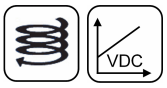
novotechnik
Siedle Group

NOVOTURN
Multi-turn Sensor
Non-contacting

MC1-2800
Ratiometric
Industrial



CE

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
- 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.

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 mm² (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 inital operating of the shaft may increase
Weight (w/o connection)	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

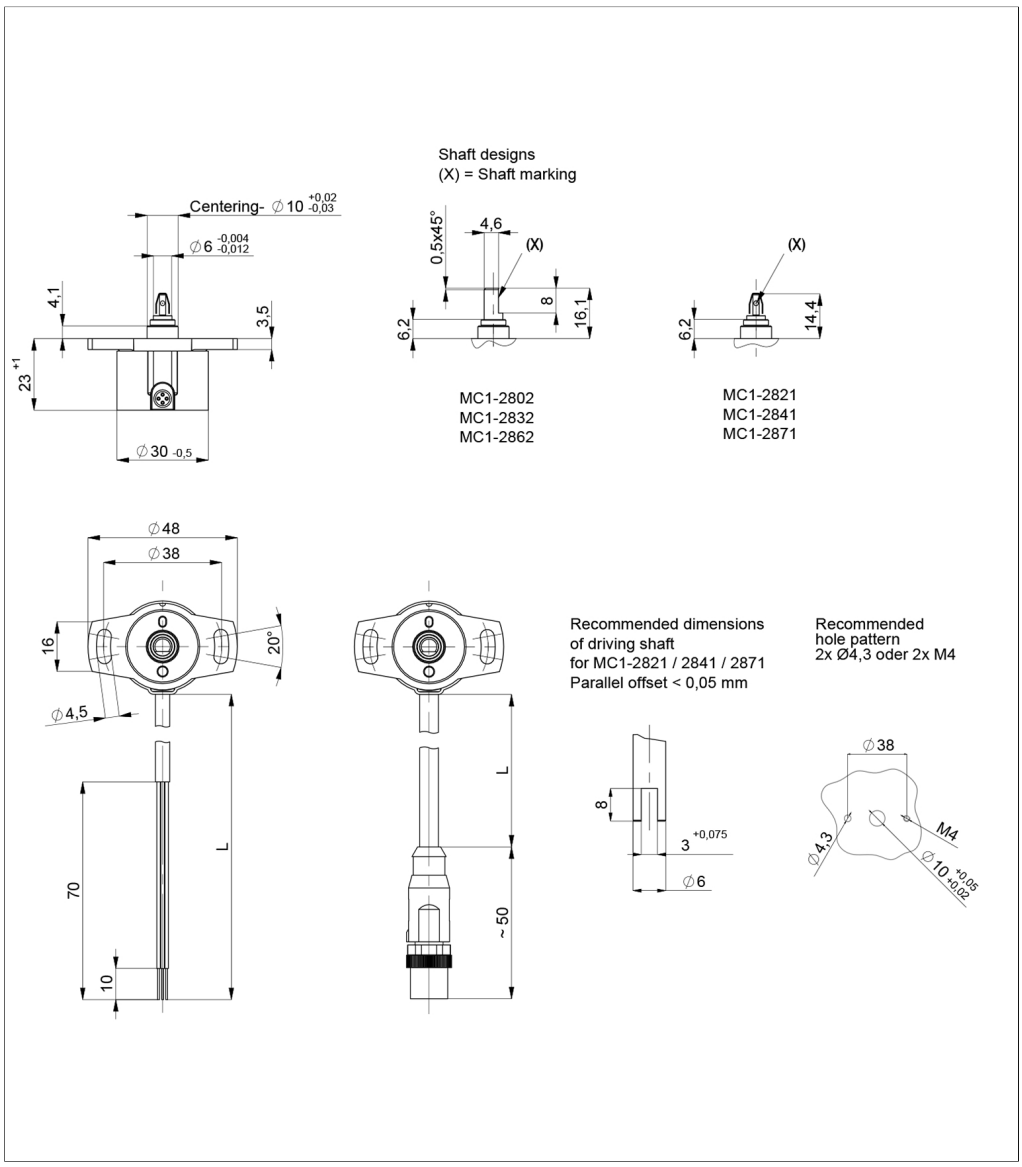
Series

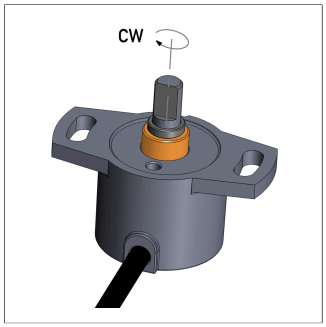
Mechanical version
2802: 6 mm shaft with flattening, IP54
2832: 6 mm shaft with flattening, IP65
2862: 6 mm shaft with flattening, IP67
2821: push-on coupling, IP54
2841: push-on coupling, IP65
2871: push-on coupling, IP67
Other shaft configurations on request

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 • 360°
001, 003, 006, 010, 016, 025, 044: 1, 3, 6, 10, 16, 25, 44 turns
Other measuring angles on request

Drawing

CAD data see
www.novotechnik.de/en/download/cad-data/





At the electrical center position, the shaft marking is pointing towards the electrical outlet.

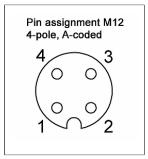
Technical Data

Type	**MC1-_ _ _ _-_ _ _-2_ _-_ _ _** **Ratiometric**
Output signal	ratiometric to supply voltage Ub 5 ... 95% (0.25 ... 4.75 V) 10 ... 90% (0.5 ... 4.5 V)
Load	≥ 10 kΩ (for cable break detection pull-down is recommended)
Diagnosis	activated (in case of error, output signal is outside of the plausible signal range)
Update rate	10 kHz
Measuring range	0 ... 360° up to 0 ... 15840° in 360°-steps (1 to 44 turns)
