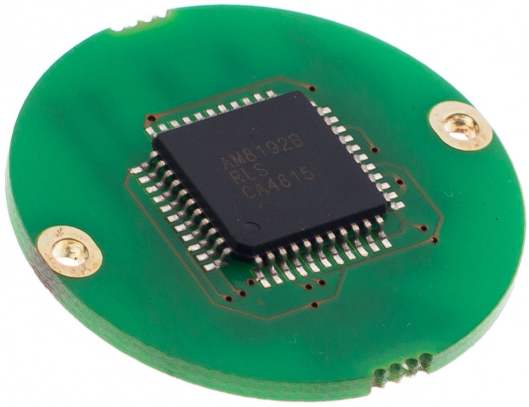
Data sheet
RMB30D01_16
Issue 16, 12th February 2020

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).

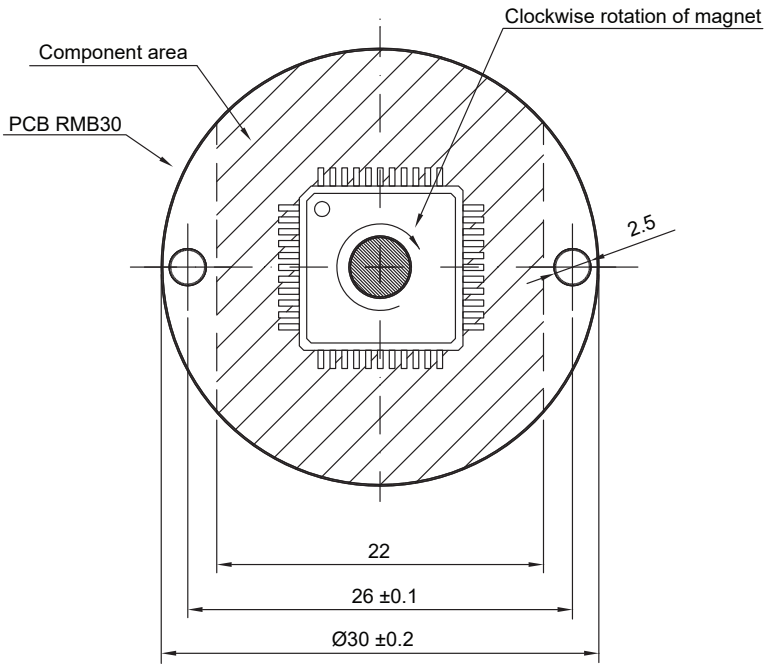
RMB30SC
Synchro serial interface (SSI) with up to 8,192 positions per revolution.

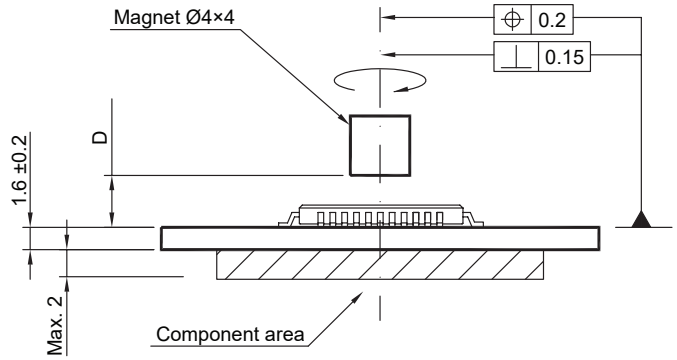
RMB30SI
Synchro serial interface (SSI) and incremental outputs.

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 ±0.5°
- RoHS compliant (lead free) - see Declaration of conformity

