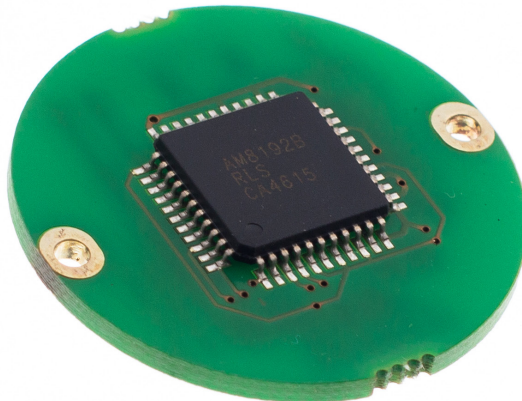


# RMB30 angular magnetic encoder module



The image does not represent all variants.

**The RMB30 encoder module offers the functionality of the RM36 encoder in a component format for easy customer integration. With a wide range of outputs and both 5 V and 24 V power supply variants the device can be easily integrated into existing electronics.**

The encoder module consists of a magnetic actuator and a separate sensor board. The rotation of the magnetic actuator is sensed by a custom encoder chip mounted on the sensor board, and processed to produce the required output format. The output signals are provided in industry standard absolute, incremental, analogue or linear formats.

The RMB30 can be used in a variety of applications including marine, medical, printing, processing, industrial automation, metalworking, engine control and instrumentation.

#### Product range

##### RMB30Cx

Linear current output in a range of variants.

##### RMB30IA

Incremental output, Push-Pull, 24 V

##### RMB30IB

Incremental output, Open Collector NPN, 24 V

##### RMB30IC

Incremental with up to 2,048 pulses per revolution (up to 8,192 counts per revolution with x4 evaluation).

##### RMB30SC

Synchro serial interface (SSI) with up to 8,192 positions per revolution.

##### RMB30SI

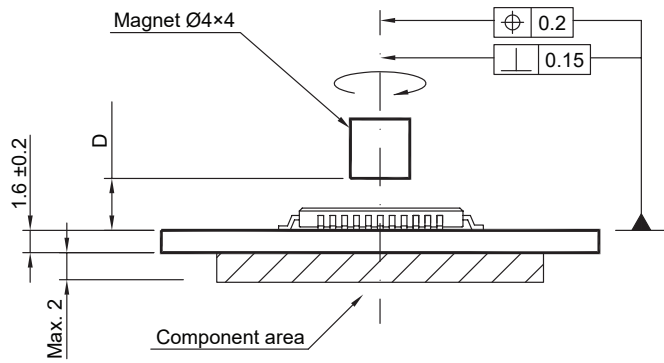
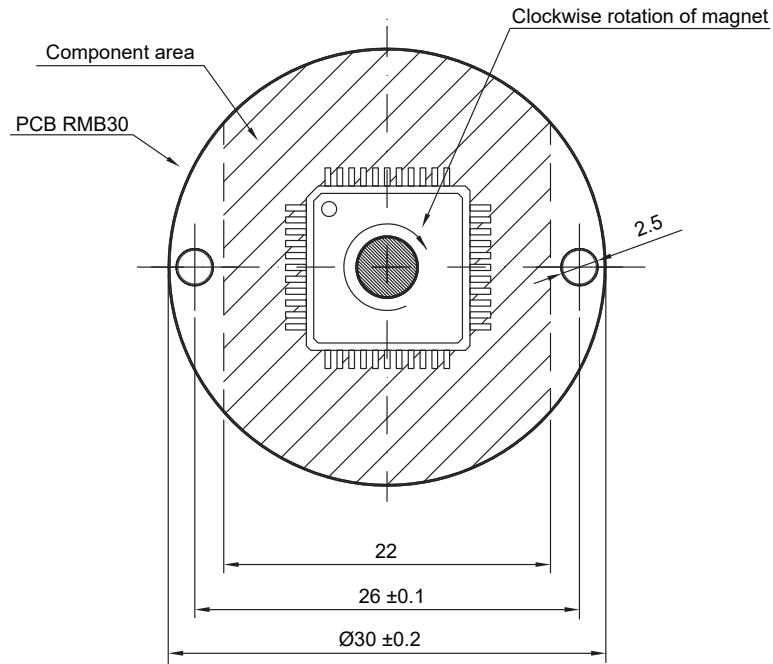
Synchro serial interface (SSI) and incremental outputs.

