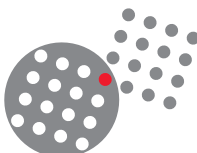


# MIL-DTL-38999 series III and range extension



**SOURIAU**  
Connection Technology

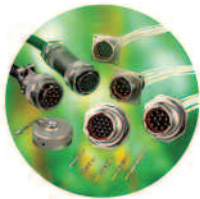


## SOURIAU

### Connectors and interconnect systems for harsh environments

The company designs, manufactures and markets high performance interconnect solutions for severe environments from industrial broadline and universal ranges to complex system with integrated functions:

filtering, high speed data transmission, hermetic seal, separation mechanism, remote handling, underwater mating, ...



Industrial



Aeronautical



Equipment & system

The dedicated end markets for SOURIAU's products are aeronautical, defense-space and industrial.



Railway  
Geophysics  
Manufacturing environment  
Instrumentation  
Automation & process



Civil & military aircraft  
Helicopter  
Weapon delivery system  
Avionics



Military marine  
Communications  
Satellites  
Launcher & missile

SOURIAU was established in 1917 and has been created by successive acquisitions of the industrial, aeronautical, defense and space activities of SOURIAU, JUPITER and BURNDY.

The Group's products are engineered and manufactured in the USA and Dominican Republic, Europe and Morocco, Japan and India, and sold by a worldwide sales and marketing organization, and in addition to SOURIAU's offices, a large network of licensed distributors and agents.

SOURIAU complies with most of national and international Quality Assurance Standards, production unit with ISO 14001.

**Quality Certificate  
Management System**

**ISO 9001**

**Environment Certificate  
Management System**

**ISO 14001**

**Quality Certificate  
Management System**

**Aeronautic Industry : EN 9100**

# MIL-DTL 38999 Series III



## Introduction

This product family is in accordance with MIL-DTL-38999 K Serie III , EN 3645 and CECC standard for bronze shell

Proposed in aluminium, composite, stainless steel, titanium and bronze versions.

This family gives :

- A high contact density up to 128 contacts #22D.
- A quick screw coupling with self locking mechanism.
- 100% scoop proof offering polarising options by angular positioning of keys.
- EMI enhanced protection by shielding ring and shell to shell bottoming.

Moreover, composite connectors reach high performance in terms of:

- Resistance to salt spray (> 2000 hours)
- Endurance : (> 1500 mating / Unmating operations with specific contacts)

Its choice is recommended wherever weight is critical (typically –30% versus aluminium version) or particularly in harsh climatic and mechanical environments.

8D Titanium version is characterized by a very high and mechanical resistance:

- Weight saving as compared to stainless steel
- Unplated and nickel plated version available

8D / D38999 family has applications in:

- Aeronautics and military
- Marine and offshore
- Industrial.

**For more informations or questions, please contact us to:**

**Contactmilaero@souriau.com**

# MIL-DTL 38999 Series III



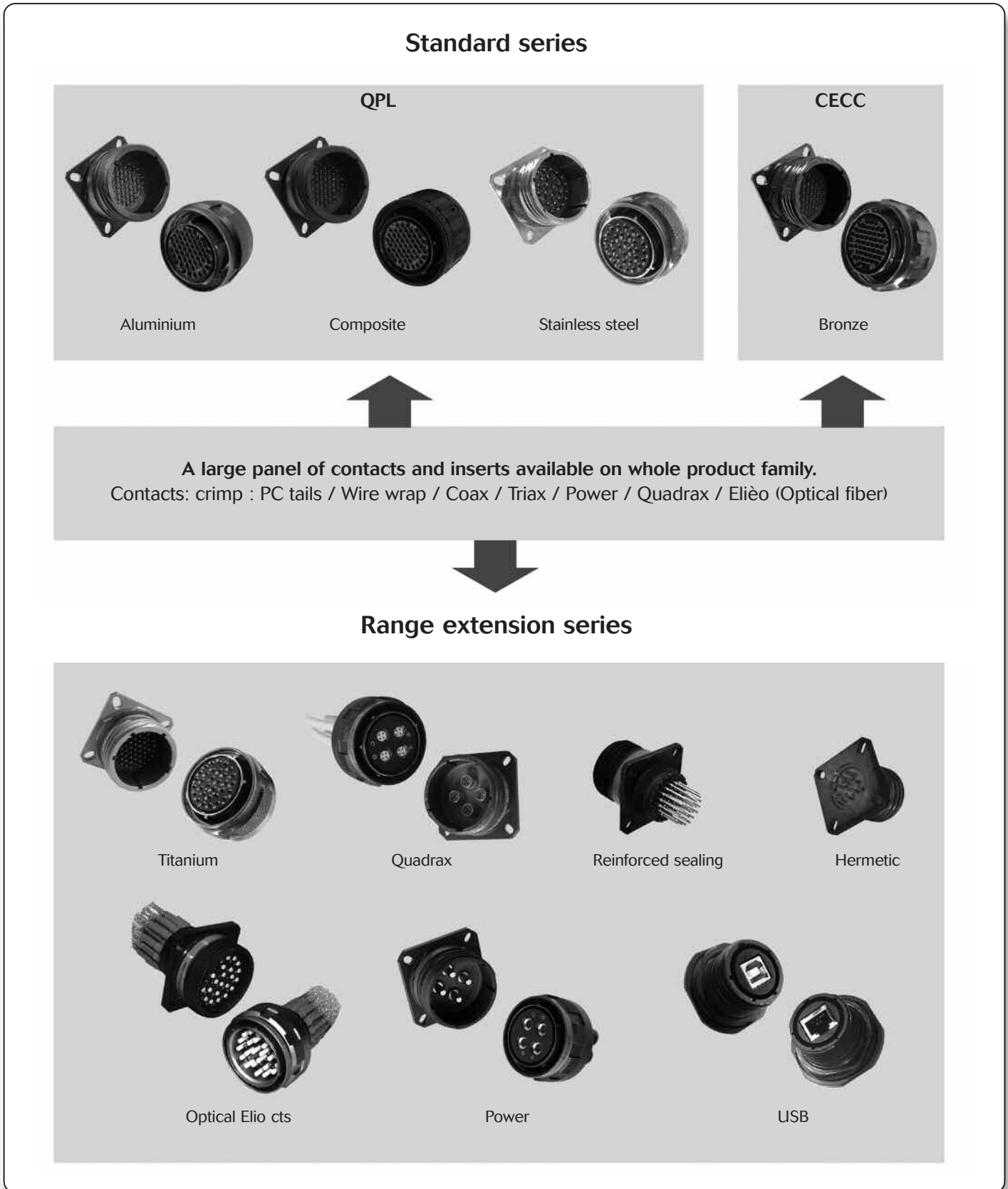
## Summary

Company profile .....	2
Introduction .....	3
Overview .....	5
Technical characteristics .....	6
Layouts .....	8
8D - D38999 Aluminium Series .....	13
8D - D38999 Composite Series .....	25
8D - D38999 Stainless Steel .....	33
8D Titanium Series .....	39
JVS Bronze Series .....	47
Common section (contacts, orientation, panel cut-out, tools...)	57
8D - JVS Series with quadrax contacts .....	67
8D - JVS with optical Elio contacts .....	75
8D reinforced sealing Series .....	83
F38999 Hermetic .....	85
8D Series with RJ45 USB .....	89
Coordinates for PCB .....	100

# MIL-DTL 38999 Series III



## Overview



# MIL-DTL 38999 Series III



## Technical characteristics

### Characteristics

• **Shell:**  
Aluminium, composite, stainless steel, bronze

• **Shells plating:**

**Aluminium shell:**

- Cadmium olive drab (W)
- Nickel (F)
- Black zinc nickel (Z)
- Green zinc cobalt (ZC)

**Composite shell:**

- Cadmium olive drab (J)
- Nickel (M)
- Without plating (X)

**Stainless steel shell:**

- Passivated (K)
- Nickel (S)

**Titanium shell:**

- Without plating (TT)
- Nickel (TF)

**Boîtier bronze:**

- Without plating

• **Insulator:** Thermoplastic or thermoset.

• **Grommet and interfacial seal:**

- Silicone elastomer

• **Contacts:** Copper alloy

• **Contacts plating:** Gold over nickel plated

• **Endurance:**

- 500 mating / unmating operations whatever the material used
- 1500 mating / unmating operations with composite connectors + specifics contacts

• **Shock:**

300g, 3 ms according EN 2591-D2 method A

• **Vibration:**

**Sinus:**

- 10 à 2000 Hz, 3x12 hrs (60g, 140 – 2000 Hz) with temperature cycling

**Random:**

- 50 to 2000 Hz, 2x8 Hrs (1g<sup>2</sup>/ Hz, 100 – 2000Hz) at T° max.
- 25 to 2000 Hz, 2x8 Hrs (5g<sup>2</sup>/ Hz, 100 – 300Hz) (at ambient T°)

Test with accessories in acc with EN 2591-D3

• **Contacts retention:**

Contacts size	22	20	16	12	8	4
Min force in N	44	67	111	111	111	200

### Weight comparison

Example for a plug shell size 15

Materials	Weight
Stainless steel	58.80 grs
Titanium	33.90 grs
Aluminium	20.35 grs
Composite	14.30 grs

40% lighter (Aluminium vs Stainless steel)  
42% lighter (Composite vs Stainless steel)  
30% lighter (Composite vs Titanium)

### Electrical

• **Test voltage rating (Vrms):**

Service	At sea level	At 21000 m
M	1 300	800
N	1 000	600
I	1 800	1 000
II	2 300	1 000

For Quadrax see page 70

• **Contact resistance:**

Contacts size	22	20	16	12	8	4
Cts resistance (mΩ)	14.6	7.3	3.8	3.5	3	2

• **Insulation resistance:**

≥ 5 000 MΩ (under 500 Vdc).

• **Contact rating:**

Contacts size	22	20	16	12	8	4
Contact rating (A)	5	7,5	13	23	45	80

• **Shell continuity**

**Aluminium shell:**

- Cadmium olive drab (W): 2.5 mΩ
- Nickel (F): 1 mΩ
- Black zinc nickel (Z): 2.5 mΩ
- Green zinc nickel (ZC): 2.5 mΩ

**Composite shell:**

- Cadmium olive drab (J): 3 mΩ
- Nickel (M): 3 mΩ

**Stainless steel shell:**

- Passivated (K) : 10 mΩ
- Nickel (S) : 1 mΩ

**Titanium shell:**

- Without plating (TT) : 10 mΩ
- Nickel (TF): 1 mΩ

**Bronze shell:**

Without plating: 5 mΩ

• **Shielding:**

**Aluminium shell:**

- 65 db at 10 GHz (F) – 50 db at 10 GHz (W)
- 85 db at 1 GHz (F)
- (Z & ZC): Consult us

**Composite shell:**

- 90 db at 10 GHz
- 85 db at 1 GHz

**Stainless steel shell:**

- 45 db at 10 GHz (K)
- 65 db at 10 GHz (S)

**Titanium shell:**

- 45 db at 10 GHz (TT)
- 65 db at 10 GHz (TF)

**Bronze shell:** 85 db at 10 GHz



# MIL-DTL 38999 Series III



## Technical characteristics

### Climatics

- **Temperature range:**

- **Aluminium shell:**

- Cadmium olive drab (W): -65°C +175°C

- Nickel (F): -65°C +200°C

- Black zinc nickel (Z): -65°C +200°C

- Green zinc nickel (ZC): -65°C +200°C

- **Composite shell:**

- Cadmium olive drab plating (J):

- -65°C +175°C

- Nickel (M): -65°C +200°C

- Without plating (X): -65°C +175°

- **Stainless steel shell:**

- Passivated (K): -65°C +200°C

- Nickel (S): -65°C +200°C

- **Titanium shell:**

- Without plating (TT): -65°C +200°C

- Nickel (TF): -65°C +200°C

- **Bronze shell:**

- No plating: -65°C +175°C

- **Sealing:**

- Mated connectors meet altitude immersion requirements of MIL-DTL-38999.

- **Salt spray:**

- **Aluminium shell:**

- Cadmium olive drab (W): 500 Hrs

- Nickel (F): 48 Hrs

- Black Zinc nickel (Z): 500 Hrs

- Green Zinc cobalt (ZC): 250 Hrs

- **Composite shell:**

- Cadmium olive drab (J) : 2000 Hrs

- Nickel (M): 2000 Hrs

- Without plating (X): 2000 Hrs

- **Stainless steel shell:**

- Passivated (K): 500 Hrs

- Nickel (S): 48 Hrs

- **Titanium shell:**

- Without plating (TT): 500 Hrs

- Nickel (TF): 48 Hrs

- **Bronze shell:**

- No plating: 500 Hrs

### Resistance to fluids

- **According to MIL-DTL-38999 standard.**

- Gasoline: JP5 (OTAN F44)

- Mineral hydrolic fluid: MIL-H-5606

- (OTAN H515)

- Synthetic hydraulic fluid: Skydrol 500 B4

- **LD4 (SAE AS 1241).**

- Mineral lubricating: MIL-L-7870A

- (OTAN 0142)

- Synthetic lubricating: MIL-L-23699

- (OTAN 0156), MIL-L-7808.

- Cleaning fluid: MIL-DTL-25769 dilué/diluted

- De-icing fluid: MIL-A-8243.

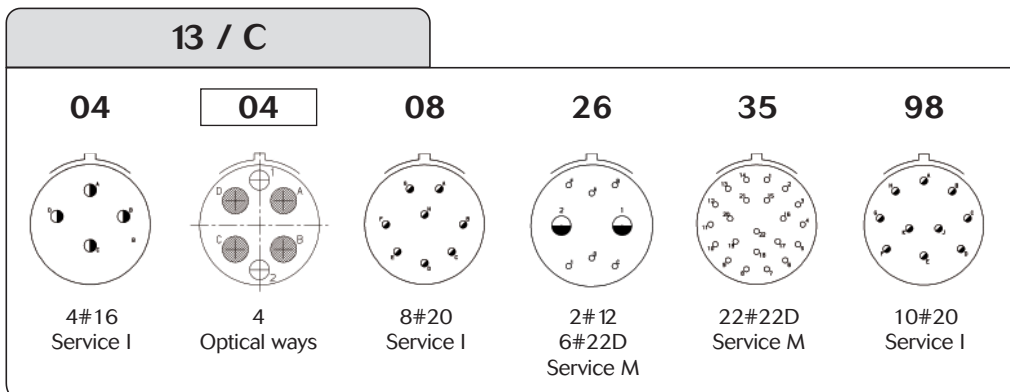
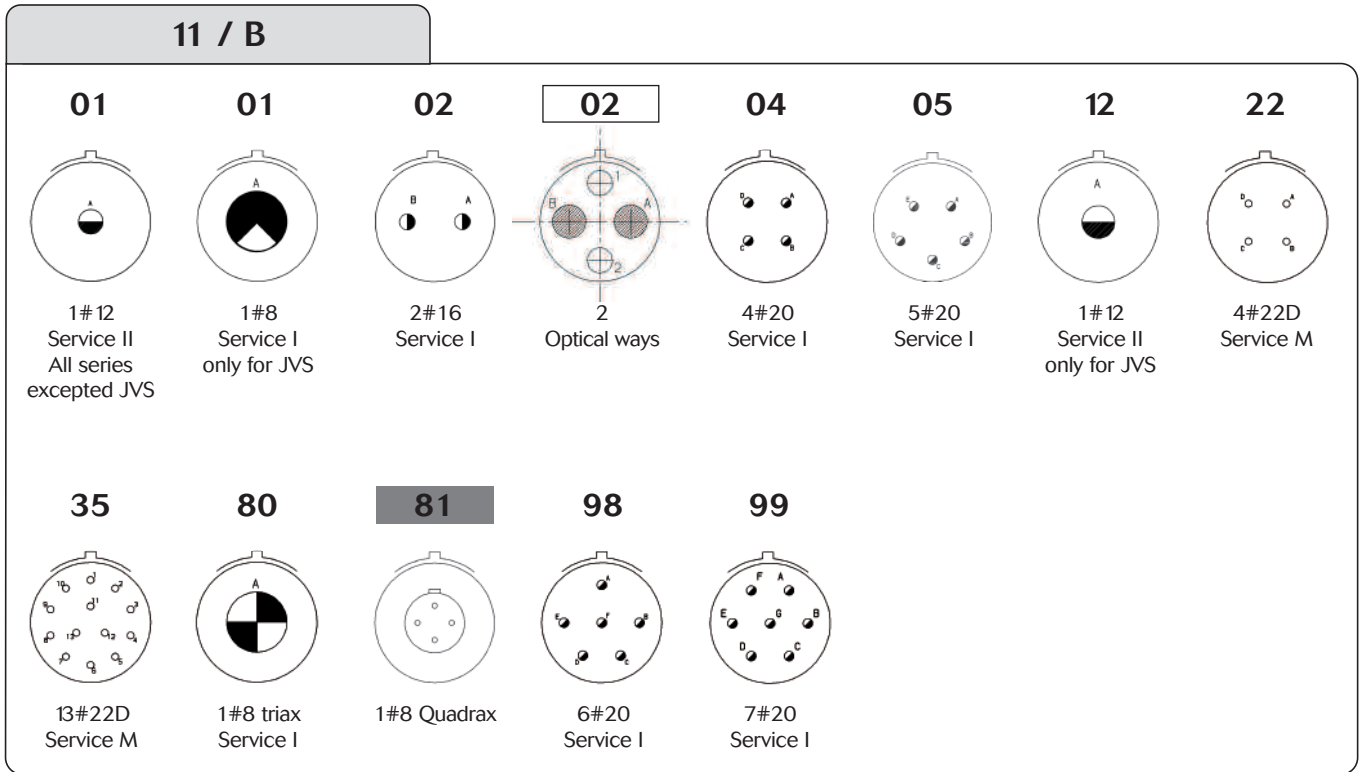
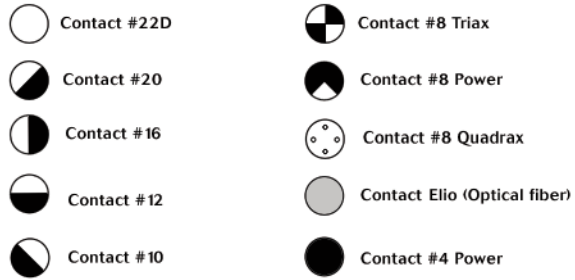
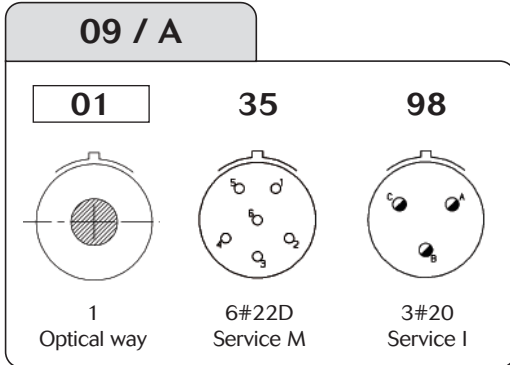
- Extinguishing fluid: Chlorobrométhane

- Cooling fluid: Coolanol

# MIL-DTL 38999 Series III



## Contact layouts





# MIL-DTL 38999 Series III



## Contact layouts

**15 / D**

<b>05</b>  5#16 Service II	<b>15</b>  1#16 14#20 Service I	<b>18</b>  18#20 Service I	<b>19</b>  19#20 Service I	<b>35</b>  37#22D Service M	<b>97</b>  4#16 8#20 Service I
-------------------------------------	---	-------------------------------------	-------------------------------------	--------------------------------------	--

**17 / E**

<b>02</b>  38#22D 1#8 triax Service M	<b>06</b>  6#12 Service I	<b>08</b>  8#16 Service II	<b>20</b>  4#12 16#22D Service M	<b>26</b>  26#20 Service I	<b>35</b>  55#22D Service M	<b>75</b>  2#8 triax Service M	<b>81</b>  38#22D 1#8 Quadrax
<b>82</b>  2 Quadrax	<b>99</b>  2#16 21#20 Service I						

**19 / F**

<b>08</b>  8 Optical ways	<b>11</b>  11#16 Service II	<b>28</b>  26#20 2#16 Service I	<b>32</b>  32#20 Service I	<b>35</b>  66#22D Service M
------------------------------------	--------------------------------------	---	-------------------------------------	--------------------------------------

Elio fiber optics Ethernet Quadrax

# MIL-DTL 38999 Series III



## Contact layouts

21 / G				23 / H		
<b>11</b>  11#12 Service I	<b>16</b>  16#16 Service II	<b>35</b>  79#22D Service M	<b>39</b>  2#16 37#20 Service I	<b>21</b>  21#16 Service II	<b>35</b>  100#22D Service M	<b>53</b>  53#20 Service I
<b>41</b>  41#20 Service I	<b>48</b>  4#8 power Service I	<b>75</b>  4#8 triax Service M	<b>84</b>  4 Quadrax	<b>54</b>  4#12 9#16 40#22D Service M	<b>55</b>  55#20 Service I	

25 / J								
<b>04</b>  8#16 48#20 Service I	<b>07</b>  2#8 triax 97#22D Service M	<b>08</b>  8#8 triax Service M	<b>11</b>  2#20 9#10 Service N	<b>19</b>  19#12 Service I	<b>20<sup>(1)</sup></b>  10#20 4#12 coax 13#16 3#8 triax Service N	<b>24</b>  12#16 12#12 Service II	<b>24</b>  24 Optical Ways	<b>29</b>  29#16 Service I
<b>35</b>  128#22D Service M	<b>37</b>  37#16 Service I	<b>41</b>  22#22D 3#20 11#16 2#12 3#8 triax Service M	<b>43</b>  23#20 20#16 Service I	<b>44</b>  4#4 power 4#16 Service I	<b>46</b>  40#20 4#16 2#8 coax Service I	<b>61</b>  61#20 Service I	<b>82</b>  97#22D 2#8 Quadrax	<b>80</b>  10#20 - 4#12 13#16 3#8 Quadrax
<b>81</b>  22#22D - 3#20 11#16 - 2#12 3#8 Quadrax	<b>86</b>  40#20 4#16 2#8 Quadrax	<b>88</b>  8 Quadrax						

(1) For classes F, W, K, S only.

Elio fiber optics
  Ethernet Quadrax







# MIL-DTL 38999 Serie III Aluminium Series

# 8D - D38999 Aluminum Serie



## Connector part numbers

Basic Series	8D	0	-	11	W	35	P	N	**
<b>Shell style:</b>									
0: Square flange receptacle									
1: In line receptacle									
7: Jam nut receptacle									
5: Plug with RFI shielding.									
<b>Type:</b>									
-: Connectors with standard crimp contacts.									
L: Receptacle with long spill (male and female size #22D, #20).									
C: Receptacle with short spill (male and female #22D, #20, #16).									
S: Receptacle with specific spill (male et female #22D)									
W: Receptacle with male contacts #22D for wire wrap (3 wraps)									
T: Receptacle with male contacts #20 for wire wrap (2 wraps)									
<b>Shell size:</b> 09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25									
<b>Plating:</b>									
W: Olive drab cadmium									
F: Nickel									
ZC: Green zinc cobalt									
Z: Black zinc nickel									
<b>Contact layout:</b> See page 8 to 11									
<b>Contact type:</b>									
P: Pin.      A: Connector supplied less pin contact or with specific contacts (connector marking: A + orientation).									
S: Socket.    B: Connector supplied less socket contact or with specific contacts (connector marking: B + orientation).									
<b>Orientation:</b> N, A, B, C, D & E (see page 58)									
<b>Specification:</b>									
046: Tinned straight spills									
251: Connector provided with power contacts (layouts with contact #8)									
022: Fuel tank									
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S plus orientation.									

## MIL-DTL-38999 part numbers\*

Basic Series	D38999	20	W	B	35	P	N	L
<b>Shell style:</b>								
20: Square flange receptacle								
24: Jam nut receptacle								
26: Plug with RFI shielding.								
<b>Plating:</b>								
W: Olive drab cadmium								
F: Nickel								
<b>Shell size:</b> A - B - C - D - E - F - G - H - J								
<b>Contact layout:</b> See page 11 for layout according to MIL-DTL-38999								
<b>Contact type:</b>								
P: Pin.      A: Connector supplied less pin contact or with specific contacts (connector marking: A + orientation).								
S: Socket.    B: Connector supplied less socket contact or with specific contacts (connector marking: B + orientation).								
<b>Orientation:</b> N, A, B, C, D & E (see page 58)								
L: For P or S contact type only, connector delivered without contacts, connector marking P or S (without L)								

\* Note: To place an order of MIL connectors delivered without MIL removable crimp contacts and keep P or S plus orientation marking, it must be specify clearly on the order (by adding a suffix L at the end of the P/N or specified in comment).

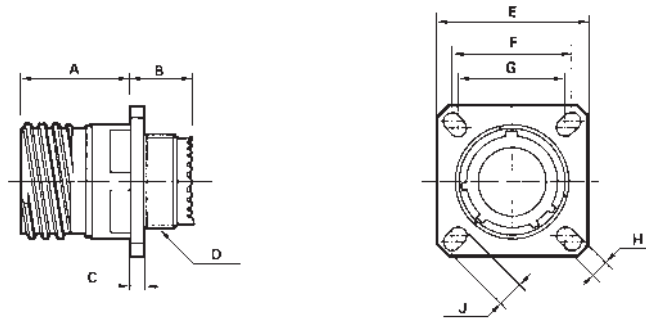


# 8D - D38999 Aluminium Series



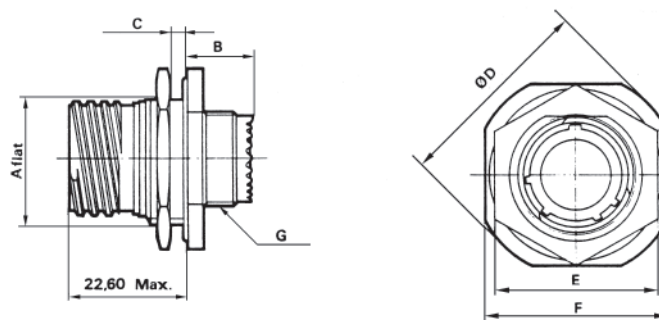
## Dimensions

### Receptacle type 0



Shell size	A Max.	B Max.	C Max.	D thread	E $\pm 0,30$	F	G	H $\pm 0,20$	J $\pm 0,20$
09 (A)	20.90	10.60	2.50	M12 x 1-6g	23.80	18.26	15.09	3.25	5.49
11 (B)	20.90	10.60	2.50	M15 x 1-6g	26.20	20.62	18.26	3.25	4.93
13 (C)	20.90	10.60	2.50	M18 x 1-6g	28.60	23.01	20.62	3.25	4.93
15 (D)	20.90	10.60	2.50	M22 x 1-6g	31.00	24.61	23.01	3.25	4.93
17 (E)	20.90	10.60	2.50	M25 x 1-6g	33.30	26.97	24.61	3.25	4.93
19 (F)	20.90	10.60	2.50	M28 x 1-6g	36.50	29.36	26.97	3.25	4.93
21 (G)	20.10	11.40	3.20	M31 x 1-6g	39.70	31.75	29.36	3.25	4.93
23 (H)	20.10	11.40	3.20	M34 x 1-6g	42.90	34.93	31.75	3.91	6.15
25 (J)	20.10	11.40	3.20	M37 x 1-6g	46.00	38.10	34.93	3.91	6.15

### Receptacle type 7

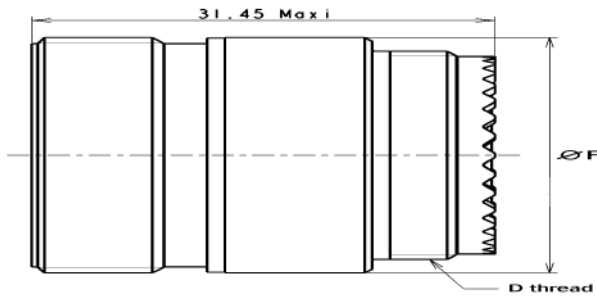


Shell size	A + 0,10 - 0,15	B Max.	C Max.	D Max.	E Max.	F $\pm 0,40$	G thread
09 (A)	16.53	9.90	3.20	30.50	23.00	27.00	M12 x 1-6g
11 (B)	19.07	9.90	3.20	35.20	26.00	31.80	M15 x 1-6g
13 (C)	23.82	9.90	3.20	38.40	31.00	34.90	M18 x 1-6g
15 (D)	26.97	9.90	3.20	41.60	34.00	38.10	M22 x 1-6g
17 (E)	30.15	9.90	3.20	44.80	37.00	41.30	M25 x 1-6g
19 (F)	33.32	9.90	3.50	49.50	41.00	46.00	M28 x 1-6g
21 (G)	36.50	9.90	3.50	52.70	46.00	49.20	M31 x 1-6g
23 (H)	39.67	9.90	3.50	55.90	47.00	52.40	M34 x 1-6g
25 (J)	42.85	9.90	3.50	59.00	52.00	55.60	M37 x 1-6g

# 8D - D38999 Aluminium Series

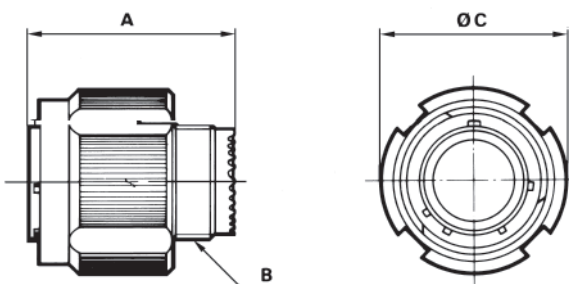


## In line receptacle type 1



Shell size	D thread	Ø F
09 (A)	M12 x 1-6g	15.90
11 (B)	M15 x 1-6g	19.05
13 (C)	M18 x 1-6g	22.25
15 (D)	M22 x 1-6g	25.40
17 (E)	M25 x 1-6g	30.15
19 (F)	M28 x 1-6g	31.75
21 (G)	M31 x 1-6g	34.75
23 (H)	M34 x 1-6g	37.10
25 (J)	M37 x 1-6g	41.30

## Plug type 5

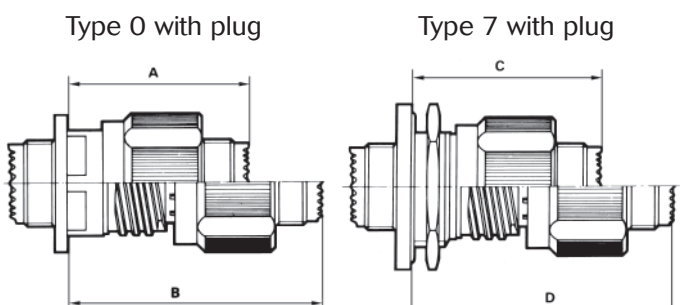


Shell size	A Max.	B thread	C Max.
09 (A)	31.00	M12 x 1-6g	21.80
11 (B)	31.00	M15 x 1-6g	25.00
13 (C)	31.00	M18 x 1-6g	29.40
15 (D)	31.00	M22 x 1-6g	32.50
17 (E)	31.00	M25 x 1-6g	35.70
19 (F)	31.00	M28 x 1-6g	38.50
21 (G)	31.00	M31 x 1-6g	41.70
23 (H)	31.00	M34 x 1-6g	44.90
25 (J)	31.00	M37 x 1-6g	48.00

## Maximum coupling torque on panel for jam nut receptacle (type 7)

Shell	09 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
Coupling torque (N.m)	6	8	10	13	20	23	25	26	28

## Mated connectors dimensions



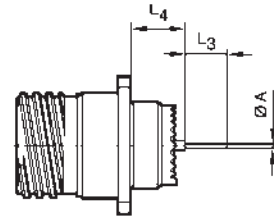
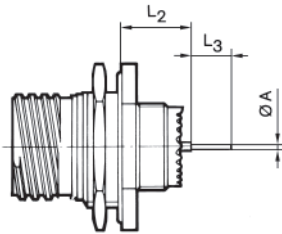
Shell size	A Max.	B Max.	C Max.	D Max.
09 (A)	37.00	52.30	38.30	53.60
11 (B)	37.00	52.30	38.30	53.60
13 (C)	37.00	52.30	38.50	53.80
15 (D)	37.00	52.30	38.50	53.80
17 (E)	37.00	52.30	38.50	53.80
19 (F)	37.00	52.30	38.50	53.80
21 (G)	36.00	51.30	38.50	53.80
23 (H)	36.00	51.30	38.50	53.80
25 (J)	36.00	51.30	38.50	53.80

