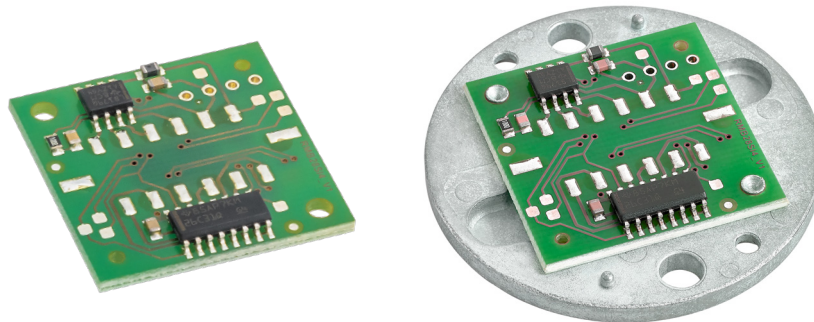


## RMB28/RMF44 angular magnetic encoder module with AM4096



The images do not represent all variants.

**The RMB28 encoder module is designed for direct integration into high volume OEM applications. The low cost 28 mm square PCB can also be supplied with a connector or as RMF44 on a 44 mm diameter metal flange for easy installation.**

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

The RMB28 and RMF44 encoder modules can be used in a variety of OEM applications, including motor control and industrial automation.

### Product range

#### RMB28I / RMF44I

Incremental with 8 to 1,024 pulses per revolution (32 to 4,096 counts per revolution with x4 evaluation).

#### RMB28SC / RMF44SC

Synchro serial interface (SSI) with 32 to 4,096 positions per revolution.

#### RMB28SI / RMF44SI

Synchro serial interface (SSI) with 32 to 4,096 positions per revolution and incremental with 8 to 1,024 pulses per revolution (32 to 4,096 counts per revolution with x 4 evaluation).

- 28 mm square module with the option of 44 mm diameter metal flange
- Low cost OEM integration
- 5 V power supply versions
- High speed operation to 60,000 rpm
- Absolute - to 12 bit resolution (4,096 counts per revolution)
- Industry standard absolute and incremental output formats
- RoHS compliant (lead-free) - see Declaration of conformity

