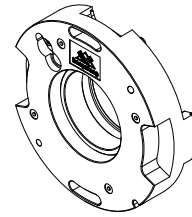
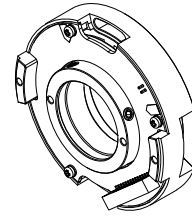


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Specifications 1/9

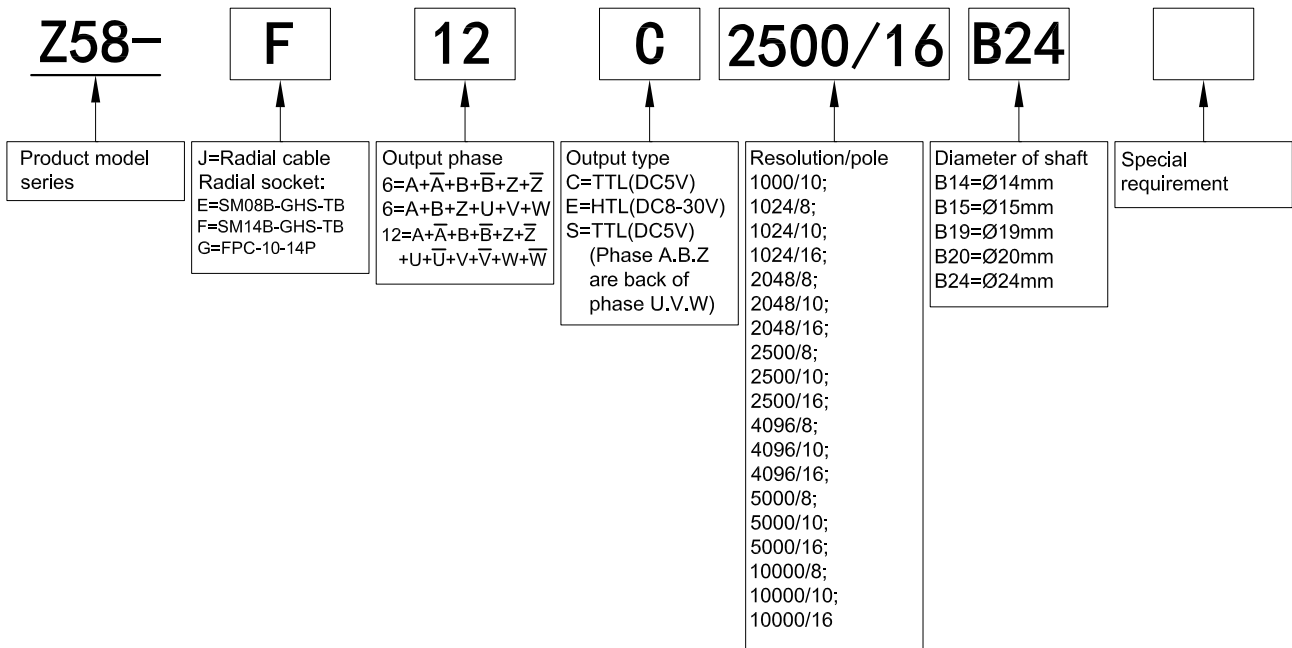
Incremental Type (Through hole, Non-bearing)

- Feature: This bearingless encoder is specially designed with ultra-thin and monolithic structure, which is easy to install and various shaft holes to select. It perfectly solve user's installation problems in the limited space and has obtained the national invention patent because of its unique structure.
- Application: servo motor, robot, etc .
- External dimensions: external diameter $\varnothing 58\text{mm}$, thickness 15mm, diameter of shaft $\varnothing 24\text{mm}$ (Max)
- Resolution: up to 10000P/R
- Supply voltage: DC5V; DC8-30V
- Cable length: 300mm
- Socket: E=SM08B-GHS-TB;
F=SM14B-GHS-TB;
G=FPC-10-14P
(need to select the matching socket)
- Weight: about 85g



Model Guide

- Model form (filled required parameters in the box as following)



