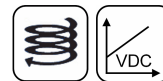


## Preliminary Data sheet

### NOVOTURN Multi-turn Sensor Non-contacting

#### MC1-2800 Ratiometric Industrial



#### Special Features

- Non-contacting, magnetic
- Long life
- Measuring range 15840° (44 turns)
- True-Power-On system: counts turns even when not powered. Patented non-volatile technology does not require gears or batteries
- Available with push-on coupling or marked shaft
- Easy mounting
- Protection class IP54 up to IP67
- Resolution 16 bits per revolution
- Other configurations see separate data sheets

#### Applications

- Mechanical engineering
- Mobile machinery
- Driveline or steering systems
- Wire-actuated encoders
- Gate drives
- Motor sports

Multi-turn sensors that use the GMR technology (giant magneto resistance), provide absolute position values, do not require any reference signals and need no power supply or buffer battery for detecting the revolutions. The fact that rotations are detected even unpowered and the sensor does not lose its position information during a power failure, makes the MC1-2800 with its diameter of only 30 mm an extremely compact real True-Power-On rotary sensor.

The sensor operates magnetically and thus contactless allowing an extremely long life.

The sensor is able to detect angular positions over up to 44 revolutions with a high resolution up to 16 bits per revolution.

#### Description

Material	Housing: high grade, temperature resistant plastic PPS-GF Shaft: stainless steel, X8CrNiS18-9 1.4305
Mounting	With 2 screws M4 and washers
Fastening torque of mounting	140 ± 40 Ncm
Bearing	Sintered bronze bushing
Electrical connection	Cable 4x 0.5 mm <sup>2</sup> (AWG 20), TPE, shielded / Connector M12x1, A-coded with cable L = 0.15 m

#### Mechanical Data

Dimensions	See dimension drawing
Mechanical travel	continuous
Permitted shaft load static or dynamic	20 N (axial / radial)
Torque	Typ. ≤ 3 Ncm Depending on the environmental temperature and standstill time, the necessary force for the initial operating of the shaft may increase
Weight	approx. 50 g

## Ordering Specifications

### Ordering Specifications

**Preferred types printed in bold**

- Delivery time up to 25 pcs. within 10 working days EXW
- Best low-volume pricing

**Supply voltage Ub**

2: Ub = 5 VDC

**Interface parameters**

- 1: 5 ... 95% ratiometric to supply voltage Ub (0.25 ... 4.75 VDC)  
2: 10 ... 90% ratiometric to supply voltage Ub (0.5 ... 4.5 VDC)

**Output characteristic**

- 1: Rising output characteristic cw  
2: Rising output characteristic ccw  
Other output characteristics on request

**Electrical connection**

- 202: Cable, 4-pole, shielded, L = 1 m  
206: Cable, 4-pole, shielded, L = 3 m  
210: Cable, 4-pole, shielded, L = 5 m  
501: Connector M12x1, 4-pin, with cable, shielded, L = 0.15 m  
Cable versions and assembled connectors on request

