

RE58 Rotary Magnetic Shaft Encoder

The RE58 is a robust industrial standard rotary magnetic encoder consisting of two parts: the RM44 magnetic encoder and various 58 mm flanges.

The solid metal housing of the RM44 encoder offers the highest IP protection class, high EMC immunity, an extended operating temperature range and the best possible shock and vibration resistance.





Features and benefits

- Robust modular design
- Industry standard absolute, incremental and analogue output options
- Accuracy to ±0.5°

- High reliability from proven non-contact encoder technology
- Easy to install
- Excellent price-performance



DATA SHEET RE58D04_02

General information

The RE58 is an encoder for measuring shaft position. A magnet is mounted within the mounting flange. Rotation of this magnet is sensed by the RM44 encoder.

The output signals are provided in industry standard absolute, incremental and analogue sinusoidal formats. Available are resolutions of up to 13 bit absolute SSI and/or 8,192 counts per revolution incremental for 5 V or 24 V power supply. A system accuracy of $\pm 0.5^{\circ}$ can be achieved.

The RE58 is a pre-assembled encoder system with a non-contact RM44 encoder attached to the back of the mounting flange. If one of the parts of the RE58 system needs to be replaced, this can easily be done without causing any damage to the other part of the RE58 system.



Choose your RE58 system

RE58-A encoder



RE58-B encoder



RE58-C encoder





Storage and handling



Handle with care. This encoder system is a high performance metrology product and should be handled with the same care as any other precision instrument. The use of industrial tools during installation or exposure to strong magnets such as a magnetic base is not recommended as it carries the risk of damaging parts of the system which as a result might not perform in accordance with specifications.

Power to RE58 encoders must be supplied from a DC SELV supply complying with the essential requirements of EN (IEC) 60950 or similar specification. The RE58 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.

Packaging

There are two packaging variants. Less than 20 encoders are packaged individually in antistatic boxes. Larger quantities come in bulk packaging (multipack boxes).

DATA SHEET RE58D04_02

Dimensions and installation drawings

RE58-A encoder (with RE58A10 mounting flange)





otin 58

RE58-B encoder (with RE58B06 mounting flange)







Dimensions and installation drawings continued

RE58-C encoder (with RE58C10 mounting flange)



Technical specifications

System data

Resolution	Up to 13 bits
Maximum speed	17,000 rpm
Hysteresis	0.18°
System accuracy	Typ. ± 0.5°
Set-up time	100 ms (first data ready after supply voltage is in range),
	worst case: 200 ms

Electrical data

Supply voltage	5 V or 8 V to 26 V (depending on output)
Current consumption	Max. 50 mA (depending on output)
Output load	Max. 30 mA (depending on output)
Connection	Flying lead
Voltage drop over cable	~13 mV/m (without load)
	~54 mV/m (with 120 Ω load)

Mechanical data

Cable	Outside diameter 5 mm
Mass	IP64: RE58-A: 292 g, RE58-B: 227 g; RE58-C: 245 g
(encoder with 1 m cable, no connector)	IP68: RE58-A: 309 g, RE58-B: 244 g; RE58-C: 262 g

Environmental data

Temperature	Operating and storage	–40 °C to +125 °C (IP64), –40 °C to +85 °C (IP68)		
EMC compliance		EN 61326		
Environmental seal	ing	IP64 (IP68 optional)	EN 60529	



Electrical connections

	AC	E	вс	C	с	IA I	C IG	IB	IE
			9	Shield - see con	nection diagra	m			
VA	Black	V _A	Green	V _{dd}	Red	V _{dd}	Red	V _{dd}	Red
V _B	Brown	V _B	Brown	GND	Blue	GND	Blue	GND	Blue
V _{dd}	Red	V _{dd}	Red	MA+	White	A+	Grey	A+	Grey
GND	Orange	V _{A-}	Yellow	SLO+	Green	B+	Green	B+	Green
		V _B .	White	MA-	Brown	Z+	White	Z+	White
		GND	Blue	SLO-	Yellow	A-	Pink		
						B-	Yellow		
						Z-	Brown		

