

● *Moving. Precisely. With You.*

High Precision Rotary Encoders

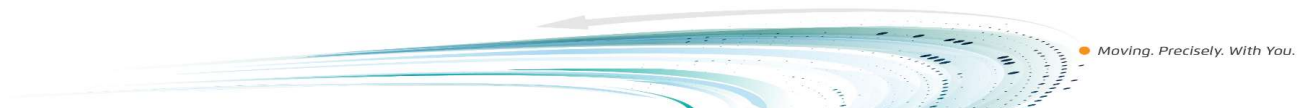
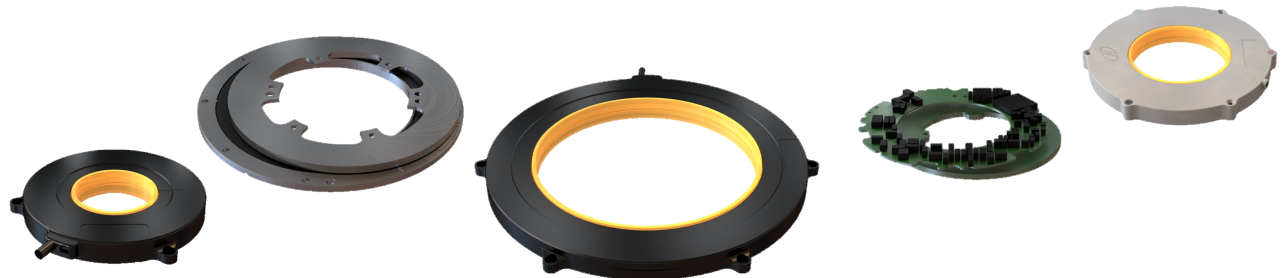


INTRODUCTION



Who we are ?

Netzer Precision Motion Sensors, established in 1998, designs, manufactures and supplies high quality & performance position encoders, based on the Electric Encoder™ proprietary technology, invented by Mr. Yishay Netzer.





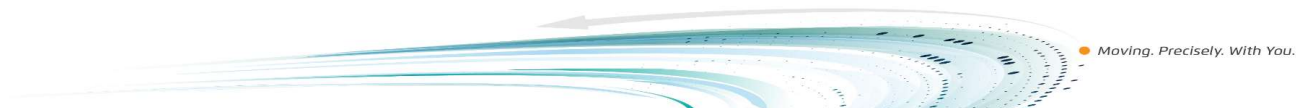
Precision in Motion

Rotary and linear, absolute and incremental, analog or digital, standard or custom, **Netzer Precision Motion Sensors'** patented, rugged and high-performance Electric Encoder™ technology suits applications ranging from space and avionics to harsh environment, instrumentation, medical and automotive.

The Electric Encoder's unique contactless core with hollow shaft, allows lowest possible axial space requirements and enhances reliability by eliminating degradation mechanism.



The advanced digital **Q-Core** adds intelligence to position-sensing and with its advanced capabilities adapts the sensors to modern motion control requirements.



What are we doing ?

Precise motion sensors for extreme environment conditions & industrial automation.

Electrical Encoder™ technology (patent)

Present markets:

- Avionic, Defense, Aerospace
- Medical
- Robotics
- Industrial Automation
- Automotive



