

The DF-60 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 (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
- 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.

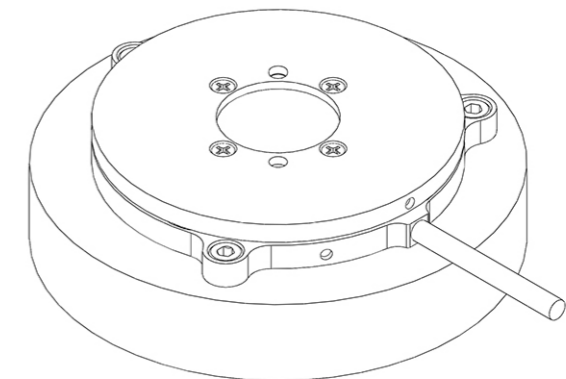
The output of Electric Encoder™ is a digital serial with absolute position single turn. The combination of precision, low profile, low weight and high reliability have made Netzer Precision encoders particularly suitable to a wide variety of industrial automation applications.

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ELECTROMATE
877-737-8698
sales@electromate.com
www.electromate.com

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General

Angular resolution	18-20 bit
Maximum tested static error	±0.020°
Extended accuracy static error	±0.010°
Maximum operational speed	1500 rpm
Measurement range	Unlimited rotation
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	10,154 gr · mm ²
Total weight	40 gr
Outer Ø / Inner Ø / Height	60 / 30 / 11.5 mm
Material (stator, rotor)	Aluminum
Nominal air gap (stator, rotor)	0.6 mm

Electrical

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

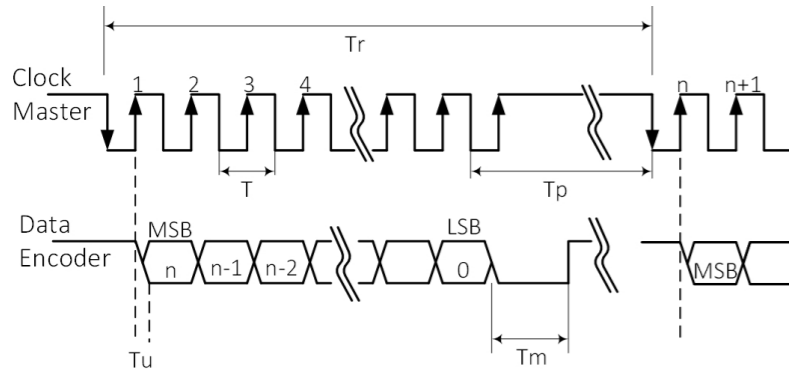
Environmental

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.



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

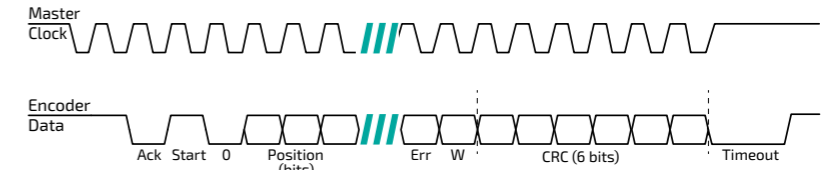
Clock +	Grey	Clock
Clock -	Blue	
Data -	Yellow	Data
Data +	Green	
GND	Black	Ground
+5V	Red	Power supply

