

盈动高科

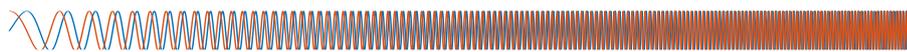
Dongguan, China

www.innomotion.com.cn

YINGDONG Co. Ltd. focuses on innovation of position and displacement measurement technology and products. Based on the capacitive, inductive and magnetic sensing principles, sensor products and customized solutions have been developed to serve various customers from industries including robot, production machine, mining, wind, marine, etc. The patented capacitive technology offers superior features comparing to the conventional opto-electronics ones. For instance, the linear absolute encoder products have luxury air gap between the sensor head and the scale in a long travel distance up to 30 meters. The rotary encoder products provide the options like large diameter of hollow shaft and small thickness of less than 10mm.

YINGDONG owns more than 30 granted patents and full competency to provide the reliable products or customized solution on position and displacement sensing.

Kit Rotary Encoder



Capacitive Encoder CAPRO-

Based on capacitive sensing and differential pattern design, the CAPRO- series are innovative rotary encoder products offering cost-effective and easy to implement solutions.

The holistic scanning is an effective approach compensating eccentricity error and offering good noise cancellation. As a result, the engineering requirement of installation is reduced and in many cases bearings are eliminated.

Basically, the CAPRO products offer absolute encoder functions with flexible output interfaces including BISS, SSI, RS485, etc. A battery multi-turn counting function is optional.

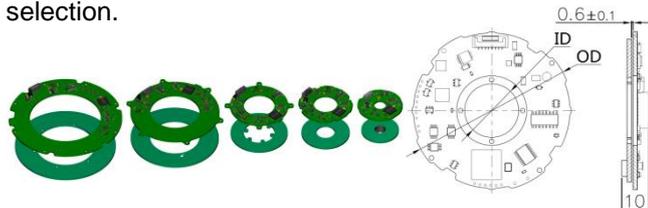


Alternatively, the kit encoder can work with the condition that rotor and stator plates are housed with metal covers. This configuration gives better protection of PCBs and higher reliability. The mechanical parameters of various models are listed in the following table.

Model	5013	6020	7625	11054	12565
ID(mm)	10	16	30	50	58
OD(mm)	60	65	78	112	128
Thickness(mm)	18	13	19	19	17
Rotor weight	17g	20g	35g	67g	90g
Stator weight	38g	37g	54g	91g	125g

Specification	
Resolution	16-23 bits
Repeatability	5 arc seconds
Accuracy	±25-75 arc seconds; or ±5 arc seconds(with calibration and compensation)
Multi turn	16 bits, customizable
Power supply	5-24 VDC
Current	150mA@5VDC
Interface	SSI, BISS C, RS485, RS485+AB, TTL
Speed	6,500RPM
Axial tolerance	± 0.1 mm
Radial tolerance	± 0.1 mm
W/ temperature	-40...+85°C
Humidity	<98%, no condensation

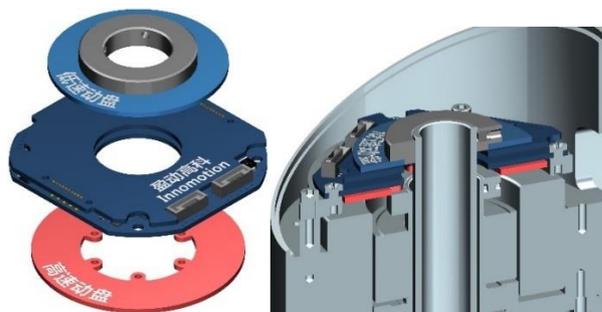
With varied mechanical dimension and mounting features, series products are available for customer selection.



The kit encoder can work with the condition that rotor and stator plates are naked PCB formats. This format gives the smallest assembly thickness and the lightest rotor and stator. The mechanical parameters(as indicated in the above figure) of various models are listed in the following table.

Model	5013	6020	7625	11054	12565	15890
ID(mm)	12	20	25	54	65	90
OD(mm)	50	60	76	110	125	158
Thickness (mm)	12	10	10	10	10	10
Rotor weight	5g	8g	9g	19g	22g	37g
Stator weight	9g	11g	13g	25g	35g	53g

"Two-in-One" Encoder



For applications like actuators integrating motor and gear box, two encoders are usually needed. One encoder is employed for current and speed control loop while another one is for position control loop.

