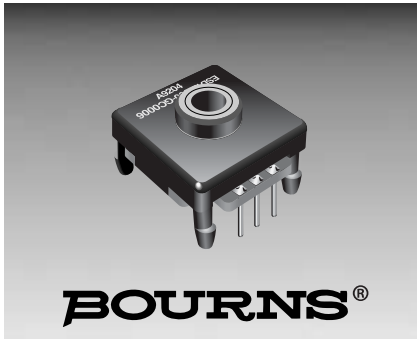




## Features

- Quadrature output
- Snap-in PC board mount
- Long operating life
- Incremental output
- Up to 24 full quadrature outputs per revolution

## ES Series - Shaftless Contacting Encoders

### Electrical Characteristics

|                                                          |                                                                                        |
|----------------------------------------------------------|----------------------------------------------------------------------------------------|
| Output .....                                             | 2-bit gray code, Channel A leads Channel B by 90 ° electrically turning clockwise (CW) |
| Closed Circuit Resistance .....                          | 5 ohms maximum                                                                         |
| Open Circuit Resistance .....                            | 100 K ohms minimum                                                                     |
| Contact Rating.....                                      | 10 milliamp @ 10 VDC or 0.1 watt maximum                                               |
| Insulation Resistance (500 VDC).....                     | 1,000 megohms minimum                                                                  |
| Dielectric Withstanding Voltage (MIL-STD-202 Method 301) |                                                                                        |
| Sea Level .....                                          | 1,000 VAC minimum                                                                      |
| Electrical Travel.....                                   | Continuous                                                                             |
| Contact Bounce (15 RPM) .....                            | 5 milliseconds maximum                                                                 |
| RPM (Operating) .....                                    | 120 maximum                                                                            |
| Phase Tolerance (CH A to CH B) .....                     | 90 ° ± 72 °                                                                            |

### Environmental Characteristics

|                                   |                                       |
|-----------------------------------|---------------------------------------|
| Operating Temperature Range ..... | +1 °C to +85 °C (+33 °F to +185 °F)   |
| Storage Temperature Range.....    | -40 °C to +85 °C (-40 °F to +185 °F)  |
| Humidity.....                     | MIL-STD-202, Method 103B, Condition B |
| Vibration .....                   | 15 G                                  |
| Contact Bounce .....              | 0.1 millisecond maximum               |
| Shock .....                       | 50 G                                  |
| Contact Bounce .....              | 0.1 millisecond maximum               |
| Rotational Life .....             | 200,000 shaft revolutions             |
| IP Rating .....                   | IP 40                                 |

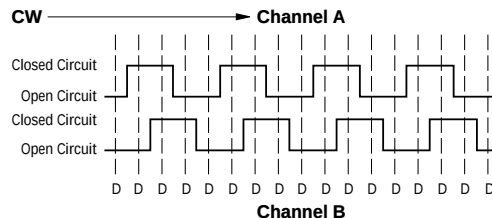
### Mechanical Characteristics

|                                 |                                                                                                                                                                                                                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanical Angle .....          | Continuous                                                                                                                                                                                                                                                                                |
| Running Torque (Detented) ..... | 0.5 to 1.5 N-cm (0.75 to 2.25 oz-in.)                                                                                                                                                                                                                                                     |
| Undetented Torque .....         | 0.17 to 0.8 N-cm (0.25 to 1.25 oz-in.)                                                                                                                                                                                                                                                    |
| Weight.....                     | Approximately 8 gm (0.28 oz.)                                                                                                                                                                                                                                                             |
| Terminals .....                 | Printed circuit board terminals                                                                                                                                                                                                                                                           |
| Soldering Condition .....       | Recommended hand soldering using Sn95/Ag5 no clean solder, 0.025 " wire diameter.<br>Maximum temperature 399 °C (750 °F) for 3 seconds. No wash process to be used with no clean flux.<br>Part can be wave soldered at 260 °C (500 °F) for 5 seconds, no wash process with no clean flux. |
| Marking .....                   | Manufacturer's name and trademark, part number and date code                                                                                                                                                                                                                              |
| Hardware .....                  | No hardware supplied                                                                                                                                                                                                                                                                      |

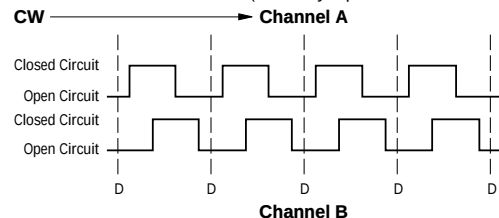
### Quadrature Output Table

This table is intended to show available outputs as currently defined.

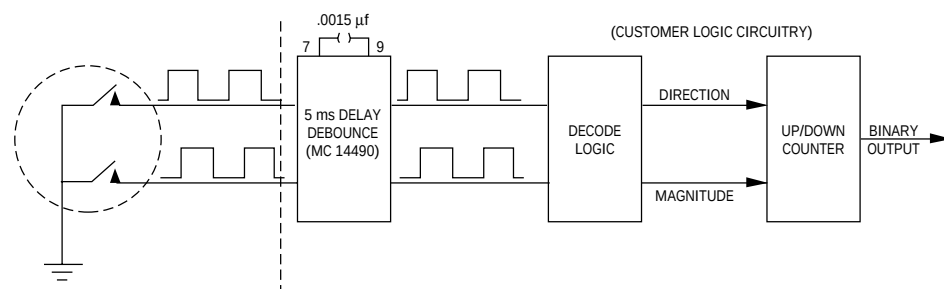
#### 1/4 CYCLE PER DETENT



#### FULL CYCLE PER DETENT (Normally Open in Detent Shown)



### RECOMMENDED INCREMENTAL CONTROL DIAGRAM FOR USE WITH A DEBOUNCE CIRCUIT



**BOURNS®**

[illegible]

DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$

Specifications are subject to change without notice.

# ES Series - Shaftless Contacting Encoders

## How To Order