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Output Mode

| Output type | Output circuit | Output wave form | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------|--|-----------|-------------|---|---|------------------|------------|----|------------------|------------|----|-------------------|------------|----|-----------|-----------|---|----|---|---|---|----|-----------|-----------|---|----|---|---|---|----|-----------|-----------|---|-------|--|--|---|----|--|--|
| TTL(DC5V) HTL(DC8-30V) | | <p> $a.b.c.d = \frac{T}{4} \pm \frac{T}{8}$ $e = T \pm \frac{T}{2}$ f: center of phase Z to rise point of phase U, that is $\pm 0.5^\circ$ </p> <p> CW direction \rightarrow (Viewing from front, direction is CW rotation) </p> <p> A.B.Z.U.V.W A.B.Z.U.V.W </p> <table border="1"> <thead> <tr> <th>poles</th> <th>g,h,j,k,m,n</th> <th>r</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>$15 \pm 1^\circ$</td> <td>90°</td> </tr> <tr> <td>10</td> <td>$12 \pm 1^\circ$</td> <td>72°</td> </tr> <tr> <td>16</td> <td>$7.5 \pm 1^\circ$</td> <td>45°</td> </tr> </tbody> </table> | poles | g,h,j,k,m,n | r | 8 | $15 \pm 1^\circ$ | 90° | 10 | $12 \pm 1^\circ$ | 72° | 16 | $7.5 \pm 1^\circ$ | 45° | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| poles | g,h,j,k,m,n | r | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | $15 \pm 1^\circ$ | 90° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | $12 \pm 1^\circ$ | 72° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | $7.5 \pm 1^\circ$ | 45° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TTL (phase A.B.Z are back of phase U.V.W) | | <p> $a.b.c.d = \frac{T}{4} \pm \frac{T}{8}$ $e = T \pm \frac{T}{2}$ f: center of phase Z to rise point of phase U, that is $\pm 0.5^\circ$ </p> <p> CW direction \rightarrow (Viewing from front, direction is CW rotation) </p> <p> A.B.Z.U.V.W A.B.Z.U.V.W </p> <table border="1"> <thead> <tr> <th>poles</th> <th>g,h,j,k,m,n</th> <th>r</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>$15 \pm 1^\circ$</td> <td>90°</td> </tr> <tr> <td>10</td> <td>$12 \pm 1^\circ$</td> <td>72°</td> </tr> <tr> <td>16</td> <td>$7.5 \pm 1^\circ$</td> <td>45°</td> </tr> </tbody> </table> | poles | g,h,j,k,m,n | r | 8 | $15 \pm 1^\circ$ | 90° | 10 | $12 \pm 1^\circ$ | 72° | 16 | $7.5 \pm 1^\circ$ | 45° | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| poles | g,h,j,k,m,n | r | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | $15 \pm 1^\circ$ | 90° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | $12 \pm 1^\circ$ | 72° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | $7.5 \pm 1^\circ$ | 45° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p style="text-align: center;">Timing Chart</p> <p> Supply voltage 5 ± 0.25 4.25 ± 0.3 </p> <p> Instantaneous power down Power off </p> <p> Power on Time(msec) </p> <p> Mode 1 2 3 1 2 3 </p> <p> 35MIN 7 ± 2 510 ± 220 22 ± 11 </p> <p> Symbol signification ★: indicate position of UVW channel ☆: position to start counting ABZ channel □: non-using zone HZ: high impedance </p> <table border="1"> <thead> <tr> <th rowspan="2">No.</th> <th colspan="3">Mode</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>HZ</td> <td>U</td> <td>A</td> </tr> <tr> <td>2</td> <td>HZ</td> <td>\bar{U}</td> <td>\bar{A}</td> </tr> <tr> <td>3</td> <td>HZ</td> <td>V</td> <td>B</td> </tr> <tr> <td>4</td> <td>HZ</td> <td>\bar{V}</td> <td>\bar{B}</td> </tr> <tr> <td>5</td> <td>HZ</td> <td>W</td> <td>Z</td> </tr> <tr> <td>6</td> <td>HZ</td> <td>\bar{W}</td> <td>\bar{Z}</td> </tr> <tr> <td>7</td> <td colspan="3">DC+5V</td> </tr> <tr> <td>8</td> <td colspan="3">OV</td> </tr> </tbody> </table> | | | No. | Mode | | | 1 | 2 | 3 | 1 | HZ | U | A | 2 | HZ | \bar{U} | \bar{A} | 3 | HZ | V | B | 4 | HZ | \bar{V} | \bar{B} | 5 | HZ | W | Z | 6 | HZ | \bar{W} | \bar{Z} | 7 | DC+5V | | | 8 | OV | | |
| No. | Mode | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | HZ | U | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | HZ | \bar{U} | \bar{A} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | HZ | V | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | HZ | \bar{V} | \bar{B} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | HZ | W | Z | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | HZ | \bar{W} | \bar{Z} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | DC+5V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | OV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

