The DS-70 is a member of the DS series of Electric Encoders™, based on Netzer Precision proprietary technology. The Electric Encoder™ offers many advantages - some unparalleled

- Low profile (10 mm)
- Hollow, floating shaft
- No bearings or other contacting elements
- High resolution and precision
- High tolerance to temperature extremes, shock, moisture, EMI, RFI and Magnetic fields
- Very low weight
- Holistic signal generation
- Digital interfaces

The Electric Encoder™ is unique in being holistic, i.e., its output reading is the averaged outcome of the whole area of the rotor, This feature makes the Electric Encoder™ forgiving to mounting tolerances, mechanical wander etc.

The absence of components such as ball bearings, flexible couplers, glass disc, light sources and detectors, along with very low power consumption makes the Electric 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 signals of Electric Encoder™ are analog Sine / Cosine representing the rotation angle while the digital outputs are obtained by further processing.

The combination of precision, low profile, low weight and high reliability have made Netzer Precision encoders particularly suitable to a wide variety of critical applications including, but not limited to medical equipment and aerospace.

General

Angular resolution	19-21 bit
Maximum tested static error	±0.010°
Extended accuracy static error	±0.006°
Maximum operational speed	1500 RPM
Measurement range	Unlimited rotation
Power On - Max. operational speed	3.3 RPM <= 20°/sec
Rotation direction	Adjustable CW/CCW*
Build In Test BIT	Optional

* Default same direction from bottom side of the encoder

Mechanical

Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	±0.1 mm
Rotor inertia	1,940 gr · mm^2
Total weight	49 gr
Outer Ø /Inner Ø/ Height	70 / 30 / 10 mm
Material (stator, rotor)	TRVX-50

Electrical

Supply voltage	5V ± 5%
Interconnection	Shielded cable

## Environmental

|	
EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-40°C to +85°C
Storage temperature	-50°C to +100°C
Relative humidity	98% Non condensing
Shock endurance	100 g for 11 ms
Vibration endurance	20 g 10 – 2000 Hz
Protection	IP 40
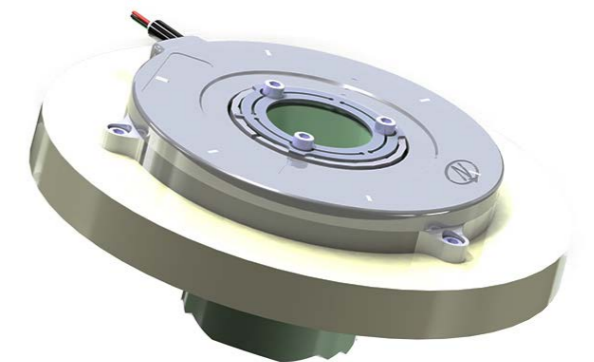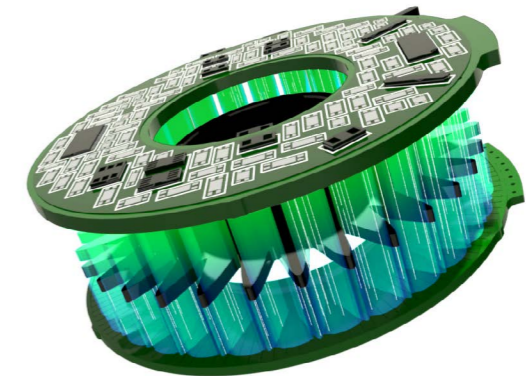
Digital SSi Interface