##### RMB30Vx

Linear voltage output in a range of variants.

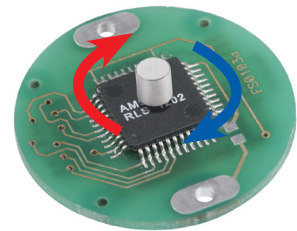
- 30 mm diameter circular module
- 24 V and 5 V power supply versions
- High speed operation to 30,000 rpm
- Absolute - to 13 bit resolution (8,192 counts per revolution)
- Industry standard absolute, incremental, analogue and linear output formats
- Accuracy to  $\pm 0.5^\circ$
- RoHS compliant (lead free) - see Declaration of conformity

Installation drawing



Module	D
IA, IB, IC	3.5 ± 0.2
SC, SI	3.5 ± 0.2
Cx, Vx	2.8 ± 0.5

**NOTE:** For the accuracy specified the center line of the magnet needs to be square to the chip within 2° and aligned within the center of the board ±0.1 mm (mid point between the 2 mounting holes).



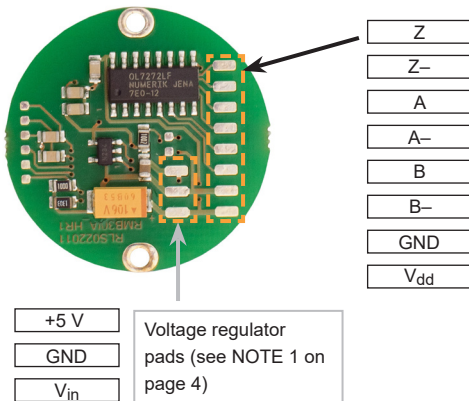
Clockwise (CW) rotation of magnet

## RMB30IA – Incremental, Push-pull

Square wave output

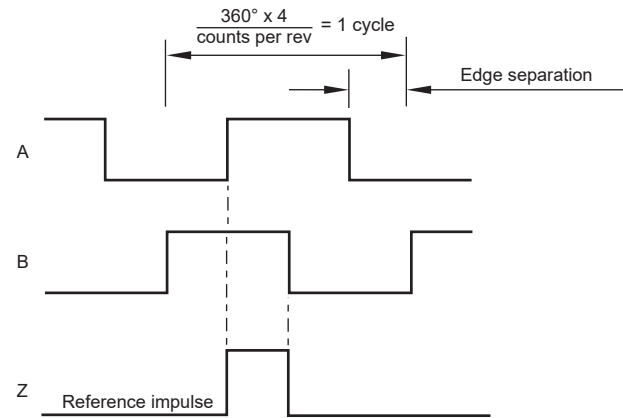
<b>Power supply</b>	$V_{dd} = 8\text{ V to }26\text{ V}$
<b>Current consumption</b>	Typ. 40 mA
<b>Output signals</b>	A, B, Z, A-, B-, Z- (RS422)
<b>Maximum output load</b>	30 mA
<b>Accuracy</b>	Typ. $\pm 0.5^\circ$
<b>Hysteresis</b>	0.18°
<b>Resolution</b>	80 to 2,048 pulses per revolution (up to 8,192 counts per revolution)
<b>Maximum speed</b>	30,000 rpm
<b>Temperature</b>	-40 °C to +125 °C
Operating and storage	

## Connections



## Timing diagram

Complementary signals not shown

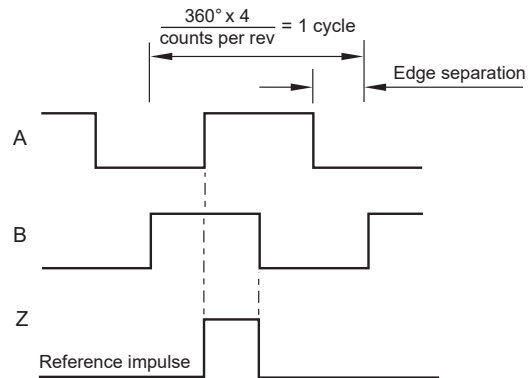


B leads A for clockwise rotation of magnet.

