# Positronic connectorsitronic com

# PROFESSIONAL, INDUSTRIAL AND MILITARY QUALITY THREE PERFORMANCE LEVELS FOR BEST COST/PERFORMANCE RATIO STANDARD DENSITY PCB MOUNT

Combo-D D-Sub

Size 20 Fixed Signal and Thermocouple Contacts

Size 8 Removable Power, Shielded, Air and High Voltage Contacts

UL Recognized CSA Recognized File #E49351 File #LR54219

DSCC 85039
Telecommunication UL File #E140980

Combo-D series connectors permit mixed contact combinations of power, shielded, air, high voltage and signal contacts within the same connector body. Twenty-two connector variants are offered in six standard shell sizes.

Three performance levels of Combo-D series connectors are offered: professional, industrial and military. CBD series connectors are quality connectors recommended for use in sheltered, non-corrosive indoor and outdoor environments having normal ventilation, but without temperature or humidity controls. Signal contacts are offered with open entry professional level or PosiBand closed entry industrial level signal contacts. CBD series connectors meet performance requirements of IEC 60807-2, Performance Level One or Two. CBM series connectors are military quality connectors recommended for use in sheltered, mildly corrosive environments having a wide range of temperature, pressure and humidity changes. CBM series connectors will meet the applicable performance requirements of DSCC 85039.

Combo-D series connectors utilize precision machined signal contacts. Connector variants are available with contact terminations for solder and straight and right angle (90°) printed board mount terminations featuring a choice of inch or metric printed board footprints.



Power, shielded and high voltage contacts are removable, having solder and straight and right angle (90°) printed board mount terminations. Power and shielded contacts are available with crimp terminations. Air contact options are also available, see page 80 for details.

For low level shielding requirements, ferrite inductors may be attached to both signal and power contacts of connectors having contact terminations which are straight or right angle (90°) for printed board mounting applications. For additional information contact Technical Sales.

The female power contacts feature the Large Surface Area (L.S.A.) closed entry contact design which provides maximum mating surfaces between male and female contacts and reduced contact resistance during operation.

A wide assortment of printed board mounting hardware, cable support hoods, and locking systems is available from stock.

A blind mating system is available for applications requiring connector coupling in recessed areas or mobile power coupling systems.

Straight and right angle (90°) PCB mount thermocouple contacts are available, please contact Technical Sales for details.

Combo-D D-Sub

# PROFESSIONAL, INDUSTRIAL AND MILITARY QUALITY THREE PERFORMANCE LEVELS FOR BEST COST/PERFORMANCE RATIO STANDARD DENSITY PCB MOUNT



## **TECHNICAL CHARACTERISTICS**

**MATERIALS AND FINISHES:** 

Insulator: Glass filled polyester per ASTM D 5927

UL 94V-0, blue color, and composite.

Precision machined copper alloy.

Contacts: Contact Plating:

ontact Plating:

SIGNAL: Gold flash over nickel plate and gold 0.000050

[1.27µ] over nickel plate. Other finishes available upon request, see page 81.

**POWER:** Gold flash over nickel. Other finishes available

upon request, see page 81.

SHIELDED: For contact platings, see page 68.

HIGH VOLTAGE: For contact platings, see page 68.

Shells: Steel with tin plate; zinc plate with chromate

seal; stainless steel passivated. Other materials and finishes available upon request.

Mounting Spacers
And Brackets:
Nylon; polyester; copper alloy or steel with zinc plate and chromate seal or tin plate;

phosphor bronze with tin plate; stainless

steel, passivated.

Push-On Fasteners: Phosphor bronze and beryllium copper with

tin plate.

Jackscrew Systems: Brass or steel with zinc plate and chromate

seal or clear zinc plate or tin plate; stainless

steel, passivated.

Hoods: Composite and plastic, UL 94V-0; brass

or steel with zinc plate and chromate seal. Aluminum; aluminum with electroless nickel plate. For aluminum hoods, zinc content is

1% maximum. Die cast zinc.

Non-magnetic versions are available, contact Technical Sales.

