

# Operation Manual

## SERIES GS-I

Guided Magnetic Incremental Length Measuring System, Suitable for Press Brakes



- Cost-effective alternative to glass scales
- High-quality guiding system
- Max. resolution of 0,00122 mm (at 4 - times edge triggered)
- Power supply / signal 5 V or 10-30 V
- Inverted signals
- Reference pulse
- Measuring length up to 1 Meter
- Compact sensor with integrated translation unit
- Speed proportional square wave outputs
- Robust, dirt and shock resistant

<b>1</b>	<b>General</b> .....	<b>3</b>
1.1	Information Operation Manual.....	3
1.2	Explanation of Symbols.....	3
1.3	Statement of Warranties.....	4
1.4	Demounting and Disposal.....	4
<b>2</b>	<b>Product Features</b> .....	<b>5</b>
2.1	Functional Principle.....	5
<b>3</b>	<b>Safety</b> .....	<b>6</b>
3.1	General Cause of Risks.....	6
3.2	Personal Protective Equipment.....	6
3.3	Conventional Use.....	6
<b>4</b>	<b>Technical Data</b> .....	<b>7</b>
4.1	Technical Data Sensor.....	7
4.2	Technical Data Rail.....	8
4.3	Technical Data Accessories.....	8
4.4	Dimensions GS-I.....	9
<b>5</b>	<b>Transport and Storage</b> .....	<b>10</b>
5.1	Safety Instructions for Transport, Unpacking and Loading.....	10
5.2	Handling of Packaging Material.....	10
5.3	Check of Transport.....	10
5.4	Storage.....	10
<b>6</b>	<b>Installation / Commissioning</b> .....	<b>11</b>
6.1	Pin Assignment Standard Version.....	11
6.2	Pin Assignment Circular Connector M16, 8-pin.....	11
6.3	Impulse Diagram.....	12
<b>7</b>	<b>Operation</b> .....	<b>13</b>
<b>8</b>	<b>Interference</b> .....	<b>14</b>
8.1	Security.....	14
8.2	Electrical Interference Suppression.....	14
8.3	Restart after Fault Clearance.....	15
<b>9</b>	<b>Maintenance</b> .....	<b>15</b>
<b>10</b>	<b>Type Designation GS-I</b> .....	<b>16</b>
<b>11</b>	<b>Index</b> .....	<b>17</b>
<b>12</b>	<b>Document History</b> .....	<b>17</b>

# 1 General

## 1.1 Information Operation Manual

The manual contains important information regarding the handling of the indicator.  
For your own safety please note all safety warnings and instructions.

Precondition for safe operation is the compliance with the specified safety and handling instructions.  
Moreover, observe the existing local accident prevention regulation and general safety rules.

Please read the operation manual carefully before starting to work. The manual should be kept accessible at anytime. The illustrations in the manual are for better representation of the facts they are not necessarily to scale and can be slightly different to the actual construction.

## 1.2 Explanation of Symbols

Warning notices are characterised by symbols in the operation manual.  
The notes will be introduced by signal words to express the magnitude of the danger.

Follow these advices in order to avoid accidents and injuries to persons and property.

Warning notices:

	<p><b>DANGER!</b> This symbol in connection with the signal word „Danger“ indicates an immediate danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.</p>
	<p><b>WARNING!</b> This symbol in connection with the signal word „Warning“ indicates a possible danger to the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.</p>
	<p><b>ATTENTION!</b> This symbol in connection with the signal word „Caution“ indicates a possibly dangerous situation. Failure to heed these instructions can lead to minor injury or property damage.</p>

Specific safety instructions:

	<p><b>DANGER!</b> ...marks perilous situations by electricity. By non-observance of the safety instructions the possibilities of death or severe injuries exist. The operations have to be carried out only by an electrician.</p>
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**Tips and recommendations:****NOTE!**

Here you can see highlights, useful tips, information and recommendations for efficient and trouble-free operation.

### 1.3 Statement of Warranties

The warranty conditions are in a separate document in the sales documents.

**Guarantee**

The producer guarantees the functional capability of the process engineering and the selected parameter. The period of warranty is one year and begins with the date of delivery. The warranty (1 year) is beginning with the date of purchase.

