

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
- Analog or Digital interfaces

### General

Angular resolution	19-21 bit
Maximum tested static error	±0.010°
Extended accuracy static error	±0.006°
Maximum operational speed	750 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 <sup>2</sup>
Total weight	49 gr
Outer Ø / Inner Ø/ Height	70 / 30 / 10 mm
Material (stator, rotor)	Ultem™ polymer / TRVX-50

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 output signals of Electric Encoder™ are analog Sine / Cosine representing the rotation angle. The digital outputs are obtained by further processing - which may be either internal or external to the encoder.

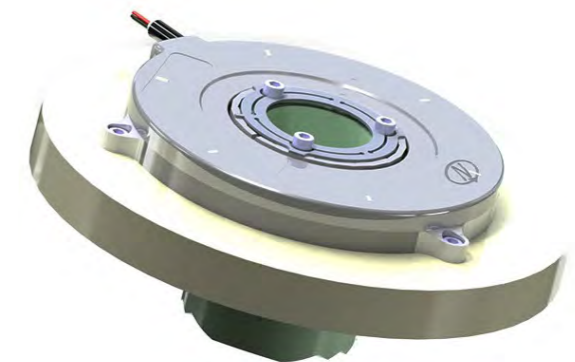
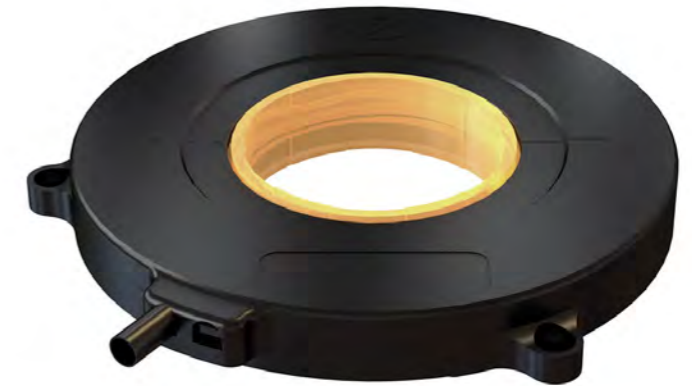
The combination of precision, low profile, low weight and high reliability have made Netzer Precision encoders particularly suitable to a wide variety of critical applications including, but not limited to medical equipment and aerospace.

### Electrical

Supply voltage	5V ± 5%
Interconnection	Shielded cable
Cable length	1,500 mm MAX

### Environmental

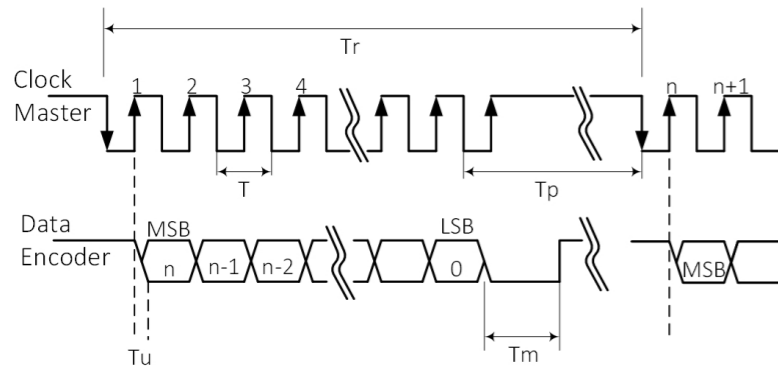
EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-40°C to +85°C
Storage temperature	-50°C to +100°C
Relative humidity	98% Non condensing
Shock endurance	100 g for 11 ms
Vibration endurance	20 g 10 – 2000 Hz
Protection	IP 40



