

RE58

Rotary Magnetic Shaft Encoder

EXCELLENT
PRICE
PERFORMANCE
RATIO

HIGHLY
RELIABLE

EASY TO
REPLACE
PARTS

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 $\pm 0.5^\circ$
- ▶ High reliability from proven non-contact encoder technology
- ▶ Easy to install
- ▶ Excellent price-performance



INDUSTRIAL AUTOMATION



ASSEMBLY LINES



AGRICULTURE



HARSH ENVIRONMENT



GREEN ENERGY HARVESTING

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.

RE58 rotary shaft encoder system



=

RM44 encoder
(available separately)



+

Mounting flange
(available separately)



Choose your RE58 system

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.

RE58-A encoder



RE58-B encoder



RE58-C encoder



Storage and handling

Operating and storage temperature

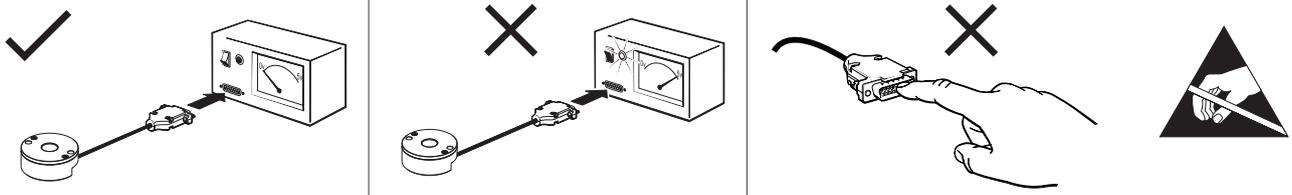


-40 °C to +125 °C (IP64)
-40 °C to +85 °C (IP68)

Humidity



Up to 100 %



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.

