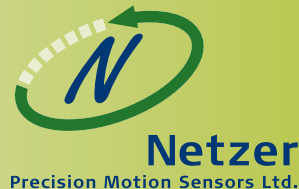


DS-37

Absolute position, rotary Electric Encoder™



The DS-37 is a member of the DS series of Electric Encoders, based on Netzer Precision proprietary technology. These encoders offer many advantages, some unparalleled:

- Low profile (8 mm).
- Hollow, floating shaft.
- No bearings or other contacting elements.
- High precision.
- High tolerance to temperature, shock, moisture, EMI & RFI.
- Insensitive to magnetic fields.
- Very low weight.

The DS-37 is suited to demanding application such as: aerospace, medical, instrumentation, automation, etc.



The holistic structure of the Electric Encoder™ provides generous mounting tolerance, thus obviating the need for internal ball bearings.

The lack of bearings and components such as flexible couplers, glass disc, light sources and detectors, along with very low power consumption makes the DS-37 encoder virtually failure free.

The internally shielded, DC operated Electric Encoder™ includes an electric field generator, a field receiver, a sinusoidal shaped dielectric rotor, and processing electronics.

The outputs signals of DS-37 Electric Encoder™ are analog Sine / Cosine representing the rotation angle, incremental or absolute position.



Mechanical

Allowable mounting eccentricity (operational)	±0.1 mm
Allowable rotor axial motion (operational)	±0.1 mm
Rotor inertia	71.62 gr mm ²
Total weight	10gr
Outer diameter / Inner diameter / Profile	37/10/8mm
Material (stator, rotor)	Ultem™ polymer
Material mounting clamps , M2	S.S.

Electrical

Supply voltage	5V ± 5%
Interconnection	Ø 3.5 mm Shielded cable

Environment

EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-40°C to +85°C
Relative humidity	<98 % - non condensing
Shock endurance	IEC 60068-2-27 100 g for 11 ms
Vibration endurance	IEC 60068-2-6 20 g 10 – 2000 Hz
Protection	IP 40

Performance

Electrical Cycles – Fine/Coarse channels	16 / 3
Angular resolution (using 12 bit A/D conversion)	17 bits
Static error (with offset compensation)	< 15 mDeg (0.262mrad)
Maximum operational speed	1,500 rpm
Measurement range	Unlimited rotation
Output	SSi absolute position
BIT (build in tests , optional)	Included (SSi version)

Digital - SSi Interface (absolute position)

DS-37

Output signal parameters

Signal latency	~250 µSec
Output code	Binary
Serial output SSi	Differential RS-422
Clock SSi	Differential RS-422
Monoflop time	25 µSec
Clock Frequency	0.5 ÷ 2.5 MHz
Position update (Max)	30 KHz

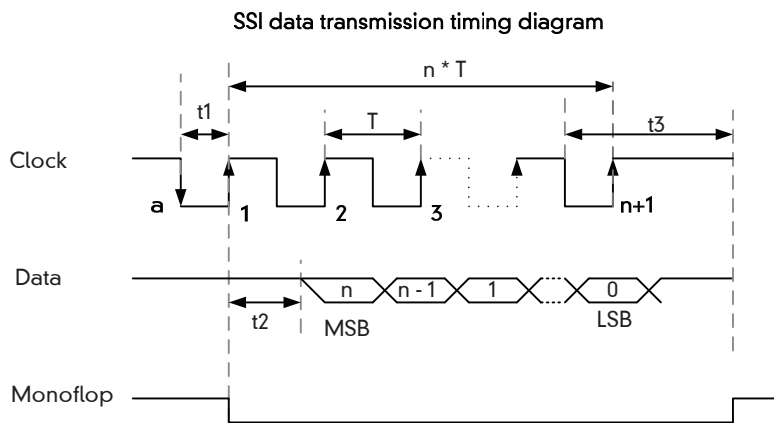
Electrical parameters

Current consumption	~ 180 mA
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SSi - Wires color code

#	Name	Color	Function
1	Clock +	Grey	SSi Clock
2	Clock -	Blue	
3	Data -	Yellow	SSi Data
4	Data +	Green	
5	GND	Black	Ground
6	+5V	Red	Power supply

Synchronous Serial Interface (SSi) allows for serial transmission of absolute position data from the Electric Encoder™ responding to controller clock pulses. The Encoder and controller are linked by clock and data differential signal lines.



n = total number of data bits.

