The DS-25 is a member of the DS series of Electric Encoders™ a product line based on Netzer Precision Motion Sensor proprietary technology. EE products are characterized by features that enable unparalleled performance:

- Low profile (7 mm)
- Hollow, floating shaft
- No bearings or other contact elements
- High resolution and unparalleled precision
- High tolerance to temperature extremes, shock, moisture, EMI, RFI and magnetic fields
- Very low weight
- Holistic signal generation
- Digital interfaces for absolute position

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 of Electric Encoder™ is a digital serial with absolute position single turn. The combination of precision, low profile, low weight and high reliability have made Netzer Precision encoders particularly suitable to a wide variety of industrial automation applications.

General

Angular resolution [1]	17 bits ; 131,072 CPR
Static error [2]	< 0.025 Deg
Maximum operational speed	4,000 rpm
Measurement	Single turn Absolute Position
Build In Test BIT	Optional

Mechanical

Allowable mounting eccentricity	±0.1 mm
Allowable rotor axial motion	±0.1 mm
Rotor inertia	11 gr · mm²
Total weight	4 gr
Outer Ø /Inner Ø/ Height	25 / 6 / 7 mm
Material (stator, rotor)	Ultem™ polymer

Notes - Optional (Call)

[1]	Angular resolution	18 - 19 bit
[2]	Static Error	< 0.010 Deg
[3]	Operating temperature	-55 °C to +125 °C

Electrical

Supply voltage	5V ± 10%
Current consumption	70 mA
Interconnection	#30 shielded cable
Cable Length	1,500 mm MAX

Environmental

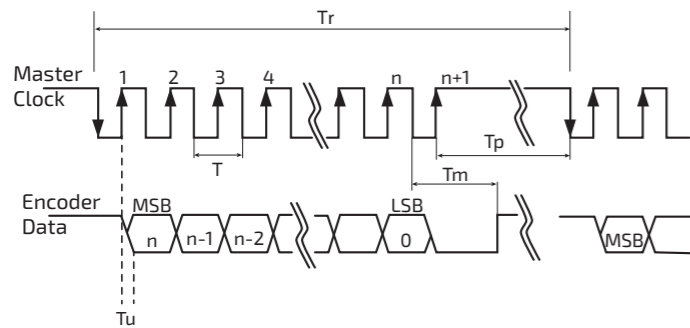|	
EMC	IEC 6100-6-2, IEC 6100-6-4
Operating temperature [3]	-55°C to +85°C
Storage temperature	-60°C to +140°C
Relative humidity	98% Non condensing
Shock endurance	100 g for 11 ms
Vibration endurance	20 g 10 – 2000 Hz
Protection	IP 40
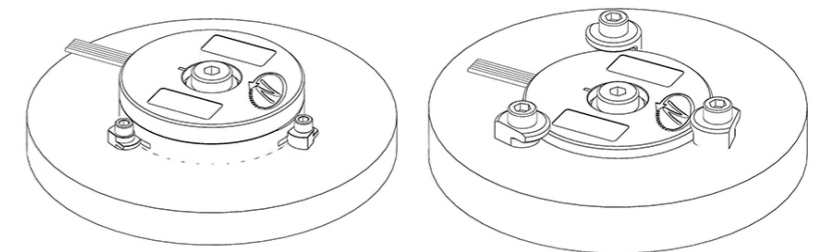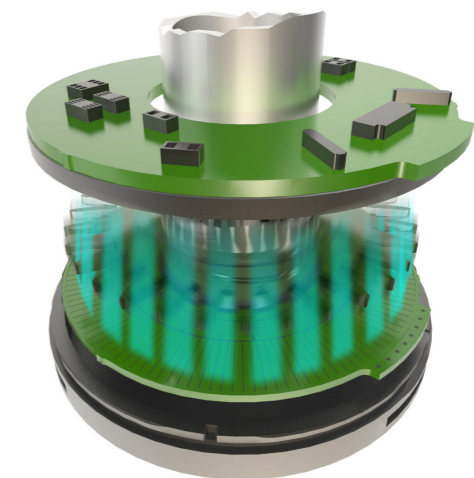
● *Moving. Precisely. With You.*

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 - 19
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

Signal latency	50 µSec
Output code	Binary
Serial output	Differential RS-422
Clock	Differential RS-422
Clock Frequency	0.1 ÷ 5.0 MHz
Position update rate	30 kHz

