

**NOVOTURN**  
**Multi-turn Sensor**  
**Non-contacting**

**MC1-2800**

CANopen

**Mobile Applications**



**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 2x 2x 0.34 mm <sup>2</sup> (AWG 22), 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

#### Interface

6: CANopen

#### Interface parameters

1: 1x position, 1x speed

#### Baud rate

- 1: 1000 kBaud
- 2: 800 kBaud
- 3: 500 kBaud
- 4: 250 kBaud
- 5: 125 kBaud
- 7: 50 kBaud

#### Electrical connection

- 232: Cable, 4-pole, shielded, L = 1 m
  - 236: Cable, 4-pole, shielded, L = 3 m
  - 240: Cable, 4-pole, shielded, L = 5 m
  - 511: Connector M12x1, 5-pin, with cable, shielded, L = 0.15 m
- Cable versions and assembled connectors on request

**M C 1 - 2 8 3 2 - A 7 F - 6 1 4 - 2 3 2**

Series

#### Mechanical version

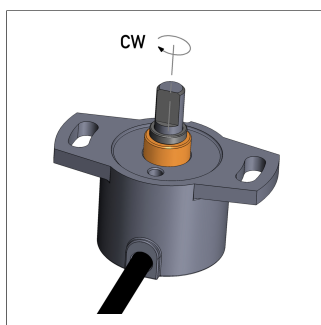
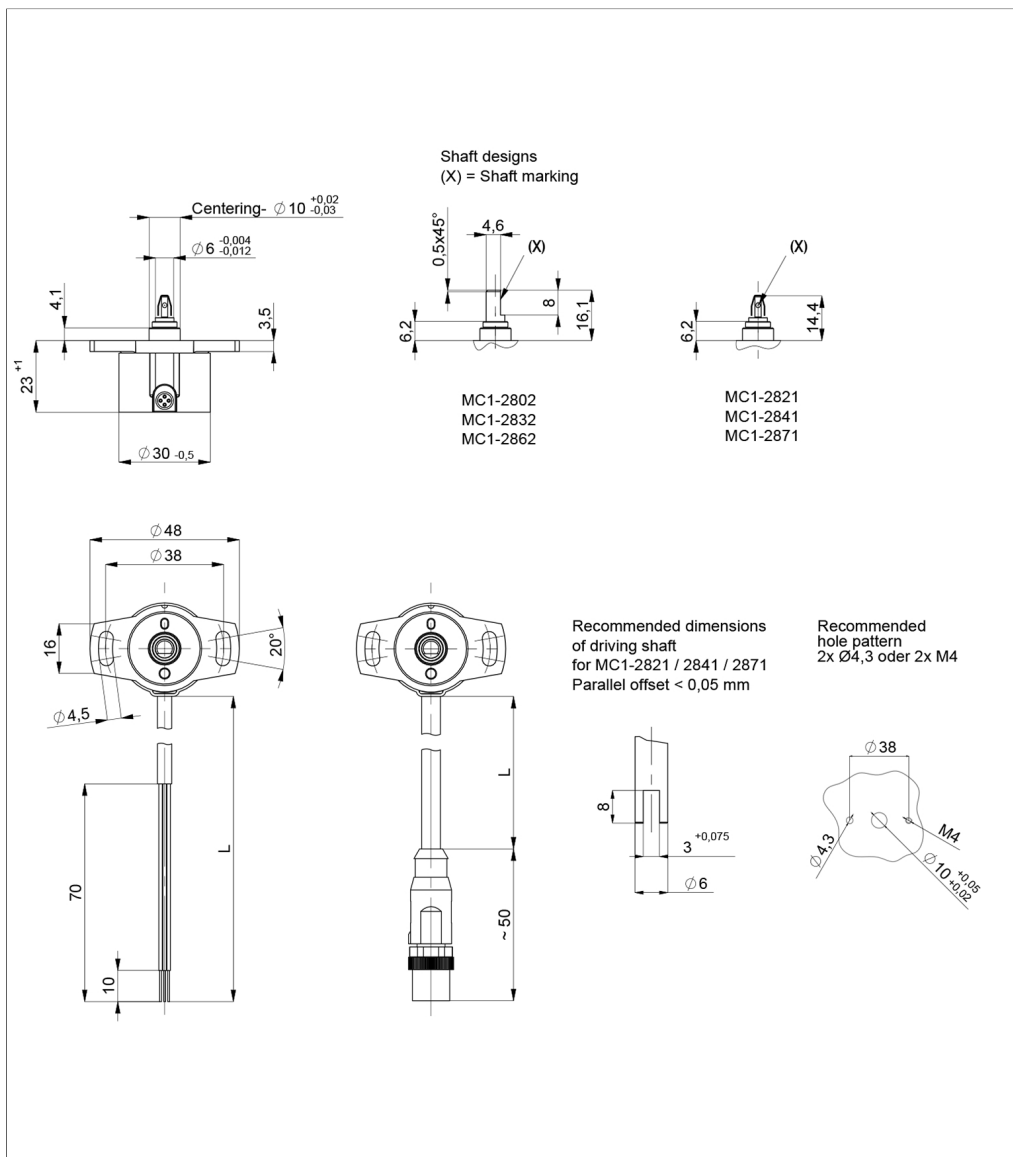
- 2802: 6 mm shaft with flattening, IP54
  - 2832: 6 mm shaft with flattening, IP65**
  - 2862: 6 mm shaft with flattening, IP67
  - 2821: push-on coupling, IP54
  - 2841: push-on coupling, IP65**
  - 2871: push-on coupling, IP67
- Other shaft configurations on request

