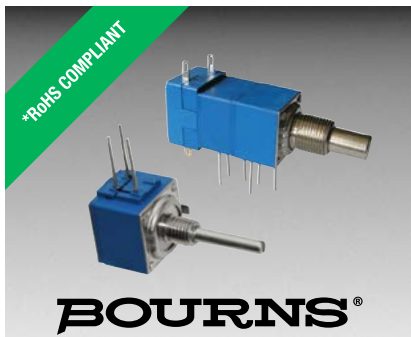




Features

- Metal shaft and bushing
- Consistent, smooth quality feel
- Up to 4 sections available
- Rotary switch option designed for "on-off" function control
- RoHS compliant*

81/82 – 5/8" Square Single-Turn Panel Control

85/86 – 5/8" Square Single-Turn Panel Control with Rotary Switch

Potentiometer Specifications

Initial Electrical Characteristics ¹	Conductive Plastic Element	Cermet Element
Standard Resistance Range		
Linear Tapers (A, B, E, & H).....	(B & E) 1 K ohms to 1 megohm	(A & H) 100 ohms to 1 megohm
Audio Tapers (C, D, F, G, S, & T).....	(D, G, S, & T) 1 K ohms to 1 megohm	(C & F) 1 K ohms to 1 megohm
Total Resistance Tolerance.....	±20 % or 10 %	±10 % or 5 %
Independent Linearity.....	±5 %	±5 %
Absolute Minimum Resistance.....	2 ohms maximum.....	2 ohms maximum
Effective Electrical Angle.....	(Linear tapers) 240 ° ± 5 °	(Linear tapers) 240 ° ± 6 °
	(Audio tapers) 225 ° ± 5 °	(Audio tapers) 225 ° ± 6 °
Contact Resistance Variation.....	±1 %	±1 % or 3 ohms (whichever is greater)
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)		
Sea Level.....	1,500 VAC minimum	1,500 VAC minimum
70,000 Feet.....	500 VAC minimum	500 VAC minimum
Insulation Resistance (500 VDC).....	1,000 megohms minimum.....	1,000 megohms minimum
Power Rating At 70 °C (Voltage Limited By Power Dissipation or 350 VAC, Whichever Is Less)		
+70 °C Single Section Assembly.....	(Linear tapers) 1 watt.....	(Linear tapers) 2 watts
	(Audio tapers) 0.5 watt.....	(Audio tapers) 1 watt
+70 °C Multiple Section Assembly.....	(Linear tapers) 0.5 watt/section.....	(Linear tapers) 1 watt/section
	(Audio tapers) 0.25 watt/section.....	(Audio tapers) 0.5 watt/section
+125 °C.....	0 watt.....	0 watt
Theoretical Resolution.....	Essentially infinite.....	Essentially infinite
Environmental Characteristics ¹		
Operating Temperature Range.....	-40 °C to +125 °C.....	-40 °C to +125 °C
Storage Temperature Range.....	-55 °C to +125 °C.....	-55 °C to +125 °C
Temperature Coefficient Over Storage Temperature Range.....	±1,000 ppm/°C.....	±150 ppm/°C
Vibration (Single Section).....	15 G	15 G
Total Resistance Shift.....	±2 % maximum	±2 % maximum
Voltage Ratio Shift.....	±5 % maximum	±5 % maximum
Shock (Single Section).....	30 G	30 G
Total Resistance Shift.....	±2 % maximum	±2 % maximum
Voltage Ratio Shift.....	±5 % maximum	±5 % maximum
Load Life.....	1,000 hours	1,000 hours
Total Resistance Shift.....	±10 % maximum	±5 % maximum
Rotational Life (No Load).....	100,000 cycles.....	100,000 cycles
Total Resistance Shift.....	(Linear taper) 10 ohms or	(All tapers) ±5 % TRS maximum
	±10 % TRS max. (whichever is greater)	
	(Audio taper) ±20 % maximum	
Contact Resistance Variation @ 50,000 cycles		
(Audio taper)	±3 %	±3 %
(Linear taper)	±2 %	±2 %
Moisture Resistance (MIL-STD-202, Method 103, Condition B)		
Total Resistance Shift.....	(B & E tapers) ±10 % maximum	±5 % maximum (all tapers)
	(D, G, S & T tapers) ±20 % maximum	
Insulation Resistance (500 VDC).....	100 megohms minimum.....	100 megohms minimum
IP Rating.....	IP40.....	IP40