Synchronous Serial Interface (**SSI**) is a point to point serial interface standard   between a master (e.g. controller) and a slave (e.g. sensor) for digital data transmission.
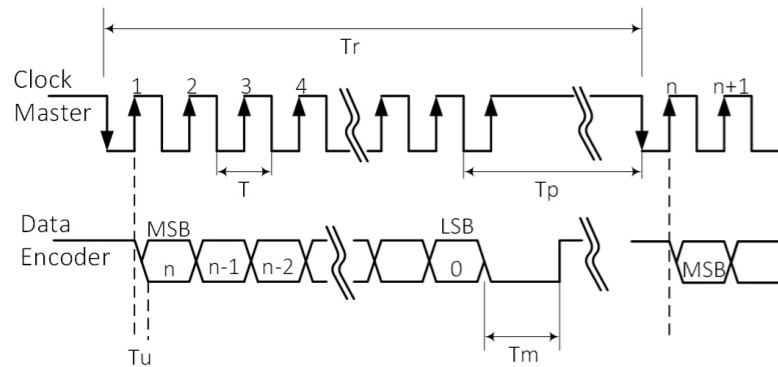
Description		Recommendations
n	Total number of data bits	12 - 21
T	Clock period	
f= 1/T	Clock frequency	0.1 - 5.0 MHz
Tu	Bit update time	200 nsec
Tp	Pause time	26 - ∞ μsec
Tm	Monoflop time	>25 μsec
Tr	Time between 2 adjacent requests	Tr > n*T+26 μsec
fr=1/Tr	Data request frequency	
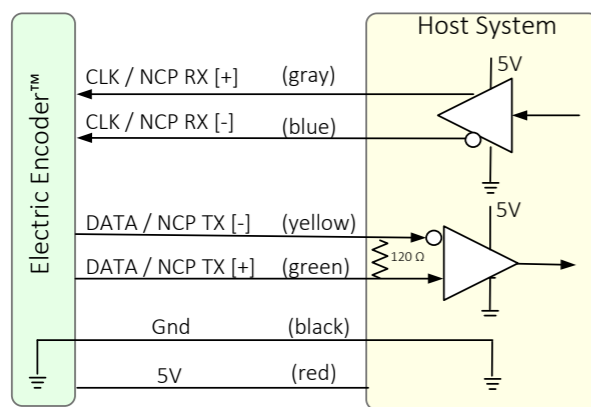
SSi / BiSS C Output signal parameters

| Output code	Binary
Serial output	Differential RS-422
Clock	Differential RS-422
Clock frequency	0.1 ÷ 5.0 MHz
Position update rate (Max)	35 kHz (Optional - up to 375 kHz)
Current consumption	100 mA

SSi / BiSS C interface wires color code

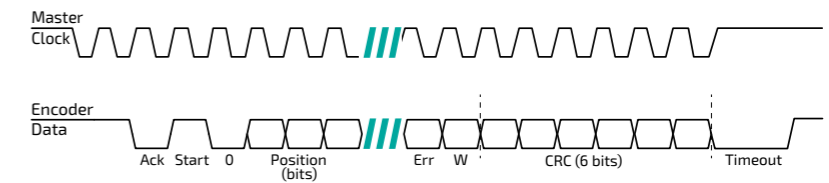| Clock +	Grey	Clock
Clock -	Blue	
Data -	Yellow	Data
Data +	Green	
GND	Black	Ground
+5V	Red	Power supply

Software tools: (SSi / BiSS C)

Advanced calibration and monitoring options are available by using the factory supplied Electric Encoder Explorer software, This facilitates proper mechanical mounting, offsets calibration and advanced signal monitoring.
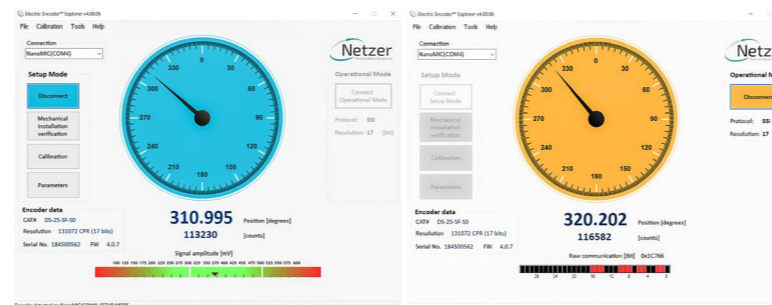
Digital BiSS C Interface

BiSS C Interface is unidirectional serial synchronous protocol for digital data transmission where the Encoder acts as "slave" transmits data according to "Master" clock. The BiSS protocol is designed in B mode and C mode (continuous mode) .The BiSS C interface as the SSi is based on RS-422 standards.

bit #		Description	Default	Length
29	Ack	Period during which the encoder calculates the absolute position , one clock cycle	0	1/clock
28	Start	Encoder signal for "start" data transmit	1	1 bit
27	"0"	"start" bit follower	0	1 bit
8...26	AP	Absolute Position encoder data		
7	Error	Error (amplitude levels)	1	1 bit
6	Warn.	Warning (non active)	1	1 bit
0...5	CRC	The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.		6 bits
	Time-out	Elapse between the sequential "start"request cycle's.		25 μs

Ordering Code

DS - 70 - S H - S 0 - n n n

- **DS Product line**
- **Outer Diameter**

Output
S	SSi
I	BiSS C

Resolution
Code	Bit	CPR
H	19	524,288
I	20	1,048,578
J	21*	2,097,156

* SSi only

BIT (Build In Test): optional
[ ]	None
B	BIT

EA	Extended Accuracy
nnn	Custom

Interconnection
0	250mm Flying leads (default)
1	500mm Flying leads
2	750mm Flying leads
3	1000mm Flying leads
C	Connector (optional)