Dimensions in millimeters

# 8D - D38999 Aluminium Series



## Receptacle with straight spill contacts



		Shell size			09 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
		Contact size	Contact type	Spill type									
<b>A</b>		# 22D	M & F	L & C					0.70				
		# 22D	M & F	S					0.50				
		# 20	M & F	C					0.70				
		# 16	M & F	C					1.15				
<b>L2</b>	<b>Min.</b>	# 22D	M	L & C	10.52					10.34			
	<b>Max.</b>	# 22D	M	L & C	11.46					11.28			
	<b>Min.</b>	# 22D	F	L & C	10.19					10.01			
	<b>Max.</b>	# 22D	F	L & C	11.46					11.28			
	<b>Min.</b>	# 22D	M	S	10.19					10.01			
	<b>Max.</b>	# 22D	M	S	11.46					11.28			
	<b>Min.</b>	# 22D	F	S	10.69					10.51			
	<b>Max.</b>	# 22D	F	S	11.63					11.45			
	<b>Min.</b>	# 20	M	C	10.36					10.18			
	<b>Max.</b>	# 20	M	C	11.63					11.45			
	<b>Min.</b>	# 20	F	C	10.69					10.51			
	<b>Max.</b>	# 20	F	C	11.63					11.45			
	<b>Min.</b>	# 16	M	C	10.69					10.51			
	<b>Max.</b>	# 16	M	C	11.63					11.45			
<b>Min.</b>	# 16	F	C	10.69					10.51				
<b>Max.</b>	# 16	F	C	11.63					11.45				
<b>L3</b>		# 22D	M & F	L					8.50				
		# 22D	M & F	C					4.00				
		# 22D	M & F	S					5.10				
		# 20	M & F	C					5.10				
		# 16	M & F	C					5.10				
<b>L4</b>	<b>Min.</b>	# 22D	M	L & C					9.48				
	<b>Max.</b>	# 22D	M	L & C			10.58					10.69	
	<b>Min.</b>	# 22D	F	L & C			9.15					9.26	
	<b>Max.</b>	# 22D	F	L & C			10.58					10.69	
	<b>Min.</b>	# 22D	M	S			9.65					9.76	
	<b>Max.</b>	# 22D	M	S			10.75					10.86	
	<b>Min.</b>	# 22D	F	S			9.15					9.26	
	<b>Max.</b>	# 22D	F	S			10.75					10.86	
	<b>Min.</b>	# 20	M	C			9.65					9.76	
	<b>Max.</b>	# 20	M	C			10.75					10.86	
	<b>Min.</b>	# 20	F	C			9.65					9.76	
	<b>Max.</b>	# 20	F	C			10.75					10.86	
	<b>Min.</b>	# 16	M	C			9.65					9.76	
	<b>Max.</b>	# 16	M	C			10.75					10.86	
<b>Min.</b>	# 16	F	C			9.65					9.76		
<b>Max.</b>	# 16	F	C			10.75					10.86		

M : Male contact      F : Female contact      L : Long spill      C : Short spill      S : Specific spill      Dimensions in millimeters

# 8D - D38999 Aluminium Series



## Souriau backshells part numbers

Basic series									8D	102	B	02
<b>Shell style:</b>												
09	11	13	15	17	19	21	23	25				
101	102	103	104	105	106	107	108	109				
<b>Plating:</b>												
B: Olive drab cadmium												
F: Nickel												
<b>Backshell type:</b>												
02: Straight cable clamp												
03: 90° cable clamp												
13: Backshell for heat shrink boots												

## Cross reference table

Backshell type	AS85049 Standard	SOURIAU part numbers
Straight cable clamp	M85049/38-**-x	8D101x02
90° cable clamp	M85049/39-**-x	8D101x03
Backshell for heat shrink boots	M85049/69-**-x	8D101x13
Backshell for screen termination and cable clamp	M85049/19**x**	N/A

x: Plating    \*\*: Shell size (See page 19 to 21)

# 8D - D38999 Aluminium Series



## Standard backshells part numbers

### Straight cable clamp (M85049/38)

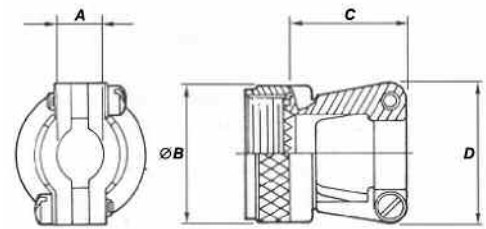
**Basic series**      **M85049**   **38**   -   **11**   **W**

**Backshell type:**  
38: Straight cable clamp

**Nut type:**  
-: Without self-locking  
S: With self-locking

**Shell size:**  
09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

**Plating (See table 3):**  
A and W for 38 type  
W and N for 38S type



See table 1 for dimensions

### 90° cable clamp (M85049/39)

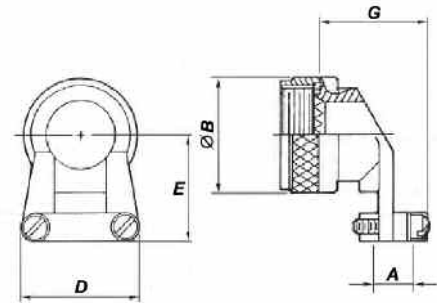
**Basic series**      **M85049**   **39**   -   **11**   **W**

**Backshell type:**  
39: 90° cable clamp

**Nut type:**  
-: Without self-locking  
S: With self-locking

**Shell size:**  
09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

**Plating (See table 3):**  
A and W for 39 type  
W and N for 39S type



See table 1 for dimensions

**Table 1**

Shell size	A		ØB Max.	C Max.	D Max.	E	G
	Min	Max.					
09	2.50	5.90	21.80	23.10	21.60	25.40	25.70
11	3.90		25.00		22.90		
13	4.80	8.30	29.40	25.70	27.90	30.70	
15	6.60	11.60	32.50	26.90	29.20	31.80	32.00
17	7.20	15.60	35.70	29.50	33.00	33.00	35.80
19	8.30	16.10	38.50	35.80	38.10	34.30	38.40
21	8.70	17.70	41.70	38.40	40.60	40.60	42.20
23	9.70	20.90	44.90	42.20	43.20	44.50	44.70
25	10.60	21.70	48.00	44.70	45.70	47.00	48.50

Dimensions in millimeters

# 8D - D38999 Aluminium Series



## Backshell for heat shrink boots (M85049/69)

**Basic series**      **M85049**    **69**    **11**    **A**    **D**

**Backshell type:**

**69:** Straight backshell for heat shrink boot

**Shell size:**

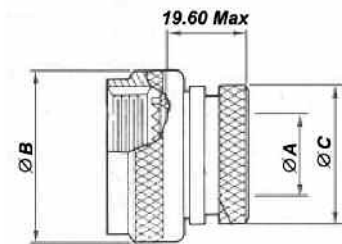
09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

**Plating:**

**A:** see table 3

**Option:**

**Nothing:** Without drain hole  
**D:** With drain hole



See table 2 for dimensions

**Table 2**

Shell size	ØB Max.	ØA Max.	ØC Max.
09	19.10	6.35	13.55
11	21.60	9.50	15.40
13	25.40	12.70	19.70
15	29.20	15.90	21.30
17	31.80	19.00	24.50
19	35.60	20.60	26.50
21	39.40	23.80	30.90
23	41.90	27.00	34.40
25	47.00	30.20	36.65

Dimensions in millimeters

**Table 3**

Plating	Description	Salt spray
<b>A</b>	Black anodise	500 Hrs
<b>N, F</b>	Nickel	48 Hrs
<b>W, B</b>	Olive drab cadmium over nickel	500 Hrs



# 8D - D38999 Aluminium Series



## Backshell for screen termination and cable clamp (M85049/19)

### Basic Series

M85049/ 19 11 W 03

#### Shell style:

19: Backshell for screen termination and cable clamp

#### Shell size:

09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

#### Plating:

W: Olive drab cadmium

N: Nickel

#### Clamp size indicator:

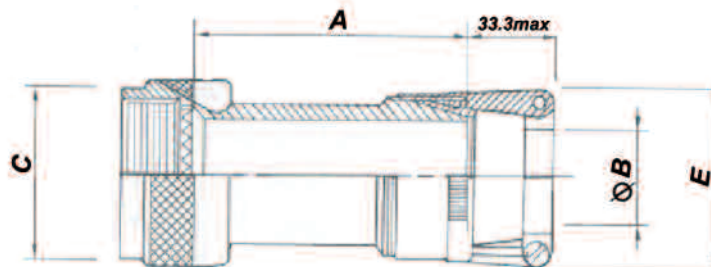
See table 4 and 5

### Table 4

Shell size	A Max.	C Max.	Clamp indicator base on shell size
09		19.10	01 - 02
11		21.60	01 - 02 - 03
13		25.40	02 - 03 - 04
15		27.90	02 - 03 - 04 - 05
17	38.10	31.80	02 - 03 - 04 - 05 - 06
19		35.60	03 - 04 - 05 - 06 - 07
21		38.10	03 - 04 - 05 - 06 - 07 - 08
23		41.90	03 - 04 - 05 - 06 - 07 - 09
25		44.50	04 - 05 - 06 - 07 - 08 - 10

### Table 5

Clamp size indicator	B		E
	Min.	Max.	
01	1.60	3.20	20.30
02	3.20	6.35	25.40
03	6.35	9.50	27.90
04	7.90	12.70	30.50
05	11.10	15.90	31.80
06	14.30	19.00	35.60
07	17.45	22.20	38.10
08	20.60	24.40	41.90
09	23.80	28.60	44.50
10	27.00	31.75	48.30



See table 4 & 5 for dimensions

# 8D - D38999 Aluminium Series



## Caps

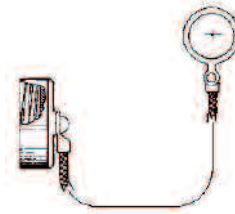
### Caps for receptacle (D38999/33 - S2453)

With stainless steel rope and eyelet



Shell size	Part numbers	
	Plating **	Olive green plating
9	S2453-09W-**-**	D38999/33 W 09 R
11	S2453-11W-**-**	D38999/33 W 11 R
13	S2453-13W-**-**	D38999/33 W 13 R
15	S2453-15W-**-**	D38999/33 W 15 R
17	S2453-17W-**-**	D38999/33 W 17 R
19	S2453-19W-**-**	D38999/33 W 19 R
21	S2453-21W-**-**	D38999/33 W 21 R
23	S2453-23W-**-**	D38999/33 W 23 R
25	S2453-25W-**-**	D38999/33 W 25 R

With stainless steel rope and ring



Shell size	Part numbers	
	Plating **	Olive green plating
9	S2453-09W-**-1	D38999/33 W 09 N
11	S2453-11W-**-1	D38999/33 W 11 N
13	S2453-13W-**-1	D38999/33 W 13 N
15	S2453-15W-**-1	D38999/33 W 15 N
17	S2453-17W-**-1	D38999/33 W 17 N
19	S2453-19W-**-1	D38999/33 W 19 N
21	S2453-21W-**-1	D38999/33 W 21 N
23	S2453-23W-**-1	D38999/33 W 23 N
25	S2453-25W-**-1	D38999/33 W 25 N

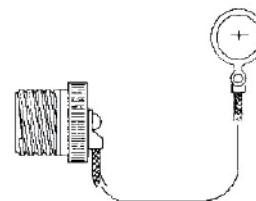
### Caps for plug (D38999/32 - S2454)

With stainless steel rope and eyelet



Shell size	Part numbers	
	Plating **	Olive green plating
9	S2454-09F-**-S	D38999/32 W 09 R
11	S2454-11F-**-S	D38999/32 W 11 R
13	S2454-13F-**-S	D38999/32 W 13 R
15	S2454-15F-**-S	D38999/32 W 15 R
17	S2454-17F-**-S	D38999/32 W 17 R
19	S2454-19F-**-S	D38999/32 W 19 R
21	S2454-21F-**-S	D38999/32 W 21 R
23	S2454-23F-**-S	D38999/32 W 23 R
25	S2454-25F-**-S	D38999/32 W 25 R

With stainless steel rope and ring



Shell size	Part numbers	
	Plating **	Olive green plating
9	S2454-09W-**-S	D38999/32 W 09 N
11	S2454-11W-**-S	D38999/32 W 11 N
13	S2454-13W-**-S	D38999/32 W 13 N
15	S2454-15W-**-S	D38999/32 W 15 N
17	S2454-17W-**-S	D38999/32 W 17 N
19	S2454-19W-**-S	D38999/32 W 19 N
21	S2454-21W-**-S	D38999/32 W 21 N
23	S2454-23W-**-S	D38999/32 W 23 N
25	S2454-25W-**-S	D38999/32 W 25 N

Plating - 34: Olive green cadmium - Plating - 12: Nickel. Note: caps available with nylon ropes. Consult us.







# MIL-DTL-38999 Serie III Composite Series

# 8D - D38999 Composite Series



## Connector part numbers

<b>Basic Series</b>	<b>8D</b>	<b>0</b>	<b>-</b>	<b>11</b>	<b>J</b>	<b>35</b>	<b>P</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>L</b>
<b>Shell style:</b>											
0: Square flange receptacle											
5: Plug with RFI shielding											
<b>Type:</b>											
None: Connectors with standard crimp contacts.											
L: Receptacle with long spill (male and female size #22D, #20).											
C: Receptacle with short spill (male and female #22D, #20, #16).											
S: Receptacle with specific spill (male et female #22D)											
W: Receptacle with male contacts #22D for wire wrap (3 wraps)											
T: Receptacle with male contacts #20 for wire wrap (2 wraps)											
P: Receptacle with solder cup (male and female size #22D; male #16 & #12; female #16 & #12 and male female #20 please consult us)											
<b>Shell size:</b> 09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25											
<b>Plating:</b>											
J: Olive drab cadmium											
M: Nickel											
X: Without plating											
<b>Contact layout:</b> See page 10 to 13											
<b>Contact type:</b>											
P: Pin (500 mating/unmating)											
H: Pin (1500 mating/unmating)											
A: Connector supplied less pin contact or with specific contacts (connector marking: A + orientation)											
S: Socket (500 mating/unmating)											
J: Socket (1500 mating/unmating)											
B: Connector supplied less socket contact or with specific contacts (connector marking: B + orientation)											
<b>Orientation:</b> N, A, B, C, D & E (see page 63)											
<b>Specification:</b>											
046: Tinned straight spills											
251: Connector provided with power contacts (layouts with contact #8)											
022: Fuel tank											
<b>Special custom:</b>											
None: Standard plastic cap											
M: Antistatic plastic cap											
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S plus orientation.											

## MIL-DTL-38999 part numbers\*

<b>Basic Series</b>	<b>D38999</b>	<b>20</b>	<b>M</b>	<b>B</b>	<b>35</b>	<b>P</b>	<b>N</b>	<b>L</b>
<b>Shell style:</b>								
20: Square flange receptacle								
26: Plug with RFI shielding.								
<b>Plating:</b>								
J: Olive drab cadmium								
M: Nickel								
<b>Shell size:</b> A - B - C - D - E - F - G - H - J								
<b>Contact layout:</b> See page 14 for layout according to MIL-DTL-38999								
<b>Contact type:</b>								
P: Pin (500 mating/unmating)								
H: Pin (1500 mating/unmating)								
A: Connector supplied less pin contact or with specific contacts (connector marking: A + orientation)								
S: Socket (500 mating/unmating)								
J: Socket (1500 mating/unmating)								
B: Connector supplied less socket contact or with specific contacts (connector marking: B + orientation)								
<b>Orientation:</b> N, A, B, C, D & E (see page 63)								
L: For P or S contact type only, connector delivered without contacts, connector marking P or S (without L)								

\* Note: To place an order of MIL connectors delivered without MIL removable crimp contacts and keep P or S plus orientation marking, it must be specify clearly on the order (by adding a suffix L at the end of the P/N or specified in comment).

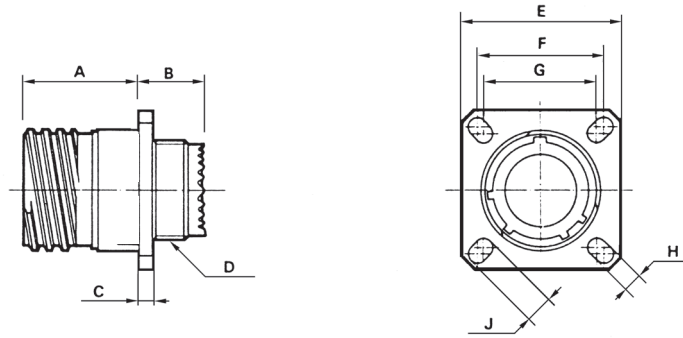


# 8D - D38999 Composite Series



## Dimensions

### Receptacle type 0



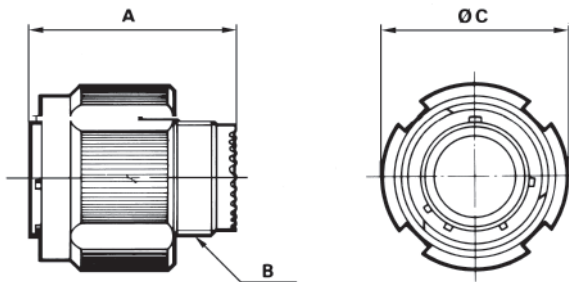
Shell size	A Max.	B Max.	C Max.	D thread	E ± 0,30	F	G	H ± 0,20	J ± 0,20
09 (A)	19.65	11.96	3.65	M12 x 1-6g	23.80	18.26	15.09	3.25	5.49
11 (B)	19.65	11.96	3.65	M15 x 1-6g	26.20	20.62	18.26	3.25	4.93
13 (C)	19.65	11.96	3.65	M18 x 1-6g	28.60	23.01	20.62	3.25	4.93
15 (D)	19.65	11.96	3.65	M22 x 1-6g	31.00	24.61	23.01	3.25	4.39
17 (E)	19.65	11.96	3.65	M25 x 1-6g	33.30	26.97	24.61	3.25	4.93
19 (F)	19.65	11.96	3.65	M28 x 1-6g	36.50	29.36	26.97	3.25	4.93
21 (G)	18.85	12.76	4.35	M31 x 1-6g	39.70	31.75	29.36	3.25	4.93
23 (H)	18.85	12.76	4.35	M34 x 1-6g	42.90	34.93	31.75	3.91	6.15
25 (J)	18.85	12.76	4.35	M37 x 1-6g	46.00	38.10	34.93	3.91	6.15

Dimensions in millimeters

# 8D - D38999 Composite Series

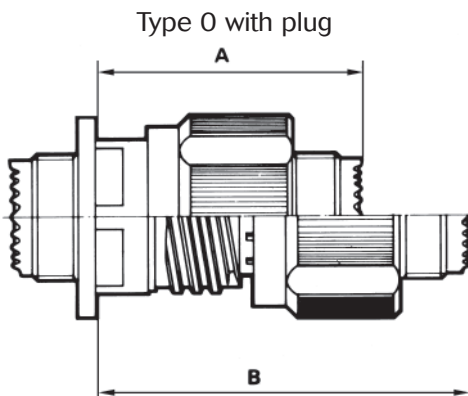


## Plug type 5



Shell size	A Max.	B thread	C Max.
09 (A)	31.00	M12 x 1-6g	21.80
11 (B)	31.00	M15 x 1-6g	25.00
13 (C)	31.00	M18 x 1-6g	29.40
15 (D)	31.00	M22 x 1-6g	32.50
17 (E)	31.00	M25 x 1-6g	35.70
19 (F)	31.00	M28 x 1-6g	38.50
21 (G)	31.00	M31 x 1-6g	41.70
23 (H)	31.00	M34 x 1-6g	44.90
25 (J)	31.00	M37 x 1-6g	48.00

## Mated connectors dimensions



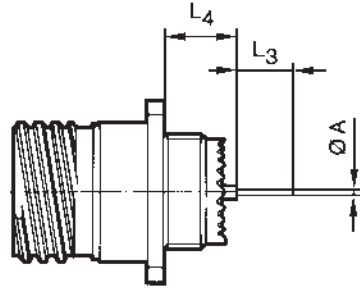
Shell size	A Max.	B Max.
09 (A)	37.00	52.30
11 (B)	37.00	52.30
13 (C)	37.00	52.30
15 (D)	37.00	52.30
17 (E)	37.00	52.30
19 (F)	37.00	52.30
21 (G)	36.00	51.30
23 (H)	36.00	51.30
25 (J)	36.00	51.30

Dimensions in millimeters

# 8D - D38999 Composite Series



## Receptacle with straight spill contacts



		Shell size			09	11	13	15	17	19	21	23	25
		Contact size	Contact type	Spill type	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(J)
<b>A</b>		# 22D	M & F	L & C					0.70				
		# 22D	M & F	S					0.50				
		# 20	M & F	C					0.70				
		# 16	M & F	C					1.15				
<b>L3</b>		# 22D	M & F	L					8.50				
		# 22D	M & F	C					4.00				
		# 22D	M & F	S					5.00				
		# 20	M & F	C					5.00				
		# 16	M & F	C					5.00				
<b>L4</b>	<b>Min.</b>	# 22D	M	L & C					9.48				
	<b>Max.</b>	# 22D	M	L & C			10.38				10.48		
	<b>Min.</b>	# 22D	F	L & C			9.15				9.26		
	<b>Max.</b>	# 22D	F	L & C			10.58				10.69		
	<b>Min.</b>	# 22D	M	S			9.65				9.76		
	<b>Max.</b>	# 22D	M	S			10.55				10.65		
	<b>Min.</b>	# 22D	F	S			9.65				9.76		
	<b>Max.</b>	# 22D	F	S			10.55				10.65		
	<b>Min.</b>	# 20	M	C			9.65				9.76		
	<b>Max.</b>	# 20	M	C			10.55				10.65		
	<b>Min.</b>	# 20	F	C			9.65				9.76		
	<b>Max.</b>	# 20	F	C			10.55				10.65		
	<b>Min.</b>	# 16	M	C			9.65				9.76		
	<b>Max.</b>	# 16	M	C			10.55				10.65		
	<b>Min.</b>	# 16	F	C			9.65				9.76		
	<b>Max.</b>	# 16	F	C			10.55				10.65		

M : Male contact      F: Female contact      L: Long spill      C : Short spill      S: Specific spill

Dimensions in millimeters

# 8D - D38999 Composite Series



## Standard backshells part numbers

### Straight cable clamp (M85049/91)

**Basic series** M85049 91 11 M

**Backshell type:**

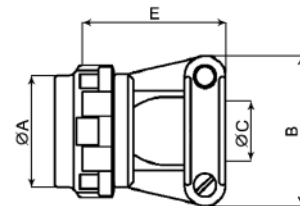
91: Straight cable clamp

**Shell size:**

09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

**Plating:**

J: Cadmium olive drab over electroless nickel  
 M: Electroless nickel  
 T: Without plating



See table 1 for dimensions

### 90° cable clamp (M85049/92)

**Basic series** M85049 92 11 M

**Backshell type:**

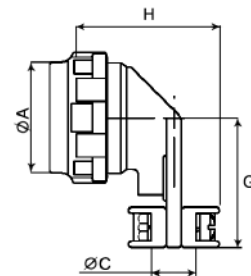
92: 90° cable clamp

**Shell size:**

09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

**Plating:**

J: Cadmium olive drab over electroless nickel  
 M: Electroless nickel  
 T: Without plating



See table 1 for dimensions

**Table 1**

Shell size	ØA Max.	B Max.	ØC Max.	E Max.	G	H
09	21.80	24.90	5.55	21.25	22.20	26.95
11	25.00	26.0	6.70	24.30	23.80	27.95
13	29.40	30.50	8.75	27.95	26.20	30.00
15	32.50	33.00	11.70		28.60	33.00
17	35.70	36.10	13.85	31.25	33.30	35.05
19	38.50	38.60	15.60	35.80	34.95	36.85
21	41.50	41.65	17.75	38.35	38.10	39.15
23	44.90	45.00	19.80	42.15	41.30	41.15
25	48.00	48.00	21.60	44.70	44.45	42.95

# 8D - D38999 Composite Series



## Straight backshell for heat shrink boots accommodation (M85049/88)

**Basic series**      **M85049**    **88**    **11**    **M**    **02**

**Backshell type:**

**88:** Straight backshell for heat shrink boots

**Shell size:**

09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25

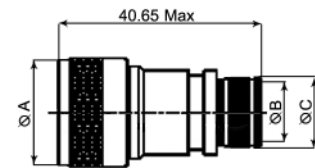
**Plating:**

**J:** Cadmium olive drab over electroless nickel

**M:** Electroless nickel

**Entry size:**

**02** ou **03:** see table 2



See tableau 2 for dimensions

**Table 2**

Shell size	ØA Max.	ØB +/- 0.10		Entry size	
		02	03	02	03
<b>09</b>	21.79	N/A	6.35	N/A	10.03
<b>11</b>	24.99	N/A	7.92	N/A	11.61
<b>13</b>	29.39	7.92	11.13	11.61	14.81
<b>15</b>	32.49	11.13	14.27	14.81	17.96
<b>17</b>	35.71	12.70	15.88	16.38	19.56
<b>19</b>	38.51	15.88	19.05	19.56	22.73
<b>21</b>	41.71	15.88	20.62	19.56	24.30
<b>23</b>	44.91	17.47	23.83	21.06	27.51
<b>25</b>	47.98	19.05	25.40	22.73	29.08

Dimensions in millimeters

# 8D - D38999 Composite Series



## Connectors weight

	With contacts				Without contact			
	Plug (type 5)		Receptacle (type 0)		Plug (type 5)		Receptacle (type 0)	
	Male	Female	Male	Female	Male	Female	Male	Female
09-35	8.5	10.1	7.8	9.4	8.1	8.6	7.4	7.9
09-98	8.5	9.8	7.8	9.1	8.1	8.6	7.4	7.9
11-01	12.8	15.7	10.4	13.3	12.1	14.1	9.7	11.7
11-02	11.5	14.1	09.3	11.8	10.9	12.5	08.7	10.3
11-04	12.6	15.7	10.2	13.3	12.0	14.1	9.7	11.7
11-05	12.6	15.8	10.2	13.4	11.9	13.8	9.5	11.5
11-22	11.4	13.8	09.1	11.6	11.1	12.8	08.8	10.6
11-35	12.5	16.0	10.1	13.6	11.6	12.8	9.2	10.4
11-80	15.25	18.6	13.40	10.4	10.75	11.63	08.90	09.4
11-98	12.5	15.3	10.1	12.9	11.7	12.8	9.3	10.5
11-99	11.8	15.0	09.6	12.8	10.8	12.2	08.6	10.0
13-04	17.2	20.9	13.7	17.5	15.6	17.9	12.4	14.3
13-08	17.6	22.8	14.1	19.2	16.5	19.6	12.9	16.1
13-26	17.9	23.6	14.4	20.1	16.2	18.9	12.7	15.4
13-35	17.4	23.1	13.8	19.6	15.8	17.6	12.3	14.1
13-98	17.2	21.8	13.7	18.3	15.8	17.9	12.3	14.3
15-05	21.4	26.7	16.6	21.9	19.8	22.8	15.0	18.0
15-15	22.2	29.3	17.4	24.5	19.9	23.0	15.1	18.1
15-18	22.4	31.3	17.6	26.5	19.9	24.0	15.0	19.2
15-19	22.0	29.6	17.1	24.8	19.2	22.0	14.5	17.2
15-35	22.0	31.3	17.2	26.5	19.4	22.0	14.6	17.2
15-97	21.8	28.9	17.1	24.1	19.4	22.6	14.7	17.8
17-02	26.51	38.85	25.23	37.57	19.35	22.35	18.07	21.07
17-06	25.9	35.5	23.2	32.8	21.9	25.9	19.2	23.2
17-08	24.9	33.6	22.2	30.1	22.4	27.4	19.7	24.7
17-26	25.5	36.3	22.8	33.6	21.8	25.9	19.2	23.1
17-35	25.7	39.3	23.0	36.6	21.9	25.5	19.2	22.8
17-75	31.3	42.6	28.6	39.9	22.3	28.6	19.6	25.9
17-99	25.5	36.1	22.8	33.4	22.0	26.1	19.3	23.4
19-11	32.1	45.7	26.1	39.7	28.7	37.1	22.7	31.1
19-32	31.3	44.7	25.3	38.7	26.8	31.9	20.8	25.9
19-35	31.6	48.1	25.6	42.0	27.1	31.6	21.0	25.6
21-11	38.0	57.9	32.8	52.6	30.8	40.3	25.5	35.1
21-16	35.1	50.4	29.9	45.2	30.2	37.9	24.9	32.7
21-35	35.4	56.1	30.1	50.8	29.9	36.3	24.6	31.1
21-39	36.8	57.1	31.5	51.9	31.0	40.8	25.7	35.5
21-41	35.3	52.7	30.1	47.5	29.6	36.3	24.3	31.0
21-48	42.41	62.40	37.71	57.70	29.3	36.2	24.6	31.5
21-75	47.3	64.2	42.6	59.50	29.3	36.2	24.6	31.5
23-21	43.1	66.3	38.0	61.2	36.5	49.9	31.5	44.8
23-35	41.4	67.5	36.3	62.5	34.4	42.5	29.3	37.5
23-53	41.5	63.6	36.4	58.6	34.1	42.4	29.0	37.4
23-55	42.2	65.3	42.2	60.2	34.5	43.3	29.4	38.2
25-07	53.6	90.05	49.0	84.85	37.8	51.8	33.2	46.6
25-11	59.08	81.60	54.48	77.00	40.8	53.8	36.2	49.2
25-19	51.7	83.7	46.6	78.6	39.2	53.3	34.0	48.2
25-24	51.2	82.5	46.1	77.4	39.6	54.0	34.4	48.9
25-29	49.5	78.5	44.4	73.4	40.5	55.9	35.4	50.7
25-35	47.3	80.1	42.2	75.0	38.4	48.1	33.2	43.0
25-37	49.27	80.36	45.47	76.16	37.8	51.50	34.0	47.30
25-44	69.64	93.70	65.04	94.65	36.1	45.80	31.5	46.75
25-43	49.6	80.2	44.4	75.1	40.1	55.4	35.0	50.3
25-46	51.9	75.7	46.7	70.1	37.2	47.4	32.1	42.2
25-61	46.6	73.4	41.5	68.2	38.1	48.9	32.9	43.8
25-08	72.9	104.8	67.8	99.6	36.9	48.8	31.8	43.6
25-20	57.9	88.2	52.8	83.0	36.4	46.6	31.3	41.5
25-04	50.4	80.2	45.3	75.0	41.2	54.8	36.1	49.6



8D - D38999 Stainless steel



MIL-DTL-38999 Serie III  
Stainless steel

# 8D - D38999 Stainless steel



## Connector part numbers

Basic Series	8D	0	-	11	K	35	P	N	**
<b>Shell style:</b>									
0: Square flange receptacle									
1: In line receptacle									
7: Jam nut receptacle									
5: Plug with RFI shielding.									
<b>Type:</b>									
-: Connectors with standard crimp contacts.									
L: Receptacle with long spill (male and female size #22D, #20).									
C: Receptacle with short spill (male and female #22D, #20, #16).									
S: Receptacle with specific spill (male et female #22D)									
W: Receptacle with male contacts #22D for wire wrap (3 wraps)									
T: Receptacle with male contacts #20 for wire wrap (2 wraps)									
<b>Shell size:</b> 09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25									
<b>Plating:</b>									
K: Passivated S: Nickel									
<b>Contact layout:</b> See page 8 to 11									
<b>Contact type:</b>									
P: Pin A: Connector supplied less pin contact or with specific contacts (Connector marking: A+ orientation)									
S: Socket B: Connector supplied less socket contact or with specific contacts (Connector marking: B+ orientation)									
<b>Orientation:</b> N, A, B, C, D & E (See page 58)									
<b>Spécification:</b>									
046: Tinned straight spills									
251: Connector provided with power contacts (layouts with contacts #8)									
022: Fuel tank									
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S plus orientation.									

## MIL-DTL 38999 part numbers\*

Basic Series	D38999	20	K	B	35	P	N	L
<b>Shell style:</b>								
20: Square flange receptacle								
24: Jam nut receptacle								
26: Plug with RFI shielding.								
<b>Plating:</b>								
K: Passivated								
S: Nickel								
<b>Shell size:</b> A - B - C - D - E - F - G - H - J								
<b>Contact layout:</b> See page 11 for layout according to MIL-DTL-38999								
<b>Contact type:</b>								
P: Pin A: Connector supplied less pin contact or with specific contacts (connector marking: A + orientation).								
S: Socket B: Connector supplied less socket contact or with specific contacts (connector marking: B + orientation).								
<b>Orientation:</b> N, A, B, C, D & E (see page 58)								
L: For P or S contact type only, connector delivered without contacts, connector marking P or S (without L)								

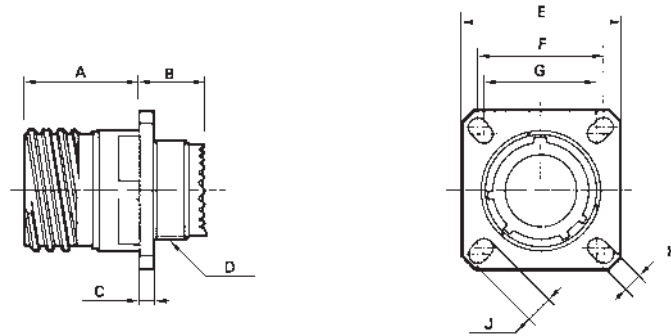
\* Note: To place an order of MIL connectors delivered without MIL removable crimp contacts and keep P or S plus orientation marking, it must be specify clearly on the order (by adding a suffix L at the end of the P / N or specified in comment).