## **MECHANICAL CHARACTERISTICS:**

Signal Contacts, Size 20 Fixed: [1.02mm]

Size 20 contacts, male - 0.040 inch [1.02mm] diameter. CBD series has open entry female contacts. PosiBand closed entry

 $\begin{array}{ll} \mbox{female options are also available. CBM series} \\ \mbox{has PosiBand closed entry female contacts,} \end{array}$ 

see page 68 for details.

Contact Retention in Insulator: Signal: 9 lbs. [40N]. Power, shielded and high voltage: 22 lbs [98N].

Resistance to 500°F [260°C] for 10 seconds duration

**Solder Iron Heat:** per IEC 60512-6.

Signal Contact Solder contacts - 0.042 inch [1.06mm]

Terminations: minimum hole diameter for 20 AWG [0.5 mm²]

wire maximum.

Straight Printed Board Mount - 0.028 inch

[0.71mm] termination diameter.

Right Angle (90°) Printed Board Mount – 0.028 inch [0.71 mm] termination diameter.

Power Contacts,
Removable, Crimp
or Solder Termination:
Size 8 contact, male - 0.142 inch [3.61mm]
mating diameter. Terminations for 6, 8, 10,
12, and 16 AWG. Female contact features
Large Surface Area (L.S.A.) closed entry

retention member. Closed crimp barrel.

Power Contacts,Size 8 contact, male - 0.142 inchPrinted Board Mount:[3.61mm] mating diameter.Printed board

terminations with 0.078 inch [1.98mm], 0.094 inch [2.39mm] and 0.125 inch [3.18mm]

contact design utilizing BeCu mechanical

termination diameters.

Shielded Contacts, See table of cable sizes for contact Removable: termination dimensions, page 78.

**High Voltage Contacts:** Straight and right angle (90°) terminations – 0.041 inch [1.04mm] minimum hole diameter.

Shells: Male shells may be dimpled for EMI/ESD

ground paths.

Polarization: Trapezoidally shaped shells and polarized

jackscrews.

Mounting to Jackscrews and riveted fasteners with Angle Brackets: 0.120 inch [3.05mm] diameter hole, and

threaded riveted fasteners with 4-40 threads

and nylon inserts.

Mounting to Rapid installation push-on fasteners and

Printed Board: threaded posts.

Locking Systems: Jackscrews and vibration locking systems.

Mechanical Operations: CBD series, open entry contacts, 50

Operations: CBD series, open entry contacts, 500 operations. CBD series, PosiBand closed entry and CBM series, 1,000 operations. Per

IEC 60512-5.

## **ELECTRICAL CHARACTERISTICS:**

SIZE 20 CONTACTS

Contact Current Rating: 7.5 amperes nominal. Initial Contact Resistance: 0.008 ohms maximum.

**Proof Voltage:** 1000 V r.m.s.

## **SIZE 8 CONTACTS**

## **POWER CONTACTS**

Contact Current Rating - Tested per UL 1977:

Standard Contact Material:

0.078 inches diameter / 12 AWG terminations:39 amperes.0.094 inches diameter / 10 AWG terminations:50 amperes.0.125 inches diameter / 8 AWG terminations:70 amperes.

See Temperature Rise Curves on page 1 for details.

**High Conductivity Contact Material:** 

8 AWG terminations: 80 amperes.

See Temperature Rise Curves on page 2 for details.

Initial Contact Resistance:

Standard Contact Material: 0.0005 ohms max. per IEC 60512-2,

Test 2b.

High Conductivity 0.00035 ohms max. per IEC 60512-2,

Contact Material: Test 2b. **Proof Voltage:** 1000 V r.m.s.

## SHIELDED CONTACTS

For electrical characteristics, see page 69.

## HIGH VOLTAGE CONTACTS

For electrical characteristics, see page 69.

**CONNECTOR** 

**Insulation Resistance:** 5 G ohms.

Clearance and

Creepage Distance: 0.039 [1.0mm] minimum.

Working Voltage: 300 V r.m.s.

**CLIMATIC CHARACTERISTICS:** 

**Temperature Range:** -55°C to +125°C.

Damp Heat, Steady State: 10 days.

