

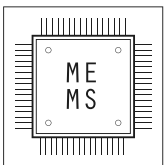
S5MA

## MEMS

ANALOG TILTMETERS

INCLINOMETERS  
& PENDULUMS





## MEMS ANALOG TILTMETERS

Inclinations measurement is essential for the supervision and for the security of civil structures in elevation during the construction and the operation phases.

MEMS tiltmeters monitor tilt changes in either one or two axial planes perpendicular to the surface of the base plate.

MEMS analog tiltmeters are permanently installed to provide a long term observation and are designed for manual readings or remote data acquisition by OMNIAlog or any other compatible logger.

### APPLICATIONS

- Structural Health Monitoring
- Bridges and piers
- Historical buildings
- Structural load testing
- Building safety along adjacent excavations
- Berms in open pit mines
- Retaining walls
- Ground subsidence

### FEATURES

- Uniaxial and biaxial versions
- Easy to install
- High performances
- Very low thermal dependency
- Long-term stability
- High dynamic range
- Precision and durability
- Small dimensions and low visual impact



Meet the essential requirements of the EMC Directive 2014/30/EU

## TECHNICAL SPECIFICATIONS

| MODELS  | 0S541MA0202 ( $\pm 2.5^\circ$ FS)<br>0S541MA0502 ( $\pm 5^\circ$ FS)<br>0S541MA1002 ( $\pm 10^\circ$ FS)                               | 0S542MA0202 ( $\pm 2.5^\circ$ FS)<br>0S542MA0502 ( $\pm 5^\circ$ FS)<br>0S542MA1002 ( $\pm 10^\circ$ FS) | 0S521MA0500 ( $\pm 5^\circ$ FS)<br>0S521MA1000 ( $\pm 10^\circ$ FS)                     | 0S522MA0500 ( $\pm 5^\circ$ FS)<br>0S522MA1000 ( $\pm 10^\circ$ FS) |
|---|--|--|---|---|
| Measurement principle                               | self-compensated MEMS inclinometer   |  | self-compensated MEMS inclinometer  |   |
| Application   | vertical surface   |  | vertical surface  |   |
| Number of axes                                      | uniaxial   | biaxial  | uniaxial  | biaxial   |
| Measuring range <sup>(1)</sup>                      | $\pm 2.5^\circ$ , $\pm 5^\circ$ , $\pm 10^\circ$   |  | $\pm 5^\circ$ , $\pm 10^\circ$  |   |
| Sensor sensitivity <sup>(3)</sup>                   | see Calibration Report   |  | see Calibration Report  |   |
| Accuracy:   |  |  |   |   |
| Lin. MPE <sup>(4)</sup>                             | $\pm 0.008^\circ$ for $\pm 2.5^\circ$ range<br>$\pm 0.012^\circ$ for $\pm 5^\circ$ range<br>$\pm 0.020^\circ$ for $\pm 10^\circ$ range |  | $\pm 0.012^\circ$ for $\pm 5^\circ$ range<br>$\pm 0.020^\circ$ for $\pm 10^\circ$ range |   |
| Pol. MPE <sup>(4)</sup>                             | $\pm 0.004^\circ$ for $\pm 2.5^\circ$ range<br>$\pm 0.006^\circ$ for $\pm 5^\circ$ range<br>$\pm 0.010^\circ$ for $\pm 10^\circ$ range |  | $\pm 0.006^\circ$ for $\pm 5^\circ$ range<br>$\pm 0.010^\circ$ for $\pm 10^\circ$ range |   |
| Sensor stability @ 30 days <sup>(2)</sup>           | <0.008°  |  | not available   |   |
| Sensor resolution                                   | 0.01 % FS  |  | 0.01 % FS   |   |
| Sensor mechanical bandwidth                         | 18 Hz  |  | 18 Hz   |   |
| Offset temperature dependency (from -20°C to +70°C) | $\pm 0.003^\circ / ^\circ\text{C}$   |  | $\pm 0.003^\circ / ^\circ\text{C}$  |   |
| Power supply  | from 18 to 30 Vdc  |  | from 18 to 30 Vdc   |   |
| Temperature operating range                         | from -30°C to +70°C  |  | from -30°C to +70°C   |   |
| On-board temperature sensor                         | NTC 3 k $\Omega$ Thermistor  |  | NTC 3 k $\Omega$ Thermistor   |   |
| - measuring range                                   | from -50°C to +150°C   |  | from -50°C to +150°C  |   |
| - accuracy  | $\pm 0.5^\circ\text{C}$ (0 to +50°C)   |  | $\pm 0.5^\circ\text{C}$ (0 to +50°C)  |   |
| Output signal                                       | 4-20 mA current loop (inclination), Ohm (temperature)  |  | 4-20 mA current loop (inclination), Ohm (temperature)                                   |   |
| Signal cable  | 0WE106IP0ZH  |  | 0WE106IP0ZH   |   |
| Cabling   | M12 male 8-pin connector on sensor body  |  | cable wired at factory into sensor body to grant waterproofing                          |   |
| Max. cable length to logger                         | 1000 m (for more information see <a href="#">FAQ #073</a> ) <sup>(5)</sup>   |  |   |   |

