■ Incremental Type (Through shaft)

● Feature: PN48 has a mechanical soft connection structure,which is unique designed with photoelectric induction and ultra-thin overall. With an LED to indicate the zero position of the encoder, it´s also easy to install and debug,various of shaft holes available, dust-proof protection,and can solve problems for encoders in high runout motor shaft and installation in limited spaces.

● Application: servo motor,robot etc .

● External dimensions: external diameter 48mm,thicknes 14mm,hollow shaft up to Ø14mm

● Induction type: photoelectric

● Resolution: up to 10000P/R

● Supply voltage: DC5V; DC8-30V

● Protection: IP50

● Radial connector: E=SM08B-GHS-TB;
                      F=SM14B-GHS-TB

● Radial cable: cable length 1 meter(standard)
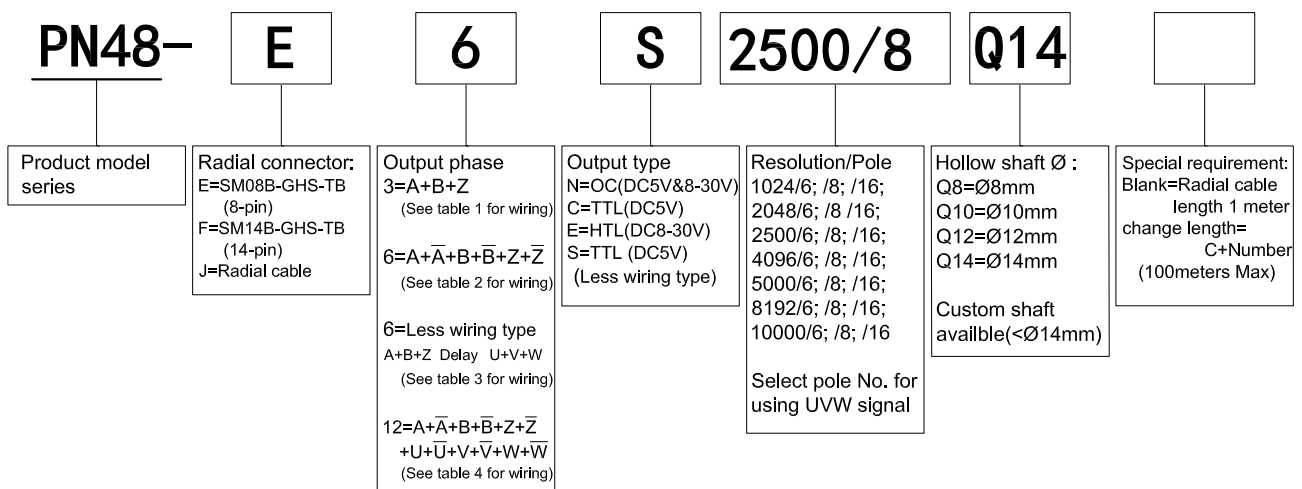
● Weight: about 80g
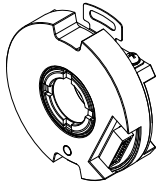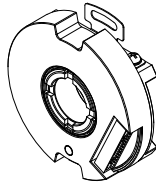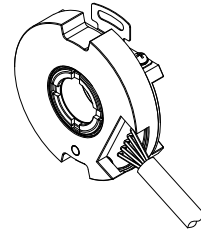
PN48-E   PN48-F   PN48-J

■ Model Guide

● Model form (filled required parameters in the blank as following)

| PN48- | E | 6 | S | 2500/8 | Q14 | |

| Product model series | Radial connector: E=SM08B-GHS-TB (8-pin) F=SM14B-GHS-TB (14-pin) J=Radial cable | Output phase 3=A+B+Z (See table 1 for wiring) 6=A+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$ (See table 2 for wiring) 6=Less wiring type A+B+Z Delay U+V+W (See table 3 for wiring) 12=A+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$ +U+$\overline{U}$+V+$\overline{V}$+W+$\overline{W}$ (See table 4 for wiring) | Output type N=OC(DC5V&8-30V) C=TTL(DC5V) E=HTL(DC8-30V) S=TTL (DC5V) (Less wiring type) | Resolution/Pole 1024/6; /8; /16; 2048/6; /8 /16; 2500/6; /8; /16; 4096/6; /8; /16; 5000/6; /8; /16; 8192/6; /8; /16; 10000/6; /8; /16 Select pole No. for using UVW signal | Hollow shaft Ø : Q8=Ø8mm Q10=Ø10mm Q12=Ø12mm Q14=Ø14mm Custom shaft availble(<Ø14mm) | Special requirement: Blank=Radial cable length 1 meter change length= C+Number (100meters Max) |