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.
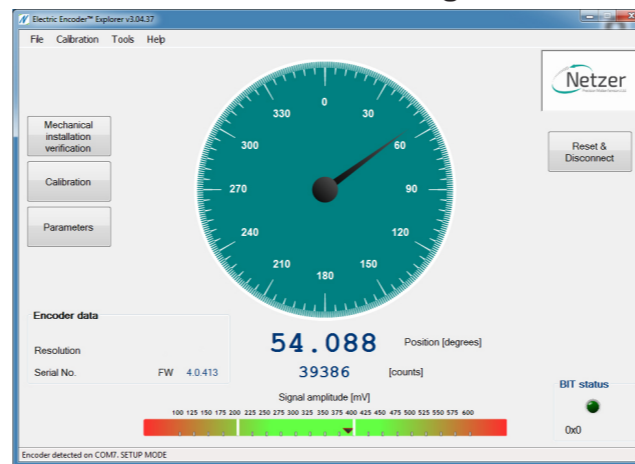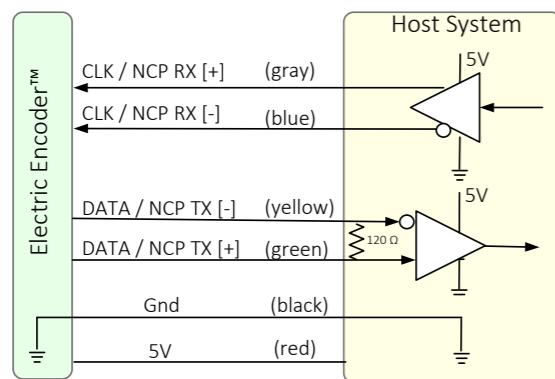

Digital BiSS-C Interface

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.
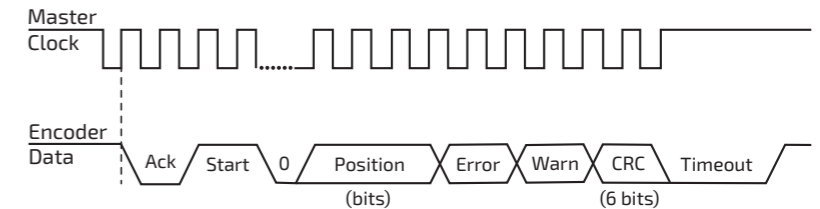
Bit #		Description	Default	Length
27	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1/clock
26	Start	Encoder signal for "start" data transmit	1	1 bit
25	"0"	"start" bit follower	0	1 bit
8...24	AP	Absolute Position encoder data		
7	Error	Error (amplitude levels)	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
	Timeout	Elapse between the sequential "start"request cycle's.		25 µs

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Absolute Position
Rotary Electric Encoder™ | DS-25 | Qcore
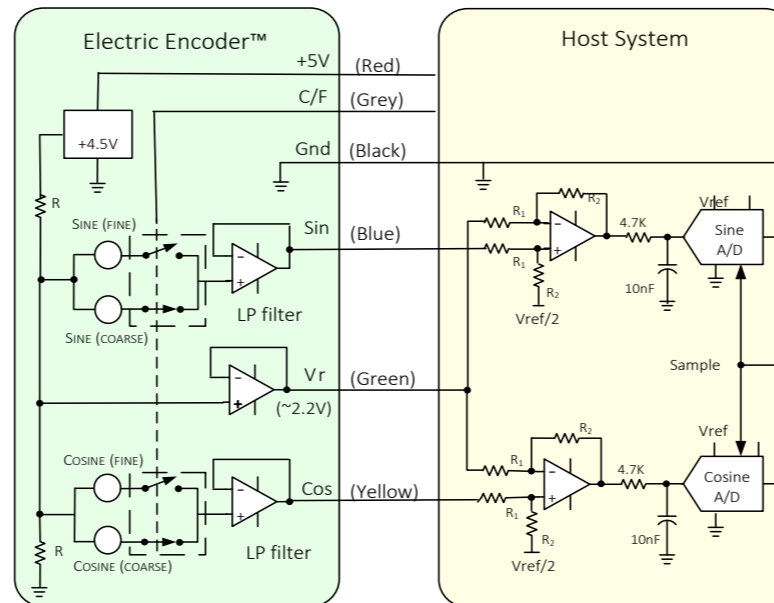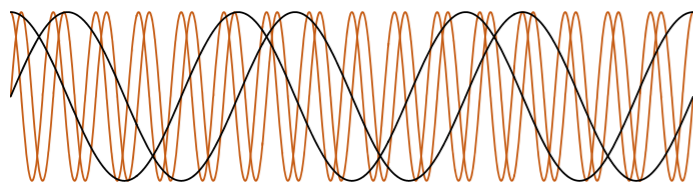
Analog Interface

Coarse and Fine channels

The DS-25 has two operational 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).

