ABSOLUTE OPTICAL SCALE GVS 508 T

SSI - BiSS C INTERFACE

TECHNICAL DATASHEET

code **ST02** | project **A77** | release **D**

GENERAL FEATURES

- Absolute optical scale with glass measuring support, SSI - BiSS C (unidirectional) interface.
- Resolutions up to 10 nm. Accuracy grade up to ± 2 µm.
- 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 the 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 - Grating pitch - Linear thermal expansion coefficient	glass scale 20 µm 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 µm
Accuracy grade	± 5 µm ** standard version ± 3 µm ** high-accuracy version (± 2 µm for ML up to 670 mm)
Interpolation error (SDE)	± 50 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_{MAX} ****
Max. traversing speed	180 m/min
Max. acceleration	50 m/s^2 in measuring direction
Required moving force	⍰ 2.5 N
Vibration resistance (EN 60068-2-6)	100 m/s^2 [55 ÷ 2000 Hz]
Shock resistance (EN 60068-2-27)	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	250 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
Electrical protections	inversion of polarity and short circuits
Weight	225 g + 610 g/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.
**** For measuring lengths higher than 1340 mm it is necessary to use the supporting bar or the intermediate fixing blocks (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** or **INTERMEDIATE FIXING BLOCKS** for measuring lengths higher than 1340 mm (optional for lower measuring lengths).

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 mm^2; signals 0.10 mm^2.

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 mm^2; signals 0.25 mm^2.

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

Megatron AG – Gewerbehaus Ergolz, Wölferstrasse 5 4414 Füllinsdorf
Telefon: +41 (0)55 617 00 88
E-Mail: sales@megatron.ch
www.megatron.ch

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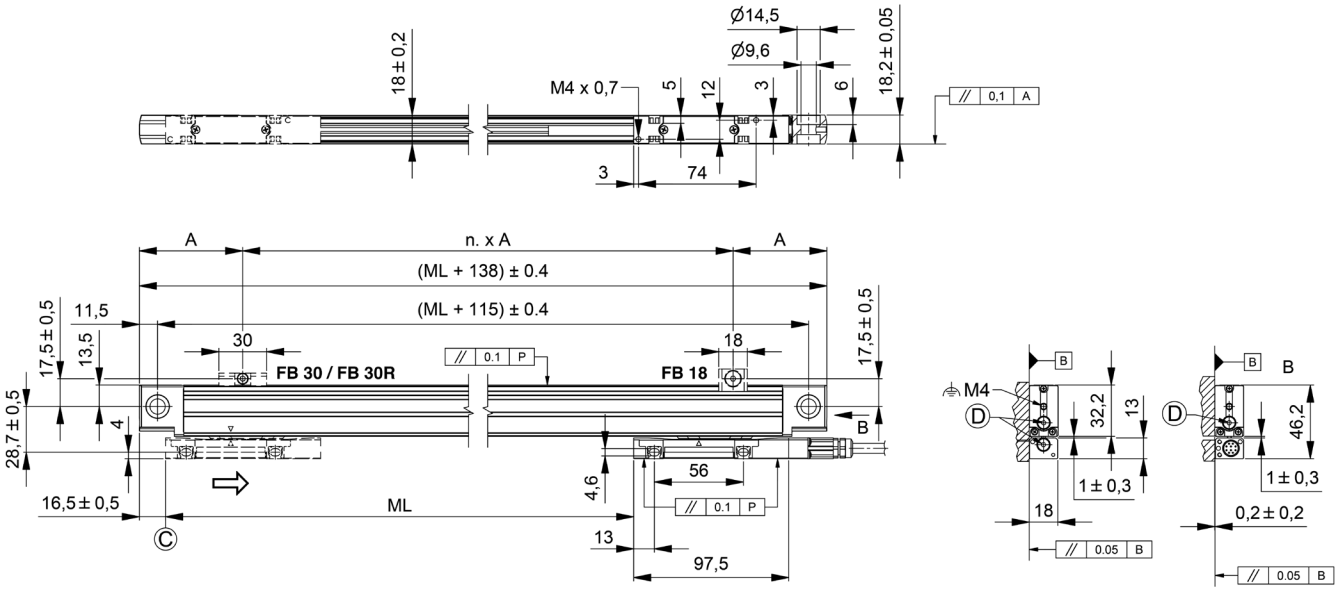
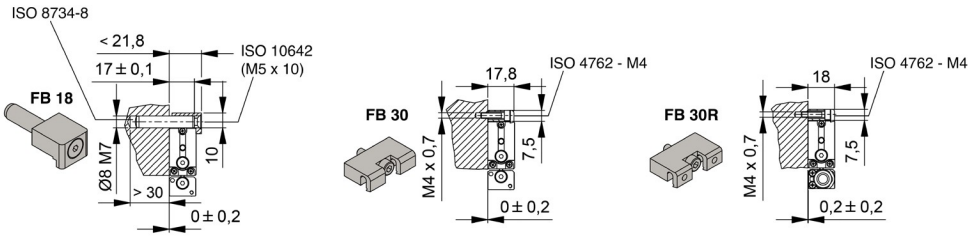
DIMENSIONS