■ Output Mode

Output type	Output circuit	Output wave form
OC (DC5V & 8-30V)	Main circuit — +DC, A/B/Z, oV, GND	$T(360°)$ a b c d $a.b.c.d = \frac{T}{4} \pm \frac{T}{8}$ A phase is 1/4T±1/8T ahead of B phase (Viewed from front side) CCW direction $\frac{T}{4} \pm \frac{T}{8}$
TTL(DC5V) HTL(DC8-30V)	Main circuit — +DC, A/B/Z/U/V/W, $\overline{A/B/Z}/\overline{U/V/W}$, OV, GND	$a.b.c.d = \frac{T}{4} \pm \frac{T}{8}$ $e = T \pm \frac{T}{2}$ f: Phase shift from center of Z phase to rise of U phase: ±0.5° (Viewed from front side) CW direction

$\frac{A.B.Z.U.V.W}{\overline{A.B.Z.U.V.W}}$ t   s

poles	g.h.j.k.m.n	r
6	20±1°	120°
8	15±1°	90°
16	7.5±1°	45°

TTL (DC5V)
(Less wiring type)

A.B.Z delay U.V.W

Main circuit — 7, 1/3/5, 2/4/6, 8, 0

Timing Chart

Supply Voltage

Instantaneous Voltage   Power off

5±0.25
4.25±0.3

Power on

Time(msec)

35MIN   35MIN
7±2   7±2

Mode   1 2 3   1 2 3
1
510±220   510±220   22±11
22±11

Symbolic meaning

★: Position for latching UVW phases

☆: Position to start counting ABZ phases

▨: Non-using zones

HZ: High Resistance

No.	Mode		
	1	2	3
1	HZ	U	A
2	HZ	$\overline{U}$	$\overline{A}$
3	HZ	V	B
4	HZ	$\overline{V}$	$\overline{B}$
5	HZ	W	Z
6	HZ	$\overline{W}$	$\overline{Z}$
7	DC+5V		
8	OV		

■ Electrical Specifications

Parameter / Output type / Item				OC	TTL	TTL (Less wiring type)	HTL
Supply voltage				DC5V & 8-30±5%	DC+5V±5%		DC8-30V±5%
Consumption current				120mA Max			
Top response frequency				100KHz	500KHz		800KHz
Output capacity	Output current			≤±30mA	≤±20mA		≤±50mA
	Output voltage	"H"		—	≥2.5V		≥Vcc-3 V_{DC}
		"L"		≤0.4V	≤0.5V		≤ 1V V_{DC}
Rise. Fall time				Less than 1us(cable length: 2m)			
Delay motion time *				—		510±220ms	—
Shielding				not connected to the encoder, must be effectively connected to GND			

* Delayed time for A.B.Z delay U.V.W when power on.

■ Mechanical Specifications

Hollow shaft Ø	Ø8mm; Ø10mm; Ø12mm; Ø14mm(optional)
Starting torque	Less than $9.8×10^{-3}$ N·m
Inertia moment	Less than $6.5×10^{-6}$ kg·m²
Shaft load	Radial 30N; Axial 20N
Slew speed	≤10000 rpm
Shell	Aluminium alloy
Weight	About 80g

■ Environmental Specifications

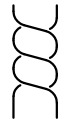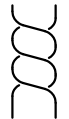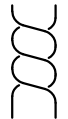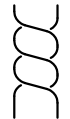|	
Environmental temperature	Operating: －20～+95°C; Storage: －25～+100°C
Environmental humidity	Operating and storage: 35～85％RH (noncondensing)
Protection	IP50

■ Cable connection table
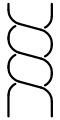
● Wiring table 1

Color	White	–	Green	–	Yellow	–	Red	Black
Pin No.	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8
Function	A	–	B	–	Z	–	+DC	OV
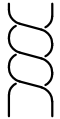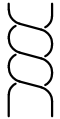
● Wiring table 2

Color	White	White/Black	Green	Green/Black	Yellow	Yellow/Black	Red	Black
Pin No.	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8
Function	A	$\overline{A}$	B	$\overline{B}$	Z	$\overline{Z}$	+DC	OV
Twisted-paired cable								