# 8D - D38999 Stainless steel



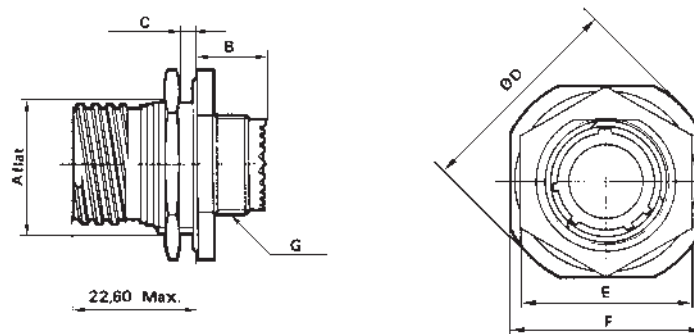
## Dimensions

### Receptacle type 0



Shell size	A Max.	B Max.	C Max.	D thread	E ± 0,30	F	G	H ± 0,20	J ± 0,20
09 (A)	20.90	10.60	2.50	M12 x 1-6g	23.80	18.26	15.09	3.25	5.49
11 (B)	20.90	10.60	2.50	M15 x 1-6g	26.20	20.62	18.26	3.25	4.93
13 (C)	20.90	10.60	2.50	M18 x 1-6g	28.60	23.01	20.62	3.25	4.93
15 (D)	20.90	10.60	2.50	M22 x 1-6g	31.00	24.61	23.01	3.25	4.93
17 (E)	20.90	10.60	2.50	M25 x 1-6g	33.30	26.97	24.61	3.25	4.93
19 (F)	20.90	10.60	2.50	M28 x 1-6g	36.50	29.36	26.97	3.25	4.93
21 (G)	20.10	11.40	3.20	M31 x 1-6g	39.70	31.75	29.36	3.25	4.93
23 (H)	20.10	11.40	3.20	M34 x 1-6g	42.90	34.93	31.75	3.91	6.15
25 (J)	20.10	11.40	3.20	M37 x 1-6g	46.00	38.10	34.93	3.91	6.15

### Receptacle type 7

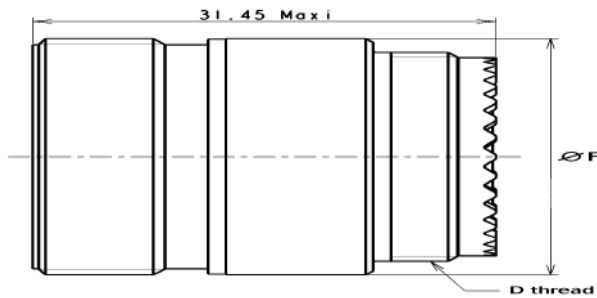


Shell size	A + 0.10 - 0.15	B Max.	C Max.	D Max.	E Max.	F ± 0.4	G thread
09 (A)	16.53	9.90	3.20	30.50	23.00	27.00	M12 x 1-6g
11 (B)	19.07	9.90	3.20	35.20	26.00	31.80	M15 x 1-6g
13 (C)	23.82	9.90	3.20	38.40	31.00	34.90	M18 x 1-6g
15 (D)	26.97	9.90	3.20	41.60	34.00	38.10	M22 x 1-6g
17 (E)	30.15	9.90	3.20	44.80	37.00	41.30	M25 x 1-6g
19 (F)	33.32	9.90	3.20	49.50	41.00	46.00	M28 x 1-6g
21 (G)	36.50	9.90	3.20	52.70	46.00	49.20	M31 x 1-6g
23 (H)	39.67	9.90	3.20	55.90	47.00	52.40	M34 x 1-6g
25 (J)	42.85	9.90	3.20	59.00	52.00	55.60	M37 x 1-6g

# 8D - D38999 Stainless steel

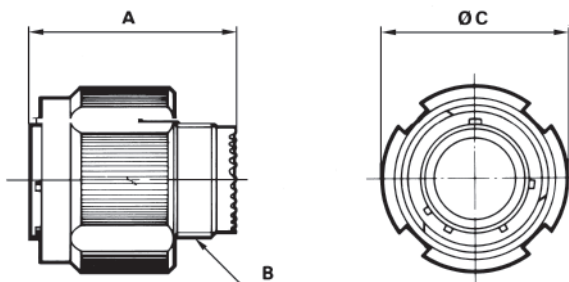


## In line receptacle type 1



Shell size	D thread	Ø F
09 (A)	M12 x 1-6g	15.90
11 (B)	M15 x 1-6g	19.05
13 (C)	M18 x 1-6g	22.25
15 (D)	M22 x 1-6g	25.40
17 (E)	M25 x 1-6g	30.15
19 (F)	M28 x 1-6g	31.75
21 (G)	M31 x 1-6g	34.75
23 (H)	M34 x 1-6g	37.10
25 (J)	M37 x 1-6g	41.30

## Plug type 5

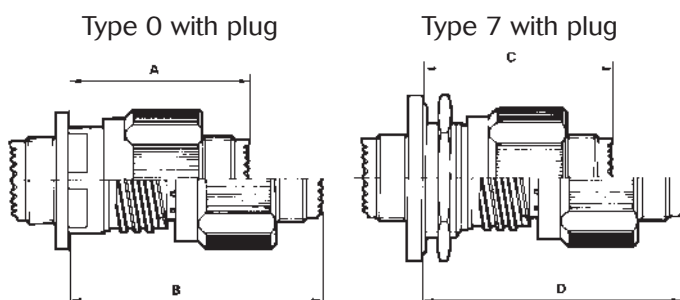


Shell size	A Max.	B thread	C Max.
09 (A)	31.00	M12 x 1-6g	21.80
11 (B)	31.00	M15 x 1-6g	25.00
13 (C)	31.00	M18 x 1-6g	29.40
15 (D)	31.00	M22 x 1-6g	32.50
17 (E)	31.00	M25 x 1-6g	35.70
19 (F)	31.00	M28 x 1-6g	38.50
21 (G)	31.00	M31 x 1-6g	41.70
23 (H)	31.00	M34 x 1-6g	44.90
25 (J)	31.00	M37 x 1-6g	48.00

## Maximum coupling torque on panel for jam nut receptacle (type 7)

Shell	09 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
Coupling torque (N.m)	6	8	10	13	20	23	25	26	28

## Mated connectors dimensions



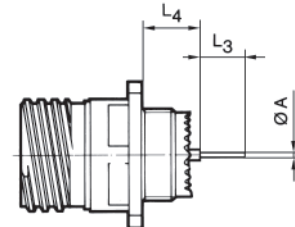
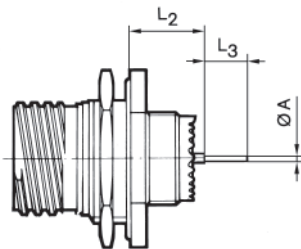
Shell size	A Max.	B Max.	C Max.	D Max.
09 (A)	37.00	52.30	38.30	53.60
11 (B)	37.00	52.30	38.30	53.60
13 (C)	37.00	52.30	38.50	53.80
15 (D)	37.00	52.30	38.50	53.80
17 (E)	37.00	52.30	38.50	53.80
19 (F)	37.00	52.30	38.50	53.80
21 (G)	36.00	51.30	38.50	53.80
23 (H)	36.00	51.30	38.50	53.80
25 (J)	36.00	51.30	38.50	53.80

Dimensions in millimeters

# 8D - D38999 Stainless steel



## Receptacle with straight spill contacts



		Shell size			09 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
		Contact size	Contact type	Spill type									
<b>A</b>		# 22D	M & F	L & C					0,70				
		# 22D	M & F	S					0.50				
		# 20	M & F	C					0.70				
		# 16	M & F	C					1.15				
<b>L2</b>	<b>Min.</b>	# 22D	M	L & C	10.52					10.34			
	<b>Max.</b>	# 22D	M	L & C	11.46					11.28			
	<b>Min.</b>	# 22D	F	L & C	10.19					10.01			
	<b>Max.</b>	# 22D	F	L & C	11.46					11.28			
	<b>Min.</b>	# 22D	M	S	10.69					10.51			
	<b>Max.</b>	# 22D	M	S	11.63					11.45			
	<b>Min.</b>	# 22D	F	S	10.36					10.18			
	<b>Max.</b>	# 22D	F	S	11.63					11.45			
	<b>Min.</b>	# 20	M	C	10.69					10.51			
	<b>Max.</b>	# 20	M	C	11.63					11.45			
	<b>Min.</b>	# 20	F	C	10.69					10.51			
	<b>Max.</b>	# 20	F	C	11.63					11.45			
	<b>Min.</b>	# 16	M	C	10.69					10.51			
	<b>Max.</b>	# 16	M	C	11.63					11.45			
<b>Min.</b>	# 16	F	C	10.69					10.51				
<b>Max.</b>	# 16	F	C	11.63					11.45				
<b>L3</b>		# 22D	M & F	L					8.50				
		# 22D	M & F	C					4.00				
		# 22D	M & F	S					5.10				
		# 20	M & F	C					5.10				
		# 16	M & F	C					5.10				
<b>L4</b>	<b>Min.</b>	# 22D	M	L & C			9.48					9.59	
	<b>Max.</b>	# 22D	M	L & C			10.58					10.69	
	<b>Min.</b>	# 22D	F	L & C			9.15					9.26	
	<b>Max.</b>	# 22D	F	L & C			10.58					10.69	
	<b>Min.</b>	# 22D	M	S			9.65					9.76	
	<b>Max.</b>	# 22D	M	S			10.75					10.86	
	<b>Min.</b>	# 22D	F	S			9.15					9.26	
	<b>Max.</b>	# 22D	F	S			10.75					10.86	
	<b>Min.</b>	# 20	M	C			9.65					9.76	
	<b>Max.</b>	# 20	M	C			10.75					10.86	
	<b>Min.</b>	# 20	F	C			9.65					9.76	
	<b>Max.</b>	# 20	F	C			10.75					10.86	
	<b>Min.</b>	# 16	M	C			9.65					9.76	
	<b>Max.</b>	# 16	M	C			10.75					10.86	
<b>Min.</b>	# 16	F	C			9.65					9.76		
<b>Max.</b>	# 16	F	C			10.75					10.86		

M : Male contact      F: Female contact      L: Long spill      C : Short spill      S: Specific spill

Dimensions in millimeters



# 8D Titanium Series



Derived from:  
MIL-DTL-38999 Serie III



# 8D Titanium Series



## Connector part numbers

Basic Series	8D	0	-	11	TT	35	S	N	**
<b>Shell style:</b> <b>0:</b> Square flange receptacle <b>1:</b> In line receptacle <b>7:</b> Jam nut receptacle <b>77:</b> Specific receptacle (please consult us) <b>5:</b> Plug with RFI shielding.									
<b>Type:</b> -: Connectors with standard crimp contacts. <b>L:</b> Receptacle with long spill (male and female size #22D, #20). <b>C:</b> Receptacle with short spill (male and female #22D, #20, #16). <b>S:</b> Receptacle with specific spill (male et female #22D) <b>W:</b> Receptacle with male contacts #22D for wire wrap (3 wraps) <b>T:</b> Receptacle with male contacts #20 for wire wrap (2 wraps)									
<b>Shell size:</b> 09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25									
<b>Plating:</b> <b>TT:</b> Unplated <b>TF:</b> Nickel plated									
<b>Contact layout:</b> See page 8 to 11									
<b>Contact type:</b> <b>P:</b> Pin <b>A:</b> Connector supplied less pin contact or with specific contacts (Connector marking: A+ orientation) <b>S:</b> Socket <b>B:</b> Connector supplied less socket contact or with specific contacts (Connector marking: B+ orientation)									
<b>Orientation:</b> N, A, B, C, D & E (See page 58)									
<b>Spécification:</b> <b>046:</b> tinned straight spills <b>251:</b> Connector provided with power contacts (layouts with contacts #8) <b>022:</b> Fuel Tank <b>L:</b> For P or S contact only, connectors delivered without contacts, connectors marking P or S plus orientation.									

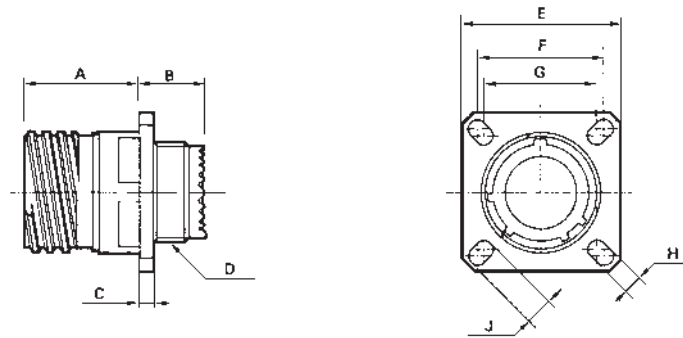


# 8D Titanium Series



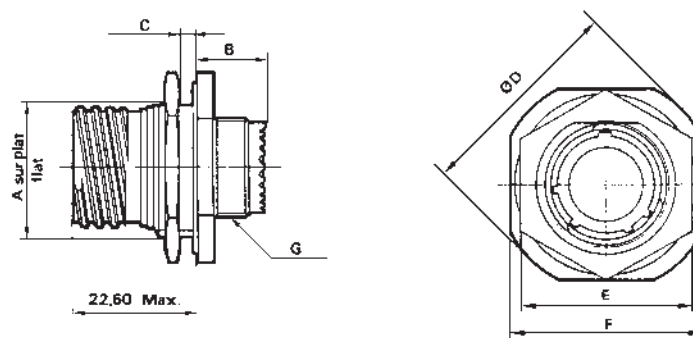
## Dimensions

### Receptacle type 0



Shell size	A Max.	B Max.	C Max.	D thread	E ± 0,30	F	G	H ± 0,20	J ± 0,20
09	20.90	10.60	2.50	M12 x 1-6g	23.80	18.26	15.09	3.25	5.49
11	20.90	10.60	2.50	M15 x 1-6g	26.20	20.62	18.26	3.25	4.93
13	20.90	10.60	2.50	M18 x 1-6g	28.60	23.01	20.62	3.25	4.93
15	20.90	10.60	2.50	M22 x 1-6g	31.00	24.61	23.01	3.25	4.93
17	20.90	10.60	2.50	M25 x 1-6g	33.30	26.97	24.61	3.25	4.93
19	20.90	10.60	2.50	M28 x 1-6g	36.50	29.36	26.97	3.25	4.93
21	20.10	11.40	3.20	M31 x 1-6g	39.70	31.75	29.36	3.25	4.93
23	20.10	11.40	3.20	M34 x 1-6g	42.90	34.93	31.75	3.91	6.15
25	20.10	11.40	3.20	M37 x 1-6g	46.00	38.10	34.93	3.91	6.15

### Receptacle type 7



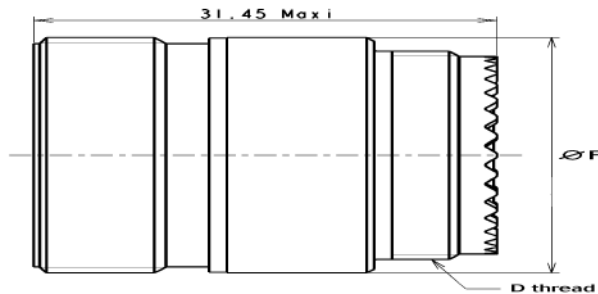
Shell size	A + 0.10 - 0.15	B Max.	C Max.	D Max.	E Max.	F ± 0.4	G thread
09	16.53	9.90	3.20	30.50	23.00	27.00	M12 x 1-6g
11	19.07	9.90	3.20	35.20	26.00	31.80	M15 x 1-6g
13	23.82	9.90	3.20	38.40	31.00	34.90	M18 x 1-6g
15	26.97	9.90	3.20	41.60	34.00	38.10	M22 x 1-6g
17	30.15	9.90	3.20	44.80	37.00	41.30	M25 x 1-6g
19	33.32	9.90	3.50	49.50	41.00	46.00	M28 x 1-6g
21	36.50	9.90	3.50	52.70	46.00	49.20	M31 x 1-6g
23	39.67	9.90	3.50	55.90	47.00	52.40	M34 x 1-6g
25	42.85	9.90	3.50	59.00	52.00	55.60	M37 x 1-6g

Dimensions in millimeters

# 8D Titanium Series

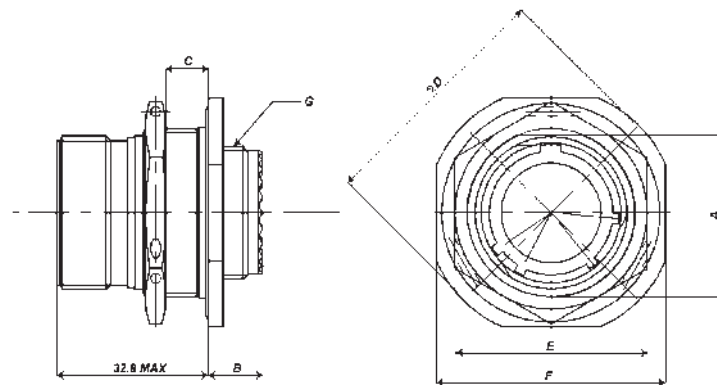


## In line receptacle type 1



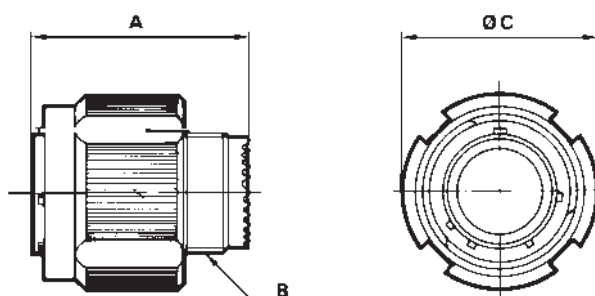
Shell size	D thread	Ø F
09	M12 x 1-6g	15.90
11	M15 x 1-6g	19.05
13	M18 x 1-6g	22.25
15	M22 x 1-6g	25.40
17	M25 x 1-6g	30.15
19	M28 x 1-6g	31.75
21	M31 x 1-6g	34.75
23	M34 x 1-6g	37.10
25	M37 x 1-6g	41.30

## Receptacle type 77



Shell size	A + 0.10 - 0.15	B Max.	C Max.	D Max.	E Max.	F ± 0.4	G thread
09	16.53	9.90	9.60	30.50	23.00	27.00	M12 x 1-6g
11	19.07	9.90	9.60	35.20	26.00	31.80	M15 x 1-6g
13	23.82	9.90	9.60	38.40	31.00	34.90	M18 x 1-6g
15	26.97	9.90	9.60	41.60	34.00	38.10	M22 x 1-6g
17	30.15	9.90	9.60	44.80	37.00	41.30	M25 x 1-6g
19	33.32	9.90	9.60	49.50	41.00	46.00	M28 x 1-6g
21	36.50	9.90	9.60	52.70	46.00	49.20	M31 x 1-6g
23	39.67	9.90	9.60	55.90	47.00	52.40	M34 x 1-6g
25	42.85	9.90	9.60	59.00	52.00	55.60	M37 x 1-6g

## Plug type 5



Shell size	A Max.	B thread	C Max.
09	31.00	M12 x 1-6g	21.80
11	31.00	M15 x 1-6g	25.00
13	31.00	M18 x 1-6g	29.40
15	31.00	M22 x 1-6g	32.50
17	31.00	M25 x 1-6g	35.70
19	31.00	M28 x 1-6g	38.50
21	31.00	M31 x 1-6g	41.70
23	31.00	M34 x 1-6g	44.90
25	31.00	M37 x 1-6g	48.00

# 8D Titanium Series

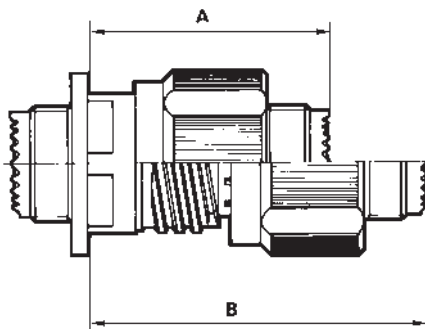


## Maximum coupling torque on panel for jam nut receptacle (type 7)

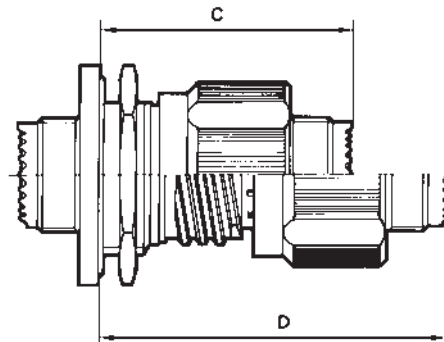
Shell	09	11	13	15	17	19	21	23	25
Coupling torque (N.m)	6	8	10	13	20	23	25	26	28

## Mated connectors dimensions

Type 0 with plug



Type 7 with plug



Shell size	A Max.	B Max.	C Max.	D Max.
09	37.00	52.30	38.30	53.60
11	37.00	52.30	38.30	53.60
13	37.00	52.30	38.50	53.80
15	37.00	52.30	38.50	53.80
17	37.00	52.30	38.50	53.80
19	37.00	52.30	38.50	53.80
21	36.00	51.30	38.50	53.80
23	36.00	51.30	38.50	53.80
25	36.00	51.30	38.50	53.80

Dimensions in millimeters

# 8D Titanium Series



## Receptacle with straight spill contacts



	Shell size			09	11	13	15	17	19	21	23	25
	Contact size	Contact type	Spill type									
<b>A</b>	# 22D	M & F	L & C					0,70				
	# 22D	M & F	S					0.50				
	# 20	M & F	C					0.70				
	# 16	M & F	C					1.15				
<b>L2</b>	<b>Min.</b>	# 22D	M	L & C	10.52				10.34			
	<b>Max.</b>	# 22D	M	L & C	11.46				11.28			
	<b>Min.</b>	# 22D	F	L & C	10.19				10.01			
	<b>Max.</b>	# 22D	F	L & C	11.46				11.28			
	<b>Min.</b>	# 22D	M	S	10.19				10.01			
	<b>Max.</b>	# 22D	M	S	11.46				11.28			
	<b>Min.</b>	# 22D	F	S	10.69				10.51			
	<b>Max.</b>	# 22D	F	S	11.63				11.45			
	<b>Min.</b>	# 20	M	C	10.36				10.18			
	<b>Max.</b>	# 20	M	C	11.63				11.45			
	<b>Min.</b>	# 20	F	C	10.69				10.51			
	<b>Max.</b>	# 20	F	C	11.63				11.45			
	<b>Min.</b>	# 16	M	C	10.69				10.51			
	<b>Max.</b>	# 16	M	C	11.63				11.45			
	<b>Min.</b>	# 16	F	C	10.69				10.51			
	<b>Max.</b>	# 16	F	C	11.63				11.45			
<b>L3</b>	# 22D	M & F	L					8.50				
	# 22D	M & F	C					4.00				
	# 22D	M & F	S					5.10				
	# 20	M & F	C					5.10				
	# 16	M & F	C					5.10				
<b>L4</b>	<b>Min.</b>	# 22D	M	L & C				9.48				
	<b>Max.</b>	# 22D	M	L & C			10.58				10.69	
	<b>Min.</b>	# 22D	F	L & C			9.15				9.26	
	<b>Max.</b>	# 22D	F	L & C			10.58				10.69	
	<b>Min.</b>	# 22D	M	S			9.65				9.76	
	<b>Max.</b>	# 22D	M	S			10.75				10.86	
	<b>Min.</b>	# 22D	F	S			9.15				9.26	
	<b>Max.</b>	# 22D	F	S			10.75				10.86	
	<b>Min.</b>	# 20	M	C			9.65				9.76	
	<b>Max.</b>	# 20	M	C			10.75				10.86	
	<b>Min.</b>	# 20	F	C			9.65				9.76	
	<b>Max.</b>	# 20	F	C			10.75				10.86	
	<b>Min.</b>	# 16	M	C			9.65				9.76	
	<b>Max.</b>	# 16	M	C			10.75				10.86	
	<b>Min.</b>	# 16	F	C			9.65				9.76	
	<b>Max.</b>	# 16	F	C			10.75				10.86	

M : Male contact    F : Female contact    L : Long spill    C : Short spill    S : Specific spill

Dimensions in millimeters







CECC 75.201.00  
JVS Bronze Series

# JVS Bronze Series



## Connector part numbers

<b>Basic series</b>	<b>JVS</b>	<b>16</b>	<b>A</b>	<b>11</b>	<b>35</b>	<b>P</b>	<b>N</b>	<b>**</b>
<b>Shell style:</b>								
00: Square flange receptacle								
07: Jam nut receptacle								
16: Plug with RFI Shielding								
<b>Material:</b>								
A: Bronze housing material.								
<b>Shell size</b> 09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25								
<b>Contact layout:</b> See page 8 to 11								
<b>Contact type:</b>								
P: Pin    A: Connector supplied less pin contact or with specific contacts (Connector marking: A+ orientation)								
S: Socket    B: Connector supplied less socket contact or with specific contacts (Connector marking: B+ orientation)								
<b>Orientations:</b> N, A, B, C, D & E (See page 58)								
<b>Specification:</b>								
251: Connector provides with power contacts (layouts with contacts #8)								
CI: Printed board mounting contacts.								
LI: Receptacle with long spill (pin or socket #22D)								
MW: Wire wrap contacts								
022: Fuel tank								
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S plus orientation.								

## CECC part numbers

<b>Basic series</b>	<b>CECC 75 201-002</b>	<b>B</b>	<b>B98</b>	<b>M</b>	<b>C</b>	<b>N</b>	<b>A</b>	<b>0</b>	<b>1</b>	<b>G</b>
<b>Shell style:</b>										
A: Plug										
B: Square flange receptacle.										
C: Jam nut receptacle.										
<b>Shell size &amp; layout:</b>										
A=09, B=11, C=13, D=15, E=17, F=19, G=21, H=23, J=25										
(B=Shell size 11) (Layouts: see page 8 to 11)										
<b>Contact type:</b>										
M: Pin										
F: Socket										
<b>Type of contact termination:</b>										
C: Crimp contact										
<b>Orientations</b> N, A, B, C, D & E (See page 58)										
<b>Shell material:</b>										
A: Aluminium bronze										
<b>Supply code:</b>										
0= Connectors supplied with contacts										
1= Connectors supplied without contacts										
<b>Assessment level:</b>										
1: Level 1										
<b>Performance level:</b>										
G: Level G										

Example :  
Abbreviated version :

<b>C 752 002</b>	<b>B</b>	<b>B98</b>	<b>M</b>	<b>C</b>	<b>N</b>	<b>A</b>	<b>0</b>	<b>1</b>	<b>G</b>
------------------	----------	------------	----------	----------	----------	----------	----------	----------	----------

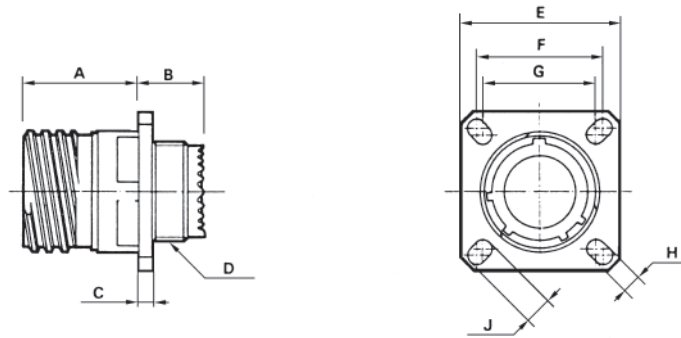


# JVS Bronze Series



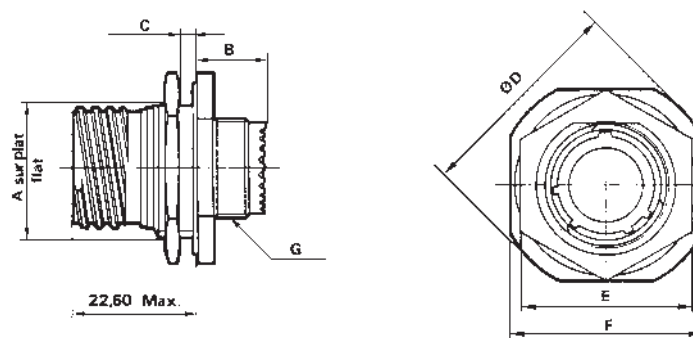
## Dimensions

### Receptacle type 00



Shell size	A Max.	B Max.	C Max.	D thread	E $\pm 0,30$	F	G	H	J
<b>09 (A)</b>	20.90	10.60	2.50	M12 x 1-6g	23.80	18.26	15.09	3.25	5.49
<b>11 (B)</b>	20.90	10.60	2.50	M15 x 1-6g	26.20	20.62	18.26	3.25	4.93
<b>13 (C)</b>	20.90	10.60	2.50	M18 x 1-6g	28.60	23.01	20.62	3.25	4.93
<b>15 (D)</b>	20.90	10.60	2.50	M22 x 1-6g	31.00	24.61	23.01	3.25	4.93
<b>17 (E)</b>	20.90	10.60	2.50	M25 x 1-6g	33.30	26.97	24.61	3.25	4.93
<b>19 (F)</b>	20.90	10.60	2.50	M28 x 1-6g	36.50	29.36	26.97	3.25	4.93
<b>21 (G)</b>	20.10	11.40	3.20	M31 x 1-6g	39.70	31.75	29.36	3.25	4.93
<b>23 (H)</b>	20.10	11.40	3.20	M34 x 1-6g	42.90	34.93	31.75	3.91	6.15
<b>25 (J)</b>	20.10	11.40	3.20	M37 x 1-6g	46.00	38.10	34.93	3.91	6.15

### Receptacle type 07



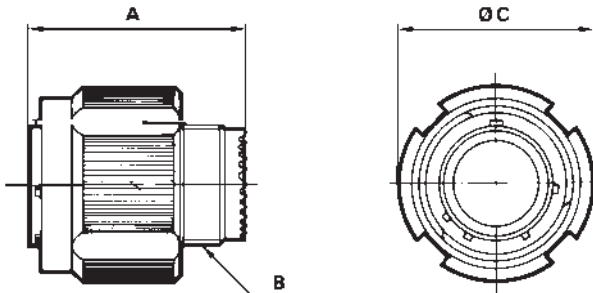
Shell size	A + 0.10 - 0.15	B Max.	C Max.	D Max.	E Max.	F $\pm 0.4$	G thread
<b>09 (A)</b>	16.53	9.90	3.20	30.50	23.00	27.00	M12 x 1-6g
<b>11 (B)</b>	19.07	9.90	3.20	35.20	26.00	31.80	M15 x 1-6g
<b>13 (C)</b>	23.82	9.90	3.20	38.40	31.00	34.90	M18 x 1-6g
<b>15 (D)</b>	26.97	9.90	3.20	41.60	34.00	38.10	M22 x 1-6g
<b>17 (E)</b>	30.15	9.90	3.20	44.80	37.00	41.30	M25 x 1-6g
<b>19 (F)</b>	33.32	9.90	3.20	49.50	41.00	46.00	M28 x 1-6g
<b>21 (G)</b>	36.50	9.90	3.20	52.70	46.00	49.20	M31 x 1-6g
<b>23 (H)</b>	39.67	9.90	3.20	55.90	47.00	52.40	M34 x 1-6g
<b>25 (J)</b>	42.85	9.90	3.20	59.00	52.00	55.60	M37 x 1-6g

Dimensions in millimeters

# JVS Bronze Series



## Plug type 16



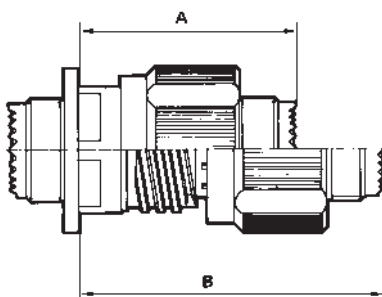
Shell size	A Max.	B thread	C Max.
09 (A)	31.00	M12 x 1-6g	21.10
11 (B)	31.00	M15 x 1-6g	23.80
13 (C)	31.00	M18 x 1-6g	28.20
15 (D)	31.00	M22 x 1-6g	31.40
17 (E)	31.00	M25 x 1-6g	36.50
19 (F)	31.00	M28 x 1-6g	39.30
21 (G)	31.00	M31 x 1-6g	42.50
23 (H)	31.00	M34 x 1-6g	45.30
25 (J)	31.00	M37 x 1-6g	48.40

## Maximum coupling torque on panel for jam nut receptacle (type 7)

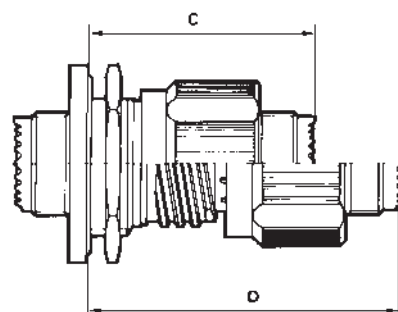
Shell	09 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
Coupling torque (N.m)	6	8	10	13	20	23	25	26	28

## Mated connectors dimensions

Type 00 with plug



Type 7 with plug



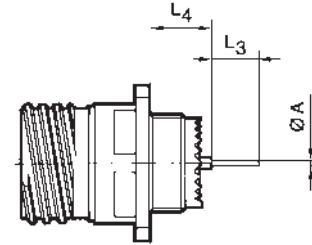
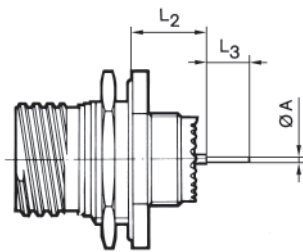
Shell size	A Max.	B Max.	C Max.	D Max.
09 (A)	37.00	52.30	38.30	53.60
11 (B)	37.00	52.30	38.30	53.60
13 (C)	37.00	52.30	38.30	53.60
15 (D)	37.00	52.30	38.30	53.60
17 (E)	37.00	52.30	38.30	53.60
19 (F)	37.00	52.30	38.30	53.60
21 (G)	36.00	51.30	38.30	53.60
23 (H)	36.00	51.30	38.30	53.60
25 (J)	36.00	51.30	38.30	53.60

