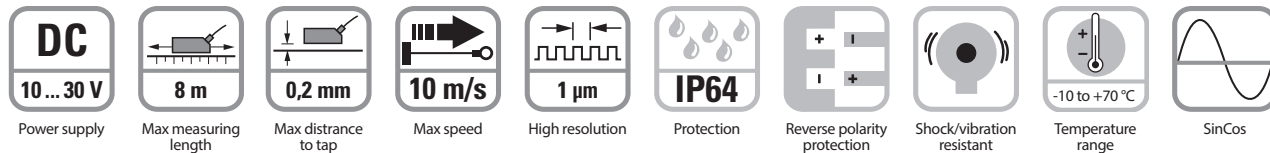


# Linear Position Technology

## Linear Magnetic Position System

### Absolute Linear Magnetic Measurement System LMA-1



#### Robust

- **Non-contact magnetic absolute measuring technology - therefore no wear - no referencing movement required.**
- **Sturdy housing with IP64 protection.**
- **For highly dynamic control.**
- **Stainless steel tape protecting the magnetic band.**



#### Simple Installation

- **Fast start-up of the measuring system:** Easy attachment of the magnetic band and the sensor head.
- **Easy mounting with large tolerances possible:** Distance of sensor head to magnetic band from 0.01 to 0.2 mm; tolerates lateral misalignment +1 mm; LED warning indicator when magnetic field is too weak.

#### Versatile

- **High resolution 1 µm / measuring length max. 8 m.**
- **Optional SinCos signal (1 Vpp) for dynamic movement control with 1 mm pole pitch**

#### Technical Data Magnetic Sensor LMA-1:

##### Mechanical characteristics

|  |   |
|--|---|
| Weight:                                    | approx. 0.22 lbs (0.1 kg)   |
| Working temperature:                       | +14 to +157 °F (-10 to +70 °C)<br>(non condensing)  |
| Storage temperature:                       | -13 to +185 °F (-25 to +85 °C)  |
| Protection acc. to EN 60529:               | IP64  |
| Housing:                                   | aluminum  |
| Max. speed:                                | SinCos reading 32.8 ft/s (10 m/s)<br>permanent absolute positions reading 3.28 ft/s (1 m/s) |
| Shock resistance acc. to EN 60068-2-27:    | 500g (5000 m/s <sup>2</sup> ), 1 ms   |
| Vibration resistance acc. to EN 60068-2-6: | 30g (300 m/s <sup>2</sup> ), 10-2000 Hz   |
| Distance sensor head / magnetic band:      | 0.01 - 0.2 mm incl. masking tape<br>(recommended 0.2 mm)                                    |
| Measuring length:                          | max. 8 m  |
| Type of connection (standard):             | M12 connector, 12 pin   |

##### Electrical characteristics:

|  |                |
|--|----------------|
| Power supply:                                  | 10-30 VDC ±10% |
| Residual ripple:                               | < 10 %         |
| Current consumption:                           | max. 150 mA    |
| Reverse polarity protection:                   | yes            |
| Short circuit protected:                       | yes            |
| RoHS compliant acc. to EU guideline 2011/65/EU |                |

##### Accuracy:

|                                   |   |
|-----------------------------------|---|
| Measuring principle:              | absolute + incremental (option)                           |
| System accuracy at 68 °F [20 °C]: | max. ± (10 + 20 x L) µm<br>L = measuring length in meters |
| Repeat accuracy:                  | ±1 increment  |
| Resolution:                       | 0.001 mm  |
| LED, red:                         | lights up when distance too large                         |

**Linear Magnetic Measurement System LMA-1**

**SSI interface:**

|                             |  |            |
|-----------------------------|--|------------|
| Output driver:              | RS485 transceiver type                     |            |
| Permissible load / channel: | max. ±20 mA                                |            |
| Signal level:               | HIGH                                       | typ. 3.8 V |
|                             | LOW at I <sub>Load</sub> = 20 mA           | typ. 1.3 V |
| Clock rate:                 | 25 bit<br>(24 + 1 failurebit for distance) |            |
| Code:                       | Gray                                       |            |
| SSI clock rate:             | 80 kHz - 0.4 MHz                           |            |
| Monoflop time:              | ≤ 40 µs                                    |            |
| Data refresh rate:          | ≤ 250 µs                                   |            |