#### Parameterization

- A7F: Start in Pre-Operational Mode, Event-Timer 0 ms, Node ID 127**
- Other parameterizations (e.g. Node ID) 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



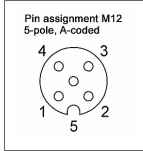
Type	MC1-28__-2__-6__-__-__ CANopen
Measured variables	Position, speed and temperature
Measuring range	44 turns = 15840°
Measuring range speed	0 ... 546 rpm
Number of channels	1
Protocol	CANopen protocol to CiA DS-301 V4.2.0, Device profile DS-406 V3.2.0 Encoder Class C2, LSS services to CiA DS-305 V3.0.0
Programmable parameters	Position, speed, temperature, cams, working areas, preset, rotation direction, node ID, baud rate, averaging, resolution position, resolution speed
Condition monitoring functions	Statistical data on temperature, operating time, supply voltage, running performance
Diagnosis	activated (in case of error, output signal is outside of the plausible signal range)
Node ID	1 ... 127 (default 127)
Transfer rate	50 ... 1000 kBAud
Update rate (internal)	1 kHz
Signal propagation delay	< 0.3 ms
Resolution position (across 360°)	16 bits
Resolution speed	0.1°/s
Absolute linearity *	≤ ±1°
Repeatability *	≤ ±0.1°
Hysteresis *	≤ ±0.5°
Temperature error	±0.36°
Supply voltage U <sub>b</sub>	12/24 VDC (8 ... 32 VDC)
Current consumption w/o load	≤ 70 mA
Overvoltage protection	45 VDC (permanent)
Polarity protection	yes (supply lines and outputs)
Short circuit protection	yes (all outputs vs. GND and supply voltage)
Insulation resistance (500 VDC)	≥ 10 MΩ
Bus termination internal	w/o (internal load resistance 120 Ω on request)
*) 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 <sub>max</sub> = 0.75 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 mT
Life	> 50 Mio. movements (mechanically)
Functional safety	If you need assistance in using our products in safety-related systems, please contact us
MTTF (IEC 60050)	tbd
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>	
ISO 13766-1 Construction machinery	
ISO 14982 Agricult./forestry machines	
Emission/Immunity E1	E1 compliant
EN 61000-4-2 ESD (contact/air discharge)	4 kV, 8 kV
EN 61000-4-3 Electromagnetic fields (RFI)	30 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:**

