MIL-DTL-38999
Series I, II, III, and IV Mil-Spec Circular Connectors Catalog

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Metabee (Chengdu) Technology Co., Ltd.

180+
Countries

300+
Workers

20,000 M²
Production Workshop

16M
Group Assets

Metabee (Chengdu) Technology Co., Ltd. established in 2022 located in Sichuan Province with convenient transportation. Our associated factory Jiangmen Dosin specialize in producing RF connectors, M series connectors, and cables.

We are committed to being the world's leading Manufacturer of electronic connectors and industrial cables. We have developed more than 20 product series and more than 5,000 varieties. These products have been widely sold to many countries and regions around the world. They are mainly used for outdoor lighting automation machinery, new energy vehicles, charging equipment, electricity generation facilities, and other industries.

We can also support OEM ODM and customized related products. All products have owned American UL, German TUV, and Europe CE ROHS certifications and have several design patents. Our associated factory has production workshop with an area of 20,000 square meters, more than 300 employees, 30 international advanced production lines, and tens of precision testing equipment. Moreover, we have constructed a specialized laboratory for product research and development. Our reliable product quality, good service, and rapid technical have helped us win many customers in China and overseas markets.

Metabee (Chengdu) Technology Co., Ltd. has become the leading technology and scale Enterprise in the connector field. We have a reliable reputation among our customers because of our professional services, quality products, and competitive prices. We welcome customers from home and abroad to cooperate with us for Common success.

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MIL-DTL-38999 Series I Electric Circular Connector

1. Main Features

- Compliance with MIL-DTL-38999 Series I standards;
- Quick bayonet coupling;
- Small size, lightweight, and high contact density;
- Removable crimp contacts with anti-mismating design;
- Various mounting options including box, wall, front, and rear mounting, as well as nut-locking;
- Compliant with MIL-DTL-38999 standard rear accessories, including special rear accessories (Ti-Ni alloy memory ring) for shielded cable clamping;
- 9 shell sizes, 72 contact arrangements, and derivative contact arrangements;
- Sealed interface and rear end, excellent environmental protection, IP65 rating;
- Five-keyway guidance mechanism with five anti-mismating keyways;
- Widely used in aviation, aerospace, and military systems.

2. Key technical characteristics

2.1 Mechanical Characteristics

Shell Material:	Aluminum alloy, stainless steel
Shell Plating:	Class B: Olive drab cadmium; Class C: Anodize; Class E: Passivated stainless steel; Class F: Electroless nickel
Insulator Material:	Thermosetting Plastic
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy, crimp, solder, and PCB types
Mechanical Life:	⩾500 mating cycles
Vibration:	Sinusoidal vibration: 10-2000 Hz at 294 m/s²; Random vibration: 100-1000 Hz with a power spectral density of 1 G²/Hz
Shock:	3ms half-sine wave, peak acceleration of 300g

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2.2 Environmental Characteristics

Operating Temperature:	Class B: -65°C to +175°C; Class E & F: -65°C to +200°C
Salt Spray Resistance:	Tested according to GJB1217 Method 1001: Class B: 500 hours; Class E: 1000 hours; Class F: 48 hours
Relative Humidity:	98% at 40°C
Operating Altitude:	⩽ 30,480 meters
Additional Features:	Excellent resistance to moisture, salt spray, fungus, rain, and dust.

2.3 Electrical Characteristics

2.3.1 Contact Resistance and Current Rating:

Contact Size	Diameter (mm)	Contact Resistance (mΩ)	Current Rating (A)
22D#	Φ0.76	⩽12	5
20#	Φ1.00	⩽5	7.5
16#	Φ1.60	⩽2.5	13
12#	Φ2.40	⩽1.5	23
10#	Φ3.15	⩽1.0	40
8#	Φ3.6	⩽0.57	46
6#	Φ4.52	⩽0.5	60
4#	Φ5.72	⩽0.35	80
0#	Φ9.07	⩽0.17	150
2/0#	Φ10.31	⩽0.124	185

2.3.2 Electromagnetic Interference Shielding:

- Minimum attenuation of 85 dB from 100 MHz to 1 GHz and 50 dB from 1 GHz to 10 GHz.

2.3.3 Withstanding Voltage (V):

Ratings*	M	N	I	II
sea level	1300	1000	1800	2300
21000m	800	600	1000	1000

* Working voltage varies depending on the contact arrangement. Please refer to the contact arrangement for details.

2.3.4 Insulation Resistance:

- ⩾ 5000 MΩ under normal conditions
- ⩾ 100 MΩ under humid conditions

2.3.5 Shell Continuity:

- ⩽ 2.5 mΩ for Class B, ⩽ 1.0 mΩ for Class F, and ⩽ 5 mΩ for Class E.

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3. Part Number:

	MS	27467	T	17	F	35	P	N

Series:	**MS**
Type:	**27467** - Plug (T-type only); **27466** - Front-mounted wall-type flange receptacle (T-type only); **27656** - Rear-mounted wall-type flange receptacle (T-type only); **27496** - Front-mounted box-type flange receptacle (E-type only); **27505** - Rear-mounted box-type flange receptacle (E-type only); **27468** – Jam nut receptacle (T-type only) **27901 -** Circular adapter receptacle (T-type only)
Shell Type:	**T** - Threaded rear for accessory mounting; **E** - Non-threaded rear, no accessory mounting
Shell Number:	**09, 11, 13, 15, 17, 19, 21, 23, 25**
Shell Plating:	**B** - Olive drab cadmium plated; **C** - Anodized; **E** - Passivated stainless steel; **F** - Electroless nickel
Insert Arrangement:	See “Insert Arrangement” Table (Page 8-14)
Contacts:	**P** - Crimp pin; **PH** - Solder pin; **PL** - Long printed circuit pin; **PC** - Short printed circuit pin; **S** - Crimp socket; **SH** - Solder socket; **SL** - Long printed circuit socket; **SC** - Short printed circuit socket
Keyway:	**N** - Normal keyway; **A, B, C, D** - Variant keyways (When crimp-type contacts are used, the "N" designation may be omitted. When using other contact types, the "N" designation is mandatory. Housing number 09 only accommodates keyway codes N, A, and D.)

Note :

1. When high oil resistance is required, the connector seal material is fluorosilicone rubber. Add "C1" to the end of the original model number (e.g., MS27467T17F35PNC1).
2. If a conductive gasket is required, add "C2" to the end of the product model number. For example, MS27466T17F35PNC2.
3. If a conductive O-ring is required, add "C5" to the end of the product model number. For example, MS27468T17F35PNC5.

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4. Crimp Contacts

Contact Size	Diameter (Mm)	Pin Color Code	Socket Color Code	Ferrule Inner Diameter (mm)	Ferrule Outer Diameter (mm)	Suitable Wire Cross-section (mm²)	Suitable Wire AWG	Suitable Wire Insulation Outer Diameter (mm)	Removal Tool Code
22D#	0.76	Orange – Blue - Black	Orange – Yellow - Grey	0.85	1.20	0.08 0.125 0.2 0.3	28 26 24 22	0.76 ~ 1.37	M81969/ 14-01
20#	1.00	Orange – Blue - Orange	Orange – Green - Brown	1.17	1.78	0.2 0.3 0.5	24 22 20	1.02 ~ 2.11	M81969/ 14-10
16#	1.60	Orange – Blue- Yellow	Orange – Green - Red	1.68	2.62	0.5 0.8 1.0 1.2	20 18 16	1.65 ~ 2.77	M81969/ 14-03
12#	2.40	Orange – Blue- Green	Orange – Green - Orange	2.49	3.84	2.0 3.0	14 12	2.46 ~ 3.61	M81969/ 14-04
10#	3.15	Green – Red - Grey	Green – Orange - Purple	3.40	4.65	4.8 8.6	10 8	3.42 ~ 4.12	M81969/ 14-05

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5. Insert Arrangements

Shell Size							
09 (A)	35 M 6–22D	98 I 3–20#	02 I 2–20#	03 I 3–20#	10 I 1–12#	11 I 1–16#	44 M 4–22D
11 (B)	35 M 13–22D	98 I 6–20#	05 I 5–20#	04 I 4–20#	01 I 1–12#	99 I 7–20#	02 I 2–16#
	15 N 4–22D 1–12#	43 M 3–16#	81 I 1–8#Dual Coax				
13 (C)	35 M 22–22D	98 I 10–20#	08 I 8–20#	04 I 4–16#	12 N 1–12# 11–22D	16 N 3–16# 13–22D	60 I 4–16# 2–20#
	03 II 3–16#	02 I 2–12#	05 I 1–16# 2–12#	24 II 1–12#	45 I 5–16#	13 N 3–16# 10–22D	26 M 2–12# 6–22D
	99 I 3–16# 4–20#	01 1–8#Dual Coax	06 M 3–12# 3–22D	04a I 2–22D# 2–12#			
15 (D)	35 M 37–22D	19 I 19–20#	18 I 18–20#	05 II 5–16#	97 I 8–20# 4–16#	15 I 14–20# 1–16#	
	02 II 2–12#	14 N 8–22D 6–16#	31 M 30–22D 1–12#	38 I 4–12#	48 I 8–16#	12 M 2–20# 2–12# 8–22D	
	23 M 3–16# 2–20# 18–22D	03 II 2–12# 1–16#	21 I 1–12# Coax 3–20# 17–22D	07a I 7–16#	16a M 1–12# 16–22D	39 M 13–22D# 2–TDB4#	

Contact Legend

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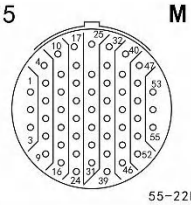
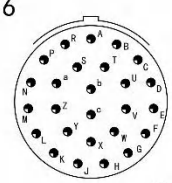
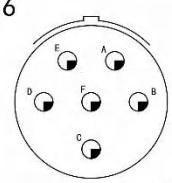
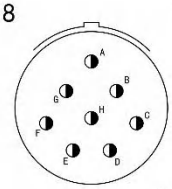
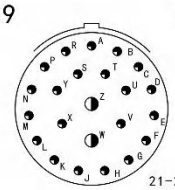
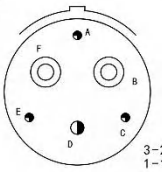
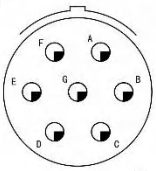
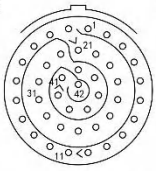
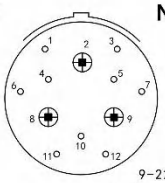
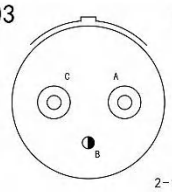
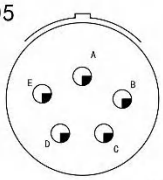
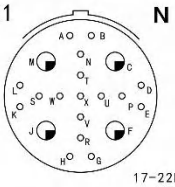
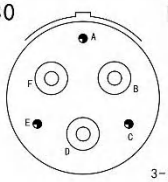
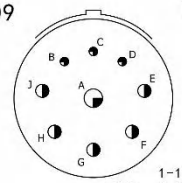
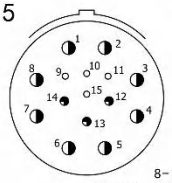
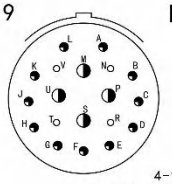
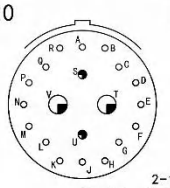
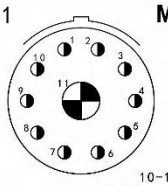
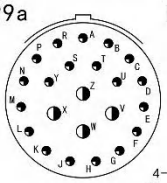
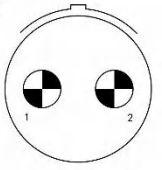
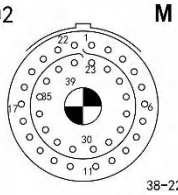
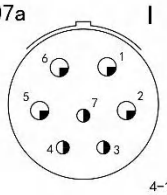
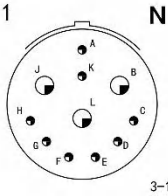
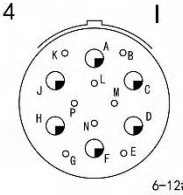
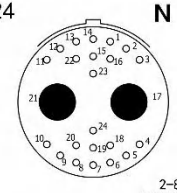
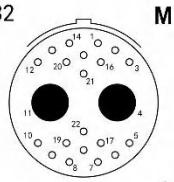
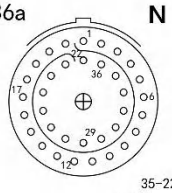
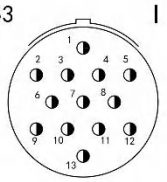
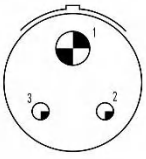
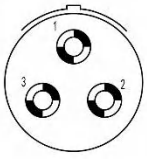
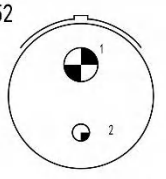
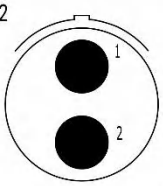
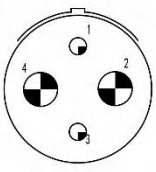
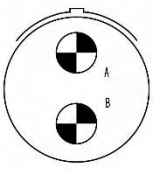
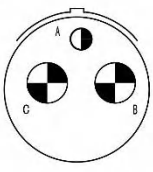
17 (E)

35 M  55-22D	26 I  26-20#	06 I  6-12#	08 II  8-16#	99 I  21-20# 2-16#	
16 I  3-20# 1-16# 2-10#	27 I  7-12#	42 M  42-22D	12 N  9-22D 3-12#Shielded	03 N  2-10# 1-16#	
05 I  5-12#	21 N  17-22D 4-12#	30 N  3-10# 3-20#	09 I  1-12# 5-16# 3-20#	15 M  3-20# 8-16# 4-22D	
19 M  4-16# 11-20# 4-22D	20 I  2-12# 2-20# 16-22D	51 M  10-16# 1-8# Dual Coax	99a N  4-16# 19-20#	22  2-8# Dual Coax	
02 M  38-22D 1-8# Dual Coax	07a I  4-12# 3-16#	11 N  3-12# 8-20#	14 I  6-12# 8-22D	24 N  2-8# 22-22D	
32 M  2-8# 20-22D	36a N  35-22D 1-12# Coax	53 I  13-16#	23  1-8# Dual Coax 2-12#	39  3-TDB4	
52  1-12# 1-8# Dual Coax	62  Power 2-8#	64  2-12# 2-8# Dual Coax	75  2-8# Dual Coax	57  1-16# 2-8#	

Contact Legend

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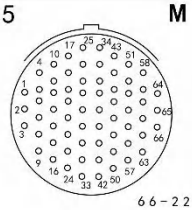
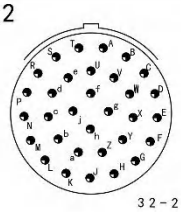
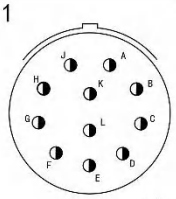
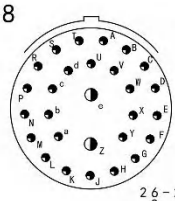
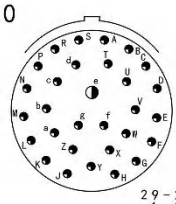
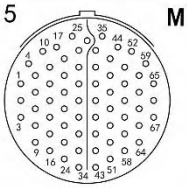
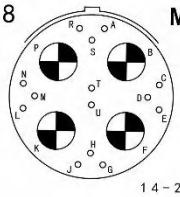
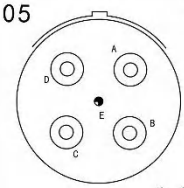
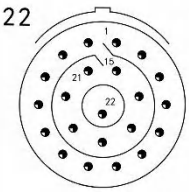
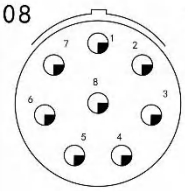
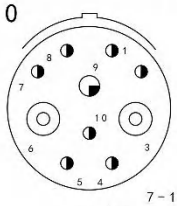
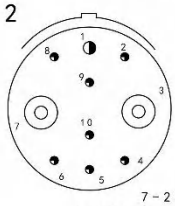
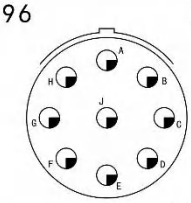
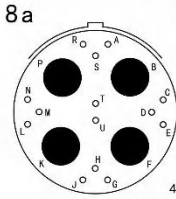
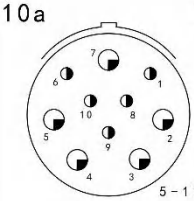
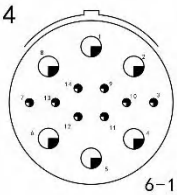
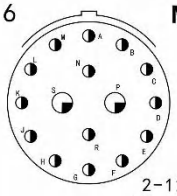
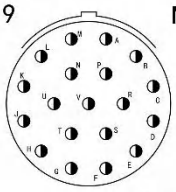
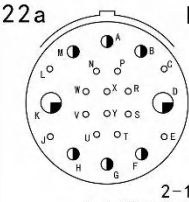
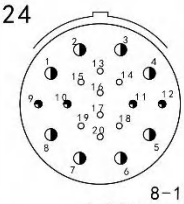
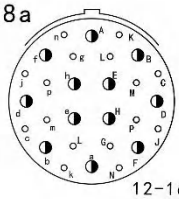
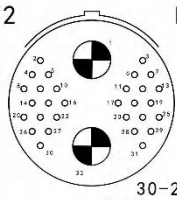
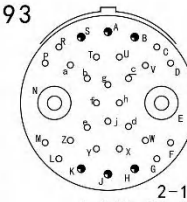
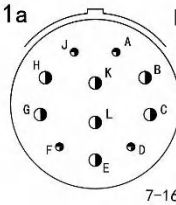
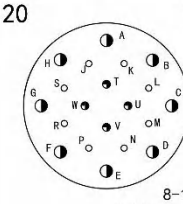
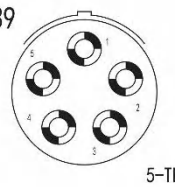
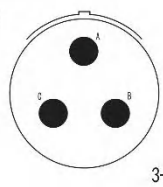
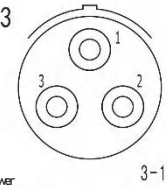
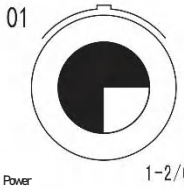
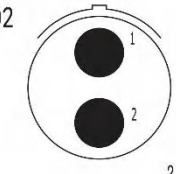
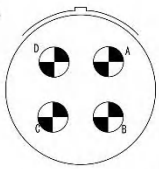
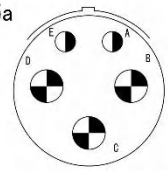
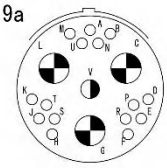
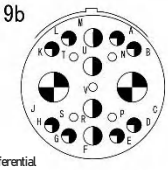
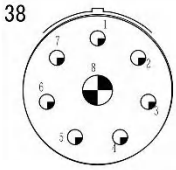
19 (F)

35 M  66-22D	32 I  32-20#	11 II  11-16#	28 I  26-20# 2-16#	30 I  29-20# 1-16#
45 M  67-22D	18 M  14-22D 4-8# Dual Coax	05 N  1-20# 4-10#	22 I  22-20#	08 M  8-12#
10 I  7-16# 1-12#, 2-10#	12 I  7-20# 1-16#, 2-10#	96 I  9-12#	18a M  4-8# 14-22D	10a I  5-12# 5-16#
14 I  6-12# 8-20#	16 M  2-12# 14-16#	19 M  19-16#	22a M  2-12# 6-16#, 14-22D	24 I  8-16# 4-20#, 8-22D
28a I  12-16# 16-22D	92 M  30-22D 2-8# Dual Coax	93 I  2-10# 6-20#, 24-22D	11a II  7-16# 4-20#	20 M  8-16# 4-20#, 8-22D
39  5-TDB4	03  3-8#	13  Power 3-10#	01  Power 1-2/0#	02  Power 2-8#
04  Differential 4-8#	05a  Differential 2-16#, 3-8#	19a  Differential 3-8#, 1-16#, 15-22D	19b  Differential 2-8#, 4-16#, 8-20#, 5-22D	38  Differential 7-12#, 1-8#

Contact Legend

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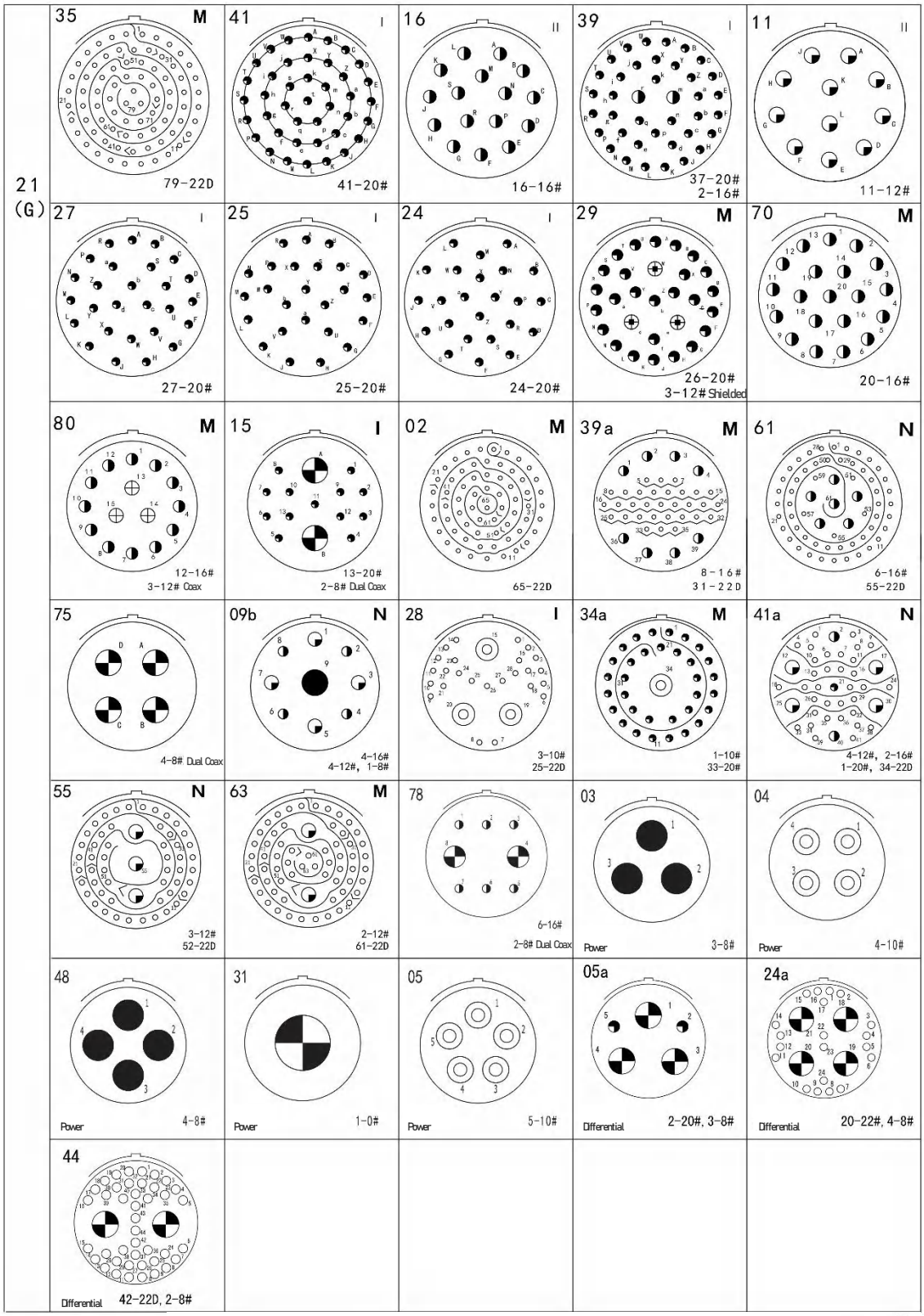
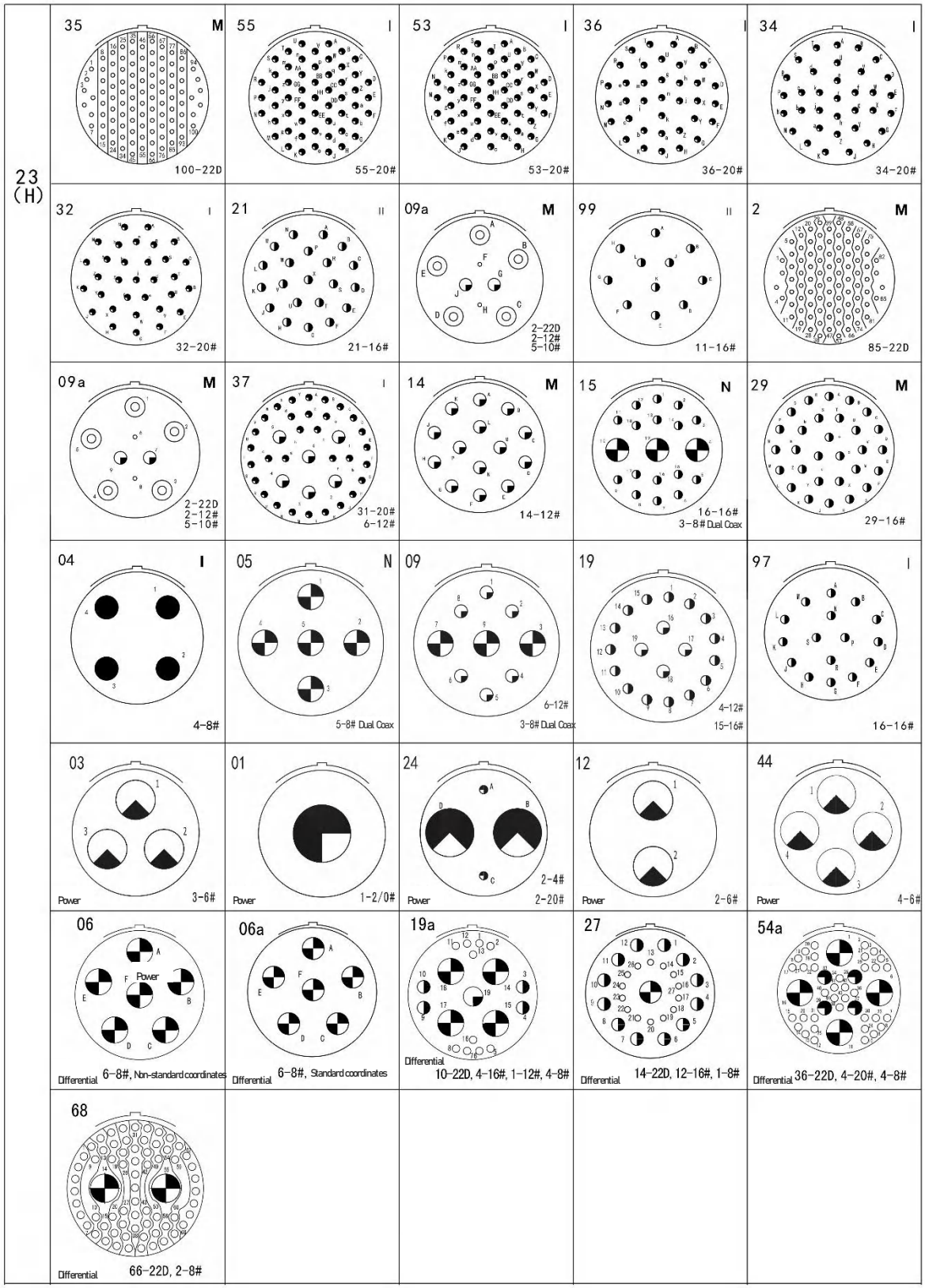


Contact Legend

sales@metabeeai.com

23 (H)



Contact Legend

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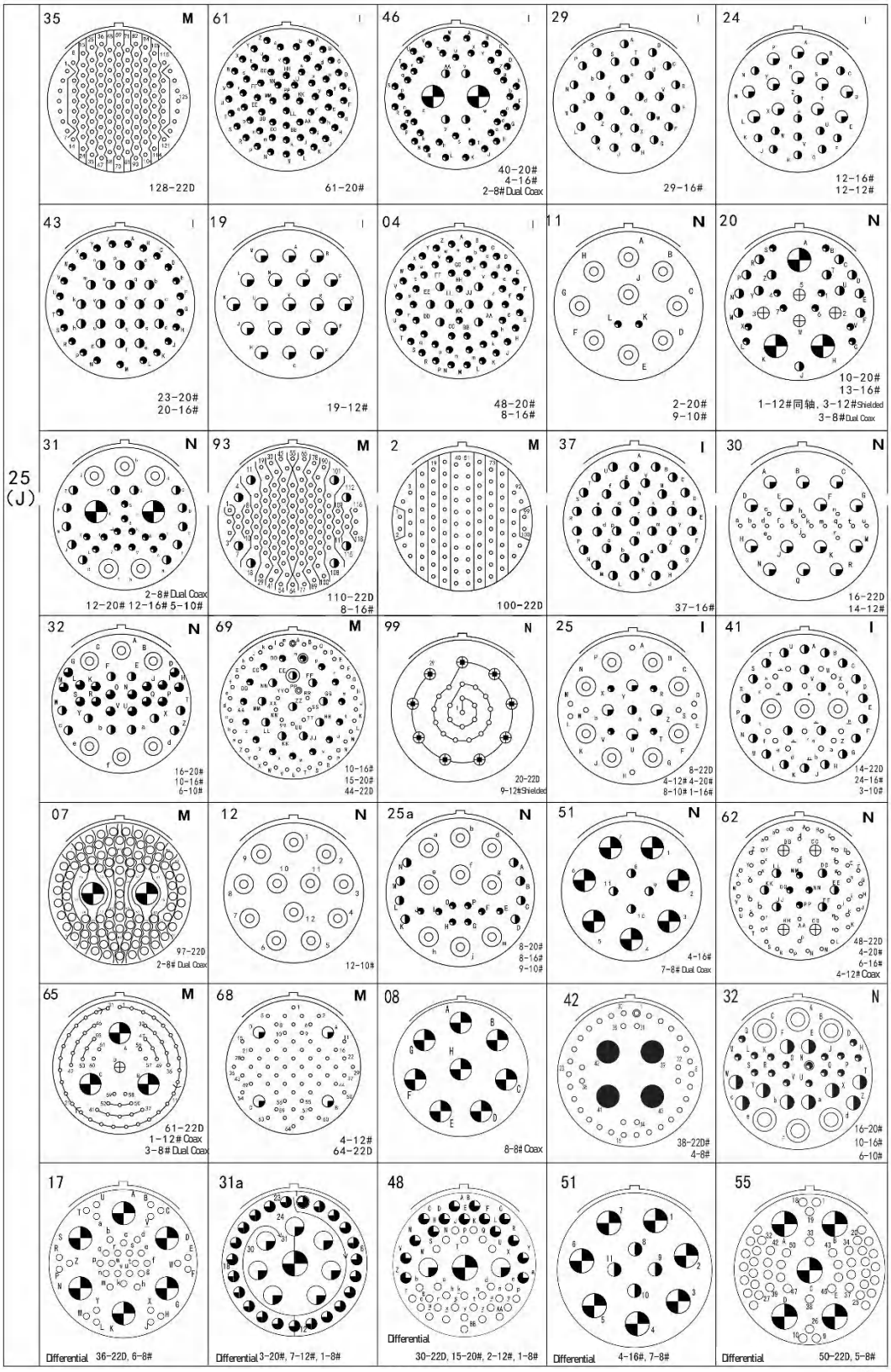

Contact Legend

22D 20# 16# 12# 12#Shield 12#Coax 10# TDB4 Contact 8#Dual Coax 8# 6# 4# 0# 1-2/0#

Can be replaced with 10# contact pin

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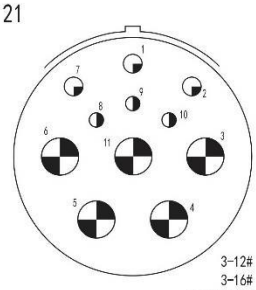
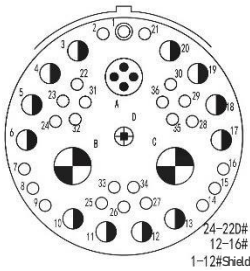
25
(J)

21



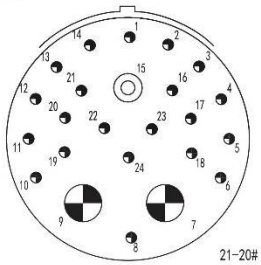
3-12#
3-16#
5-8# Dual Coax

44



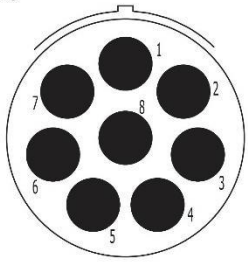
24-22D#
12-16#
1-12#Shielded
1-8# Differential 4-Rn
2-8# Dual Coax

24b



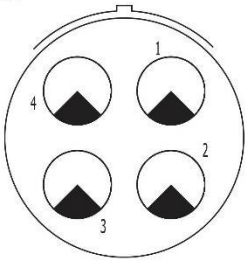
21-20#
2-8# Dual Coax
1-10# Coax

18



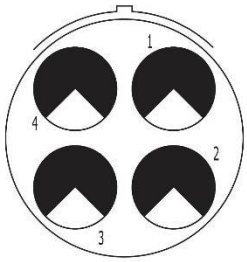
Power 8-8#

34



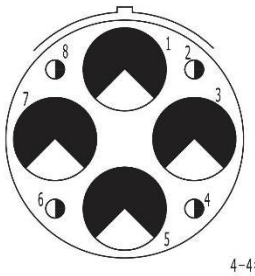
Power 4-6#

14



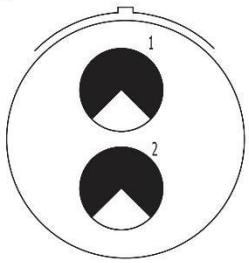
Power 4-4#

28



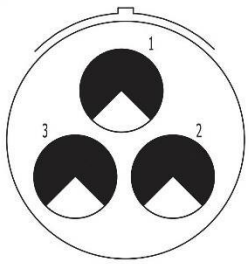
4-4#
Power 4-16#

22



Power 2-4#

33



Power 3-4#

Contact Legend

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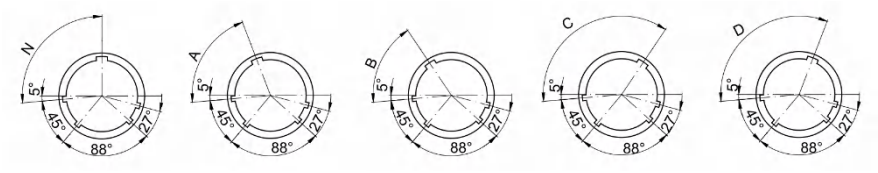
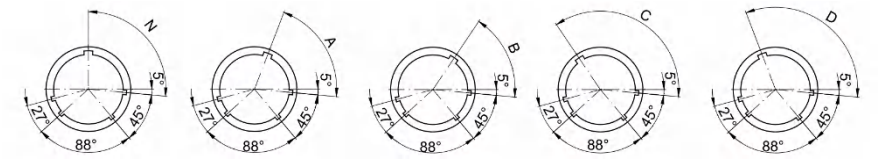
6. Keying Position

Receptacle keying angle	
Plug keying angle	

Keying code	09	11	13	15	17	19	21	23	25
N	95°	95	95°	95	95°	95°	95°	95	95°
A	77°	81°	75°	74°	77°	77°	77°	80°	80
B		67°	63°	61°	65°	65°	65°	69°	69°
C		123°	127	129	125	125	125	121	121
D	113°	109	115°	116	113°	113°	113°	110°	110°

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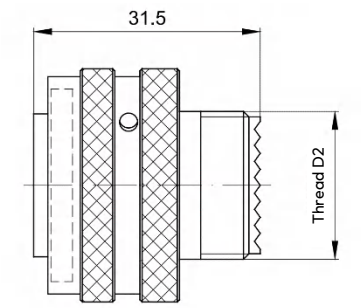
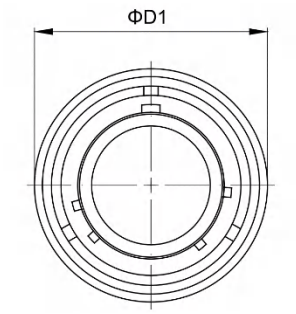
7. Sizes

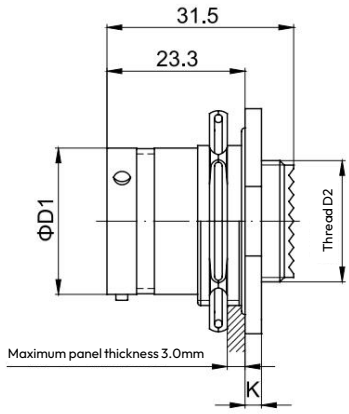
7.1 Plug MS27467:

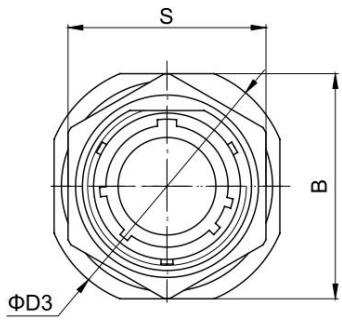




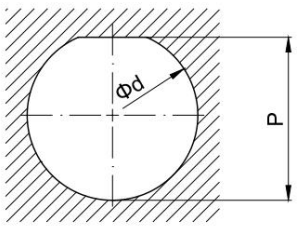
Shell Number	D1 (mm)	Thread D2 UNEF-2A
09	21.8	0.4375-28
11	25.0	0.5625-24
13	29	0.6875-24
15	32.4	0.8125-20
17	35.47	0.9375-20
19	38.38	1.0625-18
21	41.05	1.1875-18
23	44.86	1.3125-18
25	47.86	1.4375-18

7.2 Jam Nut Receptacle MS27468:





Recommended panel cutout size



Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	K (mm)	B (mm)	S (mm)	D (mm)	P (mm)
09	14.53	0.4375-28	30.18	2.77	26.97	22.66	17.7	17.0
11	17.78	0.5625-24	34.93	2.77	31.75	25.5	21.0	19.6
13	21.59	0.6875-24	38.1	2.77	34.93	30.61	25.6	24.3
15	24.77	0.8125-20	41.28	2.77	38.1	33.4	28.8	27.6
17	27.94	0.9375-20	44.45	2.77	41.28	36.96	32.0	30.7
19	30.66	1.0625-18	29.23	3.56	46.02	40.11	35.2	33.9
21	33.83	1.1875-18	52.37	3.56	49.23	43.81	38.3	37.1
23	37.01	1.3125-18	55.58	3.56	52.37	46.46	41.5	40.0
25	40.18	1.4375-18	58.72	3.56	55.58	51.23	44.7	43.4

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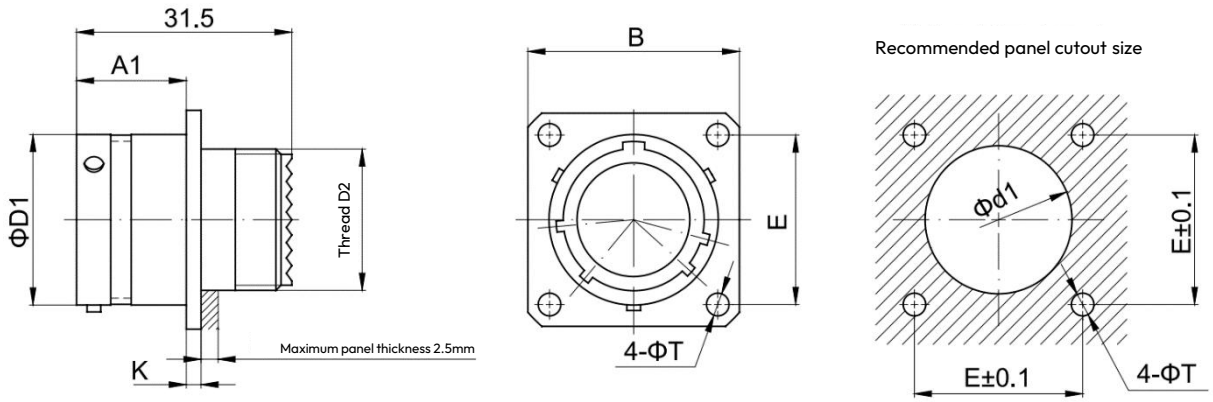
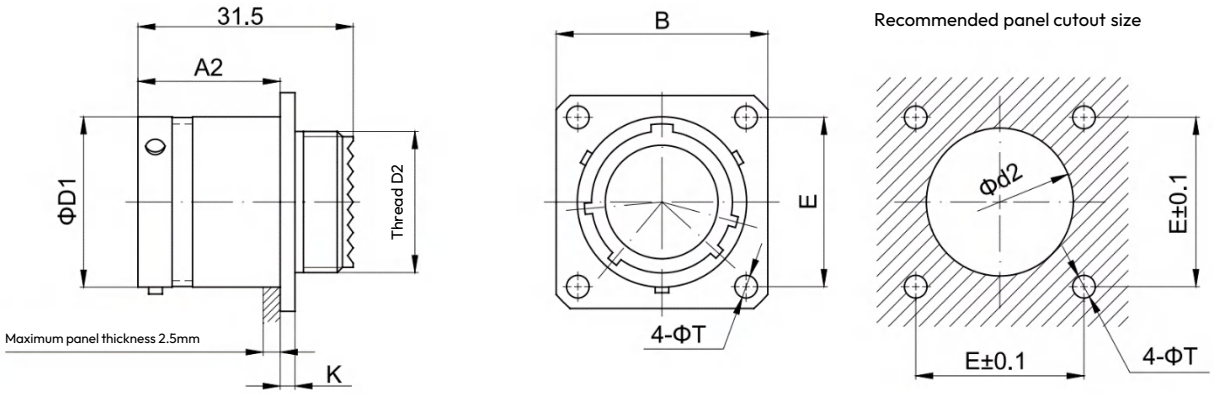
7.3 Flange Panel Mount Receptacles MS27466, MS27656：

