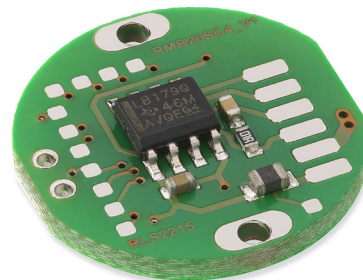
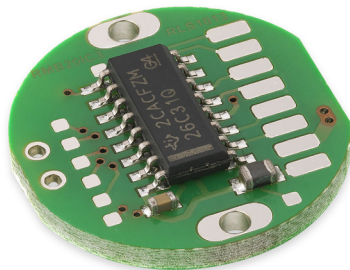


## RMB20 encoder module with AM4096



**The RMB20 encoder module provides the functionality of the RM22 encoder in a compact component format for simple customer integration. With a PCB diameter of only 20 mm, the module fits into miniature designs.**

**The encoder module consists of a magnetic actuator and a separate sensor board. Custom encoder chip that is mounted on a sensor board reads and processes the rotation of magnetic actuator and gives the required output format. Output signals are provided in industry standard absolute, incremental, analogue, commutation and linear formats.**

The RMB20 can be designed into equipment used in a wide range of applications including marine, medical, print, converting, industrial automation, motor control and instrumentation.

### Product range

#### RMB20AC/BC

Analogue sinusoidal outputs with a single sine/cosine period per revolution.

#### RMB20IC

Incremental with 8 to 1024 pulses per revolution (32 to 4096 counts per revolution with x4 evaluation).

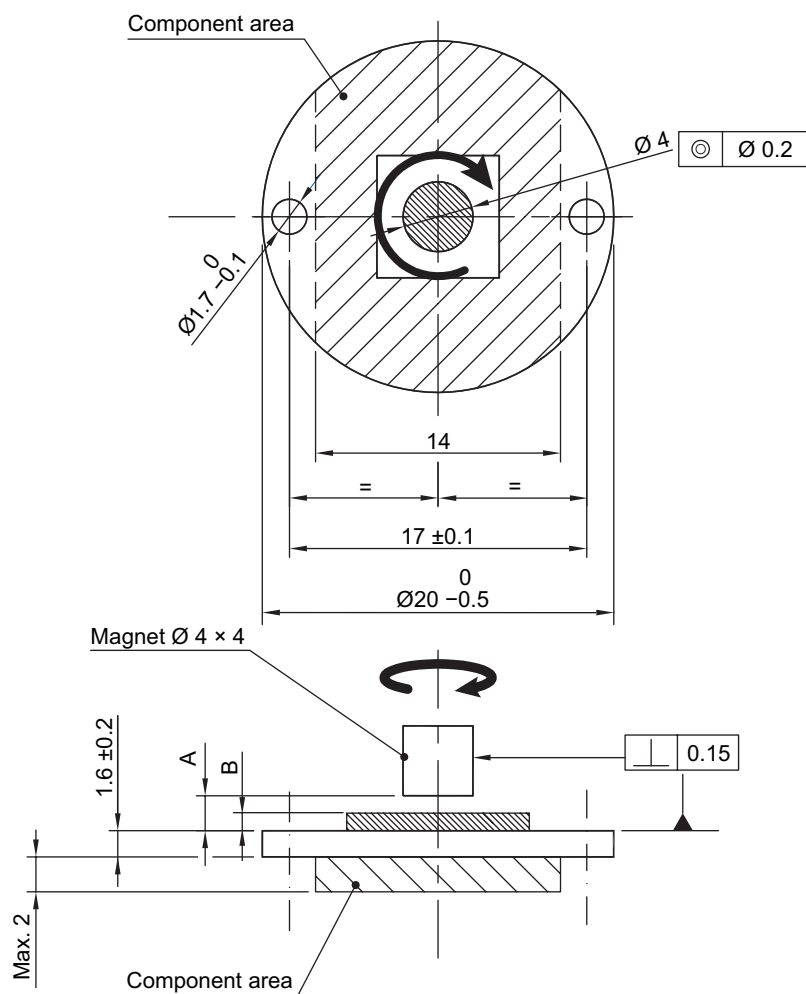
#### RMB20SC

Synchro serial interface (SSI) with 32 to 4096 positions per revolution.

The encoder module includes zeroing pads for setting the encoder zero position. The new zero position can be set by shorting the two zeroing pads.

