

# POSITAL

FRABA

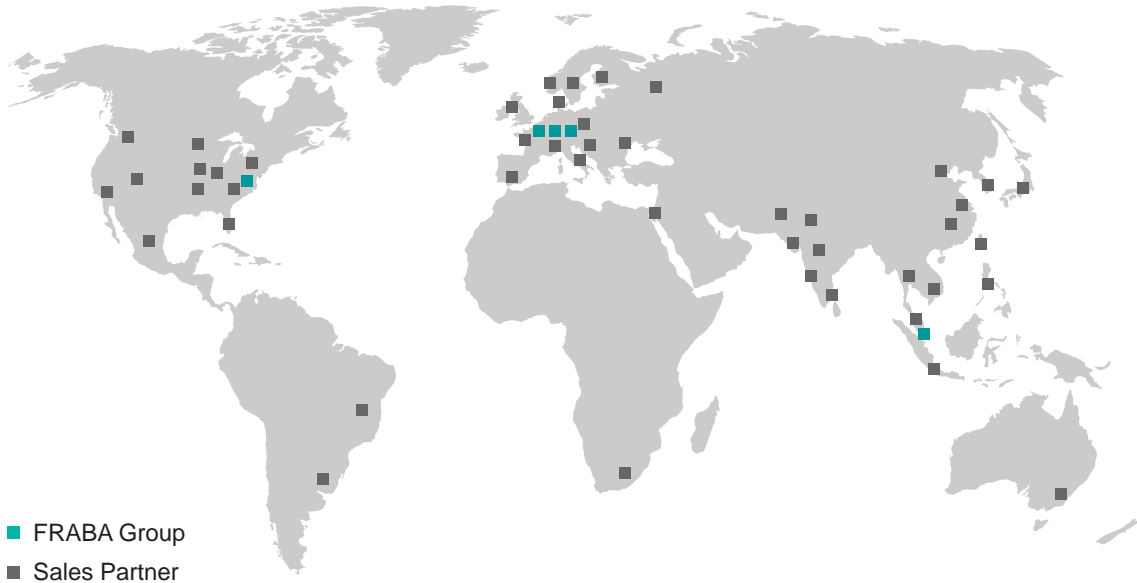
POSITION AND MOTION SENSORS



## Inclinometer Selection Guide



## GLOBAL PRESENCE



### America

FRABA Inc.  
Hamilton, NJ, USA

### Asia

FRABA Pte. Ltd.  
Singapore

### Europe

POSITAL GmbH  
Cologne, Germany

### R&D Center

Centitech GmbH  
Aachen, Germany

### Manufacturing

Consitics Sp. z o.o.  
Slubice, Poland

### Holding

FRABA N.V.  
Heerlen, The Netherlands

### Sales Partners Present in

Argentina  
Australia  
Austria  
Belarus  
Brazil  
Canada  
China  
Czech Republic  
Denmark  
Finland  
France  
Germany  
India

Indonesia  
Israel  
Italy  
Japan  
Malaysia  
Mexico  
Netherlands, The  
Norway  
Pakistan  
Philippines  
Poland  
Russia  
Singapore

Slovakia  
South Africa  
South Korea  
Spain  
Sweden  
Switzerland  
Taiwan  
Thailand  
U.K.  
USA  
Ukraine

Please visit our website for partner contacts in all countries as the list is constantly growing.



## PRODUCTS



### IXARC Rotary Encoders

Motion control applications – ranging from factory automation to mobile machinery – require accurate, realtime information about the location of mechanical equipment. The IXARC line of absolute rotary encoders provide precise and reliable measurement of the angular positions of joints, drive shafts, pulleys, etc... Available electronic connections range from simple analog outputs to sophisticated fieldbus and Industrial Ethernet interfaces.

### TILTIX Inclinometers

Accurate measurement of tilt or inclination is very important for motion control and safety systems. Inclinometers provide single or dual-axis angle measurement in an economical package. Relying on gravity for their measurement, these sensors have no exposed moving parts, resulting in easy mounting and high environmental protection.



### LINARIX Linear Sensors

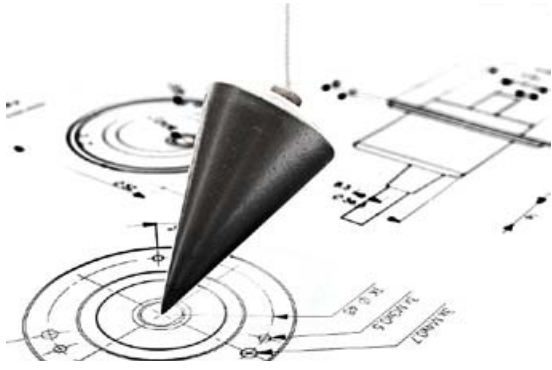
Many applications require linear motion to be monitored for system control or to ensure safety. With lengths ranging from 1 m to 10 m (3' to 33'), LINARIX draw wire sensors are available in many configurations to meet an application's requirements. Options include a wide variety of outputs (including analog, fieldbus and Ethernet variants), heavy duty housings and compact designs.

