The DF-100 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)
- 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 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.

General

Angular resolution	18-20 bit
Maximum tested static error	±0.015°
Extended accuracy static error	±0.010°
Maximum operational speed	1,500 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 (rotor to stator)
Allowable axial mounting tolerance	±0.1 mm (rotor to stator)
Rotor inertia	72,091 gr · mm²
Nominal air gap (stator, rotor)	0.6 mm
Total weight	126 gr
Outer Ø /Inner Ø/ Height	100 / 57 / 9 mm
Material (stator, rotor)	Aluminum

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

DF-100-V02
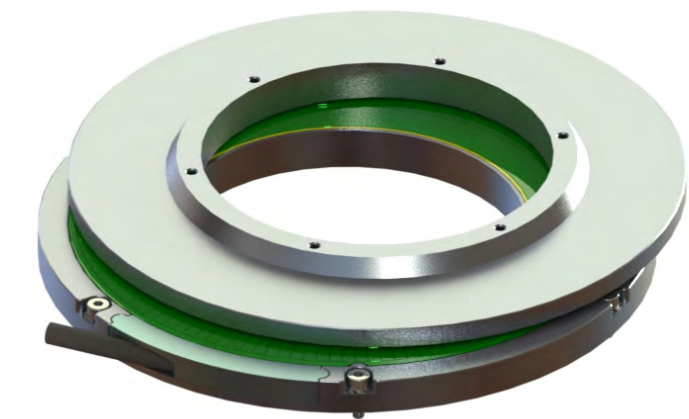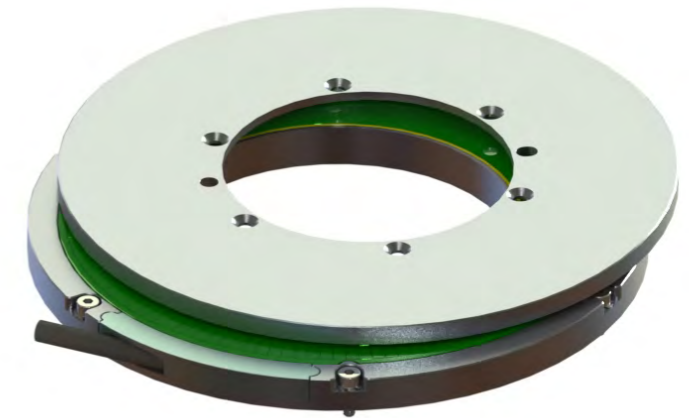
Digital SSi Interface

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.
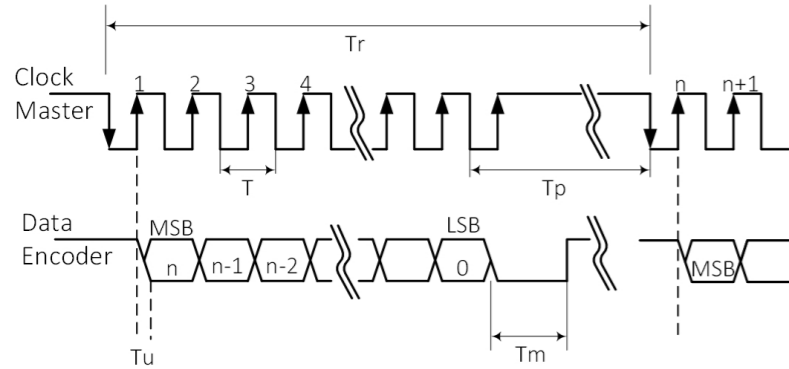
	Description	Recommendations
n	Total number of data bits	12 - 22
T	Clock period	
f= 1/T	Clock frequency	0.5 - 2.0 MHz
Tu	Bit update time	200 nsec
Tp	Pause time	26 - ∞ μsec
Tm	Monoflop time	>25 μsec
Tr	Time between 2 adjacent requests	Tr > n*T+26 μsec
fr=1/Tr	Data request frequency	
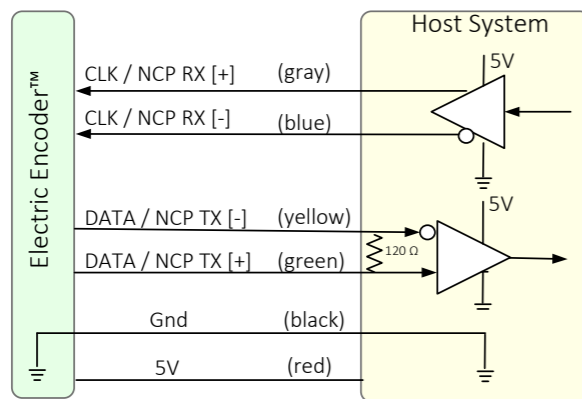
SSi / BiSS output signal parameters