Defense



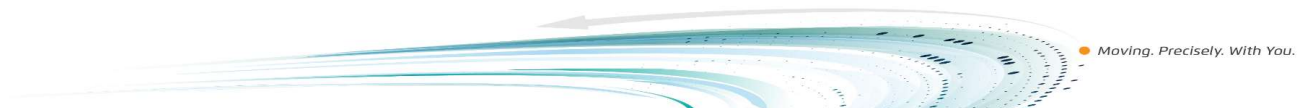
Automotive



Robotics



Space





HISTORY

Time Line

18 years of developments from
analog to advanced digital

Digital Core – I

For defense application
Hybrid – Analog / Digital

2000

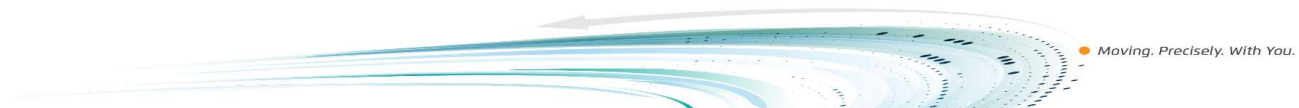
Analog core

RE product line for motor feedback

Digital Core – II

For Defense and Industrial
Automation Full Digital

2020

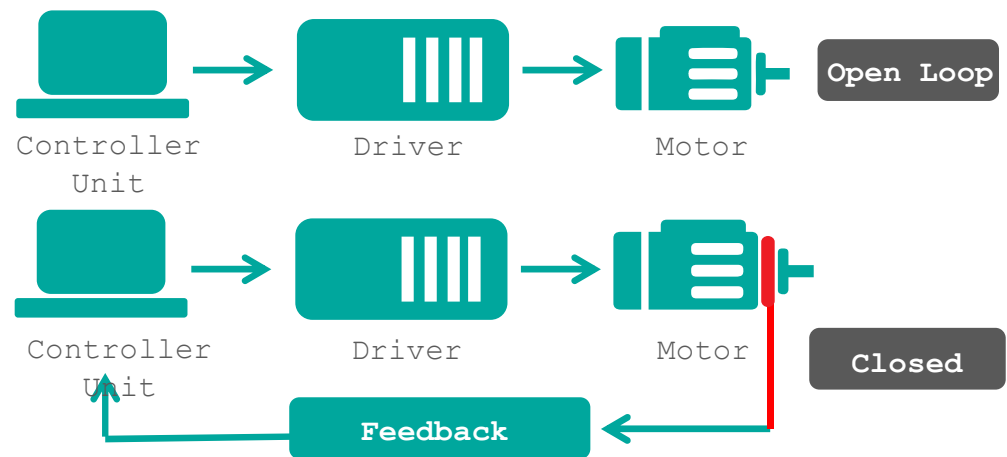




Servo Control

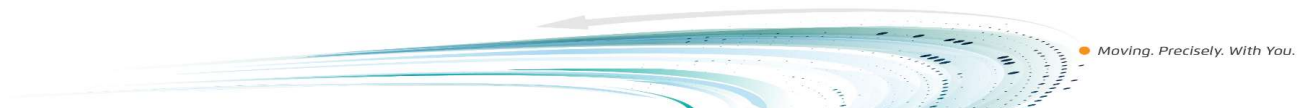
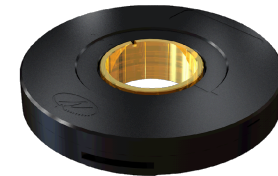
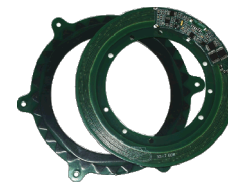
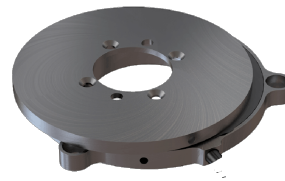
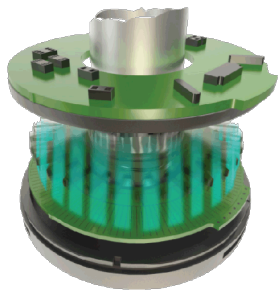
The Electric Encoder™ is part of 3 major parts of the “motion Control” (servo close loop control) for position and speed control:

- Electric Motor
- Encoder (position sensor)
- Servo Drive – motor power & motion control



The Electric Encoder

The **Electric Encoder™** non-contact technology relies on interaction between the measured displacement and a space/time modulated Electric Field.



The Electric Encoder™ Benefits



Functional

- Absolute Position
- High Resolution
- High Accuracy
- Low Power Consumption



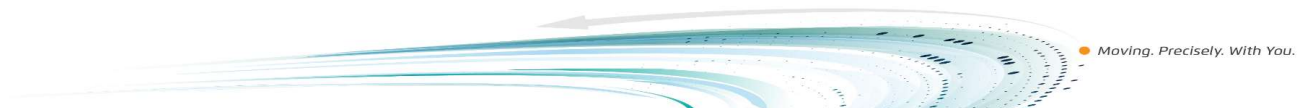
Structural

- Low Profile
- Hollow Floating Shaft
- Mounting Tolerance
- Low Weight and Inertia



Environmental

- Extreme Temperatures
- Shock and Vibration Tolerance
- Tolerance to EMI / RFI
- Immunity to Magnetic Fields



The Electric Encoder™ Benefits



RESISTANCE TO
MAGNETIC



LOW PROFILE



HOLLOW SHAFT



LIGHT WEIGHT



RESISTANCE TO
ELECTRIC SHOCKS



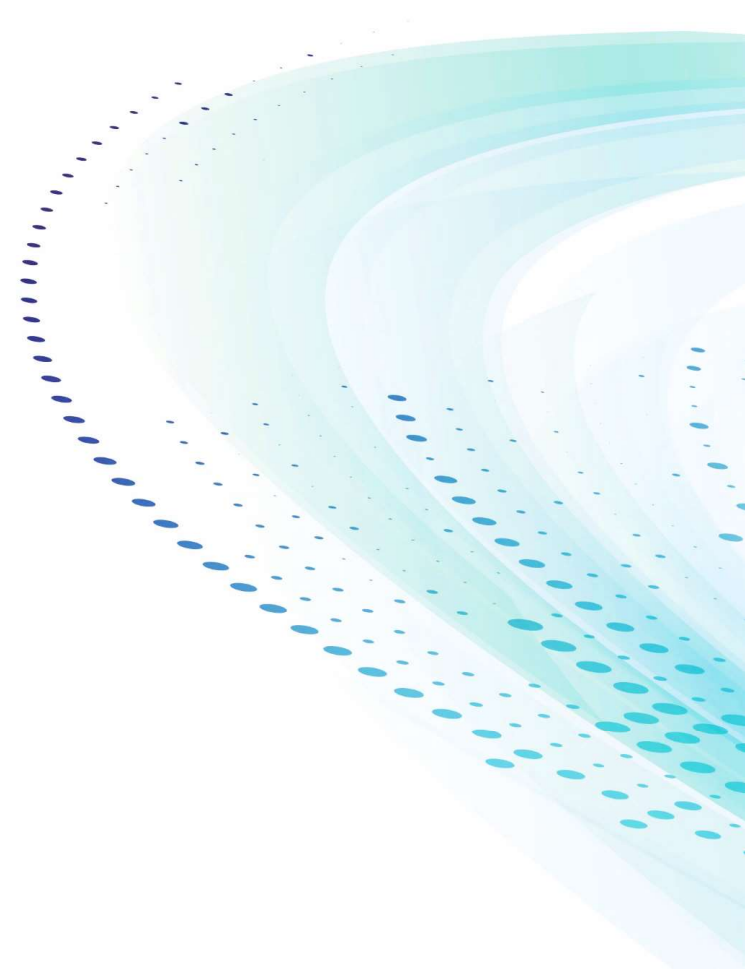
SMALL SIZE



HIGH PRECISION



DURABILITY



	Advantages in	Advantages over	Cons.
Low profile	defense, robotics	Optical with high performance	
Hollow shaft	defense, robotics	Optical and magnetic	
Small & Light	Avionic, Seek heads, medical	Resolvers, magnetic, optical , inductive	
High precision	Defense – optical Robotics	Inductive Optical / magnetic) (needs precise mounting)	
Resistance	Magnetic fields Contaminate environment	Magnetic Optical	
Durability	In shock, vibration, thermal	Over optical mainly	Sensitive to Condensation



HIGH PRECISION



RESISTANCE TO ELECTRIC SHOCKS



SMALL SIZE



LOW PROFILE



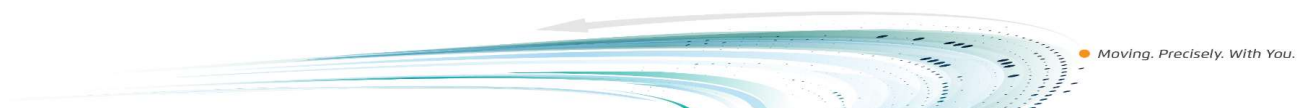
HOLLOW SHAFT



DURABILITY



RESISTANCE TO MAGNETIC





Pros.



