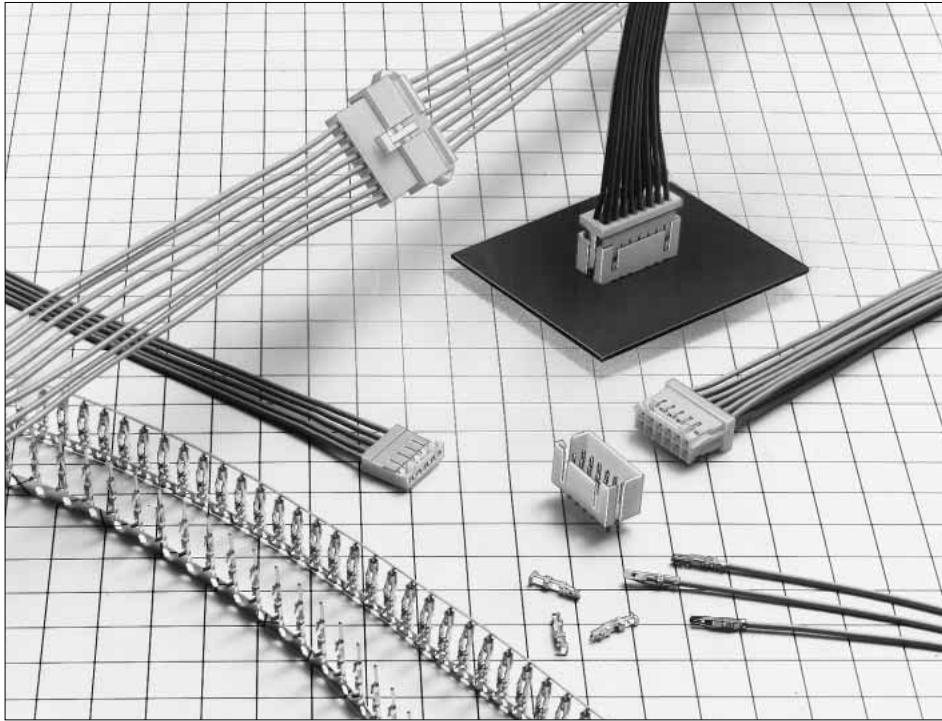


DF1B Series



■ Features

1. New Insulation Displacement and Crimping Ideas

This connector is a new type to insert the ID contacts in the case. Using this method, the following merits can be gained.

- ① By using the ID contact and crimping contact together, different current capacity cables can be mixed in one case.
- ② After connection, the contact can be replaced in excellent maintainability.
- ③ Because the insulation displacement area is protected by the case, high reliability can be assured.
- ④ Since the insulation displacement process can be performed only by replacing the applicator of the existing crimping machine, no expensive machine for insulation displacement is required.

2. Potting Header Available

The high profile header is also available, corresponding to the board potting process (sealed with resin) as waterproof measures.

3. Broad Variations

The single row and double row contacts are aligned for "Board to Cable" and "In-line" series, respectively, while standard tin and gold plating products are available.

(Refer to the applicable combination pattern on next page.)

■ Applications

Business equipment, particularly including the copy machine and printer

Cables with different current capacities can be mixed in one case

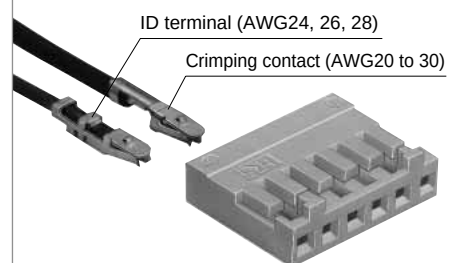


Figure 1

Potting status

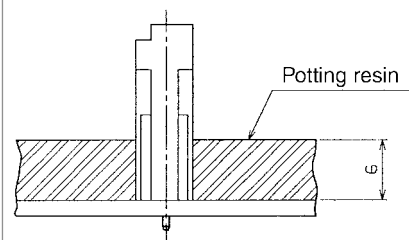
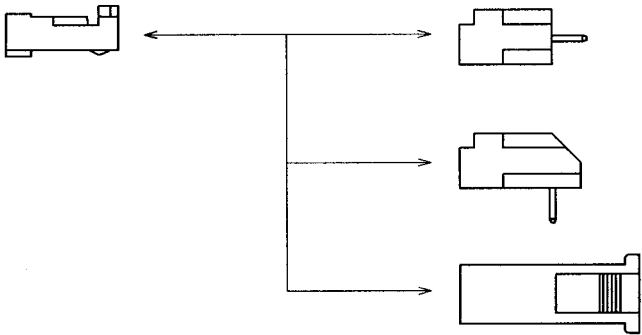


Figure 2

◆Applicable Combination

● Single Row Type

Socket (Cable Side)
DF1B-*S-2.5R



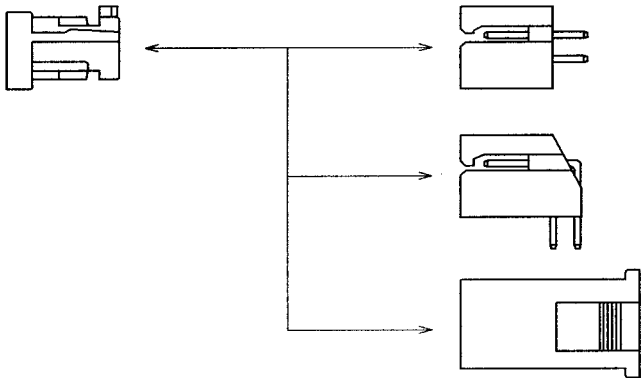
Straight Through hole Type
Pin header
DF1B(Z)-*P-2.5DSA

Right angle Through hole Type
Pin header
DF1B(Z)-*P-2.5DS

Panel Mount Type
In-line plug (Cable side)
DF1BA-*EP-2.5RC

● Double Row Type

Socket (Cable Side)
DF1B-*DS-2.5RC



Straight Through hole Type
Pin header
DF1B(Z)-*DP-2.5DSA

Right angle Through hole Type
Pin header
DF1B(Z)-*DP-2.5DS

Panel Mount Type
In-line plug (Cable side)
DF1BA-*DEP-2.5RC

In-line Connection Product (Cable to Cable Connection) : Full Lock Type

● Single Row Type

Socket (Cable Side)
DF1B-*ES-2.5RC



In-line plug (Cable side)
DF1B-*EP-2.5RC

● Double Row Type

Socket (Cable Side)
DF1B-*DES-2.5RC



In-line plug (Cable side)
DF1B-*DEP-2.5RC

Product Specifications

Rating	Current rating (Note1)	Cable Size	AWG 20 to 24 : 3A AWG 26 : 2A AWG 28 : 1A AWG 30 : 0.5A	Operating Temperature Range	-35 to +85°C (Note2)
	Voltage rating		250V AC	Operating Moisture Range	40 to 80%
				Storage Temperature Range	-10 to +60°C (Note3)
				Storage Moisture Range	40 to 70% (Note3)

UL-CSA Safety Standard Standardized Value			
Rating	Current rating (Note1)	Cable Size	AWG 20 to 22: 3A AWG 24 to 28: 1A AWG 30 : 0.5A
	Voltage rating		30V AC

UL CSA Safety File No.

UL : E52653

CSA : LR95109

Item	Specification	Condition
1. Insulation Resistance	1000M ohms Min	500V DC
2. Withstanding voltage	No flashover or insulation breakdown.	650V AC/1 minute
3. Contact Resistance	30m ohms Max	100mA
4. Insertor/Extraction Force	MIN0.44N (45gf), MAX4.4N(450gf)	Measure at the square steel pin of 0.635±0.002mm
5. Vibration	No electrical discontinuity of 1μs or more	Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 2 hours in each of the 3 directions.
6. Humidity (Steady state)	Contact resistance: 30m ohms max. Insulation resistance: 1000M ohms min.	96 hours at temperature of 40±2°C and humidity of 90% to 95%
7. Temperature Cycle	Contact resistance: 30m ohms max. Insulation resistance: 1000M ohms min.	(-55°C: 30 minutes → 5 to 35°C: 10 minutes 85°C: 30 minutes → 5 to 35°C: 10 minutes) 5 cycles
8. Operating Life	Contact resistance: 30m ohms max.	Tin plating : 30 cycles Gold plating : 50 cycles
9. Resistance to Soldering heat	No deformation of components affecting performance.	Flow: 250°C for 10 seconds Manual soldering: 300°C for 3 seconds

Note 1: Current rating of header is 3A.

Note 2: Includes temperature rise caused by current flow.

Note 3: The term "storage" refers to products stored for long period of time prior to mounting and use. Operating Temperature Range and Humidity range covers non conducting condition of installed connectors in storage, shipment or during transportation.

Note 4: Information contained in this catalog represents general requirements for this Series. Contact us for the drawings and specifications for a specific part number shown.

