# P3 America, Inc.

*Motion Control and Automation Products*

## Hall Effect Single-Turn Rotary Encoder with Analog Output — Series ERC

- Economical - Threaded Bushing Mount
- Ø22mm Robust Plastic Housing
- Hall CMOS Technology
- Analog Output - Current/Voltage or PWM
- Shock and Vibration Proof
- Alternative to Precision Potentiometers

The series ERC allows the simple replacement of potentiometers with bushing. High reliable hall effect technology provides a constant signal quality over the whole life cycles, For panel setting applications there are options like increased torque and/or mechanical stops.

| Electrical Data | | | |
|---|---|---|---|
| Effective electrical angle of rotation | 360° (std) or any fraction. Minimum angle 20° | | |
| Independent linearity | ±0.5% | | |
| Supply voltage | 5V ±10% | 9..30V | 15..30V |
| Output signal | 0..5V (ratiometric) or PWM | 0..5V, 0..20mA, 4..20mA | 0..5V, 0..10V |
| Output load | Voltage output: ≥ 5k Ohm | Current output: ≤ 500 Ohm | |
| Electrical Speed (Max) | 1600 RPM | | |
| Resolution | 12 bit (4096 steps) | | |
| Current consumption (no load) | < 16 mA | | |
| Update rate | 1 ms | | |
| Insulation voltage | 1000 VAC @ 50 Hz, 1 min. | | |
| Insulation reistance | 2 MOhm @ 500 VDC, 1 min. | | |

| Mechanical and Environmental Data | |
|---|---|
| Mechanical angle of rotation | 360º (continuous) |
| Maximum rotational speed | 800 RPM (brass bearing) 3000 RPM (optional polymer bearing) |
| Life expectancy | > 10,000 turns (brass bearing) / 15,000 turns (polymer bearing) |
| Starting torque | 0.5 ~ 1Ncm |
| Maximum radial load | 1 N |
| Sleeve Bearing | Sintered bronze bearing (std.) or optional polymer bearing |
| Protection class | IP65 (electronics and cable) |
| Operating temperature | -40ºC...+85ºC |
| Storage temperature | -40ºC...+90ºC |
| Vibration (IEC 68-2-6, Test Fc) | 20 g (±1.5mm, 10 to 2000 Hz, 16 ycles , 3 axis, (3x4 h) |
| Shock (IEC 68-2-7, Test Ea) | 50 g (11ms, 18x) |
| Housing material | Nylon 66 Glass Fiber Reinforced |
| Shaft material | Stainless steel |
| Cable | 3 core flat cable. 0.15 m (AWG28) |
| Weight | approx. 25 g |

Note: Customers should test and verify device performance in any given application. General specifications values are measured at +15°C ~ +35°C. Please consult us if application is in higher or lower temperatures. Shaft modifications are possible, please consult us. Specifications subject to change without notice.

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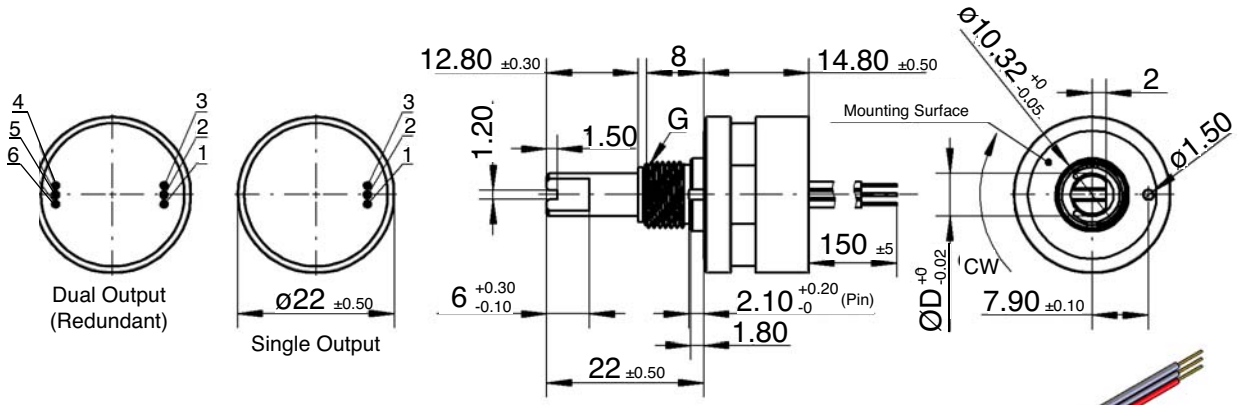
## Mechanical and Environmental Data (continued) — Series ERC

