# NTO3

Data sheet Version 1.1.2
Original: de

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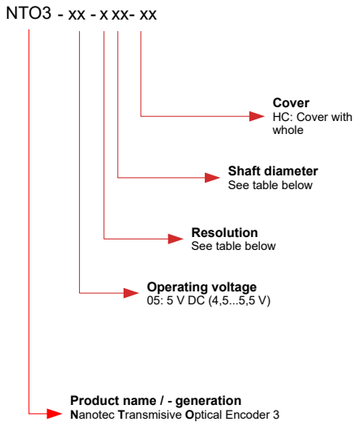
## Introduction

The *NTO3* is an optical rotary encoder for detecting the rotor position of motors. The attachment to a motor is performed by Nanotec.

This data sheet contains the technical data of the encoder and describes its function. You can find information on the combination possibilities with Nanotec motors and other mechanical drawings at **us.nanotec.com**.

### Variants and article numbers

The following figure shows the article number key for the variants of the *NTO3*:




| Letter | Resolution |
|---|---|
| C | 2000 (8000 [PPR] with quadrature) |
| K | 4000 (16000 [PPR] with quadrature) |
| Z | 5000 (20000 [PPR] with quadrature) |

| Number | Shaft diameter of the motor |
|---|---|
| 06 | 6.35 mm |
| 13 | 8 mm |
| 14 | 5 mm |

### Version information

| Data sheet version | Date | Changes | Hardware version |
|---|---|---|---|
| 1.0.0 | 10/2019 | Edition | W001 |
| 1.1.0 | 10/2020 | **Pin assignment** corrected (Pins 3 and 4 reversed) | W001 |
| 1.1.1 / 1.1.2. | 03/2021 / 09/2025 | Part number for the contacts of the mating connector corrected (2x) | W001 |

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### Intended use

The *NTO3* is used as a component of drive systems in a range of industrial applications.

Use the product as intended within the limits defined in the technical data (see **Electrical properties and technical data**) and the approved **Ambient conditions**.

Under no circumstances may this Nanotec product be integrated as a safety component in a product or system. All products containing a component manufactured by Nanotec must, upon delivery to the end user, be provided with corresponding warning notices and instructions for safe use and safe operation. All warning notices provided by Nanotec must be passed on directly to the end user.

### Warranty and disclaimer

Nanotec is not liable for damage and malfunction from installation errors, failure to observe this document, or improper repair. Responsible for the selection, operation, use of our products is the plant engineer, operator and user. Nanotec accepts no liability for product integration in the end system. The general terms and conditions at www.nanotec.com apply (customers of Nanotec Electronic USA please see **us.nanotec.com**). **Note:** Product modification / alteration is illicit.

### Target group and qualification

The product and this documentation are directed towards technically trained specialists staff such as: development engineers, plant engineers, installers/ service personnel, and application engineers.

Only specialists may install and commission the product. Specialist staff are persons who have appropriate training and experience in work with motors and their control, are familiar with and understand the content of this technical manual and know the applicable regulations.

### EU directives for product safety

The following EU directives were observed:

- RoHS directive (2011/65/EU, 2015/863/EU)

### Used icons

All notices are in the same format. The degree of the hazard is divided into the following classes.

**CAUTION!**

**The CAUTION notice indicates a possibly dangerous situation.**

Failure to observe the notice **may** result in moderately severe injuries.

► Describes how you can avoid the dangerous situation.

**NOTICE**

**Indicates a possible incorrect operation of the product.**

Failure to observe the notice may result in damage to this or other products.

► Describes how you can avoid the incorrect operation.

**TIP**

Shows a tip for the application or task.

## Safety and warning notices

**NOTICE**

**Damage to the electronics through improper handling of ESD-sensitive components!**

The device contains components that are sensitive to electrostatic discharge. Improper handling can damage the device.

► Observe the basic principles of ESD protection when handling the device.

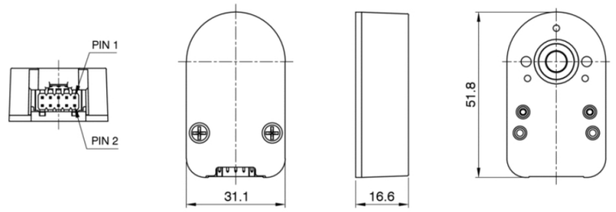
## Technical details and pin assignment

### Ambient conditions

| Ambient condition | Value |
|---|---|
| Vibration (5 Hz- 2 KHz) | 20 G |
| ESD, IEC61000-4-2 | ±4 kV |

### Dimensioned drawings

All dimensions are in millimeters.



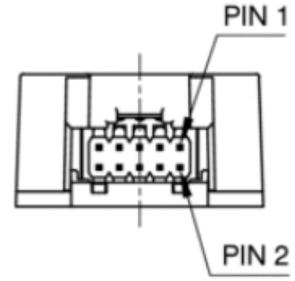

### Electrical properties and technical data

| Property | Description / value |
|---|---|
| Operating voltage | 4.5 … 5.5 V DC |
| Typical current consumption (without load) | NTO3-05-Zxx-xx: 73 mA |
| Max. Current consumption (without load) | NTO3-05-Ixx-xx: 88 mA |
| Resolution | • NTO3-05-cxx-xx: 8000 positions per mechanical revolution with quadrature (2000 [CPR] without quadrature)<br>• NTO3-05-Kxx-xx: 16000 positions per mechanical revolution with quadrature (4000 [CPR] without quadrature)<br>• NTO3-05-Zxx-xx: 20000 positions per mechanical revolution with quadrature (5000 [CPR] without quadrature) |
| Maximum mechanical speed | • NTO3-05-Cxx-xx:: 10800 revolutions/minute<br>• NTO3-05-Kxx-xx:: 10800 revolutions/minute<br>• NTO3-05-Zxx-xx: 8640 revolutions/minute |

### Pin assignment

- Type: CON-FC10
- Mating connector (not included in scope of delivery):
  - Housing: Molex 15-04-5104 (or equivalent)
  - Contacts: Molex 14-60-0058 (or equivalent)
- Suitable Nanotec cable:
  - ZK-NTO3-10-1000-PADP
  - ZK-NTO3-10-1000-S
  - ZK-NTO3-10-500-PADP
  - ZK-NTO3-10-500-S

In the following figure, pin 1 is marked.




### Incremental encoder

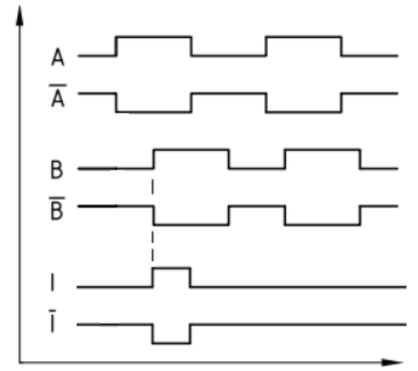
| Pin | Function | Note |
|---|---|---|
| 1 | n.c. | |
| 2 | GND | |
| 3 | I\ | |
| 4 | I | |
| 5 | A\ | |
| 6 | A | |
| 7 | Vcc(+5V) | |
| 8 | NC | |
| 9 | B\ | |
| 10 | B | |

The following signal levels apply for differential encoder signals A, A\, B, B\, I, I\:

| High level (load = 20 mA) | Low level (load = 20 mA) |
|---|---|
| ≥ 2.4 V | ≥ 0.4 V |

The rise time and output fall time are 15 ns.

### Output signals

#### Incremental output signals

Counterclockwise when viewing the drive shaft of the motor, the signal of channel A leads channel B by 90° (electrical, typical value).