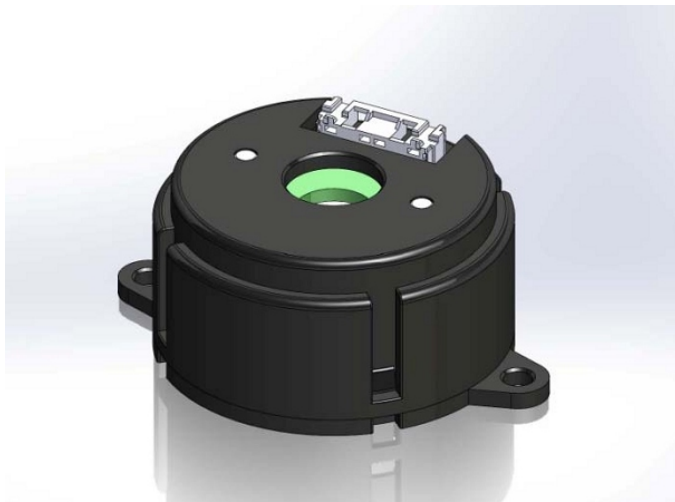


## TMCS-40 Hardware Manual

Hardware Version V1.00 | Document Revision V1.40 • 2021-APR-16

**TMCS-40 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 625 lines (40.000 counts).**



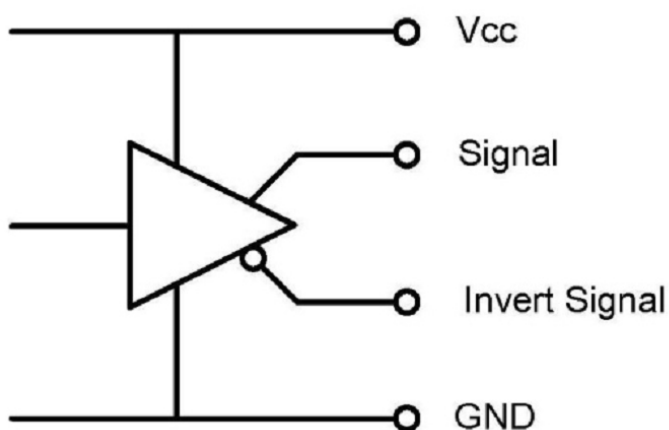
### Features

- 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	Old Order Code	Description	Size (LxWxH)
TMCS-40-6.35-10k-AT-01	TMCS-40-6.35-10000-AT-01	Encoder Module 40mm diameter, Resolution of 625lpr (40.000cpr), ABN, 6.35mm shaft diameter, TTL	40mm x 40mm x 22.60mm
TMCS-40-10k-KIT	TMCS-40-KIT	TRINAMIC TMCS-40 encoder kit including TMCS-40-6.35-10k-AT-01 encoder module, 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			110	mA
Rise/fall time			10	ns
Frequency			1500	kHz
Output Voltage "H"	VCC-2V			V
Input Voltage "L"			0.5	V
Max. output current			20	mA
Resolution lpr		625		lpr (lines per rotation)
Resolution cpr		40.000		cpr (increments per rotation)

Table 2: Electrical Characteristics

Parameter	Min	Typ	Max	Unit
Hollow Diameter (Symbol D in drawings)		6.35		mm
Shaft Loading Axial			50	N
Shaft Loading Radial			80	N
Max. RPM			7500	rpm
Net weight		60		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

The required encoder cable connector is a Molex type 5023800900 or type 510210900 CLIK-MATE™ crimp housing using Molex type 5023810000 CLIK-MATE™ crimp terminals.

