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 ± 2 µm
- 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

MITSUBISHI ELECTRIC
Changes for the Better

Technical Characteristics

Measuring support Grating pitch Linear thermal expansion coefficient	Glass scale 20 µm 8 x 10^{-6} °C^{-1} 
Serial interface	MITSUBISHI High-Speed (2.5 Mbps – Full-Duplex)
Resolution absolute measure	1 - 0.1 – 0.01 - 0.001 µm
Accuracy grade	± 5 µm * standard version ± 3 µm * high-accuracy version (± 2 µm for measuring length up to 640 mm)
Interpolation error (SDE)	± 70 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 m/s^2 in measuring direction
Required moving force	≤ 2.5 N
Vibration resistance (EN60068-2-6)	100 m/ s^2 [55 ÷ 2000 Hz]
Shock resistance (EN60068-2-27)	150 m/s^2 [11 ms]
Protection class (EN 60529)	IP 54 standard, IP 64 pressurized
Operating temperature	0 °C ÷ 50 °C
Storage temperature	-20 °C ÷ 70 °C
Relative humidity	20 % ÷ 80 % (not condensed)
Reading block sliding	by ball bearings ◎
Power supply	5 VDC ± 10 %
Current consumption	255 mA max. (with R = 120 Ω)
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 ±X µm 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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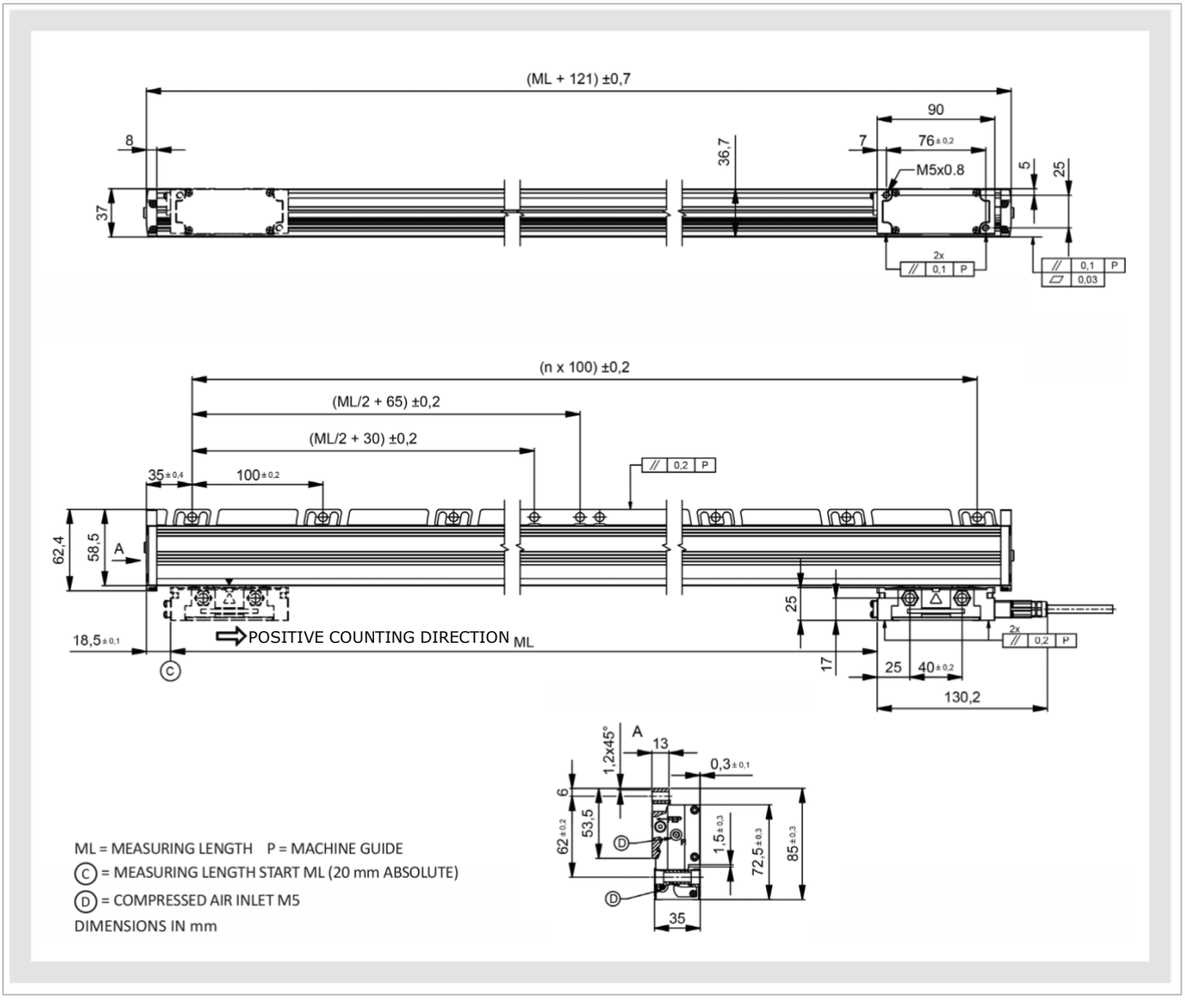
Mechanical Characteristics

