

The DS-90 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	2000 rpm
Measurement range	Unlimited rotation
Rotation direction	Adjustable CW/CCW*
Power On - Max. operational speed	3.3 RPM ≤20°/sec
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	4,242 gr · mm <sup>2</sup>
Total weight	55 gr
Outer Ø / Inner Ø / Height	90 / 50 / 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 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.

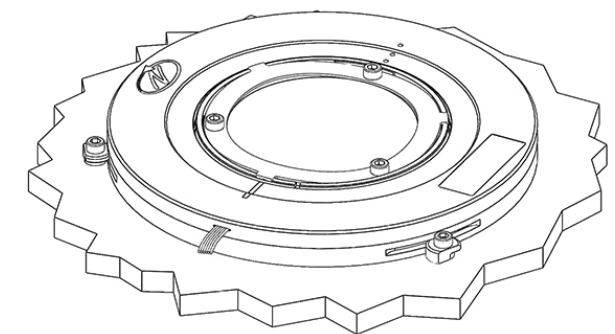
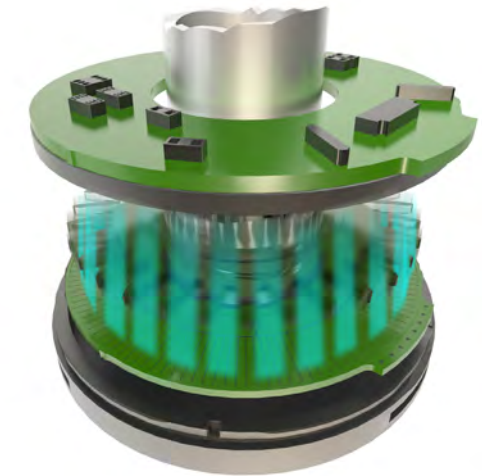
The combination of precision, low profile, low weight and high reliability have made Netzer Precision encoders particularly suitable to a wide variety of critical applications including, but not limited to medical equipment and aerospace.

### Electrical

Supply voltage	5V ± 5%
Interconnection	Shielded cable
Cable length	1,500 mm MAX
Current consumption	90 mA

### Environmental

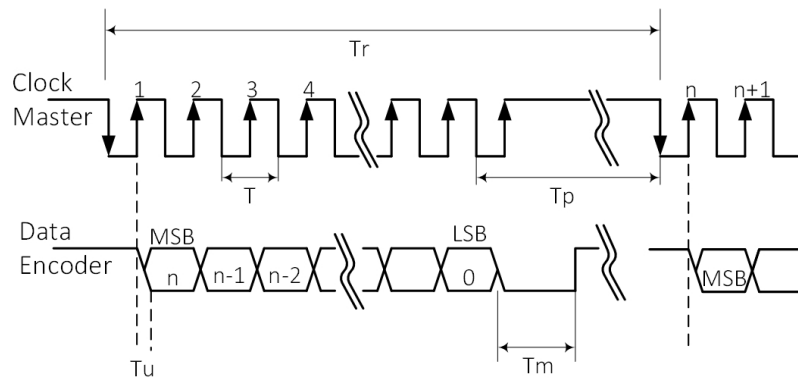
EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature range	-40°C to +85°C
Storage temperature	-50°C to +100°C
Relative humidity	98% Non condensing
Shock endurance	100 g for 11 ms
Vibration endurance	20 g 10 - 2000 Hz
Protection	IP 40



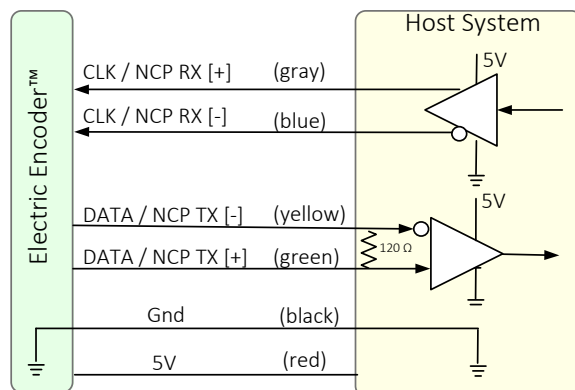


### Digital SSI Interface

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	90 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	0.1 ÷ 5.0 MHz
Position update rate (Max)	35 kHz (Optional - up to 375 kHz)

