



Page 1 of 40

**CONNECTORS AND SAVERS, ELECTRICAL,  
RECTANGULAR, NON-REMOVABLE PCB  
CONTACTS**

**BASED ON TYPE MHD**

**ESCC Detail Specification No. 3401/065**

Issue 4	June 2013
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DCR No.	CHANGE DESCRIPTION
795	Specification updated to incorporate editorial changes per DCR.

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## **1 GENERAL**

### **1.1 SCOPE**

This specification details the ratings, physical and electrical characteristics, test and inspection data for Connectors and Savers, Electrical, Rectangular, with Non-Removable PCB Contacts, Based on Type MHD. It shall be read in conjunction with:

- ESCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular,

the requirements of which are supplemented herein.

### **1.2 RANGE OF COMPONENTS**

The different configurations of the connectors specified herein and guiding and locking devices, which are also covered by this specification, are given in Table 1(a).

### **1.3 MAXIMUM RATINGS**

The maximum ratings applicable to the connectors specified herein, which shall not be exceeded at any time during use or storage, are scheduled in Table 1(b).

### **1.4 PARAMETER DERATING INFORMATION**

The applicable derating information for the connectors specified herein is shown in Figure 1.

### **1.5 PHYSICAL DIMENSIONS**

The physical dimensions of the connectors, plugs and receptacles, guiding and locking devices specified herein, and the contact mounting configurations, are shown in Figures 2(a), 2(b) and 2(c).

## **2 APPLICABLE DOCUMENTS**

The following documents form part of this specification and shall be read in conjunction with it:

- (a) ESCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular.

## **3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS**

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

**TABLE 1(a) – RANGE OF COMPONENTS**

NUMBER OF CONTACTS

No. of Contacts (Note 1)	Max. Weight (2) (g)		Max. Engagement Force (N Max.)	Separation Force (N)	
	Plug	Receptacle		N Min.	N Max.
52	10.7	7.2	36.4	2.6	36.4
100	16.4	13.1	70	5	70
152	25.7	20.1	106.4	7.6	106.4
200	32.5	25.9	140	10	140
252	44.1	33	176.4	12.6	176.4
300	48.5	38.8	210	15	210
352	57.2	43.2	246.4	17.6	246.4
400	64.5	49.2	280	20	280

**NOTES:**

1. See Figure 2(a).
2. Weights with contacts and without accessories.

CONTACT TYPES

Contact Codes	Contact Types
10	Through board solder – 90° for PCB thickness: 1.44 - 1.76 mm
11	Through board solder – 90° for PCB thickness: 1.98 - 2.42 mm
12	Through board solder – 90° for PCB thickness: 2.88 - 3.52 mm
30	Through board solder – straight for PCB thickness: 2.16 - 2.64 mm
31	Through board solder – straight for PCB thickness: 2.88 - 3.52 mm
43	Surface mount for PCB thickness: 2.16 - 2.64 mm (Centred PCB)
45	Surface mount for PCB thickness: 1.44 - 2.4 mm (Off-centre PCB)
47	Surface mount for PCB thickness: 2.16 - 2.64 mm (Off-centre PCB)
91	Contact for connector saver male - female

**NOTES:**

1. See Figure 2(c).

GUIDING AND LOCKING DEVICES

Guiding and Locking Devices Code	Mounting On	Max. Weight (g)
110	Plug	0.55
111	Plug	1.35
121	Receptacle	0.65
124	Receptacle	1.5
134	Receptacle	1.3
201	Saver Receptacle	-

**NOTES:**

1. See Figure 2(b).

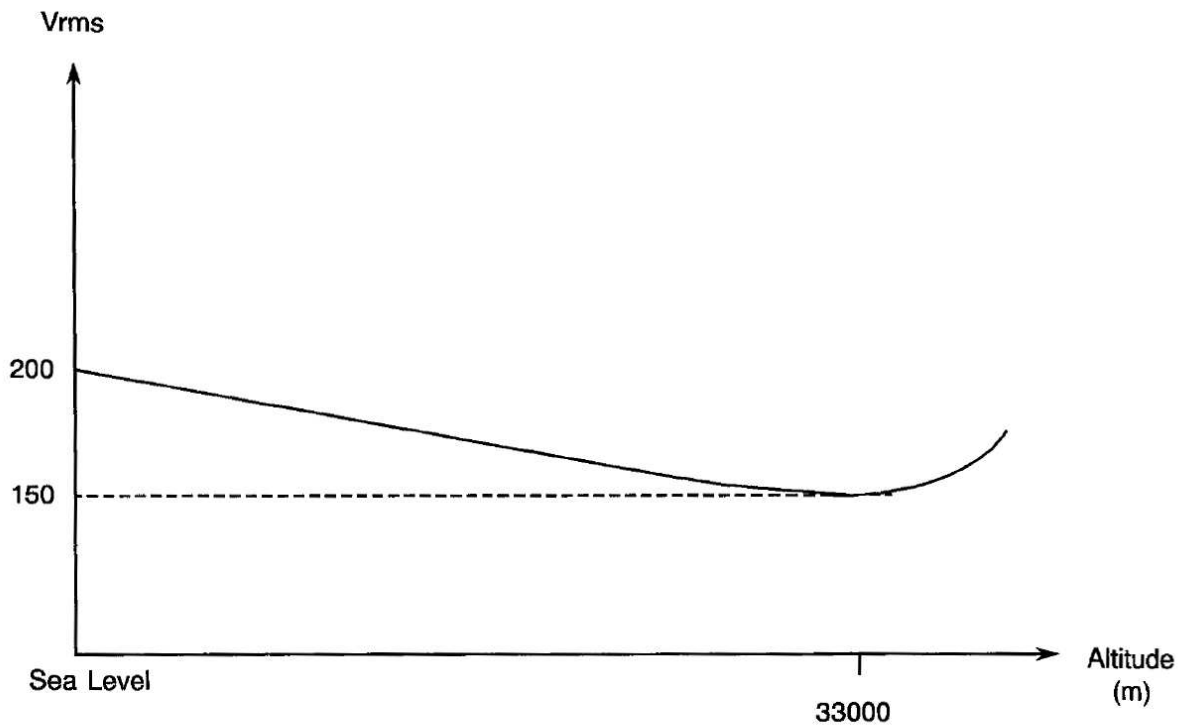
**TABLE 1(b) – MAXIMUM RATINGS**

No.	Characteristic	Symbol	Maximum Rating	Unit	Remarks
1	Working Voltage Sea Level	V	200	Vrms	Note 1
2	Rated Current	$I_R$	2	A	
3	Operating Temperature Range	$T_{op}$	-55 to +125	°C	$T_{amb}$
4	Storage Temperature Range	$T_{stg}$	-55 to +125	°C	
5	Soldering Temperature	$T_{sol}$	+260	°C	Note 2

**NOTES:**

1. Between contacts and shell.
2. Duration 10 seconds minimum and the same contact shall not be resoldered until 3 minutes have elapsed.