| 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.
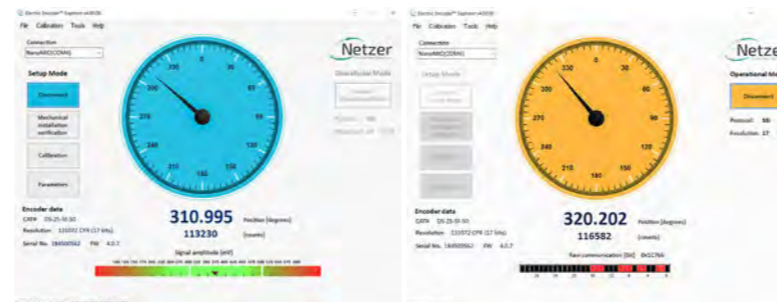
Digital BiSS-C Interface

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-C interface as the SSi is based on RS-422 standards.
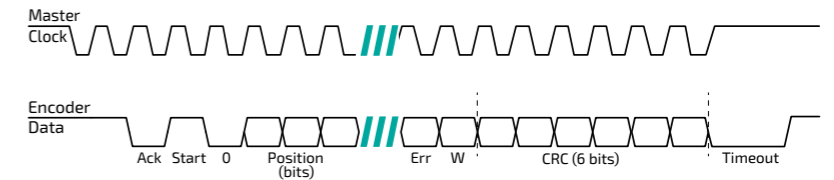
bit #		Description	Default	Length
30	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1/clock
29	Start	Encoder signal for "start" data transmit	1	1 bit
28	"0"	"start" bit follower	0	1 bit
8…26	AP	Absolute Position encoder data		
7	Warn.	Warning	1	1 bit
6	Error	Error	1	1 bit
0…5	CRC	The CRC polynomial for position, error and warning data is: x6 + x1 + x0. 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

Ordering Code

| DF | – | 100 | – | 32 | – | S | G | | – | P | E | – | n | n | n |

DF Product line

Outer Diameter

Fine ECR

Output

S	SSi
I	BiSS

Resolution

Code	Bit	CPR
G	18	262,144
H	19	524,288
I	20	1,048,576

BIT (Build In Test): optional

[ ]	None
B	BIT

EA	Extended Accuracy
nnn	Custom

E	End of shaft
M	Mid of shaft

Cable orientation: (Top view)

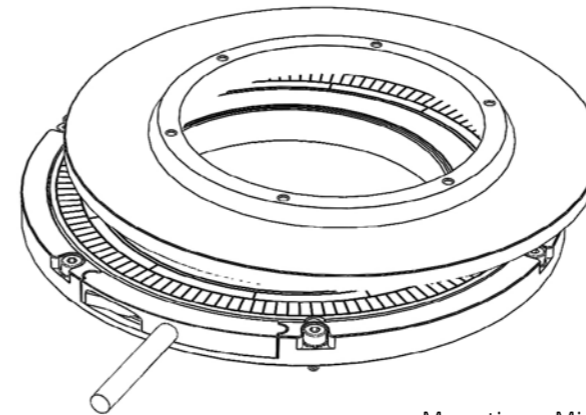| P	Perpendicular – 250mm
R	Right – 250mm
L	Left – 250mm

