General Features

Absolute optical scale with glass measuring support.

- High-speed SSI-BiSS C (unidirectional) serial interface.
- Resolutions up to 0.01 µm (BiSS).
- Accuracy grade up to ± 1 µm.
- Innovative device inside the scale for the disposal of liquids coming from inefficient filtering systems.
- Adjustable connecting cable output.
- Connector incorporated into the transducer.
- Direct reading of absolute measure.
- Small size, to allow installation in narrow spaces.
- Option: 1 Vpp analog signal.

Technical Characteristics

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 0.1 µm *
Serial interface	SSI-BiSS C (unidirectional)
Resolution absolute measure	1 - 0.1 - 0.01 µm **
Accuracy grade	±3 µm *** standard version ±1 µm *** high-accuracy version
Measuring length ML in mm	70, 120, 170, 220, 270, 320, 370, 420, 470, 520, 570, 620, 720, 770, 820, 920, 1020, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240, 2440, 2640, 2840, 3040, 3240 (max. Measuring length)
Max. traversing speed	120 m/min
Max. acceleration	30 m/s^2
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 ± 5%
Current consumption	340 mA max. (with R = 120 Ω)
Max. cable length	20 m ****
Electrical connections	see related table
Connector	inside the transducer
Electrical protections	inversion of polarity and short circuits
Weight	435 g + 1290 g/m (per m measuring length)

* Depending on CNC division factor.
** The resolution of 0.01 µm is available only with BiSS protocol.
*** The declared accuracy grade of ±X µm is referred to a measuring length of 1 m.
**** Ensuring a minimum power supply voltage of 5 V to the transducer, the maximum length can be extended to 50 m.

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Electrical Characteristics

Analog Output + Serial Output

GVS 608 T absolute optical scale is supplied with a 10-wire shielded cable, ∅ = 7.1 mm, PUR external sheath, with low friction coefficient, oil-resistant and suitable for continuous movements.
Inside the cable, a further shield for the twisted pair of the digital signals (SSI-BiSS) is present.
Conductors section:

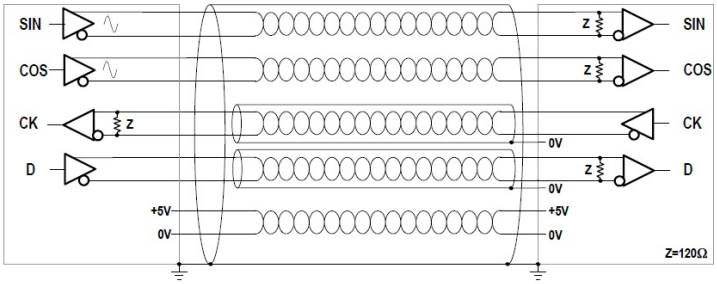
- power supply: 0.35 mm²
- signals: 0.10 mm²

Notice

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

Analog Output + Serial Output 10-wire cable

The following output signals are available:



Signal	Conductor Color
V+	red
V-	blue
A	green
$\overline{A}$	orange
B	white
$\overline{B}$	light-blue
CK	brown
$\overline{CK}$	yellow
D	pink
$\overline{D}$	grey
SCH	shield

Serial Output

GVS 608 T absolute optical scale is supplied with a 6-wire shielded cable, ∅ = 7 mm, PUR external sheath, with low friction coefficient, oil-resistant and suitable for continuous movements.
Conductors section:

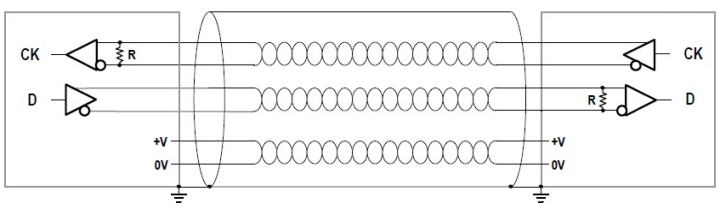
- power supply: 0.25 mm²
- signals: 0.25 mm²

Notice

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

Serial Output 6-wire cable

The following output signals are available:



Signal	Conductor Color
V+	brown
V-	white
CK	green
$\overline{CK}$	yellow
D	pink
$\overline{D}$	grey
SCH	shield

Complying to DIN 47100.

