

## Precision Rotative Transducers, Conductive Plastic, Economic Series (ECO)



The “ECO” models are a comprehensive range of rotational motion transducers for industrial applications.

All mechanical and electrical parameters can be adapted to meet your specifications.

### FEATURES

- Size 05 - 09 - 13 are available
- Long life up to 30 million cycles
- Accuracy  $\pm 1\%$  down to  $\pm 0.25\%$
- Bush or servo mounting types
- Rear mounted terminals
- Following MIL-R-39023 and NFC 93-255 requirements
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### QUICK REFERENCE DATA

Sensor type	ROTATIONAL, conductive plastic
Output type	Output by turrets
Market appliance	Industrial
Dimensions	Various sizes

SIZE	05		09			13		
MODEL	50 ES	50 CB	78 ES	78 CS	78 CB	156 ES	156 CS	156 CB

### ELECTRICAL SPECIFICATIONS

Theoretical electrical travel (TET)	Actual electrical angle (AEA) - 2°							
Independent linearity (over TET)	A $\leq \pm 1\%$ (standard)		B $\leq \pm 0.5\%$ (special)			C $\leq \pm 0.25\%$ (special)		
Actual electrical travel (AET)	330° $\pm 5^\circ$		340° $\pm 5^\circ$			350° $\pm 5^\circ$		
Ohmic values (R <sub>T</sub> )	1 k $\Omega$ - 5 k $\Omega$ - 10 k $\Omega$ - on request other values							
Ohmic value tolerances at 20 °C	$\pm 10\%$	$\pm 20\%$	$\pm 10\%$	$\pm 20\%$	$\pm 10\%$	$\pm 20\%$	$\pm 10\%$	$\pm 20\%$
Output smoothness	$\leq 0.05\%$							
Maximum power rating at 70 °C	0.2 W		0.3 W			0.5 W		
Wiper current	Recommended: a few $\mu$ A - 1 mA max. (continuous)							
Tap (current or voltage)	NA		1 (on request)					
Resistance load on wiper	Minimum 10 <sup>3</sup> x R <sub>T</sub>							
End voltage	$\leq 0.2\%$	$\leq 0.5\%$	$\leq 0.2\%$	$\leq 0.5\%$	$\leq 0.2\%$	$\leq 0.5\%$	$\leq 0.2\%$	$\leq 0.5\%$
Insulation resistance	$\geq 1000\text{ M}\Omega$ , 500 V <sub>DC</sub>							
Dielectric strength	$\geq 500\text{ V}_{\text{RMS}}$ , 50 Hz							

### MECHANICAL SPECIFICATIONS

Mechanical angle (MA)	360° continuous							
On request: stops	NA		340° $\pm 3^\circ$			350° $\pm 3^\circ$		
Mounting type	Servo	Bushing	Servo	Bushing	Servo	Bushing	Servo	Bushing
Shaft guiding	Ball bearings	Sleeve bearings	Ball bearings	Sleeve bearings	Ball bearings	Sleeve bearings	Ball bearings	Sleeve bearings
Shaft	Stainless steel							
Housing	Plastic molding							
Termination	Turrets							
Wiper	Precious metal multi-finger contact							
Starting torque (N.cm) in TET	$\leq 0.2$	$\leq 0.5$	$\leq 0.2$	$\leq 0.5$	$\leq 0.2$	$\leq 0.5$	$\leq 0.2$	$\leq 0.5$
Torque on stops (N.cm)	50							
Weight (g)	5 $\pm$ 2	8 $\pm$ 2	13 $\pm$ 2	17 $\pm$ 2	29 $\pm$ 2	34 $\pm$ 2	29 $\pm$ 2	34 $\pm$ 2
Moment of inertia (g cm <sup>2</sup> )	$\leq 0.5$		$\leq 1$			$\leq 2$		

PERFORMANCE		
MODELS	ES	CS and CB
Life (10 <sup>6</sup> cycles)	30	20
Temperature range	-55 °C to +125 °C	
Climatic category	55/125/04	
Speed rotation (RPM)	600	150
Sine vibration on 3 axes	1.5 mm or 20 g from 10 Hz to 2000 Hz	
Mechanical shocks on 3 axes	50 g - 11 ms - half sine	