■ Electrical Characteristics

| Parameter Item | Output type | | TTL | TTL (phase A.B.Z are back of phase U.V.W) | HTL |
|------------------------|----------------|-----|---------------------------------|---|-------------------------------------|
| | Supply voltage | | | DC+5V±5% | |
| Consumption current | | | 120mA Max | | |
| Top response frequency | | | 200KHz | | 300KHz |
| Output capacity | Output current | | ≤±20mA | | ≤±50mA |
| | Output voltage | "H" | ≥2.5V | | ≥V _{cc} -3 V _{dc} |
| | | "L" | ≤0.5V | | ≤ 1V V _{dc} |
| Rise & Fall time | | | Less than 1us(cable length: 2m) | | |
| Delay motion time * | | | — | 510±220ms | — |
| GND | | | not connect to encoder | | |

* Phase A.B.Z are back of phase U.V.W when power on.

■ Environmental Specifications

| | |
|---------------------------|---|
| Slew speed | (top response frequency / pulse)×60 |
| Environmental temperature | Operating: -20~+105°C; Storage: -25~+110°C |
| Environmental humidity | Operating and storage: 35~85%RH (noncondensing) |

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■ Connection

● Radial cable

| No. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|-----------|-----|-------|-------|-------|--------|-------------|-------------|--------------|------|------|------|------------|------------|------------|
| Color | shielding | red | black | white | green | yellow | white/black | green/black | yellow/black | blue | gray | pink | blue/black | gray/black | pink/black |
| Function | GND | DC | OV | A | B | Z | \bar{A} | \bar{B} | \bar{Z} | U | V | W | \bar{U} | \bar{V} | \bar{W} |

● 8-Pin Radial Socket Table 1

| Socket Pin No. | Pin1 | Pin2 | Pin3 | Pin4 | Pin5 | Pin6 | Pin7 | Pin8 |
|----------------|------|-----------|------|-----------|------|-----------|------|------|
| Function | Z | \bar{Z} | B | \bar{B} | A | \bar{A} | OV | +DC |

● 8-Pin Radial Socket Table 2

| Socket Pin No. | Pin1 | Pin2 | Pin3 | Pin4 | Pin5 | Pin6 | Pin7 | Pin8 |
|----------------|------|------|------|------|------|------|------|------|
| Function | V | U | W | Z | B | A | OV | +DC |

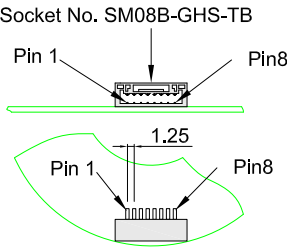
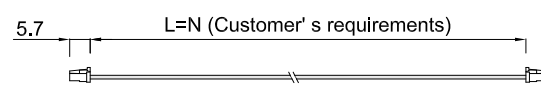

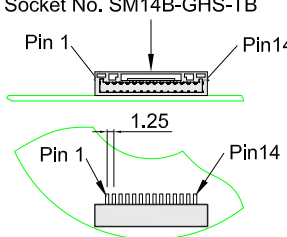
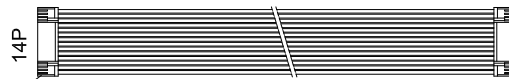
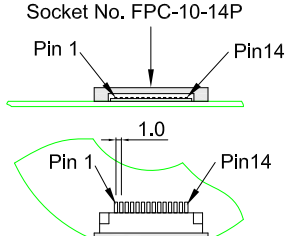
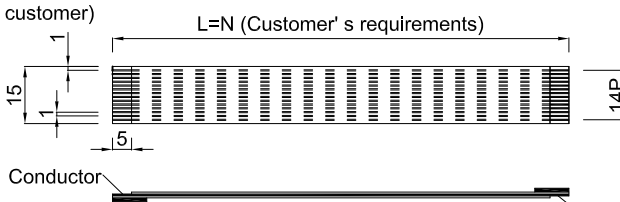
● 8-Pin Radial Socket Table 3

| Socket Pin No. | Pin1 | Pin2 | Pin3 | Pin4 | Pin5 | Pin6 | Pin7 | Pin8 | |
|----------------|------|------|-----------|------|-----------|------|-----------|------|----|
| Mode | 1 | HZ | HZ | HZ | HZ | HZ | HZ | +DC | OV |
| | 2 | U | \bar{U} | V | \bar{V} | W | \bar{W} | | |
| | 3 | A | \bar{A} | B | \bar{B} | Z | \bar{Z} | | |