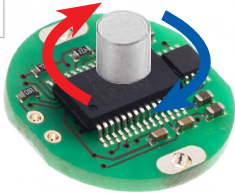
- Price performance solution
- 20 mm diameter circular module
- 5 V power supply
- High speed operation to 60,000 rpm
- Absolute - up to 12 bit resolution
- Industry standard absolute and incremental output formats
- Accuracy to  $\pm 0.5^\circ$

Installation drawing



Module	A PCB surface to magnet distance [mm]	B Chip height [mm]
RMB20AC	$2.30 \pm 0.5$	Max. 1
RMB20BC		
RMB20IC	$2.8 \pm 0.5$	Max. 2
RMB20SC		

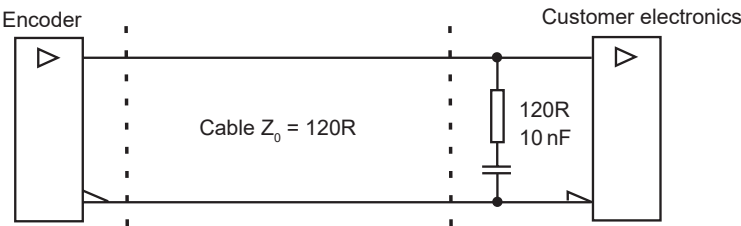
**NOTE:** For the accuracy specified, the central line of the magnet needs to be square to the chip within  $2^\circ$  and aligned within the center of the board  $\pm 0.1$  mm (mid point between the two mounting holes).



Clockwise (CW) rotation of magnet

Recommended signal termination

For digital data output lines only



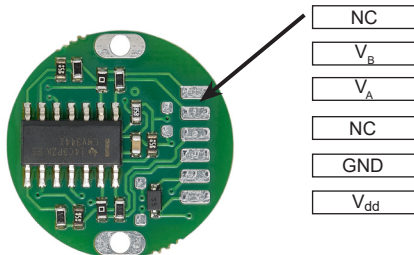
## RMB20AC – Analogue sinusoidal outputs

2 channels  $V_A$  and  $V_B$  sinusoids (90° phase shifted, single ended)

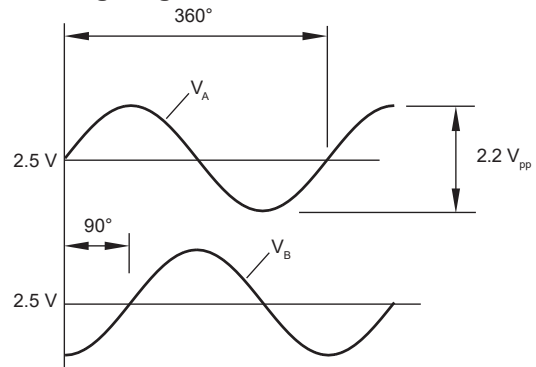
Power supply	$V_{dd} = 5\text{ V} \pm 5\%$
Current consumption	30 mA
Outputs	Single ended
Signal amplitude	$2.2 \pm 0.2\text{ V}_{pp}$
Signal offset (Vref)	$2.5\text{ V} \pm 1\%$
Internal serial impedance	$10\ \Omega$
Maximum speed	60,000 rpm
Temperature Operating and storage	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$

### Connections

RMB20AC



### Timing diagram



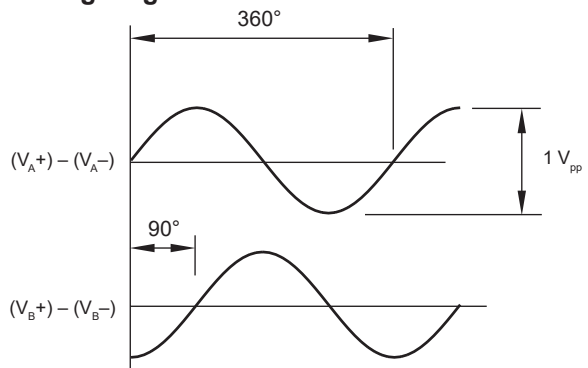
$V_A$  leads  $V_B$  for clockwise rotation of magnet

## RMB20BC – Analogue complementary sinusoidal outputs

2 channels  $V_A$  and  $V_B$  differential sinusoids

Power supply	$V_{dd} = 5\text{ V} \pm 5\%$
Current consumption	30 mA
Outputs	Differential
Signal amplitude	$0.5 \pm 0.1\text{ V}_{pp}$
Signal offset (Vref)	$0 \pm 5\text{ mV}$
Internal serial impedance	$10\ \Omega$
Maximum speed	60,000 rpm
Temperature Operating and storage	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$

