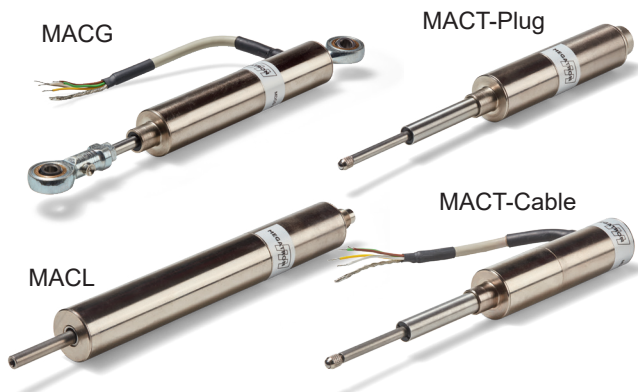


# Data Sheet for Linear Sensors

## Inductive Linear Transducer

## Series MAC



- Measuring strokes from 2 to 200 mm
- Non-contact measuring principle (long life time)
- Linearity up to 0,25%
- Cable or plug connection
- Protection grade IP65
- Analogue outputs available with signal conditioner IMA2 LVDT

The MAC series is ideally for distance monitoring and quality control. The sensors are available in three designs:  
 MACG with ball joints  
 MACT as a probe with spring return  
 MACL with a loose push rod (fixing possible in customers application)

| Electrical Data  | MAC-2                       | MAC-5    | MAC-10  | MAC-20   | MAC-50   | MAC-100   | MAC-200    |
|--|-----------------------------|----------|---------|----------|----------|-----------|------------|
| Effective electrical travel<br><b>MACG</b> (ball joints) in mm 1.) | ±1 (2)                      | ±2.5 (5) | ±5 (10) | ±10 (20) | ±25 (50) | --        | --         |
| Effective electrical travel<br><b>MACL</b> (loose core) in mm 1.)  | ±1 (2)                      | ±2.5 (5) | ±5 (10) | ±10 (20) | ±25 (50) | ±50 (100) | ±100 (200) |
| Effective electrical travel<br><b>MACT</b> (as a probe) in mm 1.)  | ±1 (2)                      | ±2.5 (5) | ±5 (10) | ±10 (20) | ±25 (50) | --        | --         |
| Sensitivity mV/V/mm  | 76                          | 82       | 43      | 34       | 27       | 12.2      | 7          |
| Independent linearity (best straight line) 1.)                     | ±0.5% (±0.25%)              |          |         |          |          | ±1%       |            |
| Excitation voltage   | 1..10 V RMS                 |          |         |          |          |           |            |
| Excitation frequency   | 0.5..5 kHz                  |          |         |          |          |           |            |
| Primary resistance typ. Ohm  | 332                         | 69       | 97      | 175      | 221      | 460       | 820        |
| Primary impedance typ. Ohm   | 790                         | 134      | 188     | 345      | 369      | 2240      | 5770       |
| Output impedance typ. Ohm  | 900                         | 170      | 118     | 360      | 525      | 2140      | 5060       |
| Temperature coefficient  | ±0.2 % F.S./10K             |          |         |          |          |           |            |
| Calibration at   | 5 V RMS / 2.5 kHz RL=1 MOhm |          |         |          |          |           |            |

| Mechanical Data, Environmental Conditions, Miscellaneous | MAC-2   | MAC-5     | MAC-10    | MAC-20    | MAC-50    | MAC-100   | MAC-200   |
|--|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Operational temperature                                  | -35 °C up to +120 °C  |           |           |           |           |           |           |
| Storage temperature                                      | -55 °C up to +120 °C  |           |           |           |           |           |           |
| Protection grade (IEC60529)                              | IP65  |           |           |           |           |           |           |
| Vibration (IEC 68-2-6, Test Fc)                          | 10 g (2..2000 Hz)   |           |           |           |           |           |           |
| Shock (IEC 68-2-27, Test Ea)                             | 200 g, 2 ms   |           |           |           |           |           |           |
| Mass <b>MDCG</b> (cable 1 m ca.)                         | 140 g   | 165 g     | 180 g     | 230 g     | 290 g     | --        | --        |
| Mass <b>MDCL</b> (cable 1 m/plug ca.)                    | 85/65 g   | 100/80 g  | 120/100 g | 175/155 g | 230/210 g | 440/420 g | 670/650 g |
| Mass <b>MDCT</b> (cable 1 m/plug ca.)                    | 110/90 g  | 125/105 g | 140/120 g | 190/170 g | 260/240 g | --        | --        |
| Material housing   | Steel nickel plated   |           |           |           |           |           |           |
| Material push rod / Core material                        | Stainless steel / Nickel-Iron-Alloy                           |           |           |           |           |           |           |
| Electrical connection                                    | Round cable 1 m / plug 5-pin (not for MACG)                   |           |           |           |           |           |           |
| Mounting parts (included in delivery)                    | 2 pc. ball joints (MACG), probe (MACT), loose push rod (MACL) |           |           |           |           |           |           |