RESISTANCE TO
MAGNETIC



LOW PROFILE



HOLLOW SHAFT



LIGHT WEIGHT



RESISTANCE TO
ELECTRIC SHOCKS



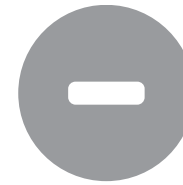
SMALL SIZE



HIGH PRECISION



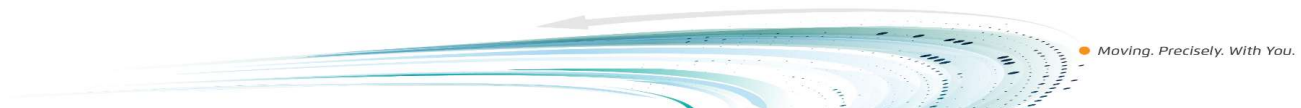
DURABILITY



Cons.



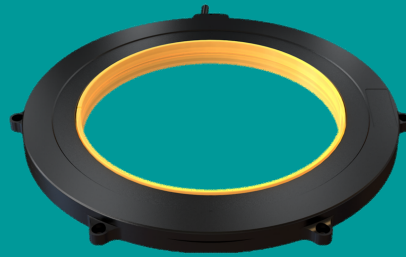
CONDENSATION





OTHER TECHNOLOGIES

Position Sensors Technology Electrical



Size | Profile | Weight | Precision | Latency



Optical



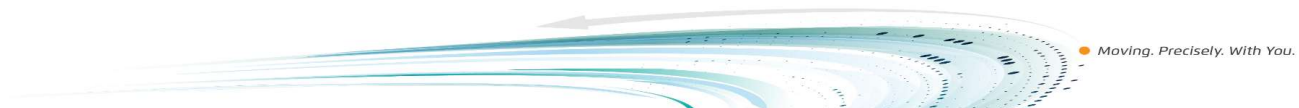
Magnetic



Inductive



Resolver



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**HARSH
ENVIRONMENT**



**INDUSTRIAL
AUTOMATION**

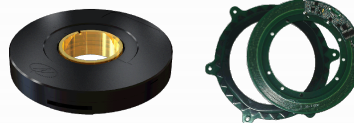


SPACE

DS, DL, DF



DX, VLX



EES





**HARSH
ENVIRONMENT**

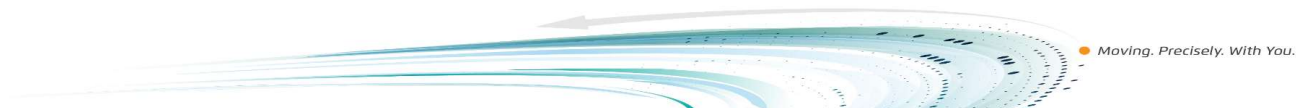




HARSH ENVIRONMENT

Netzer's Electric Encoder meets the requirements for use in a wide variety of harsh environment applications, including space, avionics and defense. The contactless core with its holistic structure is extremely durable and resistant to vibrations and shocks. The low profile, hollow shaft structure, suits compact, high-density designs.

Features





HARSH ENVIRONMENT

Electrical

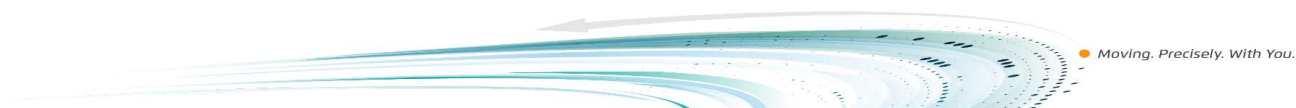
Supply voltage	+4.6 to +5.5 v
Current consumption	analog - 10 mA digital - 60mA

Environment - extreme conditions

EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-55°C to +85°C
Relative humidity	< 98% non condensing
Shock endurance	100 g for 11 ms
Vibration endurance	20 g for 10 to 2000 Hz

Output formats

Digital	Absolute position - SSI / BISS
Analog	Sine / Cosine, 1 Vp-p



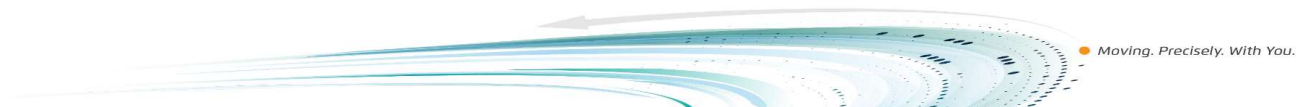


Hollow Contactless Rotor

HARSH ENVIRONMENT



Polymer housing	DS-16	DS-25	DS-37	DS-40	DS-58	DS-70	DS-90	DS-130
Functional								
Angular resolution	16 bits	17 bits	17 bits	17 bits	18 bits	19 bits	19 bits	19 bits
Accuracy	< ±0.025°	< ±0.020°	< ±0.020°	< ±0.020°	< ±0.015°	< ±0.015°	< ±0.010°	< ±0.010°
Maximum usable speed	4,000 rpm							
Measurement range	Absolute position single turn							
Mechanical								
Weight	2.7 gr	4 gr	10 gr	18 gr	36 gr	50 gr	50 gr	65 gr
Outer diameter / Inner diameter / Profile (mm)	16/4/8	25/6/7	37/10/8	40/10/8	58/20/10	70/30/10	90/50/10	130/90/10
Construction material (stator/rotor)	Ultem™ / TRVX-50 Polymer's							



