# INDUCTIVE LINEAR POSITION SENSORS

**Atek Alfa**

## ILT 110 Series

"Touchless, Inductive Meaurement Technology"

| INDUCTIVE MEASUREMENT | ANALOG INTERFACE | CANopen INTERFACE | SSI INTERFACE | RS-232 / RS-485 INTERFACE | LONG SERVICE LIFE | LED INDICATOR | HIGH ACCURACY |
|---|---|---|---|---|---|---|---|

- Inductive measurement technology
- Absolute working principle
- Magnetic field resistant
- Touchless measurement
- Status LED
- Versatile mounting
- 1 µm resolution
- 500 Hz high update rate
- Shock and vibration resistance
- Analog, SSI, CANopen, RS-232 or RS-485 interface
- IP64 protection class

The working principle of ILT 110 series inductive linear position sensors depends on the RLC coupling between the positioning element and the sensor. An output signal is provided according to the position of the positioning element. Thanks to the touchless working principle, they are long-lasting since there are no factors such as wear and tear.

They offer wide temperature tolerance, high repeatability, resolution and linearity. They work stably for a long time without being affected by electromagnetic fields. The are used in applications such as manufacturing engineering, plastic injection molding, textile, packaging, sheet metal working, woodwork, automation technology.

## MECHANICAL DATA

| | |
|---|---|
| **Housing Length (A)** | B + 84 mm |
| **Electrical Stroke (B)** | Between 100 mm… 500 mm in steps of 50 mm<br>Between 500 mm… 1000 mm in steps of 100 mm |
| **Protection Class** | IP64 |
| **Life** | Mechanically unlimited |
| **Connection Type** | Angled ball joint (±18°) |
| **Mechanical Fixing** | Adjustable (movable) mounting clamps |
| **Operating Temperature** | -20°C…+70°C |
| **Storage Temperature** | -20°C…+70°C |
| **Material** | Position Marker: POM |
| | Housing: Anodized aluminum |