Material

Product	Part	Material	Finish	Remarks
Socket	Insulator	Polyamide	White	UL94V-0
ID Contact for Socket	Contact	Phosphor copper	Tin plated or gold plated	———
Crimping Contact for Socket	Contact	Phosphor copper	Tin plated or gold plated	———
Pin Header	Insulator	Polyamide	White	UL94V-0
	Contact	Brass	Tin plated or gold plated	———
In-line Plug	Insulator	Polyamide	White	UL94V-0
ID Contact for In-line Plug	Contact	Phosphor copper	Tin plated or gold plated	———
Crimping Contact for In-line Plug	Contact	Phosphor copper	Tin plated or gold plated	———

■Ordering Information

●Connector

DF1B - ***** **S** **2.5** **RC**

① ② ③ ④ ⑤

① Series Name : DF 1B	③ Connector Type	④ Contact Pitch: 2.5mm
② Number of Contacts	S : Single row socket	⑤ Contact Type
Single Row : 2 to 16, 18, 20	DS : Double row socket	RC : ID/crimping socket (Note)
Double Row : 4 to 30, 34, 40	P : Single row pin header	DSA : Straight through hole
	DP : Double row pin header	DS : Right angle through hole
	ES : Single row in-line socket	Note: The single row socket DF1B-*S-2.5R
	DES : Double row in-line socket	only adds "R" to the tail, which has
	EP : Single row in-line plug	the same meaning as "RC".
	DEP : Double row in-line plug	

●Socket ID Contact

DF1B - **R** **24** **F** **A**

① ② ③ ④

① 1. Connection Type	③ Packaging Type
R : ID	Blank : Bag
② Applicable Cable Size	F : Reel
24 : AWG24	④ Plating Type
26 : AWG26	Blank : Tin plated
28 : AWG28	A : Gold plated

●Plug ID Contact

DF1B - **24** **P** **R** **F**

① ② ③ ④

① Applicable Cable Size	③ Connection Type
24 : AWG24	R : ID
26 : AWG26	④ Packaging Type
28 : AWG28	Blank : Bag
② Connector Type	F : Reel
P : Plug	

●Crimping Contact

DF1B - **2428** **SCF** **A**

① ② ③

① Applicable Cable Size	③ Plating Type
2022 : AWG20 to 22	Blank : Tin plating
2428 : AWG24 to 28	A : Gold plated
28 : AWG30	B : Gold plated (Note)
② Packaging Type	Note: In case of the socket contact,
SCF : Socket Contact/Reel	"A" is attached to the tail of
SC : Socket Contact/Bag	the product name. In case of
PCF : Plug Contact/Reel	the plug contact, "B" is
PC : Plug Contact/Bag	attached thereto.

Single Row Socket

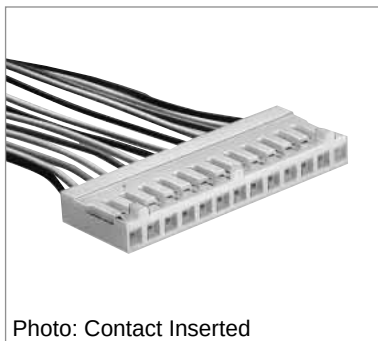
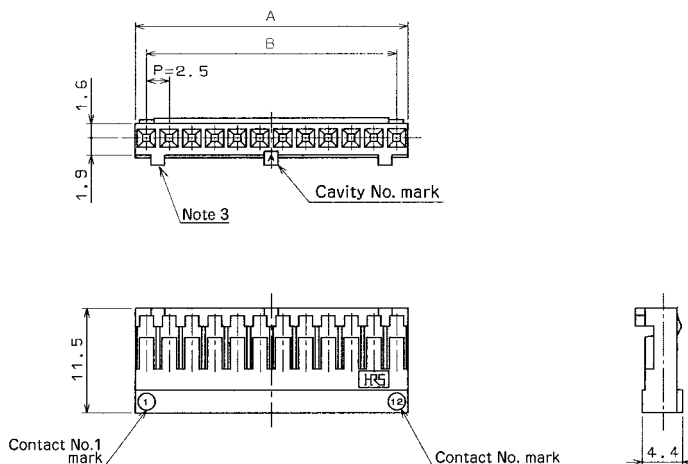


Photo: Contact Inserted



Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1B- 2S-2.5R	541-0200-6	2	5	2.5	Yes	DF1B-11S-2.5R	541-0209-0	11	27.5	25	Yes
DF1B- 3S-2.5R	541-0201-9	3	7.5	5		DF1B-12S-2.5R	541-0210-0	12	30	27.5	
DF1B- 4S-2.5R	541-0202-1	4	10	7.5		DF1B-13S-2.5R	541-0211-2	13	32.5	30	
DF1B- 5S-2.5R	541-0203-4	5	12.5	10		DF1B-14S-2.5R	541-0212-5	14	35	32.5	
DF1B- 6S-2.5R	541-0204-7	6	15	12.5		DF1B-15S-2.5R	541-0213-8	15	37.5	35	
DF1B- 7S-2.5R	541-0205-0	7	17.5	15		DF1B-16S-2.5R	541-0214-0	16	40	37.5	
DF1B- 8S-2.5R	541-0206-2	8	20	17.5		DF1B-18S-2.5R	541-0215-3	18	45	42.5	
DF1B- 9S-2.5R	541-0207-5	9	22.5	20		DF1B-20S-2.5R	541-0216-6	20	50	47.5	
DF1B-10S-2.5R	541-0208-8	10	25	22.5							

Note1: The quantity at the specific No."None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Note2: The 2 contact connector contains the convex portion to prevent mis-insertion in the center at one point, which is different from the above figure. The 3 to 7 contacts connectors have the area at both ends.

Double Row Socket

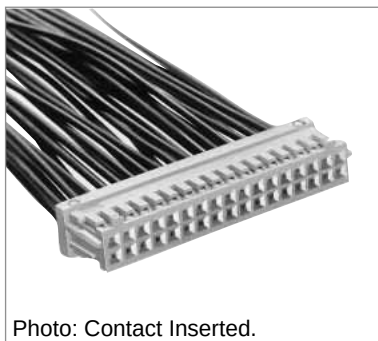
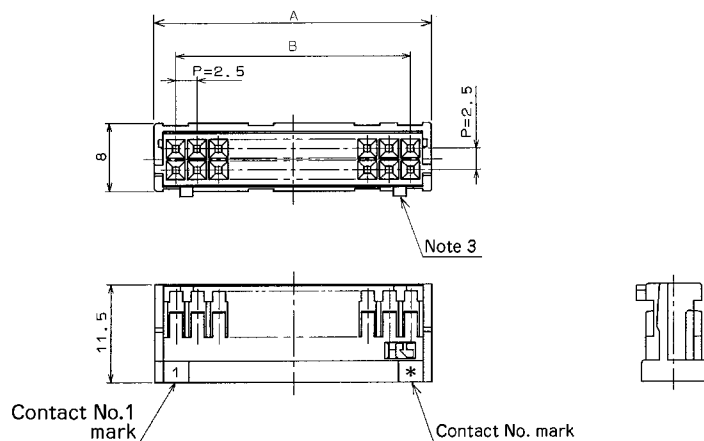


Photo: Contact Inserted.



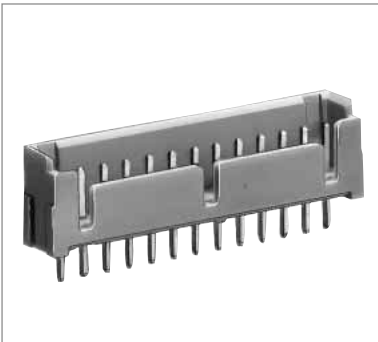
Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1B- 4DS-2.5RC	541-0648-0	4	7.5	2.5	Yes	DF1B-22DS-2.5RC	541-0606-0	22	30	25	Yes
DF1B- 6DS-2.5RC	541-0649-3	6	10	5		DF1B-24DS-2.5RC	541-0607-3	24	32.5	27.5	
DF1B- 8DS-2.5RC	541-0650-2	8	12.5	7.5		DF1B-26DS-2.5RC	541-0608-6	26	35	30	
DF1B-10DS-2.5RC	541-0600-4	10	15	10		DF1B-28DS-2.5RC	541-0609-9	28	37.5	32.5	
DF1B-12DS-2.5RC	541-0601-7	12	17.5	12.5		DF1B-30DS-2.5RC	541-0610-8	30	40	35	
DF1B-14DS-2.5RC	541-0602-0	14	20	15		DF1B-34DS-2.5RC	541-0612-3	34	45	40	
DF1B-16DS-2.5RC	541-0603-2	16	22.5	17.5		DF1B-36DS-2.5RC	541-0613-6	36	47.5	42.5	
DF1B-18DS-2.5RC	541-0604-5	18	25	20		DF1B-40DS-2.5RC	541-0615-1	40	52.5	47.5	
DF1B-20DS-2.5RC	541-0605-8	20	27.5	22.5							

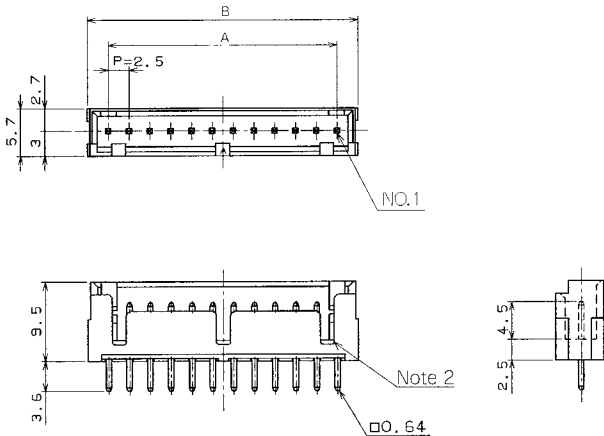
Note1: The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.) If needed, please order the product per bag.