### 1.4 Demounting and Disposal

Unless otherwise authorized, dispose the item considering the safety and environmental instructions.

**Before demounting**

- Disconnect the power supply
- Secure against re-start
- Disconnect supply lines physically and discharge remaining energy
- Dispose operating supplies with respect to the environment

**Disposal**

Recycle the decomposed elements:

- Collect metal scrap
- Electronic components in electronic scrap
- Recycle plastic parts
- Dispose the rest of the components according to their material consistence

**ATTENTION!**

Wrong disposal → damage caused to the environment!  
Electronic waste, electronic components, lubricants and operating supplies are liable to treatment of hazardous waste.  
Only approved specialized companies should perform disposal.



Local authorities and waste management facilities provide information about environmentally suitable disposal.

## 2 Product Features

- Cost-effective alternative to glass scales
- High-quality guiding system
- Max. resolution of 0,00122 mm (at 4 - times edge triggered)
- Power supply / signal 5 V or 10-30 V
- Inverted signals
- Reference pulse
- Measuring length up to 1 Meter
- Compact sensor with integrated translation unit
- Speed proportional square wave outputs
- Robust, dirt and shock resistant

\*depending on the offer

### 2.1 Functional Principle

GS-I is a guided magnetic incremental length measuring system.

GS-I consists of a sensor head, an integrated translation unit, a guiding body and a guiding rail with magnetic tape (series MB20-50-10-1-R). This guiding rail is available in all lengths up to one meter. The series GS-I operates with a resolution of 0,00122 mm at 4 - times edge triggering. The repeat accuracy is +/- 0,005 mm.

The length measuring system GS-I is conceived for dynamic applications up to 4 m/s operation speed and especial developed for press brakes. The translation unit calculates the sinusoidal signals into speed-proportional, 90 ° phase shifted square waves in 5 V/TTL- Line Driver or 10-30 V/HTL push-pull.

The sensor head is moved contactless over the magnetic tape with a distance of 2,0 mm. This will be assured through the mechanic guiding system. Thus, the system is totally maintenance free and free of wear. Due to a direct measuring, tolerances like slip or pitch are balanced.

## 3 Safety

### 3.1 General Cause of Risks

This chapter gives an overview about all important safety aspects to guarantee an optimal protection of employees.

Non-observance of the instructions mentioned in this operation manual can result in hazardous situations.

### 3.2 Personal Protective Equipment

Employees should wear protective clothing during installation of the device to minimize the risk of accidents. Change into protective clothing before beginning the work process. Also observe any labels in the operating area regarding protective clothing.

Protective clothing:



#### Safety working clothing is

- ... is close fitting
  - ... is tear proof
  - ... has tight sleeves without distant parts
- Also wear no rings, necklaces or other jewellery.**



#### Safety gloves

- ... for protecting the hands against abrasion and cuts.

### 3.3 Conventional Use

The ELGO length measuring system **GS-I** is for the limited purpose as described in this manual:



#### CAUTION!

Danger through non-conventional use!  
Non-intended use and non-observance of this operation manual can lead to dangerous situations.

Danger through non-conventional use!  
Non-intended use and non-observance of this operation manual can lead to dangerous situations.

Therefore:

- Use **GS-I** only as described
- Strictly follow this manual

Avoid in particular:

Remodelling, refitting or changing of the device or parts of it with the intention to alter functionality or scope of the device.

ELGO is not liable for any damages resulting from improper use of the product.  
The operator is liable for all damages during non-conventional use.

