

The DL-25 is a member of the DL series of Electric Encoders™, based on Netzer precision proprietary technology. The Electric Encoder™ offers many advantages - some unparalleled

- High resolution and precision
- High tolerance to temperature extremes shock, moisture, EMI, RFI and Magnetic fields
- Holistic signal generation
- Digital interfaces
- IP65



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 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             | 17-21 bit                     |
| Maximum tested static error    | ±0.030°                       |
| Extended accuracy static error | ±0.020°                       |
| Maximum operational speed      | 1,500 rpm                     |
| Measurement                    | Single turn absolute position |
| Rotation direction*            | Adjustable CW/CCW             |
| Build In Test BIT              | Optional                      |

\* Default same direction from bottom side of the encoder

### Mechanical

|                                  |                                    |
|----------------------------------|------------------------------------|
| Starting torque                  | 30 x 10 <sup>-4</sup> N.m          |
| Shaft radial force (max)         | 100 N                              |
| Total weight                     | 30 gr (with standard 250 mm cable) |
| Outer diameter / Profile / Shaft | 25 / 24.3 / 4 mm                   |
| Material (case, shaft)           | Aluminum / Stainless steel         |

### Electrical

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

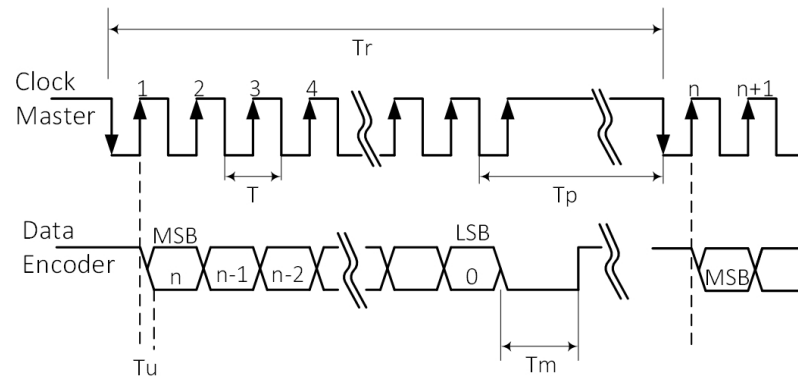
### Environmental

|                             |                            |
|-----------------------------|----------------------------|
| EMC                         | IEC 6100-6-2, IEC 6100-6-4 |
| Operating temperature range | -40°C to +85°C             |
| Storage temperature         | -50°C to +100°C            |
| Shock endurance             | 100 g for 11 ms            |
| Vibration endurance         | 20 g 10 – 2000 Hz          |
| Protection                  | IP 65                      |

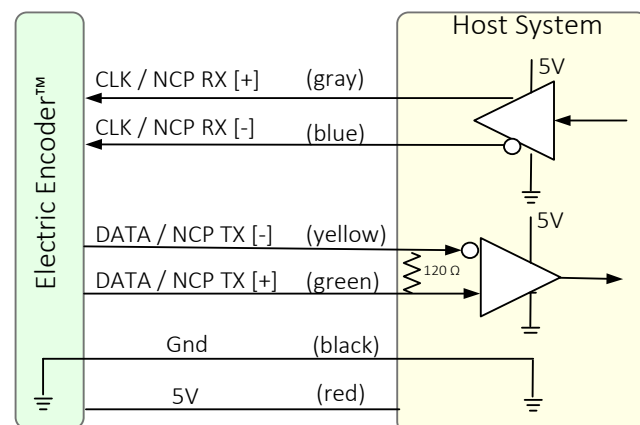


## Digital SSI Interface

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 - $\infty$ $\mu$ sec       |
| Tm          | Monoflop time                    | >25 $\mu$ sec                 |
| Tr          | Time between 2 adjacent requests | $Tr > n \cdot T + 26 \mu$ sec |
| $fr = 1/Tr$ | Data request frequency           |                               |



## SSI / BiSS Output signal parameters

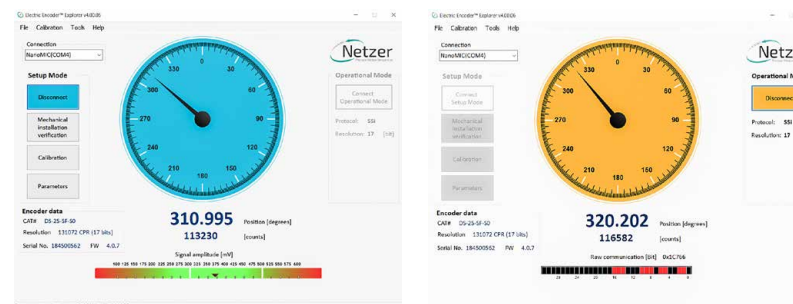
|                            |                     |
|----------------------------|---------------------|
| Output code                | Binary              |
| Serial output              | Differential RS-422 |
| Clock                      | Differential RS-422 |
| Clock frequency            | 0.1 ÷ 5.0 MHz       |
| Position update rate (Max) | 35 kHz              |

## SSI / BiSS interface wires color code

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

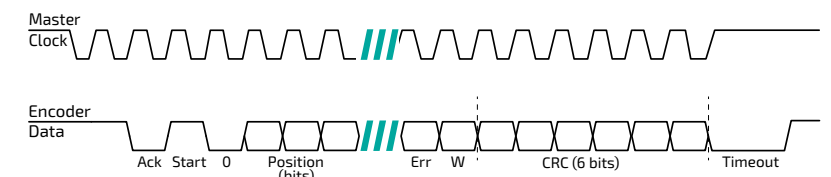
## Software tools: (SSI / BiSS - C)

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      | 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 $\mu$ s |

## Ordering Code

DL - XXX - S G - S O - n n n

DL Product Line

Outer Diameter

25, 27, 66

Output

|   |      |
|---|------|
| S | SSi  |
| I | BISS |

Resolution

| Code | bit | CPR       |
|------|-----|-----------|
| F    | 17  | 131,072   |
| G    | 18  | 262,144   |
| H    | 19  | 524,288   |
| I    | 20  | 1,048,578 |
| J    | 21* | 2,097,152 |
| K    | 22* | 4,194,304 |

DL-25, 27 17-21 bit

DL-66 18-22 bit

\* SSi only

BIT (Built In Test): Optional

|     |      |
|-----|------|
| [ ] | None |
| B   | BIT  |

|     |                   |
|-----|-------------------|
| EA  | Extended Accuracy |
| nnn | Custom            |

Cable Length

|   |                              |
|---|------------------------------|
| 0 | 250 mm Flying leads - 30AWG  |
| 1 | 500 mm Flying leads - 30AWG  |
| 2 | 750 mm Flying leads - 30AWG  |
| 3 | 1000 mm Flying leads - 30AWG |
| 4 | 250 mm Flying leads - 28AWG  |
| 5 | 500 mm Flying leads - 28AWG  |
| 6 | 750 mm Flying leads - 28AWG  |
| 7 | 1000 mm Flying leads - 28AWG |

To add a connector contact us

Cable Options

|   |                           |
|---|---------------------------|
| S | Jacket and shielded cable |
| C | Connector (D38999)        |

## Cable Information

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 |