**Option SinCos interface:**

|                          |                          |  |
|--------------------------|--------------------------|--|
| Max. frequency -3dB:     | 400 kHz                  |  |
| Signal level:            | 1 V <sub>pp</sub> (±10%) |  |
| Short circuit protected: | yes                      |  |
| Pulse rate:              | 1 SinCos per 1 mm pole   |  |

**Magnetic band LMAT-1:**

|                                  |  |                            |
|----------------------------------|--|----------------------------|
| Pole gap:                        | basic pole pitch 1 mm  |                            |
| Dimensions:                      | width  | 10 mm                      |
|                                  | thickness  | 1.97 mm incl. masking tape |
| Relative linear expansion:       | $\Delta L = L \times \alpha \times \Delta \delta$<br>L = measuring length in meters<br>$\alpha = 16 \times 10^{-6}$ 1/K temperature coefficient<br>$\Delta \delta$ = relative temperature change based on +68 °F [20 °C] in °K |                            |
| Working temperature:             | -4 to +176 °F [-20 to +80 °C]  |                            |
| Mounting:                        | adhesive joint   |                            |
| Additional length:               | 100 mm in order to obtain an optimal measuring result, the magnetic band should be about 0.1 m longer than the required measuring length   |                            |
| Min. bending radius for storage: | ≥ 150 mm   |                            |
| Material metal tape:             | precision steel strip 1.4404 acc. to EN 10088-3  |                            |

**Accessories:**

- See page H1, Connectivity, for cables and connectors

# Linear Position Technology

## Linear Magnetic Position System

### Linear Magnetic Measurement System LMA-1

**Standard Wiring:**

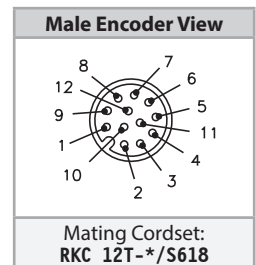
**Output Circuit 3C (Gray code):**

| Connection Type | Common (0V) | +V | +Clock | -Clock | +Data | -Data | - | - | - | - | - | - |
|-----------------|-------------|----|--------|--------|-------|-------|---|---|---|---|---|---|
| M12 Eurofast:   | 1           | 2  | 3      | 4      | 5     | 6     |   |   |   |   |   |   |

**Output Circuit 3G (Gray code + SinCos):**

| Connection Type | Common (0V) | +V | +Clock | -Clock | +Data | -Data | A | $\bar{A}$ | B | $\bar{B}$ | - | - |
|-----------------|-------------|----|--------|--------|-------|-------|---|-----------|---|-----------|---|---|
| M12 Eurofast:   | 1           | 2  | 3      | 4      | 5     | 6     | 7 | 8         | 9 | 10        |   |   |

**Wiring Diagram:**



\* Length in meters.

**Linear Magnetic Measurement System LMA-1**

**Part Number Key: Magnetic Sensor LMA-1**

| A     |   | B   |   | C     |   | D      |
|-------|---|-----|---|-------|---|--------|
| LMA-1 | - | Q16 | - | 3C25B | - | H11121 |

| A     | Type                      |
|-------|---------------------------|
| LMA-1 | Linear Magnetic, Absolute |

| B   | Housing     |
|-----|-------------|
| Q16 | 16 mm, IP64 |

| C     | Voltage Supply and Output Type                     |
|-------|--|
| 3C25B | 10-30 VDC, SSI, 25-bit Gray Code                   |
| 3G25B | 10-30 VDC, SSI, 25-bit Gray Code Plus SinCos 1 Vpp |

| D      | Type of Connection            |
|--------|-------------------------------|
| H11121 | 12-pin M12 Eurofast Connector |