1.) According IEC 60393

2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

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Series MAC

## Order Code

| Description   | Selection: <b>standard=black/bold</b> , possible <i>options=grey/italic</i> |                                  |  |   |                   |  |
|---|---|----------------------------------|--|---|-------------------|--|
| <b>Series:</b>  | <b>MAC</b>  |                                  |  |   |                   |  |
| <b>Design:</b><br><b>With ball joints</b><br><b>With loose core</b><br><b>As a probe</b>  |   | <b>G</b><br><b>L</b><br><b>T</b> |  |   |                   |  |
| <b>Effective electrical travel:</b><br><b>2 mm</b><br><b>5 mm</b><br><b>10 mm</b><br><b>20 mm</b><br><b>50 mm</b><br><b>100 mm (only version L)</b><br><b>200 mm (only version L)</b> |   |                                  |  | <b>2</b><br><b>5</b><br><b>10</b><br><b>20</b><br><b>50</b><br><b>100</b><br><b>200</b> |                   |  |
| <b>Electrical connection:</b><br><b>Plug 5-pole (not version G)</b><br><b>Cable 1 m</b><br><i>Option cable length in m</i>  |   |                                  |  | <b>S</b><br><b>K</b><br><i>Kxx</i>  |                   |  |
| <b>Independent linearity:</b><br><b>±0,5% / ±1% (depends on electrical travel)</b><br><i>Option ±0,25 (not for ≥100 mm)</i>   |   |                                  |  |   | -<br><i>L0,25</i> |  |

### Accessory (not included in delivery):

- Mating connector (STEM16) #110906: M16 thread, 5-pole, IP67, straight, shielded (STE M16 5POL IP67 G S)
- Mating connector (STEM16) #114462: M16 thread, 5-pole, IP67, angled, shielded (STE M16 5POL IP67 W S)
- Mating connector with cable (STKM16) #127664: M16 thread, 5-pole, IP67, straight, shielded, 2 m (STK M16 5POL IP67 G GS 2M AWG24)
- Mating connector with cable (STKM16) #127665: M16 thread, 5-pole, IP67, angled, shielded, 2 m (STK M16 5POL IP67 W GS 2M AWG24)
- Mounting bracket #106656 (drawing see page 6)
- Mounting flange (drawing see page 7)
- Extension for armature (50..315 mm) (drawing see page 7)
- More connectors with and without cable on request.
- Take a look at data sheet STEM16 for connector without cable or STKM16 for connector with cable.