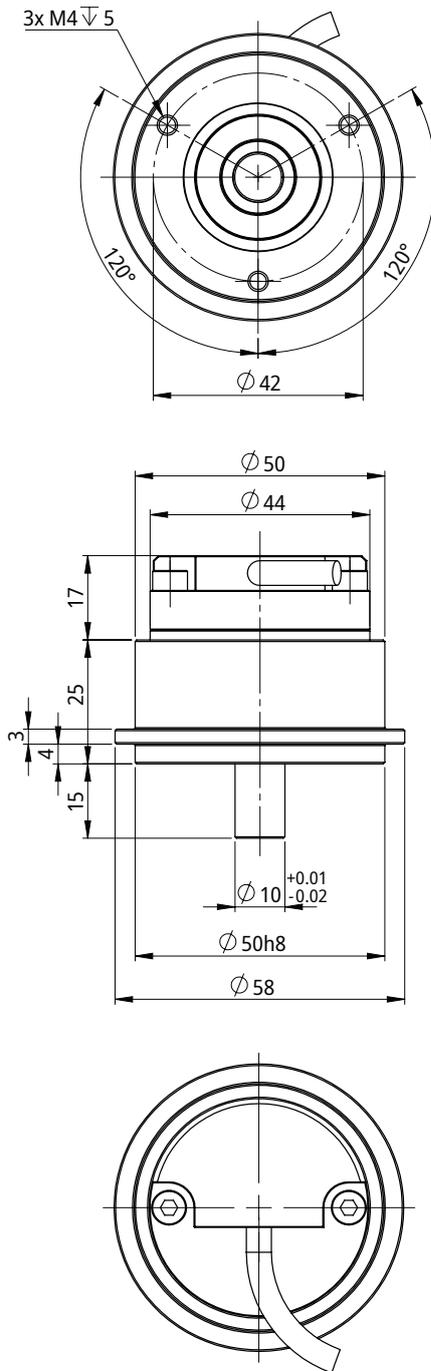
Packaging

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

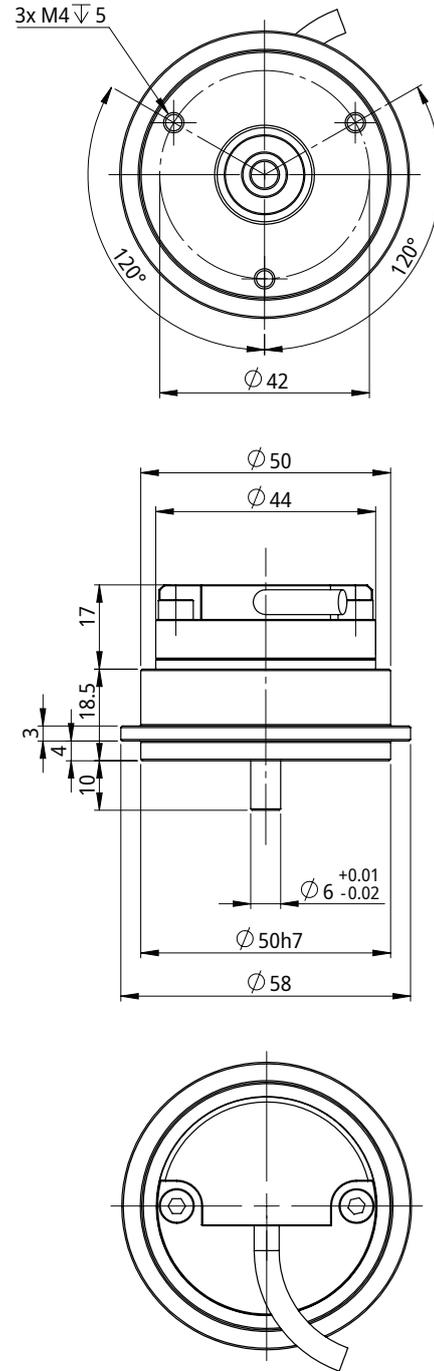
Dimensions and installation drawings

Dimensions and tolerances are in mm.

RE58-A encoder (with RE58A10 mounting flange)



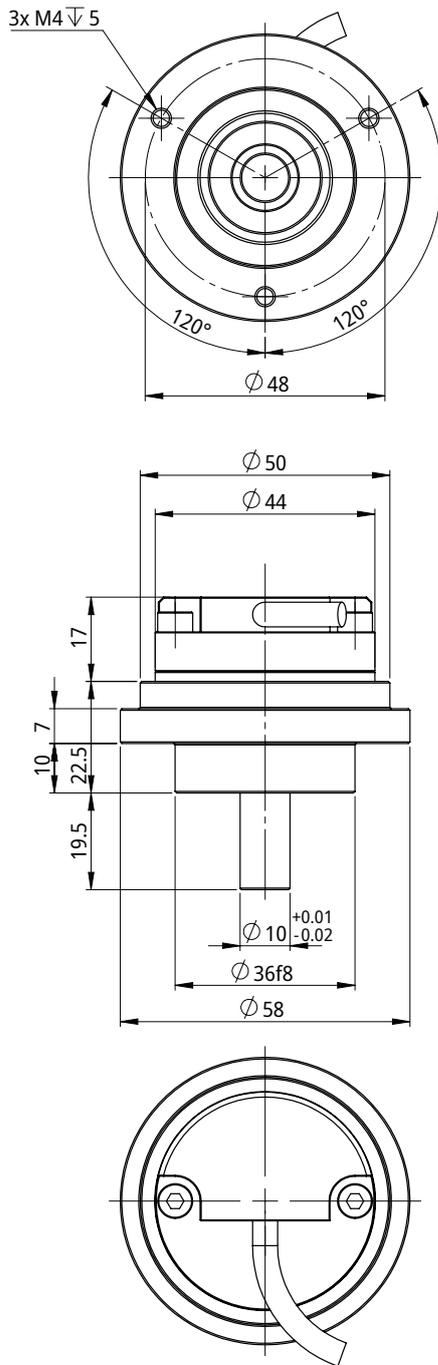
RE58-B encoder (with RE58B06 mounting flange)



Dimensions and installation drawings continued

Dimensions and tolerances are in mm.