● 14-Pin Radial Socket

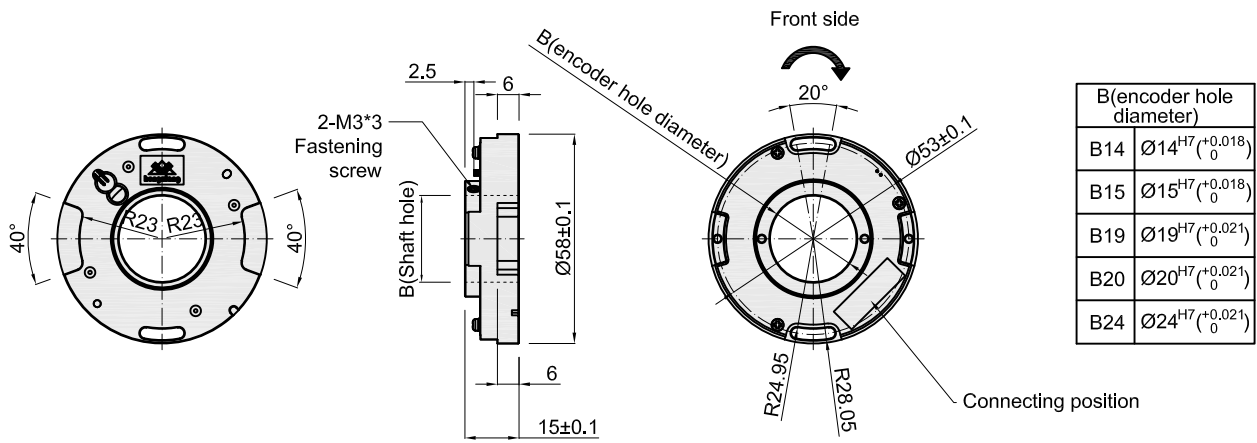
| Socket Pin No. | Pin1 | Pin2 | Pin3 | Pin4 | Pin5 | Pin6 | Pin7 | Pin8 | Pin9 | Pin10 | Pin11 | Pin12 | Pin13 | Pin14 |
|----------------|------|-----------|-----------|------|-----------|------|------|-----------|------|-----------|-------|-----------|-------|-------|
| Function | V | \bar{V} | \bar{U} | U | \bar{W} | W | Z | \bar{Z} | B | \bar{B} | A | \bar{A} | OV | +DC |

● Pin Assignments

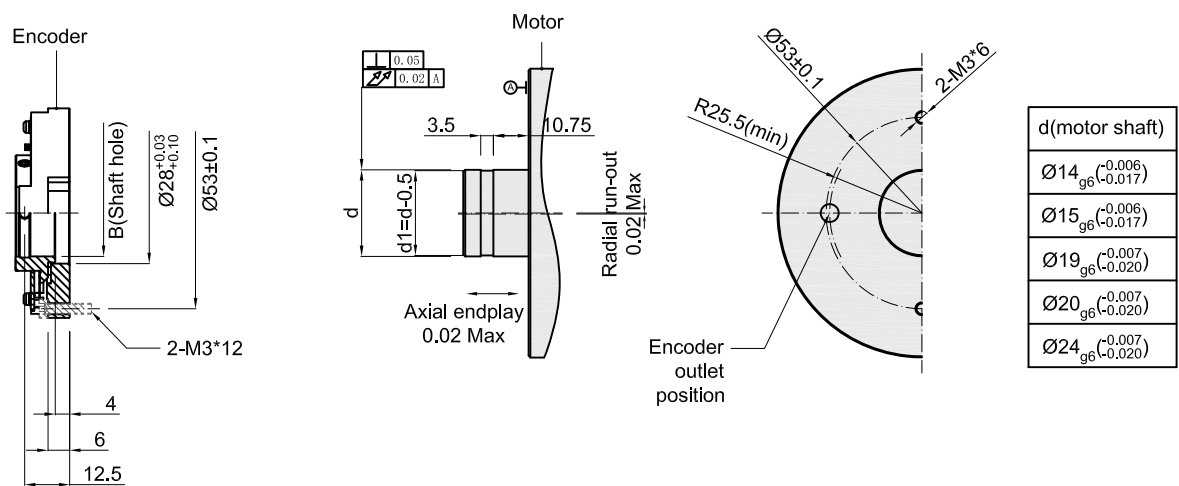
| | |
|--|--|
| <p>Socket No. SM08B-GHS-TB</p>  | <p>Plug with flexible cord (purchased by customer)</p>  <p>5.7 L=N (Customer's requirements)</p>  <p>8P</p> <p>Plug No.GHR-08V-S</p> |
| <p>Socket No. SM14B-GHS-TB</p>  |  <p>14P</p> <p>Plug No.GHR-14V-S</p> |
| <p>Socket No. FPC-10-14P</p>  | <p>Flexible flat cable 14P (purchased by customer)</p>  <p>15 L=N (Customer's requirements) 14P</p> <p>5</p> <p>Conductor</p> |