Front Mount Flange Receptacle MS27466



Rear Mount Flange Receptacle MS27656



Shell Number	D1 (mm)	Thread D2 UNEF-2A	A1(mm)	A2(mm)	K(mm)	B(mm)	E(mm)	T(mm)	d1(mm)	d2(mm)
09	14.53	0.4375-28	16.05	20.83	2.16	23.83	18.26	3.3	12.5	16.7
11	17.78	0.5625-24	16.05	20.83	2.16	26.19	20.62	3.3	15.5	20.2
13	21.59	0.6875-24	16.05	20.83	2.16	28.58	23.02	3.3	19.5	24.5
15	24.77	0.8125-20	16.05	20.83	2.16	30.96	24.62	3.3	21.5	27.7
17	27.94	0.9375-20	16.05	20.83	2.16	33.32	26.98	3.3	25.0	30.9
19	30.66	1.0625-18	16.05	20.83	2.16	36.5	29.36	3.3	28.0	32.9
21	33.83	1.1875-18	15.29	20.07	2.92	39.67	31.76	3.3	31.5	36.2
23	37.01	1.3125-18	15.29	20.07	2.92	42.88	34.92	3.7	34.5	39.3
25	40.18	1.4375-18	15.29	20.07	2.92	46.02	38.10	3.7	37.5	425

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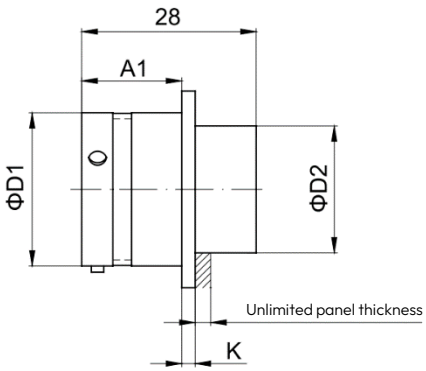
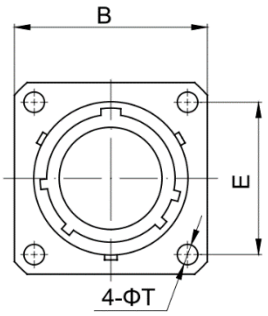
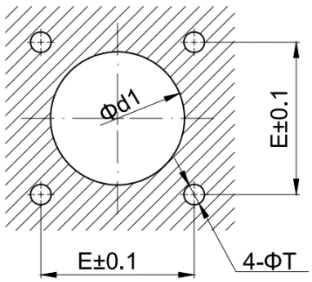
7.4 Box-Type Flange Receptacle MS27496, MS27505:

Front Mount Box-Type Flange Receptacle MS27496

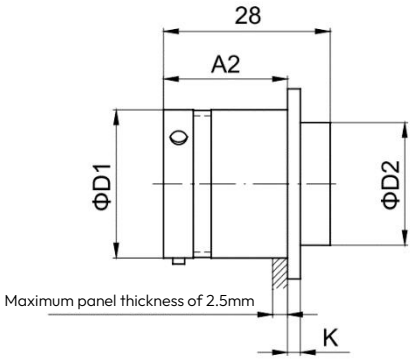


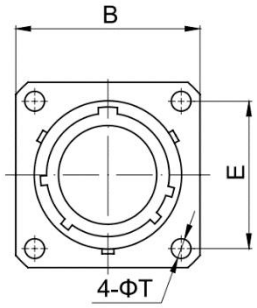


Recommended panel cutout size

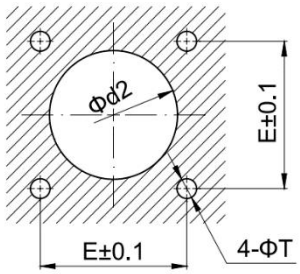


Rear Mount Box-Type Flange Receptacle MS27505





Recommended panel cutout size



Shell Number	D1 (mm)	D2 (mm)	A1 (mm)	A2 (mm)	K (mm)	B (mm)	E (mm)	T (mm)
09	14.53	11.0	16.05	20.83	2.16	23.83	18.26	3.3
11	17.78	14.2	16.05	20.83	2.16	26.19	20.62	3.3
13	21.59	17.35	1605	20.83	2.16	28.58	23.02	3.3
15	24.77	20.52	16.05	20.83	2.16	30.96	24.62	3.3
17	27.94	23.77	16.05	20.83	2.16	33.92	26.98	3.3
19	30.66	26.95	16.05	20.83	2.16	36.5	29.36	3.3
21	33.83	30.12	15.29	20.07	2.92	39.67	31.76	3.7
23	37.01	33.3	15.29	20.07	2.92	42.88	34.92	3.7
25	40.18	36.47	15.29	20.07	2.92	46.02	38.10	3.7

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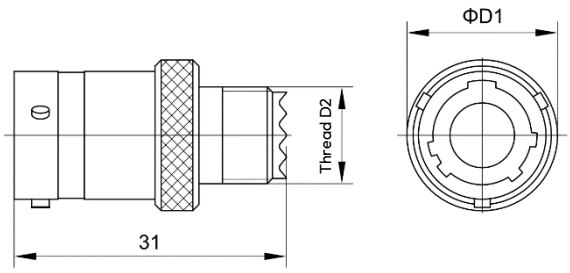
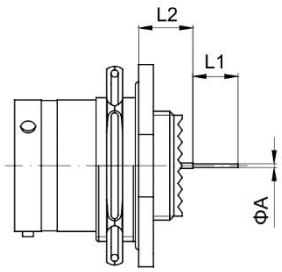
7.5 Circular Adapter Receptacle MS27901:



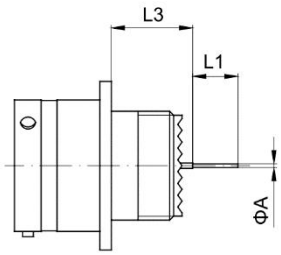
Shell Number	D1 (mm)	Thread D2 UNEF-2A
9	17.15	0.4375-28
11	20.4	0.5625-24
13	24.2	0.6875-24
15	27.4	0.8125-20
17	30.55	0.9375-20
19	33.3	1.0625-18
21	36.45	1.1875-18
23	39.6	1.3125-18
25	42.8	1.4375-18

7.6 MIL-DTL-38999 Series I Receptacles with PCB Contacts:

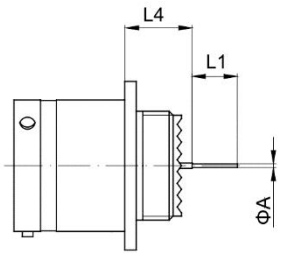
MS27468 Receptacle



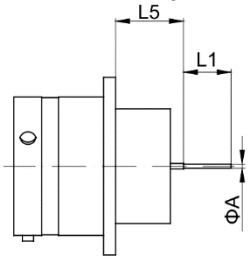
MS27466 Receptacle



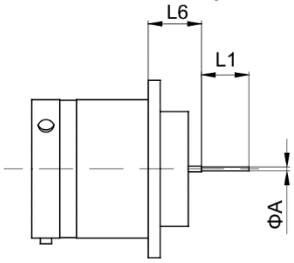
MS27656 Receptacle



MS27496 Receptacle



MS27505 Receptacle



PCB Contact Types		L1(mm)	A(mm)
22D#	Long PCB Contact	8.5	0.7
	Short PCB Contact	4.0	
20#	Long PCB Contact	8.5	0.7
	Short PCB Contact	5.0	
16#	Long PCB Contact	8.5	1.15
	Short PCB Contact	5.0	

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Dimensional Requirements for Various Contact Sizes			Shell Numbers 09-11-13-15-17-19	Shell Numbers 21-23-25
L2	For 22D# pin installation	Max	10.06	10.06
		Min	9.06	9.06
	For 22D# socket installation	Max	10.06	10.06
		Min	8.74	8.74
	For 20# or 16# pin/socket installation	Max	10.23	10.23
		Min	9.24	9.24
L3	For 22D# pin installation	Max	15.08	15.08
		Min	13.91	13.91
	For 22D# socket installation	Max	15.08	15.08
		Min	13.58	13.58
	For 20# or 16# pin/socket installation	Max	15.25	15.25
		Min	14.08	14.08
L4	For 22D# pin installation	Max	12.47	13.22
		Min	11.60	12.35
	For 22D# socket installation	Max	12.47	13.22
		Min	11.27	12.02
	For 20# or 16# pin/socket installation	Max	12.64	13.39
		Min	11.77	12.52
L5	For 22D# pin installation	Max	11.08	11.08
		Min	9.91	9.91
	For 22D# socket installation	Max	11.08	11.08
		Min	9.58	9.58
	For 20# or 16# pin/socket installation	Max	11.25	11.25
		Min	10.08	10.08
L6	For 22D# pin installation	Max	8.47	9.22
		Min	7.6	8.35
	For 22D# socket installation	Max	8.47	9.22
		Min	7.27	8.02
	For 20# or 16# pin/socket installation	Max	8.64	9.39
		Min	7.77	8.52

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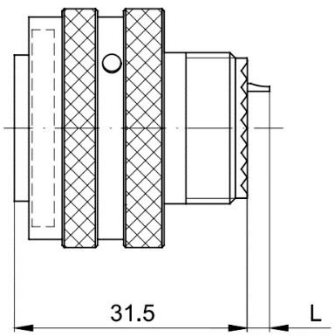
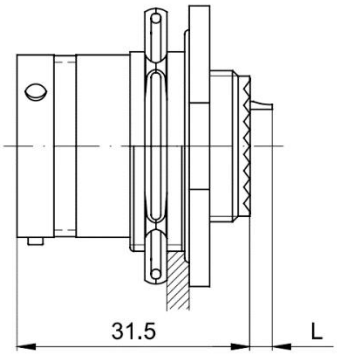
7.6 MIL-DTL-38999 Series I Solder-Type Product Dimensions:

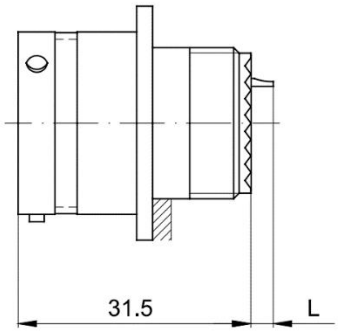
MS27467 Plug



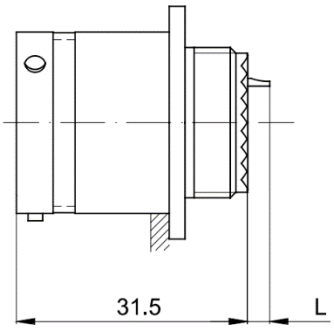
MS27468 Receptacle



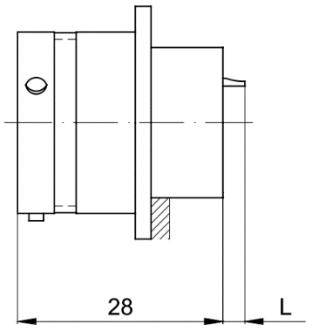
MS27466 Receptacle



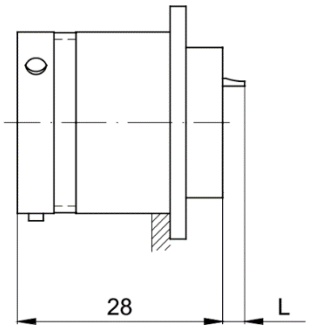
MS27656 Receptacle



MS27496 Receptacle



MS27505 Receptacle



Solder Contact Sizes	L(mm)	Solder Cup Inner Diameter(mm)	Maximum Compatible Wire Gauge (AWG)
22D#	3.44 ~ 3.47	Φ0.85	22
20#	3.44 ~ 3.47	Φ1.1	20
16#	3.44 ~ 3.47	Φ1.7	16
12#	3.44 ~ 3.47	Φ2.49	12
10#	6.3 ~ 6.4	Φ3.6	8
8#	6.3 ~ 6.4	Φ4.8	6

Note: Coaxial contacts do not utilize solder-type contacts.

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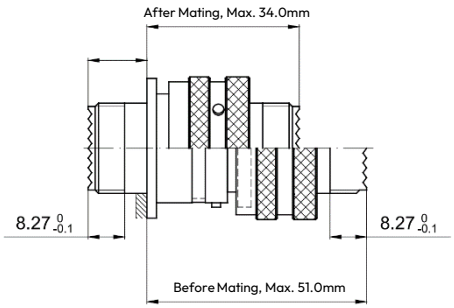
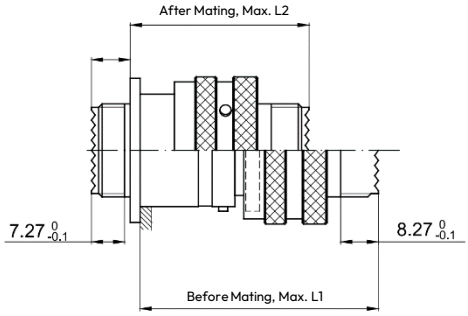
7.7 Mated Dimensions of Plugs and Receptacles

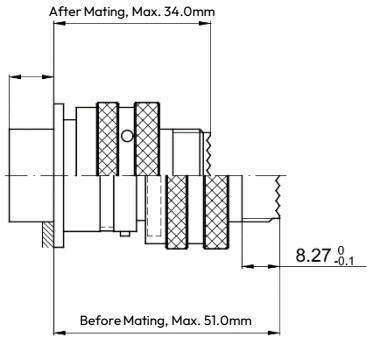
MS27466 Receptacle / MS27467 Plug



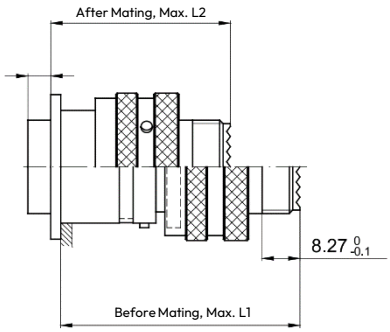
MS27656 Receptacle / MS27467 Plug



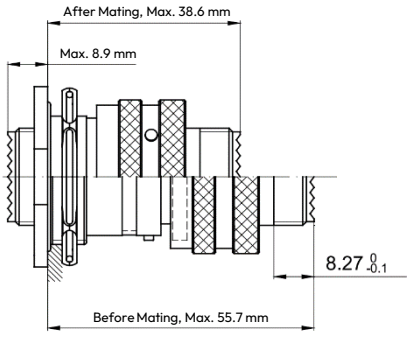
MS27496 Receptacle / MS27467 Plug



MS27505 Receptacle / MS27467 Plug



MS27468 Receptacle / MS27467 Plug



Note: For receptacles with backshells, the overall length after attachment is calculated by adding the receptacle length and backshell length, then subtracting the threaded engagement length.

Shell Number		09	11	13	15	17	19	21	23	25
L1	MAX	53.3	53.3	53.3	53.3	53.3	53.3	52.5	52.5	525
L2	MAX	36.4	36.4	36.4	36.4	36.4	36.4	35.6	35.6	35.6
A	MAX	11.1	11.1	11.1	11.1	11.1	11.1	11.9	11.9	11.9
B	MAX	7.1	7.1	7.1	7.1	7.1	7.1	7.9	7.9	7.9

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8. Protection Caps

8.1 Part Number

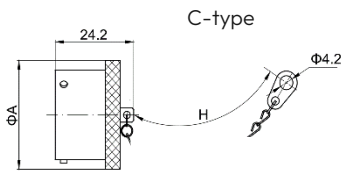
	MS	27501	F	11	C	L

Series:	**MS**
component number:	**MS27501** - Plug Protection Cap **MS27502** - Receptacle Protection Cap
Shell Plating:	**B -** Olive drab cadmium **F -** Electroless nickel **E —**Passivated stainless steel
Shell Size:	**09, 11, 13, 15, 17, 19, 21, 23, 25**
Chain Type:	**A** - Without chain **N** - Stainless steel twisted chain with ring (for MS27468 receptacle) **C** - Stainless steel twisted chain **R** -Nylon rope **S** - Stainless steel wire rope
Length marking:	**Unmarked** - Standard length (140mm for plug metal sealing cap, 100mm for receptacle metal sealing cap) **L** - Chain length 127mm **M** - Chain length 152.4mm (for MS27501 only) **N** - Chain length 177.8mm (for MS27501 only)

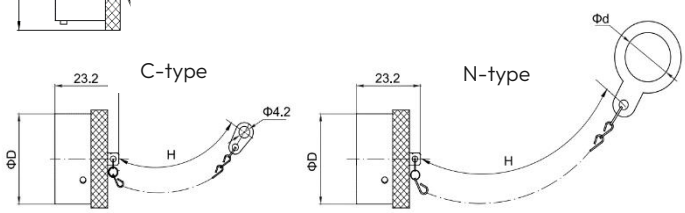
Note: MS27502 is a composite material protection cap. When there is no plating, it is indicated by "-" in the model number. Sealing caps should be ordered separately and are not included with the connector.

8.2 Sizes

Plug Protection Cap MS27501



Receptacle Protection Cap MS27502



壳体号		09	11	13	15	17	19	21	23	25
A	MAX	20.5	23.7	26.9	30.1	33.2	36.4	39.6	42.8	45.9
D	MAX	21.7	23.5	29.0	31.6	34.8	38.0	41.1	44.2	46.0
d	MIN	18.0	21.1	26.0	29.0	32.4	35.5	38.6	42.0	44.7
L	MAX	76.2	76.2	92.9	92.9	92.9	92.9	101.6	101.6	101.6

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9. Standard Backshells

Suitable for MIL-DTL-38999 Series I and II.

9.1 Part Number

		M85049/	27	14	N
Series:	**M85049/**				
Types:	**27** - A type Tail nut **49** - B type Straight cable clamp **47** - C type Angled cable clamp **62** - D type Shielded backshell (add "T" before series number) **62 -** Heat shrink sleeve backshell **01 -** Grounding compression type **06 -** Spring-loaded cable protection type				
Shell Numbers:	Refer to the shell size table.				
Shell Plating:	**W -** Olive drab cadmium **N -** Electroless nickel **S -** Passivated stainless steel				

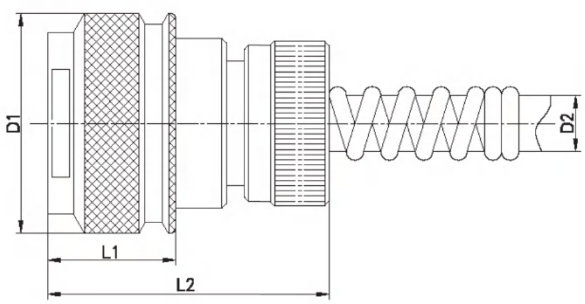
Note 01:** Backshells should be ordered separately. If the quantity ordered is the same as that of the matching plug and receptacle, the abbreviation of the tailpiece accessory (A, B, C, or D) can be added directly after the model number of the matching header or receptacle. The abbreviation is for ordering and production management purposes only.

Note 02: shell size table.

Shell Numbers	08	10	12	14	16	18	20	22	24
Suitable for MIL-DTL-38999 Series I	09	11	13	15	17	19	21	23	25
Suitable for MIL-DTL-38999 Series II	08	10	12	14	16	18	20	22	24

9.2 Sizes

M85049/06 - Spring-loaded cable protection type backshell



Part Number	D1(mm)	D2(mm)	L1(mm)	L2(mm)
M85049/06-08N	19.1	7.0	14.8	35
M85049/06-10N	21.6	10.0	14.8	35
M85049/06-12N	25.4	13.0	14.8	37
M85049/06-14N	27.5	15.0	14.8	37
M85049/06-16N	31.8	18.0	14.8	37
M85049/06-18N	35.6	20.0	14.8	40
M85049/06-20N	38.1	23.5	14.8	40
M85049/06-22N	41.9	26.5	14.8	45
M85049/06-24N	44.5	29	14.8	45

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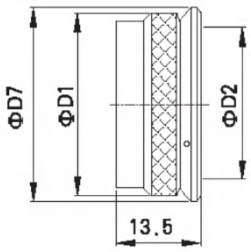
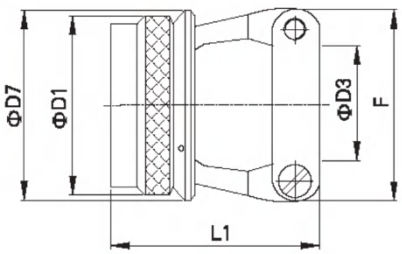
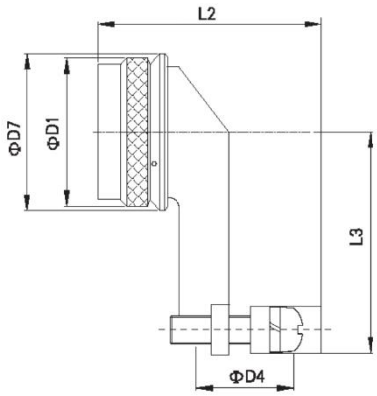
M85049/27 - (HA Type) Tail Nut



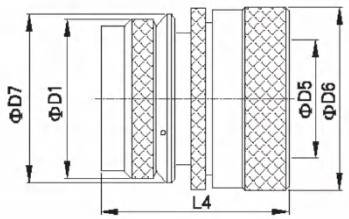
M85049/49 - (HB Type) Straight Cable Clamp



M85049/47 - (HC Type) Angled Cable Clamp

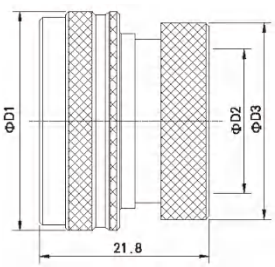


M85049/62 - (HD Type) Shielded Backshell



Shell Sizes		08	10	12	14	16	18	20	22	24
D1(mm)	MAX	156	18.6	218	25.0	28.2	31.0	34.2	37.3	40.5
D2(mm)	MAX	13.7	14.3	17.5	20.7	23.9	26.7	29.9	33.0	36.2
D3(mm)	MIN	3.2	4.8	6.5	7.4	8.1	8.8	9.3	9.,8	10.3
	MAX	6.3	8.8	12.6	16.0	19.3	21.8	25.0	28.0	31.5
D4(mm)	MIN	3.2	4.8	65	7.4	8.1	8.8	9.3	9.8	10.3
	MAX	6.0	9.8	11.0	14.0	17.0	20.0	23.0	26.0	29.0
D5(mm)	MAX	7.0	10.0	13.0	16.05	19.05	21.6	24.3	26.3	28.9
D6(mm)	MAX	13.3	15.2	19.5	21.09	24.26	26.27	32.5	34.22	36.8
F(mm)	MAX	18.6	21.6	24.8	28.0	31.2	34.0	37.2	40.3	43.5
L1(mm)	MAX	22.3	24.3	24.3	24.3	24.3	24.3	24.3	26.3	28.8
L2(mm)	MAX	29.0	32.0	23.5	36.5	38.5	41.5	44.5	46.0	48.0
L3(mm)	MAX	25.0	26.0	27.5	31.0	32.5	34.0	34.5	36.5	43.5
L4(mm)	MAX	22.7	22.7	22.7	22.7	22.7	25.4	25.4	25.4	27.2

M85049/62 - Heat shrink sleeve backshell



Part Number	D1	D2	D3
M85049/62-08N	15.6	6.7	115
M85049/62-10N	18.6	9.9	14.6
M85049/62-12N	21.7	12.8	17.6
M85049/62-14N	25.0	16.0	21.2
M85049/62-16N	28.2	19.2	24.4
M85049/62-18N	30.9	21.4	26.4
M85049/62-20N	34.2	24.6	30.9
M85049/62-22N	37.7	27.7	33.8
M85049/62-24N	40.4	30.5	36.8

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10. Straight Shielded Backshell (for Series I and II)

10.1 Part Number

	M85049/	18A-	25	N	09	A

Series:	**M85049/**
Types:	**18A** - Straight Shielded Cable Clamp (for MIL-DTL-38999 Series I and II)
Shell Numbers:	See table 01
Shell Plating:	**W -** Olive drab cadmium **N -** Electroless nickel **S -** Passivated stainless steel
Outlet diameter code:	See table 02
Length code:	See table 03

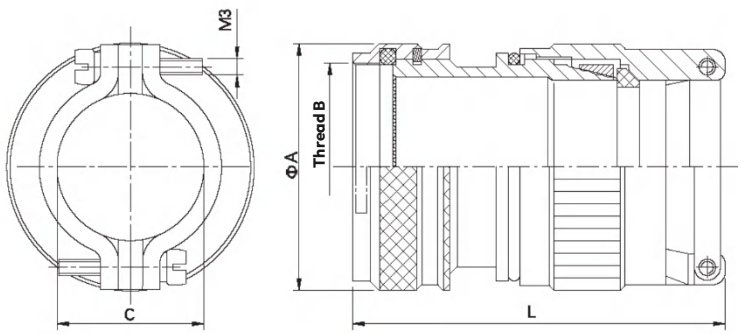

Table 01:

Shell Number	Outlet diameter code	A	Thread B
9	01 ~ 02	16.9	0.4375-28UNEF
11	01 ~ 03	20.9	0.5625-24UNEF
13	02 ~ 04	24.0	0.6875-24UNEF
15	02 ~ 05	27.0	0.8125-20UNEF
17	02 ~ 06	31.0	0.9375-20UNEF
19	03 ~ 07	33.0	1.0625-18UNEF
21	03 ~ 08	36.0	1.1875-18UNEF
23	03 ~ 09	39.0	1.3125-18UNEF
25	04 ~ 10	42.0	1.4375-18UNEF

Table 02:

Outlet diameter code	Outlet diameter C (mm)
01	1.57~3.18
02	3.18~6.35
03	6.35 ~ 9.53
04	9.53 ~ 12.7
05	12.7 ~ 15.88
06	15.88 ~ 19.05
07	19.05 ~ 22.23
08	22.23 ~ 25.4
09	25.4 ~ 28.58
10	28.58 ~ 31.75

Table 03:

Shell Number	Length Code	L (mm)
9 ~ 25	-	62.7
9 ~ 25	A	88.1
15 ~ 25	B	113.5
21 ~ 25	C	138.9

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MIL-DTL-38999 Series II Electric Circular Connector

1. Main Features

- Compliance with MIL-DTL-38999 Series II standards;
- Quick bayonet coupling;
- Small size, lightweight, and shortest shell length;
- EMI/RFI shielding: Ensures superior electromagnetic interference and radio frequency interference protection.
- Crimp-removable contacts: Allows for easy contact replacement without requiring special tools.
- Receptacles: Available in a variety of mounting styles including box-mount, surface-mount, front-mount, rear-mount, and nut-mounted.
- Lightweight design: Ideal for applications where weight and size are critical and where exposure to severe vibration, sand, or moisture is limited.
- Sealed interface and tail: Provides excellent environmental sealing for moisture, dust, and other contaminants.
- Widely used in: Aerospace, aviation, and military systems.

2. Key technical characteristics

2.1 Mechanical Characteristics

Shell Materials:	Aluminum alloy, stainless steel
Shell Finishes:	Class B: Olive drab cadmium; Class E: Passivated stainless steel; Class F: Electroless nickel
Insulator Material:	Thermosetting Plastic
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy, crimp, solder, and PCB types
Mechanical Life:	⩾500 mating cycles
Shock:	3ms half-sine wave, peak acceleration of 300g

2.2 Environmental Characteristics

Operating Temperature:	Class B: -65°C to +175°C; Class E & F: -65°C to +200°C
Salt Spray Resistance:	Tested according to GJB1217 Method 1001: Class B: 500 hours; Class E: 1000 hours; Class F: 48 hours
Relative Humidity:	98% at 40°C
Operating Altitude:	⩽ 30,480 meters
Additional Features:	Excellent resistance to moisture, salt spray, fungus, rain, and dust.

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2.3 Electrical Characteristics

2.3.1 Contact Resistance and Current Rating:

Contact Size	Diameter (mm)	Contact Resistance (mΩ)	Current Rating (A)
22D#	Φ076	≤12	5
20#	Φ1.00	≤5	7.5
16#	Φ1.60	≤2.5	13
12#	Φ2.40	≤1.5	23

2.3.2 Electromagnetic Interference Shielding:

- Minimum attenuation of 45 dB from 100 MHz to 1 GHz.

2.3.3 Withstanding Voltage (V):

Ratings*	M	I	II
sea level	1300	1800	2300
21000m	800	1000	1000

* Working voltage varies depending on the contact arrangement. Please refer to the contact arrangement for details.

2.3.4 Insulation Resistance:

- ≥ 5000 MΩ under normal conditions
- ≥ 100 MΩ under humid conditions

2.3.5 Shell Continuity:

- ≤ 2.5 mΩ for Class B, ≤ 1.0 mΩ for Class F, and ≤ 5 mΩ for Class E.

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3. How to Order

	MS	27472	T	14	F	35	P	N

Series:	**MS**
MS Number:	**27473** - Crimp Straight Plug (T-type only) **27484** - Crimp Straight Plug with Grounding Fingers (T-type only) **27472** - Crimp Wall Mounting Flange Receptacle (T-type only) **27513** - Crimp Box Mounting Flange Receptacle with grommet (E-type only) **27497** - Crimp Wall Mounting Flange Receptacle (Rear mount) (T-type only) **27508** - Crimp Box Mounting Flange Receptacle (Rear mount) (E-type only) **27474** - Crimp Jam Nut Receptacle (T-type only)
Service Class:	**T** - Threaded rear for accessory mounting; **E** - Non-threaded rear, no accessory mounting
Shell Size:	**08, 10, 12, 14, 16, 18, 20, 22, 24**
Finishes:	**B** - Olive drab cadmium plate nickel base 175°C **C** - Anodic coating (Alumilite) 200°C **F** - Electroless nickel 200°C **E** - Passivated steel 200°C
Insert Arrangement:	See “Insert Arrangement” Table (Page 31-32)
Contact Style:	**P** - Crimp pin; **PH** - Solder pin; **PL** - Long printed circuit pin; **PC** - Short printed circuit pin; **S** - Crimp socket; **SH** - Solder socket; **SL** - Long printed circuit socket; **SC** - Short printed circuit socket
Alternate Keying Position:	**N** - Normal keyway; **A, B, C, D** - Variant keyways

Note:

1. For applications requiring high oil resistance, the connector seal material shall be fluorosilicone rubber. Add "C1" to the end of the original part number. For example, MS27467T17F35PNC1.
2. If a conductive square gasket is required, add "C2" to the end of the part number. For example, MS27466T17F35PNC2.
3. If a conductive O-ring is required, add "C5" to the end of the part number. For example, MS27468T17F35PNC5.

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4. Crimp Contacts

Contact Size	Diameter (Mm)	Pin Color Code	Socket Color Code	Ferrule Inner Diameter (mm)	Ferrule Outer Diameter (mm)	Suitable Wire Cross-section (mm²)	Suitable Wire AWG	Suitable Wire Insulation Outer Diameter (mm)	Removal Tool Code
22D#	0.76	Orange – Blue - Black	Orange – Yellow - Grey	0.85	1.20	0.08 0.125 0.2 0.3	28 26 24 22	0.76 ~ 1.37	M81969/ 14-01
20#	1.00	Orange – Blue - Orange	Orange – Green - Brown	1.17	1.78	0.2 0.3 0.5	24 22 20	1.02 ~ 2.11	M81969/ 14-10
16#	1.60	Orange – Blue- Yellow	Orange – Green - Red	1.68	2.62	0.5 0.8 1.0 1.2	20 18 16	1.65 ~ 2.77	M81969/ 14-03
12#	2.40	Orange – Blue- Green	Orange – Green - Orange	2.49	3.84	2.0 3.0	14 12	2.46 ~ 3.61	M81969/ 14-04

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5. Insert Arrangement

Shell Sizes						
08	35 M 6-22D#	98 I 3-20#	02 I 2-20#	03 I 3-20#	10 I 1-12#	11 I 1-16#	
10	35 M 13-22D#	98 I 6-20#	05 I 5-20#	04 I 4-20#	01 I 1-12#	99 I 7-20#	02 I 2-16#
12	35 M 22-22D#	98 I 10-20#	04 I 4-16#	08 I 8-20#	03 II 3-16#		
14	35 M 37-22D#	18 I 18-20#	05 II 5-16#	97 I 8-20# 4-16#	15 I 14-20# 1-16#		
	19 I 19-20#	38 I 4-12#					
16	35 M 55-22D#	26 I 26-20#	06 I 6-12#	08 II 8-16#	99 I 21-20# 2-16#		
18	35 M 66-22D#	32 I 32-20#	28 I 26-20# 2-16#	11 II 11-16#	30 I 29-20# 1-16#		
	45 M 67-22D#	53 M 53-22D#	96 I 9-12#				
20	35 M 79-22D#	41 I 41-20#	16 II 16-16#	39 I 37-20# 2-16#	11 II 11-12#		

Contact Legend ○ 22D# ◔ 20# ◑ 16# ◕ 12#

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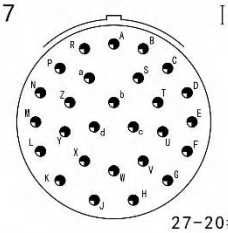
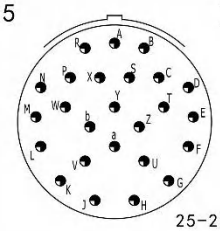
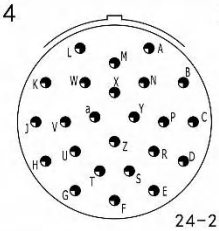
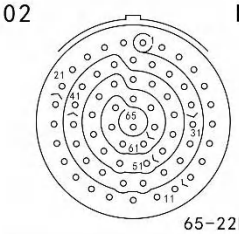
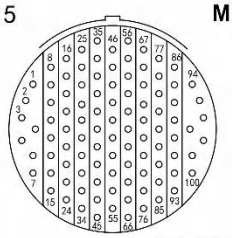
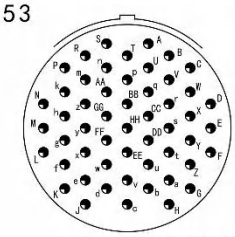
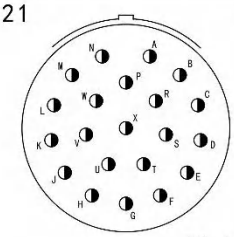
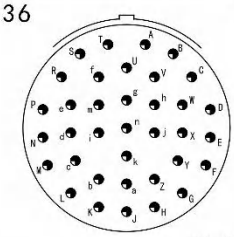
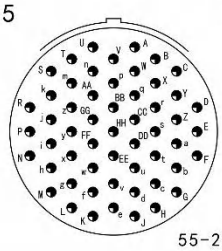
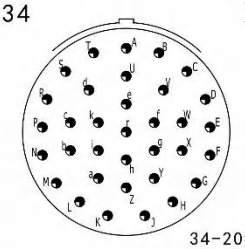
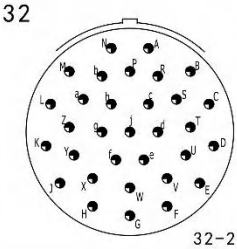
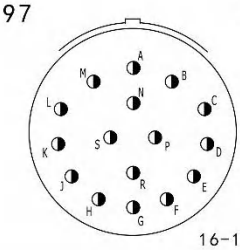
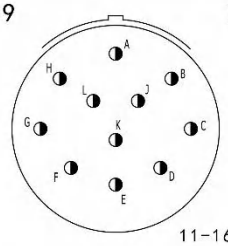
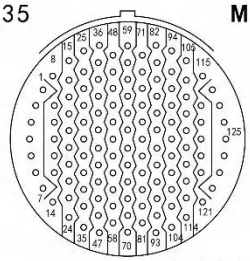
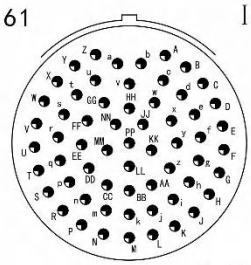
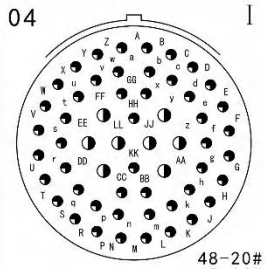
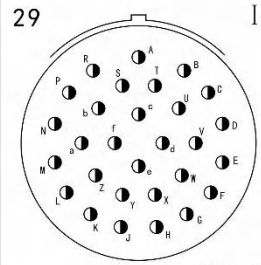
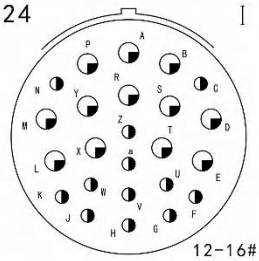
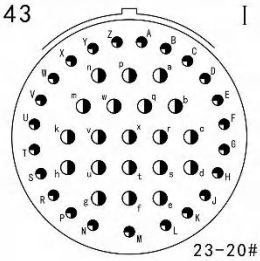
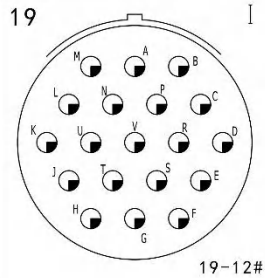
20	27 I  27-20#	25 I  25-20#	24 I  24-20#	02 M  65-22D#
22	35 M  100-22D#	53 I  53-20#	21 II  21-16#	36 I  36-20#
	55 I  55-20#	34 I  34-20#	32 I  32-20#	97 I  16-16#
	99 II  11-16#			
24	35 M  128-22D#	61 I  61-20#	04 I  48-20# 8-16#	29 I  29-16#
	24 I  12-16# 12-12#	43 I  23-20# 20-16#	19 I  19-12#	

Contact Legend ○ 22D# ◔ 20# ◑ 16# ◕ 12#

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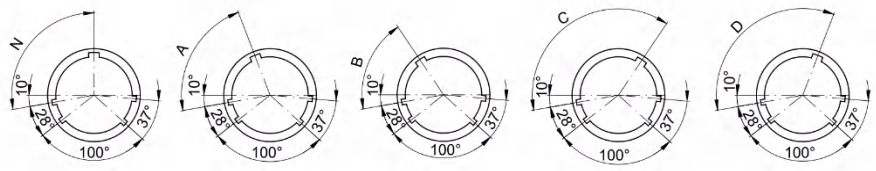
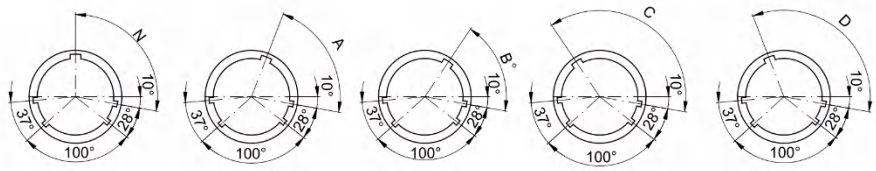
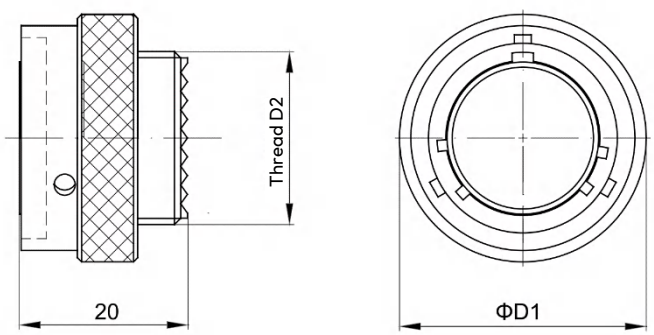
6. Keying Position

Receptacle keying angle	
Plug keying angle	

Keying Code	08	10	12	14	16	18	20	22	24
N	100°	100°	100°	100°	100°	100°	100°	100°	100°
A	82°	86°	80°	79°	82°	82°	82°	85°	85°
B		72°	68°	66°	70°	70°	70°	74°	74°
C	—	128°	132°	134°	130°	130°	130°	126°	126°
D	118°	114°	120°	121°	118°	118°	118	115°	115°

7. Sizes

7.1 Plug MS27473/MS27484:



Shell Number	D1 (mm)	Thread D2 UNEF-2A
08	19.00	0.4375-28
10	21.80	0.5625-24
12	26.20	0.6875-24
14	29.30	0.8125-20
16	32.50	0.9375-20
18	35.70	1.0625-18
20	38.80	1.1875-18
22	41.68	1.3125-18
24	44.86	1.4375-18