## THERMOCOUPLE CONTACTS:

Straight and right angle PCB mount contacts are available, please contact Technical Sales for details.

Size 20 crimp contacts are available in CBC series, see page 74 for details.

Combo-D D-Sub

## **CONTACT VARIANTS**

FACE VIEW OF MALE OR REAR VIEW OF FEMALE

## Note: Connectors can be kitted with all applicable removable contacts, contact Technical Sales for - SHELL SIZE 1 connector part number. SHELL SIZE 2 -3W3 \*23WK3 7W2 SHELL SIZE 3 -00000 21W1 5W5 9W4 13W3 17W2 SHELL SIZE 4 -0,000,000 8W8 13W6 17W5 000000000000 21WA4 25W3 27W2 - SHELL SIZE 5 24W7 36W4 43W2 47W1

## —— SHELL SIZE 6 ——



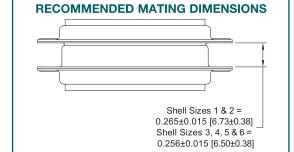
### **Notes:**

- \*1 2WK2 connectors have 1 male and 1 female contacts. Female connector should be loaded with female contact in A2 position.
- \*2 3WK3 male variant contains 2 male contacts and 1 female contact. Female variant contains 2 female contacts and 1 male contact

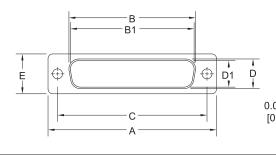


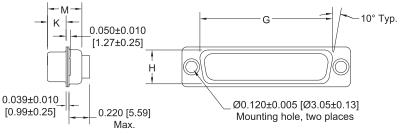
## STANDARD SHELL ASSEMBLY



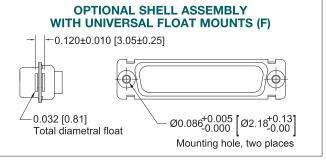








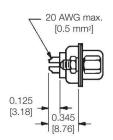
# OPTIONAL SHELL ASSEMBLY (0, 02) Ø0.120±0.005 [Ø3.05±0.13] Mounting hole, two places for stainless steel shell (0 option) Ø0.154 [3.91] Mounting hole, two places (02 option)

