

# Datasheet

## General Features

Absolute optical encoder with glass measuring support for CNC machine tools.

- MITSUBISHI High Speed serial interface
- Resolutions up to 1 nm.  
Accuracy grade up to  $\pm 2 \mu\text{m}$
- Fixed expansion point (**FEP**) in the middle, positionable on the right (**RT**) or on the left (**LT**), for a linear expansion consistent with the type of application
- Direct reading of absolute measure
- Rugged and heavy profile of considerable section
- Adjustable cable output, through double connector
- Pressurization from both sides of the scale or from the transducer



## Technical Characteristics

Measuring support	Glass scale	
Grating pitch	20 $\mu\text{m}$	
Linear thermal expansion coefficient	$8 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$	
Serial interface	MITSUBISHI High-Speed (2.5 Mbps – Full-Duplex)	
Resolution absolute measure	1 - 0.1 - 0.01 - 0.001 $\mu\text{m}$	
Accuracy grade	$\pm 5 \mu\text{m}$ * standard version $\pm 3 \mu\text{m}$ * high-accuracy version ( $\pm 2 \mu\text{m}$ for measuring length up to 640 mm)	
Interpolation error (SDE)	$\pm 70 \text{ nm}$ **	
Hysteresis	90 nm **	
Measuring length ML in mm	140, 240, 340, 440, 540, 640, 740, 840, 940, 1.040, 1.140, 1.240, 1.340, 1.440, 1.540, 1.640, 1.740, 1.840, 2.040, 2.240, 2.440, 2.640, 2.840, 3.040, 3.240 max.	
Fixed expansion point (FEP)	central or positionable on the right (RT) or on the left (LT)	
Max. traversing speed	180 m/min	
Max. acceleration	50 $\text{m/s}^2$ in measuring direction	
Required moving force	$\leq 2.5 \text{ N}$	
Vibration resistance (EN60068-2-6)	100 $\text{m/s}^2$	[55 ÷ 2000 Hz]
Shock resistance (EN60068-2-27)	150 $\text{m/s}^2$	[11 ms]
Protection class (EN 60529)	IP 54 standard, IP 64 pressurized	
Operating temperature	0 $^\circ\text{C}$ ÷ 50 $^\circ\text{C}$	
Storage temperature	-20 $^\circ\text{C}$ ÷ 70 $^\circ\text{C}$	
Relative humidity	20 % ÷ 80 % (not condensed)	
Reading block sliding	by ball bearings ©	
Power supply	5 VDC $\pm 10 \%$	
Current consumption	255 mA max. (with R = 120 $\Omega$ )	
Max. cable length	50 m***	
Connector	on the transducer, with adjustable output	
Electrical protections	inversion of polarity and short circuits	
Weight	0.55 kg + 2.8 kg/m	

\* The declared accuracy grade of  $\pm X \mu\text{m}$  is referred to a measuring length of 1 m.

\*\* The error declared is subject to the respect of the alignment tolerances.

\*\*\* Ensuring a minimum power supply voltage of 5 V to the transducer

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## Electrical Characteristics

- Connector on the transducer, easily disconnectable in case of need.
- Reading device with an infrared light emitter and receiving photodiodes.
- Serial protocol MITSUBISHI High-Speed.
- Electrical protection against polarity inversion and short circuits on output ports.
- CABLE:
  - PUR cable with low friction coefficient, resistant to oil and suitable for continuous movements
  - 6 wired, shielded cable,  $\varnothing = 6,2$  mm
  - 4 m standard length
  - Connector CY3 MITSUBISHI Full-Duplex

**The cable's bending radius should not be lower than 70 mm.**

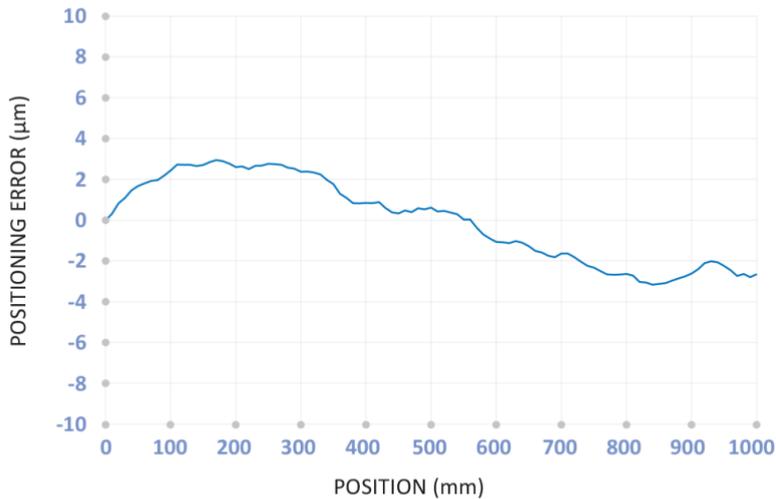
## Mechanical Characteristics

- Rugged and heavy **PROFILE** of considerable section, made of anodized aluminum.  
Dimensions 36.7 x 58.5 mm
- **SPRING SYSTEM** for misalignment compensation and self-correction of mechanical hysteresis
- Double pair of linear **SEALING LIPS** for a very high protection of the grating
- Pressurizable **READER HEAD**, consisting of tie rod and reading block, with fully-protected place for electronic boards
- **READING BLOCK** sliding through ball bearings
- Die-cast **TIE ROD**, with nickel surface treatment
- Absolute glass **GRATING**, placed in the scale housing
- Elastomeric **GASKETS** which allow to reproduce the full protection in mechanical joints (in case of disassembling)
- **FULL POSSIBILITY** to disassemble and reassemble it