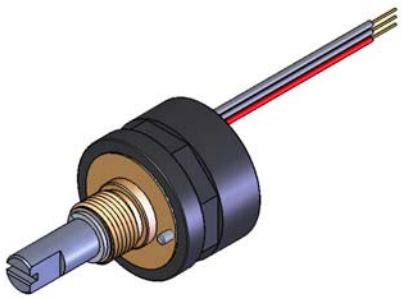
| | |
|---|---|
| Max. radial load | 1 N |
| Mass | Approx. 24 g |
| Fastening parts included in delivery | Hex nut and tooth washer |
| Fastening torque mounting nut | ≤ 1 Nm |
| Material shaft | Stainless steel |
| Material housing | Plastic |

| Emission / Immunity | |
|---|---|
| EN 55011 Emission AC/DC power | Class B |
| EN 55011 Emission housing | Class B |
| EN 61000-4-2 Immunity housing ESD | Class B |
| EN 61000-4-3 Immunity RF sine wave | Class A |
| EN 61000-4-4 Immunity DC power, I/O cable: Burst | Class B |
| EN 61000-4-5 Immunity DC power, I/O cable: Surge | Class B |
| EN 61000-4-6 Immunity DC power, I/O cable: Conducted sine wave | Class A |

1.) According IEC 60393
2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

## Dimensions (mm)



| Cable Assignment | |
|---|---|
| VSUP 1 | 1 |
| OUT 1 | 2 |
| GND 1 | 3 |
| VSUP 2 | 4 (redundant) |
| OUT 2 | 5 (redundant) |
| GND 2 | 6 (redundant) |

| Bushing | Dimension D | Dimension G |
|---|---|---|
| ERC 1 | 6mm | M10 |
| ERC 3 | 1/4” | 3/8 - 32 |

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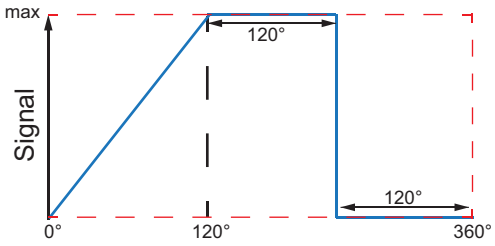
# Electrical Output Characteristic Options For Analog ERC Series

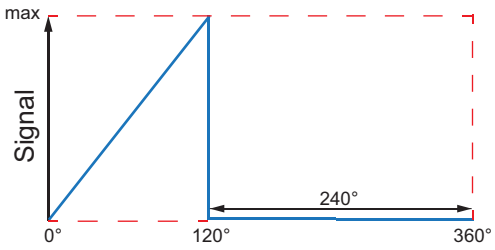
## Non Effective Electrical Angle: Delta 1/2

When the effective electrical angle is programmed less than 360º (120º in example), the remaining non effective electrical angle (240º in example) is divided in two equal parts: high level & low level (Delta 1/2). Unless otherwise specified, this is the default output.



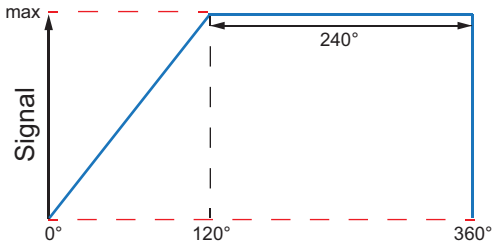

## Non Effective Electrical Angle: Low Level

When the effective electrical angle is programmed less than 360º (120º in example), the remaining non effective electrical angle (240º in example) will remain low. Unless this option is specified during ordering, non effective electrical angle will be Delta 1/2 as described above.