Linearity *	1 turn: ≤ ±0.4 %FS 2 turns: ≤ ±0.26 %FS 3...6 turns: ≤ ±0.22 %FS 7...9 turns: ≤ ±0.16 %FS 10...13 turns: ≤ ±0.15 %FS 14...27 turns: ≤ ±0.14 %FS 28...44 turns: ≤ ±0.13 %FS
Resolution (related to Ub)	16 bits over the entire measuring range
Repeatability *	≤ ±0.5°
Hysteresis *	≤ ±0.5°
Temperature error	±0.25 %FS
Supply voltage Ub	5 VDC (4.5 ... 5.5 VDC)
Current consumption w/o load	≤ 60 mA
Overvoltage protection	max. 28 VDC (10 min.)
Polarity protection	yes (supply lines)
Short circuit protection	yes (output vs. GND and supply voltage)
Insulation resistance (500 VDC)	≥ 10 MΩ
	*) For the MC1-2821/2841/2871 models with push-on coupling, the values may change (up to a factor of 2) due to the plastic deformation of the coupling spring.
Environmental Data	
Max. operational speed	800 rpm
Vibration IEC 60068-2-6	20 g, 5 ... 2000 Hz, Amax = 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)	538 years
Traceability	Serial number on type labeling: production batch of the sensor assembly and relevant sensor components
Conformity/Approval	CE, UKCA see https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu/uk WEEE see https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/
EMC Compatibility	
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 15840°. Refer to users manual.
FS = Full scale: Signal span according to electrical measuring range

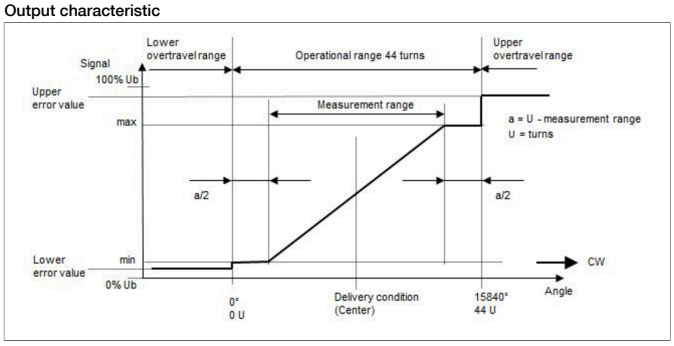
Connection Assignment

Signal	Cable code 2_ _	Connector code 5_ _
Supply voltage Ub	GN	Pin 1
GND	BN	Pin 3
Signal output	WH	Pin 2
n.c. (Position Error Reset)	YE	Pin 4
	Connect cable shielding to protection earth	