S	Shielded cable 250 mm

Cable Information

Netzer Cat No.: CB 00014
Cable: 30 AWG twisted pair (3):
2 (30 AWG 25/44 tinned copper, Insulation: PFE Ø 0.15 to Ø 0.6 ± 0.05 OD)
Temperature rating: -60 to +150 Deg C
Braided shield: Thinned copper braided 95% min. coverage
Jacket: 0.44 silicon rubber (NFA 11-A1) Ø3.45 ±0.2 OD

Pair #	Color
A1-A2	Red / Black
A3-A4	Gray / Blue
A5-A6	Green / Yellow

30 AWG twisted pairs (3)
Braided shield
Jacket 0.44 mm
Ø 3.45 ±0.2 mm
0.017
30 AWG single insulated wire
Ø0.61±0.051mm
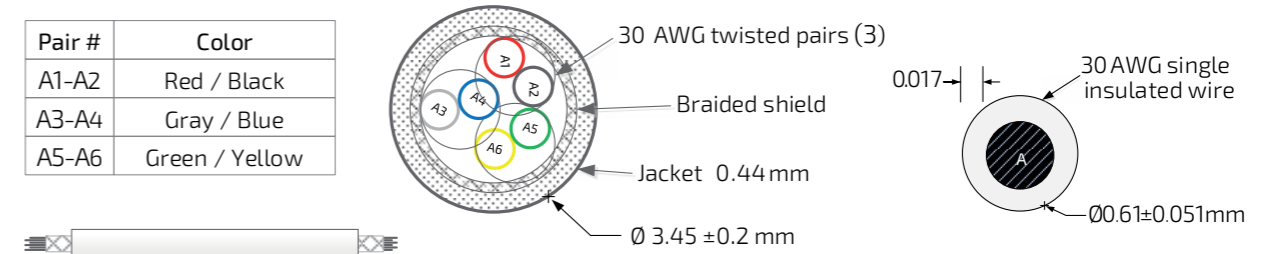
Related documents
DS-70 User Manual: Mechanical, Electrical and calibration setup.
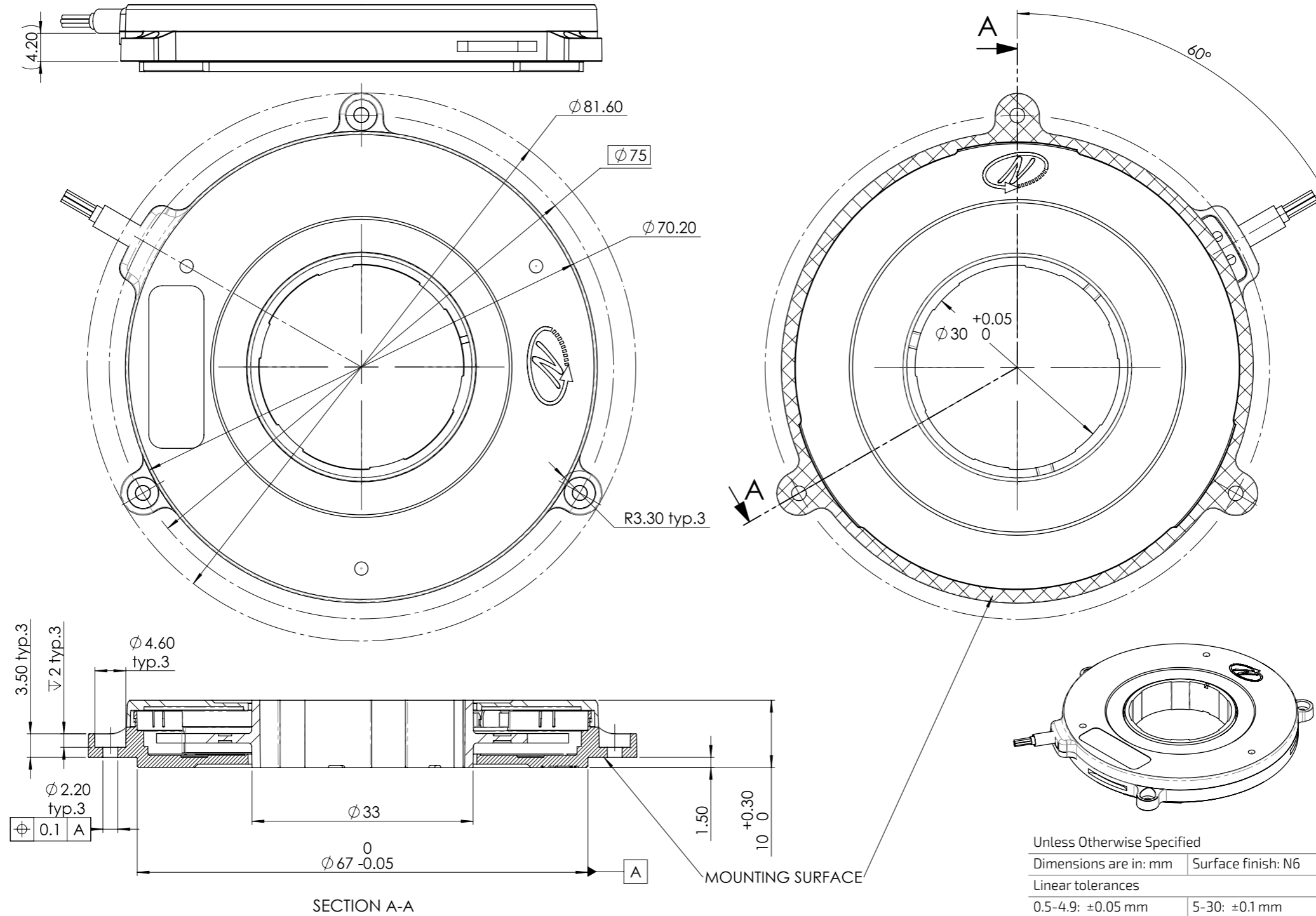
Optional Accessories
Demonstration Kit
DKIT-DS-70-SH-S0 - SSi interface
DKIT-DS-70-IH-S0 - BiSS C interface
The Demo kit includes: mounted encoder on rotary jig, and RS-422 to USB converter.

