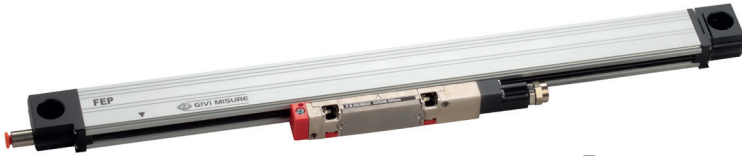


code **ST02** | project **A77** | release **C**

## GENERAL FEATURES

- Absolute optical scale with glass measuring support, SSI - BiSS C (unidirectional) interface.
- Resolutions up to 10 nm. Accuracy grade up to  $\pm 2 \mu\text{m}$ .
- Central fixed expansion point (FEP). On request positioned on the right (RT) or on the left (LT), for a linear expansion consistent with the type of application.
- Direct reading of absolute measure.
- Small size, to allow installation in narrow spaces.
- Connector on the transducer.
- Pressurization from both sides of the scale or from the transducer.
- Option: 1 Vpp analog signal.

### Cod. GVS 508

T

Measuring support	glass scale	
- Grating pitch	20 $\mu\text{m}$	
- Linear thermal expansion coefficient	$8 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$	
Incremental signal	sine wave 1 Vpp (optional)	
Resolution 1 Vpp	up to 0.01 $\mu\text{m}$ *	
Serial interface	SSI - BiSS C (unidirectional)	
Resolution absolute measure	1 - 0.1 - 0.05 - 0.01 $\mu\text{m}$	
Accuracy grade	$\pm 5 \mu\text{m}$ ** standard version $\pm 3 \mu\text{m}$ ** high-accuracy version ( $\pm 2 \mu\text{m}$ for ML up to 670 mm)	
Interpolation error (SDE)	$\pm 50 \text{ nm}$ ***	
Hysteresis	90 nm ***	
Measuring length ML in mm	70, 120, 170, 220, 270, 320, 370, 420, 470, 520, 570, 620, 670, 720, 770, 820, 920, 1020, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040 <sub>MAX</sub> ****	
Max. traversing speed	180 m/min	
Max. acceleration	50 m/s <sup>2</sup> in measuring direction	
Required moving force	$\leq 2.5 \text{ N}$	
Vibration resistance (EN 60068-2-6)	100 m/s <sup>2</sup> [55 ÷ 2000 Hz]	
Shock resistance (EN 60068-2-27)	150 m/s <sup>2</sup> [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	250 mA <sub>MAX</sub> (with R = 120 $\Omega$ )	
Max. cable length	50 m (serial + analog output) 70 m (serial output) *****	
Electrical connections	see related table	
Connector	on the transducer	
Electrical protections	inversion of polarity and short circuits	
Weight	225 g + 610 g/m	

\* Depending on CNC division factor.

\*\* 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.

\*\*\*\* For measuring lengths higher than 1340 mm it is necessary to use the supporting bar (optional for lower measuring lengths).

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

## MECHANICAL CHARACTERISTICS

- **PROFILE** made of anodized aluminum. Dimensions 32.2x18 mm.
- **SPRING SYSTEM** for misalignment compensation and self-correction of mechanical hysteresis.
- Non-extendible **SEALING LIPS**, along the sliding side of the reader head.
- 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).
- **SUPPORTING BAR** for measuring lengths higher than 1340 mm (optional for lower measuring lengths).
- **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  $\varnothing = 6.2 \text{ mm}$ , PUR external sheath.
- Conductors section:  
power supply 0.30 mm<sup>2</sup>;  
signals 0.10 mm<sup>2</sup>.

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

### SERIAL OUTPUT VERSION

- 6-wire shielded cable  $\varnothing = 6.2 \text{ mm}$ , PUR external sheath.
- Conductors section:  
power supply 0.35 mm<sup>2</sup>;  
signals 0.25 mm<sup>2</sup>.

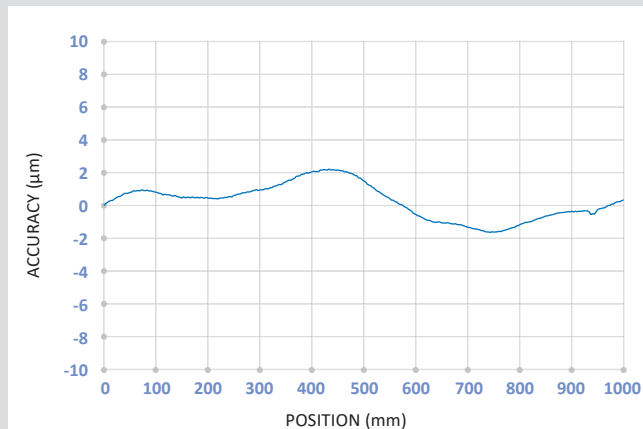
**The cable's bending radius should not be lower than 70 mm.**

