

RM44/RM58 rotary magnetic encoder with AM4096





The RM44/RM58 is an encoder for integration onto electric motors or other devices for measuring shaft position and rotational speed.

The solid metal housing provides highest IP protection classes, high EMC immunity, extended operating temperature range and best possible shock and vibration resistance.

The output signals are provided in industry standard absolute, incremental, analogue sinusoidal and linear voltage formats. Available are resolutions of up to 12 bit absolute SSI and/ or 4,096 counts per revolution incremental for 5 V or 24 V power supply.

A system accuracy of $\pm 0.5^{\circ}$ can be achieved with the supplied magnet. For easy integration onto or into the shaft, a range of magnetic actuators is also available.

Product range

RM44/RM58AC

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

RM44/RM58BC

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

RM44/RM58I

Incremental with 80 to 2,048 pulses per revolution (320 to 4,096 counts per revolution with x 4 evaluation) and/ or complementary analogue outputs with a single sine/cosine cycle per revolution.

RM44/RM58SC

Synchro serial interface (SSI) with 320 to 4,096 positions per revolution.

RM44/RM58SI

Synchro serial interface (SSI) with 320 to 4,096 positions per revolution and incremental with 80 to 2,048 pulses per revolution (320 to 4,096 counts per revolution with x 4 evaluation).

- Easy to install with self locating design
- Low cost for OEM integration
- Fully sealed to IP68
- High reliability from proven non-contact sensing technology

Data sheet RM44D06_05

Storage and handling



IMPORTANT: Power to RM44 encoders must be supplied from a DC SELV supply complying with the essential requirements of EN (IEC) 60950 or similar specification.

The RM44 series encoders have been designed to the relevant EMC standards, but must be correctly integrated to achieve EMC compliance. In particular, attention to shielding arrangements is critical.



Connections



	RM44/RM58AC		RM44/R	M58BC	RM44/RM58IA, IC		RM44/RM58IE		RM44/RM58SC		RM44/RM58SI	
Pin Nr.	Function	Wire colour	Function	Wire colour								
1	Shiel	d - see conne	ction diagram	Shield -	see connectio	on diagram	Shield - se	e connection	diagram	Shield - see of	connection dia	ıgram
2	V _A	Black	V _A	Green	Z+	White	Z	White	Clock	White	A+	Grey
3	V _B	Brown	V _B	Brown	B+	Green	В	Green	Clock-	Brown	A-	Pink
4	NC	-	NC	-	A+	Grey	A	Grey	NC	-	B+	Green
5	V _{dd}	Red	В-	Yellow								
6	NC	-	V _{A-}	Yellow	Z–	Brown	NC	-	Data	Green	Z+	White
7	NC	-	V _{B-}	White	В-	Yellow	NC	-	Data-	Yellow	Z–	Brown
8	NC	-	NC	-	A–	Pink	NC	-	NC	-	V_{dd}	Red
9	GND	Orange	GND	Blue	GND	Blue	GND	Blue	GND	Blue	Clock+	Black
10											Clock-	Violet
11											NC	-
12											Data+	Grey/Pink
13											Data-	Red/Bue
14											NC	-
15											GND	Blue

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Operating and electrical specifications

EMC compliance	EN 61326
Cable	Outside diameter 5 mm
Mass	Encoder unit 1 m cable (no connector) IP64 112 g, IP68 129 g. Magnetic actuator <2 g
Environmental sealing	IP64 (IP68 optional) EN 60529

RM44 dimensions

Dimensions and tolerances in mm









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RM58 dimensions

Dimensions and tolerances in mm







RM44 / RM58 installation drawing

Dimensions and tolerances in mm





Clockwise (CW) rotation of magnetic actuator



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RM44AC / RM58AC - Analogue sinusoidal outputs

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

Power supply	$V_{dd} = 5 V \pm 5 \%$
Current consumption	Max. 30 mA
Outputs	Single ended
Internal serial impedance	100 Ω
Signal amplitude	2.2 ±0.2 V _{pp}
Signal offset (V _{ref})	2.5 V ±1 %
Maximum speed	30,000 rpm
Temperature Operating and storage	–40 °C to +125 °C

Timing diagram



RM44BC / RM58BC – Analogue complementary sinusoidal outputs

2 channels $V_{\scriptscriptstyle A} and \, V_{\scriptscriptstyle B}$ differential sinusoids

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

RM44IA / RM58IA - Incremental, Push-pull

Square wave output

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

Timing diagram



Timing diagram



B leads A for clockwise rotation of magnet.

