

# SPLASH-PROOF, HIGH-ACCURACY CURRENT & DIGITAL OUTPUT

## CONTACTLESS MEMS TILT ANGLE SENSOR

# ESC3000Z series

RoHS compliant



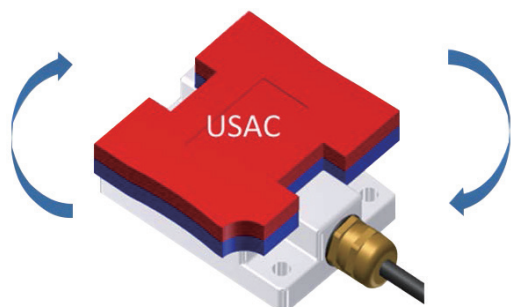
### FEATURES

ESC-Series inclinometers are high-performance sensors that utilize a MEMS accelerometer to determine X and Y-axis inclination with excellent precision. The aluminum die-cast housing provides mechanical stability for the encapsulated sensor, ensuring high environmental protection in harsh industrial environments.

- Dual-Axis Measurement: Up to  $\pm 80^\circ$
- High Accuracy: Absolute linearity  $< \pm 0.5\%$  F.S.
- Versatile Outputs: Ratiometric voltage, standard voltage, and current
- Stable Measurement under Vibration
- Programmable Parameters: Digital damper, inclination range, data transmission period, and baud rate
- Robust Design: IP67-rated aluminum die-cast enclosure

### NEW USER-FRIENDLY FUNCTIONS

#### Easy in-field zero-point resetting



※ Touch USAC 3 times each 180° CW rotation to ESC3000Z

Adjustment index point ( $0^\circ$ ) using User Settable Adjustment Card. (USAC)

- (1) Please touch ESC 3 times with USAC.
- (2) Then current position ( $\pm 5^\circ$  max./horizontality) will be changed to index point.

Any electrical connections do not needed.

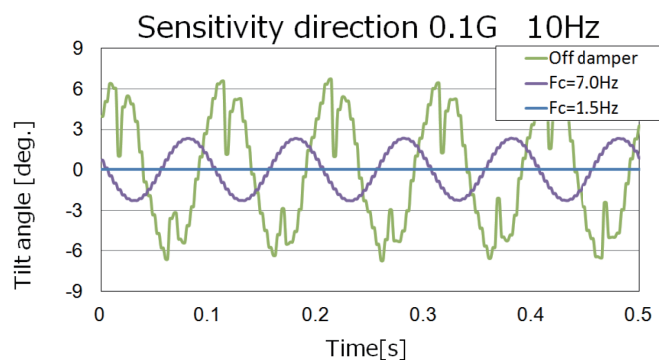
\*Note: USAC is optional item

#### Serial communication function

This series has RS485 interface as standard function. Using RS-485 serial interface command, the following functions will be able to be used.

1. Retrieving of electrical angle position.
2. Retrieving of Serial number.
3. Teach-in setting of index ( $0^\circ$ ) point. (Option)
4. Changing of electrical analog angle range. (Option)

#### Digital damper



The ESC3000Z series features a digital damper that eliminates external noise, allowing users to select from 16 different filter settings. Choosing the appropriate digital damper effectively reduces the impact of vibration.