## MECHANICAL DIMENSIONS (mm)
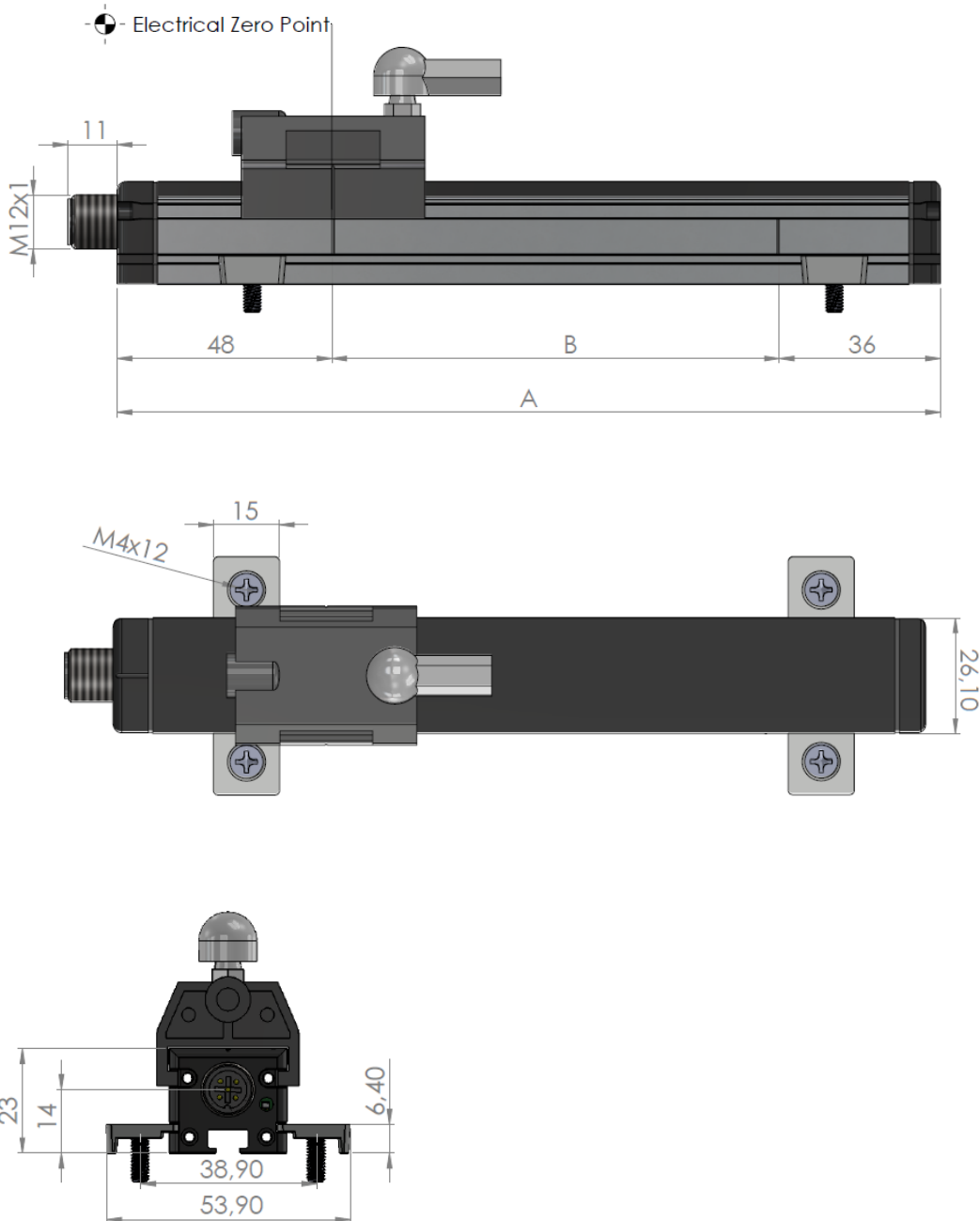
## Electrical Specifications

| | |
|---|---|
| **Electrical stroke (B)** | Between 100 mm… 500 mm in steps of 50 mm<br>Between 500 mm… 1000 mm in steps of 100 mm |
| **Output Signal** | 0-10V, 0.5-4.5V, 0-5V, 0-20 mA, 4-20 mA |
| **Number of channel** | 1 |
| **Output update rate** | 500 Hz max. |
| **Signal propagation delay** | 2, 3, 4, 5, 6, 8, 10 ms (according to filter selection) |
| **Resolution** | 16 bit |
| **Absolute Linearity** | ≤ ± %0.025 FS (min. ± 100 µm) (when the signal propagation delay is 10 ms) |
| **Reproducibility** | < ± %0.012 FS (when the signal propagation delay is 10 ms) |
| **Supply voltage** | 15…33VDC |
| **Supply voltage ripple** | ≤ %10 Vss |
| **Power consumption (w/o load)** | 0.5W |
| **Overvoltage protection** | 33 VDC |
| **Reverse polarity protection** | Yes, up to supply voltage max |
| **Short circuit protection** | Yes (outputs, GND and supply voltage), Up to 12V |

## LED Function

| Led Color | Description |
|---|---|
| Off | Sensor is not working – No supply |
| Green | Sensor is working – Position marker is within measuring range |
| Blue flash (1sn) | Sensor is working - Position marker is outside od measuring range (±6mm max) |
| Red flash (1sn) | Sensor is working - Position marker is outside od measuring range |
| Red fast flash (100ms) | Sensor error |

Status LED

## Electrical Connection

### S69M Connection

| | M12 / 5 Pin male connector On the sensor | | Extension cable with M12 / 5 pin female connector | |
|---|---|---|---|---|
| **Analog Voltage** | **Analog Current** | **Pin No** | **Cable Color** | **Pin No** | **Cable Color** |

| Analog Voltage | Analog Current | Pin No | Cable Color | Pin No | Cable Color |
|---|---|---|---|---|---|
| +V | +V | 1 | Red | 1 | Brown |
| N/C | Iout | 2 | Green | 2 | White |
| GND | GND | 3 | Black | 3 | Blue |
| Vout | N/C | 4 | Yellow | 4 | Black |
| Prog | Prog | 5 | Pink | 5 | Grey |

### S13M Connection

| Analog Voltage | Analog Current | Pin No | Cable Color | Pin No | Cable Color |
|---|---|---|---|---|---|
| +V | +V | 1 | Red | 1 | Brown |
| Vout | N/C | 2 | Yellow | 2 | White |
| GND | GND | 3 | Black | 3 | Blue |
| N/C | Iout | 4 | Green | 4 | Black |
| Prog | Prog | 5 | Pink | 5 | Grey |

## Analog Output Settings

Blue or green LED flashes every second in normal operating condition.

