# 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 ±0.5°
- 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 ±0.5° 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**

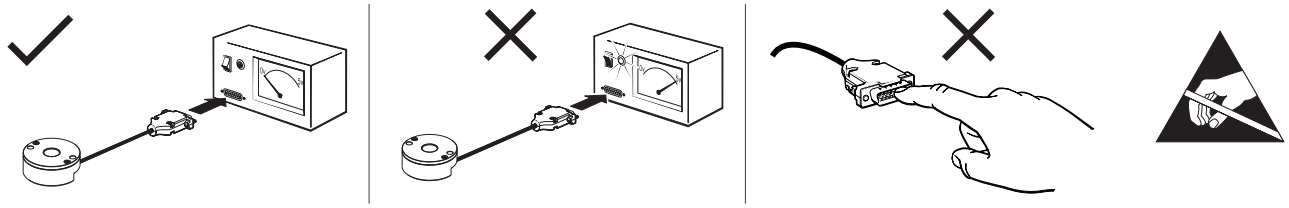
# Storage and handling

**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.**

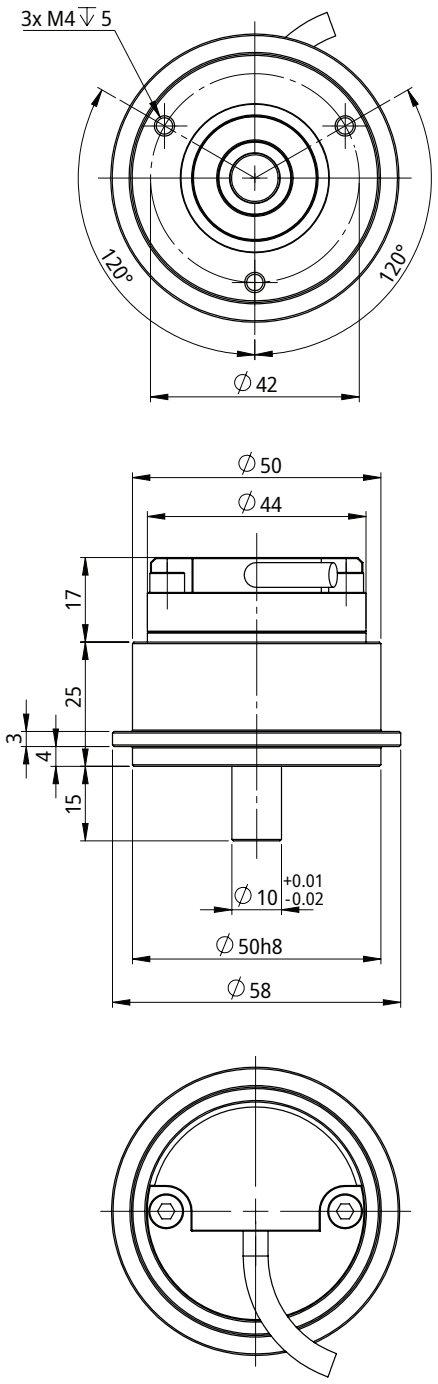
## Packaging

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

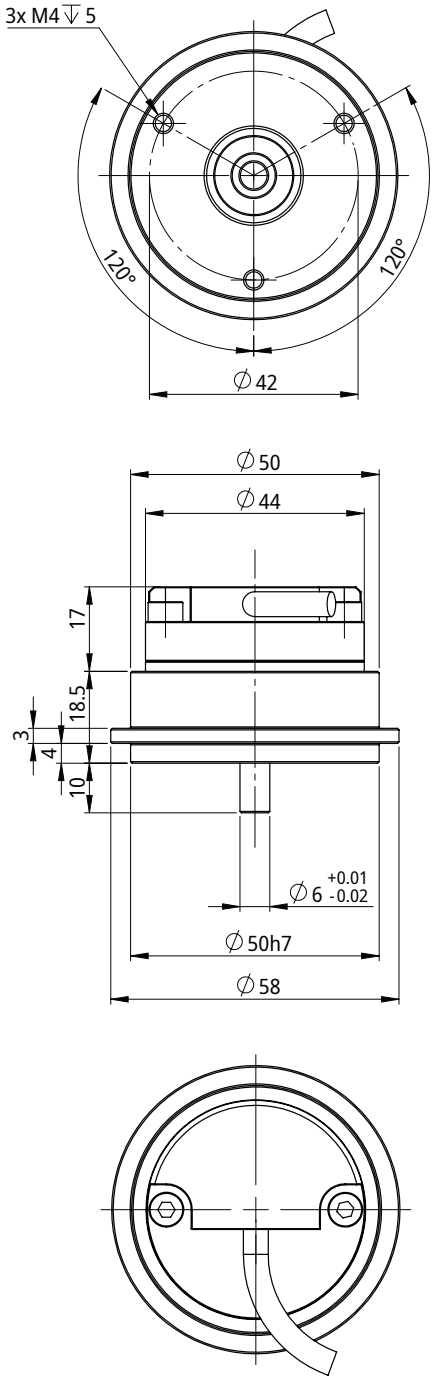
# Dimensions and installation drawings

Dimensions and tolerances are in mm.

## RE58-A encoder (with RE58A10 mounting flange)



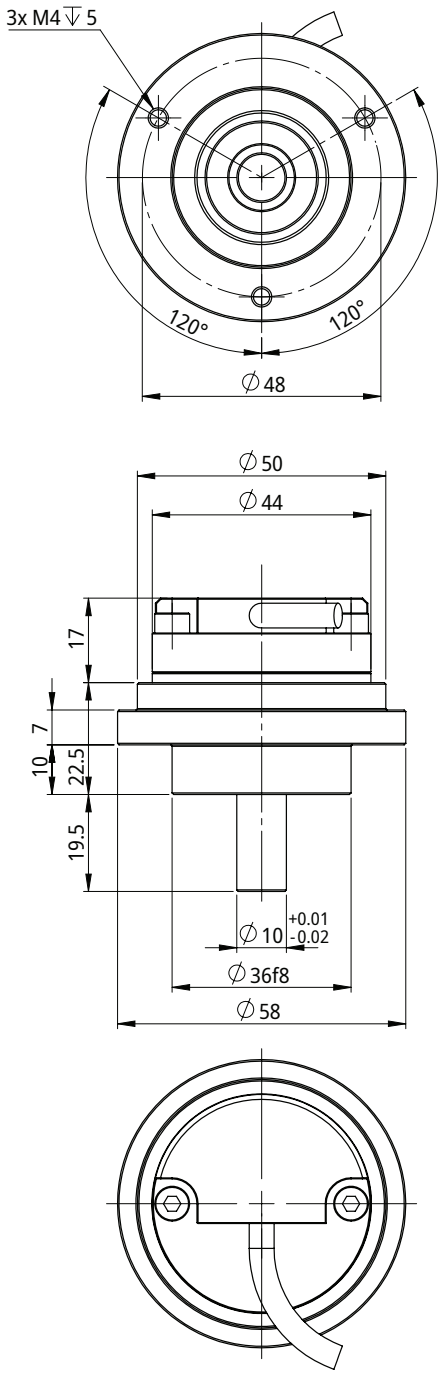

