.
- Only 26 mm thick.
- Line driver output also available (maximum cable length extension of 100 m).

⚠ Be sure to read *Safety Precautions* on page 4.

Ordering Information

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

Power supply voltage	Output configuration	Resolution (pulses/rotation)	Model
5 to 24 VDC	Open-collector output	300, 360, 500, 600, 720, 800, 1,000, 1,024 1,200, 1,500, 1,800, 2,000, 2,048 2,500, 3,600	**E6H-CWZ6C (resolution) 0.5M** Example: E6H-CWZ6C 300P/R 0.5M
5 to 12 VDC	Voltage output	300, 360, 500, 600, 720, 800, 1,000, 1,024 1,200, 1,500, 1,800, 2,000, 2,048 2,500, 3,600	**E6H-CWZ3E (resolution) 0.5M** Example: E6H-CWZ3E 300P/R 0.5M
5 to 12 VDC	Line-driver output	300, 360, 500, 600, 720, 800, 1,000, 1,024 1,200, 1,500, 1,800, 2,000, 2,048 2,500, 3,600	**E6H-CWZ3X (resolution) 0.5M** Example: E6H-CWZ3X 300P/R 0.5M

Ratings and Specifications

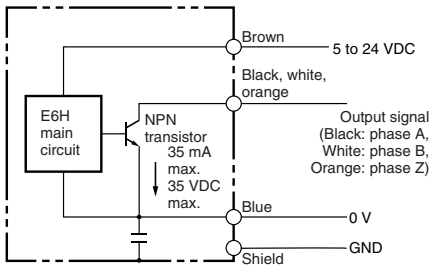
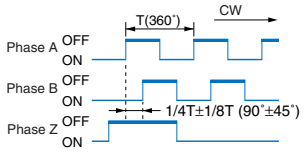
Item / Model		E6H-CWZ6C	E6H-CWZ3E	E6H-CWZ3X
Power supply voltage		5 VDC –5% to 24 VDC +15%, ripple (p-p): 5% max.	5 VDC –5% to 12 VDC +10%, ripple (p-p): 5% max.	
Current consumption*1		100 mA max.		150 mA max.
Resolution (pulses/rotation)		300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600		
Output phases		Phases A, B, and Z		Phases A, $\overline{A}$, B, $\overline{B}$, Z, and $\overline{Z}$
Output configuration		Open-collector output	Voltage output	Line-driver output*4
Output capacity		Applied voltage: 35 VDC max. Sink current: 35 mA max. Residual voltage: 0.7 V max. (at sink current of 35 mA)	Output resistance: 1 kΩ Sink current: 30 mA max. Residual voltage: 0.7 V max. (at sink current of 30 mA)	Output current: High level: I_O = –10 mA Low level: I_S = 10 mA Output voltage: V_O = 2.5 V min. V_S = 0.5 V
Maximum response frequency*2		100 kHz		
Phase difference between outputs		90°±45° between A and B (1/4 T ± 1/8 T)		
Rise and fall times of output		1 μs max. (Control output voltage: 5 V, Load resistance: 1 kΩ, Output cable: 500 mm)		1 μs max. (I_O = –10 mA, I_S = 10 mA, Output cable: 500 mm)
Starting torque		1.5 mN·m max.		
Moment of inertia		2×10^{-6} kg·m^2 max.		
Shaft loading	Radial	29.4 N		
	Thrust	4.9 N		
Maximum permissible speed		10,000 r/min		
Ambient temperature range		Operating: –10 to 70°C (at 90% humidity max.), Storage: –30 to 85°C (with no icing)		
Ambient humidity range		Operating/Storage: 90% max. (with no condensation)		
Insulation resistance		Excluded because of capacitor ground.		
Dielectric strength		Excluded because of capacitor ground.		
Vibration resistance		Destruction: 10 to 500 Hz, 100 m/s^2 or 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions		
Shock resistance		300 m/s^2 for 11 ms 3 times each in X, Y, and Z directions (excluding shock to the shaft)		
Degree of protection*3		IEC 60529 IP50		
Connection method		Pre-wired Models (Standard cable length: 0.5 m)		
Material		Case: Iron, Main unit: Aluminum, Pressboard panel: SUS304		
Weight (packed state)		Approx. 120 g		
Accessories		Instruction manual		