**FIGURE 1 – PARAMETER DERATING INFORMATION**

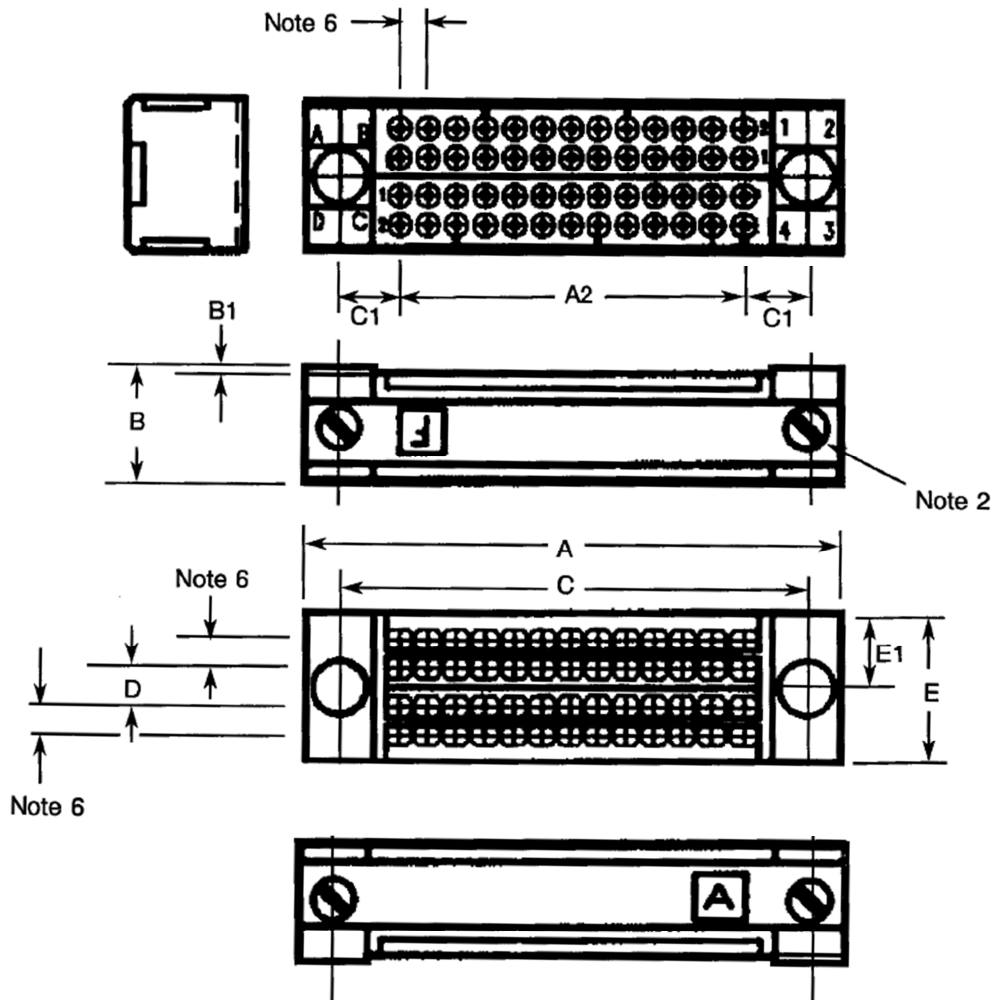


Working Voltage versus Altitude



**FIGURE 2 – PHYSICAL DIMENSIONS**

**FIGURE 2(a) – INSERTS: PLUGS AND RECEPTACLES**  
RECEPTACLE, 52 CONTACTS

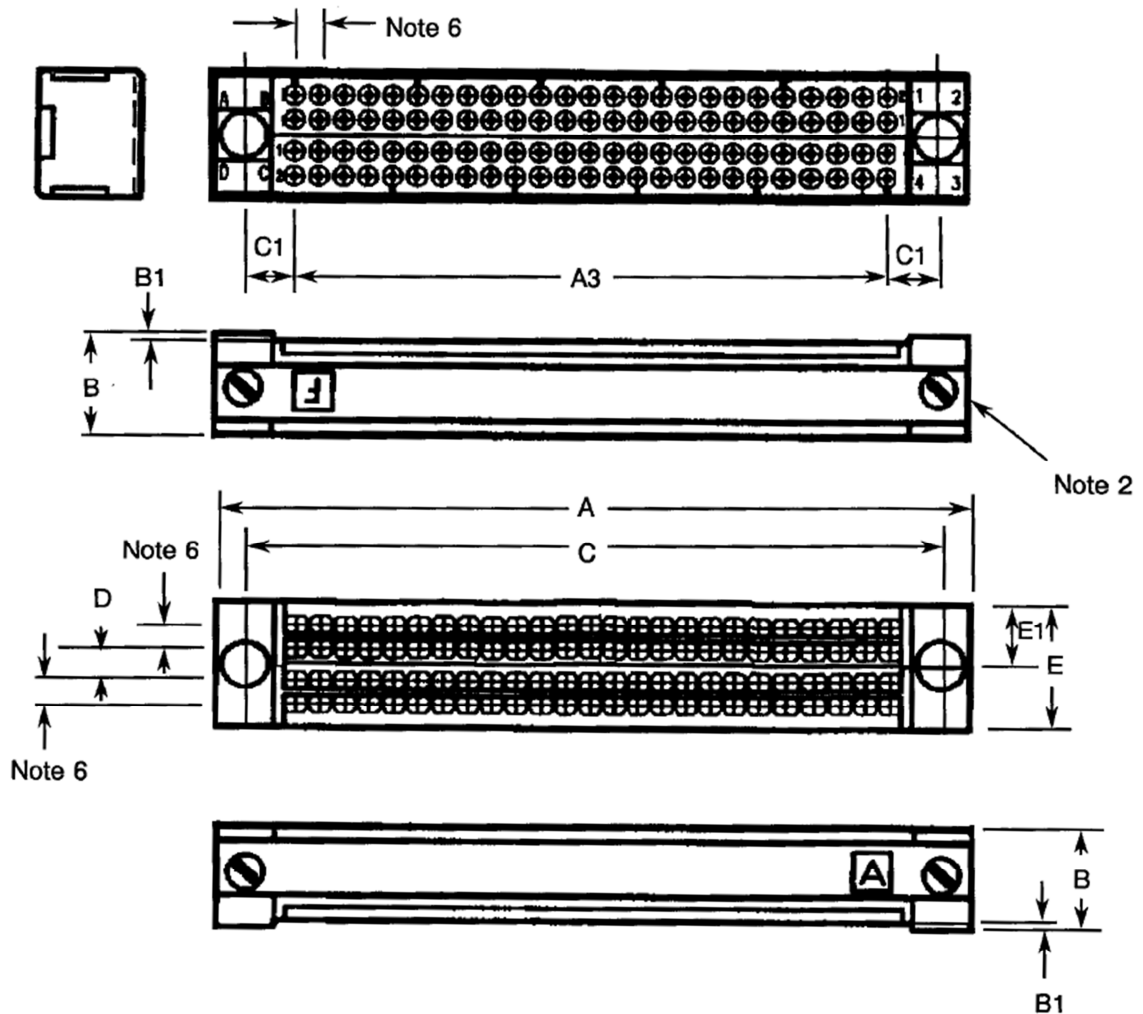


Symbol / Dim. (1)	<u>A</u>	<u>A2</u>	B	B1	<u>C</u>	<u>C1</u>	<u>D</u>	E	<u>E1</u>
Min.	35.1	22.66	7.75	0.3	30.65	3.77	2.34	9.9	4.9
Max.	35.4	23.06	8.05	0.6	30.95	4.17	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 100 CONTACTS

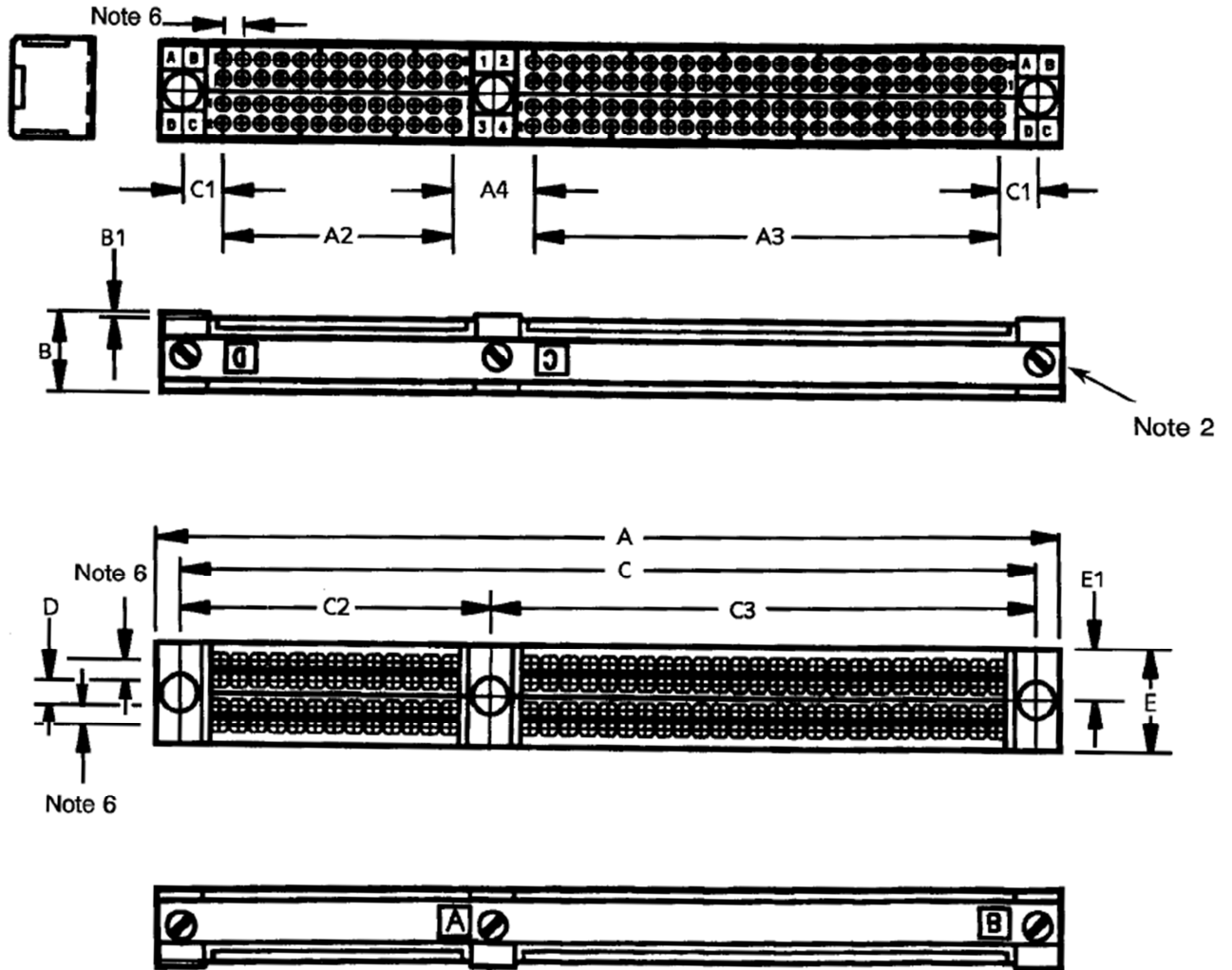


Symbol / Dim. (1)	A	<u>A3</u>	B	B1	<u>C</u>	<u>C1</u>	<u>D</u>	E	<u>E1</u>
Min.	57.9	45.52	7.75	0.3	53.51	3.77	2.34	9.9	4.9
Max.	58.2	45.92	8.05	0.6	53.81	4.17	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 152 CONTACTS