## RE58-B encoder (with RE58B06 mounting flange)



# 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. ± 0.5° |
| **Set-up time** | 100 ms (first data ready after supply voltage is in range),<br>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)<br>~54 mV/m (with 120 Ω load) |

## Mechanical data

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

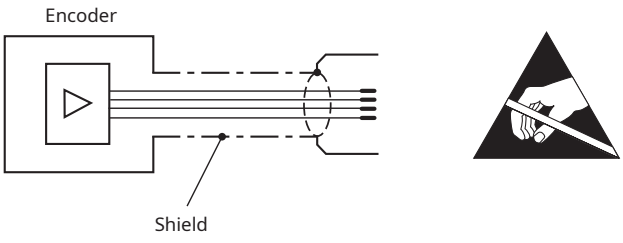
## Environmental data

| | | |
|---|---|---|
| **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

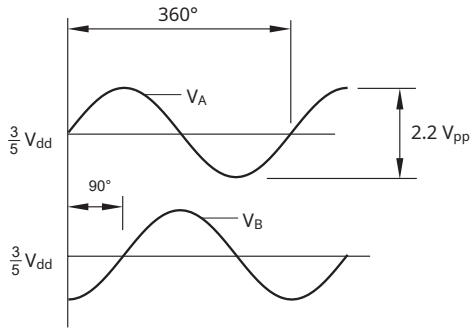
## Analogue sinusoidal output signals

RE58AC

### Specifications

| | | |
|---|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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 | $\frac{3}{5}$ ± 5 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.

