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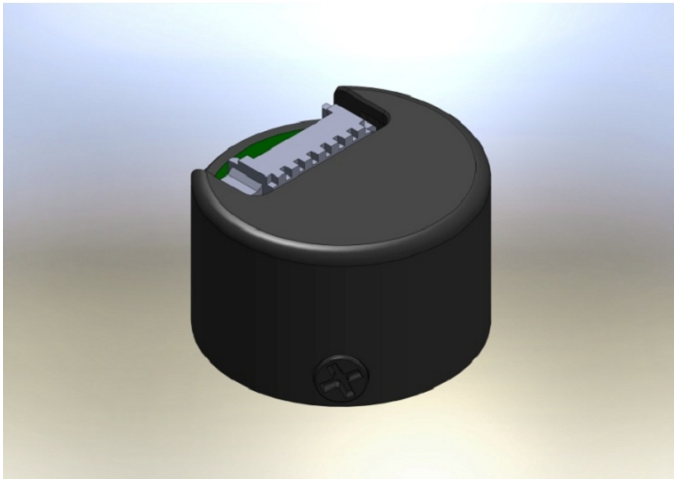
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TMCS-20 Hardware Manual

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TMCS-20 is a low-cost and small-size optical incremental encoder for use with stepper motors and 3-phase PMSM/BLDC motors. It comes with high resolution optical code wheels with a resolution of up to 8K lines.



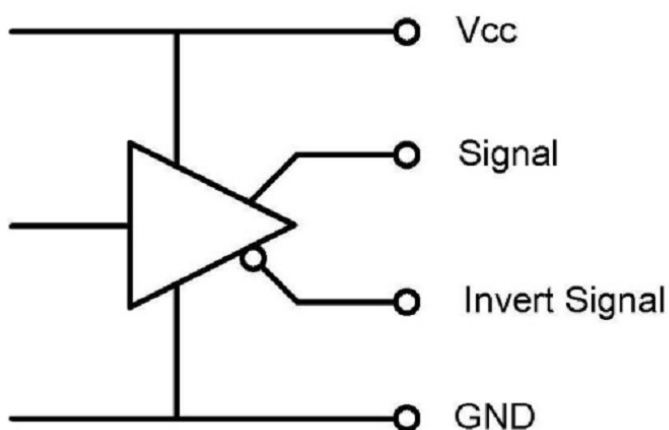
Features

- Low Cost
- High Resolution
- Small Dimension
- Easy Mounting

Applications

- Stepper Motor FOC
- Precision Motion Control
- Robotics
- Servo Motors
- Automated Equipment

Simplified Block Diagram



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1 Order Codes

Order Code	Description	Size (LxWxH)
TMCS-20-4-8192-AT-01	Encoder Module 20mm diameter, Resolution of 8K lines (32K increments), ABN, 4mm shaft diameter, TTL	20mm x 20mm x 13mm
TMCS-20-KIT	TRINAMIC TMCS-20 encoder kit including encoder housing, all code wheel options, cable loom and assembly tools	100mm x 150mm x 30mm

Table 1: Order codes

Other encoder resolutions, signal output types, and shaft diameters on request.



2 Technical Specifications

2.1 Mechanical and Electrical Parameters

Parameter	Min	Typ	Max	Unit
Supply voltage	4.5	5	5.5	V
Supply current			80	mA
Rise/fall time			100	ns
Frequency			300	kHz
Output Voltage "H"	2.4			V
Input Voltage "L"			0.4	V
Max. output current			5	mA
Resolution		32.768 (32k)		increments

Table 2: Electrical Characteristics

Parameter	Min	Typ	Max	Unit
Hollow Diameter		4		mm
Starting Torque			0.8	Ncm
Shaft Loading Axial			25	N
Shaft Loading Radial			40	N
Max. RPM			6000	rpm
Net weight		30		g

Table 3: Mechanical Specifications

Parameter	Description
Operating Temperature	-20 – +85°C
Storage Temperature	-20 – +85°C
Operating Humidity	RH 85% max, non collecting
Shock	490 m/s^2 , 3Dx2 times
Vibration	1.2mm, 10-55kHz, 3Dx30min
Protection	IP40

Table 4: Environmental Specifications



2.2 Signals and Connection

Pin Number	Color	Signal Name
1	Red	VCC
2	Black	GND
3	White	A+
4	White/Black	A-
5	Green	B+
6	Green/Black	B-
7	Yellow	Z+
8	Yellow/Black	Z-
9	Blue	Shield