(1) Other ranges available on request

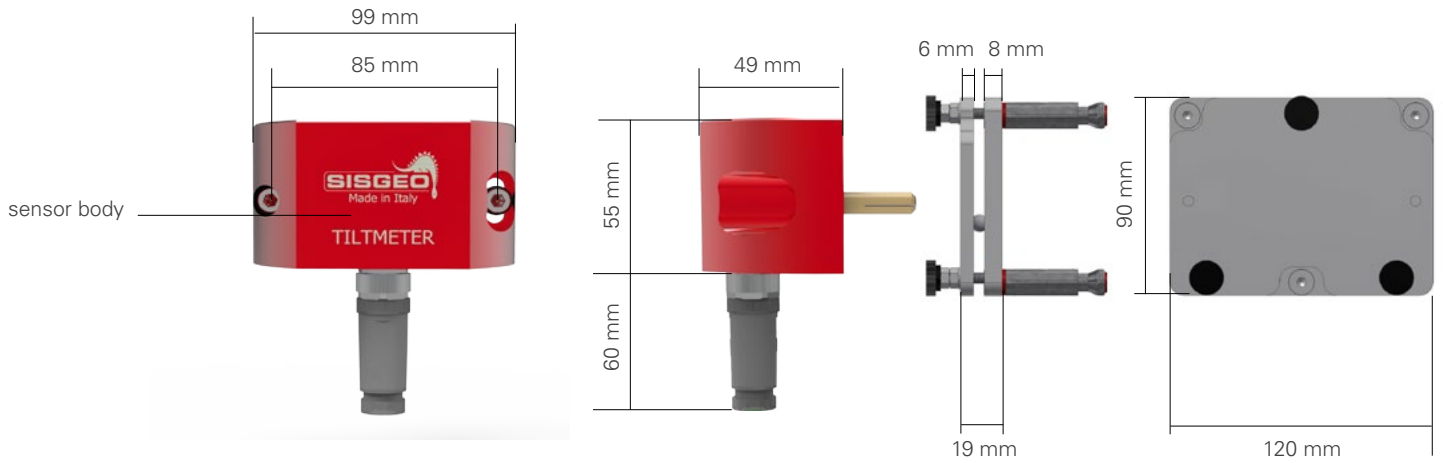
(2) Stability calculated as difference after 30 days under repeatability conditions.

(3) Sensitivity is a specific parameter different for every gauge. The sensitivity is calculated during gauge calibration test and inserted into the Calibration Report.

(4) MPE is the Maximum Permitted Error on the measuring range (FSR). In the Calibration Report, the accuracies of the gauge are calculated using both linear regression ( $\leq$  Lin. MPE) and polynomial correction ( $\leq$  Pol. MPE)

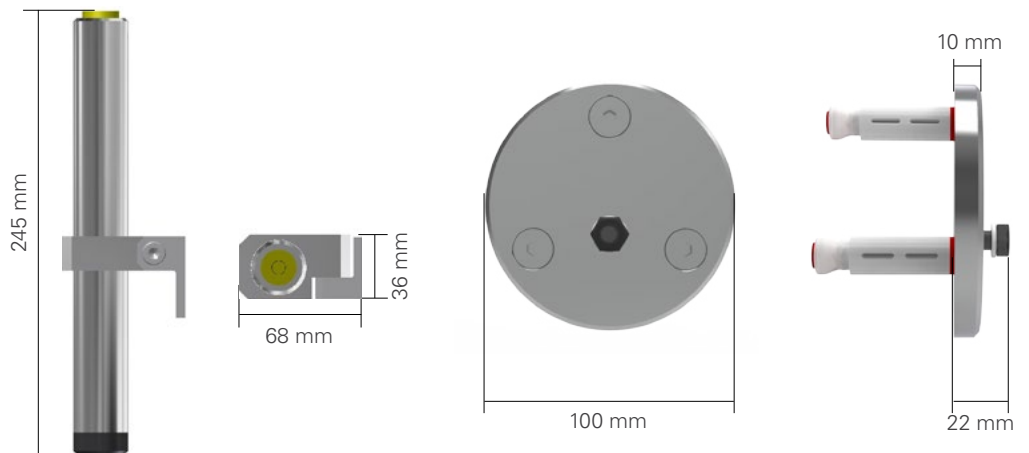
(5) Refer to FAQ section on Sisgeo website: [www.sisgeo.com/faq](http://www.sisgeo.com/faq)

