# ABSOLUTE LINEAR ENCODER GVS 808 T

SSI - BiSS C INTERFACE

TECHNICAL DATASHEET 1/4

code **ST02** | project **A70** | release **C**


SSI BiSS INTERFACE

## GENERAL FEATURES

- Absolute optical encoder with glass measuring support, SSI - BiSS C (unidirectional) 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 the 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.
- Option: 1 Vpp analog signal.

| Cod. GVS 808 | T |
|---|---|
| **Measuring support**<br>- Grating pitch<br>- Linear thermal expansion coefficient | glass scale<br>20 µm P<br>8 x $10^{-6}$ °$C^{-1}$ |
| **Incremental signal** | sine wave 1 Vpp (optional) |
| **Resolution 1 Vpp** | up to 0.01 µm * |
| **Serial interface** | SSI - BiSS C (unidirectional) |
| **Resolution absolute measure** | 1 - 0.1 - 0.05 - 0.01 - 0.0025 - 0.001 µm |
| **Accuracy grade** | ± 5 µm ** standard version<br>± 3 µm ** high-accuracy version (± 2 µm for ML 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, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240, 2440, 2640, 2840, 3040, 3240$_{MAX}$ |
| **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/s² in measuring direction |
| **Required moving force** | ≤ 2.5 N |
| **Vibration resistance (EN 60068-2-6)** | 100 m/s² [55 ÷ 2000 Hz] |
| **Shock resistance (EN 60068-2-27)** | 150 m/s² [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 (serial + analog output) 70 m (serial output) **** |
| **Electrical connections** | see related table |
| **Connector** | on the transducer, with adjustable output |
| **Electrical protections** | inversion of polarity and short circuits |
| **Weight** | 0.55 kg + 2.8 kg/m |

* Depending on CNC division factor.
** 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.

## MECHANICAL CHARACTERISTICS

- Rugged and heavy **PROFILE** of considerable section, made of anodized aluminum. Dimensions 36.7x58.5 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.

## ELECTRICAL CHARACTERISTICS

- Connector on the transducer, easily disconnectable in case of need.
- Reading device with an infra-red light emitter and receiving photodiodes.
- Option: A and B 1 Vpp output signals with phase displacement of 90° (electrical).
- Serial protocol SSI - BiSS C (unidirectional).
- CABLE:
  - Shielded twisted pair for analog signals (1 Vpp).
  - PUR cable with low friction coefficient, resistant to oil and suitable for continuous movements.

SERIAL + ANALOG OUTPUT VERSION
- 10-wire shielded cable ø = 6.2 mm, PUR external sheath.
- Conductors section: power supply 0.30 mm²; signals 0.10 mm².

**The cable's bending radius should not be lower than 80 mm.**

SERIAL OUTPUT VERSION
- 6-wire shielded cable ø = 6.2 mm, PUR external sheath.
- Conductors section: power supply 0.35 mm²; signals 0.25 mm².

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

| SIGNALS | CONDUCTOR COLOR |
|---|---|
| + V | Brown |
| 0 V | White |
| CK | Green |
| $\overline{CK}$ | Yellow |
| D | Pink |
| $\overline{D}$ | Grey |
| SCH | Shield |