Prog pin (pin 5) and GND (pin 3) are short-circuited until the LED on the product starts to flash blue. Thus, programming mode is entered.

**Step 1 - Setting the starting point:** After the position marker is brought to the desired starting point, Prog pin (pin5) and GND (pin3) are short-circuited for 1 second and the minimum analog value (4mA/0V) is set. In this case, the LED lights up blue for 2 seconds and then proceed to step 2.

**Step 2 – Setting the end point:** After the position marker is brought to the desired end point, Prog pin (pin5) and GND (pin3) are short-circuited for 1 second. Thus, the max analog value (20mA / 10V) is set and the programming mode is exited.

**Return to Factory Settings:**

In step 1, if Prog pin(pin5) and GND(pin3) are short-circuited until the LED on the product starts to flash green, the factory settings will be restored (starting 4mA / 0V, ending 20mA / 10V).

In step 2, if Prog pin(pin5) and GND(pin3) are short-circuited until the LED on the product starts to flash green, the factory settings will be restored (start 20mA / 10V, end 4mA / 0V).

**Note:** After the analog output settings are finished, the Prog pin must be left connected to + V.

## Order Code

**Electrical Connection**

**S69M** : M12/5 pin male connector
**S13M** : M12/5 pin male connector
*For the pin configuration, please refer to the Electrical Connection section on page 3

**Filter Selection**

**02** : 2ms (standard)

*For others see Electrical specifications/signal propagation delay

| Model | | XXXX | | XX | | XX | | XXXX |
|-------|--|------|--|----|--|----|--|------|
| ILT 110 | - | XXXX | - | XX | - | XX | - | XXXX |

**Measuring Lengths (stroke)**

Different measuring lengths from 100 mm to1000 mm

*Measuring length can be selected between 100 mm… 500 mm in 50 mm steps, between 500 mm… 1000 mm in 100 mm steps.

**Electrical Interface**

**V**: 0-10V
**V1**: 0-5V
**V3**: 0.5-4.5V
**A**: 4-20 mA
**A0**: 0-20 mA

*This product is designed to operate as a set, including a sensor and a position marker. The sensor must be used exclusively with its designed position marker.

## SSI INTERFACE

### Electrical Specifications

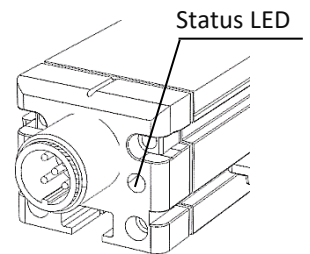| | |
|---|---|
| **Electrical stroke (B)** | Between 100 mm… 500 mm in steps of 50 mm<br>Between 500 mm… 1000 mm in steps of 100 mm |
| **Protocol** | SSI 24 and 25 bit (ask for others) |
| **Parity Bit** | Even / Odd / None (default) |
| **Alarm Bit** | Active High / Active Low / None (default) |
| **Process data area** | Bit 0… Bit 19 |
| **Inputs** | RS422 |
| **Monofloptime (tm)** | 20 µs |
| **Encoding** | Gray, Binary |
| **Output update rate** | 500 Hz (depends on the filter) |
| **Resolution (LSB)** | Selectable between 1…1000 µm |
| **Signal propagation delay** | 2, 3, 4, 5, 6, 8, 10 ms (according to filter selection) |
| **Reproducibility** | $< \pm \%0.012$ FS (when the signal propagation delay is 10 ms) |
| **Absolute Linearity** | $\leq \pm \%0.025$ FS (min. ± 100 µm) (when the signal propagation delay is 10 ms) |
| **Supply voltage** | 8…33 VDC |
| **Supply voltage ripple** | $\leq \%10$ Vss |
| **Power consumption (w/o load)** | 0.5W |
| **Overvoltage protection** | 33 VDC |
| **Reverse polarity protection** | Yes, up to supply voltage max |
| **Short circuit protection** | Yes (outputs, GND and supply voltage up to 7V) |
| **Ohmic load at outputs** | >120Ω |
| **Max. Clock rate** | 1 MHz |