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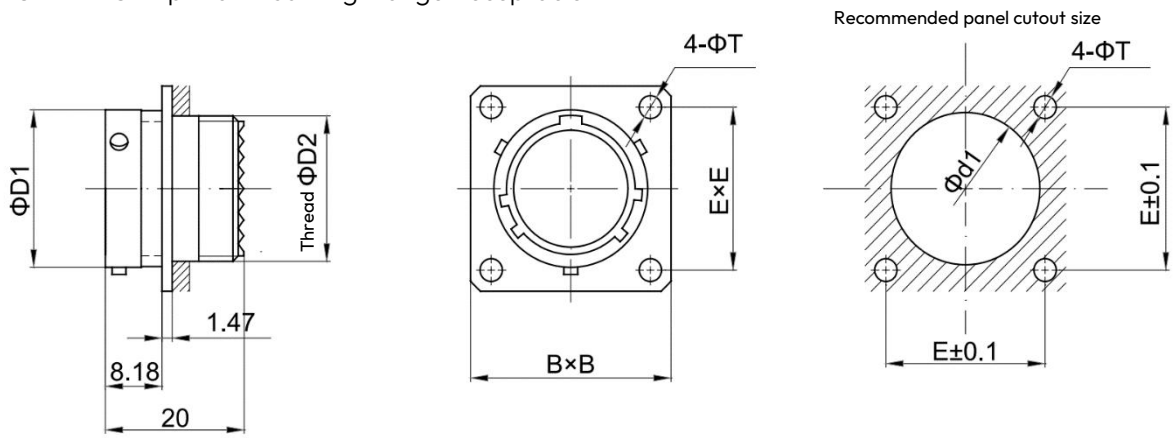
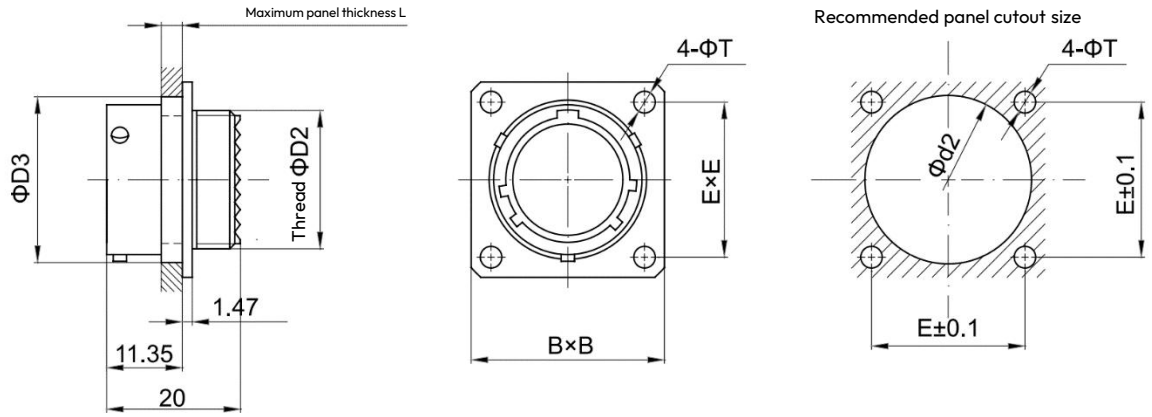
7.2 Wall Mounting Flange Receptacle MS27472/MS27497：

MS27472 Crimp Wall Mounting Flange Receptacle



MS27497 Crimp Wall Mounting Flange Receptacle (Rear Mount)



Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	L Max. (mm)	B (mm)	E (mm)	T (mm)	d1 (mm)	d2 (mm)
08	12.00	0.4375-28	13.20	3.71	21.00	15.09	3.2	12.5	14.2
10	15.00	0.5625-24	16.14	3.71	24.10	18.26	3.2	15.5	17.5
12	19.05	0.6875-24	20.50	371	26.50	20.62	3.2	19.5	21.3
14	22.23	0.8125-20	2,360	3.71	28.90	23.01	3.2	21.5	25.0
16	25.40	0.9375-20	2680	3.71	31.21	246	3.2	25.0	27.3
18	28.58	1.0625-18	30.00	3.71	33.60	26.97	3.2	28.0	31.3
20	31.75	1.1875-18	33.20	4.27	36.80	29.36	3.2	31.5	34.5
22	34.93	1.3125-18	36.35	4.27	40.00	31.75	3.2	34.5	37.5
24	38.10	1.4375-18	39.50	4.27	43.10	34.93	3.9	37.5	40.6

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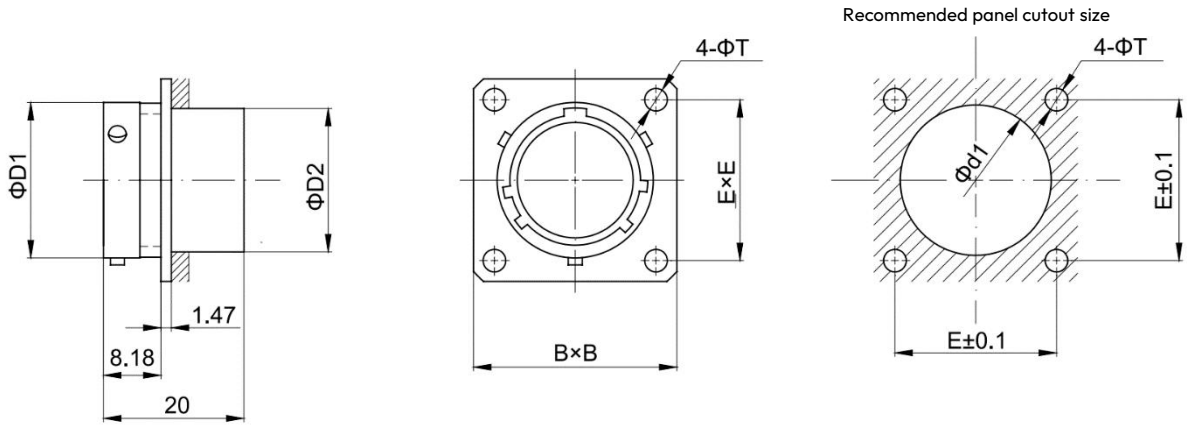
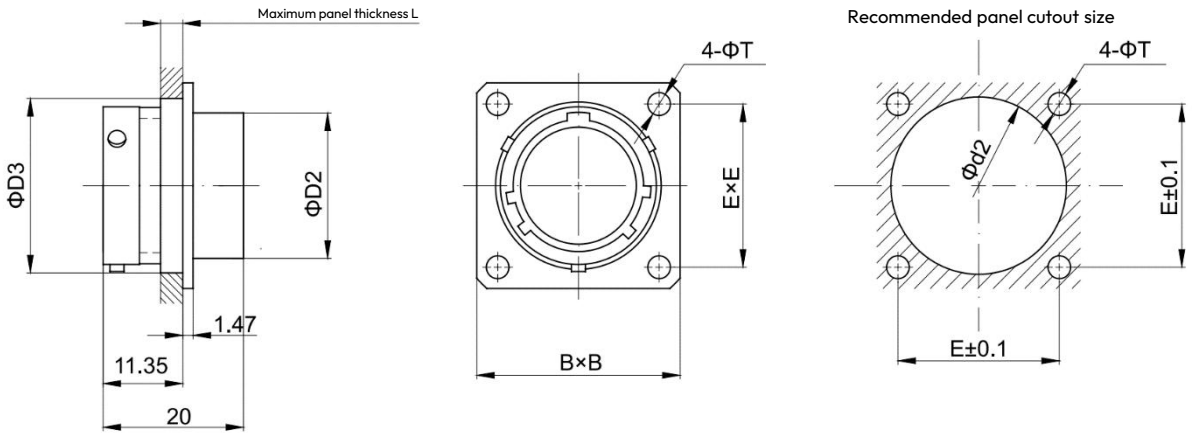
7.3 Box Mounting Flange Receptacle MS27513/MS27508：

MS27513 Crimp Box Mounting Flange Receptacle with grommet

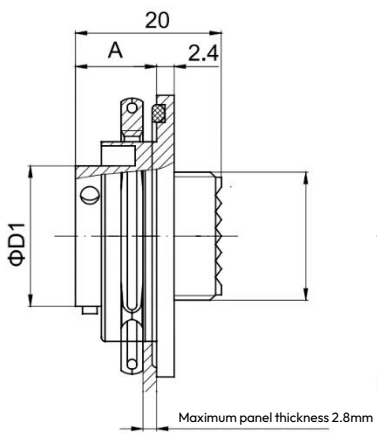


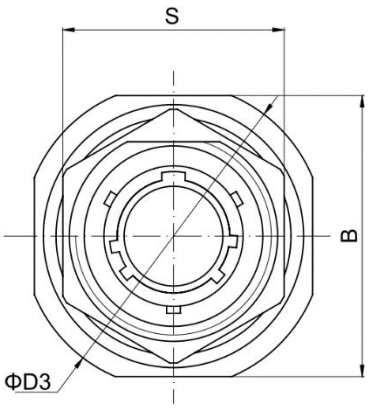
MS27508 Crimp Box Mounting Flange Receptacle (Rear Mount)



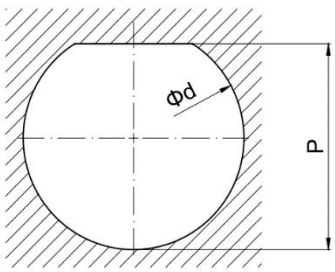
Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	L Max. (mm)	B (mm)	E (mm)	T (mm)	d1 (mm)	d2 (mm)
08	12.00	0.4375-28	13.20	3.71	21.00	15.09	3.2	12.5	14.2
10	15.00	0.5625-24	16.14	3.71	24.10	18.26	3.2	15.5	17.5
12	19.05	0.6875-24	20.50	371	26.50	20.62	3.2	19.5	21.3
14	22.23	0.8125-20	23.60	3.71	28.90	23.01	3.2	21.5	25.0
16	25.40	0.9375-20	26.80	3.71	31.21	246	3.2	25.0	27.3
18	28.58	1.0625-18	30.00	3.71	33.60	26.97	3.2	28.0	31.3
20	31.75	1.1875-18	33.20	4.27	36.80	29.36	3.2	31.5	34.5
22	34.93	1.3125-18	36.35	4.27	40.00	31.75	3.2	34.5	37.5
24	38.10	1.4375-18	39.50	4.27	43.10	34.93	3.9	37.5	40.6

7.4 MS27474 Crimp Jam Nut Receptacle:





Recommended panel cutout size



Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	A (mm)	B (mm)	S (mm)	d (mm)	p (mm)
8	12	0.4375-28	34.95	11.13	31.75	27.41	22.46	21.08
10	15	0.5625-24	38.1	11.13	34.95	30.61	25.58	24.26
12	19.05	0.6875-24	41.28	11.13	38.1	33.4	28.8	27.53
14	22.23	0.8125-20	44.45	11.13	41.28	36.96	31.98	30.68
16	25.4	0.9375-20	49.23	11.13	45.24	40.1	35.15	33.86
18	28.58	1.0625-18	51.21	11.13	48	43.81	38.28	37.06
20	31.75	1.1875-18	54.38	11.13	51.21	46.45	41.5	40.03
22	34.93	1.3125-18	57.53	11.13	54.36	50.8	44.68	43.21
24	38.1	1.4375-18	60.71	11.13	57.53	54.41	47.85	46.38

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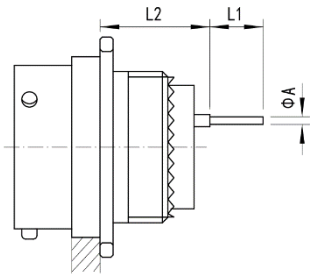
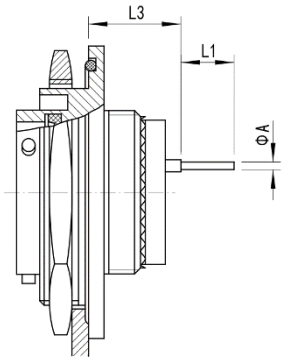
7.5 MIL-DTL-38999 Series II Receptacles with PCB Contacts:

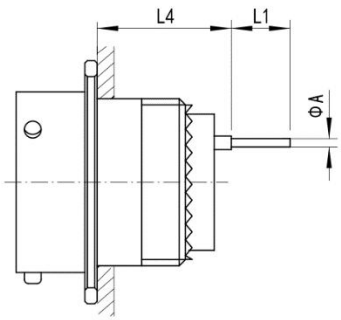
MS27497 Receptacle



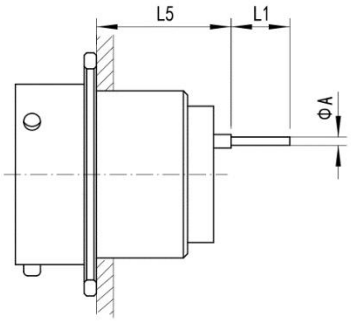
MS27474 Receptacle



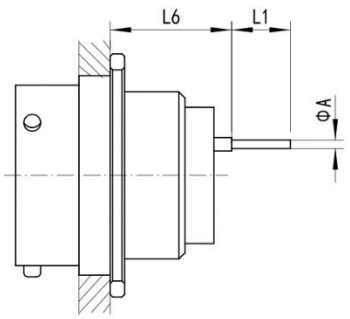
MS27472 Receptacle



MS27513 Receptacle



MS27508 Receptacle



PCB Contact Types		L1 (mm)	A (mm)
22D#	Long PCB Contact	8.5	0.7
	Short PCB Contact	4.0	
20#	Long PCB Contact	8.5	0.7
	Short PCB Contact	5.1	
16#	Long PCB Contact	8.5	1.15
	Short PCB Contact	5.1	

Dimensional Requirements for Various Contact Sizes		Shell Sizes 08-10-12-14-16-18	Shell Sizes 20-22-24
L2	For 22D# pin/socket installation	13.4	13.4
	For 20# or 16# pin/socket installation	13.57	13.57
L3	For 22D# pin/socket installation	13.61	12.95
	For 20# or 16# pin/socket installation	13.78	13.12
L4	For 22D# pin/socket installation	15.1	15.1
	For 20# or 16# pin/socket installation	15.27	15.27
L5	For 22D# pin/socket installation	11.1	11.1
	For 20# or 16# pin/socket installation	11.27	11.27
L6	For 22D# pin/socket installation	9.4	9.4
	For 20# or 16# pin/socket installation	9.57	9.57

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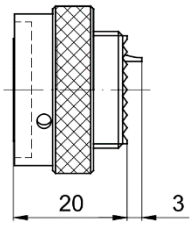
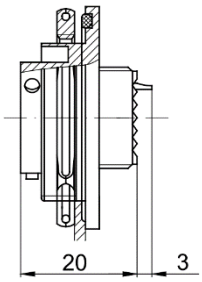
7.6 MIL-DTL-38999 Series II Solder-Type Product Dimensions:

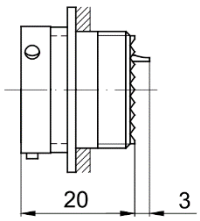
MS27473 Plug



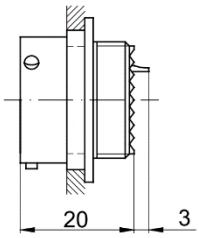
MS27474 Receptacle



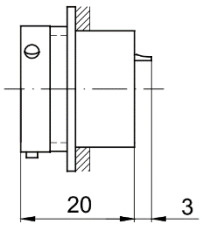
MS27472 Receptacle



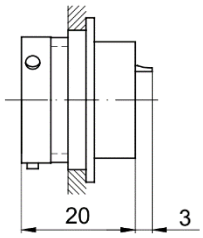
MS27497 Receptacle



MS27513 Receptacle



MS27508 Receptacle

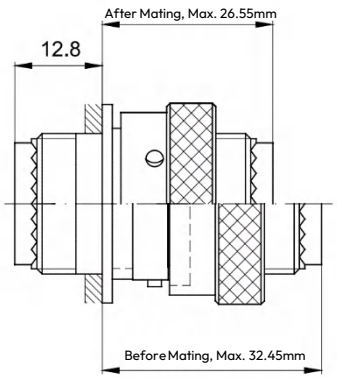


Solder Contact Sizes	Solder Cup Inner Diameter(mm)	Maximum Compatible Wire Gauge (AWG)
22D#	Φ0.9	22
20#	Φ1.1	20
16#	Φ1.7	16
12#	Φ2.49	12

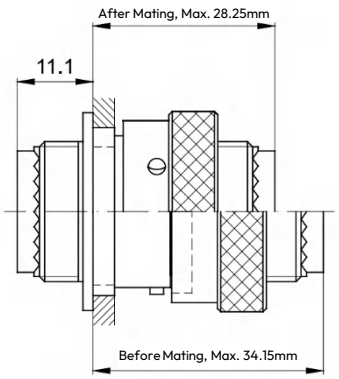
Note: Coaxial contacts do not utilize solder-type contacts.

7.7 Mated Dimensions of Plugs and Receptacles:

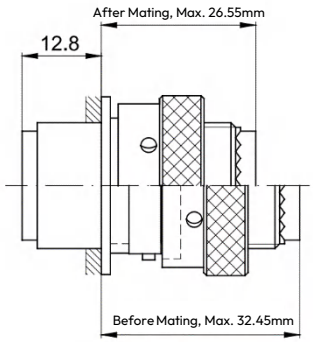
MS27472 Receptacle / MS27473 Plug



MS27497 Receptacle / MS27473 Plug



MS27513 Receptacle / MS27473 Plug



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8. Protection Caps for Plugs and Receptacles

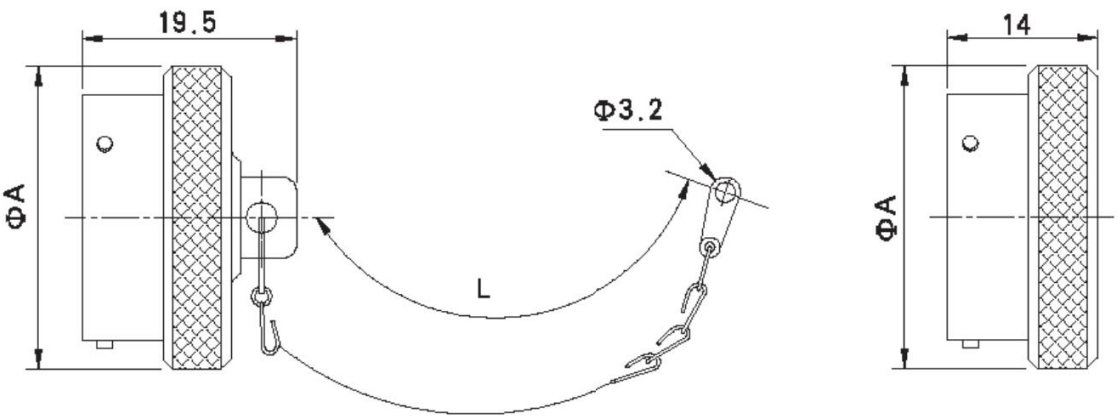
8.1 How to Order:

		MS27510	F	10	C	L
MS Number:	**MS27510** – Plug Protection Cap **MS27511** – Receptacle Protection Cap					
Finishes:	**B -** Olive drab cadmium **F -** Electroless nickel **E —**Passivated stainless steel					
Shell Sizes:	**08, 10, 12, 14, 16, 18, 20, 22, 24**					
Chain Type:	**A** - Without chain **N** - Stainless steel twisted chain with ring (for MS27468 receptacle) **C** - Stainless steel twisted chain **R** -Nylon rope **S** - Stainless steel wire rope					
Length marking:	**Unmarked** - Standard length (140mm for plug metal sealing cap, 100mm for receptacle metal sealing cap) **L** - Chain length 127mm **M** - Chain length 152.4mm (for MS27501 only) **N** - Chain length 177.8mm (for MS27501 only)					

Note : Protection caps should be ordered separately and are not included with the connector.

8.2 Sizes:

Plug Protection Cap MS27510



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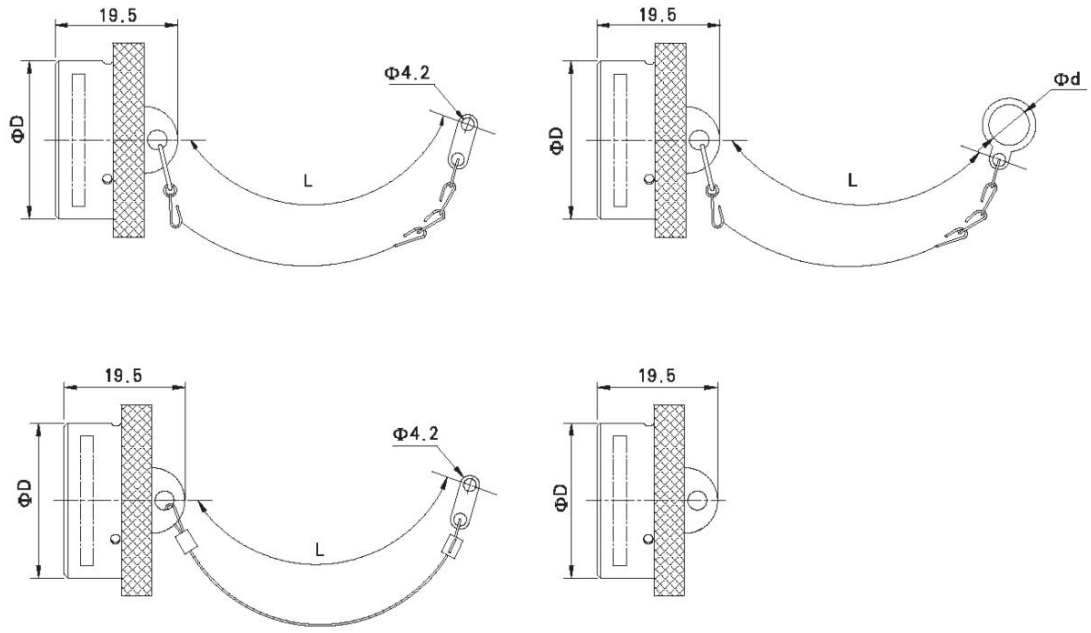
Receptacle Protection Cap MS27511



Shell Sizes		08	10	12	14	16	18	20	22	24
A	MAX	18.2	21.5	25.4	28.7	31.7	35.0	38.1	41.4	44.4
D	MAX	185	21.7	25.3	29.0	31.6	34.8	38.0	41.1	44.2
d	MIN	22.6	26.0	29.0	32.4	35.5	38.6	42.0	44.7	48.5
L	MAX	76.2	76.2	88.9	88.9	88.9	88.9	101.6	101.6	101.6

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9. Standard Accessories

Suitable for MIL-DTL-38999 Series I and II.

9.1 Part Number

		M85049/	27	14	N
Series:	**M85049/**				
Types:	**27** - A type Tail nut **49** - B type Straight cable clamp **47** - C type Angled cable clamp **62** - D type Shielded backshell (add "T" before series number) **62 -** Heat shrink sleeve backshell **01 -** Grounding compression type **06 -** Spring-loaded cable protection type				
Shell Numbers:	Refer to the shell size table.				
Shell Plating:	**W -** Olive drab cadmium **N -** Electroless nickel **S -** Passivated stainless steel				

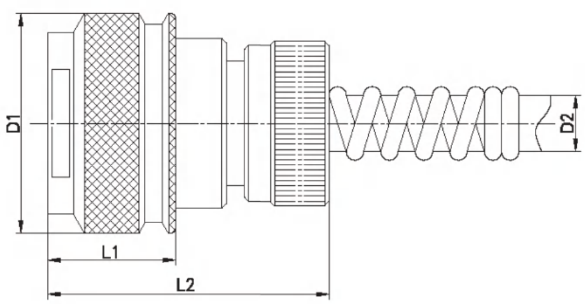
Note 01: Backshells should be ordered separately. If the quantity ordered is the same as that of the matching plug and receptacle, the abbreviation of the tailpiece accessory (A, B, C, or D) can be added directly after the model number of the matching header or receptacle. The abbreviation is for ordering and production management purposes only.

Note 02: shell size table.

Shell Numbers	08	10	12	14	16	18	20	22	24
Suitable for MIL-DTL-38999 Series I	09	11	13	15	17	19	21	23	25
Suitable for MIL-DTL-38999 Series II	08	10	12	14	16	18	20	22	24

9.2 Sizes

M85049/06 - Spring-loaded cable protection type backshell



Part Number	D1(mm)	D2(mm)	L1(mm)	L2(mm)
M85049/06-08N	19.1	7.0	14.8	35
M85049/06-10N	21.6	10.0	14.8	35
M85049/06-12N	25.4	13.0	14.8	37
M85049/06-14N	27.5	15.0	14.8	37
M85049/06-16N	31.8	18.0	14.8	37
M85049/06-18N	35.6	20.0	14.8	40
M85049/06-20N	38.1	23.5	14.8	40
M85049/06-22N	41.9	26.5	14.8	45
M85049/06-24N	44.5	29	14.8	45

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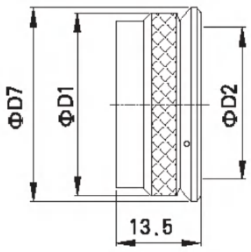
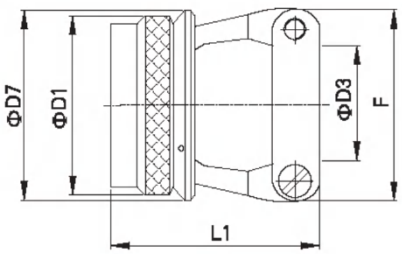
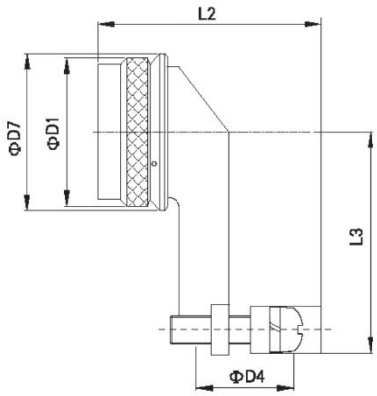
M85049/27 - (HA Type) Tail Nut



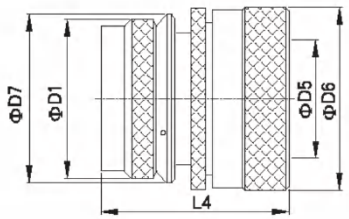
M85049/49 - (HB Type) Straight Cable Clamp



M85049/47 - (HC Type) Angled Cable Clamp

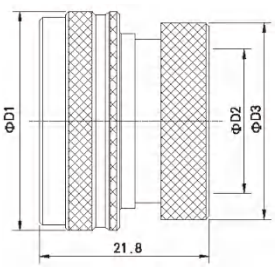


M85049/62 - (HD Type) Shielded Backshell



Shell Sizes		08	10	12	14	16	18	20	22	24
D1(mm)	MAX	156	18.6	218	25.0	28.2	31.0	34.2	37.3	40.5
D2(mm)	MAX	13.7	14.3	17.5	20.7	23.9	26.7	29.9	33.0	36.2
D3(mm)	MIN	3.2	4.8	6.5	7.4	8.1	8.8	9.3	9.,8	10.3
	MAX	6.3	8.8	12.6	16.0	19.3	21.8	25.0	28.0	31.5
D4(mm)	MIN	3.2	4.8	65	7.4	8.1	8.8	9.3	9.8	10.3
	MAX	6.0	9.8	11.0	14.0	17.0	20.0	23.0	26.0	29.0
D5(mm)	MAX	7.0	10.0	13.0	16.05	19.05	21.6	24.3	26.3	28.9
D6(mm)	MAX	13.3	15.2	19.5	21.09	24.26	26.27	32.5	34.22	36.8
F(mm)	MAX	18.6	21.6	24.8	28.0	31.2	34.0	37.2	40.3	43.5
L1(mm)	MAX	22.3	24.3	24.3	24.3	24.3	24.3	24.3	26.3	28.8
L2(mm)	MAX	29.0	32.0	23.5	36.5	38.5	41.5	44.5	46.0	48.0
L3(mm)	MAX	25.0	26.0	27.5	31.0	32.5	34.0	34.5	36.5	43.5
L4(mm)	MAX	22.7	22.7	22.7	22.7	22.7	25.4	25.4	25.4	27.2

M85049/62 - Heat shrink sleeve backshell



Part Number	D1	D2	D3
M85049/62-08N	15.6	6.7	115
M85049/62-10N	18.6	9.9	14.6
M85049/62-12N	21.7	12.8	17.6
M85049/62-14N	25.0	16.0	21.2
M85049/62-16N	28.2	19.2	24.4
M85049/62-18N	30.9	21.4	26.4
M85049/62-20N	34.2	24.6	30.9
M85049/62-22N	37.7	27.7	33.8
M85049/62-24N	40.4	30.5	36.8

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10. Straight Shielded Cable Clamp (for Series I and II)

10.1 Part Number

	M85049/	18A-	25	N	09	A

Series:	**M85049/**
Types:	**18A** - Straight Shielded Cable Clamp (for MIL-DTL-38999 Series I and II)
Shell Numbers:	See table 01
Shell Plating:	**W -** Olive drab cadmium **N -** Electroless nickel **S -** Passivated stainless steel
Outlet diameter code:	See table 02
Length code:	See table 03

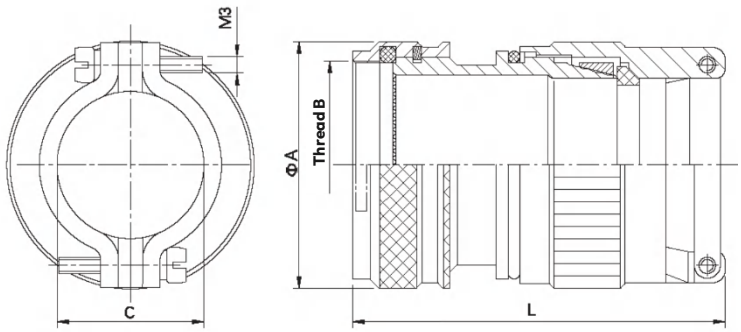

Table 01:

Shell Number	Outlet diameter code	A	Thread B
9	01 ~ 02	16.9	0.4375-28UNEF
11	01 ~ 03	20.9	0.5625-24UNEF
13	02 ~ 04	24.0	0.6875-24UNEF
15	02 ~ 05	27.0	0.8125-20UNEF
17	02 ~ 06	31.0	0.9375-20UNEF
19	03 ~ 07	33.0	1.0625-18UNEF
21	03 ~ 08	36.0	1.1875-18UNEF
23	03 ~ 09	39.0	1.3125-18UNEF
25	04 ~ 10	42.0	1.4375-18UNEF

Table 02:

Outlet diameter code	Outlet diameter C (mm)
01	1.57~3.18
02	3.18~6.35
03	6.35 ~ 9.53
04	9.53 ~ 12.7
05	12.7 ~ 15.88
06	15.88 ~ 19.05
07	19.05 ~ 22.23
08	22.23 ~ 25.4
09	25.4 ~ 28.58
10	28.58 ~ 31.75

Table 03:

Shell Number	Length Code	L (mm)
9 ~ 25	-	62.7
9 ~ 25	A	88.1
15 ~ 25	B	113.5
21 ~ 25	C	138.9

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MIL-DTL-38999 Series III Electric Circular Connector

1. Introduction

- Compliant with MIL-DTL-38999 Series III standard;
- Screw coupling with anti-vibration lock mechanism;
- Compact size, lightweight design, and high contact density;
- Superior EMI/RFI protection;
- Crimp-removable contacts: Allows for easy contact replacement and prevents mismating;
- Variety of shell materials and finishes: Including flame-resistant, composite, and aluminum alloys with multiple plating options;
- High-strength vibration resistance at elevated temperatures: Suitable for harsh environments with sand, dust, and moisture.

2. Key technical characteristics

2.1 Mechanical Characteristics

Shell Materials:	W, F- Aluminum; K-Stainless Steel;
Shell Finishes:	W- Olive Drab Cadmium, F- Electroless Nickel, K- Passivated Stainless Steel
Insulator Material:	Thermosetting Plastic
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy
Mechanical Life:	⩾500 mating cycles
Shock:	3ms half-sine wave, peak acceleration of 300g
Vibration testing:	Sinusoidal vibration test: 60g peak acceleration, with temperature cycling and simulated accessory test for 36 hours. Random vibration test: 44.1grms RMS acceleration at high temperature, 49.5grms RMS acceleration at ambient temperature.
Contact retention force:	22D#:45N； 20#:67N； 16#:111N； 12#:111N； 10#:111N； 8#:111N

2.2 Environmental Characteristics

Operating Temperature:	Class W: -65℃ to +175℃; Class F, K: -65℃ to +200℃
Damp heat:	Per MIL-DTL-38999: 24 hours, 10 cycles.
Fluid resistance:	Resistant to various fuels, coolants, and solvents.
Salt Spray Resistance:	Tested according to GJB1217 method 1001: Class W - 500 hours, Class F - 48 hours, Class K - 1000 hours.

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2.3 Electrical Characteristics

2.3.1 Contact Resistance and Current Rating:

Contact Size	Diameter (mm)	Contact Resistance (mΩ)	Current Rating (A)
22D#	Φ0.76	≤12	5
20#	Φ1.00	≤5	7.5
16#	Φ1.60	≤2.5	13
12#	Φ2.40	≤1.5	23
10#	Φ3.15	≤1.0	40
8#	Φ3.6	≤0.57	46
6#	Φ4.52	≤0.5	60
4#	Φ5.72	≤0.35	80
0#	Φ9.07	≤0.17	150
2/0#	Φ10.31	≤0.124	185

2.3.2 Electromagnetic Interference Shielding:

- For frequencies between 100 MHz and 1 GHz, the minimum attenuation is 85 dB for both F and W classes.
- For frequencies between 1 GHz and 10 GHz, the minimum attenuation is 65 dB for Class F and 50 dB for Class W.

2.3.3 Withstanding Voltage (V):

Ratings*	sea level	21000 Meters
M	1300	800
N	1000	600
I	1800	1000
II	2300	1000

* Working voltage varies depending on the contact arrangement. Please refer to the contact arrangement for details.

2.3.4 Insulation Resistance:

- ⩾ 5000 MΩ under normal conditions

2.3.5 Shell Continuity:

- ⩽ 2.5 mΩ for Class W, ⩽ 1.0 mΩ for Class F, and ⩽ 5 mΩ for Class K.

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3. How to Order

		D38999/	20	W	B	35	P	N
Series:	**D38999/:** MIL-DTL-38999 III							
Shell Style:	**20** - Wall Mount Flange Receptacle; **24** - Jam Nut Receptacle; **26** - Straight Plug							
Service Class:	**W -** Olive Drab Cadmium; **F -** Electroless Nickel; **K** - Passivated Stainless Steel							
Shell Sizes: A-J	**A** - 09 **B** - 11 **C** - 13 **D** - 15 **E** - 17 **F** - 19 **G** - 21 **H** - 23 **J** - 25							
Insert Arrangement:	See “Insert Arrangement” Table (Page 49-55)							
Contact Type:	**P** - Crimp pin; **PH** - Solder pin; **PL** - Long printed circuit pin; **PC** - Short printed circuit pin; **S** - Crimp socket; **SH** - Solder socket; **SL** - Long printed circuit socket; **SC** - Short printed circuit socket							
Alternate Keying Position:	**N** - Normal keying position; **A, B, C, D** - Variant keying positions.							

Note :

1. Identifying codes A and B indicate that the electrical connector utilizes non-standard contact configurations (such as shielded, coaxial, or fiber optic contacts). These special contacts must be ordered separately. Specific models and specifications can be found in the "Special Contacts for MIL-DTL-38999 Series III."
2. When high oil resistance is required, the sealing material will be fluorosilicone rubber. Add "C1" to the end of the original part number (e.g., D38999/20FE35PNC1).
3. If a conductive square gasket is required, add "C2" to the end of the part number.
4. If a conductive O-ring is required, add "C5" to the end of the part number.

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4. Crimp Contacts

Contact Size	Diameter (Mm)	Pin Color Code	Socket Color Code	Ferrule Inner Diameter (mm)	Ferrule Outer Diameter (mm)	Suitable Wire Cross-section (mm^2)	Suitable Wire AWG	Suitable Wire Insulation Outer Diameter (mm)	Removal Tool Code
22D#	0.76	Orange – Blue - Black	Orange – Yellow - Grey	0.85	1.20	0.08 0.125 0.2 0.3	28 26 24 22	0.76 ~ 1.37	M81969/ 14-01
20#	1.00	Orange – Blue - Orange	Orange – Green - Brown	1.17	1.78	0.2 0.3 0.5	24 22 20	1.02 ~ 2.11	M81969/ 14-10
16#	1.60	Orange – Blue- Yellow	Orange – Green - Red	1.68	2.62	0.5 0.8 1.0 1.2	20 18 16	1.65 ~ 2.77	M81969/ 14-03
12#	2.40	Orange – Blue- Green	Orange – Green - Orange	2.49	3.84	2.0 3.0	14 12	2.46 ~ 3.61	M81969/ 14-04
10#	3.15	Green – Red - Grey	Green – Orange - Purple	3.40	4.65	4.8 8.6	10 8	3.42 ~ 4.12	M81969/ 14-05

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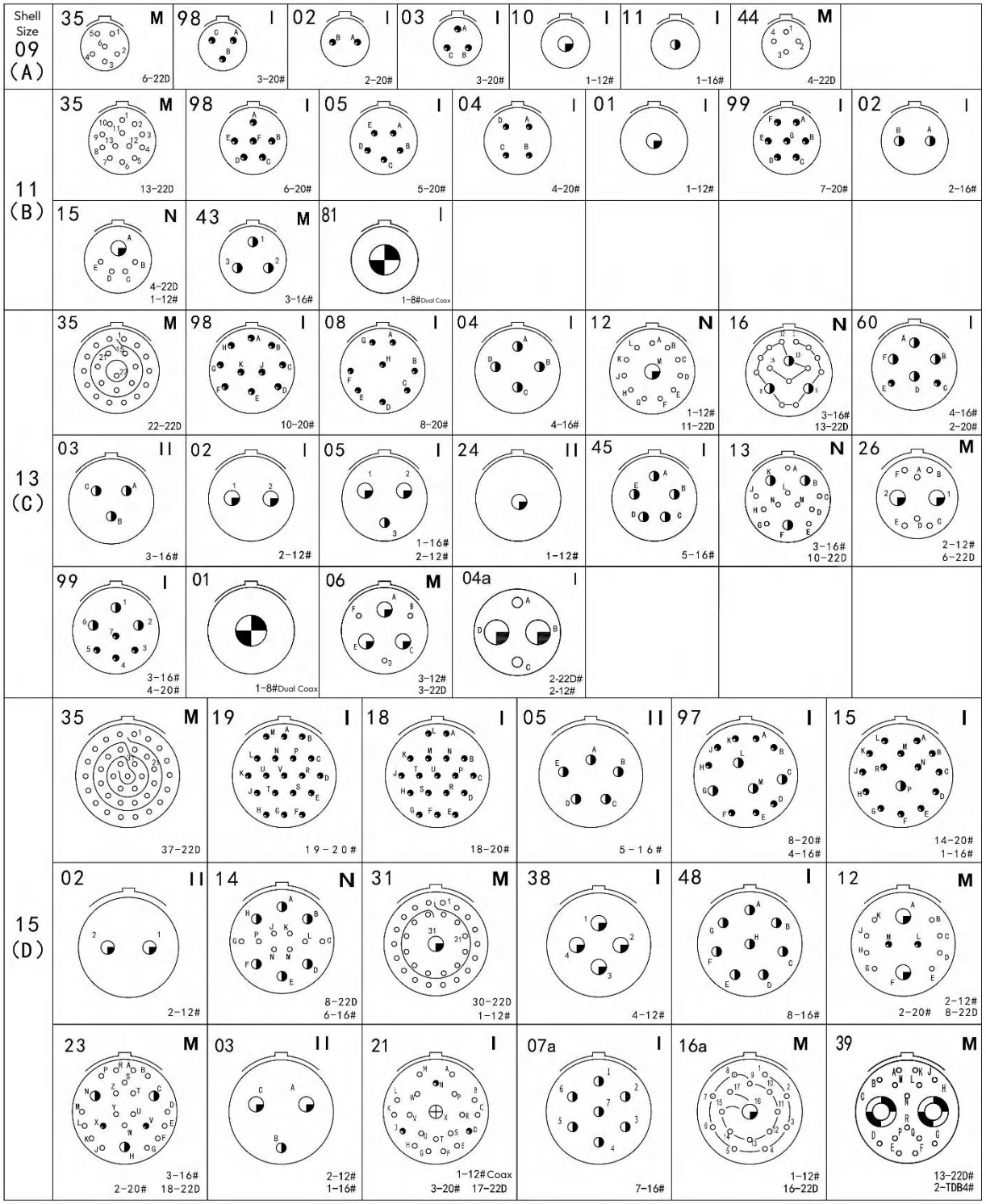
5. Insert Arrangement for MIL-DTL-38999 III