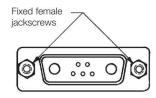


SHELL SIZES	A ±0.015	B ±0.005	B1 ±0.005	C ±0.005	D ±0.005	D1 ±0.005	±0.015	G ±0.010	H ±0.010	K ±0.005	M ±0.010
	[0.38]	[0.13]	[0.13]	[0.13]	[0.13]	[0.13]	[0.38]	[0.25]	[0.25]	[0.13]	[0.25]
SHELL SIZE 1 MALE	<u>1.213</u> [30.81]		<u>0.666</u> [16.92]	<u>0.984</u> [24.99]		<u>0.329</u> [8.36]	<u>0.494</u> [12.55]	<u>0.759</u> [19.28]	<u>0.422</u> [10.72]	<u>0.233</u> [5.92]	<u>0.422</u> [10.72]
SHELL SIZE 1 FEMALE	<u>1.213</u> [30.81]	<u>0.643</u> [16.33]		<u>0.984</u> [24.99]	<u>0.311</u> [7.90]		<u>0.494</u> [12.55]	<u>0.759</u> [19.28]	<u>0.422</u> [10.72]	<u>0.243</u> [6.17]	<u>0.429</u> [10.90]
SHELL SIZE 2 MALE	1.541 [39.14]		<u>0.994</u> [25.25]	<u>1.312</u> [33.32]		<u>0.329</u> [8.36]	<u>0.494</u> [12.55]	1.083 [27.51]	<u>0.422</u> [10.72]	<u>0.233</u> [5.92]	<u>0.422</u> [10.72]
SHELL SIZE 2 FEMALE	<u>1.541</u> [39.14]	<u>0.971</u> [24.66]		<u>1.312</u> [33.32]	<u>0.311</u> [7.90]		<u>0.494</u> [12.55]	1.083 [27.51]	<u>0.422</u> [10.72]	<u>0.243</u> [6.17]	<u>0.429</u> [10.90]
SHELL SIZE 3 MALE	<u>2.088</u> [53.04]		1.534 [38.96]	<u>1.852</u> [47.04]		<u>0.329</u> [8.36]	<u>0.494</u> [12.55]	<u>1.625</u> [41.28]	<u>0.422</u> [10.72]	<u>0.230</u> [5.84]	<u>0.426</u> [10.82]
SHELL SIZE 3 FEMALE	<u>2.088</u> [53.04]	1.511 [38.38]		<u>1.852</u> [47.04]	<u>0.311</u> [7.90]		<u>0.494</u> [12.55]	<u>1.625</u> [41.28]	<u>0.422</u> [10.72]	<u>0.243</u> [6.17]	<u>0.429</u> [10.90]
SHELL SIZE 4 MALE	<u>2.729</u> [69.32]		<u>2.182</u> [55.42]	<u>2.500</u> [63.50]		<u>0.329</u> [8.36]	<u>0.494</u> [12.55]	<u>2.272</u> [57.71]	<u>0.422</u> [10.72]	<u>0.230</u> [5.84]	<u>0.426</u> [10.82]
SHELL SIZE 4 FEMALE	<u>2.729</u> [69.32]	<u>2.159</u> [54.84]		<u>2.500</u> [63.50]	<u>0.311</u> [7.90]		<u>0.494</u> [12.55]	<u>2.272</u> [57.71]	<u>0.422</u> [10.72]	<u>0.243</u> [6.17]	<u>0.429</u> [10.90]
SHELL SIZE 5 MALE	<u>2.635</u> [66.93]		<u>2.079</u> [52.81]	<u>2.406</u> [61.11]		<u>0.441</u> [11.20]	<u>0.605</u> [15.37]	<u>2.178</u> [55.32]	<u>0.534</u> [13.56]	<u>0.230</u> [5.84]	<u>0.426</u> [10.82]
SHELL SIZE 5 FEMALE	2.635 [66.93]	<u>2.064</u> [52.43]		<u>2.406</u> [61.11]	<u>0.423</u> [10.74]		<u>0.605</u> [15.37]	<u>2.178</u> [55.32]	<u>0.534</u> [13.56]	<u>0.243</u> [6.17]	<u>0.429</u> [10.90]
SHELL SIZE 6 MALE	<u>2.729</u> [69.32]		<u>2.212</u> [56.18]	<u>2.500</u> [63.50]		<u>0.503</u> [12.78]	<u>0.668</u> [16.97]	<u>2.302</u> [58.47]	<u>0.596</u> [15.14]	<u>0.230</u> [5.84]	<u>0.426</u> [10.82]
SHELL SIZE 6 FEMALE	<u>2.729</u> [69.32]	2.189 [55.60]		2.500 [63.50]	<u>0.485</u> [12.32]		<u>0.668</u> [16.97]	2.302 [58.47]	<u>0.596</u> [15.14]	<u>0.243</u> [6.17]	<u>0.429</u> [10.90]

Combo-D D-Sub

## SOLDER CUP CONNECTOR CODE 2





For solder cup contacts, specify codae 2 in step 4 of ordering information.

Fixed female jackscrew

Fixed male jackscrew

Fixed male jackscrew

Fixed male and female polarized jackscrews available. Specify code T6 in step 7 of ordering information.

Typical part number: CBD7W2M200T60

Typical part number: CBD7W2M200T0



CBD17W2F200E0 with FS4008D contacts.

CBD17W2M55B30T20

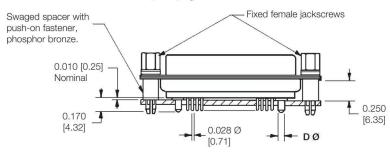
## STRAIGHT PRINTED BOARD MOUNT CONNECTOR

CODE 3, 35, 36 AND 37

For Code 93 Press-Fit Board Mount Connectors, see page 20.