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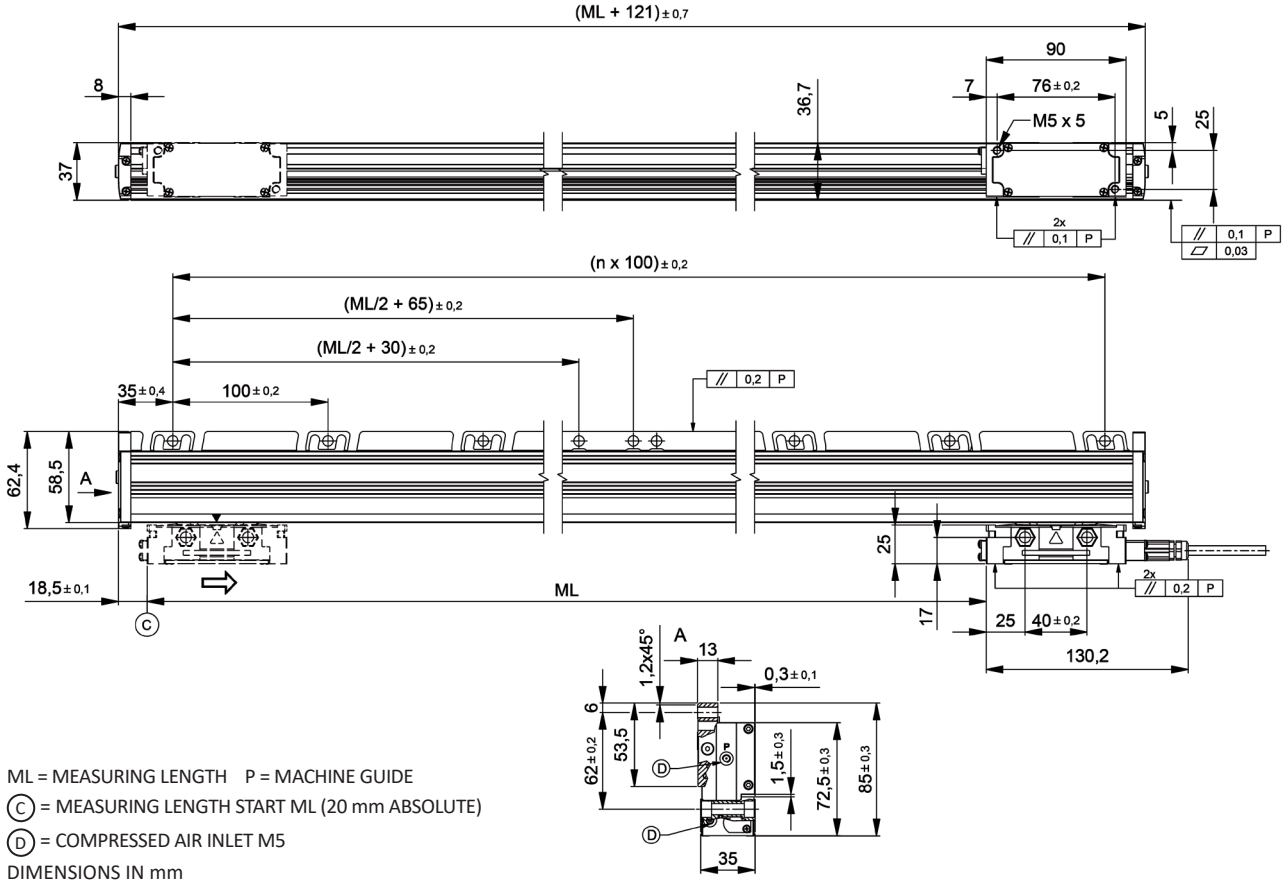
## DIMENSIONS




ML = MEASURING LENGTH P = MACHINE GUIDE

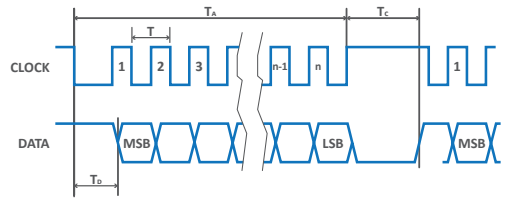
Ⓒ = MEASURING LENGTH START ML (20 mm ABSOLUTE)

Ⓓ = COMPRESSED AIR INLET M5

DIMENSIONS IN mm

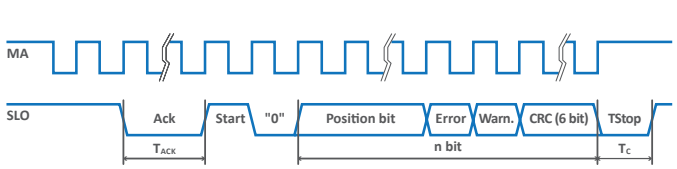
## OUTPUT SIGNALS

### SSI Version



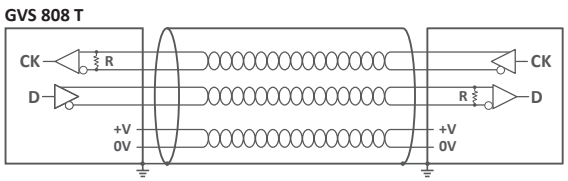

| | |
|---|---|
| **Interface** | SSI Binary – Gray |
| **Signals level** | EIA RS 422 |
| **Clock frequency** | 0.1 ÷ 1.2 MHz Duty cycle 50% ± 10% |
| **n** | 26 bit (resolution 1 - 0.1 µm)<br>30 bit (resolution 0.05 - 0.01 - 0.0025 - 0.001 µm) |
| **$T_C$** | max. 15 µs at 100 KHz |
| **$T_D$** | max. 7 µs |