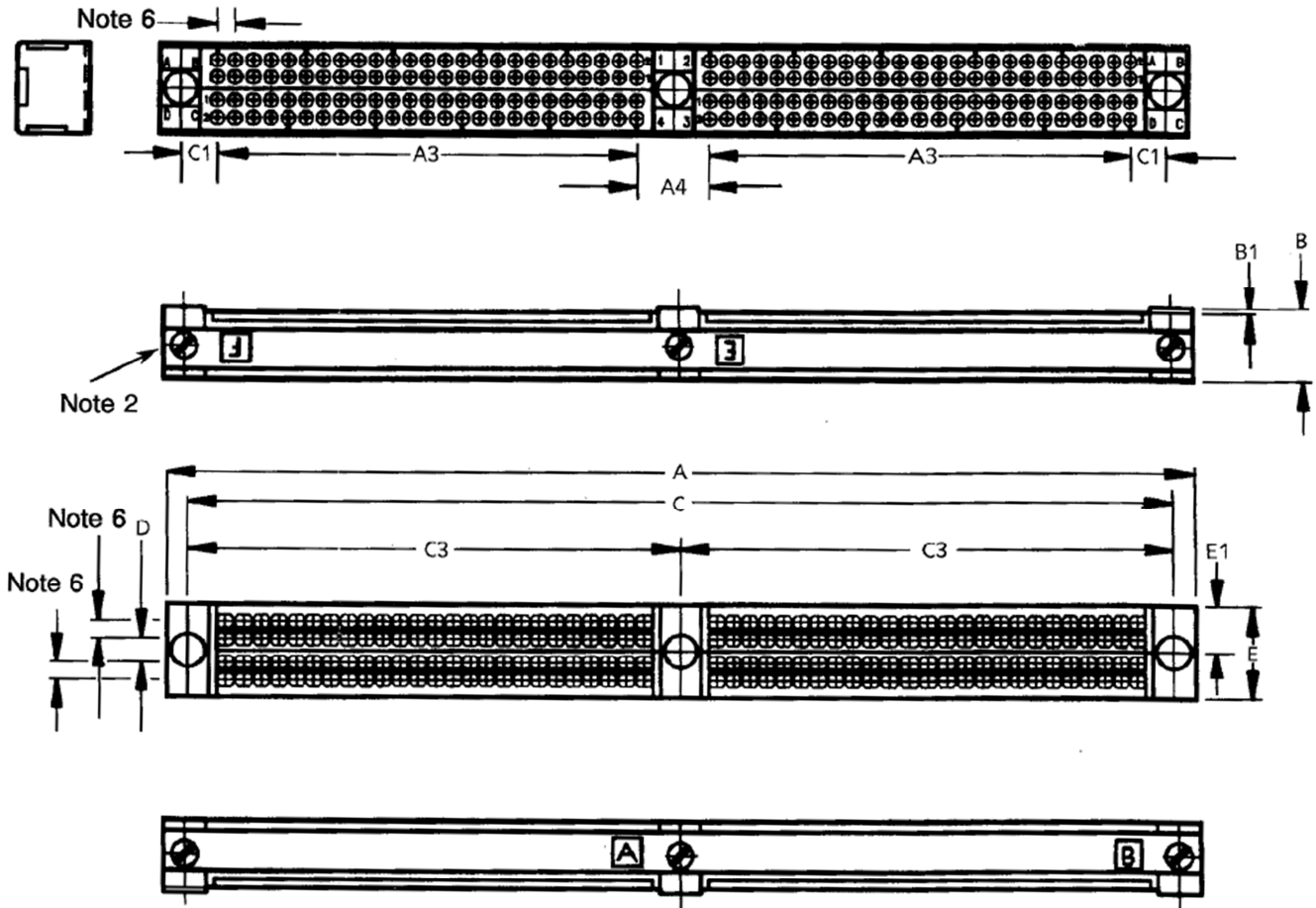


Symbol / Dim. (1)	<u>A</u>	<u>A2</u>	<u>A3</u>	<u>A4</u>	B	B1	<u>C</u>	<u>C1</u>	<u>C2</u>	<u>C3</u>	<u>D</u>	E	<u>E1</u>
Min.	88.8	22.66	45.52	7.74	7.75	0.3	84.3	3.77	30.65	53.51	2.34	9.9	4.9
Max.	89.1	23.06	45.92	8.14	8.05	0.6	84.6	4.17	30.95	53.81	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 200 CONTACTS

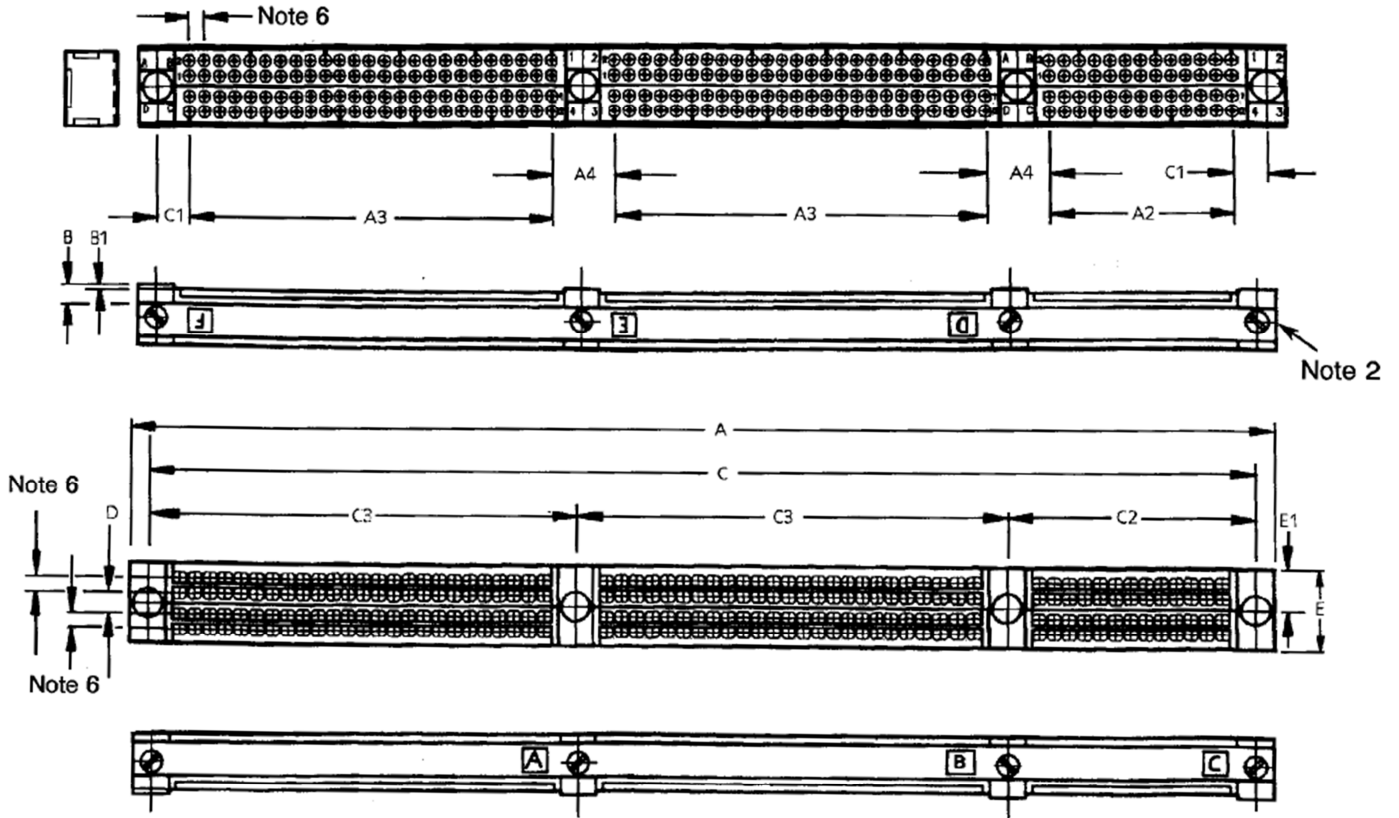


Symbol / Dim. (1)	A	<u>A3</u>	<u>A4</u>	B	B1	<u>C</u>	<u>C1</u>	<u>C3</u>	D	E	<u>E1</u>
Min.	111.6	45.52	7.74	7.75	0.3	107.16	3.77	53.51	2.34	9.9	4.9
Max.	111.9	45.92	8.14	8.05	0.6	107.46	4.17	53.81	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 252 CONTACTS

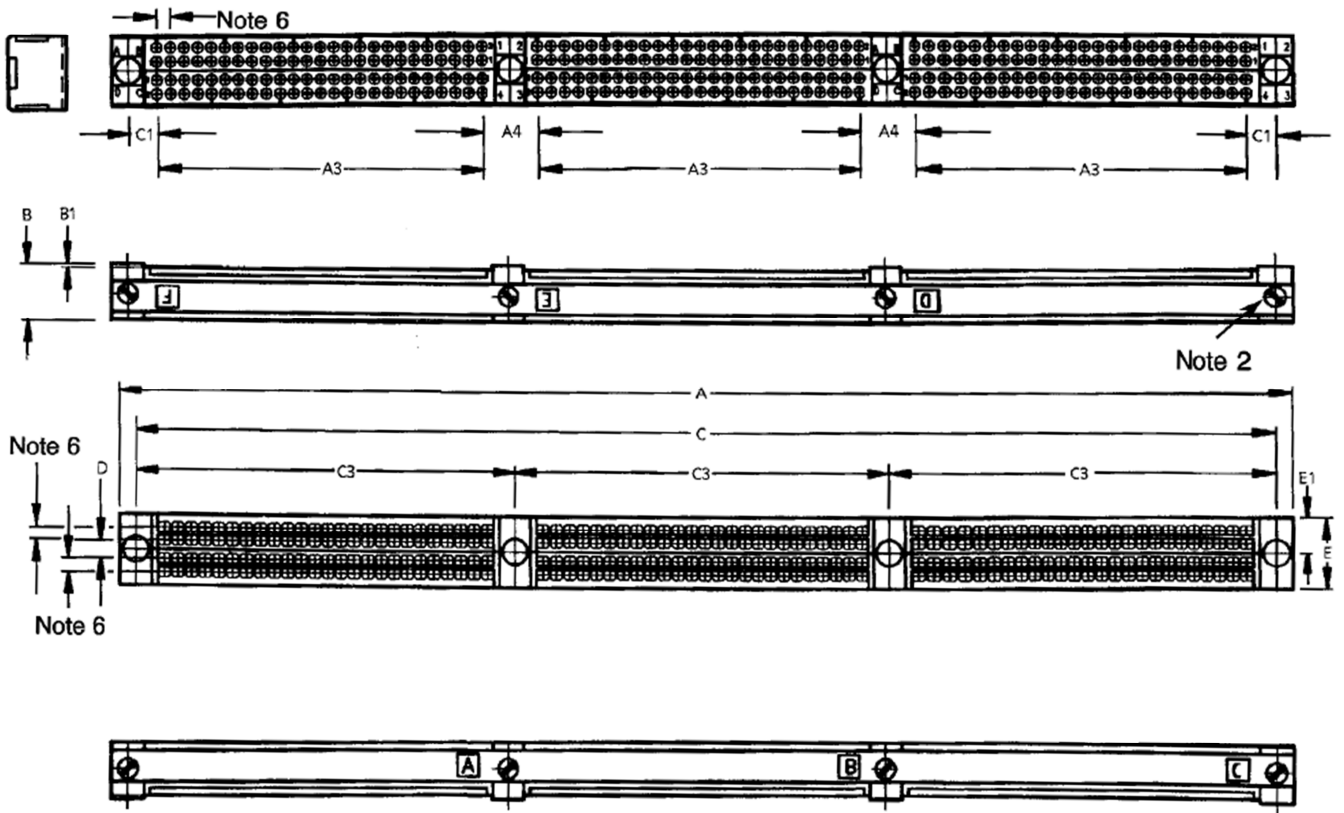


Symbol / Dim. (1)	<u>A</u>	<u>A<sub>2</sub></u>	<u>A<sub>3</sub></u>	<u>A<sub>4</sub></u>	B	B <sub>1</sub>	<u>C</u>	<u>C<sub>1</sub></u>	<u>C<sub>2</sub></u>	<u>C<sub>3</sub></u>	<u>D</u>	E	<u>E<sub>1</sub></u>
Min.	142.5	22.66	45.52	7.74	7.75	0.3	137.96	3.77	30.65	53.51	2.34	9.9	4.9
Max.	142.8	23.06	45.92	8.14	8.05	0.6	138.26	4.17	30.95	53.81	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 300 CONTACTS