Mechanical Characteristics

Stop Strength	
1/4" and 1/8" diameter shafts.....	45.19 N-cm (4 lb.-in.)
7/8" length shaft.....	22.6 N-cm (2 lb.-in.)
Mechanical Angle.....	300 ° ±5 °
Torque	
Starting and Running Torque (Non-Locking Bushings)	
Single Section.....	0.14 to 1.06 N-cm (0.2 to 1.5 oz.-in.)
Dual Section.....	0.14 to 1.06 N-cm (0.2 to 1.5 oz.-in.)
Triple Section.....	0.35 to 1.41 N-cm (0.5 to 2.0 oz.-in.)
Quadruple Section.....	0.35 to 1.41 N-cm (0.5 to 2.0 oz.-in.)
Starting and Running Torque (Locking Bushings)	
Shaft Locking Torque with Locknut @ 10 in-lb. (B & E Bushings).....	14 N-cm (20 oz.-in.)
Mounting.....	1.7-2.0 N-m (15-18 lb.-in.) maximum
Weight (Single Section).....	21 grams maximum
(Each Additional Section).....	6 grams maximum
Terminals.....	Printed circuit terminals or J-Hooks
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 trademark, wiring diagram, date code and resistance, manufacturer's part number
Ganging (multiple section potentiometers).....	4 cup maximum
Hardware.....	One lockwasher and one mounting nut is shipped with each potentiometer; locking bushing versions are shipped with one additional locking nut
	(Bushings A: H-37-2 & H-38-2; Bushing B: H-37-2 & H-38-4; Bushing C: H-37-1 & H-38-1; Bushing E: H-37-1 & H-38-3; Bushing J: H-37-2 & H-38-2; Bushing N: H-37-1 & H-38-1; Bushing R: H-37-4 & H-38-9; Bushing S: H-37-4 & H-38-10; Bushing U: H-37-3 & H-38-8)

For dimensional drawings see pages 3 & 4. For ordering information see page 5.

NOTE: Model 81/82 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.

¹Electrical specifications tested at 250 RPM, at room ambient: +25 °C nominal.



WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

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81/82 – 5/8" Square Single-Turn Panel Control
85/86 – 5/8" Square Single-Turn Panel Control with Rotary Switch

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Rotary Switch Specifications

Initial Electrical Characteristics¹

Contacts:	
DPST	N.O./N.O., N.C./N.C. or N.O./N.C.
Power Rating (Resistive Load):	
DPST	2 A @ 125 volts RMS-60 Hz or 2 A @ 28 VDC, 1 A @ 250 volts RMS-60 Hz
Contact Resistance (0.1 VDC-10 mA)	10 milliohms nominal
Contact Bounce	5 milliseconds maximum
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)	
Sea Level	1500 VAC minimum
Insulation Resistance	1000 megohms minimum

Environmental Characteristics¹

Operating Temperature Range	-40 °C to +70 °C
Storage Temperature Range	-65 °C to +125 °C
Vibration (Dual Section)	.8 G
(Triple Section)	.5 G
(Quadruple Section)	.3 G
Contact Resistance	10 milliohms maximum
Contact Bounce	0.1 millisecond maximum
Shock (Dual Section)	.20 G
(Triple Section)	.15 G
(Quadruple Section)	.10 G
Contact Resistance	10 milliohms maximum
Contact Bounce	0.1 millisecond maximum
Rotational Life	25,000 cycles
Switch Actuating Torque (50% Duty cycle @ Rated Power Load)	1.41 to 4.94 N-cm (2 to 7 oz.-in.)
Contact Resistance	100 milliohms maximum
Moisture Resistance (MIL-STD-202, Method 106, Condition B)	
Contact Resistance (0.1 VDC-10 mA)	10 milliohms maximum
Insulation Resistance (After 24 Hours @ Room Temperature) (500 VDC)	100 megohms minimum
Switch Housing Material	High temperature, flame retardant, thermosetting plastic