**Note**

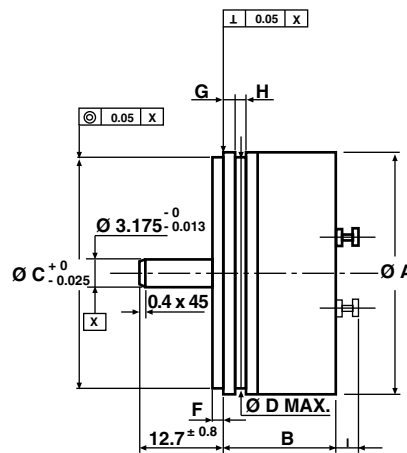
- Nothing stated herein shall be construed as a guarantee of quality or durability
- Life under Vishay laboratory conditions

**DIMENSIONS** in millimeters, general tolerance  $\pm 0.5$  mm

**SIZE 05/09/13**

**SERVO MOUNT TYPE**

- 50 ES
- 78 ES
- 78 CS
- 156 ES
- 156 CS

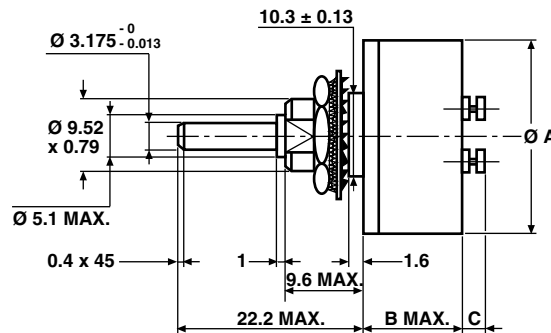


DIMENSIONS	DESIGNATION	SIZE 05	SIZE 09		SIZE 13	
		50 ES	78 ES	78 CS	156 ES	156 CS
Ø A	Ø housing	12.7	22.2		33.3	
B	Length	13.0	13.5		18.0	
Ø C	Ø pilot	9.525	19.05		30.16	
Ø D max.	Ø groove	11.45	19.64		30.9	
F	Flange thickness	1 $\pm$ 0.1			1.6 $\pm$ 0.1	
G	Shoulder	1.2 $\pm$ 0.1			1.6 $\pm$ 0.1	
H	Dia. of groove	1.2 $\pm$ 0.2			1.5 min.	
I max.	Height of the turret	2.5	2.5		3.6	

