

Data Sheet for Angle Sensors

Optical Encoders

Series MOT13



Bushing MOT13

Hollow shaft MOT13 H

- Ultra precise miniature high-end rotary encoder in top quality
- Available as solid shaft or hollow shaft variant
- Housing diameter only 13 mm
- Until 16000 pulses per revolution thanks to an integrated multiplier
- 2 channels + Index
- Ball bearing
- 5V supply voltage
- TTL, Open Collector or Linedriver electronics

MOT13 is the high-end encoder which offers at very compact housing dimensions, by means of a multiplier, resolutions until 16000 pulses per revolution. This high-quality encoder for special applications is preferable found in precision machines, devices for semiconductor manufacturing and in robotics.

Electrical Data

Output Signal	A, B, Z (Index)		
Number of pulses	Resolution (pulses per rev.) without multiplier: 32, 100, 200, 256, 300, 360, 500, 1024	Resolution (pulses per rev.) with multiplier: 900, 1000, 2000, 4000, 8000, 16000	
Limit Frequency	100 kHz (50 kHz in combination with Linedriver and multiplier)		
Supply voltage	Resolution 32...1024 pulses per rev. 5 VDC ±10 %	Resolution 2000...16000 Imp./U 5 VDC ±5 %	
Power consumption (no load)	≤ 40 mA @32..1024 pulses per rev. ≤ 50 mA @2000..16000 pulses per rev.		
Output capacity	Sink current: max. 20mA Residual voltage: 0.5V or less @10mA Open Collector output: load voltage DC max. 13.2V		
Output electronics	Voltage output (TTL) resolution 32, 100, 200, 256, 300, 360, 500, 1024 pulses per rev.	Open Collector (all resolutions)	Line Driver (all resolutions)
Switch-on delay	max. 2 μs @32..1024 pulses per rev. max. 1 μs @2000..16000 pulses per rev.		

Mechanical and Environmental Data, Miscellaneous

Mechanical angle of rotation /stroke 1.)	360° without stop
Bearing	Ball bearing
Max. operational speed	6000 rpm
Operational torque @ ambient temperature 1.) 2.)	≤ 0.1 Ncm
Operating temperature range	0..+60 °C
Storage temperature range	-20..+80 °C
Protection grade (IEC 60529)	IP40
Vibration (IEC 68-2-6, Test Fc)	55 Hz; 1.5 mm; each 2 h in X, Y, Z
Shock (IEC 68-2-27, Test Ea)	(50 G) 500 m/s ² , each 3 times in X, Y, Z

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Mechanical and Environmental Data, Miscellaneous

Housing diameter / length	Without multiplier: 13 mm	With multiplier: 13.5 mm
Housing depth	Without multiplier: 20 mm	With multiplier: 22 mm
Shaft diameter	1.5 mm	
Shaft type	Solid shaft / hollow shaft	
Max. radial load	$\leq 1.9 \text{ N @}100..500 \text{ pulses per rev.}$ $\leq 0.98 \text{ N @}900..16000 \text{ pulses per rev.}$	
Max. axial load	$\leq 1.9 \text{ N @}100..500 \text{ pulses per rev.}$ $\leq 0.98 \text{ N @}900..16000 \text{ pulses per rev.}$	
Connection type	TTL, Open Collector, Linedriver with resolutions 32...1024 ppr.: Single strands AWG30, 140 mm length	Open Collector, Linedriver with resolutions 2000...16000 ppr.: Single strands AWG32, 330 mm length
Connection position	Axial	
Sensor mounting	Solid shaft variant: 2 x M2 thread screw, depth 2	Hollow shaft variant: spring flange
Mass	Without multiplier: 10g	With multiplier: 20g
Fastening parts included in delivery	Version with solid shaft: no mounting parts included	Version with hollow shaft: incl. spring flange
Material shaft	Stainless steel	
Material housing	Aluminium	
Material disc	Glass	

1.) According IEC 60393

2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

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Order Code

Description	Selection: standard=black/bold, possible options=grey/cursive						
Series	MOT13						
Shaft: Standard: Solid shaft: Ø1.5 x 10 mm Option hollow shaft Ø1.5 mm Option solid shaft length in mm		- H Ax,xx					
Resolution in pulses per revolution: Option 100 ppr. Option 200 ppr. Option 256 ppr. Option 300 ppr. Standard: 360 ppr. Option 500 ppr. Option 900 ppr. (*) Option 1000 ppr. (*) Option 1024 ppr. Option 2000 ppr. (*) Standard: 4000 ppr. (*) Option 8000 ppr. (*) Option 16000 ppr. (*)			100 200 256 300 360 500 900 1000 1024 2000 4000 8000 16000				
Supply voltage: Standard: 5 V				5			
Output signal: Standard: A+B+Z (index)					BZ		
Output electronics: Standard: TTL (TTL exclusively for 32, 100, 200, 256, 300, 360, 500, 1024 ppr.) Standard: Open Collector (all resolutions) Option Line Driver (all resolutions)						TTL K N	
Electrical connection: Standard: For TTL, Open Collector and Linedriver electronics and resolutions 32...1024 ppr.: Single strands AWG30, 140 mm length Standard: For Open Collector and Linedriver electronics and resolutions 2000...16000 ppr.: Single strands AWG32, 330 mm length Option: Custom defined cable length in meter							- - X,XX

*) With integrated multiplier circuit

Order example MOT13

Requirement:

360 pulses per revolution, supply voltage 5 V, 2 channels with index, TTL output electronics, electrical connection: single strands AWG30 with 140 mm length

Example for order coder: MOT13 360 5 BZ TTL

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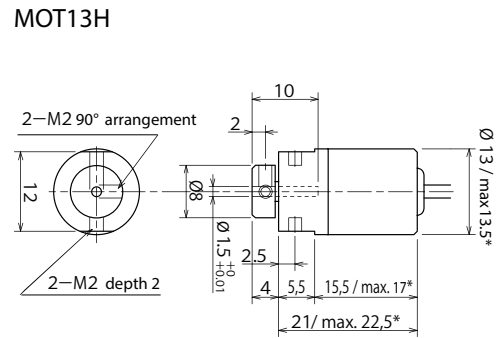
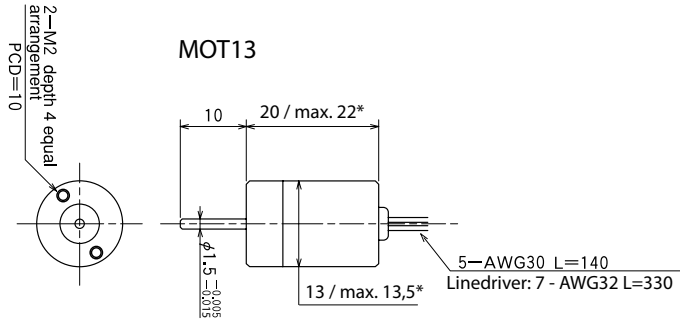
Series MOT13

For higher quantities or on-going demand, additional options are available as described below

For example:

- Other resolutions
- Specials shaft design
- Special connector and cable design
- Other operational torque

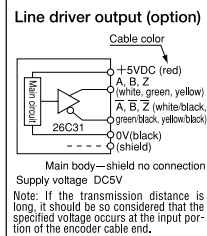
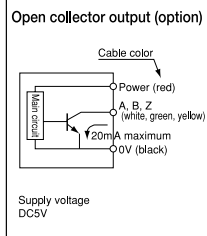
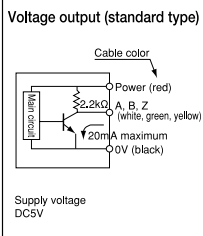
Drawing



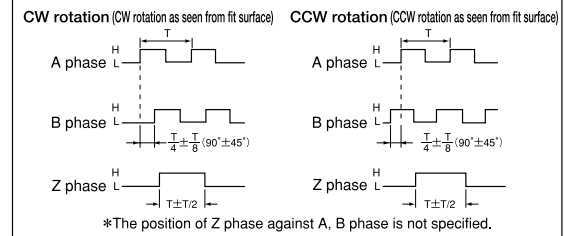
Dimensions in mm

*Multiplier Versions

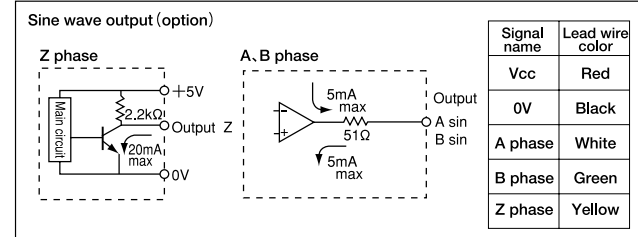
Output circuit diagram



Output waveform



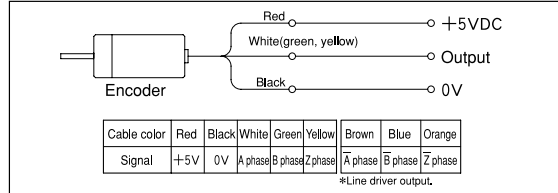
Output circuit diagram



Signal name	Lead wire color
Vcc	Red
0V	Black
A phase	White
B phase	Green
Z phase	Yellow

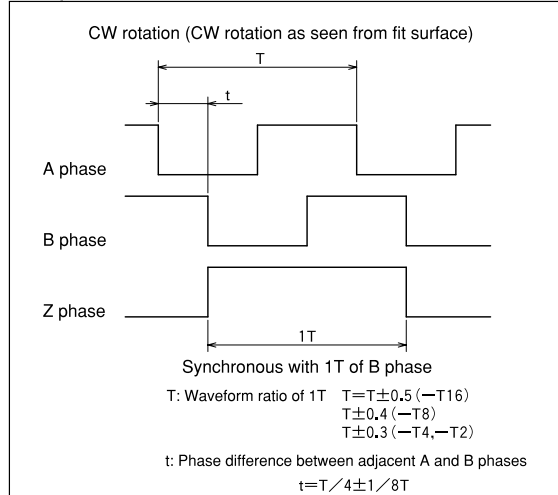
A capacitor (0.1 μF) is connected between 0V and FG (frame ground).

Output connection diagram

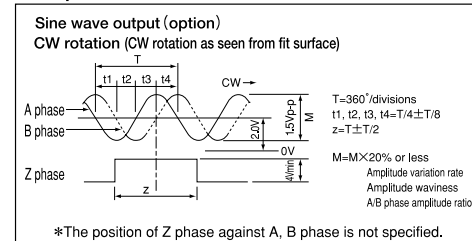


Cable color	Red	Black	White	Green	Yellow	Brown	Blue	Orange
Signal	+5V	0V	A phase	B phase	Z phase	A phase	B phase	Z phase

Output waveform



Output waveform



Spring flange MOT13H (Included)