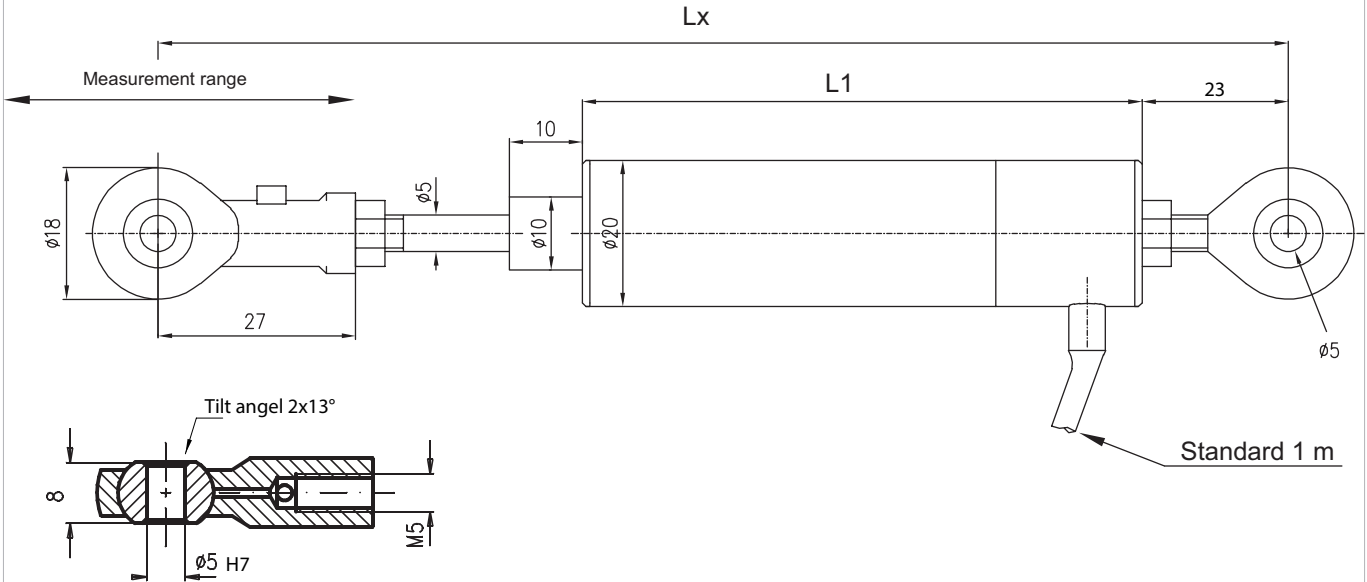
### For higher quantities or on-going demand, additional options are available as described below on request for example:

- Cable assemblies with and without connector
- Special probe, special axis length
- Higher protection class IP67 / IP68 taking into account the customer's installation conditions.

Please note for the type with >100 mm displacement: For a horizontal installation, the sensor housing must be stabilized additionally. An axial alignment must be ensured. Otherwise the sensor could bend due to its own weight! We recommend to use 3 mounting brackets.

### Drawing

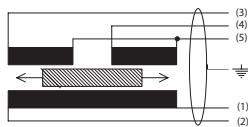
#### MAC G



Dimension in mm

| Connection     |                       |
|----------------|-----------------------|
| Color of cable | Signal                |
| Red 1          | Primary 1             |
| Black 2        | Primary 2             |
| Orange 3       | Secondary 1           |
| Yellow 4       | Secondary 2           |
| White 5        | Secondary 1, 2 Centre |
| Housing        | Shield                |

| Sensor                                | MAC G      | MAC G        | MAC G      | MAC G       | MAC G       |
|---------------------------------------|------------|--------------|------------|-------------|-------------|
| Lx [elec. zero position $\pm 1,5$ mm] | 136 mm     | 144,5 mm     | 155 mm     | 191 mm      | 252 mm      |
| L1                                    | 51 mm      | 62 mm        | 76 mm      | 115 mm      | 160 mm      |
| Stroke                                | $\pm 1$ mm | $\pm 2,5$ mm | $\pm 5$ mm | $\pm 10$ mm | $\pm 25$ mm |