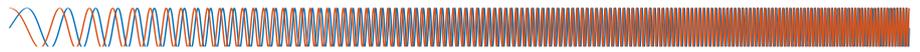
"Two-in-One" encoder fits this scenario well with a single stator plate whose both sides face two rotor plates. One rotor plate is mounted on the motor shaft while another rotor plate is mounted on the output shaft of the gear box. The stator plate is able to output the position and displacement of both shafts.

This configuration reduces the part number, complexity of design and assembly, more importantly, the total thickness of assembly.

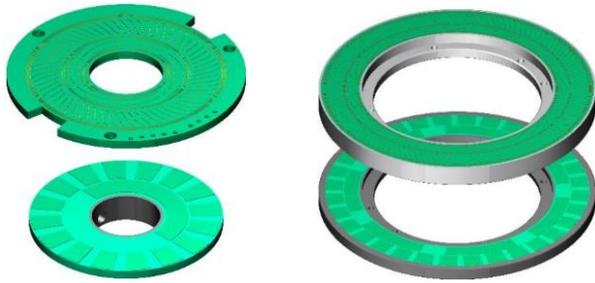
Optionally, the "Two-in-One" encoder can function as a torque sensor that is needed for high end actuators. In calibration mode, the lookup table is set up matching the angular position of both shafts unloaded and loaded. In runtime mode, the shaft torsion can be detected based on the mismatching position of both shafts. The torsion maps to the torque applied on the shaft.

The torque sensing function helps reducing the cost, size and complexity of the integrated actuator.

Kit Rotary Encoder



Inductive encoder INDRO



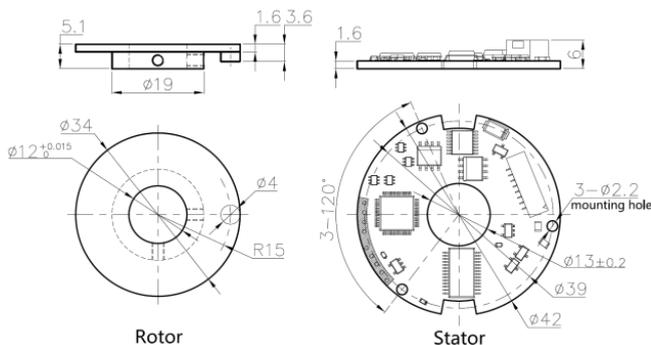
Based on inductive sensing principle, the INDRO-series are innovative rotary encoder products offering good reliability against harsh working conditions with high moisture, oil and/or dust.

The holistic scanning is an effective approach compensating eccentricity error and offering good noise cancellation. As a result, the engineering requirement of installation is reduced and in many case bearings are eliminated.

A battery multi-turn counting function is optional.

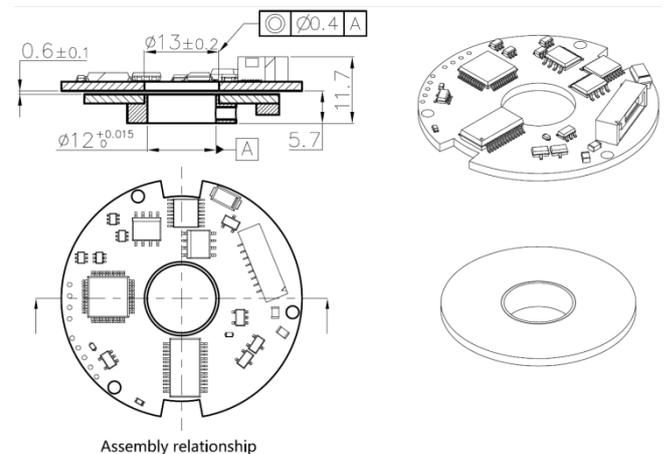
Specification	
Resolution	16-23 bits
Repeatability	5 arc seconds
Accuracy	±30-90 arc seconds
Multi turn	16 bits, customizable
Power supply	5-24 VDC
Current	150mA@5VDC
Interface	SSI, BISS C, RS485, RS485+AB, TTL
Speed	6,500RPM
Axial tolerance	± 0.1 mm
Radial tolerance	± 0.1 mm
W/ temperature	-40...+85°C

The kit encoder can work with the condition that rotor and stator plates are naked PCB formats. This format gives the smallest assembly thickness and the lightest rotor and stator. The mechanical dimension of one version is illustrated as below.

