

1. S50F Incremental Optical Encoder (Solid shaft, flange mounting)

1.1 Introduction:

S50F is a rugged general purpose solid shaft flange mount design that is compact, durable, safe and commonly used in industrial automations.

1.2 Feature:

- Encoder external diameter $\varnothing 50\text{mm}$, thickness 35.7mm, diameter of shaft $\varnothing 8\text{mm}$ (D type);
- Adopt non-contact photoelectric principle;
- Reverse polarity protection;
- Short circuit protection;
- Multiple electrical interfaces available;
- Resolution per turn up to 48000PPR.

1.3 Application:

Textile, packaging, motor, elevator, CNC and other automation control fields.

1.4 Connection:

- Radial cable (standard length 1M)
- Axial cable (standard length 1M)
- Axial socket (Equivalent binder, 682 series)

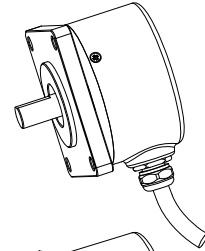
1.5 Protection:

IP50 & IP65

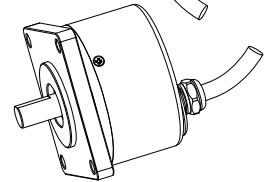
1.6 Weight:

about 220g

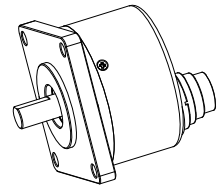
S50F-T



S50F-Q

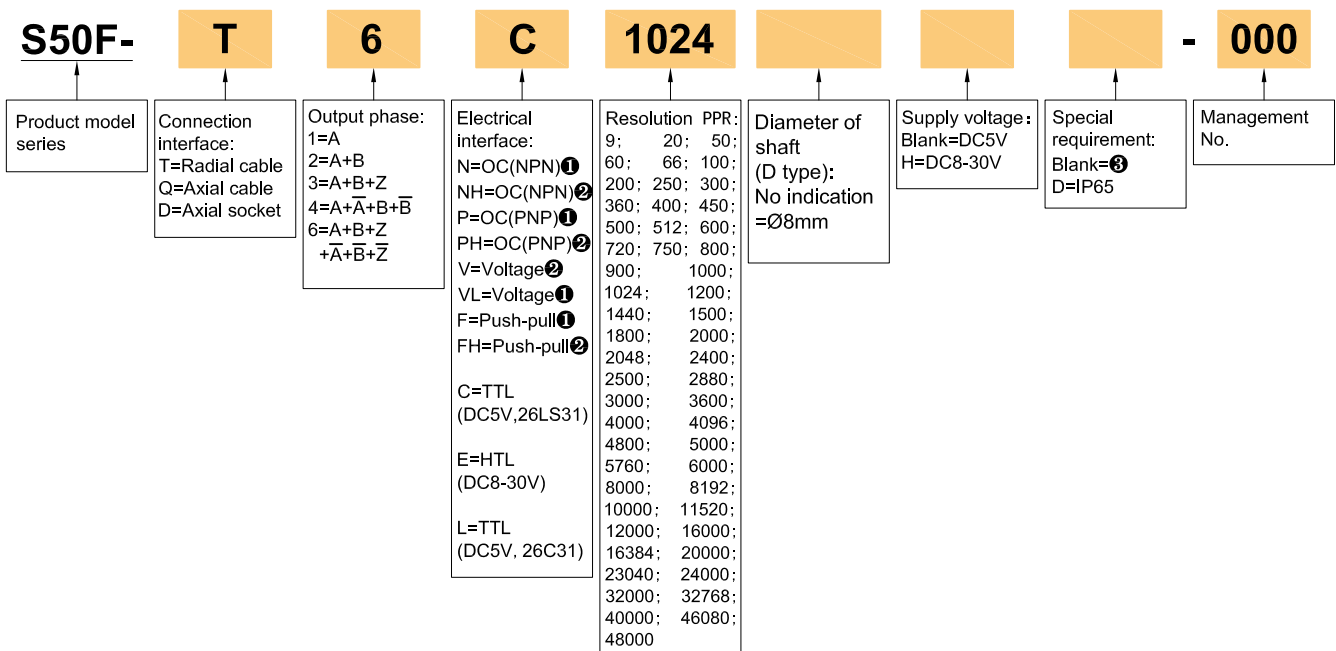


S50F-D



2. Model Selection Guide

2.1 Model composition(select parameters)



2.2 Note

- Z signal is low level active.
- Z signal is high level active.
- None indicated for IP50 and cable length of 1M, if need to change the length C+number, the longest is 100M (expressed by C100). For the specific length of use, pls refer to page 2 of the provision of output circuit.