HARSH ENVIRONMENT



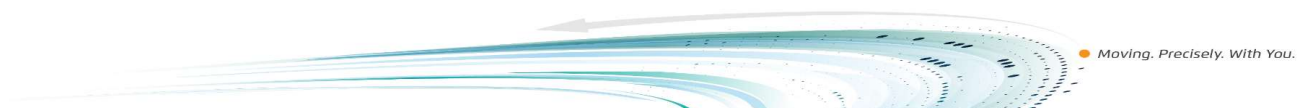
Metal Sealed Housing

Modular Metal Case

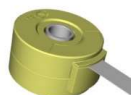


Metal Case	DL-25	DL-66
Functional		
Angular resolution	17 bits	18 bits
Accuracy	< ±0.030°	< ±0.020°
Maximum usable speed	4,000 rpm	
Measurement range	Absolute position single turn	
Output	Digital SSI / BiSS-C	
Mechanical		
Total weight	25 gr	250 gr
Outer diameter / Profile (mm)	25/25	71/62
Construction material	Aluminum	
Protection	IP65	

DF-60	DF-100	DF-150
Functional		
18bits	18 bits	18 bits
$< \pm 0.015^\circ$	$< \pm 0.015^\circ$	$< \pm 0.015^\circ$
1,500 rpm	1,500 rpm	1,500 rpm
Absolute position single turn		
Digital SSI/ BiSS-C		
Mechanical		
38 gr	145 gr	318 gr
60/30/10	100/57/10	150/110/13
Aluminum		



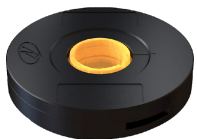
Seeker Heads



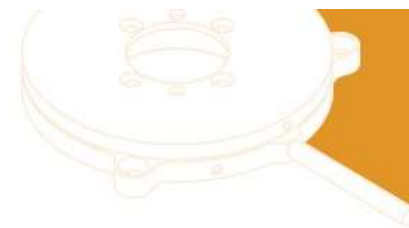
DS -16



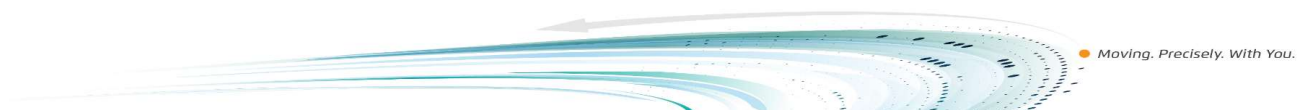
DS -25



DS -37

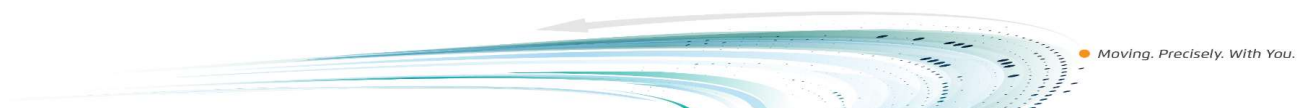
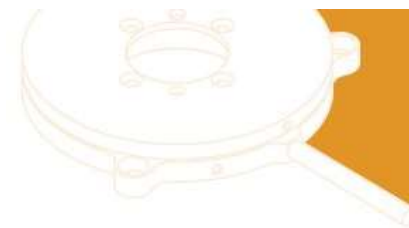
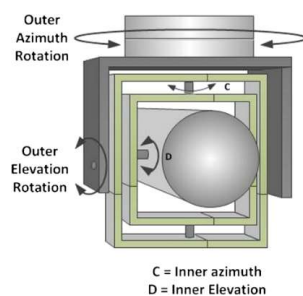
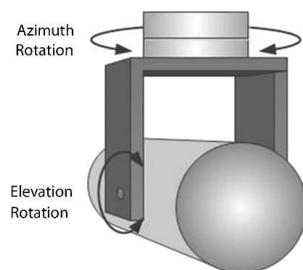



**HARSH
ENVIRONMENT**



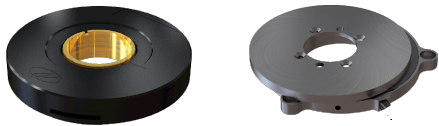
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Gimbals



Electric Encoders

Harsh Environment



DS , DF

Industrial Automation



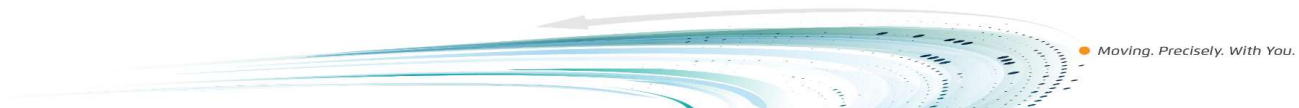
DX , VLX

VLQ – sector read head
VLM – Multi turn

Space



EES



Electric Encoders

Harsh Environment

DS	OD / ID / H	Resolution	Accuracy
DS-16	16 / 4 / 8	17-19bit	< 0,025°
DS-25	25 / 6 / 8	17-19	< 0,015°
DS-37	37 / 10 / 10	17-19	< 0,015°
DS-58	58 / 20 / 10	18-22	< 0,012°
DS-70	70 / 30 / 10	19-23	< 0,010°
DS-90	90 / 50 / 10	19-23	< 0,010°
DS-130	130 / 90 / 10	19-23	< 0,010°

DF	OD / ID / H	Resolution	Accuracy
DF-60	60 / 30 / 10	18-22bit	< 0,015°
DF-100	100 / 57 / 10	18-22	< 0,015°
DF-150	150 / 110 / 13	18-22	< 0,015°

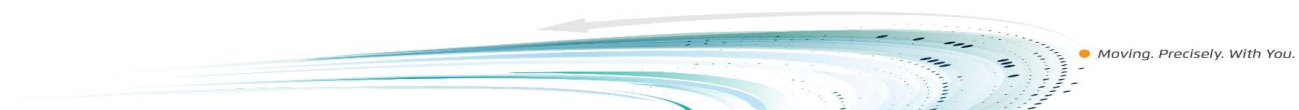
Industrial Automation

VLX	OD / ID / H	Resolution	Accuracy
VLX-60	60 / 27 / 6	18bit	< 0,015°
VLX-64	64 / 34 / 6	18	< 0,015°
VLX-70	70 / 45 / 6	18	< 0,015°