S	c		SI		Ux	۱	/x		Wx
			S	hield - see co	nnection diagrar	n			
V _{dd}	Red	V _{dd}	Red	V _{dd}	Red	V_{dd}	Red	V _{dd}	Red
GND	Blue	GND	Blue	GND	Blue	GND	Blue	GND	Blue
Clock+	White	A+	Grey	A+	Grey	MA+	White	U-	Green/Black
Data+	Green	B+	Green	A-	Pink	SLO+	Green	U+	Black
Clock-	Brown	Z+	White	B+	Green	MA-	Brown	V-	Brown/
									Black
Data–	Yellow	A-	Pink	В-	Yellow	SLO-	Yellow	V+	Violet
		В-	Yellow	Z+	White			w-	White/Black
		Z-	Brown	Z-	Brown			W+	Yellow/Black
		Clock+	Black	U	Black			A-	Pink
		Data+	Grey/Pink	v	Violet			A+	Grey
		Clock-	Violet	w	Grey/Violet			В-	Yellow
		Data-	Red/Blue					B+	Green
								Z-	Brown





Output types

Analogue sinusoidal output signals

RE58AC

Specifications		
Supply voltage	V _{dd} = 5 V ±5 %	
	Reverse polarity protection	
Current consumption	13 mA	
Output signals	V ₁ , V ₂ , V ₀	
Sine / cosine signals	Amplitude (with 120 Ω termination)	2.2 ±0.2 V _{pp}
	Signal offset	$\frac{3}{5} \pm 5 \text{ mV}$
Internal serial impedance	720 Ω	
Maximum cable length	3 m	

Timing diagram



 V_A leads V_B by 90° for clockwise rotation of magnetic actuator.

Analogue sinusoidal output signals

RE58BC

Specifications

Supply voltage	V_{dd} = 5 V ±5 %	
	Reverse polarity protection	
Current consumption	Max. 30 mA	
Outputs	Differential V _A , V _B	
Internal serial impedance	10 Ω	
Signal amplitude	0.5 ±0.1 V _{pp}	
Signal offset (Vref)	0 ±5 mV	

Timing diagram





Absolute BiSS C interface

RE58DC

Specifications	
Supply voltage	V _{dd} = 5 V ±5 %
	Reverse polarity protection
Current consumption	Max. 50 mA
Output code	Natural binary
Resolution	128, 256, 320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192
	positions per revolution
Clock input	MA (RS422)
Data output	SLO (RS422)
Accuracy	Typ. ±0.5°

Recommended signal termination



Timing diagram



Data	Length	Description
P24 – P0	0 to 24 bit	Revolution counter value (length depends on the settings chosen)
S12 – S0	3 to 13 bit	Position inside the revolution (length depends on the resolution)
E1 – E0	2 bit	Error data
CRC5 – CRC0	5 to 6 bit	Cyclic redundancy check data; polynomial 0x43; inverted bit output

Error	EO	E1
No error	1	1
Amplitude error	0	1
Too high velocity	1	0
Undervoltage; Configuration; System error	0	0

For more information on BiSS C protocol please visit **www.biss-interface.com.**

Incremental, push-pull

RE58IA

Specifications	
Supply voltage	V _{dd} = 8 V to 26 V
	Reverse polarity protection
Current consumption	50 mA
Output signals	A, B, Z, A–, B–, Z– (RS422)
Resolution	32 to 2,048 pulses per revolution (128, 256, 320, 400, 500, 512, 800, 1,000, 1,024,
	1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Maximum output load	30 mA
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Maximum cable length	20 m

Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.



Incremental, open collector NPN

RE58IB

Specifications	
Supply voltage	V _{dd} = 8 V to 26 V
	Reverse polarity protection
Current consumption	50 mA
Output signals	A, B, Z
Resolution	32 to 2,048 pulses per revolution (128, 256, 320, 400, 500, 512, 800, 1,000, 1,024,
	1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Maximum output load	20 mA
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Maximum cable length	20 m

Timing diagram

Complementary signals not shown



Recommended signal termination



B leads A for clockwise rotation of magnetic actuator.

Incremental, RS422 output signal

RE58IC

Specifications	
Supply voltage	$V_{dd} = 5 V \pm 5 \%$
	Reverse polarity protection
Current consumption	35 mA
Output signals	A, B, Z, A–, B–, C– (RS422)
Resolution	32 to 2,048 pulses per revolution (128, 256, 320, 400, 500, 512, 800, 1,000, 1,024,
	1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Accuracy	Typ. ±0.5°
Maximum cable length	50 m

Timing diagram

Complementary signals not shown



Recommended signal termination



B leads A for clockwise rotation of magnetic actuator.



