

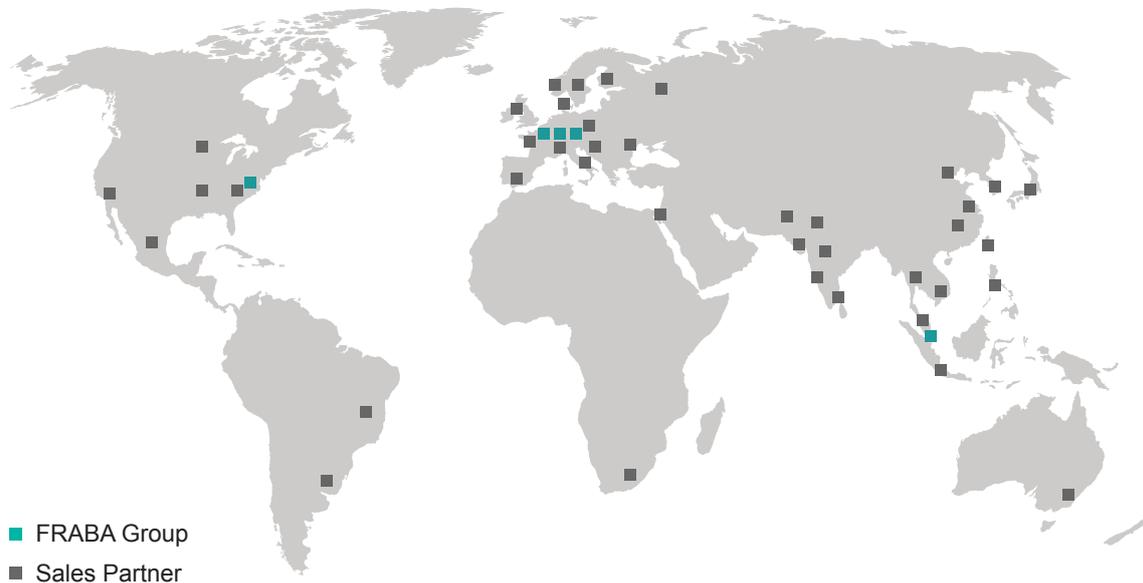
# POSITAL FRABA

## POSITION SENSORS



**Always Making Sense**

## 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.

## GLOBAL PRESENCE



### FRABA Group

FRABA is a group of enterprises focused on providing advanced products for the motion control and industrial automation markets. POSITAL has been a leading manufacturer of absolute rotary encoders for over 40 years and the last years has expanded its business to inclination and non-contact length and velocity sensors. Other FRABA Group subsidiaries include VITECTOR which focuses on protection sensors to guard doors and production machine covers.

### History

The company was founded by Franz Baumgartner in Cologne in 1918. Until the 1960s, FRABA's main product was mechanical relays. This business was supported by the company's systems engineering division, which was responsible for over 13,000 machine control systems. FRABA developed one of the first absolute rotary encoders in 1973. Today, FRABA companies specialize in innovative products that use advanced technologies to deliver exceptional performance and value.



### Service

Absolute rotary encoders are sophisticated devices that can help solve a wide range of technical problems. However, realizing the full potential of these products may require specialized knowledge when selecting the device configuration and programming the operating parameters. To ensure that customers get what they need, POSITAL's development engineers in Germany, the US and Asia have direct responsibility for customer support. In addition, a growing global network of sales partners is providing expert guidance with knowledge about the local requirements.

### Production

POSITAL products are manufactured in advanced production facilities. The computer-guided semi-automated production system tracks each device from order, through assembly and testing, to final delivery. Even with thousands of unique configurations available, standard products are ready to ship within five working days of receiving an order.



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Version 20130426

## PRODUCTS



### Rotary Encoders – IXARC

Motion control applications – ranging from factory automation to mobile machinery – require precise, real-time information about the physical location of mechanical equipment. The IXARC line of absolute rotary encoders can provide precise and unambiguous measurements of the angular positions of joints, drive shafts, pulleys, etc. in real time. This makes absolute rotary encoders an ideal way of linking mechanical components to an electronic control system.

### Inclinometers – TILTIX

Accurate measurement of the degree of tilt or inclination can be very important for motion control systems or to ensure safety. The TILTIX line of inclinometers offers an easy and efficient way of monitoring spatial orientation without the need for mechanical linkages. This feature, plus the durable packaging of many inclinometers means that these devices can be placed almost anywhere – a real advantage for design engineers!



### Linear Sensors – LINARIX

Many applications require linear motion to be monitored for system control or to ensure safety. The LINARIX line of draw wire sensors is best suited for such applications and provides a diverse selection for the customer. We offer a wide range of measurement lengths ranging from 1 m to 15 m and also provide position output in almost all available industrial interfaces both analog and digital. The draw wire sensors from POSITAL provide extremely precise measurements because of the inherent accuracy of the encoders and the rugged construction ensures reliable performance even under extreme conditions.

### Accessories

POSITAL offers a wide variety of accessories that simplify the installation process of our sensors. Connectors and cable assemblies of different sizes, couplings, adapter flanges and clamp discs for exact fitting as well as interface modules and displays are a few of the available accessories.



## APPLICATIONS TOUGH POSITION



### Drilling

Drill rigs, bucket wheel excavators and mobile hammering machines have multiple axis and joints between their arms. Precise positioning information between the arms is necessary in order to identify the exact position of the tip of the arm and have a controlled movement of the arm, in an application where safety is the prime concern. Moreover, maintaining a constant drill angle is imperative for high performance. Moving away from a given angle can be dangerous and costly to the project. Typically in such applications there are strong vibrations. IXARC encoders and TILTIX inclinometers are available with heavy duty housing and very high protection class. Sometimes where flammable gases are present, explosion proof encoders can also be used.

### Cranes

Cranes and other loading equipments are required to operate safely and precisely. Positioning is of pri-

me importance here, and a lot of time redundancy is used to ensure that no errors are being made. The IXARC SIL-2 encoders fit perfectly in this application. The LINARIX magnetic sensors used for height measurement; come in an extremely small package and are highly tolerant to condensation, shock and vibration.

### Concrete Pumps

Concrete pumps have a large number of joints and axis of rotation. They have to feed fresh concrete to high-rise construction sites, often over high obstacles. IXARC rotary encoders are being used directly on the rotational joint providing active damping of the multiple arms. Concrete pumps have to handle very tough environments. On top of that these machines are cleaned with high pressure steam. By avoiding direct coupling to a shaft, a fully enclosed measuring device like a TILTIX inclinometer will stand up to these rough conditions.



## APPLICATIONS TOUGH POSITION



### Wind Energy

IXARC heavy duty absolute encoders guarantee precise angle measurement for the pitch control system that dynamically controls the angle of the rotor blades. Encoders with a high resolution are a great choice for positioning the nacelle depending on the wind direction.

### Solar Energy

For both photovoltaic systems and solar thermal power plants (parabolic), solar tracking systems increase energy efficiency by optimizing the orientation of the solar collectors with respect to the sun. Single-axis solar tracking systems typically follow the sun as it travels east to west across the sky, while two axis systems also adjust the vertical orientation of the collectors with the help of compact and accurate IXARC encoders and TILTIX inclinometers.



### Dams and Canals

In several dams for hydro energy generation a precise positioning of the flow gates is required to control the amount and speed of water flowing through. These gates both open in an angular fashion or vertically and use the TILTIX inclinometers or LINARIX linear sensors respectively. The standard analog interfaces make the control system very simple.

Canal gates used for irrigation as well as transportation needs to be precisely positioned in order to control the amount of water in the canals. Moreover the canals are spread over vast areas and these gates are powered at times with solar energy due to vast distances. IXARC absolute multiturn encoders are used for gate positioning as they do not need to be powered all the time to remember their position.



## APPLICATIONS INDUSTRIAL GRADE



### Packaging and Pharma Machines

Packaging machines have multiple processes like form filling and sealing, palletizing, pick and place, cartoning and cardboard folding where absolute position encoders are used. Normally these machines have a lot of sensors the IXARC absolute field bus encoders help in reducing cabling and system costs.

Pharma machines need to have a very precise positioning of bottles for filling it with the right amount and correct batch of medicine. IXARC absolute encoders provide good track and traceability during power failures for this time critical industry.

### Textile and Plastic Manufacturing Machines

Textile and Plastic Manufacturing is highly process driven with various stages along multiple drive rollers. The material manufactured is changed periodically and constant adjustments need to be made in the roll positioning as well as positioning of various

nozzles controlling the production process. IXARC absolute encoders and LINARIX linear sensors are used for these applications.

### Food and Beverage Machines

Bottling plants are becoming faster by the day for feeding the growing global demands. Each of these bottles must be filled to the right level and labelled correctly. IXARC encoders are used to ensure this precise positioning of these bottles.

Increased food prices are forcing manufactures to reduce wastage. These manufactures have to comply with strict laws and hence need to pack and process these goods at the right time and quickly. IXARC encoders and LINARIX linear sensors help achieve this efficiency. POSITAL offers a wide range of non-corrosive stainless steel products with various standard industrial interfaces



## APPLICATIONS INDUSTRIAL GRADE



### Scissor Lifts and Aerial work Platforms

Each Scissor lift needs constant monitoring of the tilt due to safety reasons. The height of the lift also needs to be precisely determined. TILTIX inclinometers and LINARIX linear sensors are perfect for such applications. IXARC absolute encoders help measure the position of the Aerial work platform with respect to a ground reference.

### Forklifts and Automated Guided Vehicles

In forklifts and AGV's safety is of utmost importance as these vehicles carry load from one point to another. Monitoring the tilt as well as the height of the forks is necessary and the TILTIX inclinometers and LINARIX linear sensors help achieving this.

### Automatic Storage Retrieval System

Increasing warehouse and labor costs make the use of automatic storage and retrieval systems economical. The IXARC absolute encoders and LINARIX linear sensors are used in these systems to give the

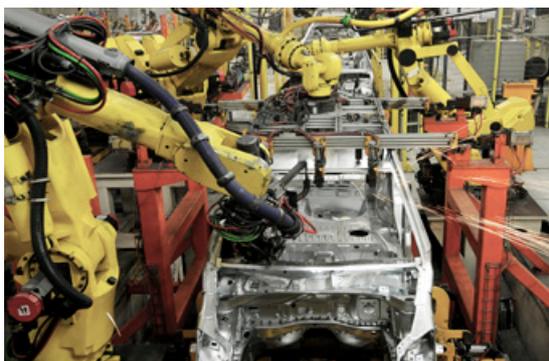
position of the trays with respect to the vertical racks where the goods are placed.