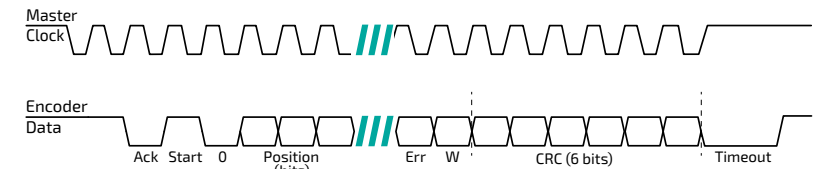
### SSi / BiSS interface wires color code

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



### Digital BiSS-C Interface

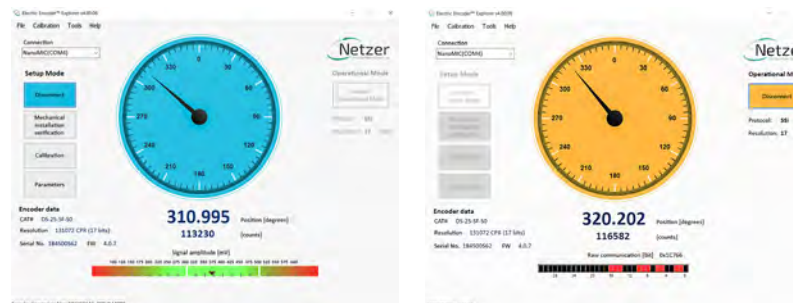
BiSS – C Interface is unidirectional serial synchronous protocol for digital data transmission where the Encoder acts as “slave” transmits data according to “Master” clock. The BiSS protocol is designed in B mode and C mode (continuous mode). The BiSS-C interface as the SSI is based on RS-422 standards.



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		25 µs

### 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.



## Ordering Code

DS - 90 - S H - S 0 - n n n

DS Product line

Outer Diameter

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

## Cable Information

Cable: 30 AWG twisted pair (3)

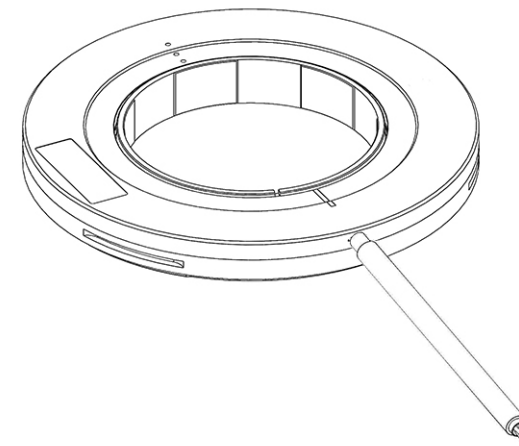
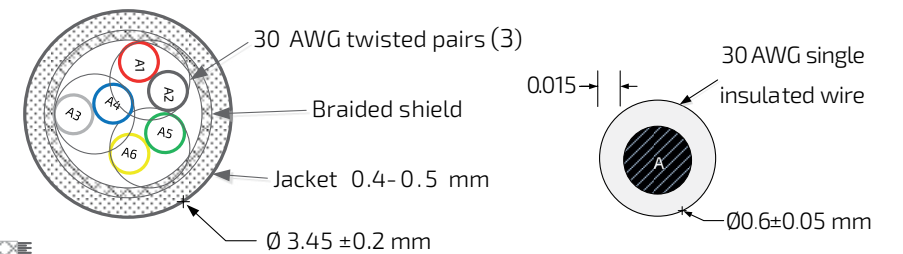
(30 AWG 25/0.05 tinned copper, Insulation: ETFE  $\varnothing$  0.12-0.15 to  $\varnothing$  0.6  $\pm$  0.05 OD)

Temperature rating: -60° to +150° C

Braided shield: Thinned copper braided 95% min. coverage

Jacket: 0.4-0.5 silicon rubber  $\varnothing$ 3.45  $\pm$ 0.2 OD

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



### Related documents

DS-90 User Manual: Mechanical, Electrical and calibration setup.