Optional Accessories
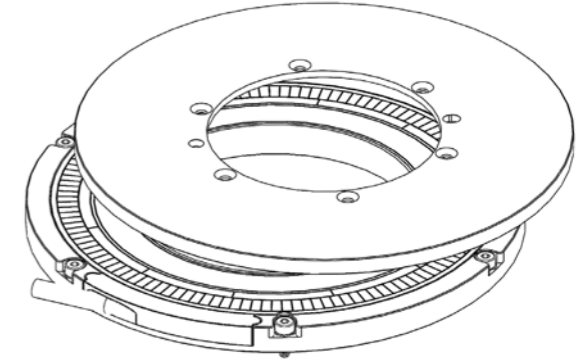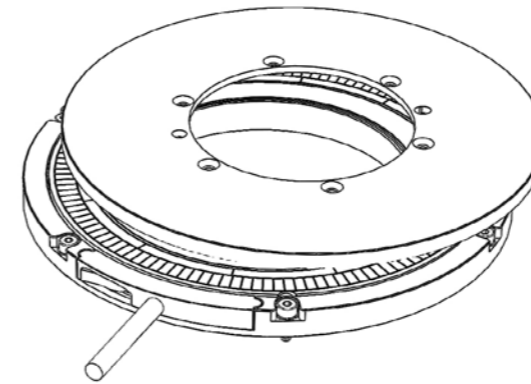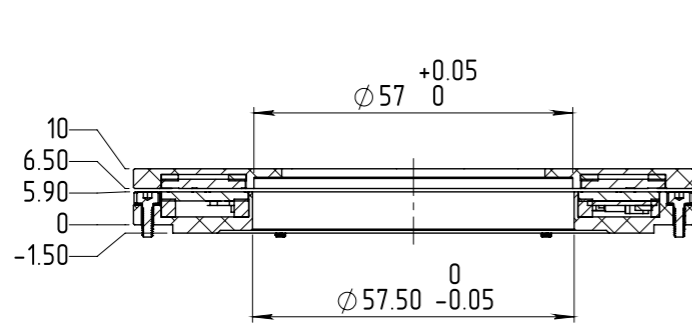
Mounting – End of shaft. Ø ID=47mm
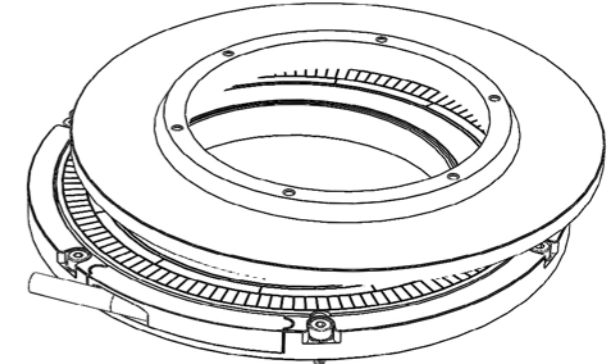
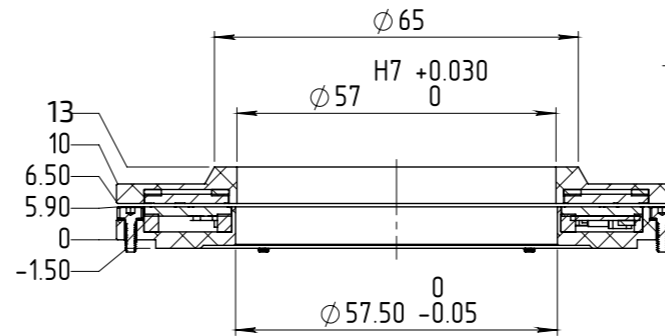Mounting – Mid of shaft. Ø ID=57mm