3. Output Mode

| Electrical interface | Output circuit | Output wave form |
|--|----------------|---|
| <p>OC NPN open collector circuit</p> | | <p>$a.b.c.d = \frac{T}{4} \pm 8\%$</p> <p>Phase A is ahead of B by $\frac{T}{4} \pm 8\%$, viewing from shaft end, direction is clockwise rotation. (See dimensional drawings)</p> <p>CW direction →</p> <p>Z signal is low level active</p> |
| <p>OC PNP open collector circuit</p> | | <p>Z signal is high level active</p> |
| <p>Push-pull</p> | | <p>Z signal is high level active</p> |
| <p>Voltage</p> | | <p>Z signal is high level active</p> |
| <p>TTL (DC5V)</p> <p>HTL (DC8-30V)</p> | | <p>$a.b.c.d = \frac{T}{4} \pm 8\%$</p> <p>Phase A is ahead of B by $\frac{T}{4} \pm 8\%$, viewing from shaft end, direction is clockwise rotation. (See dimensional drawings)</p> <p>CW direction →</p> |

4. Electrical Parameters

| Parameter Item | Output type | OC | Voltage | Push-pull | TTL | HTL | |
|-----------------------------|----------------|------------------------------------|---------|-------------------------|-------------------------------|---------------------------------|-------------------------------------|
| Supply voltage | | DC+5V±5%; DC8V-30V±5% | | | DC+5V±5% | DC8-30V±5% | |
| Consumption current | | 100mA Max | | | 120mA Max | | |
| Allowable ripple | | ≤3%rms | | | | | |
| Top response frequency | | 100KHz | | | 300KHz | 500KHz | |
| Output capacity | Output current | Input | ≤30mA | Load resistance 2.2K | ≤30mA | ≤±20mA | ≤±50mA |
| | | Output | — | | ≤10mA | | |
| | Output voltage | "H" | — | — | ≥[(Supply voltage) -2.5V] | ≥2.5V | ≥V _{CC} -3 V _{DC} |
| | | "L" | ≤0.4V | ≤0.7V(less than 20mA) | ≤0.4V(30mA) | ≤0.5V | ≤ 1V V _{DC} |
| Load voltage | | ≤DC30V | — | | — | | |
| Rise & Fall time | | Less than 2us(cable length: 2m) | | | ≤100ns | Less than 1us(Cable length: 2m) | |
| Insulation strength | | AC500V 60s | | | | | |
| Insulation resistance | | 10MΩ | | | | | |
| Mark to space ratio | | 45% to 55% | | | | | |
| Reverse polarity protection | | ✓ | | | | | |
| Short-circuit protection | | — | | | ✓① | | |
| Phase shift between A & B | | 90°±10° (frequency in low speed) | | | | | |
| | | 90°±20° (frequency in high speed) | | | | | |
| GND | | Not connect to encoder | | | | | |

① Short-circuit to another channel or GND permitted for max 30s.

5. Mechanical Specifications

| | |
|-------------------|---|
| Diameter of shaft | Ø8mm (D type, stainless steel material) |
| Starting torque | Less than $5 \times 10^{-3} \text{N} \cdot \text{m}$ |
| Inertia moment | Less than $3 \times 10^{-6} \text{kg} \cdot \text{m}^2$ |
| Shaft load | Radial 40N; Axial 20N |
| Slew speed | $\leq 6000 \text{ rpm (IP50)}$; $\leq 4000 \text{ rpm (IP65)}$ |
| Bearing Life | 1.5×10^9 revs at rated load(100000hrs at 2500RPM) |
| Shell | Aluminium alloy |
| Weight | about 220g |