## 4 Technical Data

### 4.1 Technical Data Sensor

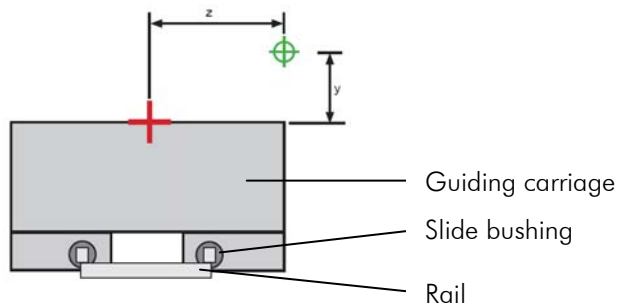
<b>Mechanical Data</b>	
Measuring principle	incremental
Repeat accuracy	+/- 0,005 mm (depending on order)
System accuracy in $\mu\text{m}$ at 20 °C	+/- (25 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	defined by guiding wagon
Pole length	5 mm
Sensor housing material	steel
Housing dimensions (guiding wagon)	L x B x H = 80 x 55 x 33 mm
Necessary magnetic tape	MB20-50-10-1-R
Max. measuring length	1 Meter
Cable connection	open cut outgoing cable head (option connector possible)
Weight	ca. 620 g for 330 mm measuring length
<b>Ambient Temperature</b>	
Stock temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP54 (sensor head)
<b>Electrical Data</b>	
Power supply	10... 30 VDC / 5 VDC, stabilised
Periodic and random deviation	10 - 30 V < 10% +/- (5V +/- 25 mV)
Current consumption	10...30 VDC: max. 50 mA 5 VDC: max. 100 mA for unstressed output signals
Output signals	A/B 90° phase offset +/- 20%
Output level	HTL 10... 30 VDC push/pull or 5 V TTL line driver
Resolution (4 edge triggering)	up to 0,00122 mm (depending on order)
Reference pulse	one-time, position adjustable by factory
Max. output frequency per channel	20 mA
Max. movement speed	4 m/s with 0,1 mm resolution
Sensor cable	1,5 m standard cable length, others on request, drag chain compliant

## 4.2 Technical Data Rail

Running distance in km	2000 km
Rails length	500 mm
Wear y-direction	0,02 mm
Wear z-direction	0,01 mm

### Example:

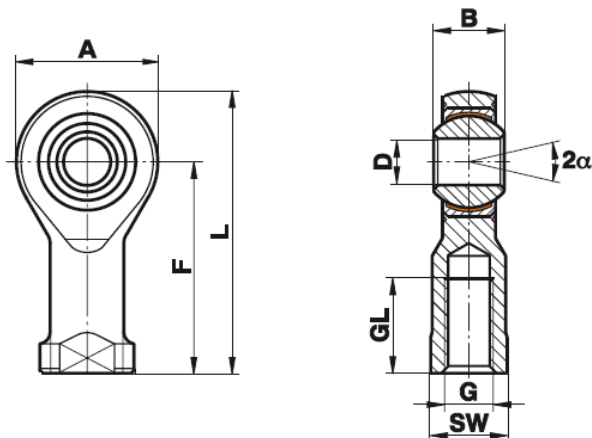
For 2000 km (4 Mio liftings) and a rail length of 500 mm there is a wear in z-direction 0,01 mm and in y-direction of 0,02 mm.



## 4.3 Technical Data Accessories

### Mounting kit GS-I-1-000-MK

1 x Thread bar M6x75	DIN 975
2 x Nut M6	DIN 934
2 x Washer A6,4	DIN 125
1 x Hexagon socket screw M6x25	DIN 912



### Dimensions Swivel Head:

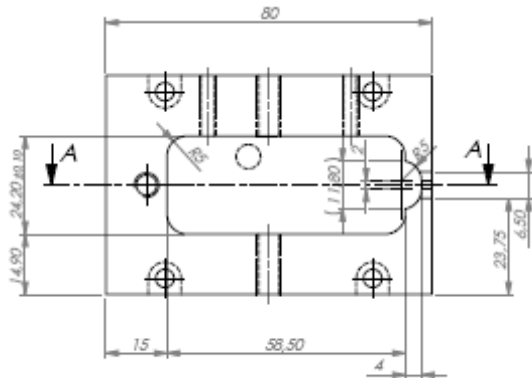
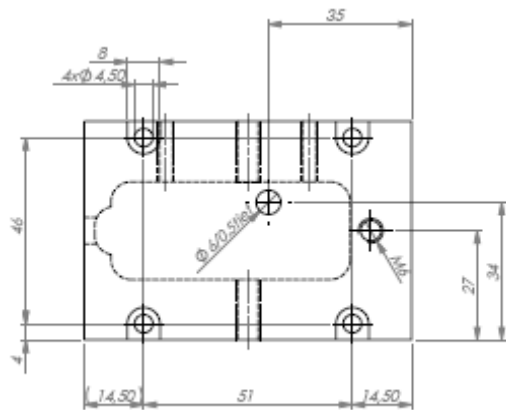
A = 20 mm  
F = 30 mm  
L = 40 mm