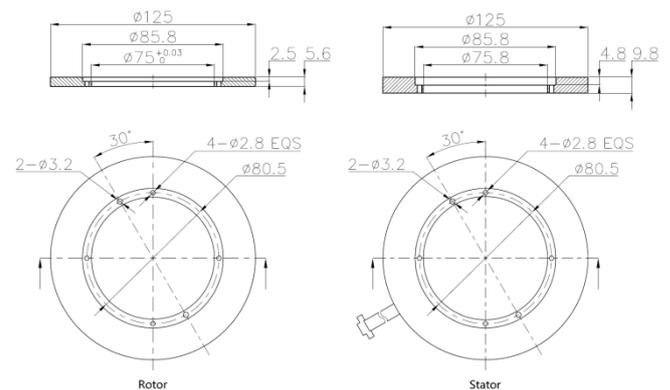


For installation, the stator plate is fixed on flange with

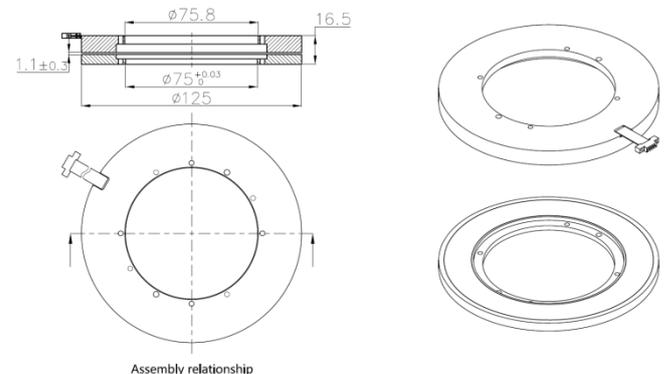
three M2 screws and the rotor plate can be mounted on the rotary shaft with two M2 set screws.



Alternatively, the kit encoder can work with the condition that rotor and stator plates are housed with metal covers. This configuration gives better protection of PCBs and higher reliability. The mechanical dimension of a housed version is illustrated as below.



For installation of the housed version, the stator plate and rotor plate are both fixed by screws tighten along with the axial direction. The assembly relationship between the rotor and stator is illustrated as below.



Industrial Rotary Encoder



Capacitive encoder CAPRO-B



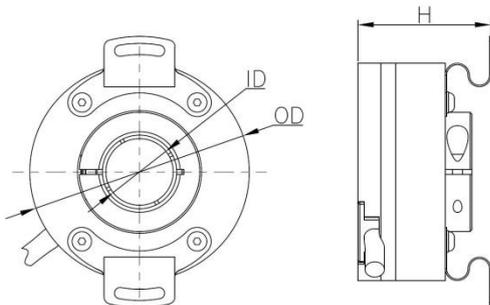
Based on capacitive sensing and 360° holistic scanning, an effective approach compensating eccentricity error and offering better noise cancellation comparing to optical or magnetic sensing, the CAPRO-B series demonstrate comprehensive advantages on cost-effectiveness, good accuracy and robustness for various applications.

-B stands for that the products are housed with integral bearings.

Specification	
Resolution	16-23 bits
Repeatability	5 arc seconds
Accuracy	±50 arc seconds; or ±5 arc seconds(with calibration and compensation)
Multi turn	16 bits, customizable
Power supply	5-24 VDC
Current	150mA@5VDC
Interface	SSI, BISS C, RS485, RS485+AB, TTL
Speed	3,500RPM
W/ temperature	-40...+85°C
Humidity	<98%, no condensation

For installation of CAPRO-B encoders, spring coupler is applied to fixed the housing on the flange and a clamping ring locks the central hole with the targeted shaft. The mechanical parameters (as indicated in the figure) of various models are listed in the following table.