DS-70-V01

Netzer
Precision Position Sensors

(4.20)

⌀81.60

⌀75

⌀70.20

R3.30 typ.3

A

60°

⌀30 +0.05 / 0

3.50 typ.3

▽2 typ.3

⌀4.60 typ.3

⌀2.20 typ.3

⊕ 0.1 A

⌀33

⌀67 0 / -0.05

1.50

⌀10 +0.30 / 0

MOUNTING SURFACE

A

SECTION A-A

Unless Otherwise Specified	
Dimensions are in: mm	Surface finish: N6
Linear tolerances	
0.5-4.9: ±0.05 mm	5-30: ±0.1 mm
31-120: ±0.15 mm	121-400: ±0.2 mm

DS-70-V01

Netzer
Precision Position Sensors

ABSOLUTE POSITION
ROTARY ELECTRIC ENCODER™

HARSH ENVIRONMENT | DS-70 Qcore

DATA SHEET

C

11 standart fastener height
9 wave spring height
8.50 encoder height
0
1.50 depth under zero plane

SECTION A-A

⊥ 0.02 A
⊥ 0.05 A

Ø 30 f8 -0.02 -0.05 *
⌀ 0.05 A
◎ 0.05 A

A

9 ±0.10 *

▽ 2.50 min.

Ø 33 +0.10 0

SECTION B-B

3
2
5
4
1

0
1.60 -0.05 *

1 ±0.10

DETAIL C
SCALE 2 : 1

3 threads M2 ▽ 5mm
every 120°
⊕ 0.1 A

Ø 75

B A   A B

Ø 25

3 threads M2 ▽ 5mm
every 120°
⊕ 0.1 A

Unless Otherwise Specified

Dimensions are in: mm	Surface finish: N6
Linear tolerances	
0.5-4.9: ±0.05 mm	5-30: ±0.1 mm
31-120: ±0.15 mm	121-400: ±0.2 mm

Notes:
1. For any incompatibility with the model or missing dimension, please refer to Netzer for clarification.
2. All installation dimensions and tolerances are according to DS-70 ICD drawing.
3. All dimensions marked with * are critical for encoder installation.

WARNING

Do not use Loctite or other glues containing Cyanoacrylate. We recommend to use 3M glue - Scotch-Weld™ Epoxy Adhesive EC-2216 B/A.

DS-70-V01

Shaft - End installation (step)

No	Part			Description	QTY.
1	DS-70-SH	Included		DS-70 encoder	1
2	MA-DS70-004	Optional	Shaft End installation kit	MP-03085-00 spring	1
3				MP-00329 DIN 912 M2 X 4 Alen	1
4	EAPK008	Optional	Mounting screws kit	Star washer DIN 6798A M2	3
5				DIN 912 M2 X 6mm Alen	3

Critical dimensions marked with "*"