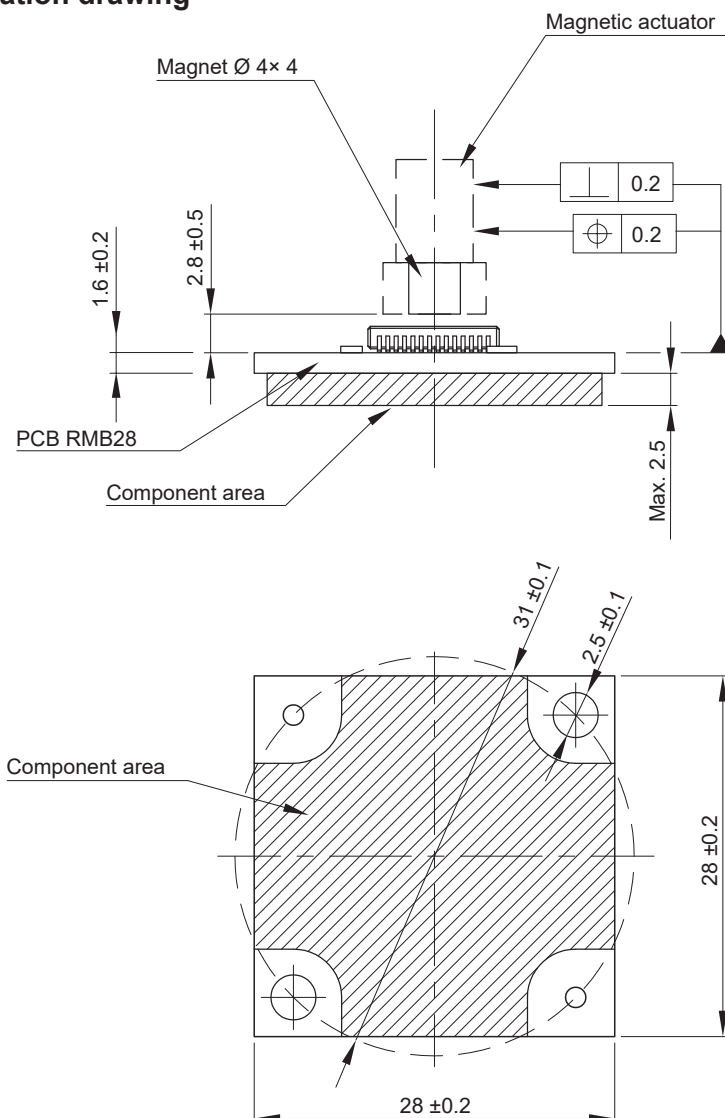


### SATI03

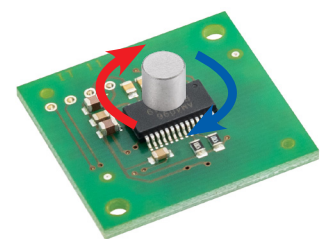
#### Stand Alone Trimming Interface

- Accuracy up to  $\pm 0.2^\circ$
- Additional information on SATI can be found in the "SATI user manual", document SATI03D06, available for download from [www.rls.si/sati03](http://www.rls.si/sati03).

## RMB28 installation drawing

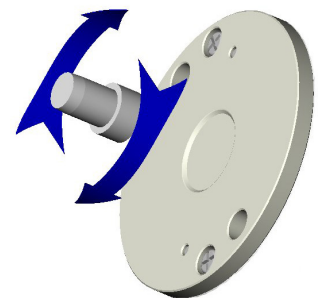
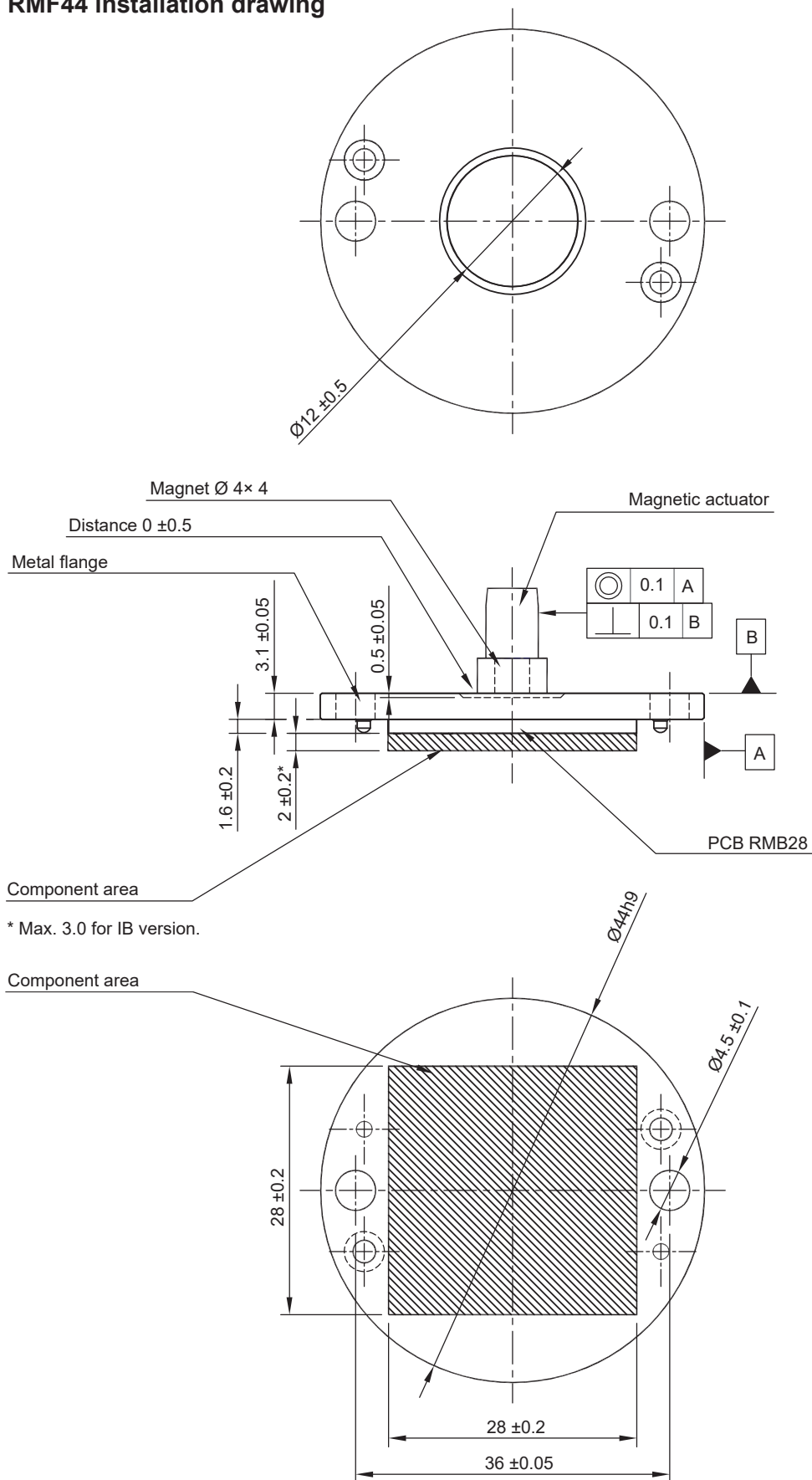