VLQ – sector read head

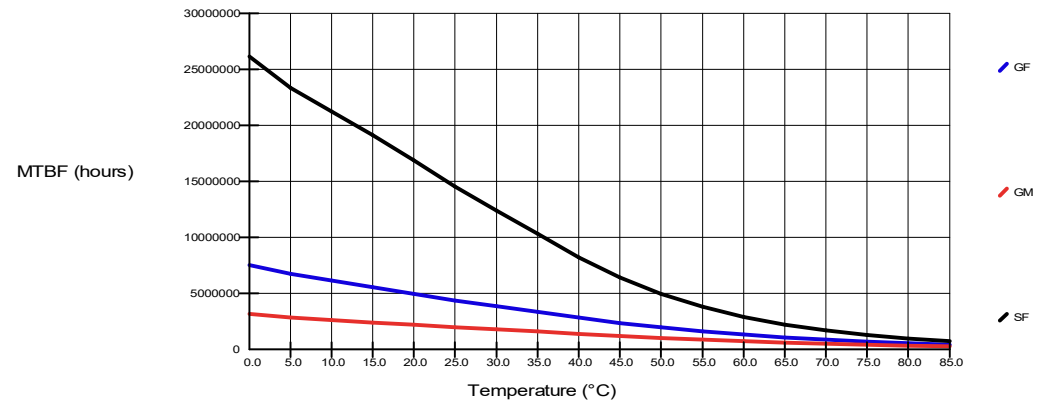
VLM – Multi turn

Space

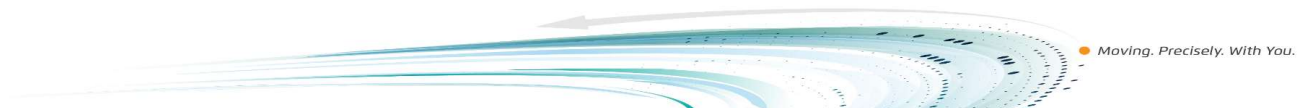


Environment conditions - TESTED

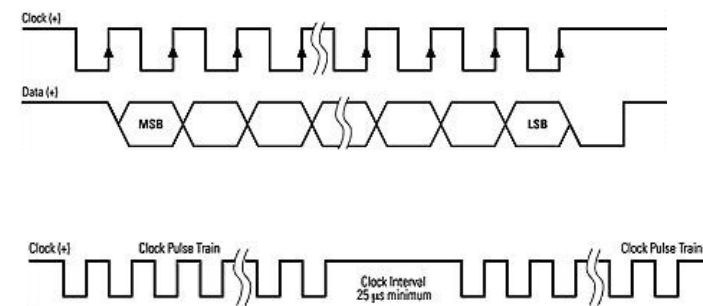
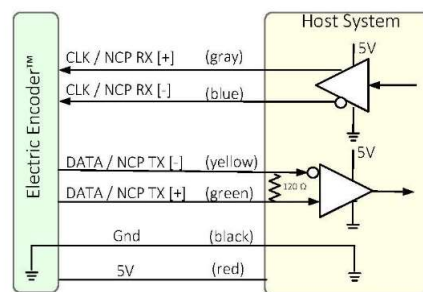
Temperature: -55°C to + 85°C (+125 °C)
 Vibration: 40g; 10 – 2,000 Hz
 Shock: 70g; 11msec
 Humidity: 95% non condensing
 MTBF: calculated (digital)



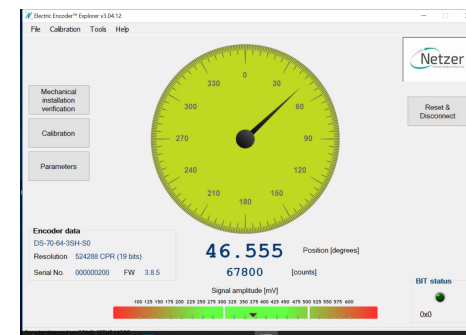
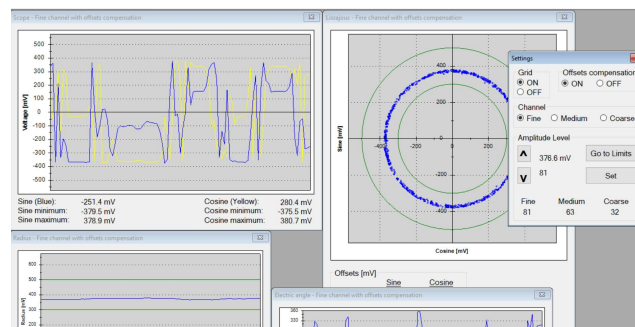
T(°C)	MTBF (hours)		
	GF (ground fixed)	GM (ground mobile)	SF (space;flight)
25.	4,300,000	2,000,000	1,500,000
85.	450,000	300,000	750,000