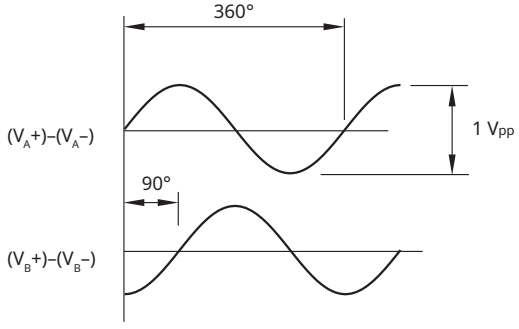
## Analogue sinusoidal output signals

RE58BC

### Specifications

| | | |
|---|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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



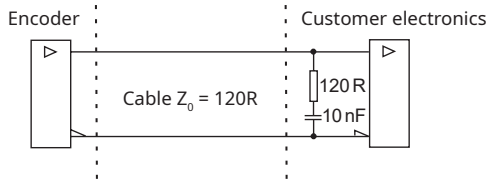
# Absolute BiSS C interface

RE58DC

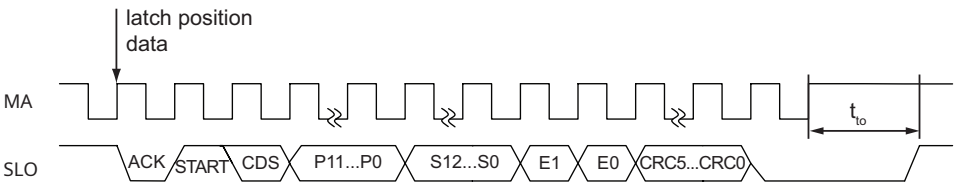
## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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 | 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

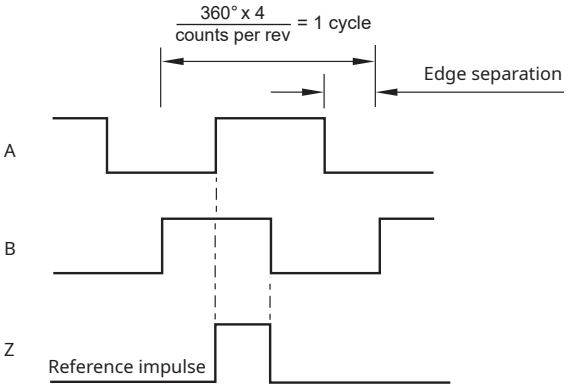
RE58IA

## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 8 V to 26 V<br>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. ±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

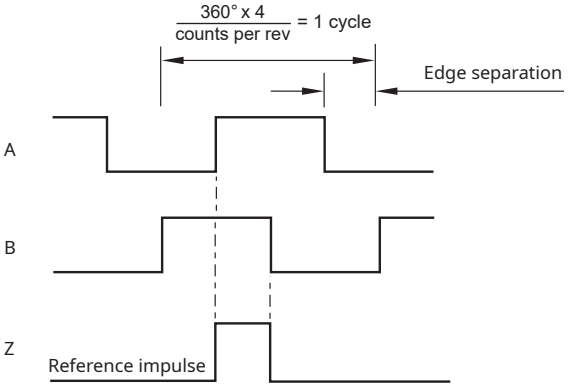
RE58IB

## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 8 V to 26 V<br>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 |

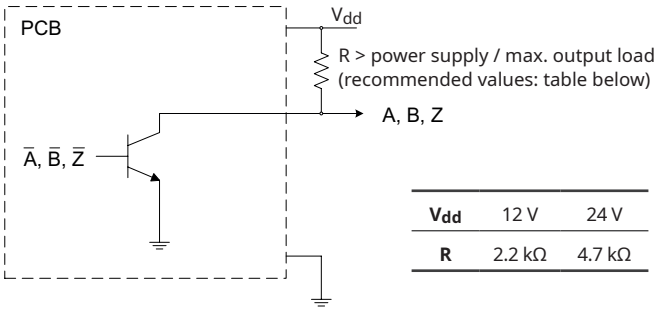
## Timing diagram

Complementary signals not shown




B leads A for clockwise rotation of magnetic actuator.