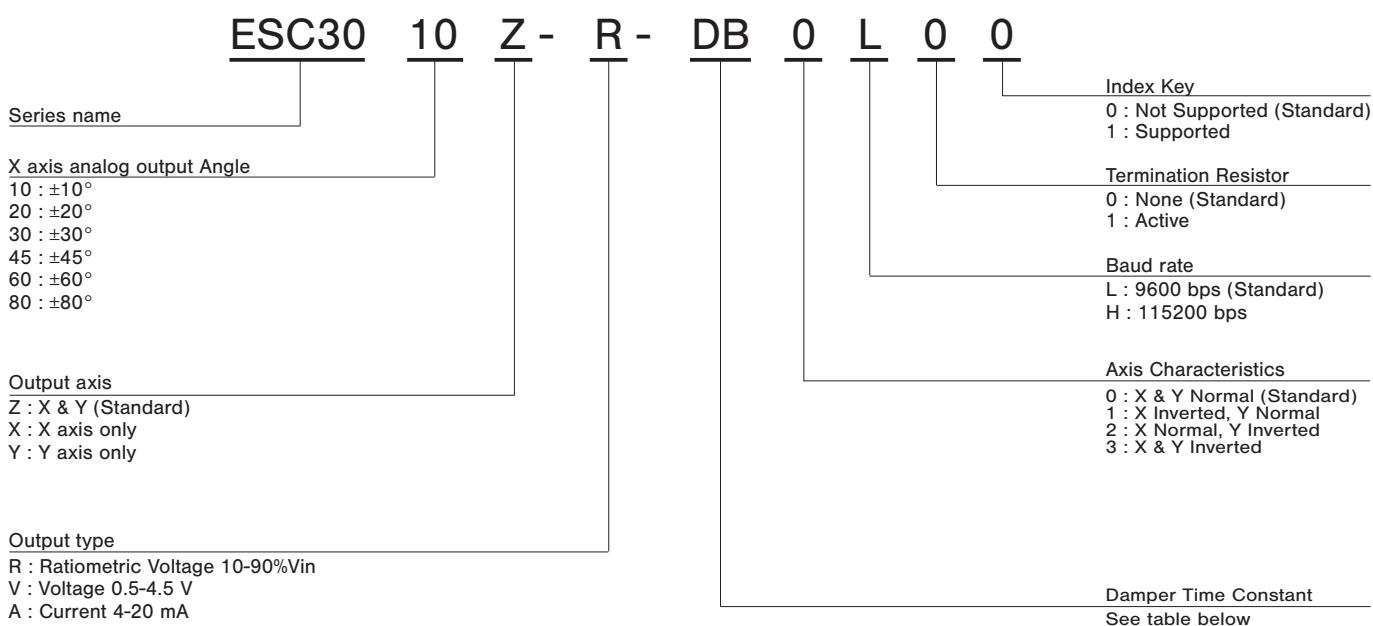
\*Note: The digital damper adjustment function is available as an option. When ordering, please ensure to select the digital damper-equipped ESC3000Z.

5. Changing damper setting. (Option)
6. Changing baud rate. (Option)
7. Changing output cycle of serial data. (Option)

# ESC3000Z

## INCLINOMETERS

### ■ PART NUMBER DESIGNATION



\* The table below shows the cut-off frequency and time constant corresponding to each damper setting.  
Users can select the optimum damper time constant according to the operating speed and vibration level.

### ■ DAMPER TIME CONSTANT

| Part No. | Level | Cut-off frequency | Time constant     |
|----------|-------|-------------------|-------------------|
| D0       | 0     | 11.2 Hz           | 120 ms            |
| D1       | 1     | 9.27 Hz           | 150 ms            |
| D2       | 2     | 7.65 Hz           | 160 ms            |
| D3       | 3     | 6.32 Hz           | 170 ms            |
| D4       | 4     | 5.21 Hz           | 190 ms            |
| D5       | 5     | 4.30 Hz           | 220 ms            |
| D6       | 6     | 3.55 Hz           | 250 ms            |
| D7       | 7     | 2.93 Hz           | 290 ms            |
| D8       | 8     | 2.42 Hz           | 330 ms            |
| D9       | 9     | 2.00 Hz           | 360 ms            |
| DA       | 10    | 1.65 Hz           | 420 ms            |
| DB       | 11    | 1.36 Hz           | 500 ms (Standard) |
| DC       | 12    | 1.21 Hz           | 590 ms            |
| DD       | 13    | 0.92 Hz           | 700 ms            |
| DE       | 14    | 0.76 Hz           | 810 ms            |
| DF       | 15    | 0.62 Hz           | 970 ms            |