Output signal parameters

Electric Cycles (Fine / Coarse channels)	16 / 3
Signal latency	250 µSec
Fine-mode output noise (DC to 1kHz)	100 µV (p-p)
Fine-mode output amplitude	±400mV ± 20%
Coarse-mode output amplitude	±300mV ± 20%
Phase relationship (CW shaft rotation - seen from top)	Sine leads Cosine
Signal bandwidth	DC to 1 kHz
Current consumption	10mA

Analog interface wires color code

1	GND	Black	Ground
2	C/F	Grey	Coarse / Fine
3	Sine	Blue	Sine signal
4	Vr	Green	V referenceCosine signal
5	Cosine	Yellow	Cosine signal
6	+5V	Red	P.S.

Absolute Position calculation

The analog Sine / Cosine outputs convey the Electrical angle of the Coarse or Fine signals. The Absolute mechanical angle is computed by digitizing the analog signals.

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Absolute Position Rotary Electric Encoder™ | DS-25 Qcore

Ordering Code

DS - 25 - S F - S 0 M

DS Product line

Outer Diameter

Output

S	SSi
I	BiSS
0	Analog

Resolution

Code	Bit	CPR
F	17	131,072

BIT (Build In Test): optional

[ ]	None
B	BIT

Rotor options - Ø ID

[ ]	Default , 6 mm
M	Rotor metal sleeve , 4.5 mm

Interconnection

0	Flying leads
S	Shielded cable 250 mm

Related documents

DS-25 User Manual : Mechanical , Electrical and calibration setup.

Demonstration Kit

DKIT-DS-25-SF with SSi interface
DKIT-DS-25-IF with BiSS interface
Includes, mounted encoder on rotary jig,
and RS-422 to USB converter.