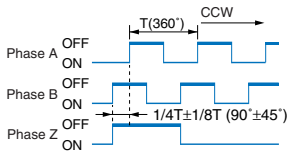
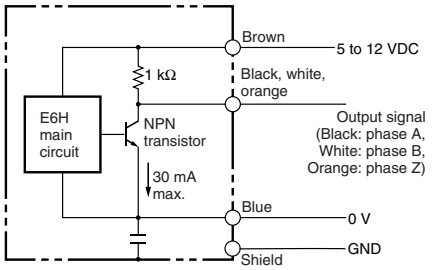
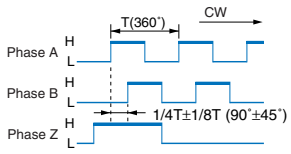
*1. An inrush current of approximately 6 A will flow for approximately 0.3 ms when the power is turned ON.
*2. The maximum electrical response speed is determined by the resolution and maximum response frequency as follows:

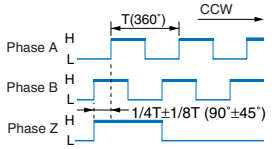
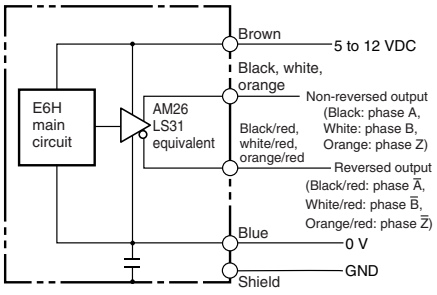
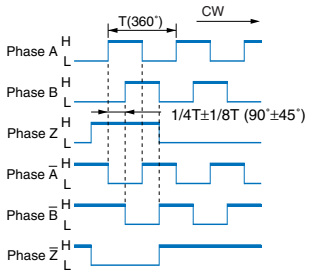
$$\text{Maximum electrical response speed (rpm)} = \frac{\text{Maximum response frequency}}{\text{Resolution}} \times 60$$

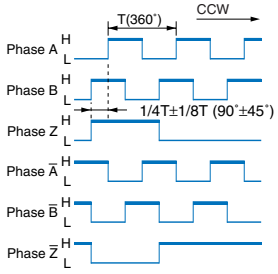
This means that the Rotary Encoder will not operate electrically if its speed exceeds the maximum electrical response speed.
*3. No protection is provided against water or oil.
*4. The line driver output is a data transmission circuit compatible with RS-422A and long-distance transmission is possible with a twisted-pair cable. The quality is equivalent to AM26LS31.

I/O Circuit Diagrams

<table>
<tr><th>Model</th><th>Output Circuits</th><th>Output mode</th><th>Connection</th></tr>
<tr><td>E6H-CWZ6C</td><td> 
</td><td>Open-collector output
Direction of rotation: CW
(as viewed from end of shaft)
 

Direction of rotation: CCW
(as viewed from end of shaft)
 
</td><td rowspan="2"><table>
<tr><th>Color</th><th>Terminal</th></tr>
<tr><td>Brown</td><td>Power supply (+Vcc)</td></tr>
<tr><td>Black</td><td>Output phase A</td></tr>
<tr><td>White</td><td>Output phase B</td></tr>
<tr><td>Orange</td><td>Output phase Z</td></tr>
<tr><td>Blue</td><td>0 V (common)</td></tr>
</table></td></tr>
<tr><td>E6H-CWZ3E</td><td> 
</td><td>Voltage output
Direction of rotation: CW
(as viewed from end of shaft)
 

Direction of rotation: CCW
(as viewed from end of shaft)
 
</td></tr>
<tr><td>E6H-CWZ3X</td><td> 
</td><td>Line-driver output
Direction of rotation: CW
(as viewed from end of shaft)
 

Direction of rotation: CCW
(as viewed from end of shaft)
 
