Technical Data Sheet

NMM1

For use with the following devices:

NMM1-SSI-V11-05-C

Technical Data Sheet Version: 1.1.0

Contents

1 This document and its conventions..... 3

2 Your product..... 4

2.1 Intended use and audience..... 4
2.2 Warranty, disclaimer..... 4
2.3 EU directives for product safety..... 4

3 Safety notes..... 5

3.1 Risk levels..... 5
3.2 Specific safety notes..... 5

4 Technical data and pin assignment..... 6

4.1 Ambient conditions..... 6
4.2 Dimensions..... 6
4.3 Communication interface and data format..... 6
4.4 Electrical data..... 7
4.5 Sensor..... 7
4.6 Pin assignment..... 7

5 Imprint, marking, versions..... 8

1 This document and its conventions

In addition to technical data, this document describes the function of the product. For possible combinations with other Nanotec products, please inquire with your Nanotec sales partner.

Before you use the product, please note the font styles and typefaces that encode this document.

Underlined text indicates cross references and hyperlinks.

- Example 1: Only use the product in accordance with its technical data and pin assignment.
- Example 2: Only use the product in valid ambient conditions.

Italic text means: This is a *named object*, a *menu path / item,* a *tab / file name* or (if necessary) an expression in a *foreign language*.

- Example 1: Select *File* > *New* > *Blank Document*
- Example 2: Open the *Tool* tab and select *Comment*
- Example 3: In principle, this document distinguishes between:
  - User (= *Nutzer; usuario; utente* [pt.]; *utilisateur; utente* [it.] etc.)
  - Third-party user (= *Drittnutzer; tercero usuario; terceiro utente; tiers utilisateur; terzo utente* etc.)
  - End user (= *Endnutzer; usuario final; utente final; utilisateur final; utente finale* etc.)

`Courier` marks `blocks of code` or `programming commands`.

- Example 1: Using Bash, call `sudo make install` to copy shared objects; then call `ldconfig`
- Example 2: Use the following NanoLibAccessor function to change the logging level in NanoLib:

```
//
        ***** C++ variant *****
 void setLoggingLevel(LogLevel level);
```

Bold text emphasizes individual words of **critical** importance. Alternatively, bracketed exclamation marks emphasize the critical(!) importance.

- Example 1: Protect yourself, others and your equipment. Follow our **general** safety notes that are generally applicable to **all** Nanotec products.
- Example 2: For due protection, also follow our **specific** safety notes that apply to **this** specific product.

2 Your product

The *NMM1* magnetic, multi-turn absolute encoder with SSI interface records and stores the absolute rotor position of your motor. Nanotec installs, configures and calibrates the encoder on the motor.

Note: To store the absolute position of the rotor, the encoder powers the internal memory even while switched off by means of energy harvesting. When switched back on, it again finds the stored rotor position without problem.

Product highlights

- Electrical single-turn resolution: 17 bit
- Diameter: 36 mm
- Battery-free, maintenance-free
- Multi-turn range: 16 bit
- Energy harvesting: via Wiegand effect

2.1 Intended use and audience

The *NMM1* encoder 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 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 messages and instructions for safe use and safe operation. All warning messages provided by Nanotec are to be immediately passed on to end users.

Audience and qualification

The product and this document exclusively address to technically trained experts such as:

- Development engineers
- Application engineers
- Plant engineers
- Installers/service personnel

Only experts may install and commission the product. Absolutely required are:

- Training and experience in working with motors, their control and electrostatically endangered components
- Reading and understanding of this and of all applicable documents
- Knowledge of all valid regulations

2.2 Warranty, disclaimer

Nanotec assumes no liability for damages and malfunctions resulting from installation errors, failure to observe this document or improper repairs. The selection and use of Nanotec products is the responsibility of the plant engineer or end user. Nanotec accepts no responsibility for the integration of the product in the end system.

Our general terms and conditions at www.nanotec.com apply. **Note:** Changes or modifications to the product are not permitted.

2.3 EU directives for product safety

The following EU directives were observed:

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

3 Safety notes

For proper use of the product, please make certain that all users and end users completely read, understand and observe this document.

3.1 Risk levels

Please note that all warning messages, alarm symbols and signal words in this document indicate various risk levels.

NOTICE

A NOTICE warns of wrong operation.

Material or ecological damage possible (not strictly injury).

► Instruction against **destructive** user **errors** (= mere material risks).

Note: Explains or simplifies a process by additional information.

3.2 Specific safety notes

Protect yourself, others and your equipment. Follow our **specific** warning messages that apply to **this** specific product.

NOTICE

Electronic damage from electrostatic discharge! ESD-sensitive components!

► Follow the basic principles on ESD protection!

4 Technical data and pin assignment

Protect yourself, others and your equipment. Use the product only within its technical safety limits.

4.1 Ambient conditions

Use your product only in permissible environments.

Protection class according to EN/IEC 60529	IP30
Ambient temperature (operation)	-40 to +105 °C (-40 to +221°F)
Impact resistance	≤ 200 g (semi-sinusoidal 6 ms, EN 60068-2-27)
Permanent impact resistance	≤ 20 g (semi-sinusoidal 16 ms, EN 60068-2-27)
Vibration resistance	≤ 30 g (10 to 1000 Hz, EN 60068-2-6)

4.2 Dimensions

Simplify product installation with properly dimensioned drawing.