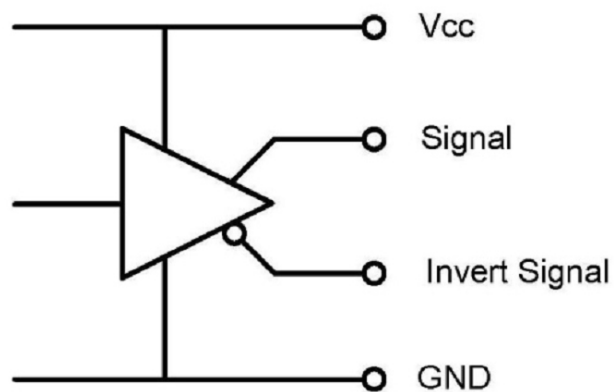


Figure 1: Connection and circuit diagram for the line driver outputs



## 2.3 Wave Form

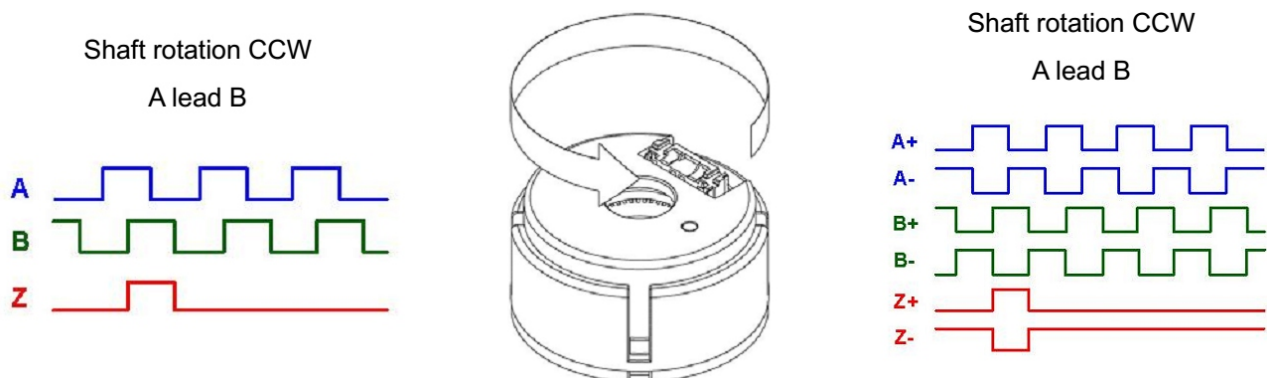


Figure 2: Example wave form for CCW rotation

## 2.4 Mechanical Drawings

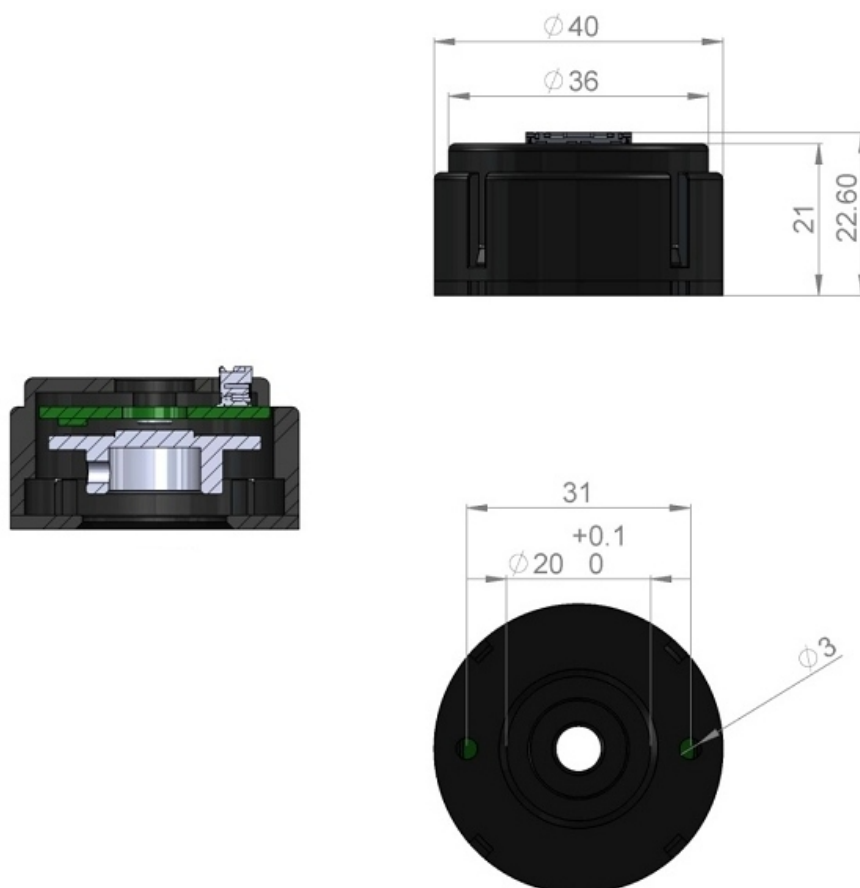


Figure 3: Bottom view, top view, side view, and cut view (units = mm)



The housing connector is of Type Molex 5023860970.