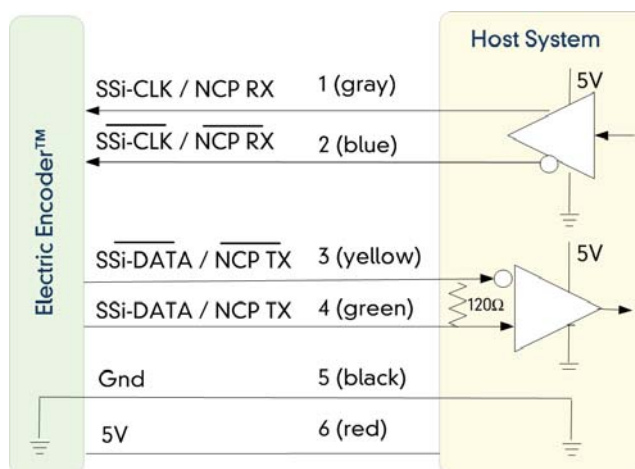
T = clock period (sec) - user defined.

$1/T$ = clock frequency 0.5 ÷ 2.5 MHz (user defined).

t_1 = minimum time required for the encoder to freeze data and preset the shift registers before receiving the first rising edge to prompt the MSB

t_2 = data transmission delay (increases with cable length)

t_3 = required delay to refresh position data between subsequent position reads.

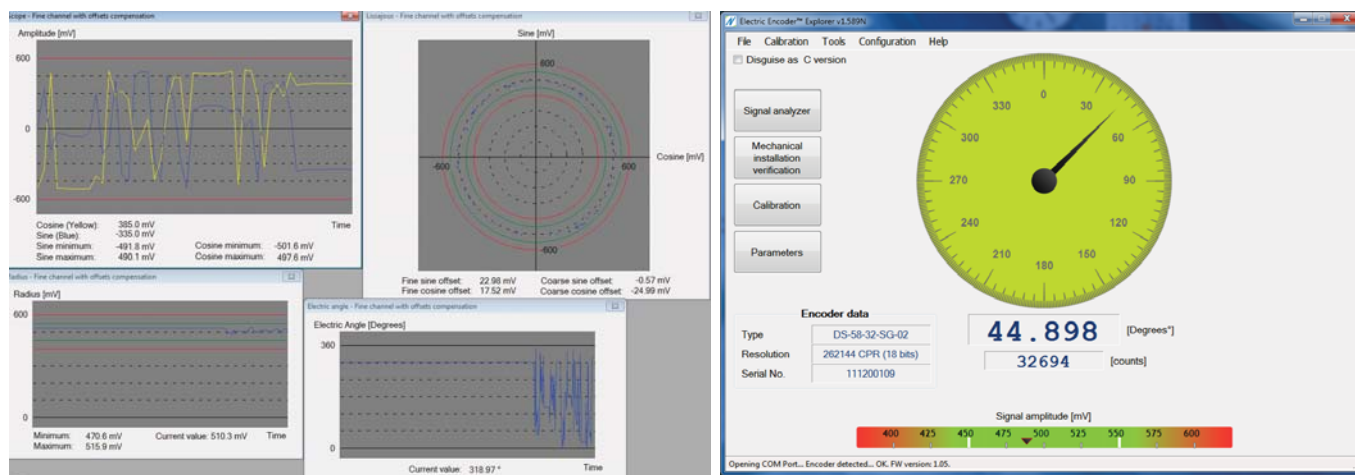


Digital - SSI Interface (absolute position)

DS-37

Software tools:

Advanced calibration and monitoring options available by using the Electric Encoder Explorer software (factory supplied) using the NCP (Netzer Communication Protocol) , the Encoder Explorer enables:



Electric Encoder Explorer (windows XP / 7)