B = 9 mm  
D = 6 mm  
GL = 12 mm  
G = M6  
SW = 11 mm

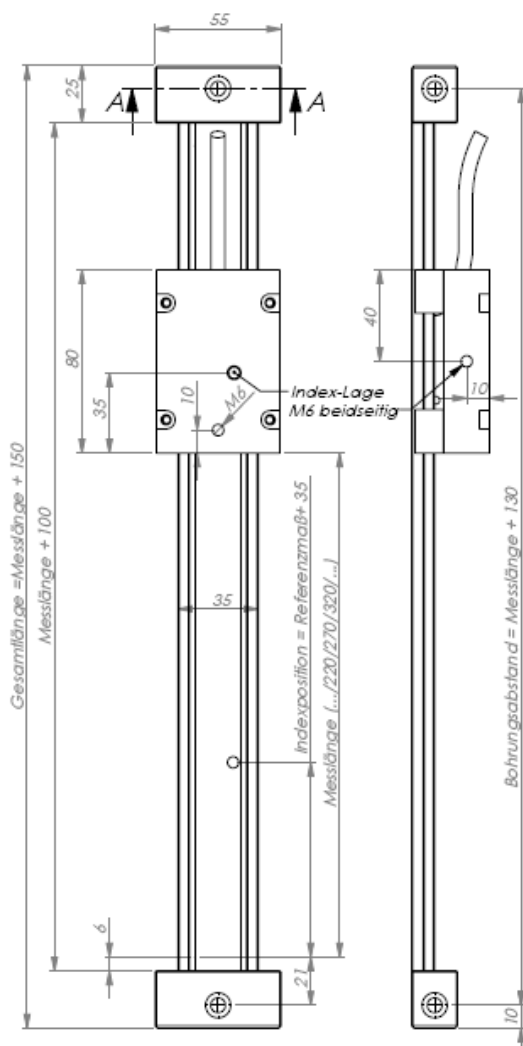


#### 4.4 Dimensions GS-I

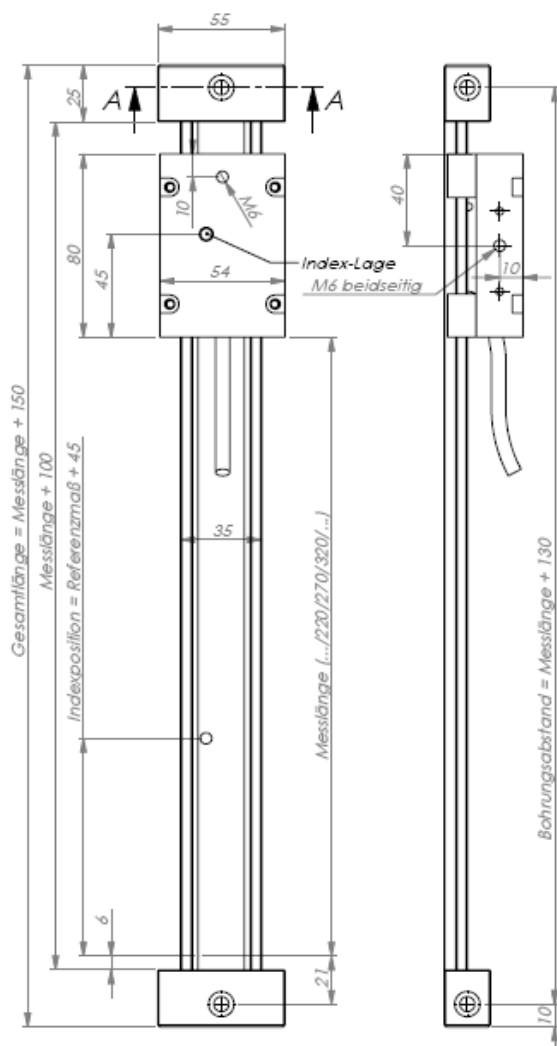
##### Guiding wagon



##### Guiding rail Example GS-I\_TB



##### Example GS-I\_BB



## 5 Transport and Storage

### 5.1 Safety Instructions for Transport, Unpacking and Loading

**ATTENTION!**

Professional transport only.  
Do not throw, hit or fold the package.