### Overhead Conveyors

Assembly lines for automotive production have dedicated work stations for different processes. The vehicle chassis is moved through a series of such work stations using overhead conveyors. A precise position of the overhead conveyors is needed in an automated assembly line with robots. IXARC absolute encoders help achieve this level of precision.

### Baggage Handling

Due to stringent security requirements all airline baggage need to be screened and distributed in a fool proof manner at each airport. A labyrinth of conveyors helps sort these in a correct fashion. IXARC absolute bus encoders help track the position of multiple baggage conveyors. The reduced wiring and programmability reduces the system cost to a great extent.



APPLICATIONS COST EFFICIENT



**Health Care**

Modern devices used in the Healthcare industry demand advanced technology for precise positioning. With TILTIX inclinometers you can keep track of the exact angle of your CT scanner with no extra equipment needed. Our compact inclinometers always provide an accurate measurement output and guarantee a long life span. LINARIX linear sensors can offer a solution for determining length and height measurements of your CT or operating tables. For applications that need position monitoring from several directions, such as fluoroscopy or radiography tables, Surgical C-arms or Navigation-Mobile C-arms, the IXARC absolute rotary encoders are the right solution.

**Elevators**

Elevator car units need to be accurately positioned with respect to each floor of a building. IXARC absolute encoders help provide this information without the need of a ground reference. During power failures the elevator car shall always know where it is positioned. IXARC encoders are available with the CANopen Lift protocol fulfilling the high safety standards of this industry. Cost efficient LINARIX linear sensors are used for door positioning.



## ABSOLUTE VS INCREMENTAL ENCODERS



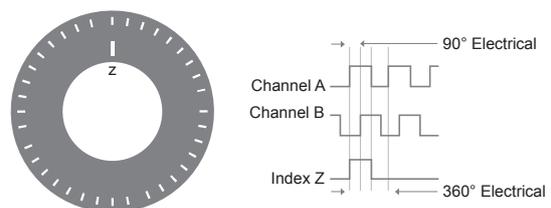
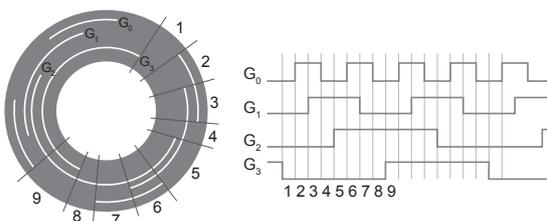
Positioning tasks require precise position values to monitor or control motion activity. In many applications position sensing is done using rotary encoders, also called shaft encoders or simply encoders. These sensors transform a mechanical angular position of a shaft or axle into an electronic signal that can be processed by a control system.

### Absolute Rotary Encoders

Absolute rotary encoders are capable of providing unique position values from the moment they are switched on as well as immediately after a power loss. This is accomplished by scanning the position of a coded material. All positions in these systems correspond to a fixed code. Even movements that occur while the system is without power are translated into accurate position values at once when the encoder is powered up again.

### Incremental Rotary Encoders

Incremental encoders measure angle values by counting a material with a periodic pattern, starting from an arbitrary origin. This measuring method does not inherently render absolute positions for a measured signal. Initial homing to a reference point is therefore inevitable in all positioning tasks, both upon start up of the control system and whenever power to the encoder has been interrupted.



## TECHNOLOGY MAGNETIC ENCODER – IXARC

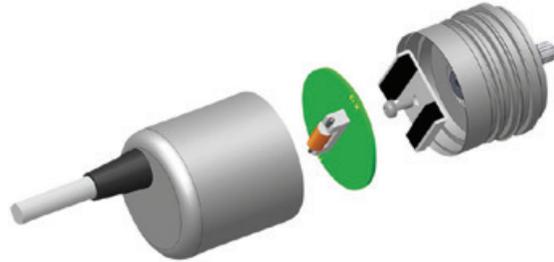


### Magnetic Measurement Principles

Magnetic rotary encoders determine angular position using magnetic field sensor technology. A permanent magnet (a) fixed to the encoder's shaft creates a magnetic field (b) that is sampled by a sensor (c) that generates a unique absolute position reading.

### Multiturn Innovation

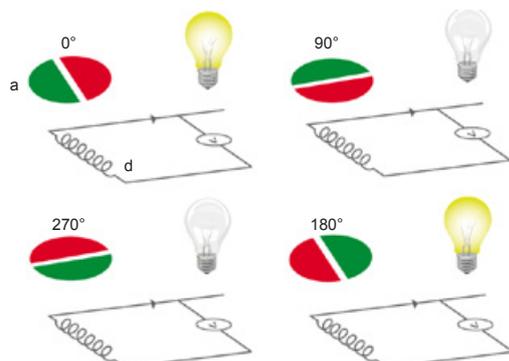
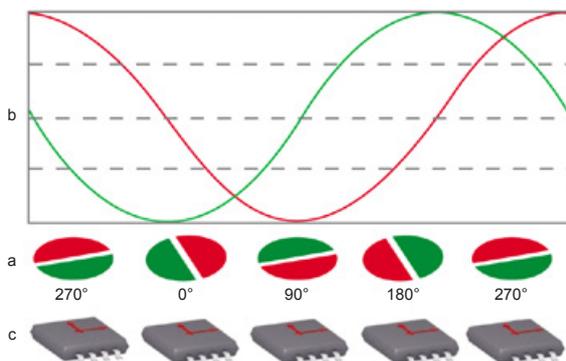
POSITAL's IXARC multiturn magnetic rotary encoders use an innovative technology to keep track of the number of rotations that the encoder has experienced, even if the rotations occur when there is no system power. To accomplish this, the encoders generate electrical energy from the rotation of the encoder shaft. The technology is based on the 'Wiegand effect': when a permanent magnet (a) on the encoder shaft rotates through a certain angle, the magnetic polarity in a 'Wiegand wire' suddenly changes, inducing a brief voltage spike in a coil (d)



surrounding the wire. This pulse both marks a rotation of the shaft and powers the electronic circuitry that records the event. The Wiegand effect occurs reliably even with very slow rotations and requires no backup batteries.

### Advantages of Magnetic Encoders

Magnetic encoders are robust, durable and compact. Their battery and gearless construction makes them mechanically simple and cost efficient as compared to optical encoders. Their compact dimensions mean that they can be used in applications with very limited installation space.

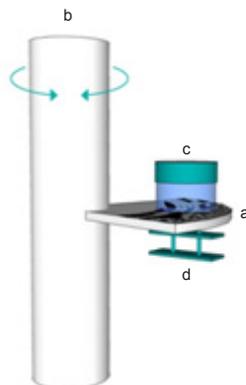


## TECHNOLOGY OPTICAL ENCODER – IXARC



### Measuring Principles

A key component of optical rotary encoders is a code disk (a) mounted on the encoder shaft (b). This is a disk made of transparent material that carries a concentric pattern of transparent and opaque areas. Infrared light from an LED (c) shines through the code disk, onto an array of photoreceptors (d). As the shaft turns, a unique combination of photoreceptors are illuminated or blocked from light by the pattern on the disk. For multiturn models, there is an additional set of code discs arranged in a gear train (e). As the main encoder shaft rotates, these discs are geared together to turn like the wheels of an odometer. The rotational position of each disc is monitored optically and the output is a count of the net number of rotations of the encoder shaft.

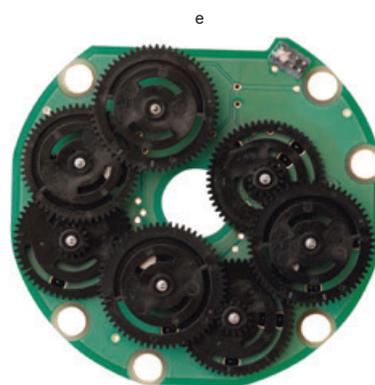


### Functionality

POSITAL's IXARC optical absolute rotary encoders use highly integrated Opto-ASICs, providing a resolution up to 16 bits (65,536 steps) per turn, along with incremental signals. For multiturn models, the measuring range is extended by the mechanically geared code disks to as many as 16,384 ( $2^{14}$ ) revolutions.

### Advantages of Optical Encoders

Optical encoders provide very high resolution and accuracy along with excellent dynamic response and are suitable for use in areas with high magnetic fields. As well, since the rotation of the code discs is an entirely mechanical process, there is no risk of these devices losing track of their absolute position due to a temporary loss of instrument power. No backup batteries are required!



## PRODUCT OVERVIEW ROTARY ENCODER – IXARC

### Heavy Duty Encoders with Analog and SSI Interfaces



Highlights	Stainless Steel SSI Encoder with 300N Shaft Load	Cost Efficient IP69K SSI Encoder	Stainless Steel Analog Encoder with 300N Shaft Load	Cost Efficient IP69K Analog Encoder
Protection Class	IP69K	IP69K	IP69K	IP69K
Communication Interface	SSI	SSI	Analog Voltage, Current	Analog Voltage, Current
Technology	Magnetic	Magnetic	Magnetic	Magnetic
Revolutions (Turns)	Up to 16 bit	Up to 16 bit	Up to 32768 turns	Up to 32768 turns
Resolution	Up to 14 bit	Up to 14 bit	Total 12 bit	Total 12 bit
Accuracy / Linearity	±0.35°	±0.35°	±0.35° / 0.05 %	±0.35° / 0.05 %
Flange Size in mm [in]	42 [1.65]	36 [1.42]	42 [1.65]	36 [1.42]
Flange Type	Synchro	Synchro	Synchro	Synchro
Shaft Diameters in mm [in]	10 [0.39]	10 [0.39]	10 [0.39]	10 [0.39]
Material Flange / Housing	Stainless Steel (V2A)	Aluminum / Steel	Stainless Steel (V2A)	Aluminum / Steel
RPM / Radial Shaft Load in N	Max. 6000 / 300	Max. 6000 / 180	Max. 6000 / 300	Max. 6000 / 180
Shock / Vibration <sup>1</sup>	300 g / 30 g	300 g / 30 g	300 g / 30 g	300 g / 30 g
Temperature in °C [°F] / Humidity	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %
Connection	Connector / Cable Gland	Connector / Cable Gland	Connector / Cable Gland	Connector / Cable Gland
Supply Voltage	4.5 to 30 V	4.5 to 30 V	12 to 30 V	12 to 30 V
Certificate	UL, CE	UL, CE	UL, CE	UL, CE
Type	MCD- S...G10G-...	MCD- S...D10D-...	MCD- A...G10G-...	MCD- A...D10D-...