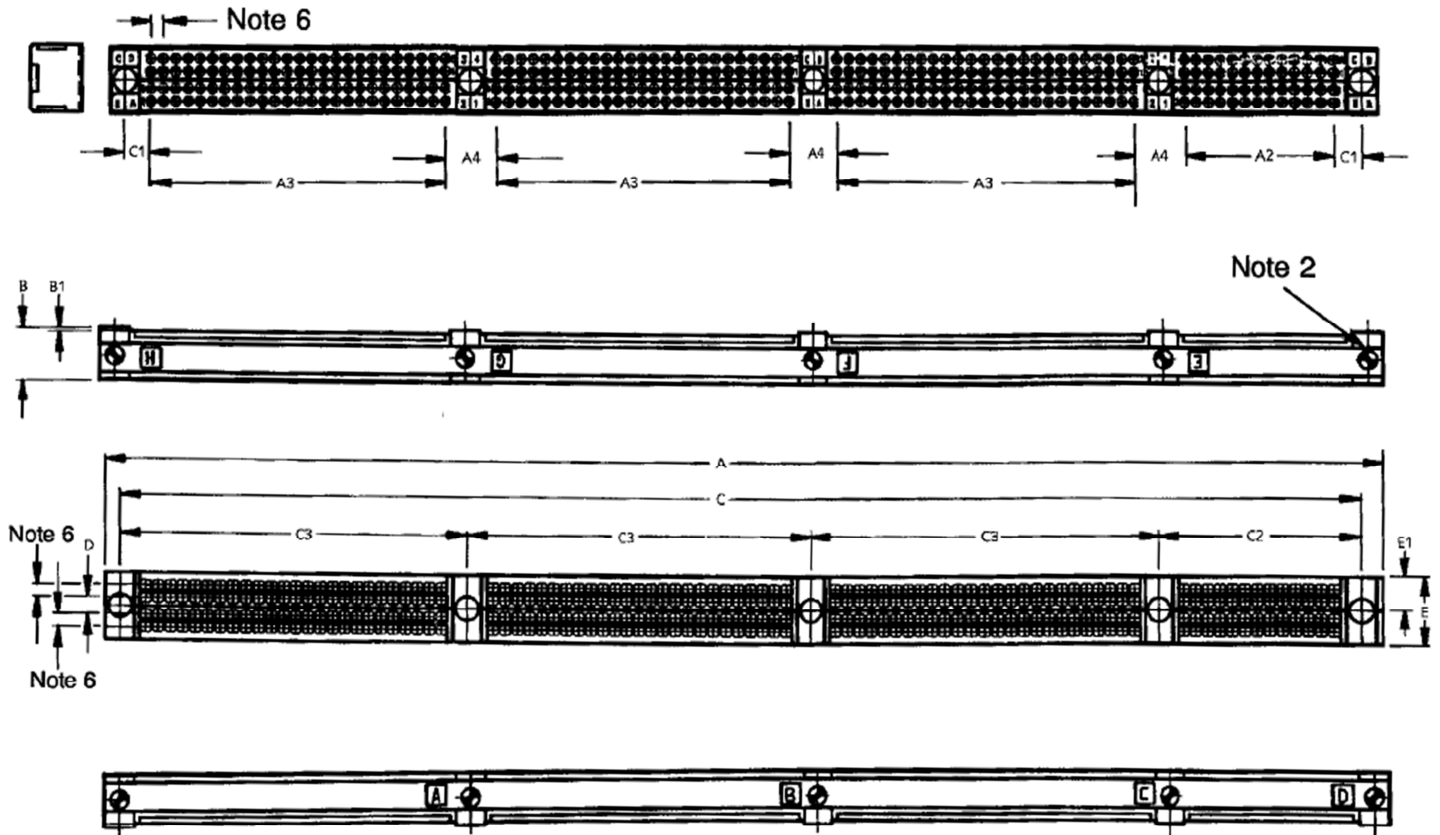


Symbol / Dim. (1)	<u>A</u>	<u>A3</u>	<u>A4</u>	B	B1	<u>C</u>	<u>C1</u>	<u>C3</u>	<u>D</u>	E	<u>E1</u>
Min.	165.3	45.52	7.74	7.75	0.3	160.82	3.77	53.51	2.34	9.9	4.9
Max.	165.6	45.92	8.14	8.05	0.6	161.12	4.17	53.81	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 352 CONTACTS

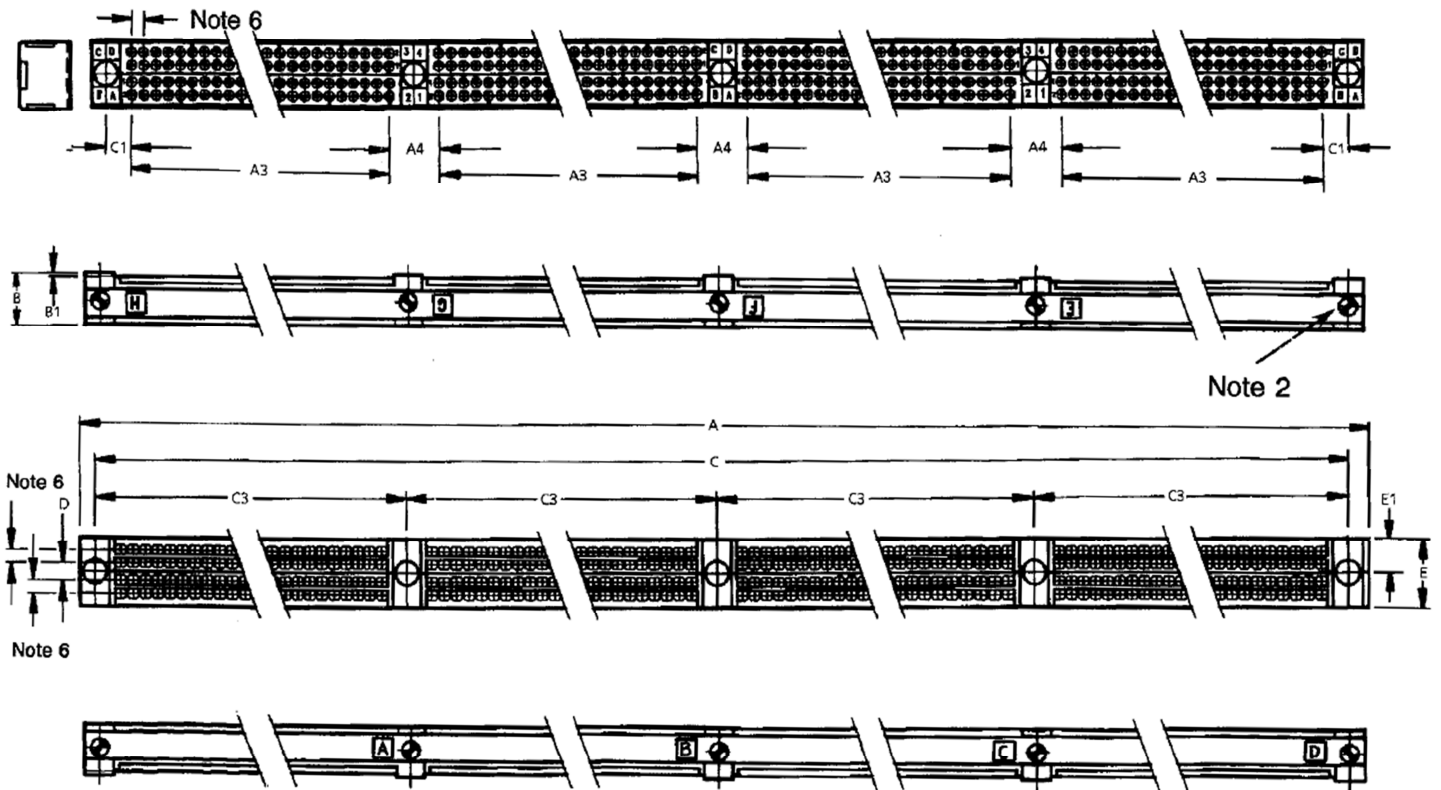


Symbol / Dim. (1)	<u>A</u>	<u>A2</u>	<u>A3</u>	<u>A4</u>	B	B1	<u>C</u>	<u>C1</u>	<u>C2</u>	<u>C3</u>	<u>D</u>	E	<u>E1</u>
Min.	196.2	22.66	45.52	7.74	7.75	0.3	191.62	3.77	30.65	53.51	2.34	9.9	4.9
Max.	196.8	23.06	45.92	8.14	8.05	0.6	191.92	4.17	30.95	53.81	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

RECEPTACLE, 400 CONTACTS



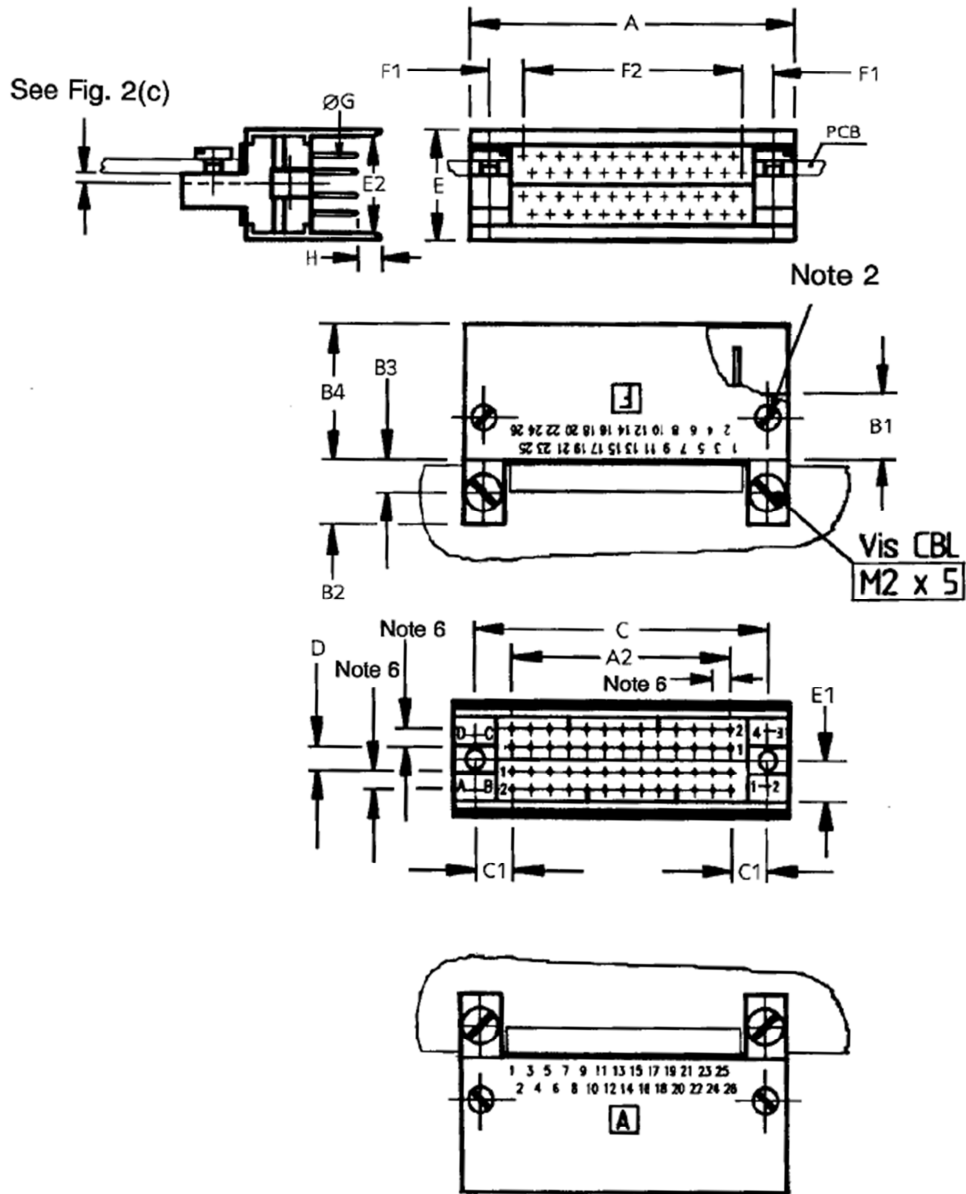
Symbol / Dim. (1)	A	<u>A3</u>	<u>A4</u>	B	B1	<u>C</u>	<u>C1</u>	<u>C3</u>	<u>D</u>	E	<u>E1</u>
Min.	219	45.52	7.74	7.75	0.3	214.48	3.77	53.51	2.34	9.9	4.9
Max.	219.3	45.92	8.14	8.05	0.6	214.78	4.17	53.81	2.74	10.1	5.1