### Accessories

POSITAL offers a wide variety of accessories that simplify sensor installation. Mating connectors of different styles and lengths ensure proper electrical connections. Using appropriate mounting accessories minimize wear and tear on encoders and help to ensure a long and reliable life cycle. Interface modules and displays are also available to provide users with immediate access to measurements.



# TECHNOLOGY TILTIX INCLINOMETERS



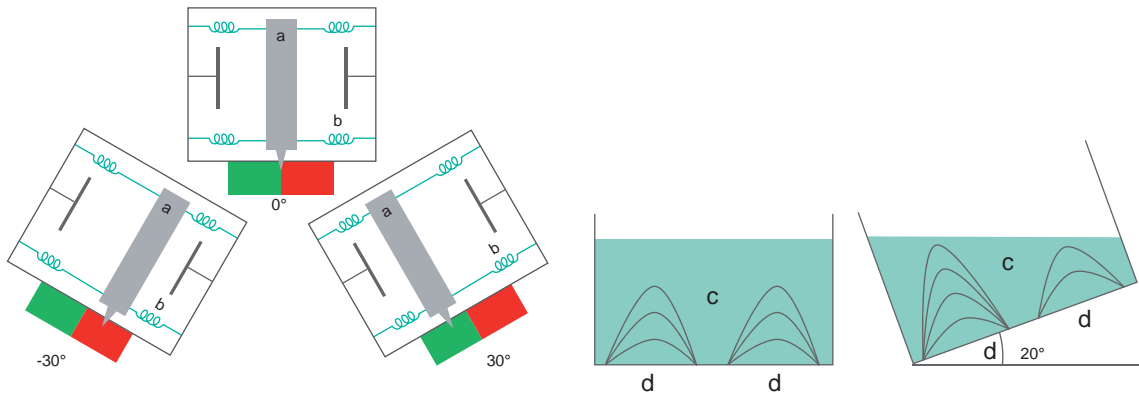
POSITAL's TILTIX Inclinometers are based on highly dynamic MEMS (Micro-Electro-Mechanical Systems) technology and on high precision Fluid Cell Technology.

### MEMS

In MEMS devices, a 'micro mass' (a) is suspended in a flexible support structure (b). Any movement will induce a displacement of the mass, which will result in a change of the capacitance between the mass and the holding structure. Changes of inclination are calculated from these measured capacitance changes. These inclinometers have a measurement range of  $\pm 80^\circ$  in two axes or  $360^\circ$  in one axis. The devices can withstand shock and vibration loadings of up to 100 g as per EN 60068-2-27.

### Fluid Cell

In fluid filled inclinometers a sensor cell is partially filled with an electrolytic liquid (c) and the walls are covered with a pair of electrodes (d). As the sensor tilts, the level of fluid covering the electrodes changes. This results in an increase or decrease of conductivity between the electrodes. From this measurement tilt can be calculated. Fluid Cells are capable of measuring inclinations of up to  $\pm 30^\circ$  with a very high level of precision. The natural damping of liquids makes these inclinometers precise as well as stable.



## PRODUCT OVERVIEW TILTIX INCLINOMETERS

### Inclinometers with MEMS Technology



|                                    |  |                                 |  |
|------------------------------------|--|---------------------------------|--|
| Highlights                         | MEMS<br>Programmable Analog                        | MEMS<br>SSI                     | MEMS<br>Bus Interfaces                             |
| Protection Class                   | Up to IP69K / IP68                                 | Up to IP69K / IP68              | Up to IP69K / IP68                                 |
| Communication Interface            | Analog,<br>Voltage,<br>Current                     | SSI                             | CANopen,<br>DeviceNet,<br>SAE J1939                |
| Technology                         | MEMS   | MEMS                            | MEMS   |
| Max Measurement Range              | 2-axis $\pm 80^\circ$ /<br>1-axis 0 to $360^\circ$ | 1-axis $0^\circ$ to $360^\circ$ | 2-axis $\pm 80^\circ$ /<br>1-axis 0 to $360^\circ$ |
| Resolution                         | 0.01°  | 0.04°                           | 0.01°  |
| Accuracy                           | 0.1°   | 0.1°                            | 0.1°   |
| Material Housing                   | Aluminum   | Aluminum                        | Aluminum   |
| Shock /<br>Vibration <sup>1)</sup> | 100 g /<br>20 g                                    | 100 g /<br>20 g                 | 100 g /<br>20 g                                    |
| Temperature<br>in °C [°F]          | -40 to +85<br>[-40 to 185]                         | -40 to +85<br>[-40 to 185]      | -40 to +85<br>[-40 to 185]                         |
| Supply Voltage                     | 10 to 30 V   | 5 to 30 V                       | 10 to 30 V   |
| Connection Type                    | Cable /<br>Connector (M12)                         | Cable /<br>Connector (M12)      | Cable /<br>Connector (M12)                         |
| Certificates                       | CE   | CE                              | CE   |
| Type Key                           | ACS-...-H2-..                                      | ACS-...-S1...-H2                | ACS-...-CA/D1...-H2-..                             |