CONTACT CODE	DØ
3	
35	<u>0.078</u> [1.98]
36	<u>0.094</u> [2.39]
37	<u>0.125</u> [3.18]

For straight printed board mount contacts, specify code no. in step 4 of ordering information.

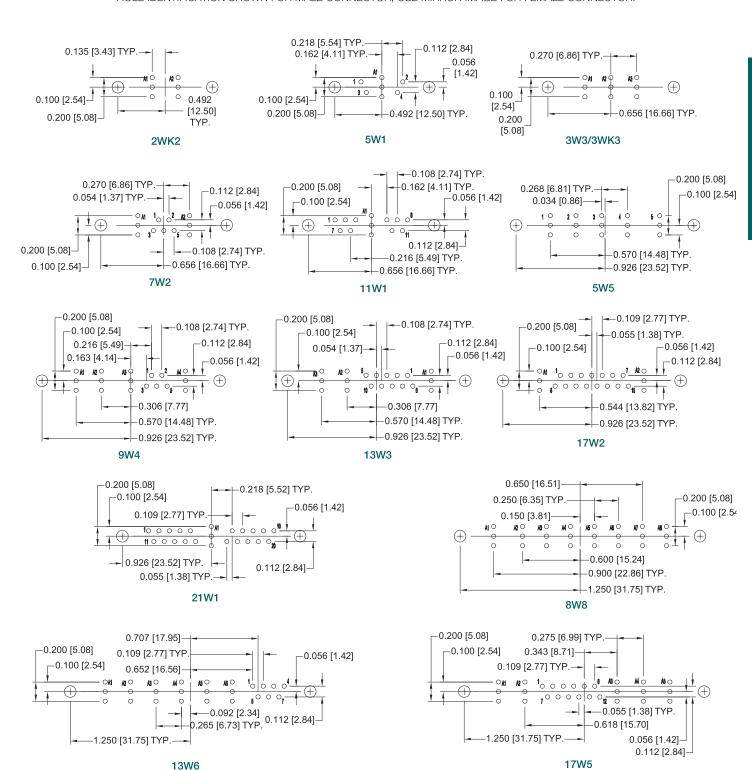


Typical part number: CBD17W2F35S60T2X



## STRAIGHT PRINTED BOARD MOUNT CONTACT HOLE PATTERN WITH FDS4201D AND MDS4201D SHIELDED CONTACTS

HOLE IDENTIFICATION SHOWN FOR MALE CONNECTOR; USE MIRROR IMAGE FOR FEMALE CONNECTOR.

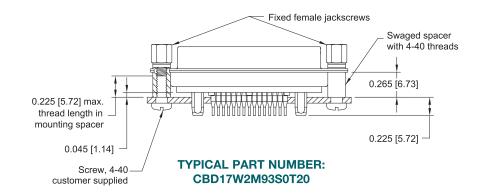


### SUGGESTED PRINTED BOARD HOLE SIZES:



## **COMPLIANT PRESS-FIT CONNECTOR CODE 93**

Positronic recommends the practice of using mounting hardware to secure connector to printed circuit board.



### SUGGESTED PRINTED BOARD HOLE SIZES:

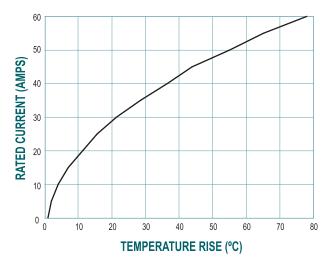
Suggest 0.123 [3.12] Ø hole for connector mounting holes

NOTE: For suggested printed board recommended drill hole sizes, plating and finished hole sizes for compliant contact termination positions, see page 85

For press-fit connector installation tools, see page 86.

FOR STRAIGHT PRINTED BOARD CONTACT HOLE PATTERNS, SEE PAGES 11 AND 12.

## TEMPERATURE RISE CURVE



Test conducted in accordance with UL1977. All power contacts under load.

Curve developed using CBD8W8M00000 and CBD8W8F93S000 connectors with MC4008D contacts terminated to 8 AWG wire.