### Optional Accessories

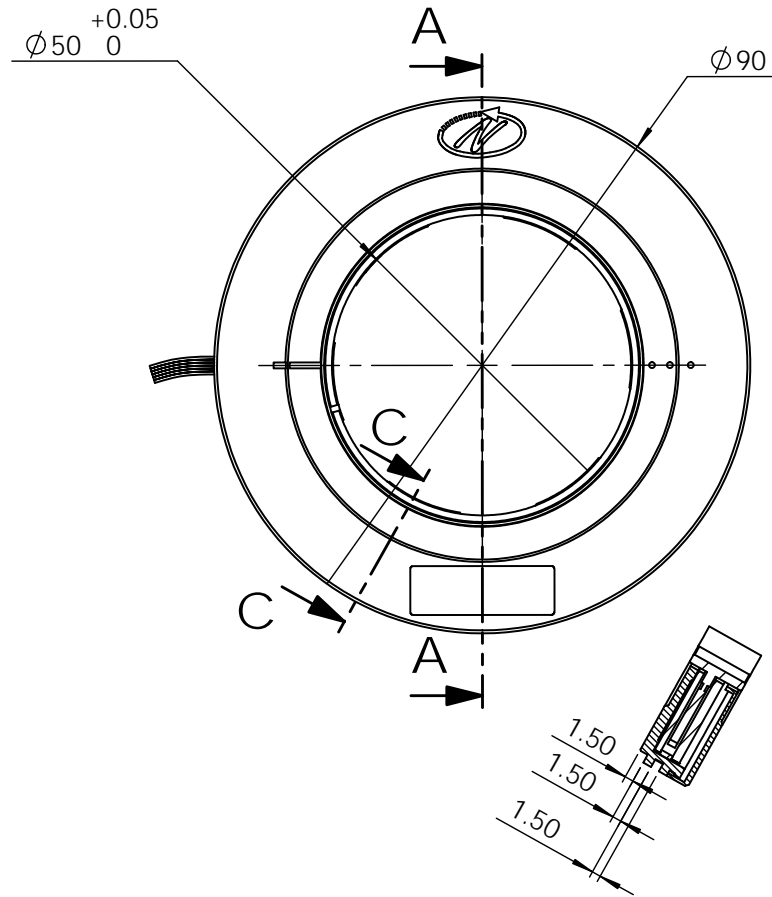
#### Demonstration Kit

DKIT-DS-90-SH-S0: (SSi Interface)

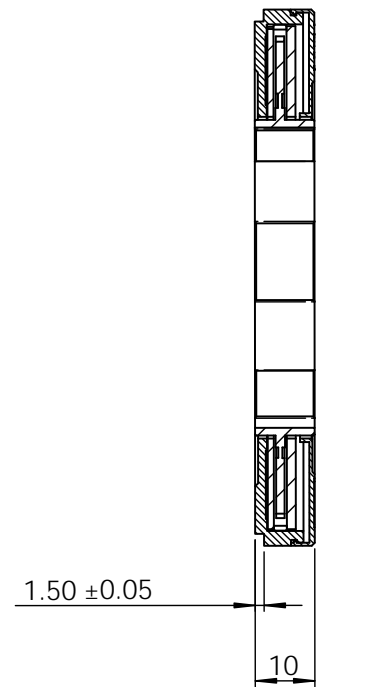
DKIT-DS-90-IH-S0: (BiSS interface)

Includes, mounted encoder on rotary jig, and RS-422 to USB converter.

