Function

Incremental encoders detect relative movement and deliver a defined number of electrical pulses per revolution, which represent the measurement of the traveled distance or angle.

Incremental encoders operate on the principle of optoelectronic scanning of dividing discs with the transmitted light principle. The light source is a light emitting diode (LED). The light-dark modulation generated as the encoder shaft rotates is picked up by photoelectronic elements. With an appropriate arrangement of the line pattern on the dividing disk connected to the shaft and the fixed aperture, the photoelectronic 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 to different output levels.

The following signal levels are available:

- Analog signals sin/cos with level 1 V_{pp}
  The analog signal allows the digitization of the trace signals. In order to obtain a fine resolution, the signals are interpolated in the higher-level control.
- RS422 differential signals (TTL)
  The resolution can be quadrupled by means of edge evaluation.

Incremental encoder with sin/cos 1 V_{pp} and clamp flange incl. cable with connector as well as incremental encoder with RS422 and Synchro flange

Technical specifications

Article No. Product name Product designation		6FX2001-3.... Motion Control Encoder Incremental encoder with sin/cos 1 V_{pp}	6FX2001-2.... Motion Control Encoder Incremental encoder with RS422 (TTL)
Operating voltage DC V_p on encoder	V	5 ± 10 %	5 ± 10 % or 10 ... 30
Limit frequency, typical	kHz	≥ 180 (- 3 dB) ≥ 450 (- 6 dB)	–
Scanning frequency, maximum	kHz	–	300
No-load current consumption, maximum	mA	150	150
Resolution, maximum	S/R	2500	5000
Signal level		Sinusoidal 1 V_{pp}	RS422 (TTL)
Outputs protected against short circuit to 0 V		Yes short-time	Yes
Switching time (10 ... 90 %) rise/fall t_+/t_- (for 1 m cable and recommended input circuit)	ns	–	≤ 50
Phase angle signal A to B Edge spacing	Degrees	90 ± 10	90
• At 300 kHz	µs	–	≥ 0.45
Cable length to downstream electronics, [1]	m	150	100 without error signal 50 with error signal
Accuracy	arcsec	± 18 mech. × 3600/PPR count z	± 18 mech. × 3600/PPR count z
LED failure monitoring		–	High-resistance driver
Speed, mechanical, maximum	rpm	12000	12000
Starting torque at 20 °C	Nm	≤ 0.01	≤ 0.01

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.

Technical specifications (continued)

Article No. Product name Product designation		6FX2001-3.... Motion Control Encoder Incremental encoder with sin/cos 1 V_{pp}	6FX2001-2.... Motion Control Encoder Incremental encoder with RS422 (TTL)
Shaft loading capacity			
• $n \leq 6000$ rpm			
- Axial	N	40	40
- Radial at shaft extension	N	60	60
• $n > 6000$ rpm			
- Axial	N	10	10
- Radial at shaft extension	N	20	20
Shaft diameter			
• Synchro flange	mm	6	6
• Clamp flange	mm	10	10
Shaft length			
• Synchro flange	mm	10	10
• Clamp flange	mm	20	20
Angular acceleration, maximum	rad/s^2	10^5	10^5
Moment of inertia of rotor	kgm^2	$\leq 2.9 \times 10^{-6}$	$\leq 2.9 \times 10^{-6}$
Vibration (55 ... 2000 Hz) according to EN 60068-2-6	m/s^2	≤ 300	≤ 300
Shock according to EN 60068-2-27			
• 6 ms	m/s^2	≤ 2000	≤ 2000
Degree of protection			
• At housing		IP67	IP67
• At shaft input		IP64	IP64
Ambient temperature, during			
Operation			
• Flange outlet or fixed cable			
- At V_p = 5 V ± 10 %	°C	-40 ... +100	-40 ... +100
- At V_p = 10 ... 30 V	°C	–	-40 ... +70
• Flexible cable			
- At V_p = 5 V ± 10 %	°C	-10 ... +100	-10 ... +100
- At V_p = 10 ... 30 V	°C	–	-10 ... +70
Net weight	kg	0.3	0.3
EMC		EMC guideline 2014/30/EU and regulations of the EMC guidelines (generic standards)	
Certificate of suitability		CE, CSA, UL	CE, CSA, UL

Technical specifications

Article No. Product name Product designation		6FX2001-7KF06 Motion Control Encoder Spring disk coupling	6FX2001-7KF10 Spring disk coupling	6FX2001-7KS06 Plug-in coupling	6FX2001-7KS10 Plug-in coupling
Diameter					
• 1st shaft diameter	mm	6	6	6	10
• 2nd shaft diameter	mm	5	6	6	10
Transferable torque, maximum	Nm	0.8	0.8	0.7	0.7
Mechanical speed, maximum	rpm	12000	12000	12000	12000
Center offset of shafts, maximum	mm	0.4	0.4	0.5	0.5
Axial displacement	mm	0.4	0.4	0.5	0.5
Angular displacement of shafts, maximum	°	3	3	1	1
Rigidity					
• Radial	Nm/rad	150	150	31	31
• Axial	N/mm	6	6	10	10
Moment of inertia	$kgcm^2$	0.019	0.019	0.02	0.02
Ambient temperature, during					
• Operation	°C	-40 ... +150	-40 ... +150	-40 ... +80	-40 ... +80
Outer diameter	mm	30	30	25	25
Length	mm	18.3	18.3	19	19
Net weight	g	16	16	20	20

Article No. Product name Product designation		6FX2001-7KP01 Motion Control Encoder Clamp
Outer diameter		
• 1st clamp diameter	mm	9
• 2nd clamp diameter	mm	12
Clamp hole diameter	mm	3.2
Height	mm	5.5
Net weight	g	3

Selection and ordering data

Description	Article No.
Spring disk coupling	
For shaft diameter:	
• 6 mm/6 mm	**6FX2001-7KF10**
• 6 mm/5 mm	**6FX2001-7KF06**
Plug-in coupling	
For shaft diameter:	
• 6 mm/6 mm	**6FX2001-7KS06**
• 10 mm/10 mm	**6FX2001-7KS10**
Clamp (1 unit) For built-on encoders with Synchro flange (3 units are required.)	**6FX2001-7KP01**

Description	Article No.
Signal connector with cap nut (1 unit) Mating connector for incremental encoder with sin/cos 1 V_{pp} and RS422 (TTL) and absolute encoder with SSI 12-pole, insulator each with 12 socket contacts 0.08 ... 0.22 mm^2 and 0.20 ... 0.56 mm^2 2 × cable clamping for diameters of 6.5 ... 10 mm and 10.1 ... 13 mm	**6FX2003-0SU12**
Signal connector with external thread for encoders with cable (1 unit) Replacement connector for incremental encoder with sin/cos 1 V_{pp} and RS422 (TTL) 12-pole, insulator with 12 pin contacts 0.20 ... 0.56 mm^2 2 × cable clamping for diameters of 6.5 ... 10 mm and 10.1 ... 13 mm	**6FX2003-0SA12**
MOTION CONNECT DRIVE-CLiQ signal cable[1)] For encoder systems with DRIVE-CLiQ and M12 connection	6FX.002-2DC3.-1..0

[1)] For complete Article No. and length code, see MOTION-CONNECT connection systems.