## PHYSICAL FEATURES



### DIMENSIONS AND MATERIALS

|                                | TILTMETERS S541MA, S542MA              | ADJUSTMENT PLATE 0S540AP3D02         |
|--------------------------------|--|--------------------------------------|
| Sensor body dimensions (LxHxW) | 99 x 55 x 49 mm                        | -                                    |
| Mounting screws                | N.2 fischer anchor bolts model PO M6   | N.3 fischer anchor bolts model SL M6 |
| Overall dimensions (LxHxW)     | 99 x 115 x 49 mm (including connector) | 90 x 120 x 61 mm                     |
| Material                       | anodized aluminum                      | stainless steel                      |
| IP class                       | IP67                                   | -                                    |

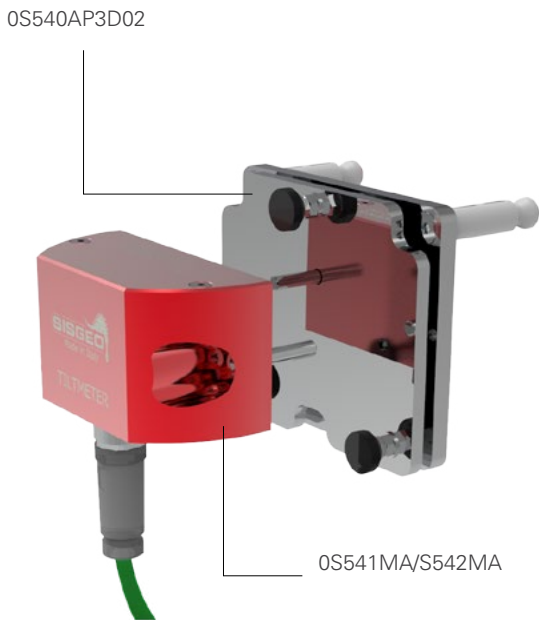


|                           | TILTMETERS S521MA, S522MA | MOUNTING PLATE 0S500PF1000           |
|---------------------------|---------------------------|--------------------------------------|
| Sensor body dimensions    | Ø 30x245 mm               | -                                    |
| Mounting screws           | -                         | N.3 fischer anchor bolts model SL M6 |
| Overall dimension (LxWxH) | 36x68x245 mm              | diam 100 mm, thickness 10 mm         |
| Material                  | stainless steel           | stainless steel                      |
| Protection                | IP68 (2.0 MPa)            | -                                    |

## ACCESSORIES AND SPARE PARTS

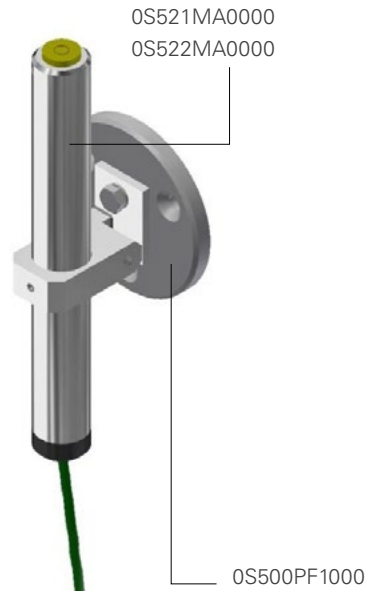
### ADJUSTMENT PLATE FOR S541/S542 OS540AP3D02

Fine adjustment plate for S541MA and S542MA tiltmeters, especially recommended for the small ranges ( $\pm 2.5^\circ$  and  $\pm 5^\circ$ ). Working on three knobs, you can set the tiltmeter at the right position.



