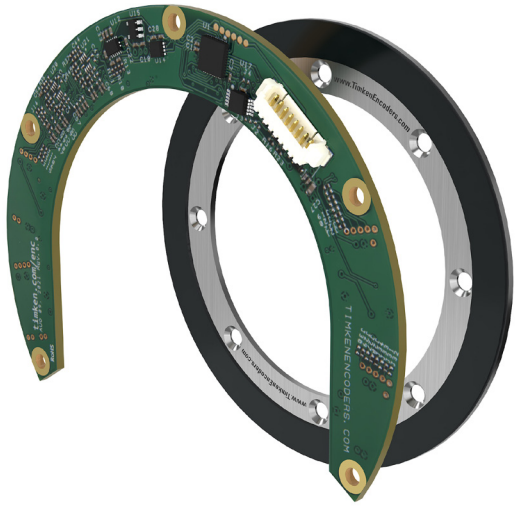
TIMKEN®
ENCODERS

80MM QUAD ABS KIT MAGNETIC ENCODER

DATA SHEET

Timken® absolute position magnetic encoder technology offers clear operational and cost benefits over other commonly used technologies. Our superior sensing products provide reliable speed and position data even in demanding operating environments.



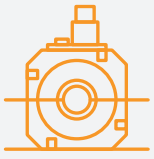
FEATURES AND BENEFITS

- High resolution magnetic encoders up to 22 bits
- 3x larger air gap than competitors
- Quad sensor design compensates for target mounting tolerances
- Turns count output available at full power or backup power
- High speed operation
- Environmentally robust
- Reliable, compact, and cost-effective
- Quick and easy installation
- Industry leading lead-times
- Experienced application engineering
- Configurable design with customization available

APPLICATIONS

ROBOTICS

AMRS



SERVO MOTORS

GIMBALS

LAB CAROUSELS

TURNS COUNTER INFORMATION

Timken Encoders offers high resolution absolute position data within a single turn as well as options to count turns under both full and backup power.

Single Turn: For applications where precise absolute position within a single turn is required, the encoder measures absolute position relative to a fixed, defined zero orientation of the target. This data is available immediately upon system startup and is reported at the desired resolution, up to 22 bits.

Multi-Turn: For applications that require tracking of multiple revolutions, the encoder counts and recalls the number of turns of the system relative to the target's zero orientation. This data is reported as a 16-bit value that is appended to the single turn absolute position data.

If power to the unit is interrupted, the multi-turn encoder will retain the turns count value, but it cannot track turns while in the power-down state. In the event of power loss, the turns count value and single turn absolute position value are saved to internal memory and recalled when power is restored. Error checking is performed by comparing the saved single turn position at power-down with the new single turn position at power-on. If these positions differ by more than +/- 90 degrees, the encoder reports an error and turns on the red LED. Motion that results in a power-on position inside of that +/- 90-degree window will not induce the error state, regardless of the number of revolutions that occurred while in power-down. In the error state, the unit will continue to function even though the turns count value may not be accurate. The turns count value will reset to zero, clearing the error, the next time power is removed or when a user reset is performed.

User Reset: Clear the error flag and reset the turns count value by power cycling the unit or through a BiSS command. 1. Write 0xCD to register 0x48 | 2. Write 0x6D to register 0x49.

Low Power Turn Counter: For applications that require persistent multi-turn tracking, even in power-interrupted scenarios, the encoder uses a backup power supply to continue to count turns. If backup power is not provided in the event of a power loss, the encoder reports an error and turns on the red LED. In this error state, the unit will continue to function even though the turns count value may not be accurate. The turns count value will reset to zero, clearing the error, when a user reset is performed.

User Reset: Clear the error flag and reset the turns count value through the BiSS command described above.