Note2: The 4 contact connector contains the convex portion to prevent miss-insertion in the center at one point, which is different from the above figure.

Single Row Straight Pin Header



●Board Through-hole Diameter:φ1.1^{+0.1}₀



Unit: mm

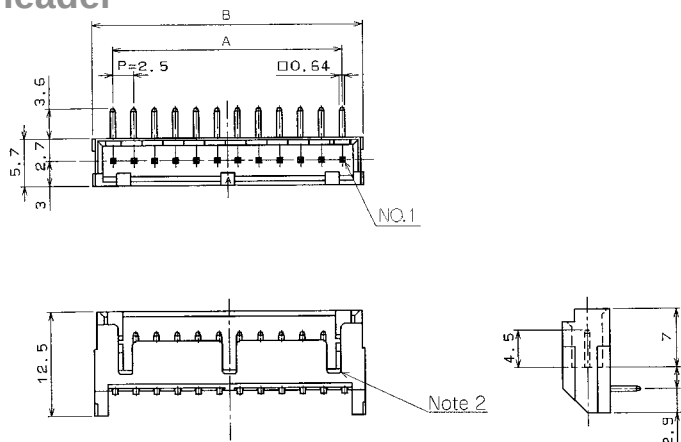
Tin plated		Gold plated					
Part Number	CL No.	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1BZ- 2P-2.5DSA	541-2000-8	DF1B- 2P-2.5DSA(01)	541-0225-7-01	2	2.5	7.5	YES
DF1BZ- 3P-2.5DSA	541-2001-0	DF1B- 3P-2.5DSA(01)	541-0226-0-01	3	5.0	10.0	
DF1BZ- 4P-2.5DSA	541-2002-3	DF1B- 4P-2.5DSA(01)	541-0227-2-01	4	7.5	12.5	
DF1BZ- 5P-2.5DSA	541-2003-6	DF1B- 5P-2.5DSA(01)	541-0228-5-01	5	10.0	15.0	
DF1BZ- 6P-2.5DSA	541-2004-9	DF1B- 6P-2.5DSA(01)	541-0229-8-01	6	12.5	17.5	
DF1BZ- 7P-2.5DSA	541-2005-1	DF1B- 7P-2.5DSA(01)	541-0230-7-01	7	15.0	20.0	
DF1BZ- 8P-2.5DSA	541-2006-4	DF1B- 8P-2.5DSA(01)	541-0231-0-01	8	17.5	22.5	
DF1BZ- 9P-2.5DSA	541-2007-7	DF1B- 9P-2.5DSA(01)	541-0232-2-01	9	20.0	25.0	
DF1BZ-10P-2.5DSA	541-2008-0	DF1B-10P-2.5DSA(01)	541-0233-5-01	10	22.5	27.5	
DF1BZ-11P-2.5DSA	541-2009-2	—————	—————	—————	—	—	
DF1BZ-12P-2.5DSA	541-2010-1	DF1B-12P-2.5DSA(01)	541-0235-0-01	12	27.5	32.5	
DF1BZ-13P-2.5DSA	541-2011-4	—————	—————	—————	—	—	
DF1BZ-14P-2.5DSA	541-2012-7	DF1B-14P-2.5DSA(01)	541-0237-6-01	14	32.5	37.5	
DF1BZ-15P-2.5DSA	541-2013-0	DF1B-15P-2.5DSA(01)	541-0238-9-01	15	35.0	40.0	
DF1BZ-16P-2.5DSA	541-2014-2	DF1B-16P-2.5DSA(01)	541-0239-1-01	16	37.5	42.5	
DF1BZ-18P-2.5DSA	541-2015-5	DF1B-18P-2.5DSA(01)	541-0240-0-01	18	42.5	47.5	
DF1BZ-20P-2.5DSA	541-2016-8	DF1B-20P-2.5DSA(01)	541-0241-3-01	20	47.5	52.5	

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.) If needed, please order the product per bag.
Note 2.The 2 and 3 contact connector contains the concave portion to prevent miss-insertion in the center at one point, which is different from the above figure.In addition, the 4 to 7 contact connectors have two concave portions at both ends.

Single Row Right Angle Pin Header



● Board Through-hole Diameter: $\phi 1.1^{+0.1}_0$



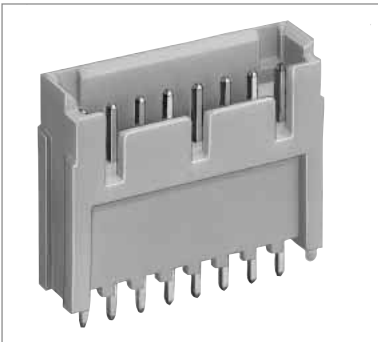
Unit: mm

Tin plated		Gold plated					
Part Number	CL No.	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1BZ- 2P-2.5DS	CL541-2034-0	DF1B- 2P-2.5DS(01)	541-0225-7-01	2	2.5	7.5	YES
DF1BZ- 3P-2.5DS	CL541-2035-2	DF1B- 3P-2.5DS(01)	541-0226-0-01	3	5.0	10.0	
DF1BZ- 4P-2.5DS	CL541-2036-5	DF1B- 4P-2.5DS(01)	541-0227-2-01	4	7.5	12.5	
DF1BZ- 5P-2.5DS	CL541-2037-8	DF1B- 5P-2.5DS(01)	541-0228-5-01	5	10.0	15.0	
DF1BZ- 6P-2.5DS	CL541-2038-0	DF1B- 6P-2.5DS(01)	541-0229-8-01	6	12.5	17.5	
DF1BZ- 7P-2.5DS	CL541-2039-3	DF1B- 7P-2.5DS(01)	541-0230-7-01	7	15.0	20.0	
DF1BZ- 8P-2.5DS	CL541-2040-2	DF1B- 8P-2.5DS(01)	541-0231-0-01	8	17.5	22.5	
DF1BZ- 9P-2.5DS	CL541-2041-5	DF1B- 9P-2.5DS(01)	541-0232-2-01	9	20.0	25.0	
DF1BZ-10P-2.5DS	CL541-2042-8	DF1B-10P-2.5DS(01)	541-0233-5-01	10	22.5	27.5	
DF1BZ-11P-2.5DS	CL541-2043-0	—	—	—	—	—	
DF1BZ-12P-2.5DS	CL541-2044-3	DF1B-12P-2.5DS(01)	541-0235-0-01	12	27.5	32.5	
DF1BZ-13P-2.5DS	CL541-2045-6	—	—	—	—	—	
DF1BZ-14P-2.5DS	CL541-2046-9	DF1B-14P-2.5DS(01)	541-0237-6-01	14	32.5	37.5	
DF1BZ-15P-2.5DS	CL541-2047-1	DF1B-15P-2.5DS(01)	541-0238-9-01	15	35.0	40.0	
DF1BZ-16P-2.5DS	CL541-2048-4	DF1B-16P-2.5DS(01)	541-0239-1-01	16	37.5	42.5	
DF1BZ-18P-2.5DS	CL541-2049-7	DF1B-18P-2.5DS(01)	541-0240-0-01	18	42.5	47.5	
DF1BZ-20P-2.5DS	CL541-2050-6	DF1B-20P-2.5DS(01)	541-0241-3-01	20	47.5	52.5	

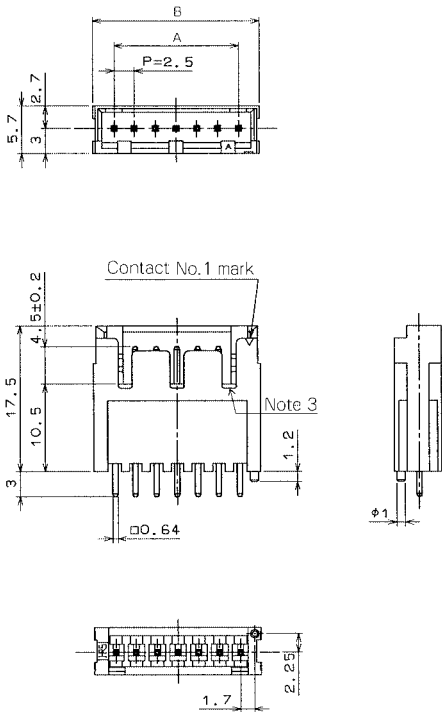
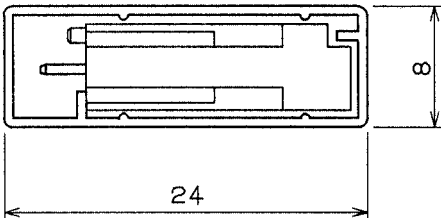
Note 1. The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Note 2. The 4 and 6 contact connector contains the concave portion to prevent miss-insertion in the center at one point, which is different from the above figure.