Dimensions in millimeters

# JVS Bronze Series



## Receptacle with straight spill contacts



		Shell size			09 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
		Contact size	Contact type	Spill type									
A		# 22D	M & F	Li					0.70				
		# 22D	M & F	Ci					0.50				
		# 20	M & F	Ci					0.70				
		# 16	M & F	Ci					1.15				
L2	Min.	# 22D	M	Li	10.52				10.34				
	Max.	# 22D	M	Li	11.46				11.28				
	Min.	# 22D	F	Li	10.19				10.01				
	Max.	# 22D	F	Li	11.46				11.28				
	Min.	# 22D	M	Ci	10.19				10.01				
	Max.	# 22D	M	Ci	11.46				11.28				
	Min.	# 22D	F	Ci	10.69				10.51				
	Max.	# 22D	F	Ci	11.63				11.45				
	Min.	# 20	M	Ci	10.36				10.18				
	Max.	# 20	M	Ci	11.63				11.45				
	Min.	# 20	F	Ci	10.69				10.51				
	Max.	# 20	F	Ci	11.63				11.45				
	Min.	# 16	M	Ci	10.69				10.51				
	Max.	# 16	M	Ci	11.63				11.45				
L3		# 22D	M & F	Li					8.50				
		# 22D	M & F	Ci					5.10				
		# 20	M & F	Ci					5.10				
		# 16	M & F	Ci					5.10				
L4	Min.	# 22D	M	Li					9.48				
	Max.	# 22D	M	Li			10.58					10.69	
	Min.	# 22D	F	Li			9.15					9.26	
	Max.	# 22D	F	Li			10.58					10.69	
	Min.	# 22D	M	Ci			9.65					9.76	
	Max.	# 22D	M	Ci			10.75					10.86	
	Min.	# 22D	F	Ci			9.15					9.26	
	Max.	# 22D	F	Ci			10.75					10.86	
	Min.	# 20	M	Ci			9.65					9.76	
	Max.	# 20	M	Ci			10.75					10.86	
	Min.	# 20	F	Ci			9.65					9.76	
	Max.	# 20	F	Ci			10.75					10.86	
	Min.	# 16	M	Ci			9.65					9.76	
	Max.	# 16	M	Ci			10.75					10.86	
Min.	# 16	F	Ci			9.65					9.76		
Max.	# 16	F	Ci			10.75					10.86		

M: Male contact    F: Female contact    Ci: Short spill    Li: Long spill

Dimensions in millimeters

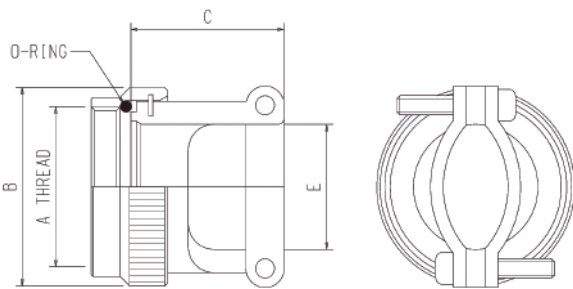
# JVS Bronze Series



## Bronze backshell part numbers (JVS)

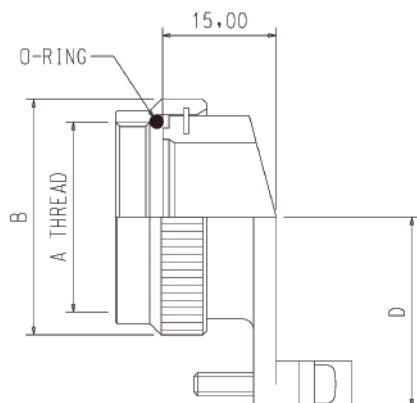
<b>Basic series</b>	<b>JVS</b>	<b>A</b>	<b>09</b>	<b>B</b>	<b>00</b>	<b>A</b>
<b>Accessory style:</b>						
A: Rear accessories (backshells)						
<b>Shell size:</b>						
09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25						
<b>Accessory variant:</b>						
B, C, P, X (See below)						
<b>Sub variant:</b>						
Not applicable: 00						
<b>Matière:</b>						
A: Bronze						

### Straight cable clamp (type B)



Shell size	A Thread	B Max.	C Max.	E Max.
09	M12 x 1.0	18.0	21.5	7.0
11	M15 x 1.0	21.0	21.5	10.5
13	M18 x 1.0	24.5	23.5	13.4
15	M22 x 1.0	27.5	23.5	16.5
17	M25 x 1.0	31.0	24.5	19.7
19	M28 x 1.0	34.0	27.5	22.2
21	M31 x 1.0	37.0	34.5	25.6
23	M34 x 1.0	40.0	37.5	28.5
25	M37 x 1.0	43.5	37.5	31.7

### 90° cable clamp (type C)

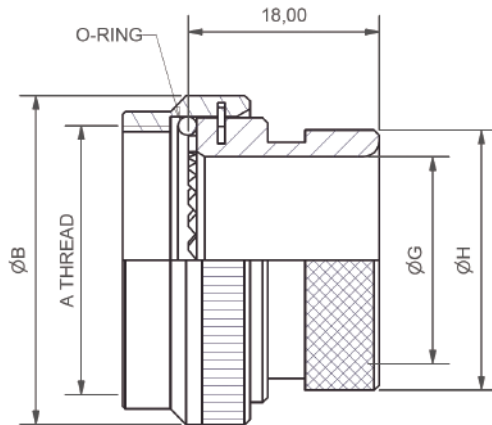


Shell size	A Thread	B Max.	D Max.
09	M12 x 1.0	18.0	20.00
11	M15 x 1.0	21.0	21.0
13	M18 x 1.0	24.5	22.0
15	M22 x 1.0	27.5	23.0
17	M25 x 1.0	31.0	25.0
19	M28 x 1.0	34.0	27.5
21	M31 x 1.0	37.0	30.0
23	M34 x 1.0	40.0	31.5
25	M37 x 1.0	43.5	34.5

Dimensions in millimeters

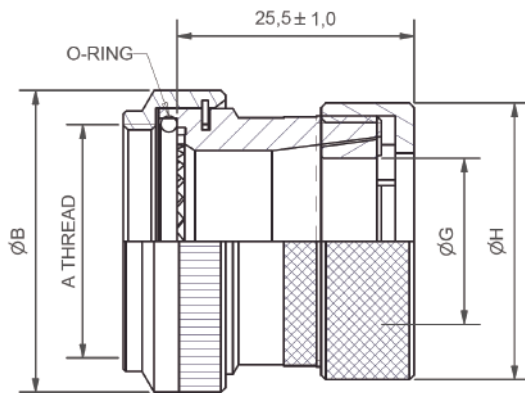


## Backshell for heat shrink boot (type P)



Shell size	A Thread	B Max.	G Max.	H Max.
09	M12 x 1.0	18.0	7.0	13.5
11	M15 x 1.0	21.0	10.5	15.4
13	M18 x 1.0	24.5	13.8	19.7
15	M22 x 1.0	29.0	16.5	21.3
17	M25 x 1.0	32.5	19.7	24.5
19	M28 x 1.0	35.5	22.1	26.5
21	M31 x 1.0	37.0	25.4	31.0
23	M34 x 1.0	40.0	28.5	34.4
25	M37 x 1.0	43.5	31.7	36.6

## Screened adaptor with cone screen clamp (type X)



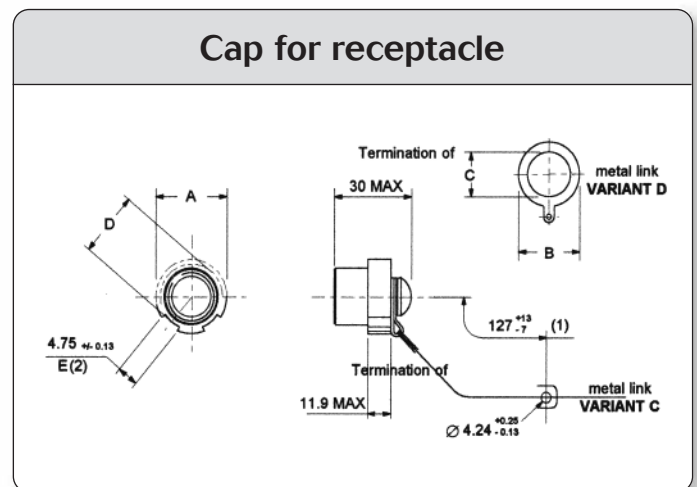
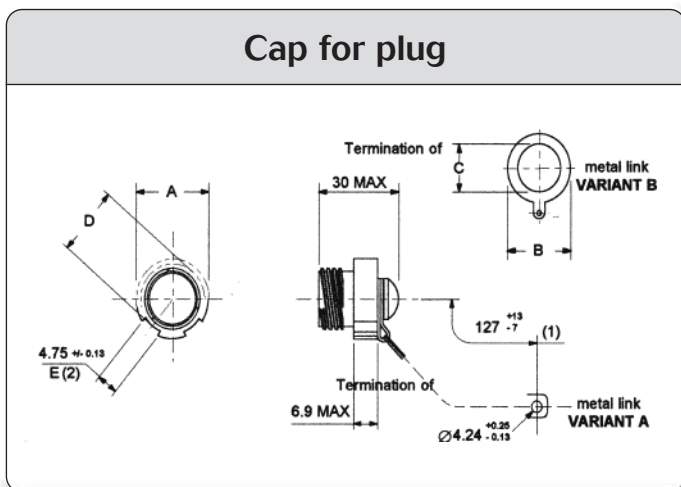
Shell size	A Thread	B Max.	G	H Max.
09	M12 x 1.0	18.0	6.8	16.0
11	M15 x 1.0	21.0	9.5	19.0
13	M18 x 1.0	24.5	12.8	22.0
15	M22 x 1.0	29.0	14.8	25.4
17	M25 x 1.0	32.5	17.9	28.5
19	M28 x 1.0	35.5	20.0	32.0
21	M31 x 1.0	37.0	23.0	35.0
23	M34 x 1.0	40.0	26.4	38.0
25	M37 x 1.0	43.5	29.3	41.0

# JVS Bronze Series



## Caps for bronze connectors (JVS)

<b>Basic series</b>	<b>JVS</b>	<b>B</b>	<b>09</b>	<b>B</b>	<b>00</b>	<b>A</b>
<b>Accessory style:</b> B: Protective cap						
<b>Shell size:</b> 09 - 11 - 13 - 15 - 17 - 19 - 21 - 23 - 25						
<b>Cap type:</b> A or B: Cap for plug (See drawing below) C or D: Cap for receptacle (See drawing below)						
<b>Sub variant:</b> Not applicable						
<b>Matière:</b> A: Bronze						



- (1) Flexible metal link
- (2) Number of notch on A diameter

Shell size	A Max.	Variant B		Variant D		D Max.	E
		B Max.	C Min.	B Max.	C Min.		
09	21.1	24.20	13.50	26.80	18.40	19.20	8
11	23.8	26.80	18.40	31.60	23.00	21.80	
13	28.2	30.50	19.80	36.90	26.20	26.10	10
15	31.4	31.60	23.00	40.10	29.40	29.30	
17	36.5	36.90	26.20	43.20	32.50	34.40	12
19	39.3	40.10	29.40	46.40	35.70	37.20	
21	42.5	43.20	32.50	49.20	39.10	40.50	16
23	45.3	46.40	35.70	52.80	42.10	43.10	
25	48.4	49.20	39.10	55.50	45.30	46.10	18

Dimensions in millimeters







# Common section



## Summary

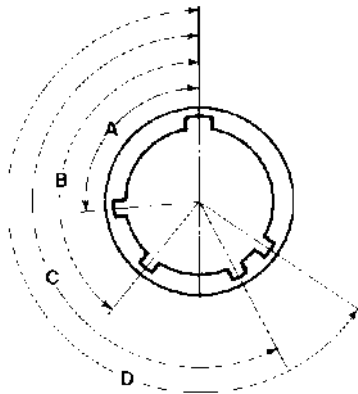
Orientations .....	58
Panel cut-out .....	59
Gaskets .....	59
Crimp contacts .....	60
Straight spill contacts .....	62
Plastic protective caps .....	62
Wire wrap contacts .....	63
Thermocouple contacts .....	63
Crimping tools .....	64
Insertion & extraction tools / Filler plug .....	64
Wiring instruction .....	65

# Common section

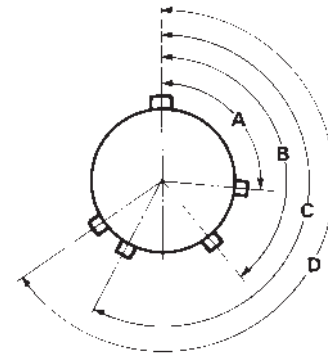


## Orientations

Viewed from face of receptacle



Viewed from front of plug



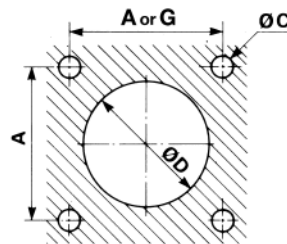
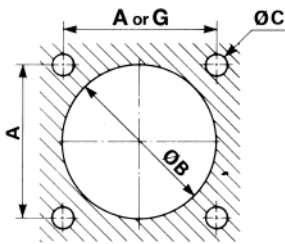
Contact size	Angles	N	A	B	C	D	E
<b>09 (A)</b>	A°	105	102	80	35	64	91
	B°	140	132	118	140	155	131
	C°	215	248	230	205	234	197
	D°	265	320	312	275	304	240
<b>11 (B)</b>	A°	95	113	90	53	119	51
	B°	141	156	145	156	146	141
	C°	208	182	195	220	176	184
	D°	236	292	252	255	298	242
<b>13 (C)</b>	A°	95	113	90	53	119	51
	B°	141	156	145	156	146	141
	C°	208	182	195	220	176	184
	D°	236	292	252	255	298	242
<b>15 (D)</b>	A°	95	113	90	53	119	51
	B°	141	156	145	156	146	141
	C°	208	182	195	220	176	184
	D°	236	292	252	255	298	242
<b>17 (E)</b>	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
<b>19 (F)</b>	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
<b>21 (G)</b>	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
<b>23 (H)</b>	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
<b>25 (J)</b>	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272

# Common section

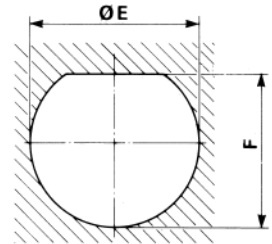


## Panel cut-out

Square flange receptacle (type 0)



Jam nut receptacle (type 7)



Shell size	9 (A)	11 (B)	13 (C)	15 (D)	17 (E)	19 (F)	21 (G)	23 (H)	25 (J)
<b>A</b>	18.26	20.62	23.01	24.61	26.97	29.36	31.75	34.93	38.10
<b>G</b>	15.09	18.26	20.62	23.01	24.61	26.97	29.36	31.75	34.94
<b>B min.</b>	16.66	20.22	23.42	26.59	30.96	32.94	36.12	39.29	42.47
<b>C ± 0.13</b>	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.91	3.91
<b>D min.</b>	13.11	15.88	19.05	23.01	25.81	28.98	32.16	34.93	37.69
<b>E + 0.25</b>	17.78	20.96	25.65	28.83	32.01	35.18	38.35	41.53	44.70
<b>F 0</b>	17.02	19.59	24.26	27.56	30.73	33.91	37.08	40.26	43.43

Max. thickness panel for square flange receptacle - type 0: front mounting : 3,2 mm Max. - Rear mounting: 2,5 mm Max.

(Dimensions in millimeters).

## Gaskets

Shell size	Part numbers	
	Gasket for receptacles type 0* (ordered separately)	O ring for receptacle type 7
<b>09 (A)</b>	8599-5541	AS3582-019
<b>11 (B)</b>	8599-5542	AS3582-022
<b>13 (C)</b>	8599-5543	AS3582-024
<b>15 (D)</b>	8599-5544	AS3582-026
<b>17 (E)</b>	8599-5545	AS3582-028
<b>19 (F)</b>	8599-5546	AS3582-128
<b>21 (G)</b>	8599-5547	AS3582-130
<b>23 (H)</b>	8599-5548	AS3582-132
<b>25 (J)</b>	8599-5549	AS3582-134

\* For rear mounting

# Common section



## Crimp contact

Contact size	Contact type	Souriau P/N (without colour code)	MIL-DTL-38999 Contacts	
			Part number	Profile and colour code
#22D	Pin	8599-0702 JJ	M39029/58 360	
	Socket	8599-0706 900	M39029/56 348	
#20	Pin	8599-0703 SA	M39029/58 363	
	Socket	8599-0707 900	M39029/56 351	
#16	Pin	8599-0704 MJ	M39029/58 364	
	Socket	8599-0708 900	M39029/56 352	
#16 Coaxial	Pin	-	M39029/76 424	
	Socket	-	M39029/77 428	
#12	Pin	8599-0705 MJ	M39029/58 365	
	Socket	8599-0709 900	M39029/56 353	
#12 Coaxial	Pin	-	M39029/102 558	
	Socket	-	M39029/103 559	
	Pin	-	M39029/28 211	
	Socket	-	M39029/75 416	
#10 Power	Pin	-	M39029/58 528	
	Socket	-	M39029/56 527	
#8 Power	Pin	8599-7544	-	
	Socket	8599-7541	-	
	Boot	8599-4542	-	For wire #8
		8599-4547	-	For wire #10
Reductor	8599-7645	-		
#8 Coaxial	Pin	-	M39029/60 367	
	Socket	-	M39029/59 366	
	Boot	8590-4571	-	
#8 Triaxial	Pin	-	M39029/90 529	
	Socket	-	M39029/91 530	
	Boot	8590-4571	-	
#4 Power	Pin	8599-7598 900*	-	For wire 25 mm <sup>2</sup>
	Socket	8599-7599 900*	-	
	Pin	8599-7534	-	For wire 21.15 mm <sup>2</sup>
	Socket	8599-7535	-	
	Boot	for Cable 16 mm <sup>2</sup>	8599-4594	-
		for Cable 10 mm <sup>2</sup>	8599-4593	-
Reductor Cable 10 mm <sup>2</sup>	8400-2352A	-		
#4 Power with reduced barrel	Pin	8599-7528 900	-	Mating part #4 / Barrel #6
	Socket	8599 7529 900	-	
	Boot	8599-4593	-	

\* Not included in connector P/N. Must be ordered separately.

# Common section



## Crimp contact

Contact size	Contact type	Contact Ø	Conductor section				External Ø over insulator	
			AWG		mm <sup>2</sup>		min	max
			min	max	min	max		
#22D	Pin	0.76	28	22	0.095	0.34	0.76	1.37
	Socket							
#20	Pin	1.00	24	20	0.21	0.60	1.02	2.11
	Socket							
#16	Pin	1.60	20	16	0.60	1.34	1.65	2.77
	Socket							
#16 Coaxial	Pin	1.60	RG 174 RG 179 RG 316				1.65	2.60
	Socket							
#12	Pin	2.40	14	12	1.91	3.18	2.46	3.61
	Socket							
#12 Coaxial	Pin	2.40	RG 174 RG 179 RG 316				2.40	2.60
	Socket							
	Pin							
	Socket							
#10 Power	Pin	3.20	Please consult us				-	2.95
	Socket							
#8 Power	Pin	3.64	-	8	-	8.98	-	-
	Socket		-	-	-	-	4.50	6.5
	Boot		-	-	-	-	2.50	4
	Reductor		-	-	-	-	-	-
#8 Coaxial	Pin	5.50	RG 188 A/U				-	2.80
	Socket							
	Boot							
#8 Triaxial	Pin	5.50	0,76MIL-C17/176 00002 FILECA F.2703/14 RAYCHEM CHEMINAX 10612 FILOTEX M 17/176 00002				3.15	3.40
	Socket							
	Boot							
#4 Power	Pin	5.74	-	(3)	-	25	-	-
	Socket		5	4	16	21.15	-	-
	Pin		-	-	-	-	6.35	7.50
	Socket		-	-	-	-	4	5.8
	Available for Boot 8599-7534 and 7535 contacts		-	-	-	-	-	-
	Reductor Cable 10 mm		-	-	-	-	-	-
#4 Power with reduced barrel	Pin	5.74	6		13.3		-	-
	Socket		-		-		4	5.80
	Boot		-		-		4	5.80

# Common section



## Straight spill contacts

Contact size	Contact type	Spill type	Part number	Profile
# 22D	Pin	L	8599 - 0720 900	
	Pin	M	8599 - 8018 JJ	
	Pin	C	8599 - 0730 900	
	Pin	C	8599 - 0796 900	
	Socket	L	8599 - 0721 900	
	Pin	M	8599 - 8028 900	
	Socket	C	8599 - 0731 900	
	Socket	S	8599 - 0797 900	
# 20	Pin	M	8599 - 0658 JJ	
	Socket	M	8599 - 0759 900	
	Pin	C	8599 - 0724 900	
	Socket	C	8599 - 0725 900	
	Pin	L	8599 - 0771 900	
	Socket	L	8599 - 0772 900	
# 16	Pin	C	8599 - 0726 900	
	Socket	C	8599 - 0727 900	
Contact coaxial # 16	Pin	C	8599 - 1000 900	
# 12	Pin	C	8599 - 7929 900	
	Socket	C	8599 - 7932 900	

S: Specific spill    L: Long spill    C: Short spill    M: Medium spill

## Plastic protective caps\*

Shell size	Part numbers		
	Caps for receptacles	Caps for plugs	Caps for composite plugs only( J and M)
9 (A)	70777	8500-5587 A	70205
11 (B)	70205	70198	8500-5598
13 (C)	70206	8500-5600	8500-5600
15 (D)	70207	8500-5601	8500-5601
17 (E)	70201	8500-5602	8500-5602
19 (F)	70209	8500-5592 A	8500-5592 A
21 (G)	70210	8500-5593 A	8500-5593 A
23 (H)	70211	8500-5593 A	70472
25 (J)	8500-5593 A	J599ABC6009A00	J599ABC6009A00

\*Excepted 8D composite version (X): supplied without cap

# Common section



## Crimp contacts: 1500 mating

Contact size	MIL-DTL-38999 contacts		
	Contact type	Part number	Profile and colour code
#22 D	Pin (H)	M39029/107 620	Blue - Red - Black
	Socket (J)	M39029/106 614	Blue - Brown - Yellow
#20	Pin (H)	M39029/107 621	Blue - Red - Brown
	Socket (J)	M39029/106 615	Blue - Brown - Green
#16	Pin (H)	M39029/107 622	Blue - Red - Red
	Socket (J)	M39029/106 616	Blue - Brown - Blue
#12	Pin (H)	M39029/107 623	Blue - Red - orange
	Socket (J)	M39029/106 617	Blue - Brown - Gray

## Wire wrap contact

Contact size	Contact type	Part number	Profile
# 22D	Pin	8599 - 0790 JJ	
# 20	Pin	8599 - 0791 900	

Contact size	Contact type	Contact Ø (mm)	mm
# 22D	Pin	0.76	0.86
# 20	Pin	1	0.86

## Thermocouple contacts

Contact size	Contact type	Souriau part numbers (without color code)	MIL-DTL-38999 contacts	
			Part numbers	Profile and colour code
# 22 D Chromel	Pin	-	M39029/87-472	
	Socket	-	M39029/88-484	
# 22 D Alumel	Pin	-	M39029/87-471	
	Socket	-	M39029/88-483	
# 20 Chromel	Pin	8599-0749 900	8599-0949 900	jaune - yellow violet bleu - blue
	Socket	8599-0753 900	8599-0953 900	jaune - yellow gris - grey gris - grey
# 20 Alumel	Pin	8599-0761 900	8599-0961 900	jaune - yellow violet vert - green
	Socket	8599-0765 900	8599-0965 900	jaune - yellow gris - grey violet

Contact size	Ø Contact (mm)	Wire section					Ø Over insulation mm		
		min	Awg	max	min	mm <sup>2</sup>	max	min	max
# 22 D Chromel Alumel	0.75	28		22	0.095	0.34		0.76	1.37
# 20 Chromel Alumel	1	24		20	0.21	0.6		1.02	2.11

# Common section



## Crimping tools

Contact size	Contact type	Pliers						
		M22520/1-01 (Souriau 8365) Turret part number		M22520/2-01 (Souriau 8476-01) Locator part number		M300 BT Locator part number	M22520/23-01	
		Norme	Souriau	Norme	Souriau		Turret part number	Locator part number
# 22D	Pin	-	-	M22520/2-09	8476-09	-	-	-
	Socket	-	-	M22520/2-07	8476-07	-	-	-
# 20	Pin	M22520/1-04	8365-04	M22520/2-10	8476-10	-	-	-
	Socket				8476-10	-	-	-
# 16	Pin	M22520/1-04	8365-04	-	-	-	-	-
	Socket			-	-	-	-	-
# 12	Pin	M22520/1-04	8365-04	-	-	-	-	-
	Socket			-	-	-	-	-
# 8 Power	Pin	-	-	-	-	SP 593	M22520/23-02	8599-9601
	Socket	-	-	-	-			
# 4 Power	Pin	-	-	-	-	-	M22520/23-04	M22520/23-11
	Socket	-	-	-	-	-		

Contact size	Contact type	Pliers		
		M22520/2-01 (Souriau 8476-01) Locator part number	M22520/4-01 Locator part number	M22520/5-01 Locator part number
# 12 Coaxial	Inner	-	-	M22520/5-03
	Outer	-	-	
# 16 Coaxial	Inner	M22520/2-35	-	-
	Outer	-	M22520/4-02	-
# 8 Coaxial	Inner	M22520/2-31	-	-
	Outer	-	-	M22520/5-05
# 8 Triaxial	Inner	K709	-	-
	Middle	-	-	Y631 closure B
	Ferrule	-	-	Y631 closure A

\* Pneumatic pliers

Nota: for the #10 contact's plier and locator, please consult us.

## Insertion and extraction tools & Filler plugs

Contact size	Material	Part number		Insertion/extraction tools		Filter plugs	
		Spec	Souriau	Insertion	Extraction	Part number	Color
# 22D	Plastic	M81969/14-01	-	Green	White	MS27488-22	Black
# 20	Plastic	M81969/14-10	-	Red	Orange	MS27488-20	Red
# 16	Plastic	M81969/14-03	-	Blue		MS27488-16	Blue
# 12	Plastic	M81969/14-04	-	Yellow	White	MS27488-12	Yellow
# 10	Plastic	M81969/14-05	-	Grey		-	-
# 8	Plastic	M81969/14-12	-	-	Red	-	-
	Metallic	-	8660-197	-	-	-	-
# 4	Plastic	M81969/14-07	-	-	Blue	-	-
	Metallic	-	8533-8175	-	-	-	-

### Dummy contact size 8

Part number: 8599-0308

### Dummy contact size 4

Part number: 8599-0310

### Filler plugs

Direction of introduction in grommet







## Wiring instruction

### Cable preparation and wire stripping

Contact size	L min.	L Max.	
# 22D	3,58 .14	3,99 .16	
# 20	5,31 .21	5,82 .23	
# 16	5,31 .21	5,82 .23	
# 12	5,31 .21	5,82 .23	
# 8	12,5 .49	13 .51	
# 4	12,5 .49	13 .51	

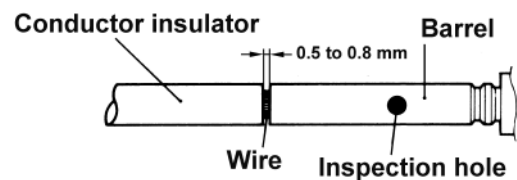
L = Length of wire stripping

### Insertion of wire in contact barrel

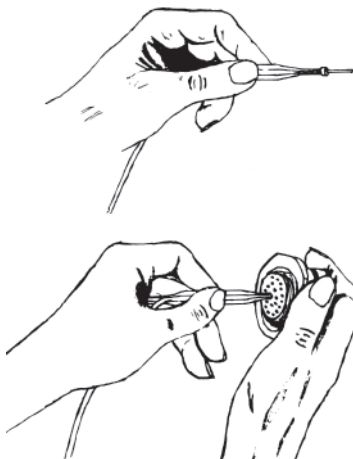
When inserting the stripped wire into the contact barrel check that no strands are left outside and that the wire is visible through the wire inspection hole in the barrel.

**Important:**

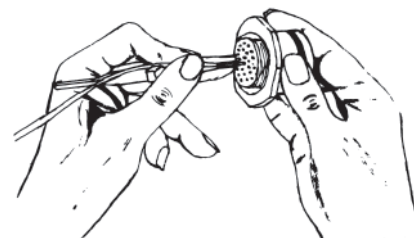
- Slide any accessories over wire strands before carrying out the following operations.
- Contacts are inserted and extracted from the rear of the connector.



### Insertion of the contacts



- 1 Engage the crimp cable/contact assembly into the longitudinal slot of the plastic tool (coloured tip). Slide the tool down the cable until the tip of the tool touches the contact retention shoulder.



- 2 Introduce the contact into the required contact cavity in the insulator, pushing tool axially, until the contact snaps into position in clip.

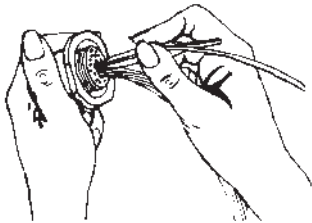
- 3 Withdraw the tool (from rear). Check that the contact is firmly locked by pulling wire gently. When connector is fully loaded, check the position of contact tips. They should all be in the same plane.

**Nota:** For larger sizes of cable which are stiff enough manual insertion without tool is preferable.

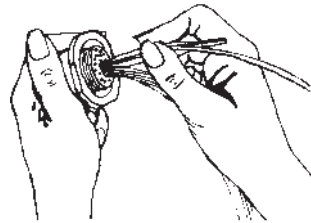
# Common section



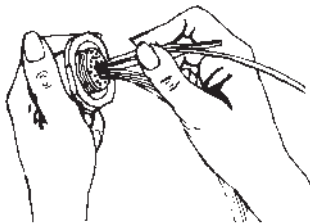
## Extraction of the contacts



- 1 Engage the appropriate cable into the longitudinal slot of the tool with the white tip towards connector.



- 2 Slide the tool down towards the contact. Insert the tool in the insulator until it touches the contact shoulder.



- 3 Holding the tool-contact and cable assembly together, remove them simultaneously.

## Backshell tightening and slacking tools

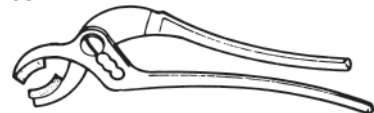
Backshell tightening pliers, part number: 8498-03

Square jaws, part number: 8500-1015 (order 2 jaws).

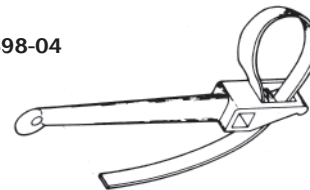
Strap clamp, part number: 8498-04

Spare strap, part number: 8498-103

8498-03



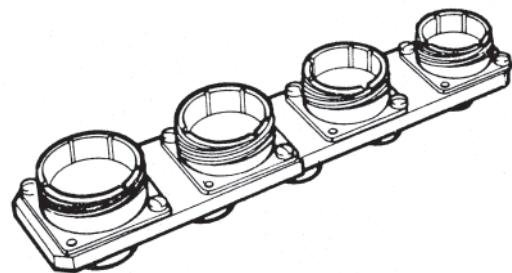
8498-04



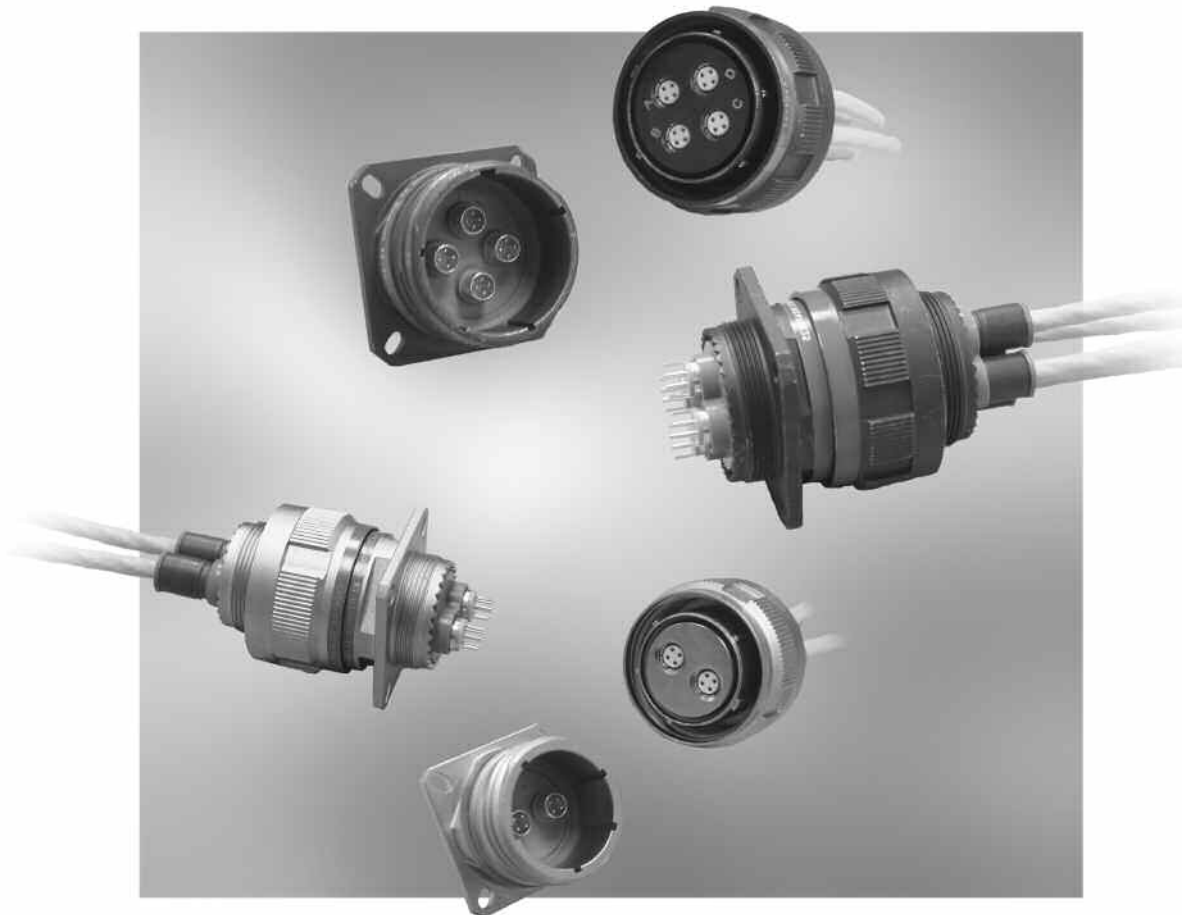
## Tightening support

Part number: 8599-0831

This tool is made up of dummy receptable housings of all 9 sizes for all key polarisation, and locates free connectors during wiring and fitting of rear accessories.