● Wiring table 3 (Less wiring type)
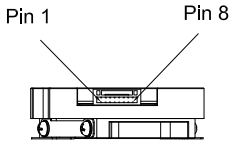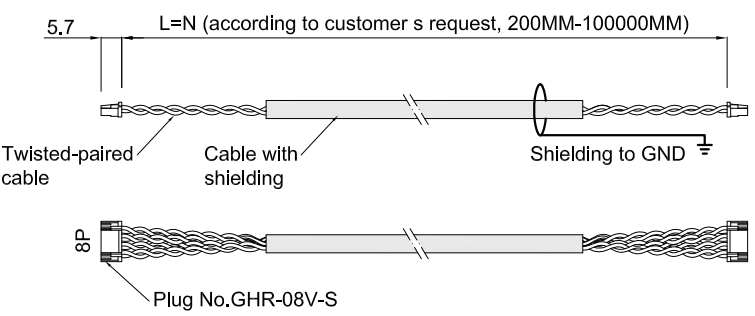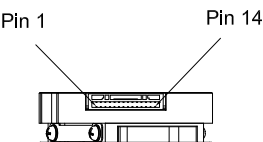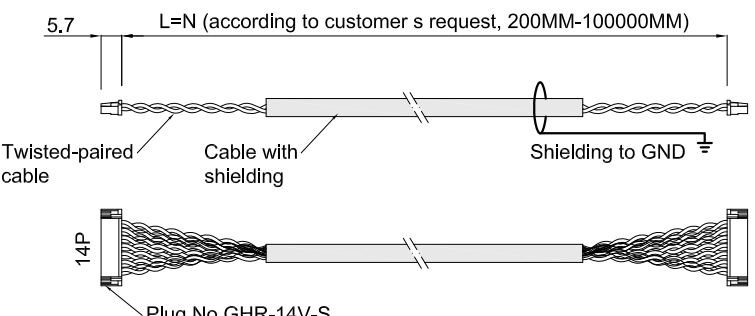
Color		White	White/Black	Green	Green/Black	Yellow	Yellow/Black	Red	Black
Pin No.		Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8
Mode	1	HZ	HZ	HZ	HZ	HZ	HZ	+DC	OV
	2	U	$\overline{U}$	V	$\overline{V}$	W	$\overline{W}$		
	3	A	$\overline{A}$	B	$\overline{B}$	Z	$\overline{Z}$		
Twisted-paired cable									

● Wiring table 4

Color	Blue	Blue/Black	Gray	Gray/Black	Pink	Pink/Black	Yellow	Yellow/Black	Green	Green/Black	White	White/Black	Black	Red
Pin No.	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8	Pin9	Pin10	Pin11	Pin12	Pin13	Pin14
Function	U	$\overline{U}$	V	$\overline{V}$	W	$\overline{W}$	Z	$\overline{Z}$	B	$\overline{B}$	A	$\overline{A}$	OV	+DC
Twisted-paired cable														