Table 5: Connector and cable pinning and signals

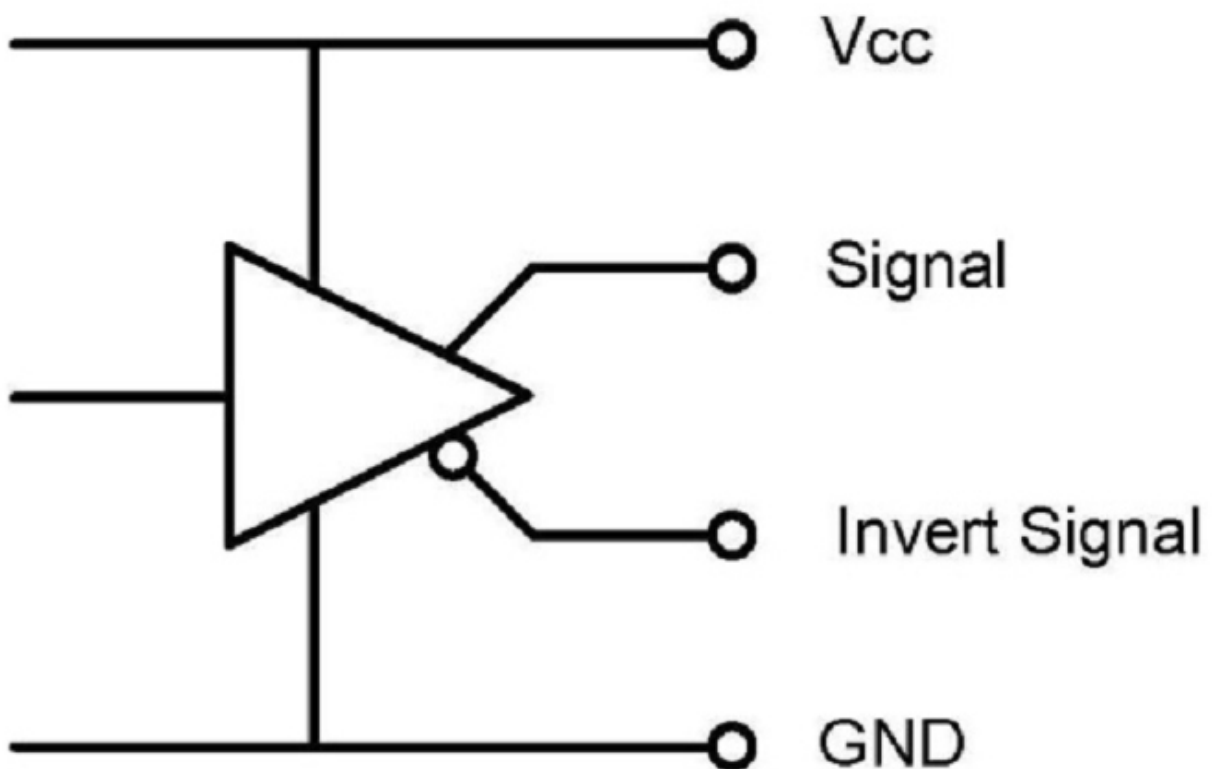


Figure 1: Connection and circuit diagram for the line driver outputs



2.3 Wave Form

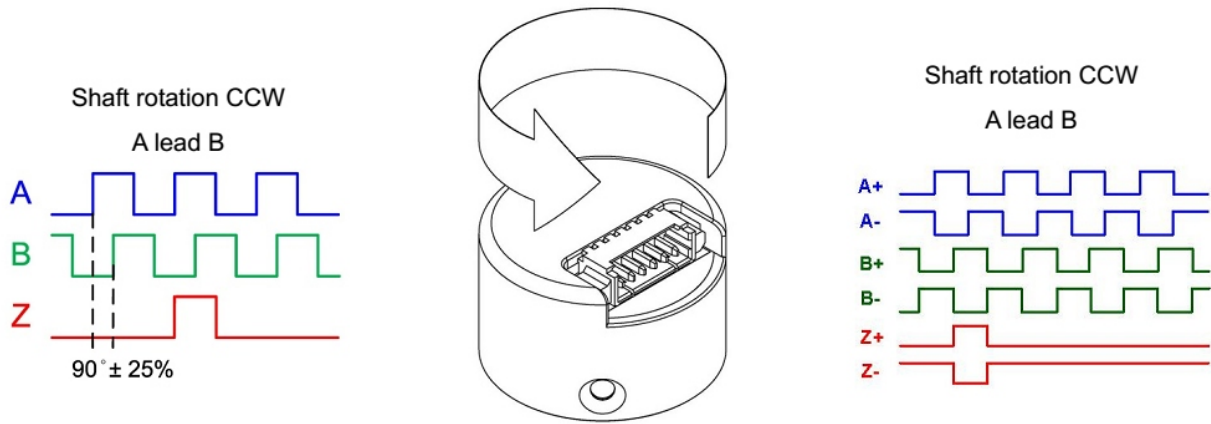


