

DF-150-32

Absolute position, rotary Electric Encoder™

The DF-150 is a member of the DF series of Electric Encoders™, based on Netzer Precision proprietary technology. The Electric Encoder™ offers many advantages - some unparalleled

Low profile (13 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.

Mechanical

Allowable mounting eccentricity	±0.1 mm
Allowable rotor axial motion	±0.1 mm
Rotor inertia	215,847 gr · mm ²
Total weight	310 gr
Outer Ø /Inner Ø/ Height	150/ 110 / 13 mm
Material (stator, rotor)	Aluminum
Nominal air gap (stator, rotor)	0.6 mm

Electrical

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

Environmental

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

Characteristics

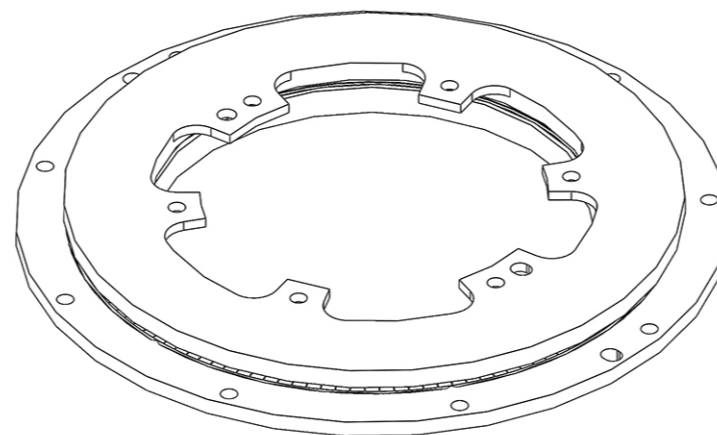
Angular resolution	18 bits ; 262,144 CPR
Static error	< 10 mDeg
Maximum operational speed	750 rpm
Measurement range	Unlimited rotation
Power On - Max. operational speed	3.3 RPM , <=20°/sec
Build In Test BIT	Optional

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.

