MDB28 - Magnetic encoder module

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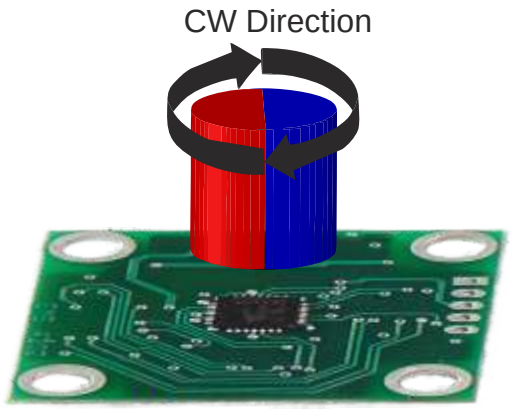
Passion for Excellence

Based on Dipole Magnet and Hall Sensors



MDB28 magnetic rotary encoder module has a precision sensor having an integrated Hall element for scanning a permanent Dipole magnet. The Sensor itself generates a constant amplitude Sine and Cosine voltages that is used for angle calculations. These Sine and Cosine signals are further interpolated to get the Incremental or Absolute signals with resolutions up to 14 bits per rotation.
MDB28 module is a 28mm PCB assembly which has a wide operating voltage range suitable for many applications

Salient Features:

- **28mm Square PCB assembly module**
- **Wide operating voltage range 5V DC and 6.5V to 30V DC**
- **Variety of outputs supported like Analog Sin-Cos output, Incremental RS422, Absolute SSI and BiSS-C protocol**
- **Supports up to 14 bits (16384 positions) per rotation Absolute and Incremental output**
- **Accuracy +/- 0.5 deg**
- **High Speed operation up to 20000 rpm at 12bit resolution**
- **3600 CPR also available to give angular resolutions easier for mathematical calculations**
- **Suitable for applications like motor control, Medical instrumentation, paper and textile industry, Industrial automation and many more**

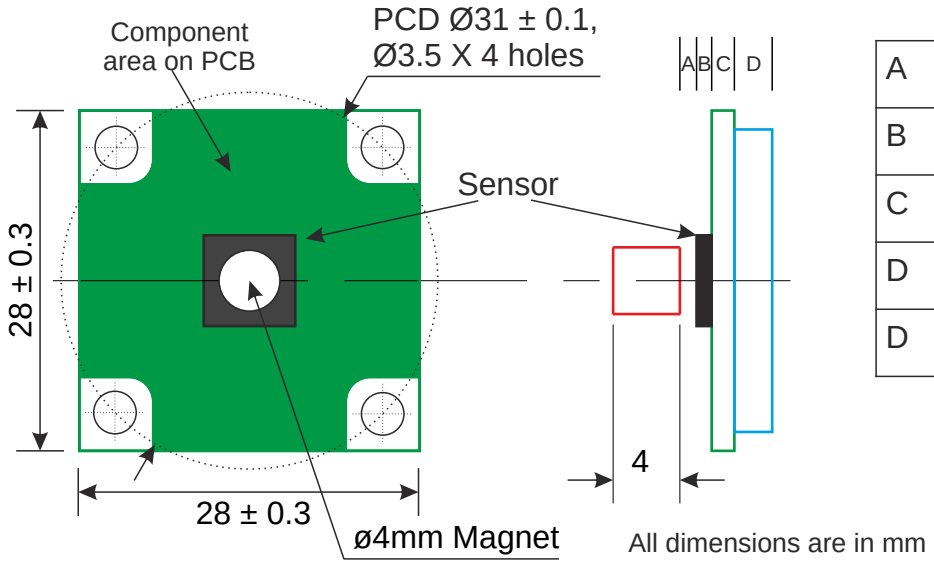
RoHS

Available models:

- **MDB28AS / AC -** Analog single ended (AS) / complementary (AC) Sine Cosine output with a single sine-cosine cycle per rotation
- **MDB28IC -** Incremental open collector A, B, and Z output with up to 16384 counts per rotation (CPR)
- **MDB28IR -** Incremental RS422 A, B and Z output with up to 16384 counts per rotation (CPR)
- **MDB28SB / SG -** Absolute output on Synchronous Serial interface (SSI) with Binary (SB) / Grey (SG) coded data up to 13 Bits per rotation
- **MDB28BC -** Absolute output on BiSS-C data up to 14 Bits per rotation
- **MDB28UX -** UVW single ended output with up to 16 folds per rotation along with the Incremental RS422 signals up to 4096 counts per rotation
- **MDB28ZS/ZG/ZB -** Analog Sine Cosine + Absolute SSI + Incremental up to 14 Bits per rotation