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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.

The cable capacity should be: C ≤90 – 100 pF/m.

SSI

Cable length	≤10 m	≤20 m	≤50 m	
Clock frequency	1.2 MHz	0.4 MHz	0.2 MHz	

BiSS

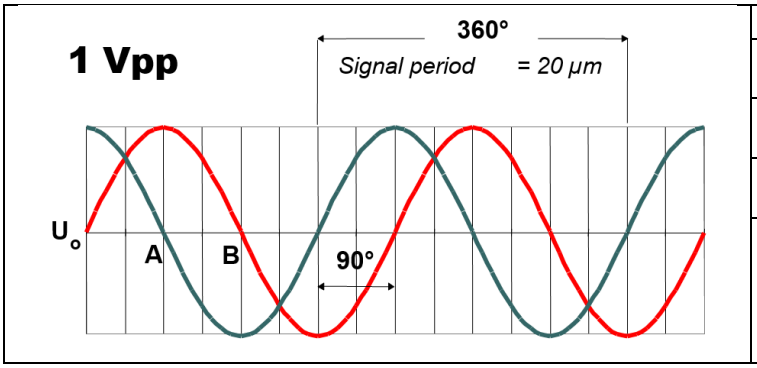
Cable length	≤2 m	≤10 m	≤20 m	≤50 m
Clock frequency	8 MHz	4 MHz	1 MHz	0.4 MHz

The scale is supplied with a standard 4-m long cable, suitable for continuous movements, but longer lengths can be required. Ensuring a minimum power supply of 5 V to the transducer, the maximum cable length can be extended to 50 m.

Notice
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

Output Signals

1 Vpp Incremental signals version:



Signals	A, $\overline{A}$, B, $\overline{B}$
Signals amplitude	0.8 Vpp ÷ 1.2 Vpp typical 1 Vpp
Reference voltage U_0	≈ 2.3 V
A and B phase displacement	90° ± 10° electrical
Max, frequency (at 2 m/s)	100 kHz

Signals amplitude is referred to differential measurement on 120 Ω impedance with power supply voltage to the transducer of 5 V ± 5%.

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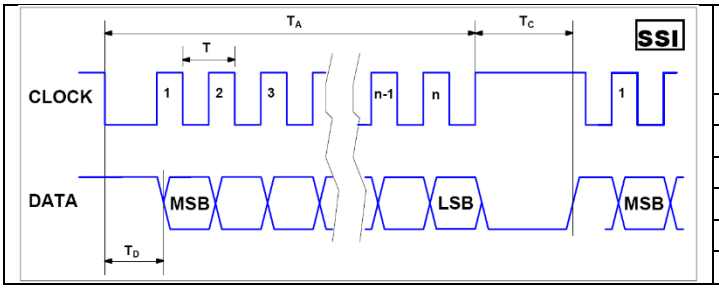
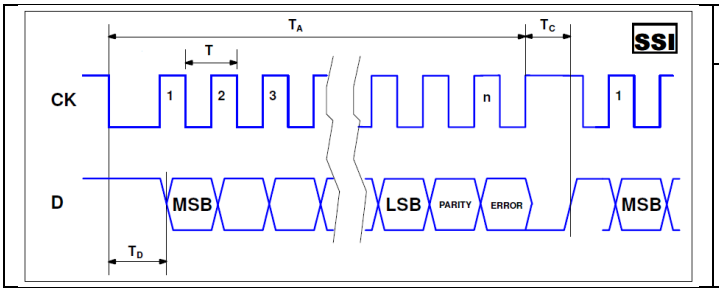
Serial signals SSI version:

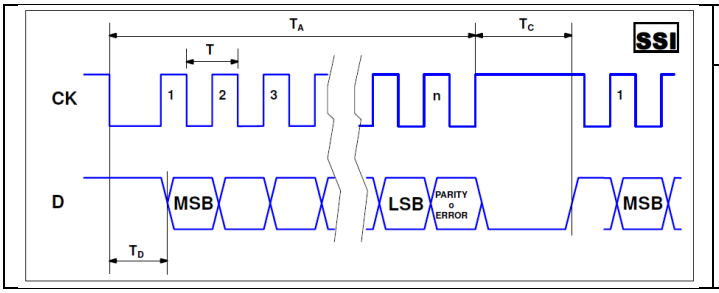


Interface	SSI (Synchronous Serial Interface) Binary - Gray
Signals level	EIA RS 422
Clock frequency	0.1 + 1.2 MHz*
n	26 bit
T_A	Clock sequence (Tx26)
T_C	max. 25 µs
T_0	max. 7 µs

* The maximum frequency is guaranteed with a cable length up to 10 m.



Interface	SSI (Synchronous Serial Interface) Binary
n	Position bit + Parity + Error



Interface	SSI (Synchronous Serial Interface) Binary
n	Position bit + Parity
	Position bit + Error

Parameters for SSI Protocol

Position bit
The value is transmitted with sign at 26 bit.

Optional bit
Parity: an additional bit for odd parity or even parity is transmitted
Error: it signals an error in reading the absolute position
- Error bit = 1 absolute position ok
- Error bit = 0 absolute position wrong

Code
The code used for the transmission of the position is in binary or Gray format.

In case the Gray format is used, it is not possible to have the optional bit in the transmitted frame.

Refresh time
At the end of **T_c** period, the sensor provides a new position.
If a new position is not required, the sensor refreshes its position every 25 µs.

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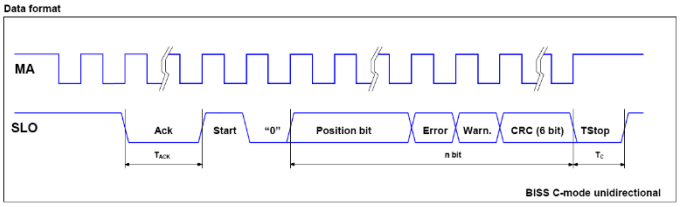
SSI timeout
In case of error/interruption of the serial line, the sensor goes back in the "ready" status after a period of 1600 µs.

Position error condition
In case of wrong absolute position, the status of the error bit, if enabled, is at 0 and a position value equal to 0 is transmitted. If the error bit is not enabled, the sensor will force the D signal low.

BiSS-C (unidirectional) version:



Interface	BiSS-C unidirectional
Signals level	EIA RS 485 / RS 422
Clock frequency	0.1 + 8 MHz*
n	26 + 2 + 6 bit (resolution 1 - 0.1 µm) 32 + 2 + 6 bit (resolution 0.01 µm)
T_C	max. 5 µs
T_{ACK}	max. 22 µs (resolution 1 - 0.1 µm) max. 20 µs (resolution 0.01 µm)

* The maximum frequency is guaranteed with a cable length up to 2 m.

Parameters for BiSS-C (unidirectional) Protocol

Position bit
The value is transmitted with sign at 26 bit (for resolution 1 - 0.1 µm) or at 32 bit (for resolution 0.01 µm).

Error: it signals an error in the absolute position reading.
- Error bit = 1 absolute position ok
- Error bit = 0 absolute position wrong

Warning
It signals a reading difficulty
- Warning bit = 1 reading ok
- Warning bit = 0 difficulty in reading

Refresh time
At the end of Tc period, the scale provides a new position.

BiSS timeout
In case of error/interruption of the serial line, the scale goes back in the "ready" status after a period of 1600 µs.

CRC6 polynomial
CRC at 6 bit inverted, with polynomial 0x43, MSB as first bit of the frame.