Figure 2: Wave form for CCW and CW rotation

2.4 Mechanical Drawings

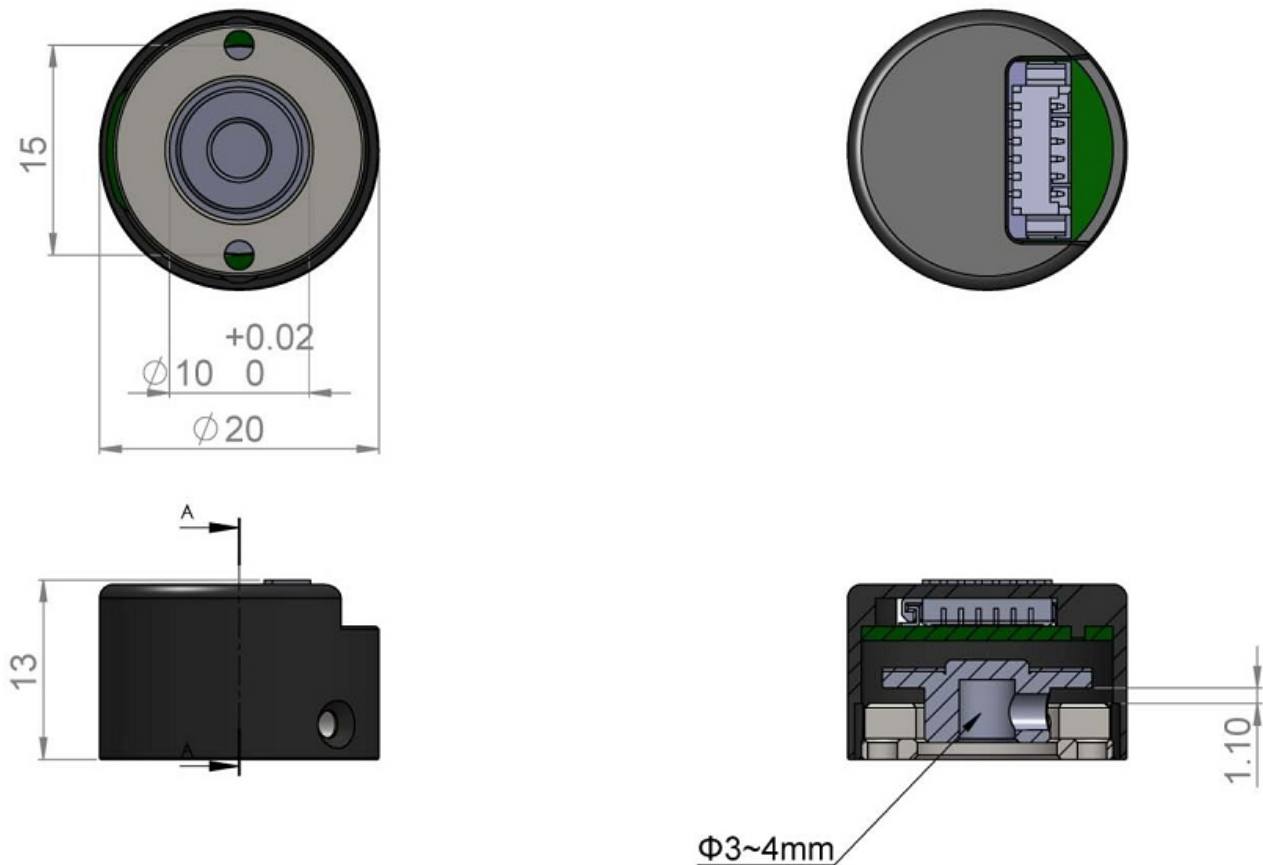


Figure 3: Bottom view, top view, side view, and cut view (units = mm)