Installation drawings:

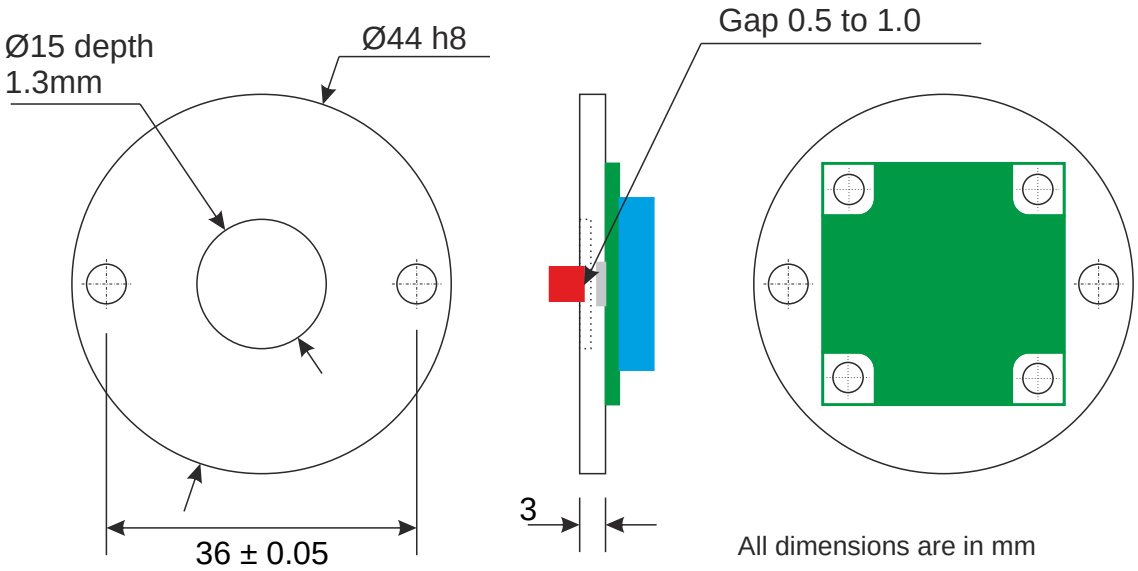
Only PCB



A	Gap between Sensor and Magnet	1 ± 0.5mm
B	Sensor Height	0.9 ± 0.1mm
C	PCB Thickness	1.6 ± 0.1mm
D	For 5V Operative Max. Component height	2mm
D	For 6.5V to 30V Max. Component height	4.5mm

Note: Magnet center axis and PCB center should be with in ± 0.2mm to get the specified accuracy results

Board with Flange mounting (optional)



Note: Magnet center axis and PCB center should be with in ± 0.2mm to get the specified accuracy results

MDB28 Specifications:

	MDB28AS / AC	MDB28SB / SG	MDB28BC
Power Supply (V_{dd})	Option 1: +5V DC (±5%) or Option 2: 6.5V DC to 30V DC		
Current consumption	50mA maximum	90mA maximum	
Output	AS - 2Vpp each signal AC - 0.5Vpp each signal	RS422	
Maximum RPM	120000 RPM	2500 to 120000 RPM	
Operating Temperature	-40°C to +125°C		
Storage Temperature	-40°C to +125°C		
Accuracy	±0.5°		
Clock Frequency	Not Applicable	4MHz maximum	10MHz maximum
Output data format	Not Applicable	SB - Binary data SG - Grey coded data	BiSS-C
SSI Data time out	Not Applicable	16µS	12.5µS to 40µS
Output driving current	20mA maximum		

	MDB28IC	MDB28IR	MDB28UX
Power Supply (V_{dd})	Option 1: +5V DC (±5%) or Option 2: 6.5V DC to 30V DC		
Current consumption	90mA maximum		
Output	A, B, Z Signals open collector	RS422 for 5VDC HDL for 6.5V to 30V operating	U, V, W single ended Incremental RS422
Maximum RPM	20000 to 120000 RPM		
Operating Temperature	-40°C to +125°C		
Storage Temperature	-40°C to +125°C		
Accuracy	±0.5°		
Output driving current	20mA maximum		