<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 ROTARY ENCODER – IXARC

### Heavy Duty Encoders with Bus Interfaces



Highlights	Cost Efficient IP69K CAN Encoder	High Precision CAN Encoder with IP68 Rating	Stainless Steel CAN Encoder with 300 N Shaft Load
Protection Class	IP69K	IP68	IP69K
Communication Interface	DeviceNet, CANopen (DS406), CANopen Lift (DSP417), SAE J1939	DeviceNet, CANopen (DS406), CANopen Lift (DSP417), SAE J1939	DeviceNet, CANopen (DS406), CANopen Lift (DSP417), SAE J1939
Technology	Magnetic	Optical	Magnetic
Revolutions	Up to 16 bit	Up to 14 bit	Up to 16 bit
Resolution	Up to 14 bit	Up to 16 bit	Up to 14 bit
Accuracy	±0.35°	±0.022°	±0.35°
Flange Size in mm [in]	36 [1.42]	58 [2.28]	42 [1.65]
Flange Type	Synchro	Synchro, Clamp, Blind Hollow	Synchro
Shaft Diameters in mm [in]	10 [0.39]	Shaft 10 [0.39 ] Hub from 6 to 15 [0.24 to 0.59]	10 [0.39]
Material Flange / Housing	Aluminum / Steel	Aluminum / Aluminum	Stainless Steel (V2A)
RPM /	Max. 6000 /	Max. 6000 /	Max. 6000 /
Radial Shaft Load in N	180	110	300
Shock / Vibration <sup>1</sup>	300 g / 30 g	100 g / 10 g	300 g / 30 g
Temperature in °C [°F] /	-40 to +85 [-40 to +185] /	-40 to +85 [-40 to +185] /	-40 to +85 [-40 to +185] /
Humidity	98 %	98 %	98 %
Connection	Connector / Cable Gland	Connector / Cable Gland	Connector / Cable Gland
Supply Voltage	4.5 to 30 V	4.5 to 30 V	4.5 to 30 V
Certificate	UL, CE	UL, CE	UL, CE
Type	MCD- C/D..-D10D-...	OCD- C/D..-...	MCD- C/D..-...H-...

<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 ROTARY ENCODER – IXARC

### Industrial Encoders with Analog, SSI, Bit Parallel and Incremental Interfaces



Highlights	High Precision SSI Encoder	Encoder with SSI and Incremental Interface	Compact SSI Encoder	Precise Encoder with Parallel Output	Compact Programmable Analog Encoder
Protection Class	Up to IP67	Up to IP67	Up to IP65	Up to IP67	Up to IP65
Communication Interface	SSI	SSI + Incremental	SSI	Parallel	Analog Voltage, Current
Technology	Optical	Optical	Magnetic	Optical	Magnetic
Revolutions (Turns)	Up to 14 bit	Up to 14 bit	Up to 16 bit	Up to 14 bit	Up to 32768 turns
Resolution	Up to 16 bit	Up to 16 bit	Up to 14 bit	Up to 16 bit	Total 12 bits
Accuracy / Linearity	$\pm 0.022^\circ$	$\pm 0.022^\circ$	$\pm 0.35^\circ$	$\pm 0.022^\circ$	$\pm 0.35^\circ$ / 0.05 %
Flange Size in mm [in]	58 [2.28]	58 [2.28]	36 [1.42] / 58 [2.28]	58 [2.28]	36 [1.42] / 58 [2.28]
Flange Type	All	All	All	All	All
Shaft Diameters in mm [in]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]
Material Flange / Housing	Aluminum or Stainless Steel / Steel	Aluminum or Stainless Steel / Steel	Aluminum / Steel	Aluminum or Stainless Steel / Steel	Aluminum / Steel
RPM / Radial Shaft Load in N	Max. 12000 / 110	Max. 12000 / 110	Max. 12000 / 110	Max. 12000 / 110	Max. 12000 / 110
Shock / Vibration <sup>1</sup>	100 g / 10 g	100 g / 10 g	100 g / 10 g	100 g / 10 g	100 g / 10 g
Temperature in °C [°F] / Humidity	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %
Connection	Connector / Cable Gland	Connector / Cable Gland	Connector / Cable Gland	Connector / Cable Gland	Connector / Cable Gland
Supply Voltage	4.5 to 30 V	4.5 to 30 V	4.5 to 30 V	4.5 to 30 V	12 to 30 V
Certificate	UL, CE	UL, CE	UL, CE	UL, CE	UL, CE
Type	OCD-..	OCD-..	MCD-..	OCD-..	MCD-..

<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 ROTARY ENCODER – IXARC

### Industrial Encoders with Bus Interfaces



Highlights	Encoder with PROFIBUS Interface	Precise Encoder with CAN Bus Interface	Compact Encoder with CAN Bus Interface	Precise Encoder with DeviceNet Interface	Compact Encoder with DeviceNet Interface
Protection Class	Up to IP67	Up to IP67	Up to IP65	Up to IP67	Up to IP65
Communication Interface	PROFIBUS DPV0/DPV1/DPV2	CANopen (DS406) CANopen Lift (DSP417)	CANopen (DS406) CANopen Lift (DSP417)	DeviceNet	DeviceNet
Technology	Optical	Optical	Magnetic	Optical	Magnetic
Revolutions	Up to 14 bit	Up to 14 bit	Up to 16 bit	Up to 14 bit	Up to 16 bit
Resolution	Up to 16 bit	Up to 16 bit	Up to 14 bit	Up to 16 bit	Up to 14 bit
Accuracy	±0.022°	±0.022°	±0.35°	±0.022°	±0.35°
Flange Size in mm [in]	58 [2.28]	58 [2.28]	58 [2.28]	58 [2.28]	36 [1.42] 58 [2.28]
Flange Type	Clamp, Synchro, Blind Hollow	All	Clamp, Synchro, Blind Hollow	All	Clamp, Synchro, Blind Hollow
Shaft Diameters in mm [in]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]	From 6 to 15 [0.24 to 0.59]
Material Flange / Housing	Aluminum or Stainless Steel / Steel	Aluminum or Stainless Steel/ Steel	Aluminum / Steel	Aluminum or Stainless Steel / Steel	Aluminum / Steel
RPM / Radial Shaft Load in N	Max. 12000 / 110	Max. 12000 / 110	Max. 12000 / 110	Max. 12000 / 110	Max. 12000 / 110
Shock / Vibration <sup>1</sup>	100 g / 10 g	100 g / 10 g	100 g / 10 g	100 g / 10 g	100 g / 10 g
Temperature in °C [°F] / Humidity	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %	-40 to +85 [-40 to +185] / 98 %
Connection	Connector / Connection Cap	Connector / Connection Cap	Connector / Connection Cap	Connector / Connection Cap	Connector / Connection Cap
Supply Voltage	10 to 30 V	10 to 30 V	10 to 30 V	10 to 30 V	10 to 30 V
Certificate	UL, CE	UL, CE	UL, CE	UL, CE	UL, CE
Type	OCD-..	OCD-..	MCD-..	OCD-..	MCD-..

<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 ROTARY ENCODER – IXARC

### Industrial Encoders with Ethernet Interfaces



Highlights	Precise Encoder with EtherNet/IP	Absolute PROFINET Encoder	Precise Encoder with Modbus / TCP	Encoder with ETHERNET POWERLINK	Encoder with EtherCAT
Protection Class	Up to IP67				
Communication Interface	EtherNet/IP	PROFINET	Modbus / TCP	ETHERNET POWERLINK	EtherCAT
Technology	Optical	Optical	Optical	Optical	Optical
Revolutions	Up to 14 bit				
Resolution	Up to 16 bit				
Accuracy	±0.022°	±0.022°	±0.022°	±0.022°	±0.022°
Flange Size in mm [in]	58 [2.28]	58 [2.28]	58 [2.28]	58 [2.28]	58 [2.28]
Flange Type	Clamp, Synchro, Blind Hollow				
Shaft Diameters in mm [in]	From 6 to 15 [0.24 to 0.59]				
Material Flange / Housing	Aluminum or Stainless Steel / Steel				
RPM /	Max. 12000 /	Max. 12000 /	Max. 12000 /	Max. 12000 /	Max. 12000 /
Radial Shaft Load in N	110	110	110	110	110
Shock / Vibration <sup>1</sup>	100 g / 10 g				
Temperature in °C [°F] /	-40 to +85 [-40 to +185] /	-40 to +85 [-40 to +185] /	-40 to +85 [-40 to +185] /	-40 to +85 [-40 to +185] /	-40 to +85 [-40 to +185] /
Humidity	98 %	98 %	98 %	98 %	98 %
Connection	Connector	Connector	Connector	Connector	Connector
Supply Voltage	10 to 30 V				
Certificate	UL, CE				
Type	OCD-..	OCD-..	OCD-..	OCD-..	OCD-..