Interfaces



Digital interface
SSI / BiSS-C
Clock : 2Mhz
Position update : 30Khz



TODAY'S APPLICATIONS

01

Defense
Seeking heads , Gimbals

02

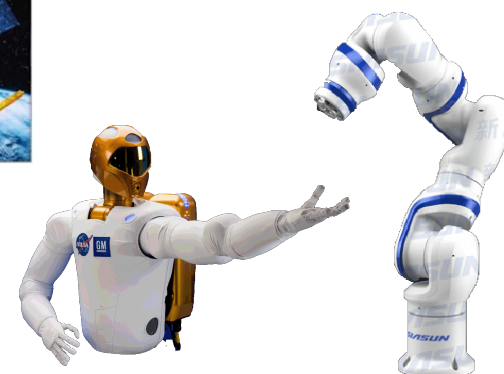
Space
Optical

03

Robotics
Arms

04

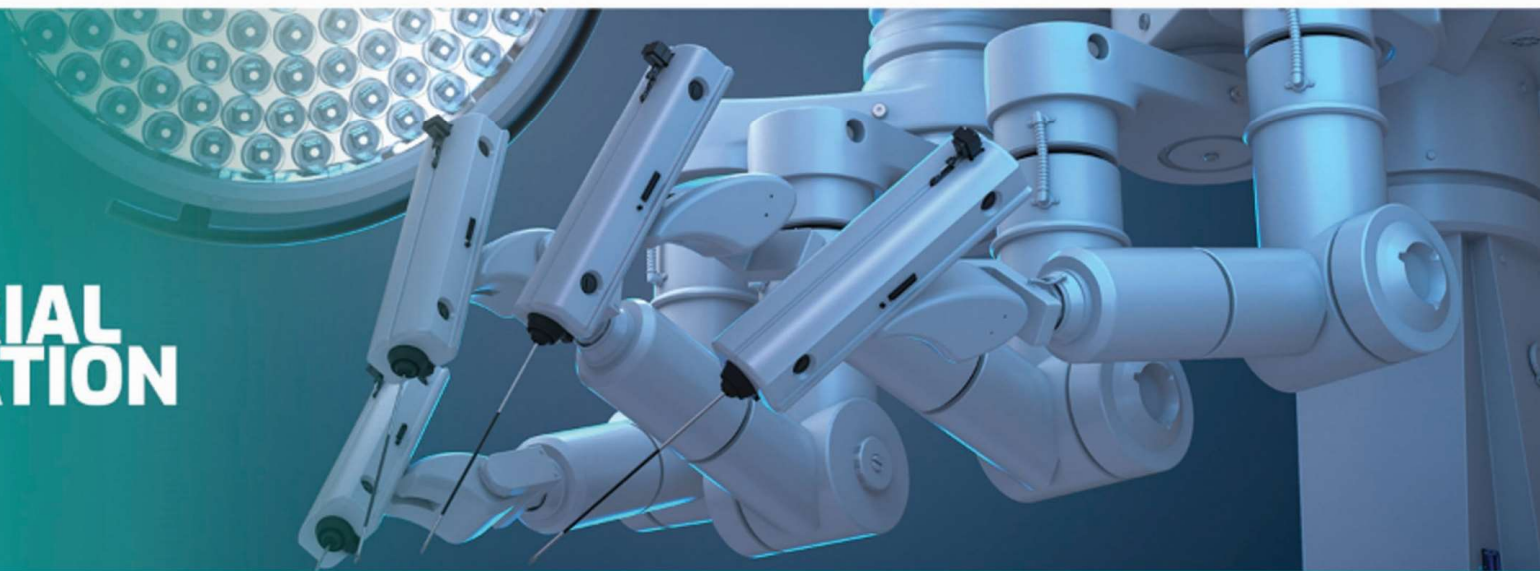
Medical
Surgical

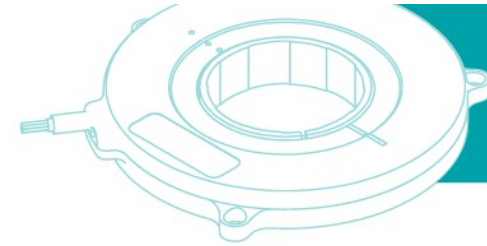


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**INDUSTRIAL
AUTOMATION**

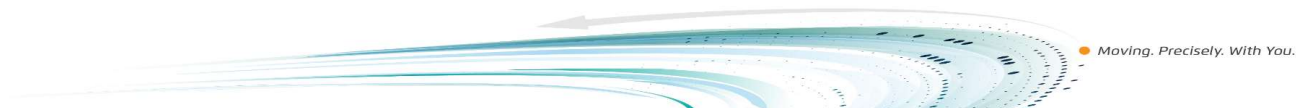
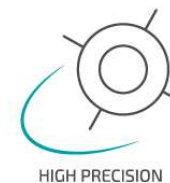


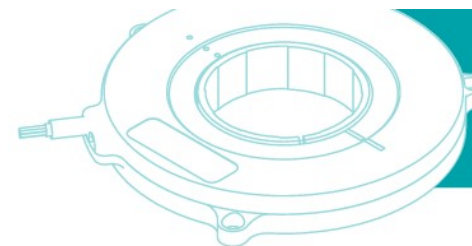


INDUSTRIAL AUTOMATION

Designed with **new Q-Core** processing, the DX and VLX product lines offer low-cost OEM position sensors for automotive, medical, robotics and industrial automation applications, with full resistance to magnetic fields. The Electric Encoder suits tight mechanical designs of servo drives and motors.

Features





INDUSTRIAL AUTOMATION

Electrical

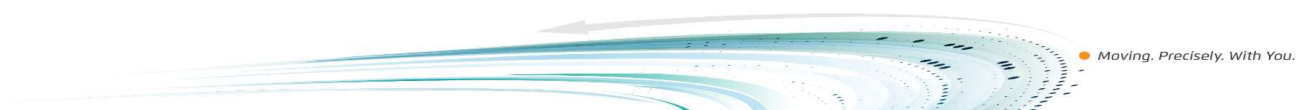
Supply voltage	+4.6 to +5.5 v
Current consumption	analog - 10 mA digital - 60mA

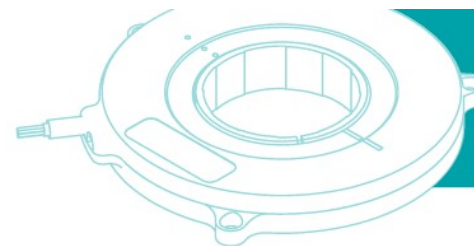
Environment

EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-25°C to +65°C
Relative humidity	< 98% non condensing
Shock endurance	100 g for 11 ms
Vibration endurance	20 g for 10 to 2000 Hz

Output

Digital	SSI / BISS
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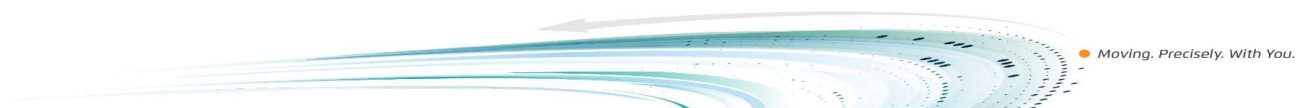




