

## SECTION 2

# COMBINATION D-SUB CONNECTORS

Combination D-SUB Connectors provide the ideal solution for applications to require power, signal and coaxial connections within one connector. This series of connectors achieves space saving on PCB's and I/O designs.

Within this product family are various pin out configurations possible. Almost endless selections can be created mixing power, signal and coaxial contacts.



Examples are coaxial contacts handling frequencies up to 2 GHz. Power contacts from 10 amp to 40 amp current handling. Signal contacts in various styles complete the product offering.



Industry standard terminations types, solder cup, PCB contacts in straight and angled pin configurations. Crimp types and wire wrap contacts.

**Here are just a few Product characteristics:**

- Space savings on the PCB
- Different wire terminations are possible in a single connector
- Cost savings - mixed layout
- Insertable and removable coaxial, power, high voltage and signal contacts
- Precision machined contacts
- Various quality classes are available
- Wide product range

A wide range of standard pin configurations fully loaded with signal contacts are available. Specially configured contacts with power, coaxial and signal contacts can be constructed. Please use the Part Number Creator on page 2 | 2 and 2 | 3 or contact technical support at your closest CONEC office.



# PART NUMBER CREATOR

for standard version

**3 003W3 S X X 6 1 A 1 0 X**

**Product Line**

- 3 = Shell steel tin plated
- 1 = Brass tin plated\*
- 5 = Shell yellow chromated\* (not RoHS compliant)
- A = Stainless steel\* \*on request

**Shell size and design**

- 1 = 5W1, 2W2C
- 2 = 3W3, 7W2, 11W1, 3W3C
- 3 = 5W5, 9W4, 13W3, 17W2, 21W1
- 4 = 8W8, 13W6, 17W5, 21WA4, 25W3, 27W2
- 5 = 24W7, 36W4, 43W2, 47W1 Empty positions ADD „0“ = 003W3

**Contact type**

- P = Plug connector
- S = Socket connector

**Surface/Quality class for SIGNAL contacts**

- A = Quality class 3 = 50 mating cycles
- B = Quality class 2 = 200 mating cycles\*
- C = Quality class 1 = 500 mating cycles
- J = Special application = > 500 mating cycles (on request)\*
- X = Crimp and 3W3, 5W5, 8W8, 2W2C, 3W3C (no contacts are supplied with the connector) \*on request

**Termination only for SIGNAL contacts**

- K = Crimp without contacts
- M = Solder cup
- N = Wire wrap, .500" / 12.7 mm
- P = Press fit
- R = Solder pin, straight, .220" / 5.6 mm
- T = Solder pin, angled, .280" / 7.19 mm
- U = Solder pin, angled, .370" / 9.40 mm
- W\* = Solder pin, angled, .450" / 11.43 mm
- X = 3W3, 5W5, 8W8, 2W2C, 3W3C
- Z\* = Solder pin, angled, .540" / 13.84 mm
- \* = please contact us

**Termination for HIGH POWER- or COAXIAL contacts**

- |   |  |  |
|---|--|--|
| <b>Quality class 3 / Quality class 1</b>                | <b>Quality class 3 / Quality class 1</b> | <b>Quality class 3 / Quality class 1</b> |
| C1 = Solder/Crimp angled 10 A                           | 59 / 55 = Solder pin, angled 15 A        | H2 / 88 = 3 Solder pins angled 75 Ω      |
| C2 = Solder/Crimp angled 20 A                           | 73 / 56 = Solder pin, angled 20 A        | H3 / 89 = 3 Solder pins angled 75 Ω      |
| C3 = Solder/Crimp angled 30 A                           | 74 / 57 = Solder pin, angled 30 A        | H5 / 90 = 5 Solder pins angled 75 Ω      |
| C4 = Solder/Crimp angled 40 A                           | 75 / 58 = Solder pin, angled 40 A        | 91 = Screw termination 20 A              |
| F2,61 / F1,41 = Solder cup 10 A                         | 77 / 60 = Solder pin, angled 40 A        | /P1 = press fit 30A                      |
| F4,62 / F3,42 = Solder cup 20 A                         | 81 / 66 = Solder pin, angled 20 A        | /P2 = press fit 30A                      |
| F6,63 / F5,43 = Solder cup 30 A                         | 82 / 67 = Solder pin, angled 30 A        | /P4 = press fit 30A                      |
| F8,64 / F7,44 = Solder cup 40 A                         | 85 / 65 = Solder pin, angled 30 A        | 99 = no high power, coax or crimp        |
| 68 / 48 = Solder pin, straight 20 A, D= .077" / 1.95 mm | G7 / 76 = 3 Solder pins Straight 50 Ω    | contacts loaded                          |
| 69 / 49 = Solder pin, straight 20 A, D= .102" / 2.60 mm | G9 / 78 = 3 Solder pins angled 50 Ω      | Coaxial contacts with cable              |
| 70 / 50 = Solder pin, straight 20 A, D= .110" / 2.85 mm | H1 / 79 = 3 Solder pins angled 50 Ω      | termination must be ordered separately.  |
| 71 / 51 = Solder pin, straight 30 A, D= .130" / 3.18 mm | H4 / 80 = 5 Solder pins angled 50 Ω      |  |
| 72 / 52 = Solder pin, straight 40 A, D= .150" / 3.75 mm | G8 / 86 = 3 Solder pins Straight 75 Ω    |  |