<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 ROTARY ENCODER – IXARC

### Explosion Proof and Safety-Rated Encoders



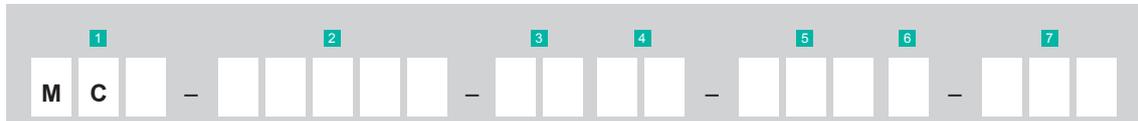
Highlights	ATEX rated bus Encoder	ATEX rated SSI Encoder	ATEX rated Ethernet Encoder	SIL CL 2 rated compact Encoder	SIL CL 3 rated precise Encoder
Protection Class	Up to IP67	Up to IP67	Up to IP67	Up to IP67	Up to IP67
Communication Interface	PROFIBUS, CANopen, DeviceNet	SSI	EtherNet/IP, PROFINET, Modbus TCP	CANSafe (EN50325-5)	CANSafe (EN50325-5)
Technology	Optical	Optical	Optical	Magnetic	Optical
Revolutions	Up to 14 bit	Up to 14 bit	Up to 14 bit	Singleturn	Up to 14 bit
Resolution	Up to 16 bit	Up to 16 bit	Up to 16 bit	Up to 14 bit	Up to 16 bit
Accuracy	±0.022°	±0.022°	±0.022°	±1.8° (safe)	±0.35° (safe)
Flange Size in mm [in]	78 [3.07]	78 [3.07]	78 [3.07]	25 [0.98] 58 [2.28]	58 [2.28]
Flange Type	Clamp, Blind Hollow, Synchro	Clamp, Blind Hollow, Synchro	Clamp, Blind Hollow, Synchro	Synchro	Clamp, Blind Hollow, Synchro
Shaft Diameters in mm [in]	Shaft 10 [0.39] / Hub 14 [0.55]	Shaft 10 [0.39] / Hub 14 [0.55]	Shaft 10 [0.39] / Hub 14 [0.55]	6 [0.24] 10 [0.39]	From 6 to 15 [0.24 to 0.59]
Material Flange / Housing	Aluminum or Stainless Steel	Aluminum or Stainless Steel	Aluminum or Stainless Steel	Aluminum / Steel	Aluminum / Steel
RPM / Radial Shaft Load in N	Max. 3000 / 50	Max. 3000 / 50	Max. 3000 / 50	Application Dependent	Max. 6000 / 110
Shock / Vibration <sup>1</sup>	100 g / 10 g	100 g / 10 g	100 g / 10 g	100 g / 10 g	100 g / 10 g
Temperature in °C [°F] / Humidity	-40 to +75 [-40 to +167] / 98 %	-40 to +75 [-40 to +167] / 98 %	-40 to +75 [-40 to +167] / 98 %	-40 to +75 [-40 to +167] / 98 %	-30 to +70 [-22 to +158] / 98 %
Connection	Connection Cap with Cable Gland	Connection Cap with Cable Gland	Cable	Cable	Connector / Connection Cap
Supply Voltage	10 to 30 V	4.5 to 30 V	10 to 30 V	9 to 35 V	12 to 30 V
Certificate	ATEX/IECEX	ATEX/IECEX	ATEX/IECEX	SIL CL 2 and P I d	SIL CL 3 and P I e
Type	OCE/M-	OCE/M-	OCE/M-	MCS-	OCS-

<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 SELECTION GUIDE ROTARY ENCODER – IXARC

### IXARC Magnetic Encoder



#### 1 Certificate

**D** CE/UL  
**S** SIL

#### 2 Communication Interface

**AV001** Voltage: 0 to 5 V  
**AV003** Voltage: 0.5 to 4.5 V  
**AVP01** Voltage: 0 to 5 V w. Pushbuttons  
**AV002** Voltage: 0 to 10 V  
**AVP03** Voltage: 0.5 to 4.5 V w. Pushbuttons  
**AV002** Voltage: 0 to 10 V  
**AVP02** Voltage: 0 to 10 V w. Pushbuttons  
**AV004** Voltage: 0.5 to 9.5 V  
**AVP04** Voltage: 0.5 to 9.5 V w. Pushbuttons  
**AC005** Current: 4 to 20 mA  
**ACP05** Current: 4 to 20 mA w. Pushbuttons  
**AC006** Current: 0 to 20 mA  
**ACP06** Current: 0 to 20 mA w. Pushbuttons  
**S101B** SSI Binary  
**S101G** SSI Gray  
**IN00I** Incremental  
**CA00** CANopen  
**CL00B** CANopen Lift  
**D2B1B** DeviceNet

#### 3 Revolution

**00** Singleturn  
**04** Multiturn: 4 bit (16 rev)  
**08** Multiturn: 8 bit (256 rev)  
**12** Multiturn: 12 bit (4096 rev)  
**13** Multiturn: 13 bit (8192 rev)  
**14** Multiturn: 14 bit (16384 rev)  
**16** Multiturn: 16 bit (65536 rev)

#### 4 Resolution

**10** 10 bit (1024 Steps / 0.35°)  
**12** 12 bit (4096 Steps / 0.088°)  
**13** 13 bit (8192 Steps / 0.044°)  
**16** 16 bit (65536 Steps / 0.005°)

#### 5 Mechanical

See next Page for Details

#### 6 Environmental Grade

**0** Industrial: IP54 to IP65  
**A** Commercial: IP54  
**D** Heavy Duty: IP54 to IP69K  
**G** Heavy Duty: IP54 to IP69K (Stainless)

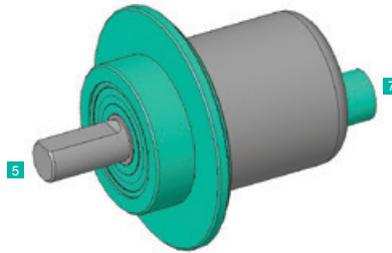
#### 7 Connection

**CRW** Cable: Radial 1 m  
**2RW** Cable: Radial 2 m  
**5RW** Cable: Radial 5 m  
**ARW** Cable: Radial 10 m  
**CAW** Cable: Axial 1 m  
**2AW** Cable: Axial 2 m  
**5AW** Cable: Axial 5 m  
**AAW** Cable: Axial 10 m  
**PRM** Connector: Radial 3 x M12  
**PRQ** Connector: Radial M12 (8 pin)  
**PAM** Connector: Axial M12 (5 pin)  
**PAQ** Connector: Axial M12 (8 pin)

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

# PRODUCT SELECTION GUIDE ROTARY ENCODER – IXARC

## Mechanical Interface and Connection Type: Magnetic Encoder – IXARC



### 7 36 mm Housing Connection

Type	W
__W	16
P__	13

### 7 42 mm Housing Connection

Type	W
__W	15
P__	10

### 5 Clamp Flange (M)

Type	d	l
M10	10	10

### 5 6 Synchro HD Stainless Steel Flange (G10G)

Type	d	l
G10G	10	20

### 5 6 Synchro HD Flange (D10D)

Type	d	l
D10D	10	20

### 7 58 mm Housing Connection

Type	W
__W	20
P__	13

### 5 Blind Hollow Flange (V)

Type	d	l min / max
V06	6	12 / 18
V10	10	12 / 18
V12	12	12 / 18

### 5 Clamp Flange (L)

Type	d	l
L06	6	10
L10	10	20
L12	12	20
LA7	9.5	20

### 5 Blind Hollow Flange (A06)

Type	d	l min / max
A06	6	11 / 14

### 5 Synchro Flange (Y)

Type	d	l
Y06	6	10
Y10	10	20
Y12	12	20

### 5 Synchro Flange (R)

Type	d	l
R06	6	10
R10	10	12

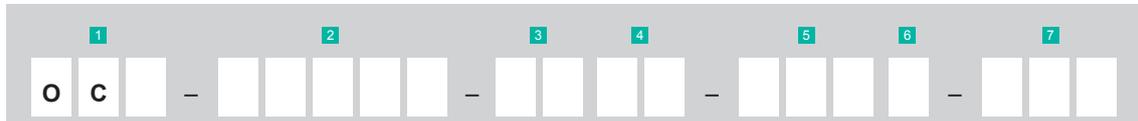
### 5 Blind Hollow Flange (H)

Type	d	l min / max
H06	6	15 / 30
H08	8	15 / 30
H12	12	15 / 30
H14	14	15 / 30
H15	15	15 / 30

All measurement in mm

# PRODUCT SELECTION GUIDE ROTARY ENCODER – IXARC

## IXARC Optical Encoder



### 1 Certificate

<b>D</b>	CE/UL
<b>E</b>	Ex Oil/ Gas
<b>M</b>	Ex Mining
<b>S</b>	SIL

### 4 Resolution

<b>12</b>	12 bit (4096 Steps / 0.088°)
<b>13</b>	13 bit (8192 Steps / 0.044°)
<b>16</b>	16 bit (65536 Steps / 0.005°)

### 5 Mechanical

See next Page for Details

### 2 Communication Interface

<b>PP00B</b>	Parallel Binary
<b>PP00G</b>	Parallel Gray
<b>P100B</b>	Parallel Preset binary
<b>P100G</b>	Parallel Preset Gray
<b>S101B</b>	SSI Binary
<b>S401B</b>	SSI Binary w. Pushbuttons
<b>S101G</b>	SSI Gray
<b>S401G</b>	SSI Gray w. Pushbuttons
<b>S5xxB</b>	SSI+Incremental binary + A/B/Z (RS-422)
<b>S6xxB</b>	SSI+Incremental binary + A/B/Z (Push-Pull)
<b>S5xxG</b>	SSI+Incremental Gray + A/B/Z (RS-422)
<b>S6xxG</b>	SSI+Incremental Gray + A/B/Z (Push-Pull)
<b>DPC1B</b>	Profibus DP
<b>CAA1B</b>	CANopen
<b>CL00B</b>	CANopen Lift
<b>D2B1B</b>	DeviceNet
<b>IBA1B</b>	Interbus
<b>EIB1B</b>	PROFINET IO
<b>EEA0B</b>	EtherNet/IP
<b>E2A1B</b>	POWERLINK
<b>EC00B</b>	EtherCAT
<b>EM00B</b>	Modbus/TCP

### 3 Revolution

<b>00</b>	Singleturn
<b>08</b>	Multiturn: 8 bit (256 rev)
<b>12</b>	Multiturn: 12 bit (4096 rev)
<b>13</b>	Multiturn: 13 bit (8192 rev)
<b>14</b>	Multiturn: 14 bit (16384 rev)
<b>16</b>	Multiturn: 16 bit (65536 rev)

### 6 Environmental Grade

<b>0</b>	Industrial: IP54 to IP65
<b>S</b>	Industrial: IP54 to IP67
<b>V</b>	Industrial: IP54 to IP67 (Stainless Steel)
<b>H</b>	Heavy Duty: IP54 to IP67
<b>W</b>	Explosion Proof: IP67 (Stainless Steel)