### SSI TIMING DIAGRAM
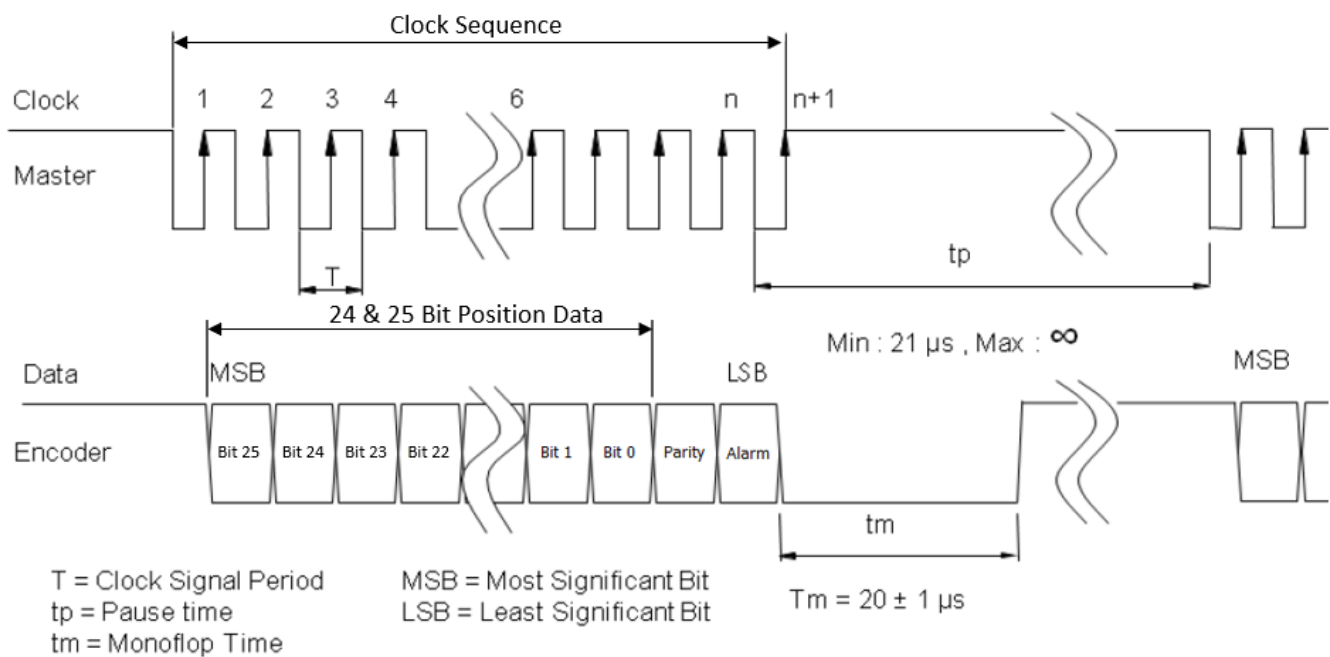


If the device resolution is less than 24 or 25 Bits, the remaining bit fields from the MSB are filled with 0.

The device indicates this status with the Alarm bit at power-on after the lock state.

Alarm: 1 (alarm)          MCU lock up alarm     MCU watchdog alarm
       0 (no alarm)

## LED Function

| Led Color | Description |
|---|---|
| Off | Sensor is not working – No supply |
| Green | Sensor is working – Position marker is within measuring range |
| Blue flash (1 sn) | Sensor is working - Position marker is outside od measuring range (±6mm max) |
| Red flash (1 sn) | Sensor is working - Position marker is outside od measuring range |
| Red fast flash (100 ms) | Sensor error |

Status LED

## Electrical Connection

| Signal | Cable | M12 / 8 pin male connector (S14M Connection) |
|---|---|---|
| | | |
| Clk+ | White | Pin 1 |
| Data+ | Yellow | Pin 2 |
| Clk- | Blue | Pin 3 |
| N/C | N/C | Pin 4 |
| Data- | Green | Pin 5 |
| GND | Black | Pin 6 |
| +V (Supply Voltage) | Red | Pin 7 |
| N/C | N/C | Pin 8 |

## Order Code

| Model | Measuring Lengths (stroke) | Resolution | Filter Selection | Electrical Interface | Output Signal | Parity Bit | Alarm Bit | Electrical Connection |
|---|---|---|---|---|---|---|---|---|
| **ILT 110** | XXXX | XXXX | XX | XXX | XXX | X | X | XXXX |

**Model**

**Measuring Lengths (stroke)**

Different measuring lengths from 100 mm to1000 mm

*Measuring length can be selected between 100 mm… 500 mm in 50 mm steps, between 500 mm… 1000 mm in 100 mm steps.