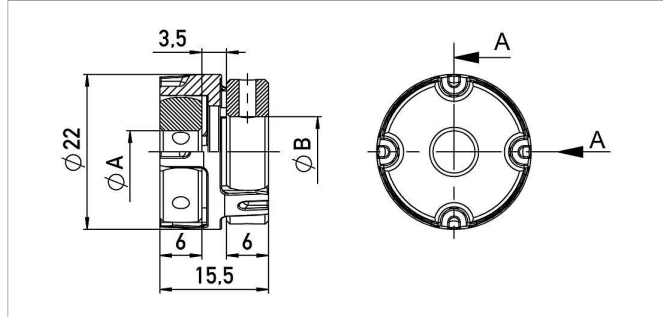
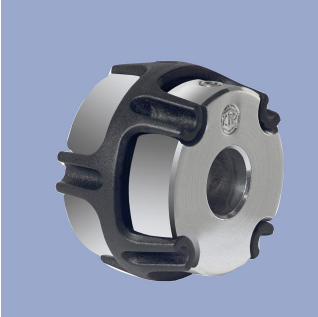
While operation, care should be taken not to rotate the sensor shaft below 0° or above 5760°. Refer to users manual.

**Connection Assignment**

Signal	Cable code 2_ _	Connector code 5_ _
Supply voltage Ub	WH	Pin 2
GND	BN	Pin 3
CAN_H	YE	Pin 4
CAN_L	GN	Pin 5
CAN_SHLD	Shield	Pin 1
Connect cable shielding to GND		



## Sensor Mounting



### Z-106-G\_

Backlash-free, double cardanic shaft coupling for  $\varnothing 6$  mm to  $\varnothing 6$  mm,  $\varnothing 6.35$  mm or  $\varnothing 10$  mm, mounting via 2 threaded pins with internal hexagon

Material Aluminium, PEEK

Operating temp.  $-40 \dots +160^\circ\text{C}$

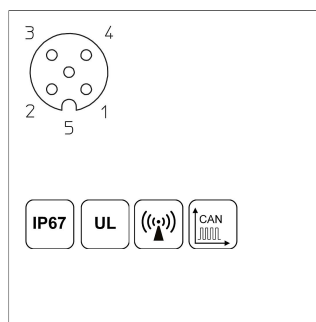
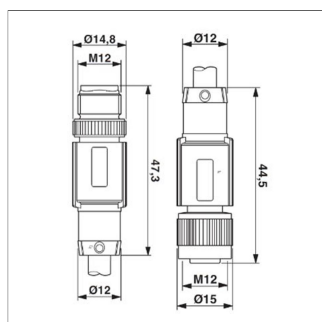
Transferable torque  $\leq 1$  Nm

torque

Displacement rad.  $\leq 0.1$  mm, angl.  $\leq 0.45^\circ$

P/N	Type	$\varnothing A / \varnothing B$ [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

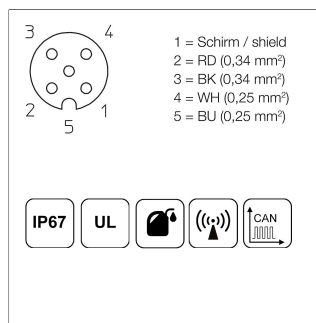
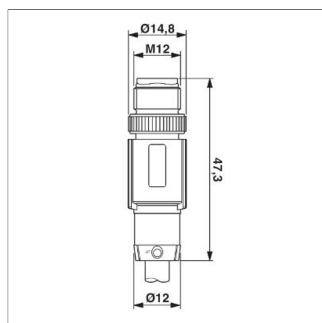


**EEM-33-52**  
M12x1 Mating female/male connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded (shield on knurl), CAN-Bus

Plug housing PUR  
Cable sheath PUR, Ø = 6.7 mm, -25 ... +90°C (plug/socket) -20 ... +80°C (cable)