# 8D-JVS Series with quadrax contacts



Derived from:  
MIL-DTL-38999 Serie III

# 8D-JVS Series with quadrax contacts



## Description

- Size 8 outer contact with 4 #24 inner contacts forming two 100 or 150 matched impedance pairs with excellent 360° shielding.
- Replace 2 twinax contacts with:
  - better performances (reduced cross talk)
  - shorter cabling time
  - compact profile, lighter weight
- One contact complete a full duplex 100 mbps ethernet link
- Ground connection of the cable braid possibility trough electrical continuity with the connector shell
- Standard 38999 shells and inserts

## Characteristics

### Applications

- Quadrax connector for network applications in severe climatic and/or mechanical environments.

### Mechanical

See page 6

### Climatics

See page 7

Contact	Rated current (A)	Max contact resistance (mΩ)		
		23°C		200°C
		Initial	After tests	After tests
Signal contacts	1	15	30	45
Outer body	12	3	4	6

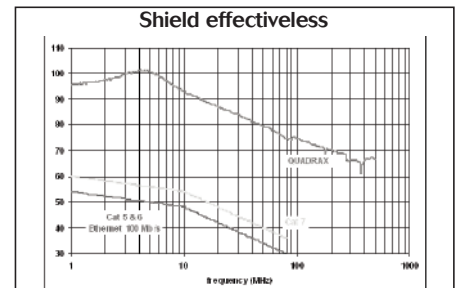
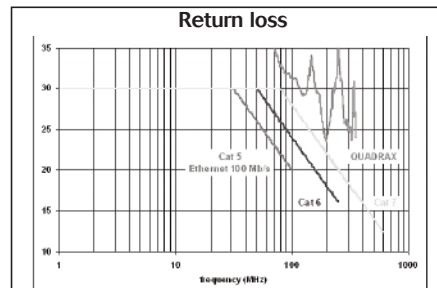
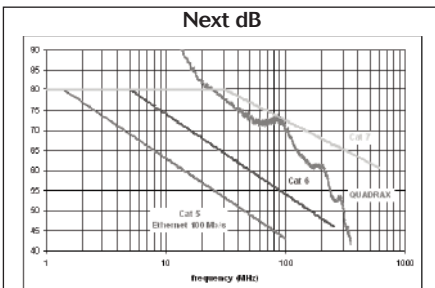
### Electrical

- **ISO/IEC 11801 category 6 compliant:**
  - Next (Cross talk): > 46 dB at 250 MHz
  - Return loss: > 16 dB at 250 MHz
  - Shield effectiveness: > 36 dB at 250 MHz
- **Contact to shell continuity: 10 mΩ max.**
- **Contact resistance (low level):**
  - Initial: 15 mΩ
  - After tests: 30 mΩ

- **Test voltage rating:**
  - Sea level: 500 Vrms
  - At 21000 m = 125 Vrms
- **Insulation resistance: > 5000 mΩ**
- **# 24 contact for cable wire:**  
AWG 22 à 7 to AWG 26

### Mechanical :

- **Operating temperature:** -65°C to +200°C
- **# 24 contacts:** copper alloy
- **Contact # 8 body:** copper alloy
- **Insulator:** thermoplastic
- **Contact plating:** Gold over nickel



# 8D-JVS Series with quadrax contacts



## Connector part numbers

<b>Basic Series</b>	<b>8D</b>	<b>0</b>	<b>C</b>	<b>11</b>	<b>W</b>	<b>81</b>	<b>P</b>	<b>N</b>	<b>284</b>
<b>Shell style:</b>									
0: Square flange receptacle									
7: Jam nut receptacle									
5: Plug									
<b>Type:</b>									
C: Receptacle with Quadrax PC tail contacts*									
Q: Connectors with Quadrax crimp contacts									
<b>Shell size:</b> 11 - 17 - 21 - 25									
<b>Plating:</b>									
W: Olive green cadmium (aluminium)									
F: Nickel (aluminium)									
K: Passivated (stainless steel)									
S: Nickel (stainless steel)									
J: Olive green cadmium (composite)									
M: Nickel (composite)									
X: Without plating (composite)									
TF: Nickel (Titanium)									
TT: Without plating (Titanium)									
<b>Contact layout:</b> See page 8 to 11									
<b>Contact type:</b>									
P: Pin      A: Connector supplied less pin contact									
S: Socket    B: Connector supplied less socket contact									
<b>Orientation:</b> N, A, B, C, D & E (See page 58)									
<b>Specification:</b>									
284: Grounded (cts 100 Ω)*									
308: Not grounded (cts 100 Ω)									
384: Grounded (cts 150 Ω)*									
408: Not grounded (cts 150 Ω)									

## Bronze connectors part numbers

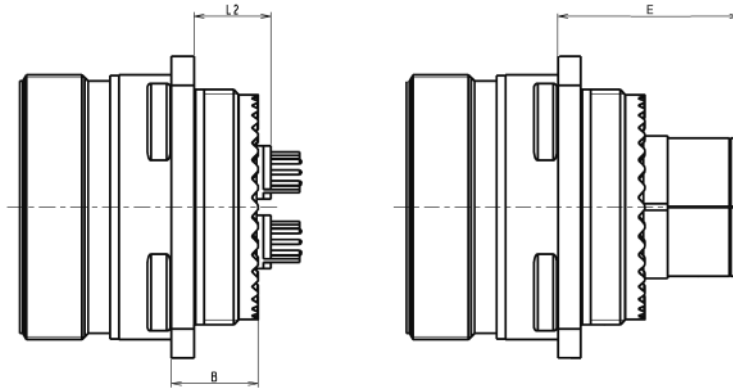
<b>Basic Series</b>	<b>JVS</b>	<b>C</b>	<b>00A</b>	<b>09</b>	<b>35</b>	<b>P</b>	<b>N</b>	<b>284</b>
<b>Shell style:</b>								
C: Receptacle with Quadrax PC tail contacts*								
Q: Connectors with Quadrax crimp contacts								
<b>Shell style:</b>								
00A: Square flange receptacle								
16A: Plug								
07A: Jam nut receptacle								
<b>Shell size:</b> 11 - 17 - 21 - 25								
<b>Contact layout:</b> See page 8 to 11								
<b>Contact type:</b>								
P: Pin      A: Connector supplied less pin contact								
S: Femelle    B: Connector supplied less socket contact								
<b>Orientation:</b> N, A, B, C, D & E (See page 58)								
<b>Specification:</b>								
284: Grounded (cts 100 Ω)*								
308: Not grounded (cts 100Ω)								
384: Grounded (cts 150 Ω)*								
408: Not grounded (cts 150 Ω)								

\* Excepted mixte versions (17-81, 25-80, 25-81, 25-82, 25-86)

# 8D-JVS Series with quadrax contacts

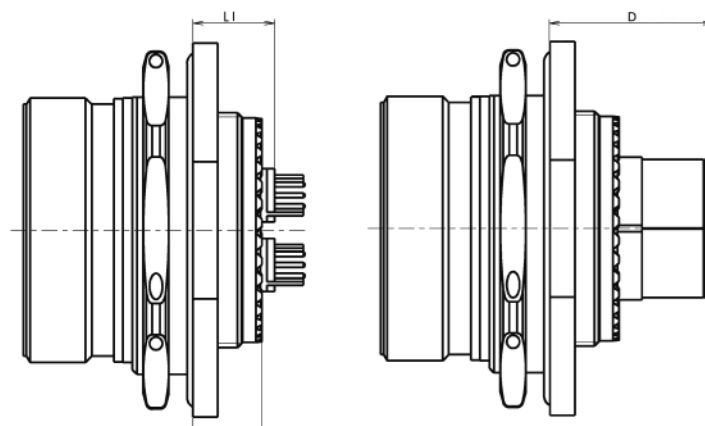


## Square flange receptacle – Type 0



Shell size	PC tail contacts	Contacts to crimp	L2 Max.	L2 Min.
	B Max.	E Max.		
11	37.00	52.30	38.30	53.60
17	37.00	52.30	38.30	53.60
21	36.00	51.30	38.50	53.80
25	36.00	51.30	38.50	53.80

## Jam nut receptacle – Type 7



Shell size	PC tail contacts	Contacts to crimp	L1 Max.	L1 Min.
	B Max.	D Max.		
11	9.90	22.40	11.45	10.50
17	9.90	22.20	11.30	10.35
21	9.90	22.20	11.30	10.35
25	9.90	22.20	11.30	10.35

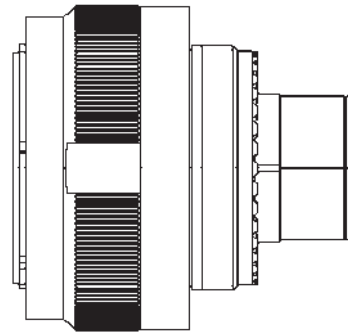
Dimensions in millimeters)

# 8D-JVS Series with quadrax contacts

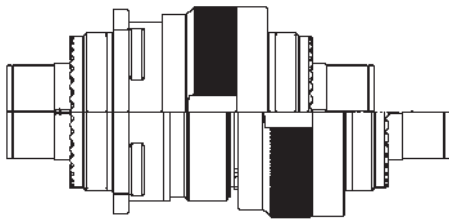


## Plug - Type 5

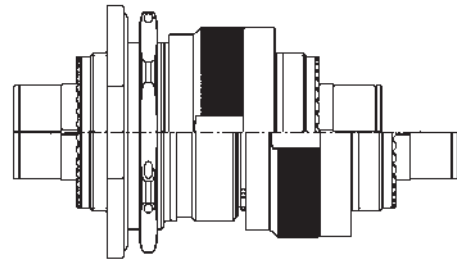
Shell size	C max. size.
11	44.00
17	44.00
21	44.00
25	44.00



## Mated connector - Type 0 & type 5

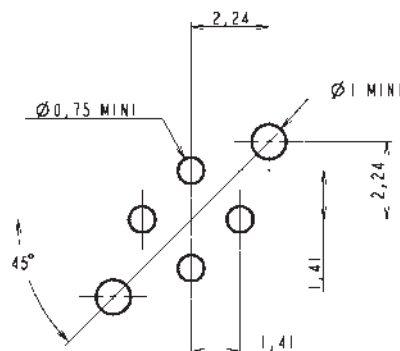


## Mated connector - Type 7 & type 5



Shell size	B Max.	D Max.	L1 Max.	L1 Min.
11	64.90	66.60	49.60	51.30
17	64.90	66.60	49.60	51.30
21	64.10	66.60	48.80	51.30
25	64.10	66.60	48.80	51.30

## Drill dimensions for PCB mount

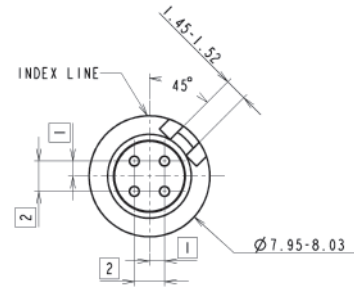
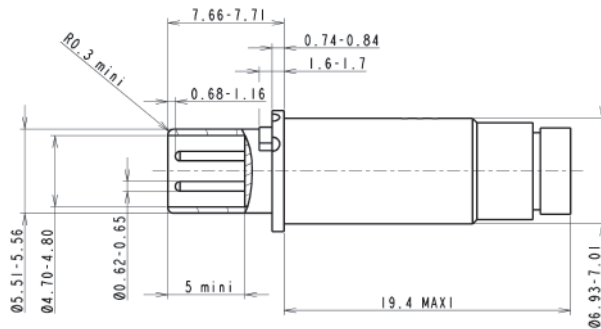


(Dimensions in millimeters)

# 8D-JVS Series with quadrax contacts

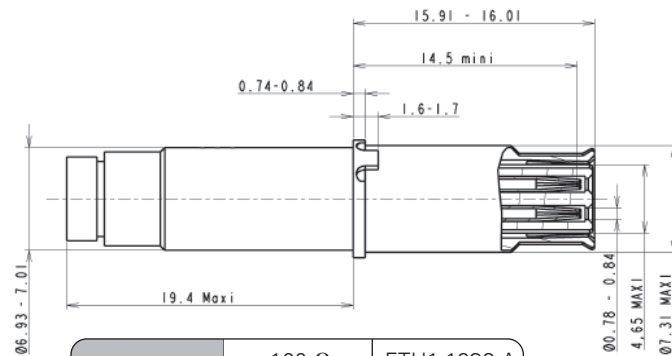
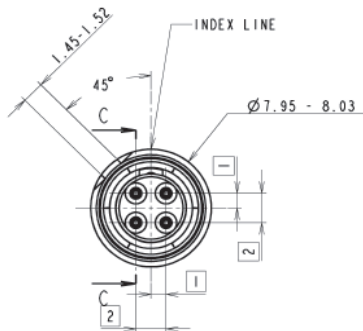


## Crimp pin contact



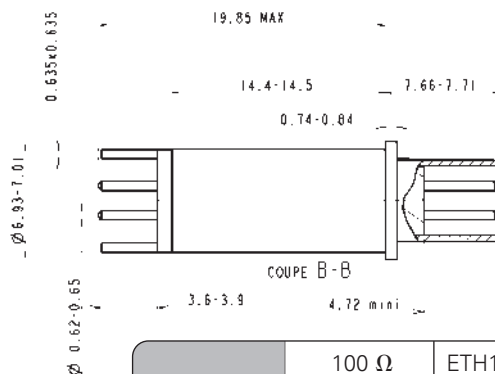
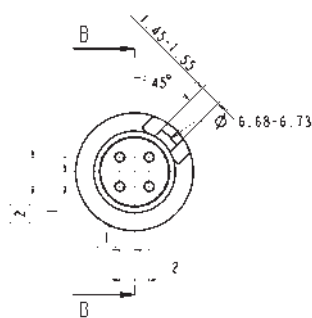
Part number	100 $\Omega$	ETH1-1235 A
	150 $\Omega$	ETH1-1503 A

## Crimp socket contact



Part number	100 $\Omega$	ETH1-1236 A
	150 $\Omega$	ETH1-1504 A

## Pin contact for PCB mount



Part number	100 $\Omega$	ETH1-1237 A
	150 $\Omega$	ETH1-1501 A

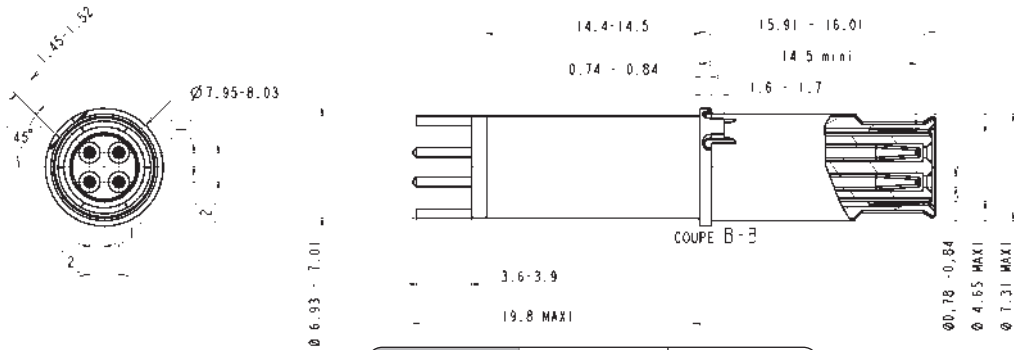
(Dimensions in millimeters)



# 8D-JVS Series with quadrax contacts



## Socket contact for PCB mount

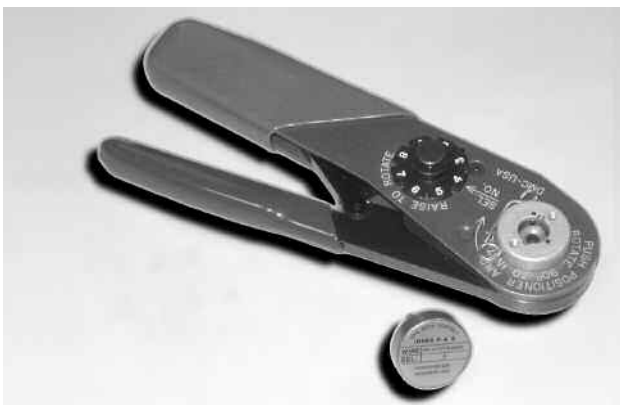


Part number	100 $\Omega$	ETH1-1238 A
	150 $\Omega$	ETH1-1502 A

(Dimensions in millimeters)

## Tooling

### Crimping tools



Ref: M22520/2-01 and K709

### Insertion and extraction tools



Ref: 8660-197



Ref: M22520/5-01 et / and M22520/5-45B



# Notes



# 8D - JVS Series with optical Elio contacts



Derived from:  
MIL-DTL-38999 Serie III

# 8D - JVS Series with optical Elio contacts



## Description

- Optical Elio contact qualified according to Arinc 801 EN4531 and ABS1379 fitting in standard 38999 shell with specific inserts.
- Easy insertion and extraction of the contact, without tool (bayonet locking system).
- Individual contact sealing (rear sealing boot integrated on contact).
- Contact easy to clean (no need to remove the contacts, levelling contacts on receptacle side).
- Robust and high vibration with standing solution.

## Characteristics

### Applications

- Fiber optic connector for industrial, military and aeronautical application in severe climatic or mechanical environment.

### Mechanical

- See page 6.

### Climatics

- See page 7.

### Optical

- Typical insertion loss multimode: 0.3 dB at 1300 nm.
- Typical return loss multimode: - 30 dB at 1300 nm.
- Maximum IL during and after climatic tests at 1300 nm and 850 nm for multimode 62.5 / 125 fiber: 0.7 dB.

# 8D - JVS Series with optical Elio contacts



## Connector part numbers

Basic series	8D	0	E	11	W	02	A	N
<b>Shell style:</b>								
0: Square flange receptacle (Female insert B only)								
7: Jam nut receptacle (Excepted composite version) (Female insert B only)								
5: Plug with RFI shielding (Male insert A only)								
<b>Designation:</b>								
E: ELIO™ optical connector								
<b>Shell size:</b> 09 - 11 - 13 - 19 - 25								
<b>Plating:</b>								
W: Olive green cadmium (aluminium)								
F: Nickel (aluminium)								
K: Passivated (stainless steel)								
S: Nickel (stainless steel)								
J: Olive green cadmium (composite)								
M: Nickel (composite)								
X: Without protection (composite)								
TF: Nickel plated (Titanium)								
TT: Unplated (Titanium)								
<b>Contact layout:</b>								
See page 8 to 11)								
<b>Insert type:</b>								
A: Male insert (plug)								
B: Female insert with ceramic alignment sleeves (receptacle)								
<b>Orientation:</b> N, A, B, C, D & E (See page 58)								

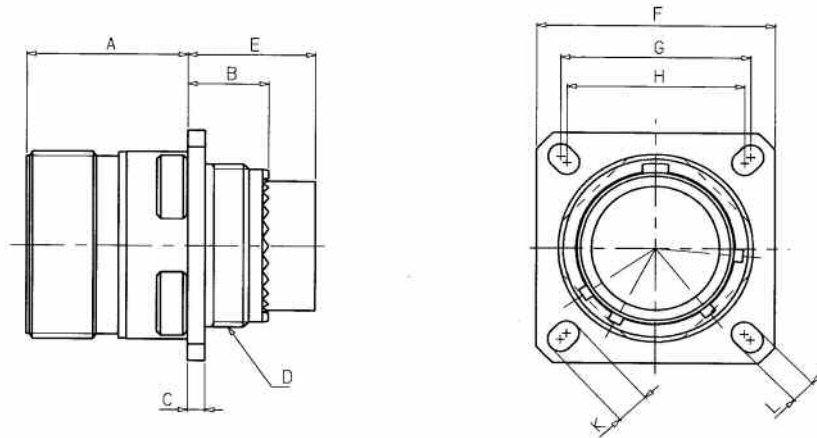
## Connector part numbers Bronze

Basic series	JVS	E	0	A	11	02	A	N
<b>Designation:</b>								
E: ELIO™ connecteur optique / optical connector								
<b>Shell style:</b>								
0: Square flange receptacle (Female insert B only)								
7: Jam nut receptacle (Female insert B only)								
6: Plug with RFI shielding (Male insert A only)								
<b>Material:</b>								
A: Bronze								
<b>Shell size:</b> 09 - 11 - 13 - 19 - 25								
<b>Insert arrangement:</b> (see page 8 to 11)								
<b>Insert type:</b>								
A: Male insert (plug)								
B: Female insert with ceramic alignment sleeves (receptacle)								
<b>Orientation:</b> N, A, B, C, D & E (See page 58)								

# 8D - JVS Series with optical Elio contacts

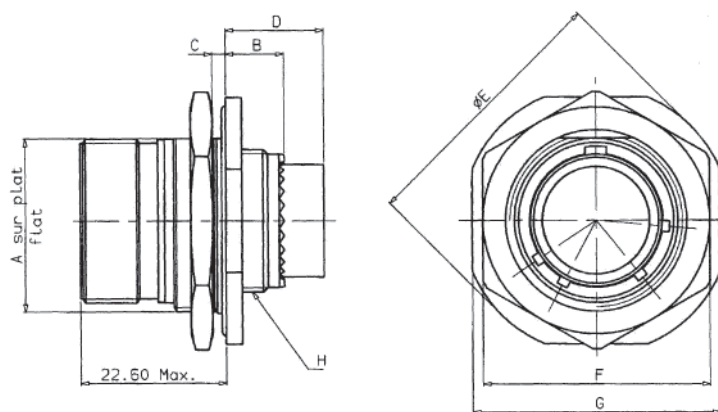


## Receptacle type 0



Shell size	A Max.	B Max.	C Max.	D thread	E Max.	F ± 0.30	G	H	K ± 0.20	L ± 0.20
09	20.90	10.60	2.50	M12 x 1-6g	17.10	23.80	18.30	15.10	5.50	3.25
11	20.90	10.60	2.50	M15 x 1-6g	17.10	26.20	20.62	18.26	4.93	3.25
13	20.90	10.60	2.50	M18 x 1-6g	17.10	28.60	23.01	20.62	4.93	3.25
19	20.90	11.60	2.50	M28 x 1-6g	17.10	36.50	29.36	26.97	4.93	3.25
25	20.10	11.40	3.20	M37 x 1-6g	17.90	46.00	38.10	34.93	6.15	3.25

## Receptacle type 7



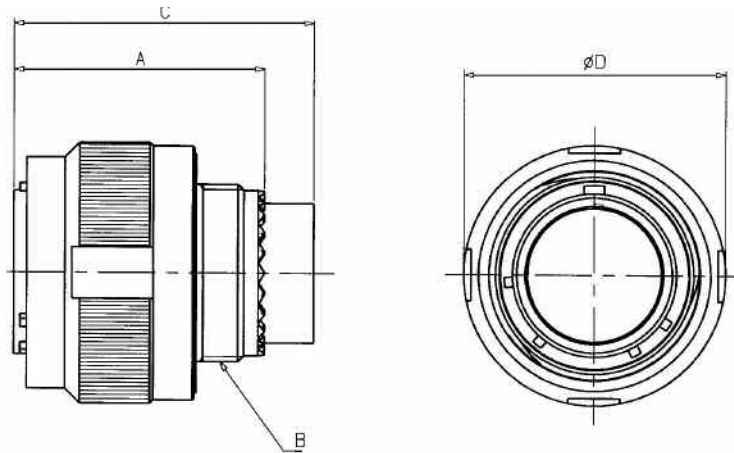
Shell size	A Max.	B Max.	C Max.	D Max.	E Max.	F Max.	G ± 0.40	H Thread
09	16.55	9.90	3.20	16.40	32.50	23.00	27.00	M12 x 1-6g
11	19.07	9.90	3.20	16.40	35.20	27.00	31.80	M15 x 1-6g
13	23.82	9.90	3.20	16.40	38.40	32.00	34.90	M18 x 1-6g
19	33.32	9.90	3.50	16.40	49.50	41.00	46.00	M28 x 1-6g
25	42.85	9.90	3.50	16.40	59.00	55.60	55.60	M37 x 1-6g

Dimensions in millimeters

# 8D - JVS Series with optical Elio contacts

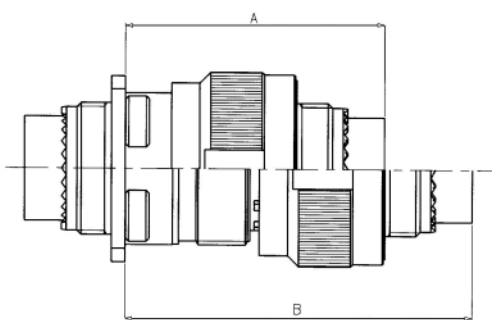


## Plug type 5

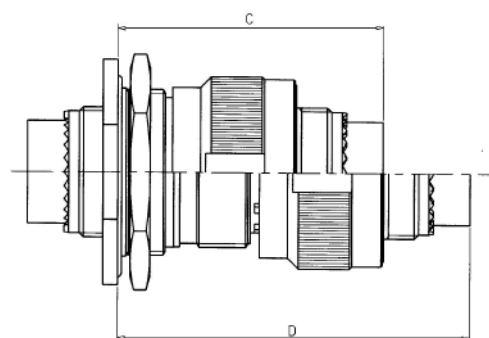


Shell size	A Max.	B Thread	C Max.	D Max.
09	31.00	M12 x 1-6g	37.50	21.80
11	31.00	M15 x 1-6g	37.50	25.00
13	31.00	M18 x 1-6g	37.50	29.40
19	31.00	M18 x 1-6g	37.50	38.50
25	31.00	M37 x 1-6g	37.50	48.00

## Mated connectors dimensions



Square flange receptacle type 0 with plug



Jam nut receptacle type 7 with plug

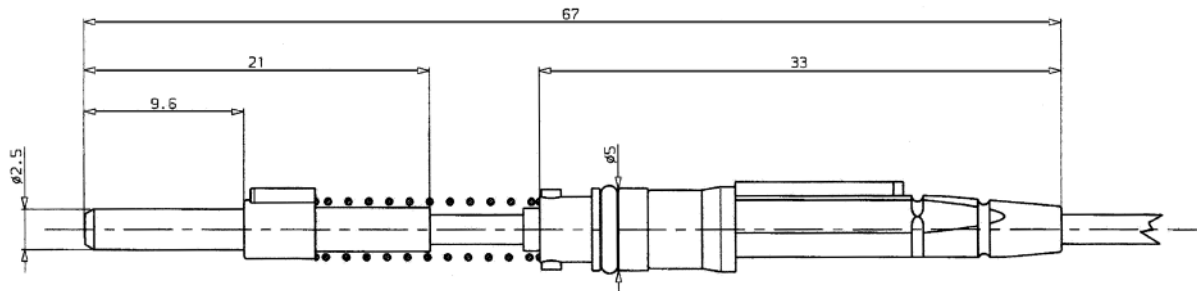
Shell size	A Max.	B Max.	C Max.	D Max.
09	43.50	58.80	44.80	60.10
11	43.50	58.80	44.80	60.10
13	43.50	58.80	45.00	60.30
19	43.50	58.80	45.00	60.30
25	43.50	58.80	45.00	60.30

Dimensions in millimeters

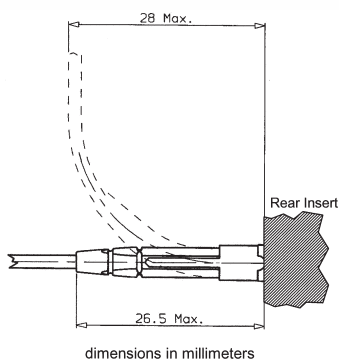
# 8D - JVS Series with optical Elio contacts



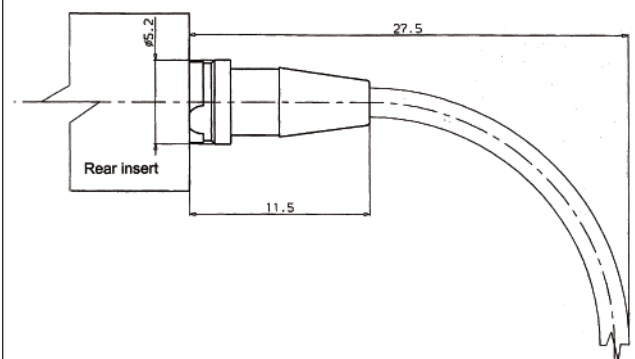
## Dimensions of ELIO™ Termini - Straight long boot version (L)



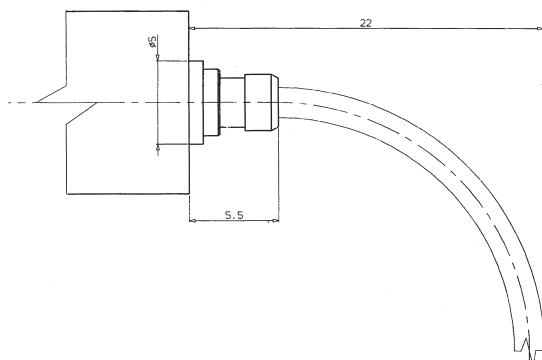
## Rear dimensions of the straight long boot version of the ELIO™ Termini



## Rear dimensions of the straight short boot version of the ELIO™ Termini



## Rear dimensions of the ELIO™ Termini without boot



Dimensions in millimeters

## Ordering information

ELIO™	18 S	G	L
<b>Cable diameter wider:</b>			
<b>SBN</b> for 980 µm jacket cable or cable wider than 2 mm with 900 µm fiber - without sealing joint			
<b>SCN</b> from 1.5 mm up to 1.9 mm cable - without sealing joint			
<b>18S</b> for 1.8 mm cable			
<b>Fiber type:</b>			
<b>G</b> for 50/125 or 62.5/125 fiber (PC shape ferrule)			
<b>D</b> for 100/140 fiber			
<b>J</b> for POF 1.0 mm fiber - with sealing joint			
<b>Boot shape:</b>			
<b>L</b> Straight long			
<b>S</b> Straight short			
<b>N</b> Without boot (unsealed version only)			



# 8D - JVS Series with optical Elio contacts



## Adaptor for standard backshells

### Elio - ABA

Shell size:

09 - 11 - 13 - 25

XX XX

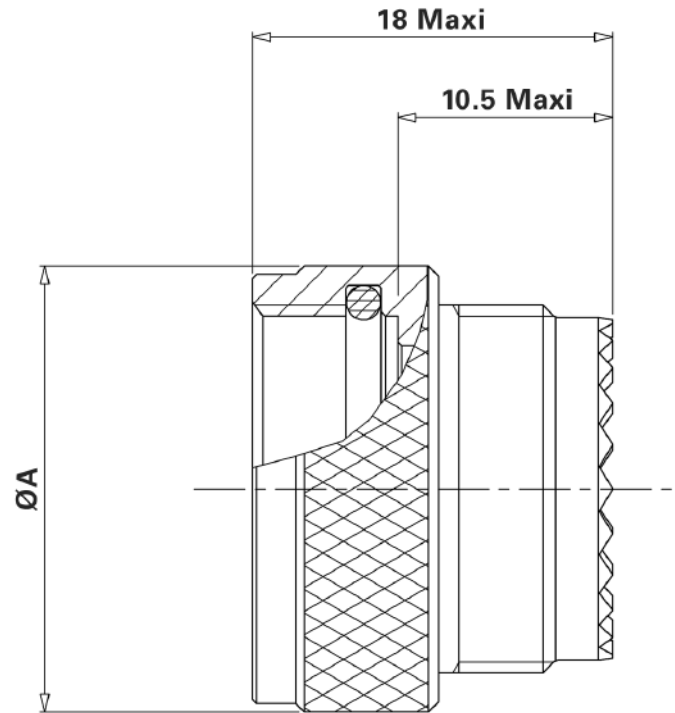
Plating:

W: Olive drab cadmium

F: Nickel

Note : Backshells adaptor is placed between connector and standard backshell.