**NOTE:** For the accuracy specified, the central line of the magnet needs to be square to the chip within 2° and aligned within the center of the board ±0.1 mm (mid point between the two mounting holes).



Clockwise (CW) rotation of magnet

# RMF44 installation drawing

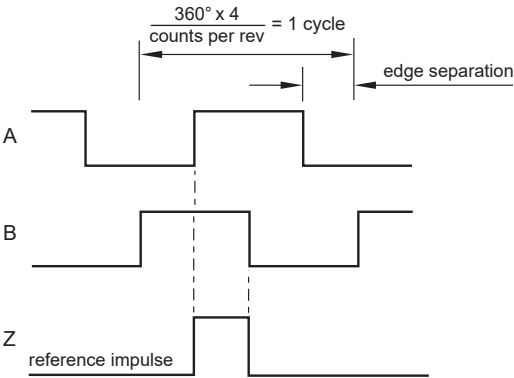


Clockwise (CW) rotation of magnet

RMB28IA / RMF44IA – Incremental, Open Collector, NPN  
Square wave output

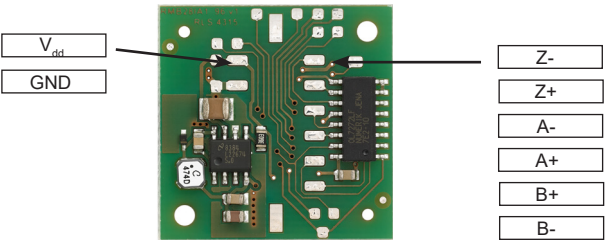
Power supply	$V_{dd} = 8\text{ V to }26\text{ V}$
Current consumption	50 mA
Output signals	A, B, Z, A-, B-, Z- (RS422)
Maximum output load	30 mA
Accuracy	Typ. $\pm 0.5^\circ$
Hysteresis	$0.18^\circ$
Resolution	32, 64, 128, 256, 512, 1,024, 2,048, 4,096 cpr
Maximum speed	60,000 rpm for resolutions up to 1,024 cpr 30,000 rpm for 2,048 and 4,096 cpr
Temperature	$-40\text{ }^\circ\text{C to }+125\text{ }^\circ\text{C}$ (IP64) Operating and storage $-40\text{ }^\circ\text{C to }+85\text{ }^\circ\text{C}$ (IP68)

Timing diagram



B leads A for clockwise rotation of magnet.