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. $\pm 0.5^\circ$
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 (encoder with 1 m cable, no connector)	IP64: RE58-A: 292 g, RE58-B: 227 g; RE58-C: 245 g IP68: RE58-A: 309 g, RE58-B: 244 g; RE58-C: 262 g

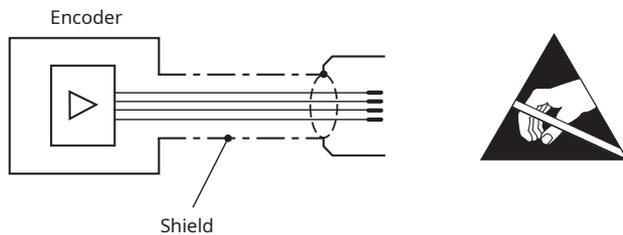
Environmental data

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

Electrical connections

AC		BC		DC		IA IC IG		IB IE	
Shield - see connection diagram									
V _A	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		

SC		SI		Ux		Vx		Wx	
Shield - see connection diagram									
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	B-	Yellow	SLO-	Yellow	V+	Violet
		B-	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			B-	Yellow
		Data-	Red/Blue					B+	Green
								Z-	Brown
								Z+	White



Output types

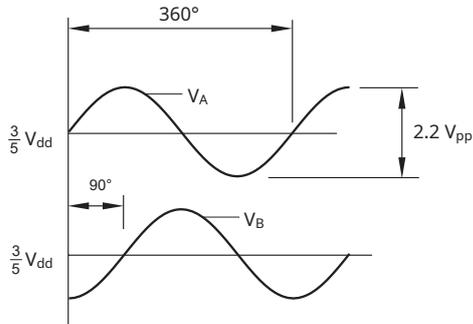
Analogue sinusoidal output signals

RE58AC

Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ Reverse polarity protection	
Current consumption	13 mA	
Output signals	V_1, V_2, V_0	
Sine / cosine signals	Amplitude (with $120\ \Omega$ termination)	$2.2 \pm 0.2\ V_{pp}$
	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.

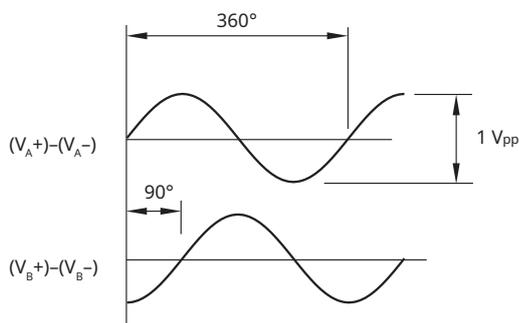
Analogue sinusoidal output signals

RE58BC

Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ Reverse polarity protection	
Current consumption	Max. 30 mA	
Outputs	Differential V_A, V_B	
Internal serial impedance	10 Ω	
Signal amplitude	$0.5 \pm 0.1\ V_{pp}$	
Signal offset (V_{ref})	$0 \pm 5\text{ mV}$	

Timing diagram



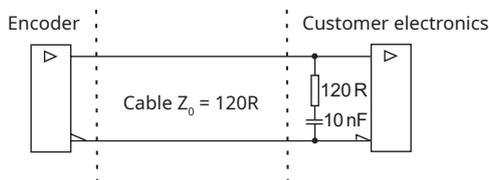
Absolute BiSS C interface

RE58DC

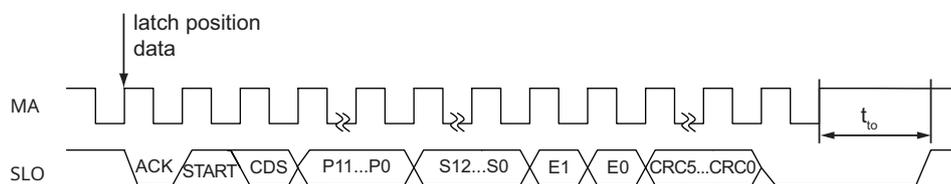
Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ 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. $\pm 0.5^\circ$