80MM QUAD ABS KIT MAGNETIC ENCODERS FULL DATA

MECHANICAL SPECIFICATIONS	Hub Material	400 series stainless steel
	Magnet Material	Nitrile bonded ferrite
	Primary Connector	8 pin Molex 0532617008
	Mating Connector	8 pin Molex 0510210800
	Max Speed	4,000 RPM
	Target Mass	26 g
	PCB Mass	8.8 g

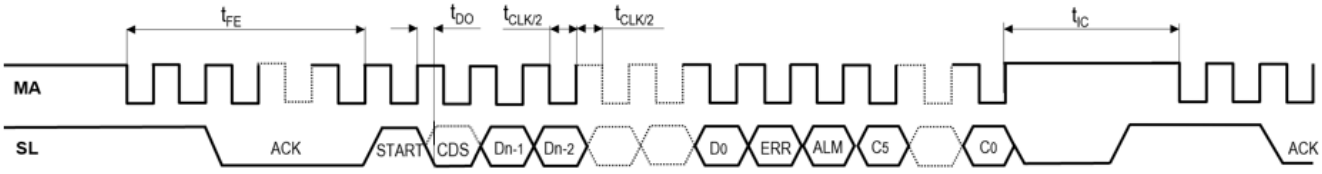
MECHANICAL MOUNTING	**Air Gap: Magnet to Sensor Chip**	**Mounting Hardware Recommendations**	**Radial Position Tolerance**
	Nominal/Ideal: 0.40-0.60 mm Minimum: 0.2 mm Maximum: 1.2 mm	Sensor PCB Fastener: M2, Wafer Head Machine Screw Torque (Max): 0.28 N-m Magnetic Target Fastener: M2.5, ISO 7046 (DIN 965)	X-Y: +/- 0.38mm

ENVIRONMENTAL SPECIFICATIONS	Operating Temperature	-30° – 85° C
	Humidity	0 - 90% non-condensing
	External Bias Field	12 mT (External fields over 50 mT can permanently damage the magnetic target
	ESD Protection	6 kV

SYSTEM SPECIFICATIONS	Protocol	BiSS-C
	Interface	BiSS, SSI
	Resolution	16 – 22 bits
	Positional Accuracy	+/- 0.05°
	Max Sampling Rate	18 kHz
	Max Refresh Rate	> 44 kHz

ELECTRICAL SPECIFICATIONS		Min.	Typical	Max.	Units
	Main Power Supply Voltage (V_{dd})	4.5	5.0	5.5	V
	Main Power Supply Current Draw	102	136	170	mA
	Backup Power Supply Voltage (V_B)	2.5	3.15	3.6	V
	Backup Power Supply Current Draw		20	35 (peak)	µA
	Data Output Voltage and Current	See datasheets for: Driver: ISL3295EIHZ-T Receiver: MAX3281EAUT+T			
	Data Clock		2.5		MHz

BISS-C INTERFACE



BiSS-C Waveforms (n=resolution for single turn; n=16+resolution for multi-turn)

* For bidirectional BiSS-C, please refer to: http://biss-interface.com/download/biss-c-protocol-description-english

BISS-C TIMING CHARACTERISTICS

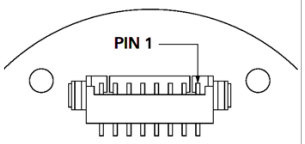
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
First Data Shifted to Output Register	t_{FE}	2.75			µs	
Idle Time	t_{IC}	15			µs	
Data Output Valid	t_{DO}			80	ns	
Clock Pulse Width	$t_{CLK/2}$		400		ns	
Clock Frequency	f_{CLK}	2.4	2.5	2.6	MHz	Other frequencies also available
Line Delay			2.8		µs	
ACK			7		Bits	At 2.5 MHz

DATA FRAME BIT DEFINITIONS: BISS-C AND SSI

Field	Description
Dn-1:D0 n=22 for 22-bit single turn resolution n= 38 = 16 + 22 for 22-bit with 16-bit turns count	Data output is MSB first With turns counting output: Dn_{-1}:Dn_{-16} are 16-bit turn count data; Dn_{-17}:D_0 are single turn absolute position data
ERR – Active LOW.	Error Flag: signal error or turns count error.
ALM – Active LOW.	Alarm Flag: Air gap out of range, ABS data compromised – LED goes red.
C5:C0	CRC bits. CRC polynomial: $\chi 6 + \chi + 1$, inverted