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<tr><th>Color</th><th>Terminal</th></tr>
<tr><td>Brown</td><td>Power supply (+Vcc)</td></tr>
<tr><td>Black</td><td>Output phase A</td></tr>
<tr><td>Black/red</td><td>Output phase Ā</td></tr>
<tr><td>White</td><td>Output phase B</td></tr>
<tr><td>White/red</td><td>Output phase B̄</td></tr>
<tr><td>Orange</td><td>Output phase Z</td></tr>
<tr><td>Orange/ red</td><td>Output phase Z̄</td></tr>
<tr><td>Blue</td><td>0 V (common)</td></tr>
</table>
Note: 1. Receiver: AM26LS32 equivalent
2. "Black/red" indicates a red strip.</td></tr>
</table>

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

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

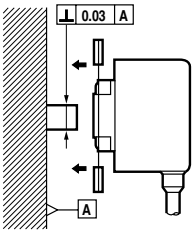
This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

Precautions for Correct Use

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

● Mounting

- The diameter of the mating shaft must be 8 $^{-0.012}_{-0.004}$ mm and 8 to 11 mm long from the mounting surface.
- The allowable displacement in the mating shaft must 0.05 mm in the radial direction and 0.3 mm in the thrust direction.
- The mounting surface and shaft must be perpendicular to within 0.03 mm.
- When securing the Encoder, do not allow force to be applied to the leaf spring.



Eccentricity will develop in the Encoder if the above values are not satisfied, and the mounting leaf spring may be destroyed.

- When securing the Encoder, use two M3 screws to secure the leaf spring to the mounting surface.
- Use the Allen set screw provided with the hollow shaft to secure the shaft. Use a tightening torque of 0.4 N·m and apply screw lock glue to the screw to prevent it from becoming loose.
- If wiring after securing the Encoder, do not pull on the cable. Also, do not apply shock to the Encoder or hollow shaft.
- If the Encoder phase Z must be aligned with the origin of the installation device, mount the Encoder while checking the phase Z output.

● 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.

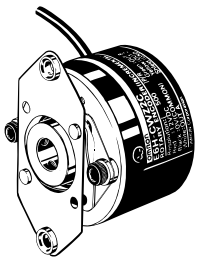
Rotary Encoder Recommended Power Supplies: Consult your OMRON representative for details.

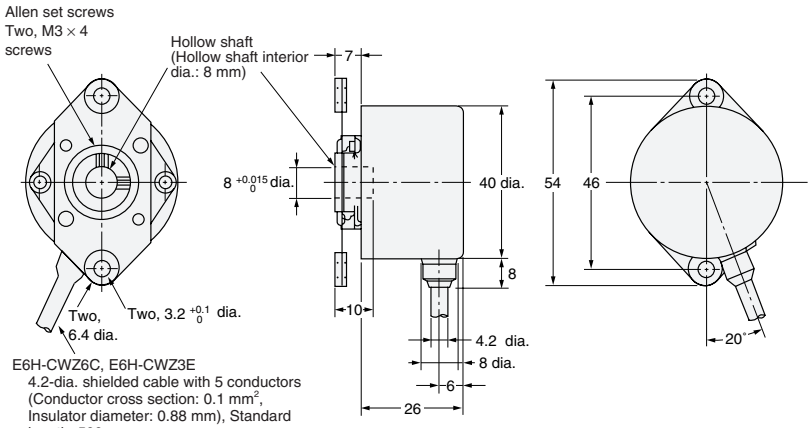
(Unit: mm)

Dimensions

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

E6H-C





E6H-CWZ6C, E6H-CWZ3E
4.2-dia. shielded cable with 5 conductors (Conductor cross section: 0.1 mm², Insulator diameter: 0.88 mm), Standard length: 500 mm
E6H-CWZ3X
5.5-dia. shielded cable with 8 conductors (Conductor cross section: 0.1 mm², Insulator diameter: 1.0 mm), Standard length: 500 mm

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.

Warranty and Limitations of Liability

WARRANTY

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At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

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Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog 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 users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

2008.11

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

OMRON Corporation
Industrial Automation Company

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- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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AVIC JONHON

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FORSTAR®

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