**Mounting style**

- |  |  |
|--|--|
| A1 = Riveted   | E6 = 4-40 UNC threaded rear spacer with PCB clip, PCB .126" / 3.20 mm          |
| A2 = M3 threaded insert  | F1 = M3 clip and threaded rear spacer with PCB clip, PCB .063" / 1.60 mm       |
| A3 = 4-40 UNC threaded insert  | F2 = 4-40 UNC clip and threaded rear spacer with PCB clip, PCB .063" / 1.60 mm |
| A4 = M3 threaded rear spacer   | F3 = M3 clip and threaded rear spacer with PCB clip, PCB .091" / 2.30 mm       |
| A5 = 4-40 UNC threaded rear spacer   | F4 = 4-40 UNC clip and threaded rear spacer with PCB clip, PCB .091" / 2.30 mm |
| A6 = Float fastening   | F5 = M3 clip and threaded rear spacer with PCB clip, PCB .126" / 3.20 mm       |
| A7 = Threaded rear spacer for M3 press fit                                     | F6 = 4-40 UNC clip and threaded rear spacer with PCB clip, PCB .126" / 3.20 mm |
| A8 = Threaded rear spacer for 4-40 UNC press fit                               | G1 = Metal bracket, M3 threaded insert for .370" / 9.40 mm                     |
| C1 = M3 threaded rear spacer with PCB clip, PCB .063" / 1.60 mm                | G2 = Metal bracket, 4-40 UNC threaded insert for .370" / 9.40 mm               |
| C2 = 4-40 UNC threaded rear spacer with PCB clip, PCB .063" / 1.60 mm          | G3 = Metal bracket, M3 threaded insert and clip for .370" / 9.40 mm            |
| C3 = M3 threaded rear spacer with PCB clip, PCB .091" / 2.30 mm                | G4 = Metal bracket, 4-40 UNC threaded insert and clip for .370" / 9.40 mm      |
| C4 = 4-40 UNC threaded rear spacer with PCB clip, PCB .091" / 2.30 mm          | H1 = Metal bracket, M3 threaded lock for .370" / 9.40 mm                       |
| C5 = M3 threaded rear spacer with PCB clip, PCB .126" / 3.20 mm                | H2 = Metal bracket, 4-40 UNC threaded lock for .370" / 9.40 mm                 |
| C6 = 4-40 UNC Threaded rear spacer with PCB clip, PCB .126" / 3.20 mm          | H3 = Metal bracket, M3 threaded lock and clip for .370" / 9.40 mm              |
| D1 = M3 clip and threaded rear spacer with PCB clip, PCB .063" / 1.60 mm       | H4 = Metal bracket, 4-40 UNC threaded lock and clip for .370" / 9.40 mm        |
| D2 = 4-40 UNC clip and threaded rear spacer with PCB clip, PCB .063" / 1.60 mm | N1 = Metal bracket, M3 threaded insert for .280" / 7.19 mm                     |
| D3 = M3 clip and threaded rear spacer with PCB clip, PCB .091" / 2.30 mm       | N2 = Metal bracket, 4-40 UNC threaded insert for .280" / 7.19 mm               |
| D4 = 4-40 UNC clip and threaded rear spacer with PCB clip, PCB .091" / 2.30 mm | N3 = Metal bracket, M3 threaded insert and clip for .280" / 7.19 mm            |
| D5 = M3 clip and threaded rear spacer with PCB clip, PCB .126" / 3.20 mm       | N4 = Metal bracket, 4-40 UNC threaded insert and clip for .280" / 7.19 mm      |
| D6 = 4-40 UNC clip and threaded rear spacer with PCB clip, PCB .126" / 3.20 mm | P1 = Metal bracket, M3 threaded lock for .280" / 7.19 mm                       |
| E1 = M3 threaded rear spacer with PCB clip, PCB .063" / 1.60 mm                | P2 = Metal bracket, 4-40 UNC threaded lock for .280" / 7.19 mm                 |
| E2 = 4-40 UNC threaded rear spacer with PCB clip, PCB .063" / 1.60 mm          | P3 = Metal bracket, M3 threaded lock and clip for .280" / 7.19 mm              |
| E3 = M3 threaded rear spacer with PCB clip, PCB .091" / 2.30 mm                | P4 = Metal bracket, 4-40 UNC threaded lock and clip for .280" / 7.19 mm        |
| E4 = 4-40 UNC threaded rear spacer with PCB clip, PCB .091" / 2.30 mm          | W1 = Threaded rear spacer with M3 press in pin                                 |
| E5 = M3 threaded rear spacer with PCB clip, PCB .126" / 3.20 mm                | W2 = Threaded rear spacer with 4-40 UNC press in pin                           |