Single Row Straight Pin Header for Potting



Tube Size



Unit: mm

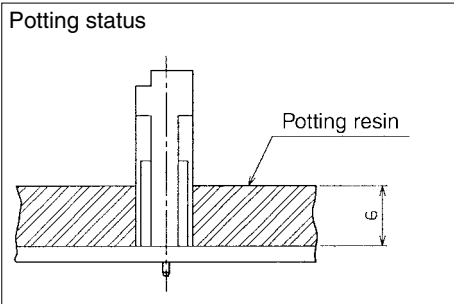
Part Number	CL No.	Number of Contacts	A	B	Tube Package Quantity	RoHS
DF1BD- 2P-2.5DSA(**)	541-0800-3-***	2	2.5	7.5	64pieces	Yes
DF1BD- 3P-2.5DSA(**)	541-0801-6-***	3	5	10	48	
DF1BD- 4P-2.5DSA(**)	541-0802-9-***	4	7.5	12.5	38	
DF1BD- 5P-2.5DSA(**)	541-0803-1-***	5	10	15	32	
DF1BD- 6P-2.5DSA(**)	541-0804-4-***	6	12.5	17.5	27	
DF1BD- 7P-2.5DSA(**)	541-0805-7-***	7	15	20	24	
DF1BD- 8P-2.5DSA(**)	541-0806-0-***	8	17.5	22.5	21	
DF1BD- 9P-2.5DSA(**)	541-0807-2-***	9	20	25	19	
DF1BD-10P-2.5DSA(**)	541-0808-5-***	10	22.5	27.5	17	

- Board Positioning Boss Hole Diameter:φ1.1^{+0.1}₋₀
- Board Through-hole Diameter:φ1.1^{+0.1}₋₀

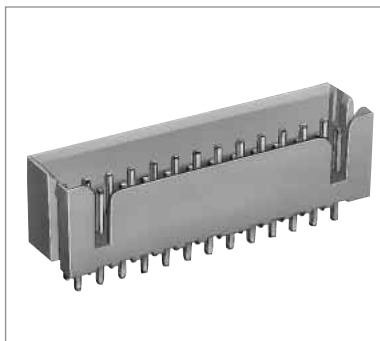
[Specific No.] -* *, (* *)
(05): Tin plated
(25) : Tin plated, tube packaging

Note 1.A packaging quantity is delivered by the bag unit (100 pcs.). If needed, please order the product per pack.
Note 2.Please order the tube packaging products, multiplying the packaging quantity (pieces).
Note 3.The 2 and 3 contact connector contains the concave portion to prevent miss-insertion in the center at one point, which is different from the above figure.In addition, the 4 to 7 contacts connectors have two concave portions at both ends.

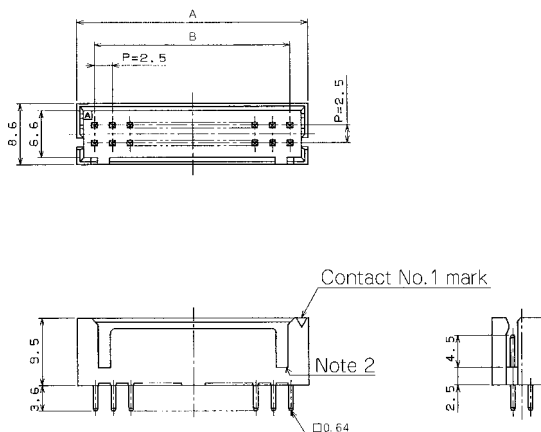
Applicable Potting Thickness : 6mm



Double Row Straight Pin Header



●Board Through-hole Diameter: $\phi 1.1^{+0.1}_{-0}$



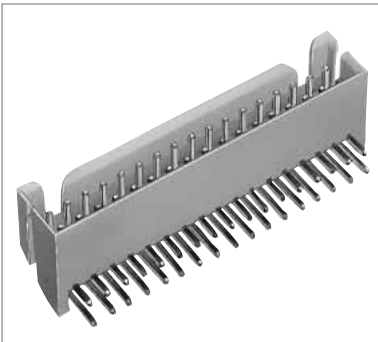
Unit: mm

Tin plated		Gold plated					
Part Number	CL No.	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1BZ- 4DP-2.5DSA	541-2017-0	DF1B- 4DP-2.5DSA(01)	541-0651-5-01	4	7.5	2.5	YES
DF1BZ- 6DP-2.5DSA	541-2018-3	DF1B- 6DP-2.5DSA(01)	541-0652-8-01	6	10.0	5.0	
DF1BZ- 8DP-2.5DSA	541-2019-6	DF1B- 8DP-2.5DSA(01)	541-0653-0-01	8	12.5	7.5	
DF1BZ-10DP-2.5DSA	541-2020-5	DF1B-10DP-2.5DSA(01)	541-0616-4-01	10	15.0	10.0	
DF1BZ-12DP-2.5DSA	541-2021-8	DF1B-12DP-2.5DSA(01)	541-0617-7-01	12	17.5	12.5	
DF1BZ-14DP-2.5DSA	541-2022-0	DF1B-14DP-2.5DSA(01)	541-0618-0-01	14	20.0	15.0	
DF1BZ-16DP-2.5DSA	541-2023-3	DF1B-16DP-2.5DSA(01)	541-0619-2-01	16	22.5	17.5	
DF1BZ-18DP-2.5DSA	541-2024-6	DF1B-18DP-2.5DSA(01)	541-0620-1-01	18	25.0	20.0	
DF1BZ-20DP-2.5DSA	541-2025-9	DF1B-20DP-2.5DSA(01)	541-0621-4-01	20	27.5	22.5	
DF1BZ-22DP-2.5DSA	541-2026-1	DF1B-22DP-2.5DSA(01)	541-0622-7-01	22	30.0	25.0	
DF1BZ-24DP-2.5DSA	541-2027-4	DF1B-24DP-2.5DSA(01)	541-0623-0-01	24	32.5	27.5	
DF1BZ-26DP-2.5DSA	541-2028-7	DF1B-26DP-2.5DSA(01)	541-0624-2-01	26	35.0	30.0	
DF1BZ-28DP-2.5DSA	541-2029-0	DF1B-28DP-2.5DSA(01)	541-0625-5-01	28	37.5	32.5	
DF1BZ-30DP-2.5DSA	541-2030-9	DF1B-30DP-2.5DSA(01)	541-0626-8-01	30	40.0	35.0	
DF1BZ-34DP-2.5DSA	541-2031-1	DF1B-34DP-2.5DSA(01)	541-0628-3-01	34	45.0	40.0	
DF1BZ-36DP-2.5DSA	541-2032-4	DF1B-36DP-2.5DSA(01)	541-0629-6-01	36	47.5	42.5	
DF1BZ-40DP-2.5DSA	541-2033-7	DF1B-40DP-2.5DSA(01)	541-0631-8-01	40	52.5	47.5	

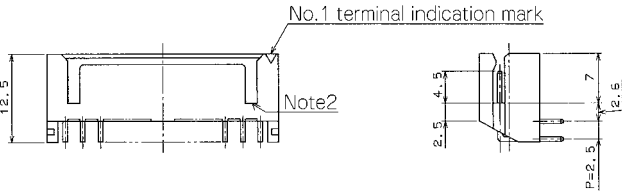
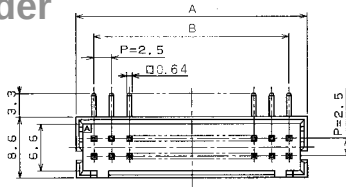
Note 1. The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Note 2. The 4 and 6 contact connector contains the concave portion to prevent miss-insertion in the center area at one point, which is different from the above figure.

Double Row Right Angle Pin Header



● Board Through-hole Diameter:φ1.1^{+0.1}₀

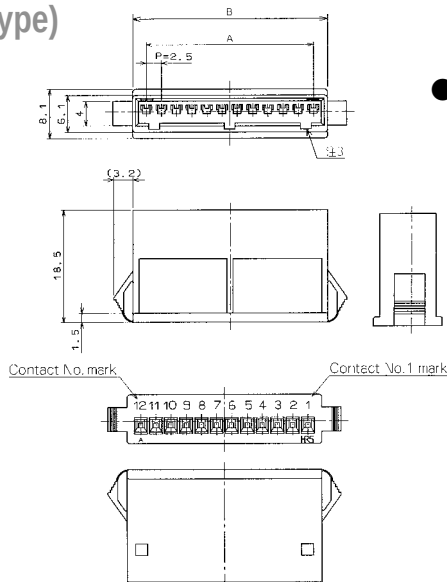
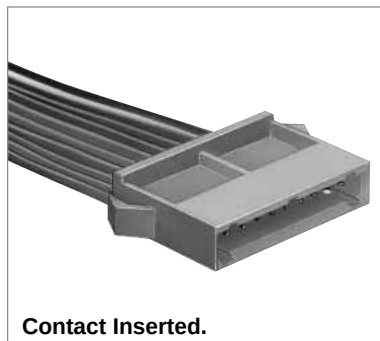