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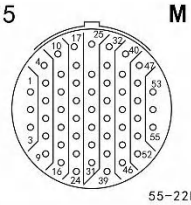
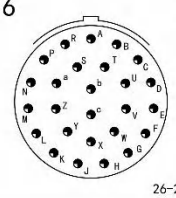
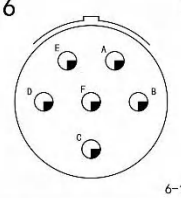
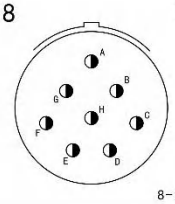
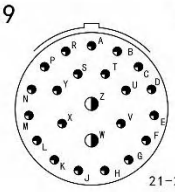
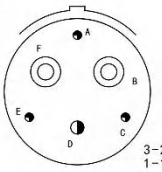
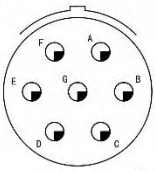
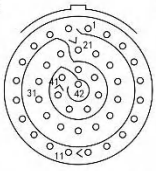
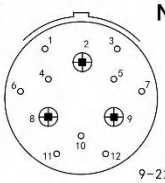
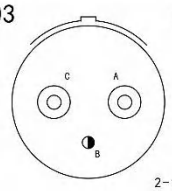
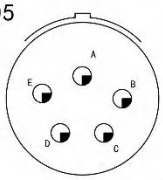
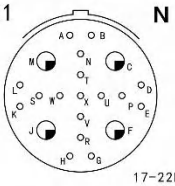
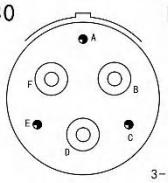
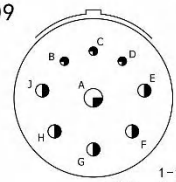
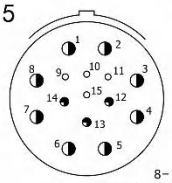
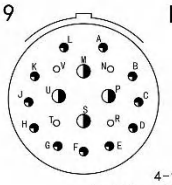
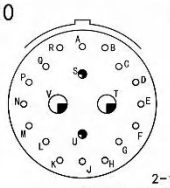
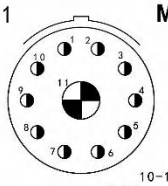
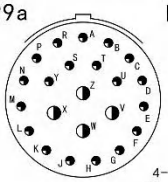
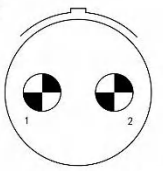
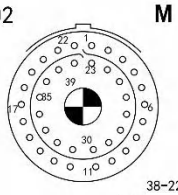
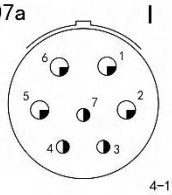
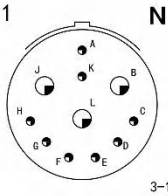
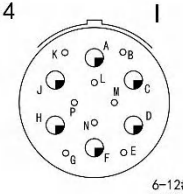
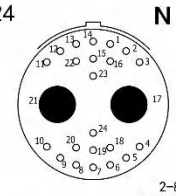
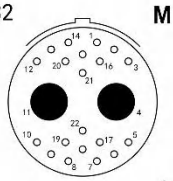
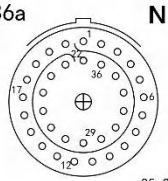
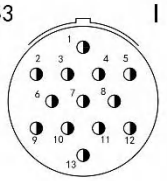
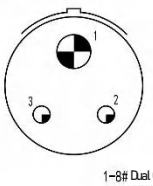
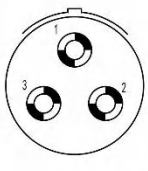
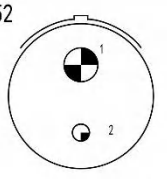
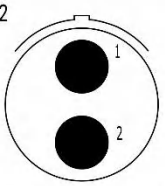
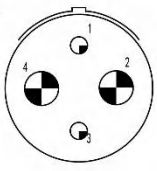
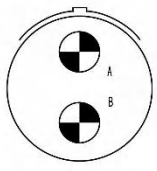
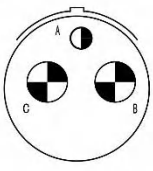
17 (E)

35 M  55-22D	26 I  26-20#	06 I  6-12#	08 II  8-16#	99 I  21-20# 2-16#
16 I  3-20# 1-16# 2-10#	27 I  7-12#	42 M  42-22D	12 N  9-22D 3-12# Shielded	03 N  2-10# 1-16#
05 I  5-12#	21 N  17-22D 4-12#	30 N  3-10# 3-20#	09 I  1-12# 3-20# 5-16#	15 M  8-16# 3-20# 4-22D
19 M  4-16# 11-20# 4-22D	20 I  2-12# 2-20# 16-22D	51 M  10-16# 1-8# Dual Coax	99a N  4-16# 19-20#	22  2-8# Dual Coax
02 M  38-22D 1-8# Dual Coax	07a I  4-12# 3-16#	11 N  3-12# 8-20#	14 I  6-12# 8-22D	24 N  2-8# 22-22D
32 M  2-8# 20-22D	36a N  35-22D 1-12# Coax	53 I  13-16#	23  1-8# Dual Coax 2-12#	39  3-TDB4
52  1-12# 1-8# Dual Coax	62  Power 2-8#	64  2-12# 2-8# Dual Coax	75  2-8# Dual Coax	57  1-16# 2-8#

Contact Legend

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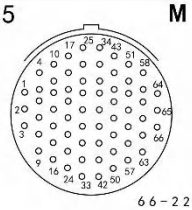
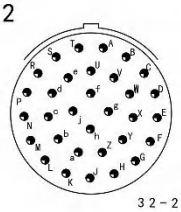
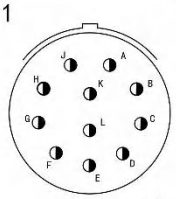
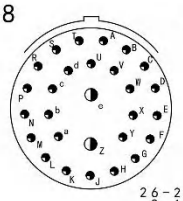
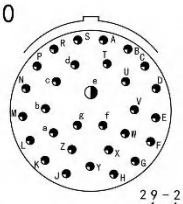
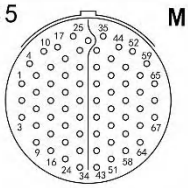
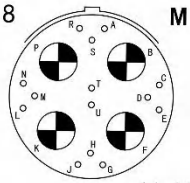
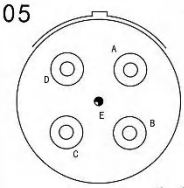
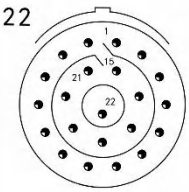
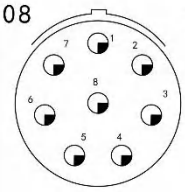
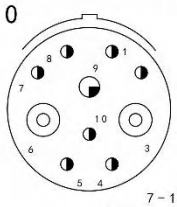
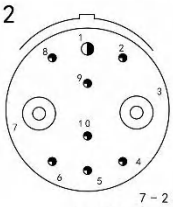
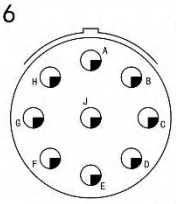
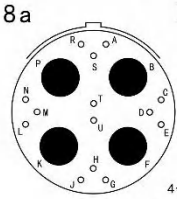
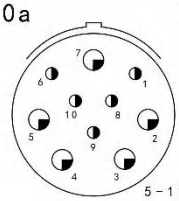
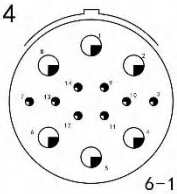
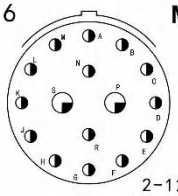
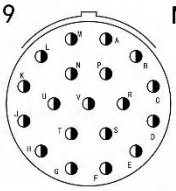
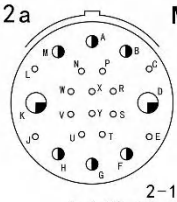
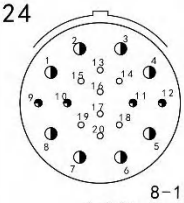
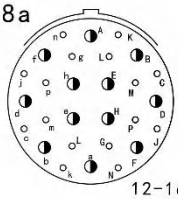
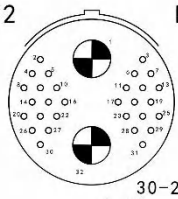
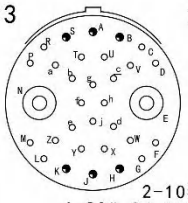
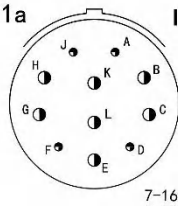
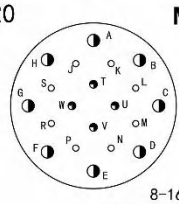
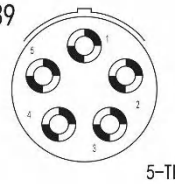
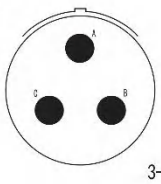
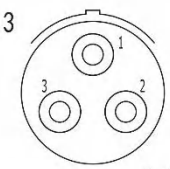
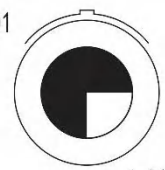
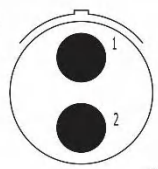
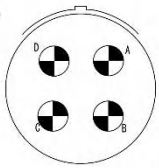
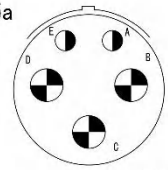
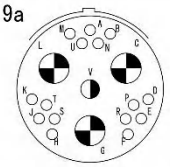
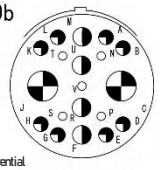
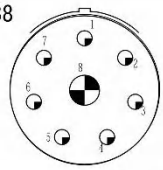
19 (F)

35 M  66-22D	32 I  32-20#	11 II  11-16#	28 I  26-20# 2-16#	30 I  29-20# 1-16#
45 M  67-22D	18 M  14-22D 4-8# Dual Coax	05 N  1-20# 4-10#	22 I  22-20#	08 M  8-12#
10 I  7-16# 1-12#, 2-10#	12 I  7-20# 1-16#, 2-10#	96 I  9-12#	18a M  4-8# 14-22D	10a I  5-12# 5-16#
14 I  6-12# 8-20#	16 M  2-12# 14-16#	19 M  19-16#	22a M  2-12# 6-16#, 14-22D	24 I  8-16# 4-20#, 8-22D
28a I  12-16# 16-22D	92 M  30-22D 2-8# Dual Coax	93 I  2-10# 6-20#, 24-22D	11a II  7-16# 4-20#	20 M  8-16# 4-20#, 8-22D
39  5-TDB4	03  3-8#	13  Power 3-10#	01  Power 1-2/0#	02  Power 2-8#
04  Differential 4-8#	05a  Differential 2-16#, 3-8#	19a  Differential 3-8#, 1-16#, 15-22D	19b  Differential 2-8#, 4-16#, 8-20#, 5-22D	38  Differential 7-12#, 1-8#

Contact Legend

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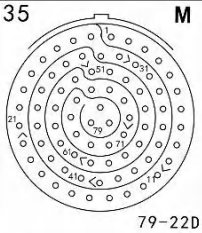
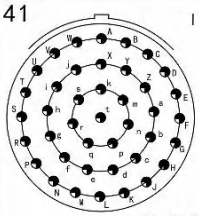
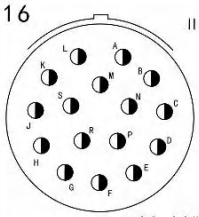
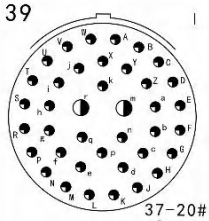
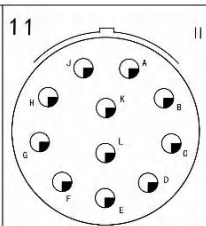
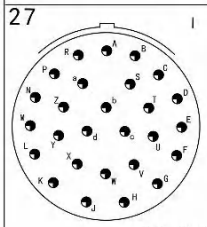
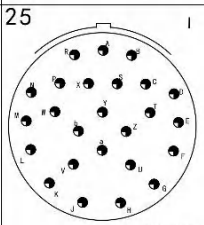
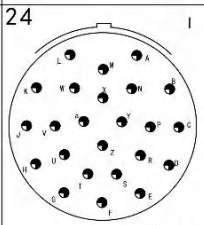
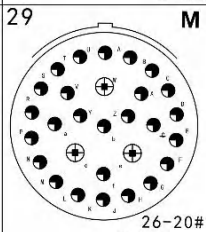
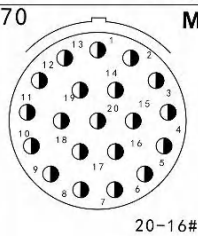
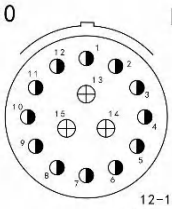
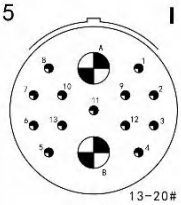
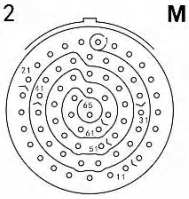
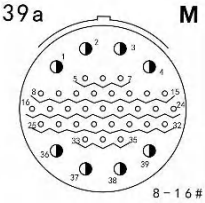
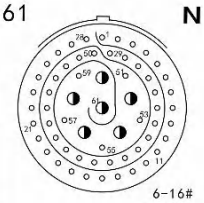
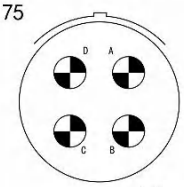
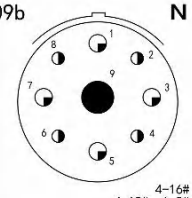
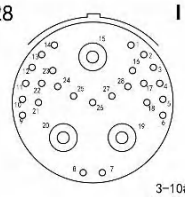
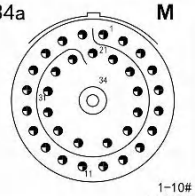
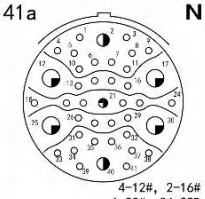
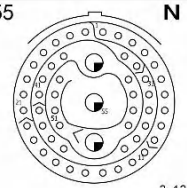
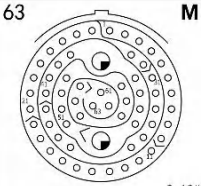
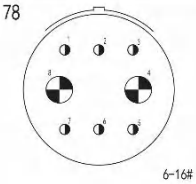
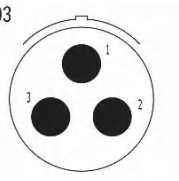
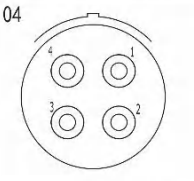
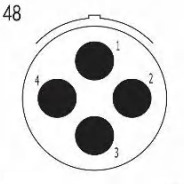
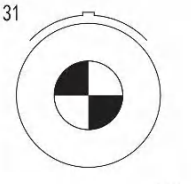
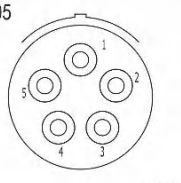
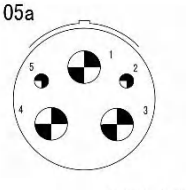
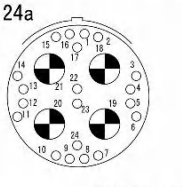
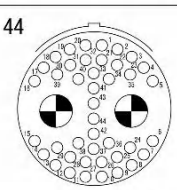
21 (G)

35 M  79-22D	41 I  41-20#	16 II  16-16#	39 I  37-20# 2-16#	11 II  11-12#	
27 I  27-20#	25 I  25-20#	24 I  24-20#	29 M  26-20# 3-12# Shielded	70 M  20-16#	
80 M  12-16# 3-12# Coax	15 I  13-20# 2-8# Dual Coax	02 M  65-22D	39a M  8-16# 31-22D	61 N  6-16# 55-22D	
75  4-8# Dual Coax	09b N  4-16# 4-12#, 1-8#	28 I  3-10# 25-22D	34a M  1-10# 33-20#	41a N  4-12#, 2-16# 1-20#, 34-22D	
55 N  3-12# 52-22D	63 M  2-12# 61-22D	78  6-16# 2-8# Dual Coax	03  Power 3-8#	04  Power 4-10#	
48  Power 4-8#	31  Power 1-0#	05  Power 5-10#	05a  Differential 2-20#, 3-8#	24a  Differential 20-22#, 4-8#	
44  Differential 42-22D, 2-8#					

Contact Legend

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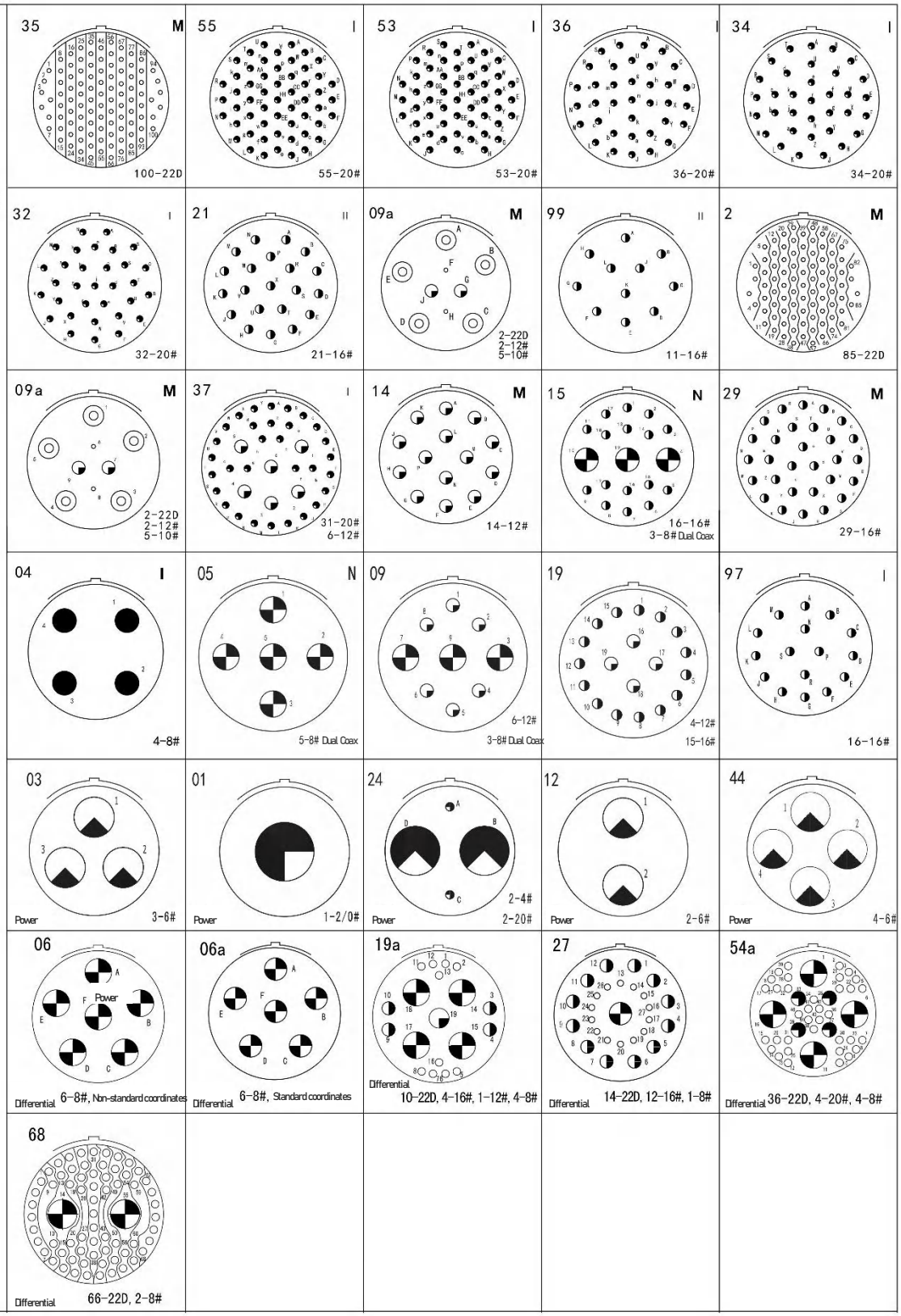
23 (H)



Contact Legend

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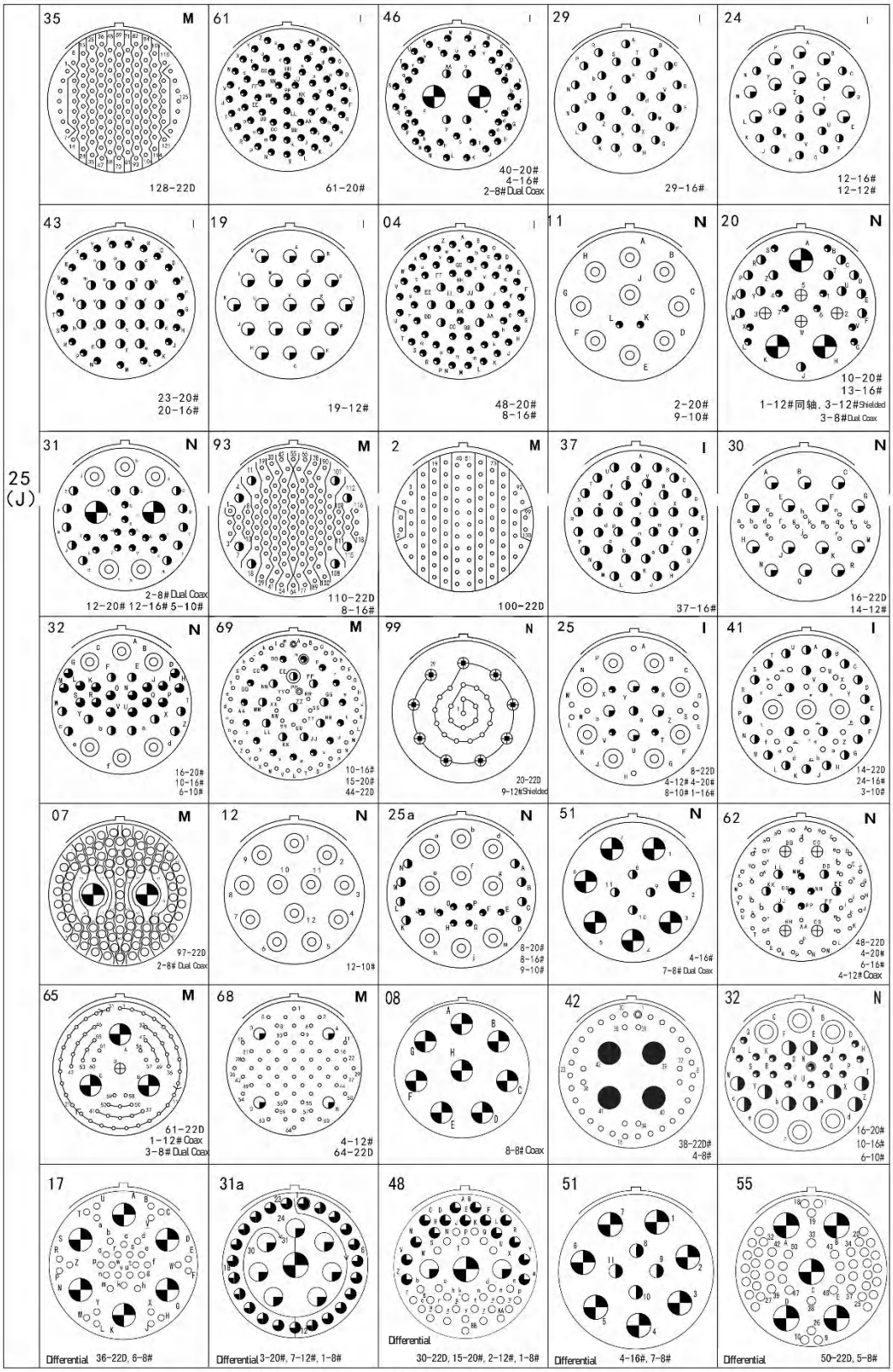
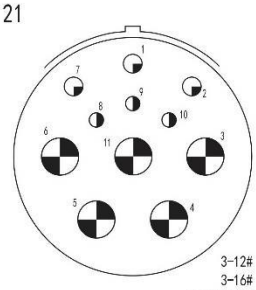


Contact Legend

22D 20# 16# 12# 12#Shield 12#Coax 10# TDB4 Contact (Can be replaced with 10# contact pin) 8#Dual Coax 8# 6# 4# 0# 1-2/0#

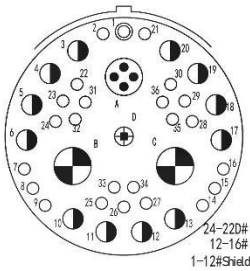
25
(J)

21



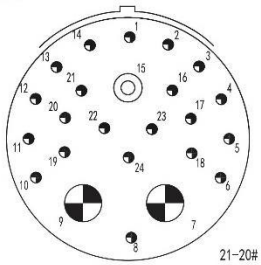
3-12#
3-16#
5-8# Dual Coax

44



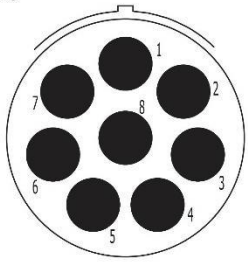
24-22D#
12-16#
1-12#Shielded
1-8# Differential 4-Pin
2-8# Dual Coax

24b



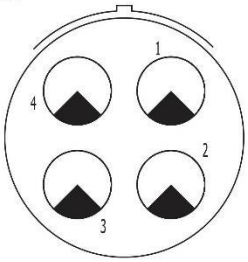
21-20#
2-8# Dual Coax
1-10# Coax

18



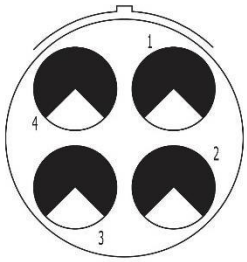
Power 8-8#

34



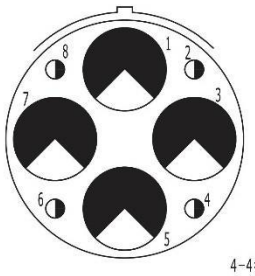
Power 4-6#

14



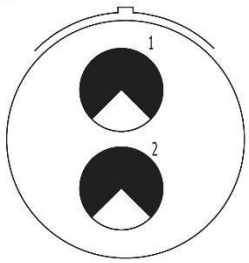
Power 4-4#

28



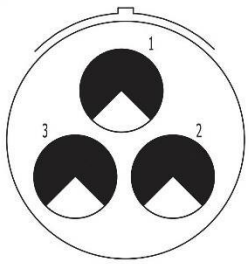
4-4#
Power 4-16#

22



Power 2-4#

33

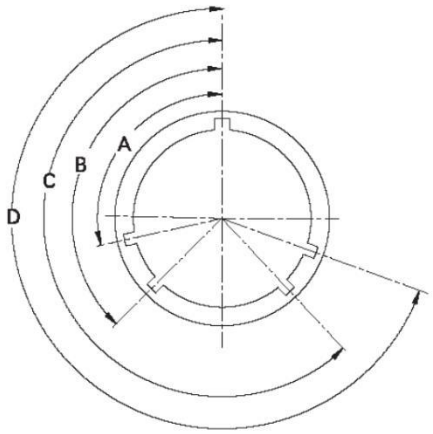


Power 3-4#

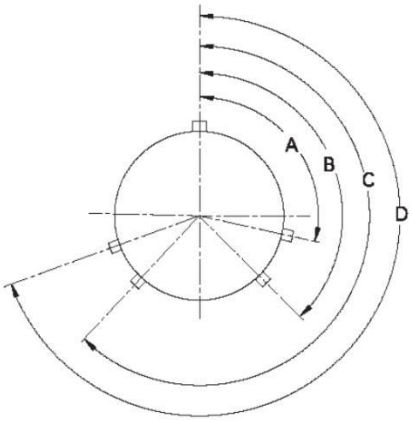
Contact Legend

6. Keying Position

Receptacle front view



Plug front view



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

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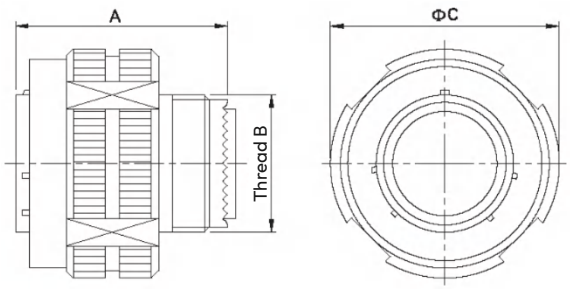
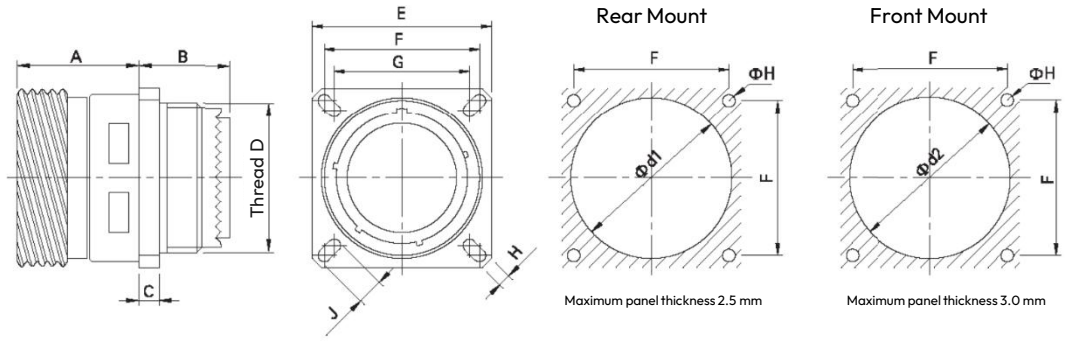
7. Sizes

7.1 Plug



Shell Size	Shell Number	A Max. (mm)	Thread B	C Max. (mm)
9	A	31.00	M 12×1-6g	21.6
11	B	31.00	M 15×1-6g	24.85
13	C	31.00	M 18×1-6g	29.25
15	D	31.00	M 22×1-6g	32.30
17	E	31.00	M 25×1-6g	35.50
19	F	31.00	M 28×1-6g	38.30
21	G	31.00	M 31×1-6g	41.44
23	H	31.00	M 34×1-6g	44.88
25	J	31.00	M 37×1-6g	47.82

7.2 Flange Mount Receptacles



Shell Sizes	Shell Number	A Max. (mm)	B Max. (mm)	C Max. (mm)	Thread D	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	d1 Min. (mm)	d2 Min. (mm)
9	A	20.83	10.60	2.5	M 12×1-6g	23.80	18.26	15.09	3.25	5.49	16.66	13.11
11	B	20.83	10.60	2.5	M 15×1-6g	26.20	20.62	18.26	3.25	4.93	20.22	15.88
13	C	20.83	10.60	2.5	M 18×1-6g	28.60	23.01	20.62	3.25	4.93	23.42	19.05
15	D	20.83	1,060	2.5	M 22×1-6g	31.00	24.61	23.01	3.25	4.39	26.59	23.01
17	E	20.83	10.60	2.5	M 25×1-6g	33.30	26.97	24.61	3.25	4.93	30.96	25.81
19	F	20.83	10.60	2.5	M 28×1-6g	36.50	29.36	26.97	3.25	4.93	32.94	28.98
21	G	20.07	11.40	3.2	M 31×1-6g	39.70	31.75	29.36	3.25	4.93	36.12	32.16
23	H	20.07	11.40	3.2	M 34×1-6g	42.90	34.93	31.75	3.91	6.15	39.29	34.93
25	J	20.07	11.40	3.2	M 37×1-6g	46.00	38.10	34.93	3.91	6.15	42.47	37.69

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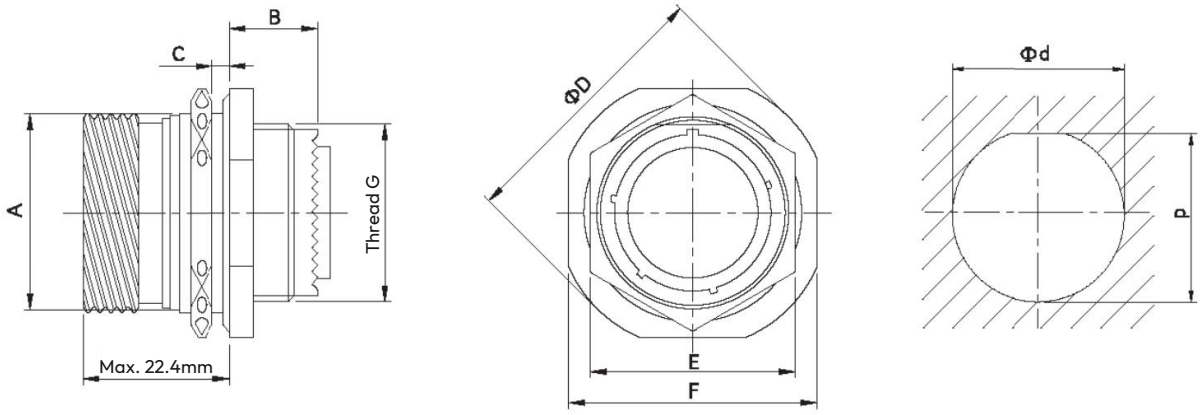
7.3 Jam Nut Receptacle



Shell Sizes	MS Shell Number	A (mm)	B Max. (mm)	C Max. (mm)	D Max. (mm)	E Max. (mm)	F (mm)	Thread G	d (mm)	p (mm)
9	A	0.6250	9.90	3.2	30.20	22.50	27.00	M 12×1-6g	17.70	16.99
11	B	0.7500	9.90	3.2	34.90	25.00	31.80	M 15×1-6g	20.88	19.53
13	C	0.8750	9.90	3.2	38.10	30.00	34.90	M 18×1-6g	25.58	24.26
15	D	1.0000	9.90	3.2	41.30	33.30	38.10	M 22×1-6g	28.80	27.53
17	E	1.1875	9.90	3.2	44.50	36.50	41.30	M 25×1-6g	31.98	30.68
19	F	1.2500	9.90	3.2	4,920	39.70	46.00	M 28×1-6g	35.15	33.86
21	G	1.3750	9.90	3.2	52.40	43.00	49.20	M 31×1-6g	38.28	37.06
23	H	1.5000	9.90	3.2	55.60	46.00	52.40	M 34×1-6g	41.50	40.24
25	J	1.5250	9.90	3.2	58.70	50.70	55.60	M 37×1-6g	44.68	43.41

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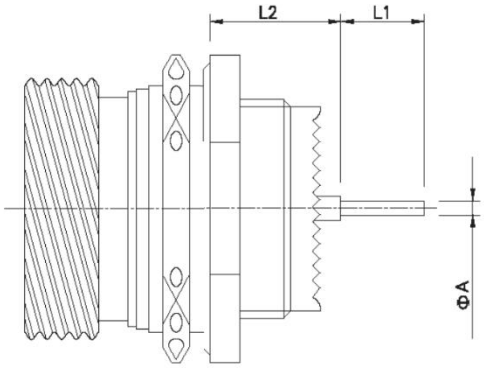
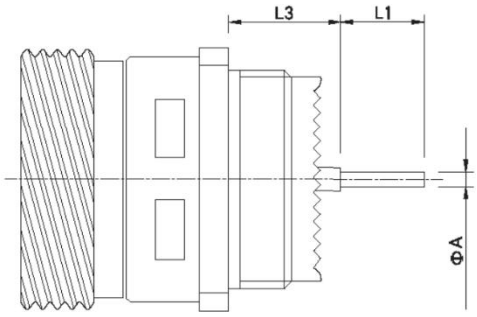
7.4 MIL-DTL-38999 Series III Receptacles with PCB Contacts:

D38999/24 Receptacle



D38999/20 Receptacle



PCB Contact Types		L1 (mm)	A (mm)
22D#	Long PCB Contact	8.5	0.7
	Short PCB Contact	4.0	
20#	Long PCB Contact	8.5	0.7
	Short PCB Contact	5.1	
16#	Long PCB Contact	8.5	1.15
	Short PCB Contact	5.1	

Dimensional Requirements for Various Contact Sizes			Shell Sizes 09-11 (mm)	Shell Sizes 13-15-17-19-21-23-25 (mm)
L2	For 22D# pin installation	Max	10.52	10.34
		Min	11.46	11.28
	For 22D# socket installation	Max	10.19	10.01
		Min	11.46	11.28
	For 20# or 16# pin/socket installation	Max	10.69	10.51
		Min	11.63	11.45
L3	For 22D# pin installation	Max	9.48	9.48
		Min	1,058	10.58
	For 22D# socket installation	Max	9.15	9.15
		Min	10.58	10.58
	For 20# or 16# pin/socket installation	Max	9.65	9.65
		Min	10.75	10.75

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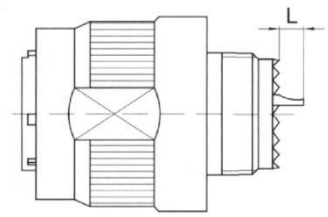
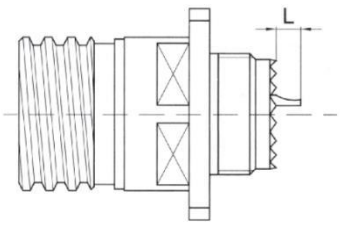
7.5 Solder-Type Product Dimensions:

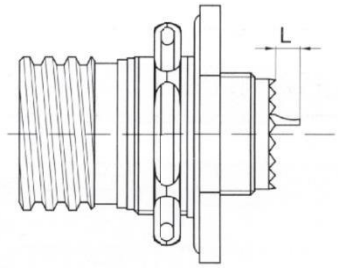
D38999/26 Receptacle



D38999/26 Receptacle



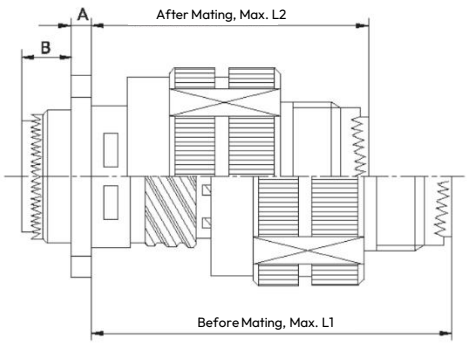
D38999/26 Receptacle



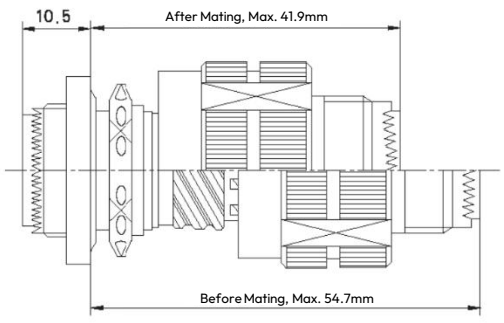
Solder Contact Sizes	L(mm)	Solder Cup Inner Diameter(mm)	Maximum Compatible Wire Gauge (AWG)
22D#	4	Φ0.9	22
20#	4	Φ11	20
16#	4	Φ1.9	16
12#	4	Φ2.9	12
10#	6	Φ3.6	8
8#	6	Φ4.8	6

7.6 Mated Dimensions of Plug and Receptacle

D38999/20 Receptacle & D38999/26 Plug



D38999/24 Receptacle & D38999/26 Plug



Shell Sizes		09	11	13	15	17	19	21	23	25
L1	MAX	53.2	53.2	53.2	53.2	53.2	53.2	52.4	52.4	52.4
L2	MAX	40.3	40.3	40.3	40.3	40.3	40.3	39.6	39.6	39.6
A	MAX	2.5	2.5	2.5	2.5	2.5	2.5	3.2	3.2	3.2
B	MAX	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6

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8. Protection Caps for Plugs and Receptacles

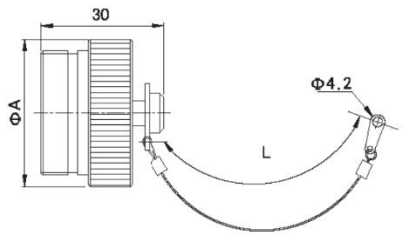
8.1 How to Order:

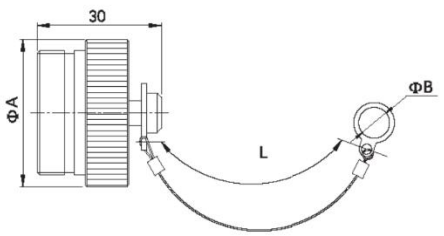
		D38999/32	F	15	N
Series Number:	**D38999/32** – Plug Protection Cap **D38999/33** – Receptacle Protection Cap				
Finishes:	**W –** Olive Drab Cadmium; **F –** Electroless Nickel; **K** – Passivated Stainless Steel **J –** Olive Drab Cadmium, Composite **M –**Electroless Nickel, Composite				
Shell Sizes	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Chain Types:	**R** - Stainless steel wire rope (for flange mount receptacles) **C** - Nylon wire rope (for flange mount receptacles) **N** - Stainless steel wire with ring (for jam nut receptacles) **S** - Nylon wire with ring (for jam nut receptacles)				

Note : Protection caps should be ordered separately and are not included with the connector.

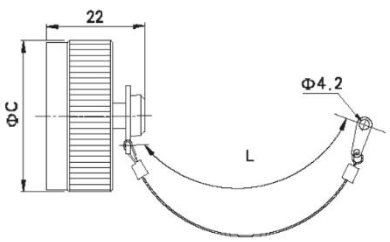
8.2 外形尺寸：

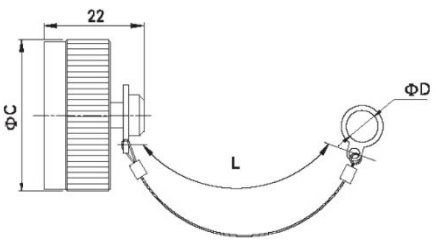
Plug Protection Cap
D38999/32





Receptacle Protection Cap
D38999/33





Shell Sizes		09	11	13	15	17	19	21	23	25
A (mm)	MAX	22.86	25.40	30.48	33.02	36.83	39.37	43.18	44.45	48.26
B (mm)	MIN	12.92	17.78	19.27	22.60	25.62	28.95	31.97	34.03	38.32
C (mm)	MAX	22.86	27.86	30.48	31.75	36.83	38.10	41.91	44.45	48.26
D (mm)	MIN	17.78	21.33	25.62	28.95	31.97	35.30	38.32	41.65	44.45
L (mm)	MAX	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00

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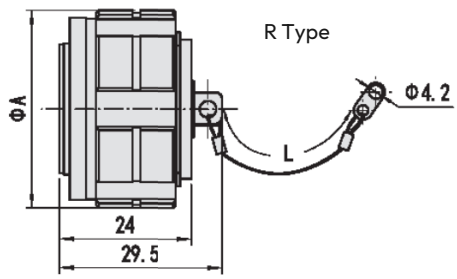
9. Anti-loosening Receptacle Protection Cap

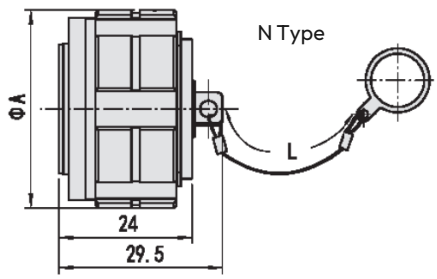
9.1 How to Order:

		D38999/33A	F	10	N
Series Number:	**D38999/33A** - Anti-loosening Receptacle Protection Cap				
Finishes:	W- Cadmium-plated military green aluminum alloy shell F - Electroless nickel-plated aluminum alloy shell K - Passivated stainless steel FT - Hard chrome-plated aluminum alloy shell J - Cadmium-plated military green composite material shell M - Electroless nickel-plated composite material shell				
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Chain Types:	**R** - Stainless steel wire rope (for flange mount receptacles) **N** - Stainless steel wire with ring (for jam nut receptacles)				

Note : Protection caps should be ordered separately and are not included with the connector.

