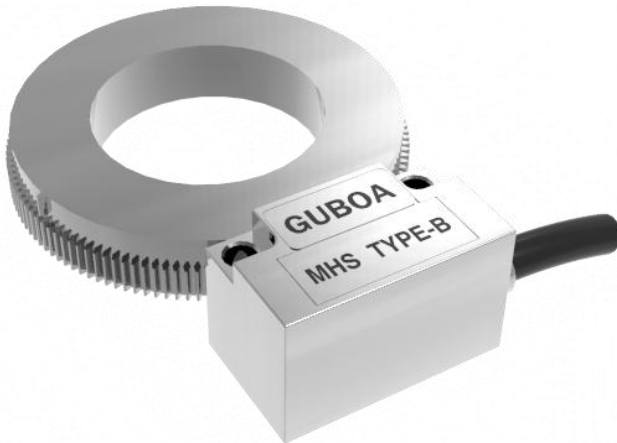


# Manual

## MHS Type-B

Mitsubishi High Speed Serial Interface (MHSSI) Encoder



### Applications

Speed and position feedback for motorized spindles, CNC lathe, turning/milling machines

### General Information

- MHS series is an incremental rotary encoder, the signal is transmitted in the digital form.
- Data transmission interface: Mitsubishi high speed serial interface (MHSSI) 2.5 Mbit/s ;  
MHS series can be directly connected to Mitsubishi CNC series M800/M80/E80/C80.
- Contactless detection of rotating position and speed can avoid mechanical wear problem.
- Compact design for the installation and application in the narrow space.
- Fully encapsulated packing, protecting rating IP68.
- Available to provide partial customization.

## ■ Specification

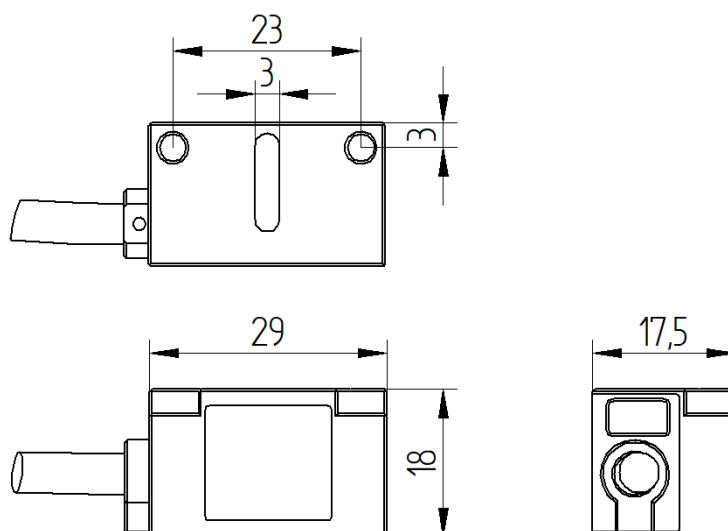
| Technical data                    | MHS 04B                                        |
|-----------------------------------|------------------------------------------------|
| Supply voltage Vcc (DCV)          | 5 V $\pm$ 5%                                   |
| Current consumption (open output) | $\leq$ 90 mA                                   |
| Data transmission interface       | Mitsubishi high speed serial interface (MHSSI) |
| Data transmission rate            | 2.5 Mbit/s                                     |
| Switch-on time                    | < 0.5 s                                        |
| Maximum rotational speed          | $\leq$ 40000 rpm                               |
| Sensing gap                       | 0.15 $\pm$ 0.03 mm                             |
| Weight (with 1m wire)             | 105 g $\pm$ 5%                                 |

| Electrical testing    |                                                           |
|-----------------------|-----------------------------------------------------------|
| EMC/EMI               | EN 61000-6-1; EN 61000-6-2<br>/EN 61000-6-3; EN 61000-6-4 |
| Protection            | IP 68 (IEC 60529)                                         |
| Vibration             | 200 m/ s <sup>2</sup> , 55Hz to 2000Hz (EN 60068-2-6)     |
| Shock                 | 2000 m/ s <sup>2</sup> , 6ms (EN 60068-2-27)              |
| Operating temperature | -20°C ~ 85 °C                                             |

