

RS 422 interface (TTL) incremental encoder

Product name	TTL (RS 422) incremental encoder
Encoder operating voltage	5 V DC $\pm 10\%$ or 10 ... 30 V DC
Sampling frequency, max.	300 kHz
No-load current consumption, max.	150 mA
Signal level	TTL (RS 422)
Outputs protected against short-circuit to 0 V	Yes
Switching time (10 ... 90%) (with 1 m (3.3 ft) cable and recommended input circuit)	Rise/fall time $t_+/t_- \leq 50$ ns
Phase angle, signal A to B min. edge spacing at:	90°
• 300 kHz	≥ 0.45 μ s
Cable length to electronic circuitry ¹⁾, max.	100 m (328 ft)
LED failure monitoring	High-resistance driver
Resolution, max.	5000 S/R
Accuracy (in angular seconds)	$\pm 18^\circ$ mech. \times 3600/revolution z
Electr. speed, permissible	(18×10^6) rpm/revolution
Mech. speed, max.	12,000 rpm
Friction torque (at 20 °C (68 °F))	≤ 0.01 Nm (0.08 lb _f -in)
Starting torque (at 20 °C (68 °F))	≤ 0.01 Nm (0.08 lb _f -in)
Shaft loading capability	
• $n > 6000$ rpm	
. Axial	10 N (2.2 lb _f)
. Radial at shaft extension	20 N (4.5 lb _f)
• $n \leq 6000$ rpm	
. Axial	40 N (9 lb _f)
. Radial at shaft extension	60 N (13.5 lb _f)
Angular acceleration, max.	$> 10^5$ rad/s ²
Moment of inertia of rotor	1.45×10^{-6} kgm ² (12.83×10^{-6} lb _f -in-s ²)

Product name	TTL (RS 422) incremental encoder
Vibration (55 ... 2000 Hz) in accordance with EN 60068-2-6	≤ 300 m/s ² (984 ft/s ²)
Shock in accordance with EN 60068-2-27	
• 2 ms	≤ 2000 m/s ² (6563 ft/s ²)
• 6 ms	≤ 1000 m/s ² (3281 ft/s ²)
Operating temperature	
• Flange socket or fixed cable	
At V _p = 5 V ±10%	-40 ... +100 °C (-40 ... +212 °F)
At V _p = 10 ... 30 V	-40 ... +70 °C (-40 ... +158 °F)
• Flexible cable	
At V _p = 5 V ±10%	-10 ... +100 °C (+14 ... +212 °F)
At V _p = 10 ... 30 V	-10 ... +70 °C (+14 ... +158 °F)
Degree of protection in accordance with EN 60529 (IEC 60529)	
• Without shaft input	IP67
• With shaft input	IP64
EMC	Tested in accordance with the electromagnetic compatibility directive 89/336/EEC and the regulations of the EMC guidelines (applicable basic standards).
Weight, approx.	0.25 kg (0.55 lb)
CE marking	Yes

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

Product name	TTL (RS 422) double-track incremental encoder
Encoder operating voltage	5 V DC ±5%
Sampling frequency, max.	
• Track 1	160 kHz
• Track 2	1 MHz
No-load current consumption, max.	
• Track 1	150 mA
• Track 2	150 mA
Signal level	TTL (RS 422)
Outputs protected against short-circuit to 0 V	Yes

Product name	TTL (RS 422) double-track incremental encoder
Switching time (10 ... 90%) (with 1 m (3.3 ft) cable and recommended input circuit)	Rise/fall time $t_r/t_f \leq 100$ ns
Phase angle, signal A to B min. edge spacing at:	90°
<ul style="list-style-type: none"> • 1 MHz (track 2) 	≥ 0.125 μ s
<ul style="list-style-type: none"> • 160 kHz (track 1) 	≥ 0.8 μ s
Cable length to electronic circuitry ¹⁾, max.	
<ul style="list-style-type: none"> • Up to 500 kHz 	100 m (328 ft)
<ul style="list-style-type: none"> • Up to 1 MHz 	50 m (164 ft)
Resolution, max.	
<ul style="list-style-type: none"> • Track 1 	1024 S/R
<ul style="list-style-type: none"> • Track 2 	9000 S/R
Accuracy (in angular seconds)	
<ul style="list-style-type: none"> • Track 1 	± 63
<ul style="list-style-type: none"> • Track 2 	± 12
Electr. speed, permissible	
<ul style="list-style-type: none"> • Track 1 	9000 rpm
<ul style="list-style-type: none"> • Track 2 	6500 rpm
Mech. speed, max.	12,000 rpm
Friction torque (at 20 °C (68 °F))	≤ 0.01 Nm (0.08 lb _f -in)
Starting torque (at 20 °C (68 °F))	≤ 0.01 Nm (0.08 lb _f -in)
Shaft loading capability	
<ul style="list-style-type: none"> • $n \leq 6000$ rpm 	
<ul style="list-style-type: none"> • Axial 	10 N (2.2 lb _f)
<ul style="list-style-type: none"> • Radial at shaft extension 	20 N (4.5 lb _f)
Angular acceleration, max.	$> 10^5$ rad/s ²
Moment of inertia of rotor	20×10^{-6} kgm ² (177×10^{-6} lb _f -in-s ²)
Vibration (55 ... 2000 Hz) in accordance with EN 60068-2-6	≤ 100 m/s ² (328 ft/s ²)
Shock (6 ms) to EN 60068-2-27	≤ 1000 m/s ² (3281 ft/s ²)
Operating temperature	-10 ... +70 °C (+14 ... +158 °F)
Degree of protection in accordance with EN 60529 (IEC 60529)	
<ul style="list-style-type: none"> • Without shaft input 	IP67
<ul style="list-style-type: none"> • With shaft input 	IP64

Product name	TTL (RS 422) double-track incremental encoder
EMC	Tested in accordance with the electromagnetic compatibility directive 89/336/EEC and the regulations of the EMC guidelines (applicable basic standards).
Weight, approx.	0.7 kg (1.5 lb)
CE marking	Yes

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