	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	



Digital BiSS-C Interface

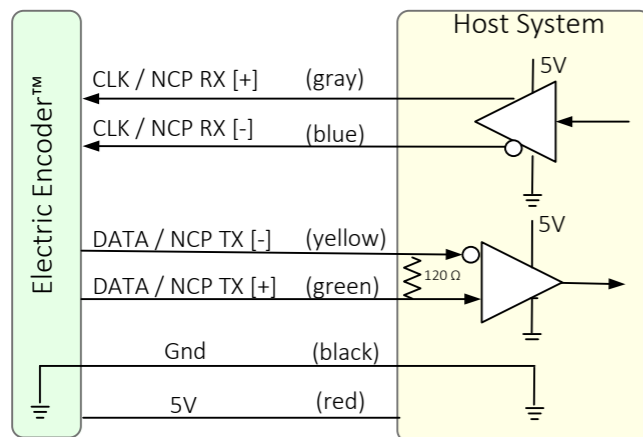
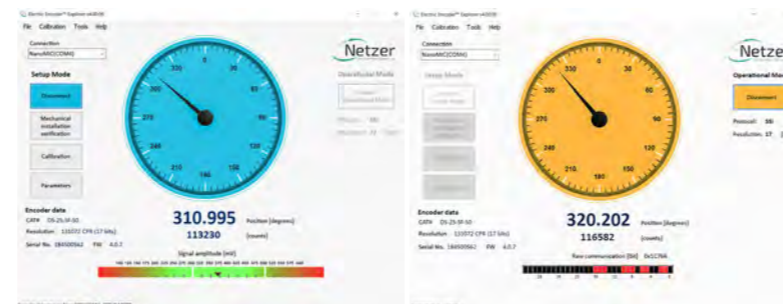
BiSS – C Interface is unidirectional serial synchronous protocol for digital data transmission where the Encoder acts as “slave” transmits data according to “Master” clock. The BiSS protocol is designed in B mode and C mode (continuous mode). The BiSS-C interface as the SSI is based on RS-422 standards.



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
	Time-out	Elapse between the sequential “start” request cycle’s.		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

DF - 60 - 32 - S G - S 0 - n n n

DF Product line

Outer Diameter

Fine ECR

Output

S	SSi
I	BiSS

Resolution

Code	Bit	CPR
G	18	262,144

BIT (Build In Test): optional

[]	None
B	BIT

EA Extended Accuracy

nnn Custom

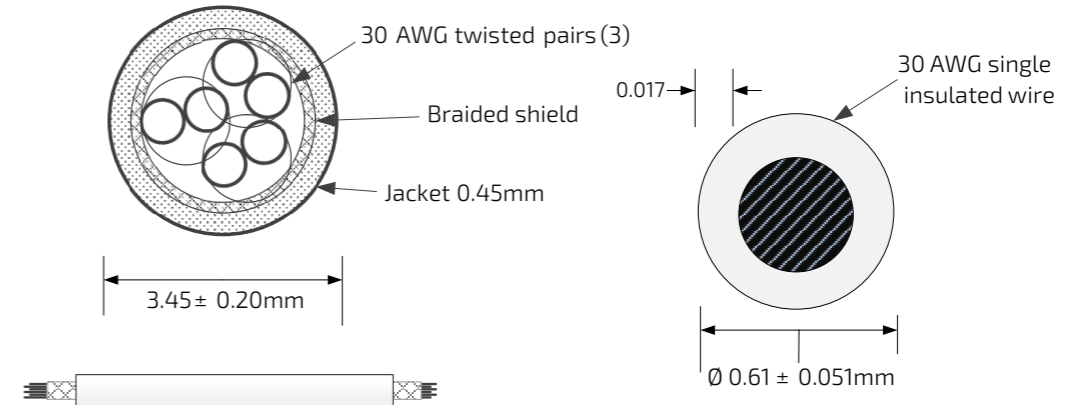
Interconnection

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

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



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Related documents

DF-60 User Manual: Mechanical, Electrical and calibration setup.