Note: For specifications of ZS, ZG, ZB models refer below table

Model	Sine cosine	Incremental	Absolute
MDB28ZS	MDB28AC	MDB28IR	MDB28SB
MDB28ZG	MDB28AC	MDB28IR	MDB28SG
MDB28ZB	MDB28AC	MDB28IR	MDB28BC

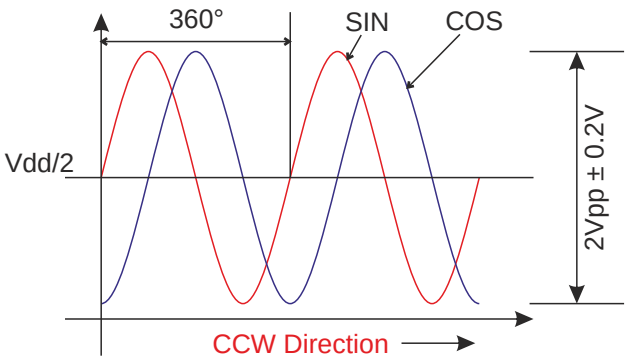
Pin Connection details:

(Model and Pin number **"1"** marked on the PCB)

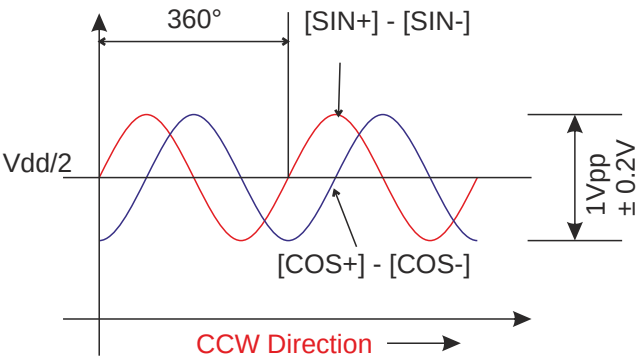
Pin	MDB28AS	MDB28AC	MDB28IR	MDB28IC	MDB28SB/SG/BC	MDB28UX
1	Vdd	Vdd	Vdd	Vdd	Vdd	Vdd
2	GROUND	GROUND	GROUND	GROUND	GROUND	GROUND
3	SIN +	SIN +	A +	A	Data +	U
4	COSINE +	COSINE +	A -	B	Data -	V
5		SIN -	B +	Z	Clock +	W
6		COSINE -	B -		Clock -	
7			Z +			
8			Z -			

Output waveforms:

MDB28AS

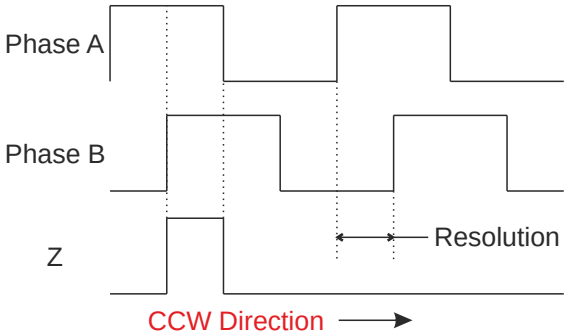


MDB28AC



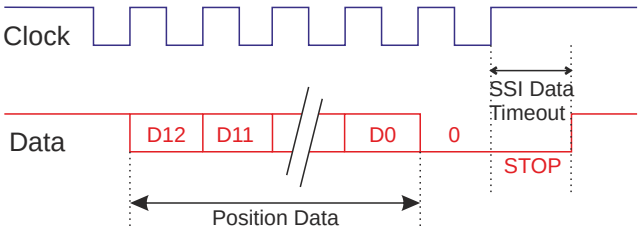
MDB28IR / IC

(Differential signals in case of IR are not shown)