Unit: mm

Tin plated		Gold plated					
Part Number	CL No.	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1BZ- 4DP-2.5DS	541-2051-9	DF1B- 4DP-2.5DS(01)	541-0654-3-01	4	7.5	2.5	YES
DF1BZ- 6DP-2.5DS	541-2052-1	DF1B- 6DP-2.5DS(01)	541-0655-6-01	6	10.0	5.0	
DF1BZ- 8DP-2.5DS	541-2053-4	DF1B- 8DP-2.5DS(01)	541-0656-9-01	8	12.5	7.5	
DF1BZ-10DP-2.5DS	541-2054-7	DF1B-10DP-2.5DS(01)	541-0632-0-01	10	15.0	10.0	
DF1BZ-12DP-2.5DS	541-2055-0	DF1B-12DP-2.5DS(01)	541-0633-3-01	12	17.5	12.5	
DF1BZ-14DP-2.5DS	541-2056-2	DF1B-14DP-2.5DS(01)	541-0634-6-01	14	20.0	15.0	
DF1BZ-16DP-2.5DS	541-2057-5	DF1B-16DP-2.5DS(01)	541-0635-9-01	16	22.5	17.5	
DF1BZ-18DP-2.5DS	541-2058-8	DF1B-18DP-2.5DS(01)	541-0636-1-01	18	25.0	20.0	
DF1BZ-20DP-2.5DS	541-2059-0	DF1B-20DP-2.5DS(01)	541-0637-4-01	20	27.5	22.5	
DF1BZ-22DP-2.5DS	541-2060-0	DF1B-22DP-2.5DS(01)	541-0638-7-01	22	30.0	25.0	
DF1BZ-24DP-2.5DS	541-2061-2	DF1B-24DP-2.5DS(01)	541-0639-0-01	24	32.5	27.5	
DF1BZ-26DP-2.5DS	541-2062-5	DF1B-26DP-2.5DS(01)	541-0640-9-01	26	35.0	30.0	
DF1BZ-28DP-2.5DS	541-2063-8	DF1B-28DP-2.5DS(01)	541-0641-1-01	28	37.5	32.5	
DF1BZ-30DP-2.5DS	541-2064-0	DF1B-30DP-2.5DS(01)	541-0642-4-01	30	40.0	35.0	
DF1BZ-34DP-2.5DS	541-2065-3	DF1B-34DP-2.5DS(01)	541-0644-0-01	34	42.5	37.5	
DF1BZ-36DP-2.5DS	541-2066-6	DF1B-36DP-2.5DS(01)	541-0645-2-01	36	47.5	42.5	
DF1BZ-40DP-2.5DS	541-2067-9	DF1B-40DP-2.5DS(01)	541-0647-8-01	40	52.5	47.5	

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.
Note 2.The 4 and 6 contact connector contains the concave portion to prevent miss-insertion in the center area at one point, which is different from the above figure.

Single Row In-line Plug(Simple Lock Type)



●Applicable Socket: DF1B-*S-2.5R

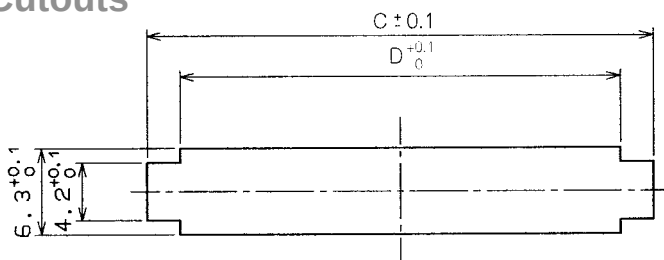
Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1BA- 2EP-2.5RC	541-0700-9	2	2.5	7.1	Yes	DF1BA- 8EP-2.5RC	541-0706-5	8	17.5	22.1	Yes
DF1BA- 3EP-2.5RC	541-0701-1	3	5	9.6		DF1BA- 9EP-2.5RC	541-0707-8	9	20	24.6	
DF1BA- 4EP-2.5RC	541-0702-4	4	7.5	12.1		DF1BA-10EP-2.5RC	541-0708-0	10	22.5	27.1	
DF1BA- 5EP-2.5RC	541-0703-7	5	10	14.6		DF1BA-12EP-2.5RC	541-0710-2	12	27.5	32.1	
DF1BA- 6EP-2.5RC	541-0704-0	6	12.5	17.1							
DF1BA- 7EP-2.5RC	541-0705-2	7	15	19.6							

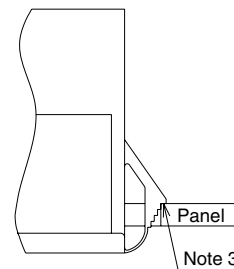
Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Note 2.The 2 contacts connector contains the concave portion to prevent miss-insertion in the center area at one point, which is different from the above figure.In addition, the 3 to 7 contact connectors contain the concave portion at both sides.

Panel Cutouts



Unit: mm



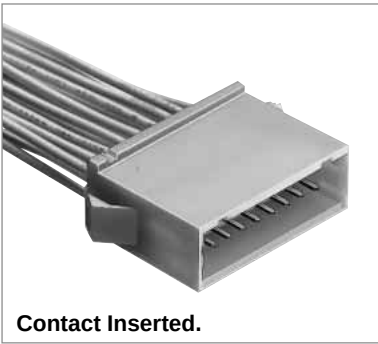
Applicable Plug	Number of Contacts	C			D
		Panel Board Thickness (Note 1)			
		0.5 to 1.2	1.3 to 1.6	1.7 to 2.0	
DF1BA- 2EP-2.5RC	2	11.2	11.9	12.6	7.3
DF1BA- 3EP-2.5RC	3	13.7	14.4	15.1	9.8
DF1BA- 4EP-2.5RC	4	16.2	16.9	17.6	12.3
DF1BA- 5EP-2.5RC	5	18.7	19.4	20.1	14.8
DF1BA- 6EP-2.5RC	6	21.2	21.9	22.6	17.3
DF1BA- 7EP-2.5RC	7	23.7	24.4	25.1	19.8
DF1BA- 8EP-2.5RC	8	26.2	26.9	27.6	22.3
DF1BA- 9EP-2.5RC	9	28.7	29.4	30.1	24.8
DF1BA-10EP-2.5RC	10	31.2	31.9	32.6	27.3
DF1BA-12EP-2.5RC	12	36.2	36.9	37.6	32.3

Note 1.The installation hole size C according to panel board thickness.

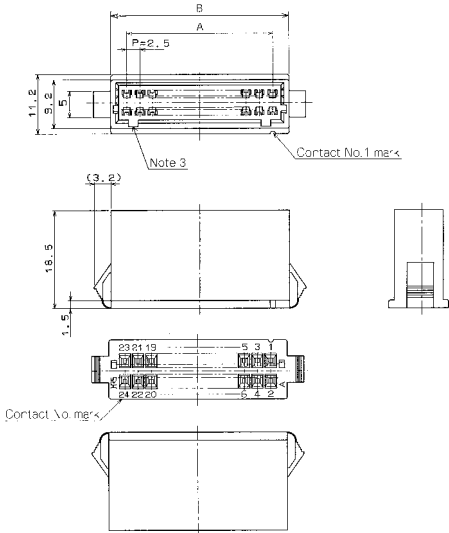
Note 2.Fabricate installation holes so that no burr can occur.

Note 3.At the panel tab portion, use the surface that will not be rounded.

Double Row In-line Plug (Simple Lock Type)



Contact Inserted.



●Applicable Socket: DF1B-●DS-2.5RC

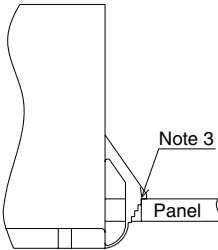
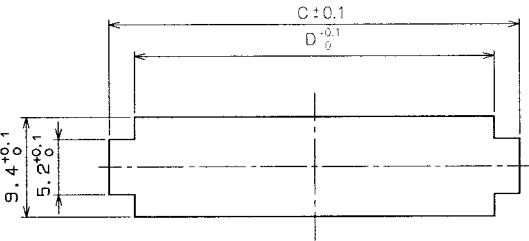
Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1BA- 4DEP-2.5RC	541-0719-7	4	2.5	8.6	Yes	DF1BA-20DEP-2.5RC	541-0727-5	20	22.5	28.6	Yes
DF1BA- 6DEP-2.5RC	541-0720-6	6	5	11.1		DF1BA-22DEP-2.5RC	541-0728-8	22	25	31.1	
DF1BA- 8DEP-2.5RC	541-0721-9	8	7.5	13.6		DF1BA-24DEP-2.5RC	541-0729-0	24	27.5	33.6	
DF1BA-10DEP-2.5RC	541-0722-1	10	10	16.1		DF1BA-26DEP-2.5RC	541-0730-0	26	30	36.1	
DF1BA-12DEP-2.5RC	541-0723-4	12	12.5	18.6		DF1BA-28DEP-2.5RC	541-0731-2	28	32.5	38.6	
DF1BA-14DEP-2.5RC	541-0724-7	14	15	21.1		DF1BA-30DEP-2.5RC	541-0732-5	30	35	41.1	
DF1BA-16DEP-2.5RC	541-0725-0	16	17.5	23.6		DF1BA-34DEP-2.5RC	541-0734-0	34	40	46.1	
DF1BA-18DEP-2.5RC	541-0726-2	18	20	26.1							

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.
Note 2.The 4 contacts connector contains the concave portion to prevent miss-insertion in the center at one point, which is different from the above figure.