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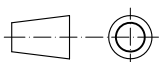
Basic Dimensions



Assembling requirement



Unit: mm



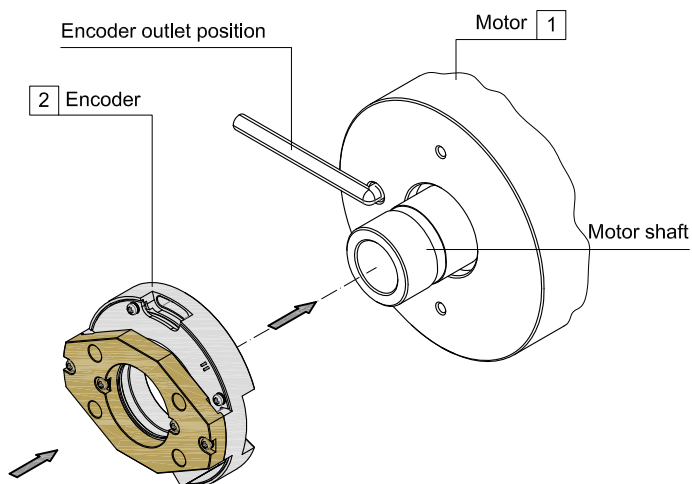
= Rotate direction of signal output shaft

■ Assembling steps for UVW encoder(servo only)

Step 1

- a. Before installing the encoder, first confirm the starting zero position of the motor and lock it tightly to ensure the motor shaft won't moving until the encoder completed installation, otherwise the zero position of the encoder cannot be aligned with the zero position of the motor,
- b. put the encodes (2) directly on the motor shaft and gently push it to the motor platform by hand.

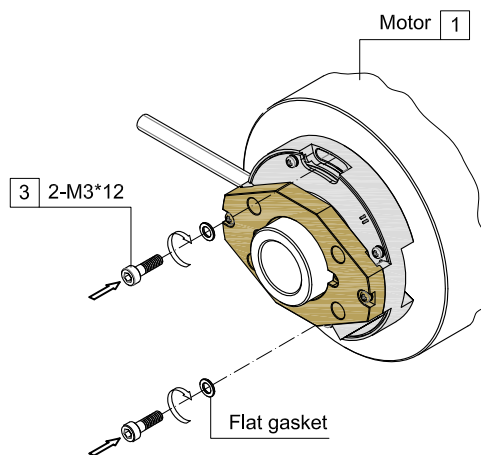
Note: For the tolerance of the encoder shaft sleeve and the motor shaft, please refer to page 5.



Step 2

- Apply thread glue to the front of the two M3*12 bolts (3), and fix them on the motor (1) together with the spring washer and flat plate.