### 5.2 Handling of Packaging Material

Adverts for proper disposal refer to chapter demounting and disposal.

### 5.3 Check of Transport

Examine delivery immediately after receiving for completeness and transport damages.

In case of externally recognizable transport damages:

- Do not accept the delivery or do accept under reserve
- Note extent of damages on the transportation documents or on the delivery note
- File complaint immediately

**NOTE!**

Claim any damages you recognize as soon as possible. The claims for damage must be filed in the lawful reclaim periods.

### 5.4 Storage

Store device only under following conditions:

- Do not store outside
- Keep dry and dust-free
- Do not expose to aggressive media
- Protect from direct sun light
- Avoid mechanical shocks
- Storage temperature: -20°C up to +85°C
- Relative humidity: 80 % non-condensing
- Inspect packages regularly if stored for an extensive period of time (> 3 months)

## 6 Installation / Commissioning

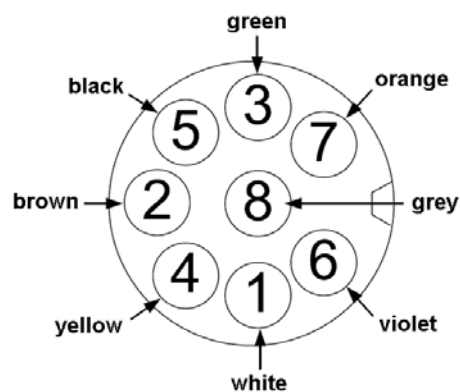
### 6.1 Pin Assignment Standard Version

en	cable end open Standard
Function	Colour
0 V (GND)	White
5 VDC/ 10... 30 VDC	Brown
Channel A	Green
Channel A'	Violet
Channel B	Yellow
Channel B'	Orange
Channel Z	Black
Channel Z'	Grey
Screen/Shielding	PE

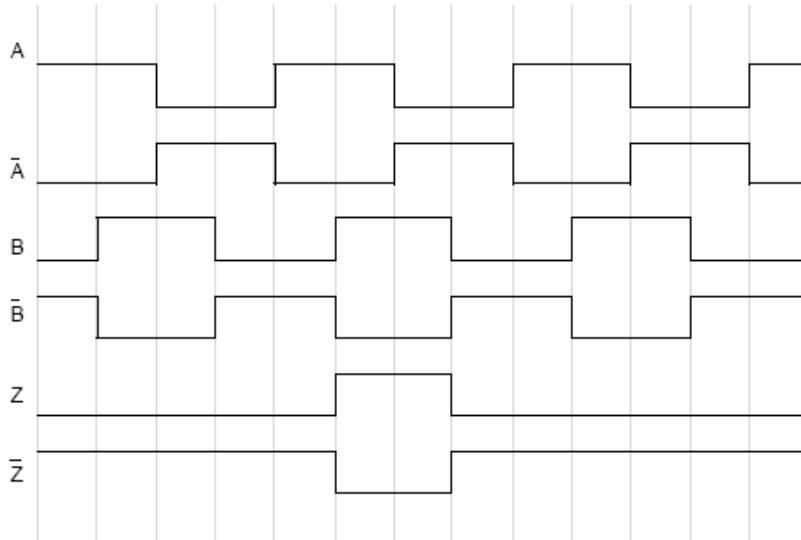
### 6.2 Pin Assignment Circular Connector M16, 8-pin

When using circular connector M16 the PIN assignment is as following:

	Circular connector M16
Function	Colour
0 V	1 White
+ Ub	2 Brown
Kanal A	3 Green
Kanal B	4 Yellow
Kanal Z	5 Black
Kanal A'	6 Violet
Kanal B'	7 Orange
Kanal Z'	8 Grey