# connectpositronic.com

## PROFESSIONAL, INDUSTRIAL AND MILITARY QUALITY THREE PERFORMANCE LEVELS FOR BEST COST/PERFORMANCE RATIO STANDARD DENSITY PCB MOUNT

Combo-D **D-Sub** 

## ORDERING INFORMATION - CODE NUMBERING SYSTEM

Specify Complete Connector By Selecting An Option From Step 1 Through 8

	•	Specify	Completi	e Conne	ector by	Selectif	ig An C	puon i	-rom s	steb i	Through 8		
	STEP	1	2	3	4	5	6	7	8	9	1	0	
	EXAMPLE	CBD	17W2	F	55	R7	N	T2	Х	/AA	I — 🖸	14	
	STEP 1 - BASIC SERIES  CBD - Professional/Industrial Quarter Step 3.  CBM - Military conformance wit "closed entry" female signates plated 0.000050 [1 gold over nickel plate. C "S" or "M" in Step 3.	h  nal con- .27µ]									*2 STEP 10 - SPECIAL OPTIONS FOR SPECIAL OPTIONS, SEE SPECIAL OPTIONS APPENDIX ON PAGE 81.  CONTACT TECHNICAL SALES FOR ORDERING DETAILS OF THE FOLLOWING:		
	STEP 2 - CONNECTOR V Shell Size 1 - 2WK2, 5W1 Shell Size 2 - 3W3, 3WK3, 7W2 Shell Size 3 - 5W5, 9W4, 13W3 Shell Size 4 - 8W8, 13W6, 17W 25W3, 27W2 Shell Size 5 - 24W7, 36W4, 43W Shell Size 6 - 46W4	., 11W1 , 17W2, 2 <sup>-</sup> 5, 21WA4,	IW1							/AA NOTE legisla	Straight / Right PCB mount  P 9 - ENVIRO COMPLIANCE - RoHS Compliance tition is not require	DNMENTAL E OPTIONS  liant to environmental red, this step will not be	
STEP 3 - CONNECTOR GENDER  F - Female - Professional Level - Open Entry Signal Contacts  M - Male S - Female - Industrial / Military Level - PosiBand Closed Entry Signal Contacts						used. Example: CBD17W2F55R7N  STEP 8 - SHELL OPTIONS  0 - Zinc Plated, with Chromate Seal.  *4S - Stainless Steel, passivated.  X - Tin Plated.  Z - Tin Plated and Dimpled (male conn.					NS omate Seal. vated. d (male connectors only).		
<ul> <li>STEP 4 - CONTACT TERMINATION TYPE</li> <li>0 - Connector ordered without size 8 power, shielded, air or high voltage removable contacts. See pages 60-88 for contact part numbers. Available on 2WK2, 3W3, 3WK3, 5W5 and 8W8.</li> <li>2 - Fixed Solder Cup, Signal Contacts only.</li> <li>3 - Solder, Straight Printed Board Mount with Signal Contacts, 0.170 [4.32] Tail Length.</li> <li>35 - Solder, Straight Printed Board Mount with Signal and 0.078 [1.98] Ø Power Contacts, 0.170 [4.32] Tail Length.</li> <li>36 - Solder, Straight Printed Board Mount with Signal and 0.094 [2.39] Ø Power Contacts, 0.170 [4.32] Tail Length.</li> <li>37 - Solder, Straight Printed Board Mount with Signal and 0.125 [3.18] Ø</li> </ul>							**2 STEP 7 - LOCKING AND POLARIZING SYSTEMS  0 - None.  V3 - Lock Tab, connector front panel mounted.  V5 - Lock Tab, connector rear panel mounted.  VL - Lock Lever, used with Hoods only.  T - Fixed Female Jackscrews.  T2 - Fixed Female Jackscrews.  T6 - Fixed Male and Female Polarized Jackscrews.  E - Rotating Male Jackscrews.  E2 - Rotating Male Screw Locks.  E3 - Rotating Male with Internal Hex for 3/32 Hex Drives  E6 - Rotating Male and Female Polarized Jackscrews.						
55 57 68 78 77	Power Contacts, 0.170 [4.32 5 — Solder, Right Angle (90°) Prin only, 0.283 [7.19] Signal Con 5 — Solder, Right Angle (90°) Print [1.98] Ø Power Contacts, 0.2 7 — Solder, Right Angle (90°) Print [3.18] Ø Power Contacts, 0.2 5 — Solder, Straight Printed Board MDS/FDS 4201D footprint, 0.1 7 — Solder, Metric System Right, with Signal Contacts only, 0.3 5 — Solder, Metric System Right And 0.078 [1.98] Ø Power Contacts 7 — Solder, Metric System Right, with Signal and 0.125 [3.18] Contact Extension. 15 — Solder, Right Angle (90°) Prin Shielded Contacts MRT/FRT Contact Extension. 3 — Size 20 Omega type complia termination length 0.225 [5.7	] Tail Leng ted Board tact Extens ed Board I 83 [7.19] S ed Board I 83 [7.19] S Angle (90°) 370 [9.40] gle (90°) Prir , 0.370 [9.44 Angle (90°) Ø Power C ted Board 4201D foont and Size	th. Mount with Mount with sion. Mount with ignal Conta Mount with ignal Conta Signal Conta Printed Board No Printed Board No Printed Bocontacts, 0.  Mount with other with Mount with 1.28	signal Co Signal and ct Extensic Signal and ct Extensic Shielded C ct Tail Leng pard Moun tact Exten Mount with nard Moun 370 [9.40] an Signal an 33 [7.19] S	ontacts  0.078 on.  0.125 on. contacts gth. t sion. Signal and sion. t Signal d d ignal	0 - 02 - *5 B3 - *5 B8 - F - P -	O - AN - AC - Z - H - *3 G - N - P 5 - M Mountin Mountin Bracket, Bracket, Float Mc Threade Bracket Bracket Bracket	- None - Lightwe - Lightwe - Lightwe - Hood, Town - Hood, E - Hood, E - Push-or  Hounting - Hole, O - Mounting	ight Aluright Alurigh	minum H minum H ide Oper rotating ning, Me Die Cast er, for Ri  YLE 51 Ø Angle (90' Angle (90' 50 [6.35] 50 [6.35]	male jackscrewertal, shell sizes 2 t Zinc, shell sizes ght Angle (90°) I with Angle (90°) Metal with Crose Plastic with Crose Length Length	h. ended height, plastic and s, shell sizes 1 through 5 through 5 s 1 through 6 Mounting Brackets	