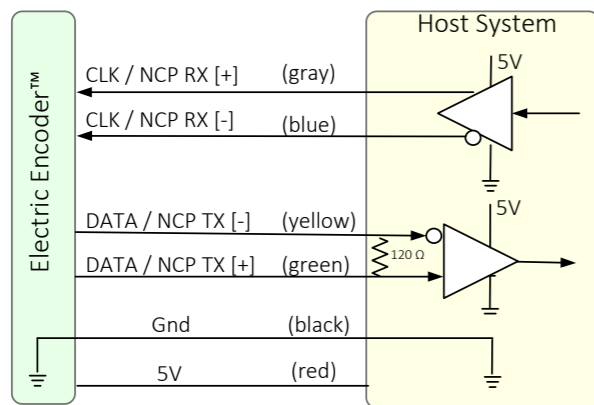


### Digital SSI Interface

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 - 22
T	Clock period	
f= 1/T	Clock frequency	0.5 - 2.0 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 Output signal parameters

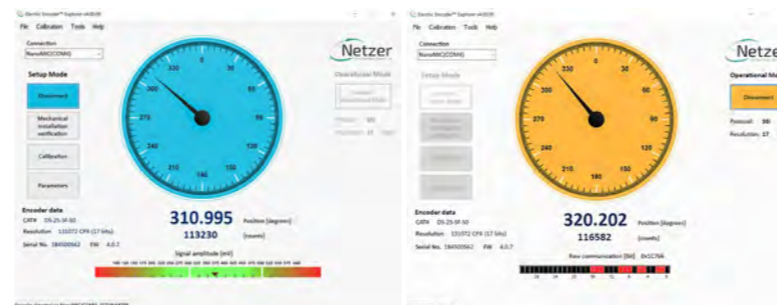
Output code	Binary
Serial output	Differential RS-422
Clock	Differential RS-422
Clock frequency	0.5 ÷ 2.0 MHz
Position update rate (Max)	30 kHz
Current consumption	180 mA

### SSI / BiSS interface wires color code

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

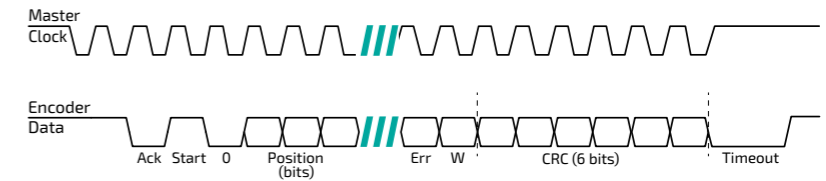
### Software tools: (SSI / BiSS - C)

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	0	1/clock
28	Start	1	1 bit
27	“0”	0	1 bit
8...26	AP		
7	Error	1	1 bit
6	Warn.	1	1 bit
0...5	CRC		6 bits
Time-out	Elapse between the sequential “start” request cycle’s.		25 µs

### Ordering Code

DS - 70 - 64 - 3 S H - S 0 - n n n

DS Product line

Outer Diameter

Fine ECR

Output

S	SSi
I	BiSS

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):

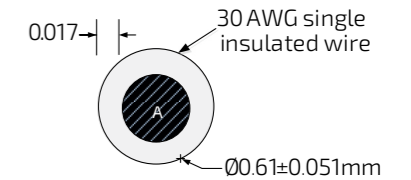
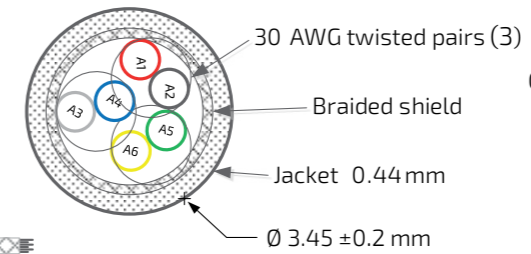
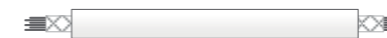
2 (30 AWG 25/44 tinned copper, Insulation: PFE  $\varnothing$  0.15 to  $\varnothing$  0.6  $\pm$  0.05 OD)

Temperature rating: -60 to +150 Deg C

Braided shield: Thinned copper braided 95% min. coverage

Jacket: 0.44 silicon rubber (NFA 11-A1)  $\varnothing$ 3.45  $\pm$ 0.2 OD

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



#### Related documents

DS-70 User Manual: Mechanical, Electrical and calibration setup.