<sup>1)</sup> Based on (EN 60068-2-27) / (EN 60068-2-6)

**Please refer to the product finder on our website for all possible combinations.**

## PRODUCT OVERVIEW TILTIX INCLINOMETERS

### Inclinometers with MEMS and Fluid Cell Technology



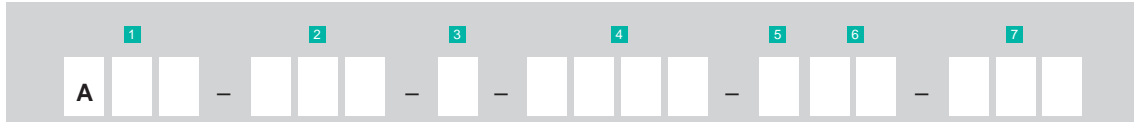
|                                 |  |                                 |  |                            |                            |
|---------------------------------|--|---------------------------------|--|----------------------------|----------------------------|
| Highlights                      | MEMS<br>Programmable<br>Analog                     | MEMS<br>SSI                     | MEMS<br>Bus Interfaces                             | Fluid Cell<br>Analog       | Fluid Cell<br>CANopen      |
| Protection Class                | Up to IP69K / IP68                                 | Up to IP69K / IP68              | Up to IP69K / IP68                                 | IP67                       | IP67                       |
| Communication Interface         | Analog Voltage or Current                          | SSI                             | CANopen, DeviceNet, SAE J1939                      | Analog Voltage or Current  | CANopen                    |
| Technology                      | MEMS   | MEMS                            | MEMS   | Fluid Cell                 | Fluid Cell                 |
| Max. Measurement Range          | 2-axis $\pm 80^\circ$ /<br>1-axis 0 to $360^\circ$ | 1-axis $0^\circ$ to $360^\circ$ | 2-axis $\pm 80^\circ$ /<br>1-axis 0 to $360^\circ$ | 2-axis $\pm 30^\circ$      | 2-axis $\pm 30^\circ$      |
| Resolution                      | 0.01°  | 0.04°                           | 0.01°  | 0.001°                     | 0.001°                     |
| Accuracy                        | 0.1°   | 0.1°                            | 0.1°   | 0.01°                      | 0.01°                      |
| Material Housing                | Fiber Reinforced Plastic                           | Fiber Reinforced Plastic        | Fiber Reinforced Plastic                           | Aluminum                   | Aluminum                   |
| Shock / Vibration <sup>1)</sup> | 100 g /<br>20 g                                    | 100 g /<br>20 g                 | 100 g /<br>20 g                                    | 30 g /<br>5 g              | 30 g /<br>5 g              |
| Temperature in °C [°F]          | -40 to +85<br>[-40 to 185]                         | -40 to +85<br>[-40 to 185]      | -40 to +85<br>[-40 to 185]                         | -40 to +85<br>[-40 to 185] | -40 to +85<br>[-40 to 185] |
| Supply Voltage                  | 10 to 30 V   | 5 to 30 V                       | 10 to 30 V   | 10 to 30 V                 | 10 to 30 V                 |
| Connection Type                 | Cable /<br>Connector (M12)                         | Cable /<br>Connector (M12)      | Cable /<br>Connector (M12)                         | Cable /<br>Connector (M12) | Cable /<br>Connector (M12) |
| Certificates                    | CE   | CE                              | CE   | CE                         | CE                         |
| Type Key                        | ACS-...-E2-..                                      | ACS-...-S1...-E2                | ACS-...-CA/D1...<br>-E2-..                         | AGS-..                     | AGS-..                     |

1) Based on (EN 60068-2-27) / (EN 60068-2-6)

**Please refer to the product finder on our website for all possible combinations.**

# PRODUCT SELECTION GUIDE TILTIX INCLINOMETERS

## TILTIX Inclinator



### 1 Technology

- ACS** MEMS
- AGS** Fluid Cells

### 2 Measurement Range

- 005** ±5° (AGS)
- 010** ±10° (ACS)
- 015** ±15° (AGS)
- 020** ±20° (ACS)
- 030** ±30° (AGS)
- 040** ±40° (ACS)
- 060** ±60° (ACS)
- 080** ±80° (ACS)
- 090** 90° (ACS)
- 120** 120° (ACS)
- 180** 180° (ACS)
- 270** 270° (ACS)
- 360** 360° (ACS)