**Part Number Key: Magnetic Band LMAT-1**

| A      |   | B    |
|--------|---|------|
| LMAT-1 | - | 0005 |

| A      | Type                                       |
|--------|--|
| LMAT-1 | 10 mm, Linear Magnetic Tape, 1 mm Pole Gap |

| B    | Length* |            |
|------|---------|------------|
| 0005 | 0.5 m   | 0040 4.0 m |
| 0010 | 1.0 m   | 0060 6.0 m |
| 0020 | 2.0 m   | 0080 8.0 m |
| 0030 | 3.0 m   | - -        |

\*measuring range = Length - 0.1 m

**Accessories:**

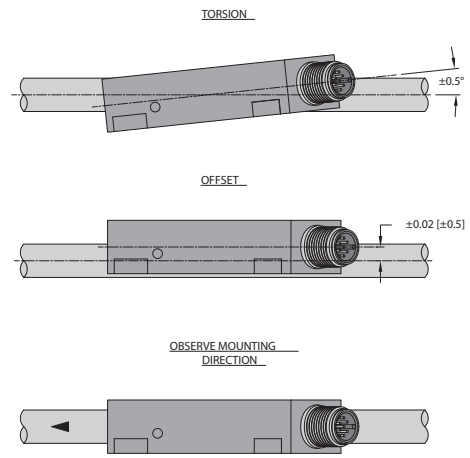
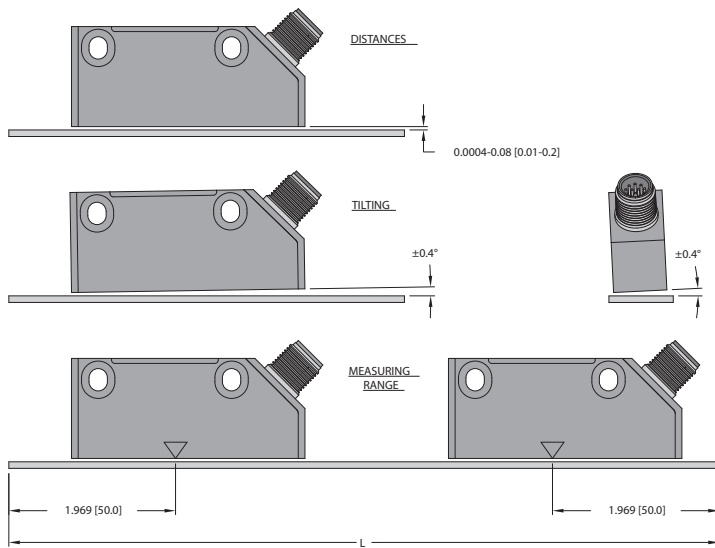
- See page H1, Connectivity, for cables and connectors

# Linear Position Technology

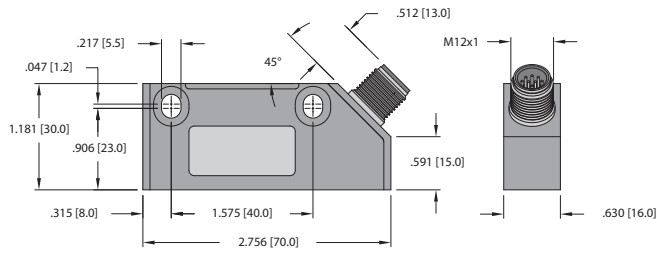
## Linear Magnetic Position System

### Linear Magnetic Measurement System LMA-1

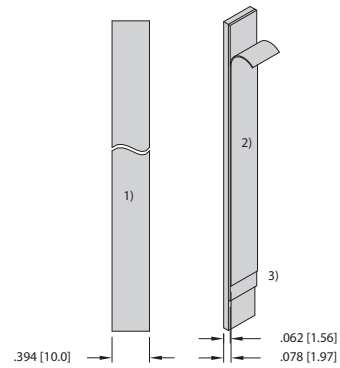
#### Permissible Mounting Tolerances:



#### Dimensions: LMA-1



#### Magnetic Band LMAT-1



- 1) Length L, max 8 m
- 2) Masking tape
- 3) Magnetic band