**Resolution**

Selectable between 1…1000 µm

**Filter Selection**

**02** : 2ms (standard)

*For others see Electrical specifications/signal propagation delay

**Electrical Interface**

**SSI** : SSI

**Output Signal**

**24G** : SSI 24 bit, Gray
**25G**: SSI 25 bit, Gray
**24B**: SSI 24 bit, Binary
**25B** : SSI 25 bit, Binary
*Ask for others.

**Parity Bit**

**E**: Even
**O**: Odd
**N**: None (default)

**Alarm Bit**

**H**: Active high
**L**: Active low
**N**: None (default)

**Electrical Connection**
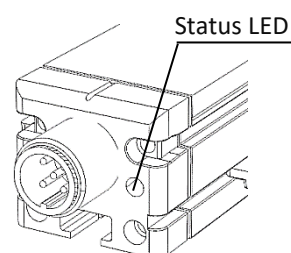
**S14M** : M12/8pin male connector

*This product is designed to operate as a set, including a sensor and a position marker. The sensor must be used exclusively with its designed position marker.

## Electrical Specifications

| | |
|---|---|
| Measured variables | Position, speed and temperature |
| Electrical stroke (B) | Between 100 mm… 500 mm in steps of 50 mm<br>Between 500 mm… 1000 mm in steps of 100 mm |
| Measuring range speed | 0…5 m/s |
| Protocol | CANopen protocol to CiA DS-301 V4.2.0,<br>Device profile DS-406 V3.2 |
| Programmable parameter | nod-id, baud-rate |
| Node-ID | 1…127 (default 127) |
| Baud rate | 10 … 1000 kBaud |
| Output update rate | 500 Hz |
| Position resolution<br>Speed resolution | 1 µm min.<br>10 µm/s min. |
| Signal propagation delay | 2, 3, 4, 5, 6, 8, 10 ms (according to filter selection) |
| Reproducibility | $< \pm$ %0.012 FS (when the signal propagation delay is 10 ms) |
| Absolute Linearity | $\leq \pm$ %0.025 FS (min. ± 100 µm) (when the signal propagation delay is 10 ms) |
| Supply voltage | 8…33 VDC |
| Supply voltage ripple | $\leq$ %10 Vss |
| Power consumption (w/o load) | 0.5W |
| Overvoltage protection | 33 VDC |
| Reverse polarity protection | Yes, up to supply voltage max |
| Short circuit protection | Yes (outputs, GND and supply voltage max.) |
| Termination resistance | No (optional internal 120 Ω load resistance) |

## LED Function

| Led Color | Description |
|---|---|
| Off | Sensor is not working – No supply |
| Green | Sensor is working – Position marker is within measuring range |
| Blue flash (1 sn) | Sensor is working - Position marker is outside od measuring range (±6mm max) |
| Red flash (1 sn) | Sensor is working - Position marker is outside od measuring range |
| Red fast flash (100 ms) | Sensor error |



Status LED

## Electrical Connection

### M12 / 5 Pin male connector (S13M Connection)



| Signal | Cable Color | Pin No |
|---|---|---|
| CAN SHIELD | CAN SHIELD | 1 |
| +V (Supply Voltage) | Red | 2 |
| GND | Black | 3 |
| CAN_H | Yellow | 4 |
| CAN_L | Green | 5 |
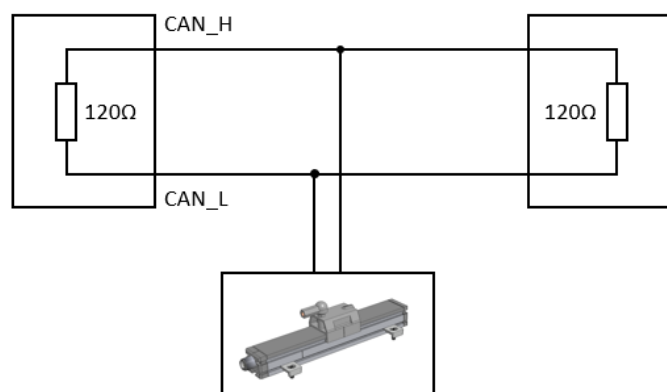


## Order Code

| Model | | | | Electrical Interface | | |
|---|---|---|---|---|---|---|
| | | | | C: CANopen | | |
| ILT 110 | - | XXXX | - | X | - | XXXX |

**Measuring Lengths (stroke)**

Different measuring lengths from 100 mm to1000 mm

*Measuring length can be selected between 100 mm… 500 mm in 50 mm steps, between 500 mm… 1000 mm in 100 mm steps.