9.2 Sizes





Shell Sizes		09	11	13	15	17	19	21	23	25
A (mm)	max	21.8	25.0	29.4	32.5	35.6	38.6	41.7	44.9	48.0
L (mm)	max	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0

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10. Standard Accessories

Suitable for MIL-DTL-38999 Series III Connectors.

Note:

(1) To prevent loosening, at least one of the following methods should be used when installing the accessories:

① Secure the accessory with a safety wire through the safety hole.

② Apply threadlocker to the rear thread of the product and tighten the connecting nut to prevent loosening.

③ Use heat shrink tubing to shrink the entire accessory for added security.

(2) For accessories with a set screw, apply threadlocker to the set screw before tightening.

(4) If the product to be mated with the cable accessory is equipped with size 8 contacts, please select a longer cable accessory, such as M85049/38H or M85049/18, to avoid interference between the contact locator and the cable accessory.

(5) The table below lists the corresponding table of MIL-DTL-38999 series welded and crimped products and compatible cable accessories, as well as the functional classification of the cable accessories. Due to the large number of modified products and accessories in our company, a comprehensive list cannot be provided. The content of this table is for reference only. Please contact us for detailed information.

Connector Type:	Compatible Cable Accessory Function Type:	Compatible Accessories:
MIL-DTL-38999 Series III Crimp-type connector	Non-clamping, non-shielded	M85049/14
	Clamping, non-shielded	M85049/38
		M85049/39
		M85049/16
		M85049/91-x×J (Composite)
		M85049/92-××J (Composite)
	Shielded, non-clamping	M85049/20
		M85049/20-××J (Composite)
		M85049/69
		M85049/88
		M85049/90
	Clamping and shielded	M85049/38-××NB
		M85049/18

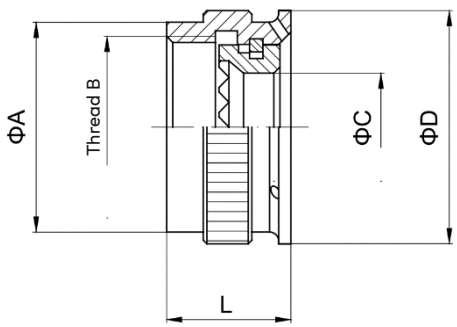
Connector Type:	Compatible Cable Accessory Function Type:	Compatible Accessories:
MIL-DTL-38999 Series III Solder-type connector	Non-clamping, non-shielded	M85049/14
	Clamping, non-shielded	M85049/38H
		M85049/16H
		M85049/91H-××J (Composite)
	Shielded, non-clamping	M85049/20
		M85049/69
		M85049/88
		M85049/90
	Clamping and shielded	M85049/18

10.1 How to Order:

		M85049/	38-	15	N
Series:	**M85049/**				
Types:	**14** - Tail nut **16** - Angled cable clamp **20** - Shielded backshell **38** - Straight cable clamp **39** - Angled cable clamp **69** - Heat shrink sleeve backshell				
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy				

10.2 Sizes

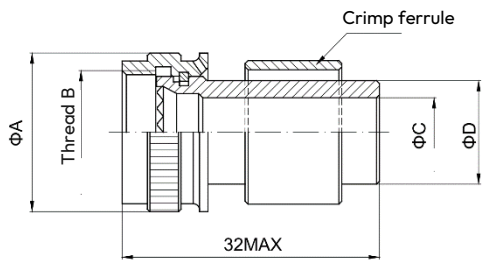
M85049/14 - Tail nut (Non-clamping, non-shielded)



Anti-rotation accessory designed to securely clamp the cable assembly, ensuring the connector's environmental performance. It does not clamp the cable and is suitable for general-purpose applications.

Shell Sizes	A (mm)	Thread B	C (mm)	D (mm)
09	15.2	M12×1	7.9	19
11	18.2	M15×1	10.8	22
13	21.2	M18×1	13.6	25.1
15	25.1	M22×1	16.9	29
17	28.1	M25×1	20.1	32.1
19	31.1	M28×1	22.1	35.1
21	34.0	M31×1	25.2	38.1
23	37.0	M34×1	28.3	41.1
25	40.0	M37×1	31.6	44.1

M85049/20 - Shielded Backshell (Shielded, non-clamping)



Anti-rotation, shielded mesh clamp. This accessory securely clamps the cable gland and provides a connection between the shielded mesh and the rear accessory, ensuring the connector's environmental resistance and electromagnetic shielding performance. It is not designed to clamp cables and is suitable for applications with low cable tension.

Shell Sizes	A (mm)	Thread B	C (mm)	D (mm)	Appropriate press block code
09	19	M12×1	6.55	8.81	08
11	22	M15×1	8.63	12.65	10
13	25.1	M18×1	10.90	12.95	12
15	29	M22×1	14.10	16.00	14
17	32.1	M25×1	17.25	19.30	16
19	35.1	M28×1	20.40	22.61	18
21	38.1	M31×1	23.60	25.65	20
23	41.1	M34×1	26.40	28.70	22
25	44.1	M37×1	28.40	30.53	24

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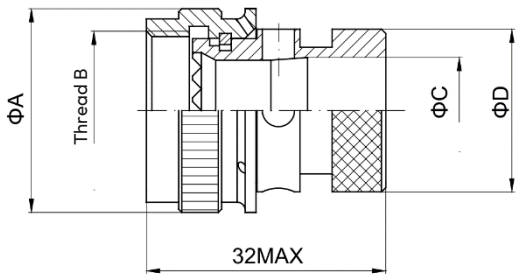
M85049/69 - Heat Shrink Sleeve Backshell (Shielded, non-clamping)

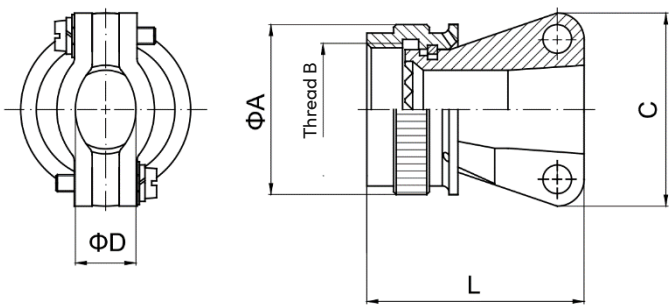


Anti-rotation, clamping, and shielded backshell. This accessory provides a tight seal around the cable, connects the shield to the backshell, and ensures the connector's environmental and electromagnetic shielding performance. It is not designed to clamp the cable and is suitable for applications with low cable tension. Note: Heat shrink boot is sold separately.

Shell Sizes	A	Thread B	C	D
09	19.0	M12×1	6.7	13.5
11	22.0	M15×1	9.9	15.3
13	25.1	M18×1	12.8	19.6
15	29.0	M22×1	16.0	21.2
17	32.1	M25×1	19.2	24.4
19	35.1	M28×1	21.4	26.4
21	38.1	M31×1	24.6	30.9
23	41.1	M34×1	27.7	34.4
25	44.1	M37×1	30.9	36.6

M85049/38 - Straight cable clamp

The cable exit diameter "D" varies when "S" or "M" is appended to the model number. The designations "S" and "M" are indicated on the product label. For instance, the cable exit diameter of model M85049/38-13W(M) ranges from 4.85mm to 6.58mm.



Anti-rotation, cable clamping accessory. Provides a secure grip on the cable gland and clamps the cable, ensuring the connector's environmental performance, especially in applications where the cable is subjected to tensile forces.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	Add "S" After the Part Number		Add "M" After the Part Number		Standard		L Max. (mm)
				D (mm)	Screw length	D	Screw length	D	Screw length	
09	19	M12×1	20.0	-	-	-	-	2.49 ~ 5.94	M3.5*12	27.0
11	22	M15×1	21.0	-	-	-	-	3.87 ~ 5.94	M3.5*12	28.5
13	25.1	M18×1	23.4	4.83	M3.5*12	4.83 ~ 6.58	M3.5*14	4.83 ~ 8.33	M3.5*16	30.0
15	29	M22×1	26.6	6.60	M3.5*12	6.60-9.11	M3.5*14	6.60 ~ 11.61	M3.5*16	31.5
17	32.1	M25×1	30.6	7.19	M3.5*12	7.19 ~ 11.40	M3.5*16	7.19 ~ 15.60	M3.5*20	33.5
19	35.1	M28×1	34.0	8.26	M4*14	8.26 ~ 13.16	M4*18	8.26 ~ 16.10	M4*22	36.6
21	38.1	M31×1	35.8	8.71	M4*14	8.71 ~ 13.61	M4*18	8.71 ~ 17.73	M4*24	39.8
23	41.1	M34×1	39.0	9.68	M4*14	9.68 ~ 16.58	M4*20	9.68 ~ 20.90	M4*26	42.9
25	44.1	M37×1	40.6	10.62	M4*14	10.62 ~ 17.42	M4*20	10.62 ~ 21.66	M4*26	45.0

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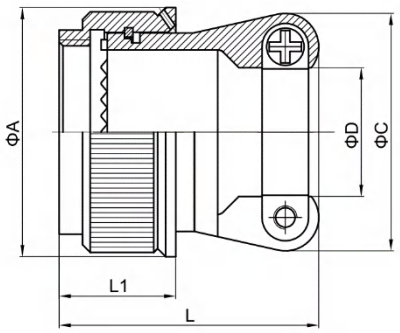
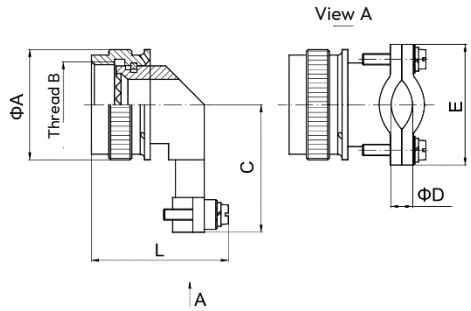
M85049/38H - Solder-type Straight cable clamp（Clamping, non-shielded）



Functions identically to M85049/38, compatible with soldered products, and suitable for MIL-DTL-38999 Series III power products.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D Min. (mm)	D Max. (mm)	L Max. (mm)
09	19.0	M12×1	20.0	2.49	5.94	27.0
11	22.0	M15×1	21.0	3.87	5.94	28.5
13	25.1	M18×1	23.4	4.83	8.33	30.0
15	29.0	M22×1	26.6	6.60	11.61	31.5
17	32.1	M25×1	30.6	7.19	15.60	33.5
19	35.1	M28×1	34.0	8.26	16.10	36.6
21	38.1	M31×1	35.8	8.71	17.73	39.8
23	41.1	M34×1	39.0	9.68	20.90	42.9
25	44.1	M37×1	40.6	10.62	21.66	45.0

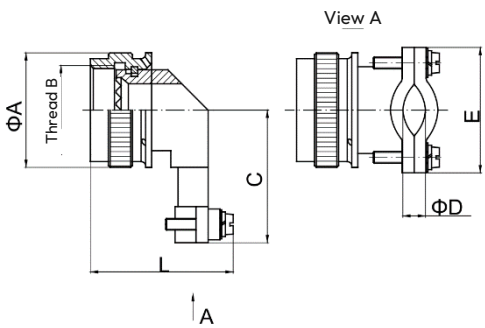
M85049/39 - Angled cable clamp（Clamping, non-shielded）



Anti-rotation, 90° cable clamping cable accessory. It can tightly clamp the cable body and clamp the cable at a 90° angle, ensuring the environmental performance of the connector and is used in applications where the cable is under tension.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D (mm)		E Max. (mm)	L Max. (mm)
				Min.	Max.		
09	19.0	M12×1	20.60	2.49	5.94	21.6	29.5
11	22.0	M15×1	22.00	3.87	5.94	22.8	29.5
13	25.1	M18×1	23.60	4.83	8.33	26.0	31.9
15	29.0	M22×1	25.20	6.60	11.61	29.0	35.1
17	32.1	M25×1	26.80	7.19	15.60	30.6	39.1
19	35.1	M28×1	31.30	8.26	16.10	37.0	41.5
21	38.1	M31×1	32.90	8.71	17.73	39.0	43.3
23	41.1	M34×1	34.50	9.68	20.90	41.0	46.5
25	44.1	M37×1	36.10	10.62	21.66	42.0	47.1

M85049/16 - Angled cable clamp（Clamping, non-shielded）



This anti-rotation, 90-degree cable clamp accessory functions similarly to the M85049/39 rear accessory, but with a larger cable exit diameter (D) compared to the M85049/39 accessory.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D (mm)		E Max. (mm)	L Max. (mm)
				Min.	Max.		
09	19.0	M12×1	20.0	2.85	6.71	21	25.9
11	22.0	M15×1	21.5	6	9.96	26.5	29.2
13	25.1	M18×1	23.0	8.45	12.85	31.5	32
15	29.0	M22×1	25.0	12	16.03	36.5	35.2
17	32.1	M25×1	27.0	11.1	19.2	31	36.4
19	35.1	M28×1	28.5	13.75	21.46	37	40.7
21	38.1	M31×1	29.5	19.3	24.64	35	43.8
23	41.1	M34×1	31.0	21.4	27.81	35	43
25	44.1	M37×1	33.0	23.5	30.99	37	44.2

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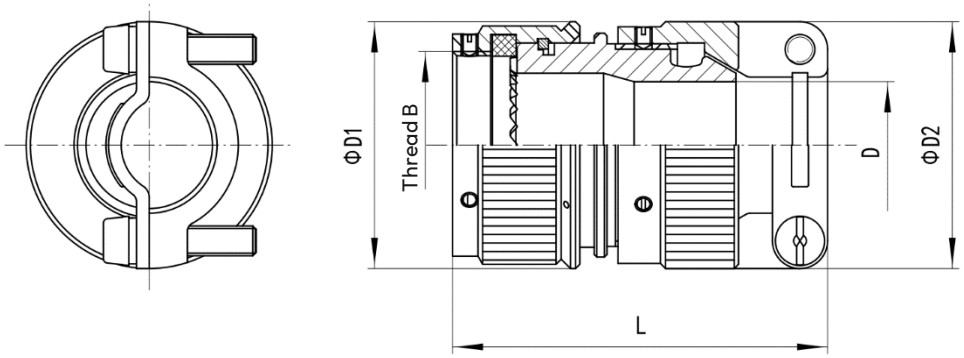
M85049/69-xxB Backshell (Clamping and shielded)

		M85049/	69-	15	N	B
Series:	**M85049/**					
Types:	**69** – Straight Shielded Backshell (Clamping and shielded)					
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**					
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy					
Type Code:	**B**					



Shell Sizes	Thread A	D1 (mm)	D2 (mm)	D (mm)	L (mm)
09	M12×1	19.0	20.0	7.0	40.0
11	M15×1	22.0	22.5	9.7	41.0
13	M18×1	25.1	25.9	12.8	41.0
15	M22×1	29.0	29.0	14.9	46.0
17	M25×1	32.0	32.5	18.0	46.0
19	M28×1	35.0	36.6	20.0	47.5
21	M31×1	38.0	39.5	23.2	52.5
23	M34×1	41.1	42.0	26.3	57.5
25	M37×1	44.1	45.0	28.9	58.5

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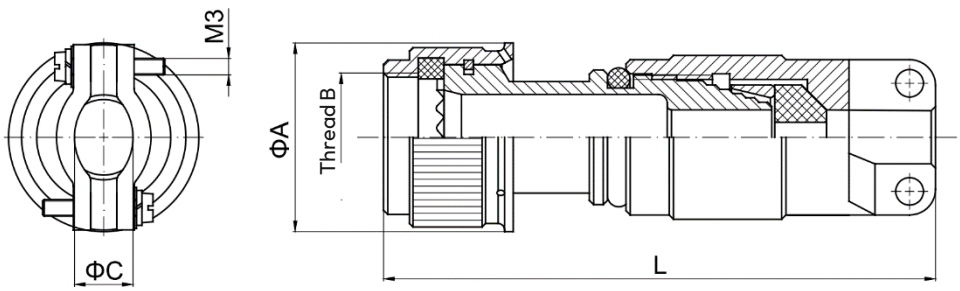
M85049/18-××N Cable Clamp (Clamping and shielded)

		M85049/	18-	25	N	09	A
Series:	**M85049/**						
Types:	**18** – Straight Shielded Cable Clamp						
Shell Sizes:	See table 01						
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy						
Outlet diameter code:	See table 01 and table 02						
Length Code:	See table 03						



Rotation-proof, shield-clamping, and cable-clamping accessory. This accessory provides a tight seal around the cable, connecting the shield to the rear accessory, ensuring high environmental durability and electromagnetic shielding performance for connectors used in harsh environments. The cable accessory is available in various lengths to accommodate applications such as high-low frequency mixed installations that require longer accessories. Finished cable is recommended for use with this accessory.

Table 01

Shell Sizes	Outlet Diameter Code	A	Thread B
09	01 ~ 02	19	M12×1
11	01 ~ 03	22	M15×1
13	02 ~ 04	25.1	M18×1
15	02 ~ 05	29	M22×1
17	02 ~ 06	32	M25×1
19	03 ~ 07	35	M28×1
21	03 ~ 08	38	M31×1
23	03 ~ 09	41.1	M34×1
25	04 ~ 10	44.1	M37×1

Table 02

Outlet diameter code	Outlet diameter C (mm)
01	1.57 ~ 3.18
02	3.18 ~ 6.35
03	6.35 ~ 9.53
04	9.53 ~ 12.7
05	12.7~15.88
06	15.88 ~ 19.05
07	19.05 ~ 22.23
08	22.23 ~ 25.4
09	25.4 ~ 28.58
10	28.58 ~ 31.75

Table 03

Shell Number	Length Code	L (mm)
09 ~ 25	标准(省略不标出)	64.4
09 ~ 25	A	89.8
15 ~ 25	B	115.2
21 ~ 25	C	140.6

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11. Special Backshells

This type of backshell is specifically designed for clamping shielded cables with braided shields. It comes in both straight and angled styles. Optionally, the accessory can be equipped with a shape memory Ti-Ni alloy ring. When heated, this ring contracts to tightly clamp the braided shield to the rear of the accessory, achieving 360-degree electromagnetic shielding.

Note: To activate the shape memory Ti-Ni alloy ring, heat it with a heat gun for approximately 45 seconds to 1 minute. The color indicator on the ring will change from green to black when the ring has fully contracted, indicating a temperature of approximately 165°C. At this point, stop heating. Ensure that the ring is heated evenly.

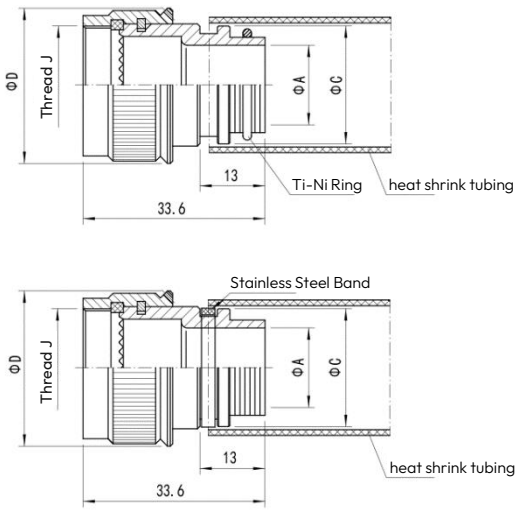
11.1 How to Order:

M85049/88, M85049/90 Backshells (Shielded, non-clamping)

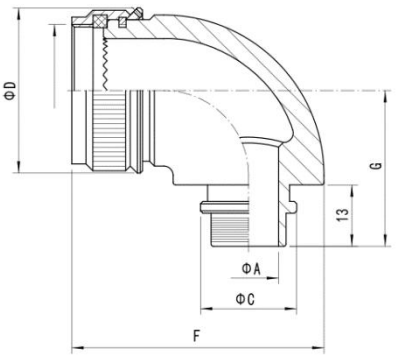
	M85049/	88-	11	N	A	-05
Series:	**M85049/**					
Types:	**88** – Straight Backshell **90** – Angled Backshell					
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25** For series III: **A**(09), **B**(11), **C**(13), **D**(15, **E**(17), **F**(19), **G**(21), **H**(23), **J**(25)					
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy (only for type 88)					
Ti-Ni Alloy Ring:	**None** – without Ti-Ni alloy ring **A** - with Ti-Ni alloy ring					
Cable outlet hole diameter or Ti-Ni ring specification:	Specify the cable exit hole diameter when no Ti-Ni ring is selected. Specify the Ti-Ni ring size when a Ti-Ni ring is selected.					

11.2 Sizes:

M85049/88 Straight



M85049/90 Right Angle



No.	Shell Sizes	Ti-Ni Ring Part Number	Shielding Mesh Gauge (tinned copper wire diameter)	A (mm) Cable Outlet Diameter		C (mm)		F (mm)	D (mm)	G (mm)	Thread J
				Straight	Angled	Straight	Angled				
1	09	TR-04	6×10(0.15 ~ 0.20)	6.3	6.3	14	14	38.2	19	26	M12×1-6H
		TR-05	10×16(0.15~0.20	7.9	7.9	15.5	15				
		TR-06	10×16(0.15 ~ 0.20)	9.5	-	17.1	-				
2	11	TR-04	6×10(0.15 ~ 0.20)	6.3	6.3	14	14	39.7	22	26	M15×1-6H
		TR-05	10×16(0.15 ~ 0.20)	7.9	7.9	15.5	15.5				
		TR-06	10×16 (0.15 ~ 0.20)	9.5	9.5	17.1	17.1				
		TR-07	10×16 0 12 0.20)	11.1	11.1	18.7	18				
		TR-08	16×24(0.12 ~ 0.25)	12.7	-	20.3	-				
3	13	TR-04	6×10(0.15 ~ 0.20)	6.3	6.3	14	14	45.2	25.1	29	M18×1-6H
		TR-05	10×16 (0.15 ~ 0.20)	7.9	7.9	15.5	15.5				
		TR-06	10×16(0.15 ~ 0.20)	9.5	9.5	17.1	17.1				
		TR-07	10×16 (0.12 ~ 0.20)	11.1	11.1	18.7	18.7				
		TR-08	16×24 12 0.25	12.7	12.7	20.3	20.3				
		TR-10	16×24 (0.10 ~ 0.30)	16	16	23.5	23				
4	15	TR-05	10×16 (0.15 ~ 0.20)	7.9	-	15.5	-	47.0	29	29	M22×1-6H
		TR-06	10×16(0.15 ~ 0.20)	9.5	9.5	17.1	17.1				
		TR-07	10×16(0.12 ~ 0.20)	11.1	11.1	18.7	18.7				
		TR-08	16×24 (0.12 ~ 0.25)	12.7	127	20.3	20.3				
		TR-10	16×24 10 0.30)	16	16	23.5	23.5				
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	25.5				
5	17	TR-05	10×16 (0.15 ~ 0.20)	7.9	-	15.5	-	50.7	32.1	33	M25×1-6H
		TR-06	10×16 (0.15 ~ 0.20)	9.5	-	17.1	-				
		TR-07	10×16(0.12 ~ 0.20)	11.1	11.1	18.7	18.7				
		TR-08	16×24 (0.12 ~ 0.25)	12.7	12.7	20.3	20.3				
		TR-10	16× 0 0.30)	16	16	23.5	23.5				
		TR-12	16×24 10~0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	-	30	-				
6	19	TR-08	16×24 (0.12 ~ 0.25)	12.7	12.7	20.3	20.3	53.5	35.1	33	M28×1-6H
		TR-10	16×24(0.10 ~ 0.30)	16	16	23.5	23.5				
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 10 0.30)	22.2	22.2	30	30				
		TR-16	24×30 0 10 ~ 0.30)	25.4	25.4	33	32				
7	21	TR-08	16×24 (0.12 ~ 0.25)	12.7	12.7	20.3	20.3	55.7	38.1	39	M31×1-6H
		TR-10	16×24 (0.10 ~ 0.30)	16	16	23.5	23.5				
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	22.2	30	30				
		TR-16	24×30 0.10 ~ 0.30)	25.4	25.4	33	33				
		TR-18	30×40 10 0.30)	28.5	-	36.2	-				
8	23	TR-10	16×24 (0.10 ~ 0.30)	16	16	23.5	23.5	58.2	41.1	39	M34×1-6H
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	22.2	30	30				
		TR-16	24×30(0.10 ~ 0.30)	25.4	25.4	33	33				
		TR-18	30×40 (0.10 ~ 0.30)	28.5	28.5	36.2	36.2				
		TR-20	30×40 10 ~ 0.30)	31.8	-	39.4	-				
9	25	TR-10	16×24 (0.10 ~ 0.30)	16	-	23.5	-	63.7	44.1	44	M37×1-6H
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	22.2	30	30				
		TR-16	24×30 (0.10 ~ 0.30)	25.4	25.4	33	33				
		TR-18	30×40 (0.10 ~ 0.30)	28.5	28.5	36.2	36.2				
		TR-20	30X 0 0.30	31.8	31.8	39.4	39.4				
		TR-22	30×40(0.10 ~ 0.30)	35	35	42.5	42				

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12. MIL-DTL-38999 Series III Special Contacts

Types	Part Numbers	Notes
12# Pin	M39029/58-365	
12# Socket	M39029/56-353	
12# Pin	M39029/107-623	⩾1500 mating cycles
12# Socket	M39029/106-617	⩾1500 mating cycles
12# Shielded Pin	M39029/28-211	
12# Shielded Socket	M39029/75-416	
12# Coaxial Pin	M39029/102-558	
12# Coaxial Socket	M39029/103-559	
8# Dual-coax Pin	M39029/90-529	
8# Dual-coax Socket	M39029/91-530	
8# Sealing Cap	MS27488-8(红色)	
10# Sealing Cap	MS27488-8(白色)	
12# Sealing Cap	MS27488-8(黄色)	

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MIL-DTL-38999 Series III Composite Connectors

1. Key technical characteristics

1.1 Mechanical Characteristics

Shell Materials:	Composite (30% lighter than an aluminum alloy shell)
Shell Finishes:	J- Olive Drab Cadmium； M- Electroless Nickel
Insulator Material:	Thermoplastic or thermosetting material
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy
Mechanical Life:	≥500 mating cycles
Shock:	3ms half-sine wave, peak acceleration of 300g
Vibration testing:	**Sinusoidal vibration:** 60g, with temperature cycling and simulated attachments (36 hours) **Random vibration:** • High temperature: Frequency 100-1000Hz, power spectral density 1g²/Hz, corresponding to an RMS value of 41.7g • Ambient temperature: Frequency 100-1000Hz, power spectral density 5g²/Hz, corresponding to an RMS value of 49.5g
Contact retention force:	22D#:45N； 20#:67N； 16#:111N； 12#:111N； 10#:111N； 8#:111N

1.2 Electrical Characteristics

1.2.1 Contact Resistance and Current Rating:

Contact Size	Diameter (mm)	Contact Resistance (mΩ)	Current Rating (A)
22D#	Φ076	≤12	5
20#	Φ1.00	≤5	7.5
16#	Φ1.60	≤2.5	13
12#	Φ2.40	≤1.5	23
10#	Φ3.15	≤1.0	40

1.2.2 Electromagnetic Interference Shielding:

- Minimum attenuation is 85dB (J, M) from 100MHz to 1GHz;
- Minimum attenuation is 50dB (J) and 65dB (M) from 1GHz to 10GHz.

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1.2.3 Withstanding Voltage (V):

Ratings*	sea level	21000 Meters
M	1300	800
N	1000	600
I	1800	1000
II	2300	1000

* Working voltage varies depending on the contact arrangement. Please refer to the contact arrangement for details.

1.2.4 Insulation Resistance:

- ⩾ 5000 MΩ under normal conditions

1.2.5 Shell Continuity:

- ⩽ 3 mΩ for Class J, ⩽ 3 mΩ for Class M

1.2.6 8# Dual-coax Contacts:

- Frequency range: 0-20MHz
- Rated voltage: Maximum 500V AC, 125V AC at 21000 meters
- Voltage drop: Inner and middle contacts ⩽ 55mV at 1A, outer contact ⩽ 75mV at 12A

1.3 Environmental Characteristics

Operating Temperature:	Class J: -65℃ to +175℃; Class M: -65℃ to +200℃
Damp heat:	Per MIL-DTL-38999: 24 hours, 10 cycles.
Fluid resistance:	Resistant to various fuels, coolants, and solvents.
Salt Spray Resistance:	2000h

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2. How to Order:

		D38999/	20	J	B	35	P	N	-H	-S
Series:	**D38999/:** MIL-DTL-38999 Series III									
Shell Style:	**20** - Wall Mount Receptacle; **24** - Jam Nut Receptacle; **26** - Straight Plug									
Service Class:	**J -** Olive Drab Cadmium, composite **M -** Electroless Nickel, composite									
Shell Sizes: A-J	**A**(09), **B**(11), **C**(13), **D**(15), **E**(17), **F**(19), **G**(21), **H**(23), **J**(25)									
Insert Arrangement:	See “Insert Arrangement” Table (Page 49-55)									
Contact Type:	**P -** Crimp-type pin **H -** Crimp-type pin, 1500 cycles **PL -** Long printed circuit board pin **PC -** Short printed circuit board pin **A -** Special purpose pin contact **S -** Crimp-type socket **J -** Crimp-type socket, 1500 cycles **SL -** Long printed circuit board socket **SC -** Short printed circuit board socket **B -** Special purpose socket contact									
Alternate Keying Position:	**N** - Normal keying position; **A, B, C, D** - Variant keying positions.									
Solder Contact Code:	**H** – Sold-type contact (for solder-type connectors only)									
Safety Hole Code:	**S** - for plugs and receptacles, flange mount receptacles with M3*12 pan head screw **S10** - for flange mount receptacles with M3*10 pan head screw **S14** - for flange mount receptacles with M3*14 pan head screw **S16** - for flange mount receptacles with M3*16 pan head screw **SC** - for flange mount receptacles with M3*12 countersunk pan head screw, for recessed panel mounting **S10C** - for flange mount receptacles with M3*10 countersunk pan head screw, for recessed panel mounting									

Note:

1. Identification codes A and B indicate non-standard contact configurations (e.g., shielded, coaxial, fiber optic) used in electrical connectors. These contacts must be ordered separately. For specific models and specifications, refer to "MIL-DTL-38999 Series III Special Contacts".
2. When a product requires high oil resistance, the seal material is fluorosilicone rubber. Add "C1" to the end of the original model number (e.g., D38999/20FE35PNC1).
3. When a product requires a conductive square flange gasket, add "C2" or (C2) to the end of the model number. When a product requires a conductive O-ring, add "C5" or (C5) to the end of the model number. For example, D38999/20JE35PNC2, D38999/24JE35PNC5. Note that (C2) and (C5) are not printed on the product model marking, while C2 and C5 without parentheses are printed.
4. When a fuse is installed in a plug or receptacle, a Φ0.5 soft stainless steel wire is used.

[Part number example] D38999/20JB35PN-H

D38999 series flange mount receptacle, cadmium-plated olive drab finish, B shell, 35 contacts, pin type, solder type, N keying code. Soldered contacts are only suitable for soldered connectors.

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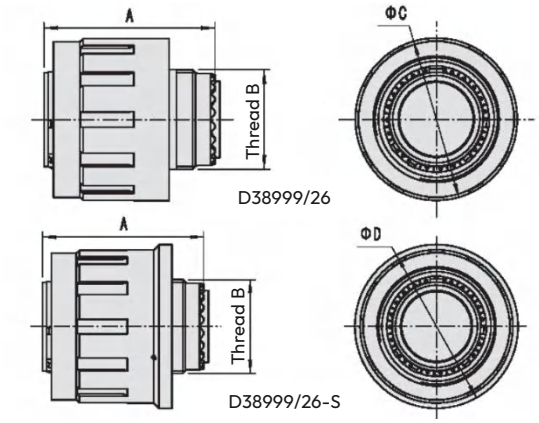
3. Sizes

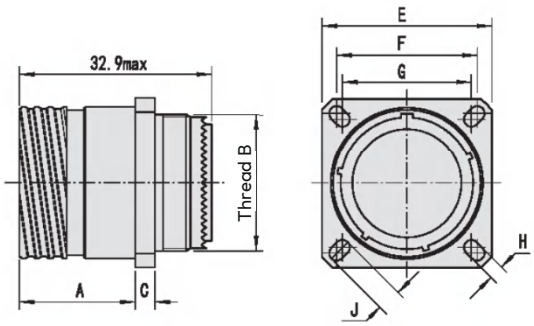
3.1 Plug

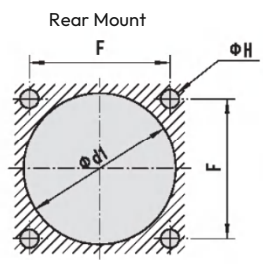


Shell Sizes	Shell Code	A Max. (mm)	Thread B	C Max. (mm)	D Max. (mm)
9	A	31.00	M12×1-6g	21.80	23.80
11	B	31.00	M15×1-6g	25.00	27.00
13	C	31.00	M18×1-6g	29.40	31.40
15	D	31.00	M22×1-6g	32.40	34.40
17	E	31.00	M25×1-6g	35.60	37.60
19	F	31.00	M28×1-6g	38.50	40.50
21	G	31.00	M31×1-6g	41.70	43.70
23	H	31.00	M34×1-6g	44.90	46.90
25	J	31.00	M37×1-6g	48.00	50.00

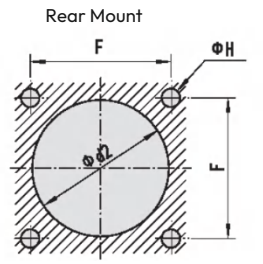
3.2 Flange Mount Receptacle

If the part number has "-S" at the end, each socket includes 5 pan head screws with safety holes, as well as flat washers and spring washers.





Maximum panel thickness 2.5 mm



Maximum panel thickness 2.5 mm
Do accessories when the cutout dimension is "d2".

Shell Sizes	Shell Code	A Max. (mm)	C Max. (mm)	Thread D	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	d1 Min. (mm)	d2 Min. (mm)
9	A	19.80	3.65	M12×1-6g	23.80	18.26	15.09	3.25	5.49	16.66	13.11
11	B	19.80	3.65	M15×1-6g	26.20	20.62	18.26	3.25	4.93	20.22	15.88
13	C	19.80	3.65	M18×1-6g	28.60	23.01	20.62	3.25	4.93	23.42	19.05
15	D	19.80	3.65	M22×1-6g	31.00	24.61	23.01	3.25	4.39	26.59	23.01
17	E	19.80	3.65	M25×1-6g	33.30	26.97	24.61	3.25	4.93	30.96	25.81
19	F	19.80	3.65	M28×1-6g	36.50	29.36	26.97	3.25	4.93	32.94	28.98
21	G	19.00	4.35	M31×1-6g	39.70	31.75	29.36	3.25	4.93	36.12	32.16
23	H	19.00	4.35	M34×1-6g	42.90	34.93	31.75	3.91	6.15	39.29	34.93
25	J	19.00	4.35	M37×1-6g	46.00	38.10	34.93	3.91	6.15	42.47	37.69

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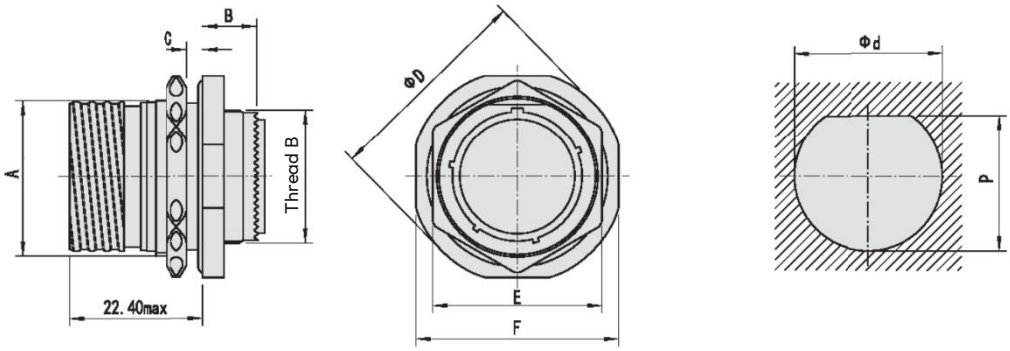
3.3 Jam Nut Receptacle

If the part number ends in "-S", the nut used to tighten the part has a reverse thread and six safety holes around it.



Shell Sizes	Shell Code	A (mm)	B Max. (mm)	C Max. (mm)	D Max. (mm)	E Max. (mm)	F (mm)	Thread G	d (mm)	p (mm)
9	A	16.50	9.90	3.20	30.50	24.00	27.00	M12×1-6g	17.70	16.99
11	B	19.30	9.90	3.20	35.20	27.00	31.80	M15×1-6g	20.88	19.53
13	C	24.00	9.90	3.20	38.40	32.00	34.90	M18×1-6g	25.58	24.26
15	D	27.20	9.90	3.20	41.60	36.00	38.10	M22×1-6g	28.80	27.53
17	E	30.40	9.90	3.20	44.80	37.00	41.30	M25×1-6g	31.98	30.68
19	F	33.40	9.90	3.20	49.30	41.00	46.00	M28×1-6g	35.15	33.86
21	G	36.50	9.90	3.20	52.70	46.00	49.20	M31×1-6g	38.28	37.06
23	H	39.70	9.90	3.20	55.90	50.00	52.40	M34×1-6g	41.50	40.24
25	J	42.80	9.90	3.20	59.00	51.23	55.60	M37×1-6g	44.68	43.41

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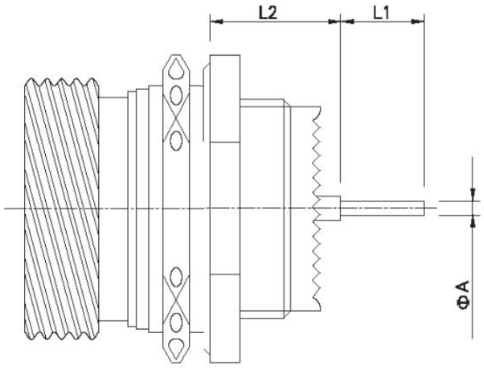
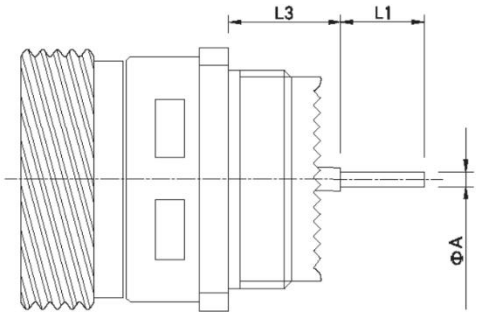
3.4 MIL-DTL-38999 Series III Receptacles with PCB Contacts:

D38999/24 Receptacle



D38999/20 Receptacle



PCB Contact Types		L1 (mm)	A (mm)
22D#	Long PCB Contact	8.5	0.7
	Short PCB Contact	4.0	
20#	Long PCB Contact	8.5	0.7
	Short PCB Contact	5.1	
16#	Long PCB Contact	8.5	1.15
	Short PCB Contact	5.1	

Dimensional Requirements for Various Contact Sizes			Shell Sizes 09-11 (mm)	Shell Sizes 13-15-17-19-21-23-25 (mm)
L2	For 22D# pin installation	Max	10.52	10.34
		Min	11.46	11.28
	For 22D# socket installation	Max	10.19	10.01
		Min	11.46	11.28
	For 20# or 16# pin/socket installation	Max	10.69	10.51
		Min	11.63	11.45
L3	For 22D# pin installation	Max	9.48	9.48
		Min	1,058	10.58
	For 22D# socket installation	Max	9.15	9.15
		Min	10.58	10.58
	For 20# or 16# pin/socket installation	Max	9.65	9.65
		Min	10.75	10.75

4. MIL-DTL-38999 Series III Insert Arrangement

See the “MIL-DTL-38999 Series III Insert Arrangement Table” on Page 49-55.