■ Connector

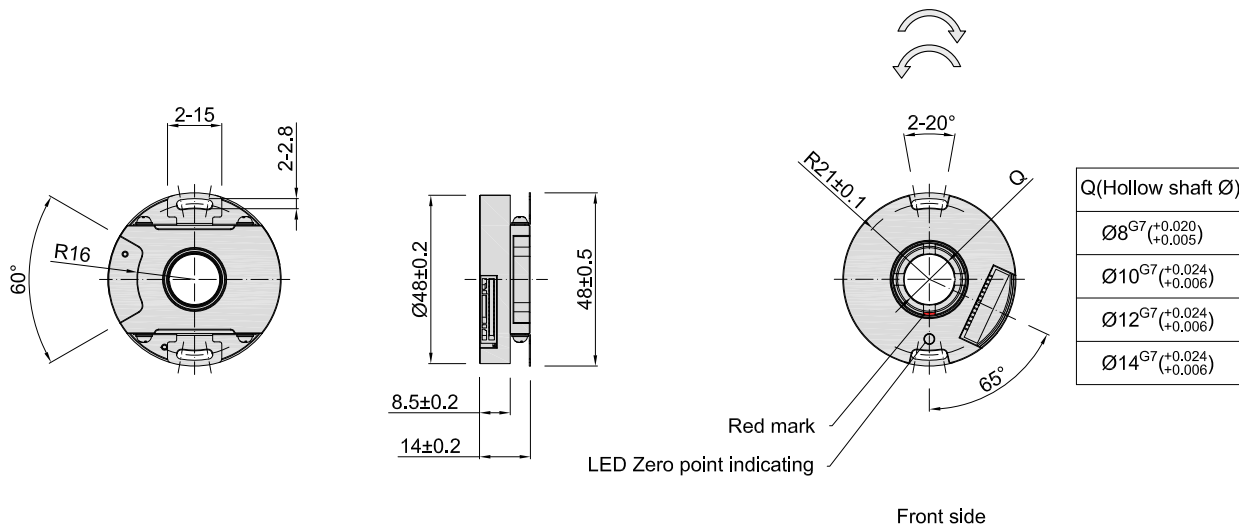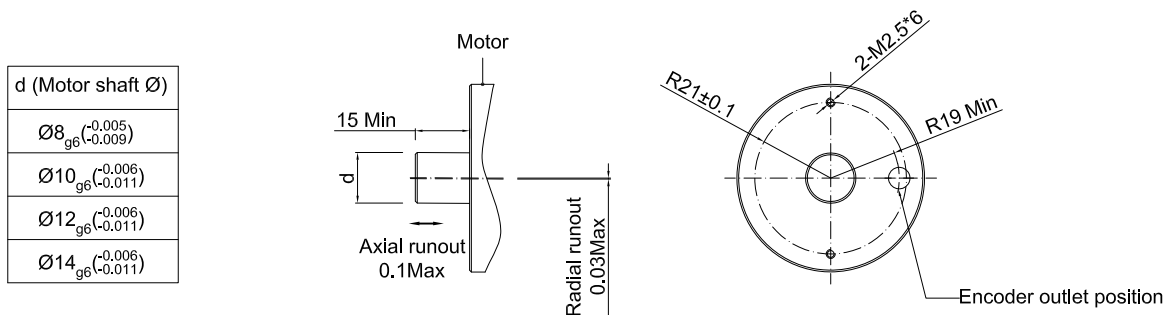|	
Connector No. SM08B-GHS-TB	Plug+shielding cable (order additionally)
Pin 1 Pin 8	5.7 L=N (according to customer s request, 200MM-100000MM) Twisted-paired cable Cable with shielding Shielding to GND 8P Plug No.GHR-08V-S
Connector No. SM14B-GHS-TB	Plug+shielding cable (order additionally)
Pin 1 Pin 14	5.7 L=N (according to customer s request, 200MM-100000MM) Twisted-paired cable Cable with shielding Shielding to GND 14P Plug No.GHR-14V-S

■ Radial Cable Schematic

L=1000±30 (Cable with shielding)   70±10   10

65°   Shielding to GND

Unit: mm

■ Basic Dimensions

2-15

2-2.8

60°

R16

Ø48±0.2

48±0.5

8.5±0.2

14±0.2

2-20°

R21±0.1

Q

65°

Red mark

LED Zero point indicating

Front side

Q(Hollow shaft Ø)
$Ø8^{G7}(^{+0.020}_{+0.005})$
$Ø10^{G7}(^{+0.024}_{+0.006})$
$Ø12^{G7}(^{+0.024}_{+0.006})$
$Ø14^{G7}(^{+0.024}_{+0.006})$
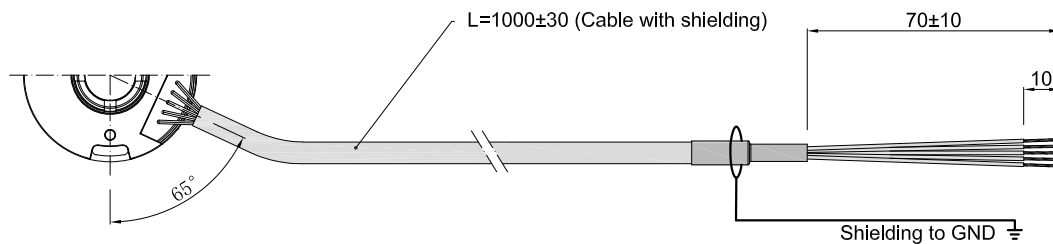
■ Specifications for Mounting shaft

d (Motor shaft Ø)
$Ø8_{g6}(^{-0.005}_{-0.009})$
$Ø10_{g6}(^{-0.006}_{-0.011})$
$Ø12_{g6}(^{-0.006}_{-0.011})$
$Ø14_{g6}(^{-0.006}_{-0.011})$

Motor

15 Min

d

Axial runout
0.1Max

Radial runout
0.03Max

R21±0.1

2-M2.5*6

R19 Min

Encoder outlet position

Unit: mm
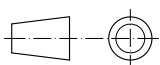
= Rotate direction of incremental TTL & HTL signal output shaft

= Rotate direction of OC signal output shaft

hengxiang

■   Assembling steps for encoder with UVW signal

Step 1
a. Before installing the encoder, first to confirm the
   starting zero position of the motor and lock it
   tightly to ensure that the motr shaft is not moving
   until the encoder is finished installation,otherwise
   the encoder and the motor's zero position cannot
   be aligned.
b. Put the encoder (2) directly on the motor shaft and
   gently push it to the motor platform by hand.
c. Screwed the two M2.5*6 bolts (3) at the same time,
   but do not tighten, just enough to rotate the encoder
   by hand.