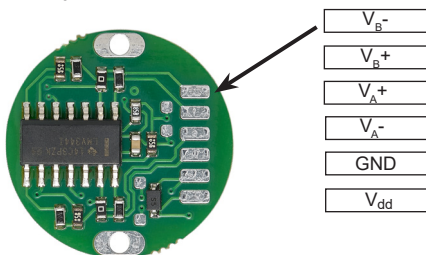
### Timing diagram



$V_A$  leads  $V_B$  for clockwise rotation of magnet

### Connections

RMB20BC



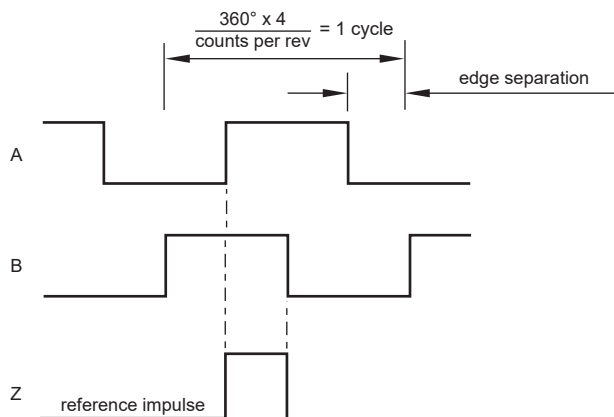
## RMB20IC – Incremental output

Square wave differential line driver to RS422

<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	35 mA
<b>Output signals</b>	A, B, Z, A–, B–, Z– (RS422)
<b>Resolutions</b>	32, 64, 128, 256, 512, 1,024, 2,048, 4,096 cpr
<b>Maximum speed</b>	60.000 for resolutions up to 1,024 cpr 30.000 for 2,048 and 4,096 cpr
<b>Accuracy</b>	$\pm 0.5^\circ$
<b>Hysteresis</b>	$0.18^\circ$
<b>Temperature</b>	$-40^\circ\text{C}$ to $+125^\circ\text{C}$
Operating and storage	

### Timing diagram

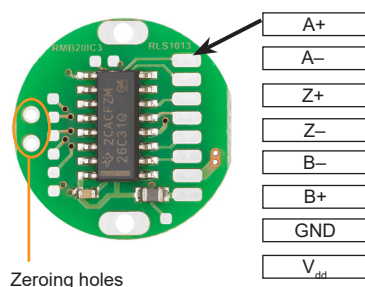
Complementary signals not shown



B leads A for clockwise rotation of magnet.

### Connections

RMB20IC

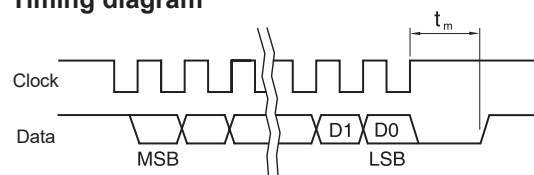


## RMB20SC – Absolute binary synchro-serial interface (SSI)

Serial encoded absolute position measurement

<b>Output code</b>	Natural binary
<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	35 mA
<b>Resolutions</b>	512, 1,024, 2,048, 4,096 positions per revolution
<b>Repeatability</b>	$\leq 0.07^\circ$
<b>Data output</b>	Serial data (RS422)
<b>Data input</b>	Clock (RS422)
<b>Temperature</b>	$-40^\circ\text{C}$ to $+125^\circ\text{C}$
Operating and storage	

### Timing diagram

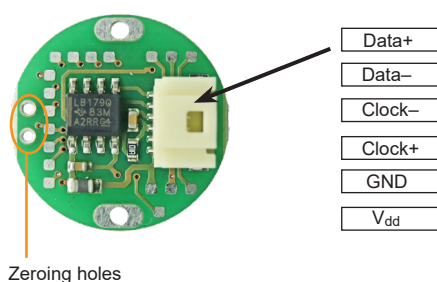
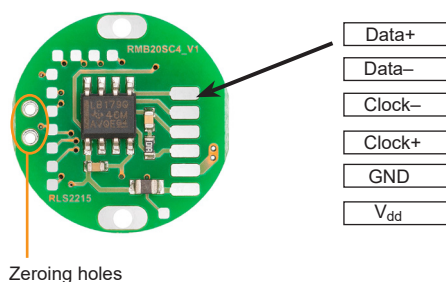


Clock  $\leq 4\text{ MHz}$      $12.5\text{ }\mu\text{s} \leq t_m \leq 20.5\text{ }\mu\text{s}$

Position increases for clockwise rotation of magnet.