**M C 1 - 2 8 3 2 - 0 1 0 - 2 1 1 - 2 0 2**

Series

**Number of turns for output characteristic**

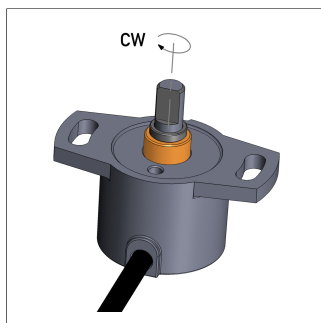
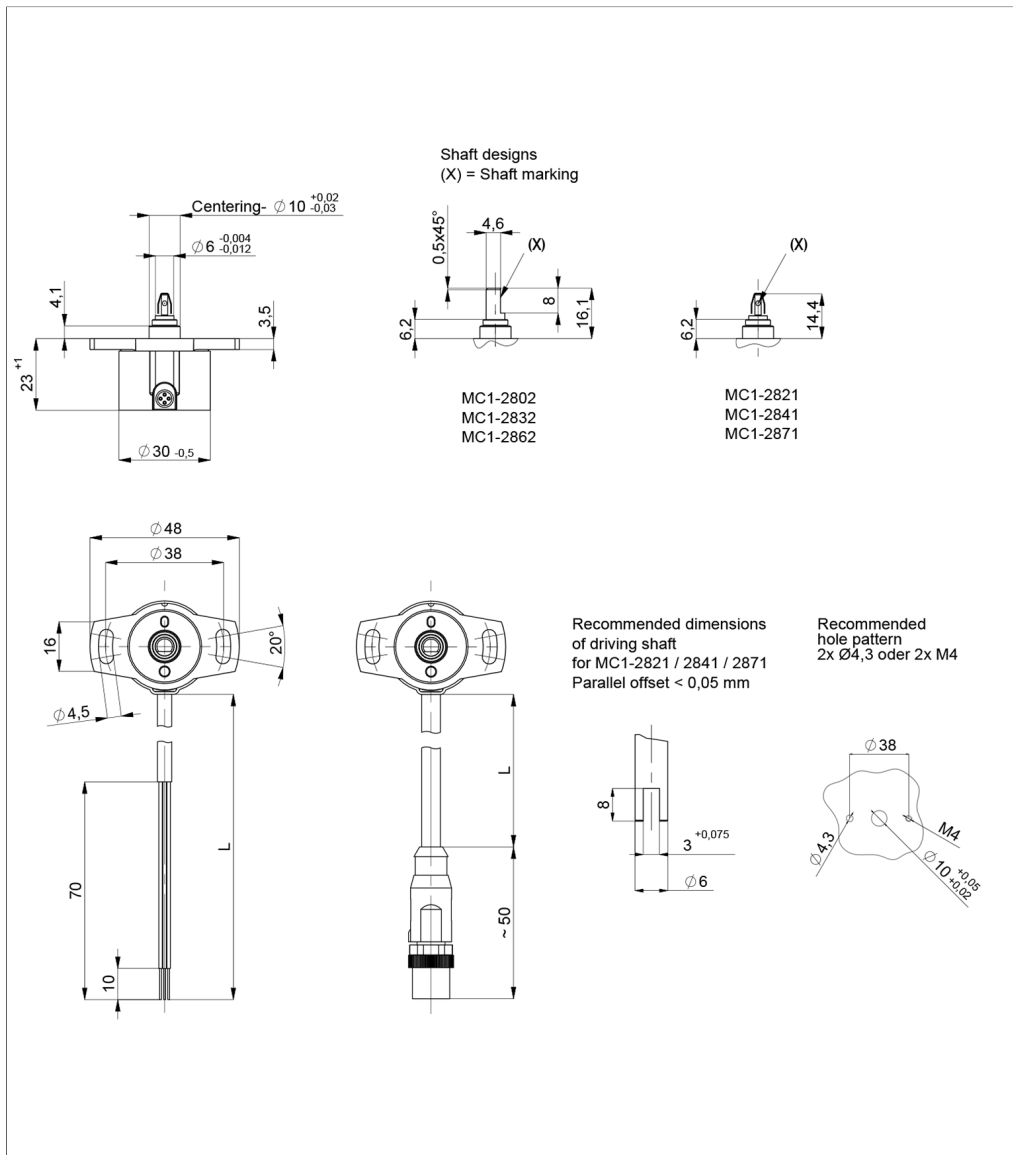
001 ... 044: 1 up to 44 turns  
Increment 1 turn, X turns correspond to a measuring angle of  $X \cdot 360^\circ$   
**001, 003, 006, 010, 016, 025, 044: 1, 3, 6, 10, 16, 25, 44 turns**  
Other measuring angles on request

**Mechanical version**

2802: 6 mm shaft with flattening, IP54  
**2832: 6 mm shaft with flattening, IP65**  
2862: 6 mm shaft with flattening, IP67  
2821: push-on coupling, IP54  
**2841: push-on coupling, IP65**  
2871: push-on coupling, IP67  
Other shaft configurations on request

**Drawing**

CAD data see  
[www.novotechnik.de/en/download/cad-data/](http://www.novotechnik.de/en/download/cad-data/)



When the marking of the shaft is pointing towards the electrical outlet, the sensor output is located on an integer turn position.