### 3 Number of Axis

- 1** Single Axis (ACS only)
- 2** Dual Axis

### 4 Communication Interface

- CA01** CANopen (ACS)
- CA1** CANopen (AGS)
- D101** DeviceNet (ACS)
- DP1** Profibus DP (AGS)
- S101** SSI (ACS) Binary
- S302** SSI (ACS) Gray
- SV00** Voltage + RS232 (ACS)
- SV1** Voltage + RS232 (AGS)
- SC00** Current + RS232 (ACS)
- SC1** Current + RS232 (AGS)
- S01** RS232 (AGS)
- SP1** PWM (AGS)
- SS1** Switch (AGS)

### 5 Mounting

- H** Horizontal (Dual Axis)
- V** Vertical (Single Axis)

### 6 Housing Material

- E2** Fibre-Reinforced Plastic
- H2** Aluminum (ACS)
- 0H** Aluminum (AGS)

### 7 Connection Type

- PM** M12 Connector (ACS)
- CW** Cable Exit (ACS)
- P8M** Connector (AGS)
- CRW** Cable Exit (AGS)

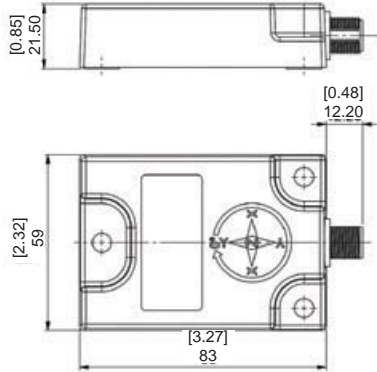
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# PRODUCT SELECTION GUIDE TILTIX INCLINOMETERS

## Mechanical Options TILTIX Inclinerometer

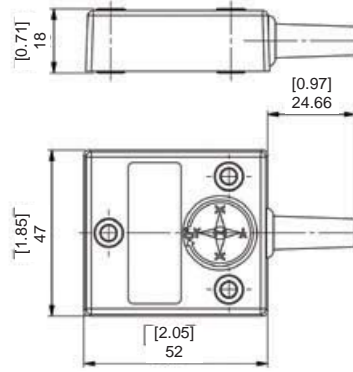
### MEMS, Fibre-Reinforced Plastic, Connector

ACS-----E2-PM



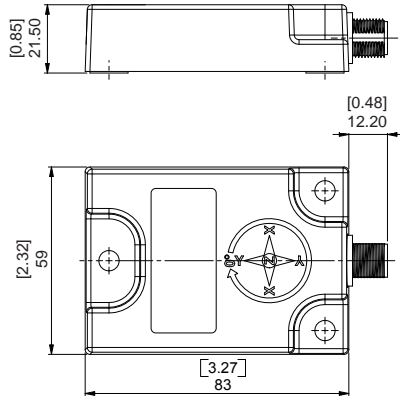
### MEMS, Fibre-Reinforced Plastic, Cable

ACS-----E2-CW



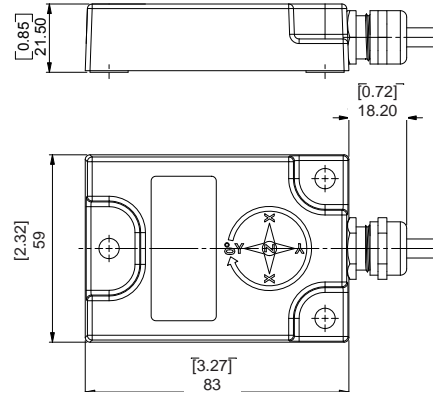
### MEMS, Aluminum, Connector

ACS-----H2-PM



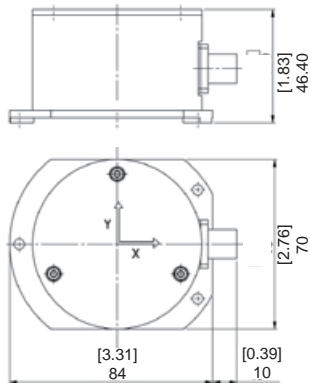
### MEMS, Aluminum, Cable

ACS-----H2-CW



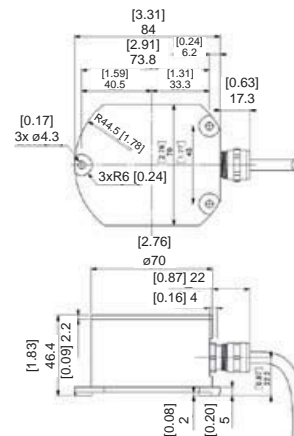
### Fluid Cell, Connector

AGS-----P8M



### Fluid Cell, Cable

AGS-----CRW



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