Panel Cutouts

Unit: mm



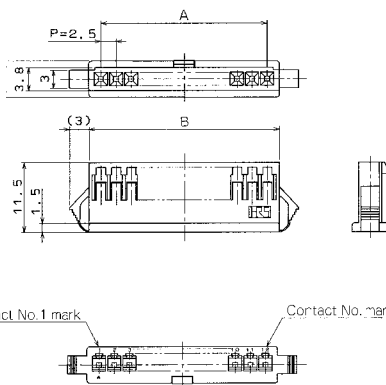
Applicable Plug	Number of Contacts	C			D
		Panel Board Thickness (Note 1)			
		0.5 to 1.2	1.3 to 1.6	1.7 to 2.0	
DF1BA- 4DEP-2.5RC	4	12.7	13.4	14.1	8.8
DF1BA- 6DEP-2.5RC	6	15.2	15.9	16.6	11.3
DF1BA- 8DEP-2.5RC	8	17.7	18.4	19.1	13.8
DF1BA-10DEP-2.5RC	10	20.2	20.9	21.6	16.3
DF1BA-12DEP-2.5RC	12	22.7	23.4	24.1	18.8
DF1BA-14DEP-2.5RC	14	25.2	25.9	26.6	21.3
DF1BA-16DEP-2.5RC	16	27.7	28.4	29.1	23.8
DF1BA-18DEP-2.5RC	18	30.2	30.9	31.6	26.3
DF1BA-20DEP-2.5RC	20	32.7	33.4	34.1	28.8
DF1BA-22DEP-2.5RC	22	35.2	35.9	36.6	31.3
DF1BA-24DEP-2.5RC	24	37.7	38.4	39.1	33.8
DF1BA-26DEP-2.5RC	26	40.2	40.9	41.6	36.3
DF1BA-28DEP-2.5RC	28	42.7	43.4	44.1	38.8
DF1BA-30DEP-2.5RC	30	45.2	45.9	46.6	41.3
DF1BA-34DEP-2.5RC	34	50.2	50.9	51.6	46.3

Note 1.The installation hole size C according to panel board thickness.
Note 2.Fabricate installation holes so that no burr can occur.
Note 3.At the panel tab portion, use the surface that will not be rounded.

Single Row In-line Socket (Full Lock Type)



Contact Inserted.



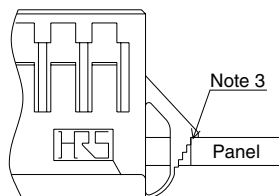
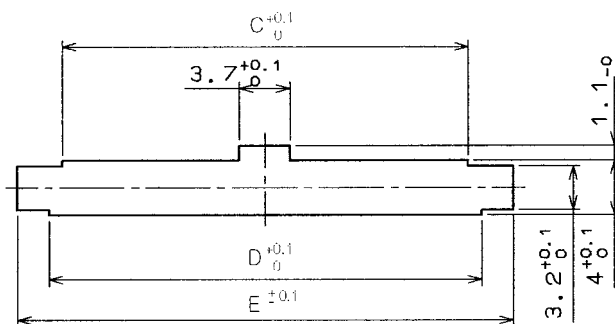
●Applicable Socket: DF1B-※DEP-2.5RC

Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1B- 2ES-2.5RC	541-0320-8	2	2.5	6.5	Yes	DF1B- 8ES-2.5RC	541-0326-4	8	17.5	21.5	Yes
DF1B- 3ES-2.5RC	541-0321-0	3	5	9		DF1B- 9ES-2.5RC	541-0327-7	9	20	24	
DF1B- 4ES-2.5RC	541-0322-3	4	7.5	11.5		DF1B-10ES-2.5RC	541-0328-0	10	22.5	26.5	
DF1B- 5ES-2.5RC	541-0323-6	5	10	14		DF1B-11ES-2.5RC	541-0329-2	11	25	29	
DF1B- 6ES-2.5RC	541-0324-9	6	12.5	16.5		DF1B-12ES-2.5RC	541-0330-1	12	27.5	31.5	
DF1B- 7ES-2.5RC	541-0325-1	7	15	19		DF1B-13ES-2.5RC	541-0331-4	13	30	34	

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Panel Cutouts



Unit: mm

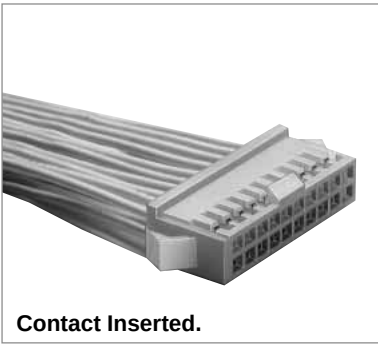
Applicable Plug	Number of Contacts	C	D	E		
				Panel Board Thickness (Note 1)		
				0.5 to 1.2	1.3 to 1.6	1.7 to 2.0
DF1B- 2ES-2.5RC	2	4.7	6.7	10.8	11.3	12
DF1B- 3ES-2.5RC	3	7.2	9.2	13.3	13.8	14.5
DF1B- 4ES-2.5RC	4	9.7	11.7	15.8	16.3	17
DF1B- 5ES-2.5RC	5	12.2	14.2	18.3	18.8	19.5
DF1B- 6ES-2.5RC	6	14.7	16.7	20.8	21.3	22
DF1B- 7ES-2.5RC	7	17.2	19.2	23.3	23.8	24.5
DF1B- 8ES-2.5RC	8	19.7	21.7	25.8	26.3	27
DF1B- 9ES-2.5RC	9	22.2	24.2	28.3	28.8	29.5
DF1B-10ES-2.5RC	10	24.7	26.7	30.8	31.3	32
DF1B-11ES-2.5RC	11	27.2	29.2	33.3	33.8	34.5
DF1B-12ES-2.5RC	12	29.7	31.7	35.8	36.3	37
DF1B-13ES-2.5RC	13	32.2	34.2	38.3	38.8	39.5

Note 1.The installation hole size C will be changed according to panel board thickness.

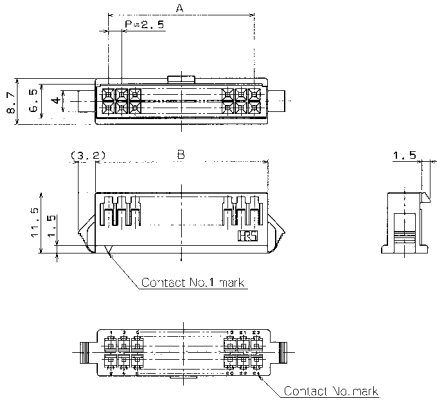
Note 2.Fabricate installation holes so that no burr can occur.

Note 3.At the panel tab portion, use the surface that will not be rounded.

Double Row In-line Socket (Full Lock Type)



Contact Inserted.



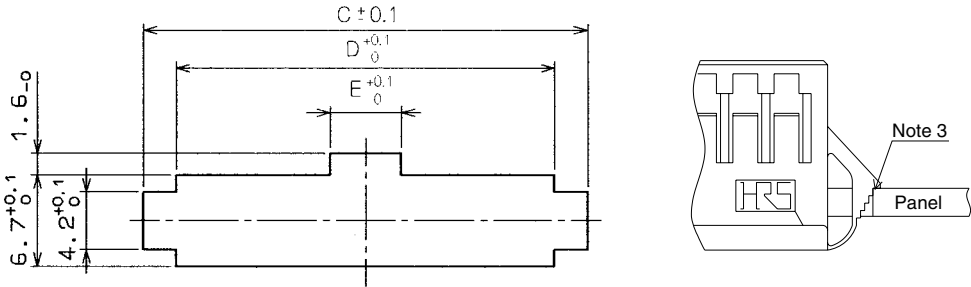
●Applicable Socket: DF1B-●EP-2.5RC

Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1B-10DES-2.5RC	541-0351-1	10	10	15	Yes	DF1B-24DES-2.5RC	541-0357-8	24	27.5	32.5	Yes
DF1B-12DES-2.5RC	541-0352-4	12	12.5	17.5		DF1B-26DES-2.5RC	541-0358-0	26	30	35	
DF1B-14DES-2.5RC	541-0353-7	14	15	20		DF1B-28DES-2.5RC	541-0359-3	28	32.5	37.5	
DF1B-16DES-2.5RC	541-0354-0	16	17.5	22.5		DF1B-30DES-2.5RC	541-0360-2	30	35	40	
DF1B-18DES-2.5RC	541-0346-1	18	20	25		DF1B-32DES-2.5RC	541-0361-5	32	37.5	42.5	
DF1B-20DES-2.5RC	541-0355-2	20	22.5	27.5		DF1B-34DES-2.5RC	541-0362-8	34	40	45	
DF1B-22DES-2.5RC	541-0356-5	22	25	30							

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Panel Cutouts



Unit: mm

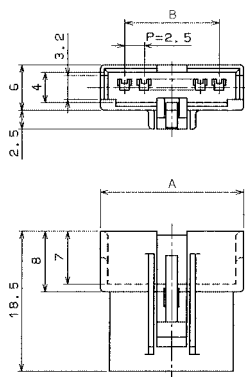
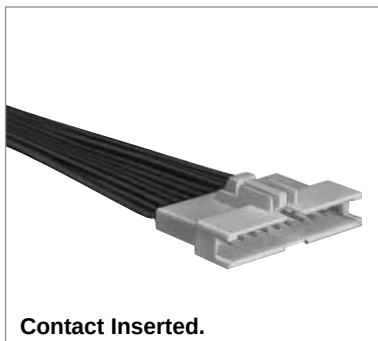
Applicable Plug	Number of Contacts	C			D	E
		Panel Board Thickness (Note 1)				
		0.5 to 1.2	1.3 to 1.6	1.7 to 2.0		
DF1B-10DES-2.5RC	10	19.1	19.8	20.5	15.2	3.7
DF1B-12DES-2.5RC	12	21.6	22.3	23	17.7	3.7
DF1B-14DES-2.5RC	14	24.1	24.8	25.5	20.2	3.7
DF1B-16DES-2.5RC	16	26.6	27.3	28	22.7	3.7
DF1B-18DES-2.5RC	18	29.1	29.8	30.5	25.2	3.7
DF1B-20DES-2.5RC	20	31.6	32.3	33	27.7	5.2
DF1B-22DES-2.5RC	22	34.1	34.8	35.5	30.2	5.2
DF1B-24DES-2.5RC	24	36.6	37.3	38	32.7	5.2
DF1B-26DES-2.5RC	26	39.1	39.8	40.5	35.2	5.2
DF1B-28DES-2.5RC	28	41.6	42.3	43	37.7	5.2
DF1B-30DES-2.5RC	30	44.1	44.8	45.5	40.2	5.2
DF1B-32DES-2.5RC	32	46.6	47.3	48	42.7	5.2
DF1B-34DES-2.5RC	34	49.1	49.8	50.5	45.2	5.2

Note 1.The installation hole size C according to panel board thickness.

