Guided Magnetic Absolute Length Measuring System
**General Information:** The GSA2 is a guided magnetic absolute length measuring system. The system consists of a guide carriage with integrated sensor and a guide rail with the magnetic tape. Different lengths of up to one meter are available. GSA has a resolution of 1.0 μm. The repeat accuracy is +/- 1 increment. The length measuring system GSA2 was developed for dynamic applications with travelling speeds of 2m/s (static) or 4m/s (dynamic), especially in regard to metal working. The sensor head is guided along the magnetic tape contact-free. Thanks to direct measurement, tolerances such as slip and pitch error are compensated.

**Functional principle:** A line of hall sensors and a magnetoresistive resistance bridge element are guided along a magnetic tape encoded with an absolute track and a fine interpolation track. The absolute track and the sensor line deliver an absolute value, and the fine interpolation track and the interpolation electronics provide the high resolution of the measuring system.

The fine interpolation track consists of north and south poles alternating every 1 mm, and which are scanned by resistance bridges. The sensor line delivers the absolute value. It consists of single hall sensors which scan the code consisting of north and south poles.

**Important Features:**
- Absolute measurement
- Contact-free measurement
- Robust, dirt- and shock resistant
- Measuring length up to 1 meter
- Resolution 1.0 μm
- Changes in the position are detected even without power—no referencing necessary
- Optionally, incremental square wave signals (A, B) and sine-cosine-signals (1 Vss) for dynamic movement control

**Measuring Principle of the Magnetic Tape:**

Two-track system (fine interpolation track on top / absolute track below)

![Magnetic Tape Diagram](image-url)

**Pin Assignment:**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Function RS422</th>
<th>Option SSI</th>
<th>Option CAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>white</td>
<td>0 V</td>
<td>0 V</td>
<td>0 V (GND)</td>
</tr>
<tr>
<td>brown</td>
<td>+ 24 V</td>
<td>+ 24 V</td>
<td>+ 24 VDC</td>
</tr>
<tr>
<td>orange</td>
<td>TX -</td>
<td>SSI / TX Data inv.</td>
<td>CAN low</td>
</tr>
<tr>
<td>yellow</td>
<td>TX</td>
<td>SSI / TX Data</td>
<td>CAN high</td>
</tr>
<tr>
<td>violet</td>
<td></td>
<td>SSI / CLK Clock inv.</td>
<td></td>
</tr>
<tr>
<td>green</td>
<td></td>
<td>SSI / CLK Clock</td>
<td>-</td>
</tr>
<tr>
<td>grey</td>
<td>A channel (with Option I)</td>
<td>reserved for tests</td>
<td>-</td>
</tr>
<tr>
<td>black</td>
<td>B channel (with Option I)</td>
<td>reserved for tests</td>
<td>-</td>
</tr>
<tr>
<td>shielding</td>
<td>PE</td>
<td>PE</td>
<td>PE</td>
</tr>
</tbody>
</table>
Technical Data:

**Mechanical Data**
- **Measuring principle**: Absolute
- **Repeat accuracy**: +/- 1 Increment
- **System accuracy in μm at 20 °C**: +/- (10 + 20 x L) (L = measuring length in meters)
- **Pole pitch**: 1 mm
- **Housing material guide carriage**: Steel
- **Dimensions guide carriage**: L x W x H: 110mm x 54mm x 24mm
- **Required magnetic tape**: AB20-10-2-R.C15
- **Max. measuring length**: 1 m
- **Connection**: Open cable ends
- **Weight**: approx. 620 g with measuring length of 330 mm

**Ambient Conditions**
- **Storage temperature**: -25… +85 °C
- **Operation temperature**: -10… +70 °C (-25… +85 °C) on request
- **Protection class IP64 (sensor head)**

**Electrical Data**
- **Supply voltage**: 10… 30 VDC +/- 10 %
- **Ripple**: 10 - 30 V: < 10 %
- **Current consumption**: max. 150 mA
- **Interfaces**: SSI, CANopen, CAN BASIC ELGO, RS422
- **Resolution**: 1.0 μm
- **Max. travelling speed**: 1 m/s with permanent absolute position scanning, 10 m/s with SC10 scanning, 4m/s with square wave 5V
- **Sensor cable**: 1.5 m standard cable length, others on request, drag chain compliant

**Order Designation:**
For orders, please use the following order designation:

**Example:**

GSA2- 00 - 01.5 - 2 - 0220 - SB0 - 0 - X - X
A A - B B . B - C - D D D D - E E E - F - G - H

GSA2 ELGO standard, signal cable length 1.5 m, resolution 1.0 μm, SSI interface, measuring length 220 mm and without connector

**A**  SN number
00  ELGO standard
01  first special version
02  second special version

**B**  Signal cable length in XX . X m
01.5  1.5 m standard cable length

**C**  Resolution
9  1.0 μm

**D**  Measuring length in XXXX mm
E.g. 0220 = 220 mm
Max. 1 meter (1000 mm)

**E**  Interface
- **SB0**: SSI interface (25 Bit binary code)
- **SG0**: SSI interface (25 Bit Gray code)
- **CA0**: CANopen (DS406)
- **CN0**: CAN BASIC ELGO
- **420**: RS422

**F**  Bit rate
0  9600 Bit/s - standard bit rate with RS232 (230) and 422 (420/A20)
1  19200 Bit/s with RS232 or RS422
2  38400 Bit/s with RS232 or RS422
3  125000 Bit/s with CAN
4  250000 Bit/s with CAN
5  500000 Bit/s with CAN
6  1000000 Bit/s with CAN

**G**  Device address
0.. F (standard setting: device address 0)

**H**  Connector
X  no connector

**NOTE!**
The mechanical load limits given in the user manual must not be exceeded!
**SSI Interface:**

**Functional principle:** If the clock is not interrupted for the time $T_m - T/2$ (emission of another 25 periods), the shifting register clocks out the same data value again (error detection in evaluation).

Some encoders have a Power Failure Bit (PFB):

In GSA2, the PFB s always „low“.

**Read-out of Data (2 times with 25 clocks)**

**Dimensions:**