OX = Standard

# TECHNICAL DATA

## Standard version

Materials	Connector with signal contacts	Coaxial contacts	High power contacts	High voltage contacts
Insulator Green standard / black crimp	PBTP, GV (UL94 V-0)			
Shell	steel tin plated brass tin / stainless steel on request			
Contact plating	Gold plated over nickel			
Contact material	CU alloy			
Retaining clip	CU alloy			
Insulator		PTFE/PBTP/PI		PTFE
<b>Mechanical and electrical characteristics</b>				
Current rating	7,5A (UL) / 5A (CSA, VDE)			
Test voltage between 2 contacts contact and shell	1000 V, 50Hz 1 min.		1000 V, 50Hz 1 min.	
Resistance between mated contacts	max. 8 mΩ	max. 2.7 mΩ	max. 1 mΩ	max. 2.7 mΩ
Insulation resistance	≥5 GΩ	≥ 10 GΩ	≥ 5 GΩ	≥ 2x10 <sup>7</sup> MΩ
Volume resistivity	10 <sup>16</sup> Ωcm			
Dielectric impedance	50KV/mm			
Characteristic impedance		50/75 Ω		
VSWR-value at according MIL-C-39012	1.2GHz 1.5GHz 2.0GHz	≤1,2 ≤1,3 ≤1,5		
Dielectric voltage		750V 50Hz		3.8kV
Frequency range		0-2GHz		
Working voltage	250 V	250 V	250 V	max. 2.8kV
Temperature range	-55°C to +125°C			
Insertion force per contact	3.4N	7N	7N	5N
Extraction force per contact	0.2N	7N	approx. 5N	approx. 2.5N
Mating cycles	A = Quality class 3 = 50 mating cycles, B = Quality class 2 = 200 mating cycles, C = Quality class 1 = 500 mating cycles			

Technical specifications are subject to change without notice.

# PIN CONFIGURATION – MATING SIDE OF SOCKET CONNECTOR

## SHELL SIZE 1



## SHELL SIZE 2



## SHELL SIZE 3



## SHELL SIZE 4



## SHELL SIZE 5



Connectors 3W3, 5W5 and 8W8 with female insulators: Socket contacts are fingerprobe safe according to UL 1950 and CSA 22.2.950.

# TECHNICAL INFORMATION

## SKIN EFFECT

Alternating currents do not uniformly occupy the entire cross section of the conductor, rather inductance effect in the conductor deflects the current towards the surface of the conductor, whereby this deflection increases with the frequency.

The resistive attenuation of a transmission line increases with the frequency as a result of this skin effect.