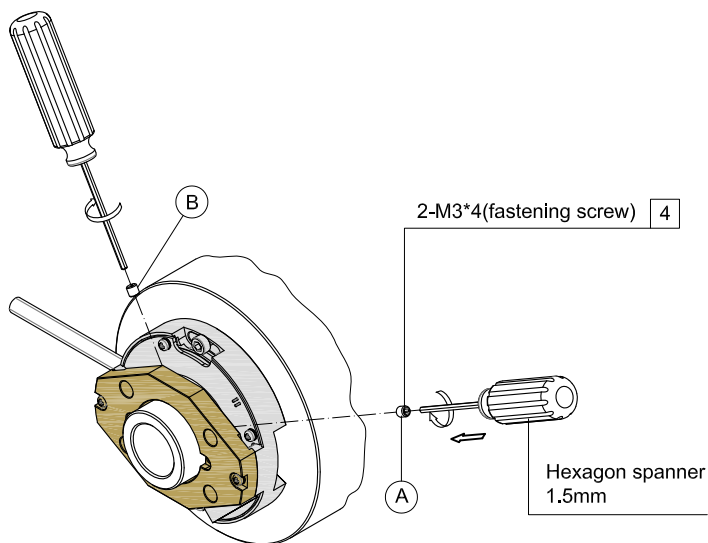
Note: At this time, the screws do not need to be tightened or loosened too much. The force is based on the ability to turn the encoder by hand.



Step 3

- Apply thread glue to the front of the two m3*4 top screws (4) on the side of the encoder and tighten them to fix the encoder's disk to the motor shaft.

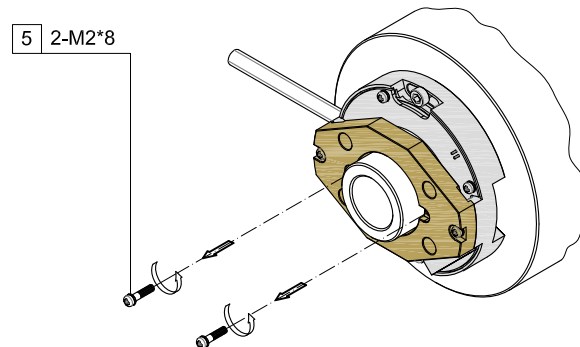
Note:
Follow the tightening sequence of the two screws as figure, first A then B
Recommended tightening force is 0.6N.m



■ Assembling steps for UVW encoder(Continued)

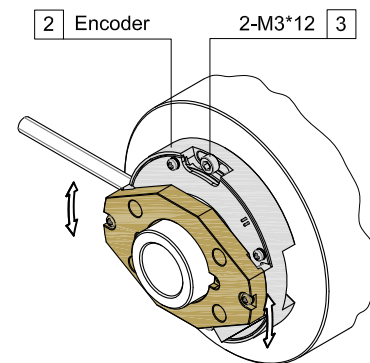
Step 4

Remove the two M2*8 bolts (5) and discard them to complete the separation between the encoder disk and the encoder body



Step 5

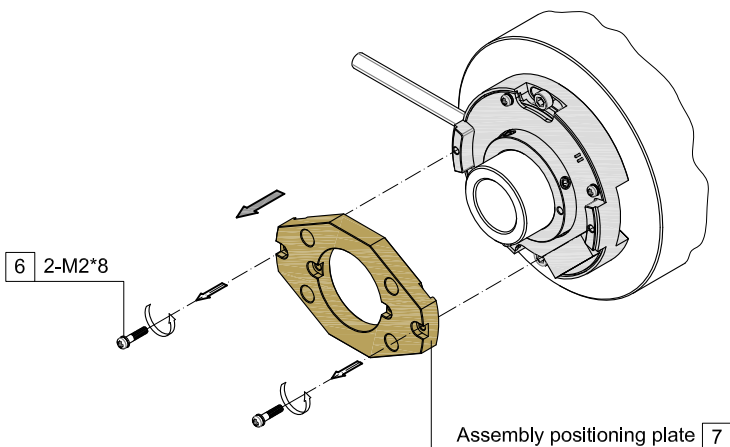
- Connect the encoder signal wires, power on, and connect to the oscilloscope or other testing equipment that can read the zero signal of the motor and encoder.
- Turn the encoder (2) from left to right and observe the testing equipment until the zero position of the encoder is aligned with the zero position signal of the motor.
- Then tighten the two M3*12 bolts (3), (recommended tightening force is 0.6 N.m)
- The zero position of the motor can be unlocked at this time, but the motor still can't be rotated.



Step 6

- Remove the two M2*8 bolts (6)
- Take off the assembly positioning plate (7), the encoder is ready to use now

Note: If you want to reset the zero position or remove the encoder (2), you must replace the assembly positioning plate (7).