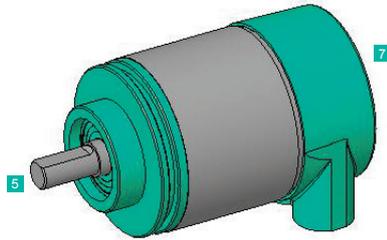
### 7 Connection

<b>CRW</b>	Cable: Radial 1 m
<b>2RW</b>	Cable: Radial 2 m
<b>ARW</b>	Cable: Radial 10 m
<b>CAW</b>	Cable: Axial 1 m
<b>2AW</b>	Cable: Axial 2 m
<b>AAW</b>	Cable: Axial 10 m
<b>PRM</b>	Connector: radial 3 x M12 Ethernet
<b>PRL</b>	Connector: radial M23 (12 pin)
<b>PRP</b>	Connector: radial M23 (16 pin)
<b>PRT</b>	Connector: radial M27 (26 pin)
<b>PRM</b>	Connector: radial M12 (5 pin)
<b>PRM</b>	Connector: radial 2 x M12 Modbus
<b>PRN</b>	Connector: radial 2 x M12 CAN
<b>PRI</b>	Connector: radial 2 x M23 (9 pin)
<b>PRQ</b>	Connector: radial M12 (8 pin)
<b>PAL</b>	Connector: axial M23 (12 pin)
<b>PAP</b>	Connector: axial M23 (16 pin)
<b>PAM</b>	Connector: axial M12 (5 pin)
<b>PAQ</b>	Connector: axial M12 (8 pin)
<b>H3P</b>	Connection Cap: 3 Cable Glands
<b>H1B</b>	Connection Cap: 1 x M12 Connector
<b>H72</b>	Connection Cap: 3 x M12 Connector
<b>H2B</b>	Connection Cap: 2 x M12 Connector
<b>H2M</b>	Connection Cap: 2 x M20 Cable Glands
<b>H1C</b>	Connection Cap: 1 x M23 Connector
<b>HCC</b>	Connection Cap: without
<b>HFZ</b>	Connection Cap: 2 x radial glands (for OCE / OCM)
<b>HFE</b>	Connection Cap: 3 x radial glands (for OCE / OCM)
<b>HFG</b>	Connection Cap: axial output (for OCE / OCM)

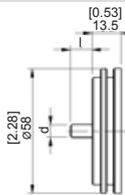
Please refer to the product finder on our website for all possible combinations.

# PRODUCT SELECTION GUIDE ROTARY ENCODER – IXARC

## Mechanical Interface and Connection Types : Optical Encoder – IXARC

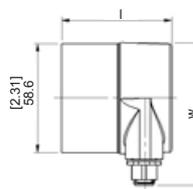


### 5 Through Hollow Flange (T)



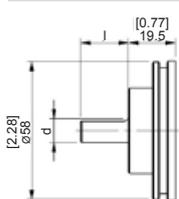
Type	d
T08	8
T10	10
T12	12

### 7 Housing for Bus and Ethernet



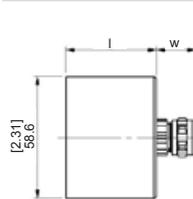
Connection		
Type	W	L (ST / MT) <sup>1</sup>
PAM	70	57.5 / 68.5
H __	90	57.5 / 68.5

### 5 Clamp Flange (C)



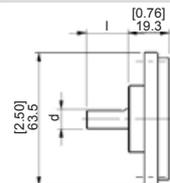
Type	d	l
C06	6	10
C10	10	20
C12	12	20
CA7	9.5	20

### 7 Axial Housings for Cable and Connector



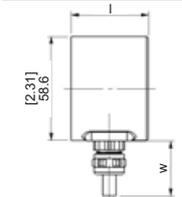
Connection		
Type	W	L (ST / MT) <sup>1</sup>
_ AW	18	32.2 / 43.2
PA __	24	32.2 / 43.2

### 5 Square Flange (Q)



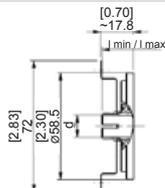
Type	d	l
Q06	6	10
Q10	10	20
QA7	9.5	20

### 7 Radial Housings for Cable and Connector



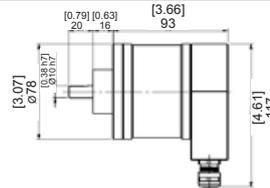
Connection		
Type	W	L (ST / MT) <sup>1</sup>
_ PW	19	43.2 / 53.0
PA __	24	43.2 / 53.0

### 5 Synchro Flange (S)

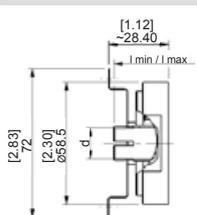


Type	d	l
S06	6	10
S10	10	20
S12	12	20

### 5 Ex Clamp Flange (F10)<sup>2</sup>

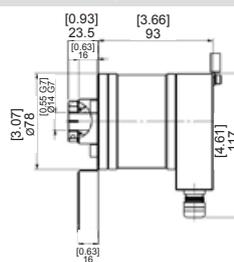


### 5 Blind Hollow Flange (B)



Type	d	l min / max
B06	06	15 / 30
B08	08	15 / 30
B10	10	15 / 30
B12	12	15 / 30
B14	14	15 / 30
B15	15	15 / 30

### 5 Ex Blind Hollow Flange (E14)<sup>2</sup>

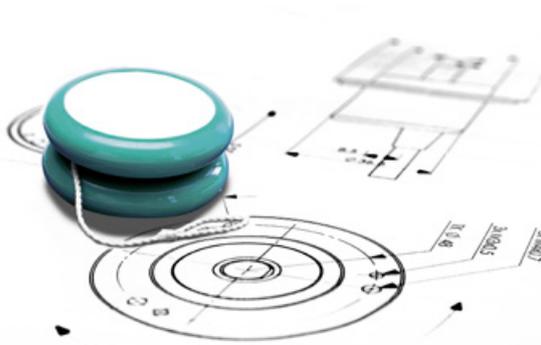


All measurement in mm

<sup>1</sup> ST singleturn, MT multiturn

<sup>2</sup> Available for OCE/M Types

## TECHNOLOGY LINEAR SENSORS – LINARIX



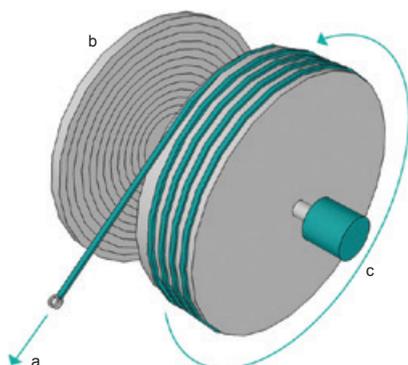
POSITAL's LINARIX draw wire sensors measure linear motion by displacing a retractable steel wire (a) wound around a cable drum (b) that actuates the rotary encoder (c) coupled to it. The encoder in return provides a proportional output. Measurements are highly accurate, reliable and the systems have very long lifetimes. The LINARIX line offers a wide range of measurement lengths ranging from 1 m to 15 m and also provides position output in almost all available industrial interfaces both analog and digital.

Compared to the conventional linear pots and linear measurement systems using multiple gears and encoders, the LINARIX line of sensors are more durable and can directly replace them, additionally, avoiding the common problems of slippage, wear and

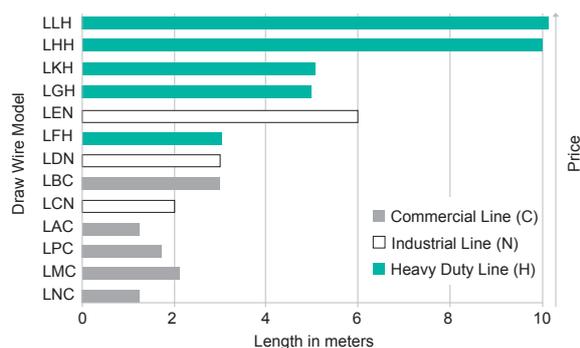


tear damage. The draw wire sensors from POSITAL provide extremely precise measurements because of the inherent accuracy of the encoders and the rugged construction ensures reliable performance even under extreme conditions.

The POSITAL product offering has been categorized based on robustness and length giving the customer maximum selectability based on their respective application.



**Length vs Price**



## PRODUCT OVERVIEW LINEAR SENSORS – LINARIX

### Draw Wires for Commercial Use



Measuring Range in m [in]	1.25 [49]	1.25 [49]	2.10 [83]	3.00 [118]	1.74 [69]
Communication Interfaces <sup>1</sup>	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet
Accuracy in [±FSO%]	0.05	0.04	0.05	0.04	0.02
Wire Material	Coated Polyamide Stainless Steel	Nylon Coated Stainless Steel	Coated Polyamide Stainless Steel	Nylon Coated Stainless Steel	Coated Polyamide Stainless Steel
Wire Diameter in mm	0.36	0.48	0.45	0.48	0.45
Draw Wire Housing Material	Plastic	Anodized Aluminum Frame, Polycarbonate Spring Housing	Plastic	Anodized Aluminum Frame, Polycarbonate Spring Housing	Aluminum
Operating Temperature in °C [°F]	-20 to 80 [-4 to 176]	-40 to 94 [-40 to 201]	-20 to 80 [-4 to 176]	-40 to 94 [-40 to 201]	-20 to 80 [-4 to 176]
Max. Extension Force in N	1.50	2.34	5.00	3.90	5.00
Min. Retraction Force in N	1.00	1.26	3.50	2.10	3.50
Digital Resolution <sup>2</sup> in µm	31	24	52	49	36
Drum Circumference in mm [in]	125 [4.9]	100 [3.9]	215 [8.5]	200 [7.9]	149 [5.9]
Type Key	L...N-C..	L...A-C..	L...M-C..	L...B-C..	L...P-C..

<sup>1</sup> Other interfaces available on request

<sup>2</sup> Based on an encoder with 12 Bit Resolution

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

## PRODUCT OVERVIEW LINEAR SENSORS – LINARIX

### Draw Wires for Industrial Use



Measuring Range in m [in]	2 [79]	3 [118]	6 [236]
Communication Interfaces <sup>1</sup>	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet
Accuracy in [±FSO%]	0.02	0.01	0.01
Wire Material	Plastic Coated Stainless Steel	Plastic Coated Stainless Steel	Stainless Steel
Wire Diameter in mm	0.45	0.87	0.54
Draw wire Housing Material	Zinc Die-Cast	Zinc Die-Cast	Aluminum / Plastic
Operating Temperature in °C [°F]	-10 to 80 [14 to 176]	-40 to 80 [-40 to 176]	-20 to 80 [-4 to 176]
Max. Extension Force in N	2	3	8
Min. Retraction Force in N	1.2	2.5	3.0
Digital Resolution <sup>2</sup> in µm	24	49	40
Drum Circumference in mm [in]	100 [3.9]	200 [7.9]	200 [7.9]
Type Key	L...C-.N..	L...D-.N..	L...E-.N..