Connections



## RMB28IC / RMF44IC– Incremental, RS422

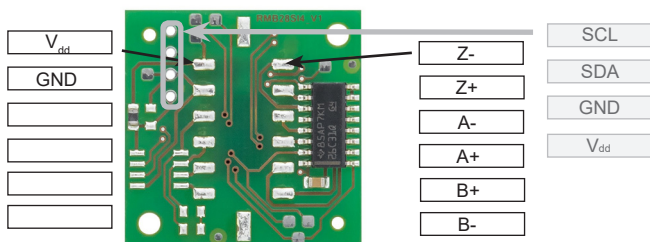
Square wave differential line driver to RS422

<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	Max. 35 mA
<b>Output signals</b>	A, B, Z, A–, B–, Z– (RS422)
<b>Accuracy</b>	$\pm 0.5^\circ$
<b>with SATI</b>	$\pm 0.2^\circ$
<b>Hysteresis</b>	$0.18^\circ$
<b>Resolutions</b>	32, 64, 128, 256, 512, 1,024, 2,048, 4,096 cpr
<b>Maximum speed</b>	60,000 rpm for resolutions up to 1,024 cpr 30,000 rpm for 2,048 and 4,096 cpr
<b>Temperature</b>	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$
<b>Operating and storage</b>	$-40\text{ }^\circ\text{C}$ to $+105\text{ }^\circ\text{C}$ (with connector)

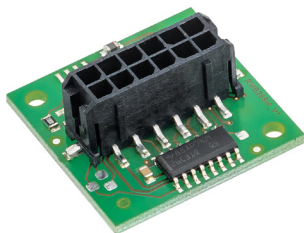
### Connections

#### RMB28IC / RMF44IC for trimming with SATI:

TWI connections to encoder



With Molex connector



#### Connector type

Molex 501568-0607

#### Mating connector

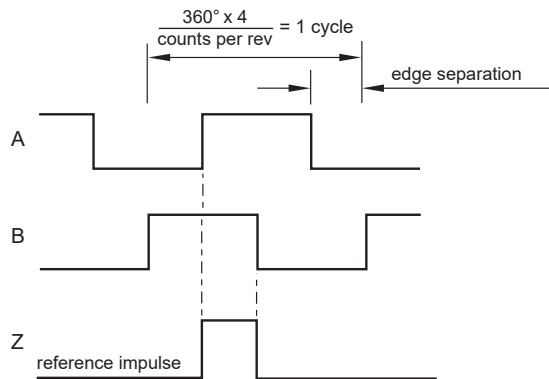
Molex 501330-0600 (not provided)

#### Crimp terminal

501334-0000 (not provided)

### Timing diagram

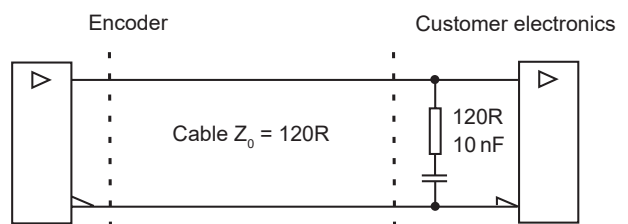
Complementary signals not shown



B leads A for clockwise rotation of magnet.

### Recommended signal termination

For data output lines only



#### SATI03

#### Stand Alone Trimming Interface

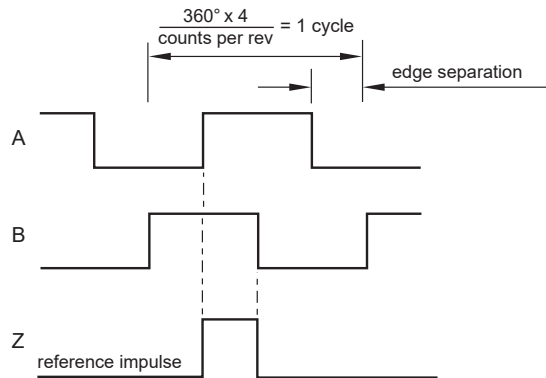
- Accuracy up to  $\pm 0.2^\circ$
- Additional information on SATI can be found in the "SATI user manual", document SATI03D06, available for download from [www.rls.si/sati03](http://www.rls.si/sati03).