Related documents

DF-100 User Manual: Mechanical , Electrical and calibration setup.
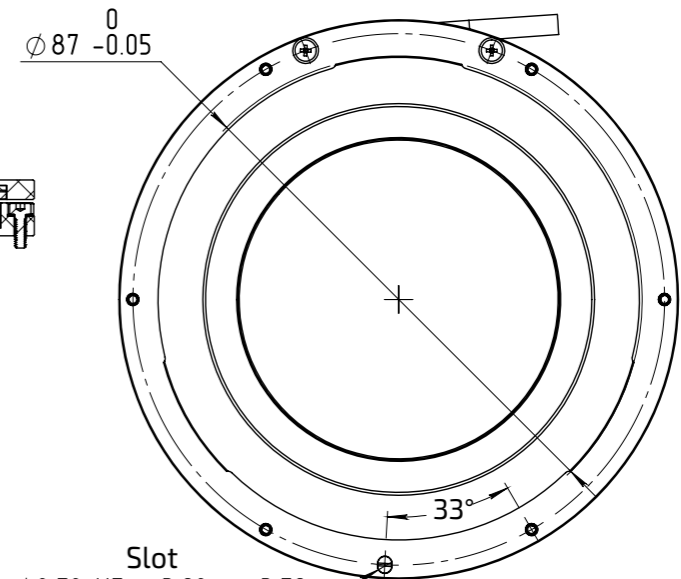
Demonstration Kit

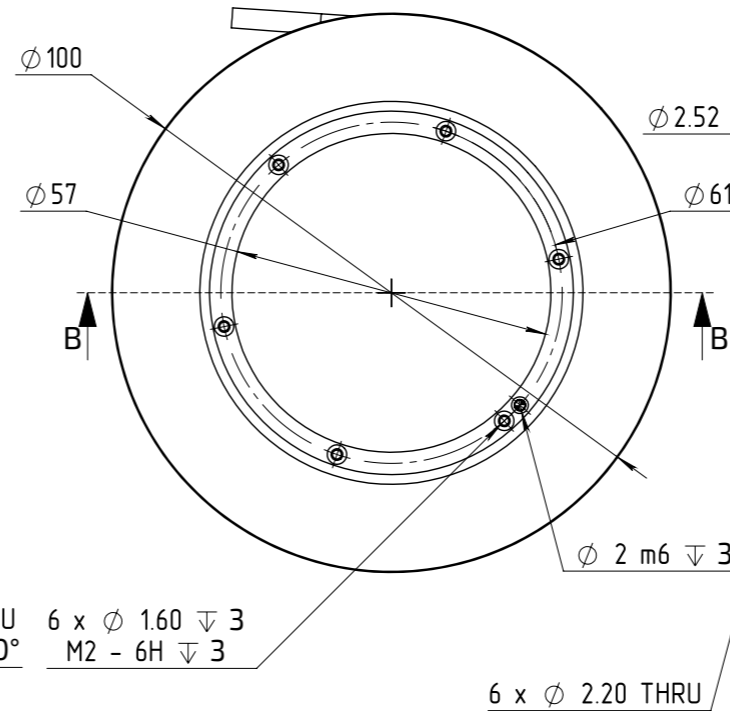**DF-100DKIT-01:** Includes ,mounted encoder on rotary jig, and RS-422 to USB converter.
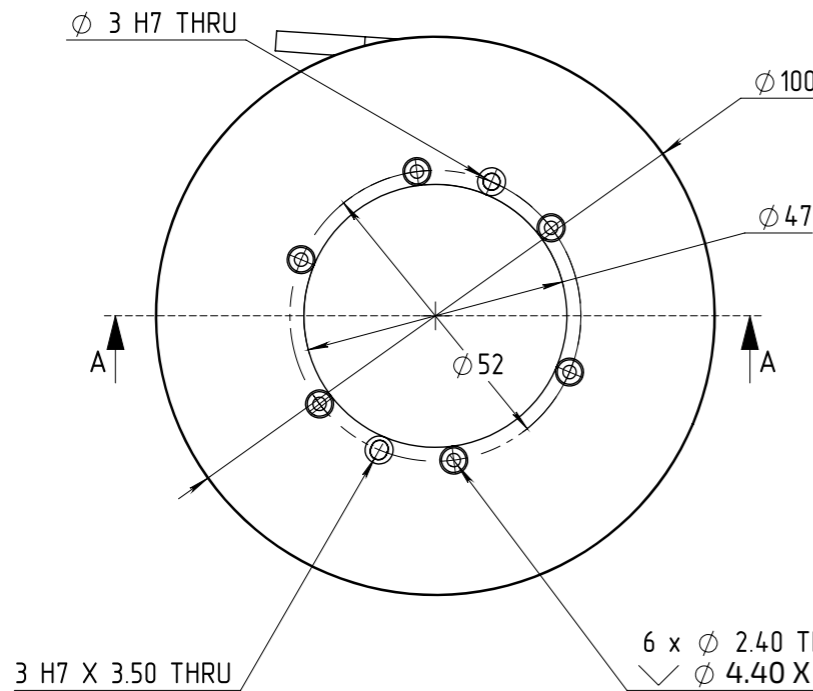
Rotor Type 1 (End Shaft)

