BOURNS®

Features

- Bushing mount
- Sealable
- Non-standard features and specifications available
- Optional high torque feature
- Optional center tap feature
- Gangable

3500/3501 - Precision Potentiometer

Electrical Characteristics[1]

	3500 Wirewound Element	3501 Hybritron® Element
Standard Resistance Range	50 to 200 K ohms	1 K to 200 K ohms
Total Resistance Tolerance	±3 %	±10 %
Independent Linearity	±0.20 %	±0.25 %
Effective Electrical Angle	3600 ° +10 °, -0 °	3600 ° +10 °, -2 °
Absolute Minimum Resistance/ Minimum Voltage	1 ohm or 0.1 % maximum (whichever is greater)	0.2 % maximum
Noise	100 ohms ENR maximum	Output smoothness 0.1 % max.
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)		
Sea Level	1,500 VAC minimum	1,500 VAC minimum
70,000 Feet	400 VAC minimum	400 VAC minimum
Power Rating (Voltage Limited By Power Dissipation or 325 VAC, Whichever Is Less)		
+70 °C	2 watts	2 watts
+125 °C	0 watt	0 watt
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Resolution	See recommended part nos	Essentially infinite

Environmental Characteristics[1]

Operating Temperature Range	+1 °C to +125 °C	+1 °C to +125 °C
Storage Temperature Range	-65 °C to +125 °C	-65 °C to +125 °C
Temperature Coefficient Over Storage Temperature Range[2]	±50 ppm/°C maximum/unit	±100 ppm/°C maximum/unit
Vibration	20 G	20 G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2 % maximum	±2 % maximum
Voltage Ratio Shift	±0.1 % maximum	±0.1 % maximum
Shock	100 G	100 G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2 % maximum	±2 % maximum
Voltage Ratio Shift	±0.1 % maximum	±0.1 % maximum
Load Life	1,000 hours, 2 watts	1,000 hours, 2 watts
Total Resistance Shift	±2 % maximum	±5 % maximum
Rotational Life (No Load)	2,000,000 shaft revolutions[2]	4,000,000 shaft revolutions
Total Resistance Shift	±5 % maximum	±5 % maximum
Moisture Resistance (MIL-STD-202, Method 103, Condition B)		
Total Resistance Shift	±2 % maximum	±5 % maximum
IP Rating	IP 65	IP 65

Mechanical Characteristics[1]

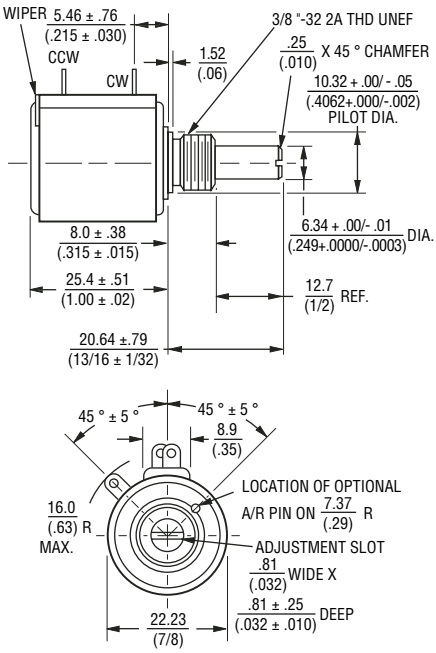
Stop Strength	67.8 N-cm (96 oz.-in.) minimum
Mechanical Angle	3600 ° +10 °, -0 °
Torque (Starting & Running)	0.42 N-cm (0.6 oz.-in.) maximum
Mounting	170-200 N-cm (15-18 lb.-in.) maximum
Shaft Runout	0.05 mm (0.002 in.) T.I.R.
Lateral Runout	0.13 mm (0.005 in.) T.I.R.
Shaft End Play	0.13 mm (0.005 in.) T.I.R.
Shaft Radial Play	0.08 mm (0.003 in.) T.I.R.
Pilot Diameter Runout	0.05 mm (0.002 in.) T.I.R.
Backlash	1.0 ° maximum
Weight	Approximately 28 gm
Terminals	Gold-plated solder lugs
Soldering Condition	Recommended hand soldering using Sn95/Ag5 no clean solder, 0.025 " wire diameter. Maximum temperature 399 °C (750 °F) for 3 seconds. No wash process to be used with no clean flux.
Marking	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, and date code.
Ganging (Multiple Section Potentiometers)	2 cups maximum
Hardware	One lockwasher (H-37-2) and one mounting nut (H-38-2) is shipped with each potentiometer.