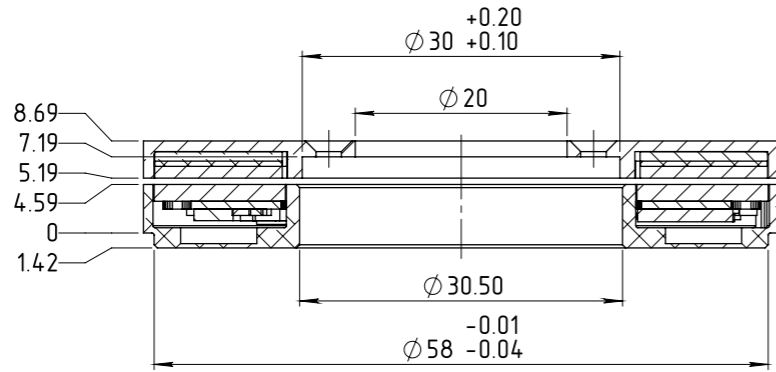
Optional Accessories

Demonstration Kit

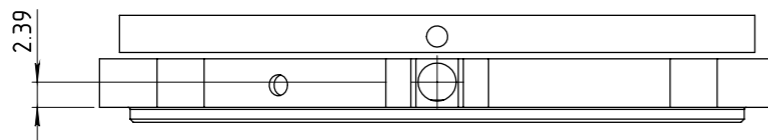