### Connections

RMB20SC



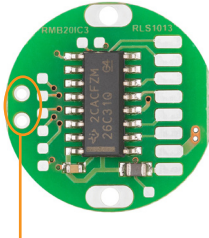
Connector type: Molex 501568-0607  
Mating connector: Molex 501330-0600  
Crimp terminal: 501334-0000

## Zero position setting procedure

Encoder zero position can be easily set by shortening the zeroing pads on the board. After locking the motor at the mechanical zero position short together the two zeroing pads.

The output angle position data can be zeroed at any angle with resolution of 0.0879°.

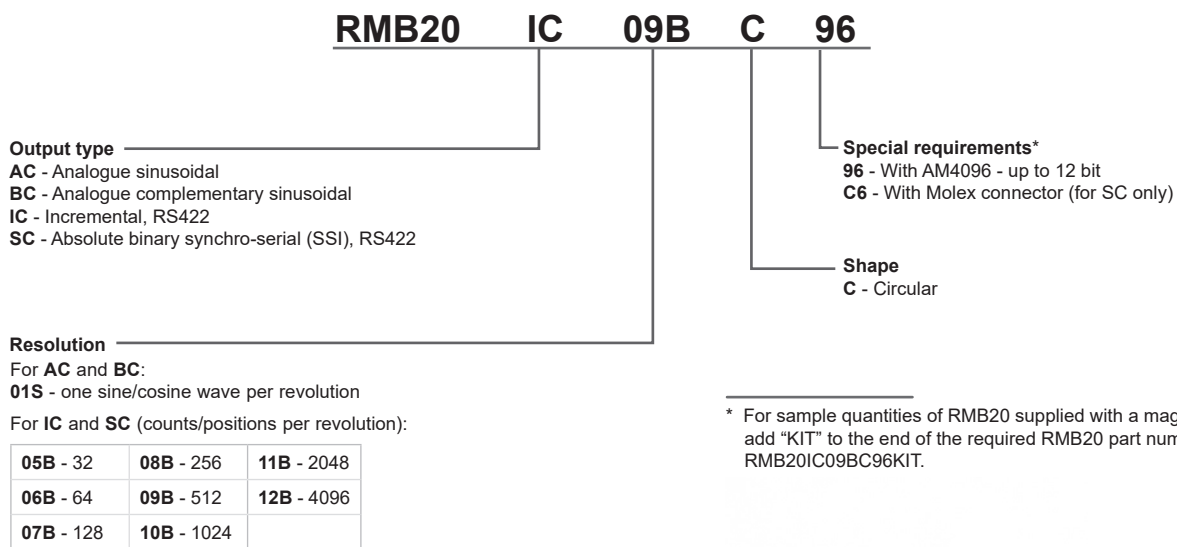
### RMB20 zeroing example



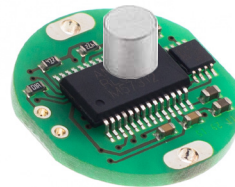
zeroing holes

The zeroing holes can be shorted to set the zero position of the encoder.

## Part numbering

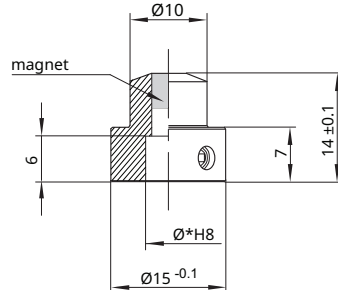


\* For sample quantities of RMB20 supplied with a magnet please add "KIT" to the end of the required RMB20 part number, eg. RMB20IC09BC96KIT.



## Magnetic actuator and magnet ordering information

### Actuator for integration onto shaft



Shaft = Ø\*h7

Fixing: Grub screw provided

\* Hole diameter for nominal shaft size.  
See table on the right for more  
information on available shaft sizes.