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.



PLUG, 52 CONTACTS

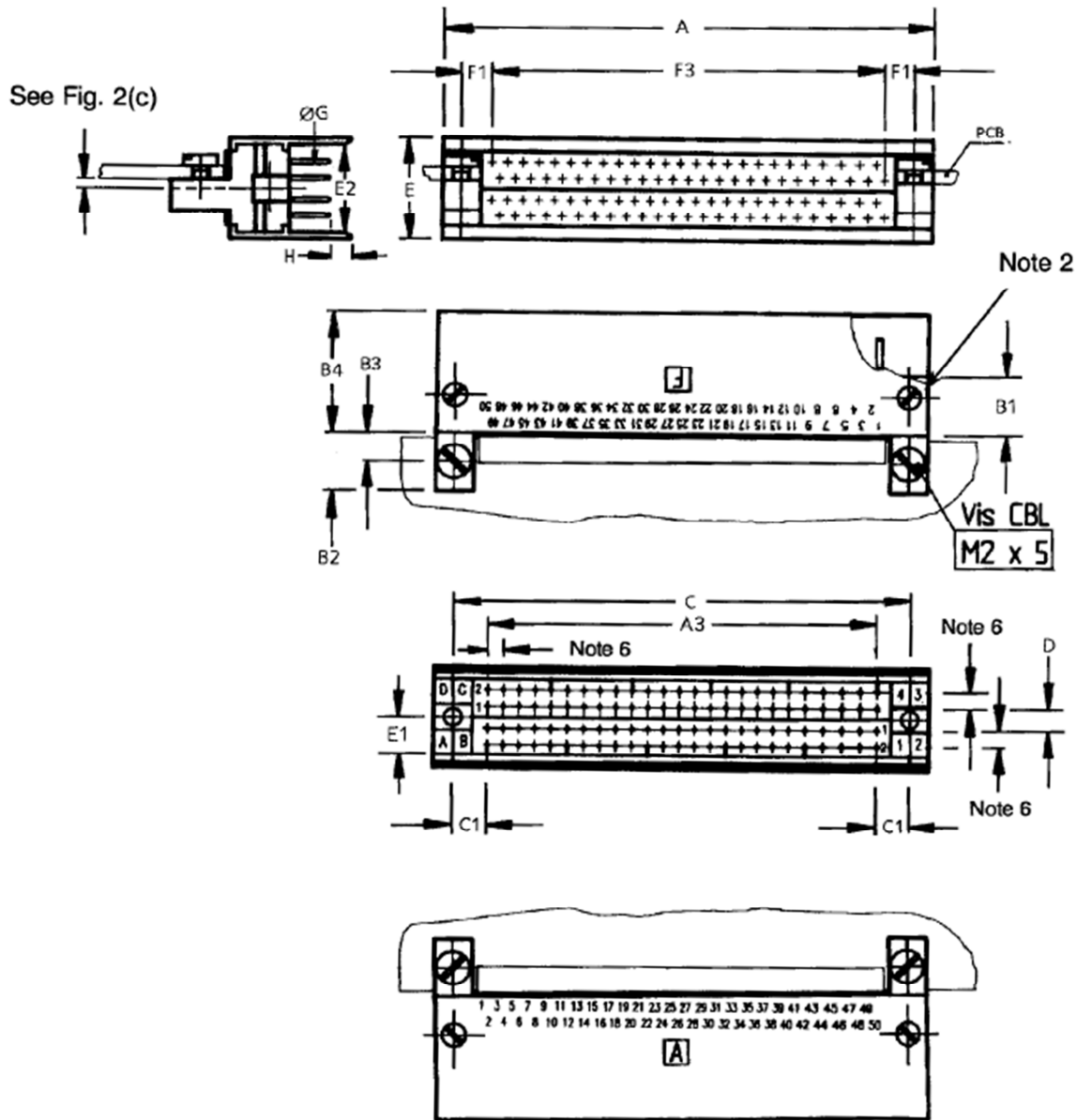


Symbol / Dim. (1)	A	<u>A2</u>	B1	B2	B3	B4	<u>C</u>	<u>C1</u>	<u>D</u>	E	E1	E2	<u>F1</u>	<u>F2</u>	ØG	H
Min.	35.1	22.66	7	-	3.5	14.3	30.65	3.77	2.34	-	5.05	10.2	3.29	23.61	0.42	2
Max.	35.4	23.06	7.2	7.4	3.6	14.6	30.95	4.17	2.74	12	5.25	10.45	3.69	24.01	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 100 CONTACTS

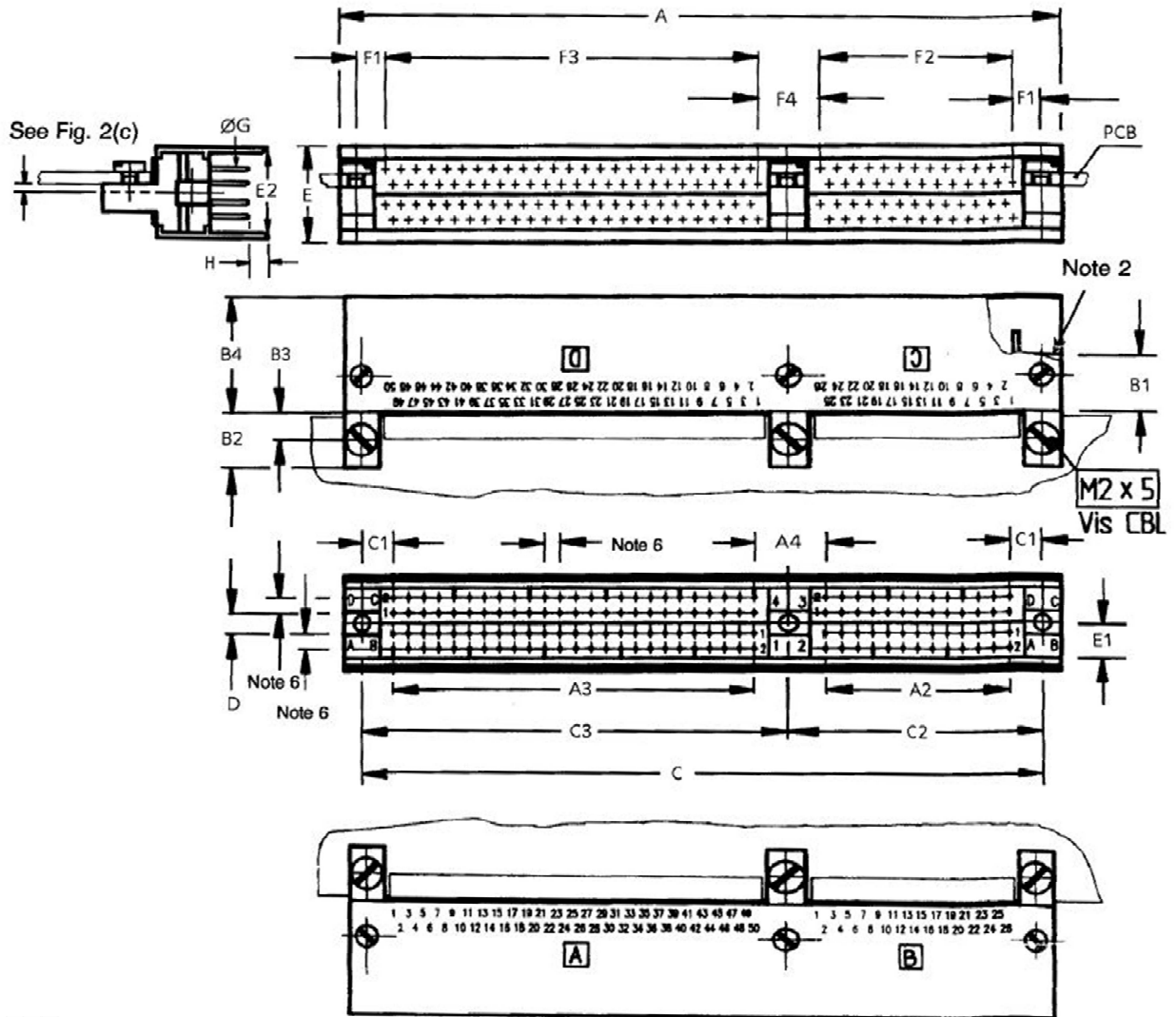


Symbol / Dim. (1)	A	<u>A3</u>	B1	B2	B3	B4	<u>C</u>	<u>C1</u>	<u>D</u>	E	E1	E2	<u>F1</u>	<u>F3</u>	ØG	H
Min.	57.9	45.52	7	-	3.5	14.3	53.51	3.77	2.34	-	5.05	10.2	3.29	46.47	0.42	2
Max.	58.2	45.92	7.2	7.4	3.6	14.6	53.81	4.17	2.74	12	5.25	10.45	3.69	46.87	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 152 CONTACTS