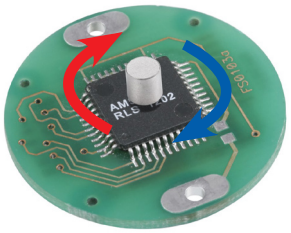
Installation drawing





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

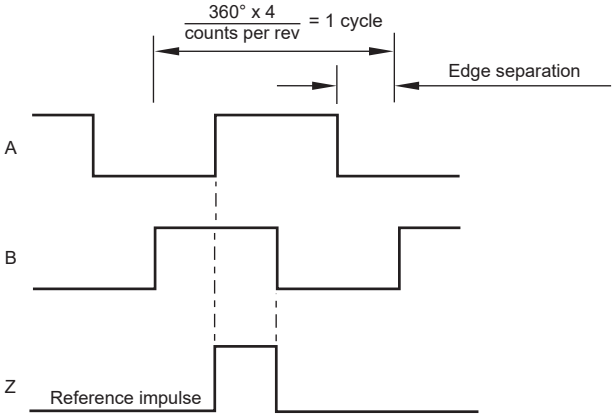
RMB30IA – Incremental, Push-pull

Square wave output

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

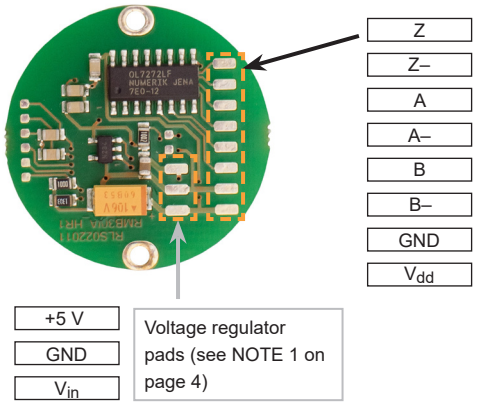
Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnet.

Connections

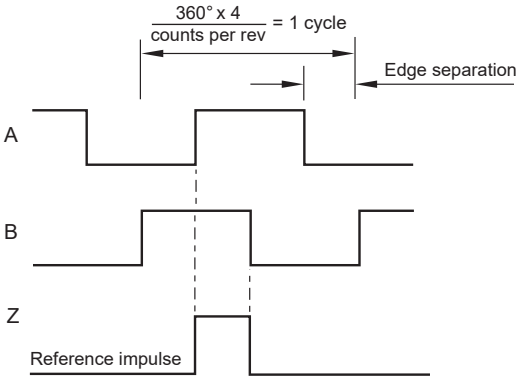


RMB30IB – Incremental, Open Collector, NPN

Square wave output

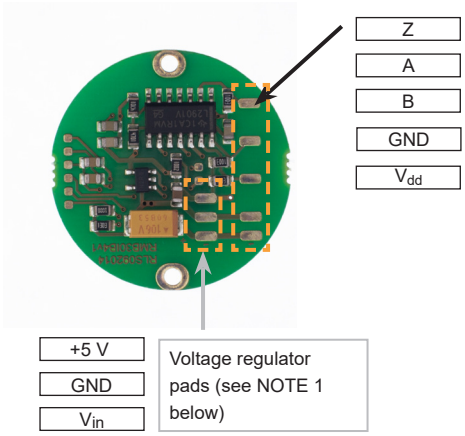
Power supply	V_{dd} = 8 V to 26 V
Current consumption	Typ. 40 mA
Output signals	A, B, Z
Maximum output load	20 mA
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Resolution	80 to 2,048 pulses per revolution (up to 8,192 counts per revolution)
Maximum speed	30,000 rpm
Temperature Operating and storage	–40 °C to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

Timing diagram

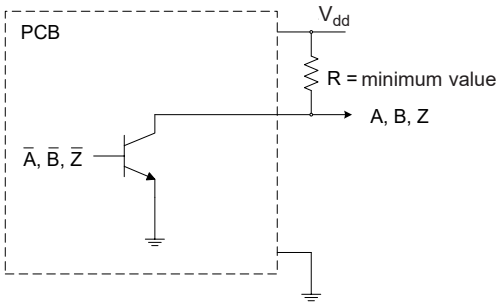


B leads A for clockwise rotation of magnet.

Connections



Recommended signal termination



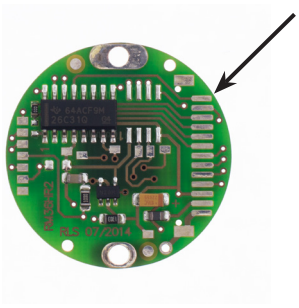
NOTE 1: RMB30IA and RMB30IB boards need 2 power supplies; pad V_{dd} needs 24 V and pad +5 V needs 5 V. Pads V_{in}, GND and +5 V have been provided to allow easy connection to a 3 terminal voltage regulator to generate 5 V from 24 V.

RMB30IC – Incremental outputs

Square wave differential line driver to RS422

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

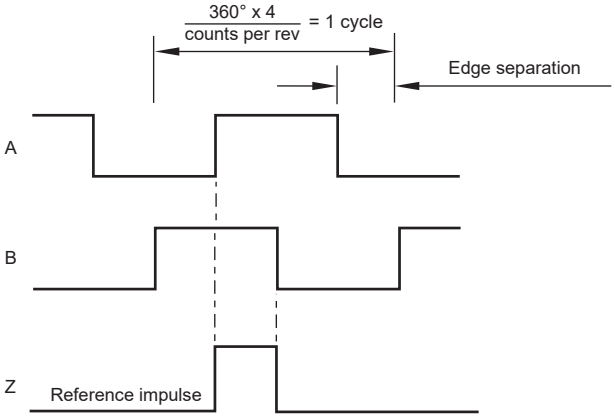
Connections



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

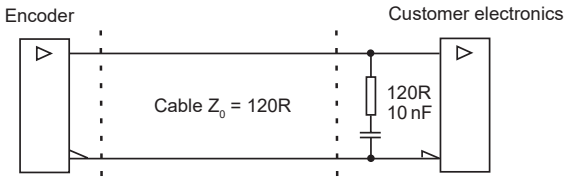
Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnet.