**RMB30IB – Incremental, Open Collector, NPN**  
Square wave output

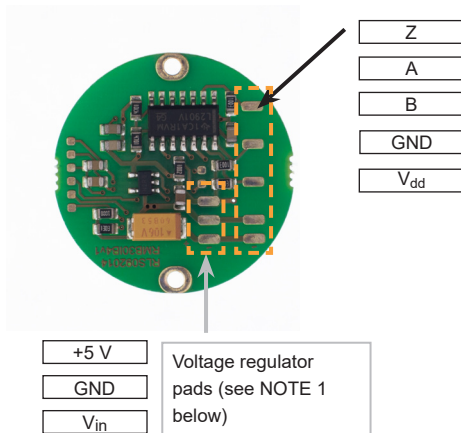
<b>Power supply</b>	$V_{dd} = 8\text{ V to }26\text{ V}$
<b>Current consumption</b>	Typ. 40 mA
<b>Output signals</b>	A, B, Z
<b>Maximum output load</b>	20 mA
<b>Accuracy</b>	Typ. $\pm 0.5^\circ$
<b>Hysteresis</b>	0.18°
<b>Resolution</b>	80 to 2,048 pulses per revolution (up to 8,192 counts per revolution)
<b>Maximum speed</b>	30,000 rpm
<b>Temperature</b>	-40 °C to +125 °C
Operating and storage	

**Timing diagram**

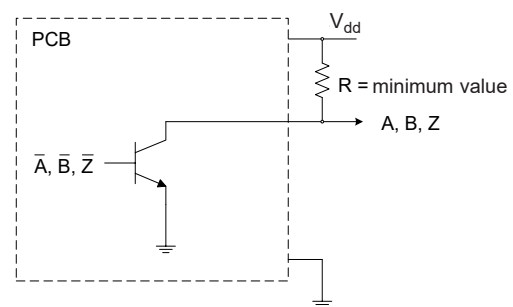


B leads A for clockwise rotation of magnet.

**Connections**



**Recommended signal termination**



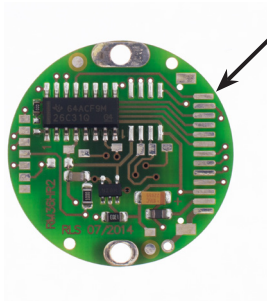
**NOTE 1:** RMB30IA and RMB30IB boards need 2 power supplies; pad V<sub>dd</sub> needs 24 V and pad +5 V needs 5 V. Pads V<sub>in</sub>, GND and +5 V have been provided to allow easy connection to a 3 terminal voltage regulator to generate 5 V from 24 V.

## RMB30IC – Incremental outputs

Square wave differential line driver to RS422

<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	Typ. 40 mA
<b>Output signals</b>	A, B, Z, A-, B-, Z- (RS422)
<b>Accuracy</b>	Typ. $\pm 0.5^\circ$
<b>Hysteresis</b>	0.18°
<b>Resolution</b>	80 to 2,048 pulses per revolution (up to 8,192 counts per revolution)
<b>Maximum speed</b>	30,000 rpm
<b>Temperature</b>	-40 °C to +125 °C
Operating and storage	

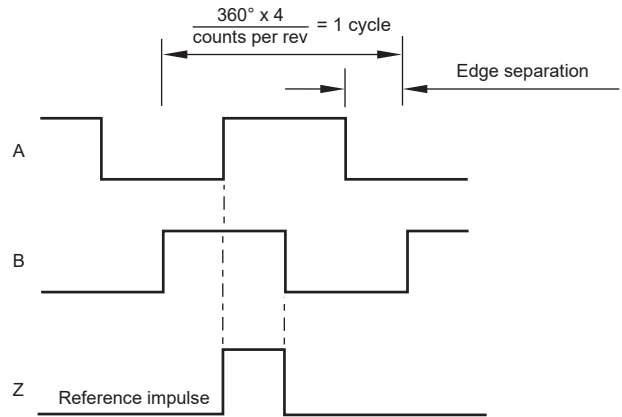
## Connections



A-
A
Z
Z-
B-
B
GND
$V_{dd}$

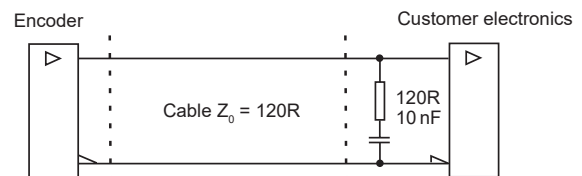
## Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnet.