Lead wires PE, 2x0.25 mm<sup>2</sup>+2x0.34 mm<sup>2</sup>

P/N	Type	Length
400106373	EEM-33-52	5 m

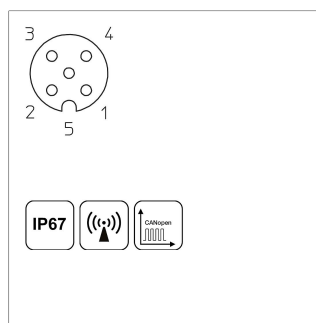
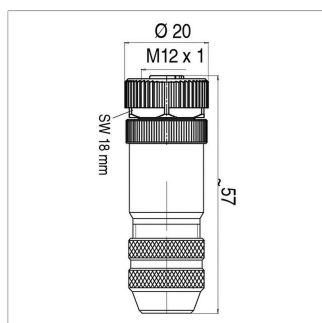


**EEM-33-49/50/51**  
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded (shield on knurl), open ended

Plug housing TPU  
Cable sheath PUR, Ø = 6.7 mm, -25 ... +90°C (socket) -20 ... +80°C (cable)

Lead wires PE, 2x0.25 mm<sup>2</sup>+2x0.34 mm<sup>2</sup>

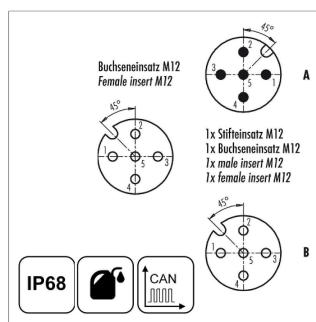
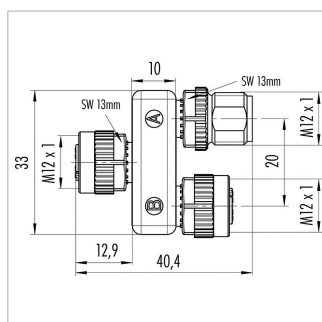
P/N	Type	Length
400106368	EEM-33-49	2 m
400106371	EEM-33-50	5 m
400106372	EEM-33-51	10 m



**EEM-33-73**  
M12x1 Mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus

Plug housing Metal, -40 ... +85°C  
For wire gauge 6 ... 8 mm, max. 0.75 mm<sup>2</sup>

P/N	Type
400005645	EEM-33-73

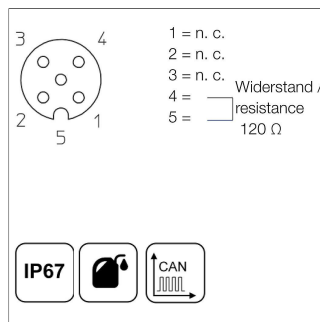
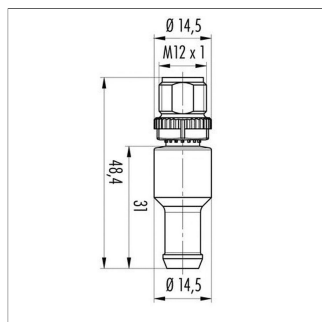


**EEM-33-45**  
M12x1 splitter / T-connector, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-Bus

Plug housing PUR, -25 ... +85°C

P/N	Type
400056145	EEM-33-45

**Connector System  
M12**



**EEM-33-47**  
M12x1 terminating resistor, 5-pin, A-coded,  
IP67, 120 Ω resistance, CAN-Bus

Plug housing	PUR, -25 ... +85°C
<b>P/N</b>	<b>Type</b>
400056147	EEM-33-47

**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

Suited for applications in dragchains

**UL** UL - approved

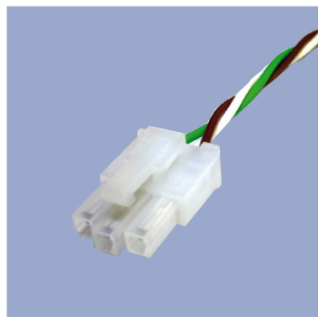
CAN-Bus



## 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

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