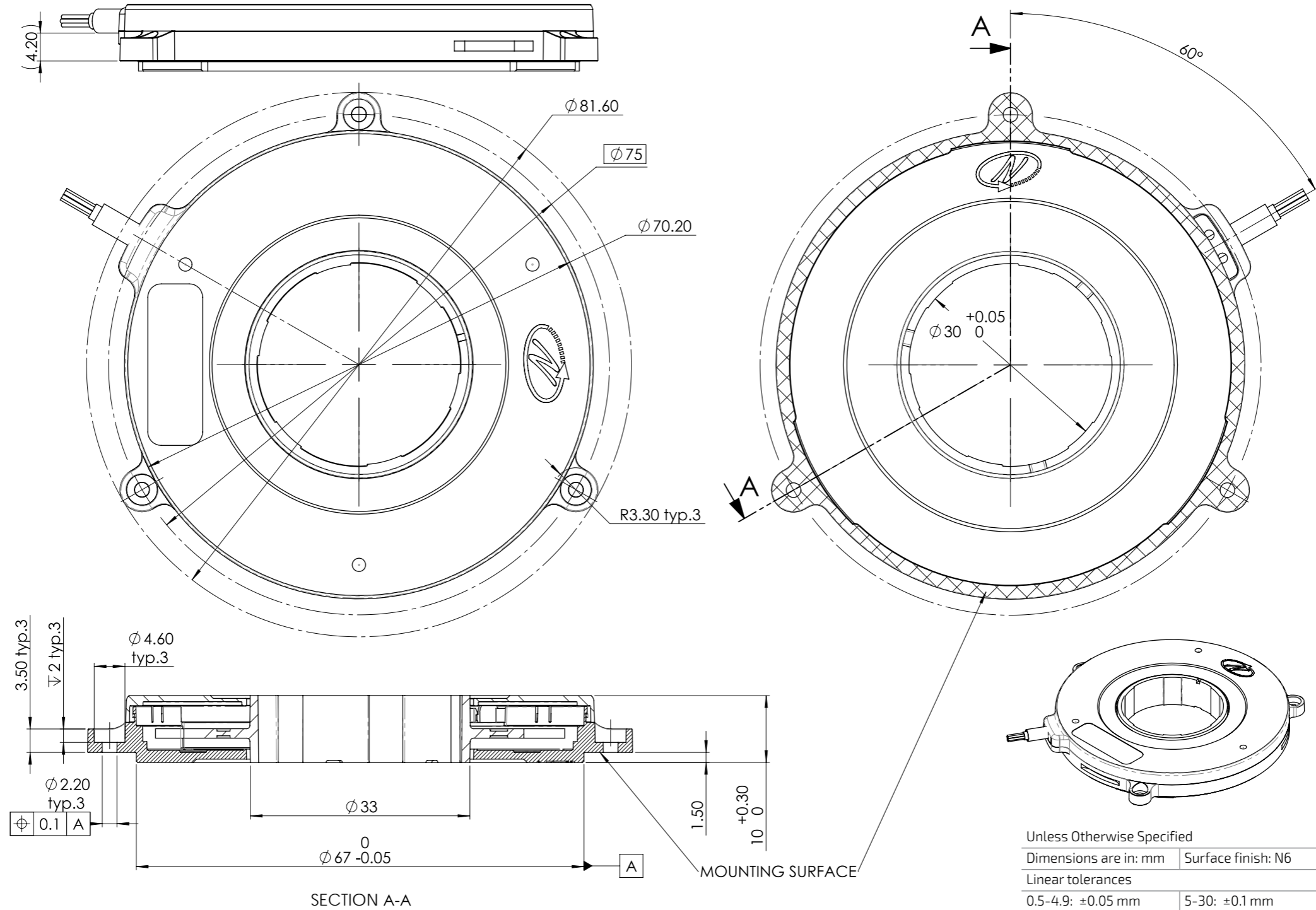
#### Optional Accessories

##### Demonstration Kit

DKIT-DS-70-64-3SH-S0 - SSi interface

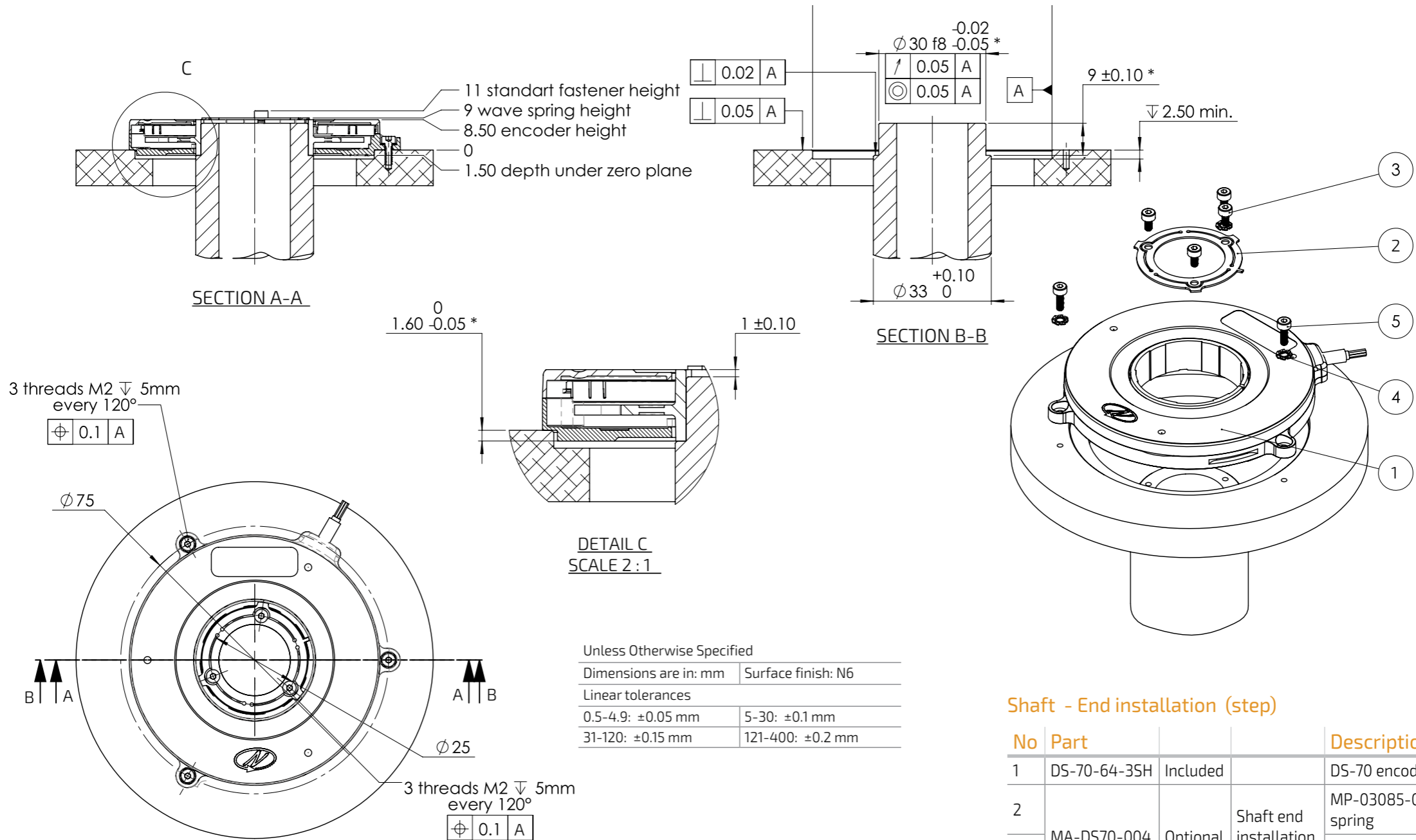
DKIT-DS-70-64-3IH-S0 - BiSS interface

The Demo kit includes: mounted encoder on rotary jig, and RS-422 to USB converter.



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



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- 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.

**Shaft - End installation (step)**

No	Part		Description	QTY.	
1	DS-70-64-3SH	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		Optional	Star washer DIN 6798A M2	3	
5	EAPK008	Optional	Mounting Kit DIN 912 M2 X 6mm Alen	3	

Critical dimensions marked with "\*\*"

**WARNING**



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