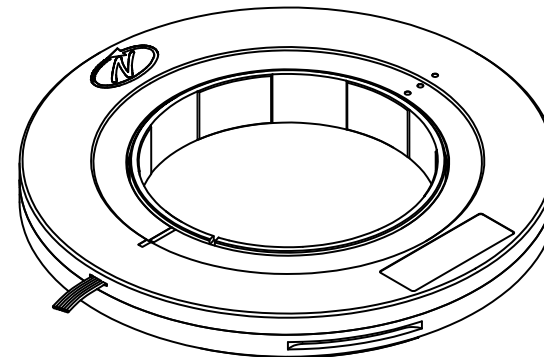
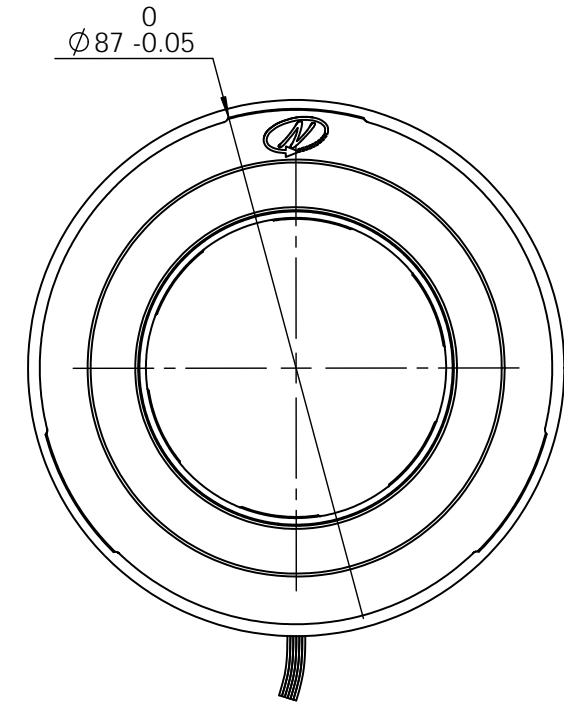
ICD  
DS-90-SH-50 / DS-90-IH-50