## Technical Data

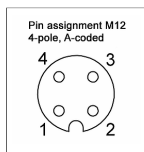
Type	MC1-____-2-____ Ratiometric
Output signal	ratiometric to supply voltage $U_b$ 5 ... 95% (0.25 ... 4.75 V) 10 ... 90% (0.5 ... 4.5 V)
Load	$\geq 10 \text{ k}\Omega$
Diagnosis	activated (in case of error, output signal is outside of the plausible signal range)
Update rate	tbd
Measuring range	0 ... 360° up to 0 ... 15840° in 360°-steps (1 to 44 turns)
Independent linearity *	1 turn: tbd 3 turns: typ. $\leq \pm 0.167 \text{ %FS}$ , max. $\leq \pm 0.267 \text{ %FS}$ 6 turns: typ. $\leq \pm 0.083 \text{ %FS}$ , max. $\leq \pm 0.183 \text{ %FS}$ 10 turns: typ. $\leq \pm 0.05 \text{ %FS}$ , max. $\leq \pm 0.15 \text{ %FS}$ 16 turns: typ. $\leq \pm 0.031 \text{ %FS}$ , max. $\leq \pm 0.131 \text{ %FS}$ 44 turns: tbd
Resolution	16 bits over the entire measuring range
Repeatability *	$\leq \pm 0.1^\circ$
Hysteresis *	$\leq \pm 0.5^\circ$
Temperature error	$\pm 0.15 \text{ %FS}$
Supply voltage $U_b$	5 VDC (4.5 ... 5.5 VDC)
Current consumption w/o load	$\leq 50 \text{ mA}$
Overvoltage protection	24 VDC (60 min.)
Polarity protection	yes (supply lines)
Short circuit protection	yes (output vs. GND and supply voltage)
Insulation resistance (500 VDC)	$\geq 10 \text{ M}\Omega$ *) For the MC1-2821/2841/2871 models with push-on coupling, the values can change mechanically caused (up to a factor of 2) if the recommended dimensions of driving shaft is not adhered to or if installed excentric or after numerous plug-in cycles.
<b>Environmental Data</b>	
Max. operational speed	800 rpm
Vibration IEC 60068-2-6	20 g, 5 ... 2000 Hz, $A_{max} = 0.75 \text{ mm}$
Shock IEC 60068-2-27	50 g, 6 ms
Protection class DIN EN 60529	IP54 / IP65 / IP67
Operating temperature	-40 ... +85°C -25 ... +85°C (connector M12)
Insensitivity to magnetic DC fields	$< 15 \text{ mT}$
Life	$> 50 \text{ Mio. movements (mechanically)}$
Functional safety	If you need assistance in using our products in safety-related systems, please contact us
MTTF (IEC 60050)	$> 20 \text{ years}$
Traceability	Serial number on type labeling: production batch of the sensor assembly and relevant sensor components
Conformity/Approval	CE, UKCA see <a href="https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu/uk">https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu/uk</a> WEEE see <a href="https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/">https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/</a>
<b>EMC Compatibility</b>	
EN 61000-4-2 ESD (contact/air discharge)	4 kV, 8 kV
EN 61000-4-3 Electromagnetic fields (RFI)	10 V/m
EN 61000-4-4 Fast transients (burst)	1 kV
EN 61000-4-6 Cond. disturbances (HF fields)	10 V eff.
EN 55016-2-3 Radiated disturbances	Industrial and residential area

### Important:

While operation, care should be taken not to rotate the sensor shaft below 0° or above 15840°. Refer to users manual.  
FS = Full scale: Signal span according to electrical measuring range

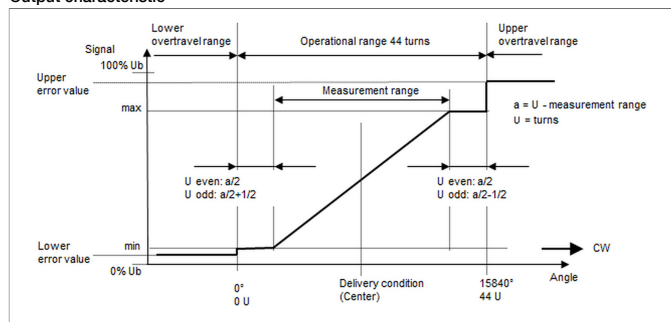
**Connection Assignment**

Signal	Cable code 2_ _	Connector code 5_ _
Supply voltage Ub	GN	Pin 1
GND	BN	Pin 3
Signal output	WH	Pin 2
Do not connect	YE	Pin 4
Connect cable shielding to protection earth		