Netzer Cat No.: CB 00014
Provider: Ray-Q USA. CAT No.: RQ 213210
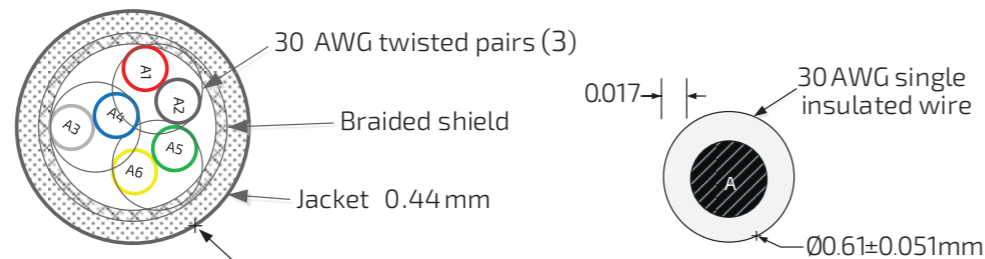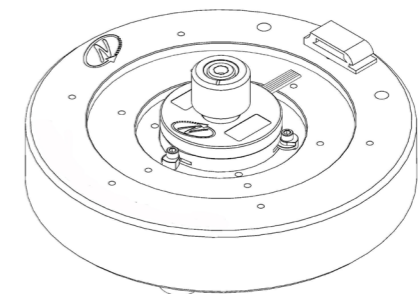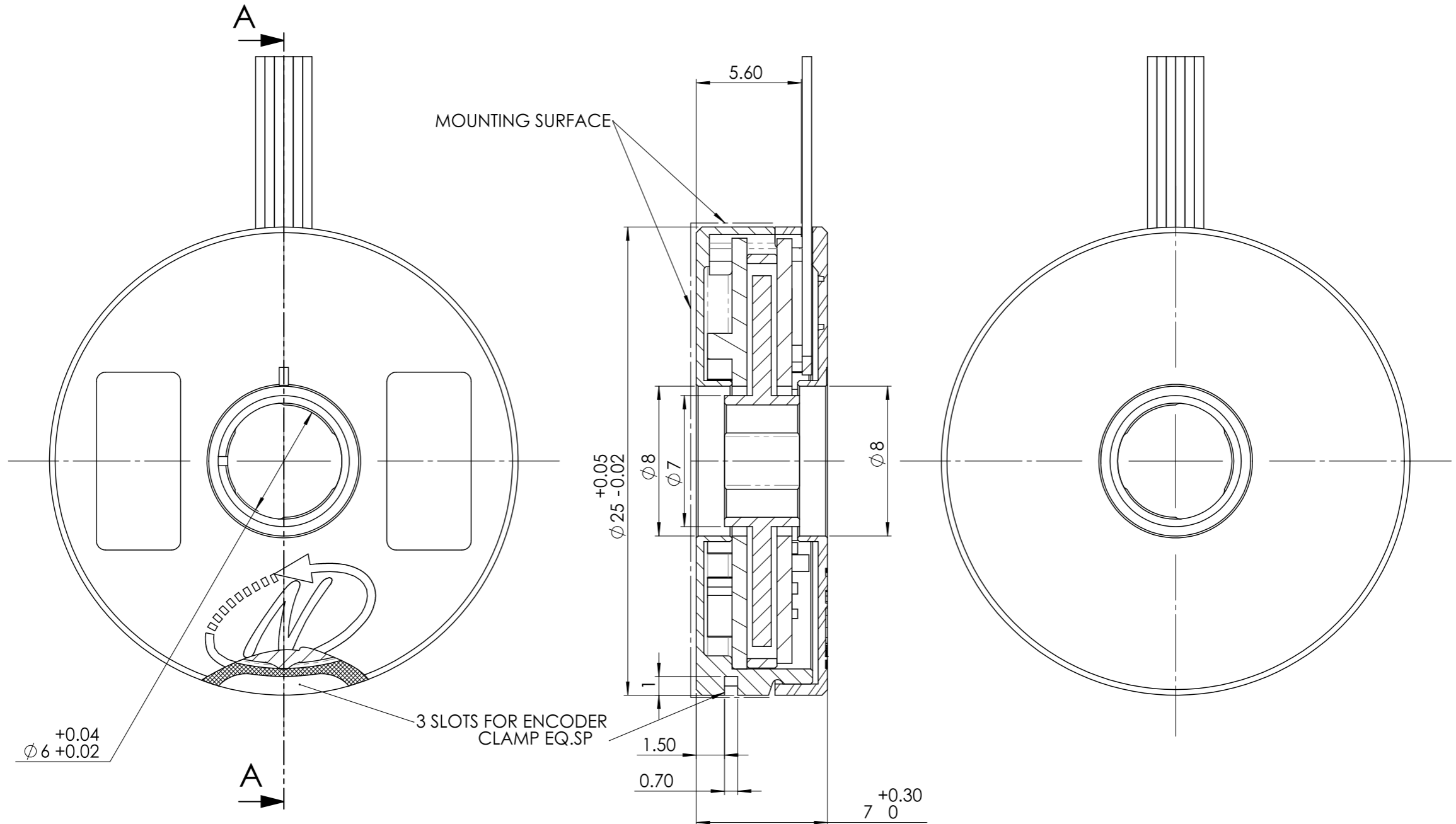Cable: 30 AWG twisted pair (3): 2 (30 AWG 25/44 tinned copper,
Insulation: PFE Ø 0.15 to Ø 0.6 ± 0.05 OD).
Temperature rating: –60 to +150 Deg C.
Braided shield: Thinned copper braided 95% min. coverage.
Jacket: 0.44 silicon rubber (NFA 11-A1) Ø3.45 ±0.2 OD