## **NOTES**

- \*1 Not available on shell size 6, CBD 46W4.
- \*2 For additional information on accessories listed in steps 5, 6, 7 and 10, see Accessory Catalog.
- \*3 When using G hood with CBD variants, use the extended height hood. See Accessories Catalog for extended G hood options.
- \*4 For stainless steel dimpled male versions, contact Technical Sales.
- \*5 Not available when using 2WK2, 3W3, 3WK3, 5W5, 8W8, instead use B, R, R3, R4, or R5.
- **DIMENSIONS ARE IN INCHES [MILLIMETERS].** ALL DIMENSIONS ARE SUBJECT TO CHANGE.

- Bracket, Mounting, Right Angle (90°) Metai, Swag Thread Fixed Female Jackscrews with Cross Bar
- \*5 R6 Bracket, Mounting, Right Angle (90°) Metal, Swaged to Connector with 0.120
   [3.05] Ø Mounting Hole with Cross Bar
- \*5 R7 Bracket, Mounting, Right Angle (90°) Metal, Swaged to Connector with 4-40 Threads with Cross Bar \*5 R8 - Bracket, Mounting, Right Angle (90°) Metal, Swaged to Connector with 4-40
  - Locknut with Cross Bar - Swaged Spacer, 4-40 Threads, 0.250 [6.35] Length, Spacer length changes to 0.265 [6.73] when used in conjunction with Code 93 contacts
- Swaged Spacer, 4-40 Threads, 0.125 [3.18] Length
- Swaged Locknut, 4-40 Threads
- Swaged Spacer with Push-on Fastener, 4-40 Threads, 0.250 [6.35] Length