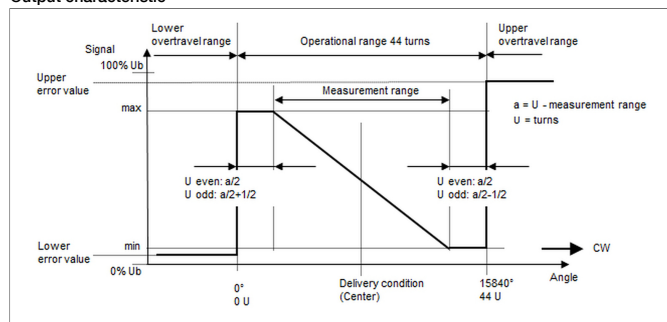


## Technical Data Output Characteristics

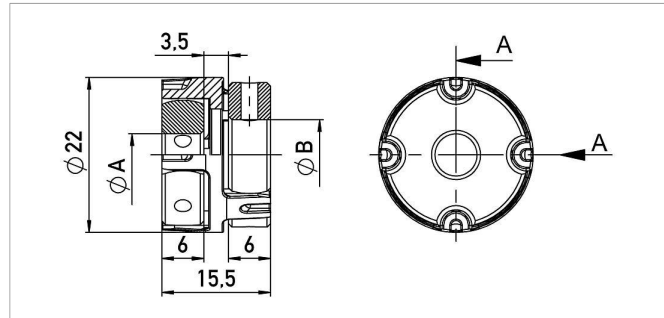
Output characteristic



Output characteristic



## Sensor Mounting



### Z-106-G\_

Backlash-free, double cardanic shaft coupling for Ø6 mm to Ø6 mm, Ø6.35 mm or Ø10 mm, mounting via 2 threaded pins with internal hexagon

Material Aluminium, PEEK

Operating temp. -40 ... +160°C

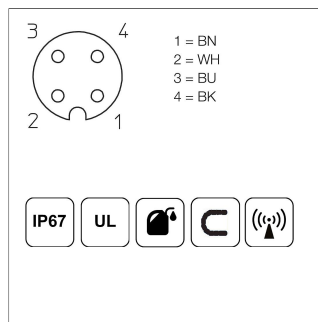
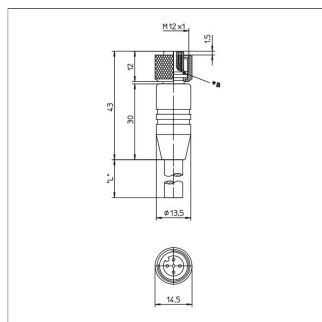
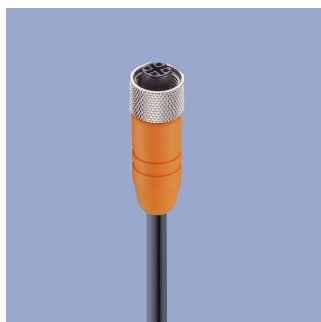
Transferable torque ≤ 1 Nm

torque

Displacement rad. ≤ 0.1 mm, angl. ≤ 0.45°

P/N	Type	ØA / ØB [mm]
400103910	Z-106-G-6	6 / 6
400103912	Z-106-G-6,35	6 / 6.35
400103913	Z-106-G-10	6 / 10

## Connector System M12



**EEM-33-32/62/97**  
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

Plug housing PA  
Cable sheath PUR, Ø = max. 6 mm, -25 ... +80°C (moved), -50 ... +80°C (fixed)

Lead wires PP, 0.34 mm<sup>2</sup>

P/N	Type	Length
400005600	EEM-33-32	2 m
400005609	EEM-33-62	5 m
400005650	EEM-33-97	10 m

**IP67** Protection class IP67 DIN EN 60529

**IP68** Protection class IP68 DIN EN 60529

Very good Electromagnetic Compatibility (EMC) and shield systems

Very good resistance to oils, coolants and lubricants

**C** Suited for applications in dragchains

**UL** UL - approved

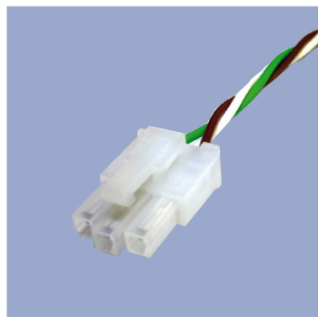
CAN-Bus



## Connecting Options on request



- M12 connector**
- Customized lengths
  - 3-, 4-, 6- and 8-pole versions
  - Protection class IP68
  - Ordering codes of standard versions see ordering specifications



- Molex Mini Fit jr.**
- Customized length and lead wires
  - 3-, 4- and 6-pole versions
  - On request



- Tyco AMP Super Seal**
- Pin- and bushing housing
  - Customized lengths
  - 3-, 4- and 6-pole versions
  - Protection class IP67
  - On request



- Molex Mini Fit jr.**
- Customized length and lead wires
  - 3-, 4- and 6-pole versions
  - On request



- Deutsch DTM 04**
- Pin- and bushing housing
  - Customized lengths
  - 3-, 4- and 6-pole versions
  - Protection class IP67
  - On request



- ITT Cannon Sure Seal connector**
- Customized lengths
  - 3-, 4- and 6-pole versions
  - Protection class IP67
  - On request

Novotechnik  
Messwertaufnehmer OHG  
P.O.Box 4220  
73745 Ostfildern (Germany)  
Horbstrasse 12  
73760 Ostfildern (Germany)  
Phone +49 711 4489-0  
Fax +49 711 4489-118  
info@novotechnik.de  
www.novotechnik.de



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