STANDARD mounting

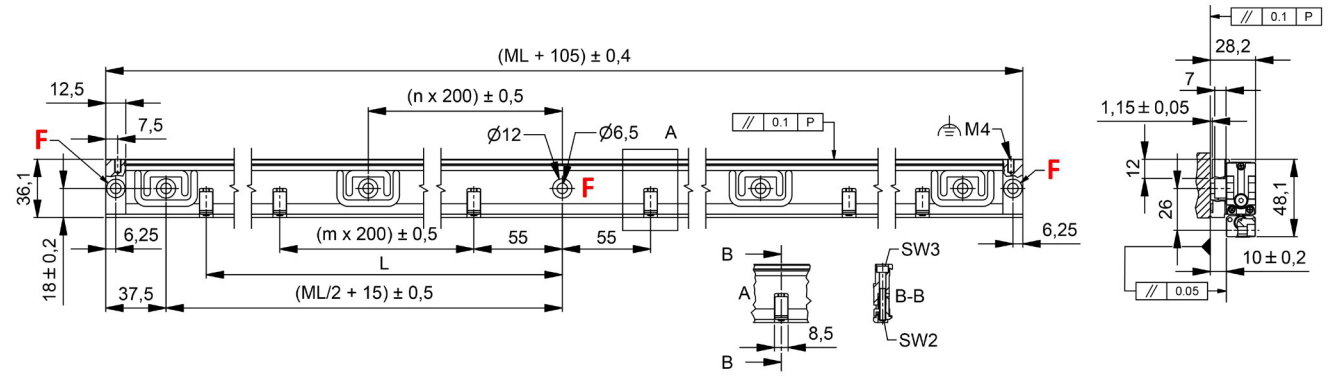


The intermediate fixing blocks FB 18 or FB 30 secure the scale to the machine and allow for its correct alignment.
If the scale is mounted with the cable exit on the left (visible rear side), it is necessary to use the FB 30R blocks.

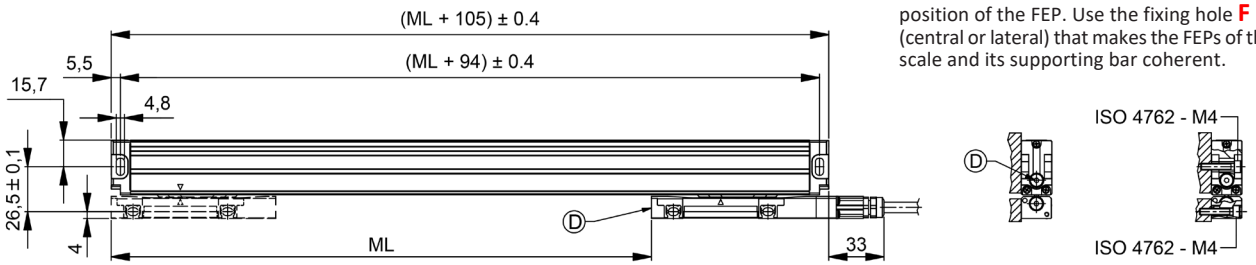


ML (mm)	N.	A
Up to 570	0	---
From 620 to 1240	2	(ML+138)/3
From 1340 to 1740	3	(ML+138)/4
From 1840 to 2040	4	(ML+138)/5

Mounting with SUPPORTING BAR



The supporting bar fixing determines the position of the FEP. Use the fixing hole **F** (central or lateral) that makes the FEPs of the scale and its supporting bar coherent.



ML = MEASURING LENGTH P = MACHINE GUIDE MEASURING LENGTH START ML (20 mm ABSOLUTE) COMPRESSED AIR INLET M5 DIMENSIONS IN mm