## Recommended signal termination



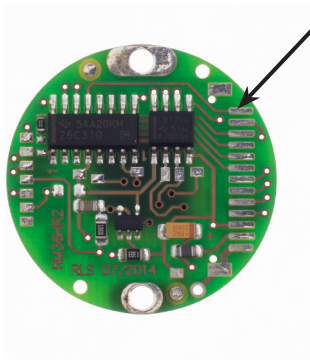


## RMB30SI – Absolute binary synchro-serial (SSI) + Incremental, RS422

Complex feedback device for absolute position at start up as well as during operation + incremental outputs.  
Both the incremental and the SSI output always have the same fixed resolution.

<b>Output code</b>	Natural binary
<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	Typ. 40 mA
<b>Incremental outputs</b>	A, B, Z, A-, B-, Z- (RS422)
<b>Data output</b>	Serial data (RS422)
<b>Data input</b>	Clock (RS422)
<b>Accuracy</b>	Typ. $\pm 0.5^\circ$
<b>Hysteresis</b>	$0.18^\circ$
<b>Resolution</b>	80 to 2,048 pulses per revolution (up to 8,192 counts per revolution)
<b>Maximum speed</b>	30,000 rpm
<b>Temperature</b>	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$
Operating and storage	

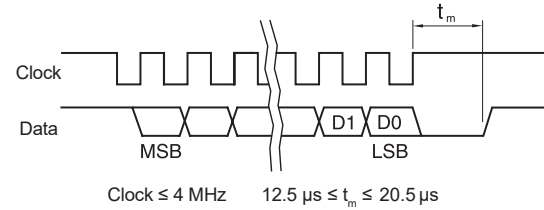
### Connections



A-
A
Z
Z-
B-
B
Data-
Data
Clock-
Clock
GND
$V_{dd}$

### Timing diagram - SSI

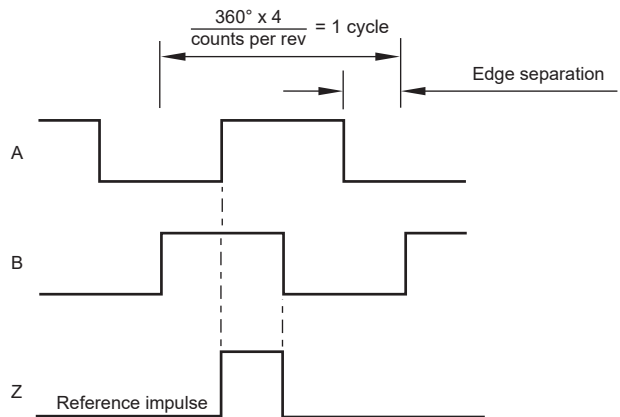
Complementary signals not shown



Position increases for clockwise rotation of magnet.

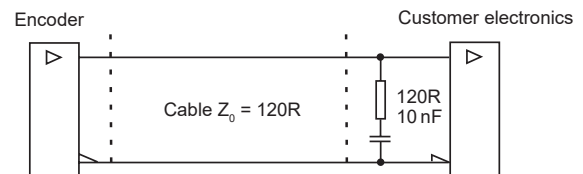
### Timing diagram - incremental

Complementary signals not shown



B leads A for clockwise rotation of magnet.

### Recommended signal termination



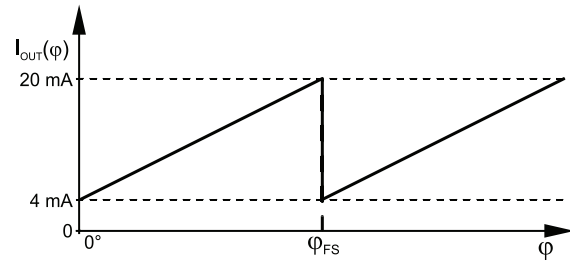
### RMB30Cx – Linear current output

<b>Power supply</b>	$V_{dd} = 20\text{ V to }30\text{ V DC}$ Reverse polarity protection
<b>Current consumption</b>	50 mA plus output current
<b>Output current</b>	4 mA to 20 mA
<b>Output loading</b>	$R_L = 0\text{ to } \frac{V_{dd}}{I_{OUTmax}}$
<b>Nonlinearity</b>	1 %
<b>Maximum speed</b>	30,000 rpm
<b>Temperature</b>	-25 °C to +85 °C Operating and storage