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



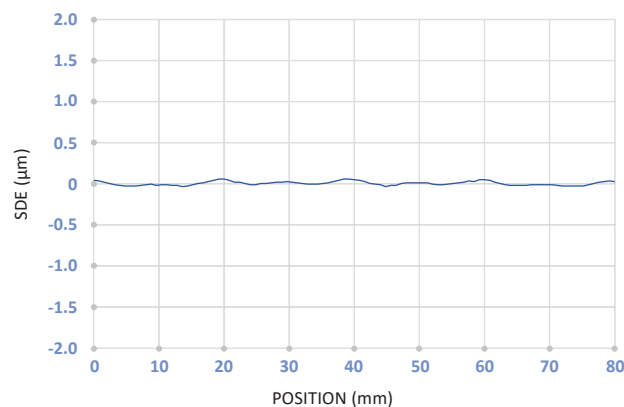
code **ST02** | project **A77** | release **C**

## ACCURACY



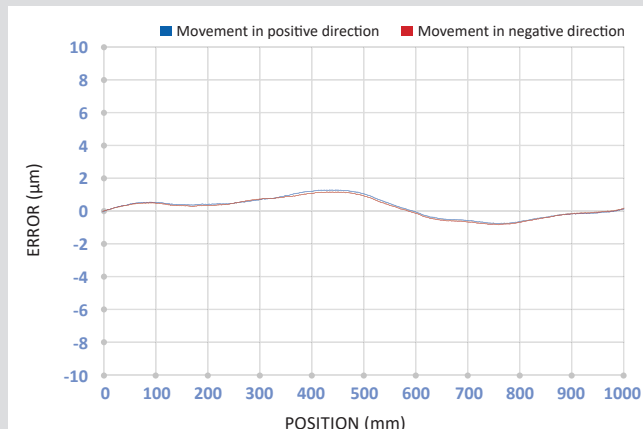
Accuracy graph: deviation between the value measured by the encoder and the value measured by the reference system.

## 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:  $T = 20\text{ °C} \pm 0.1\text{ °C}$  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.

## INNOVATIVE SYSTEM FEP

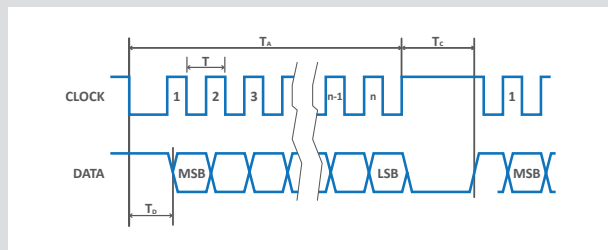
FixedExpansionPoint

GVS 508 is supplied with a Fixed Expansion Point (FEP) positioned in the middle (standard), 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. In case of a lateral FEP, the scale is provided with a special elastic end cap on the opposite side, that leaves the scale free to expand in the predetermined correct direction. Also in case of mounting with supporting bar, it is possible to determine the central or lateral position of the FEP through its specifically-designed elastic fixing.

code **ST02** | project **A77** | release **C**

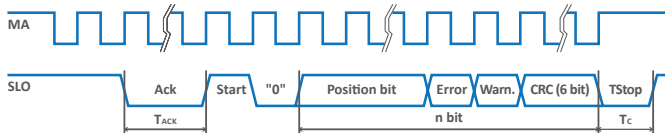
## OUTPUT SIGNALS

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 (res. 1 - 0.1 µm) 30 bit (res. 0.05 - 0.01 µm)
Tc	max. 15 µs at 100 KHz
Td	max. 7 µs

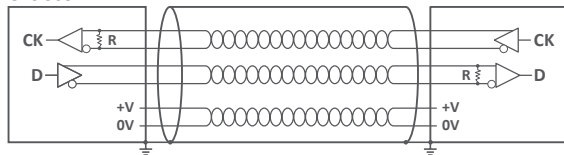
BiSS C (unidirectional) Version



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 (res. 1 - 0.1 µm) 32 + 2 + 6 bit (res. 0.05 - 0.01 µm)
Tc	max. 20 µs
TAck	2 Clock

## CABLE

GVS 508 T



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.

## ORDERING CODE

Example OPTICAL SCALE **GVS 508 T1A 02040 05V S0 V M04/S CG8 LT PR**

Model	Scale type, resolution	Measuring length	Power supply	Output signals	Incremental signal	Cable length, cable type	Connector, wiring	FEP (fixed expansion point)	Special, pressurization
GVS 508	T1 = 1 µm T01 = 0.1 µm T005 = 0.05 µm T001 = 0.01 µm A = absolute	Measuring length in mm 2040 = ML <sub>MAX</sub>	05V = 5 V	S0 = SSI programmable S1 = SSI binary S2 = SSI binary+even parity S3 = SSI binary+odd parity S4 = SSI binary+error S5 = SSI binary+even parity+error S6 = SSI binary+odd parity+error S7 = SSI Gray B1 = BiSS binary	V = +1 Vpp No cod. = no increm. signal	Mnn = length in m M04 = 4 m (standard) M50 = 50 m S = PUR cable	Cnn = progressive SC = without connector	No cod. = central FEP (standard) RT = right FEP LT = left FEP	No cod. = standard SPnn = special nn PR = pressurized

## ORDERING CODE

Example SUPPORTING BAR **SB50 02040**

Model	GVS 508 Measuring length
SB 50	Measuring length in mm 2040 = ML <sub>MAX</sub>

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