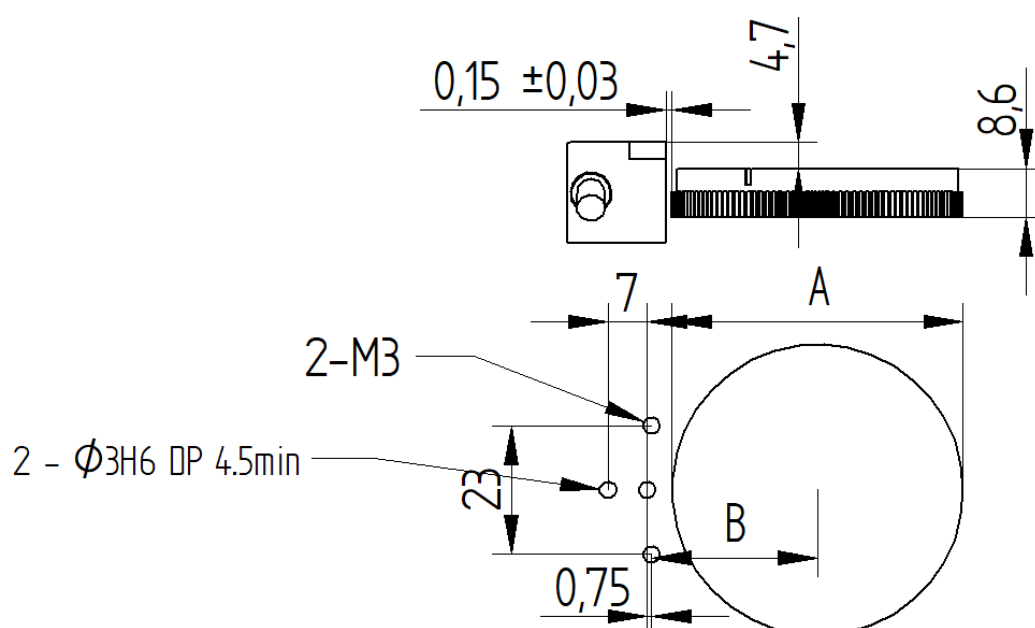
## ■ Application

| Available on Mitsubishi CNC M800 / M80 / E80 / C80                                                                                                       |                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spindle drive                                                                                                                                            | Servo drive                                                                                                                                                                    |
| Series <ul style="list-style-type: none"> <li>■ MDS-E-SP</li> <li>■ MDS-EH-SP</li> <li>■ MDS-EJ-SP</li> <li>■ MDS-EM-SP</li> <li>■ MDS-EMH-SP</li> </ul> | Series <ul style="list-style-type: none"> <li>■ MDS-E-Vx</li> <li>■ MDS-EH-Vx</li> <li>■ MDS-EJ-Vx</li> <li>■ MDS-EHG-Vx</li> <li>■ MDS-EM-Vx</li> <li>■ MDS-EMH-Vx</li> </ul> |
| Firmware : BND-1501W202                                                                                                                                  | Firmware : BND-1501W201                                                                                                                                                        |
| Firmware : BA or later                                                                                                                                   | Firmware : BA or later                                                                                                                                                         |

## ■ Dimension

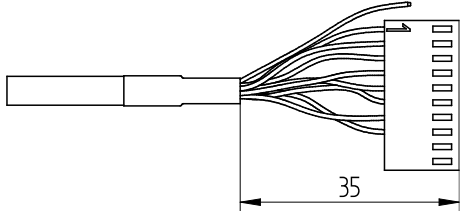
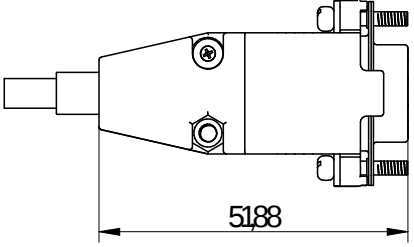
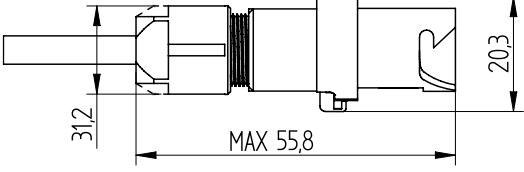