Mechanical Characteristics¹

Actuating Torque (Each Section, Switch Module Only)	3.53 to 10.6 N-cm (5 to 15 oz.-in.)
Running Torque (Out of Detent, 2-4 Module Assembly)	0.21 to 1.41 N-cm (0.3 to 2 oz.-in.)
Detent	CW or CCW standard
Actuation Angle	25 °
Contact Materials	Fine silver with gold overlay
Terminal Styles	Solder lug only
Standard Orientation	In-line with control terminals
Optional	Rotated 90 ° CCW from standard
Terminal Strength (Before and After Soldering Heat Exposure)	0.9 Kg (2 lbs.) minimum

NOTE: Model 81/82 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.

¹Electrical specifications tested at 250 RPM, at room ambient: +25 °C nominal.

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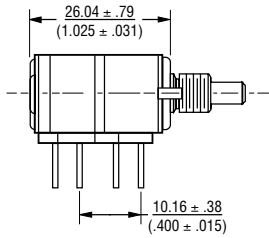
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81/82 – 5/8" Square Single-Turn Panel Control

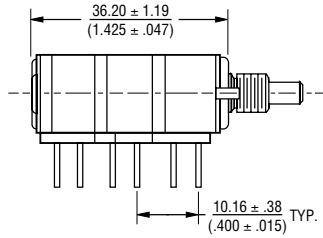
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Product Dimensions

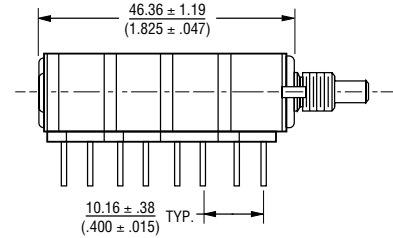
Dual Unit - PC Pins & J-Hook



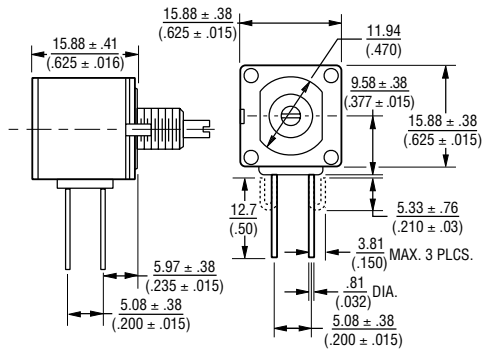
Triple Unit - PC Pins & J-Hook



Quad Unit - PC Pins & J-Hook

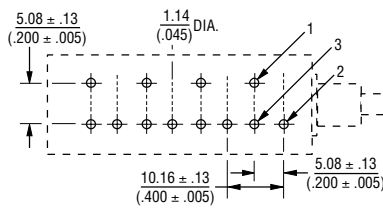


**Model 81/82
Single Unit - PC Pins & J-Hook**



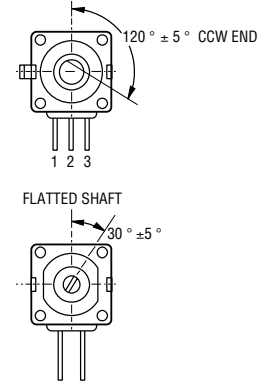
Terminal outlines shown as solid lines represent PC Pins, available on Model 81. Dashed line terminal outline represents "J" Hook, available on Model 82.

**Model 81
Suggested PC Board Layout - PC Pins
(Single-Shaft Style Bottom View)**



Note: For units with dual concentric shaft styles, a 2.54 (.100) spacer is added between the module(s) driven by the outer shaft and those driven by the inner shaft. For G, K, or V shafts, add the spacer between modules 1 and 2. For L or M shafts, add the spacer between modules 2 and 3. For N or P shafts, add the spacer between modules 3 and 4.