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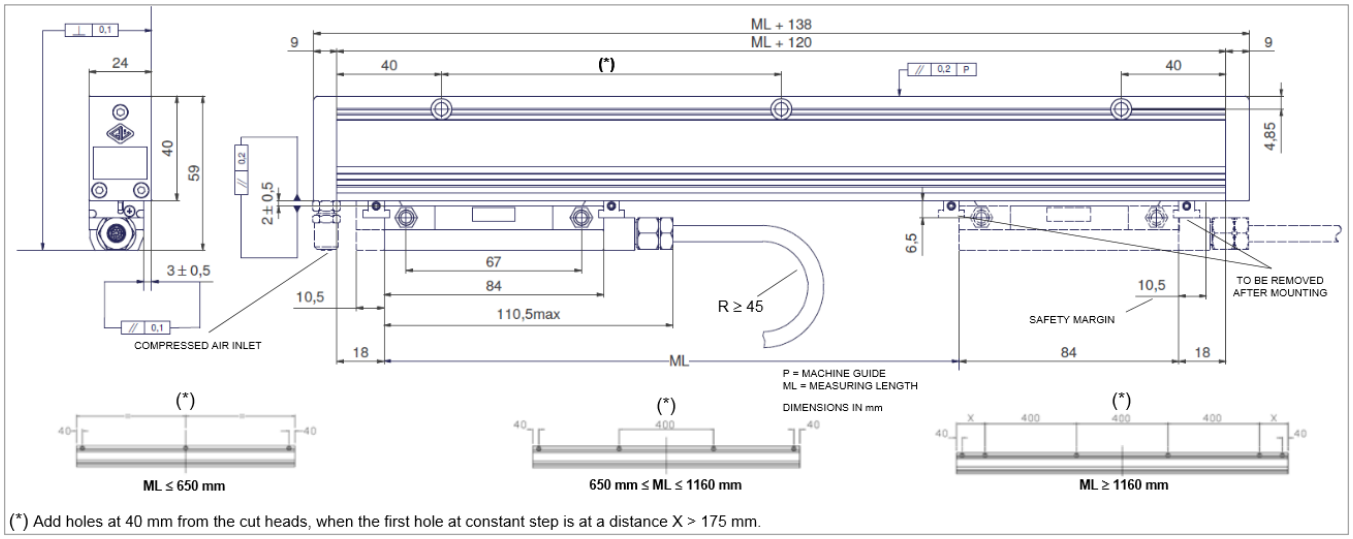
Mechanical Characteristics

- Rugged and heavy PROFILE made of anodized aluminum.
- Dimensions 40 x 24 mm.
- Elastic COUPLING for misalignment compensation and self-correction of mechanical hysteresis. Backlash error <0.2 µm.
- Non-extendible SEALING LIPS along the sliding side of the reader head, fixed at the lateral ends.
- 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.
- Possibility of direct service.

Dimensions



(*) Add holes at 40 mm from the cut heads, when the first hole at constant step is at a distance X > 175 mm.

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Ordering Code

Type	GVS 608	-	T1A	-	03240	-	05V	-	S0	-	V	-	M04/S	-	CG8	-	PR

Resolution
T1 = 1 µm
T01 = 0,1 µm
A = absolute

Measuring length [mm]
03240 = 3240 mm
30040 = 30040 mm (max. Measuring length)

Power supply
05V = 5 VDC

Output signal
S0 = SSI programmable
S1 = SSI binary
S2 = binary + even parity
S3 = binary + odd parity
S4 = SSI binary + error
S5 = SSI binary + even parity + error
S6 = SSI binary + odd parity + error
S7 = SSI gray
B1 = BiSS-C binary

Incremental signal
V = + 1 Vpp
X = no incremental signal

Cable length
Mxx = length in meter
M04 = 4 m (standard)
50 = 50 m

Cable type
R = 6-wire cable (only serial)
S = 10-wire cable (serial and analog)

Connector
CG8 = CG8 connector (standard)
SC = without connector, open cable end

Option
X = no specifications (standard)
SPxx = special version (on request)
PR = pressurized

Manufacturer: GIVI MISURE

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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