Incremental, open collector output signal

RE58IE

Specifications	
Supply voltage	V _{dd} = 5 V ±5 %
	Reverse polarity protection
Current consumption	35 mA
Output signals	A, B, Z
Resolution	32 to 2,048 pulses per revolution (128, 256, 320, 400, 500, 512, 800, 1,000, 1,024,
	1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Accuracy	Typ. ±0.5°
Maximum cable length	20 m

Incremental, push-pull

RE58IG

Specifications

•	
Supply voltage	V _{dd} = 8 V to 26 V Reverse polarity protection
Current consumption	50 mA
Output signals	A, B, Z, A–, B–, Z– (5 V RS422)
Maximum output load	30 mA
Resolution	32 to 2,048 pulses per revolution (128, 256, 320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Accuracy	Typ. ±0.5°
Hysteresis	0.18°
Maximum cable length	20 m

Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.

Recommended signal termination



Absolute binary synchro-serial interface (SSI)

RE58SC

Specifications	
Supply voltage	$V_{dd} = 5 V \pm 5 \%$
	Reverse polarity protection
Current consumption	Max. 35 mA
Output code	Natural binary
Resolution	128, 256, 320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096, 8,192
	positions per revolution
Data output	Serial data (RS422)
Data input	Clock (RS422)
Accuracy	Typ. ±0.5°
Maximum cable length	100 m (at 1MHz)

Timing diagram



Position increases for clockwise rotation of magnetic actuator.

Recommended signal termination





Absolute binary synchro-serial interface (SSI) + Incremental, RS422

RE58SI

Specifications	
Supply voltage	V _{dd} = 5 V ±5 %
	Reverse polarity protection
Current consumption	Max. 35 mA
Output code	Natural binary
Resolution	32 to 2,048 pulses per revolution (128, 256, 320, 400, 500, 512, 800, 1,000, 1,024,
	1,600, 2,000, 2,048, 4,096, 8,192 counts per revolution)
Data output	Serial data (RS422)
Data input	Clock (RS422)
Accuracy	Тур. ±0.5°
Maximum cable length	50 m

Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.



Position increases for clockwise rotation of magnetic actuator.

Recommended signal termination



Commutation single ended + incremental with line driver

RE58Ux

Specifications Supply voltage V_{dd} = 5 V ±5 % Reverse polarity protection **Current consumption** 30 mA **Output signals** A, B, Z, A-, B-, Z- (5 V RS422) **Incremental resolutions** 128, 256, 320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096 counts per revolution **Commutation outputs** U, V, W (±24 mA output drive) Number of poles for commutation 2, 4, 6, 8, 10, 12, 14, 16 outputs Accuracy Typ. ±0.5° Hysteresis 0.18°



Linear voltage output

RE58Vx

Specifications

Supply voltage	V _{dd} = 5 V ±5 %
	Reverse polarity protection
Current consumption	Typ. 26 mA
Output voltage	0 V to V _{dd}
Output loading	Max. 10 mA
Nonlinearity	1 %

Timing diagram



$oldsymbol{arphi}_{ ext{period}}$	riod N _{period} I		φstep
360°	1	1,024	0.35°
180°	2	1,024	0.18°
90°	4	1,024	0.09°
45°	45° 8 512		0.09°

 φ_{period} = Angle covered in one period (one sawtooth)

Vperiod = Output voltage range for one period

φstep = Step angle (angular movement needed to register a change in the position)

Vstep = Output voltage range for one step

Nperiod = Number of periods in one revolution

Nstep = Number of steps in one period

Output type and electrical variant

ዋperiod Rotation	360°	180°	90°	45°
Clockwise	VA	VB	VC	VD
Counterclockwise	VE	VF	VG	VH

Commutation with line driver + incremental with line driver

RE58Wx

Specifications Supply voltage V_{dd} = 5 V ±5 % Reverse polari

	Reverse polarity protection			
Current consumption	30 mA			
Output signals	A, B, Z, A–, B–, Z– (5 V RS422)			
Incremental resolutions	256, 320, 400, 500, 512, 800, 1,000, 1,024, 1,600, 2,000, 2,048, 4,096 counts per			
	revolution			
Commutation outputs	U, V, W, U–, V–, W– (RS422)			
Number of poles for commutation	2, 4, 6, 8, 10, 12, 14, 16			
outputs				
Accuracy	Typ. ±0.5°			
Hysteresis	0.18°			