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

0.017
30 AWG single insulated wire
Ø0.61±0.051mm

● *Moving. Precisely. With You.*

Absolute Position
Rotary Electric Encoder™ | DS-25 Qcore

ICD

MOUNTING SURFACE

5.60

$\varnothing 25 \, {}^{+0.05}_{-0.02}$

$\varnothing 8$

$\varnothing 7$

$\varnothing 8$

1

1.50

0.70

$7 \, {}^{+0.30}_{0}$

$\varnothing 6 \, {}^{+0.04}_{+0.02}$

3 SLOTS FOR ENCODER
CLAMP EQ.SP

A — A

DS-25 with rotor metal sleeve
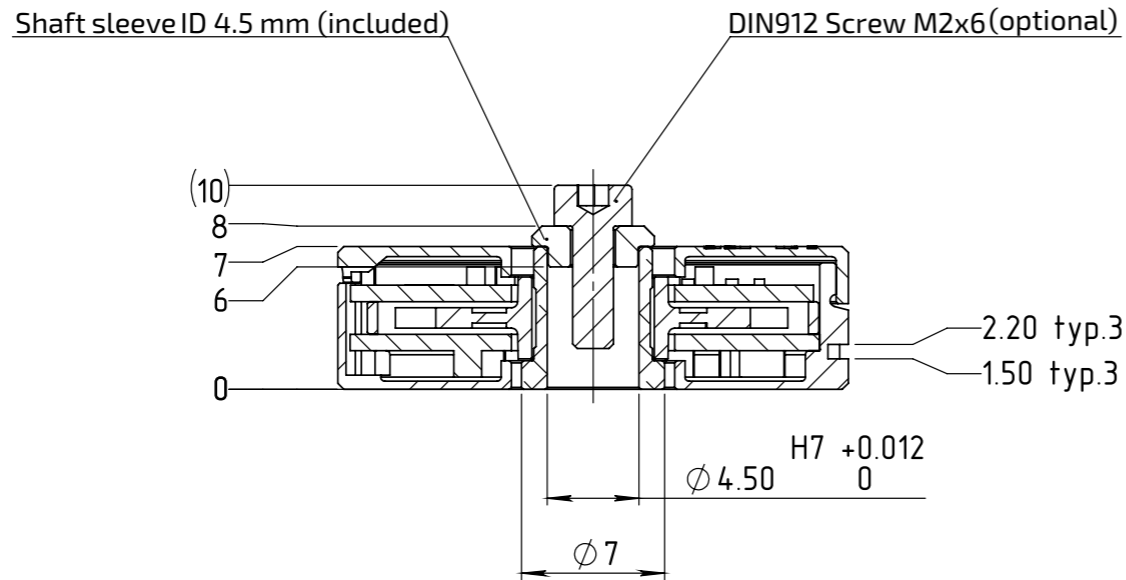
Shaft sleeve ID 4.5 mm (included)
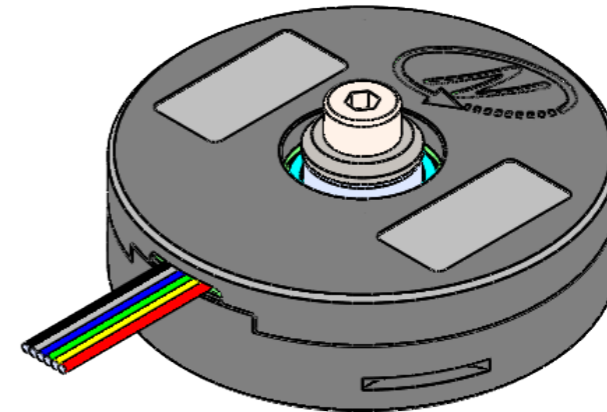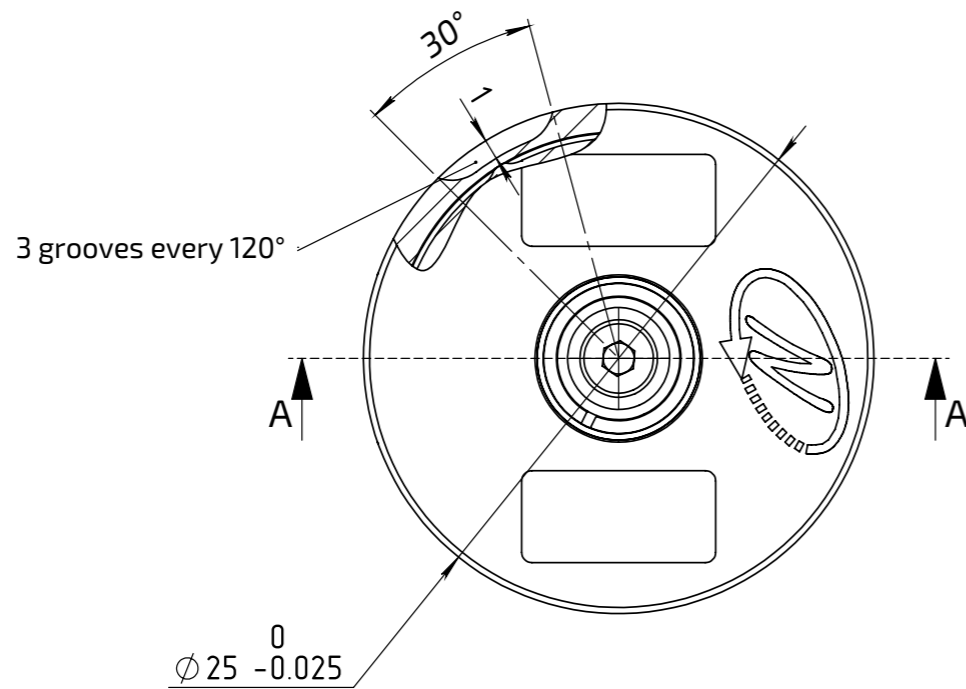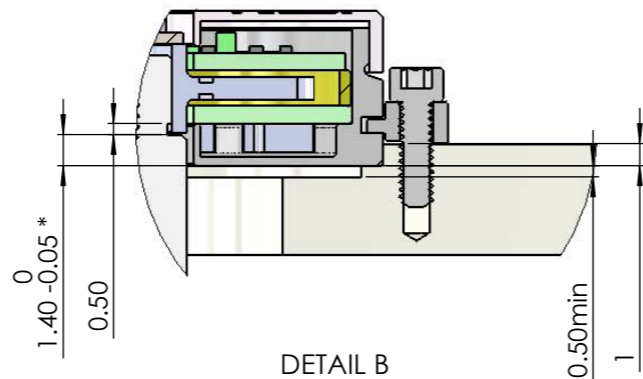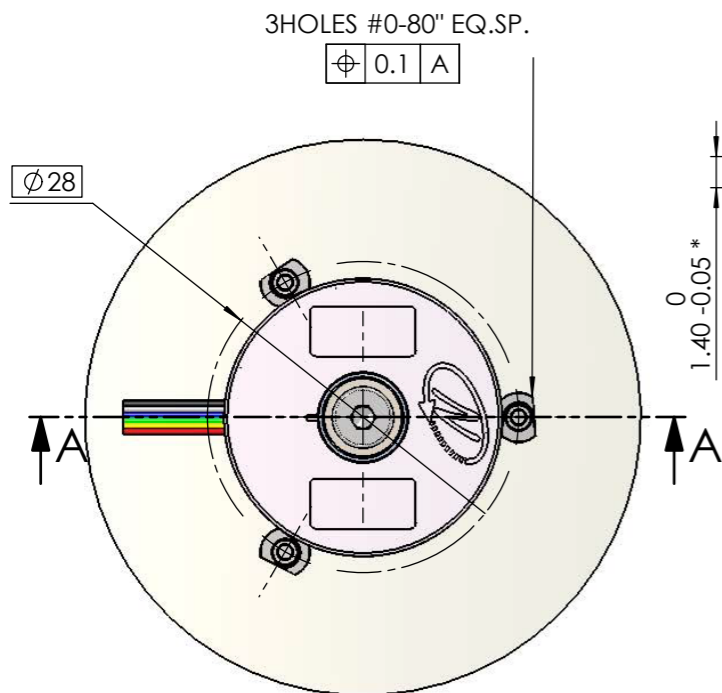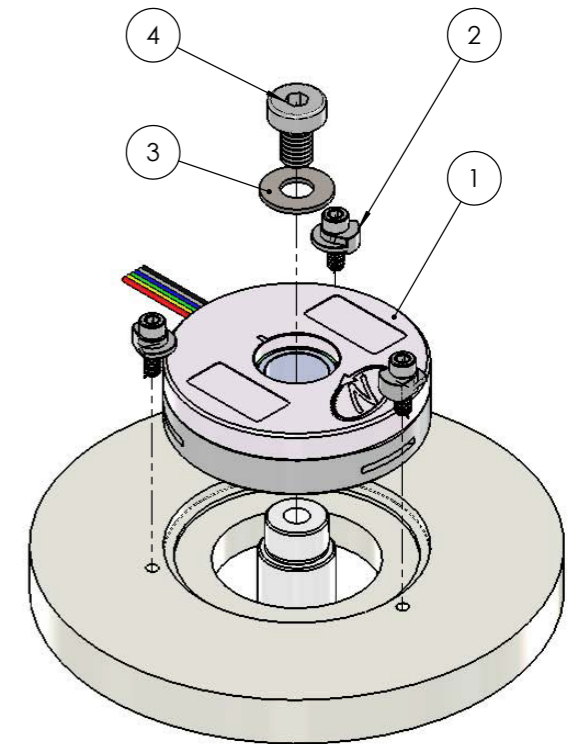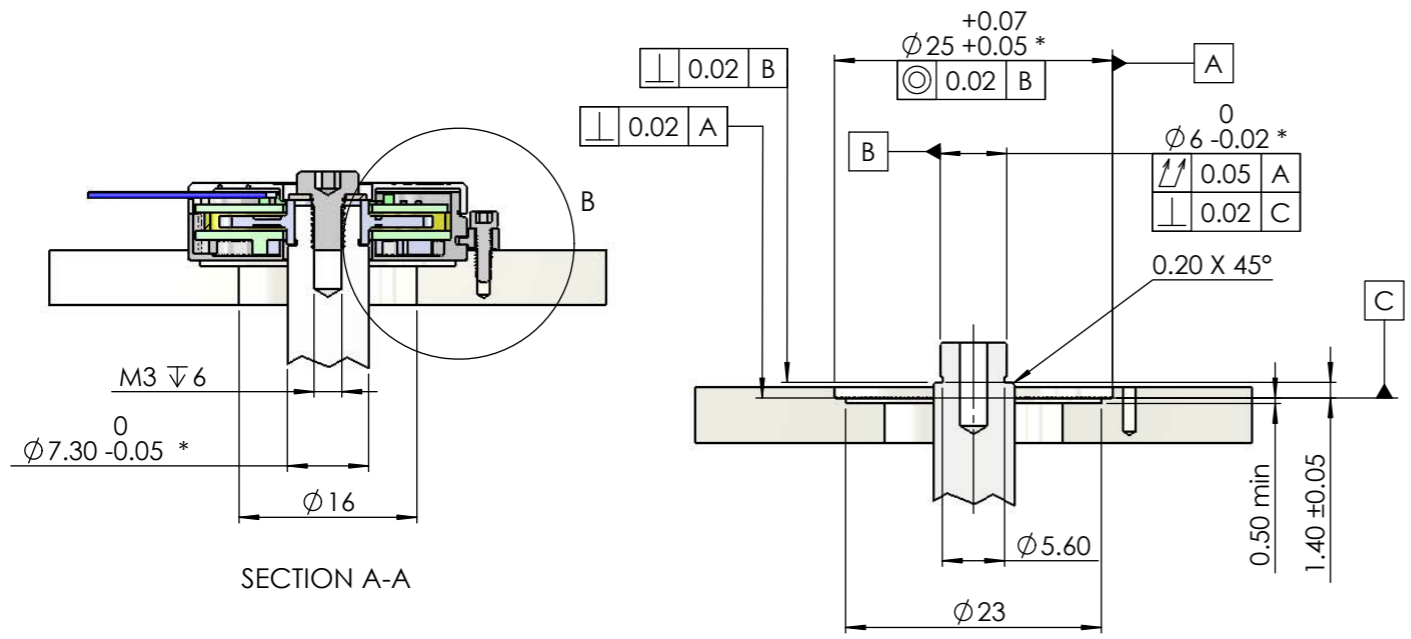
DIN912 Screw M2x6 (optional)