**Electrical Connection**

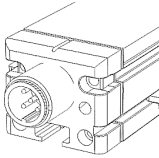**S13M** : M12/5 pin male connector

## RS-232 / RS485 INTERFACE

## Electrical Specifications

| | |
|---|---|
| **Electrical stroke (B)** | Between 100 mm… 500 mm in steps of 50 mm<br>Between 500 mm… 1000 mm in steps of 100 mm |
| **Communucation Protocols** | Modbus RTU, Modbus ASCII, ASCII (every 100 ms) |
| **Baud Rate** | 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200<br>MODBUS RTU / MODBUS ASCII Default: 19200<br>ASCII Default: 9600 |
| **Data Bits** | MODBUS ASCII: 7<br>ASCII / MODBUS RTU: 8 |
| **Parity** | None, Odd, Even<br>Default: None |
| **Address** | Between 1 and 247<br>Default: 1 |
| **Output update rate** | 500 Hz |
| **Signal propagation delay** | 2, 3, 4, 5, 6, 8, 10 ms (according to filter selection) |
| **Resolution** | 16 bit |
| **Reproducibility** | $< \pm$ %0.012 FS (when the signal propagation delay is 10 ms) |
| **Absolute Linearity** | $\leq \pm$ %0.025 FS (min. $\pm$ 100 µm) (when the signal propagation delay is 10 ms) |
| **Supply voltage** | 8…33 VDC |
| **Supply voltage ripple** | $\leq$ %10 Vss |
| **Power consumption (w/o load)** | 0.5W |
| **Overvoltage protection** | 33 VDC |
| **Reverse polarity protection** | Yes, up to supply voltage max |
| **Short circuit protection** | Yes (outputs, GND and supply voltage max.) |

## LED Function

| Led Color | Description |
|---|---|
| Off | Sensor is not working – No supply |
| Green | Sensor is working – Position marker is within measuring range |
| Blue flash (1 sn) | Sensor is working - Position marker is outside od measuring range (±6mm max) |
| Red flash (1 sn) | Sensor is working - Position marker is outside od measuring range |
| Red fast flash (100 ms) | Sensor error |

Status LED

## Electrical Connection

**M12 / 5 Pin male connector (S13M Connection)**

| Signal | Cable Color | Pin No |
|---|---|---|
| SHIELD | SHIELD | 1 |
| +V (Supply Voltage) | Red | 2 |
| GND | Black | 3 |
| (RS232 - Rx) / (RS485 - A) | Yellow | 4 |
| (RS232 - Tx) / (RS485 - B) | Green | 5 |

**ASCII DATA FRAME FORMAT (Sent every 100 ms)**

| Pos Data 8 | 7 | 6 | 5 | 4 | 3 | 2 | Pos Data 1 digit | CRC H | CRC L | 1F (0x0A) |
|---|---|---|---|---|---|---|---|---|---|---|

Position Data

Should be calculated with CRC-16 Maxim Algorithm

**RS-232 / RS-485 ASCII output telegram:**

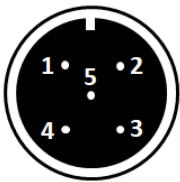8 character digit + 16 bit CRC High Byte + 16bit CRC Low Byte + LF (0x0A)

[Click for sample CRC calculation algorithm with C#](#)

## Order Code

| Model | | Measuring Lengths (stroke) | | Electrical Interface | | Comm. Protocol | | Electrical Connection |
|---|---|---|---|---|---|---|---|---|
| **ILT 110** | - | **XXXX** | - | **XX** | - | **XXXX** | - | **XXXX** |

**Electrical Interface**

**S1 :** RS-232
**S2 :** RS-485

**Electrical Connection**

**S13M** : M12/5 pin male connector

**Measuring Lengths (stroke)**

Different measuring lengths from 100 mm to1000 mm

*Measuring length can be selected between 100 mm… 500 mm in 50 mm steps, between 500 mm… 1000 mm in 100 mm steps.

**Comm. Protocol**

**MR** : Modbus RTU
**MA** : Modbus ASCII
**AS** : ASCII (every 100 ms)

*This product is designed to operate as a set, including a sensor and a position marker. The sensor must be used exclusively with its designed position marker.