2.5 Motor Assembly

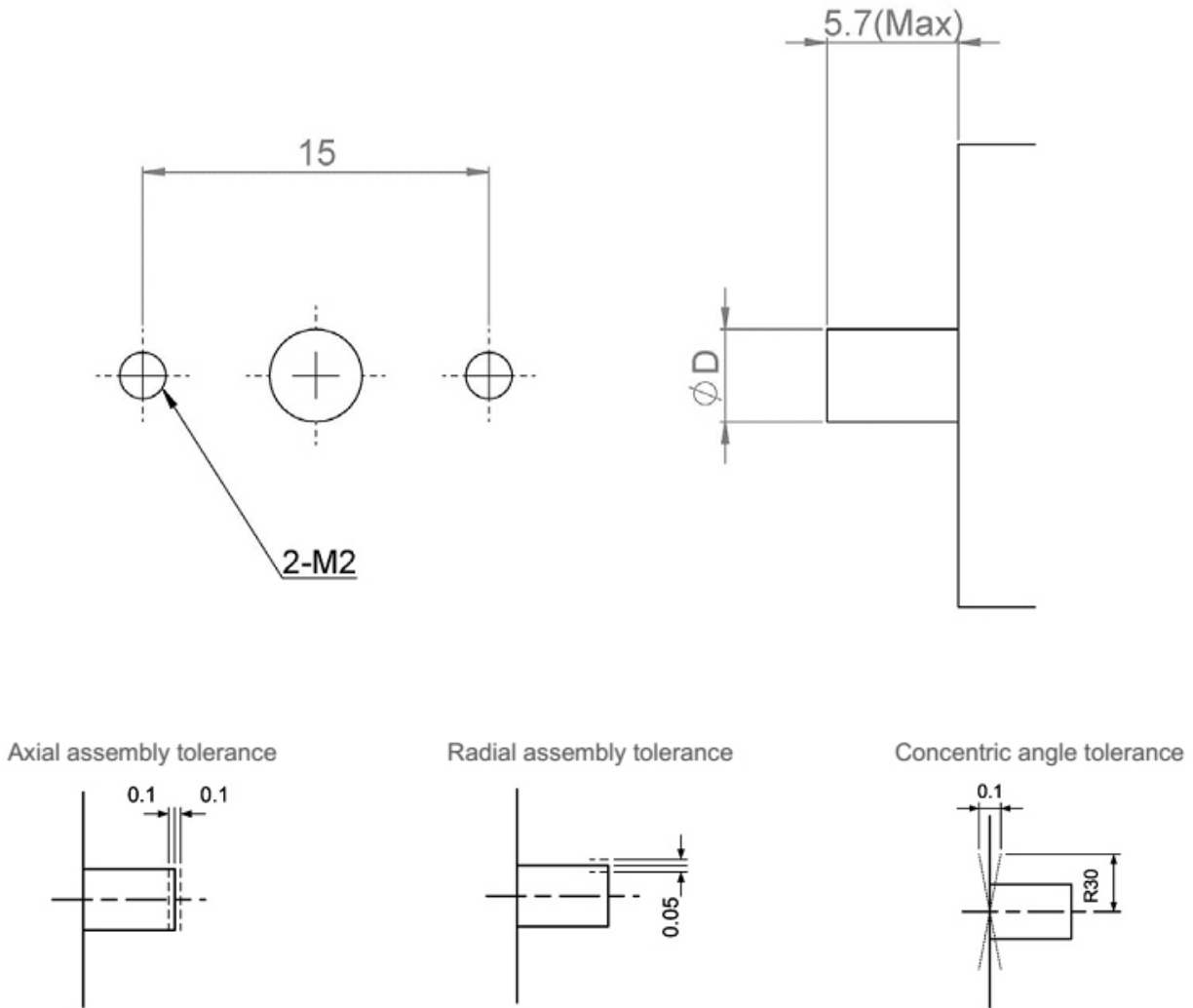


Figure 4: Required dimensions for motor assembly (units = mm)



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5 Supplemental Directives

5.1 Producer Information

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This product documentation is related and/or associated with additional tool kits, firmware and other items, as provided on the product page at: www.trinamic.com.



6 Revision History

6.1 Hardware Revision

Version	Date	Author	Description
1.00	01.03.2017	TMC	Initial release

Table 6: Hardware Revision

6.2 Document Revision

Version	Date	Author	Description
1.00	22.02.2017	SK	Initial release

Table 7: Document Revision