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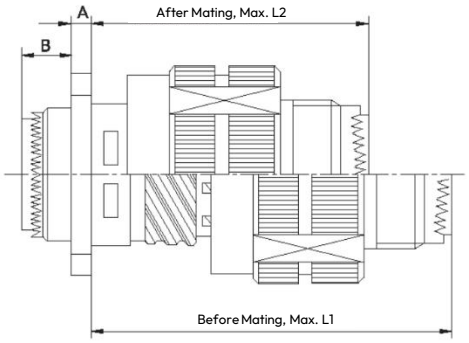
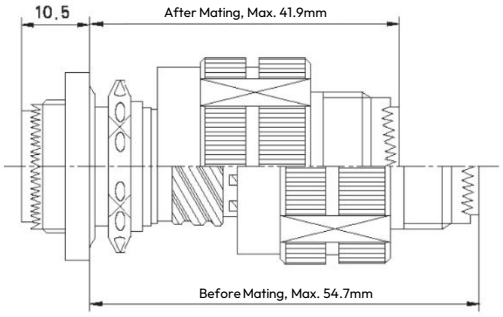
5. Mated Dimensions of Plug and Receptacle

D38999/20 Receptacle & D38999/26 Plug



D38999/24 Receptacle & D38999/26 Plug



Shell Sizes		09	11	13	15	17	19	21	23	25
L1	MAX	53.2	53.2	53.2	53.2	53.2	53.2	52.4	52.4	52.4
L2	MAX	40.3	40.3	40.3	40.3	40.3	40.3	39.6	39.6	39.6
A	MAX	2.5	2.5	2.5	2.5	2.5	2.5	3.2	3.2	3.2
B	MAX	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6

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6. Protection Caps for Plugs and Receptacles

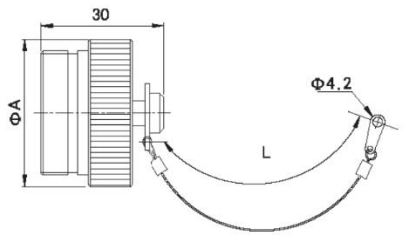
6.1 How to Order:

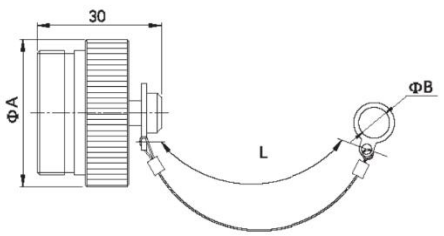
		D38999/32	F	15	N
Series Number:	**D38999/32** – Plug Protection Cap **D38999/33** – Receptacle Protection Cap				
Finishes:	**W –** Olive Drab Cadmium; **F –** Electroless Nickel; **K** – Passivated Stainless Steel **J –** Olive Drab Cadmium, Composite **M –**Electroless Nickel, Composite				
Shell Sizes	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Chain Types:	**R** - Stainless steel wire rope (for flange mount receptacles) **C** - Nylon wire rope (for flange mount receptacles) **N** - Stainless steel wire with ring (for jam nut receptacles) **S** - Nylon wire with ring (for jam nut receptacles)				

Note : Protection caps should be ordered separately and are not included with the connector.

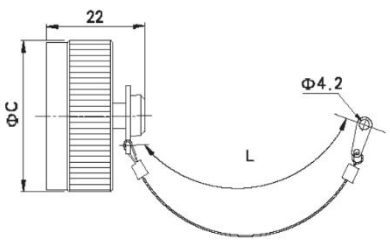
6.2 Sizes:

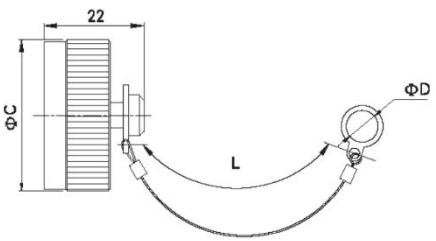
Plug Protection Cap
D38999/32





Receptacle Protection Cap
D38999/33





Shell Sizes		09	11	13	15	17	19	21	23	25
A (mm)	MAX	22.86	25.40	30.48	33.02	36.83	39.37	43.18	44.45	48.26
B (mm)	MIN	12.92	17.78	19.27	22.60	25.62	28.95	31.97	34.03	38.32
C (mm)	MAX	22.86	27.86	30.48	31.75	36.83	38.10	41.91	44.45	48.26
D (mm)	MIN	17.78	21.33	25.62	28.95	31.97	35.30	38.32	41.65	44.45
L (mm)	MAX	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00

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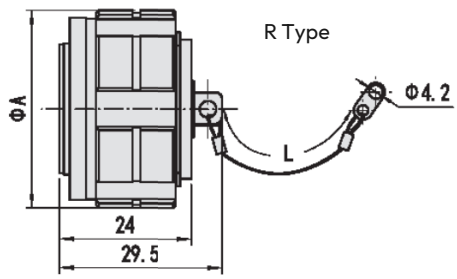
7. Anti-loosening Receptacle Protection Cap

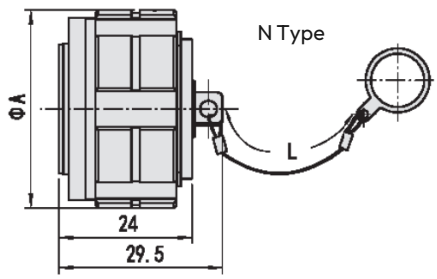
7.1 How to Order:

		D38999/33A	F	10	N
Series Number:	**D38999/33A** - Anti-loosening Receptacle Protection Cap				
Finishes:	W- Cadmium-plated military green aluminum alloy shell F - Electroless nickel-plated aluminum alloy shell K - Passivated stainless steel FT - Hard chrome-plated aluminum alloy shell J - Cadmium-plated military green composite material shell M - Electroless nickel-plated composite material shell				
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Chain Types:	**R** - Stainless steel wire rope (for flange mount receptacles) **N** - Stainless steel wire with ring (for jam nut receptacles)				

Note : Protection caps should be ordered separately and are not included with the connector.

7.2 Sizes





Shell Sizes		09	11	13	15	17	19	21	23	25
A (mm)	max	21.8	25.0	29.4	32.5	35.6	38.6	41.7	44.9	48.0
L (mm)	max	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0

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8. Standard Accessories

Suitable for MIL-DTL-38999 Series III Connectors.

Note:

(1) To prevent loosening, at least one of the following methods should be used when installing the accessories:

① Secure the accessory with a safety wire through the safety hole.

② Apply threadlocker to the rear thread of the product and tighten the connecting nut to prevent loosening.

③ Use heat shrink tubing to shrink the entire accessory for added security.

(2) For accessories with a set screw, apply threadlocker to the set screw before tightening.

(4) If the product to be mated with the cable accessory is equipped with size 8 contacts, please select a longer cable accessory, such as M85049/38H or M85049/18, to avoid interference between the contact locator and the cable accessory.

(5) The table below lists the corresponding table of MIL-DTL-38999 series welded and crimped products and compatible cable accessories, as well as the functional classification of the cable accessories. Due to the large number of modified products and accessories in our company, a comprehensive list cannot be provided. The content of this table is for reference only. Please contact us for detailed information.

Connector Type:	Compatible Cable Accessory Function Type:	Compatible Accessories:
MIL-DTL-38999 Series III Crimp-type connector	Non-clamping, non-shielded	M85049/14
	Clamping, non-shielded	M85049/38
		M85049/39
		M85049/16
		M85049/91-x×J (Composite)
		M85049/92-××J (Composite)
	Shielded, non-clamping	M85049/20
		M85049/20-××J (Composite)
		M85049/69
		M85049/88
		M85049/90
	Clamping and shielded	M85049/38-××NB
		M85049/18

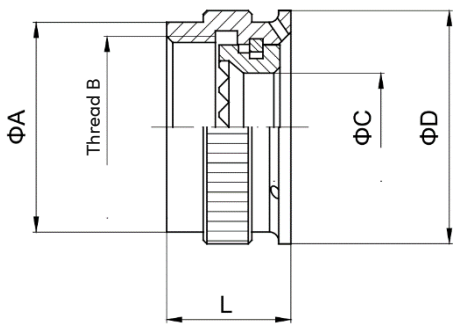
Connector Type:	Compatible Cable Accessory Function Type:	Compatible Accessories:
MIL-DTL-38999 Series III Solder-type connector	Non-clamping, non-shielded	M85049/14
	Clamping, non-shielded	M85049/38H
		M85049/16H
		M85049/91H-××J (Composite)
	Shielded, non-clamping	M85049/20
		M85049/69
		M85049/88
		M85049/90
	Clamping and shielded	M85049/18

8.1 How to Order:

		M85049/	38-	15	N
Series:	**M85049/**				
Types:	**14** - Tail nut **16** - Angled cable clamp **20** - Shielded backshell **38** - Straight cable clamp **39** - Angled cable clamp **69** - Heat shrink sleeve backshell				
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy				

8.2 Sizes

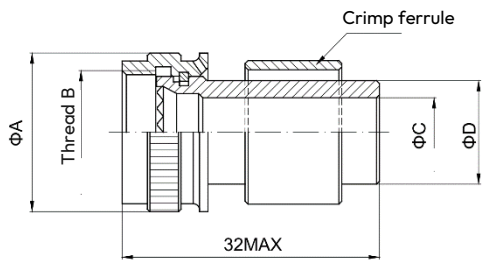
M85049/14 - Tail nut (Non-clamping, non-shielded)



Anti-rotation accessory designed to securely clamp the cable assembly, ensuring the connector's environmental performance. It does not clamp the cable and is suitable for general-purpose applications.

Shell Sizes	A (mm)	Thread B	C (mm)	D (mm)
09	15.2	M12×1	7.9	19
11	18.2	M15×1	10.8	22
13	21.2	M18×1	13.6	25.1
15	25.1	M22×1	16.9	29
17	28.1	M25×1	20.1	32.1
19	31.1	M28×1	22.1	35.1
21	34.0	M31×1	25.2	38.1
23	37.0	M34×1	28.3	41.1
25	40.0	M37×1	31.6	44.1

M85049/20 - Shielded Backshell (Shielded, non-clamping)



Anti-rotation, shielded mesh clamp. This accessory securely clamps the cable gland and provides a connection between the shielded mesh and the rear accessory, ensuring the connector's environmental resistance and electromagnetic shielding performance. It is not designed to clamp cables and is suitable for applications with low cable tension.

Shell Sizes	A (mm)	Thread B	C (mm)	D (mm)	Appropriate press block code
09	19	M12×1	6.55	8.81	08
11	22	M15×1	8.63	12.65	10
13	25.1	M18×1	10.90	12.95	12
15	29	M22×1	14.10	16.00	14
17	32.1	M25×1	17.25	19.30	16
19	35.1	M28×1	20.40	22.61	18
21	38.1	M31×1	23.60	25.65	20
23	41.1	M34×1	26.40	28.70	22
25	44.1	M37×1	28.40	30.53	24

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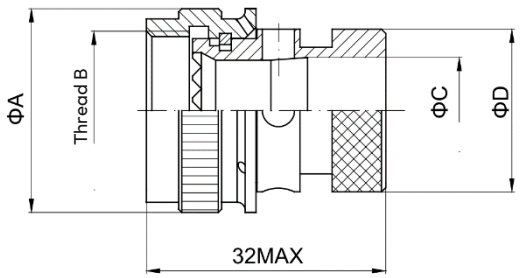
M85049/69 - Heat Shrink Sleeve Backshell (Shielded, non-clamping)

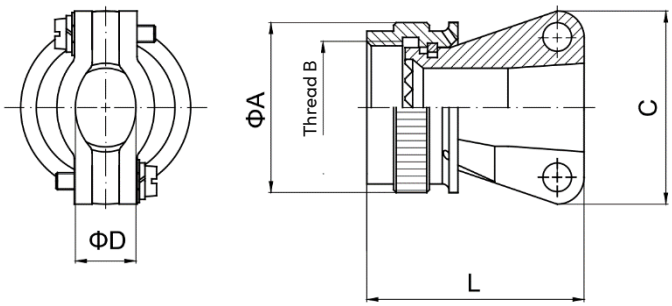


Anti-rotation, clamping, and shielded backshell. This accessory provides a tight seal around the cable, connects the shield to the backshell, and ensures the connector's environmental and electromagnetic shielding performance. It is not designed to clamp the cable and is suitable for applications with low cable tension. Note: Heat shrink boot is sold separately.

Shell Sizes	A	Thread B	C	D
09	19.0	M12×1	6.7	13.5
11	22.0	M15×1	9.9	15.3
13	25.1	M18×1	12.8	19.6
15	29.0	M22×1	16.0	21.2
17	32.1	M25×1	19.2	24.4
19	35.1	M28×1	21.4	26.4
21	38.1	M31×1	24.6	30.9
23	41.1	M34×1	27.7	34.4
25	44.1	M37×1	30.9	36.6

M85049/38 - Straight cable clamp

The cable exit diameter "D" varies when "S" or "M" is appended to the model number. The designations "S" and "M" are indicated on the product label. For instance, the cable exit diameter of model M85049/38-13W(M) ranges from 4.85mm to 6.58mm.



Anti-rotation, cable clamping accessory. Provides a secure grip on the cable gland and clamps the cable, ensuring the connector's environmental performance, especially in applications where the cable is subjected to tensile forces.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	Add "S" After the Part Number		Add "M" After the Part Number		Standard		L Max. (mm)
				D (mm)	Screw length	D	Screw length	D	Screw length	
09	19	M12×1	20.0	-	-	-	-	2.49 ~ 5.94	M3.5*12	27.0
11	22	M15×1	21.0	-	-	-	-	3.87 ~ 5.94	M3.5*12	28.5
13	25.1	M18×1	23.4	4.83	M3.5*12	4.83 ~ 6.58	M3.5*14	4.83 ~ 8.33	M3.5*16	30.0
15	29	M22×1	26.6	6.60	M3.5*12	6.60-9.11	M3.5*14	6.60 ~ 11.61	M3.5*16	31.5
17	32.1	M25×1	30.6	7.19	M3.5*12	7.19 ~ 11.40	M3.5*16	7.19 ~ 15.60	M3.5*20	33.5
19	35.1	M28×1	34.0	8.26	M4*14	8.26 ~ 13.16	M4*18	8.26 ~ 16.10	M4*22	36.6
21	38.1	M31×1	35.8	8.71	M4*14	8.71 ~ 13.61	M4*18	8.71 ~ 17.73	M4*24	39.8
23	41.1	M34×1	39.0	9.68	M4*14	9.68 ~ 16.58	M4*20	9.68 ~ 20.90	M4*26	42.9
25	44.1	M37×1	40.6	10.62	M4*14	10.62 ~ 17.42	M4*20	10.62 ~ 21.66	M4*26	45.0

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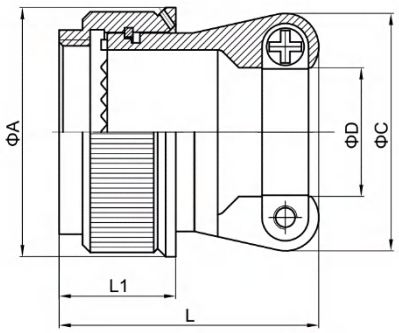
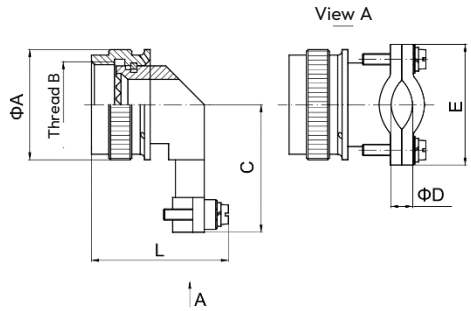
M85049/38H - Solder-type Straight cable clamp（Clamping, non-shielded）



Functions identically to M85049/38, compatible with soldered products, and suitable for MIL-DTL-38999 Series III power products.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D Min. (mm)	D Max. (mm)	L Max. (mm)
09	19.0	M12×1	20.0	2.49	5.94	27.0
11	22.0	M15×1	21.0	3.87	5.94	28.5
13	25.1	M18×1	23.4	4.83	8.33	30.0
15	29.0	M22×1	26.6	6.60	11.61	31.5
17	32.1	M25×1	30.6	7.19	15.60	33.5
19	35.1	M28×1	34.0	8.26	16.10	36.6
21	38.1	M31×1	35.8	8.71	17.73	39.8
23	41.1	M34×1	39.0	9.68	20.90	42.9
25	44.1	M37×1	40.6	10.62	21.66	45.0

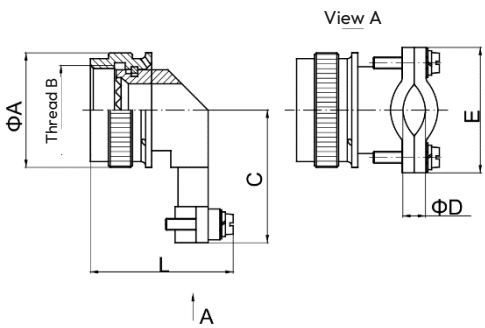
M85049/39 - Angled cable clamp（Clamping, non-shielded）



Anti-rotation, 90° cable clamping cable accessory. It can tightly clamp the cable body and clamp the cable at a 90° angle, ensuring the environmental performance of the connector and is used in applications where the cable is under tension.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D (mm)		E Max. (mm)	L Max. (mm)
				Min.	Max.		
09	19.0	M12×1	20.60	2.49	5.94	21.6	29.5
11	22.0	M15×1	22.00	3.87	5.94	22.8	29.5
13	25.1	M18×1	23.60	4.83	8.33	26.0	31.9
15	29.0	M22×1	25.20	6.60	11.61	29.0	35.1
17	32.1	M25×1	26.80	7.19	15.60	30.6	39.1
19	35.1	M28×1	31.30	8.26	16.10	37.0	41.5
21	38.1	M31×1	32.90	8.71	17.73	39.0	43.3
23	41.1	M34×1	34.50	9.68	20.90	41.0	46.5
25	44.1	M37×1	36.10	10.62	21.66	42.0	47.1

M85049/16 - Angled cable clamp（Clamping, non-shielded）



This anti-rotation, 90-degree cable clamp accessory functions similarly to the M85049/39 rear accessory, but with a larger cable exit diameter (D) compared to the M85049/39 accessory.

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D (mm)		E Max. (mm)	L Max. (mm)
				Min.	Max.		
09	19.0	M12×1	20.0	2.85	6.71	21	25.9
11	22.0	M15×1	21.5	6	9.96	26.5	29.2
13	25.1	M18×1	23.0	8.45	12.85	31.5	32
15	29.0	M22×1	25.0	12	16.03	36.5	35.2
17	32.1	M25×1	27.0	11.1	19.2	31	36.4
19	35.1	M28×1	28.5	13.75	21.46	37	40.7
21	38.1	M31×1	29.5	19.3	24.64	35	43.8
23	41.1	M34×1	31.0	21.4	27.81	35	43
25	44.1	M37×1	33.0	23.5	30.99	37	44.2

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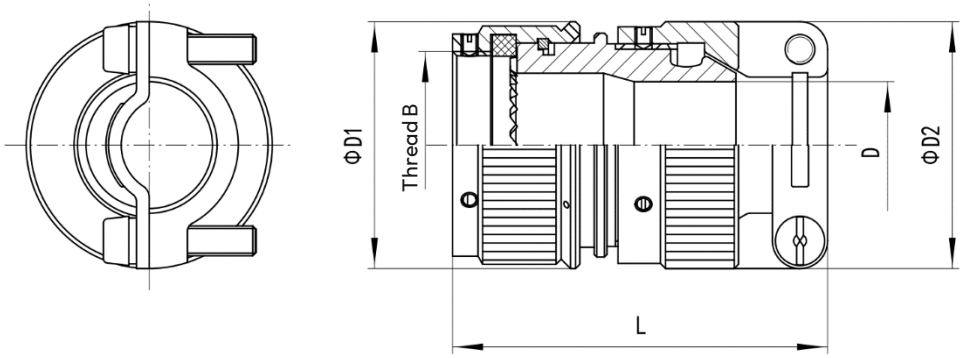
M85049/69-xxB Backshell (Clamping and shielded)

		M85049/	69-	15	N	B
Series:	**M85049/**					
Types:	**69** – Straight Shielded Backshell (Clamping and shielded)					
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**					
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy					
Type Code:	**B**					



Shell Sizes	Thread A	D1 (mm)	D2 (mm)	D (mm)	L (mm)
09	M12×1	19.0	20.0	7.0	40.0
11	M15×1	22.0	22.5	9.7	41.0
13	M18×1	25.1	25.9	12.8	41.0
15	M22×1	29.0	29.0	14.9	46.0
17	M25×1	32.0	32.5	18.0	46.0
19	M28×1	35.0	36.6	20.0	47.5
21	M31×1	38.0	39.5	23.2	52.5
23	M34×1	41.1	42.0	26.3	57.5
25	M37×1	44.1	45.0	28.9	58.5

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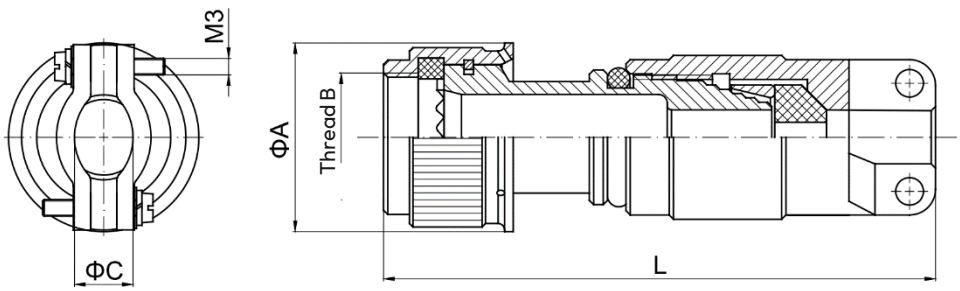
M85049/18-××N Cable Clamp (Clamping and shielded)

		M85049/	18-	25	N	09	A
Series:	**M85049/**						
Types:	**18** – Straight Shielded Cable Clamp						
Shell Sizes:	See table 01						
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy						
Outlet diameter code:	See table 01 and table 02						
Length Code:	See table 03						



Rotation-proof, shield-clamping, and cable-clamping accessory. This accessory provides a tight seal around the cable, connecting the shield to the rear accessory, ensuring high environmental durability and electromagnetic shielding performance for connectors used in harsh environments. The cable accessory is available in various lengths to accommodate applications such as high-low frequency mixed installations that require longer accessories. Finished cable is recommended for use with this accessory.

Table 01

Shell Sizes	Outlet Diameter Code	A	Thread B
09	01 ~ 02	19	M12×1
11	01 ~ 03	22	M15×1
13	02 ~ 04	25.1	M18×1
15	02 ~ 05	29	M22×1
17	02 ~ 06	32	M25×1
19	03 ~ 07	35	M28×1
21	03 ~ 08	38	M31×1
23	03 ~ 09	41.1	M34×1
25	04 ~ 10	44.1	M37×1

Table 02

Outlet diameter code	Outlet diameter C (mm)
01	1.57 ~ 3.18
02	3.18 ~ 6.35
03	6.35 ~ 9.53
04	9.53 ~ 12.7
05	12.7~15.88
06	15.88 ~ 19.05
07	19.05 ~ 22.23
08	22.23 ~ 25.4
09	25.4 ~ 28.58
10	28.58 ~ 31.75

Table 03

Shell Number	Length Code	L (mm)
09 ~ 25	标准(省略不标出)	64.4
09 ~ 25	A	89.8
15 ~ 25	B	115.2
21 ~ 25	C	140.6

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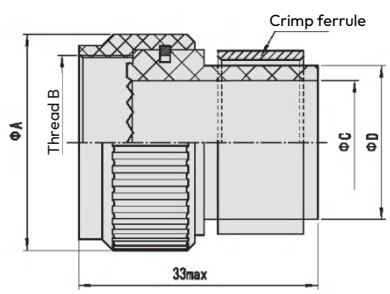
9. Composite Accessories

9.1 How to Order:

	M85049/	91-	15	J	-S
Series:	**M85049/**				
Types:	**20** - Shielded backshell **91** - Straight cable clamp (for crimp-type products only) **91H** - Straight cable clamp (for both solder-type and crimp-type products) **92** - Angled cable clamp				
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25**				
Finishes:	**J** - Olive drab cadmium, composite **M** - Electroless nickel, composite				
Safety Hole Code:	**S** - Connecting nut has 3 safety holes				

9.2 Sizes:

M85049/20-xxJ Composite Backshell (Shielded, non-clamping)

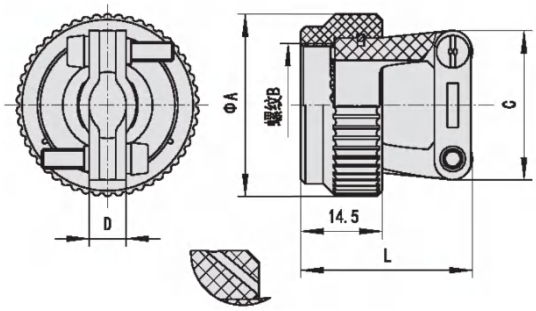


Not suitable for solder-type connectors. For crimp-type connectors only.

Shell Sizes	A (mm)	Thread B	C (mm)	D (mm)
09	21.8	M12×1	6.73	12.65
11	25	M15×1	8.71	12.95
13	29.5	M18×1	11.1	16
15	32.5	M22×1	14.27	19.3
17	35.5	M25×1	17.45	22.61
19	38.5	M28×1	20.62	25.65
21	41.5	M31×1	23.8	28.7
23	45	M34×1	26.57	30.53
25	48	M37×1	28.58	34.52

M85049/91-××J Straight Composite Cable Clamp (Clamping, non-shielded)

Not suitable for solder-type connectors. For crimp-type connectors only.



Safety hole diagram (for reference, when part number ends with -S)

Shell Sozes	A Max. (mm)	Thread B	C Max. (mm)	D Min. (mm)	D Max. (mm)	L Max. (mm)
09	21.8	M12×1	20.0	4.00	5.94	27.0
11	25	M15×1	20.0	4.00	5.94	28.5
13	29.5	M18×1	23.4	4.83	8.33	30.0
15	32.5	M22×1	26.6	6.60	11.61	31.5
17	35.5	M25×1	30.6	7.19	15.60	33.5
19	38.5	M28×1	34.0	8.26	16.10	36.6
21	41.5	M31×1	35.8	8.71	17.73	39.8
23	45	M34×1	39.0	9.68	20.90	42.9
25	48	M37×1	40.6	10.62	21.66	45.0

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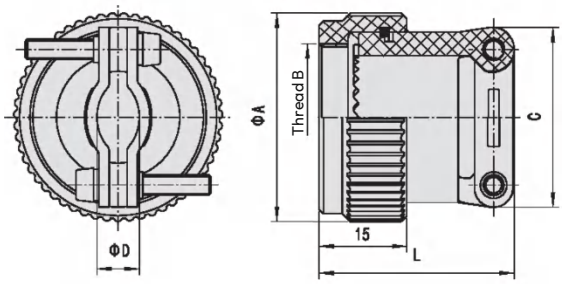
M85049/91H-xxJ Straight Composite Cable Clamp, Solder Type (Clamping, non-shielded)

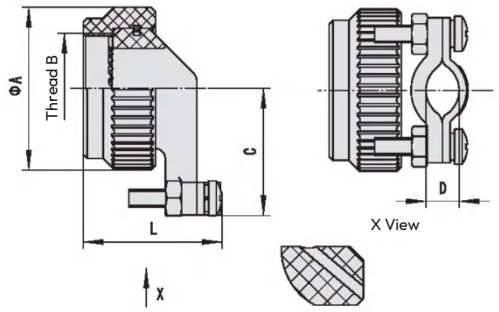
Suitable for both solder-type and crimp-type connectors.



Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D Min. (mm)	D Max. (mm)	L Max. (mm)
09	21.8	M12×1	20.0	4.00	5.94	27.0
11	25	M15×1	20.0	4.00	5.94	28.5
13	29.5	M18×1	23.4	4.83	8.33	30.0
15	32.5	M22×1	26.6	6.60	11.61	31.5
17	35.5	M25×1	30.6	7.19	15.60	33.5
19	38.5	M28×1	34.0	8.40	16.10	36.6
21	41.5	M31×1	35.8	8.80	17.73	39.8
23	45	M34×1	39.0	9.80	20.90	42.9
25	48	M37×1	40.6	10.60	21.66	45.0

M85049/92-xxJ Angled Composite Cable Clamp (Clamping, non-shielded)

Not suitable for solder-type connectors. For crimp-type connectors only.



Safety hole diagram (for reference, when part number ends with -S)

Shell Sizes	A Max. (mm)	Thread B	C Max. (mm)	D Min. (mm)	D Max. (mm)	L Max. (mm)
09	21.8	M12×1	20.6	2.49	5.94	29.5
11	25	M15×1	22.0	3.87	5.94	29.5
13	29.5	M18×1	23.6	4.83	8.33	31.9
15	32.5	M22×1	25.2	6.60	11.61	35.1
17	35.5	M25×1	26.8	7.19	15.60	39.1
19	38.5	M28×1	31.3	8.26	16.10	41.5
21	41.5	M31×1	32.9	8.71	17.73	43.3
23	45	M34×1	34.5	9.68	20.90	46.5
25	48	M37×1	36.1	10.62	21.66	47.1

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10. Special Backshells

This type of backshell is specifically designed for clamping shielded cables with braided shields. It comes in both straight and angled styles. Optionally, the accessory can be equipped with a shape memory Ti-Ni alloy ring. When heated, this ring contracts to tightly clamp the braided shield to the rear of the accessory, achieving 360-degree electromagnetic shielding.

Note: To activate the shape memory Ti-Ni alloy ring, heat it with a heat gun for approximately 45 seconds to 1 minute. The color indicator on the ring will change from green to black when the ring has fully contracted, indicating a temperature of approximately 165°C. At this point, stop heating. Ensure that the ring is heated evenly.

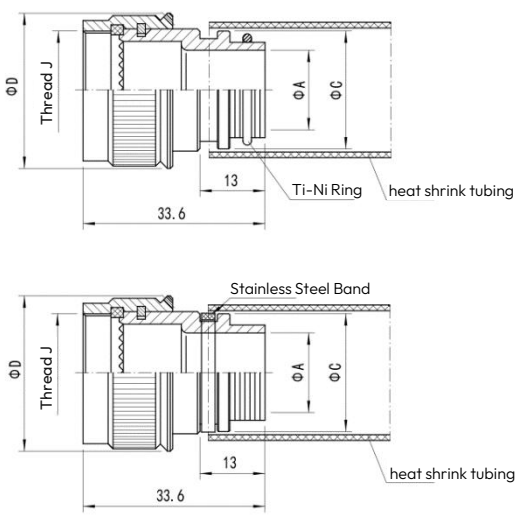
10.1 How to Order:

M85049/88, M85049/90 Backshells (Shielded, non-clamping)

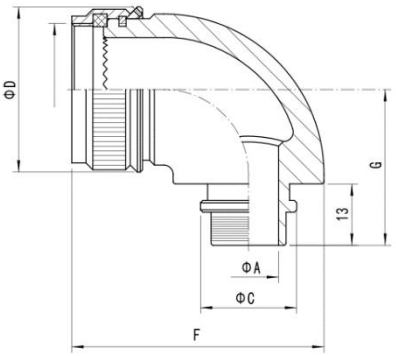
	M85049/	88-	11	N	A	-05
Series:	**M85049/**					
Types:	**88** – Straight Backshell **90** – Angled Backshell					
Shell Sizes:	**09, 11, 13, 15, 17, 19, 21, 23, 25** For series III: **A**(09), **B**(11), **C**(13), **D**(15, **E**(17), **F**(19), **G**(21), **H**(23), **J**(25)					
Finishes:	**W** - Olive drab cadmium **N** - Electroless nickel **S** - Passivated stainless steel **FT** - Hard chrome-plated aluminum alloy **TA** - Titanium alloy (only for type 88)					
Ti-Ni Alloy Ring:	**None** – without Ti-Ni alloy ring **A** - with Ti-Ni alloy ring					
Cable exit hole diameter or Ti-Ni ring specification:	Specify the cable exit hole diameter when no Ti-Ni ring is selected. Specify the Ti-Ni ring size when a Ti-Ni ring is selected.					

10.2 Sizes:

M85049/88 Straight



M85049/90 Right Angle



No.	Shell Sizes	Ti-Ni Ring Part Number	Shielding Mesh Gauge (tinned copper wire diameter)	A (mm) Cable Outlet Diameter		C (mm)		F (mm)	D (mm)	G (mm)	Thread J
				Straight	Angled	Straight	Angled				
1	09	TR-04	6×10(0.15 ~ 0.20)	6.3	6.3	14	14	38.2	19	26	M12×1-6H
		TR-05	10×16(0.15~0.20	7.9	7.9	15.5	15				
		TR-06	10×16(0.15 ~ 0.20)	9.5	-	17.1	-				
2	11	TR-04	6×10(0.15 ~ 0.20)	6.3	6.3	14	14	39.7	22	26	M15×1-6H
		TR-05	10×16(0.15 ~ 0.20)	7.9	7.9	15.5	15.5				
		TR-06	10×16 (0.15 ~ 0.20)	9.5	9.5	17.1	17.1				
		TR-07	10×16 0 12 0.20)	11.1	11.1	18.7	18				
		TR-08	16×24(0.12 ~ 0.25)	12.7	-	20.3	-				
3	13	TR-04	6×10(0.15 ~ 0.20)	6.3	6.3	14	14	45.2	25.1	29	M18×1-6H
		TR-05	10×16 (0.15 ~ 0.20)	7.9	7.9	15.5	15.5				
		TR-06	10×16(0.15 ~ 0.20)	9.5	9.5	17.1	17.1				
		TR-07	10×16 (0.12 ~ 0.20)	11.1	11.1	18.7	18.7				
		TR-08	16×24 12 0.25	12.7	12.7	20.3	20.3				
		TR-10	16×24 (0.10 ~ 0.30)	16	16	23.5	23				
4	15	TR-05	10×16 (0.15 ~ 0.20)	7.9	-	15.5	-	47.0	29	29	M22×1-6H
		TR-06	10×16(0.15 ~ 0.20)	9.5	9.5	17.1	17.1				
		TR-07	10×16(0.12 ~ 0.20)	11.1	11.1	18.7	18.7				
		TR-08	16×24 (0.12 ~ 0.25)	12.7	127	20.3	20.3				
		TR-10	16×24 10 0.30)	16	16	23.5	23.5				
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	25.5				
5	17	TR-05	10×16 (0.15 ~ 0.20)	7.9	-	15.5	-	50.7	32.1	33	M25×1-6H
		TR-06	10×16 (0.15 ~ 0.20)	9.5	-	17.1	-				
		TR-07	10×16(0.12 ~ 0.20)	11.1	11.1	18.7	18.7				
		TR-08	16×24 (0.12 ~ 0.25)	12.7	12.7	20.3	20.3				
		TR-10	16× 0 0.30)	16	16	23.5	23.5				
		TR-12	16×24 10~0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	-	30	-				
6	19	TR-08	16×24 (0.12 ~ 0.25)	12.7	12.7	20.3	20.3	53.5	35.1	33	M28×1-6H
		TR-10	16×24(0.10 ~ 0.30)	16	16	23.5	23.5				
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 10 0.30)	22.2	22.2	30	30				
		TR-16	24×30 0 10 ~ 0.30)	25.4	25.4	33	32				
7	21	TR-08	16×24 (0.12 ~ 0.25)	12.7	12.7	20.3	20.3	55.7	38.1	39	M31×1-6H
		TR-10	16×24 (0.10 ~ 0.30)	16	16	23.5	23.5				
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	22.2	30	30				
		TR-16	24×30 0.10 ~ 0.30)	25.4	25.4	33	33				
		TR-18	30×40 10 0.30)	28.5	-	36.2	-				
8	23	TR-10	16×24 (0.10 ~ 0.30)	16	16	23.5	23.5	58.2	41.1	39	M34×1-6H
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	22.2	30	30				
		TR-16	24×30(0.10 ~ 0.30)	25.4	25.4	33	33				
		TR-18	30×40 (0.10 ~ 0.30)	28.5	28.5	36.2	36.2				
		TR-20	30×40 10 ~ 0.30)	31.8	-	39.4	-				
9	25	TR-10	16×24 (0.10 ~ 0.30)	16	-	23.5	-	63.7	44.1	44	M37×1-6H
		TR-12	16×24 (0.10 ~ 0.30)	19	19	26.7	26.7				
		TR-14	24×30 (0.10 ~ 0.30)	22.2	22.2	30	30				
		TR-16	24×30 (0.10 ~ 0.30)	25.4	25.4	33	33				
		TR-18	30×40 (0.10 ~ 0.30)	28.5	28.5	36.2	36.2				
		TR-20	30X 0 0.30	31.8	31.8	39.4	39.4				
		TR-22	30×40(0.10 ~ 0.30)	35	35	42.5	42				

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11. MIL-DTL-38999 Series III Special Contacts

Types	Part Numbers	Notes
12# Pin	M39029/58-365	
12# Socket	M39029/56-353	
12# Pin	M39029/107-623	⩾1500 mating cycles
12# Socket	M39029/106-617	⩾1500 mating cycles
12# Shielded Pin	M39029/28-211	
12# Shielded Socket	M39029/75-416	
12# Coaxial Pin	M39029/102-558	
12# Coaxial Socket	M39029/103-559	
8# Dual-coax Pin	M39029/90-529	
8# Dual-coax Socket	M39029/91-530	
8# Sealing Cap	MS27488-8(红色)	
10# Sealing Cap	MS27488-8(白色)	
12# Sealing Cap	MS27488-8(黄色)	

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MIL-DTL-38999 Series III Receptacles, Dual Flange for EP PCB mounting

1. Introduction

- The connector interface adheres to the dimensions specified in MIL-DTL-38999 series standards.
- It features a quick-connect mechanism secured by three screws.
- The contacts are designed for soldering to a printed circuit board and include an anti-skew feature for the pins.
- The receptacle has a dual-flange design, with the front flange designed for mounting to a panel and the rear flange providing threaded holes for PCB attachment. The overall design is compact and robust.

2. Key Technical Characteristics

2.1 Mechanical Characteristics

Shell Materials:	Aluminum, Stainless Steel, Titanium alloy
Shell Finishes:	W- Olive Drab Cadmium ; F- Electroless Nickel; FT- Nickel-plated forged aluminum alloy; K- Passivated Stainless Steel; TA- Titanium alloy
Insulator Material:	Thermoplastic or thermosetting material
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy
Mechanical Life:	≥500 mating cycles

2.2 Environmental Characteristics

Operating Temperature:	Class W: -65℃ to +175℃; Class F, FT, K, TA: -65℃ to +200℃
Salt Spray Resistance:	Class W: 500h; Class K, TA: 1000h; Class F: 48h; Class FT: 96h

2.3 Electrical Characteristics

Contact Resistance and Current Rating:

Contact Size	Contact Resistance (mΩ)	Current Rating (A)
22D#	≤12	5
20#	≤5	7.5
16#	≤2.5	13
12#	≤1.5	23

Withstanding Voltage (V):

Ratings	sea level	21000 Meters
M	1300	800
N	1000	600
I	1800	1000
II	2300	1000

Insulation Resistance: ≥5000 MΩ (500V DC)

Shell Continuity: Class W: 2.5 mΩ; Class F, FT: 1 mΩ; Class K, TA: 10 mΩ;

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3. How to Order:

		D38999/	20	W	B	98	PL1	N	14
Series:	**D38999/:** MIL-DTL-38999 Series III								
Shell Style:	**20 -** Flange Mount Receptacle								
Service Class:	**W -** Olive Drab Cadmium **F -** Electroless Nickel **K** - Passivated Stainless Steel **FT -** Nickel-plated forged aluminum alloy TA - Titanium alloy								
Shell Sizes: A-J	**A** - 09 **B** - 11 **C** - 13 **D** - 15 **E** - 17 **F** - 19 **G** - 21 **H** - 23 **J** - 25								
Insert Arrangement:	See “Insert Arrangement” Table (Page 49-55)								
Contact Type:	PL1 - printed circuit board pin SL1 - printed circuit board socket								
Alternate Keying Position:	**N** - Normal keying position; **A, B, C, D** - Variant keying positions.								
Type Code:	14 – Dual flange receptacle								

[Part Number Example] D38999/20WB98PL1N-14

D38999 series square flange receptacle, with olive drab cadmium-plated aluminum alloy shell, B shell size, 98 contacts, printed circuit board solder type pin contacts, N keyway, and dual flange mounting.

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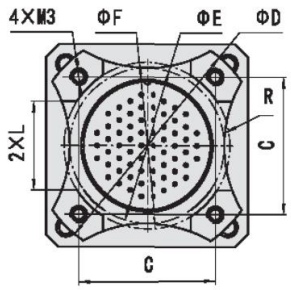
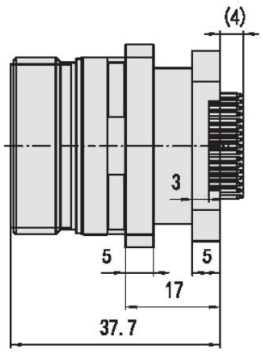
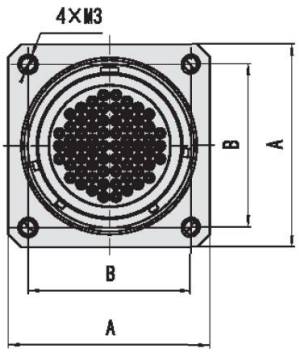
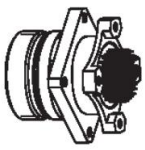
4. Sizes

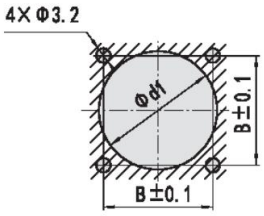




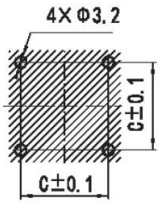




3D Model



Panel cutout dimensions



PCB board mounting hole dimensions

Shell Code	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	L (mm)	R (mm)	d1 Min. (mm)
A(09)	23.8	18.26	13.5	24.5	12	14	8	6	16.66
B(11)	26.2	20.62	15.26	27	15	15.5	8	8	20.22
C(13)	28.6	23.01	17.85	31.8	18	19	10	11	23.42
D(15)	31.0	24.61	20.09	35	22	22.5	12	16	26.59
E(17)	33.3	26.97	22.21	38.1	25	24.5	14	24	30.96
F(19)	36.5	29.36	24.76	41.3	28	28.5	16	30	32.94
G(21)	39.7	31.75	26.74	44.5	31	32	18	42	36.12
H(23)	42.9	34.93	29.07	47.7	34	35	20	58	39.29
J(25)	46.0	38.10	31.32	50.8	37	37.5	23	75	42.47

MIL-DTL-38999 Series IV Circular Connectors

1. Main Features

- Compliant with MIL-DTL-38999 Series IV
- These connectors offer high density with up to 128 contacts
- A bayonet locking mechanism for secure mating
- 100% polarization to prevent mismating
- The integrated ground spring enhances EMI/RFI shielding
- Suitable for demanding aerospace and military applications subjected to high vibration.