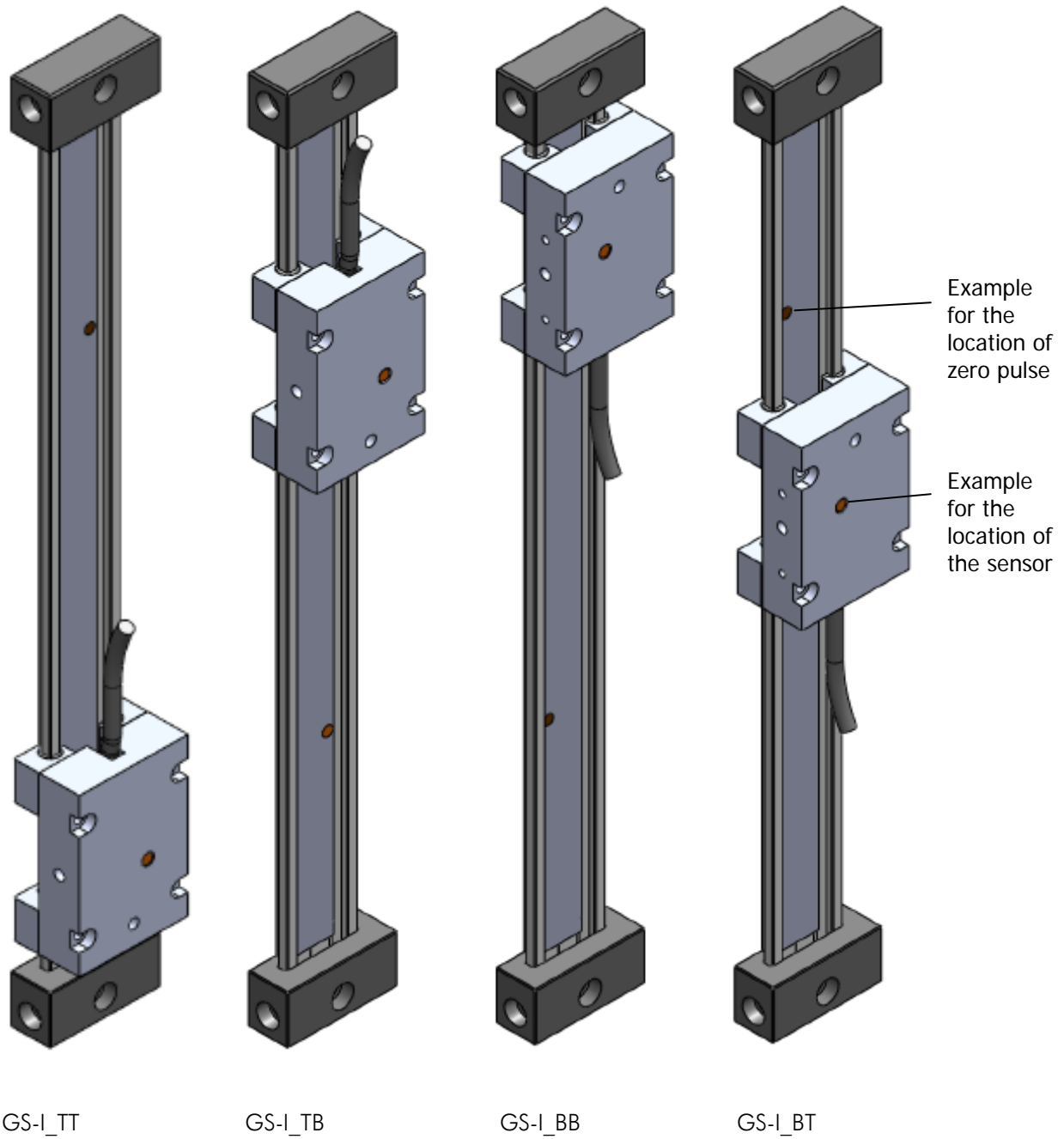
### 6.3 Impulse Diagram



The channels A and B are 90 ° phasing shifted

The output of the index impulse occurs according to the travelling distance (see type designation)

## 7 Operation



## 8 Interference

The following chapters describe possible causes for malfunction and the instructions to correct them. If you observe recurring errors you might consider electrical interference suppression measures as described in section 8. If errors cannot be corrected with the following instructions please contact the manufacturer (see last page).

### 8.1 Security

Basics:



**WARNING!**

**Risks of injury from improper fault clearances!**

Improper fault clearances can cause serious personal or property damage.