$\emptyset$ 57 $^{+0.05}_{0}$

$\emptyset$ 57.50 $^{0}_{-0.05}$

10
6.50
5.90
0
−1.50

Rotor Type 3 (Mid Shaft)

$\emptyset$ 65

$\emptyset$ 57 H7 $^{+0.030}_{0}$

$\emptyset$ 57.50 $^{0}_{-0.05}$

13
10
6.50
5.90
0
−1.50

Bottom View

$\emptyset$ 87 $^{0}_{-0.05}$

33°

Slot
$\emptyset$ 2.52 H7 x 3.02 ⟱ 3.50

$\emptyset$ 3 H7 THRU

$\emptyset$ 100

$\emptyset$ 47

$\emptyset$ 52

A   A

3 H7 X 3.50 THRU

6 x $\emptyset$ 2.40 THRU
⌵ $\emptyset$ 4.40 X 90°

$\emptyset$ 100

$\emptyset$ 57

$\emptyset$ 61

B   B

6 x $\emptyset$ 1.60 ⟱ 3
M2 – 6H ⟱ 3

$\emptyset$ 2 m6 ⟱ 3

6 x $\emptyset$ 2.20 THRU

$\emptyset$ 95
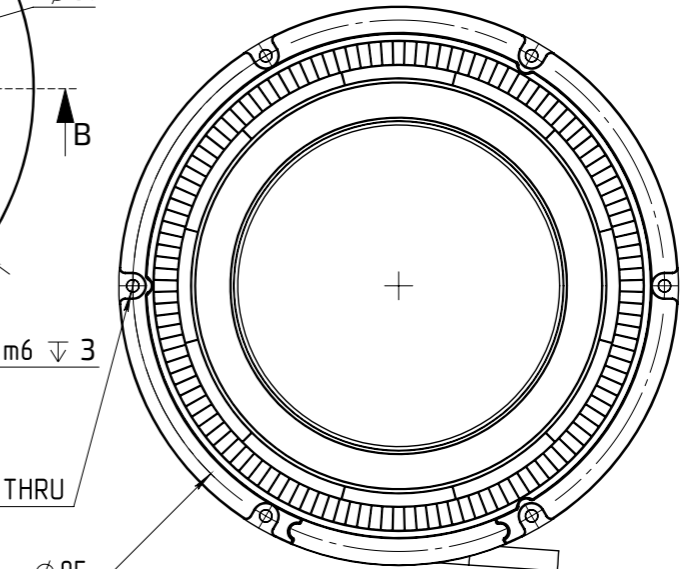
Stator Top View (w/o rotor)

86°

Left (counterclockwise)
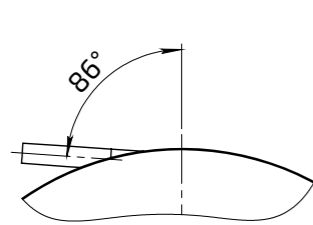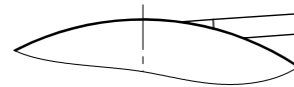
Three options for cable direction
(Top View)

Straight

Right (clockwise)

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

Netzer
Precision Position Sensors

ABSOLUTE POSITION
ROTARY ELECTRIC ENCODER™

**HARSH
ENVIRONMENT** | DF-100

DATA SHEET

SECTION C-C

⊥ 0.05 B   ⊥ 0.05 B

2.50 min.