SECTION C-C  
3 PLACES



SECTION A-A



Unless Otherwise Specified

Dimensions are in: mm | Surface finish: N6

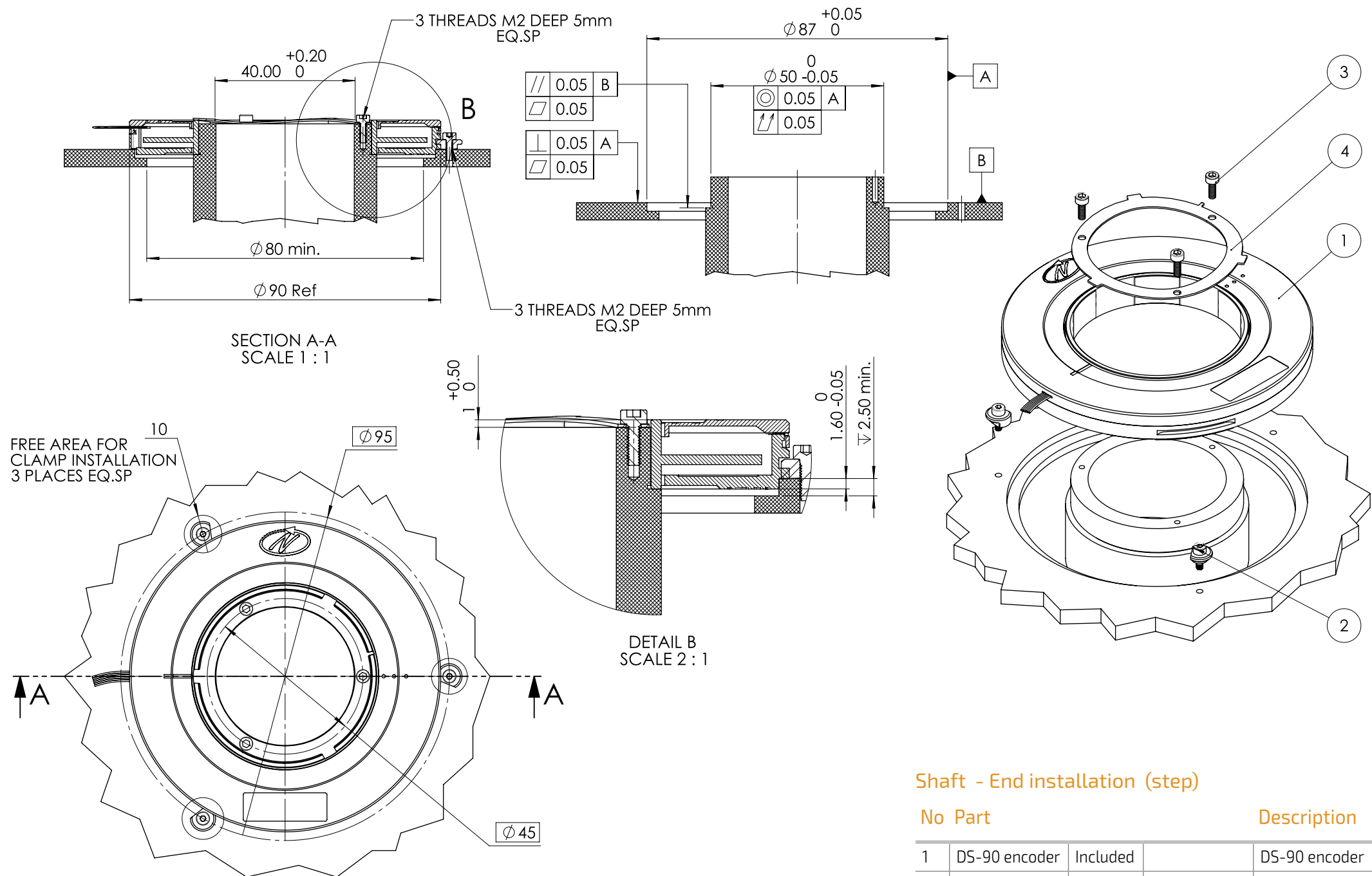
Linear tolerances

0.5-4.9: ±0.05 mm	5-30: ±0.1 mm
31-120: ±0.15 mm	121-400: ±0.2 mm

**WARNING**



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



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0.5-4.9: $\pm 0.05$ mm	5-30: $\pm 0.1$ mm
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**WARNING**