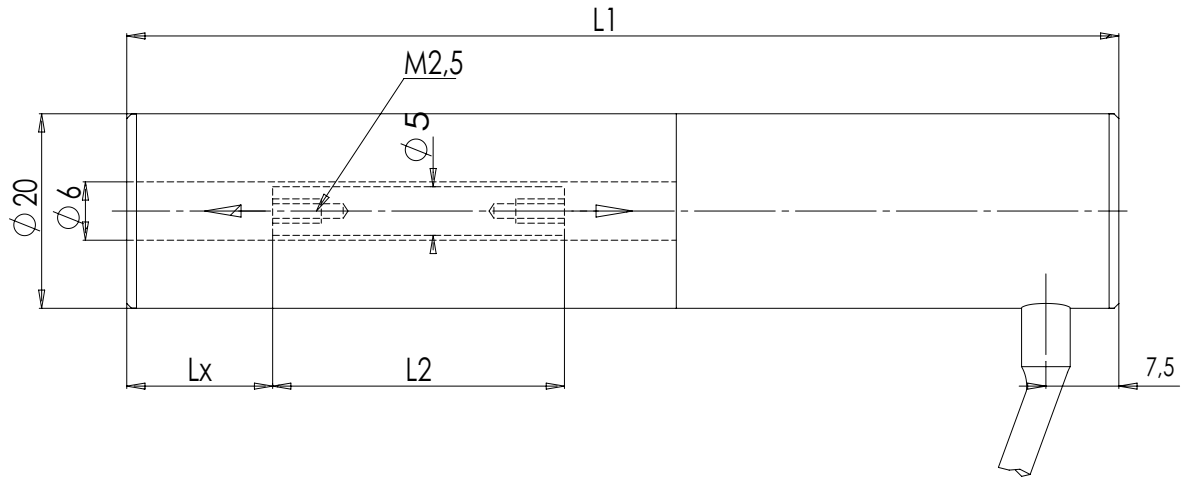
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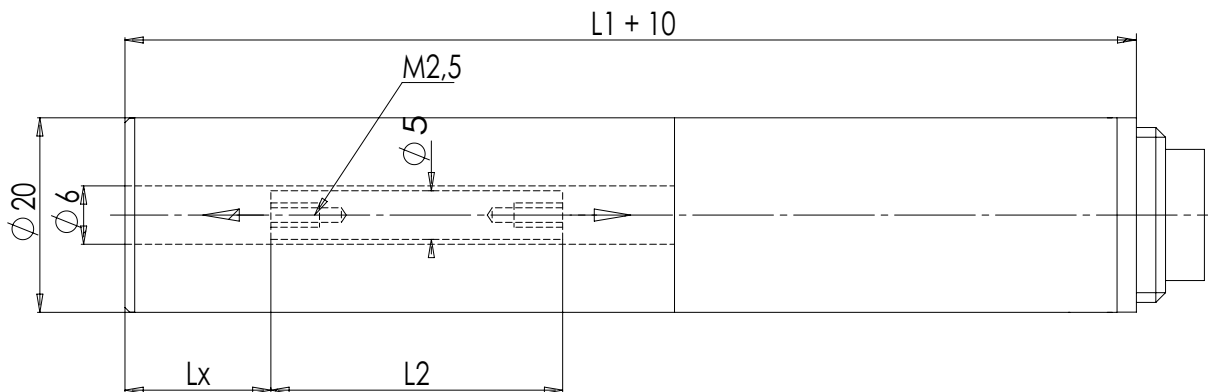
Series MAC

## Drawing

MAC L cable version

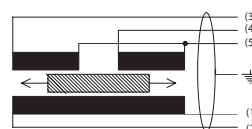
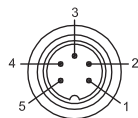


MAC L connector version



| Connection |                |                       |
|------------|----------------|-----------------------|
| Pin number | Color of cable | Signal                |
| 1          | Red            | Primary 1             |
| 2          | Black          | Primary 2             |
| 3          | Orange         | Secondary 1           |
| 4          | Yellow         | Secondary 2           |
| 5          | White          | Secondary 1, 2 Centre |
|            | Housing        | Shield                |

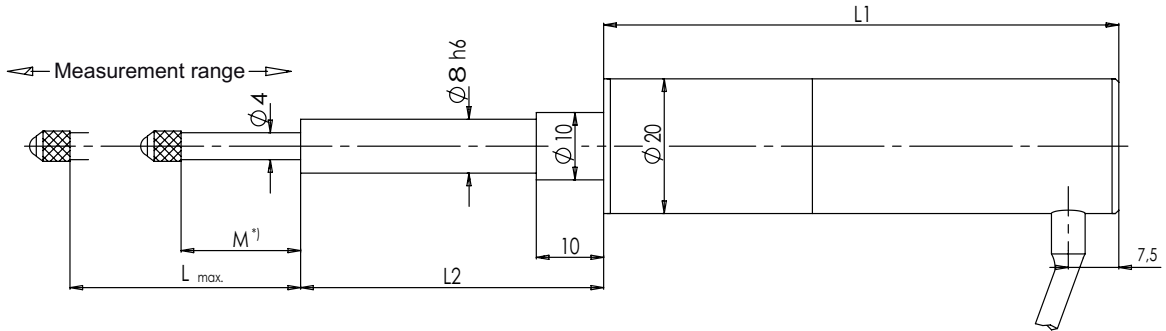
| Sensor                           | MAC L | MAC L   | MAC L | MAC L  | MAC L  | MAC L  | MAC L   |
|----------------------------------|-------|---------|-------|--------|--------|--------|---------|
| Lx [elec. zero position ±1,5 mm] | 9 mm  | 11,5 mm | 15 mm | 18 mm  | 32 mm  | 81 mm  | 116 mm  |
| L1                               | 51 mm | 62 mm   | 76 mm | 115 mm | 160 mm | 298 mm | 466 mm  |
| L2                               | 17 mm | 23 mm   | 30 mm | 62 mm  | 80 mm  | 130 mm | 230 mm  |
| Stroke                           | ±1 mm | ±2,5 mm | ±5 mm | ±10 mm | ±25 mm | ±50 mm | ±100 mm |