Model	5013	6020	7625	11054
ID(mm)	11	19	24	50
OD(mm)	52	62	78	112
H(mm)	35	37	32	49



Heavy duty hollow shaft encoder

- ◆ Incremental output HTL/TTL
- ◆ Harsh environment of high moisture, condensation, oil, vibration...
- ◆ Hollow shaft ID≤20mm
- ◆ Encapsulated sensor head
- ◆ Stainless steel shaft and case
- ◆ Moment of inertia ~58KG*mm²
- ◆ Min. starting torque 6 N*cm
- ◆ Weight 1.2KG
- ◆ Torque arm to fix case
- ◆ Clamping ring to fix shaft



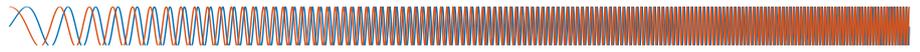
Heavy duty shaft encoder

- ◆ Incremental output HTL/TTL
- ◆ Harsh environment of high moisture, condensation, oil, vibration...
- ◆ Solid or blinded shaft output
- ◆ Steel shaft and aluminum housing
- ◆ Max. axial load: 1400N
- ◆ Max. radial load: 5600N
- ◆ Moment of Inertia ~75KG*mm²
- ◆ Super small speed ripple <1RPM
- ◆ Min. starting torque: 6 N*cm
- ◆ Weight: 1.5KG
- ◆ Redundancy supported



Specification (for above two heavy duty encoders)	
Power supply	4.75 ... 30 VDC
Output	A+, B+, R+, A-, B- R-
Output interface	HTL, TTL/RS422
Resolution (PPR)	1024, customizable
AB phase shift	90° ± 20°
PWM aspect ratio	180° ± 20°
Output frequency	≤1.56 MHz@4096PPR
EMC	EN 61000-6-2 EN 61000-6-3
Max. speed	6000RPM
IP protection	IP 68
Working temperature	-20...+100 ° C
Vibration IEC60068-2-6	10-2000Hz@30g
Shock IEC60068-2-27	6 ms@300g

Off-axis Encoder



Gear magnetic encoder GAME



- ◆ Magnetic sensor scans the varied magnetic field caused by the rotating gear wheel
- ◆ Output 1 Vpp Differential signal (sin/cos) or TTL / RS422
- ◆ High signal quality and low speed ripple
- ◆ Maintenance and wear-free
- ◆ Harsh environment of high moisture, condensation, oil, vibration
- ◆ Customized production of precision target wheels enables flexible integration into applications

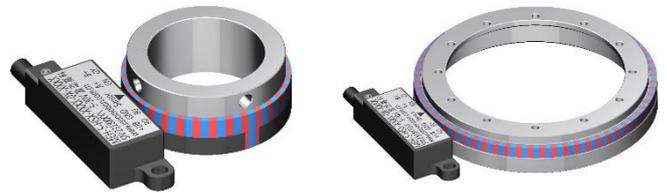
Electrical data:

Specs	GAME-T (TTL)	GAME-A (sin/cos)
Supply power	5 VDC±10%	5 VDC±10%
Output signal	RS422 (TTL)	Sin/Cos 1Vpp
Output current	≤27 mA	≤20 mA
Signal ripple	50%±10%	1Vpp±5%
Phase error	90°±10%	90°±5%
Input frequency	≤500 kHz	≤500kHz
Output frequency	≤8 MHz	≤500kHz
Interpolation	2 ^N (Customizable)	NA
EMC	EN 61000-6-2 \ EN 61000-6-3	

Mechanical data:

Specs	
Tooth module	0.4 to 1.0
Z track form	Removed tooth or single tooth
Air gap between sensor and wheel	0.2mm(0.4 module), 0.3mm(0.5 module), 0.5mm(0.8 module)
Air gap error	±0.05 mm
Sensor housing	Al alloy
Gear material	Ferromagnetic steel
Gear precision grade	7 or above
Working temperature	-30 °C ~ 85°C
Degree of protection	IP68
Vibration resistance	200m/s ² , DIN EN 60068-2-6
Shock resistance	2000m/s ² , 60068-2-27

Magnetic wheel encoder MRI



- ◆ Magnetic sensor scans the varied magnetic field of the scale on the wheel
- ◆ Output 1 Vpp Differential signal (sin/cos) or TTL / RS422
- ◆ Maintenance and wear-free
- ◆ Harsh environment of high moisture, condensation, oil, vibration
- ◆ Customized production of magnetic wheels enables flexible integration into applications