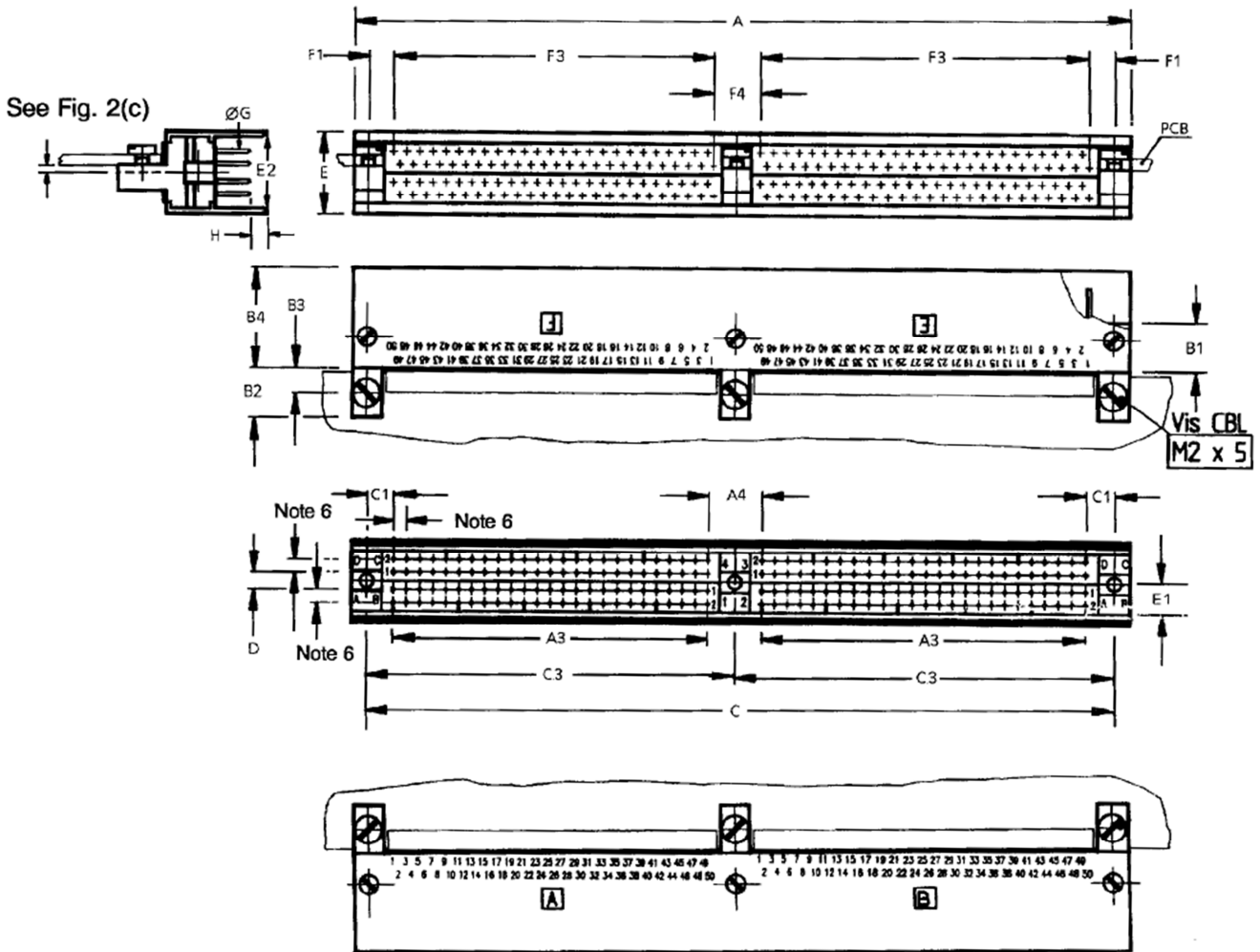


Symbol / Dim. (1)	A	<u>A2</u>	<u>A3</u>	<u>A4</u>	B1	B2	B3	B4	<u>C</u>	<u>C1</u>	<u>C2</u>	<u>C3</u>	<u>D</u>	E	E1	E2	F1	F2	F3	F4	ØG	H
Min.	88.8	22.66	45.52	7.74	7	-	3.5	14.3	84.305	3.77	30.65	53.51	2.34	-	5.05	10.2	3.29	23.61	46.47	6.79	0.42	2
Max.	89.1	23.06	45.92	8.14	7.2	7.4	3.6	14.6	84.605	4.17	30.95	53.81	2.74	12	5.25	10.45	3.69	24.01	46.87	7.19	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 200 CONTACTS

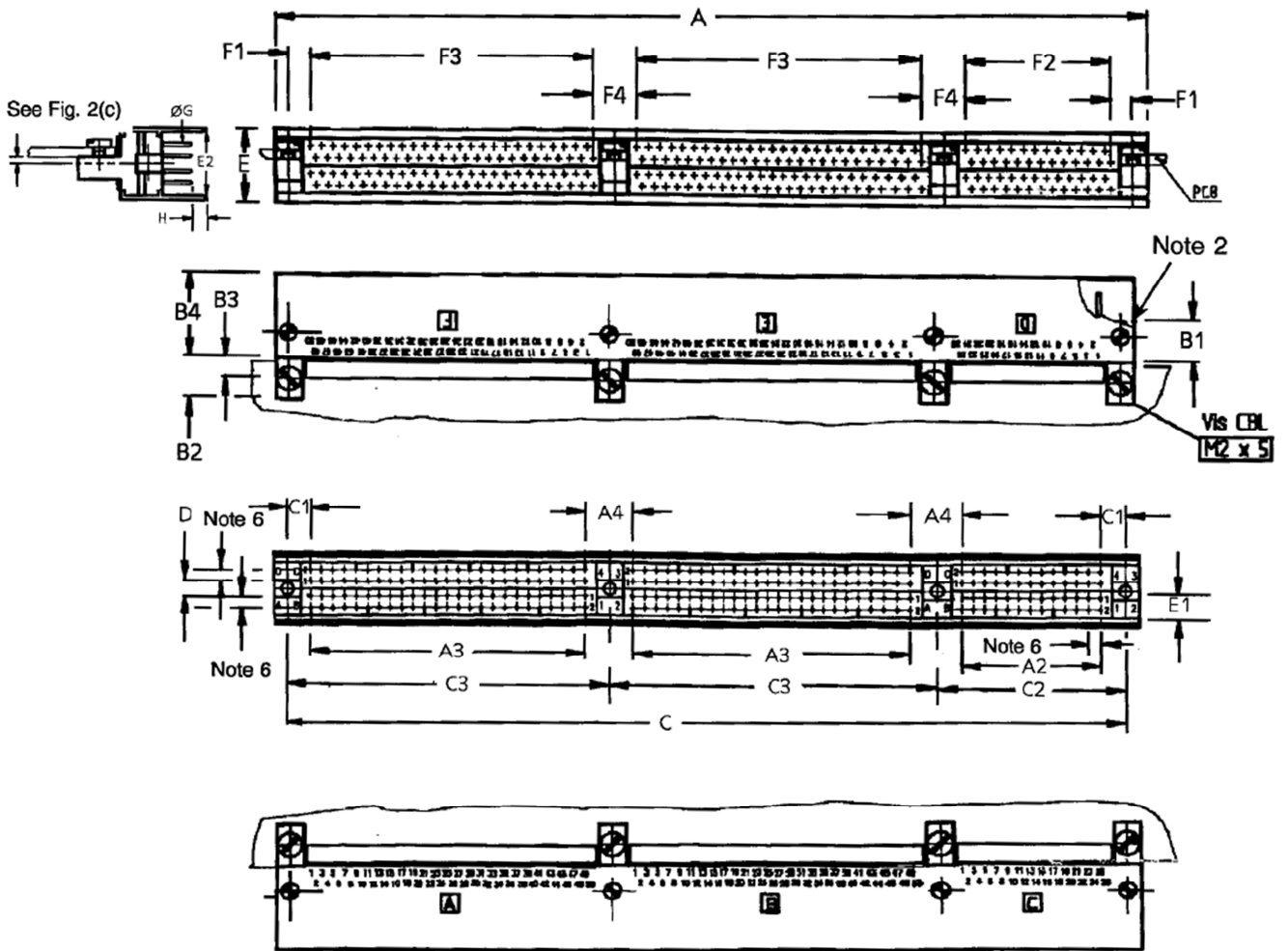


Symbol / Dim. (1)	A	<u>A3</u>	<u>A4</u>	B1	B2	B3	B4	<u>C</u>	<u>C1</u>	<u>C3</u>	D	E	E1	E2	F1	F3	F4	ØG	H
Min.	111.6	45.52	7.74	7	-	3.5	14.3	107.17	3.77	53.51	2.34	-	5.05	10.2	3.29	46.47	6.79	0.42	2
Max.	111.9	45.92	8.14	7.2	7.4	3.6	14.6	107.47	4.17	53.81	2.74	12	5.25	10.45	3.69	46.87	7.19	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 252 CONTACTS