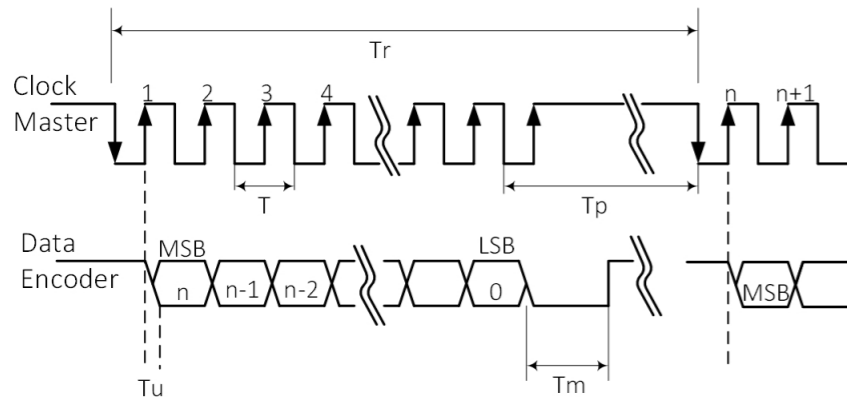


DF-150-32 Absolute position, rotary Electric Encoder™

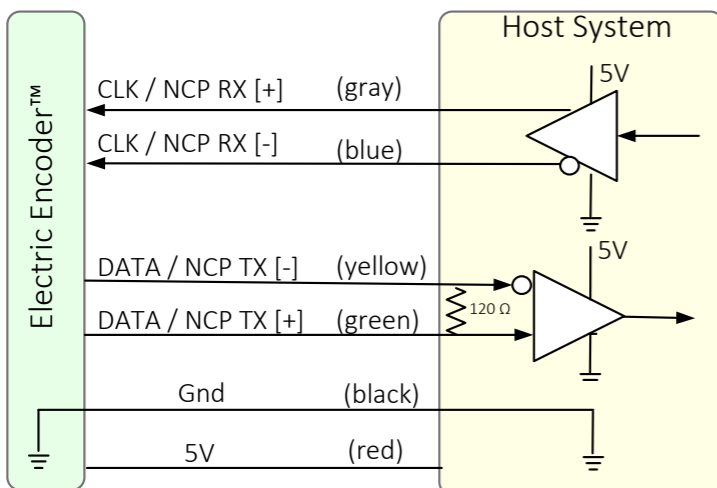


Digital SSI Interface

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

Signal latency	~250 μSec
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

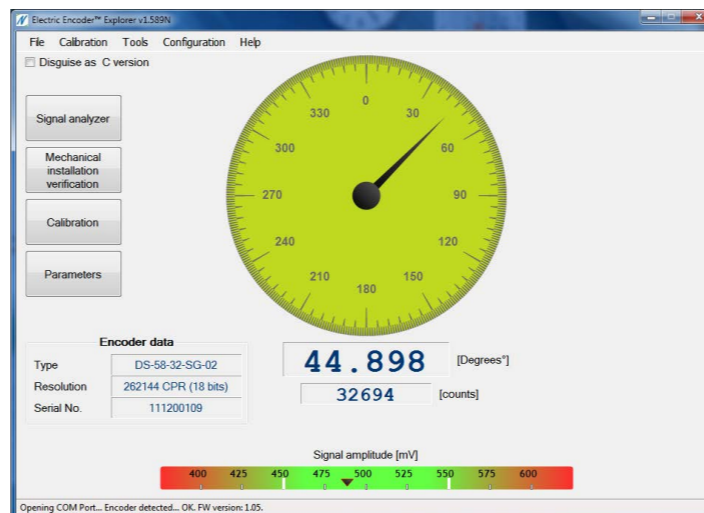
SSI	
Monoflop time	25 μSec

SSI / BiSS interface wires color code

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

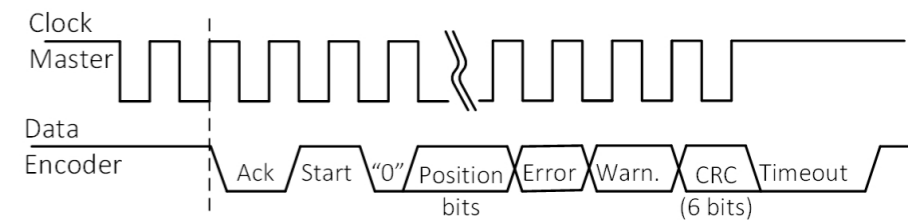
Software tools: (SSI / BiSS - C)

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
28	Ack	Period during which the encoder calculates the absolute position , one clock cycle	0	1/clock
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"start" bit follower	0	1 bit
8...25	AP	Absolute Position encoder data		
7	Warn.	Warning	1	1 bit
6	Error	Error	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



DF-150-32

Absolute position, rotary Electric Encoder™

DF - 150 - 32 - S G - S 0 - n n n

DS Product line

Outer Diameter

Fine ECR

Outputs:
S - Digital : SSi
I - Digital : BiSS-C

Resolution		
Code	Bit	CPR
G	18	262,144

BIT (Build In Test): optional
[] - none
B - BIT

nnn - Custom

C - Connector (optional)
0 - Flying leads (default)

Interconnection:
S - shielded cable 250 mm (default)