Therefore:

- Fault clearance may only be carried out by qualified and instructed personnel
- Prior to the beginning of work provide sufficient room to assemble the equipment
- Please look for cleanliness at the place of installation
- Loosely around laying parts and tools are sources of accidents

If components have to be replaced:

- Look for correct installation of spare parts
- All mounting elements have to be assembled correctly
- Before resetting please ensure that all covers and protective devices are installed correctly and function properly

### 8.2 Electrical Interference Suppression

The shield of signal output cable should only be connected one-way to the following electrical device. Signal wires should be installed separately from load power lines and with a safe distance of at least 0.5 m to capacitive and inductive interferences such as contactors, relays, motors, switching power supplies, timed controllers.

If interferences occur in spite of applying all above mentioned measures proceed as follows:

- Add RC elements over contactor coils of AC contactors (for example 0,1  $\mu$ F/100  $\Omega$ )
- Add recovery diodes over DC inductances
- Add RC elements over each drive phase (in connector box of the drive).
- Do not connect the GND potential with PE (earth potential)!

### **8.3 Restart after Fault Clearance**

After fault clearance:

1. Reset emergency stop switch.
2. Quit disturbance on the control system.
3. Make sure that no person is located in the danger zone.

Start operating as explained in chapter "Operation". The PE (shield) of the signal cable should be connected only at one side to the following electrical device. The signal output cable has to be installed separately from current conduction lines and from inductive and capacitive sources of interference as relays, motors, switching power supplies, controllers etc. a security distance of at least 0,5 m has to be observed.

## **9 Maintenance**

The device is maintenance-free.

## 10 Type Designation GS-I

For ordering please use the following reference code:

GS-I - AA - BB.B - C - DD - EEEE - FF - GGG

### A SN number

- 00 ELGO Standard
- 01 first special design
- 02 second special design

### B Signal cable length in XX . X m

- 01.5 1,5 m Standard length

### C Resolution

- 1 0,1 mm
- 2 0,01 mm
- 3 0,005 mm
- 4 0,5 mm
- 5 0,05 mm
- 6 0,0025 mm
- 8 0,00122 mm

### D Power supply / signal level

- 00 10-30 V DC / 10-30 V DC
- 01 10-30 V DC / 5 V-TTL
- 11 5 V DC / 5 V-TTL

### E Measuring length in XXXX mm

- Bsp. 0220 = 220 mm
- Max. 1 Meter (1000 mm)

### F Cable output / zero pulse position

- B Bottom
- T Top

#### Note:

1. Position explains cable output
2. Position explains zero pulse position (see drawing)

### G Index position

- 050 50 mm

Example:

GS-I - 00 - 01.5 - 1 - 00 - 0220 - BT - 050  
 AA - BB.B - C - DD - EEEE - FF - GGG

GS-I encoding to ELGO standard, signal cable length of 1,5 m, 0,1 mm resolution, power supply 10-30 VDC push/pull, 10-30 VDC signal level, measuring length 220 m, cable output placed below, zero pulse above and a index position of 50 mm.

Your order:

GS-I - AA - BB.B - C - DD - EEEE - FF - GGG



## 11 Index

<b>C</b>	
Circular connector M16 .....	11
Commissioning.....	11
Current consumption.....	7
<b>D</b>	
Demounting .....	4
Demounting and disposal .....	10
<b>E</b>	
Earth potential .....	14
<b>F</b>	
Fault clearance .....	15
<b>G</b>	
Guarantee .....	4, 6
<b>I</b>	
Impulse diagram .....	12
Interference .....	14
<b>M</b>	
Maintenance .....	15
Measuring principle .....	7, 8
<b>O</b>	
Output frequency.....	7
<b>P</b>	
Periodic and random deviation.....	7
Pin assignment.....	11
Pole length .....	7
Protective clothing.....	6
<b>R</b>	
Reference code .....	16
Repeat accuracy.....	5
Resolution .....	7
<b>S</b>	
Safety instructions .....	3
Sensor cable.....	7
<b>T</b>	
Temperature .....	7
Transport.....	10

## 12 Document History

Rev.	Date	Author	Changes
0	20.01.11	BB	Document translated