6. Environmental Parameters

| | |
|---------------------------|---|
| Environmental temperature | Operating: $-20 \sim +90^\circ\text{C}$ (repeatable winding cable: -10°C); Storage: $-25 \sim +95^\circ\text{C}$ |
| Environmental humidity | Operating and storage: 35~85%RH(noncondensing) |
| Vibration(Endurance) | Amplitude 0.75mm,5~55Hz,2h for X,Y,Z direction individually |
| Shock(Endurance) | 490m/s^2 11ms three times for X,Y,Z direction individually |
| Protection | IP50 & IP65 |

7. Wiring table

7.1 OC/Voltage/Push-pull (Wiring table for socket and cable connection)

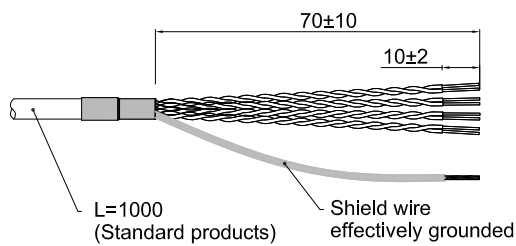
| Socket pin number | Supply voltage | | Incremental signal | | |
|-------------------|----------------|-------|--------------------|-------|--------|
| | 1 | 2 | 3 | 4 | 5 |
| Wire color | Red | Black | White | Green | Yellow |
| Function | Up | 0V | A | B | Z |

7.2 TTL/HTL (Wiring table for socket and cable connection)

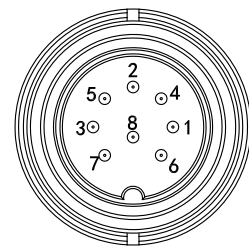
| Socket pin number | Supply voltage | | Incremental signal | | | | | |
|----------------------|----------------|-------|--------------------|----------|-------|----------|--------|-----------|
| | 1 | 2 | 3 | 6 | 4 | 7 | 5 | 8 |
| Wire color | Red | Black | White | White/BK | Green | Green/BK | Yellow | Yellow/BK |
| Function | Up | 0V | A+ | A- | B+ | B- | Z+ | Z- |
| Twisted-paired cable | | | | | | | | |

Up=Supply voltage.
Shield wire is not connected to the internal circuit of encoder.

Cable connection



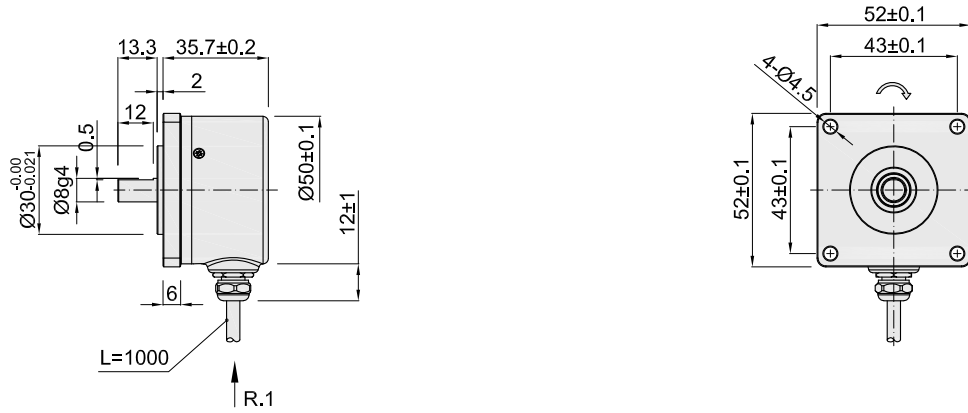
Axial socket connection



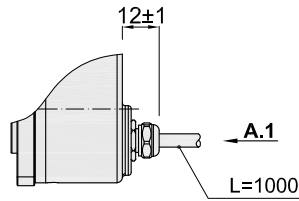
M16-8DIN pin male socket pin assignment diagram

8. Basic Dimensions

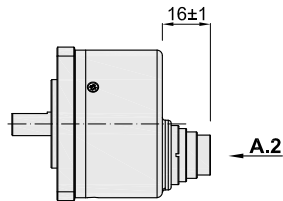
8.1 S50F-T



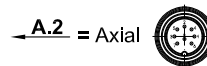
8.2 S50F-Q



8.3 S50F-D

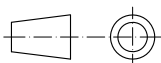


Socket model: (Equivalent 682 series, M16-8DIN flange socket)