Note:
   Please refer to page 6 for the matching tolerance
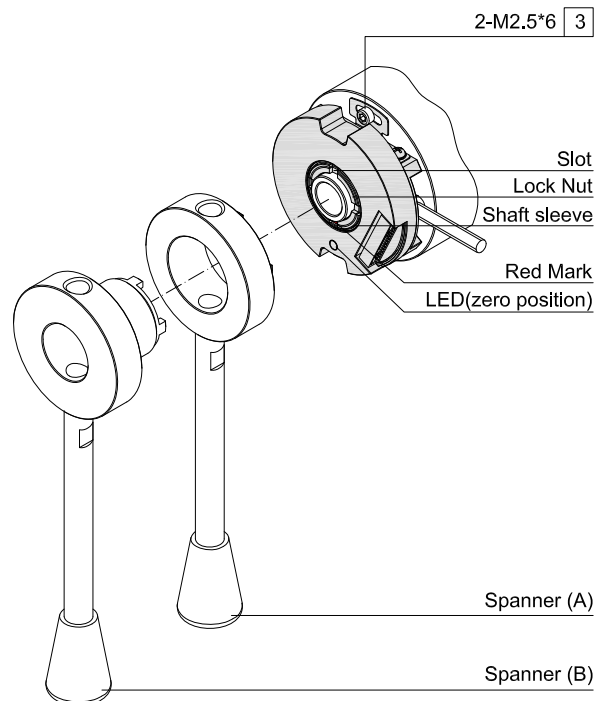   of the encoder shaft sleeve and the motor shaft.
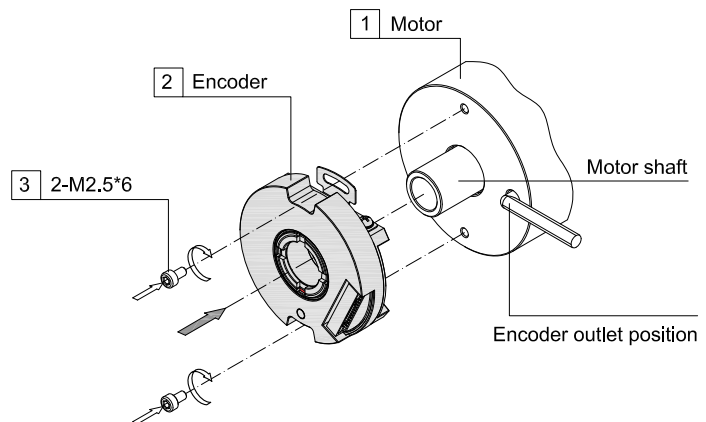
Step 2
a. Fix the spanner (A) on the slot of the encoder shaft
   sleeve (outer ring) and then use the spanner (B) to
   tighten the lock nut (recommended tightening force
   is 10-13nm).
b. Pls refer to the cable connection table on page 4-5,
   power on after checking all are correct,please confirm
   again that the motor is in the zero locked state, and
   then turn the encoder (2) left and right by hand,observe
   the LED on the encoder, when it is on,the zero signal
   is aligned, then tighten the two M2.5*6 bolts (3) and keep
   the LED on.

Note:
*. The red mark on the shaft sleeve is always aligned with
   the LED indicator.
*. After making sure that the lock nut has been tightened,
   put thread glue on the inner thread of the slot to prevent
   the screw from loosening.
*. Because the width of the zero signal is relatively narrow,
   it is easy to cause displacement during the tightening
   process and the LED may not light up. please be patient
   to debug or use other testing equipments as auxiliary
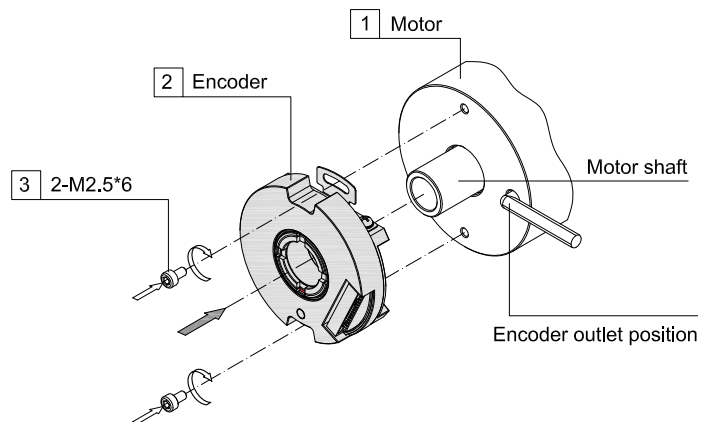   observation.