<sup>1</sup> Other interfaces available on request

<sup>2</sup> Based on an encoder with 12 Bit Resolution

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

## PRODUCT OVERVIEW LINEAR SENSORS – LINARIX

### Draw Wires for Heavy Duty Use



Measuring Range in m [in]	3.00 [118]	5.00 [197]	5.08 [200]	10.00 [394]	10.16 [400]
Communication Interfaces <sup>1</sup>	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet	Analog, SSI, CANopen, DeviceNet
Accuracy in [±FSO%]	0.02	0.02	0.02	0.01	0.02
Wire Material	Coated Polyamide Stainless Steel	Nylon Coated Stainless Steel	Nylon Coated Stainless Steel	Nylon Coated Stainless Steel	Nylon Coated Stainless Steel
Wire Diameter in mm	0.80	1.00	0.86	1.00	0.86
Draw wire Housing Material	Aluminum	Aluminum	Powder painted Aluminum	Aluminum	Powder painted Aluminum
Operating Temperature in °C [°F]	-20 to 80 [-4 to 176]	-20 to 80 [-4 to 176]	-40 to 90 [-40 to 194]	-20 to 80 [-4 to 176]	-40 to 90 [-40 to 194]
Max. Extension Force in N	9.0	16.0	6.5	21.0	6.5
Min. Retraction Force in N	5.5	4.0	3.5	8.0	3.5
Digital Resolution <sup>2</sup> in µm	63	77	78	77	78
Drum Circumference in mm [in]	260 [10.2]	315 [12.4]	320 [12.6]	315 [12.4]	320 [12.6]
Type Key	L...F-.H..	L...G-.H.	L...K-.H.	L...H-.H..	L...L-.H..

<sup>1</sup> Other interfaces available on request

<sup>2</sup> Based on an encoder with 12 Bit Resolution

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

## PRODUCT SELECTION GUIDE LINEAR SENSORS – LINARIX

### Linear Sensors – LINARIX



#### 1 Technology

- W** Draw Wire Only
- D** Optic (Diode)
- M** Magnetic

#### 2 Communication Interface

- 00000** Draw Wire Only
- AV001** Voltage: 0 to 5 V
- AVP01** Voltage: 0 to 5 V w. Pushbuttons
- AV002** Voltage: 0 to 10 V
- AVP02** Voltage: 0 to 10 V w. Pushbuttons
- AC005** Current: 4 to 20 mA
- ACP05** Current: 4 to 20 mA w. Pushbuttons
- P100B** Parallel Binary with Preset
- P100G** Parallel Gray with Preset
- S101B** SSI Binary
- S101G** SSI Gray
- S5xxB** SSI Binary + Incremental A/B/Z (RS-422)
- S6xxB** SSI Binary + Incremental A/B/Z (Push-Pull)
- S5xxG** SSI Gray + Incremental A/B/Z (RS-422)
- S6xxG** SSI Gray + Incremental A/B/Z (Push-Pull)
- IN00I** Incremental
- DPC1B** Profibus DP
- CAA1B** CANopen
- CL00B** CANopen Lift
- D2B1B** DeviceNet
- IBA1B** Interbus
- EIB1B** PROFINET IO
- EEA0B** EtherNet/IP
- E2A1B** POWERLINK
- EM00B** Modbus/TCP

#### 3 Measurement Range

- 1** 1 m
- 2** 2 m
- 3** 3 m
- 5** 5 m
- 6** 6 m
- A** 10 m

#### 4 Encoder Resolution

- 00** Draw Wire Only
- D2** 12 bit
- D3** 13 bit
- D4** 16 bit

#### 5 Draw Wire Model

See next Page for Details

#### 6 Connection Exit Options

See next Page for Details

#### 7 Environmental Grade Encoder

- A** Commercial IP54
- S** Industrial IP54 to IP67
- O** Industrial IP54 to IP65

#### 8 Environmental Grade Draw Wire

- C** Commercial
- N** Industrial
- H** Heavy Duty

#### 9 Connection Type

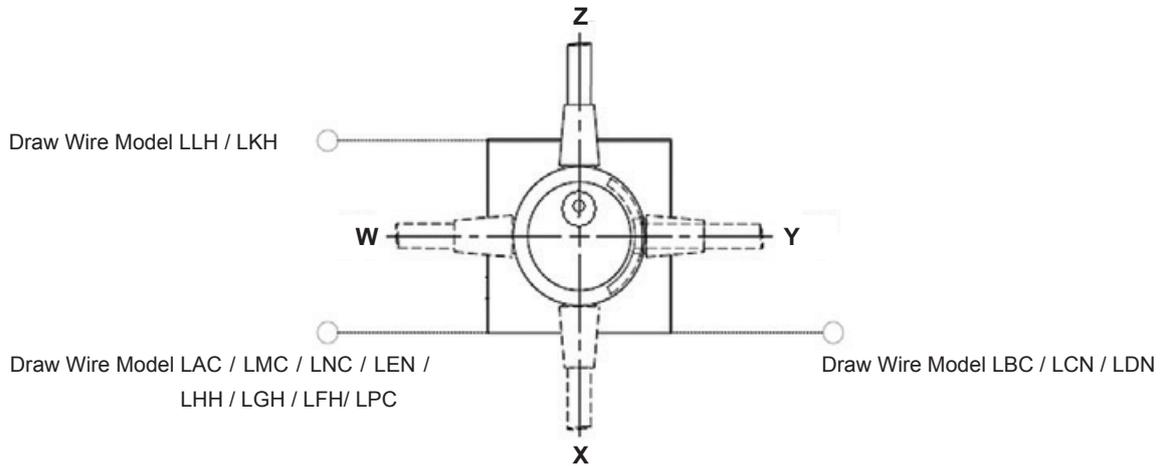
- 000** Draw Wire Only
- CRW** 1 m PVC Cable - Radial Exit
- ARW** 10 m PVC Cable - Radial Exit
- CAW** 1 m PVC Cable - Axial Exit
- AAW** 10 m PVC Cable - Axial Exit
- PRL** M23 12 pin - Radial Exit
- PRP** M23 16 pin - Radial Exit
- PRT** M26 26 pin - Radial Exit
- PRM** M12 5 pin - Radial Exit
- PRN** 2 x M12 5 pin - Radial Exit
- PRQ** M12 8 pin - Radial Exit
- PAL** M23 12 pin - Axial Exit
- PAP** M23 16 pin - Axial Exit
- PAM** M12 5 pin - Axial Exit
- PAQ** M12 8 pin - Axial Exit
- H3P** M12 Cable Glands x 3
- H1B** M12 Connector x 1
- H2B** M12 Connector x 2
- H1C** M23 Connector x 1

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

# PRODUCT SELECTION GUIDE LINEAR SENSORS – LINARIX

## Mechanical Options LINARIX Linear Sensors

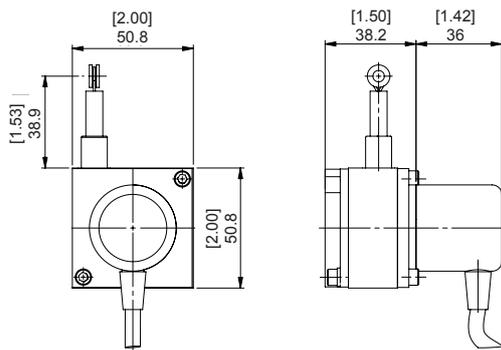
### Connection Exit Options 6



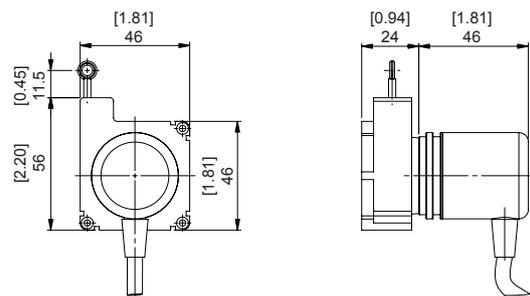
Connection Exit selected based on Draw Wire Model 5. When Draw Wire Model is “Draw Wire Only” then Connection Exit Option 6 is 0.

### Draw Wire Model (L-----5-----8-----)

#### LAC (L-----A-----C-----)



#### LNC (L-----N-----C-----)



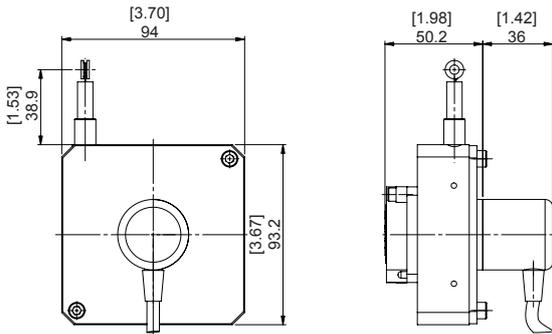
All measurement in mm

# PRODUCT SELECTION GUIDE LINEAR SENSORS – LINARIX

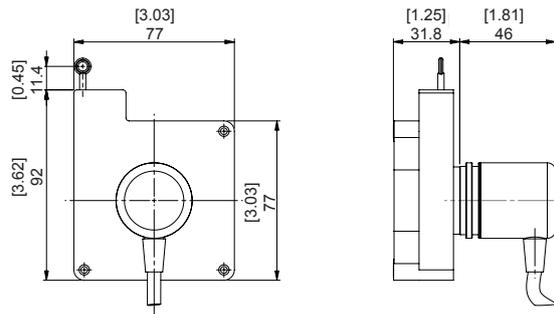
## Mechanical Options LINARIX Linear Sensors

### Draw Wire Model (L-----5-8-----)

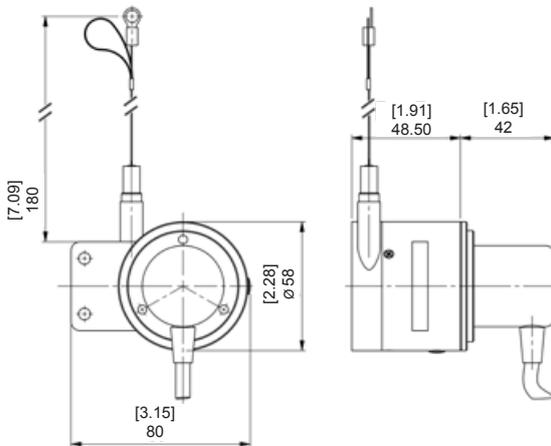
#### LBC (L-----B- C-----)