## RMB28IE / RMF44IE – Incremental, Open Collector, NPN

Low cost alternative for ball bearing encoders

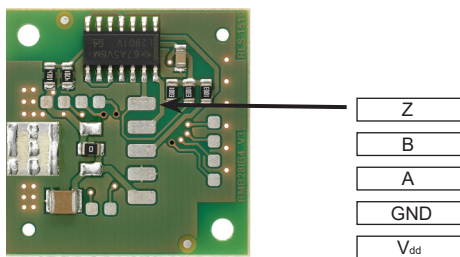
<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	35 mA (not loaded)
<b>Output signals</b>	A, B, Z
<b>Maximum output load</b>	20 mA
<b>Accuracy</b>	Typ. $\pm 0.5^\circ$
<b>Hysteresis</b>	$0.18^\circ$
<b>Resolutions</b>	32, 64, 128, 256, 512, 1,024, 2,048, 4,096 cpr
<b>Maximum speed</b>	60,000 rpm for resolutions up to 1,024 cpr 30,000 rpm for 2,048 and 4,096 cpr
<b>Temperature</b>	$-40^\circ\text{C}$ to $+125^\circ\text{C}$
Operating and storage	

### Timing diagram

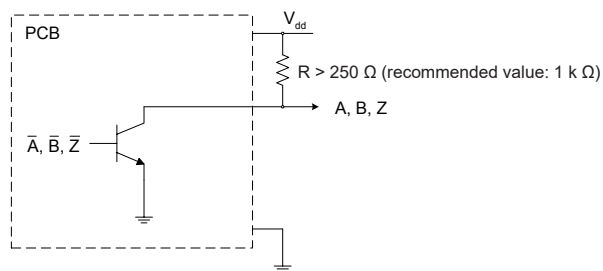


B leads A for clockwise rotation of magnet.

### Connections



### Recommended signal termination



## RMB28SC / RMF44SC – Absolute binary synchro-serial (SSI), RS422

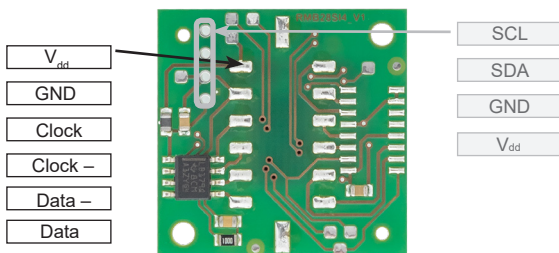
Serial encoded absolute position measurement

<b>Output code</b>	Natural binary
<b>Power supply</b>	$V_{dd} = 5\text{ V} \pm 5\%$
<b>Current consumption</b>	Max. 35 mA
<b>Data output</b>	Serial data (RS422)
<b>Data input</b>	Clock (RS422)
<b>Accuracy</b>	Typ. $\pm 0.5^\circ$
<b>with SATI</b>	$\pm 0.2^\circ$
<b>Hysteresis</b>	$0.18^\circ$
<b>Resolutions</b>	32, 64, 128, 256, 512, 1,024, 2,048, 4,096 cpr
<b>Maximum speed</b>	60,000 rpm for resolutions up to 1,024 cpr 30,000 rpm for 2,048 and 4,096 cpr
<b>Temperature</b>	$-40^\circ\text{C}$ to $+125^\circ\text{C}$
<b>Operating and storage</b>	$-40^\circ\text{C}$ to $+105^\circ\text{C}$ (with connector)

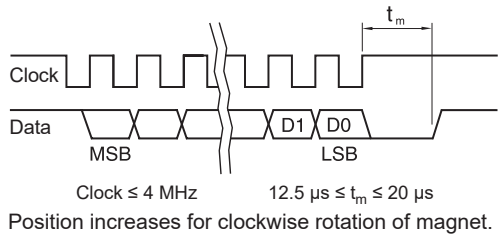
### Connections

RMB28SC / RMF44SC for trimming with SATI:

TWI connections to encoder

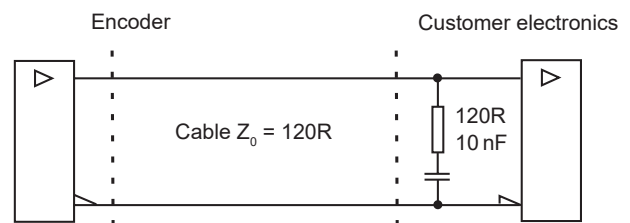


### Timing diagram

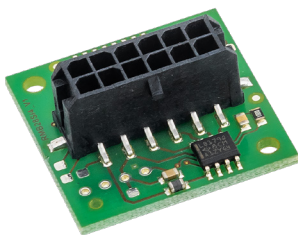


### Recommended signal termination

For data output lines only



With Molex connector



#### Connector type

Molex 501568-0607

#### Mating connector

Molex 501330-0600 (not provided)

#### Crimp terminal

501334-0000 (not provided)



#### SATI03

#### Stand Alone Trimming Interface

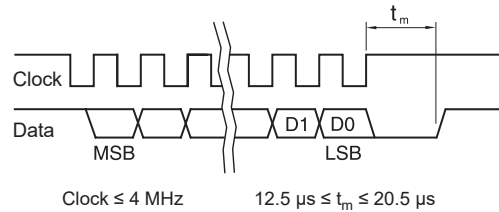
- Accuracy up to  $\pm 0.2^\circ$
- Additional information on SATI can be found in the "SATI user manual", document SATI03D06, available for download from [www.rls.si/sati03](http://www.rls.si/sati03).

## RMB28SI / RMF44SI – 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>	Max. 35 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>with SATI</b>	$\pm 0.2^\circ$
<b>Hysteresis</b>	$0.18^\circ$
<b>Resolutions</b>	32, 64, 128, 256, 512, 1,024, 2,048, 4,096 cpr
<b>Maximum speed</b>	60,000 rpm for resolutions up to 1,024 cpr 30,000 rpm for 2,048 and 4,096 cpr
<b>Temperature</b>	$-40^\circ\text{C}$ to $+125^\circ\text{C}$
<b>Operating and storage</b>	$-40^\circ\text{C}$ to $+105^\circ\text{C}$ (with connector)

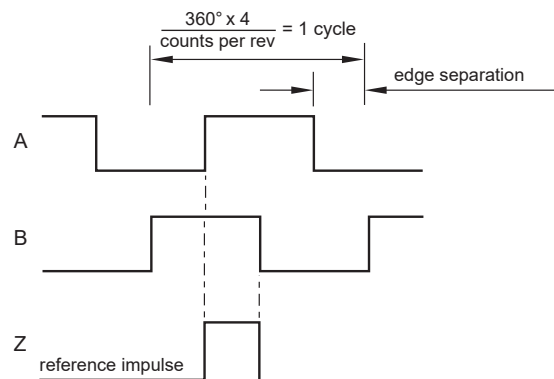
### Timing diagram - SSI



Position increases for clockwise rotation of magnetic actuator.

### Timing diagram - Incremental

Complementary signals not shown

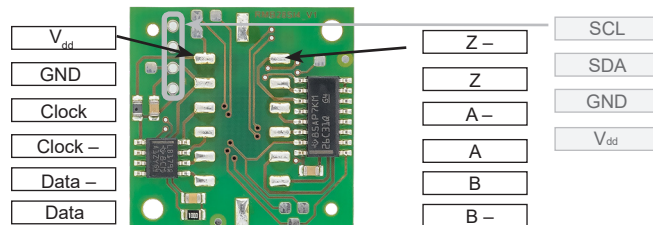


B leads A for clockwise rotation of magnet.