- Pin 1=DC
- 2=0V
- 3=A
- 4=B
- 5=Z
- 6=Ā
- 7=Ē
- 8=Z̄

Unit: mm

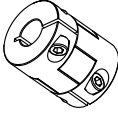
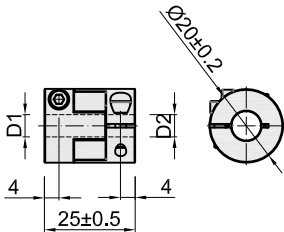

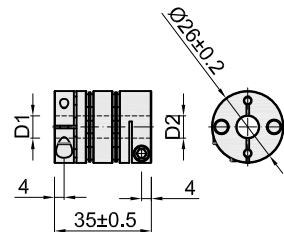


- ↻ = Shaft rotation direction of incremental signal output
- R.1 = Radial cable (standard length 1M)
- A.1 = Axial cable (standard length 1M)
- A.2 = Axial socket (M16-8DIN)

About vibration

Vibration act on encoder always cause wrong pulse, so we should pay attention to working place. More pulse per revolution, narrower groovy spacing of grating, more effect to encoder by vibration, when rev is low or stop, vibration act on shaft or main body would cause grating vibrating, so encoder might make wrong pulse.

9. Accessories(Recommended purchase)

| <p>Crossover M Series (general accuracy, higher accuracy optional W series) 6M8 No: 08700038 8M8 No: 08700039 8M10 No: 08700040</p>  |  | <table border="1"> <thead> <tr> <th>Model</th> <th>D1</th> <th>D2</th> </tr> </thead> <tbody> <tr> <td>6M8</td> <td>$\varnothing 6^{+0.01}_{+0.03}$</td> <td rowspan="2">$\varnothing 8^{+0.01}_{+0.03}$</td> </tr> <tr> <td>8M8</td> <td rowspan="2">$\varnothing 8^{+0.01}_{+0.03}$</td> </tr> <tr> <td>8M10</td> <td></td> <td>$\varnothing 10^{+0.01}_{+0.03}$</td> </tr> <tr> <td colspan="3">Material: aluminium alloy</td> </tr> </tbody> </table> | Model | D1 | D2 | 6M8 | $\varnothing 6^{+0.01}_{+0.03}$ | $\varnothing 8^{+0.01}_{+0.03}$ | 8M8 | $\varnothing 8^{+0.01}_{+0.03}$ | 8M10 | | $\varnothing 10^{+0.01}_{+0.03}$ | Material: aluminium alloy | | |
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| 8M8 | $\varnothing 8^{+0.01}_{+0.03}$ | | | | | | | | | | | | | | | |
| 8M10 | | | $\varnothing 10^{+0.01}_{+0.03}$ | | | | | | | | | | | | | |
| Material: aluminium alloy | | | | | | | | | | | | | | | | |
| <p>Diaphragm Type W Series (high accuracy) 6W8 No: 08700042 8W8 No: 08700043 8W10 No: 08700044</p>  |  | <table border="1"> <thead> <tr> <th>Model</th> <th>D1</th> <th>D2</th> </tr> </thead> <tbody> <tr> <td>6W8</td> <td>$\varnothing 6^{+0.01}_{+0.03}$</td> <td rowspan="2">$\varnothing 8^{+0.01}_{+0.03}$</td> </tr> <tr> <td>8W8</td> <td rowspan="2">$\varnothing 8^{+0.01}_{+0.03}$</td> </tr> <tr> <td>8W10</td> <td></td> <td>$\varnothing 10^{+0.01}_{+0.03}$</td> </tr> <tr> <td colspan="3">Material: aluminium alloy</td> </tr> </tbody> </table> | Model | D1 | D2 | 6W8 | $\varnothing 6^{+0.01}_{+0.03}$ | $\varnothing 8^{+0.01}_{+0.03}$ | 8W8 | $\varnothing 8^{+0.01}_{+0.03}$ | 8W10 | | $\varnothing 10^{+0.01}_{+0.03}$ | Material: aluminium alloy | | |
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