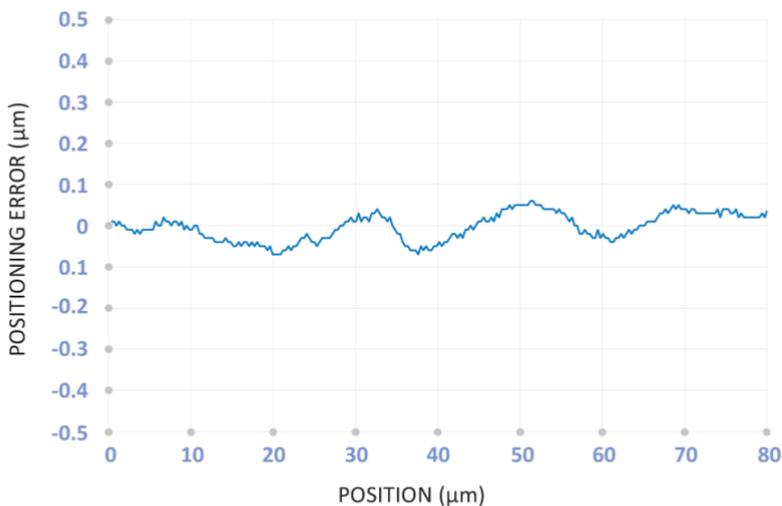
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## Accuracy



Accuracy graph: deviation between the value measured by the encoder and the value measured by the reference system.

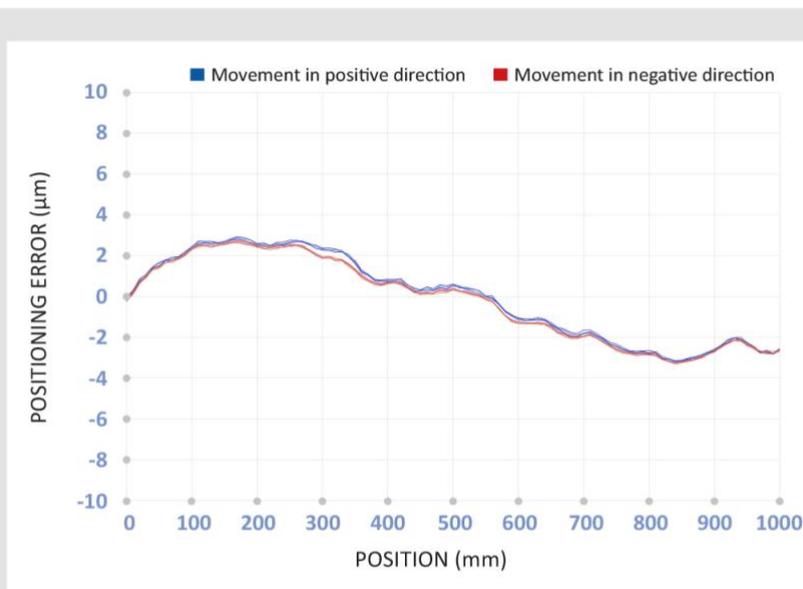
## Interpolation - SDE



SDE (sub-division error) graph: accuracy of the interpolation device within the single grating pitch.

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## Repeatability



Repeatability graph obtained by carrying out the measurements several times in both directions of advancement.

- Unidirectional repeatability: measurement error detected without inverting the movement direction of the encoder.
- Hysteresis: difference in the measure due to the inversion of the encoder movement direction.

The graphs show tests carried out in a metrological room under controlled climatic conditions:  $T = 20 \text{ °C} \pm 0.1 \text{ °C}$  and  $R.H. = 45 \div 55\%$ . The reference system for the comparison of position measurements is interferometric with 1 nm resolution and equipped with an environmental compensation device.



GVS 808 is supplied with a Fixed Expansion Point (FEP) positioned in the middle (standard). On request it is possible to supply scales with FEP positionable on the left (LT) or on the right (RT). Based on the application, the customer can determine the linear thermal expansion direction, so as to maximize the machining accuracy and repeatability even in the presence of significant temperature changes.

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## Ordering Code

**Model**      **GVS 808** - **M1A** - **3240** - **V** - **M1** - **M04/S** - **CY3** - - -

### Scale type, resolution

**M1**      = 1  $\mu\text{m}$   
**M01**     = 0.1  $\mu\text{m}$   
**M001**   = 0.01  $\mu\text{m}$   
**M0001** = 0.001  $\mu\text{m}$   
**A**        = absolute

### Measuring length [mm]

**3.240** = max. measuring length

### Power supply

**V**        = 5 Vdc

### Output signals

**M1**      = MITSUBISHI High-Speed

### Cable length, cable type

**Mnn**     = length in m  
**M04**     = 4 m (standard)  
**M30**     = 50 m  
**S**        = PUR cable

### Connector, wiring

**CY3**     = MITSUBISHI Full-Duplex connector

### FEP (fixed expansion point)

No cod. = central FEP (standard)  
**SLT**     = selectable FEP

### Special, pressurization

No cod. = standard  
**SPnn**   = special nn  
**PR**     = pressurized

Without prior notice, the products may be subject to modifications that the Manufacturer reserves to introduce as deemed necessary for their improvement.