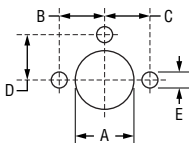
Shaft Flat Orientation*



*EXCLUDES MODELS 83 AND 84

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

Suggested Panel Layout



BUSHING	DIM A
A, B & J	$\frac{9.91}{(.39)}$
C, E & N	$\frac{6.73}{(.265)}$
R & S	$\frac{10.5}{(.413)}$
U	$\frac{7.5}{(.295)}$

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

ANTI-ROTATION LUG	DIM B	DIM C	DIM D	DIM E
A	$\frac{7.75}{(.305)}$	N/A	N/A	$\frac{2.49}{(.098)}$
B	$\frac{7.75}{(.305)}$	$\frac{7.75}{(.305)}$	N/A	$\frac{2.49}{(.098)}$
C	N/A	$\frac{7.75}{(.305)}$	N/A	$\frac{2.49}{(.098)}$
E	$\frac{13.49}{(.531)}$	N/A	N/A	$\frac{3.45}{(.136)}$
F	N/A	N/A	$\frac{7.75}{(.305)}$	$\frac{2.54}{(.100)}$
J	$\frac{9.53}{(.375)}$	N/A	N/A	$\frac{2.54}{(.100)}$
K	$\frac{9.53}{(.375)}$	$\frac{9.53}{(.375)}$	N/A	$\frac{2.54}{(.100)}$

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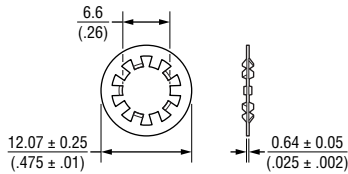
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81/82 – 5/8" Square Single-Turn Panel Control 85/86 – 5/8" Square Single-Turn Panel Control with Rotary Switch

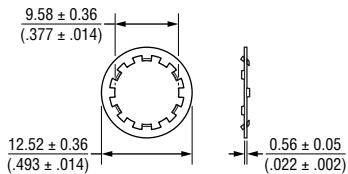
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Hardware

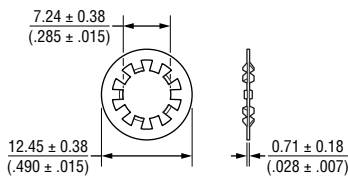
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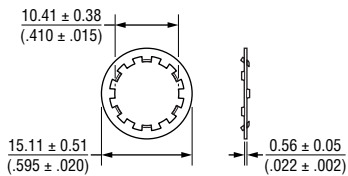
LOCKWASHER H-37-2



LOCKWASHER H-37-3



LOCKWASHER H-37-4

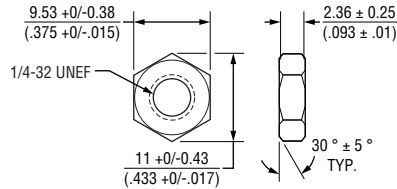


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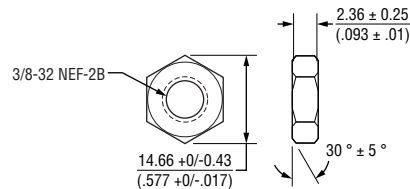
YY WW M

M = COUNTRY OF MANUFACTURE (MEXICO)
WW = WEEK NUMBER
YY = LAST TWO DIGITS OF YEAR MANUFACTURED

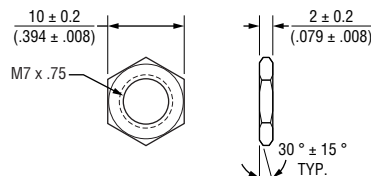
NUT H-38-1



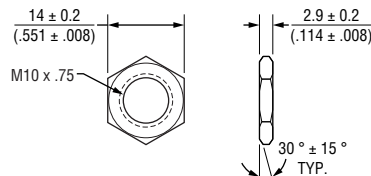
NUT H-38-2



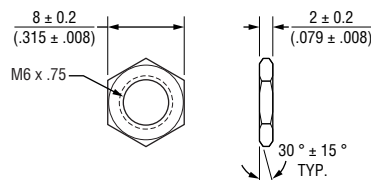
NUT H-38-8



NUT H-38-9

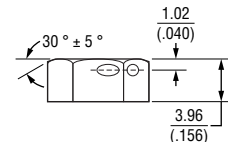
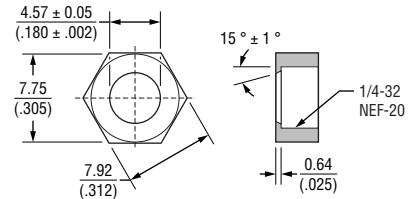