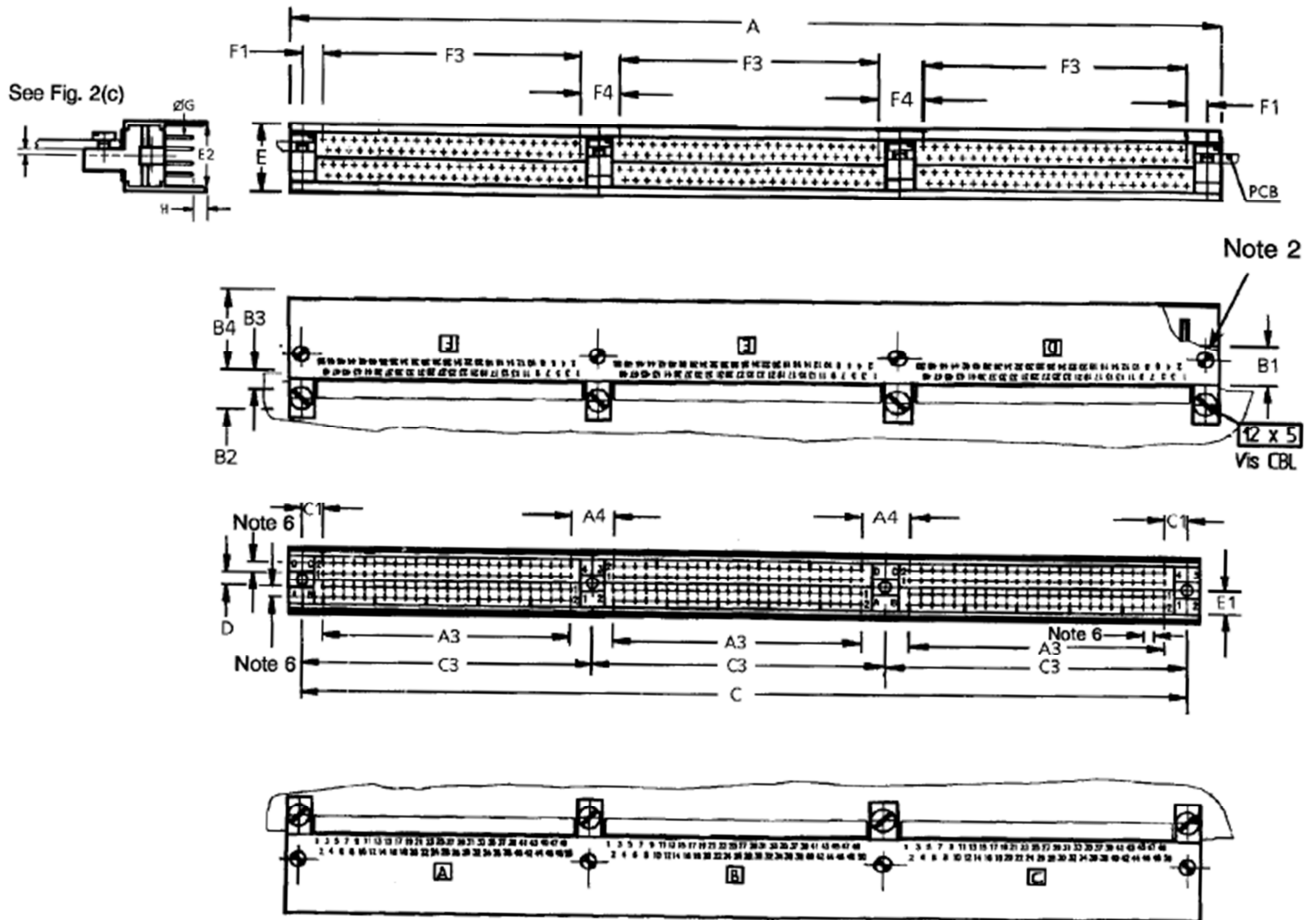


Symbol / Dim. (1)	A	<u>A2</u>	<u>A3</u>	<u>A4</u>	B1	B2	B3	B4	C	<u>C1</u>	<u>C2</u>	<u>C3</u>	D	E	E1	E2	F1	F2	F3	F4	ØG	H
Min.	142.5	22.66	45.52	7.74	7	-	3.5	14.3	137.96	3.77	30.65	53.51	2.34	-	5.05	10.2	3.29	23.61	46.47	6.79	0.42	2
Max.	142.8	23.06	45.92	8.14	7.2	7.4	3.6	14.6	138.26	4.17	30.95	53.81	2.74	12	5.25	10.45	3.69	24.01	46.87	7.19	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 300 CONTACTS

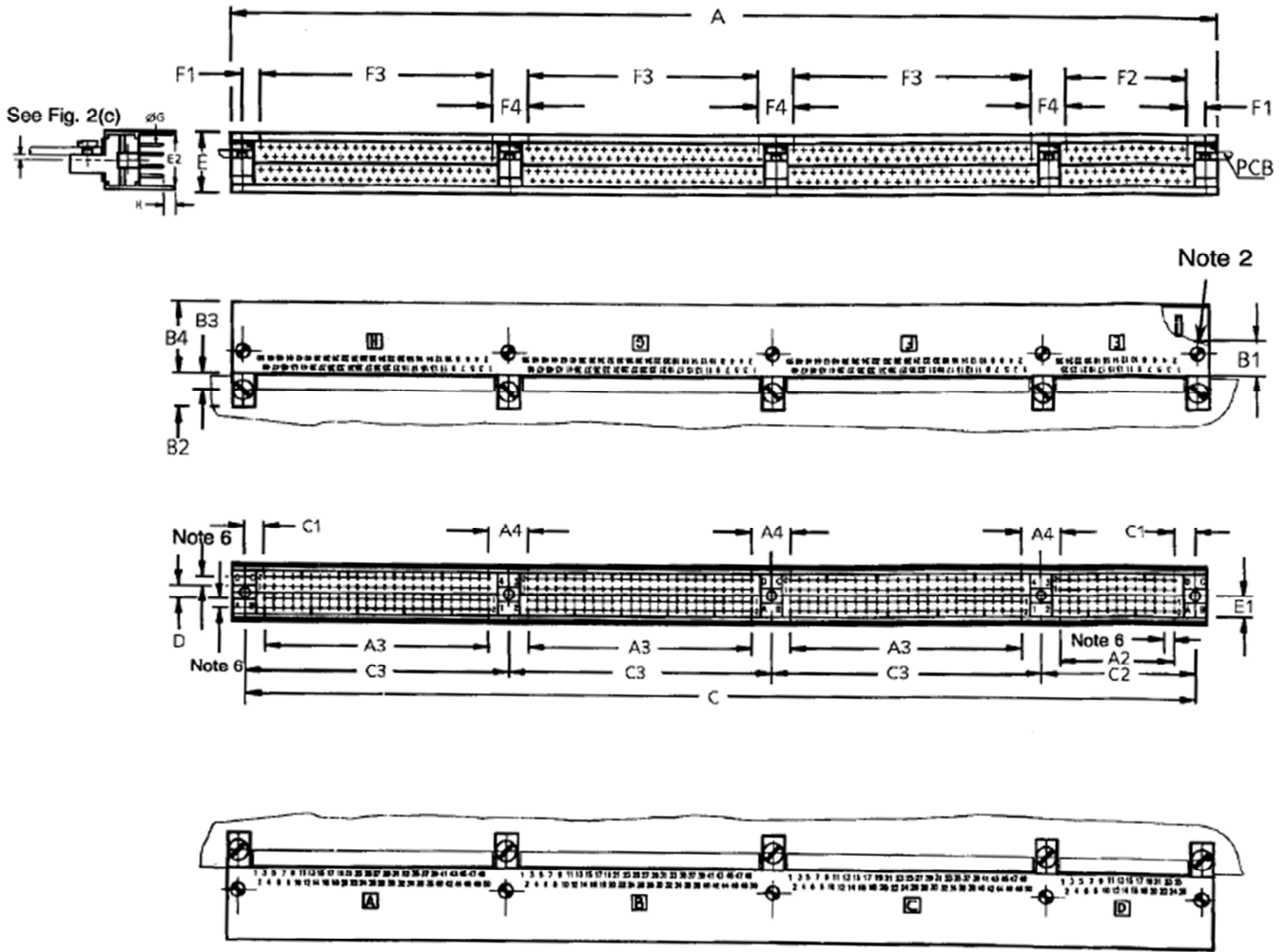


Symbol / Dim. (1)	A	<u>A3</u>	<u>A4</u>	B1	B2	B3	B4	<u>C</u>	<u>C1</u>	<u>C3</u>	D	E	E1	E2	<u>F1</u>	<u>F3</u>	<u>F4</u>	ØG	H
Min.	165.3	45.52	7.74	7	-	3.5	14.3	160.82	3.77	53.51	2.34	-	5.05	10.2	3.29	46.47	6.79	0.42	2
Max.	165.6	45.92	8.14	7.2	7.4	3.6	14.6	161.12	4.17	53.81	2.74	12	5.25	10.45	3.69	46.87	7.19	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 352 CONTACTS

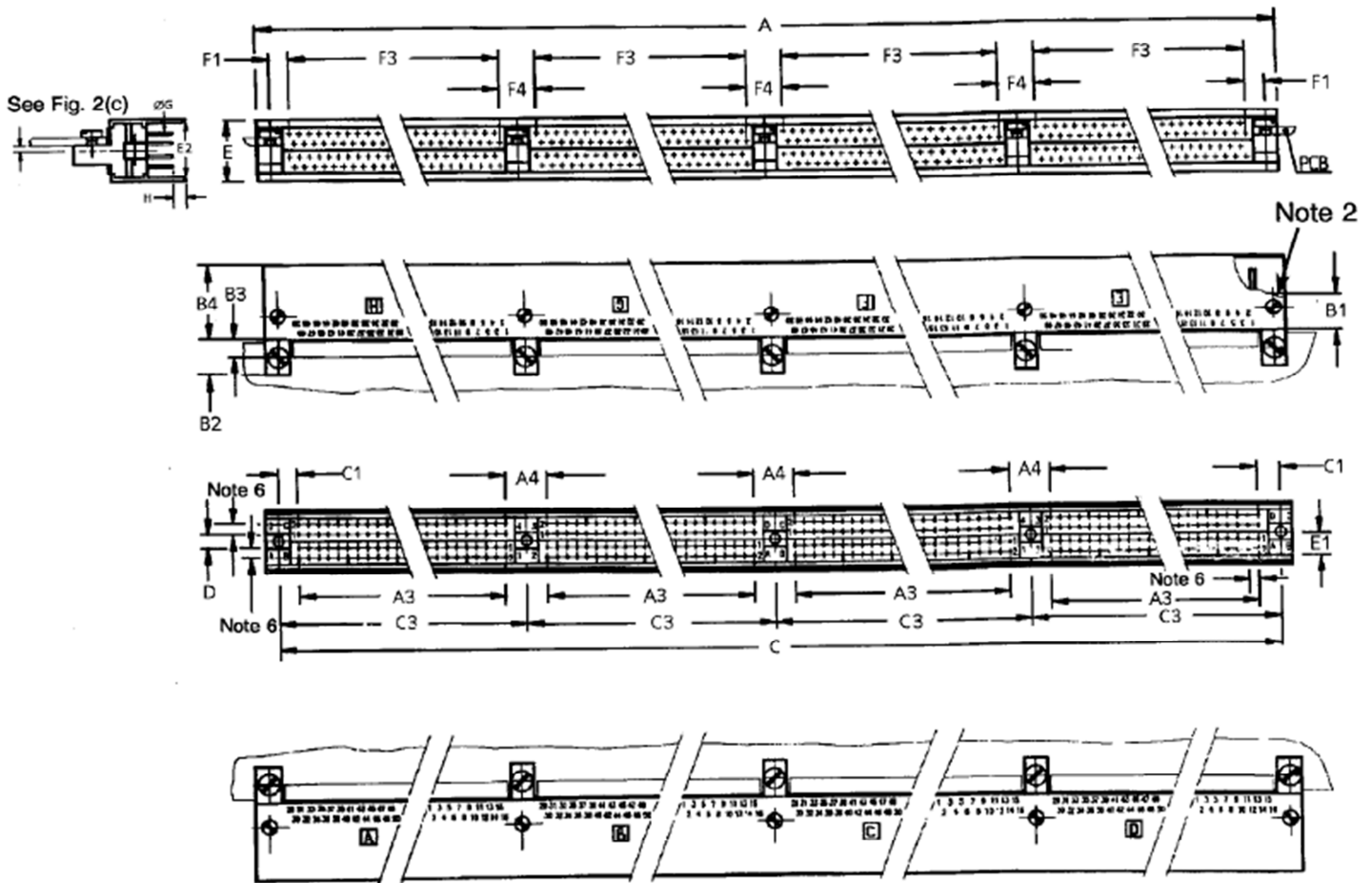


Symbol / Dim. (1)	A	<u>A2</u>	<u>A3</u>	<u>A4</u>	B1	B2	B3	B4	C	<u>C1</u>	<u>C2</u>	<u>C3</u>	D	E	E1	E2	F1	F2	<u>F3</u>	F4	ØG	H
Min.	196.2	22.66	45.52	7.74	7	-	3.5	14.3	191.62	3.77	30.65	53.51	2.34	-	5.05	10.2	3.29	23.61	46.47	6.79	0.42	2
Max.	196.5	23.06	45.92	8.14	7.2	7.4	3.6	14.6	191.92	4.17	30.95	53.81	2.74	12	5.25	10.45	3.69	24.01	46.87	7.19	0.44	3