Recommended signal termination

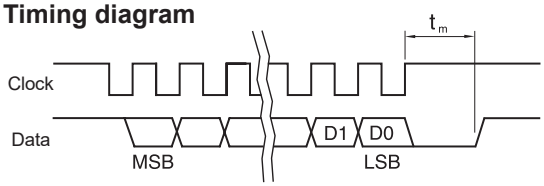


RMB30SC – Absolute binary synchro-serial interface (SSI)

Serial encoded absolute position measurement

Output code	Natural binary
Power supply	V_{dd} = 5 V ± 5 %
Current consumption	Typ. 40 mA
Data output	Serial data (RS422)
Data input	Clock (RS422)
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Resolution	up to 8,192 counts per revolution
Maximum speed	30,000 rpm
Temperature Operating and storage	–40 °C to +125 °C

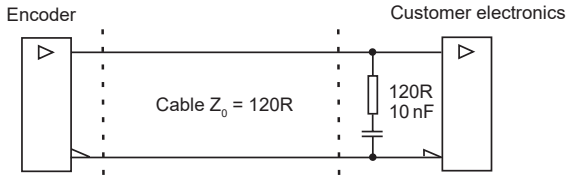
Timing diagram



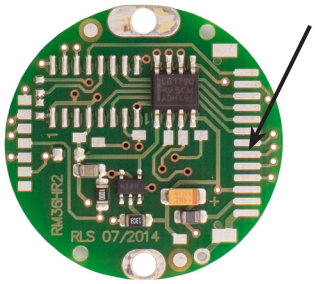
Clock ≤ 4 MHz 12.5 µs ≤ t_m ≤ 20.5 µs

Position increases for clockwise rotation of magnet.

Recommended signal termination



Connections



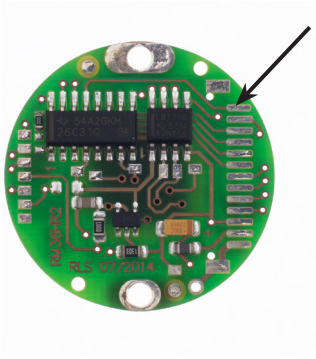
Data-
Data
Clock-
Clock
GND
V_{dd}

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.

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

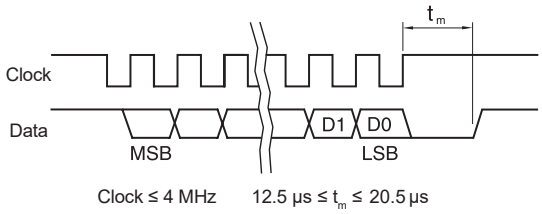
Connections



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

Timing diagram - SSI

Complementary signals not shown

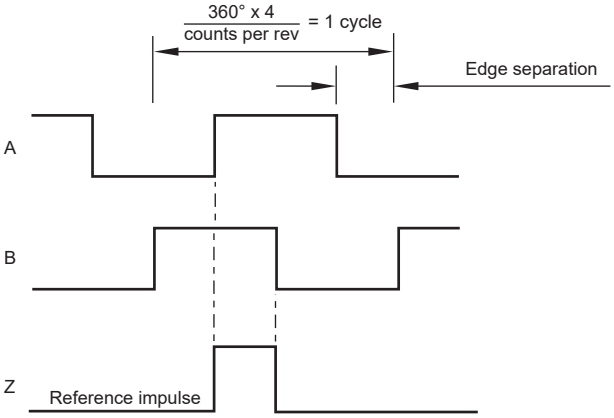


Clock ≤ 4 MHz 12.5 µs ≤ t_m ≤ 20.5 µs

Position increases for clockwise rotation of magnet.

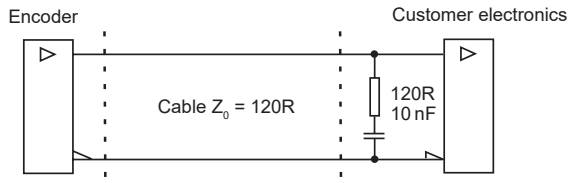
Timing diagram - incremental

Complementary signals not shown



B leads A for clockwise rotation of magnet.