- 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

Dimensions



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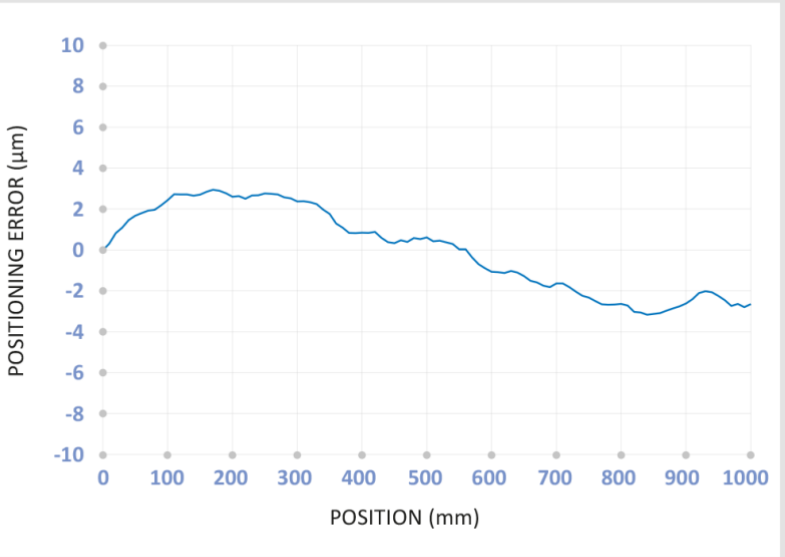
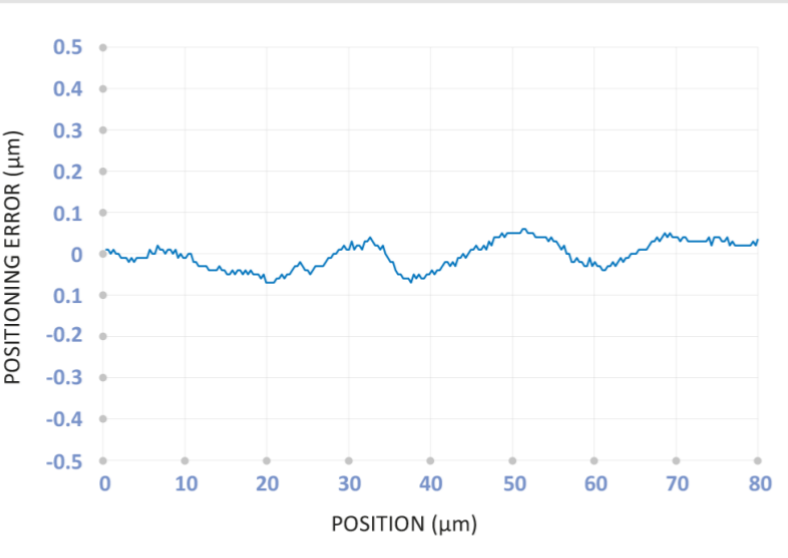
Accuracy