(10)
8
7
6
0

2.20 typ.3
1.50 typ.3

H7 +0.012
$\emptyset$ 4.50   0

$\emptyset$ 7

SECTION A-A

30°

1

3 grooves every 120°

A   A

0
$\emptyset$ 25 −0.025

Shaft - End installation (step)

SECTION A-A

⊥ | 0.02 | B
⊥ | 0.02 | A

M3 ▽ 6
Ø 7.30 0 -0.05 *
Ø 16

SECTION D-D

+0.07
Ø 25 +0.05 *
◎ | 0.02 | B

A

B

Ø 6 0 -0.02 *
⟋ | 0.05 | A
⊥ | 0.02 | C

0.20 X 45°

C

0.50 min
1.40 ±0.05

Ø 5.60
Ø 23

DETAIL B

3HOLES #0-80'' EQ.SP.
⊕ | 0.1 | A

Ø 28

1.40 0 -0.05 *
0.50

0.50min

UNLESS OTHERWISE SPECIFIED

Dimentions are in: mm
Surface Finish: N6
Linear Tolerances: ±0.5 deg
All Chamfer: 0.1 mm x 45°

No	Part			Description	QTY.
1	DS-25	Included		DS-25 encoder	1
2	EAPK004	Included	Kit 0-80''	Kit , 3 x Encoder clamps Nylon	1
3	MA-DS25-004	Optional	Shaft End installation kit	Washer DIN125-A3.2	1
4				Screw DIN 7984 M3x5	1

Critical dimensions marked with "*"

● Moving. Precisely. With You.

Absolute Position
Rotary Electric Encoder™ | DS-25 ○core

Deep , Shaft - MID installation (step)