#### Part numbers:

For resolutions up to 9 bit absolute (512 cpr incremental)

<b>RMA04A2A00</b> – Ø4 mm shaft	<b>RMA10A2A00</b> – Ø10 mm shaft
<b>RMA05A2A00</b> – Ø5 mm shaft	<b>RMA19A2A00</b> – Ø3/16" shaft
<b>RMA06A2A00</b> – Ø6 mm shaft	<b>RMA25A2A00</b> – Ø1/4" shaft
<b>RMA08A2A00</b> – Ø8 mm shaft	<b>RMA37A2A00</b> – Ø3/8" shaft

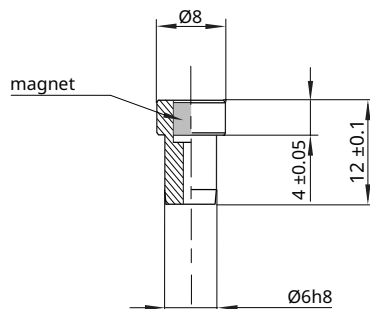
For resolutions from 10 bit absolute (800 cpr incremental) and above

<b>RMA04A3A00</b> – Ø4 mm shaft	<b>RMA10A3A00</b> – Ø10 mm shaft
<b>RMA05A3A00</b> – Ø5 mm shaft	<b>RMA19A3A00</b> – Ø3/16" shaft
<b>RMA06A3A00</b> – Ø6 mm shaft	<b>RMA25A3A00</b> – Ø1/4" shaft
<b>RMA08A3A00</b> – Ø8 mm shaft	<b>RMA37A3A00</b> – Ø3/8" shaft

### Actuator for integration into shaft



with N-pole  
marker



Hole = Ø6G7

Fixing: Glue (recommended – LOCTITE 648 or 2701)

#### Part numbers:

For resolutions up to 9 bit absolute (512 cpr incremental)

**RMH06A2A00**

For resolutions from 10 bit absolute (800 cpr incremental) and above

**RMH06A3A00**

#### With N-pole marker scribed to a ±5° accuracy:

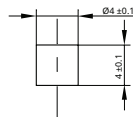
For resolutions up to 9 bit absolute (512 cpr incremental)

**RMH06A2A02**

For resolutions from 10 bit absolute (800 cpr incremental) and above

**RMH06A3A02**

### Magnet for direct recessing in non-ferrous shafts



Fixing: Glue (recommended – LOCTITE 648 or 2701)

#### Part numbers:

For resolutions up to 9 bit absolute (512 cpr incremental)

**RMM44A2A00** (individually packed) – for sample quantities only  
**RMM44A2C00** (packed in tubes)

For resolutions from 10 bit absolute (800 cpr incremental) and above

**RMM44A3A00** (individually packed) – for sample quantities only  
**RMM44A3C00** (packed in tubes)

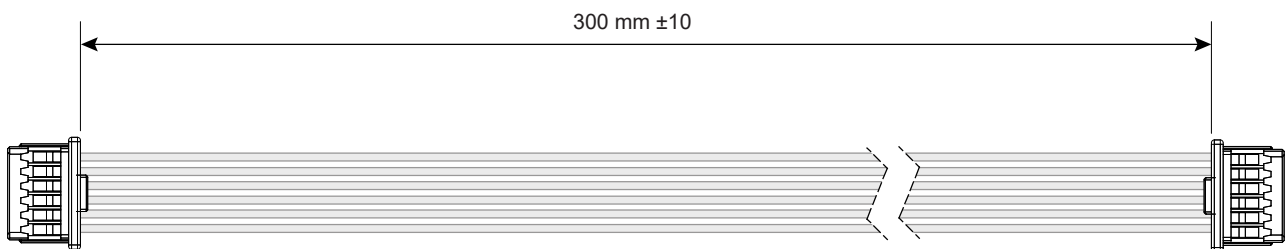
## Accessories part numbering

### Cable assembly with dual ended connectors

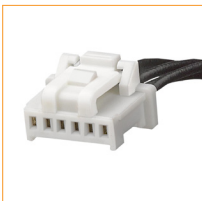
#### Cable specifications for connection of Molex 501330-0600

Part numbers	ACC028 (cable length: 30 cm)
Number of wires	6
Wire size	28 AWG
Wire insulation diameter	0.6 mm
Wire type	UL 1571
Connector	Molex 501330-0600
Crimp terminal	501334-0000
Mating connector type	Molex 501568-0607

#### Dimensions



→ MOLEX 501330-0600



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## Document issues

Issue	Date	Page	Amendments done
1	29. 4. 2016	-	New document
2	14. 7. 2016	3	Zeroing pads added
3	2. 6. 2017	1	RoHS logo added
		4	Zeroing procedure added
4	26. 3. 2019	3	Molex connector for RMB20SC added
5	30. 8. 2019	2	Dimensions drawing amended
		6	Cable accessories amended
6	27. 9. 2021	2	Dimensions drawing amended
		3	Temperature SC amended
7	6. 12. 2021	1, 2, 3, 5	AC / BC output added
8	10. 3. 2022	3	AB / BC output amended

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