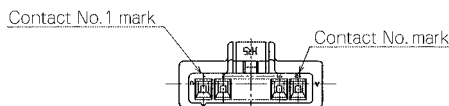
Note 2.Fabricate installation holes so that no burr can occur.

Note 3.At the panel tab portion, use the surface that will not be rounded.

Single Row In-line Plug (Full Lock Type)



●Applicable Socket: DF1B-*ES-2.5RC

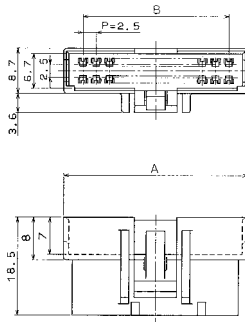
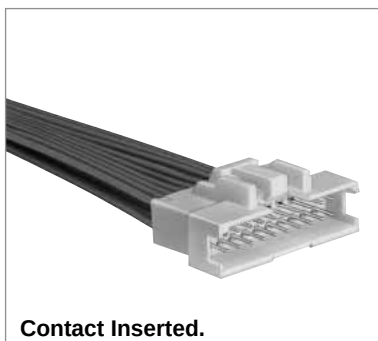


Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1B- 2EP-2.5RC	541-0332-7	2	8.9	2.5	Yes	DF1B- 8EP-2.5RC	541-0338-3	8	23.9	17.5	Yes
DF1B- 3EP-2.5RC	541-0333-0	3	11.4	5		DF1B- 9EP-2.5RC	541-0339-6	9	26.4	20	
DF1B- 4EP-2.5RC	541-0334-2	4	13.9	7.5		DF1B-10EP-2.5RC	541-0340-5	10	28.9	22.5	
DF1B- 5EP-2.5RC	541-0335-5	5	16.4	10		DF1B-11EP-2.5RC	541-0341-8	11	31.4	25	
DF1B- 6EP-2.5RC	541-0336-8	6	18.9	12.5		DF1B-12EP-2.5RC	541-0342-0	12	33.9	27.5	
DF1B- 7EP-2.5RC	541-0337-0	7	21.4	15		DF1B-13EP-2.5RC	541-0343-3	13	36.4	30	

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

Double Row In-line Plug (Full Lock Type)



●Applicable Socket: DF1B-*DES-2.5RC

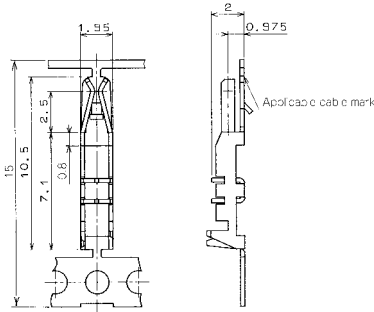


Unit: mm

Part Number	CL No.	Number of Contacts	A	B	RoHS	Part Number	CL No.	Number of Contacts	A	B	RoHS
DF1B-10DEP-2.5RC	541-0366-9	10	17.2	10	Yes	DF1B-24DEP-2.5RC	541-0372-1	24	34.7	27.5	Yes
DF1B-12DEP-2.5RC	541-0367-1	12	19.7	12.5		DF1B-26DEP-2.5RC	541-0373-4	26	37.2	30	
DF1B-14DEP-2.5RC	541-0368-4	14	22.2	15		DF1B-28DEP-2.5RC	541-0374-7	28	39.7	32.5	
DF1B-16DEP-2.5RC	541-0369-7	16	24.7	17.5		DF1B-30DEP-2.5RC	541-0375-0	30	42.2	35	
DF1B-18DEP-2.5RC	541-0350-9	18	27.2	20		DF1B-32DEP-2.5RC	541-0376-2	32	44.7	37.5	
DF1B-20DEP-2.5RC	541-0370-6	20	29.7	22.5		DF1B-34DEP-2.5RC	541-0377-5	34	47.2	40	
DF1B-22DEP-2.5RC	541-0371-9	22	32.2	25							

Note 1.The quantity at the specific No. "None" is delivered by the bag unit (100 pcs.). If needed, please order the product per bag.

ID Contact for Socket



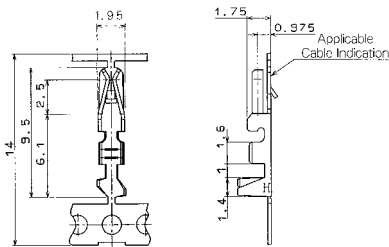
Part Number	CL No.	Applicable Cable Indication	Applicable Cable				Packaging Type	Quantity	Finish	RoHS
			AWG	UL Style	Wire Construction	Jacket Diameter				
DF1B-R24F	541-0217-9	24	AWG 24	1061	11 cores./0.16mm	0.9 to 1.39mm	Reel	10000	Tin plated	Yes
DF1B-R24	541-0220-3						Bag	100		
DF1B-R26F	541-0218-1	26	AWG 26	1061	7 cores./0.16mm	0.9 to 1.39mm	Reel	10000		
DF1B-R26	541-0221-6						Bag	100		
DF1B-R28F	541-0219-4	28	AWG 28	1061	7 cores./0.127mm	0.9 to 1.39mm	Reel	10000		
DF1B-R28	541-0222-9						Bag	100		
DF1B-R24FA(06)	541-0261-0-06	24	AWG 24	1061	11 cores./0.16mm	0.9 to 1.39mm	Reel	10000	Gold plated	
DF1B-R24A(06)	541-0264-9-06						Bag	100		
DF1B-R26FA(06)	541-0262-3-06	26	AWG 26	1061	7 cores./0.16mm	0.9 to 1.39mm	Reel	10000		
DF1B-R26A(06)	541-0265-1-06						Bag	100		
DF1B-R28FA(06)	541-0263-6-06	28	AWG 28	1061	7 cores./0.127mm	0.9 to 1.39mm	Reel	10000		
DF1B-R28A(06)	541-0266-4-06						Bag	100		

● ID Contact Extraction Tool DF-C-PO (A)

Note 1.The applicable cable conductor is the tin plated annealing copper wire.

Note 2.If other cables are used instead of the applicable cable, cotact Hirose sales department.

Crimping Contact for Socket



● Applicable Cable (Tin Plated Annealing Copper Wire)

Conductor Size (Wire construction)
AWG20 (21cores/0.18mm)
AWG22 (17cores/0.16mm)
AWG24 (11cores/0.16mm)
AWG26 (7cores/0.16mm)
AWG28 (7cores0.127mm)
AWG30 (7cores/0.1mm)

● Recommended Cable

UL1061, UL1007

● Strip Length

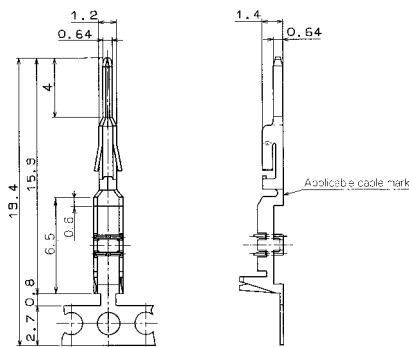
2.0 to 2.5mm

Note:If other cables are used instead of the applicable cable, consult Hirose sales department.

Part Number	CL No.	Applicable Cable Indication	Applicable Cable		Packaging Type	Quantity	Finish	RoHS
			AWG	Jacket Diameter				
DF1B-2022SCF	541-0223-1	20	AWG 20 to	1.2 to 1.9mm	Reel	10000	Tin plated	Yes
DF1B-2022SC	541-0224-4	22	AWG 22		Bag	100		
DF1B-2428SCF	541-0678-1	24	AWG 24 to	0.9 to 1.5mm	Reel	10000		
DF1B-2428SC	541-0679-4	28	AWG 28		Bag	100		
DF1B-30SCF	541-0682-9	30	AWG 30	0.6 to 1.2mm	Reel	10000		
DF1B-30SC	541-0683-1				Bag	100		
DF1B-2022SCFA	541-0662-1	20	AWG 20 to	1.2 to 1.9mm	Reel	10000	Gold plated	
DF1B-2022SCA	541-0663-4	22	AWG 22		Bag	100		
DF1B-2428SCFA	541-0680-3	24	AWG 24 to	0.9 to 1.5mm	Reel	10000		
DF1B-2428SCA	541-0681-6	28	AWG 28		Bag	100		
DF1B-30SCFA	541-0684-4	30	AWG 30	0.6 to 1.2mm	Reel	10000		
DF1B-30SCA	541-0685-7				Bag	100		

● Crimping Contact Extraction Tool DF-C-PO (B)

ID Contact for Plug



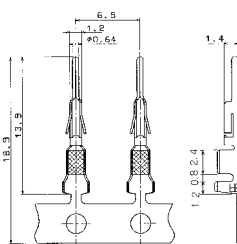
Part Number	CL No.	Applicable Cable Indication	Applicable Cable				Packaging Type	Quantity	Finish	RoHS
			AWG	UL Style	Wire structure	Jacket Diameter				
DF1B-24PRF	541-0666-2	24	AWG 24	1061	11 pcs./0.16mm	0.9 to 1.39mm	Reel	10000	Tin plated	Yes
DF1B-24PR	541-0667-5						Bag	100		
DF1B-26PRF	541-0668-8	26	AWG 26	1061 1007	7 pcs./0.16mm	0.9 to 1.39mm	Reel	10000		
DF1B-26PR	541-0669-0						Bag	100		
DF1B-28PRF	541-0670-0	28	AWG 28	1061 1007	7 pcs./0.127mm	0.9 to 1.39mm	Reel	10000		
DF1B-28PR	541-0671-2						Bag	100		

● ID Contact Extraction Tool DF-C-PO (C)

Note 1.The applicable cable conductor is the tin plated annealing copper wire.