## OPTIONAL PRODUCTS

| Product | Code | Description | Pin Configuration |
|---|---|---|---|
|  | M12/P5 CONNECTOR 5MT 90' | M12/5 pin female connector, with 5 meters cable, 90° (For connection with M12/5 pin male connector on the sensor) |  |
|  | M12/P5 CONNECTOR 5MT STRAIGHT | M12/5 pin female connector, with 5 meters cable, straight (For connection with M12/5 pin male connector on the sensor) | **Pin1 :** Brown<br>**Pin2 :** White<br>**Pin3 :** Blue<br>**Pin4 :** Black<br>**Pin5 :** Grey |

## GPM-U (Guided and Top Joint)
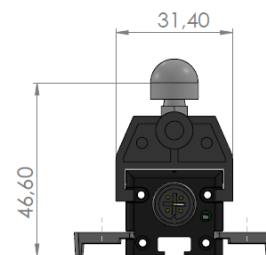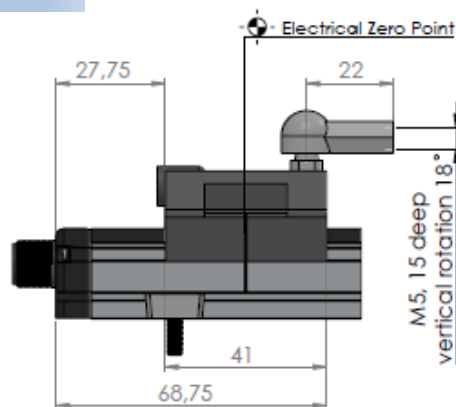
| | GPM-6-U | GPM-10-U |
|---|---|---|
| Stroke Used | 100 ... 600 mm | 700 ... 1000 mm |
| Housing Material | POM | |
| Joint Material | Igumid G / iglide® L280 (W300) | |
| Weight | ~20 gr | |

## GPM-Y (Guided and Side Joint)
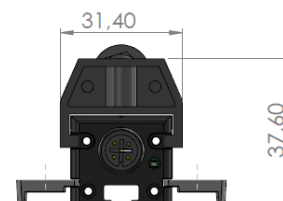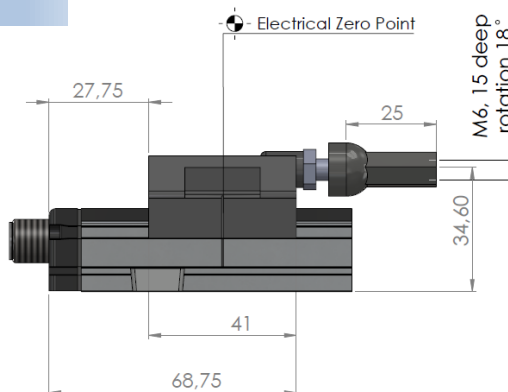
| | GPM-6-Y | GPM-10-Y |
|---|---|---|
| Stroke Used | 100 ... 600 mm | 700 ... 1000 mm |
| Housing Material | POM | |
| Joint Material | Igumid G / iglide® L280 (W300) | |
| Weight | ~22 gr | |

## FPM (Floating and independent)
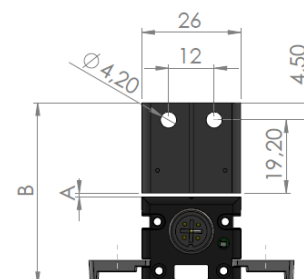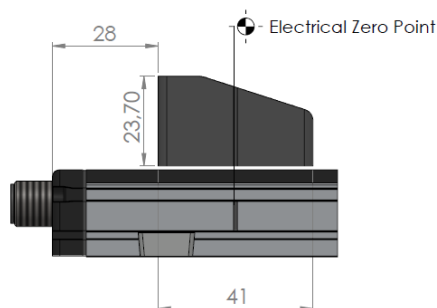
| | FPM-6 | FPM-10 |
|---|---|---|
| Stroke Used | 100 ... 600 mm | 700 ... 1000 mm |
| Working Distance (A) | 0,3 mm | |
| Mounting Dimension (B) | 47 mm | |
| Perm. Lateral offset | ± 0,5 mm | |
| Housing Material | POM | |
| Weight | ~23 gr | |