2. Key technical characteristics

2.1 Mechanical Characteristics

Shell Materials:	Aluminum, Stainless Steel
Shell Finishes:	W- Olive Drab Cadmium ; F- Electroless Nickel; K- Passivated Stainless Steel
Insulator Material:	Thermoplastic or thermosetting material
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy, crimp type, removable
Mechanical Life:	≥500 mating cycles
Shock:	3ms half-sine wave, peak acceleration of 300g
Vibration testing:	Sinusoidal vibration: 10-2000 Hz at 588 m/s²; Random vibration: 100-1000 Hz with a power spectral density of 1 G²/Hz.

2.2 Environmental Characteristics

Operating Temperature:	Class W: -65℃ to +175℃; Class F, K: -65℃ to +200℃
Fungus resistance:	According to GJB150.10, the test duration is 28 days.
Fluid resistance:	Resistant to various fuels, coolants, and solvents.
Salt Spray Resistance:	Tested according to GJB1217 method 1001: Class W - 500 hours, Class F - 48 hours, Class K - 1000 hours.

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2.3 Electrical Characteristics

2.3.1 Contact Resistance and Current Rating:

Contact Size	Diameter (mm)	Contact Resistance (mΩ)	Current Rating (A)
22D#	Φ0.76	⩽14.6	5
20#	Φ1.00	⩽7.5	7.5
16#	Φ1.60	<37	13
12#	Φ2.40	⩽1.83	23
10#	D315	⩽10	33
8#	Φ36	⩽0.57	46

2.3.3 Withstanding Voltage (V):

Ratings*	M	N	I	II
sea level	1300	1000	1800	2300
21000 Meters	800	600	1000	1000

* Working voltage varies depending on the contact arrangement. Please refer to the contact arrangement for details.

2.3.4 Insulation Resistance:

- Normal conditions: ⩾5000 MΩ
- High temperature: ⩾1000 MΩ
- Humid conditions: ⩾100 MΩ

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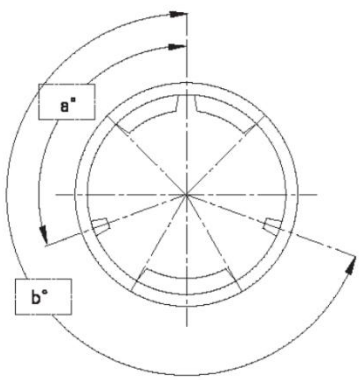
3. How to Order

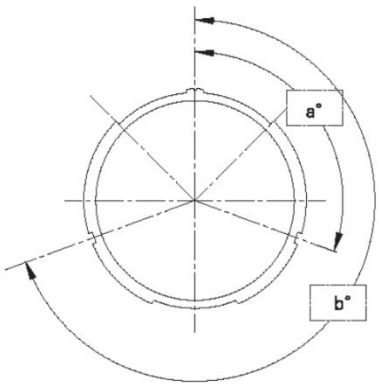
	D38999/	40	W	B	35	P	N
Series:	**D38999/:** MIL-DTL-38999						
Shell Style:	**40** – Wall mount flange receptacle **42** – Box mount flange receptacle **44** – Jam nut receptacle **46** – Shielded plug						
Service Class:	**W** – Olive Drab Cadmium; **F** – Electroless Nickel; **K** - Passivated Stainless Steel						
Shell Sizes: A-J	**B**(11), **C**(13), **D**(15), **E**(17), **F**(19), **G**(21), **H**(23), **J**(25)						
Insert Arrangement:	See "Insert Arrangement" Table (Page 49-55)						
Contact Type:	**P** - Pin **S** - Socket						
Alternate Keying Position:	**N** - Normal keying position; **A, B, C, D** - Variant keying positions.						

4. Keying Position

Keying angle of the mating nut



Keying angle of the receptacle shell



Keying Angle	a	b
N	110°	250
A	100°	260°
B	90	270°
C	80	280°
D	70	290°
K	120°	255

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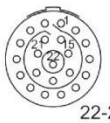
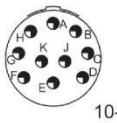
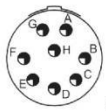
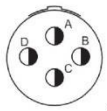
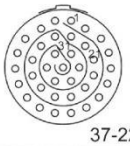
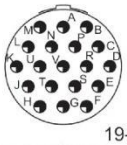
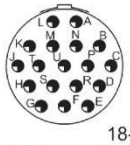
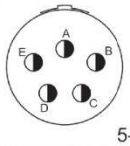
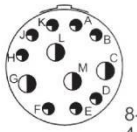
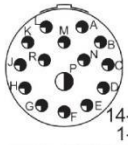
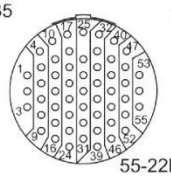
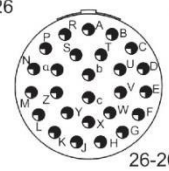
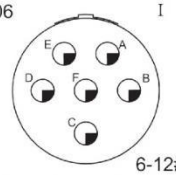
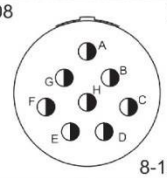
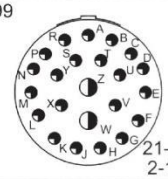
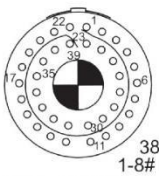
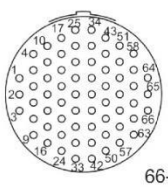
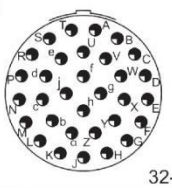
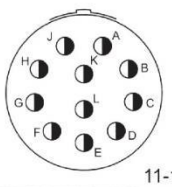
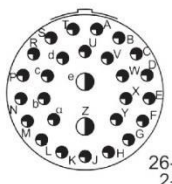
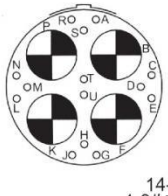
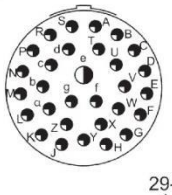
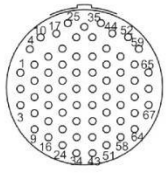
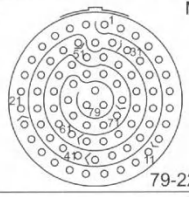
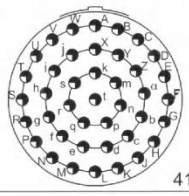
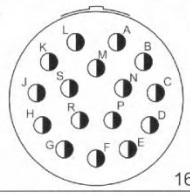
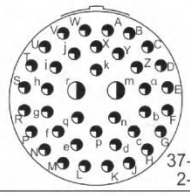
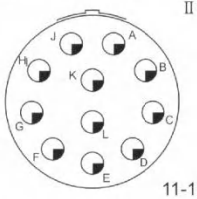
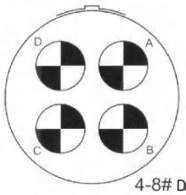
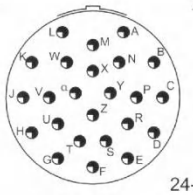
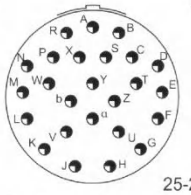
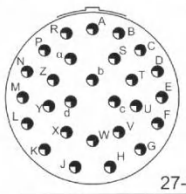
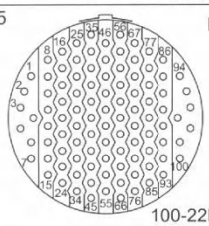
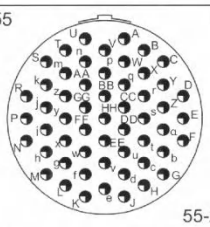
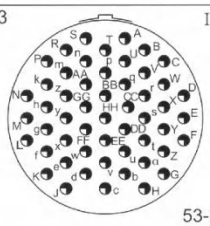
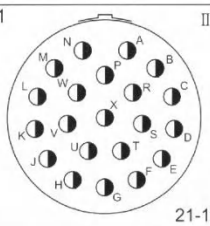
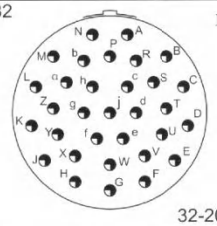
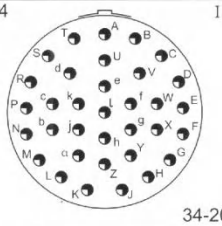
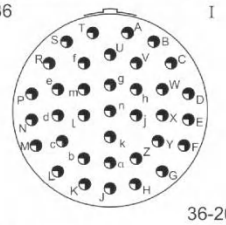
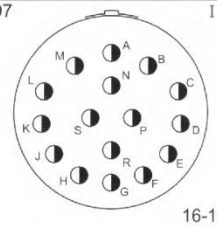
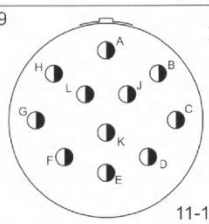
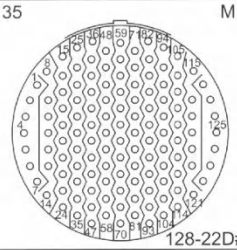
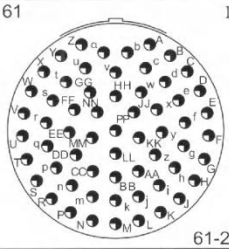
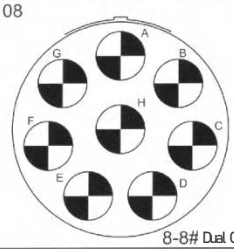
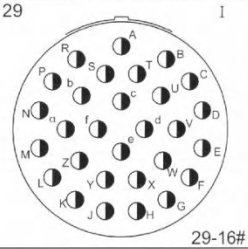
5. Insert Arrangement

Shell Size						
11 (B)	35 M  13-22D#	05 I  5-20#	98 I  6-20#	99 I  7-20#	02 I  2-16#	04 I  4-20#
13 (C)	35 M  22-22D#	98 I  10-20#	08 I  8-20#	04 I  4-16#		
15 (D)	35 M  37-22D#	19 I  19-20#	18 I  18-20#	05 II  5-16#	97 I  8-20# 4-16#	
	15 I  14-20# 1-16#					
17 (E)	35 M  55-22D#	26 I  26-20#	06 I  6-12#	08 II  8-16#	99 I  21-20# 2-16#	
	02 I  38-22D# 1-8# Dual Coax					
19 (F)	35 M  66-22D#	32 I  32-20#	11 II  11-16#	28 I  26-20# 2-16#		
	18 M  14-22D# 4-8# Dual Coax	30 I  29-20# 1-16#	45 M  67-22D#			

21 (G)	35 M  79-22D#	41 I  41-20#	16 II  16-16#	39 I  37-20# 2-16#
	11 II  11-12#	75  4-8# Dual Coax	24 I  24-20#	25 I  25-20#
	27 I  27-20#			
23 (H)	35 M  100-22D#	55 I  55-20#	53 I  53-20#	21 II  21-16#
	32 I  32-20#	34 I  34-20#	36 I  36-20#	97 I  16-16#
	99 II  11-16#			
25 (J)	35 M  128-22D#	61 I  61-20#	08  8-8# Dual Coax	29 I  29-16#

Contact Legend 22D# 20# 16# 12# 12# Coax 10# 8# Dual Coax

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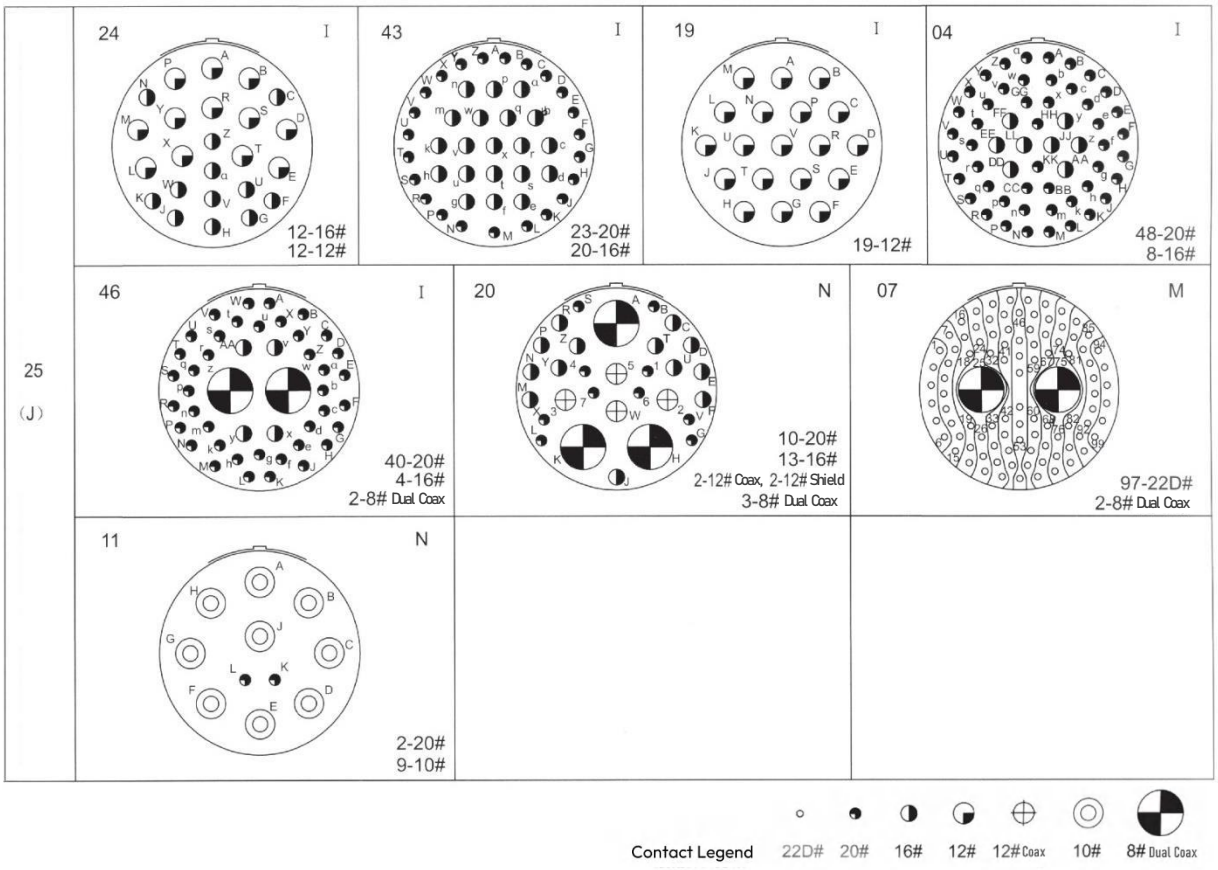
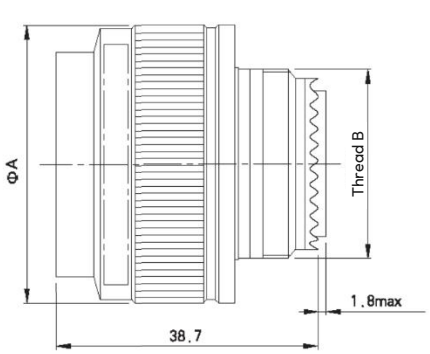
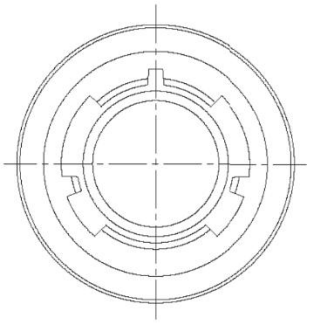


6. Sizes

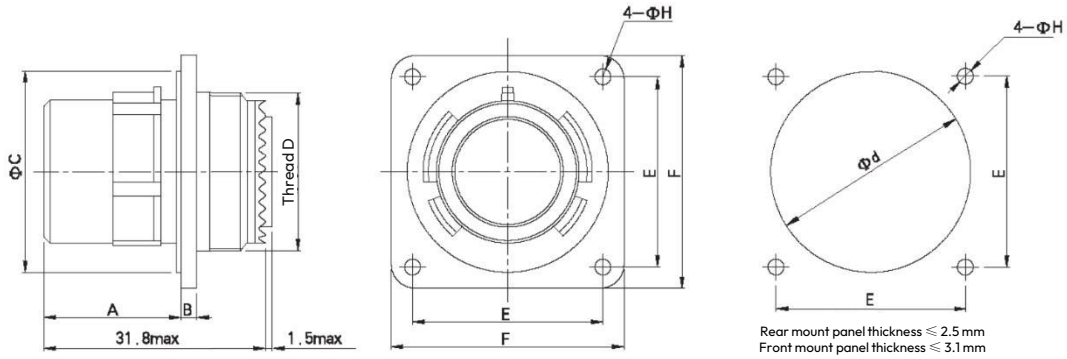
6.1 D38999/46 Plug





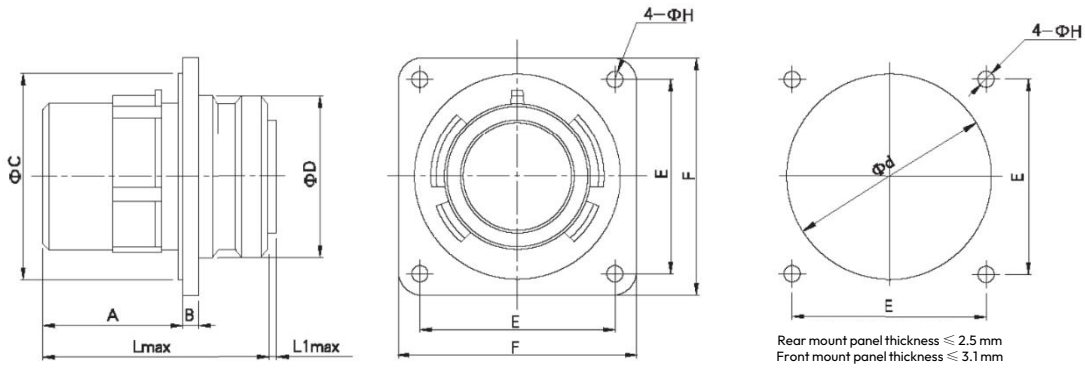
Shell Sizes	Shell Code	A Max. (mm)	Thread B(-6g)
11	B	26.6	M15×1
13	C	30.8	M18×1
15	D	34.0	M22×1
17	E	37.4	M25×1
19	F	40.0	M28×1
21	G	43.2	M31×1
23	H	46.5	M34×1
25	J	49.7	M37×1

6.2 D38999/40 Wall Mount Flange Receptacle



Shell Sizes	Shell Code	A Max. (mm)	B Max. (mm)	C Max. (mm)	Thread D(-6g)	E (mm)	F (mm)	H (mm)	d Front-mount (mm)	d Rear-mount (mm)
11	B	2,013	2.6	20.1	M15×1	20.62	26.2	3.2	15.3	20.5
13	C	20.13	2.6	23.3	M18×1	23.02	28.6	3.2	19.2	23.7
15	D	2,013	2.6	26.5	M22×1	24.62	31.0	3.2	23.3	26.9
17	E	2,013	2.6	29.66	M25×1	26.98	33.3	3.2	25.9	31.0
19		20.13	2.6	32.8	M28×1	29.36	36.5	3.2	29.0	33.0
21	G	20.13	3.2	36.0	M31×1	31.76	39.7	3.2	32.2	36.2
23	H	20.13	3.2	39.2	M34×1	34.92	42.9	3.7	35.0	39.4
25	J	2,013	3.2	42.4	M37×1	38.10	46.0	3.7	37.8	42.6

6.3 D38999/42 Box Mount Flange Receptacle



Shell Sizes	Shell Code	A Max. (mm)	B Max. (mm)	L (mm)	L1 (mm)	C Max. (mm)	D Max. (mm)	E (mm)	F (mm)	H	d Front-mount (mm)	d Rear-mount (mm)
11	B	20.13	2.6	31.2	2.1	20.1	14.6	20.62	26.2	3.2	15.3	20.5
13	C	20.13	2.6	31.2	2.1	23.3	17.5	23.02	28.6	3.2	19.2	237
15	D	20.13	26	31.2	2.1	26.5	20.7	24.62	31.0	3.2	23.3	26.9
17	E	20.13	2.6	31.2	2.1	29.66	23.9	26.98	33.3	3.2	25.9	31.0
19	F	20.13	2.6	31.2	2.1	328	26.6	29.36	36.5	3.2	29.0	330
21	G	20.13	3.2	31.8	1.5	36.0	29.6	31.76	39	3.2	32.2	36.2
23	H	20.13	3.2	31.8	1.5	39.2	32.9	34.92	42.9	3.7	35.0	39.4
25	J	20.13	3.2	31.8	1.5	42.4	36.1	38.10	46.0	3.7	37.8	42.6

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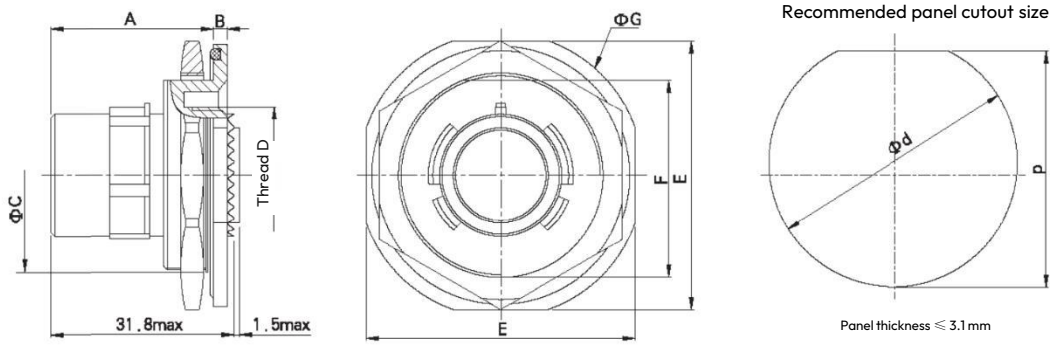
6.4 D38999/44 Jam Nut Receptacle



Shell Sizes	Shell Code	A Max. (mm)	B Max. (mm)	C Max. (mm)	Thread D(-6g)	E Max. (mm)	F Max. (mm)	G Max. (mm)	d (mm)	p (mm)
11	B	28.0	2.6	25.4	M15×1	34.9	23.93	38.1	25.6	24.3
13	C	28.0	2.6	2,858	M18×1	38.1	27.08	41.2	28.8	27.3
15	D	28.0	2.6	31.75	M22×1	41.3	30.26	44.5	32.2	30.7
17	E	28.0	2.6	34.92	M25×1	45.2	33.56	49.2	35.2	33.8
19	F	28.0	2.6	38.10	M28×1	48.0	36.61	51.2	38.4	37.0
21	G	28.0	2.6	41.28	M31×1	51.2	39.78	54.3	41.6	40.1
23	H	28.0	2.6	44.45	M34×1	54.3	42.96	57.5	44.7	43.1
25	J	28.0	2.6	47.63	M37×1	57.5	46.13	60.7	48.0	46.3

7. Precautions

The plug should be inserted straight into the socket until the mating nut surface is flush with the socket. The mating nut should then be rotated 90 degrees clockwise until a positive lock is achieved, indicated by an audible click and a noticeable increase in resistance. The red band on the plug should be fully covered. To disconnect, the mating nut should be rotated 90 degrees counterclockwise.

8. Accessories

Compatible with MIL-DTL-38999 Series III accessories. See page 63-70.

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9. Protection Caps for Plugs and Receptacles

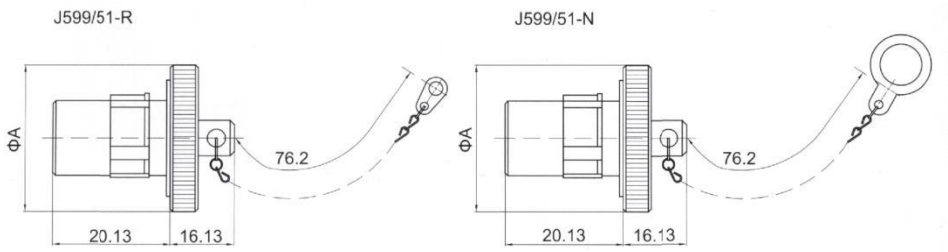
9.1 How to Order:

		D38999/51	F	15	N
Series Number:	**D38999/51** – Plug protection cap **D38999/52** - Receptacle protection cap				
Finishes:	**W -** Olive Drab Cadmium; **F -** Electroless Nickel; **J -** Olive Drab Cadmium, Composite **M -**Electroless Nickel, Composite				
Shell Sizes:	**11, 13, 15, 17, 19, 21, 23, 25**				
Chain Types:	**N** - Stainless steel wire with ring **R** - Stainless steel wire rope				

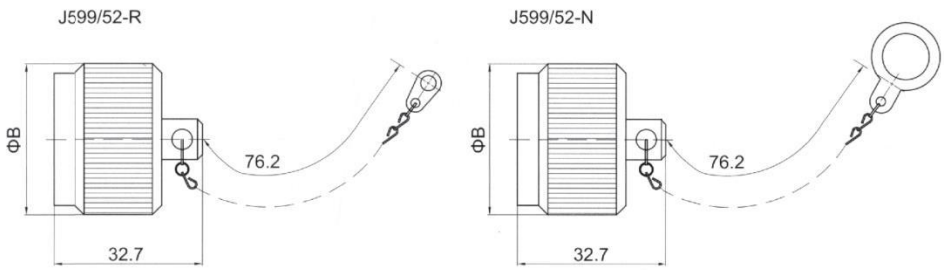
Note : Protection caps should be ordered separately and are not included with the connector.

9.2 Sizes:

Plug protection cap **D38999/51**



Receptacle protection cap **D38999/52**



Shell Sizes	11	13	15	17	19	21	23	25
Shell Code	B	C	D	E	F	G	H	J
A (mm)	35.05	39.88	42.16	45.47	48.77	52.32	57.15	56.85
B (mm)	23.42	26.59	30.96	34.14	37.31	40.11	43.28	46.45

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Appendix 1: Contact Arrangement Index for MIL-DTL-38999 Series I, II, III, and IV

No.	Insert Arrangement Code				Degree	Number of contacts	Types and numbers of contacts							
	Series I	Series II	Series III	Series IV			22D	20	16	12	12 Coax	10	8	8 Dual-coax
1	09-35	08-35	A35		M	6	6							
2	09-98	08-98	A98		I	3		3						
3	11-35	10-35	B35	B35	M	13	13							
4	11-04		B04	B04	I	4		4						
5	11-05	10-05	B05	B05	I	5		5						
6	11-98	10-98	B98	B98	I	6		6						
7	11-99	10-99	B99	B99	I	7		7						
8	11-02		B02	B02	I	2			2					
9	11-01		B01	B01	I	1				1				
10	13-35	12-35	C35	C35	M	22	22							
11	13-9g	12-98	C98	C98	I	10		10						
12	13-08	12-08	C08	C08	I	8		8						
13	13-04	12-04	C04	C04	I	4			7					
14	13-03	12-03		C03	II	3			3					
15			C12	C12	N	12	11			1				
16			C50	C50	M	5		4				1		
17			C60	C60	I	6		2	4					
18	15-35	14-35	D35	D35	M	37	37							
19	15-19	14-19	D19	D19	I	19		19						
20	15-18	14-18	D18	D18	I	18		18						
21	15-05	14-05	D05	D05	II	5			5					
22	15-15	14-15	D15	D15	I	15		14	1					
23	15-97	14-97	D97	D97	I	12		8	4					
24	15-03				II	3			1	2				
25	17-35	16-35	E35	E35	M	55	55							
26	17-42				M	42	42							
27	17-26	16-26	E26	E26	I	26		26						
28	17-08	16-08	E08	E08	II	8			8					
29	17-06	16-06	E06	E06	I	6				6				
30	17-05				II	5				5				
31	17-99	16-99	E99	E99	I	23		21	2					
32	17-12				N	12	9				3			
33	17-03				N	3			1			2		
34	17-21					21	17			4				
35	17-30				N	6		3				3		
36				E02	M	39	38							1
37	19-3F	18-35	F34	F34	M	66	66							
38	19-45	18-45	F45	F45	M	67	67							
39		18-53			M	53	53							
40	19-32	18-32	F32	F32	I	32		32						
41	19-11	18-11	F11	F11	II	11			11					
42	19-96	18-96			I	9				9				
43	19-28	18-28	F28	F28	I	28		26	2					

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No.	Insert Arrangement Code				Degree	Number of contacts	Types and numbers of contacts							
	Series I	Series II	Series III	Series IV			22D	20	16	12	12 Coax	10	8	8 Dual-coax
44	19-30	18-30	F30	F30	I	30		29						
45	19-18		F18	F18	M	18	14							4
46	19-18a				M	18	14						4	
47		18-93	F93	F93	I	32	24	6				2		
48			F05	F05		5		1				4		
49	21-35	20-35	G35	G35	M	79	79							
50	21-02	20-02			M	65	65							
51	21-41	20-41	G41	G41	I	41		41						
52	21-27	20-27	G27	G27	I	27		27						
53	21-25	20-25	G25	G25	I	25		25						
54	21-24	20-24	G24	G24	I	24		24						
55	21-16	20-16	G16	G16	II	16			16					
56	21-11	20-11	G11	G11	II	11				11				
57	21-39	20-39	G39	G39	I	39		37						
58	21-15				I	15		13						2
59			G29	G29		29		26			3			
60				G75	N	4								4
61	23-35	20-35	H35	H35	M	100	100							
62	23-55	22-55	H55	H55	I	55		55						
63	23-53	22-53	H53	H53	I	53		53						
64	23-36	22-36	H36	H36	I	36		36						
65	23-34	22-34	H34	H34	I	34		34						
66	23-32	22-32	H32	H32	I	32		32						
67	23-21	22-21	H21	H21	II	21			21					
68	23-97	22-97	H97	H97	I	16			16					
69	23-99	22-99	H99	H99	II	11			11					
70	23-04				I	4							4	
71	25-35	24-35	J35	J35	M	128	128							
72	25-61	24-61	J61	J61	I	61		61						
73	25-29	24-29	J29	J29	I	29			29					
74	25-19	24-19	J19	J19	I	19				19				
75	25-24	24-24	J24	J24	I	24			12	12				
76	25-43	24-43	J43	J43	I	43		23	20					
77	25-04	24-04	J04	J04	I	56		48	8					
78	25-11		J11	J11		11		2				9		
79	25-20		J20	J20	N	30		10	13		4			3
80	25-46		J46	J46	I	46		40	4					2
81	25-69			J69	M	69	44	15	10					
82	25-99				N	29	20				9			
83	25-32				N	32		16	10			6		
84			J31	J31	N	31		12	12			5		2
85			J93	J93	M	118	110		8					
86				J07	M	99	97							2
87				J08	N	8								8

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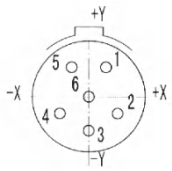
Appendix 2: Printed Circuit Board Hole Dimensions for MIL-DTL-3899 Series Connectors

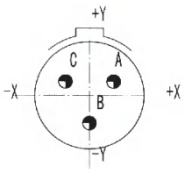
Applicable to MIL-DTL-38999 Seriesl, II, III, and IV printed circuit boards. The contact arrangement codes in the diagram are based on the 5991 series. The hole numbers shown are for pin insertion. Printed circuit board hole diameters: 22D# minimum 0.9mm, 20# minimum 1.0mm, 16# minimum 1.3mm (for reference).

9-35
(6-22D#)



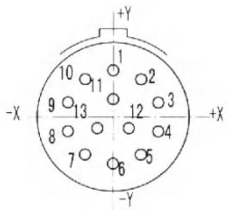
Hole Code	Coordinates	
	X	Y
1	+1.14	+1.98
2	+1.98	-1.14
3	0.00	-2.29
4	-1.98	-1.14
5	-1.14	+1.98
6	0.00	0.00

9-98
(3-20#)



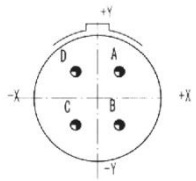
Hole Code	Coordinates	
	X	Y
A	+1.65	+0.97
B	0.00	-1.91
C	-1.65	+0.97

11-35
(13-22D#)



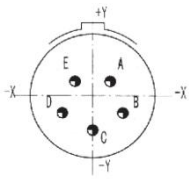
Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y
1	0.00	+3.71	8	-3.51	-1.14
2	+2.16	+3.00	9	-3.51	+1.14
3	+3.51	+1.14	10	-2.16	+3.00
4	+3.51	-1.14	11	0.00	+1.42
5	+2.16	-3.00	12	+1.24	-0.89
6	0.00	-3.71	13	-1.24	-0.89
7	-2.16	-3.00			

11-04
(4-20#)



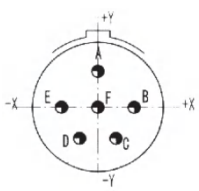
Hole Code	Coordinates	
	X	Y
A	+1.65	+1.65
B	+1.65	-1.65
C	-1.65	-1.65
D	-1.65	+1.65

11-05
(5-20#)



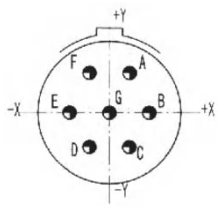
Hole Code	Coordinates	
	X	Y
A	+1.65	+1.42
B	+2.87	-1.65
C	0	-3.30
D	-2.87	-1.65
E	-1.65	+1.42

11-98
(6-20#)



Hole Code	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

11-99
(7-20#)



Hole Code	Coordinates	
	X	Y
A	+1.65	+2.87
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

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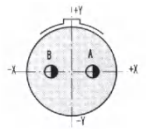
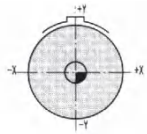
11-02
(2-16#)



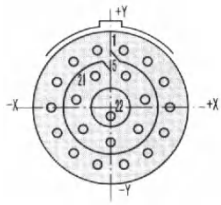
Hole Code	Coordinates	
	X	Y
A	+2.41	0.00
B	-2.41	0.00

11-01
(1-12#)



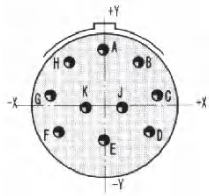
Hole Code	Coordinates	
	X	Y
A	0.00	0.00

13-35
(22-22D#)



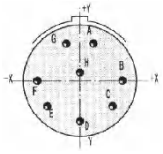
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
1	+1.14	+5.00	9	-3.20	-4.01	17	+2.36	-1.91
2	+3.20	+4.01	10	-4.62	-2.24	18	0.00	-3.05
3	+4.62	+2.24	11	-5.16	0.00	19	-2.36	-1.91
4	+5.16	0.00	12	-4.62	+2.24	20	-2.97	+0.66
5	+4.62	-2.24	13	-3.20	+4.01	21	-1.14	+2.72
6	+3.20	-4.01	14	-1.14	+5.00	22	0.00	-0.76
7	+1.14	-5.00	15	+1.14	+2.72			
8	-1.14	-5.00	16	+2.97	+0.66			

13-98
(10-20#)



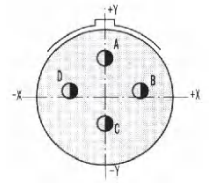
Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y
A	0.00	+4.95	F	-4.17	-2.67
B	+3.18	+3.81	G	-4.90	+0.76
C	+4.90	+0.76	H	-3.18	+3.81
D	+4.17	-2.67	J	+1.65	-0.38
E	0.00	-3.43	K	-1.65	-0.38

13-08
(8-20#)



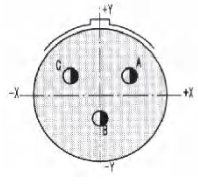
Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y
A	+1.65	+3.99	E	-3.05	-3.05
B	+4.32	0.00	F	-4.32	0.00
C	+3.05	-3.05	G	-1.65	+3.99
D	0.00	-4.32	H	0.00	+1.12

13-04
(4-16#)



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

13-03
(3-16#)



Hole Code	Coordinates	
	X	Y
A	+2.39	+1.47
B	0.00	-2.82
C	-2.39	+1.47

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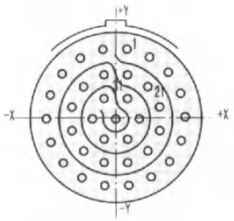
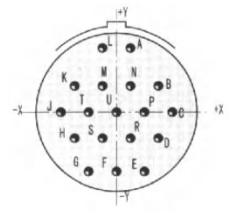
15-35
(37-22D#)



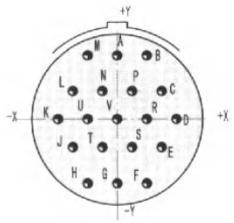
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
1	+1.14	+6.65	14	-6.76	-0.25	27	-4.32	-1.27
2	+3.12	+5.51	15	-6.45	+2.03	28	-4.32	+1.02
3	+5.36	+4.06	16	-5.36	+4.06	29	-3.12	+3.02
4	+6.45	+2.03	17	-3.12	+5.51	30	-1.14	+4.37
5	+6.76	-0.25	18	-1.14	+6.65	31	+1.14	+1.88
6	+6.27	-2.49	19	+1.14	+4.37	32	+2.29	-0.10
7	+5.08	-4.45	20	+3.12	+3.02	33	+1.14	-2.08
8	+3.30	-5.89	21	+4.32	+1.02	34	-1.14	-2.08
9	+1.14	-6.65	22	+4.32	-1.27	35	-2.29	-0.10
10	-1.14	-6.65	23	+3.12	-3.23	36	-1.14	+1.88
11	-3.30	-5.89	24	+1.14	-4.37	37	0.00	-0.10
12	-5.08	-4.45	25	-1.14	-4.37			
13	-6.27	-2.49	26	-3.12	-3.23			

15-18
(18-20#)



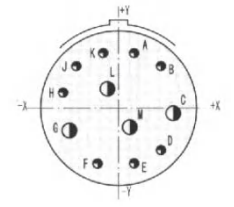
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.65	+6.40	H	-4.95	-2.87	R	+1.65	-2.87
B	+4.95	+2.87	J	-6.60	0.00	S	-1.65	-2.87
C	+6.60	0.00	K	-4.95	+2.87	T	-3.30	0.00
D	+4.95	-2.87	L	-1.65	+6.40	U	0.00	0.00
E	+3.30	-5.72	M	-1.65	+2.87			
F	0.00	-5.72	N	+1.65	+2.87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

15-19
(19-20#)



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

15-97
(8-20#,4-16#)



Hole Code	Coordinates		Hole Code	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

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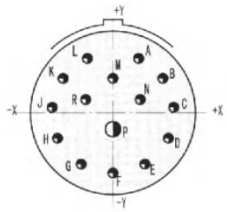
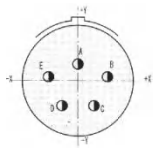
15-15
(14-20#,1-16#)



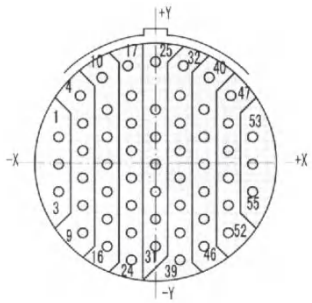
Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y
A	+2.54	+5.72	J	-6.20	+0.36
B	+5.13	+3.56	K	-5.13	+3.56
C	+6.20	+0.36	L	-2.54	+5.72
D	+5.54	-2.87	M	0.00	+3.56
E	+3.20	-5.31	N	+2.79	+1.02
F	0.00	-6.22	P	0.00	-1.96
G	-3.20	-5.31	R	-2.79	+1.02
H	-5.54	-2.87			

15-05
(5-16#)



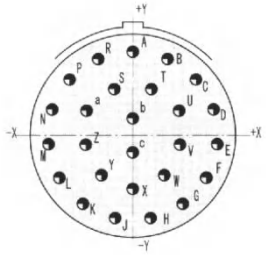
Hole Code	Coordinates	
	X	Y
A	0.00	+2.54
B	+4.42	+0.61
C	+2.39	-3.76
D	-2.39	-3.76
E	-4.42	+0.61

17-35
(55-22D#)



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

17-26
(26-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0.00	+8.15	K	-4.80	-6.60	V	+4.52	-0.91
B	+3.33	+7.44	L	-7.06	-4.09	W	+3.02	-3.84
C	+6.07	+5.44	M	-8.10	-0.86	X	0.00	-5.16
D	+7.75	+2.51	N	-7.75	+2.51	Y	-3.02	-3.84
E	+8.10	-0.86	P	-6.07	+5.44	Z	-4.52	-0.91
F	+7.06	-4.09	R	-3.33	+7.44	a	-4.45	+2.39
G	+4.80	-6.60	S	-1.78	+4.50	b	0.00	+1.65
H	+1.70	-7.98	T	+1.78	+4.50	C	0.00	-1.65
J	-1.70	-7.98	U	+4.45	+2.39			

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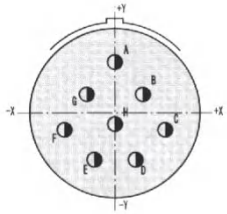
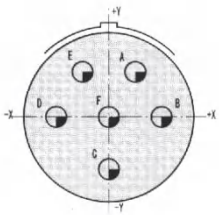
17-08
(8-16#)



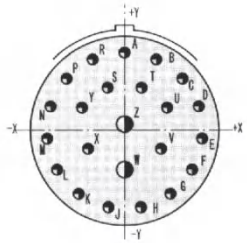
Hole Code	Coordinates	
	X	Y
A	0.00	+5.99
B	+3.25	+2.18
C	+5.84	-1.98
D	+2.39	-5.49
E	-2.39	-5.49
F	-5.84	-1.98
G	-3.25	+2.18
H	0.00	-1.32

17-06
(6-12#)