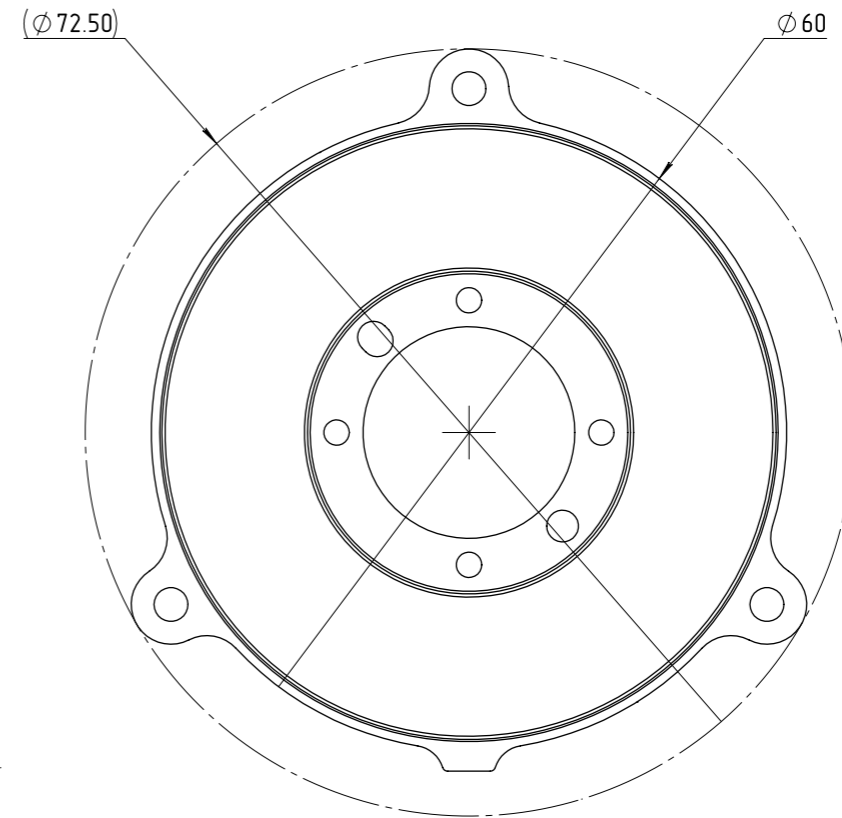
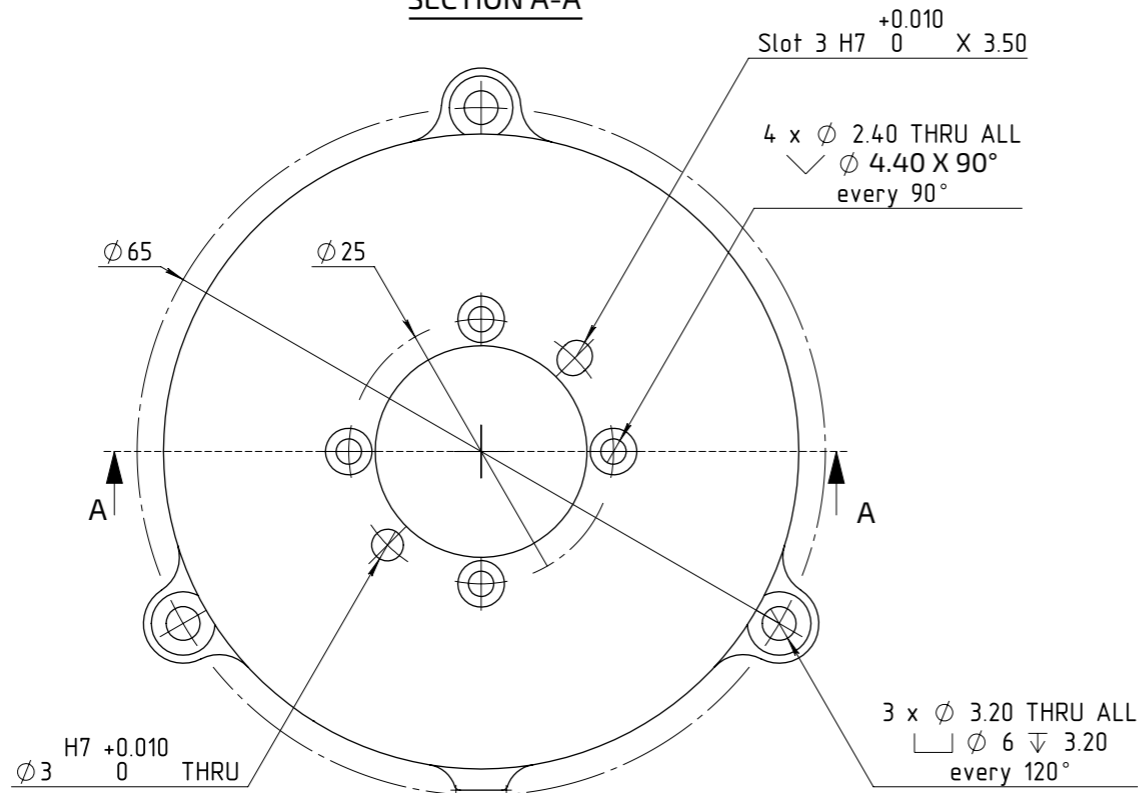
DKIT-DF-60-32-SG-S0 - SSi interface