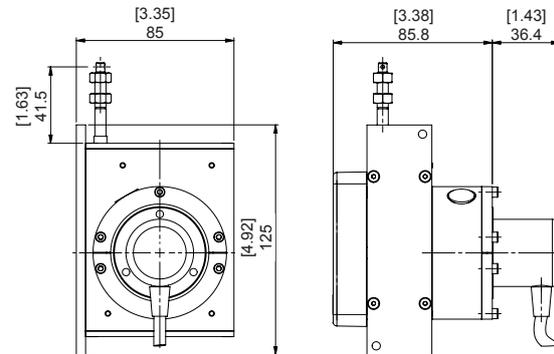
#### LMC (L-----M- C-----)



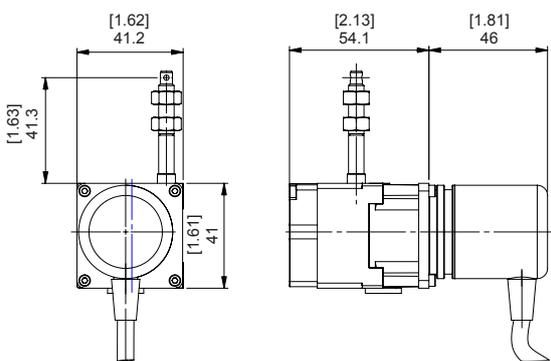
#### LPC (L-----P- C-----)



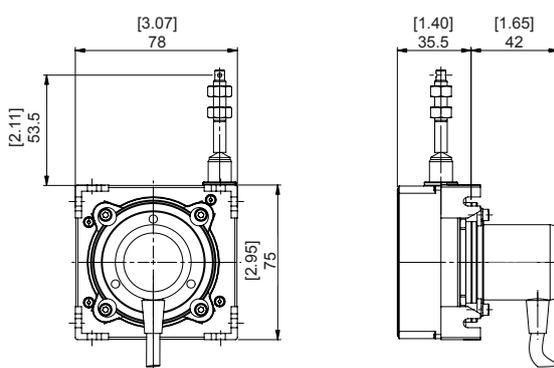
#### LEN (L-----E- N-----)



#### LCN (L-----C- N-----)



#### LDN (L-----D- N-----)



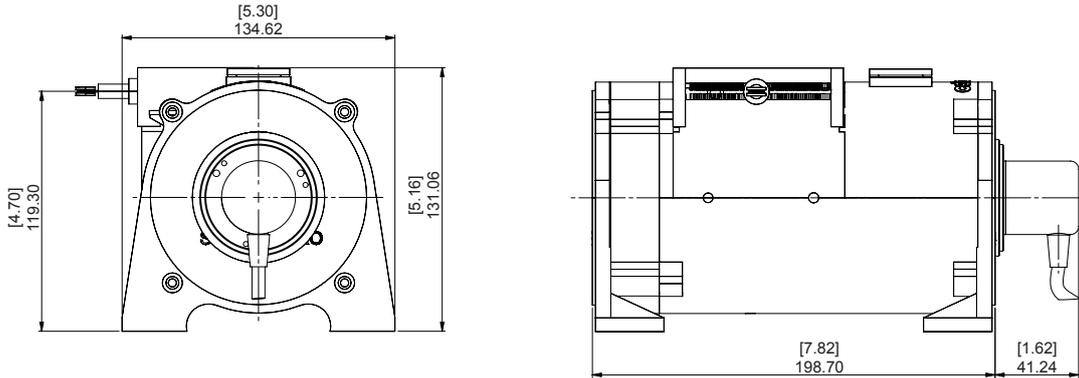
All measurement in mm

# PRODUCT SELECTION GUIDE LINEAR SENSORS – LINARIX

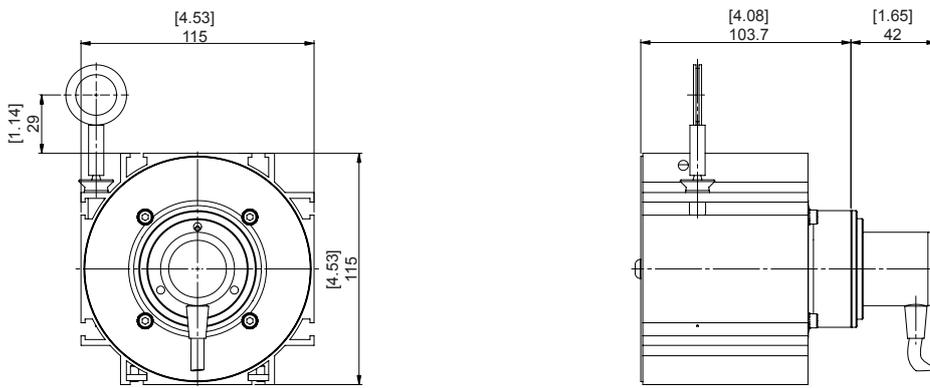
## Mechanical Options LINARIX Linear Sensors

### Draw Wire Model (L-----5-----8-----)

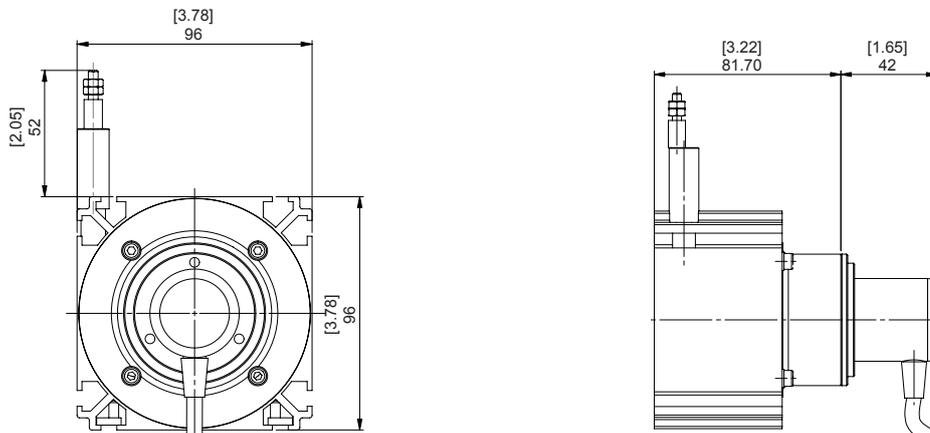
LLH (L-----L-----H-----) and LKH (L-----K-----H-----)



LGH (L-----G-----H-----) and LHH (L-----H-----H-----)

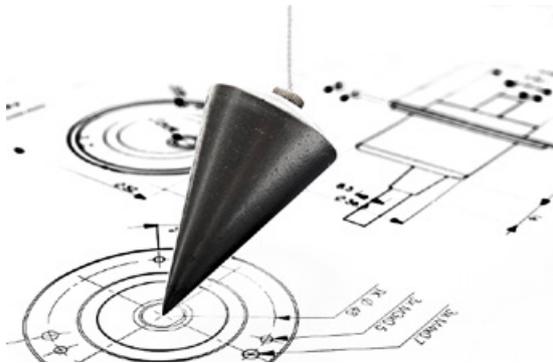


LFH (L-----F-----H-----)



All measurement in mm

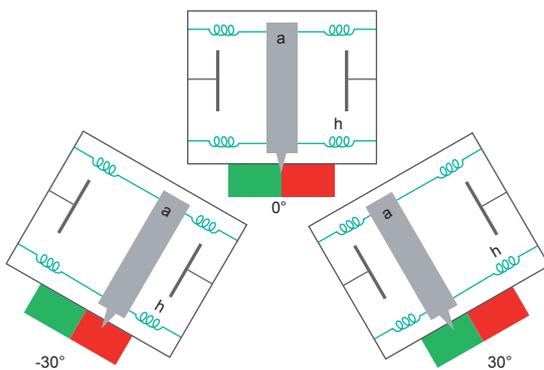
## TECHNOLOGY INCLINOMETER – TILTIX



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

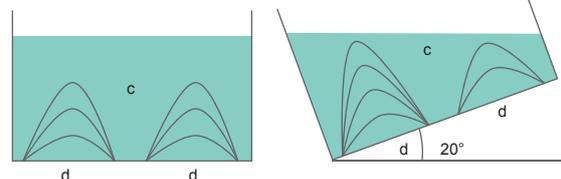
### MEMS

In MEMS devices, a 'micro mass' (a) is suspended in a flexible support structure (h). 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. They offer excellent dynamic response.



### Fluid Cell

A sensor cell is partially filled with an electrolytic liquid (c); the walls are covered with electrodes (d). As the sensor tilts, the level of fluid covering the electrodes changes. This results in the increase or decrease of conductivity between a pair of electrodes. With measure of the conductivity between the electrodes, one can calculate the tilt angle. 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 INCLINOMETER – TILTIX

### Inclinometer for Industrial Environments



Highlights	Compact Programmable Analog Inclinometer	Compact Inclinometer with SSI	Compact Bus Inclinometer	High Accuracy Analog Inclinometer	High Accuracy CANopen Inclinometer
Protection Class	Up to IP69K / IP68	Up to IP69K / IP68	Up to IP69K / IP68	IP67	IP67
Interfaces	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 $\pm 80^\circ$ / 1-axis 0 to $360^\circ$	1-axis $0^\circ$ to $360^\circ$	2-axis $\pm 80^\circ$ / 1-axis 0 to $360^\circ$	2-axis $\pm 30^\circ$	2-axis $\pm 30^\circ$
Resolution	$0.01^\circ$	$0.04^\circ$	$0.01^\circ$	$0.001^\circ$	$0.001^\circ$
Accuracy	$0.1^\circ$	$0.1^\circ$	$0.1^\circ$	$0.01^\circ$	$0.01^\circ$
Material Housing	Fiber Reinforced Plastics	Fiber Reinforced Plastics	Fiber Reinforced Plastics	Aluminum	Aluminum
Shock / Vibration <sup>1</sup>	100 g / 20 g	100 g / 20 g	100 g / 20 g	30 g / 5 g	30 g / 5 g
Operating Temperature °C [°F]	-40 to +85 [-40 to 185]	-40 to +85 [-40 to 185]	-40 to +85 [-40 to 185]	-40 to +85 [-40 to 185]	-40 to +85 [-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	Cable / Connector (M12)	Cable / Connector (M12)	Cable / Connector (M12)	Cable / Connector (M12)	Cable / Connector (M12)
Certificates	CE	CE	CE	CE	CE
Type	ACS-...-E2-..	ACS-...-S1...-E2	ACS-...-CA/D1...-E2-..	AGS-..	AGS-..