Shell size	Ø A Maxi	B Thread
09	20	M12 x 1-6g
11	20	M15 x 1-6g
13	23	M18 x 1-6g
25	48	M37 x 1-6g



## Tooling data

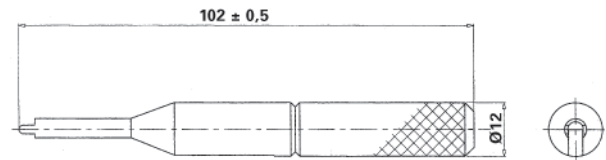
### Insertion and extraction tool

For the terminus with boot



P/N : ELI1-0231A

For the terminus without boot



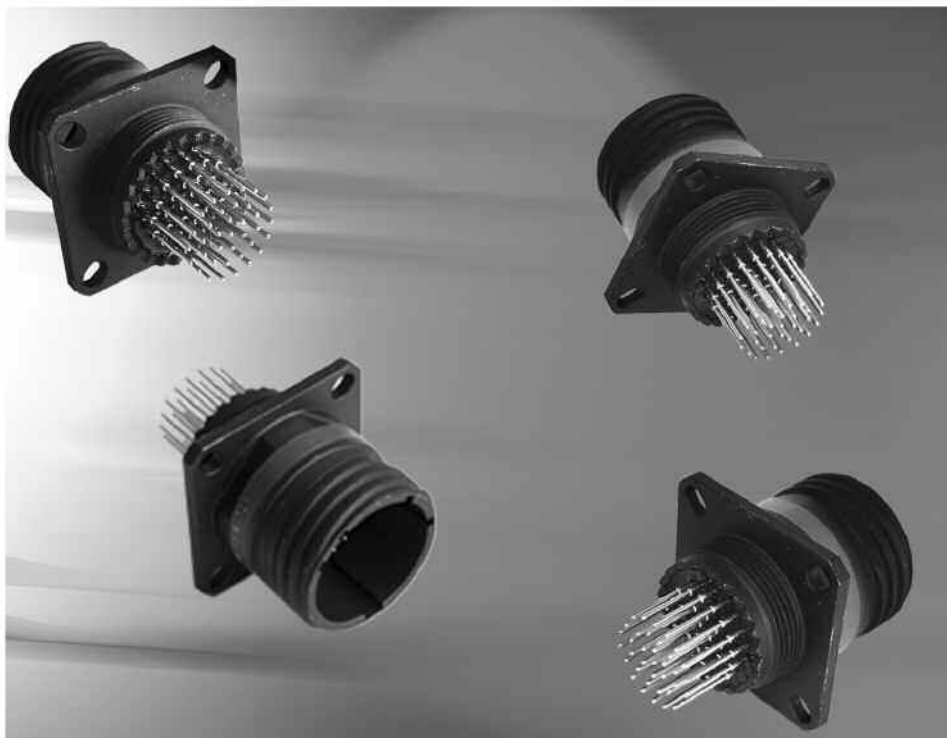
P/N : 80WV0049A



## Notes



## 8D reinforced sealing series



Derived from:  
MIL-DTL-38999 Serie III

# 8D reinforced sealing series



## Description

- Reinforced sealing receptacle with male or female straight spill contacts.
- High hermeticity performance:  $10^{-7}$  atm.cm<sup>3</sup>/s
- 100 % scoop proof.
- High density connectors.
- Lower profile for compactness.
- Weight saving compared to hermetic version.
- Reinforced sealing for harsh environments.
- Good shock resistance.

## Layouts

### Arrangements / Layouts

All 8D layouts can be manufactured with Resin sealed (except power).

### Ordering information

After the basic series "8D", related to the digit "R" (8D+R...).

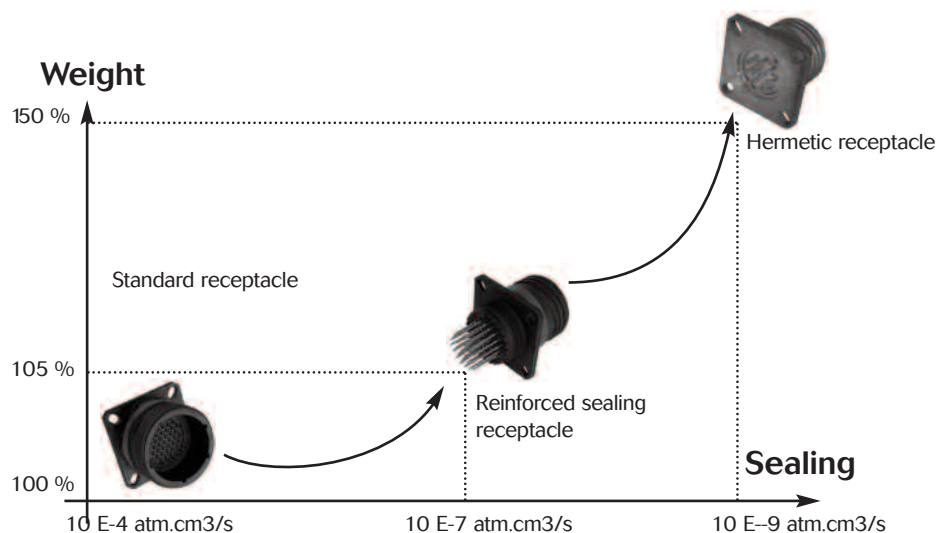
Don't forget the digit related to the spill length (C, M, L, S).

### Examples:

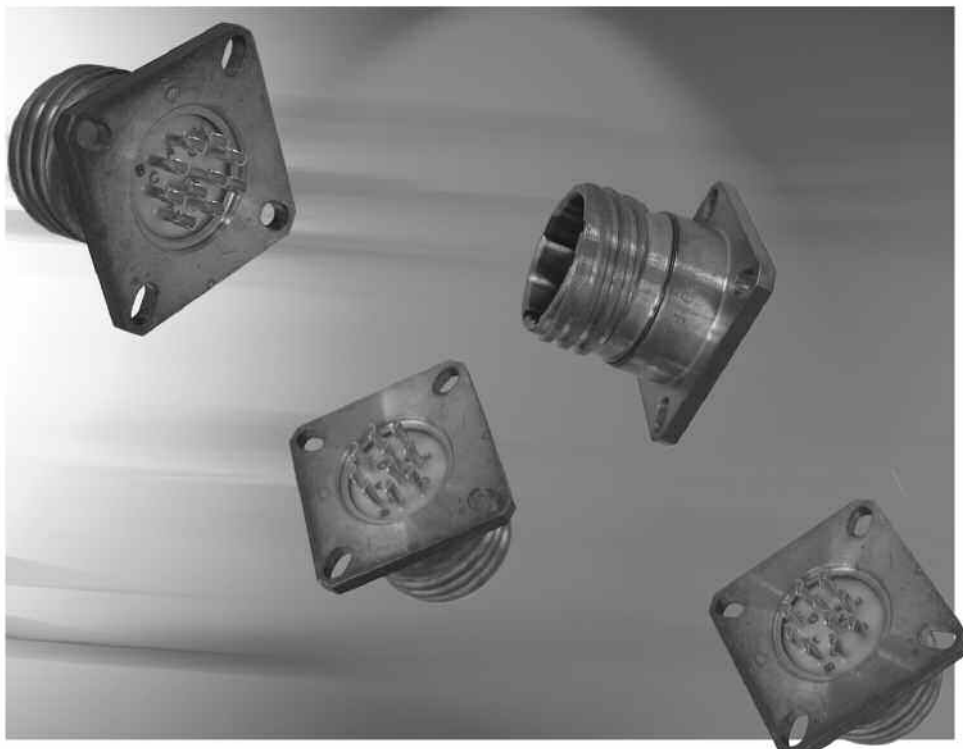
8D (Alu) = 8DR 0 C 13 W 35 PN

8D (Titane) = 8DR 7 L 13 TT 35 PN

## Comparison between standard, reinforced sealing and hermetic version

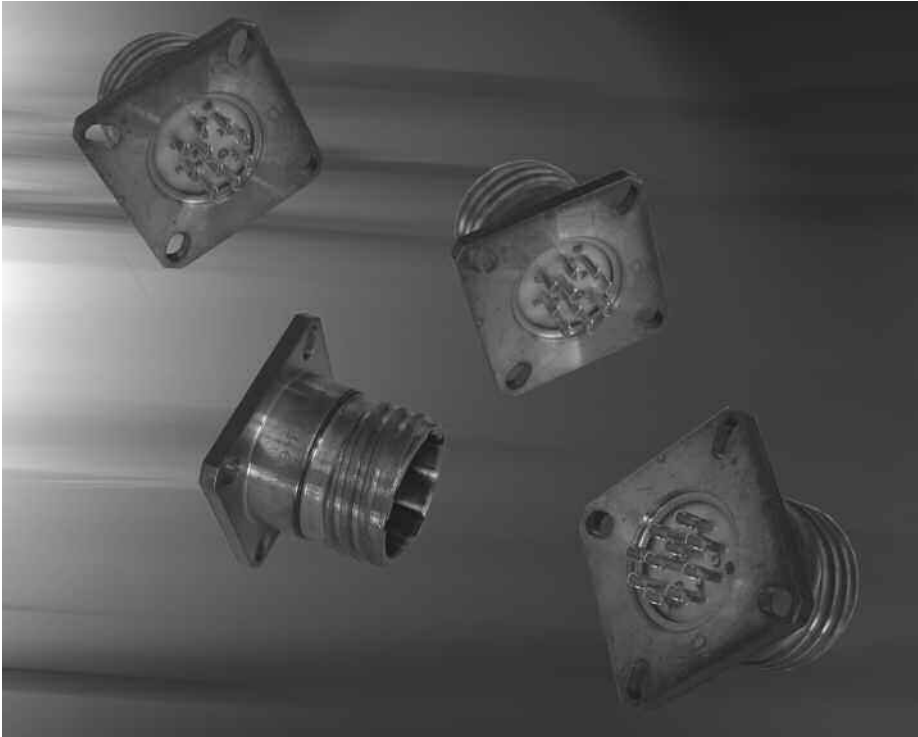


# F 38999 Hermetic



Derived from:  
MIL-DTL-38999 Serie III

# F 38999 Hermetic



## Description

### As per MIL-DTL 38999

- Glass insulator
- High hermeticity performance
- Ideal for high pressure environments
- Low profile

## Technical features

### Mechanical

- **Shell:** stainless steel
- **Shell plating:** passivated
- **Interfacial seal:** silicone elastomer
- **Contacts:** gold
- **Endurance:** 500 operations
- **Hermeticity:**  
no leakage in excess of  $10^{-7}$  cm<sup>3</sup>/s

### Electrical

- **Test voltage rating:**

Service	Sea level	At 2100 m
M	1 300	800
I	1 800	1 000

- **Shielding:** 45 dB at 10 GHz
- **Insulation resistance:**  
5000 m $\Omega$  (under 500 Vdc)
- **Current rating:**

Contact size	Rating (A)
# 22 D	3
# 20	5
# 16	10
# 12	17

### Environmental

- **Temperature:** -65°C at 200°C
- **Salt spray:** per MIL DTL 38999

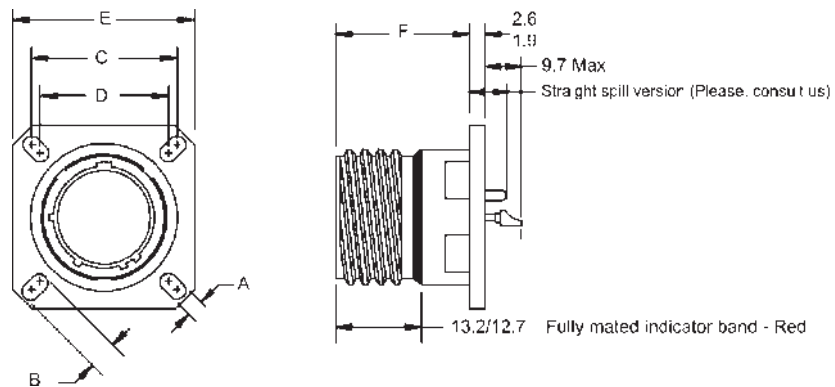
# F 38999 Hermetic



## Ordering information

<b>Basic Series</b>	<b>F38999</b>	<b>21</b>	<b>Y</b>	<b>A</b>	<b>35</b>	<b>P</b>	<b>N</b>	<b>WF</b>	<b>-</b>
<b>Shell style:</b>									
21: Box mounting flange receptacle									
23: Jam nut receptacle									
25: Solder mounting receptacle									
<b>Class:</b>									
Y: Passivated stainless steel									
<b>Shell size:</b>									
A: 09 B: 11 C: 13 D: 15 E: 17 F: 19 G: 21 H: 23 J: 25									
<b>Layout:</b>									
See page 11									
<b>Contact types:</b>									
P: Male solder cup									
C: Male straight spill (please consult us)									
<b>Orientation:</b>									
N, A, B, C, D, E (See page 58)									
WF: Mandatory suffix									
<b>Specification:</b>									
None for standard product									

### Box mounting flange receptacle (type 21)



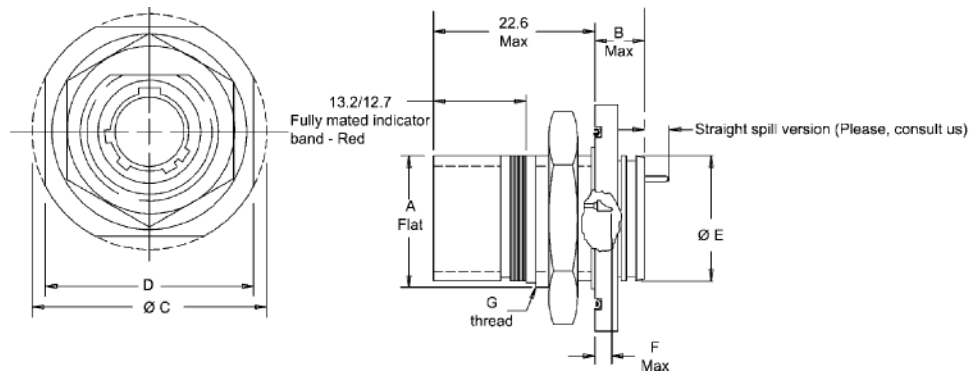
Shell size	A ± 0.20	B ± 0.20	C	D	E ± 0.30	F Max.
A (9)	3.25	5.49	18.26	15.09	23.80	21.40
B (11)	3.25	4.93	20.62	18.26	26.20	21.40
C (13)	3.25	4.93	23.01	20.62	28.60	21.40
D (15)	3.25	4.93	24.61	23.01	31.00	21.40
E (17)	3.25	4.93	26.97	24.61	33.30	21.40
F (19)	3.25	4.93	29.36	26.97	36.50	21.40
G (21)	3.25	4.93	31.75	29.36	39.70	21.40
H (23)	3.91	6.15	34.93	31.75	42.90	21.40
J (25)	3.91	6.15	38.10	34.93	46.00	21.40

Dimensions in millimeters

# F 38999 Hermetic

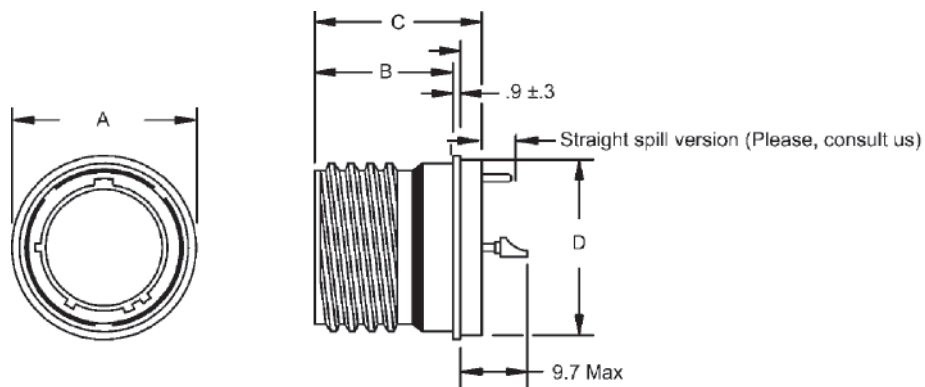


## Jam nut receptacle type 23



Shell size	A flat $+ .10$ $- .15$	B Max.	$\text{Ø C} \pm .3$	$\text{Ø D} \pm .4$	$\text{Ø E} \pm .3/0$	F Max.	G thread
<b>A (9)</b>	16.53	9.10	30.20	27.00	16.30	5.30	M17 x 1-6g
<b>B (11)</b>	19.07	9.10	34.90	31.80	19.40	5.30	M20 x 1-6g
<b>C (13)</b>	23.82	9.10	38.10	34.90	22.70	5.10	M25 x 1-6g
<b>D (15)</b>	26.97	9.10	41.30	38.10	25.90	5.10	M28 x 1-6g
<b>E (17)</b>	30.15	9.10	44.50	41.30	29.00	5.10	M32 x 1-6g
<b>F (19)</b>	33.32	9.70	49.20	46.00	32.20	5.10	M35 x 1-6g
<b>G (21)</b>	36.50	9.70	52.40	49.20	35.40	5.10	M38 x 1-6g
<b>H (23)</b>	39.67	9.70	55.60	52.40	38.60	5.10	M41 x 1-6g
<b>J (25)</b>	42.85	9.70	58.70	55.60	41.70	5.10	M44 x 1-6g

## Solder mounting receptacle (type 25)



Shell size	$\text{Ø A}$ Max.	B Max.	C Max.	D Max.
<b>A (9)</b>	19.40	17.20	23.80	17.10
<b>B (11)</b>	21.80	17.20	23.80	19.90
<b>C (13)</b>	24.90	17.20	23.80	23.10
<b>D (15)</b>	28.10	17.20	23.80	26.20
<b>E (17)</b>	31.30	17.20	23.80	29.40
<b>F (19)</b>	33.60	17.20	23.80	31.80
<b>G (21)</b>	36.80	17.20	23.80	35.00
<b>H (23)</b>	40.00	17.20	24.60	38.20
<b>J (25)</b>	43.20	17.20	24.60	41.30

Dimensions in millimeters



# 8D Series with RJ45 USB



Derived from:  
MIL-DTL-38999 Serie III

# 8D Series with RJ45 USB



## Description

- Derived from MIL-DTL-38999 Serie III
- True ruggedized RJ45 & USB A solution
- High vibration resistance
- Shock resistant
- IP67
- Shielded
- No tools for cabling

## Application

- Data transmission using standard interface.
- Flight data transmissions.

## Technical features

### Mechanical

- **Aluminium:**
- **Composite:**
- **Shell:** aluminium alloy or carbon reinforced thermoplastic
- **Shell plating:**
  - nickel or olive green cadmium
  - composite no protection
- **Insert:** thermoplastic
- **Endurance:** 500 matings
- **Vibration:** 10-500 Hz 20 g

- **RJ 45 receptacle jack:**
- **USB A jack receptacle:**

### Electrical

- **RJ45:** - 10 BaseT, 100 BaseTX and 1000 BaseT Networks cat 5<sup>e</sup> per TIA/EIA 568 A/B
- **USB serie A:** meet all requirement of the "Universal serial bus specification" (revision 2)

### Environmental

- **Meets MIL-DTL-38999 Excepted:**
- **Sealing:** IP67 with cap MIL-DTL-38999
- **Temperature:** -40°C at 85°C

### Fluid resistance

- **Meets MIL-DTL-38999 Excepted:**  
**with a cap**  
Backshells and caps  
Per AS85049 or equivalent sold separately

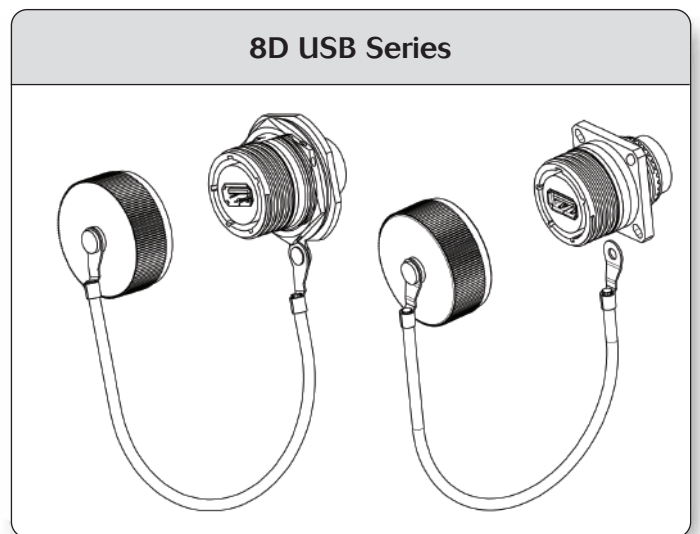
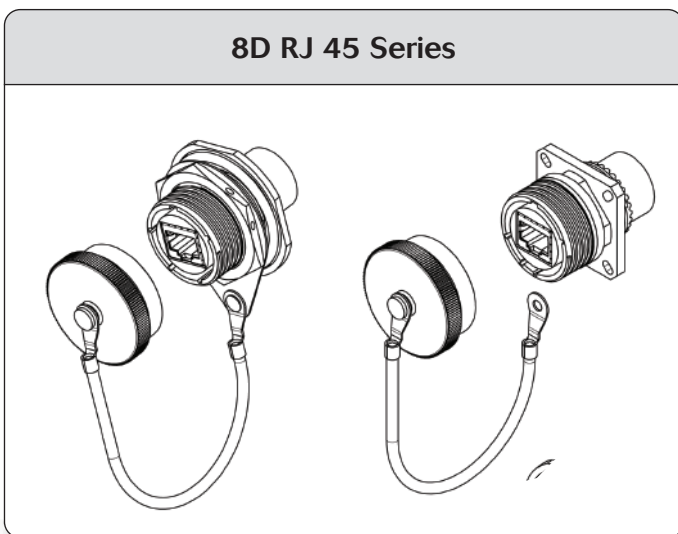
NB: No tools for cabling

# 8D Series with RJ45 USB



## Ordering information

<b>Basic Series</b>	<b>8D</b>	<b>0</b>	<b>F</b>	<b>19</b>	<b>W</b>	<b>RJ</b>	<b>S</b>	<b>N</b>	<b>***</b>
<b>Shell style:</b> <b>0:</b> square flange receptacle <b>5:</b> plug <b>7:</b> jam nut receptacle (Aluminium only)									
<b>Designator:</b> <b>F:</b> feedthrough <b>S:</b> solder out <b>C:</b> Pigtail cable receptacle <b>P:</b> Pigtail cable plug									
<b>Shell size:</b> <b>17:</b> USB <b>19:</b> RJ 45									
<b>Plating:</b> <b>W:</b> cadmium / olive drab cadmium (Aluminium) <b>F:</b> nickel (Aluminium) <b>X:</b> no plating (composite) <b>J:</b> cadmium / olive drab cadmium (composite) <b>M:</b> nickel / nickel (composite) <b>L:</b> black zinc (Aluminium) - Please, consult us									
<b>Insert:</b> <b>RJ:</b> RJ 45 <b>UA:</b> USB type A									
<b>Contact style:</b> <b>S:</b> receptacle <b>P:</b> plug									
<b>Keying:</b> <b>N, A, B, C, D, E</b> (See page 58)									
<b>Cable length:</b> inches required for type C Please, consult us for cable lengths & end connectors									

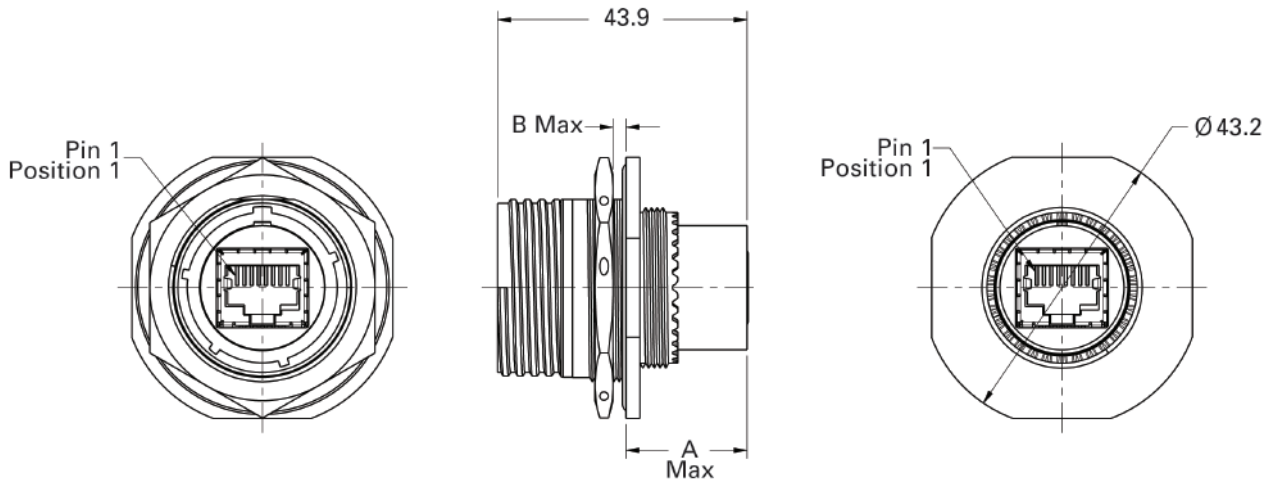


# 8D Series with RJ45 USB



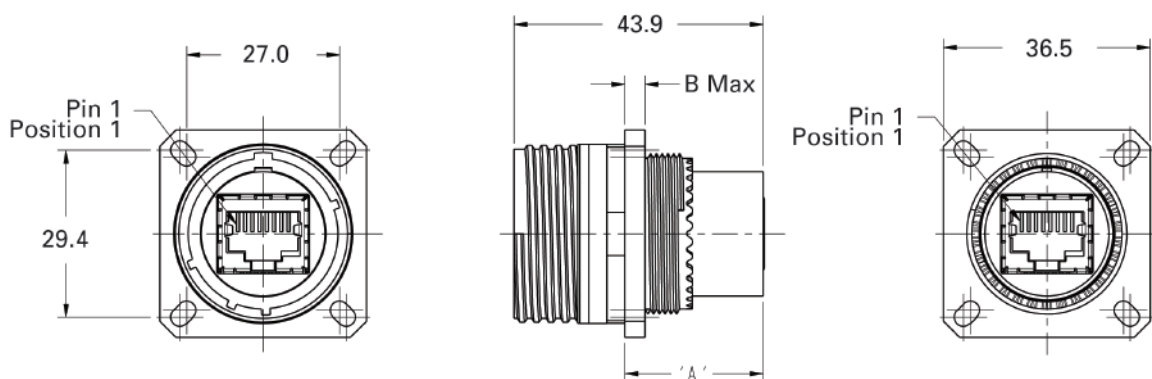
## RJ 45 Feedthrough serie

### Jam nut receptacle



Shell type	A Max.	B Max.
Aluminium	21.34	3.20

### Square flange receptacle



Shell type	A Max.	B Max.
Aluminium	21.34	3.20
Composite	21.34	3.20

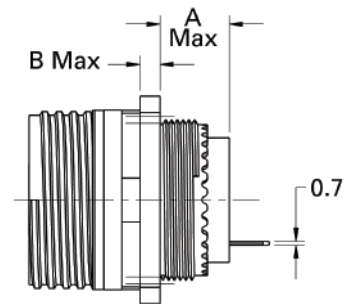
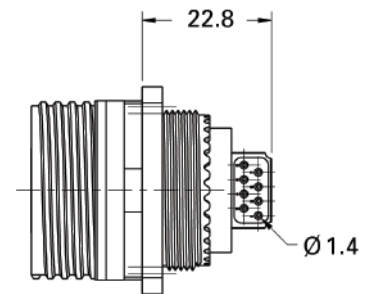
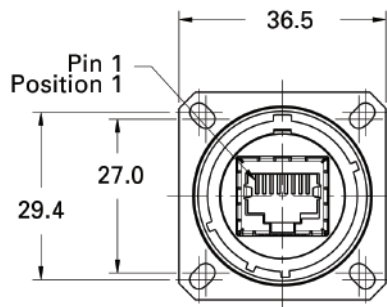
# 8D Series with RJ45 USB



## RJ45 Solder out serie

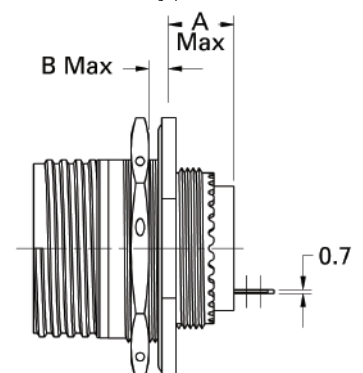
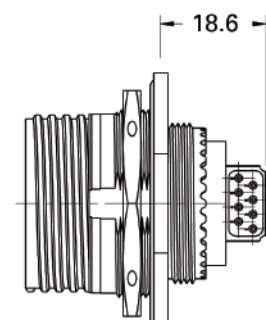
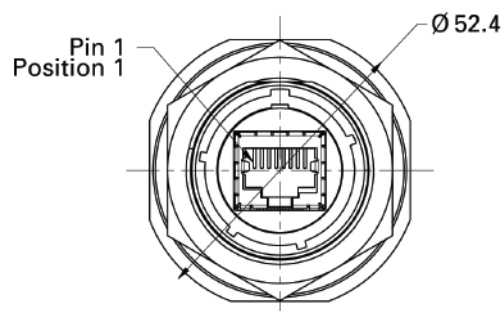
### Suare flange receptacle

Shell type	A Max.	B Max.
Aluminium	11.91	2.50
Composite	12.14	3.65



### Jam nut receptacle

Shell type	A Max.	B Max.
Aluminium	12.70	3.20

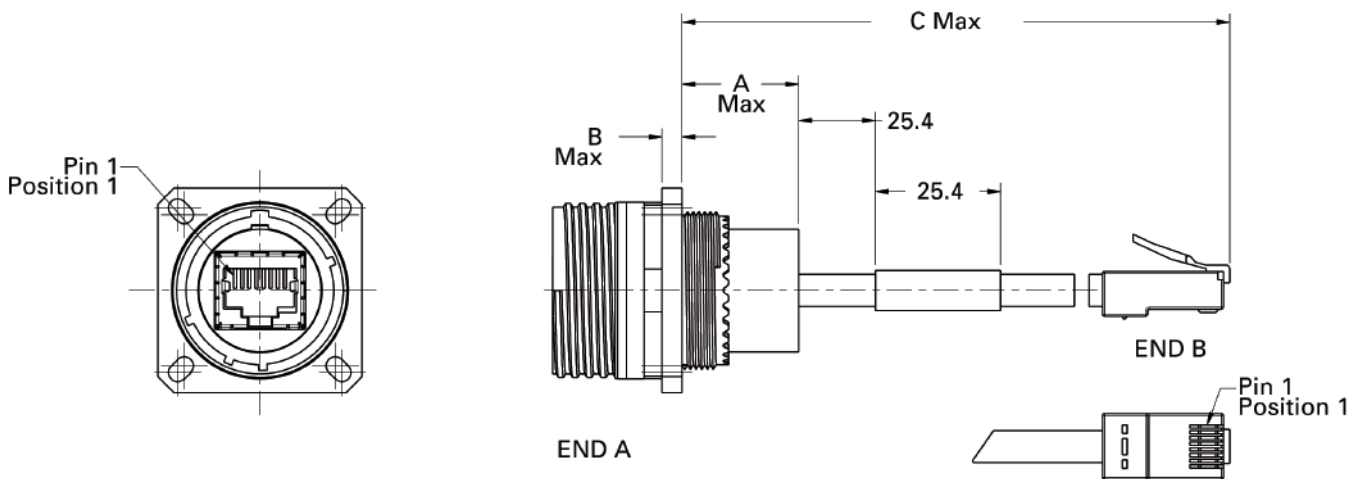


# 8D Series with RJ45 USB



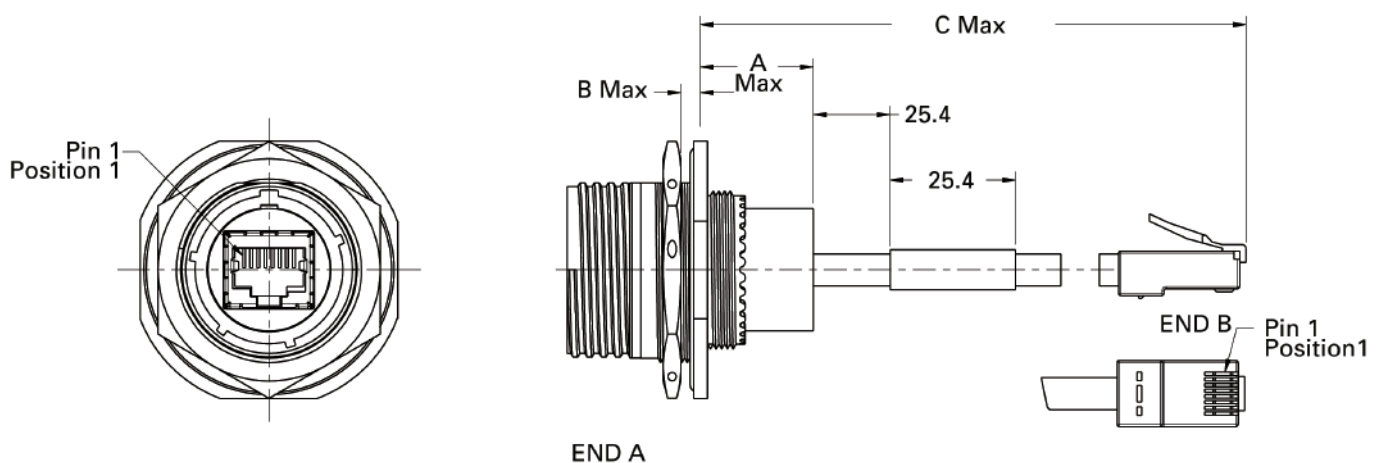
## RJ45 Pigtail serie

### Suare flange receptacle



Shell type	A Max.	B Max.	C Max.
Aluminium	20.78	2.50	304.80 ±25.4
Composite	20.78	3.65	304.80 ±25.4