NUT H-38-14

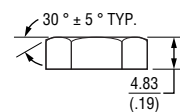
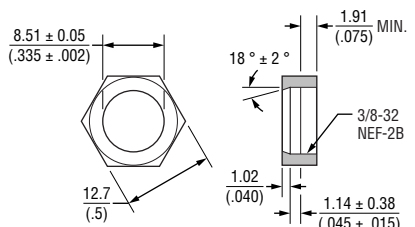


DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

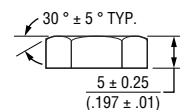
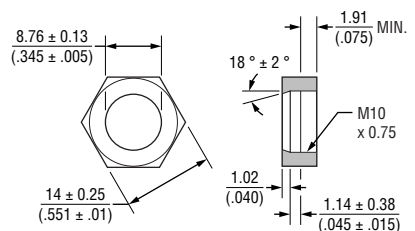
LOCKNUT H-38-3



LOCKNUT H-38-4



LOCKNUT H-38-10



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81/82 – 5/8 " Square Single-Turn Panel Control 85/86 – 5/8 " Square Single-Turn Panel Control with Rotary Switch

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How To Order

Models 81 & 82: Part number for multiple section potentiometers must have a taper and resistance value for each section.

Models 85 & 86: Part number must contain a switch type.

RoHS IDENTIFIER
L Compliant

ANTI-ROTATION LUG

A	Single .305 R, 90 °CW
B	Double .305 R, 90 ° & 270 °CW
C	Single .305 R, 270 °CW
D	No Lug
E	Single .531 R, 90 °CW
F	Single .305 R, 180 °CW
J	Single .375 R, 90 °CW
K	Double .375 R, 90 ° & 270 °CW

SECTIONS APPLICABLE MODELS

1	Single	81,82
2	Double	81,82,85,86
3	Triple	81,82,85,86
4	Quad	81,82,85,86

BUSHING

A	Plain 3/8 " (9.53 mm) D x 3/8 " (9.53 mm) L
B	Locking 3/8 " (9.53 mm) D x 1/2 " (12.7 mm) L
C	Plain 1/4 " (6.35 mm) D x 1/4 " (6.35 mm) L
E	Locking 1/4 " (6.35 mm) D x 1/2 " (12.7 mm) L
J	Plain 3/8 " (9.53 mm) D x 1/4 " (6.35 mm) L
N	Plain 1/4 " (6.35 mm) D x 3/8 " (9.53 mm) L
R	Plain 10 mm D x 9 mm L
S	Locking 10 mm D x 12.5 mm L
U	Plain 7 mm D x 6 mm L

MODEL

81	Single-Turn, PC Pins
82	Single-Turn, J-Hooks
85	Single-Turn, Pot/Rotary Switch, PC Pins
86	Single-Turn, Pot/Rotary Switch, J-Hooks