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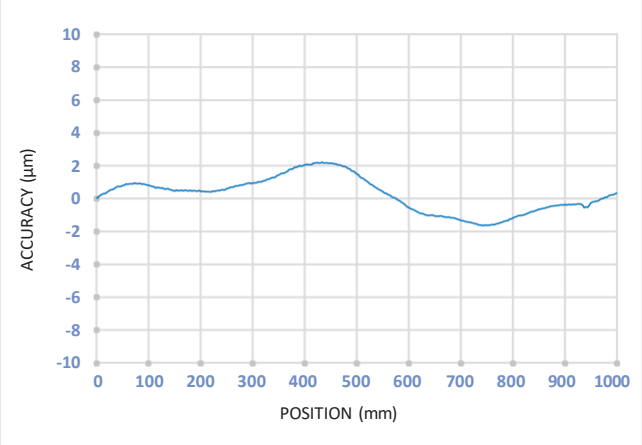
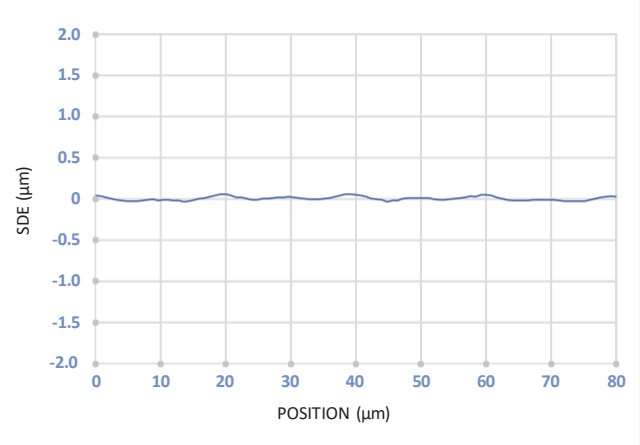
ACCURACY



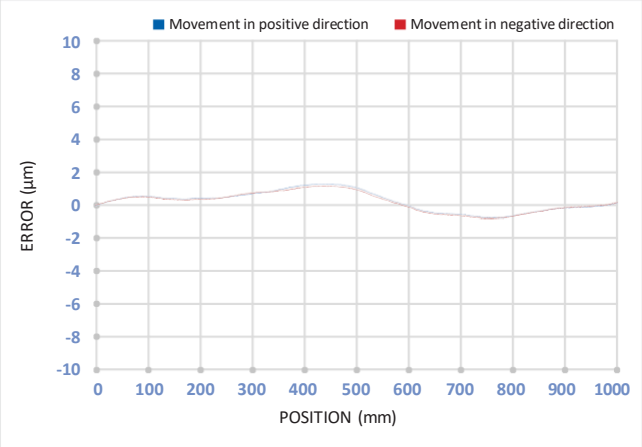
Accuracy graph: deviation between the value measured by the encoder and the value measured by the reference system.

INTERPOLATION - SDE



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

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.

INNOVATIV
SYSTE
FE
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.

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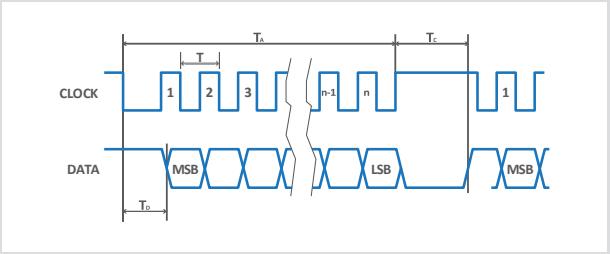
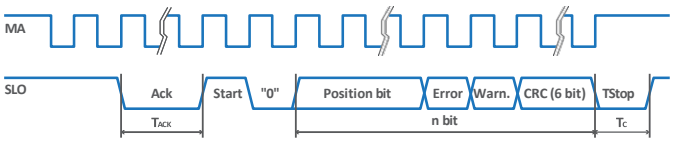
OUTPUT SIGNALS

SSI Version



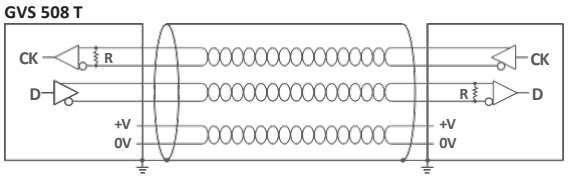
Interface	SSI Binary – Gray
Signals level	EIA RS 422
Clock frequency	0.1 ÷ 1.2 MHz Duty cycle 50% ± 10%
n	26 bit (res. 1 - 0.1 µm) 30 bit (res. 0.05 - 0.01 µm)
T_C	max. 15 µs at 100 KHz
T_D	max. 7 µs

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 (res. 1 - 0.1 µm) 32 + 2 + 6 bit (res. 0.05 - 0.01 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.

ORDERING CODE

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

Model	Scale type, resolution	Measuring length	End cap *	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 02040 = ML_{MAX}	No cod. = LP end cap (28 mm) SP = SP end cap (11.5 mm)	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

* GVS 508 scales are supplied as standard with LP (large profile) end caps, but they can be requested with SP (small profile) end caps based on the customer's needs.
In case of installation with supporting bar, it is necessary to use SP end caps.

ORDERING CODE

Example SUPPORTING BAR **SB 50 02040**

Model	GVS 508 measuring length
SB 50	Measuring length in mm 02040 = ML_{MAX}

Example INTERMEDIATE FIXING BLOCKS **FB 30**

Model
FB 18
FB 30
FB 30R

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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