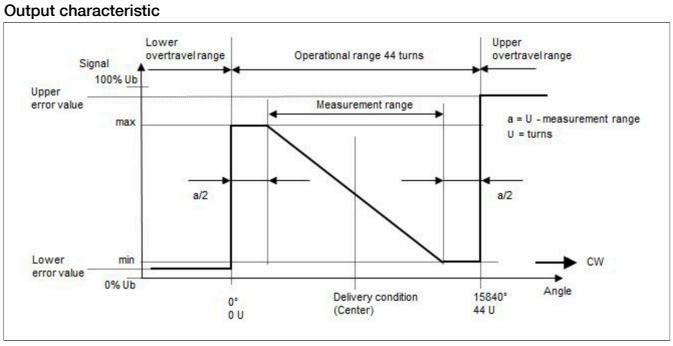


Technical Data
Output Characteristics

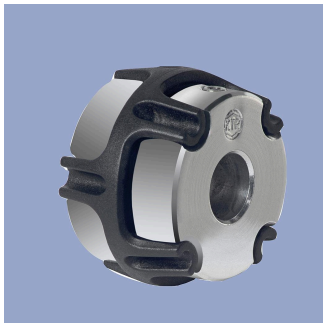
Output characteristic

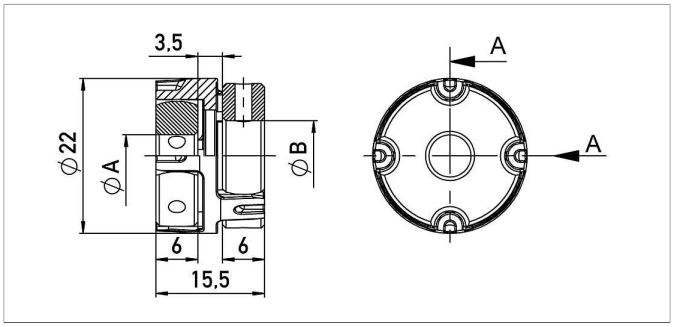


Output characteristic



Sensor Mounting



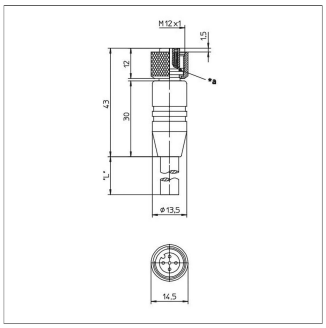


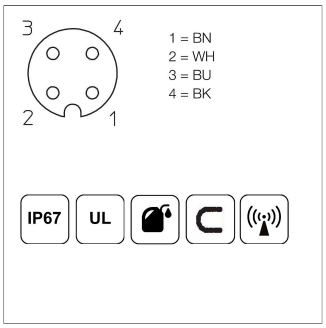
Z-106-G-_
Backlash-free, double cardanic shaft coupling for Ø6 mm to Ø6 mm, Ø6.35 mm or Ø10 mm, mounting via 2 threaded pins with internal hexagon

Material	Aluminium, PEEK
Operating temp.	-40 ... +160°C
Transferable torque	≤ 1 Nm
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 mm²

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 Compatibiliy (EMC) and shield systems

Very good resistance to oils, coolants and lubricants

Suited for applications in dragchains

UL UL - approved

CAN CAN-Bus

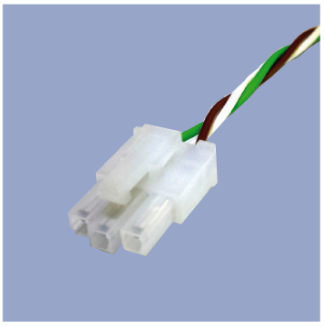
Connecting Options on request

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

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



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

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- Customized length and lead wires
- 3-, 4- and 6-pole versions
- On request

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