# ESC3000Z

## INCLINOMETERS

### ■ STANDARD SPECIFICATIONS

| Item                  | Output | Ratiometric Voltage                                                                                                                                                                                      | Voltage     | Current        | Serial (RS-485) |
|-----------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------|-----------------|
| Effective Tilt Angle  |        | $\pm 10^\circ, \pm 20^\circ, \pm 30^\circ, \pm 45^\circ, \pm 60^\circ, \pm 80^\circ$<br>Independent selection of X and Y axes (Optional)<br>Angle reset function via RS-485 command available (Optional) |             |                | $\pm 80^\circ$  |
| Absolute Linearity    |        | $\pm 0.5\%FS$                                                                                                                                                                                            |             |                | –               |
| Input Voltage         |        | $5 \pm 0.25$ VDC                                                                                                                                                                                         | 8 ~ 30 VDC  | $24 \pm 4$ VDC | –               |
| Current Consumption   |        | 50 mA max.                                                                                                                                                                                               |             |                |                 |
| Output Range          |        | 10 ~ 90%Vin                                                                                                                                                                                              | 0.5 ~ 4.5 V | 4 ~ 20 mA      | –               |
| Response Time         |        | Time constant (Input step): 500 ms (Standard)<br>Selectable in 16 steps (120–970 ms) (Optional)<br>Damper reset via RS-485 command (Optional)                                                            |             |                |                 |
| Temp. Characteristics |        | 0° position : $\pm 0.5^\circ$ (–30 to 85°C / Reference Temperature: 25°C)                                                                                                                                |             |                |                 |
| Dimensions / Weight   |        | W90 × D70 × H22.5 mm / Approx. 300 g                                                                                                                                                                     |             |                |                 |
| Cable                 |        | 6-core cabtyre cable (OD: $\varnothing 7.4$ mm, Conductor: 0.5 mm <sup>2</sup> )                                                                                                                         |             |                |                 |
| EMS                   |        | ISO 11452 compliant: Output shift within $\pm 1\%FS$ from 10 MHz to 1 GHz at 100 V/m (ratiometric, current, serial outputs) and 50 V/m (voltage output)                                                  |             |                |                 |
| Operating Temp. Range |        | –30 ~ 85°C                                                                                                                                                                                               |             |                |                 |
| Vibration             |        | 70 m/s <sup>2</sup> , 5 to 200 Hz (10 min, 2 hours)                                                                                                                                                      |             |                |                 |
| Shock                 |        | 1,000 m/s <sup>2</sup> , half-sine wave, 6 ms                                                                                                                                                            |             |                |                 |
| IP Rating             |        | IP67                                                                                                                                                                                                     |             |                |                 |
| Index Point Teach-in  |        | 0° tilt output teaching range: Within $\pm 5^\circ$ of horizontal (Optional)                                                                                                                             |             |                |                 |

### ■ TEMPERATURE CHARACTERISTICS

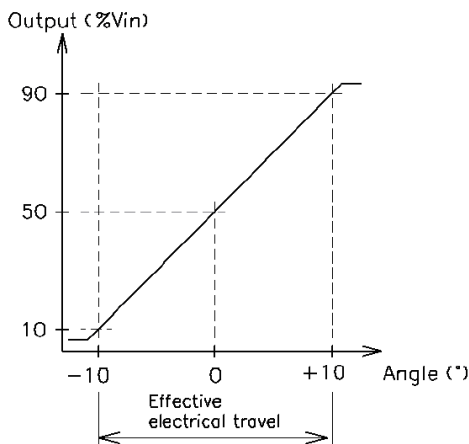
The ESC3000Z series ensures stable temperature characteristics over a wide temperature range, thanks to individual calibration using a proprietary temperature compensation system.