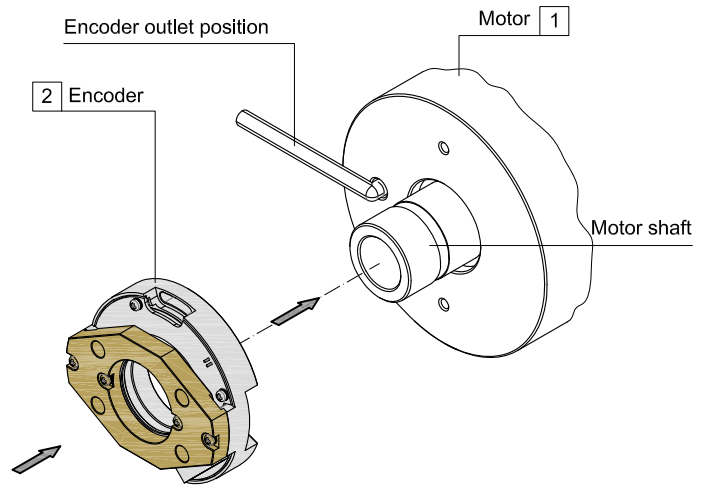


■ Assembling steps without UVW encoder

Step 1

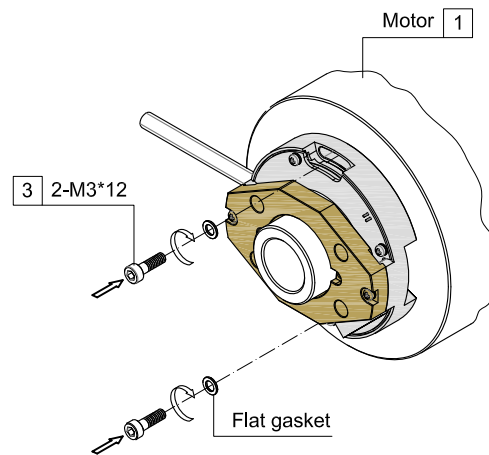
Put the encoder (2) directly on the motor shaft and gently push it to the motor platform by hand.

Note: For the tolerance of the encoder shaft sleeve and the motor shaft, please refer to page 5.



Step 2

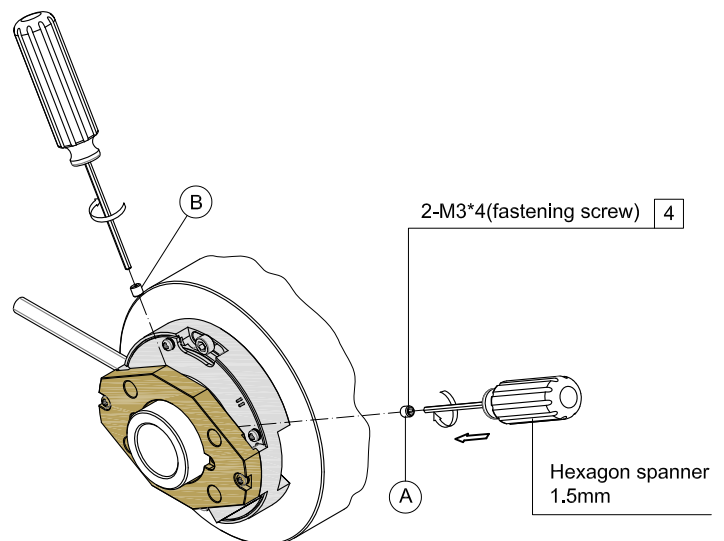
Apply thread glue to the front of the two M3*12 bolts (3), and fix them to the motor (1) together with spring washer and flat plate, and then tighten them with a fixed torque of 0.6N.m.



Step 3

Apply thread glue to the front of the two M3*4 top screws (4) on the side of the encoder and tighten them to fix the encoder's disk on the motor shaft.

Note:
Follow the tightening sequence of the two screws as figure, first A then B
Recommended tightening force is 0.6N.m



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■ Assembling steps without UVW encoder (Continued)

Step 4

- a. Remove the four M2*8 bolts (6) in turn.
- b. Take off the assembly positioning plate (7), the encoder is ready to use now

Note: If you want to reset the zero starting point or remove the encoder (2), you must replace the assembly positioning plate(7).