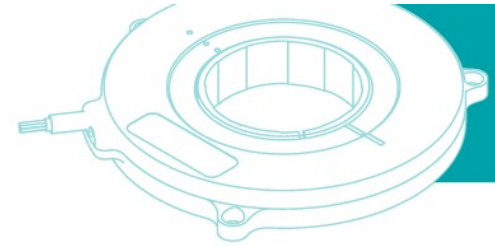
INDUSTRIAL AUTOMATION



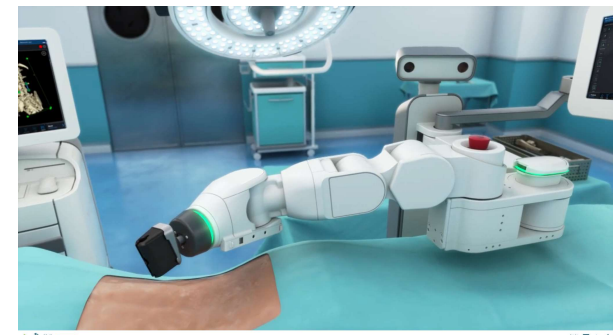
Polymer housing	DX-25	DX-40	DX-58	DX-70	VLX-60	VLX-64
Functional						
Angular resolution	17 bits	17 bits	18 bits	19 bits	18 bits	18 bits
Accuracy	< ±0.025°	< ±0.025°	< ±0.020°	< ±0.015°	< ±0.015°	< ±0.015°
Maximum usable speed	4,000 rpm				4,000 rpm	
Measurement range	Absolute position single turn				Absolute position single turn	
Mechanical						
Total weight	4 gr	10 gr	36 gr	50 gr	28 gr	28 gr
Outer diameter / Inner diameter / Profile (mm)	25/6/7	37/10/8	58/20/10	70/30/10	60/25/10	64/34/8
Construction material (stator/rotor)	Ultem™ / TRVX-50 Polymer's				PCB (FR4)	



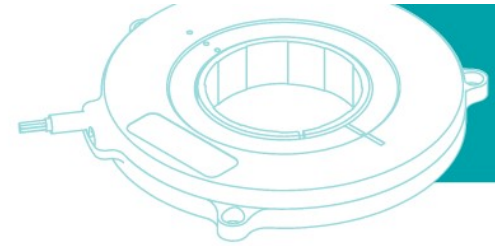
Medical Robotics



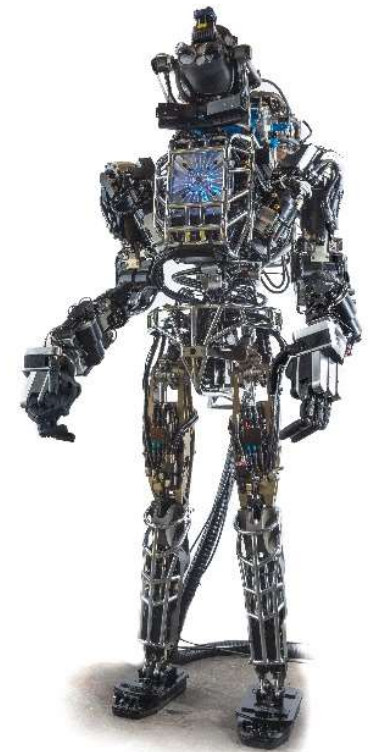
INDUSTRIAL
AUTOMATION



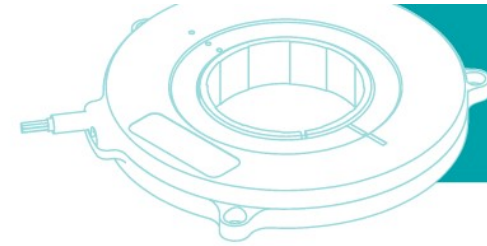
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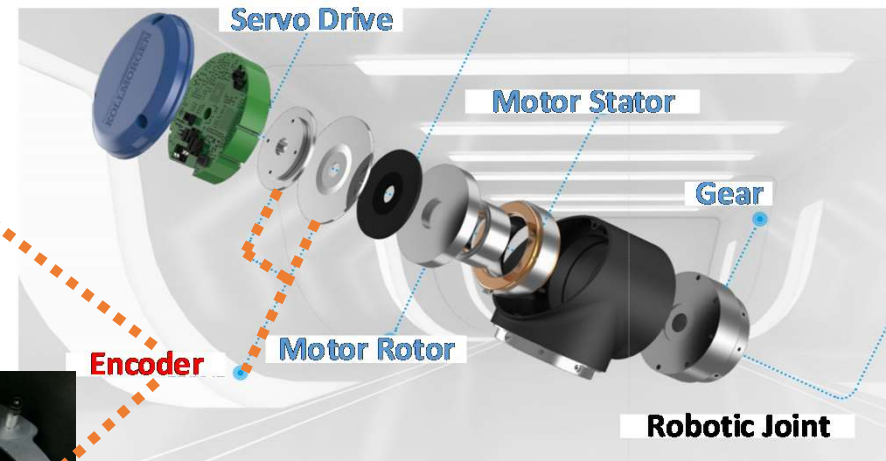
Robotics Joints



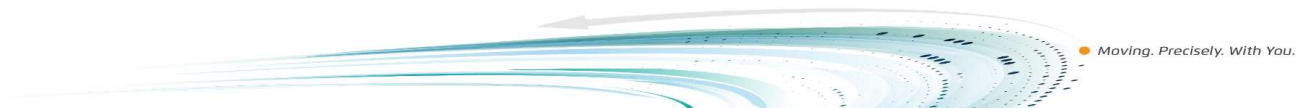
● Moving. Precisely. With You.



Robotics Joints



Low Profile:	10mm
Hollow Shaft:	20mm
Resolution:	19 Bit
Accuracy error:	<0.010°
Bandwidth:	>30KHz
Interface:	Ssi / BiSS



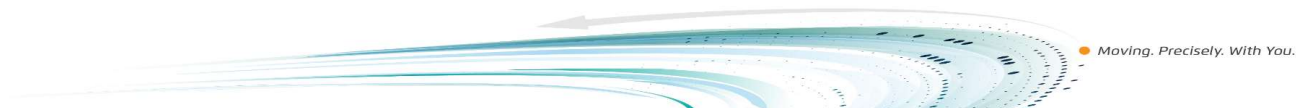
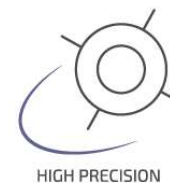




SPACE

The EES product line, with frameless or encapsulated design, provides high-precision position sensors for low orbit or deep space missions. Due to the underlying Electric Encoder technology, EES is an attractive option for low-profile, light and durable designs.