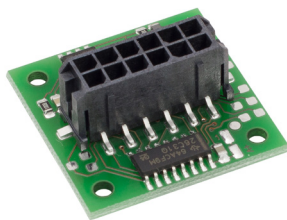
### Connections

RMB28SI / RMF44SI for trimming with SATI:

TWI connections to encoder



With Molex connector



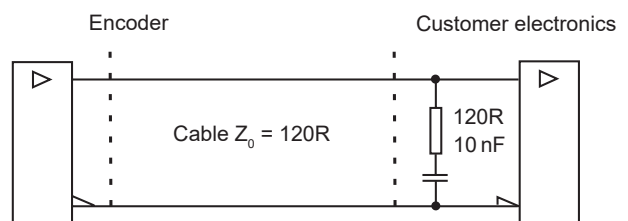
**Connector type**  
Molex 501568-0607

**Mating connector**  
Molex 501330-0600 (not provided)

**Crimp terminal**  
501334-0000 (not provided)

### Recommended signal termination

For data output lines only



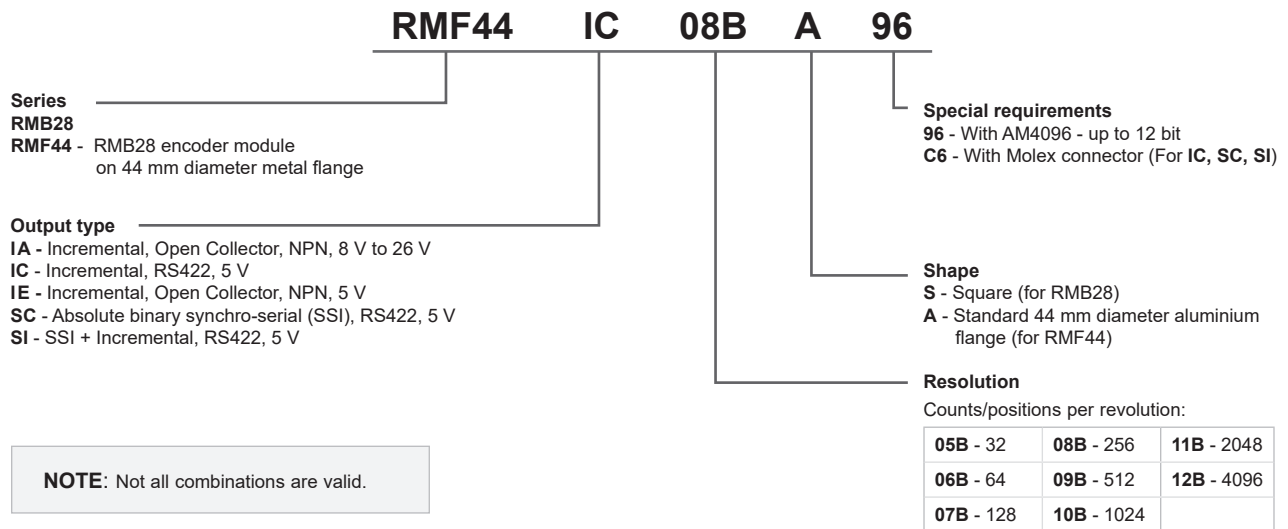
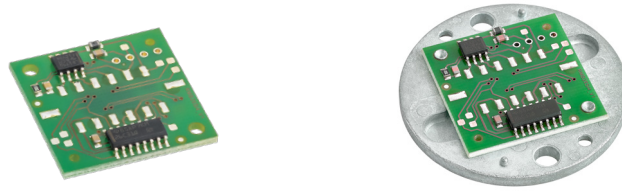
### SATI03

#### Stand Alone Trimming Interface

- Accuracy up to  $\pm 0.2^\circ$
- Additional information on SATI can be found in the "SATI user manual", document SATI03D06, available for download from [www.rls.si/sati03](http://www.rls.si/sati03).



## Part numbering



\* For sample quantities of RMB28 supplied with a magnet please add "KIT" to the end of the required RMB28 part number, eg. RMB28IC09BS96KIT.

Series	Output type	Resolution	Shape	Special requirements
RMB28 / RMF44	IA	05B / 06B / 07B / 08B / 09B / 10B / 11B / 12B	S / A	96
	IC			96 / C6
	IE			96
	SC			96 / C6
	SI			

## Accessories part numbering



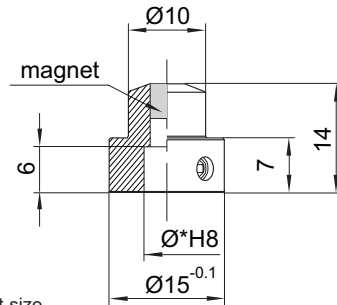
Stand alone trimming interface

**Part number: SATI03**

Additional information on SATI can be found in the "SATI user manual", document SATI03D06, available for download from [www.rls.si/sati03](http://www.rls.si/sati03).