### Jam nut receptacle



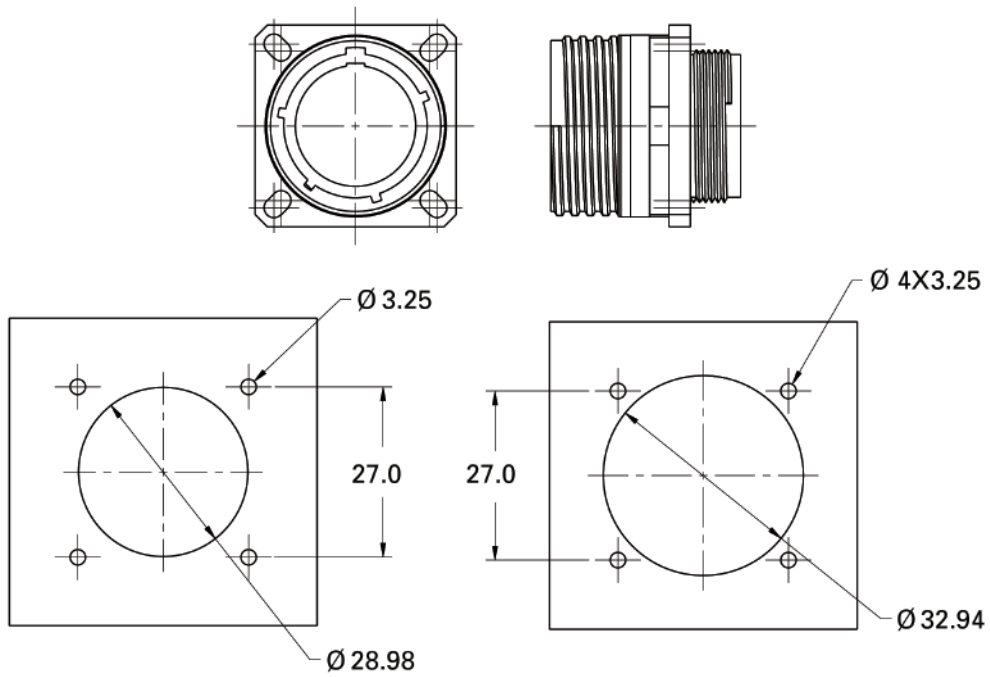
Shell type	A Max.	B Max.	C Max.
Aluminium	21.34	3.20	304.80 ±25.4

# 8D Series with RJ45 USB

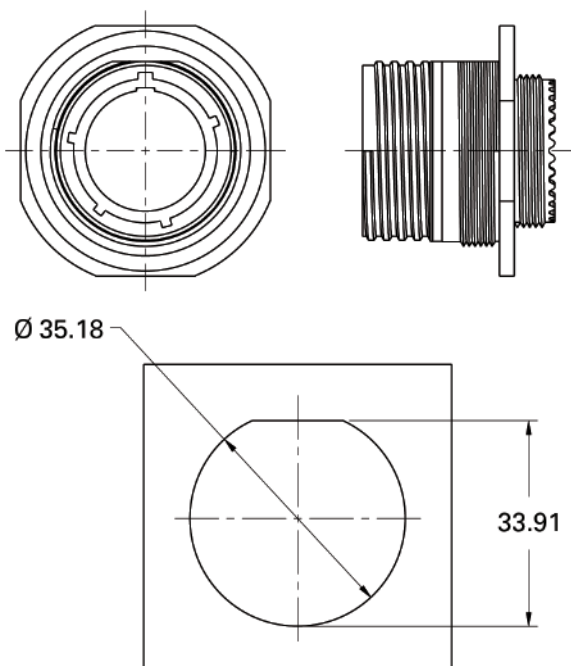


## Panel cut out for RJ45 serie

### Suare flange receptacle



### Jam nut receptacle

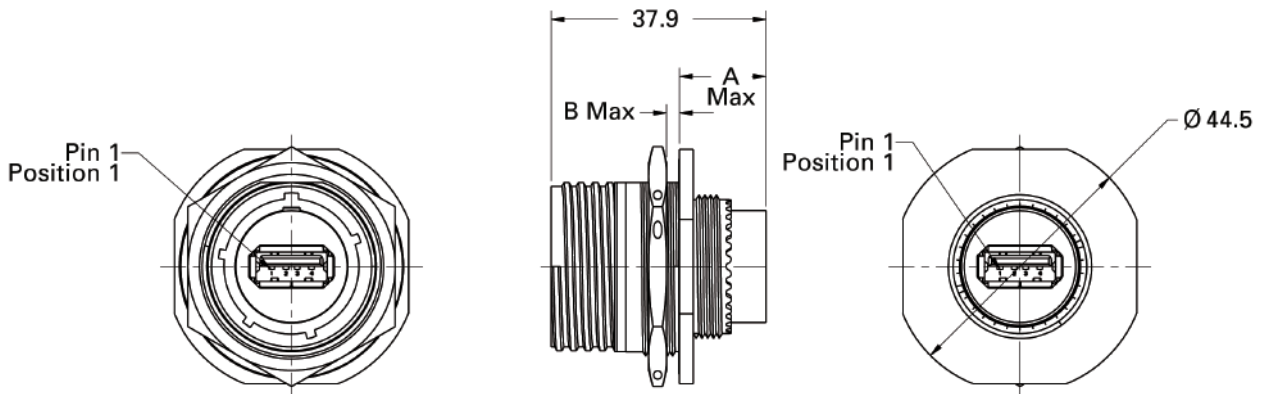


# 8D Series with RJ45 USB



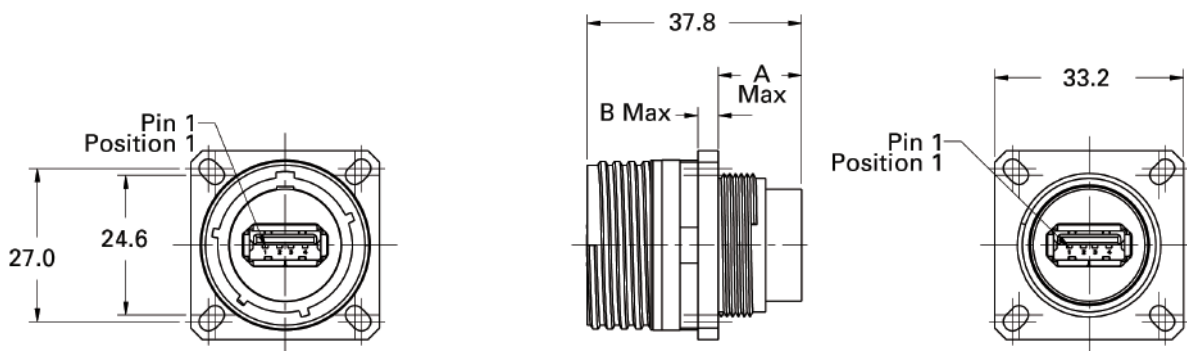
## USB Feedthrough serie

### Jam nut receptacle



Shell type	A Max.	B Max.
Aluminium	15.24	3.20

### Square flange receptacle



Shell type	A Max.	B Max.
Aluminium	4.45	2.50
Composite	4.88	3.85



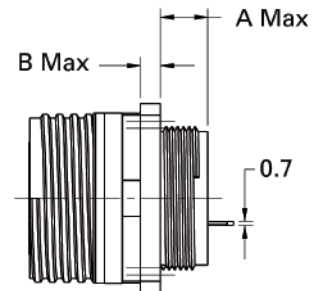
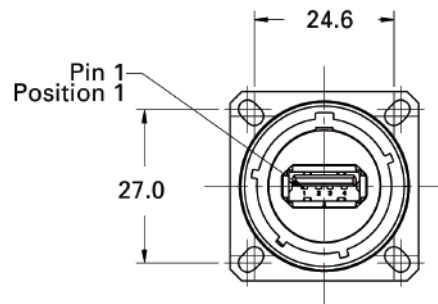
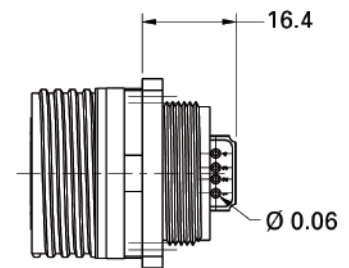
# 8D Series with RJ45 USB



## USB Solder out serie

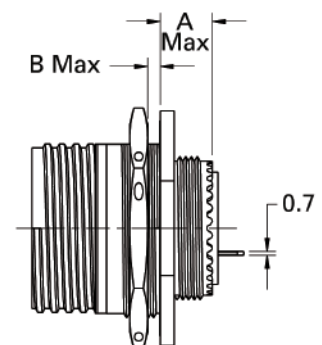
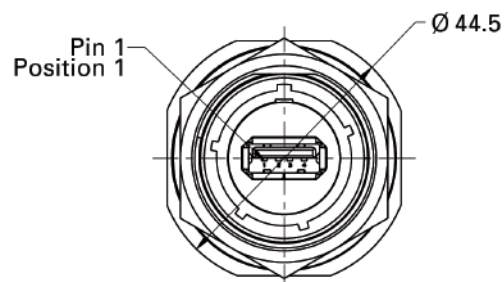
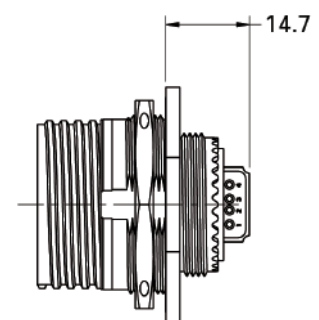
### Suare flange receptacle

Shell type	A Max.	B Max.
Aluminium	8.10	2.50
Composite	8.33	3.65



### Jam nut receptacle

Shell type	A Max.	B Max.
Aluminium	11.94	3.20

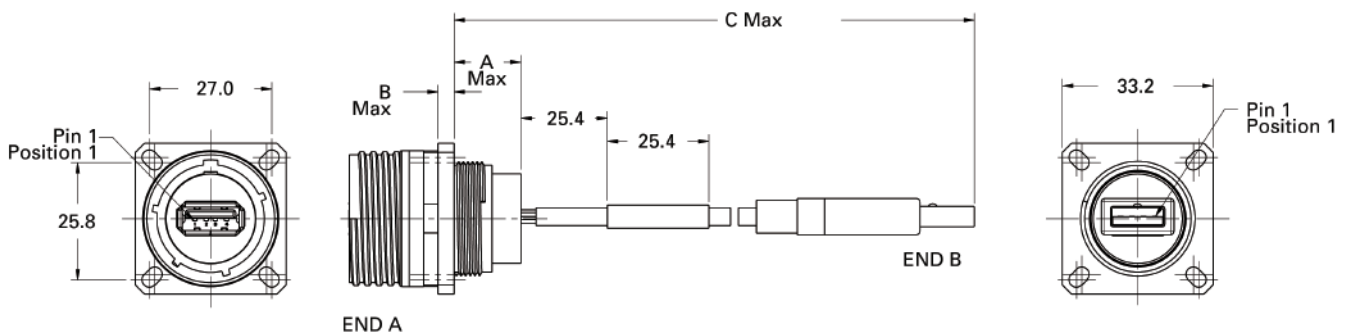


# 8D Series with RJ45 USB



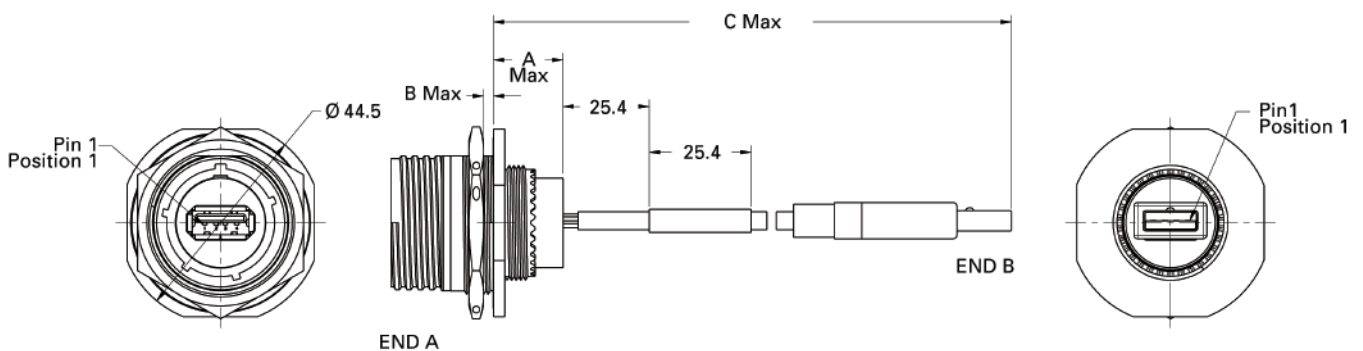
## USB Pigtail serie

### Suare flange receptacle



Shell type	A Max.	B Max.	C Max.
Aluminium	14.45	2.50	304.80 ±25.4
Composite	14.68	3.65	304.80 ±25.4

### Jam nut receptacle



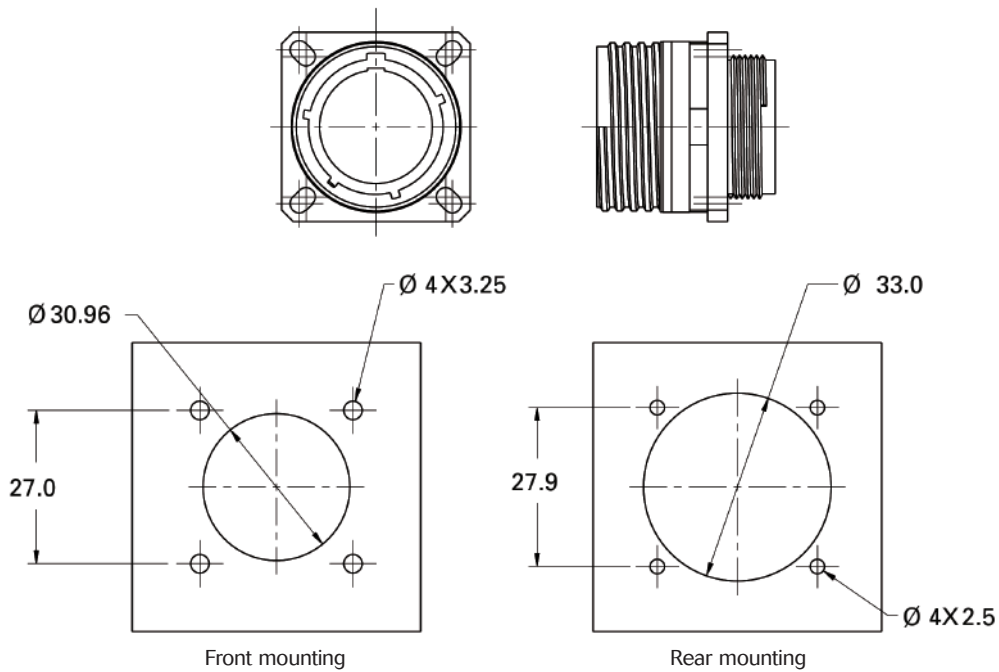
Shell type	A Max.	B Max.	C Max.
Aluminium	15.24	3.20	304.80 ±25.4

# 8D Series with RJ45 USB

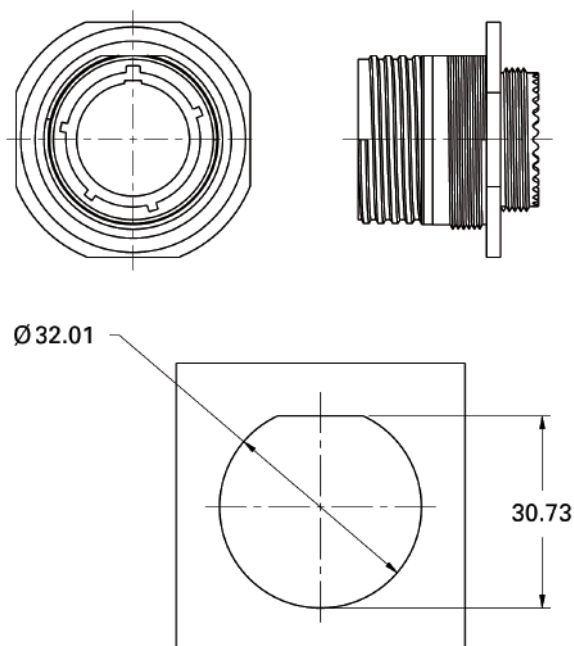


## Panel cut out for USB serie

### Suare flange receptacle



### Jam nut receptacle



# Coordinates for straight spill terminations



## Cavity identification – Viewed from front face of male insulator

Hole sizes: 1 mm min. (#22 and 20 contacts) and 1,3 mm min. (# 16 contact) coordinates in mm.

**9**

**35**

**98**

Contact	Coordinates	
	X	Y
1	+1.14	+1.98
2	+1.98	-1.14
3	0.00	-2.29
4	-1.98	-1.14
5	-1.14	+1.98
6	0.00	0.00

Contact	Coordinates	
	X	Y
1	+1.65	+0.97
2	0.00	-1.90
3	-1.65	+0.97

**11**

**02**

Contact	Coordinates	
	X	Y
1	0.00	+2.41
2	0.00	-2.41

**35**

Contact	Coordinates	
	X	Y
1	0.00	+3.71
2	+2.16	+3.00
3	+3.50	+1.14
4	+3.50	-1.14
5	+2.16	-2.99
6	0.00	-3.71
7	-2.16	-2.99

**98**

Contact	Coordinates	
	X	Y
A	0.00	+3.30
B	+3.30	0.00
C	+1.65	-2.87
D	-1.65	-2.87
E	-3.30	0.00
F	0.00	0.00

**99**

Contact	Coordinates	
	X	Y
A	+1.65	+2.85
B	+3.30	0.00
C	+1.65	-2.87
D	-1.65	-2.87
E	-3.30	0.00
F	-1.65	+2.87
G	0.00	0.00

**05**

Contact	Coordinates	
	X	Y
A	+1.65	+1.42
B	+2.86	-1.65
C	0.00	-3.30
D	-2.86	-1.65
E	-1.65	+1.42

**04**

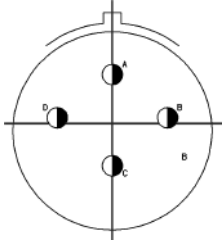
Contact	Coordinates	
	X	Y
A	+1.65	+1.65
B	+1.65	-1.65
C	-1.65	-1.65
D	-1.65	+1.65

# Coordinates for straight spill terminations



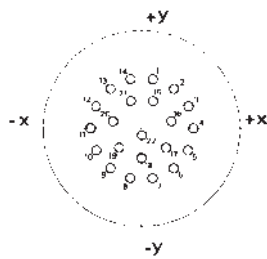
13

04



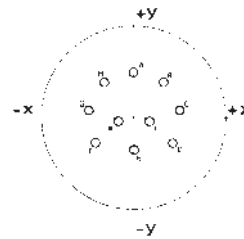
Contact	Coordinates	
	X	Y
A	0.00	+3.81
B	+3.71	+0.89
C	0.00	-2.11
D	-3.71	-0.89

35



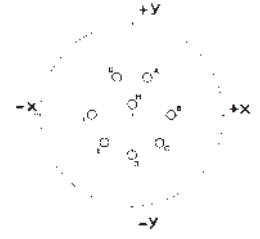
Contact	Coordinates	
	X	Y
1	+1.14	+5.00
2	+3.20	+4.01
3	+4.62	+2.24
4	+5.15	0.00
5	+4.62	-2.24
6	+3.20	-4.01
7	+1.14	-5.00
8	-1.14	-5.00
9	-3.20	-4.01
10	-4.62	-2.24
11	-5.15	0.00

98



Contact	Coordinates	
	X	Y
12	-4.62	+2.24
13	-3.20	+4.01
14	-1.14	+5.00
15	+1.14	+2.72
16	+2.97	+0.66
17	+2.36	-1.91
18	0.00	-3.05
19	-2.36	-1.91
20	-2.97	+0.66
21	-1.14	+2.72
22	0.00	-0.76

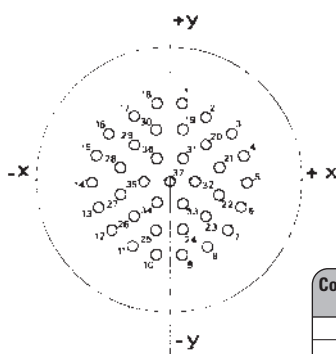
08



Contact	Coordinates	
	X	Y
A	+1.65	+3.99
B	+4.32	0.00
C	+3.05	-3.05
D	0.00	-4.32
E	-3.05	-3.05
F	-4.32	0.00
G	-1.65	+3.99
H	0.00	+1.12

15

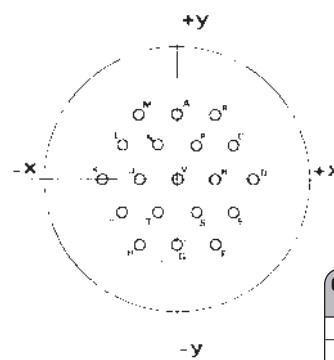
35



Contact	Coordinates	
	X	Y
1	+1.14	+6.65
2	+3.12	+5.51
3	+5.36	+4.06
4	+6.45	+2.03
5	+6.76	-0.25
6	+6.27	-2.49
7	+5.08	-4.44
8	+3.30	-5.89
9	+1.14	-6.65
10	-1.14	-6.65
11	-3.30	-5.89
12	-5.08	-4.44
13	-6.27	-2.49
14	-6.76	-0.25
15	-6.45	+2.03
16	-5.36	+4.06

Contact	Coordinates	
	X	Y
17	-3.12	+5.51
18	-1.14	+6.65
19	+1.14	+4.37
20	+3.12	+3.02
21	+4.32	+1.02
22	+4.32	-1.27
23	+3.12	-3.23
24	+1.14	-4.37
25	-1.14	-4.37
26	-3.12	-3.23
27	-4.32	-1.27
28	-4.32	+1.02
29	-3.12	+3.02
30	-1.14	+4.37
31	+1.14	+1.88
32	+2.29	-0.10
33	+1.14	-2.08
34	-1.14	-2.08
35	-2.29	-0.10
36	-1.14	+1.88
37	0.00	-0.10

19



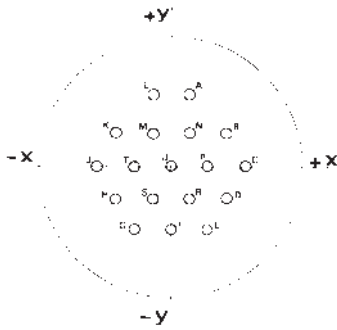
Contact	Coordinates	
	X	Y
A	0.00	+5.72
B	+3.30	+5.72
C	+4.95	+2.72
D	+6.60	0.00
E	+4.95	-2.87
F	+3.30	-5.72
G	0.00	-5.72
H	-3.30	-5.72
J	-4.95	-2.87
K	-6.60	0.00
L	-4.95	+2.87
M	-3.30	+5.72
N	-1.65	+2.87
P	+1.65	+2.87
R	+3.30	0.00
S	+1.65	-2.87
T	-1.65	-2.87
U	-3.30	0.00
V	0.00	0.00

# Coordinates for straight spill terminations



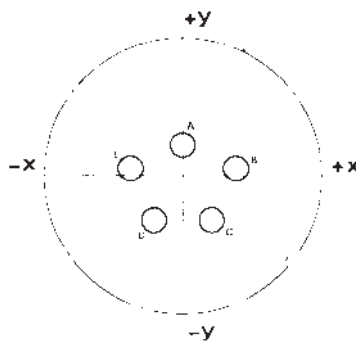
15

18



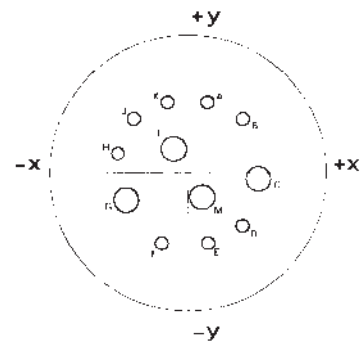
Contact	Coordinates		Contact	Coordinates	
	X	Y		X	Y
A	+1.65	+6.40	K	-4.95	+2.87
B	+4.95	+2.87	L	-1.65	+6.40
C	+6.60	0.00	M	-1.65	+2.87
D	+4.95	-2.87	N	+1.65	+2.87
E	+3.30	-5.72	P	+3.30	0.00
F	0.00	-5.72	R	+1.65	-2.87
G	-3.30	-5.72	S	-1.65	-2.87
H	-4.95	-2.87	T	-3.30	0.00
J	-6.60	0.00	U	0.00	0.00

05



Contact	Coordinates	
	X	Y
A	0	+2.54
B	+4.42	+0.61
C	+2.39	+3.76
D	-2.39	-3.76
E	-4.42	+0.61

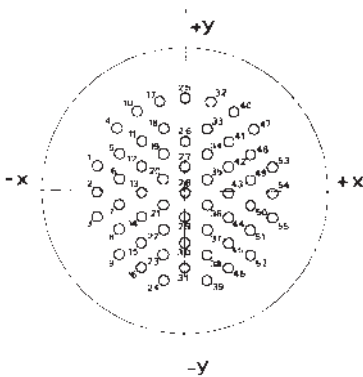
97



Contact	Coordinates		Contact	Coordinates	
	X	Y		X	Y
A	+1.65	+5.94	G	-5.26	-2.41
B	+4.52	+4.52	H	-5.94	+1.65
C	+5.84	-0.58	J	-4.52	+4.52
D	+4.52	-4.52	K	-1.65	+5.94
E	+1.65	-5.94	L	-1.19	+2.06
F	-2.26	-5.97	M	+1.19	-2.06

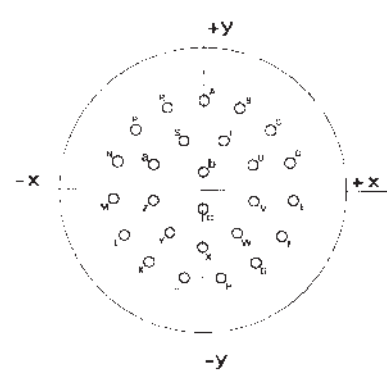
17

35



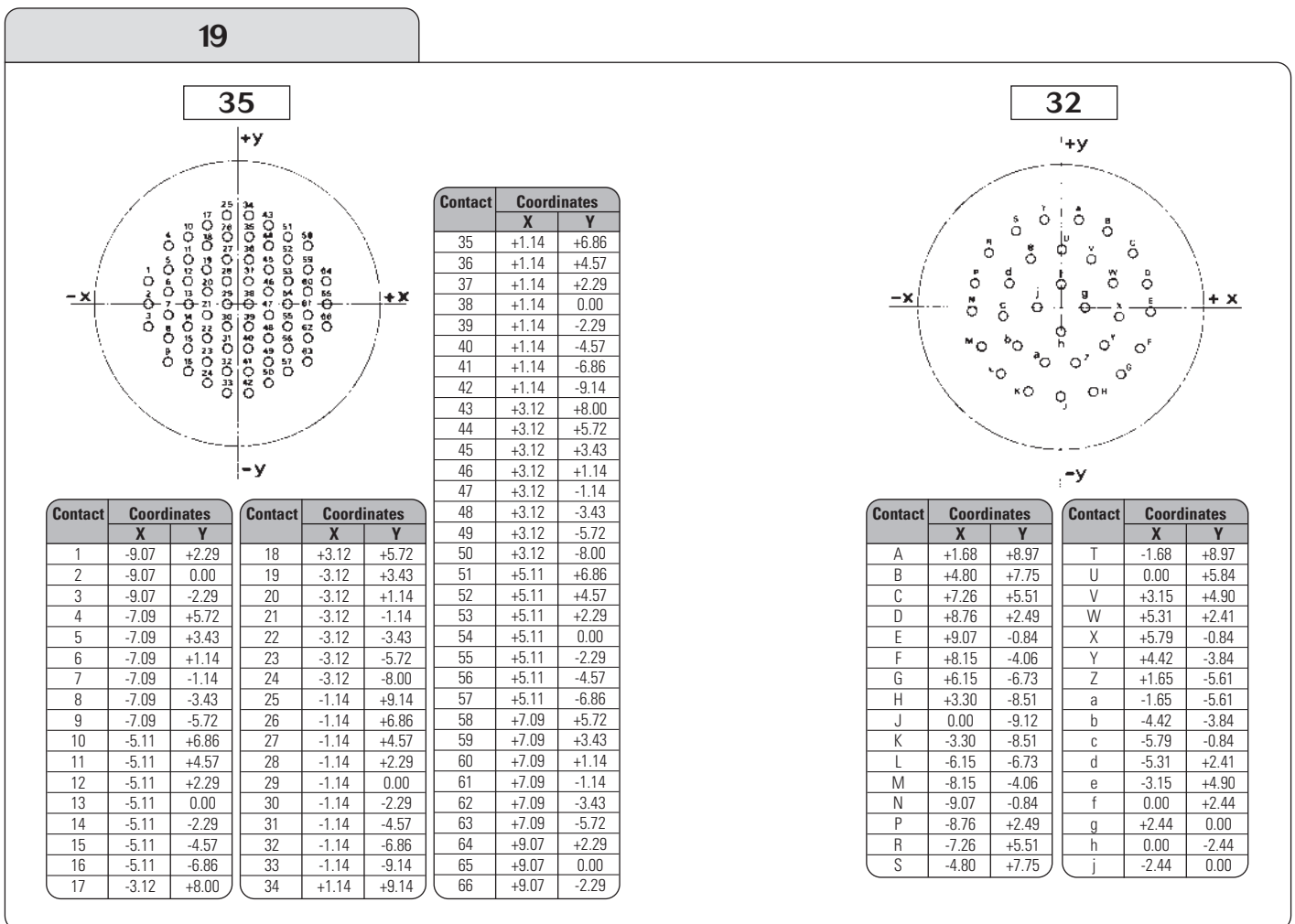
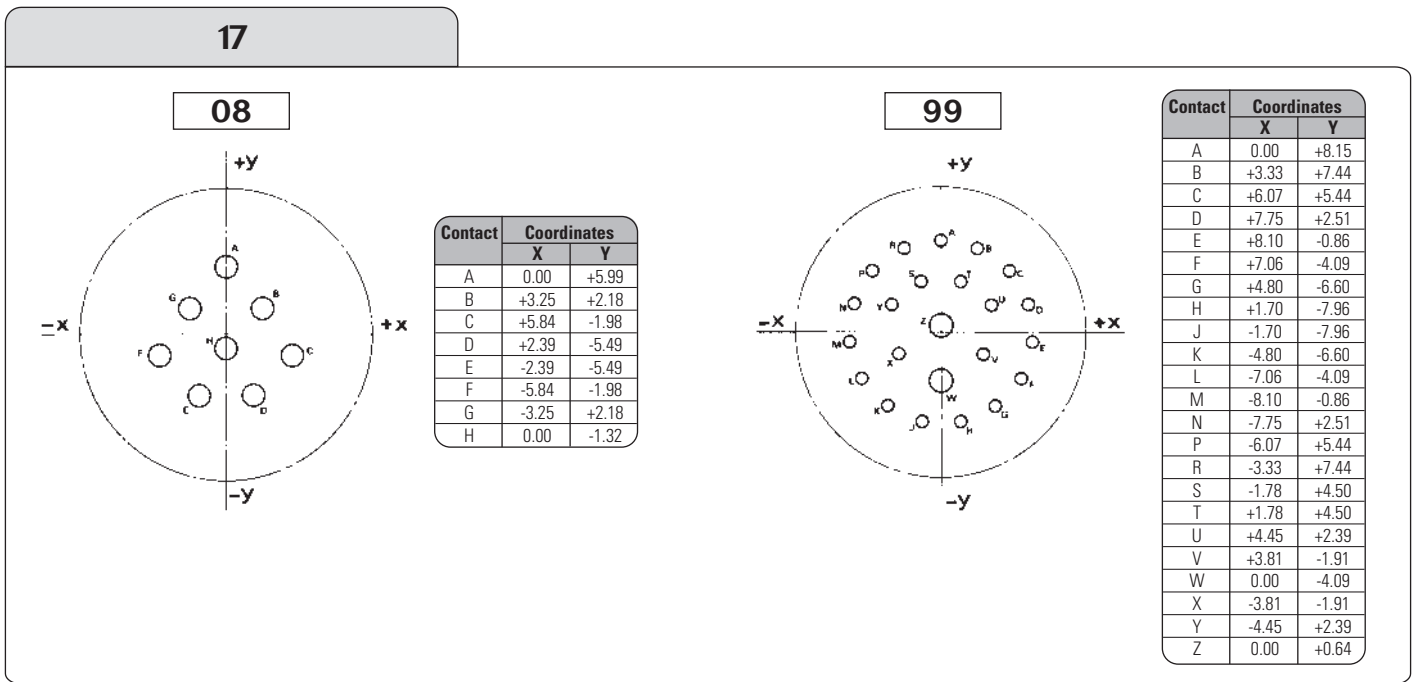
Contact	Coordinates		Contact	Coordinates	
	X	Y		X	Y
1	-7.92	+2.18	14	-3.96	-2.39
2	-7.92	-0.10	15	-3.96	-4.67
3	-7.92	-2.39	16	-3.96	-6.96
4	-6.15	+5.61	17	-2.26	+8.03
5	-5.94	+3.33	18	-1.98	+5.61
6	-5.94	+1.04	19	-1.98	+3.33
7	-5.94	+1.24	20	-1.98	+1.04
8	-5.94	-3.53	21	-1.98	-1.24
9	-5.94	-5.82	22	-1.98	-3.53
10	-4.37	+7.09	23	-1.98	-5.82
11	-3.96	+4.47	24	-1.98	+8.10
12	-3.96	+2.18	25	0.00	+8.36
13	-3.96	-0.10	26	0.00	+4.47
27	0.00	+2.18	40	+4.37	+7.09
28	0.00	-0.10	41	+3.96	+4.47
29	0.00	-2.39	42	+3.96	+2.18
30	0.00	-4.67	43	+3.96	-0.10
31	0.00	-6.96	44	+3.96	-2.39
32	+2.26	+8.03	45	+3.96	-4.67
33	+1.98	+5.61	46	+3.96	-6.96
34	+1.98	+3.33	47	-6.15	+5.61
35	+1.98	+1.04	48	+5.94	+3.33
36	+1.98	-1.24	49	+5.94	+1.04
37	+1.98	-3.53	50	+5.94	-1.24
38	+1.98	-5.82	51	+5.94	-3.53
39	+1.98	-8.10	52	+5.94	-5.82
40	+4.37	+7.09	53	+7.92	+2.18
41	+3.96	+4.47	54	+7.92	-0.10
42	+3.96	+2.18	55	+7.92	-2.39