Part numbering

				RE58	IC	0A	13B	10	F	2	E	10
Output type												
Output type AC - Analogue sinusoidal, 5 BC - Absolute natural binary DC - Absolute BiSS C, 5 V IA - Incremental, push pull, IB - Incremental, open colle Ux - Commutation single end Wx - Commutation with line d A - One period per revolution B - Two periods per revolution	V IC BiSS C, RS422, 5 V IE IG 24 V SC ctor NPN, 24 V SI ed + incremental with river + incremental with pon (2 poles) E ion (4 poles) F	 Incrementa Incrementa Incrementa Absolute bin SSI + Incrementa SSI + incrementa hine driver Five periods Six periods 	l, RS422, 5 V l, open collector l, RS422, 5 V, su nary synchro-se nental, RS422, 5 s per revolution per revolution (, 5 V pply 24 V rial (SSI), RS V (10 poles) 12 poles)	5422, 5 Y	v						
C - Three periods per revolu	ution (6 poles) G	- Seven perio	ods per revolutio	on (14 poles)							
D - Four periods per revolut	ion (8 poles) H	- Eight period	ds per revolutio	n (16 poles)								
Vx - Linear voltage 0-5 V, supp A - Clockwise, 360° E B - Clockwise, 180° F C - Clockwise, 90° G D - Clockwise, 45° H	 by 5 V Counterclockwise, Counterclockwise, Counterclockwise, Counterclockwise, 	360° 180° 90° 45°										
Chaft size												
 OA - With RE58A10 flange OB - With RE58B06 flange OC - With RE58C10 flange 						1						
Resolution												
For AC, BC: 01S - One sine/cos	ine period per revoluti	on										
For Vx: 10B / 10Z - 1024 count	s or positions per revo	ution ions per revolut	tion):									
Desimal Binany												
D32 - 320 07B - 128	2eroing binary	97 - 512										
D40 - 400 08B - 256	06Z - 64	0Z - 1024										
D50 - 500 09B - 512	07Z - 128	1Z - 2048										
D80 - 800 10B - 1024	08Z - 256	2Z - 4096										
1D0 - 1000 11B - 2048												
1D6 - 1600 12B - 4096 13B 8192												
130 - 2000 130 - 8192												
Cable length	if 1M special requirer	ont is choson)										
	sin nivî special requiren											
Connector options												
F - Flying lead (no connector	pr)											
Body style and cable exit												
2 - Cylindrical body, radial	cable exit											
E - IP64, die-cast body (Zinc	alloy), standard EMC o	ade (standard)										
F - IP68, die-cast body (Zinc	alloy), standard EMC g	ade										
Special requirements												

- **10** No special requirements
- $\mathbf{1M}~-~Cable~length~in~meters$
- 96 With AM4096 (for output types AC, BC, IA, IB, IC, IE, SC and SI only)
- 9M With AM4096 (for output types AC, BC, IA, IB, IC, IE, SC and SI only) and cable length in meters

Not all part number combinations are valid. Please refer to the table on the next page for available options.

Table of available combinations

Series	Output type	Shaft size	Resolution	Cable length	Connector options	Body style and cable exit	Environment and material	Special requirements
	AC							
	BC		015					96 / 9M
	DC / IG		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B / 12B / 11B / 10B / 09B / 08B / 07B					10 / 1M
	IA / IB		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B	2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B				10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B					96 / 9M
	IC		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B / 12Z / 11Z / 10Z / 09Z / 08Z / 07Z / 06Z / 05Z			2	E/F	10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B		F			96 / 9M
	IE	- 0A / 0B / 0C	2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B					10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B	10				96 / 9M
RE58	SC		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B / 12Z / 11Z / 10Z / 09Z / 08Z / 07Z / 06Z / 05Z					10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B					96 / 9M
	SI	SI Ux Vx	2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B					10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B					96 / 9M
			2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B					
	Ux		12B / 11B / 10B / 09B / 08B / 12Z / 11Z / 10Z / 09Z / 08Z / 07Z / 06Z / 05Z					10 / 1M
	Vx		10B / 10Z				10 / 1M	
	Wx		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 12B / 11B / 10B / 09B / 08B					10 / 1M



Accessories



Zeroing pen <u>zeropen</u>

(2 clamps + 2 fasteners)



Head office

RLS Merilna tehnika d. o. o.

Poslovna cona Žeje pri Komendi Pod vrbami 2 SI-1218 Komenda Slovenia T +386 1 5272100F +386 1 5272129E mail@rls.si

www.rls.si

Global support

Visit our website to contact your nearest sales representative.

Document issues

Issue	Date	Page	Description
02	16. 5. 2022	All	Accuracy, AC/BC pinout and high speed data amended

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/eng/salesterms, (b) Renishaw, Inc., are available at https:// www.renishaw.com/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. © 2022 RLS d.o.o.