## 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:

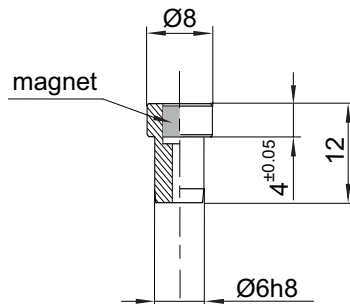
For resolutions up to 9 bit absolute (512 cpr incremental)

<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



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:

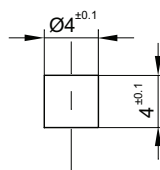
For resolutions up to 9 bit absolute (512 cpr incremental)

**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)

## Head office

### RLS merilna tehnika d.o.o.

Poslovna cona Žeje pri Komendi  
Pod vrbami 2  
SI-1218 Komenda  
Slovenia

**T** +386 1 5272100

**F** +386 1 5272129

**E** [mail@rls.si](mailto:mail@rls.si)

**www.rls.si**

## Document issues

Issue	Date	Page	Amendments done
1	29. 10. 2019	-	New document
2	30. 1. 2020	6	Signal termination detail added
3	29. 5. 2020	1, 5, 7, 8, 9	SATI01 replaced with SATI03 interface

This product is not designed or intended for use outside the environmental limitations and operating parameters expressly stated on the product's datasheet. Products are not designed or intended for use in medical, military, aerospace, automotive or oil & gas applications or any safety-critical applications where a failure of the product could cause severe environmental or property damage, personal injury or death. Any use in such applications must be specifically agreed to by seller in writing, and is subject to such additional terms as the seller may impose in its sole discretion. Use of products in such applications is at buyer's own risk, and buyer will indemnify and hold harmless seller and its affiliates against any liability, loss, damage or expense arising from such use. Information contained in this datasheet was derived from product testing under controlled laboratory conditions and data reported thereon is subject to the stated tolerances and variations, or if none are stated, then to tolerances and variations consistent with usual trade practices and testing methods. The product's performance outside of laboratory conditions, including when one or more operating parameters is at its maximum range, may not conform to the product's datasheet. Further, information in the product's datasheet does not reflect the performance of the product in any application, end-use or operating environment buyer or its customer may put the product to. Seller and its affiliates make no recommendation, warranty or representation as to the suitability of the product for buyer's application, use, end-product, process or combination with any other product or as to any results buyer or its customer might obtain in their use of the product. Buyer should use its own knowledge, judgment, expertise and testing in selecting the product for buyer's application, end-use and/or operating environment, and should not rely on any oral or written statement, representation, or samples made by seller or its affiliates for any purpose. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH IN THE SELLER'S TERMS AND CONDITIONS OF SALE, SELLER MAKES NO WARRANTY EXPRESS OR IMPLIED WITH RESPECT TO THE PRODUCT, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE DISCLAIMED AND EXCLUDED. All sales are subject to seller's exclusive terms and conditions of sale which, where the seller is (a) RLS merilna tehnika d.o.o., are available at <https://www.rls.si/customer-service>, (b) Renishaw, Inc., are available at <http://www.renishaw.com/Shop/legal/en/-42186>, or (c) another person, are available on request, and in each case, are incorporated herein by reference, and are the exclusive terms of sale. No other terms and conditions apply. Buyer is not authorized to make any statements or representations that expand upon or extend the environmental limitations and operating parameters of the products, or which imply permitted usage outside of that expressly stated on the datasheet or agreed to in writing by seller.

RLS merilna tehnika d.o.o. has made considerable effort to ensure the content of this document is correct at the date of publication but makes no warranties or representations regarding the content. RLS merilna tehnika d.o.o. excludes liability, howsoever arising, for any inaccuracies in this document. © 2020 RLS d.o.o.