## ■ Installation Position Layout

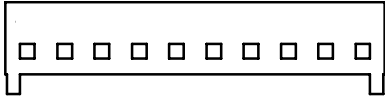


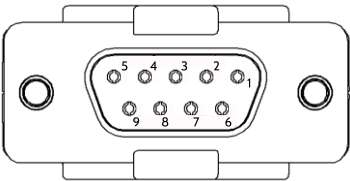
$$B = A (\text{Gear outer diameter}) / 2 + 3.15$$

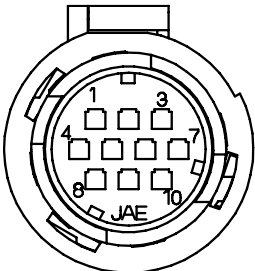
■ Connector Type

| Type                    | Code | Image                                                                                |
|-------------------------|------|--------------------------------------------------------------------------------------|
| Open-end                | N    |    |
| D-SUB<br>9 Pin / Female | D    |   |
| JAE<br>10 Pin / Socket  | P    |  |

## ■ Pin Definition

| Open-end                                                                          | Function | Color  |
|-----------------------------------------------------------------------------------|----------|--------|
|  | RQ +     | green  |
|                                                                                   | RQ -     | yellow |
|                                                                                   | +5 V     | brown  |
|                                                                                   | 0 V      | white  |
|                                                                                   | Data -   | pink   |
|                                                                                   | Data +   | gray   |
|                                                                                   | Shield   | -      |

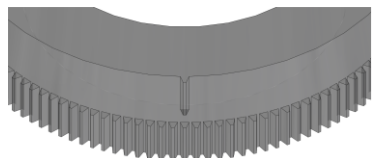
| D-SUB - 9 Pin / Female                                                             | Pin          | Function | Color  |
|------------------------------------------------------------------------------------|--------------|----------|--------|
|  | 1            | -        | -      |
|                                                                                    | 2            | RQ +     | green  |
|                                                                                    | 3            | RQ -     | yellow |
|                                                                                    | 4            | +5 V     | brown  |
|                                                                                    | 5            | -        | -      |
|                                                                                    | 6            | 0 V      | white  |
|                                                                                    | 7            | Data -   | pink   |
|                                                                                    | 8            | Data +   | gray   |
|                                                                                    | 9            | -        | -      |
|                                                                                    | Outer casing | Shield   |        |

| JAE 10 Pin<br>Model: JN1HS10PL3                                                     | Pin | Function | Color  |
|-------------------------------------------------------------------------------------|-----|----------|--------|
|  | 1   | -        | -      |
|                                                                                     | 2   | -        | -      |
|                                                                                     | 3   | RQ +     | green  |
|                                                                                     | 4   | RQ -     | yellow |
|                                                                                     | 5   | Data +   | gray   |
|                                                                                     | 6   | Data -   | pink   |
|                                                                                     | 7   | +5 V     | brown  |
|                                                                                     | 8   | 0 V      | white  |
|                                                                                     | 9   | Shield   | -      |
|                                                                                     | 10  | -        | -      |

■ Gear model

| Sensing gear code                            |                                                      |
|----------------------------------------------|------------------------------------------------------|
| M    X    XXX - XXX - FS<br>①    ②    ③    ④ |                                                      |
| ①                                            | <b>Module:</b><br>4: module 0.4                      |
| ②                                            | <b>Teeth *</b><br>128~640                            |
| ③                                            | <b>Inner diameter * ( mm ) :</b><br>40~220           |
| ④                                            | <b>Reference mark:</b><br>FS : Flag (For MHS Type-B) |