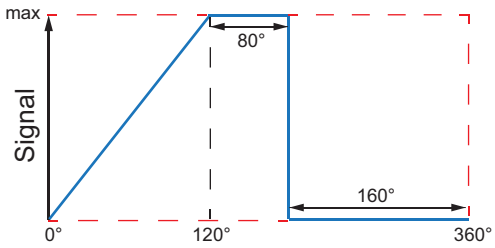

## Non Effective Electrical Angle: High Level

When the effective electrical angle is programmed less than 360º (120º in example), the remaining non effective electrical angle (240º in example) will remain high. Unless this option is specified during ordering, non effective electrical angle will be Delta 1/2 as described above.



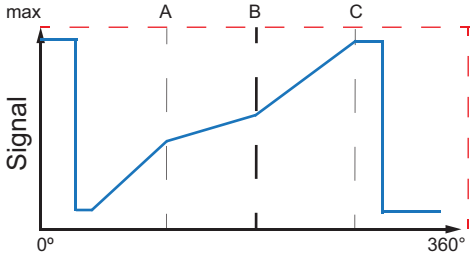

## Non Effective Electrical Angle: Variable

When the effective electrical angle is programmed less than 360º (120º in example), the remaining non effective electrical angle (240º in example) can be divided into high and low level in any ratio according to customer request. (80º high and 160º low in example). Unless this option is specified during ordering, non effective electrical angle will be Delta 1/2 as described above.




## Multi Point Programming

3 to 6 rising or falling linear segements are possible. Minimum and maximum levels can be specified. First and last linear segments are always horizontal.
1 to 3 settable calibration points.

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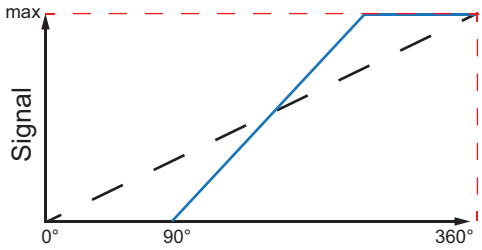
# Electrical Output Characteristic Options For Analog ERC Series

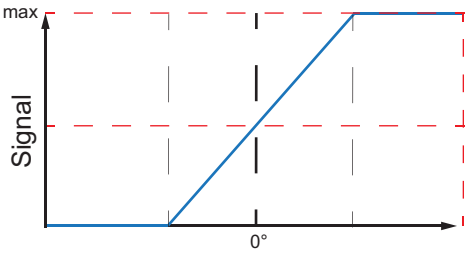
## Zero Point Programming

Mechanical zero point is aligned with marking on the sensor housing. Electrical zero point can be aligned to mechanical zero point or any offset (90° offset shown in example). Option must be specified when ordering.



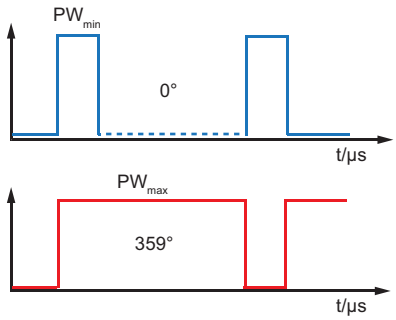

## Center Point Programming

Mechanical zero point is aligned with marking on sensor housing. When aligned the effective electrical angle is at 50% output.



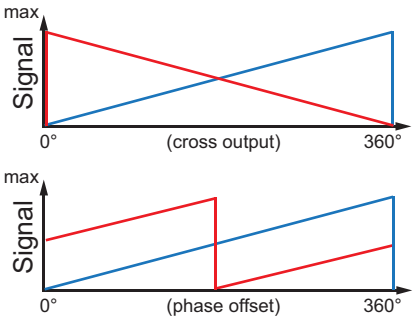

## Pulse Width Modulation (PWM)

PWM provides a constant carrier frequency which defines high to low ratio. The ration between high and low corresponds to the signal characteristics. It is in a fixed relation to the angle. Generally, for further signal processing, no A/D converter is required because many micro-controllers already have PWM input. Note: PWM output is only possible with ERC version that are 5V supply, 0-5V output (0505 types).




## Redundant Output (2 channel)

True redundancy is realized by 2 galvanically seperated sensing elements on the sensor chip. A single magnet provides a magnetic field simultaneuously for both elements. Both elements can be programmed identically or channel 2 can be programmed independently from channel 1. In the example, a cross output is shown and a parallel offset is shown with offset programming on channel 2.

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