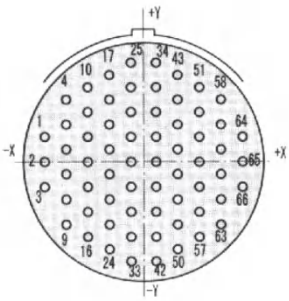
Hole Code	Coordinates	
	X	Y
A	+3.07	+5.31
B	+6.12	0.00
C	0.00	-6.12
D	-6.12	0.00
E	-3.07	+5.31
F	0.00	0.00

17-99
(21-20#,2-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0.00	+8.15	J	-1.70	-7.98	T	+1.78	+4.50
B	+3.33	+7.44	K	-4.80	-6.60	U	+4.45	+2.39
C	+6.07	+5.44	L	-7.06	-4.09	V	+3.81	-1.91
D	+7.75	+2.51	M	-8.10	0.86	W	0.00	-4.09
E	+8.10	-0.86	N	-7.75	+2.51	X	-3.81	-1.91
F	+7.06	-4.09	P	-6.07	+5.44	Y	-4.45	+2.39
G	+4.80	-6.60	R	-3.33	+7.44	Z	0.00	+0.64
H	+1.70	-7.98	S	-1.78	+4.50			

19-35
(66-22D#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
	-9.07	+2.29	23	-3.12	-5.72	45	+3.12	+3.43
2	-9.07	0	24	-3.12	-8.00	46	+3.12	+1.14
3	-9.07	-2.29	25	-1.14	+9.14	47	+3.12	-1.14
4	-7.09	+5.72	26	-1.14	+6.86	48	+3.12	-3.43
5	-7.09	+3.43	27	-1.14	+4.57	49	+3.12	-5.72
6	-7.09	+1.14	28	-1.14	+2.29	50	+3.12	-8.00
7	-7.09	-1.14	29	-1.14	0	51	+5.11	+6.86
8	-7.09	-3.43	30	-1.14	-2.29	52	+5.11	+4.57
9	-7.09	-5.72	31	-1.14	-4.57	53	+5.11	+2.29
10	-5.11	+6.86	32	-1.14	-6.86	54	+5.11	0
11	-5.11	+4.57	33	-1.14	-9.14	55	+5.11	-2.29
12	-5.11	+2.29	34	+1.14	+9.14	56	+5.11	-4.57
13	-5.11	0	35	+1.14	+6.86	57	+5.11	-6.86
14	-5.11	-2.29	36	+1.14	+4.57	58	+7.09	+5.72
15	-5.11	-4.57	37	+1.14	+2.29	59	+7.09	+3.43
16	-5.11	-6.86	38	+1.14	0	60	+7.09	+1.14
17	-3.12	+8.00	39	+1.14	-2.29	61	+7.09	-1.14
18	-3.12	+5.72	40	+1.14	-4.57	62	+7.09	-3.43
19	-3.12	+3.43	41	+1.14	-6.86	63	+7.09	-5.72
20	-3.12	+1.14	42	+1.14	-9.14	64	+9.07	+2.29
21	-3.12	-1.14	43	+3.12	+8.00	65	+9.07	0
22	-3.12	-3.43	44	+3.12	+5.72	66	+9.07	-2.29

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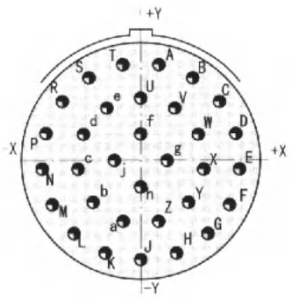
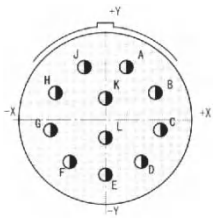
19-32
(32-20#)



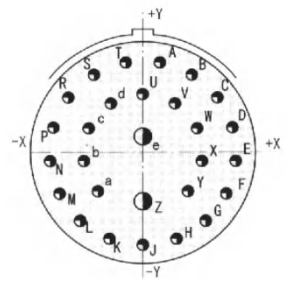
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.68	+8.97	M	-8.15	-4.06	Z	+1.65	-5.61
B	+4.80	+7.75	N	-9.07	-0.84	a	-1.65	-5.61
C	+7.26	+5.51	P	-8.76	+2.49	b	-4.42	-3.84
D	+8.76	+2.49	R	-7.26	+5.51	C	-5.79	-0.84
E	+9.07	-0.84	S	-4.80	+7.75	d	-5.31	+2.41
F	+8.15	-4.06	T	-1.68	+8.97	e	-3.15	+4.90
G	+6.15	-6.73	U	0	+5.84	f	0	+2.44
H	+3.30	-8.51	V	+3.15	+4.90	g	+2.44	0
J	0	-9.12	W	+5.31	+2.41	h	0	-2.44
K	-3.30	-8.51	X	+5.79	-0.84		-2.44	0
L	-6.15	-6.73	Y	+4.42	-3.84			

19-11
(11-16#)



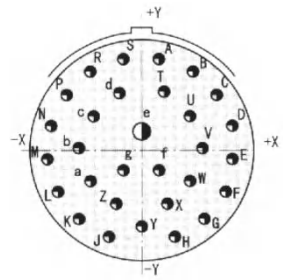
Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y
A	+2.67	+6.60	G	-6.99	-1.35
B	+6.35	+3.35	H	-6.35	+3.35
C	+6.99	-1.35	J	-2.67	+6.60
D	+4.55	-5.46	K	0	+2.67
E	0	-7.14	L	0	-2.34
F	-4.55	-5.46			

19-28
(26-20#,2-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.68	+8.97	L	--6.15	-6.73	X	+5.79	-0.84
B	+4.80	+7.75	M	-8.15	-4.06	Y	+4.42	-3.84
C	+7.26	+5.51	N	-9.07	-0.84	Z	0	-4.85
D	+8.76	+2.49	P	-8.76	+2.49	a	-4.42	-3.84
E	+9.07	—0.84	R	-7.26	+5.51	b	-5.79	—0.84
F	+8.15	-4.06	S	-4.80	+7.75	C	-5.31	+2.41
G	+6.15	-6.73	T	-1.68	+8.97	d	-3.15	+4.90
H	+3.30	-8.51	U	0	+5.84	e	0	+1.57
J	0	-9.12	V	+3.15	+4.90			
K	-3.30	-8.51	W	+5.31	+2.41			

19-30
(29-20#,1-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.65	+8.79	L	-8.00	-4.01	X	+2.44	-5.16
B	+4.72	+7.59	M	-8.92	-0.84	Y	0	-7.37
C	+7.16	+5.33	N	-8.64	+2.36	Z	-2.44	-5.16
D	+8.64	+2.36	P	-7.16	+5.33	a	-4.90	-2.97
E	+8.92	-0.84	R	-4.72	+7.59	b	-5.79	+0.20
F	+8.00	-4.01	S	-1.65	+8.79	C	-4.60	+3.28
G	+5.99	-6.63	T	+2.13	+5.51	d	-2.13	+5.51
H	+3.15	-8.38	U	+4.60	+3.28	e	0	+1.83
J	-3.15	-8.38	V	+5.79	+0.20	f	+1.75	-1.93
K	-5.99	-6.63	W	+4.90	-2.97	g	-1.75	-1.93

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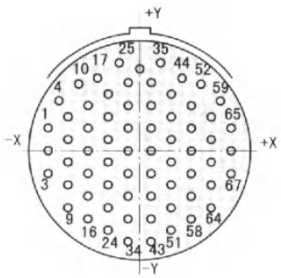
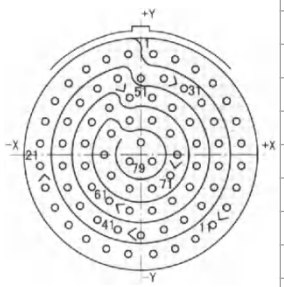
19-45
(67-22D#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
	-9.07	+2.06	24	-3.12	-8.23	47	+3.12	+0.91
2	-9.07	-0.23	25	-2.24	+9.14	48	+3.12	-1.37
3	-9.07	-2.51	26	0	+8.61	49	+3.12	-3.66
4	-7.72	+5.41	27	-1.14	+6.63	50	+3.12	-5.94
5	-7.09	+3.20	28	-1.14	+4.34	51	+3.12	-8.23
6	-7.09	+0.91	29	-1.14	+2.06	52	+6.20	+7.11
7	-7.09	-1.37	30	-1.14	-0.23	53	+5.11	+4.34
8	-7.09	-3.66	31	-1.14	-2.51	54	+5.11	+2.06
9	-7.09	-5.94	32	-1.14	-4.80	55	+5.11	-0.23
10	-6.20	+7.11	33	-1.14	-7.09	56	+5.11	-2.51
11	-5.11	+4.34	34	-1.14	-9.37	57	+5.11	-4.80
12	-5.11	+2.06	35	+2.24	+9.14	58	+5.11	-7.09
13	-5.11	-0.23	36	+1.14	+6.63	59	+7.72	+5.41
14	-5.11	-2.51	37	+1.14	+4.34	60	+7.09	+3.20
15	-5.11	-4.80	38	+1.14	+2.06	61	+7.09	+0.91
16	-5.11	-7.09	39	+1.14	-0.23	62	+7.09	-1.37
17	-3.96	+7.65	40	+1.14	-2.51	63	+7.09	-3.66
18	-3.12	+5.49	41	+1.14	-4.80	64	+7.09	-5.94
19	-3.12	+3.20	42	+1.14	-7.09	65	+9.07	+2.06
20	-3.12	+0.91	43	+1.14	-9.37	66	+9.07	-0.23
21	-3.12	-1.37	44	+3.96	+7.65	67	+9.07	-2.51
22	-3.12	-3.66	45	+3.12	+5.49			
23	-3.12	-5.94	46	+3.12	+3.20			

21-35
(79-22D#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y		X	Y
	+1.35	+10.82	21	-10.85	-1.22	41	-2.49	-8.18	61	-3.40	-5.05
2	+3.71	+10.26	22	-10.85	+1.22	42	-4.67	-7.11	62	-5.28	-3.53
3	+5.89	+9.19	23	-10.31	+3.58	43	-6.55	-5.59	63	-6.02	-1.22
4	+7.77	+7.67	24	-9.27	+5.77	44	-7.90	-3.58	64	-6.02	+1.22
5	+9.27	+5.77	25	-7.77	+7.67	45	-8.43	-1.22	65	-5.28	+3.53
6	+10.31	+3.58	26	-5.89	+9.19	46	-8.43	+1.22	66	-3.40	+5.05
7	+10.85	+1.22	27	-3.71	+10.26	47	-7.90	+3.58	67	-1.22	+3.71
8	+10.85	-1.22	28	-1.35	+10.82	48	-6.55	+5.59	68	+1.22	+3.71
9	+10.31	-3.58	29	0	+8.20	49	-4.67	+7.11	69	+3.18	+2.29
10	+9.27	-5.77	30	+2.49	+8.18	50	-2.49	+8.18	70	+3.94	0
11	+7.77	-7.67	31	+4.67	+7.11	51	-1.22	+6.12	71	+3.18	-2.29
12	+5.89	-9.19	32	+6.55	+5.59	52	+1.22	+6.12	72	+1.22	-3.71
13	+3.71	-10.26	33	+7.90	+3.58	53	+3.40	+5.05	73	-1.22	-3.71
14	+1.35	-10.82	34	+8.43	+1.22	54	+5.28	+3.53	74	-3.18	-2.29
15	-1.35	-10.82	35	+8.43	-1.22	55	+6.02	+1.22	75	-3.94	0
16	-3.71	-10.26	36	+7.90	-3.58	56	+6.02	-1.22	76	-3.18	+2.29
17	-5.89	-9.19	37	+6.55	-5.59	57	+5.28	-3.53	77	0	+1.33
18	-7.77	-7.67	38	+4.67	-7.11	58	+3.40	-5.05	78	+1.22	-0.74
19	-9.27	-5.77	39	+2.49	-8.18	59	+1.22	-6.12	79	-1.22	-0.74
20	-10.31	-3.58	40	0	-8.81	60	-1.22	-6.12			

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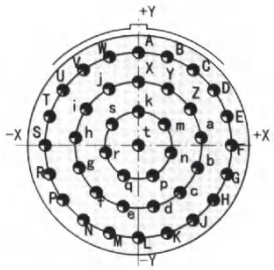
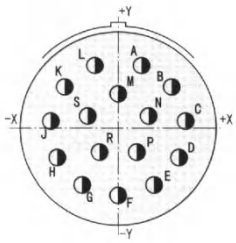
21-41
(41-20#)



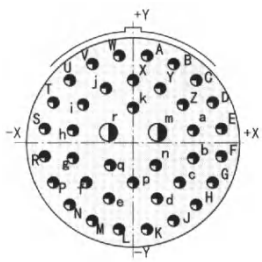
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0	+10.60	R	-10.09	-3.28	f	-4.78	-5.39
B	+3.28	+10.09	S	-10.60	0	g	-6.73	-2.55
C	+6.23	+8.58	T	-10.09	+3.28	h	-7.15	+0.87
D	+8.58	+6.23	U	-8.58	+6.23		-5.92	+4.09
E	+10.09	+3.28	V	-6.23	+8.58	j	-3.35	+6.38
F	+10.60	0	W	-3.28	+10.09	k	0	+3.81
G	+10.09	-3.28	X	0	+7.20	m	+2.98	+2.38
H	+8.58	-6.23	Y	+3.35	+6.38	n	+3.71	-0.85
J	+6.23	-8.58	Z	+5.92	+4.09	p	+1.66	-3.43
K	+3.28	-10.09	a	+7.15	+0.87	q	-1.66	-3.43
L	0	-10.60	b	+6.73	-2.55	r	-3.71	-0.85
M	-3.28	-10.09	C	+4.78	-5.39	S	-2.98	+2.38
N	-6.23	-8.58	d	+1.73	-6.99	t	0	0
P	-8.58	-6.23	e	-1.73	-6.99			

21-16
(16-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+3.00	+8.18	G	-4.62	-7.37	N	+3.91	+1.57
B	+6.88	+5.36	H	-7.82	-3.81	P	+2.39	-3.10
C	+8.66	+0.91	J	-8.66	+0.91	R	-2.39	-3.10
D	+7.82	-3.81	K	-6.88	+5.36	S	-3.91	+1.57
E	+4.62	-7.37	L	-3.00	+8.18			
F	0	-8.71	M	0	+4.45			

21-39
(37-20#,2-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.65	+10.44	P	-9.42	-4.80	d	+2.84	-6.73
B	+4.80	+9.42	R	-10.44	-1.65	e	-2.84	-6.73
C	+7.47	+7.47	S	-10.44	+1.65	f	-5.51	-4.80
D	+9.42	+4.80	T	-9.42	+4.80	g	-7.11	-1.88
E	+10.44	+1.65	U	-7.47	+7.47	h	-7.11	+1.45
F	+10.44	-1.65	V	-4.80	+9.42	i	-5.89	+4.55
G	+9.42	-4.80	W	-1.65	+10.44	j	-3.20	+6.50
H	+7.47	-7.47	X	0	+7.49	k	0	+4.17
J	+4.80	-9.42	Y	+3.20	+6.50	m	+2.90	+1.22
K	+1.65	-10.44	Z	+5.89	+4.55	n	+2.69	-2.72
L	-1.65	-10.44	a	+7.11	+1.45	p	0	-4.80
M	-4.80	-9.42	b	+7.11	-1.88	q	-2.69	-2.72
N	-7.47	-7.47	C	+5.51	-4.80	r	-2.90	+1.22

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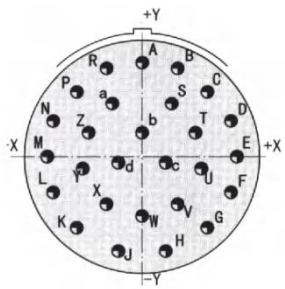
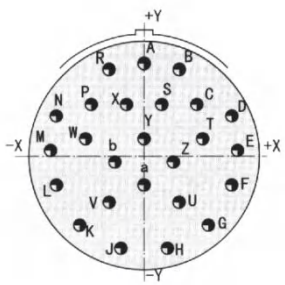
21-27
(27-20#)



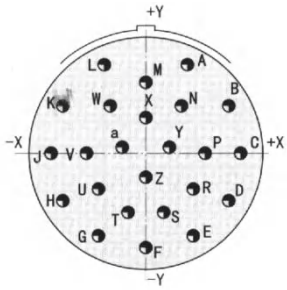
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0	+10.16	K	-6.99	-7.62	V	+3.81	-5.08
B	+3.81	+9.53	L	-9.53	-3.81	W	0	-6.35
C	+6.99	+6.99	M	-10.16	0	X	-3.81	-5.08
D	+9.53	+3.81	N	-9.53	+3.81	Y	-6.35	-1.27
E	+10.16	0	P	-6.99	+6.99	Z	-5.72	+2.54
F	+9.53	-3.81	R	-3.81	+9.53	a	-3.18	+5.72
G	+6.99	-7.62	S	+3.18	+5.72	b	0	+2.54
H	+2.54	-10.16	T	+5.72	+2.54	C	+2.54	-0.64
J	-2.54	-10.16	U	+6.35	-1.27	d	-2.54	-0.64

21-25
(25-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0	+10.16	K	-6.99	-7.62	V	-3.81	-5.08
B	+3.81	+9.53	L	-9.53	-3.18	W	-6.35	+1.91
C	+5.72	+5.72	M	-10.16	+0.64	X	-1.91	+5.72
D	+9.53	+4.45	N	-9.53	+4.45	Y	0	+1.91
E	+10.16	+0.64	P	-5.72	+5.72	Z	+3.18	-0.64
F	+9.53	-3.18	R	-3.81	+9.53	a	0	-3.18
G	+6.99	-7.62	S	+1.91	+5.72	b	-3.18	-0.64
H	+2.54	-10.16	T	+6.35	+1.91			
J	-2.54	-10.16	U	+3.81	-5.08			

21-24
(24-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+4.45	+9.53	J	-10.16	0	T	-1.91	-6.35
B	+8.89	+5.08	K	-8.89	+5.08	U	-5.08	-3.81
C	+10.16	0	L	-4.45	+9.53	V	-6.35	0
D	+8.89	-5.08	M	0	+7.62	W	-3.81	+5.08
E	+5.08	-8.89	N	+3.81	+5.08	X	0	+3.81
F	0	-10.16	P	+6.35	0	Y	+2.54	+0.64
G	-5.08	-8.89	R	+5.08	-3.81	Z	0	-2.54
H	-8.89	-5.08	S	+1.91	-6.35	a	-2.54	+0.64

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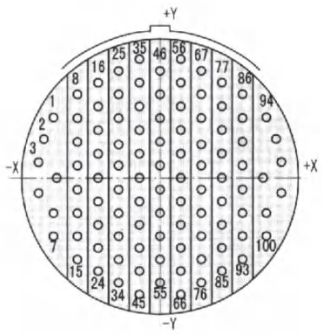
23-35
(100-22D#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
	-10.87	+6.12	35	-2.11	+12.07	69	+4.22	+6.05
2	-11.86	+3.91	36	-2.11	+9.65	70	+4.22	+3.63
3	-12.40	+1.55	37	-2.11	+7.24	71	+4.22	+1.22
4	-10.54	0	38	-2.11	+4.83	72	+4.22	-1.19
5	-12.40	-1.55	39	-2.11	+2.41	73	+4.22	-3.61
6	-10.87	-3.61	40	-2.11	0	74	+4.22	-6.02
7	-10.87	-6.02	41	-2.11	-2.41	75	+4.22	-8.43
8	-8.43	+8.46	42	-2.11	-4.83	76	+4.22	-10.85
9	-8.43	+6.05	43	-2.11	-7.24	77	+6.32	+9.65
10	-8.43	+3.63	44	-2.11	-9.65	78	+6.32	+7.24
11	-8.43	+1.22	45	-2.11	-12.07	79	+6.32	+4.83
12	-8.43	-1.19	46	0	+10.87	80	+6.32	+2.41
13	-8.43	-3.61	47	0	+8.46	81	+6.32	0
14	-8.43	-6.02	48	0	+6.05	82	+6.32	-2.41
15	-8.43	-8.43	49	0	+3.63	83	+6.32	-4.83
16	-6.32	+9.65	50	0	+1.22	84	+6.32	-7.24
17	-6.32	+7.24	51	0	-1.19	85	+6.32	-9.65
18	-6.32	+4.83	52	0	-3.61	86	+8.43	+8.46
19	-6.32	+2.41	53	0	-6.02	87	+8.43	+6.05
20	-6.32	0	54	0	-8.43	88	+8.43	+3.63
21	-6.32	-2.41	55	0	-10.85	89	+8.43	+1.22
22	-6.32	-4.83	56	+2.11	+12.07	90	+8.43	-1.19
23	-6.32	-7.24	57	+2.11	+9.65	91	+8.43	-3.61
24	-6.32	-9.65	58	+2.11	+7.24	92	+8.43	-6.02
25	-4.22	+10.87	59	+2.11	+4.83	93	+8.43	-8.43
26	-4.22	+8.46	60	+2.11	+2.41	94	+10.87	+6.12
27	-4.22	+6.05	61	+2.11	0	95	+11.86	+3.91
28	-4.22	+3.63	62	+2.11	-2.41	96	+12.40	+1.55
29	-4.22	+1.22	63	+2.11	-4.83	97	+10.54	0
30	-4.22	-1.19	64	+2.11	-7.24	98	+12.40	-1.55
31	-4.22	-3.61	65	+2.11	-9.65	99	+10.87	-3.61
32	-4.22	-6.02	66	+2.11	-12.07	100	+10.87	-6.02
33	-4.22	-8.43	67	+4.22	+10.87			
34	-4.22	-10.85	68	+4.22	+8.46			

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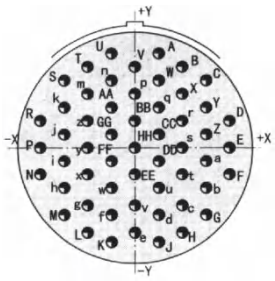
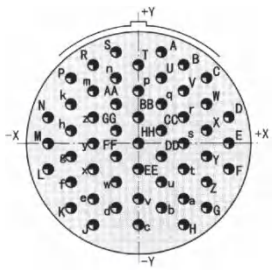
23-55
(55-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+2.84	+11.56	W	+2.84	+8.26	r	+5.72	+3.30
B	+5.72	+9.91	X	+5.72	+6.60	S	+5.72	0
C	+8.53	+8.26	Y	+8.53	+4.95	t	+5.72	-3.30
D	+11.43	+3.30	Z	+8.53	+1.65	u	+2.84	-4.95
E	+11.43	0	a	+8.53	-1.65	V	0	-6.60
F	+11.4a3	-3.30	b	+8.53	-4.95	W	-2.84	-4.95
G	+8.53	-8.26	C	+5.72	-6.60	X	-5.72	-3.30
H	+5.72	-9.91	d	+2.84	-8.26	y	-5.72	0
J	+2.84	-11.56	e	0	-9.91	Z	-5.72	+3.30
K	-2.84	-11.56	f	-2.84	-8.26	AA	-2.84	+4.95
L	-5.72	-9.91	g	-5.72	-6.60	BB	0	+3.30
M	-8.53	-8.26	h	-8.53	-4.95	CC	+2.84	+1.65
N	-11.43	-3.30		-8.53	-1.65	DD	+2.84	-1.65
P	-11.43	0		-8.53	+1.65	EE	0	-3.30
R	-11.43	+3.30	k	-8.53	+4.95	FF	-2.84	-1.65
S	-8.53	+8.26	m	-5.72	+6.60	GG	-2.84	+1.65
T	-5.72	+9.91	n	-2.84	+8.26	HH	0	0
U	-2.84	+11.56	p	0	+6.60			
V	0	+9.91	q	+2.84	+4.95			

23-53
(53-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+2.84	+11.56	V	+5.72	+6.60	r	+5.72	+3.30
B	+5.72	+9.91	W	+8.53	+4.95	S	+5.72	0
C	+8.53	+8.26	X	+8.53	+1.65	t	+5.72	-3.30
D	+11.43	+3.30	Y	+8.53	-1.65	u	+2.84	-4.95
E	+11.43	0	Z	+8.53	-4.95	V	0	-6.60
F	+11.43	-3.30	a	+5.72	-6.60	W	-2.84	-4.95
G	+8.53	-8.26	b	+2.84	-8.26	X	-5.72	-3.30
H	+5.72	-10.41	C	0	-9.91	y	-5.72	0
J	-5.72	-10.41	d	-2.84	-8.26	Z	-5.72	+3.30
K	-8.53	-8.26	e	-5.72	-6.60	AA	-2.84	+4.95
L	-11.43	-3.30	f	-8.53	-4.95	BB	0	+3.30
M	-11.43	0	g	-8.53	-1.65	CC	+2.84	+1.65
N	-11.43	+3.30	h	-8.53	+1.65	DD	+2.84	-1.65
P	-8.53	+8.26	k	-8.53	+4.95	EE	0	-3.30
R	-5.72	+9.91	m	-5.72	+6.60	FF	-2.84	-1.65
S	-2.84	+11.56	n	-2.84	+8.26	GG	-2.84	+1.65
T	0	+9.91	p	0	+6.60	HH	0	0
U	+2.84	+8.26	q	+2.84	+4.95			

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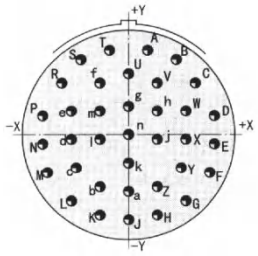
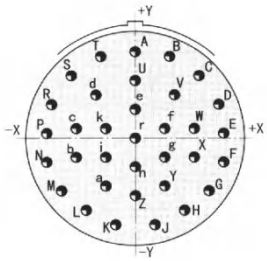
23-36
(36-20#)



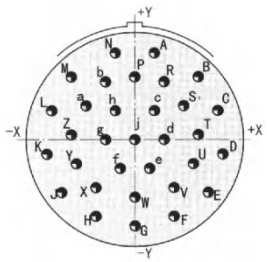
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+2.54	+11.43	N	-11.43	-1.27	b	-3.81	-6.99
B	+6.35	+10.16	P	-11.43	+2.54	C	-6.99	-4.45
C	+8.89	+6.99	R	-8.89	+6.69	d	-7.62	-0.64
D	+11.43	+2.54	S	-6.35	+10.16	e	-7.62	+3.18
E	+11.43	-1.27	T	-2.54	+11.43	f	-3.81	+6.99
F	+10.80	-5.08	U	0	+8.26	g	0	+3.81
G	+7.62	-8.89	V	+3.81	+6.99	h	+3.81	+3.18
H	+3.81	-10.80	W	+7.62	+3.18	j	+3.81	-0.64
J	0	-11.43	X	+7.62	-0.64	k	0	-3.81
K	-3.81	-10.80	Y	+6.99	-4.45	l	-3.81	-0.64
L	-7.62	-8.89	Z	+3.81	-6.99	m	-3.81	+3.18
M	-10.80	-5.08	a	0	-7.62	n	0	0

23-34
(34-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0	+11.43	N	-11.43	-3.18	b	-7.62	-2.54
B	+4.45	+10.80	P	-11.43	+0.64	C	-7.62	+1.27
C	+8.26	+8.26	R	-10.80	+4.45	d	-5.08	+5.72
D	+10.80	+4.45	S	-8.26	+8.26	e	0	+3.81
E	+11.43	+0.64	T	-4.45	+10.80	f	+3.81	+1.27
F	+11.43	-3.18	U	0	+7.62	g	+3.81	-2.54
G	+9.53	-6.99	V	+5.08	+5.72	h	0	-3.81
H	+6.35	-9.53	W	+7.62	+1.27	j	-3.81	-2.54
J	+2.54	-11.43	X	+7.62	-2.54	k	-3.81	+1.27
K	-2.54	-11.43	Y	+3.81	-6.35	r	0	0
L	-6.35	-9.53	Z	0	-7.62			
M	-9.53	-6.99	a	-3.81	-6.35			

23-32
(32-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+2.54	+11.43	M	-8.26	+8.26	Z	-8.26	+0.64
B	+8.26	+8.26	N	-2.54	+11.43	a	-6.35	+4.45
C	+10.8	+3.81	P	0	+8.26	b	-3.81	+7.62
D	+11.43	-1.91	R	+3.81	+7.62	C	+2.54	+3.81
E	+9.53	-6.99	S	+6.35	+4.45	d	+3.81	0
F	+5.08	-10.16	T	+8.26	+0.64	e	+1.91	-3.81
G	0	-11.43	U	+7.62	-3.18	f	-1.91	-3.81
H	-5.08	-10.16	V	+5.08	-6.35	g	-3.81	0
J	-9.53	-6.99	W	0	-7.62	h	-2.54	+3.81
K	-11.43	-1.91	X	-5.08	-6.35	j	0	0
L	-10.8	+3.81	Y	-7.62	-3.18			

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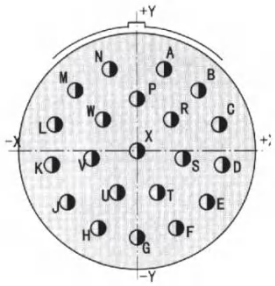
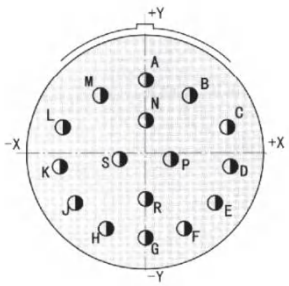
23-21
(21-16#)



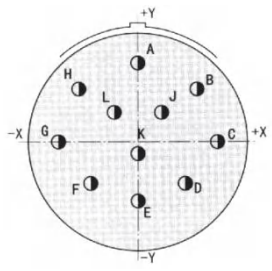
Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+3.25	+9.78	H	-4.65	-9.19	R	+4.06	+3.71
B	+7.34	+7.24	J	-8.33	-6.07	S	+5.44	-0.89
C	+9.80	+3.12	K	-10.16	-1.65	T	+2.39	-4.93
D	+10.16	-1.65	L	-9.80	+3.12	U	-2.39	-4.93
E	+8.33	-6.07	M	-7.34	+7.24	V	-5.44	-0.89
F	+4.65	-9.19	N	-3.25	+9.78	W	-4.06	+3.71
G	0	-10.31	P	0	+6.22	X	0	0

23-97
(16-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0	+8.74	G	0	-10.31	N	0	+3.96
B	+5.33	+6.86	H	-4.65	-9.19	P	+3.05	-0.76
C	+9.80	+3.12	J	-8.33	-6.07	R	0	-5.54
D	+10.16	-1.65	K	-10.16	-1.65	S	-3.05	-0.76
E	+8.33	-6.07	L	-9.80	+3.12			
F	+4.65	-9.19	M	-5.33	+6.86			

23-99
(11-16#)



Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y
A	0	+10.26	G	-10.26	0
B	+7.62	+6.86	H	-7.62	+6.86
C	+10.26	0	J	+3.05	+3.81
D	+6.10	-5.33	K	0	-1.52
E	0	-7.62	L	-3.05	+3.81
F	-6.10	-5.33			

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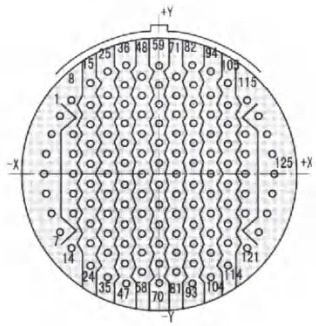
25-35
(128-22D#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y		X	Y
	-12.17	+7.09	33	-6.32	-7.24	65	0	-1.19	97	+6.32	+4.83
2	-13.21	+4.83	34	-6.32	-9.65	66	0	-3.61	98	+6.32	+2.41
3	-13.87	+2.41	35	-6.32	-12.07	67	0	-6.02	99	+6.32	0
4	-14.10	0	36	-4.06	+13.49	68	0	-8.43	100	+6.32	-2.41
5	-13.87	-2.41	37	-4.22	+10.85	69	0	-10.85	101	+6.32	-4.83
6	-13.21	-4.83	38	-4.22	+8.43	70	0	-14.10	102	+6.32	-7.24
7	-12.17	-7.09	39	-4.22	+6.02	71	+2.11	+12.07	103	+6.32	-9.65
8	-10.77	+9.07	40	-4.22	+3.61	72	+2.11	+9.65	104	+6.32	-12.07
9	-10.54	+4.83	41	-4.22	+1.19	73	+2.11	+7.24	105	+8.43	+11.28
10	-10.54	+2.41	42	-4.22	-1.19	74	+2.11	+4.83	106	+8.43	+8.43
11	-10.54	0	43	-4.22	-3.61	75	+2.11	+2.41	107	+8.43	+6.02
12	-10.54	-2.41	44	-4.22	-6.02	76	+2.11	0	108	+8.43	+3.61
13	-10.54	-4.83	45	-4.22	-8.43	77	+2.11	-2.41	109	+8.43	+1.19
14	-10.77	-9.07	46	-4.22	-10.85	78	+2.11	-4.83	110	+8.43	-1.19
15	-8.43	+11.28	47	-4.22	-13.26	79	+2.11	-7.24	111	+8.43	-3.61
16	-8.43	+8.43	48	-2.11	+12.07	80	+2.11	-9.65	112	+8.43	-6.02
17	-8.43	+6.02	49	-2.11	+9.65	81	+2.11	-12.07	113	+8.43	-8.43
18	-8.43	+3.61	50	-2.11	+7.24	82	+4.06	+13.49	114	+8.43	-10.85
19	-8.43	+1.19	51	-2.11	+4.83	83	+4.22	+10.85	115	+10.77	+9.07
20	-8.43	-1.19	52	-2.11	+2.41	84	+4.22	+8.43	116	+10.54	+4.83
21	-8.43	-3.61	53	-2.11	0	85	+4.22	+6.02	117	+10.54	+2.41
22	-8.43	-6.02	54	-2.11	-2.41	86	+4.22	+3.61	118	+10.54	0
23	-8.43	-8.43	55	-2.11	-4.83	87	+4.22	+1.19	119	+10.54	-2.41
24	-8.43	-10.85	56	-2.11	-7.24	88	+4.22	-1.19	120	+10.54	-4.83
25	-6.32	+12.60	57	-2.11	-9.65	89	+4.22	-3.61	121	+10.77	-9.07
26	-6.32	+9.65	58	-2.11	-12.07	90	+4.22	-6.02	122	+12.17	+7.09
27	-6.32	+7.24	59	0	+13.26	91	+4.22	-8.43	123	+13.21	+4.83
28	-6.32	+4.83	60	0	+10.85	92	+4.22	-10.85	124	+13.87	+2.41
29	-6.32	+2.41	61	0	+8.43	93	+4.22	-13.26	125	+14.10	0
30	-6.32	0	62	0	+6.02	94	+6.32	+12.60	126	+13.87	-2.41
31	-6.32	-2.41	63	0	+3.61	95	+6.32	+9.65	127	+13.21	-4.83
32	-6.32	-4.83	64	0	+1.19	96	+6.32	+7.24	128	+12.17	-7.09

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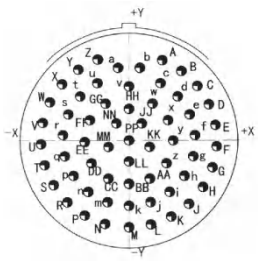
25-61
(61-20#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
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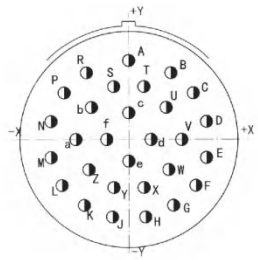
A	+4.98	+12.70	Y	-7.98	+11.05	V	0	+8.59
B	+7.98	+11.05	Z	-4.98	+12.70	W	+3.73	+5.66
C	+10.49	+8.71	a	-1.73	+11.53	X	+6.02	+3.10
D	+12.32	+5.84	b	+1.73	+11.53	y	+6.78	-0.25
E	+13.39	+2.57	C	+4.39	+9.22	Z	+5.79	-3.53
F	+13.61	-0.76	d	+7.24	+7.19	AA	+3.33	-5.92
G	+12.98	-4.17	e	+9.19	+4.45	BB	0	-6.78
H	+11.53	-7.29	f	+10.13	+1.17	CC	-3.33	-5.92
J	+9.35	-9.93	g	+9.96	-2.24	DD	-5.79	-3.53
K	+6.58	-11.94	h	+8.66	-5.41	EE	-6.78	-0.25
L	+3.40	-13.18		+6.38	-7.98	FF	-6.02	+3.10
M	0	-13.64		+3.38	-9.63	GG	-3.73	+5.66
N	-3.40	-13.18	k	0	-10.21	HH	0	+5.08
P	-6.58	-11.94	m	-3.38	-9.63	JJ	+2.67	+2.39
R	-9.35	-9.93	n	-6.38	-7.98	KK	+3.43	-1.04
S	-11.53	-7.29	p	-8.66	-5.41	LL	0	-3.35
T	-12.98	-4.17	q	-9.96	-2.24	MM	-3.43	-1.04
U	-13.61	-0.76	r	-10.13	+1.17	NN	-2.67	+2.39
V	-13.39	+2.57	S	-9.19	+4.45	PP	0	0
W	-12.32	+5.84	t	-7.24	+7.19			
X	-10.49	+8.71	u	-4.39	+9.22			

25-29
(29-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	0	+12.22	L	-10.03	-7.04	X	+2.31	-7.37
B	+6.55	+10.31	M	-11.91	-2.77	Y	-2.31	-7.37
C	+10.03	+7.04	N	-11.91	+2.77	Z	-6.10	-4.60
D	+11.91	+2.77	P	-10.03	+7.04	a	-8.10	0
E	+11.91	-2.77	R	-6.55	+10.31	b	-5.79	+4.93
F	+10.03	-7.04	S	-2.31	+8.15	C	0	+4.09
G	+6.68	-10.31	T	+2.31	+8.15	d	+3.40	0
H	+2.31	-11.99	U	+5.79	+4.93	e	0	-3.30
J	-2.31	-11.99	V	+8.10	0	f	-3.40	0
K	-6.68	-10.31	W	+6.10	-4.60			

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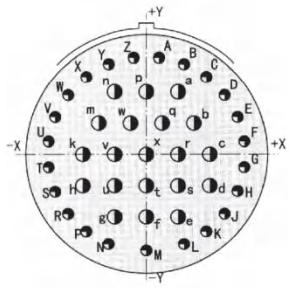
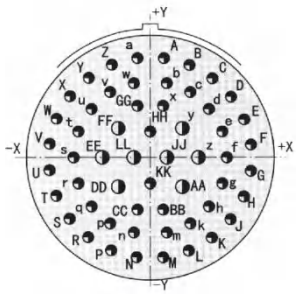
25-43
(23-20#,20-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.75	+13.49	S	-12.52	-5.21	h	-8.74	-4.37
B	+5.16	+12.57	T	-13.49	-1.75	k	-8.74	0
C	+8.23	+10.80	U	-13.49	+1.75	m	-6.55	+4.37
D	+10.77	+8.28	V	-12.52	+5.21	n	-4.37	+8.74
E	+12.52	+5.21	W	-10.77	+8.28	p	0	+8.74
F	+13.49	+1.75	X	-8.23	+10.80	q	+2.18	+4.37
G	+13.49	-1.75	Y	-5.16	+12.57	r	+4.37	0
H	+12.52	-5.21	Z	-1.75	+13.49	S	+4.37	-4.37
J	+10.77	-8.28	a	+4.37	+8.74	t	0	-4.37
K	+8.23	-10.80	b	+6.55	+4.37	u	-4.37	-4.37
L	+5.16	-12.57	C	+8.74	0	V	-4.37	0
M	0	-13.49	d	+8.74	-4.37	W	-2.18	+4.37
N	-5.16	-12.57	e	+4.37	-8.74	X	0	0
P	-8.23	-10.80	f	0	-8.74			
R	-10.77	-8.28	g	-4.37	-8.74			

25-04
(48-20#,8-16#)



Hole Code	Coordinates		Hole Code	Coordinates		Hole Code	Coordinates	
	X	Y		X	Y		X	Y
A	+1.75	+13.49	W	-12.52	+5.21	t	-9.58	+3.35
B	+5.16	+12.57	X	-10.77	+8.28	u	-7.90	+6.38
C	+8.23	+10.80	Y	-8.23	+10.80	V	-5.38	+8.74
D	+10.77	+8.28	Z	-5.16	+12.57	W	-2.18	+10.08
E	+12.52	+5.21	a	-1.75	+13.49	X	+1.75	+6.68
F	+13.49	+1.75	b	+2.18	+10.08	y	+4.37	+3.78
G	+13.49	-1.75	C	+5.38	+8.74	Z	+6.55	0
H	+12.52	-5.21	d	+7.90	+6.38	AA	+4.37	-3.78
J	+10.77	-8.28	e	+9.58	+3.35	BB	+1.75	-6.68
K	+8.23	-10.80	f	+10.46	0	CC	-1.75	-6.68
L	+5.16	-12.57	g	+9.58	-3.35	DD	-4.37	-3.78
M	+1.75	-13.49	h	+7.90	-6.38	EE	-6.55	0
N	-1.75	-13.49	k	+5.38	-8.74	FF	-4.37	+3.78
P	-5.16	-12.57	m	+2.18	-10.08	GG	-1.75	+6.68
R	-8.23	-10.80	n	-2.18	-10.08	HH	0	+3.35
S	-10.77	-8.28	p	-5.38	-8.74	JJ	+2.18	0
T	-12.52	-5.21	q	-7.90	-6.38	KK	0	-3.35
U	-13.49	-1.75	r	-9.58	-3.35	LL	-2.18	0
V	-13.49	+1.75	S	-10.46	0			

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Together, We Thrive

Our team of passionate experts brings a wealth of experience to the table, ready to collaborate with you and unlock your full potential. By joining forces, we can create innovative solutions and achieve remarkable things.

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