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	E0	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

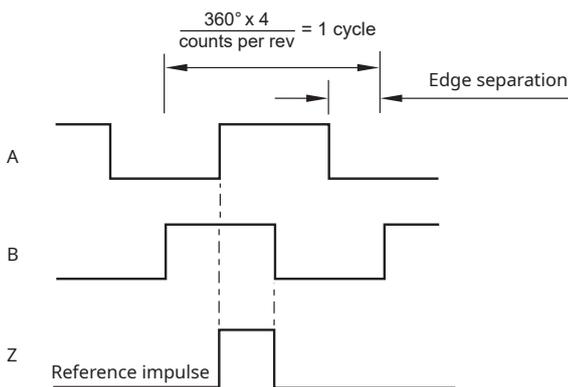
RE58IA

Specifications

Supply voltage	$V_{dd} = 8\text{ V to }26\text{ V}$ Reverse polarity protection
Current consumption	50 mA
Output signals	A, B, Z, 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	30 mA
Accuracy	Typ. $\pm 0.5^\circ$
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

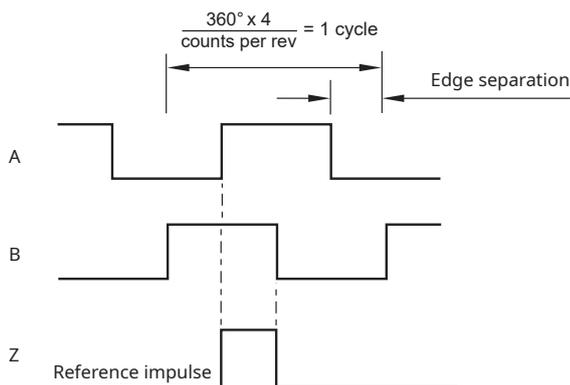
RE581B

Specifications

Supply voltage	$V_{dd} = 8\text{ V to }26\text{ V}$ 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. $\pm 0.5^\circ$
Hysteresis	0.18°
Maximum cable length	20 m

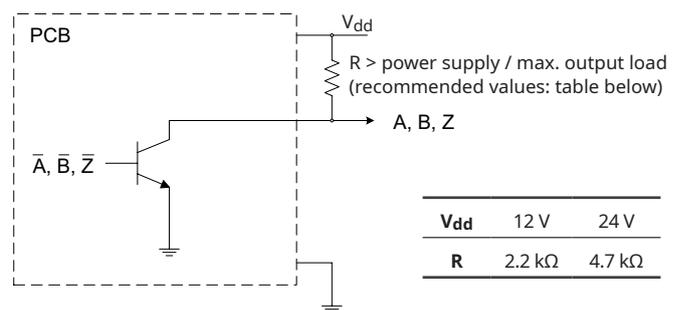
Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.

Recommended signal termination



Incremental, RS422 output signal

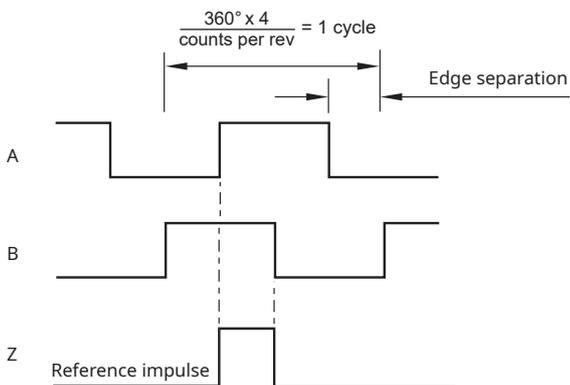
RE58IC

Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ 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. $\pm 0.5^\circ$
Maximum cable length	50 m

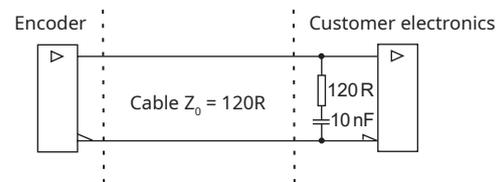
Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.