Analog - Sine / Cosine , 1 Vp-p interface

DS-37

Output signal parameters

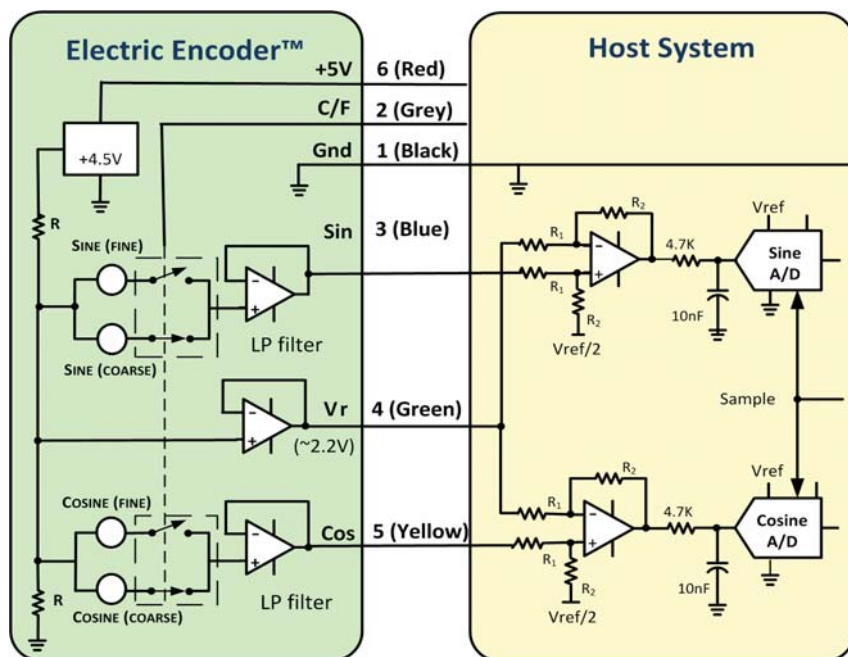
Signal latency	250 μ Sec
Fine-mode output noise (DC to 1kHz)	100 μ V (p-p)
Fine-mode output amplitude	0.5V $\pm$ 20%
Coarse-mode output amplitude	0.5V $\pm$ 20%
Phase relationship (CW shaft rotation - seen from top)	Sine leads Cosine
Signal bandwidth	DC to 1 kHz

Coarse and Fine channels

The DS-37 has two operation modes: a Coarse-mode and a Fine-mode - equivalent to two separate encoders in a common housing. The modes are selectable by a logic C/F command; logic "0" (0V to +0.5V) selects the Coarse-mode, which has 3 Electrical Cycle/Revolution (EC/R) while logic "1" (+3V to +5V) selects the Fine-mode which has 16 EC/R. The switching time is less than 1 ms.

The Coarse-mode outputs need to be read only upon system initiation after which the encoder is permanently switched to the Fine mode. Coarse and Fine sine/cosine pairs are used to calculate the initial absolute position, from that point tracking the Fine-channel outputs provides the absolute mechanical rotation angle with the specified accuracy and resolution.

All output signals are referenced to an internally generated voltage Vr (~2.25V)



Wires color code

#	Name	Color	Function
1	GND	Black	Ground
2	C/F	Grey	Coarse / Fine
3	Sine	Blue	Sine signal
4	Vr	Green	V reference
5	Cosine	Yellow	Cosine signal
6	+5V	Red	Power supply

Absolute Position calculation:

The analog Sine /Cosine outputs convey the electric angle of the Coarse or Fine signals. The absolute mechanical angle is computed by digitizing the analog signals and applying factory-supplied algorithms. Please refer to AN-02 and AN-03 .

Ordering

DS-37

DS

Product line

OD mm

Fine EC/R

Outputs:
D - Digital : SSi (external module)
C - AqB +I (external module)
0 - Analog

37

16

D

F

S

C

n

n

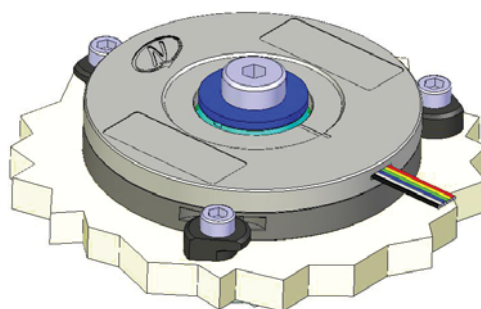
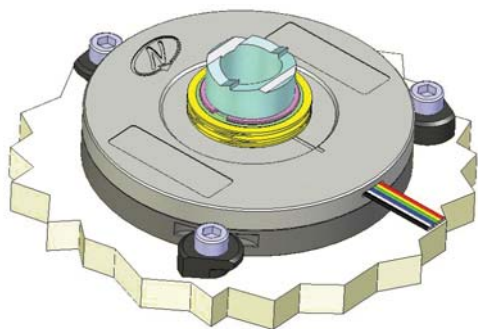
n

0 - flying leads
C- connector

Interconnection:
0 - Loose wires 250 mm
S - shielded cable
C - Capsulated external module