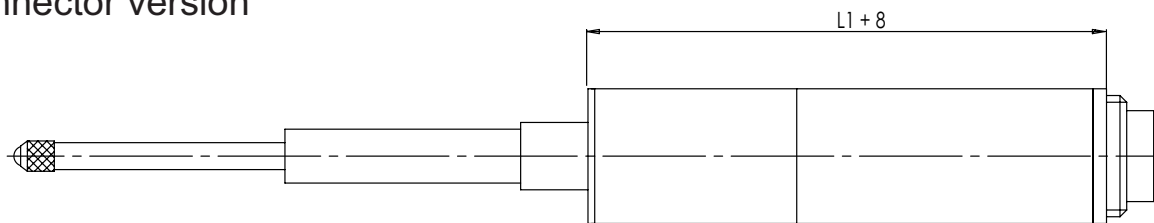
Dimension in mm

### Drawing

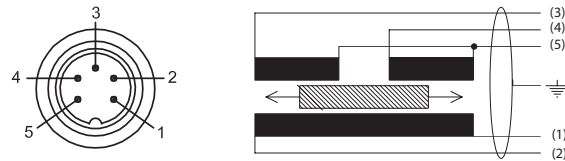
#### MAC T cable version



#### MAC T connector version



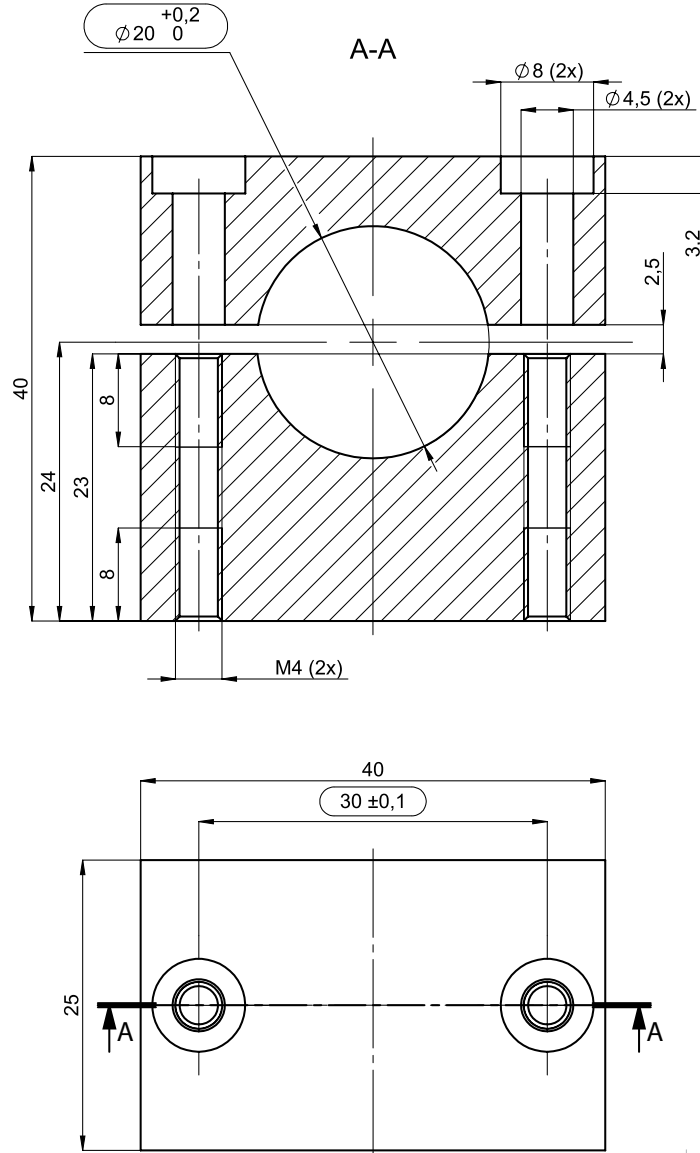
| Connection |                |                       |
|------------|----------------|-----------------------|
| Pin number | Color of cable | Signal                |
| 1          | Red            | Primary 1             |
| 2          | Black          | Primary 2             |
| 3          | Orange         | Secondary 1           |
| 4          | Yellow         | Secondary 2           |
| 5          | White          | Secondary 1, 2 Centre |
|            | Housing        | Shield                |