$\phi 25 \; {}^{+0.07}_{+0.05}*$

⊥ | 0.02 | B

◎ | 0.02 | B

A

⊥ | 0.05 | A

B

$\phi 6 \; {}^{0}_{-0.02}*$

⤢ | 0.05 | A

⊥ | 0.02 | C

0.20 X 45°

C

M3 ⍋ 6

$\phi 7.30 \; {}^{0}_{-0.05}*$

$\phi 16$

$\phi 5.60$

$\phi 23$

$\phi 25.50$

◎ | 0.1 | A

${}^{+0.50}_{0}$

SECTION A-A

SECTION C-C

3 HOLES M2 EQ.SP.

⊕ | 0.1 | A

$\phi 29.80$

$1.40 \; {}^{0}_{-0.05}*$

0.50

0.50min

1.50 REF

$5.50 \; {}^{0}_{-0.10}$

DETAIL B

A | A

UNLESS OTHERWISE SPECIFIED

Dimentions are in: mm
Surface Finish: N6
Linear Tolerances: ±0.5 deg
All Chamfer: 0.1 mm x 45°
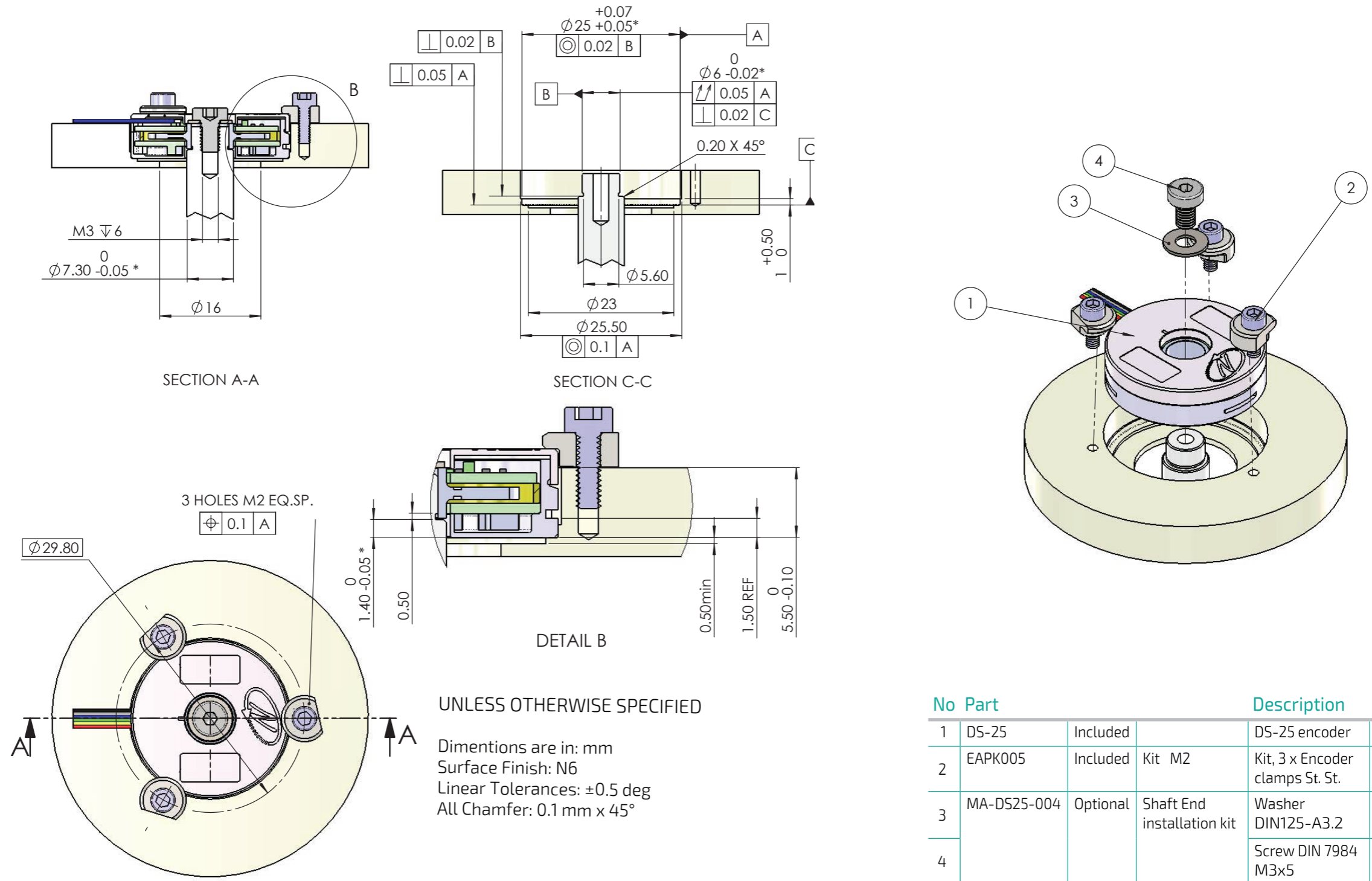
No	Part			Description	QTY.
1	DS-25	Included		DS-25 encoder	1
2	EAPK005	Included	Kit M2	Kit, 3 x Encoder clamps St. St.	1
3	MA-DS25-004	Optional	Shaft End installation kit	Washer DIN125-A3.2	1
4				Screw DIN 7984 M3x5	1

Critical dimensions marked with "*"