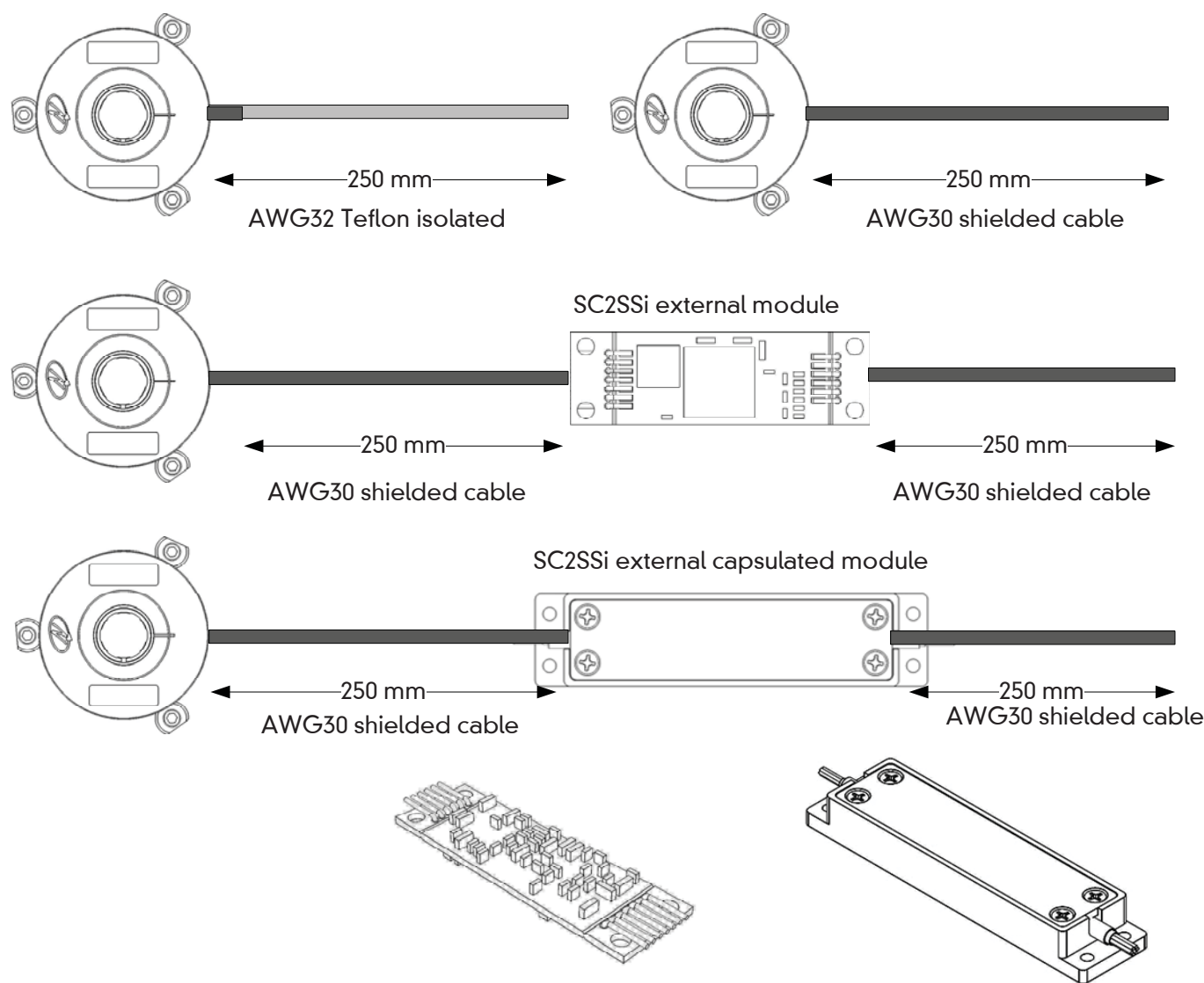
Resolution Binary		
Code	Bit	CPR
D	15	32,768
E	16	65,536
F	17	131,072

Analog	
Code	0



Interconnection options

DS-37



Netzer Cat No.: CB00014 , 30 AWG twisted pair (3) :
2 (30 AWG 25/44 tinned copper , 0.15 PFE to $\varnothing 0.6 \pm 0.05$).
Cable: Three 30 AWG twisted pairs.
Shield: Tinned copper braided 95% min. coverage.
Jacket: 0.45 silicon rubber to $\varnothing 3.45 \pm 0.2$

Pair #	Color
1	Red / Black
2	Gray / Blue
3	Green / Yellow