The skin depth (equivalent thickness of the layer in which current flows) can be determined using

$$\delta = \frac{1}{\sqrt{f \pi \sigma \mu_0 \mu_r}}$$

f = frequency

$\sigma$  = conductivity of the conductor material

$\sigma_{Ag} = 62 \times 10^6 \text{ S/m}$

$\sigma_{Cu} = 58 \times 10^6 \text{ S/m}$

$\mu_0 = 1,256 \cdot 10^{-6} \text{ Vs / Am}$

$\mu_r$  ... relative permeability constant for the employed material

## VSWR-VALUE

The ratio between the value of the largest and the smallest voltages on a loss-free line is known as the ripple or voltage standing wave ratio s (where  $1 \leq s < \infty$ ). The reciprocal value of the VSWR is known as the inverse voltage standing wave ratio m (where  $0 < m \leq 1$ ).

(VSWR = Voltage standing wave ratio)

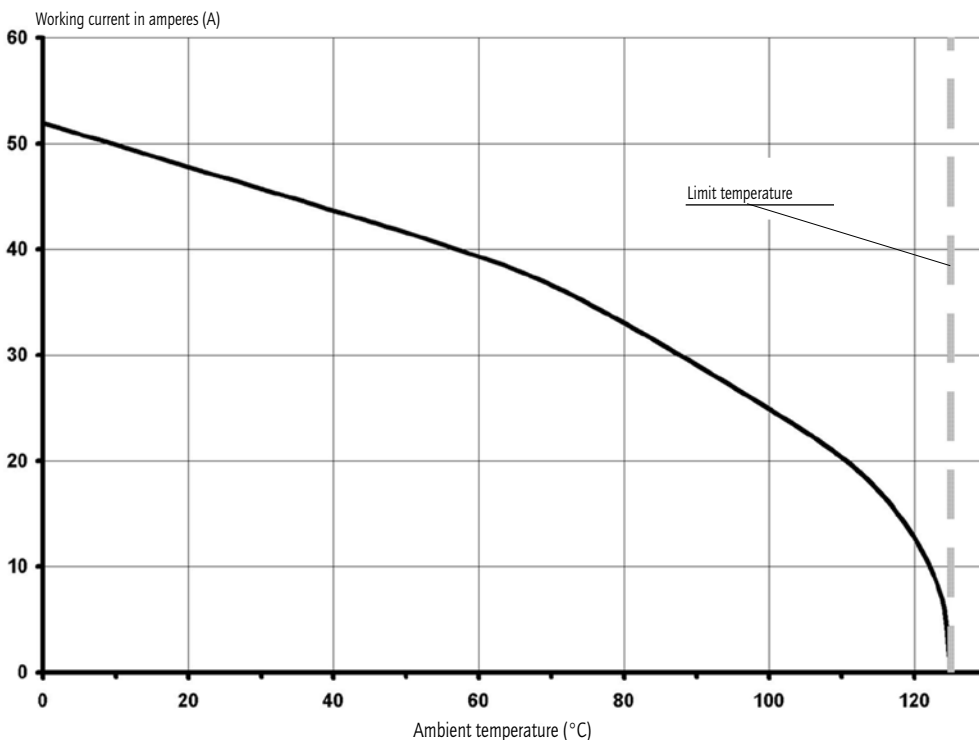
The value of s is linked with the → reflection coefficient r on s transmission line according to the equation

$$s = \frac{(1 + |r|)}{(1 - |r|)}$$

## DERATING CURVE

Measurement is according to DIN 41640 part 3 whereas all power contacts are connected in series.

For test procedure – product-no. 3008W8SXX99A has been equipped with 132C11049X and 3008W8PXX99AA10X with 131C11049X.



# MATING CONDITIONS

Float mount tolerance guide



Rigid mount tolerance guide



Rigid mount vertical to tolerance guide



PANEL CUT-OUT

Rear panel mounting

Front panel mounting



Shell size	A $\pm 0,13$	B $\pm 0,13$	C $\pm 0,13$	D $\pm 0,13$	E $\pm 0,13$
1	20.50	22.20	25.00	11.40	13.00
2	28.80	30.50	33.30	11.40	13.00
3	42.50	44.30	47.04	11.40	13.00
4	59.10	60.70	63.50	11.40	13.00
5	56.30	58.30	61.10	14.10	15.80

# CRIMPING INSTRUCTIONS FOR COAX CONTACTS



Strip the wire  
Using dimensions shown on the  
individual product drawings



Slide sleeve over coax cable



Crimp the inner contact on the  
inner conductor



Snap the inner contact into  
the outer contact



Slide braid over outer contact



Crimp the sleeve on to outer  
contact



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