Netzer Cat No.: CB-00014

Provider: Ray-Q USA. wire CAT No: RQ213210

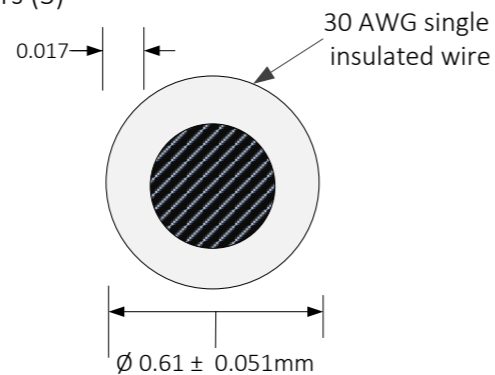
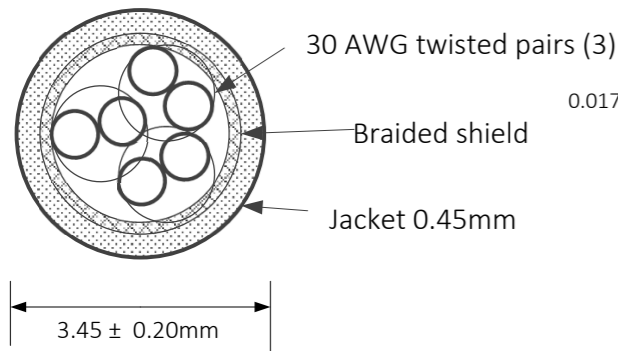
Cable: 30 AWG twisted pair (3) :2 (30 AWG 25/44 finned copper , 0.15 PFE to $\varnothing 0.6 \pm 0.05$ OD).

Temperature rating: -60 to +150 Deg C.

Braided shield: Thinned copper braided 95% min. coverage.