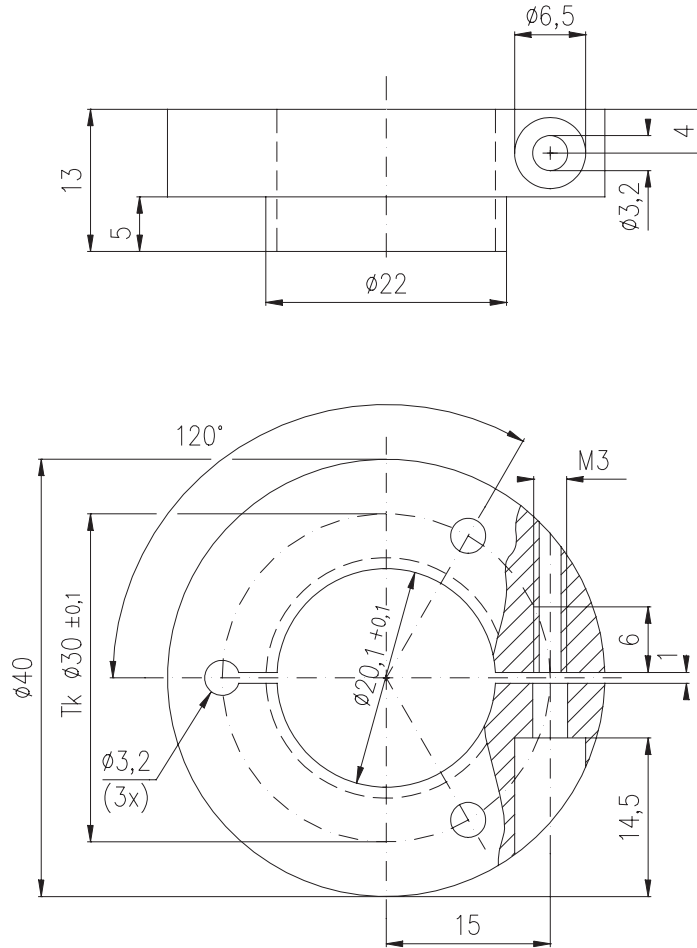
Dimension in mm

| Sensor                          | MAC T   | MAC T   | MAC T   | MAC T   | MAC T   |
|---------------------------------|---------|---------|---------|---------|---------|
| M [elec. zero position ±1,5 mm] | 26 mm   | 23,5 mm | 20 mm   | 16,5 mm | 40 mm   |
| L1                              | 51 mm   | 62 mm   | 76 mm   | 115 mm  | 160 mm  |
| L2                              | 45 mm   | 45 mm   | 45 mm   | 45 mm   | 83 mm   |
| L max                           | 30,5 mm | 30,5 mm | 30,5 mm | 30,5 mm | 69,5 mm |
| Stroke                          | ±1 mm   | ±2,5 mm | ±5 mm   | ±10 mm  | ±25 mm  |

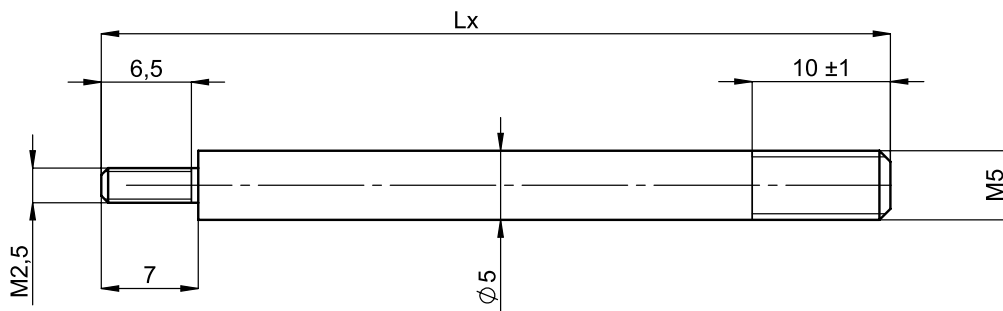
## Drawing mounting bracket



## Drawing mounting flange



## Drawing extension for armature



| $L_x$ |
|-------|
| 57    |
| 77    |
| 87    |
| 94    |
| 157   |
| 257   |
| 322   |

Dimensions in mm