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RM44IC / RM58IC- Incremental, RS422

Square wave differential line driver to RS422

Power supply	V_{dd} = 5 V ±5 %
Current consumption	Max. 35 mA
Output signals	A, B, Z, A–, B–, Z– (RS422)
Accuracy	±0.5°
Hysteresis	0.18°
Resolutions	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 Operating and storage	-40 °C to +125 °C (IP64) -40 °C to +85 °C (IP68)

Timing diagram Complementary signals not shown



B leads A for clockwise rotation of magnet.

RM44IE / RM58IE – Incremental, Open Collector, NPN

Low cost alternative for ball bearing encoders

Power supply	$V_{dd} = 5 V \pm 5 \%$
Current consumption	35 mA (not loaded)
Output signals	A, B, Z
Maximum output load	20 mA
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Resolutions	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 Operating and storage	-40 °C to +125 °C (IP64) -40 °C to +85 °C (IP68)

Timing diagram



B leads A for clockwise rotation of magnet.

Recommended signal termination





RM44SC / RM58SC - Absolute binary synchro-serial (SSI), RS422

Serial encoded absolute position measurement

Output code	Natural binary
Power supply	V_{dd} = 5 V ±5 %
Current consumption	Max. 35 mA
Data output	Serial data (RS422)
Data input	Clock (RS422)
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Resolutions	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 Operating and storage	–40 °C to +125 °C (IP64) –40 °C to +85 °C (IP68)

Timing diagram



Position increases for clockwise rotation of magnet.

RM44SI / RM58SI – 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	$V_{dd} = 5 V \pm 5 \%$
Current consumption	Max. 35 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°
Resolutions	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 Operating and storage	–40 °C to +125 °C (IP64) –40 °C to +85 °C (IP68)

Timing diagram - SSI



 $\label{eq:clock} \mbox{Clock} \le 4 \mbox{ MHz} \qquad 12.5 \mbox{ } \mu s \le t_m \le 20.5 \mbox{ } \mu s$ Position increases for clockwise rotation of magnetic actuator.

Timing diagram - Incremental

Complementary signals not shown



B leads A for clockwise rotation of magnet.

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Data sheet RM44D06_05

Part numbering



Series	Output type	Shaft	Resolution	Cable length	Connector options	Body style and cable exit	Environment and material	Special requirements
	AC		010					
RM44 / RM58	BC	00	015			2	E/F	9M / 96
	IA							
	IC		05B / 06B/	10	F			
	IE		07B / 08B / 09B / 10B / 11B / 12B					
	SC							
	SI							



Magnetic actuators and magnets ordering information

Actuator for integration onto shaft



Fixing: Grub screw provided

Shaft = Ø*h7



Actuator for integration into shaft





Hole = Ø6G7

Fixing: Glue (recommended – LOCTITE 648 or LOCTITE 2701)

Magnet for direct recessing in non-ferrous shafts



with N-pole

marker



Fixing: Glue (recommended - LOCTITE 648 or LOCTITE 2701)

RE58 flange part numbering

Refer to RE58 datasheet for further details.





Part numbers:

RE58A10 - Ø58 mm, 10 mm shaft

RE58B06 - Ø58 mm, 6 mm shaft

RE58C10 - Ø58 mm, 10 mm shaft

All RE58 flanges are supplied with required washer and M4 fasteners for RM44 encoder attachment.

Part numbers:

For resolutions up to 9 bit absolut	e (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 absolu	te (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

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

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
1	19. 12. 2019	General	New document
2	22. 9. 2020	1, 2, 5, 8	RM44/RM58AC and RM44/RM58BC outputs added
		3, 4	Dimensions drawing amended
		5, 8	RM44/RM58IA description amended
3	6. 9. 2021	5	RM44AC/RM58AC temperature range amended
4	14. 2. 2022	2, 8	Connections description amended and connector added
5	14. 6. 2022	2	Connections description amended

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