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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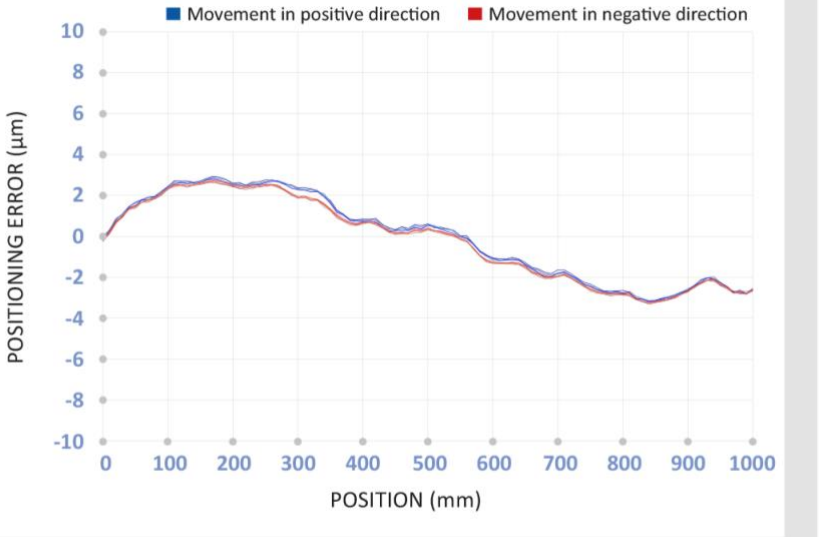
Repeatability



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 °C ± 0.1 °C and R.H.= 45 ÷ 55%. The reference system for the comparison of position measurements is interferometric with 1 nm resolution and equipped with an environmental compensation device.

INNOVATIVE SYSTEM FEP
FixedExpansionPoint

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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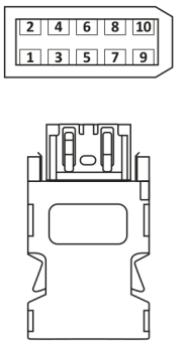
Electrical Characteristics

PIN	Signal	Color	Connector
1	5 V	Brown	
2	0 V	White	
3	MR	Green	
4	MRR	Yellow	
5	-	-	
6	-	-	
7	MD	Pink	
8	MDD	Grey	
9	-	-	
Body	SCH	Shield	PIN side

- 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, ∅ = 6,2 mm
- 4 m standard lenght

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

The cable is provided with CY3 (MITSUBISHI Full-Duplex) connector, with the following connection scheme. Avoid locating the cable next to any device that may cause electromagnetic interferences (motors, solenoid valves, inverters). If interferences are detected, act directly on the source of disturb using EMC filters.
If cable extensions are needed, it is necessary to use shielded cables with a section of at least 0.5 mm^2 for power supply and 0.25 mm^2 for signals. Ensuring a minimum power supply of 5 V to the transducer, the maximum cable length can be extended to 50 m.
In case of cable extension, it is necessary to guarantee:
- the electrical connection between the body of the connectors and the cables shield
- a minimum power supply voltage of 5 V to the transducer

Alarm Conditions

Alarm BIT	MITSUBISHI – Alarm description
A0 (LSB)	**Analog signal error.** This alarm is activated if the amplitude of the analog signals is not within the specifications (too low or too high)
A1	**Phase error.** This alarm is activated if there is no coherency between the interpolation phase and the analog phase
A2	Not implemented
A3	Not implemented
A4	Not implemented
A5	Not implemented
A6	Not implemented
A7	Not implemented

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Ordering Code

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

Scale type, resolution
M1 = 1 µm
M01 = 0.1 µm
M001 = 0.01 µm
M001 = 0.001 µm
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.

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