Recommended signal termination



Incremental, open collector output signal

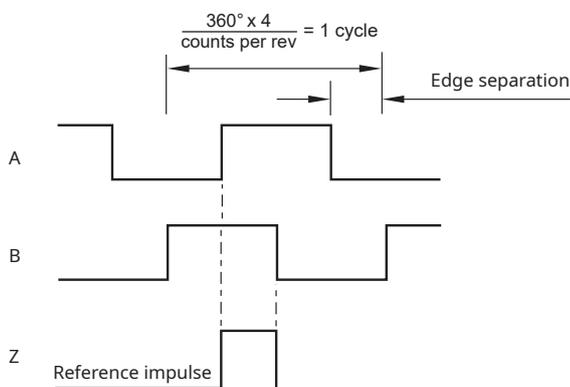
RE58IE

Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ 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. $\pm 0.5^\circ$
Maximum cable length	20 m

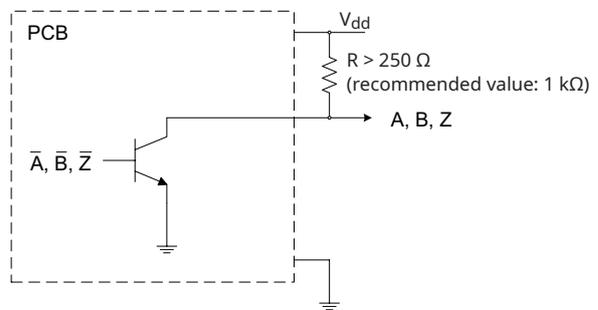
Timing diagram

Complementary signals not shown



B leads A for clockwise rotation of magnetic actuator.

Recommended signal termination



Incremental, push-pull

RE58IG

Specifications

Supply voltage	$V_{dd} = 8\text{ V to } 26\text{ V}$ 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. $\pm 0.5^\circ$
Hysteresis	0.18 $^\circ$
Maximum cable length	20 m

For the timing diagram and recommended signal termination please see the [RE58IC output](#).

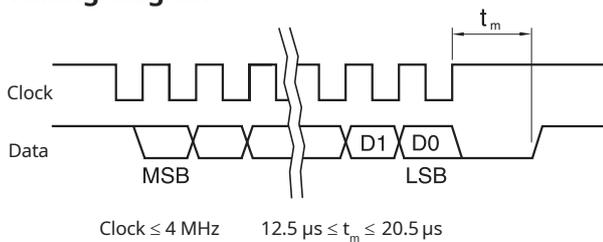
Absolute binary synchro-serial interface (SSI)

RE58SC

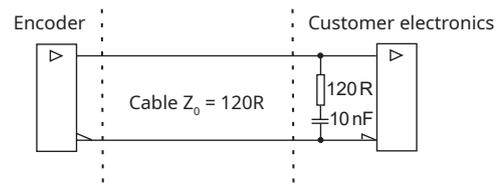
Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ 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. $\pm 0.5^\circ$
Maximum cable length	100 m (at 1 MHz)

Timing diagram



Recommended signal termination



Position increases for clockwise rotation of magnetic actuator.