Recommended Part Numbers

Part Number	Resistance (Ω)	Resolution
3500S-1-102	1,000	.030
3500S-1-502	5,000	.018
3500S-1-103	10,000	.019
3500S-2-102	**1,000**	**.030**
3500S-2-502	**5,000**	**.018**
3500S-2-103	**10,000**	**.019**

Part Number	Resistance (Ω)
3501H-1-102	**1,000**
3501H-1-502	**10,000**
3501H-1-103	**10,000**

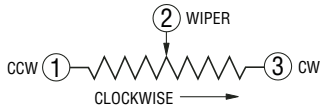
3500S-2/3501H-1



NOTE: SHAFT LENGTH VARIATIONS

3500S-1-RC	**11/16 (17.46)**	**(plastic bushing)**
3500S-2-RC	**13/16 (20.64)**	**(metal bushing)**
3501H-1-RC	**13/16 (20.64)**	**(metal bushing)**

TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .25 (.010), .XXX ± .13 (.005)
FRACTIONS: ±1/64
DIMENSIONS: MM (IN.)



BOLDFACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.

REV. 12/03

MATERIAL DATA SHEET

Reliable Electronic Solutions

Material #	3500S-2
Product Line	Precision
Posted Date	03/02/2005
Compliance Date	Since Inception
RoHS Compliant	Yes

No.	Construction element	Material group	Material weight [g]	Materials	CAS If applicable	Average mass [%]	Sum [%]
1	Mandrel	Metal	2.791	Copper	7440-50-8	92-99%	11.2238%
				Organic coatings	**********	1-8%	
2	Resist Wire	Copper Alloy	0.5782	Nickel	7440-02-0	2-47%	2.3252%
				Copper	7440-50-8	Balance	
				Iron	1300-37-1	Max3%	
				Manganese	7439-96-5	Max 3%	
				Cobalt	7440-48-4	Max 0.5%	
3	Varnish	Insulating Varnish	0.1093	Phenol Resin	**********	100%	0.4395%
4	Housing Molded	Mold Compound	4.6905	Phthalate Polymer	25035-78-3	<40%	18.8626%
				Silicate	13983-17-0	<15%	
				Glass Fiber	65997-17-3	<40%	
				Alumna	27645-51-2	<10%	
				Calcium Separate	1592-23-0	<2%	
				Pentabromophenyl ether	1163-19-5	<4%	
				Antimony Trioxide	1309-64-4	<3%	
5	Tab	Silver Solder on Nickel	0.008	Cadmium	7440-43-9	0-20%	0.0322%
				Copper	7440-50-8	0-20%	
				Nickel	7440-02-0	60-80%	
				Silver	7440-22-4	0-20%	
				Zinc	7440-66-6	0-20%	
6	Terminals	Plating	0.035	Gold	7440-57-5	>90.00%	0.1408%
		Leaded Brass		Copper	7440-50-8	55-72%	
				Lead	7439-92-1	0-3.5%	

				Tin	7440-31-5	0-1%	
				Zinc	7440-66-6	35-45%	
7	Hex Nut	Brass Alloy	1.179	Copper	7440-50-8	55.5-86%	4.7413%
				Zinc	7440-66-6	13.90-42.5%	
				Lead	7439-92-1	.00-3.7%	
				Tin	7440-31-5	.00-1.2%	
				Aluminum	7429-90-5	.00-2.3%	
				Manganese	7439-96-5	.00-3.5%	
				Silicon	7440-21-3	.00-1.5%	
				Nickel	7440-02-0	.00-.02%	
8	Lock Washer	Steel Alloy	0.2945	Carbon	7440-11-0	0.51%	1.1843%
				Manganese	7439-98-5	0.75%	
				Phosphorus	7723-14-0	0.02%	
				Sulfur	7704-39-9	0.025%	
				Iron	7439-89-6	98.695%	
		Zinc Plating	0.00297	Chromium	7440-47-3	0.1%	0.0120%
				Tin	7440-31-5	0.64%	
				Zinc	7440-66-6	99.25%	
9	Washer	Steel Alloy	0.008	Iron	7493-89-6	52-78%	0.0322%
				Chromium	7440-47-3	12-24%	
				Nickel	7440-02-0	6.0-19%	
				Molybdenum	7439-98-7	0-5.0%	
				Silicon	7440-21-3	0-6%	
				Manganese	7439-96-3	0-2.0%	
				Tungsten	7440-33-7	0-1.8%	
				Aluminum	7429-90-5	0-1.5%	
				Columbium	7440-03-1	0-1.0%	
				Titanium	7440-32-6	0-0.7%	
				Copper	7440-50-8	0.075%	
				Cobalt	7440-48-4	0.1.0%	
10	Teflon Washer	PTFE	0.0082	Polytetrafluoroethylene	9002-84-0	15%	0.0330%
				1-Dichloro-1-Fluoroathane	1717-00-6	85%	
11	Ink	Ink	0.003	Formaldehyde	50-00-0	0.1-1 %	0.0121%
				Phenol	108-95-2	1-5%	