Note 2.If other cables are used instead of the applicable cable, contact Hirose sales department.

Crimping Contact for Plug



● Applicable Cable (Tin Plated Annealing Copper Wire)

Conductor Size (Contact wire construction)
AWG20 (21 pieces/0.18mm)
AWG22 (17 pieces/0.16mm)
AWG24 (11 pieces/0.16mm)
AWG26 (7 pieces/0.16mm)
AWG28 (7 pieces/0.127mm)
AWG30 (7 pieces/0.1mm)

● Recommended Cable

UL1061, UL1007

● Strip Length

3.0 to 3.7mm

Note:If other cables are used instead of the applicable cable, consult Hirose sales department.

Part Number	CL No.	Applicable cable indicator	Applicable Cable		Packaging Type	Quantity	Treatment	RoHS
			AWG	Jacket Diameter				
DF1B-2022PCF	541-0259-9	20	AWG 20 to	1.2 to 1.9mm	Reel	10000	Tin plated	Yes
DF1B-2022PC	541-0260-8	22	AWG 22		Bag	100		
DF1B-2428PCF	541-0664-7	24	AWG 24 to	0.9 to 1.5mm	Reel	10000		
DF1B-2428PC	541-0665-0	28	AWG 28		Bag	100		
DF1B-30PCF	541-0686-0	30	AWG 30	0.6 to 1.2mm	Reel	10000		
DF1B-30PC	541-0687-2				Bag	100		
DF1B-2022PCFB	541-0690-7	20	AWG 20 to	1.2 to 1.9mm	Reel	10000	Gold plated	
DF1B-2022PCB	541-0691-0	22	AWG 22		Bag	100		
DF1-PD2428SCFB	541-0660-6	24	AWG 24 to	0.9 to 1.5mm	Reel	10000		
DF1-PD2428SCB	541-0661-9	28	AWG 28		Bag	100		
DF1B-30PCFB	541-0688-5	30	AWG 30	0.6 to 1.2mm	Reel	10000		
DF1B-30PCB	541-0689-8				Bag	100		

● Crimping Contact Extraction Tool DF-C-PO (C)

◆ Applicable Tool



[Press Main Unit and Applicator]

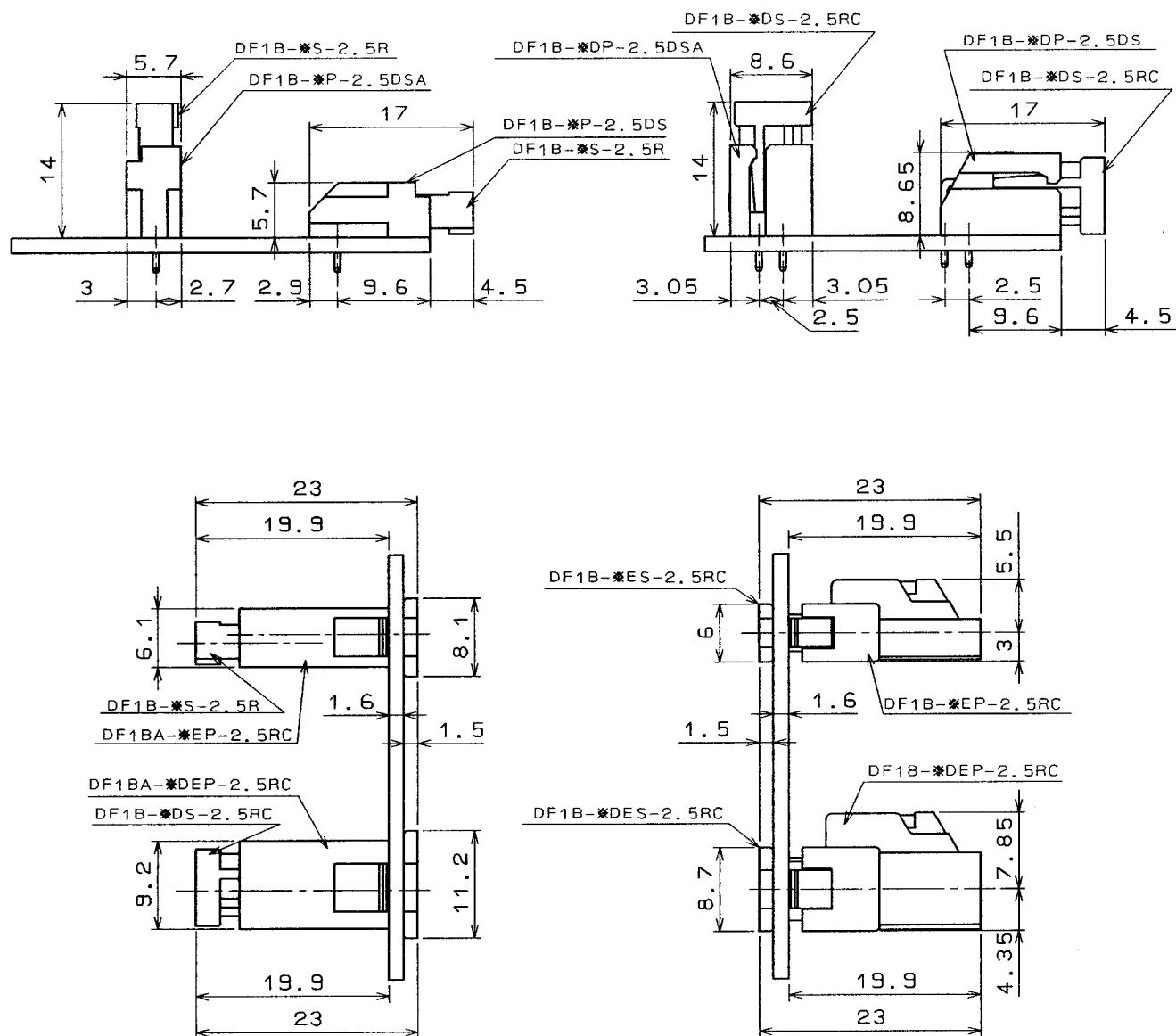


[Manual Crimping Tool]

Connection Type	Type	Part Number	CL No.	Applicable Contacts
ID	Applicator	AP105-DF1B-R	901-4507-4	DF1B-R**F/FA06 **=24,26,28
		AP105-DF1B-PR	901-4536-2	DF1B-**PRF**=24,26,28
	Manual ID tool	DF1B-T2428HR	550-0171-0	DF1B-R**/A06**=24,26,28
		DF1B-T2428PHR	550-0221-7	DF1B-**PR/PRB **=24,26,28
Crimping	Applicator	AP105-DF1B-2022S	901-4510-9	DF1B-2022SCF/SCFA
		AP105-DF1B-2428S	901-4518-0	DF1B-2428SCF/SCFA
		AP105-DF1B-30S	901-4517-8	DF1B-30SCF/SCFA
		AP105-DF1B-2022P	901-4509-0	DF1B-2022PCF/PCFB
		AP105-DF1B-2428P	901-4521-5	DF1B-2428PCF,DF1-PD2428SCF/SCFB
		AP105-DF1B-30P	901-4519-3	DF1B-30PCF/PCFB
	Manual crimping tool	DF1B-TA2022SHC	550-0182-7	DF1B-2022SC/SCA
		DF1B-TA2428SHC	550-0209-1	DF1B-2428SC/SCA
		DF1B-TA30SHC	550-0211-3	DF1B-30SC/SCA
		DF1B-TA2022PHC	550-0183-0	DF1B-2022PC/PCB
		DF1B-TA2428PHC	550-0224-5	DF1B-2428PC,DF1-PD2428SCB
		DF1B-TA30PHC	550-0210-0	DF1B-30PC/PCB
Press Main Unit		CM-105	901-0005-4	—————
Extraction Tool		DF-C-PO(A)	550-0170-8	DF1B-R**F
		DF-C-PO(B)	550-0179-2	DF1B-****SCF
		DF-C-PO(C)	550-0198-7	DF1B-****PC,DF1B-**PRF

Note: If a trouble has occurred due to tools which are not designated by Hirose, Hirose won't guarantee any product

◆ Applicable Tool



◆ Precautions

1. Recommended Soldering Condition	Flow: 250°C for 10 seconds Manual soldering: 300°C for 3 seconds
2. Cleaning Condition	Refer to Nylon Connector Use Hand book.
3. Connection Condition	Refer to Nylon Connector Use Hand book.
4. Cautions	■The color phase of this product is slightly different from that of the formed product according to the manufacturing lot and future storage conditions, but the difference doesn't affect the performance.
5. Precaution	Refer to Nylon Connector Use Hand book.