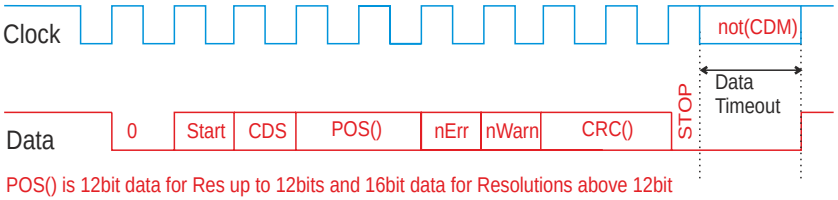
MDB28SB / SG

(Differential signals are not shown)



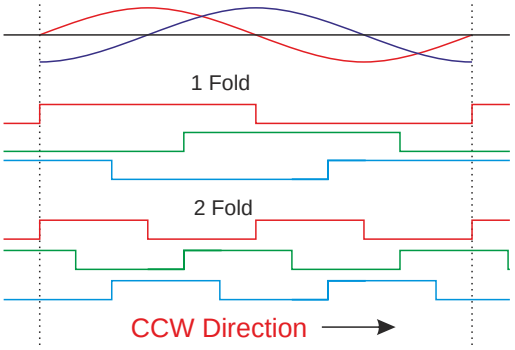
Position data is 13bit for all resolutions up to 13bits with trailing zeros.
Position data increments in CCW direction

MDB28BC



POS() is 12bit data for Res up to 12bits and 16bit data for Resolutions above 12bit with trailing zeros. Position data increments in CCW direction

MDB28UX



Output Resolutions:

MDB28IC / MDB28IR

CPR	Hysteresis	Max. RPM
4 to 256*	0.7°	120000
260 to 512*	0.35°	60000
516 to 4096*	0.17°	30000
8192	0.17°	5000
16384	0.17°	2500

* - In increments of 4. Eg 4, 8, 12, till 256 etc

MDB28UX

'X'	No of Poles
'1' to '9'	1 to 9
'A' to 'G'	10 to 16

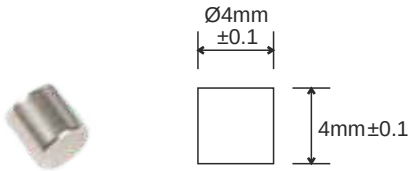
MDB28SB/SG/BC

No of Bits	Hysteresis
8	0.7°
9	0.35°
10 to 12	0.17°
13	0.17°
14*	0.17°

* - Available only in BC

Note: Pulse per Rotation (PPR) can be calculated as counts per rotation (CPR) ÷ 4

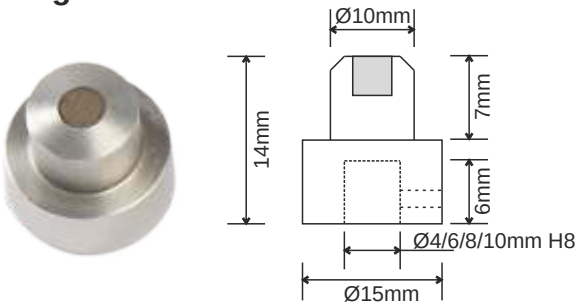
Magnet



Order code - MDG04

Note: Magnet should be glued on a non-magnetic material

Magnet with Holder



Order code - MDH04 / 06 / 08 / 10

Note: M3 Grub screw is provided on the holder for fixing on to Shaft

Ordering Information:

MDB28 □□ □ □ □□□□□ □□

Series name
28mm Square
rotary encoder PCB

Model name
AS - Single ended SIN COS output
AC - Complementary SIN COS output
IR - Incremental RS422 output
SB - SSI with binary data output
SG - SSI with grey coded data output
BC - BiSS-C with binary data output
UX - U V W output single ended
(**X** stands for number of poles)
ZS - AC + IR + SB
ZG - AC + IR + SG
ZB - AC + IR + BC

Mounting type
0 - only Board
1 - Board with Flange

00 - Standard
RoHS assembly

01 - Standard
non-RoHS assembly

Resolution in CPR
For **AS** and **AC**
00000
For **IR and IC**
00004 to 04096, 08192, 16384
For **SB and SG**(no of bits)
00512(9), **01024**(10), **02048**(11), **04096**(12),**08192**(13)
For **BC** (no of bits)
00256(8), **00512**(9), **01024**(10), **02048**(11), **04096**(12), **08192**(13), **16384**(14)
For **UX** (use this for incremental resolution)
00004 to 04096

Operating Voltage
0 - 5V DC
1 - 6.5V to 30V DC

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