## Recommended signal termination




| **Vdd** | 12 V | 24 V |
|---|---|---|
| **R** | 2.2 kΩ | 4.7 kΩ |

# Incremental, RS422 output signal

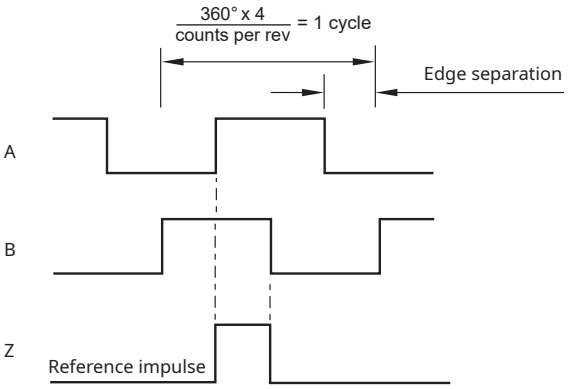
RE58IC

## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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 |

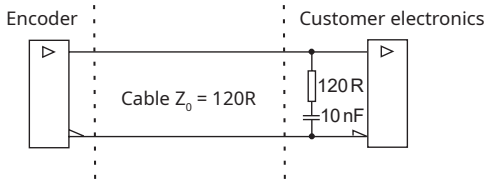
## Timing diagram

Complementary signals not shown




B leads A for clockwise rotation of magnetic actuator.

## Recommended signal termination



## Incremental, open collector output signal

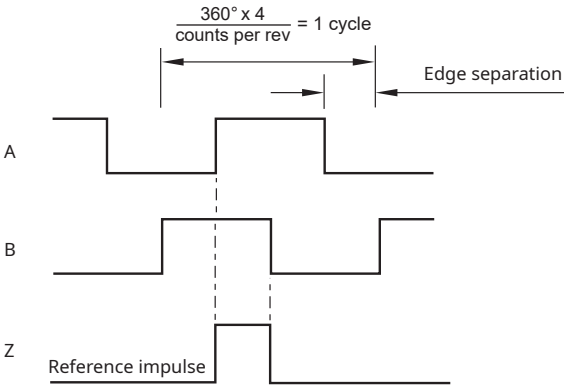
RE58IE

### Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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 |

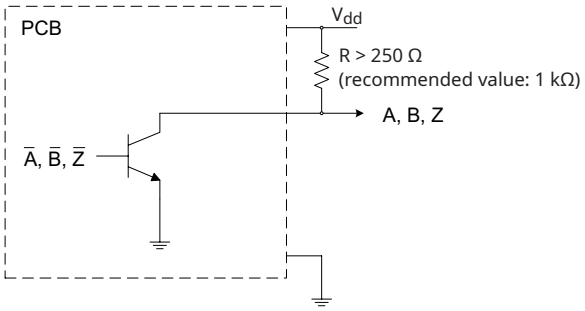
### Timing diagram

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 V to 26 V<br>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 |

For the timing diagram and recommended signal termination please see the **RE58IC output**.

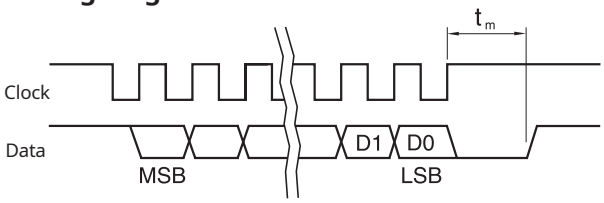
# Absolute binary synchro-serial interface (SSI)

RE58SC

## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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) |

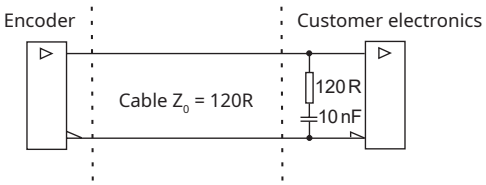
## Timing diagram




Clock ≤ 4 MHz  12.5 µs ≤ $t_m$ ≤ 20.5 µs

Position increases for clockwise rotation of magnetic actuator.