### BiSS C (unidirectional) Version




| | |
|---|---|
| **Interface** | BiSS C unidirectional |
| **Signals level** | EIA RS 485 / RS 422 |
| **Clock frequency** | 0.5 ÷ 5 MHz Duty cycle 50% ± 10% |
| **n** | 26 + 2 + 6 bit (resolution 1 - 0.1 µm)<br>32 + 2 + 6 bit (resolution 0.05 - 0.01 - 0.0025 - 0.001 µm) |
| **$T_C$** | max. 20 µs |
| **$T_{Ack}$** | 2 Clock |

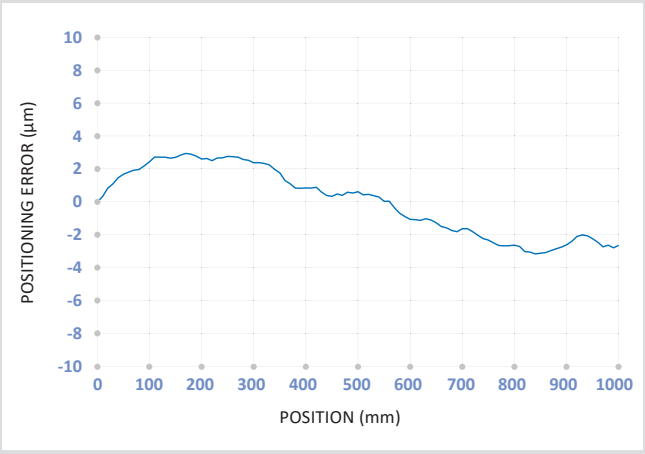
## CABLE




In case of cable extension, it is necessary to guarantee:

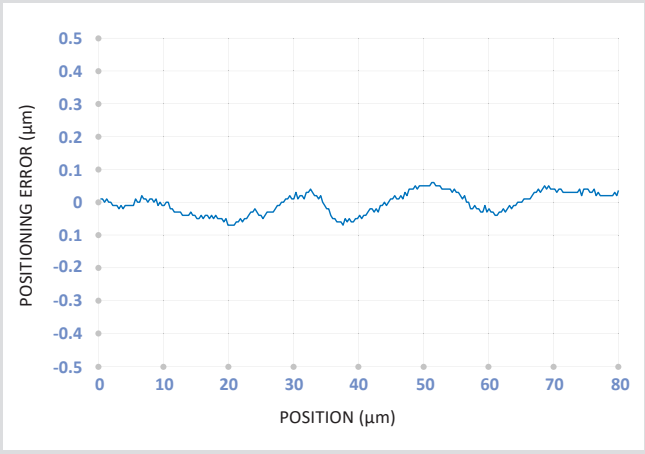
- the electrical connection between the body of the connectors and the cables shield;
- a minimum power supply voltage of 5 V to the transducer.

## ACCURACY



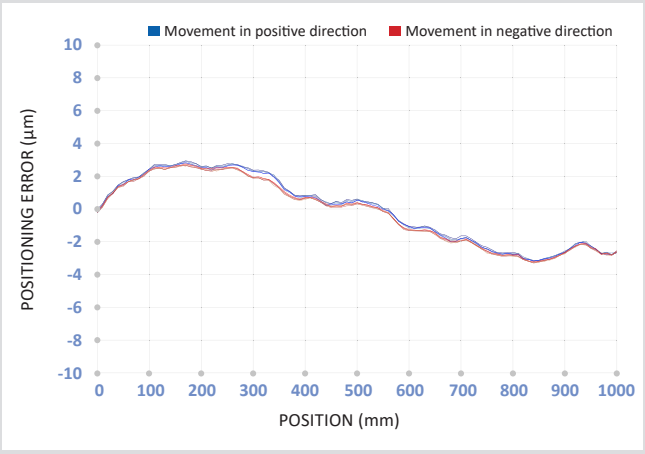

Accuracy graph: deviation between the value measured by the encoder and the value measured by the reference system.