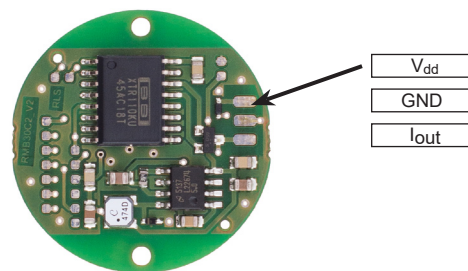
#### Output type and electrical variant

$\varphi_{FS}$	360°	180°	90°	45°
Clockwise	<b>CA</b>	<b>CB</b>	<b>CC</b>	<b>CD</b>
Counterclockwise	<b>CE</b>	<b>CF</b>	<b>CG</b>	<b>CH</b>

#### Electrical output/shaft position



#### Connections



### RMB30Vx / RMF44Vx – Linear voltage output

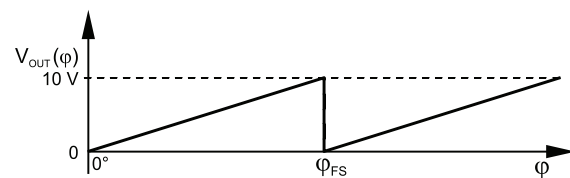
Alternative for potentiometers

<b>Power supply</b>	$V_{dd} = 20\text{ V to }30\text{ V DC}$ Reverse polarity protection
<b>Current consumption</b>	Typ. 40 mA
<b>Output voltage</b>	0 V to 10 V DC
<b>Output loading</b>	Max. 10 mA
<b>Nonlinearity</b>	1 %
<b>Maximum speed</b>	30,000 rpm
<b>Temperature</b>	-40 °C to +125 °C Operating and storage

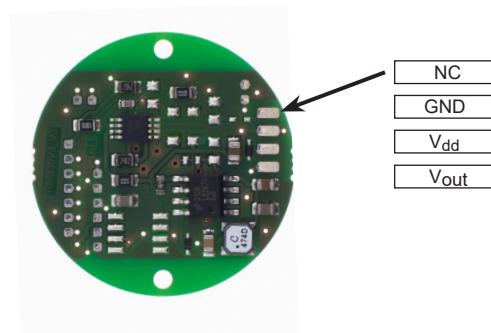
#### Output type and electrical variant

$\varphi_{FS}$	360°	180°	90°	45°
Clockwise	<b>VA</b>	<b>VB</b>	<b>VC</b>	<b>VD</b>
Counterclockwise	<b>VE</b>	<b>VF</b>	<b>VG</b>	<b>VH</b>

#### Electrical output/shaft position



#### Connections





## Part numbering

**RMB30 IA 09B C 1**

### Output type

**IA** - Incremental, push-pull, 24 V  
**IB** - Incremental, open collector, 24 V  
**IC** - Incremental, RS422, 5 V  
**SC** - Absolute binary synchro-serial (SSI), RS422, 5 V  
**SI** - SSI and incremental, 5 V  
**Cx** - Linear current:

Linear current output 4 - 20 mA, supply 20 V to 30 V DC				
	360°	180°	90°	45°
Clockwise	<b>CA</b>	<b>CB</b>	<b>CC</b>	<b>CD</b>
Counterclockwise	<b>CE</b>	<b>CF</b>	<b>CG</b>	<b>CH</b>

**Vx** - Linear voltage:

Linear voltage output 0 - 10 V, supply 20 V to 30 V DC				
	360°	180°	90°	45°
Clockwise	<b>VA</b>	<b>VB</b>	<b>VC</b>	<b>VD</b>
Counterclockwise	<b>VE</b>	<b>VF</b>	<b>VG</b>	<b>VH</b>

**NOTE:** Not all combinations are valid.

**Special requirements\***  
**1** - None (standard)

**Shape**  
**C** - Circular

### Resolution

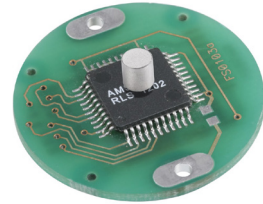
For **IA**, **IB**, **IC**, **SC** and **SI** (counts or positions per revolution)

Decimal			Binary		
<b>D32</b> - 320	<b>D80</b> - 800	<b>2D0</b> - 2000	<b>07B</b> - 128	<b>10B</b> - 1024	<b>13B</b> - 8192
<b>D40</b> - 400	<b>1D0</b> - 1000		<b>08B</b> - 256	<b>11B</b> - 2048	
<b>D50</b> - 500	<b>1D6</b> - 1600		<b>09B</b> - 512	<b>12B</b> - 4096	