SHAFT TYPE

SHAFT TYPE	LENGTHS (CODE)	BUSHINGS (CODE)
A Single Plain 1/4 " (6.35 mm) D	16,20,24,28	A, B, J
B Single Slotted 1/4 " (6.35 mm) D	16,20,24,28	A, B, J
C Single Flatted 1/4 " (6.35 mm) D	20,24,28	A, B, J
E Single Slotted 1/8 " (3.18 mm) D	12,16,20,24,28	C, E, N
F Single Flatted 1/8 " (3.18 mm) D	24	C, N
G Dual Concentric Plain 1/4 " (6.35 mm) D - 1/8 " (3.18 mm) D Outer Operates Section 1	36,40	A, J
K Dual Concentric Plain 1/8 " (3.18 mm) D - 5/64 " (1.98 mm) D Outer Operates Section 1	32,36	C, N
L Dual Concentric Plain 1/4 " (6.35 mm) D - 1/8 " (3.18 mm) D Outer Operates Section 1/2	36,40	A, J
M Dual Concentric Plain 1/8 " (3.18 mm) D - 5/64 " (1.98 mm) D Outer Operates Section 1/2	32,36	C, N
N Dual Concentric Plain 1/4 " (6.35 mm) D - 1/8 " (3.18 mm) D Outer Operates Section 1/2/3	36,40	A, J
P Dual Concentric Plain 1/8 " (3.18 mm) D - 5/64 " (1.98 mm) D Outer Operates Section 1/2/3	32,36	C, N
R Single Slotted 6 mm D	16,19,22,50	R, S
T Single Slotted 4 mm D	10, 13, 22	U
V Dual Concentric Plain 6 mm D - 3 mm D Outer Operates Section 1	30, 42	R

SHAFT LENGTH (FMS) AVAILABLE ONLY IN BUSHING

Code	Description	Code
12	3/8 " L	C, N, J
16	1/2 " L	A, C, J, N
20	5/8 " L	A, B, C, E, J, N
24	3/4 " L	A, B, C, E, J, N
28	7/8 " L	A, B, C, E, J, N
32	1 " L	A, B, C, E, J, N
36	1-1/8 " L	A, B, C, E, J, N
40	1-1/4 " L	A, B, C, E, J, N
Metric		
10	10 mmL	U
13	13 mmL	U
16	16 mmL	R, S
19	19 mmL	R, S
22	22 mmL	R, S, U
30	30 mmL	R, S
42	42 mmL	R, S
50	50 mmL	R, S

SWITCH TYPE (MODELS 85 & 86 ONLY)

(R50)	DPST N.O./N.C. CW Detent In-Line Term
(R51)	DPST N.O./N.C. CCW Detent In-Line Term
(R52)	DPST N.O./N.O. CW Detent In-Line Term
(R53)	DPST N.O./N.O. CCW Detent In-Line Term
(R56)	DPST N.O./N.C. CW Detent Horz Term
(R57)	DPST N.O./N.C. CCW Detent Horz Term
(R58)	DPST N.O./N.O. CW Detent Horz Term
(R59)	DPST N.O./N.O. CCW Detent Horz Term

ELEMENT TAPER TYPE/TOLERANCE RESISTANCE CODE VALUE IN OHMS

ELEMENT TAPER TYPE/TOLERANCE	RESISTANCE CODE VALUE IN OHMS
(A) Linear Cermet ±10 %	(05) - 100 (30) - 15 K
(H) Linear Cermet ±5 %	(28) - 150 (16) - 20 K
	(06) - 200 (17) - 25 K
	(07) - 250 (18) - 50 K
	(08) - 500 (19) - 75 K
	(09) - 750 (20) - 100 K
	(10) - 1 K (31) - 150 K
	(29) - 1.5 K (21) - 200 K
	(11) - 2 K (22) - 250 K
	(12) - 2.5 K (23) - 500 K
	(13) - 5 K (24) - 750 K
	(14) - 7.5 K (25) - 1 M
	(15) - 10 K
(B) Linear C-P ±20 %	(10) - 1 K (18) - 50 K
(E) Linear C-P ±10 %	(12) - 2.5 K (20) - 100 K
	(13) - 5 K (22) - 250 K
	(15) - 10 K (23) - 500 K
	(16) - 20 K (25) - 1 M
	(17) - 25 K
(C) CW Audio Cermet ±10 %	(10) - 1 K (18) - 50 K
(D) CW Audio C-P ±20 %	(12) - 2.5 K (20) - 100 K
(F) CCW Audio Cermet ±10 %	(13) - 5 K (22) - 250 K
(G) CCW Audio C-P ±20 %	(15) - 10 K (23) - 500 K
(S) CW Audio C-P ±10 %	(17) - 25 K (25) - 1 M
(T) CCW Audio C-P ±10 %	

*Boldface features are Bourns standard options.
All others are available with higher minimum order quantities.*

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REV. 10/20

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