0.60 ±0.10

$\varnothing 57 \; {}^{-0.05}_{-0.10}$

↗ 0.05 B
◎ 0.05 B

$\varnothing 80$ min.

$\varnothing 87 \; {}^{+0.05}_{0}$

B

C — C

Rotor Type 1 (End Shaft)

Two dowel pins and
six countersink M2
holes, see sheet 1 for
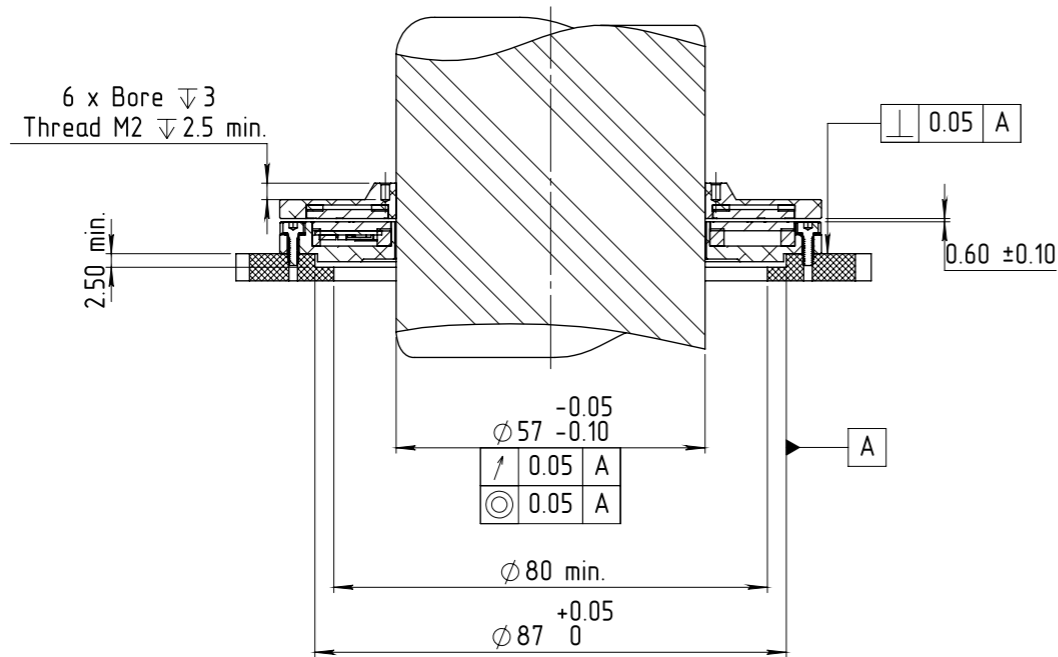details

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

DF-100-V02

SECTION D-D

6 x Bore ⤓ 3
Thread M2 ⤓ 2.5 min.

| ⊥ | 0.05 | A |

2.50 min.

0.60 ±0.10

$\varnothing 57 \begin{smallmatrix} -0.05 \\ -0.10 \end{smallmatrix}$

| ↗ | 0.05 | A |
| ◎ | 0.05 | A |

A

$\varnothing 80$ min.