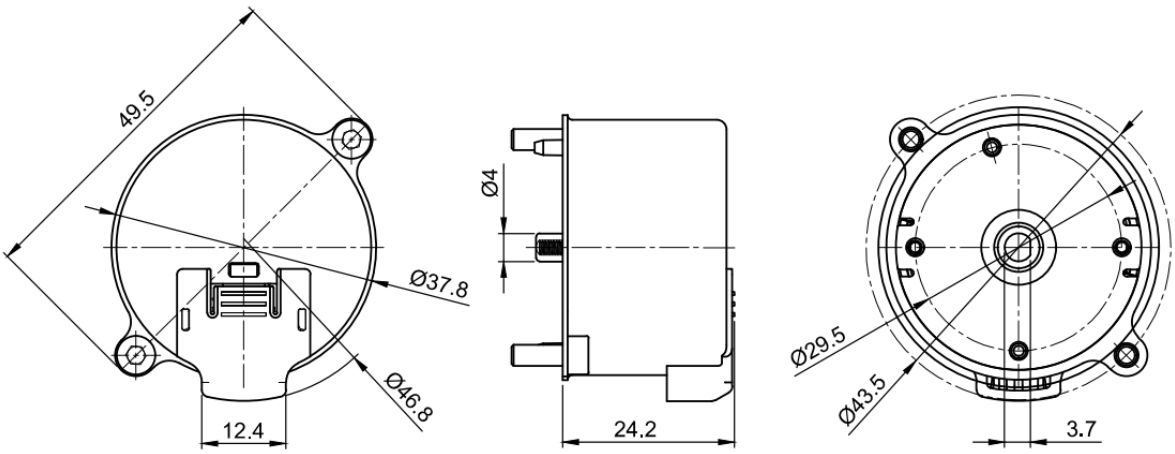


Fig. 1: All dimensions in millimeters.

4.3 Communication interface and data format

The Synchronous Serial Interface (SSI) transfers a total of 33 bits of position values (17 + 16) with each data packet.

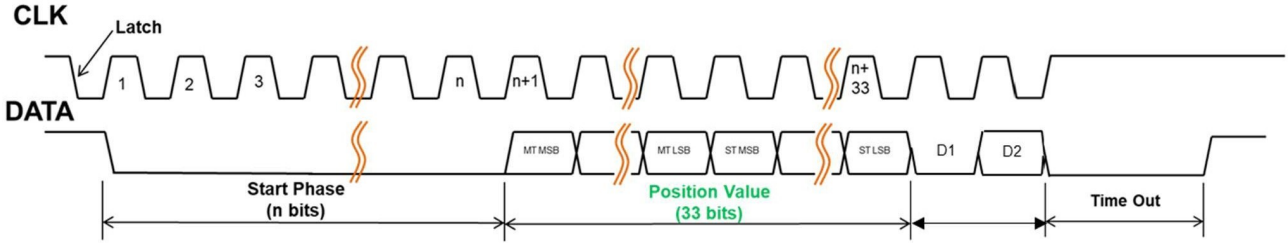


Fig. 2: Data transfer via SSI.

SSI interface

- Cycle time: 50 µs
- Timeout: typ. 6.7 µs

SSI data format

- Start phase (16 start bits = *0*) + multi-turn (16 bits) + single turn (17 bits) + D1 + D2
- D1: Constant value = *0*
- D2: Error-bit for the display of the sensor-internal status:
  - Value = *1*: no error
  - Value = *0*: error

4.4 Electrical data

Protection against both polarity-reversal and short-circuit makes the NMM1 especially safe.

Electrical connection	JST BM08B-GHS-TBT (axial)
Polarity-reversal/short-circuit protection	Yes/Yes
Energy harvesting	Wiegand effect
Operating voltage	4.75 to 15 VDC
Consumption	≤ 0.3 W
Start-up time	≤ 100 ms
Clock input	RS 422
Clock frequency	300 kHz to 2.6 MHz
Maximum speed	12,000 rpm

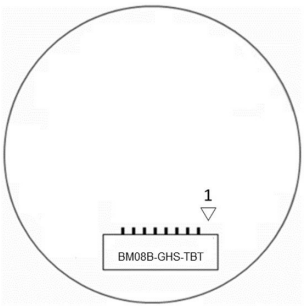
4.5 Sensor

The resolution is 17 bit (single turn) or 16 bit (multi-turn).

Single turn	Magnetic
Resolution *single turn*	17 bit = 2^{17}
Multi-turn technology	Independent magnetic pulse counter (battery-free/ gearless)
Measurement range *multi-turn*	16 bit = 2^{16} revolutions
Accuracy	±0.0878° (≤ 12 bit) measured after calibrating at room temperature
Count direction	Axis rotation clockwise (axis viewed from front)
Maximum speed	12,000 rpm

4.6 Pin assignment

The following pins have a function.



BM08B-GHS-TBT (Pin: signal)

- **1:** GND
- **2:** -/-
- **3:** -/-
- **4:** Data +
- **5:** Data -
- **6:** CLOCK -
- **7:** CLOCK +
- **8:** VCC

5 Imprint, marking, versions

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Versions

Document version	Date	Changes	Hardware release
1.0.0	03/2021	Edition	W001
1.1.0	11/2021	Changed Dimensions	W001