

GEL 177 with position slide

The rugged linear scale GEL 177 - made of aluminium extruded profile - was conceived for the machine construction industry. The position sensing is performed contactless by means of permanent magnets of various designs.

- An open magnet is directly mounted to the moving machine part. It runs contactless over the profile housing.
- A position slide with magnets runs on profiled rails in the housing. It is connected to the moving machine part with a ball-shaped coupling.

This linear scale offers the user the following important advantages:

- a long service life due to the non-contacting and wearless measuring of position magnets
- direct, digital synchronous serial outputs (SSI) or analogue current or voltage output
- there is a homogeneous supply voltage of 24 V
- for lengths up to 5,000 mm
- resolution up to 5 μm (SSI)

Output signals

The absolute information on the travelled path is supplied either digitally or analogue. The digital transmission is performed in Gray-Code, so that a simple cabling is ensured and the transmission security rises. Various current/voltage outputs are available as analogue output signals.

Measuring principle

The tried and tested measuring principle was further improved. It is the running time of the torsion pulse that is measured and which is proportional to the distance between an internal start signal and a stop signal. The torsion emerges from the interaction of two magnetic fields under the position magnet. The running time is the absolute measure up to the position of the magnet and is transformed into a digital or analogue output signal.

Technical data

| sensor | analogue | SSI |
|---|--|--|
| sensor head | aluminium die casting | |
| scale | aluminium extruded profile | |
| protection class | IP 65 | |
| fastening | with movable mounting feet | |
| connection type | plug or cable connection | |
| measuring length | 50 ... 5,000 mm in 50 mm steps (special lengths in 5 mm steps) | |
| resolution | 25 µm or 25 bits | 5 µm |
| linear tolerance (non-corrected) | < ± 0.02 %*, min. ± 50 µm (independent of influences of temperature from outside) | < ± 0.01 %*, min. ± 40 µm (independent of influences of temperature from outside) |
| repeatability | < ± 0.001 %*, min. ± 2.5 µm | |
| hysteresis | < 4 µm | |
| voltage supply | 24 V DC (+20 % /-15%) | |
| power consumption | 100 mA typ. | 70 mA typ. |
| temperature coefficient | < 40 ppm/°C | < 15 ppm/°C |
| voltage sustaining capability | 500 V | |
| operating temperature | -40 °C ... +75 °C | |
| EMC (if the assembly instructions are observed) | | |
| electromagnetic emissions | EN 50081-1 | |
| electromagnetic immunity | EN 50082-2 | |
| The linear scale GEL 177 is in strict conformity with Directive EMC 89/336/EEC of the European Union which is certified by the CE mark. | | |
| shock protection | 100 g (single shock) as per IEC 68-2-27 | |
| vibration protection | 5 g /10 ... 150 Hz as per IEC 68-2-6 | |
| SSI | | |
| data format | - | Gray |
| data length | - | 25 bits |
| output signal | | |
| voltage | 0 ... + 10 V or + 10 ... 0 V, $R_L \geq 5 \text{ k}\Omega$ | - |
| current | 0 ... +20 mA or +20 ... 0 mA 4 ... +20 mA or +20 ... 4 mA burden 0 ... 500 Ω | - |

* referring to the measuring length

Synchronous serial interface, Pin layouts

Synchronous serial interface

Principles of serial data transmission
Gray-Code (25 bits)

$f \geq 100 \text{ kHz}$
 $ci = \text{clock pulse space min. } 16 \mu\text{s}$
 $T = \text{cycle duration of the clock signal}$

Number of distance measurements per second

| measuring length | 150 | 300 | 500 | 750 | 1000 | 2000 |
|------------------|-------|------|------|------|------|------|
| measurements | 10000 | 6600 | 4500 | 3300 | 2500 | 1400 |

Baud rate

The transmission rate depends on the line length and reaches a maximum of 1.5 MBaud. Use screened cables with paired wires.

| cable length | <50 | <100 | <200 | <400 |
|-----------------------|------|------|------|------|
| clock frequency [kHz] | <400 | <300 | <200 | <100 |

Pin layout (analogue)

6-pole plug or cable outlet

| <p>soldered side</p> | pin | cable | 0 ... 20 mA | 20 ... 0 mA | 4 ... 20 mA | 20 ... 4 mA | 0 ... 10 V | 10 ... 0 V |
|----------------------|-----|--------|----------------------------|-------------|-------------|-------------|------------|------------|
| | 1 | grey | 0 ... 20 mA | 20 ... 0 mA | 4 ... 20 mA | 20 ... 0 mA | 0 ... 10 V | 10 ... 0 V |
| | 2 | pink | DC GND | | | | | |
| | 3 | yellow | nc | nc | nc | nc | 10 ... 0 V | nc |
| | 4 | green | nc | | | | | |
| | 5 | brown | + 24 V DC (+ 20 % / -15 %) | | | | | |
| | 6 | white | DC GND | | | | | |

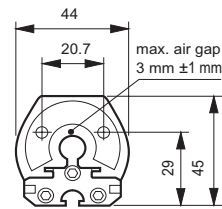
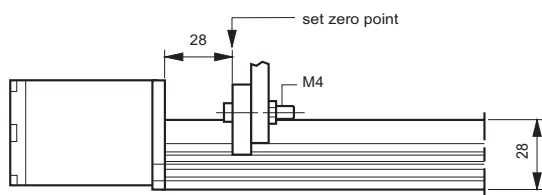
Pin layout (SSI)

7-pole plug or cable outlet

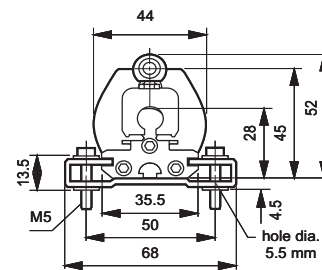
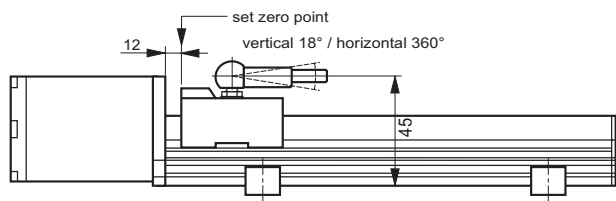
| <p>soldered side</p> | pin | cable | signal |
|----------------------|-----|--------|-----------|
| | 1 | grey | data (-) |
| | 2 | pink | data (+) |
| | 3 | yellow | clock (+) |
| | 4 | green | clock (-) |
| | 5 | brown | +24 V DC |
| | 6 | white | 0 V |
| 7 | - | nc | |

Dimensioned drawings, Type code

GEL 177 with external position magnet



GEL 177 with position slide



plug connection

with 6-pole plug **GG 170.06** for analogue output or
with 7-pole plug **GG 170.07** for SSI output
(both plugs to be ordered separately)

Type code

| 177 | X | XXXX | X | X | Description |
|-----|---|------|---|------|--|
| | | | | - | position sensor none |
| | | | | 1 | external position magnet |
| | | | | 2 | position slide |
| | | | | A | connection plug connection |
| | | | | F | cable connection without plug, 2 m |
| | | | | 0050 | measuring length e.g. 50 mm, please state in 50-mm steps |
| | | | | A | current 0 ... 10 V |
| | | | | Z | 10 ... 0 V |
| | | | | B | 0 ... 20 mA |
| | | | | C | 4 ... 20 mA |
| | | | | D | 20 ... 0 mA |
| | | | | E | 20 ... 4 mA |
| | | | | S | SSI output (Gray-Code, 25 bits) |

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