## Recommended signal termination



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

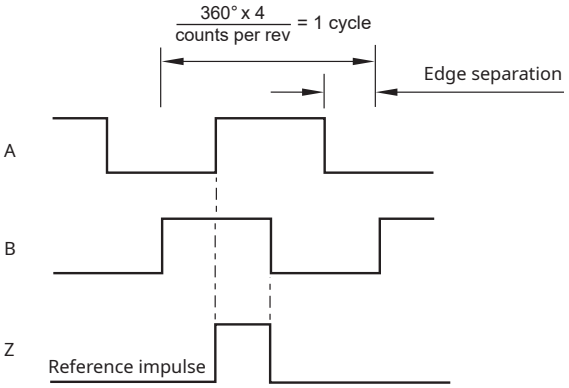
RE58SI

### Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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. ±0.5° |
| **Maximum cable length** | 50 m |

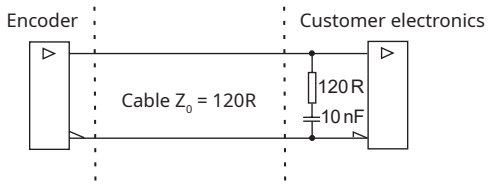
### Timing diagram

Complementary signals not shown

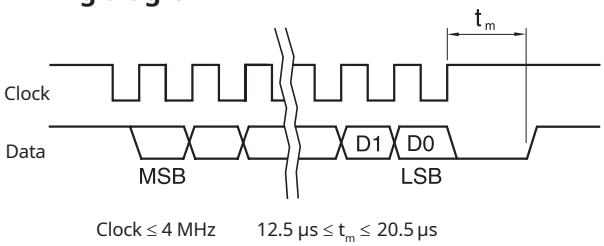



B leads A for clockwise rotation of magnetic actuator.

### Recommended signal termination




### Timing diagram




Clock ≤ 4 MHz  12.5 µs ≤ $t_m$ ≤ 20.5 µs

Position increases for clockwise rotation of magnetic actuator.

# Commutation single ended + incremental with line driver

RE58Ux

## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>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° |

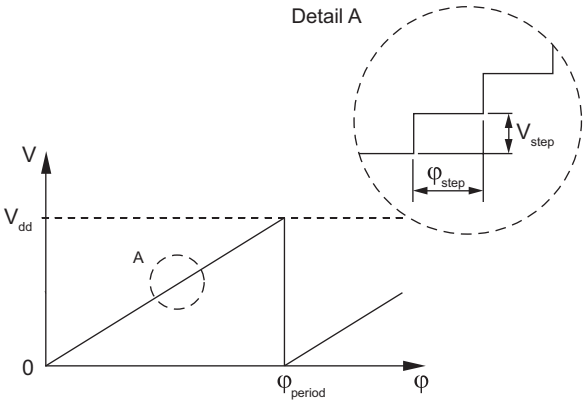
# Linear voltage output

RE58Vx

## Specifications

| | |
|---|---|
| **Supply voltage** | $V_{dd}$ = 5 V ±5 %<br>Reverse polarity protection |
| **Current consumption** | Typ. 26 mA |
| **Output voltage** | 0 V to $V_{dd}$ |
| **Output loading** | Max. 10 mA |
| **Nonlinearity** | 1 % |

## Timing diagram




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

| $\varphi_{period}$ | $N_{period}$ | $N_{step}$ | $\varphi_{step}$ |
|---|---|---|---|
| **360°** | 1 | 1,024 | 0.35° |
| **180°** | 2 | 1,024 | 0.18° |
| **90°** | 4 | 1,024 | 0.09° |
| **45°** | 8 | 512 | 0.09° |

| | | |
|---|---|---|
| $\varphi_{period}$ | = | Angle covered in one period (one sawtooth) |
| $V_{period}$ | = | Output voltage range for one period |
| $\varphi_{step}$ | = | 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 |

### Output type and electrical variant

| $\varphi_{period}$<br>**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 %<br>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
**BC** - Analogue complementary sinusoidal, 5 V
**DC** - Absolute BiSS C, 5 V
**IA** - Incremental, push pull, 24 V
**IB** - Incremental, open collector NPN, 24 V
**IC** - Incremental, RS422, 5 V
**IE** - Incremental, open collector, 5 V
**IG** - Incremental, RS422, 5 V, supply 24 V
**SC** - Absolute binary synchro-serial (SSI), RS422, 5 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)
**B** - Two periods per revolution (4 poles)
**C** - Three periods per revolution (6 poles)
**D** - Four periods per revolution (8 poles)
**E** - Five periods per revolution (10 poles)
**F** - Six periods per revolution (12 poles)
**G** - Seven periods per revolution (14 poles)
**H** - Eight periods per revolution (16 poles)

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

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