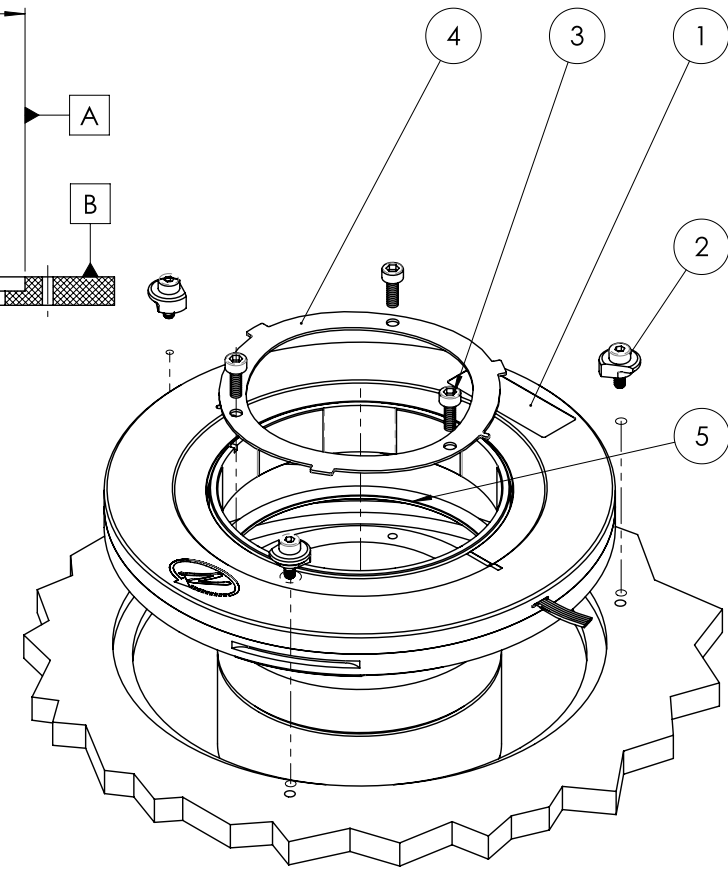
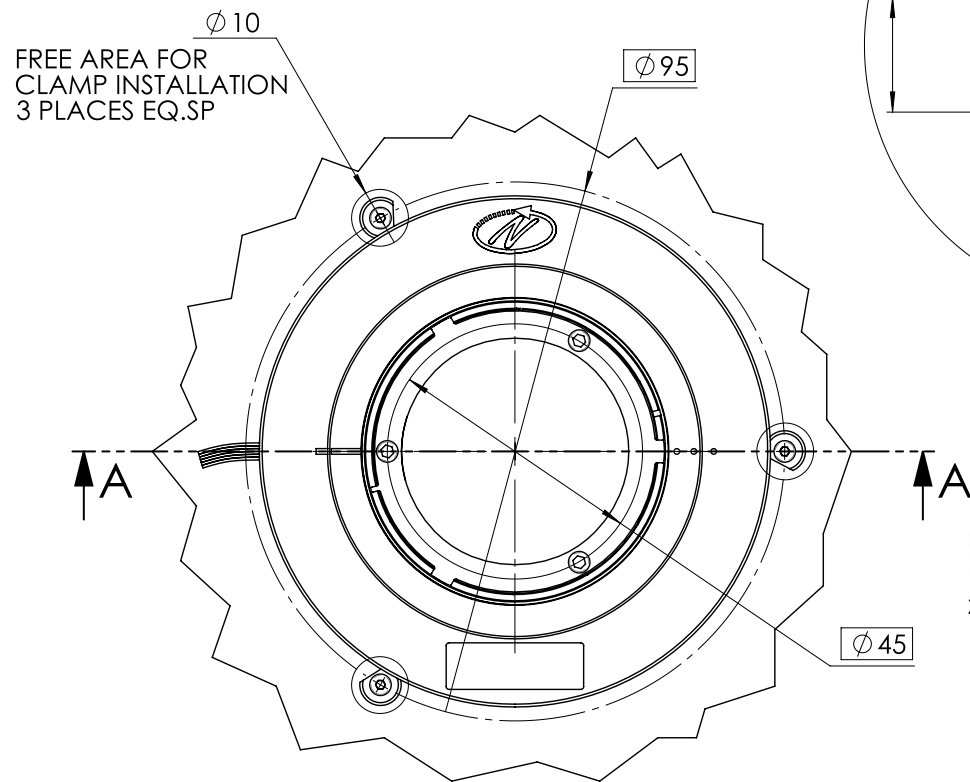
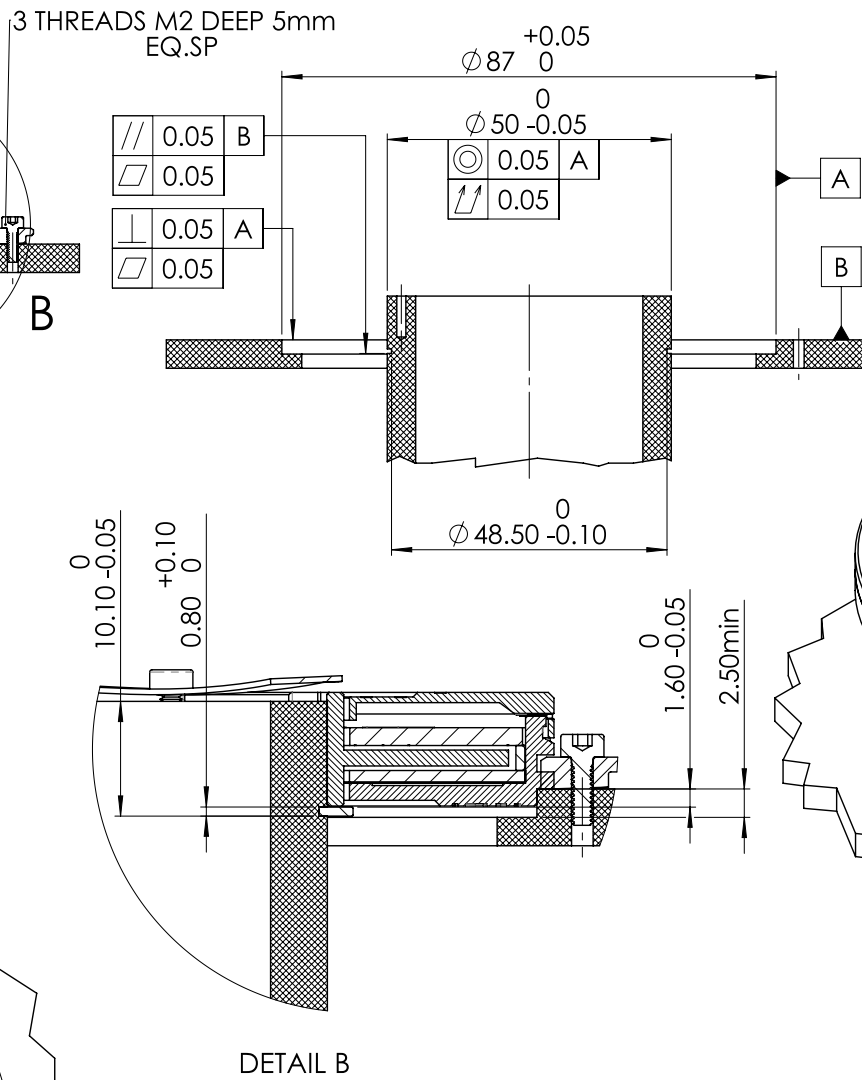
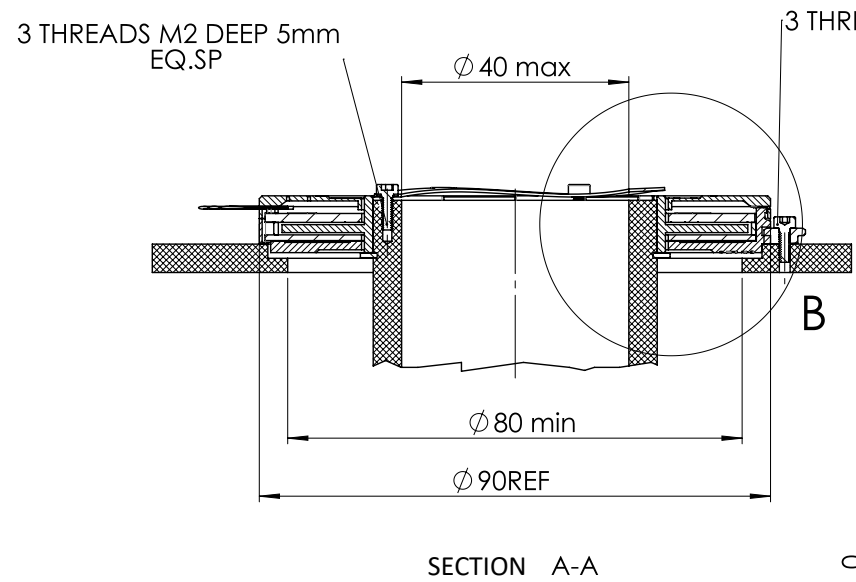
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**Shaft - End installation (step)**

No	Part	Description	QTY. per kit
1	DS-90 encoder	Included	1
2	EAPK005	Included Kit	3
3	MA-DS90-004	Optional Shaft End installation kit	3
4		DS-90 wave spring	1

Critical dimensions marked with "\*"





- Notes
- 1) For any incompatibility with the model or missing dimension, please refer to Netzer for clarification.
  - 2) Packing must prevent physical damage during process storage and shipment

Unless Otherwise Specified

Dimensions are in: mm	Surface finish: N6
Linear tolerances	
0.5-4.9: $\pm 0.05 \text{ mm}$	5-30: $\pm 0.1 \text{ mm}$
31-120: $\pm 0.15 \text{ mm}$	121-400: $\pm 0.2 \text{ mm}$

**Shaft - End installation (Retaining ring)**

No	Part		Description	QTY. per kit
1	DS-90 encoder	Included	DS-90 encoder	1
2	EAPK005	Included	Kit, 3 x M2 encoder clamps ST. ST.	3
3			Shaft end installation kit	3
4	MA-DS90-001	Optional	DS-90 wave spring	1
5			DS-90 retaining ring	1

Critical dimensions marked with "\*"