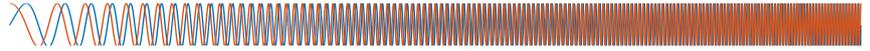
Electrical data:

Specs	MRI-T(TTL)	MRI-A(sin/cos)
Supply power	5 VDC±10%	5 VDC±10%
Output signal	RS422 (TTL)	Sin/Cos 1Vpp
Output current	≤27 mA	≤20 mA
Signal ripple	50%±20%	1Vpp±20%
Phase error	90°±20%	90°±20%
Input frequency	≤500 kHz	≤500kHz
Output frequency	≤8 MHz	≤500kHz
Interpolation	2 ^N (Customizable)	NA
EMC	EN 61000-6-2 \ EN 61000-6-3	

Mechanical data:

Specs	
Magnetic pole length	2mm or 5mm
Air gap between sensor and wheel	0.8mm
Air gap error	±0.2 mm
Sensor housing	Al alloy
Sensor dimension	12X15X50 mm ³
Magnetic wheel mounting form	Set screw, or screw along axial direction, or clamping ring
Magnetic wheel outer diameter	Pole length*number of poles /π
Working temperature	-20 °C ~ 85°C
Degree of protection	IP68
Vibration resistance	200m/s ² , DIN EN 60068-2-6
Shock resistance	2000m/s ² ,60068-2-27

Large Shaft Encoder



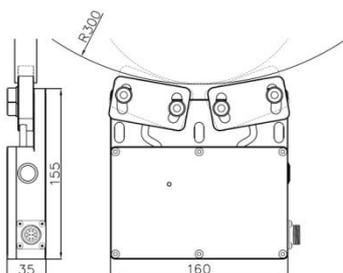
Magnetic belt rotary encoder



- ◆ Targeted applications with large shafts such as wind turbine, propeller shaft, turning machines, etc.
- ◆ Magnetic belt is welded with steel locks on both ends. Tightening the locks ensures reliable mounting of the belt over the shaft surface
- ◆ Being installed off-axis, two sensor heads detect the belt gap and automatically switch in between to ensure signal continuity
- ◆ Shaft diameter >100mm
- ◆ Pseudo absolute angle can be output when the sensors detect the gap end at the first turn
- ◆ Harsh environment of high moisture, condensation, oil, vibration

Specification	
Supply Voltage	5-24 VDC
Current	150mA@5VDC, 100mA@24VDC
Interface	SSI, BISS C, RS485, HTL, TTL, 1Vpp
Resolution	Customizable
Speed	3,000RPM
Axial tolerance	± 5 mm
Radial tolerance	± 1 mm
Working temperature	-40...+85° C (可订制)
Class of protection	IP 68

The arc-shaped mounting holes are created on sensor heads, which ensure the sensors can fit different shaft diameters. The following figure illustrates how the system is installed with a shaft of 600mm diameter.



Shaft torque sensor

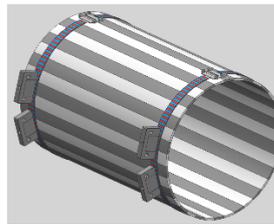


In many power transmission systems, torque is an important parameter to indicate the system performance. Dynamically monitoring the torque value helps improve the control scheme, enhance the efficiency and reduce the failure rate with predictive maintenance.

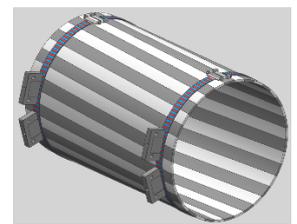
Strain gauge is a popular approach for torque sensing, however, the complexity increases when the power has to be supplied to the gauge glued on the rotating shafts via slip ring and the signal to be transmitted back to the standstill processor wirelessly.

The innovative solution avoids any power or signal on the rotating shaft by installing two sets of magnetic belt encoders separated on the shaft in a distance of hundreds of millimeters. Comparing the angular difference of the two sets and combining the shaft cross section dimension and material shear modulus, the system can calculate the shaft distortion and torque dynamically and precisely.