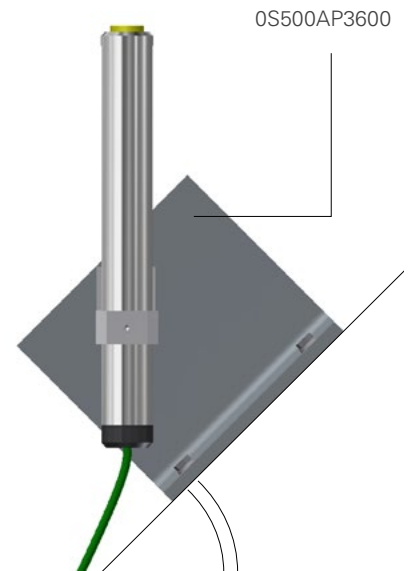
### MOUNTING PLATE FOR S520 OS500PF1000

Stainless steel circular plate with three anchors for S521MA and S522MA wall mounting.

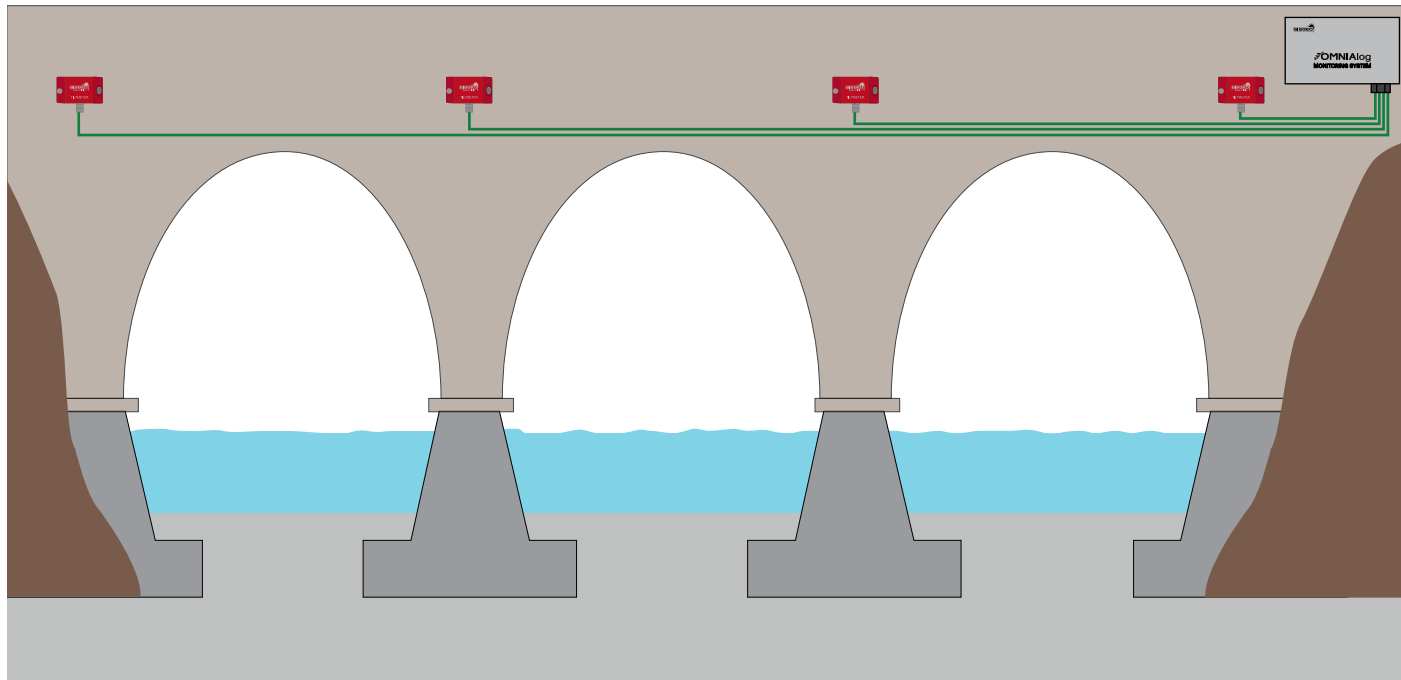


### PLATE FOR SLOPED SURFACE OS500AP3600

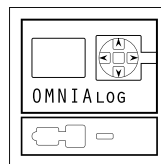
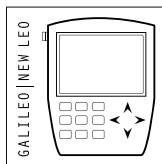
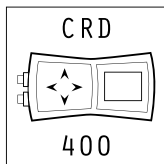
Plate for installation of S521MA and S522MA tiltmeters onto sloped surface. It consists of a galvanized iron bracket with overall dimensions 130x140x65mm.



AN EXAMPLE OF INSTALLATION ON ARCH BRIDGE



READABLE BY



For further information refer to their own datasheets

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ADDITIONAL SUPPORT

SISGEO offers on-line assistance service to the Customers in order to maximize the performance of the system and training on the correct use of the instrument/readout.

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