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

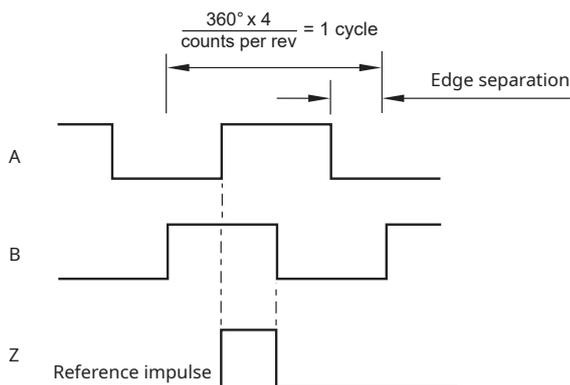
RE58SI

Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ 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	Typ. $\pm 0.5^\circ$
Maximum cable length	50 m

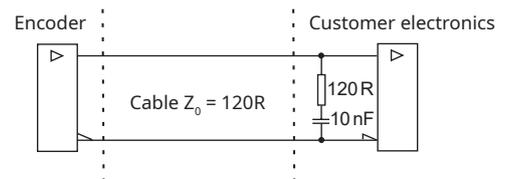
Timing diagram

Complementary signals not shown

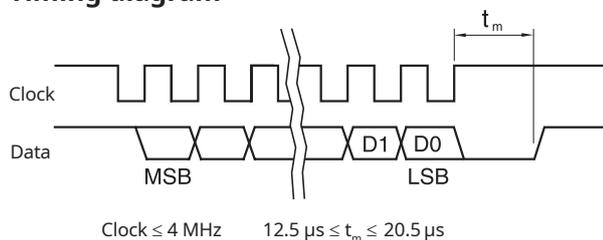


B leads A for clockwise rotation of magnetic actuator.

Recommended signal termination



Timing diagram



Position increases for clockwise rotation of magnetic actuator.

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 outputs	2, 4, 6, 8, 10, 12, 14, 16
Accuracy	Typ. ±0.5°
Hysteresis	0.18°

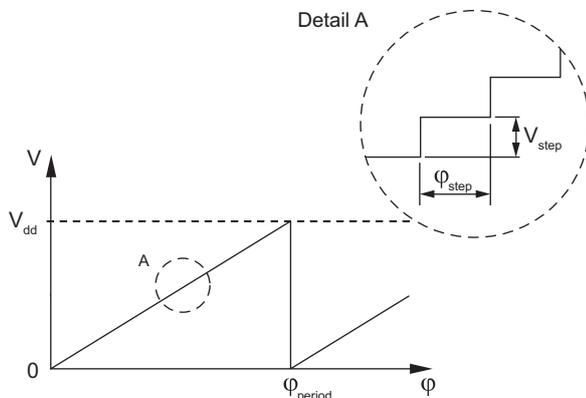
Linear voltage output

RE58Vx

Specifications

Supply voltage	$V_{dd} = 5\text{ V} \pm 5\%$ Reverse polarity protection
Current consumption	Typ. 26 mA
Output voltage	0 V to V_{dd}
Output loading	Max. 10 mA
Nonlinearity	1 %

Timing diagram



φ_{period}	N_{period}	N_{step}	φ_{step}
360°	1	1,024	0.35°
180°	2	1,024	0.18°
90°	4	1,024	0.09°
45°	8	512	0.09°

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

V_{period} = Output voltage range for one period

φ_{step} = Step angle (angular movement needed to register a change in the position)

V_{step} = Output voltage range for one step

N_{period} = Number of periods in one revolution

N_{step} = Number of steps in one period

$$\varphi_{\text{step}} = \frac{\varphi_{\text{period}}}{N_{\text{step}}} \quad V_{\text{step}} = \frac{V_{dd}}{N_{\text{step}}}$$

Output type and electrical variant

φ_{period}	360°	180°	90°	45°
Rotation				
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 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 outputs	2, 4, 6, 8, 10, 12, 14, 16
Accuracy	Typ. ±0.5°
Hysteresis	0.18°