The speed and power rate value are also available.



Unloaded Shaft

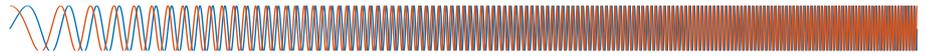


Shaft torsion caused by load

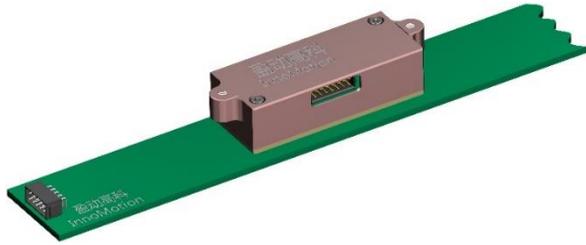
The passive magnetic scale on rotating shaft offers various advantages over traditional torque sensing systems.



Linear Encoder



Capacitive linear encoder CAPLIN



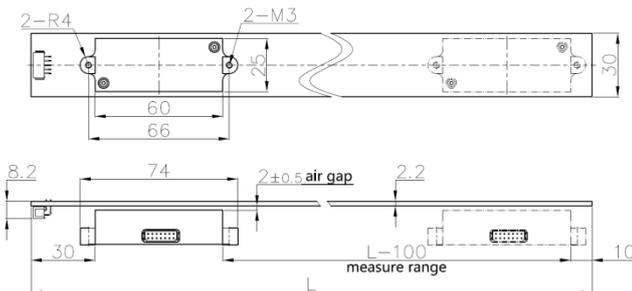
Many emerging applications require encoders with extended misalignments between the moving sensor and the static scales. Based on capacitive sensing and differential pattern design, the CAPLINS offer easy to implement solutions for those demands.

The CAPLIN scale, produced with the well-established PCB process, is cost effective while it achieves the accuracy less than tens of micro meters per meter.

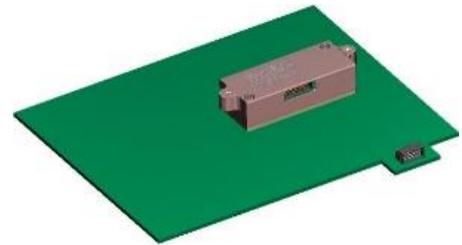
Based on a patented coding technology, CAPLIN offers an absolute positioning function at the power-up stage. The addressable length is up to 10 meters.

Specification	
Supply power	4.75 ... 5.5 VDC
Current	150 mA (5 V)
Interface	BISS C, SSI, RS485, TTL
Resolution	1um, 其它可设置
Repeatability	5um
Linear accuracy	20um/m
Measurement length	10m, customizable
Max. speed	5m/s
EMC	EN 61000-6-2 / EN 61000-6-3
Air gap between sensor and scale	2mm
Z axis air gap tolerance	± 0.5mm
Y axis air gap tolerance	± 1mm
工作温度	-20...+85 ° C

The figure below shows one arrangement of the sensor and scale.



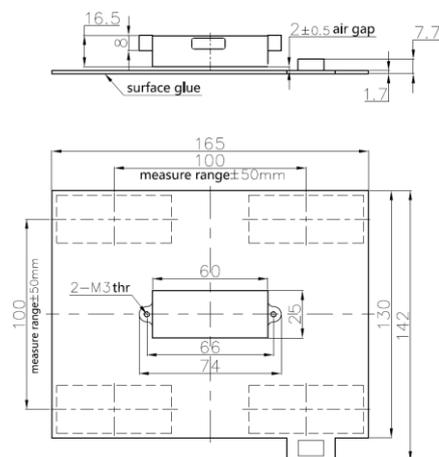
Planar motion encoder



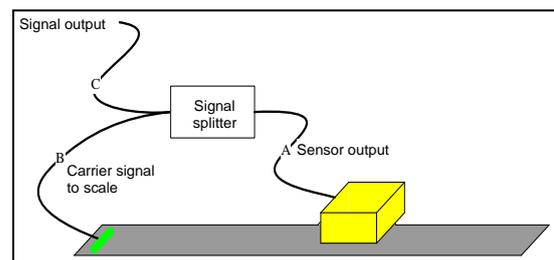
In planar motion cases that the movement along X and Y axis is coupled, the sensor has to move in a large distance along Y axis when scanning X axis movement. The capacitive principle can meet this requirement although optical and magnetic sensing technology fail.