**SIZE 05/09/13**

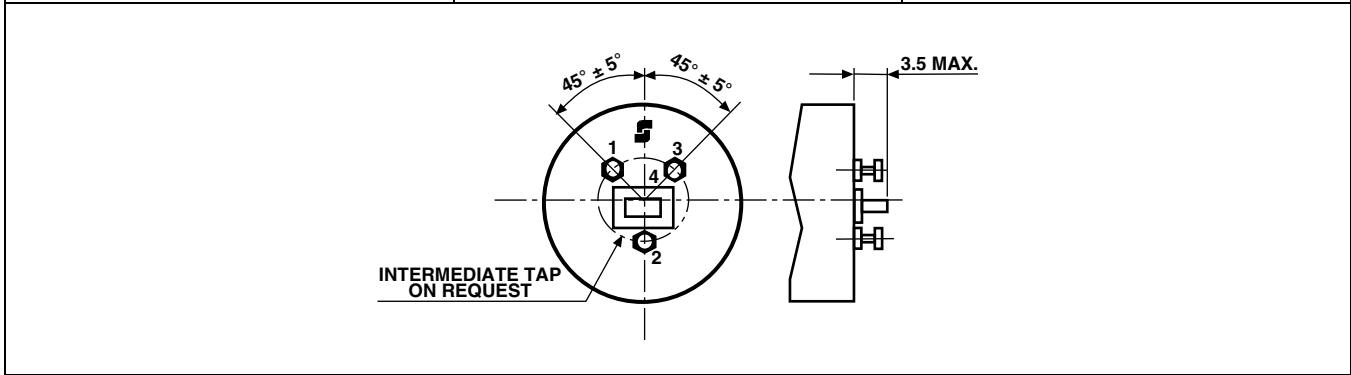
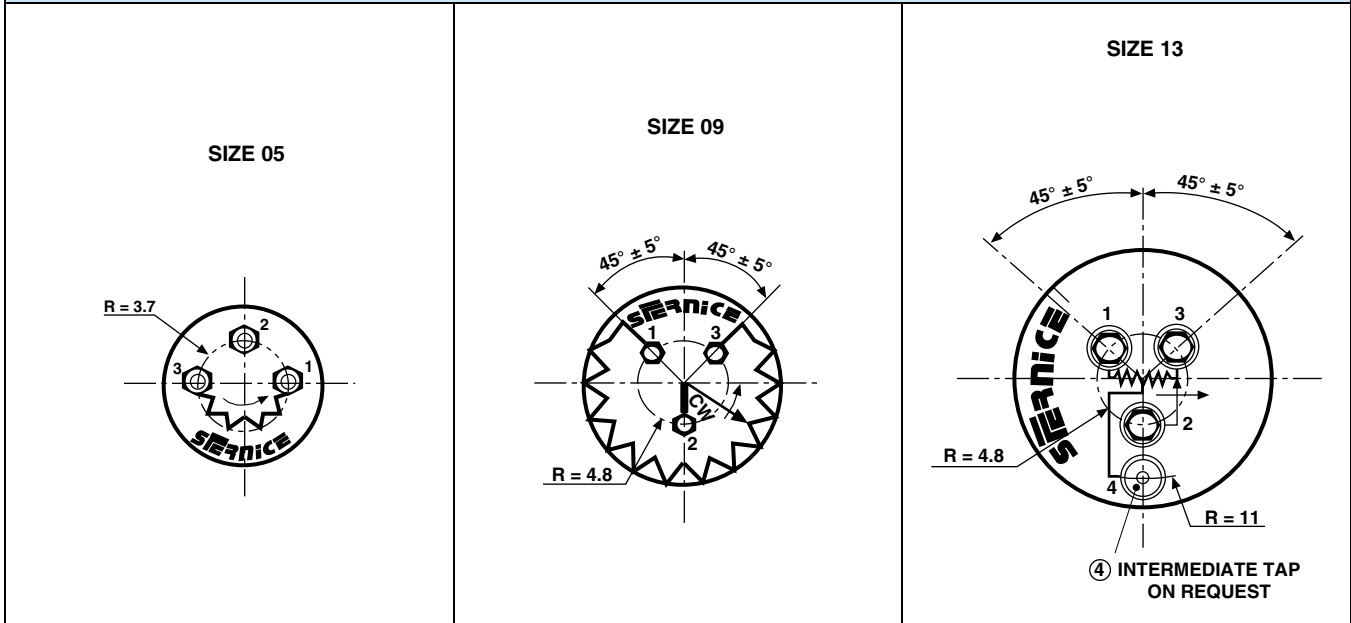
**BUSHING MOUNT TYPE**

- 50 CB
- 78 CB
- 156 CB



DIMENSIONS	DESIGNATION	SIZE 05	SIZE 09	SIZE 13
		50 CB	78 CB	156 CB
Ø A	Ø housing	12.7	22.2	33.3
B max.	Length	11	11.5	16
C max.	Height of the turret	2.5	2.5	3.6

**DIMENSIONS** in millimeters, general tolerance  $\pm 0.5$  mm



**ORDERING INFORMATION/DESCRIPTION**

ECO	78	E	S	A	T	103	e4
SERIES	MODEL	TYPE	FIXATION	LINEARITY CODE	TAP	OHMIC VALUE	LEAD FINISH
		E = Ball bearings C = Sleeve bearings	S: Servo B: Bushing	A: $\pm 1\%$ B: $\pm 0.5\%$ C: $\pm 0.25\%$	On request T: Voltage U: Current position to be specified	First 2 digits are significant numbers 3 <sup>rd</sup> digit indicates number of zeros	

Special characteristics and designs on request

**SAP PART NUMBERING GUIDELINES**

ECO	78CB	C	502
SERIES	MODEL	LINEARITY	OHMIC VALUE



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