Jacket: 0.45 silicon rubber jacket $\varnothing 3.45 \pm 0.2$ OD

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



Related documents:

DF-150 User Manual : Mechanical , Electrical and calibration

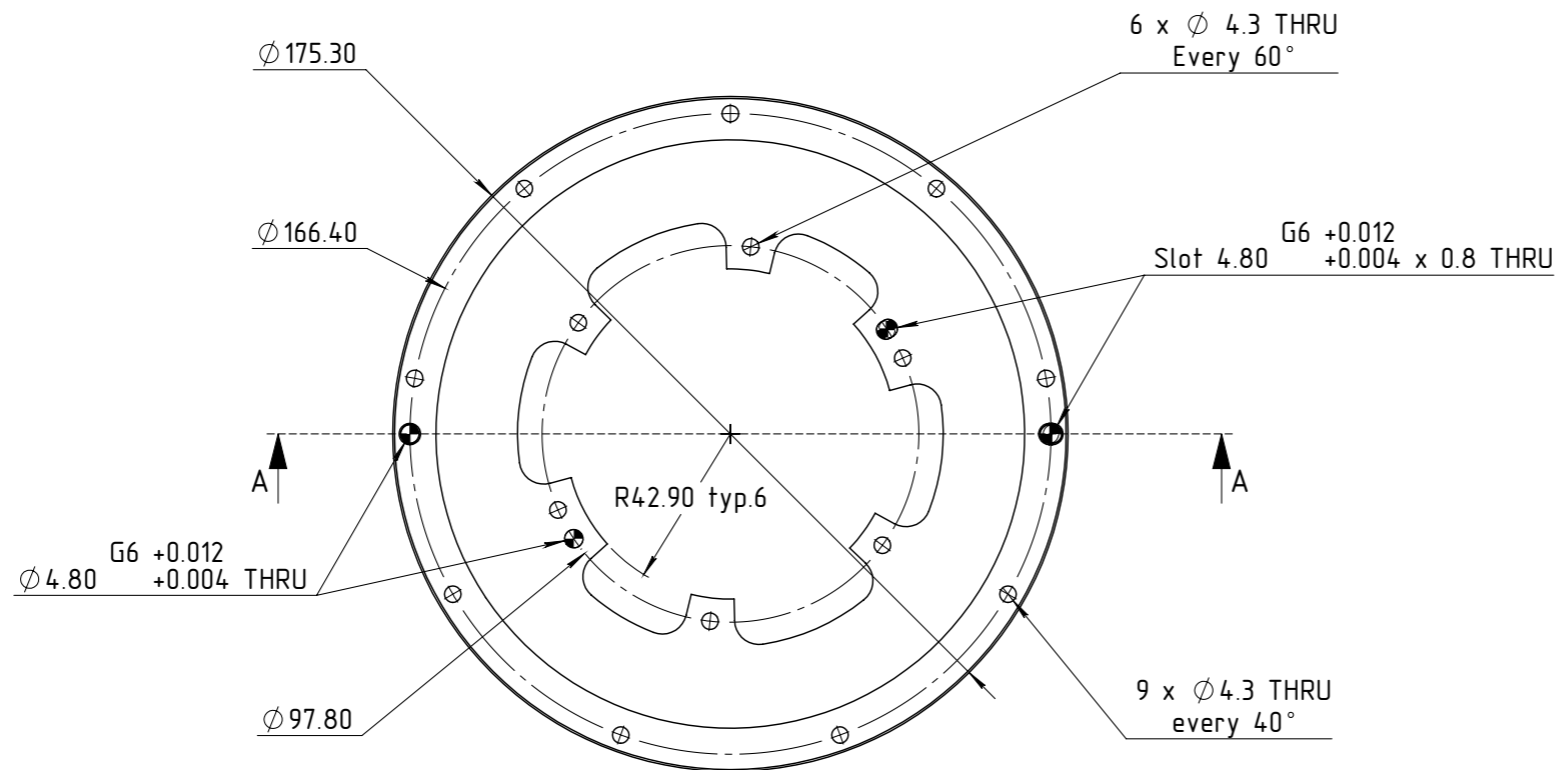
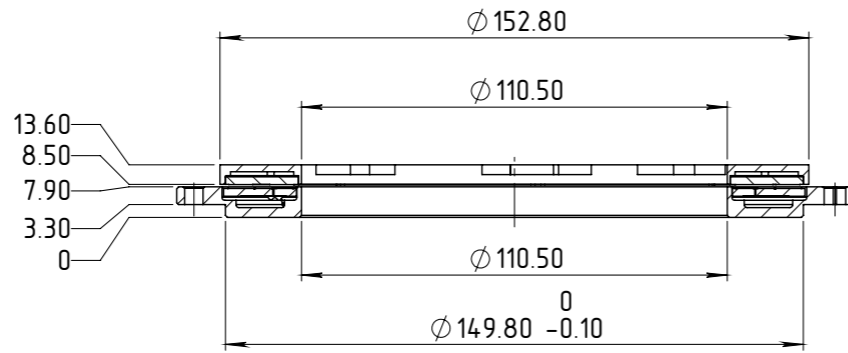
Demonstration Kit:

DF-150DKIT-01: Includes ,mounted encoder on rotary jig , and RS-422 to USB converter.

DF-150-32

Absolute position, rotary Electric Encoder™

SECTION A-A



The information contained in this drawing is the sole property of Netzer Precision Motion Sensors Ltd. Any reproduction in part or whole without the written permission of Netzer Precision Motion Sensors Ltd. is prohibited. The drawing is confidential and is the property of Netzer Precision Ltd. It must not be disclosed to a third party without written consent of Netzer Precision Ltd.

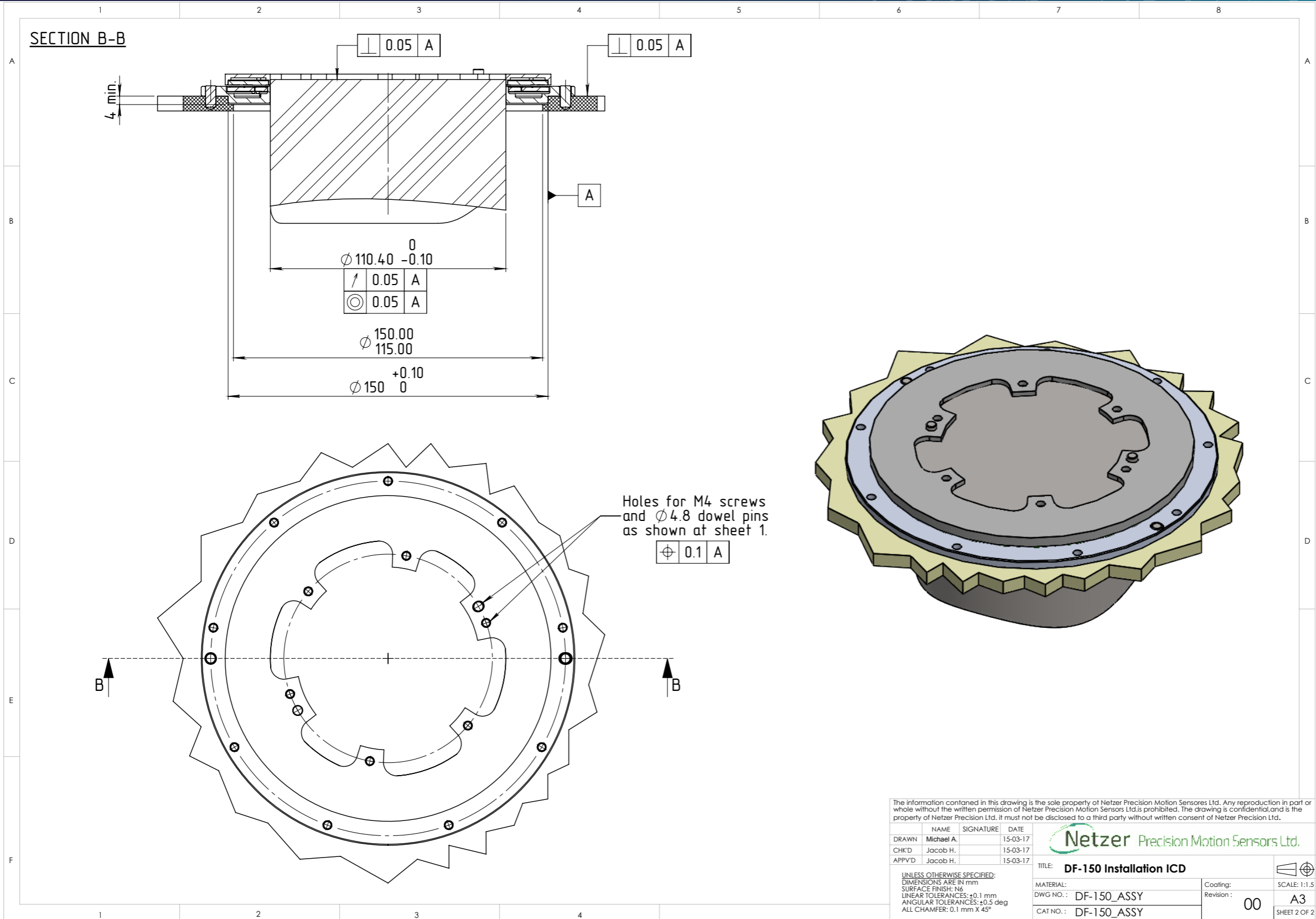
NAME	SIGNATURE	DATE
DRAWN Michael A.		15-03-17
CHK'D Jacob H.		15-03-17
APP'VD Jacob H.		15-03-17

Netzer Precision Motion Sensors Ltd.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN mm SURFACE FINISH: N6 LINEAR TOLERANCES: ± 0.1 mm ANGULAR TOLERANCES: ± 0.5 deg ALL CHAMFER: 0.1 mm X 45°		TITLE: DF-150 Assembly	SCALE: 1:1.5
MATERIAL: DF-150_ASSY	Coating:	Revision: 00	A3
CAT NO.: DF-150_ASSY			SHEET 1 OF 2

DF-150-32

Absolute position, rotary Electric Encoder™



The information contained in this drawing is the sole property of Netzer Precision Motion Sensors Ltd. Any reproduction in part or whole without the written permission of Netzer Precision Motion Sensors Ltd. is prohibited. The drawing is confidential and is the property of Netzer Precision Ltd. It must not be disclosed to a third party without written consent of Netzer Precision Ltd.

	NAME	SIGNATURE	DATE
DRAWN	Michael A.		15-03-17
CHK'D	Jacob H.		15-03-17
APP'VD	Jacob H.		15-03-17

Netzer Precision Motion Sensors Ltd.

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN mm
 SURFACE FINISH: μ 6
 LINEAR TOLERANCES: ± 0.1 mm
 ANGULAR TOLERANCES: ± 0.5 deg
 ALL CHAMFER: 0.1 mm X 45°

TITLE: DF-150 Installation ICD	Coating:	SCALE: 1:1.5
MATERIAL: DF-150_ASSY	Revision:	A3
CAT NO.: DF-150_ASSY	00	SHEET 2 OF 2