Part numbering

RE58 IC 0A 13B 10 F 2 E 10

Output type

- | | |
|--|--|
| AC - Analogue sinusoidal, 5 V | IC - Incremental, RS422, 5 V |
| BC - Analogue complementary sinusoidal, 5 V | IE - Incremental, open collector, 5 V |
| DC - Absolute BiSS C, 5 V | IG - Incremental, RS422, 5 V, supply 24 V |
| IA - Incremental, push pull, 24 V | SC - Absolute binary synchro-serial (SSI), RS422, 5 V |
| IB - Incremental, open collector NPN, 24 V | SI - SSI + Incremental, RS422, 5 V |

- Ux** - Commutation single ended + incremental with line driver
Wx - Commutation with line driver + incremental with line driver

- | | |
|---|--|
| A - One period per revolution (2 poles) | E - Five periods per revolution (10 poles) |
| B - Two periods per revolution (4 poles) | F - Six periods per revolution (12 poles) |
| C - Three periods per revolution (6 poles) | G - Seven periods per revolution (14 poles) |
| D - Four periods per revolution (8 poles) | H - Eight periods per revolution (16 poles) |

Vx - Linear voltage 0-5 V, supply 5 V

- | | |
|----------------------------|-----------------------------------|
| A - Clockwise, 360° | E - Counterclockwise, 360° |
| B - Clockwise, 180° | F - Counterclockwise, 180° |
| C - Clockwise, 90° | G - Counterclockwise, 90° |
| D - Clockwise, 45° | H - Counterclockwise, 45° |

Shaft size

- 0A** - With RE58A10 flange
0B - With RE58B06 flange
0C - With RE58C10 flange

Resolution

- For **AC, BC: 01S** - One sine/cosine period per revolution
 For **Vx: 10B / 10Z** - 1024 counts or positions per revolution
 For **DC, IA, IB, IC, IE, IG, SC, SI, Ux, Wx** (counts/positions per revolution):

Decimal	Binary	Zeroing binary	
D32 - 320	07B - 128	05Z - 32	09Z - 512
D40 - 400	08B - 256	06Z - 64	10Z - 1024
D50 - 500	09B - 512	07Z - 128	11Z - 2048
D80 - 800	10B - 1024	08Z - 256	12Z - 4096
1D0 - 1000	11B - 2048		
1D6 - 1600	12B - 4096		
2D0 - 2000	13B - 8192		

Cable length

- 10** - 1.0 meter (or 10 meters if 1M special requirement is chosen)

Connector options

- F** - Flying lead (no connector)

Body style and cable exit

- 2** - Cylindrical body, radial cable exit

Environment and material

- E** - IP64, die-cast body (Zinc alloy), standard EMC grade (standard)
F - IP68, die-cast body (Zinc alloy), standard EMC grade

Special requirements

- 10** - No special requirements
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
RE58	AC	0A / 0B / 0C	01S	10	F	2	E / F	96 / 9M
	BC							10 / 1M
	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					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					10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B					96 / 9M
	IE		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B					10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B					96 / 9M
	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		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B					10 / 1M
			12B / 11B / 10B / 09B / 08B / 07B					96 / 9M
	Ux		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 13B					10 / 1M
			12B / 11B / 10B / 09B / 08B / 12Z / 11Z / 10Z / 09Z / 08Z / 07Z / 06Z / 05Z					
	Vx		10B / 10Z					10 / 1M
	Wx		2D0 / 1D6 / 1D0 / D80 / D50 / D40 / D32 / 12B / 11B / 10B / 09B / 08B					10 / 1M

Accessories



Zeroing pen
ZEROPEN00

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Document issues

Issue	Date	Page	Description
02	16. 5. 2022	All	Accuracy, AC/BC pinout and high speed data amended
03	19. 5. 2023	19	BC output type description amended
04	30. 6. 2023	13	Timing diagram and recommended signal termination rearranged.

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