■ Assembling steps for encoder without UVW signal

Step 1
Put the encoder (2) directly on the motor shaft (1)
and gently push it to the motor platform, then tighten
the two M2.5*6 bolts (3) at the same time.

Note:
Please refer to page 6 for the matching tolerance of
the encoder shaft sleeve and the motor shaft.

1 Motor

2 Encoder

Motor shaft

3 2-M2.5*6

Encoder outlet position

2-M2.5*6 3

Slot
Lock Nut
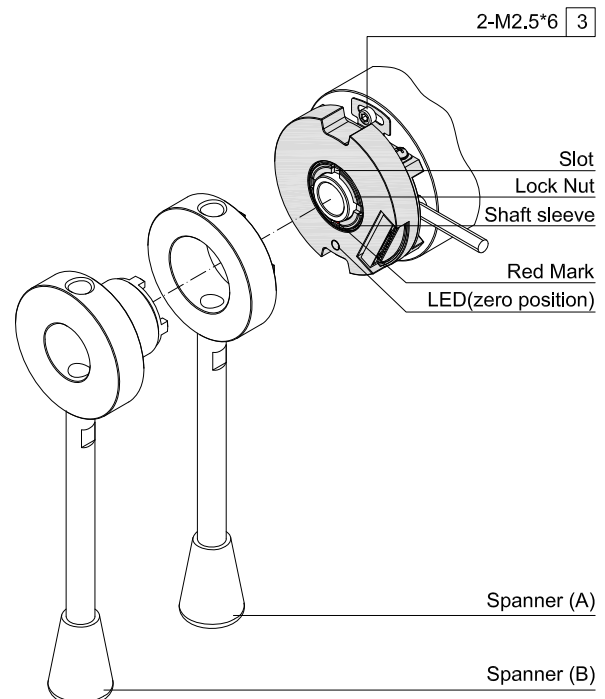Shaft sleeve

Red Mark
LED(zero position)

Step 2
Fix the spanner (A) on the slot of the
encoder shaft sleeve (outer ring) and
then use the spanner (B) to tighten
the lock nut
(recommended tightening force is 10-13nm).

Note:
*. The red mark on the shaft sleeve aligned
with the LED indicator is regarded as the
zero primary position. when the LED light
is on, this will be the final precise zero position.
*. After making sure that the lock nut has been
tightened, put thread glue on the inner thread
of the slot to prevent the screw from ioosening.

Spanner (A)

Spanner (B)

■ Caution

1. Caution for Operation
- The working temperature shall not exceed the storage temperature.
- The working humidity shall not exceed the storage humidity.
- Do not use where the temperature changes dramatically and have fog.
- Do not close to corrosive and flammable gas.
- Keep away from dust, salt and metal powder.
- Keep away from places where you will use water, oil, or medicine.
- Undue vibration and shock will impact the encoder.

2. Caution for Installation
- Please follow the installation steps in page 7-8
- Electrical components shall not be over-voltage or other phenomena.
  please conduct electrostatic assessment of the setting environment.
- Do not close the cable of the motor power to the encoder.
- The FG wire of the motor and mechanical device should be grounded.
- Perpendicularity between the motor mounting platform and the motor shaft must meet the requirements.
- The shielding wire must be effectively grounded since the shielding is not connected to the encoder.
- In order to keep the encoder stable against the electromagnetic insulation,the soft magnetic material
  (soft iron) is used as the encoder´s outer cover, to prevent affecting from the external current magnetic
  field generated.

3. Caution for Wiring
- Use the encoder under the specified supply voltage. please note that the supply voltage range may
  drop due to the wiring length.
- Please do not put the encoder wires and other power lines in one pipe or binding together.
- Please use twisted pair wires for the signal and power wires of encoder.
- Please do not apply excessive force to the cable of encoder, or it will may be damaged.