For **Cx** and **Vx**

**10B** - 1024 counts per revolution

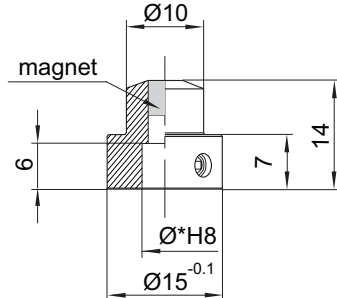
\* For sample quantities of RMB30 supplied with a magnet please add "KIT" to the end of the required RMB30 part number, eg. RMB30IA09BC1KIT.



Series	Output type	Resolution	Shape	Special requirements
<b>RMB30</b>	<b>Cx</b>	10B	C	1
	<b>Vx</b>			
	<b>IA</b>	2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B / 12B / 11B / 10B / 09B / 08B / 07B		
	<b>IB</b>			
	<b>IC</b>			
	<b>SC</b>			
	<b>SI</b>			

## Magnetic actuator and magnet ordering information

### Actuator for integration onto shaft



Shaft = Ø\*h7  
Fixing: Grub screw provided

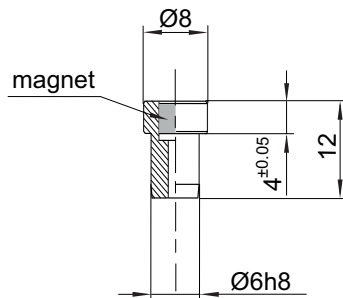
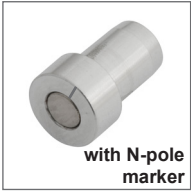
\* Hole diameter for nominal shaft size.  
See table on the right for more information on available shaft sizes.

#### Part numbers:

For resolutions up to 9 bit absolute (512 cpr incremental)  
**RMA04A2A00** – Ø4 mm shaft      **RMA10A2A00** – Ø10 mm shaft  
**RMA05A2A00** – Ø5 mm shaft      **RMA19A2A00** – Ø3/16" shaft  
**RMA06A2A00** – Ø6 mm shaft      **RMA25A2A00** – Ø1/4" shaft  
**RMA08A2A00** – Ø8 mm shaft      **RMA37A2A00** – Ø3/8" shaft

For resolutions from 10 bit absolute (800 cpr incremental) and above  
**RMA04A3A00** – Ø4 mm shaft      **RMA10A3A00** – Ø10 mm shaft  
**RMA05A3A00** – Ø5 mm shaft      **RMA19A3A00** – Ø3/16" shaft  
**RMA06A3A00** – Ø6 mm shaft      **RMA25A3A00** – Ø1/4" shaft  
**RMA08A3A00** – Ø8 mm shaft      **RMA37A3A00** – Ø3/8" shaft

### Actuator for integration into shaft



#### 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**

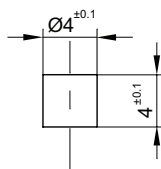
#### With N-pole marker scribed to a ±5° accuracy:

For resolutions up to 9 bit absolute (512 cpr incremental)  
**RMH06A2A02**

For resolutions from 10 bit absolute (800 cpr incremental) and above  
**RMH06A3A02**

Hole = Ø6G7  
Fixing: Glue (recommended – LOCTITE 648 or 2701)

### 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)

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**www.rls.si**

## Document issues

Issue	Date	Page	Amendments done
09	23. 6. 2011	4, 5, 6	New product images
10	21. 5. 2014	4, 5, 6, 8	8 bit resolution option added to output types IC, SC and SI
		3	Other resolutions options added to the RMB30IA output
11	3. 3. 2017	1	RoHS added
		3, 4	IA and IB descriptions amended; IA 9-bit resolution deleted
		8	Cx and Vx resolution amended
		9	Ordering code amended, table added
12	18. 5. 2018	3 - 6	Resolutions amended
13	27. 7. 2018	General	Resolutions amended
14	8. 5. 2019	3, 4, 5, 6	RMB30IA, RMB30IB, RMB30IC, RMB30SC and RMB30SI power consumption amended
		7, 8	Temperature range for RMB30Cx and RMB30Vx / RMF44Vx amended
15	30. 8. 2019	2	Installation drawing amended
16	12. 2. 2020	3	Power supply amended

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