$\varnothing 87 \begin{smallmatrix} +0.05 \\ 0 \end{smallmatrix}$

D   D

Dowel pins hole and
six M2 threads, see
sheet 1 for details.
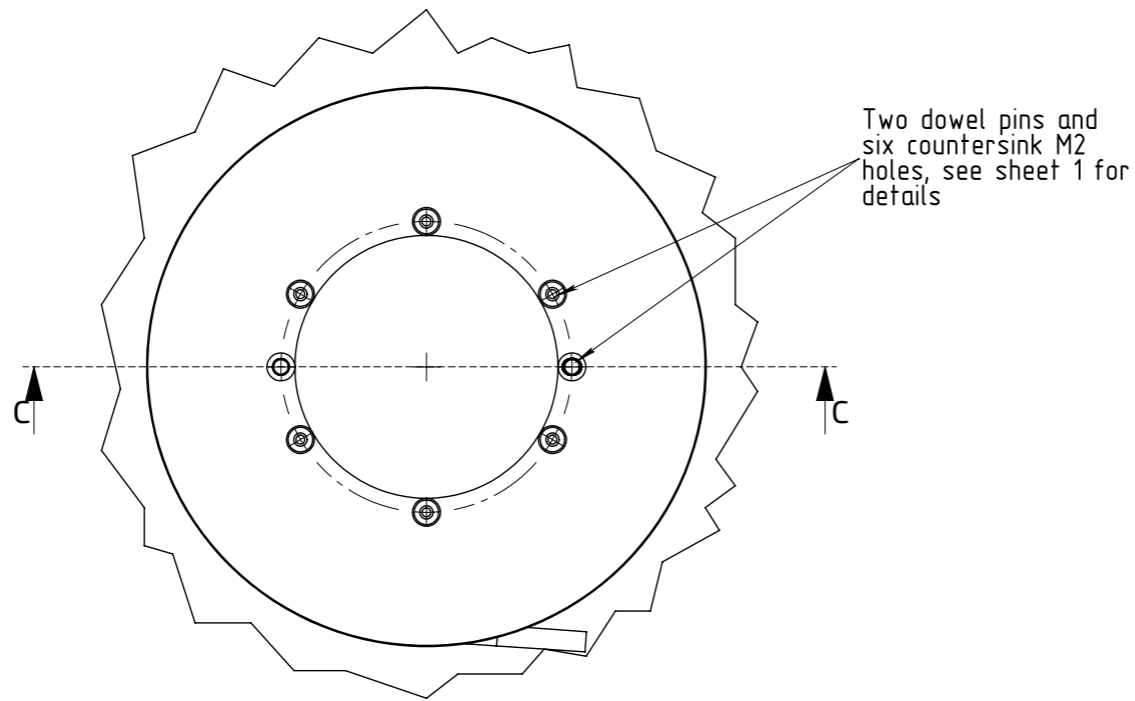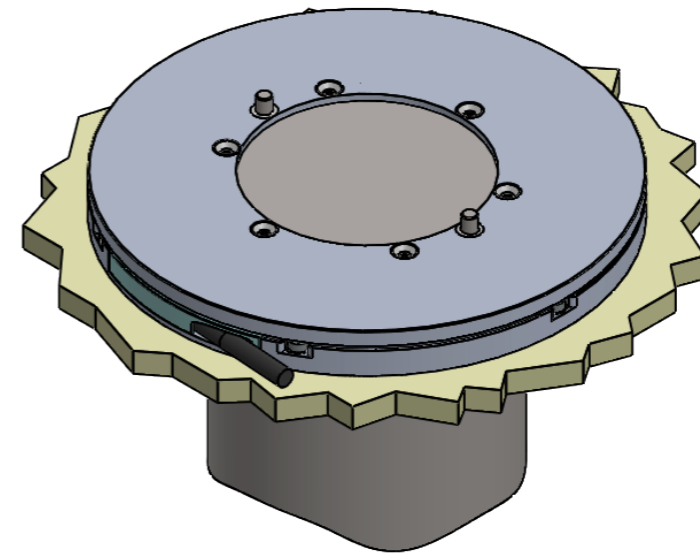
Rotor Type 3 (Mid Shaft)

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

DF-100-V02