\* Customized available

| Reference mark | Image                                                                                |
|----------------|--------------------------------------------------------------------------------------|
| FS             |  |

## Encoder model

| Encoder type code          |                                                                           |
|----------------------------|---------------------------------------------------------------------------|
| MHS 04B – XX – XXX – X – X |                                                                           |
| ①② ③ ④ ⑤ ⑥                 |                                                                           |
| ①                          | <b>Module</b><br>04: Module 0.4                                           |
| ②                          | <b>Type</b><br>B: Mini size metal case                                    |
| ③                          | <b>Resolution *</b><br>20 bits                                            |
| ④                          | <b>Induction teeth *</b><br>128~640                                       |
| ⑤                          | <b>Connectors *</b><br>N: Open-end      D : D-sub 9 Pin<br>P : JAE 10 pin |
| ⑥                          | <b>Cable length *</b><br>S : 1 m<br>L : 3 m                               |

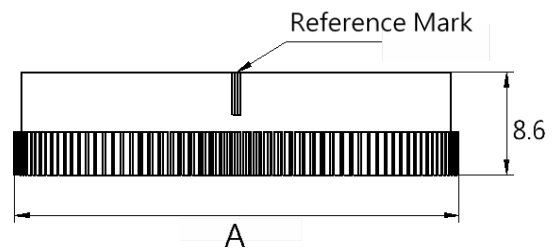
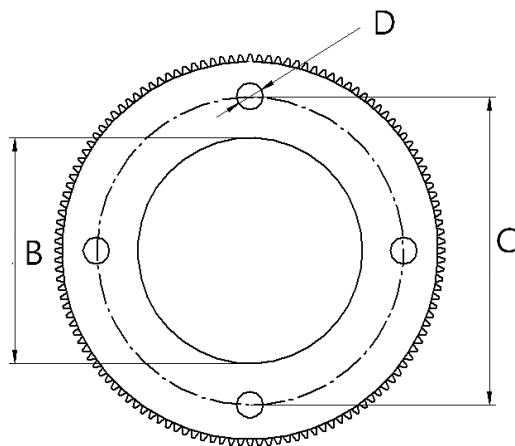
\* Customized available

## Standard model

| Encoder           | Gear         | Max. speed (rpm) | Resolution (bits) | Resolution (in degree) |
|-------------------|--------------|------------------|-------------------|------------------------|
| MHS 04B-20-128-xx | M4 128-40FS  | 40,000           | 20                | 0.00034                |
| MHS 04B-20-192-xx | M4 192-60FS  | 27,000           | 20                | 0.00034                |
| MHS 04B-20-256-xx | M4 256-82FS  | 20,000           | 20                | 0.00034                |
| MHS 04B-20-384-xx | M4 384-125FS | 13,000           | 20                | 0.00034                |
| MHS 04B-20-512-xx | M4 512-160FS | 10,000           | 20                | 0.00034                |
| MHS 04B-20-640-xx | M4 640-220FS | 8,000            | 20                | 0.00034                |

**■ Gear wheel model**

| Model        | OD (A) | ID (B)          | PCD (C) | Hole (D) | Teeth |
|--------------|--------|-----------------|---------|----------|-------|
| M4128- 40FS  | 52     | 40 $+0.016/-0$  | n/a     | n/a      | 128   |
| M4192- 60FS  | 77.6   | 60 $+0/-0.018$  | n/a     | n/a      | 192   |
| M4256- 82FS  | 103.2  | 82 $+0/-0.018$  | n/a     | n/a      | 256   |
| M4384- 125FS | 154.4  | 125 $+0.025/-0$ | 134     | 8*Ø4.5   | 384   |
| M4512- 160FS | 205.6  | 160 $+0.02/-0$  | 170     | 8*Ø5.5   | 512   |
| M4640- 220FS | 256.8  | 220 $+0.02/-0$  | 230     | 8*Ø5.5   | 640   |



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