# ESC3000Z

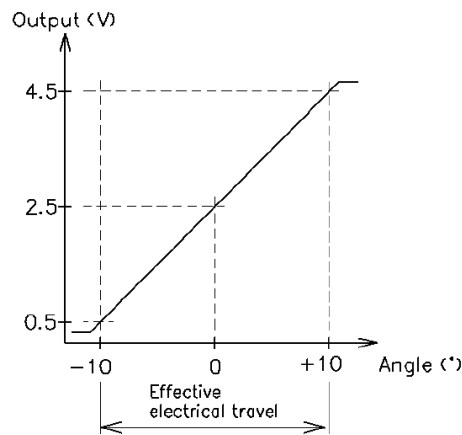
## INCLINOMETERS

### ■ OUTPUT CHARACTERISTICS

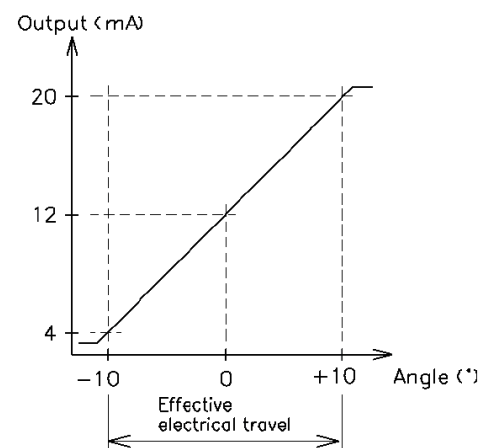
#### ● Ratiometric Voltage



#### ● Voltage

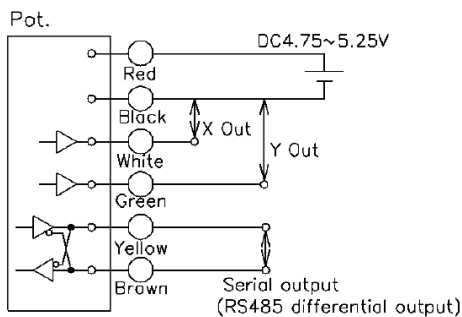


#### ● Current

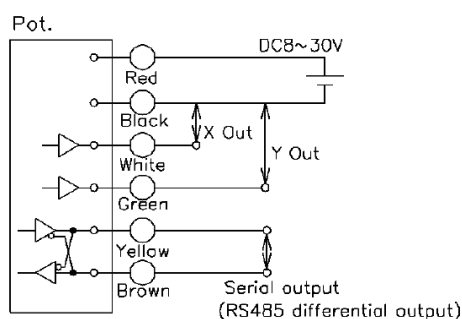


### ■ SCHEMATIC

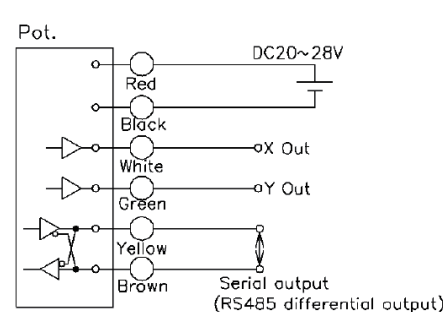
#### ● Ratiometric Voltage



#### ● Voltage



#### ● Current



### ■ HANDLING INSTRUCTION

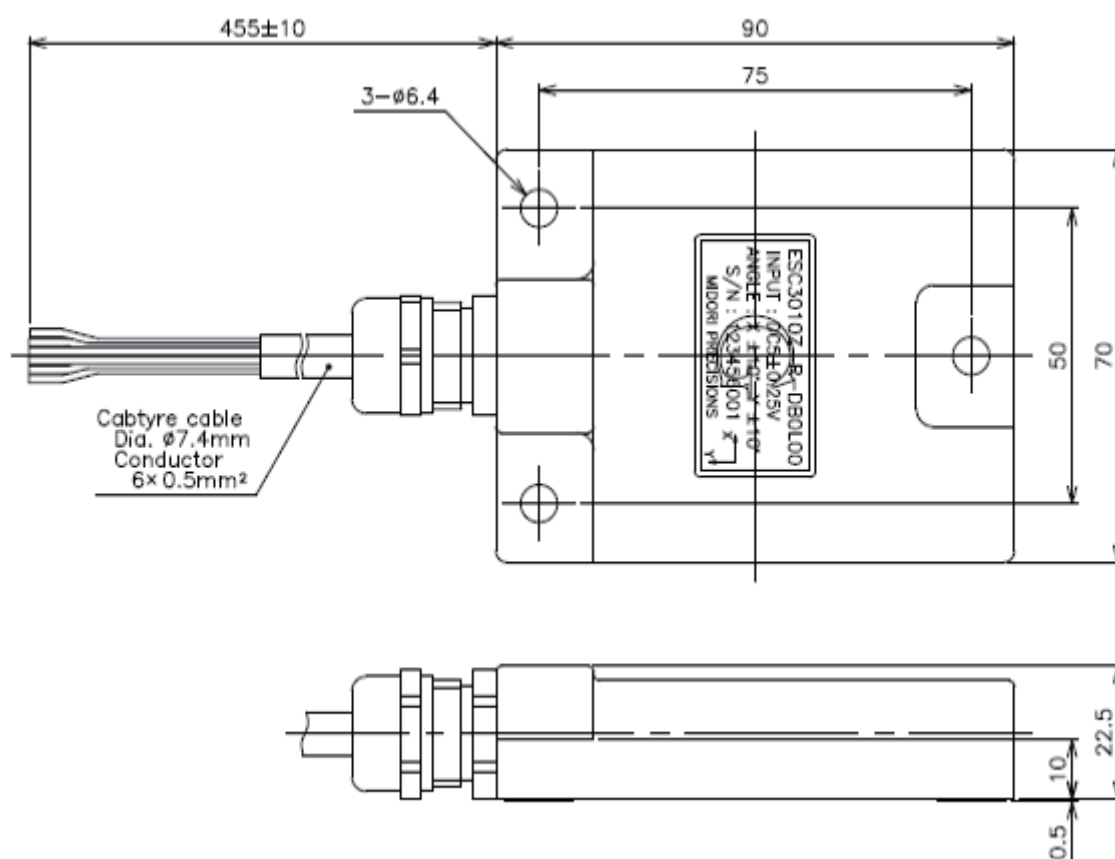
- This product is not designed to measure resistance.
- Take appropriate electrostatic discharge (ESD) protection measures when handling this product.
- Depending on the installation environment, electrostatic charges generated during operation may cause unexpected malfunctions.
- Vibrations exceeding an acceleration of 12 m/s<sup>2</sup> or frequencies above 3,000 Hz may affect the accuracy of tilt angle measurements.
- Depending on the operating temperature, the zero-point output may experience a gradual drift over time.

# ESC3000Z

## INCLINOMETERS

### OUTLINE DIMENSIONS

(Unit:mm)



### TILT DIRECTION