Thanks to the special pseudo random number coding technology, it offers a globally unique product that can give absolute position data in planar motion scenario. For such case, state-of-the-art works incremental only.

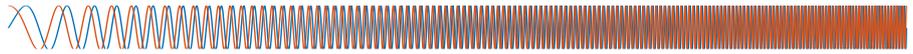
The mechanical arrangement is similar to that of the linear CAPLIN, only with different scale shape.



For capacitive linear encoder products, both sensor and scales can be active, which differs from that of optical and magnetic linear ones.



Linear Encoder



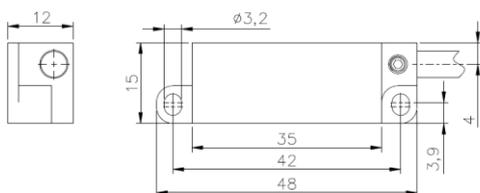
Magnetic scale incremental encoder



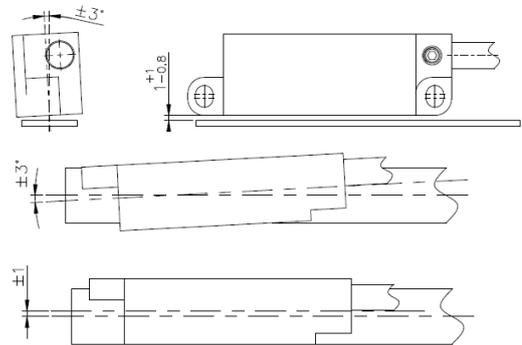
- ◆ Magnetic sensor scans the linear magnetic scale
- ◆ Output 1 Vpp Differential signal (sin/cos) or TTL / RS422
- ◆ Maintenance and wear-free
- ◆ Harsh environment of high moisture, condensation, oil, vibration
- ◆ Magnetic pole length 2mm or 5mm
- ◆ Measurement length up to 50m

specs	MLE-T	MLE-A
Power supply	5 VDC±10%	5 VDC±10%
Output signal	RS422 (TTL)	Sin/Cos 1Vpp
Output current	≤27 mA	≤20 mA
Output ripple	50%±20%	1Vpp±20%
Phase and error	90°±20%	90°±20%
Input frequency	≤500 kHz	≤500kHz
Output frequency	≤8 MHz	≤500kHz
Interpolation	2 ^N (Customizable)	NA
EMC	EN 61000-6-2 / EN 61000-6-3	
Class of protection	IP68	
Air gap between sensor and scale	1.5mm	
Air gap tolerance	±0.5 mm	
Working temperature	-20 °C ~ 85°C	
Vibration resistance	200m/s ² , DIN EN 60068-2-6	
Shock resistance	2000m/s ² , DIN EN 60068-2-27	

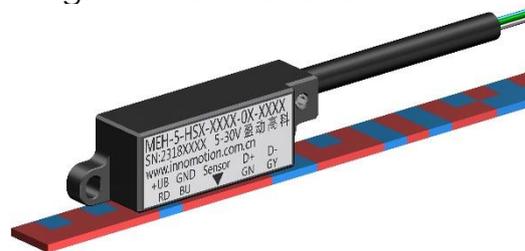
Sensor housing is made of aluminum alloy, the dimension is illustrated as below.



The sensor installation misalignment is only allowed to certain degree, as indicated below.



Pseudo random number coded magnetic scale encoder



- ◆ Magnetic sensor scans the linear magnetic scale
- ◆ Dual tracks: incremental and pseudo random number coded
- ◆ Incremental track pole length: 5mm
- ◆ Resolution: 5um, customizable
- ◆ Measurement length is customized
- ◆ Interface: BISS C and RS485

Nonius magnetic scale encoder



- ◆ Magnetic sensor scans the linear magnetic scale
- ◆ Dual tracks: incremental and nonius
- ◆ Incremental track pole length: 2 or 1.5mm
- ◆ Resolution: 1 um, customizable
- ◆ Measurement length <256mm
- ◆ Interface: BISS C and RS485



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