Features



SPACE



Electrical

Supply voltage	+15.5 v
Current consumption	analog - 10 mA, digital - 160mA

Environment - extreme conditions

EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-60°C to +85°C
Shock endurance	100 g for 11 ms
Vibration endurance	20 g for 10 to 2000 Hz

Available output formats

Digital	Absolute position - SSI / BISS
Analog	Sine / Cosine, 1 Vp-p



SPACE

Electrical

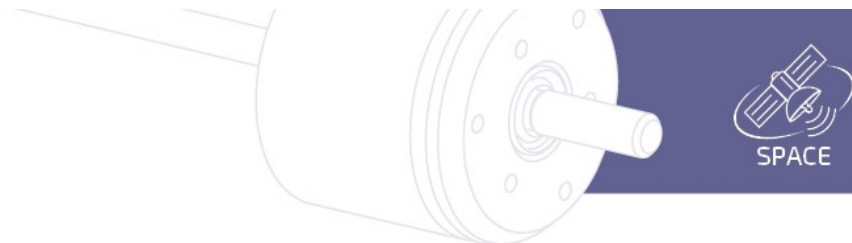
Supply voltage	+15.5 v
Current consumption	analog - 10 mA, digital - 160mA

Environment - extreme conditions

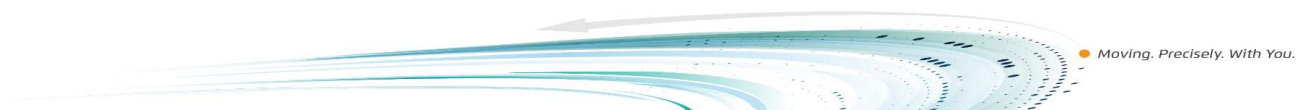
EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-60°C to +85°C
Shock endurance	100 g for 11 ms
Vibration endurance	20 g for 10 to 2000 Hz

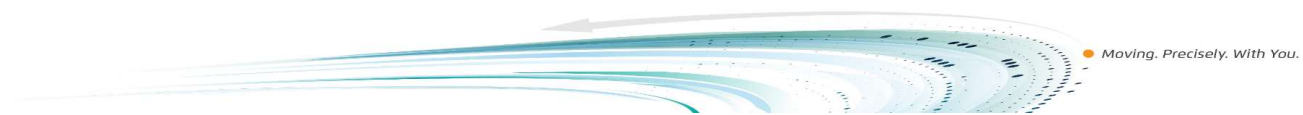
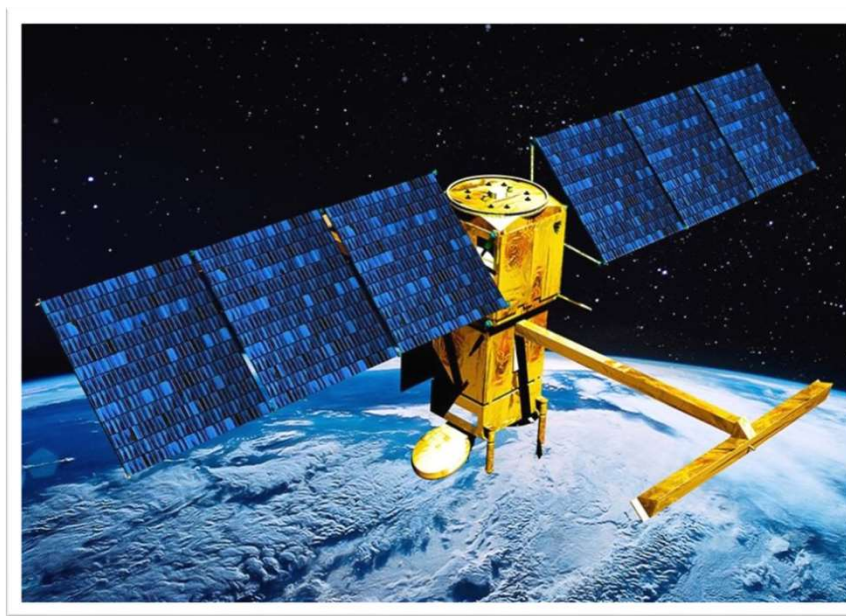
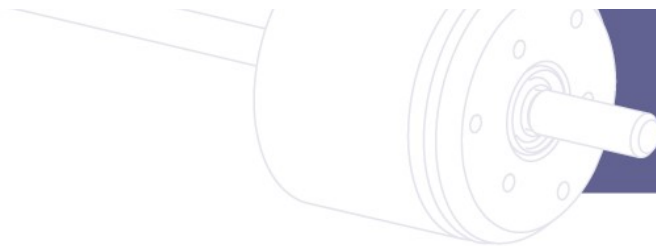
Available output formats

Digital	Absolute position - SSI / BISS
Analog	Sine / Cosine, 1 Vp-p



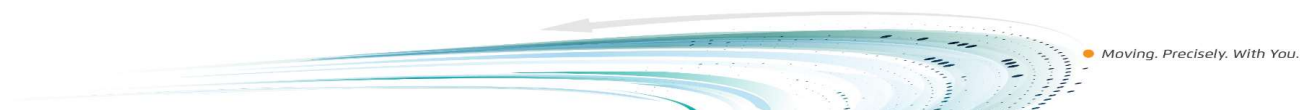
Polymer housing	EES-58 Digital
Functional	
Angular resolution	20 bits
Accuracy	< ±0.003°
Maximum usable speed	1,000 rpm
Measurement range	Unlimited rotation - 360° Absolute position single turn
Mechanical	
Total weight	450 gr
Outer diameter / Profile (mm)	87/61
Protection	IP65







Customers





Dominant segment player

World wide presence in leading applications





Thanks



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