## INTERPOLATION - SDE




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

## 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 encoders 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.

## ORDERING CODE

Example LINEAR ENCODER **GVS 808 T1A 03240 05V S1 V M04/S CG8 SLT PR**

| Model | Encoder type, resolution | Measuring length | Power supply | Output signals | Incremental signal | Cable length, cable type | Connector, wiring | FEP (Fixed Expansion Point) | Special, pressurization |
|---|---|---|---|---|---|---|---|---|---|
| GVS 808 | T1 = 1 µm<br>T01 = 0.1 µm<br>T005 = 0.05 µm<br>T001 = 0.01 µm<br>T00025 = 0.0025 µm<br>T0001 = 0.001 µm<br>A = absolute | Measuring length in mm<br>03240 = ML$_{MAX}$ | 05V = 5 V | S1 = SSI binary<br>S2 = SSI binary+even parity<br>S3 = SSI binary+odd parity<br>S4 = SSI binary+error<br>S5 = SSI binary+even parity+error<br>S6 = SSI binary+odd parity+error<br>S7 = SSI Gray<br>B1 = BiSS binary | V = + 1 Vpp<br>No cod. = no increm. signal | Mnn = length in m<br>M04 = 4 m (standard)<br>M50 = 50 m<br>S = PUR cable | Cnn = progressive<br>SC = without connector | No cod. = central FEP (standard)<br>SLT = selectable FEP | No cod. = standard<br>SPnn = special nn<br>PR = pressurized |



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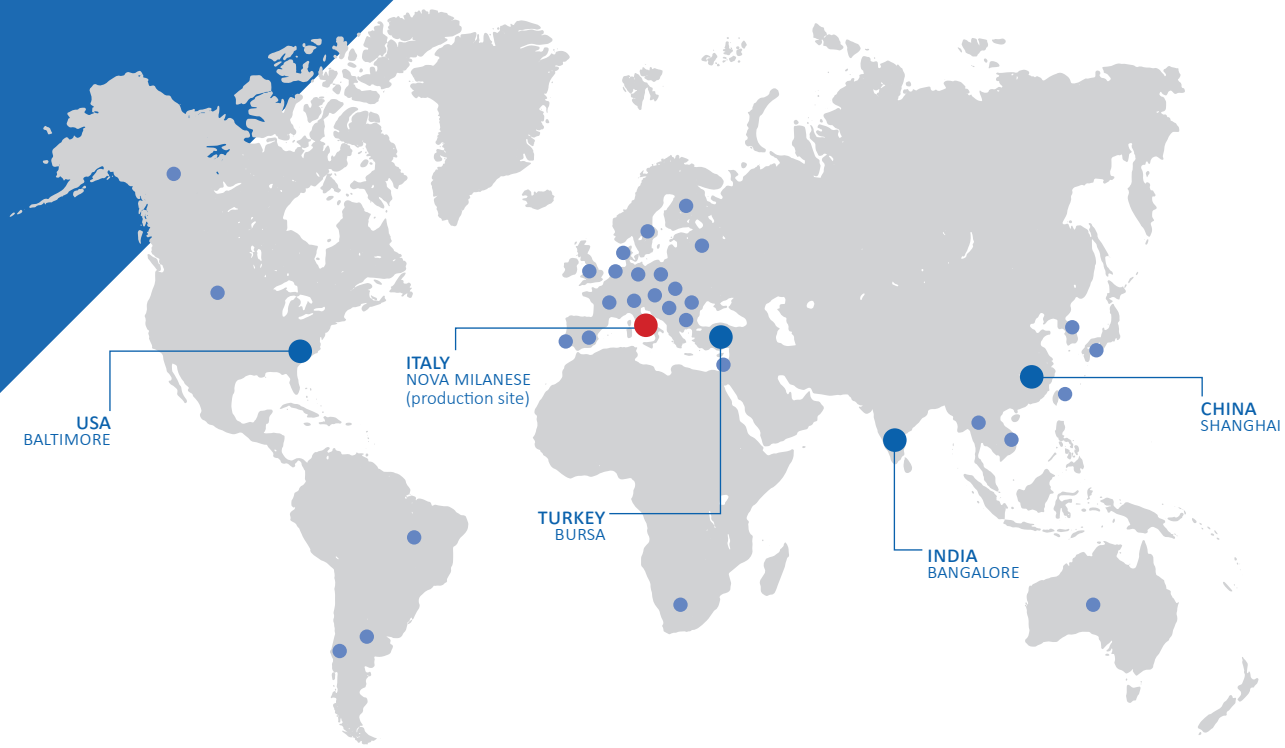


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