26



Contact	Coordinates		Contact	Coordinates	
	X	Y		X	Y
A	0.00	+8.15	P	-6.07	+5.44
B	+3.33	+7.44	R	-3.33	+7.44
C	+6.07	+5.44	S	-1.78	+4.50
D	+7.75	+2.51	T	+1.78	+4.50
E	+8.10	-0.86	U	+4.45	+2.39
F	+7.06	-4.09	V	+4.53	+0.91
G	+4.80	-6.60	W	+3.02	-3.84
H	+1.70	-7.98	X	0.00	-5.16
J	-1.70	-7.98	Y	-3.02	-3.84
K	-4.80	-6.60	Z	-4.53	-0.91
L	-7.06	-4.09	a	-4.45	+2.39
M	-8.10	-0.86	b	0.00	+1.65
N	-7.75	+2.51	c	0.00	-1.65

# Coordinates for straight spill terminations

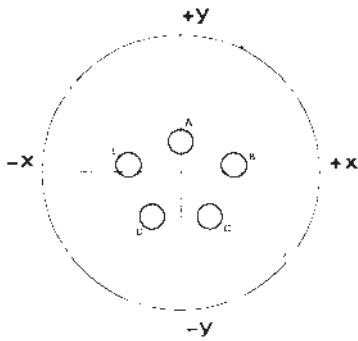


# Coordinates for straight spill terminations



19

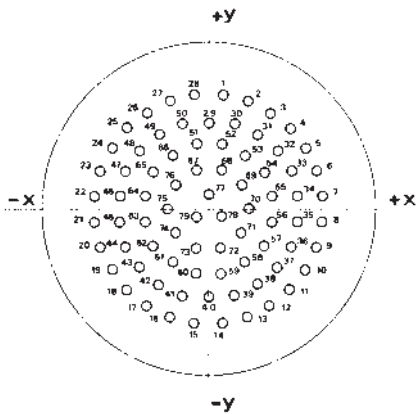
11



Contact	Coordinates	
	X	Y
A	+2.67	+6.60
B	+6.35	+3.35
C	+6.99	-1.35
D	+4.55	-5.46
E	0.00	-7.14
F	-4.55	-5.46
G	-6.99	-1.35
H	-6.35	+3.35
J	-2.67	+6.60
K	0.00	+2.67
L	0.00	-2.34

21

35

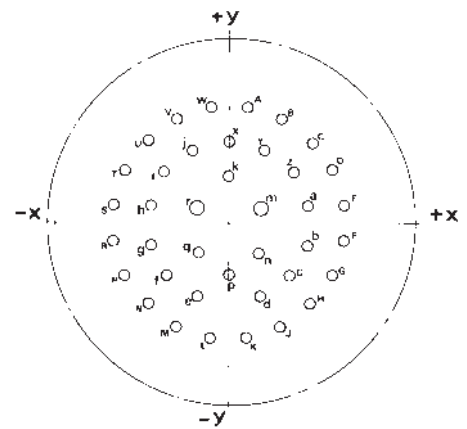


Contact	Coordinates	
	X	Y
41	-2.49	-8.18
42	-4.67	-7.11
43	-6.55	-5.59
44	-7.90	-3.58
45	-8.43	-1.22
46	-8.43	+1.22
47	-7.90	+3.58
48	-6.55	+5.59
49	-4.67	+7.11
50	-2.49	+8.18
51	-1.22	+6.12
52	+1.22	+6.12
53	+3.40	+5.05
54	+5.28	+3.53
55	+6.02	+1.22
56	+6.02	-1.22
57	+5.28	-3.53
58	+3.40	-5.05
59	+1.22	-6.12
60	-1.22	-6.12
61	-3.40	-5.05
62	-5.28	-3.53
63	-6.02	-1.22
64	-6.02	+1.22
65	-5.28	+3.53
66	-3.40	+5.05
67	-1.22	+3.71
68	+1.22	+3.71
69	+3.18	+2.29
70	+3.94	0.00
71	+3.18	-2.29
72	+1.22	-3.71
73	-1.22	-3.71
74	-3.18	-2.29
75	-3.94	0.00
76	-3.18	+2.29
77	0.00	+1.35
78	+1.22	-0.74
79	-1.22	-0.74

Contact	Coordinates	
	X	Y
1	+1.35	+10.82
2	+3.71	+10.26
3	+5.89	+9.19
4	+7.77	+7.67
5	+9.27	+5.77
6	+10.31	+3.58
7	+10.85	+1.22
8	+10.85	-1.22
9	+10.31	-3.58
10	+9.27	-5.77
11	+7.77	-7.67
12	+5.89	-9.19
13	+3.71	-10.26
14	+1.35	-10.82
15	-1.35	-10.82
16	-3.71	-10.26
17	-5.89	-9.19
18	-7.77	-7.67
19	-9.27	-5.77
20	-10.31	-3.58

Contact	Coordinates	
	X	Y
21	-10.85	-1.22
22	-10.85	+1.22
23	-10.31	+3.58
24	-9.27	+5.77
25	-7.77	+7.67
26	-5.89	+9.19
27	-3.71	+10.26
28	-1.35	+10.82
29	0.00	+8.20
30	+2.49	+8.18
31	+4.67	+7.11
32	+6.55	+5.59
33	+7.90	+3.58
34	+8.43	+1.22
35	+8.43	-1.22
36	+7.90	-3.58
37	+6.55	-5.59
38	+4.67	-7.11
39	+2.49	-8.18
40	0.00	-8.81

39



Contact	Coordinates	
	X	Y
A	+1.65	+10.44
B	+4.80	+9.42
C	+7.47	+7.47
D	+9.42	+4.80
E	+10.44	+1.65
F	+10.44	-1.65
G	+9.42	-4.80
H	+7.47	-7.47
J	+4.80	-9.42
K	+1.65	-10.44
L	-1.65	-10.44
M	-4.80	-9.42
N	-7.47	-7.47
P	-9.42	-4.80
R	-10.44	-1.65
S	-10.44	+1.65
T	-9.42	+4.80
U	-7.47	+7.47
V	-4.80	+9.42
W	-1.65	+10.44

Contact	Coordinates	
	X	Y
X	0.00	+7.49
Y	+3.20	+6.50
Z	+5.89	+4.55
a	+7.11	+1.45
b	+7.11	-1.88
c	+5.51	-4.80
d	+2.84	-6.73
e	-2.84	-6.73
f	-5.51	-4.80
g	-7.11	-1.88
h	-7.11	+1.45
i	-5.89	+4.55
j	-3.20	+6.50
k	0.00	+4.17
m	+2.90	+1.22
n	+2.69	-2.72
p	0.00	-4.80
q	-2.69	-2.72
r	-2.90	+1.22

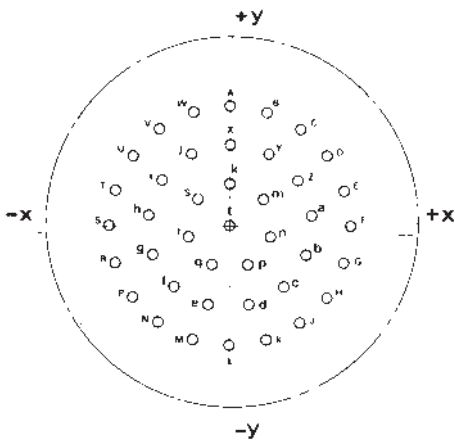


# Coordinates for straight spill terminations



21

41

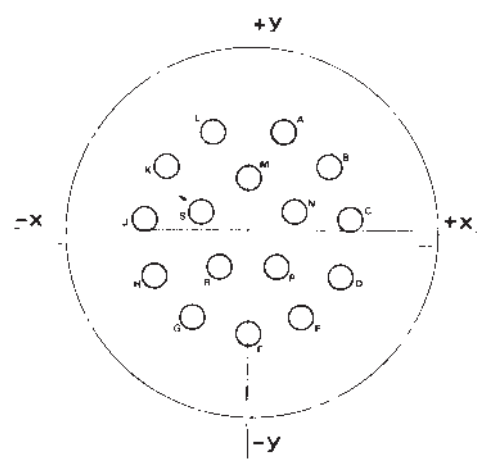


Contact	Coordinates	
	X	Y
T	-10.09	+3.28
U	-8.58	+6.23
V	-6.23	+8.58
W	-3.28	+10.09
X	0.00	+7.20
Y	+3.35	+6.38
Z	+5.92	+4.09
a	+7.15	+0.87
b	+6.73	-2.55
c	+4.78	-5.39
d	+1.73	-6.99
e	-1.73	-6.99
f	-4.78	-5.39
g	-6.73	-2.55
h	-7.15	+0.87
i	-5.92	+4.09
j	-3.35	+6.38
k	0.00	+3.81
m	+2.98	+2.38
n	+3.71	-0.85
p	-1.66	-3.43
q	+1.66	-3.43
r	-3.71	-0.85
s	-2.98	+2.38
t	0.00	0.00

Contact	Coordinates	
	X	Y
A	0.00	+10.60
B	+3.28	+10.09
C	+6.23	+8.58
D	+8.58	+6.23
E	+10.09	+3.28
F	+10.60	0.00
G	+10.09	-3.28
H	+8.58	-6.23

Contact	Coordinates	
	X	Y
J	+6.23	-8.58
K	+3.28	-10.09
L	0.00	-10.60
M	-3.28	-10.09
N	-6.23	-8.58
P	-8.58	-6.23
R	-10.09	-3.28
S	-10.60	0.00

16



Contact	Coordinates	
	X	Y
A	+3.00	+8.18
B	+6.88	+5.36
C	+8.66	+0.914
D	+7.82	-3.81
E	+4.62	-7.37
F	0.00	-8.71
G	-4.62	-7.37
H	-7.82	-3.81

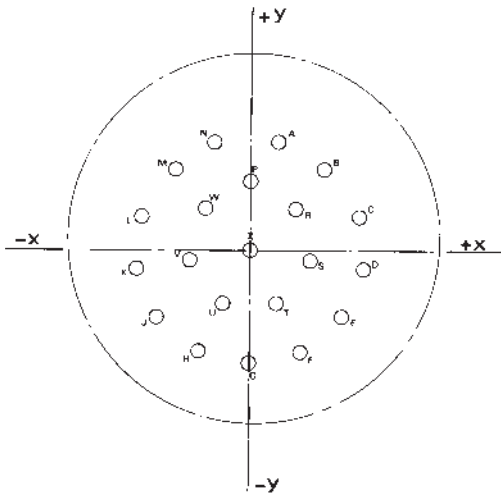
Contact	Coordinates	
	X	Y
J	-8.66	+0.91
K	-6.88	+5.36
L	-3.00	+8.18
M	0.00	+4.45
N	+3.91	+1.57
P	+2.39	-3.10
R	-2.39	-3.10
S	-3.91	+1.57

# Coordinates for straight spill terminations



23

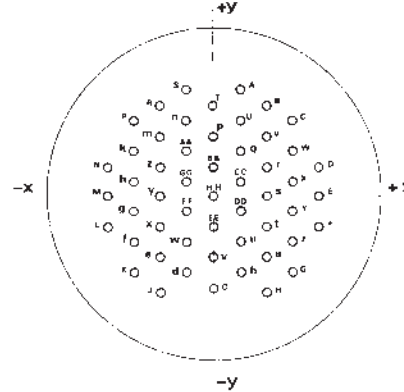
21



Contact	Coordinates	
	X	Y
A	+3.25	+9.78
B	+7.34	+7.24
C	+9.80	+3.12
D	+10.16	-1.65
E	+8.33	-6.07
F	+4.65	-9.19
G	0.00	-10.31
H	-4.65	-9.19
J	-8.33	-6.07
K	-10.16	-1.65
L	-9.80	+3.12

Contact	Coordinates	
	X	Y
M	-7.34	+7.24
N	-3.25	+9.78
P	0.00	+6.22
R	+4.06	+3.71
S	+5.44	-0.89
T	+2.39	-4.93
U	-2.39	-4.93
V	-5.44	-0.89
W	-4.06	+3.71
X	0.00	0.00

53



Contact	Coordinates	
	X	Y
A	+4.98	+12.70
B	+7.98	+11.05
C	+10.49	+8.71
D	+12.32	+5.84
E	+13.39	+2.57
F	+13.61	-0.76
G	+12.98	-4.17
H	+11.53	-7.29
J	+9.35	-9.93
K	+6.58	-11.94
L	+3.40	13.18
M	0.00	-13.64

Contact	Coordinates	
	X	Y
N	-3.40	-13.18
P	-6.58	-11.94
R	-9.35	-9.93
S	-11.53	-7.29
T	-12.98	-4.17
U	-13.61	-0.76
V	-13.39	+2.57
W	-12.32	+5.84
X	-10.49	+8.71
Y	-7.98	+11.05
Z	-4.98	12.70

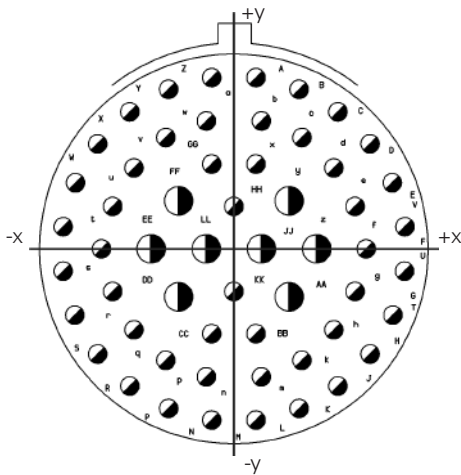
Contact	Coordinates	
	X	Y
a	-1.73	+11.53
b	+1.73	+11.53
c	+4.39	+9.22
d	+7.24	+7.19
e	+9.19	+4.45
f	+10.13	+1.17
g	+9.96	-2.24
h	+8.66	-5.41
i	+6.38	-7.98
j	+3.38	-9.63
k	0.00	-10.21
m	-3.38	-9.63
n	-6.38	-7.98
p	-8.66	-5.41
q	-9.96	-2.24
r	-10.13	+1.17
s	-9.19	+4.45
t	-7.24	+7.19
u	-4.39	+9.22
v	0.00	+8.59
w	+3.73	+5.66
x	+6.02	+3.10
y	+6.78	-0.25
z	+5.79	-3.53
AA	+3.33	-5.92
BB	0.00	-6.78
CC	-3.33	-5.92
DD	-5.79	-3.53
EE	-6.78	-0.25
FF	-6.02	+3.10
GG	-3.73	+5.66
HH	0.00	+5.08
JJ	+2.67	+2.39
KK	+3.43	-1.04
LL	0.00	-3.35
MM	-3.43	-1.04
NN	-2.67	+2.39
PP	0.00	0.00

# Coordinates for straight spill terminations



25

04

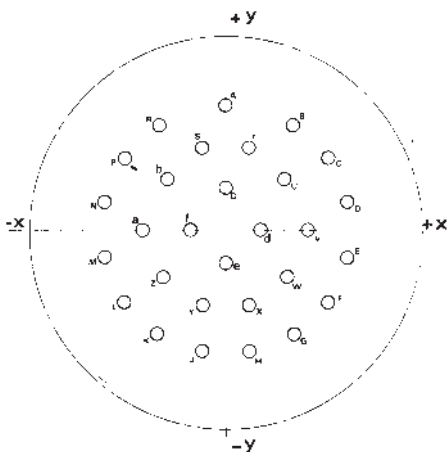


Contact	Coordinates	
	X	Y
A	+1.75	+13.49
B	+5.49	+12.57
C	+8.23	+10.80
D	+10.77	+8.28
E	+12.52	+5.21
F	+13.49	+1.75
G	+13.49	-1.75
H	+12.52	-5.21
J	+10.77	-8.28
K	+8.23	-10.80
L	+5.16	-12.57
M	+1.75	-13.49
N	-1.75	-13.49
P	-5.16	-12.57
R	-8.23	-10.80
S	-10.77	-8.28
T	-12.52	-5.21
U	-13.49	-1.75
V	-13.49	+1.75
W	-12.52	+5.21
X	-10.77	+8.28
Y	-8.23	+10.80
Z	-5.16	+12.57

Contact	Coordinates	
	X	Y
a	-1.75	+13.49
b	+2.18	+10.08
c	+5.38	+8.78
d	+7.90	+6.38
e	+9.58	+3.35
f	+10.46	0.00
g	+9.58	-3.35
h	+7.90	-6.38
k	+5.38	-8.78
m	+2.18	-10.08
n	-2.18	-10.08
p	-5.38	-8.78
q	-7.90	-6.38
r	-9.58	-3.35
s	-10.46	0.00
t	-9.58	+3.35
u	-7.90	+6.38
v	-5.38	+8.78
w	-2.18	+10.08
x	+1.75	+6.66
y	+4.37	+3.78
z	+6.55	0.00

Contact	Coordinates	
	X	Y
AA	+4.37	-3.78
BB	+1.75	-6.66
CC	-1.75	-6.66
DD	-4.37	+3.78
EE	-6.55	0.00
FF	-4.37	+3.78
GG	-1.75	+6.66
HH	0.00	+3.35
JJ	+2.18	0.00
KK	0.00	-3.35
LL	+2.18	0.00

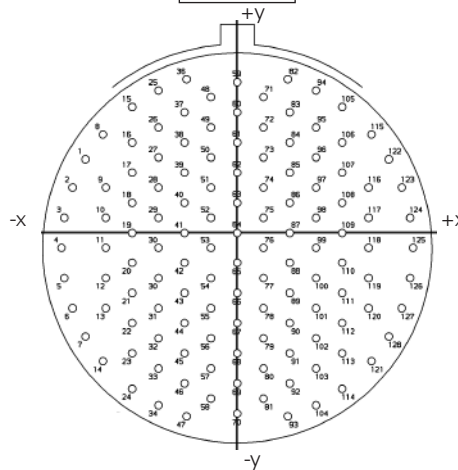
29



Contact	Coordinates	
	X	Y
A	0.00	-12.22
B	+6.55	+10.31
C	+10.03	+7.04
D	+11.91	+2.77
E	+11.91	-2.77
F	+10.03	-7.04
G	+6.68	-10.31
H	+2.31	-11.99
J	-2.31	-11.99
K	-6.68	-10.31
L	-10.03	-7.04
M	-11.91	-2.77
N	-11.91	+2.77
P	-10.03	+7.04

Contact	Coordinates	
	X	Y
R	-6.55	+10.31
S	-2.31	+8.15
T	+2.31	+8.15
U	+5.79	+4.93
V	+8.10	0.00
W	+6.10	-4.60
X	+2.31	-7.37
Y	-2.31	-7.37
Z	-6.10	-4.60
a	-8.10	0.00
b	-5.79	+4.93
c	0.00	+4.09
d	+3.40	0.00
e	0.00	-3.30
f	-3.40	0.00

35



Contact	Coordinates	
	X	Y
A	+4.98	+12.70
B	+7.98	+11.05
C	+10.49	+8.71
D	+12.32	+5.84
E	+13.39	+2.57
F	+13.61	-0.76
G	+12.98	-4.17
H	+11.53	-7.29
J	+9.35	-9.93
K	+6.58	-11.94
L	+3.40	13.18

Contact	Coordinates	
	X	Y
M	0.00	-13.64
N	-3.40	-13.18
P	-6.58	-11.94
R	-9.35	-9.93
S	-11.53	-7.29
T	-12.98	-4.17
U	-13.61	-0.76
V	-13.39	+2.57
W	-12.32	+5.84
X	-10.49	+8.71
Y	-7.98	+11.05
Z	-4.98	+12.70

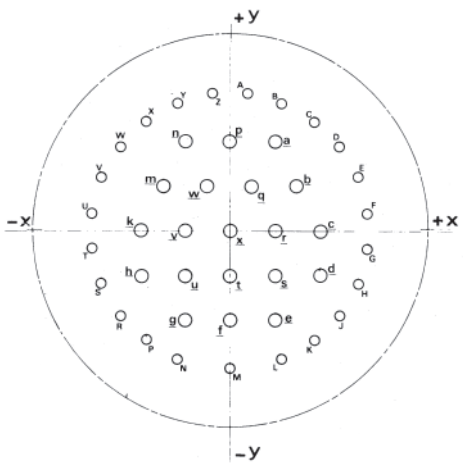
Contact	Coordinates	
	X	Y
a	-1.73	+11.53
b	+1.73	+11.53
c	+4.39	+9.22
d	+7.24	+7.19
e	+9.19	+4.45
f	+10.13	+1.17
g	+9.96	-2.24
h	+8.66	-5.41
i	+6.38	-7.98
j	+3.38	-9.63
k	0.00	-10.21
m	-3.38	-9.63
n	-6.38	-7.98
p	-8.66	-5.41
q	-9.96	-2.24
r	-10.13	+1.17
s	-9.19	+4.45
t	-7.24	+7.19
u	-4.39	+9.22
v	0.00	+8.59
w	+3.73	+5.66
x	+6.02	+3.10
y	+6.78	-0.25
z	+5.79	-3.53
AA	+3.33	-5.92
BB	0.00	-6.78
CC	-3.33	-5.92
DD	-5.79	-3.53
EE	-6.78	-0.25
FF	-6.02	+3.10
GG	-3.73	+5.66
HH	0.00	+5.08
JJ	+2.67	+2.39
KK	+3.43	-1.04
LL	0.00	-3.35
MM	-3.43	-1.04
NN	-2.67	+2.39
PP	0.00	0.00

# Coordinates for straight spill terminations



25

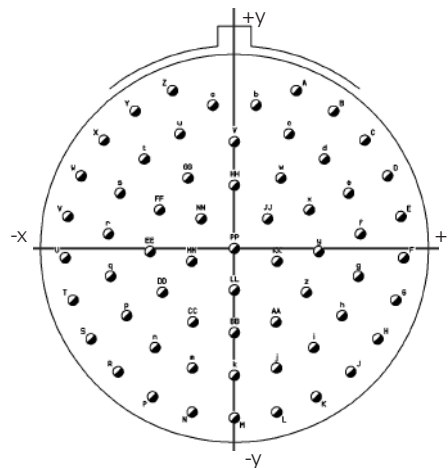
43



Contact	Coordinates	
	X	Y
A	+1.75	+13.49
B	+5.16	+12.57
C	+8.23	+10.80
D	+10.77	+8.28
E	+12.52	+5.21
F	+13.49	+1.75
G	+13.49	-1.75
H	+12.52	-5.21
J	+10.77	-8.28
K	+8.23	-10.80
L	+5.16	-12.57
M	0.00	-13.49
N	-5.16	-12.57
P	-8.23	-10.80
R	-10.77	-8.28
S	-12.52	-5.21
T	-13.49	-1.75
U	-13.49	+1.75
V	-12.52	+5.21
W	-10.77	+8.28
X	-8.23	+10.80
Y	-5.16	+12.57
Z	-1.75	+13.49

Contact	Coordinates	
	X	Y
a	+4.37	+8.74
b	+6.55	+4.37
c	+8.74	0.00
d	+8.74	-4.37
e	+4.37	-8.74
f	0.00	-8.74
g	-4.37	-8.74
h	-8.74	-4.37
k	-8.74	0.00
m	-6.55	+4.37
n	-4.37	+8.74
p	0.00	+8.74
q	+2.18	+4.37
r	+4.37	0.00
s	+4.37	-4.37
t	0.00	-4.37
u	-4.37	-4.37
v	-4.37	0.00
w	-2.18	+4.37
x	0.00	0.00

61



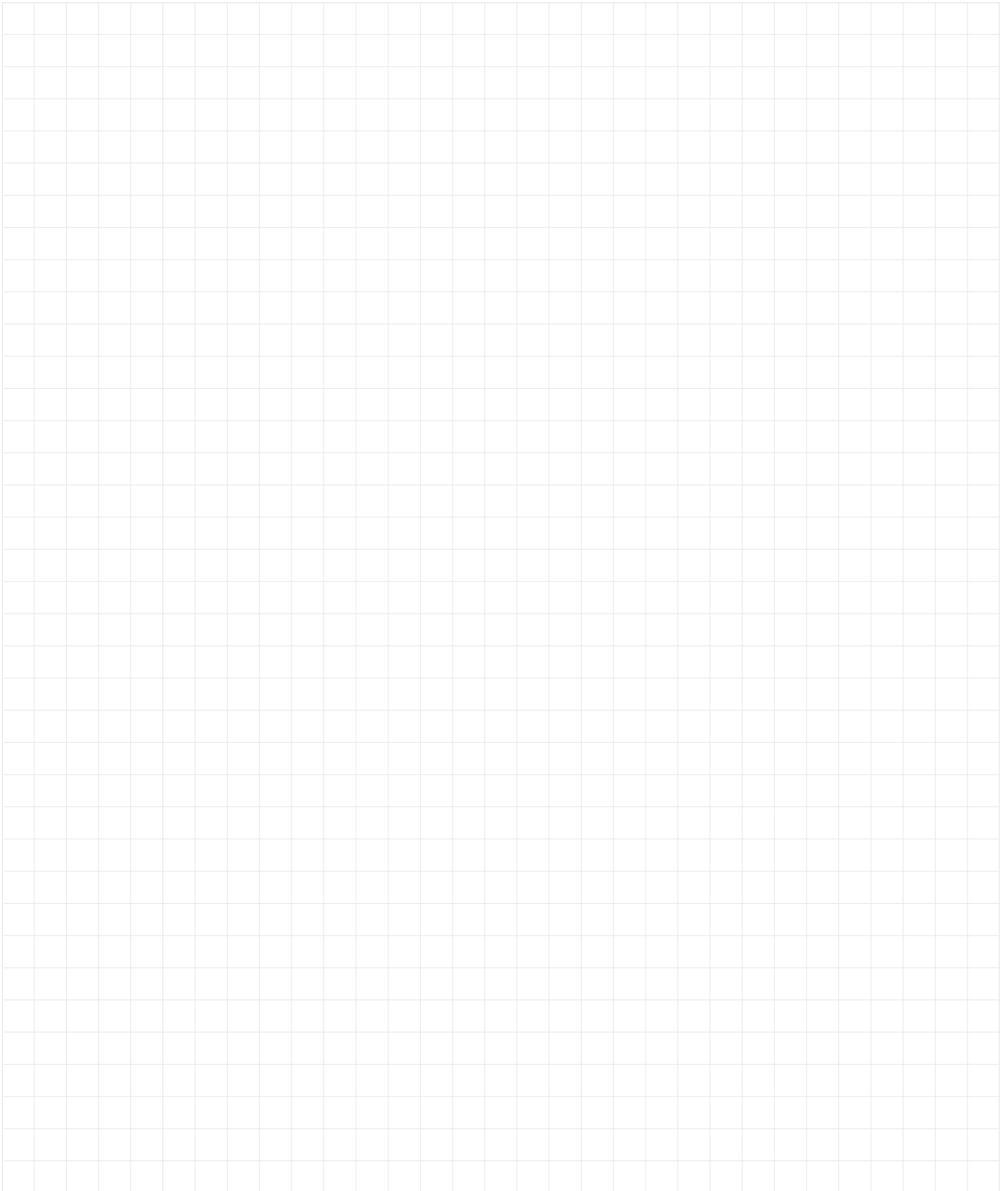
Contact	Coordinates	
	X	Y
A	+4.98	+12.70
B	+7.98	+11.05
C	+10.49	+8.71
D	+12.32	+5.84
E	+13.39	+2.57
F	+13.61	-0.76
G	+12.98	-4.17
H	+11.53	-7.29
J	+9.35	-9.93
K	+6.58	-11.94
L	+3.40	-13.18
M	0.00	-13.64
N	-3.40	-13.18
P	-6.58	-11.94
R	-9.35	-9.93
S	-11.53	-7.29
T	-12.98	-4.17
U	-13.61	-0.76
V	-13.39	+2.57
W	-12.32	+5.84
X	-10.49	+8.71
Y	-7.98	+11.05
Z	-4.98	+12.70

Contact	Coordinates	
	X	Y
a	-1.73	+11.53
b	+1.73	+11.53
c	+4.39	+9.22
d	+7.24	+7.19
e	+9.19	+4.45
f	+10.13	+1.17
g	+9.96	-2.24
h	+8.66	-5.41
i	+6.38	-7.98
k	0.00	-10.21
m	-3.38	-9.63
n	-6.38	-7.98
p	-8.66	-5.41
q	-9.96	-2.24
r	-10.13	+1.17
s	-9.19	+4.45
t	-7.24	+7.19
u	-4.39	+9.22
v	0.00	+8.59
w	+3.73	+5.66
x	+6.02	+3.10
y	+6.78	-0.25
z	+5.79	-3.53
AA	+3.33	-5.92
BB	0.00	-6.78
CC	-3.33	-5.92
DD	-5.79	-3.53
EE	-6.78	-0.25
FF	-6.02	+3.10
GG	-3.73	+5.66
HH	0.00	+5.08
JJ	+2.67	+2.39
KK	+3.43	-1.04
LL	0.00	-3.35
MM	-3.43	-1.04
NN	-2.67	+2.39
PP	0.00	0.00

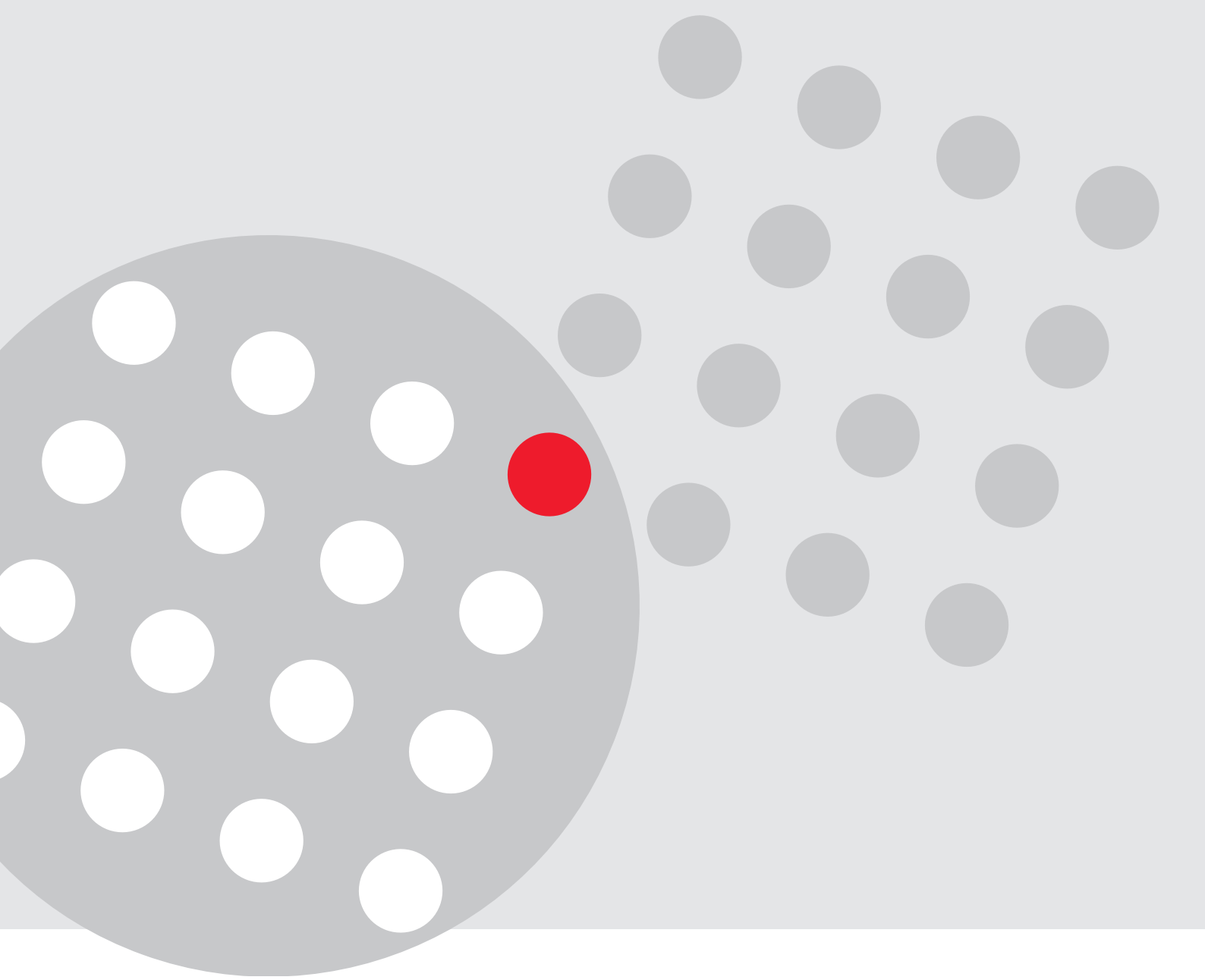




## Notes







[www.souriau.com](http://www.souriau.com)