				Diethyl glycol monobutyl ether	112-35-6	10-30%	
12	C-Ring	Stainless Steel Alloy	0.009	Iron	7439-89-6	48-89%	0.0362%
				Chromium	7440-47-3	10-27%	
				Nickel	7440-02-0	0-22%	
				Manganese	7439-96-5	0-15%	
				Tungsten	7440-33-7	0-4%	
				Molybdenum	7439-98-7	0-4%	
				Aluminum	7429-90-5	0-2%	
				Copper	7440-50-8	0-4%	
				Silicon	7440-51-3	0-5%	
				Cobalt	7440-48-4	0-5%	
13	Lid Molded	PBT	1.962	Glass	65997-17-3	10-30%	7.8901%
				PBT	**********	65-89%	
				Antimony Oxide	1309-64-4	1-5%	
14	Bushing	Aluminum Bar	1.157	Iron	7439-89-6	86.5-99.5%	4.6528%
				Aluminum	7429-90-5	0.1-0.5%	
				Bismuth	7440-69-9	0.2-0.5%	
				Boron	7440-42-8	.01-1.0%	
				Carbon	7440-44-0	.10-1.5%	
				Chromium	7440-47-3	.4-10%	
				Columbium	7440-03-1	.15-.35%	
				Copper	7440-50-8	.30-1.90%	
				Lead	7439-92-1	.01-.15%	
				Manganese	7439-96-3	.04-0.7%	
				Molybdenum	7439-98-7	15-1.10%	
				Nickel	7440-02-0	.01-10%	
				Phosphorous	7723-14-0	.040-.12%	
				Silicon	7440-21-3	.15-2.00%	
				Sulfur	7704-34-9	.050-.35%	
				Vanadium	7440-62-2	.01-.15%	
				Zinc Coating	1314-13-2	2 oz/ft_ %	
				Aluminum Coating	7429-90-5	.5 oz/ft_ %	
15	Rotor Molded	PBT	1.5625	Glass	65997-17-3	10-30%	6.2835%

				PBT	**********	65-89%	
				Antimony Oxide	1309-64-4	1-5%	
16	Shaft	Steel Alloy	8.743	Nickel	7440-02-0	8.90%	35.1595%
				Chromium	7440-47-3	18.30%	
				Iron	1309-37-1	Balance	
				Manganese	7439-96-5	1.80%	
				Silicon	7440-21-3	1.00%	
17	Contact Spring	Metal Alloy	0.0055	Copper	7440-50-8	0-20%	0.0221%
				Nickel	7440-02-0	0-20%	
				Palladium	7440-05-3	40-60%	
				Platinum	7440-06-4	0-20%	
				Silver	7440-22-4	20-40%	
18	Collector Bar	Copper Alloy	0.105	Copper	7440-50-8	97.6-98.2%	0.4223%
				Cobalt	7440-48-4	0.2-0.35	
				Beryllium	7440-41-7	1.6-2%	
19	Cover Molded	PBT	1.099	Glass	65997-17-3	10-30%	4.4196%
				Antimony Oxide	1309-64-4	1-5%	
				PBT	**********	65-89%	
20	Terminals	Plaiting	0.326	Gold	7440-57-5	>90.00%	1.3110%
		Leaded Brass		Copper	7440-50-8	55-72%	
				Lead	7439-92-1	0-3.5%	
				Tin	7440-31-5	0-1%	
				Zinc	7440-66-6	35-45%	
21	Slider	Nylon	0.137	Molybdenum Disulfide Concentrate	1917-33-5	<4%	0.5509%
		Total weight	24.8667				