PRIMARY CONNECTOR PINOUT

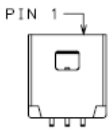
Pin #	1	2	3	4	5	6	7	8
BiSS-C	V_{dd}	GND	GND T	V_B T	MA+	MA-	SL+	SL-
SSI	V_{dd}	GND	GND T	V_B T	CLK+	CLK-	MISO+	MISO-

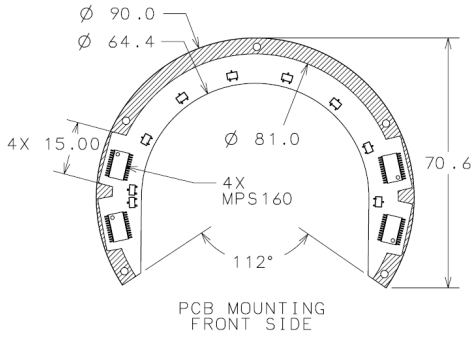


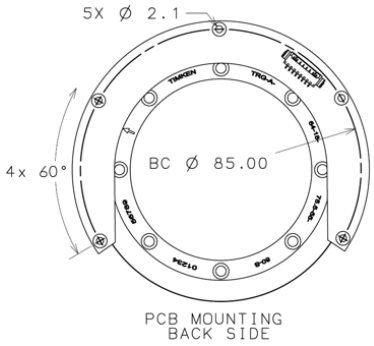
T: Custom option for an analog temperature sensor. Can be used if low power turn counter function is not required or if VB is provided on the backup power auxiliary connector.

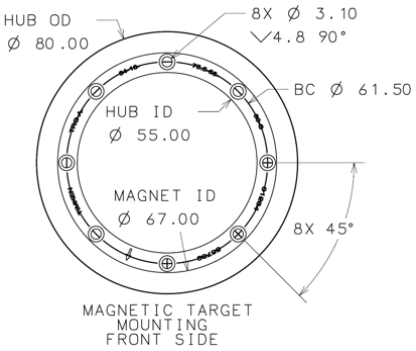
BACKUP POWER AUXILIARY CONNECTOR PINOUT

Connector	3 pin Molex 5015680307	**Pin #**	1	2	3	
Mating Connector	3 pin Molex 0513300300	**Function**	GND	V_B	V_{dd}	

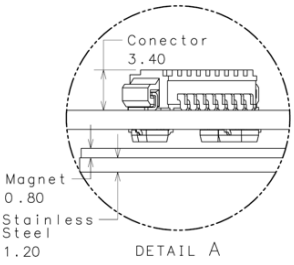


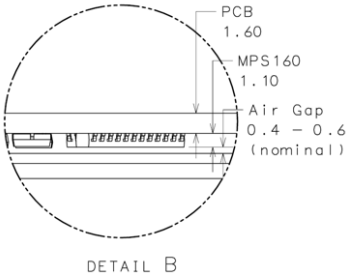






3D MODELS AVAILABLE TO DOWNLOAD AT WWW.TIMKENENCODERS.COM





CONFIGURATION EXAMPLE: ABS-80 – 22 – B – C – M – 100 – 0

Type	80 mm OD	Resolution (Bits)	Interface[1]		Connection		Turns Counter		Filtering[2]		Options[3]
			Select	Description	Select	Description	Select	Description	Select	Max Operating Speed	
ABS	80	16	B	BiSS-C	C	8-pin header	S	Single turn	100	100 RPM	0
		17	S	SSI - differential	L	8-pin header + 3-pin header (low power turn counter only)	M	Multi-turn	2000	2000 RPM	Custom #
		18	P	SPI - differential			L	Low power turn counter			
		19									
		20									
		21									
		22									

1: Additional full- or half-duplex interfaces available upon request.

2: Additional filtering options available upon request.

3: Timken Encoders' engineers are experienced in providing specialized solutions to meet the needs of your application. Options include but are not limited to custom data clock rates, custom targets, sensor conformal coating, on-board temperature sensors, on-board super capacitors to support low power operation, and more.

More details regarding specifications, installation, and instructions are available at **www.timkenencoders.com**.

Timken Encoders

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TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets bearings, gear drives, automated lubrication systems, belts, brakes, clutches, chain, couplings, linear motion products and related industrial motion rebuild and repair services.

Stronger. By Design.