DKIT-DF-60-32-IG-S0 - BiSS interface

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



SECTION A-A



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Unless Otherwise Specified

Dimensions are in: mm | Surface finish: N6

Linear tolerances

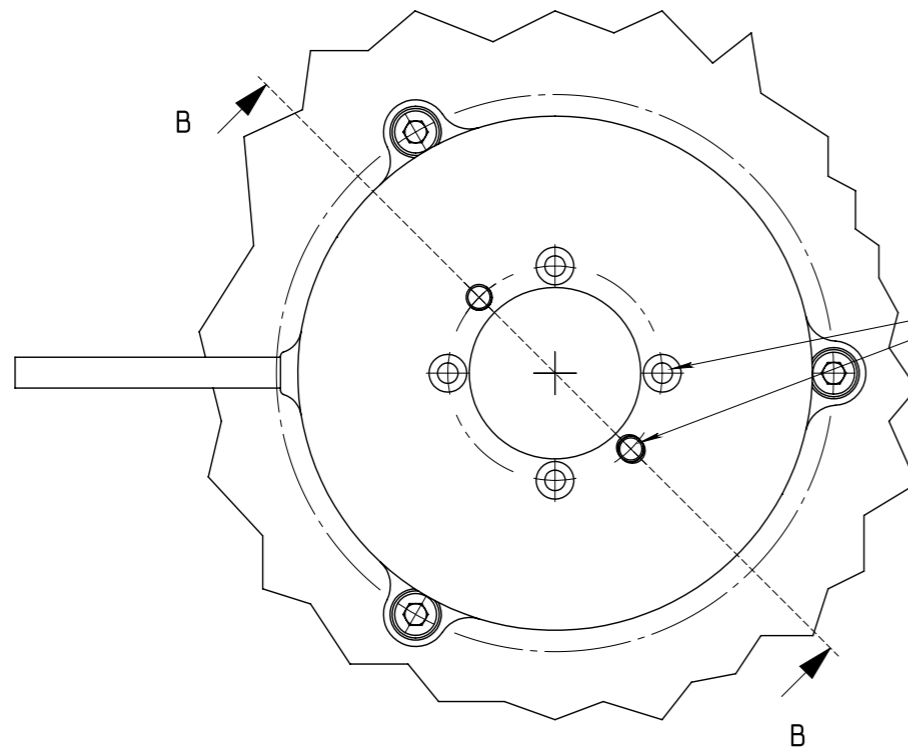
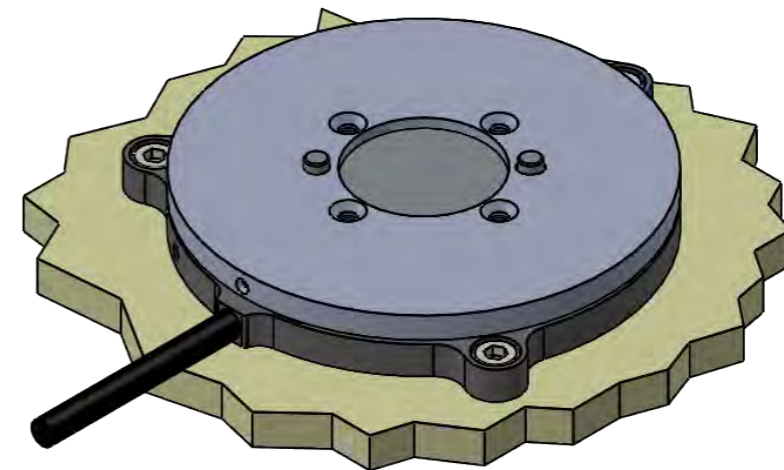
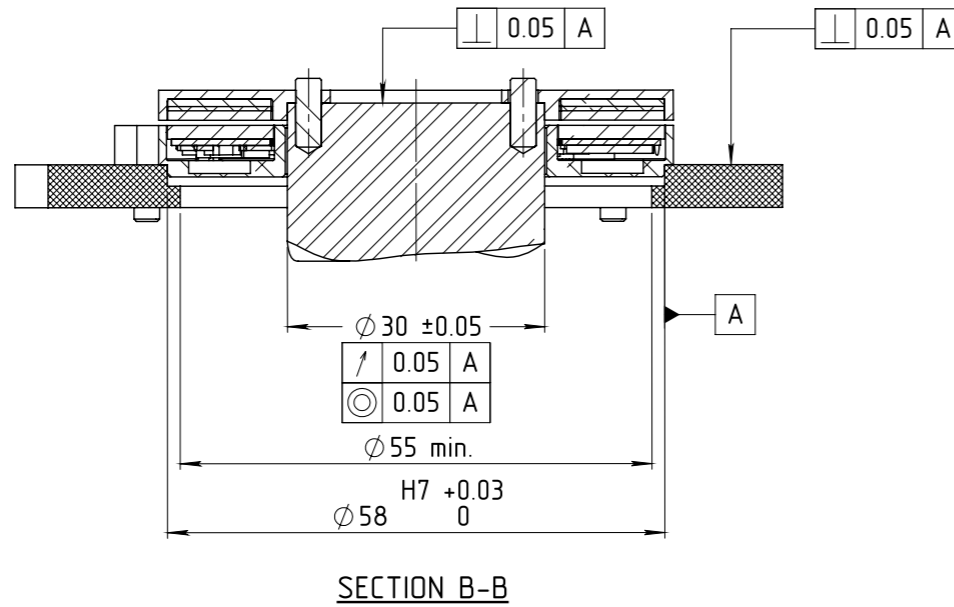
0.5-4.9: ± 0.05 mm | 5-30: ± 0.1 mm

31-120: ± 0.15 mm | 121-400: ± 0.2 mm

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Two $\varnothing 3$ dowel pins and four countersink M3 holes, see sheet 1 for details

Unless Otherwise Specified

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Linear tolerances	
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