<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 INCLINOMETER – TILTIX

### Inclinometer for Tough Environments



**ANALOG**



**SSI**



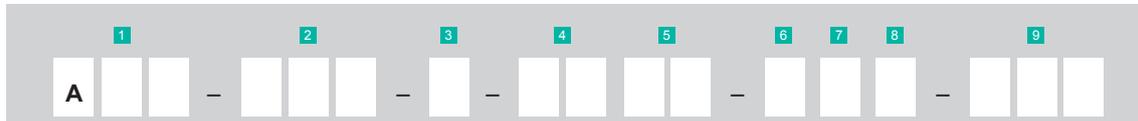
Highlights	Rugged Programmable Analog Inclinometer	Rugged SSI Inclinometer	Rugged Bus Inclinometer
Protection Class	Up to IP69K / IP68	Up to IP69K / IP68	Up to IP69K / IP68
Interfaces	Analog Voltage or Current	SSI	CANopen, DeviceNet, SAE J1939
Technology	MEMS	MEMS	MEMS
Max Measurement Range	2-axis $\pm 80^\circ$ / 1-axis 0 to $360^\circ$	1-axis $0^\circ$ to $360^\circ$	2-axis $\pm 80^\circ$ / 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 / Vibration <sup>1</sup>	100 g / 20 g	100 g / 20 g	100 g / 20 g
Operating Temperature in °C [°F]	-40 to +85 [-40 to 185]	-40 to +85 [-40 to 185]	-40 to +85 [-40 to 185]
Supply Voltage	10 to 30 V	5 to 30 V	10 to 30 V
Connection	Cable / Connector (M12)	Cable / Connector (M12)	Cable / Connector (M12)
Certificates	CE	CE	CE
Type	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 SELECTION GUIDE INCLINOMETER – TILTIX

### Inclinometer – TILTIX



#### 1 Technology

- ACS** MEMS
- AGS** Fluid Cells

#### 2 Measurement Range

- 005** +/-5° (AGS)
- 015** +/-15° (AGS)
- 030** +/-30° (AGS)
- 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

- CA** CANopen
- D1** DeviceNet (ACS)
- DP** Profibus DP (AGS)
- S1** SSI (ACS) Binary
- S2** SSI (ACS) Gray
- SV** Voltage + RS232
- SC** Current + RS232
- SO** RS232 (AGS)
- SP** PWM (AGS)
- SS** Switch (AGS)

#### 5 Firmware

- 00** For ACS (S1, SV, SC)
- 01** For ACS (CA, D1)
- 02** For ACS (S1,S3)
- 1** For AGS

#### 6 Mounting

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

#### 7 Housing Material

- E** Industrial PBT 47x 52 mm (ACS)
- H** Heavy Duty Aluminum 59 x 83 mm (ACS)
- 0** Aluminum 84 x 70 mm (AGS)

#### 8 Inclinometer Series

- 2** ACSII
- H** High End, Omitted for AGS

#### 9 Connection Type

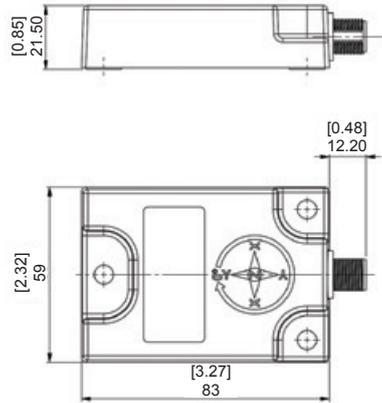
- PM** M12 Connector (ACS)
- DW** Cable Exit (ACS)
- P8M** Connector (AGS)
- CRW** Cable Exit (AGS)

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

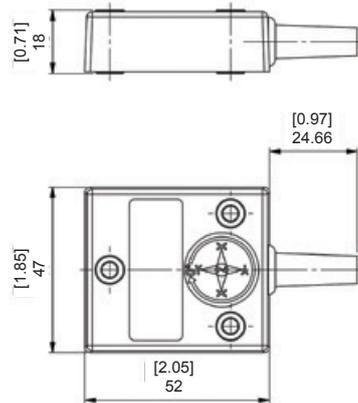
# PRODUCT SELECTION GUIDE INCLINOMETER – TILTIX

## Mechanical Options TILTIX Inclinator

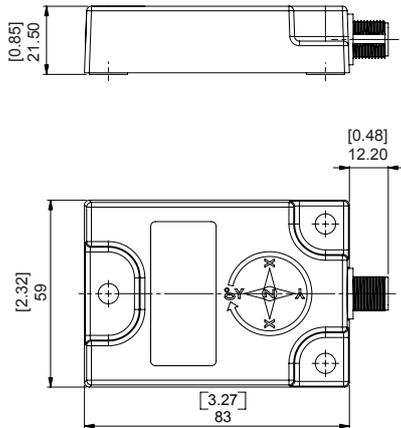
ACS-----E2-PM



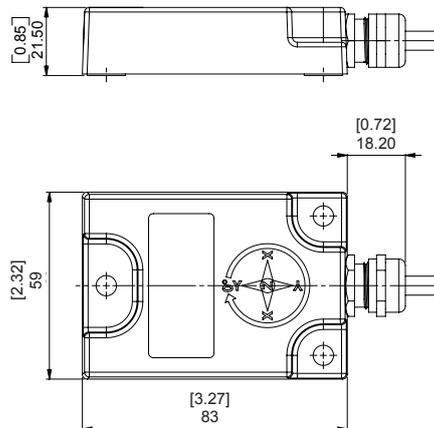
ACS-----E2-CW



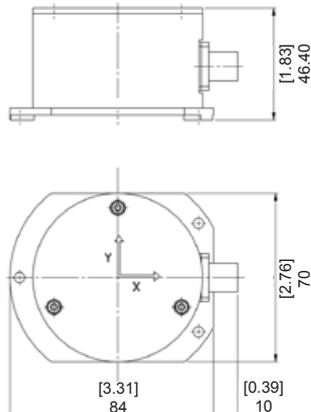
ACS-----H2-PM



ACS-----H2-CW



AGS-----P8M



## PRODUCT OVERVIEW ACCESSORIES

### Mounting Options: Couplings and Reducing Adapters



Product	Reducing Adapter	Couplings	Couplings	Couplings
Diameters / Sizes in mm	15 to 12 / 15 to 10	6 to 6, 6 to 10, 10 to 10	6 to 6, 6 to 10, 10 to 10	6 to 6, 6 to 10, 10 to 10
Types or Material	Stainless Steel, Aluminum	Bellow	Disc	Jaw



Product	Flange Adapters	Tethers and Clamp Rings	Clamp Discs
Features	MGY58 and Flange Adapters	Various torque supports and clamping discs	Clamp discs to mount encoders onto a surface
Material	Aluminum, Plastics	Aluminum, Stainless Steel	Aluminum

## PRODUCT OVERVIEW ACCESSORIES

### Electrical Connections and Interface Options

#### Connectors and Cordsets



Standards	M12	M23	M27	M12 Assembly	M23 Assembly, M27 Assembly
Lengths	–	–	–	2, 5, 10	2, 5, 10
Pins / Cables	4 pin D, 5 pin A, 8 pin A	9, 12, 16	26	4 pin D, 5 pin A, 8 pin A	9, 12, 16, 26
Material of Cable	–	–	–	PUR / PVC	PUR / PVC
Material of Connector	Metal	Metal	Metal	PBT Metal	Metal
Termination	–	–	–	Open Ends / RJ45	Open Ends
Protection Type	IP67	IP67	IP67	IP69K	IP67

#### Configuration and Interface Modules



Product	SSI2USB Module	Voltage Panel Display
Features	<ul style="list-style-type: none"> <li>▪ Easy interface of SSI device to USB port of PC</li> <li>▪ Graphical User Interface to view and store SSI Data</li> <li>▪ Power Supply to SSI device (max 12 Volts) using USB Port</li> <li>▪ Three independent tri-state outputs</li> <li>▪ Could be used as a Virtual Com port device</li> </ul>	<ul style="list-style-type: none"> <li>▪ Measures voltage from 0 to 40V d.c</li> <li>▪ 2.4" color TFT screen</li> <li>▪ Use PanelPilot software, to setup and customize the display</li> <li>▪ Programmable via the USB interface</li> <li>▪ Simple panel mounting solution</li> <li>▪ Wide operating voltage of 4V to 30V d.c.</li> </ul>

## GLOSSARY

Analog	A common standard with either a voltage or a current output
ATEX / IECEx	ATEX and IECEx norms define essential requirements for equipment and protective systems intended for use in potentially explosive atmospheres
CANopen	CANopen is a fieldbus protocol using CAN networks
CANopen Lift	CANopen Lift is a fieldbus protocol for elevator applications
CE	With the CE marking POSITAL declares that the product conforms with essential requirements of the applicable EC directives
DeviceNet	DeviceNet is a fieldbus system based on CAN networks and CIP protocol, managed by ODVA, widely used in factory automation and available on many PLCs
EtherNet/IP	EtherNet/IP is an industrial communication protocol developed by Rockwell Automation and managed by ODVA. It is based on CIP and TCP/IP protocol
ETHERNET POWERLINK	Ethernet Powerlink is a real-time communication system based on Ethernet networks and managed by EPSG
Interbus	Interbus is a fieldbus technology developed by Phoenix Contact
IP54	Protected against dust and contact and splashed water from all directions
IP65	Dust and Contact proof and protection against powerful water jets
IP67	Dust and Contact proof and protection against temporary immersion upto 1 m
IP68	Dust and Contact proof and protection against water pressure
IP69K	Dust and Contact proof and protected against high pressure, high temperature wash down applications
Modbus	Modbus is a serial protocol managed by the Modbus Organization
Parallel	All bits of the position output are transferred simultaneously using one line for each bit
PROFIBUS	Profibus is available on many PLCs and one of the most common fieldbus technologies in factory automation and other areas. It is based on RS485. There are different versions of Profibus and different device profiles
PROFINET	Profinet is an Industrial Ethernet standard from „Profibus&ProfiNet International“ designed for automation
SAE J1939	SAE J1939 is a fieldbus standard used for communication by the car and heavy-duty truck industry
SIL	SIL (Safety Integrity Level) is defined as a relative level of risk-reduction provided by a safety function. In accordance with the requirements of IEC 61508/EN 62061, PL e and Cat.4 according to EN ISO 13849-1
SSI	SSI is a widely used serial interface with point-to-point connection between PLC/Master and encoder. It is based on the RS422 standard
UL	UL (Underwriters Laboratories) is a US based consulting and certification company providing safety standards for electrical devices. UL marking confirms the compliance with applicable UL safety standards



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