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Application



RS422 (TTL) incremental encoder

The optoelectronic incremental TTL encoders are tailored for the use as direct spindle encoders in conjunction with the SINUMERIK 808D CNCs.

Design

The direct incremental spindle encoder features a Synchro flange and can be attached to the machine with 3 clamp straps and a spring disk coupling.

The encoder supply voltage of 5 V DC is provided by the SINUMERIK 808D CNC.

The direct incremental spindle encoder delivers specific pulses per revolution according to your selection which are multiplied by the factor of 4 internally to reach the precision level suitable for standard lathes and milling machines.

Incremental encoders operate on the principle of optoelectronic scanning of dividing disks with the transmitted light principle. With an appropriate arrangement of the line pattern on the dividing disk connected to the shaft and the fixed aperture, the optoelectronic elements provide two trace signals A and B at 90° to one another, as well as a reference signal R. The encoder electronics amplify these signals and convert them into different output levels.

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Direct spindle encoder

Technical specifications

Article No.	6FX2001-2E...
Product name	RS422 (TTL) incremental encoder for spindle
Operating voltage U_p on encoder	5 V DC ± 10 %
Scanning frequency, max.	300 kHz
No-load current consumption, max.	150 mA
Resolution, max.	5000 S/R
Signal level	RS422 (TTL)
Outputs protected against short-circuit to 0 V	Yes
Switching time (10 ... 90 %) (for 1 m cable and recommended input circuit)	Rise/fall time t_+/t_- ≤ 50 ns
Phase angle, signal A to B Edge spacing, min.	90°
• At 300 kHz	≥ 0.45 µs
Cable length to downstream electronics, max.[1)]	100 m without fault signal 50 m with fault signal
Accuracy (in angular seconds)	± 18 mech. × 3600/ PPR count z
LED failure monitoring	High-resistance driver
Maximum mechanical speed	12000 rpm
Starting torque (at 20 °C)	≤ 0.01 Nm
Shaft loading capacity	
• n ≤ 6000 rpm	
- Axial	40 N
- Radial at shaft extension	60 N
• n > 6000 rpm	
- Axial	10 N
- Radial at shaft extension	20 N
Shaft diameter	6 mm
Shaft length	10 mm
Angular acceleration, max.	10^5 rad/s^2
Moment of inertia of rotor	2.9×10^{-6} kgm^2
Vibration (55 ... 2000 Hz) to EN 60068-2-6	≤ 300 m/s^2
Shock to EN 60068-2-27	
• 2 ms	≤ 2000 m/s^2
Degree of protection to EN 60529 (IEC 60529)	
• At housing	IP67
• At shaft input	IP64
Ambient temperature	
Operation	
• Flange outlet	
- At U_p = 5 V ± 10 %	-40 ... +100 °C
Net weight	0.3 kg
EMC	EMC Directive 2014/30/EC and regulations of EMC directives (applicable basic standards)
Certificate of suitability	CE, CSA, UL

S/R = Signals/Revolution

Technical specifications (continued)

Article No.	6FX2001-7KF10
Product name	Spring disk coupling
Transferable torque, max.	0.8 Nm
Shaft diameter	6 mm both ends
Center offset of shafts, max.	0.4 mm
Axial displacement	± 0.4 mm
Angular displacement of shafts, max.	3°
Torsional rigidity	150 Nm/rad
Lateral spring stiffness	6 N/mm
Moment of inertia	19 gcm^2
Speed mechanical max.	12000 rpm
Ambient temperature	
• Operation	-40 ... +150 °C
Net weight	16 g

Selection and ordering data

Description	Article No.
RS422 (TTL) incremental encoder	
Synchro flange 5 V DC supply voltage Radial flange outlet	
• 500 S/R	**6FX2001-2EA50**
• 1000 S/R	**6FX2001-2EB00**
• 1024 S/R	**6FX2001-2EB02**
• 1250 S/R	**6FX2001-2EB25**
• 1500 S/R	**6FX2001-2EB50**
• 2000 S/R	**6FX2001-2EC00**
• 2048 S/R	**6FX2001-2EC04**
• 2500 S/R	**6FX2001-2EC50**
• 3600 S/R	**6FX2001-2ED60**
• 5000 S/R	**6FX2001-2EF00**
Spring disk coupling For shaft diameter 6 mm/6 mm	**6FX2001-7KF10**
Clamp strap (1 unit) For encoders with Synchro flange (3 units are required)	**6FX2001-7KP01**

S/R = Signals/Revolution

1) With recommended cable and input circuitry of the downstream electronics, observe max. permissible cable length of module to be evaluated.