Recommended signal termination



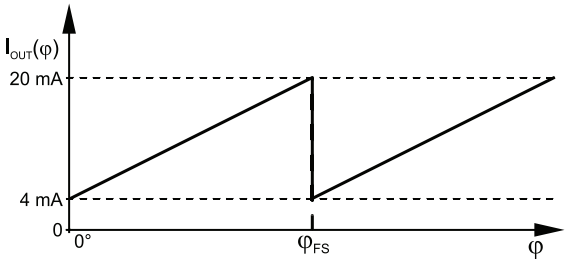
RMB30Cx – Linear current output

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

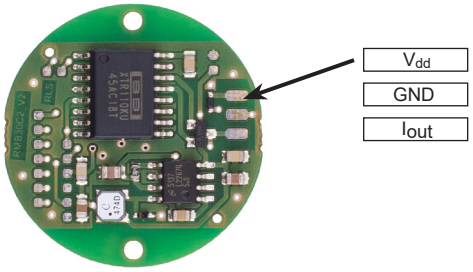
Output type and electrical variant

φ_{FS}	360°	180°	90°	45°
Clockwise	**CA**	**CB**	**CC**	**CD**
Counterclockwise	**CE**	**CF**	**CG**	**CH**

Electrical output/shaft position



Connections



RMB30Vx / RMF44Vx – Linear voltage output

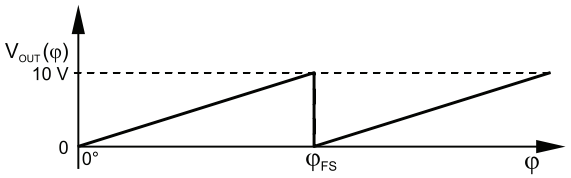
Alternative for potentiometers

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

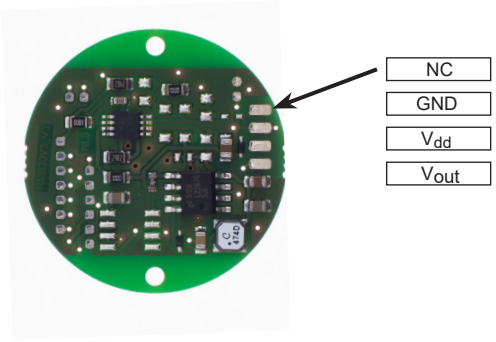
Output type and electrical variant

φ_{FS}	360°	180°	90°	45°
Clockwise	**VA**	**VB**	**VC**	**VD**
Counterclockwise	**VE**	**VF**	**VG**	**VH**

Electrical output/shaft position



Connections



Part numbering

RMB30 IA 09B C 1

Special requirements*
1 - None (standard)

Shape
C - Circular

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	**CA**	**CB**	**CC**	**CD**
Counterclockwise	**CE**	**CF**	**CG**	**CH**

Vx - Linear voltage:

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

NOTE: Not all combinations are valid.

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

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

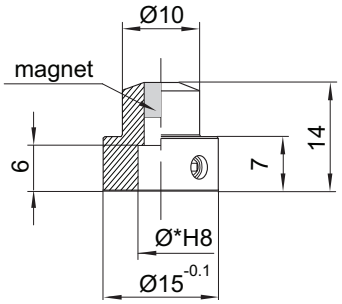
For Cx and Vx
10B - 1024 counts per revolution

* 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
RMB30	Cx	10B	C	1
	Vx			
	IA	2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B / 12B / 11B / 10B / 09B / 08B / 07B		
	IB			
	IC			
	SC			
	SI			

Magnetic actuator and magnet ordering information

Actuator for integration onto shaft



Shaft = Ø*h7
Fixing: Grub screw provided

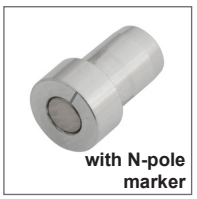
* Hole diameter for nominal shaft size. See table on the right for more information on available shaft sizes.

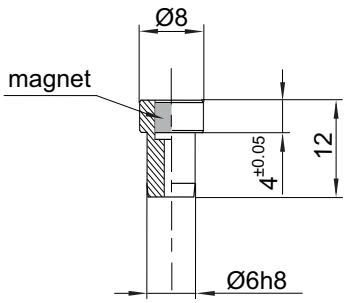
Part numbers:

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

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

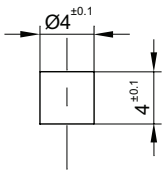
For resolutions from 10 bit absolute (800 cpr incremental) and above
RMH06A3A00

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)

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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