## 2.5 Motor Assembly

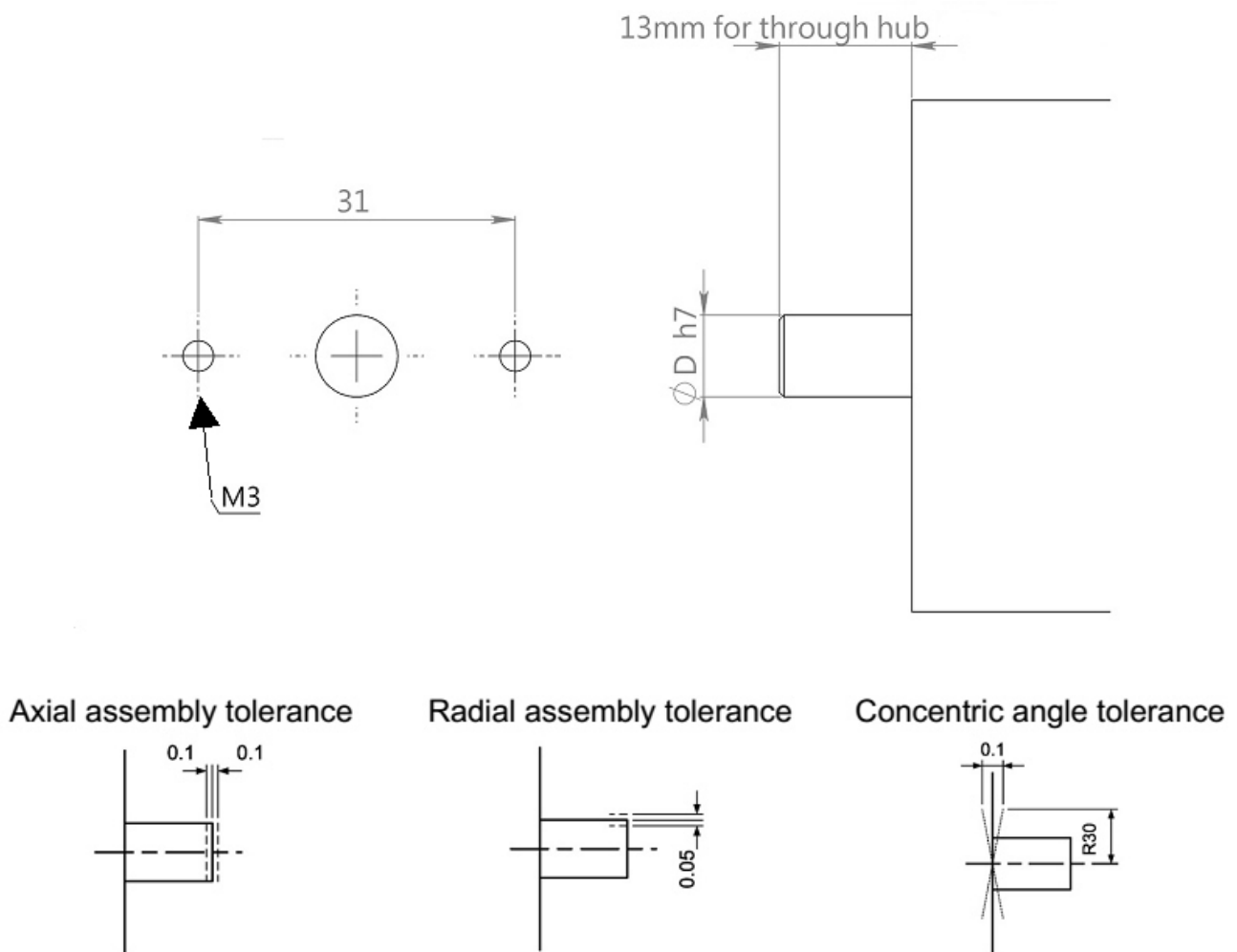


Figure 4: Required dimensions for motor assembly (units = mm) /  $D = 6.35\text{mm}$



### 3 Figures Index

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## 5 Supplemental Directives

### 5.1 Producer Information

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The Target User knows how to responsibly make use of this product without causing harm to himself or others, and without causing damage to systems or devices, in which the user incorporates the product.

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## 5.7 Collateral Documents & Tools

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](http://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	24.02.2017	SK	Initial release.
1.01	14.08.2017	SK	Correct resolution on page 4.
1.10	11.09.2017	SK	Electrical ratings updated.
1.11	21.12.2017	OK	Resolution entries clarified.
1.12	27.08.2018	SK	Information on required shaft diameter D added.
1.13	29.11.2018	SK	Waveform image description updated.
1.20	01.07.2019	SK	Removed Start Torque Parameter since it is not needed/defined for simply encoder kit without bearing inside.
1.30	10.08.2020	SK	Corrected the lpr value.
1.40	16.04.2021	SK	Order codes updated.

Table 7: Document Revision



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[TMCS-40-10k-KIT](#) [TMCS-40-6.35-10K-AT-01](#)