**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.

PLUG, 400 CONTACTS



Symbol / Dim. (1)	A	<u>A3</u>	<u>A4</u>	B1	B2	B3	B4	<u>C</u>	<u>C1</u>	<u>C3</u>	D	E	E1	E2	<u>F1</u>	<u>F3</u>	<u>F4</u>	ØG	H
Min.	219	45.52	7.74	7	-	3.5	14.3	214.48	3.77	53.51	2.34	-	5.05	10.2	3.29	46.47	6.79	0.42	2
Max.	219.3	45.92	8.14	7.2	7.4	3.6	14.6	214.78	4.17	53.81	2.74	12	5.25	10.45	3.69	46.87	7.19	0.44	3

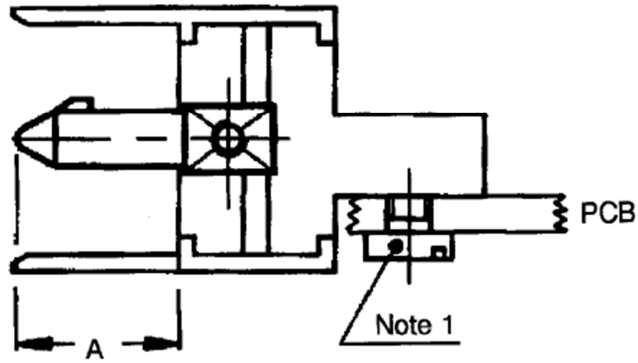
**NOTES:**

1. All dimensions are in millimetres.
2. Torque: 10N.cm.
3. Underlined dimensions, in table, are critical to ensure intermateability.
4. The front of the insert shall be marked with the minimum marking shown.
5. Orientation of labelling of contacts and guiding devices is not a true representation.
6. Pitch: 1.905mm.



**FIGURE 2(b) – GUIDING AND LOCKING DEVICES**

**CODE 110**

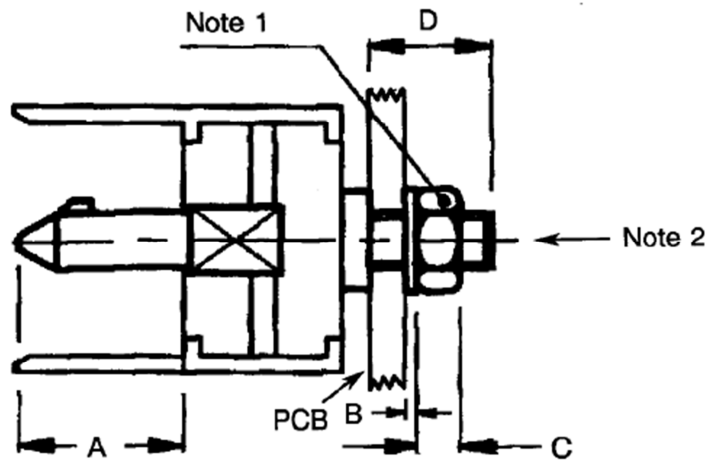


Symbol	Millimetres	
	Min.	Max.
A	7	7.35

**NOTES:**

1. Torque: 15N.cm.

**CODE 111**

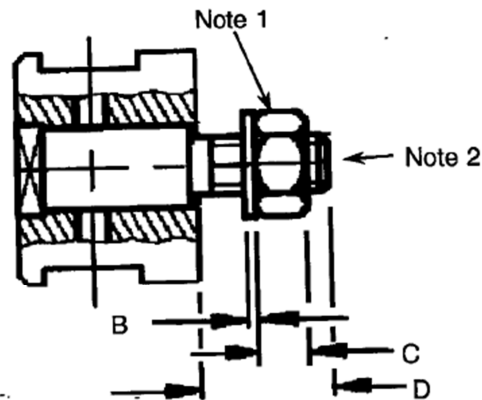


Symbol	Millimetres	
	Min.	Max.
A	7	7.35
B	0.45	0.55
C	1.9	2.1
D	-	5.5

**NOTES:**

1. Torque: 25N.cm.
2. M2.5.

CODE 121

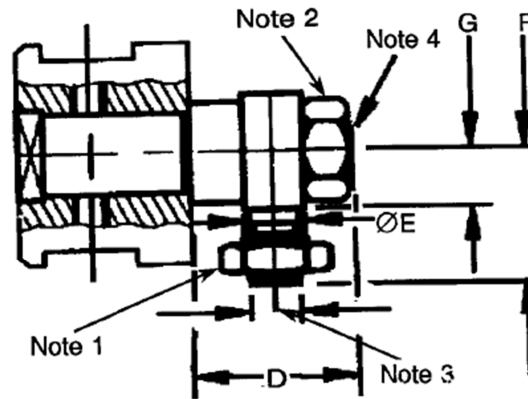


Symbol	Millimetres	
	Min.	Max.
B	0.45	0.55
C	1.9	2.1
D	-	5.5

**NOTES:**

1. Torque: 25N.cm.
2. M2.5.

CODES 124 AND 134

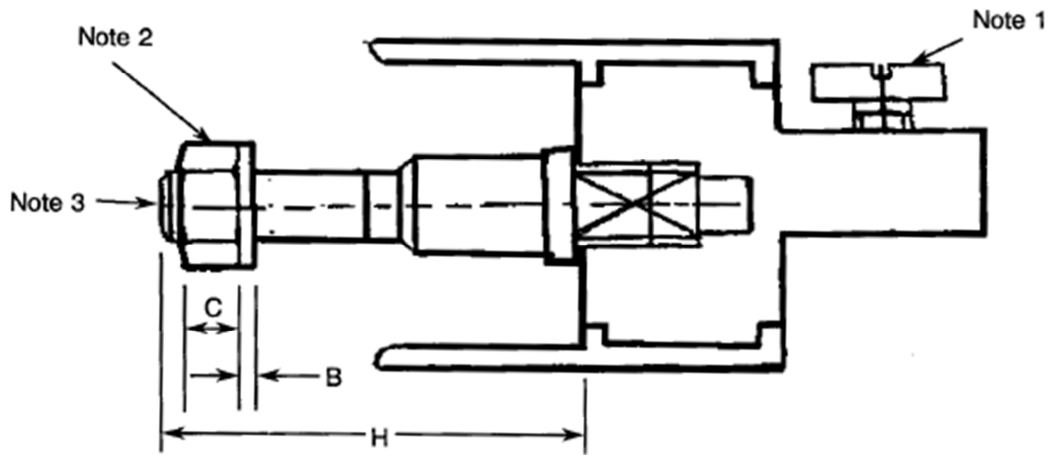


Symbol	Millimetres		Notes
	Min.	Max.	
D	-	7	
ØE	2.45	2.55	
F	-	6	Code 124
F	-	6.6	Code 134
G	2.6	2.7	

**NOTES:**

1. Torque: 15N.cm.
2. Torque: 25N.cm.
3. M2.
4. M2.5.

CODE 201



Symbol	Millimetres	
	Min.	Max.
B	0.45	0.55
C	1.9	2.1
H	-	15

**NOTES:**

1. Torque: 15N.cm.
2. Torque: 25N.cm.
3. M2.5.

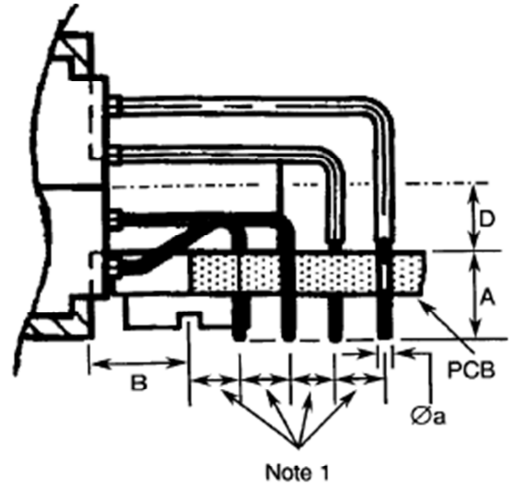
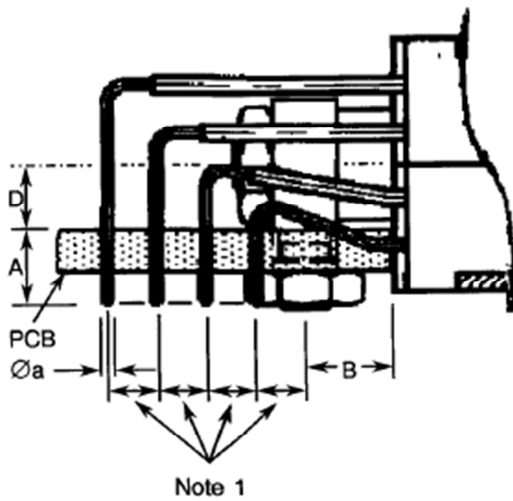
**FIGURE 2(c) – CONTACT MOUNTING CONFIGURATIONS – VIEW OF REAR PART OF CONNECTOR**

**CODES 10, 11 AND 12**

**RIGHT-ANGLE SOLDER CONTACTS**

**RECEPTACLE SIDE**

**PLUG SIDE**



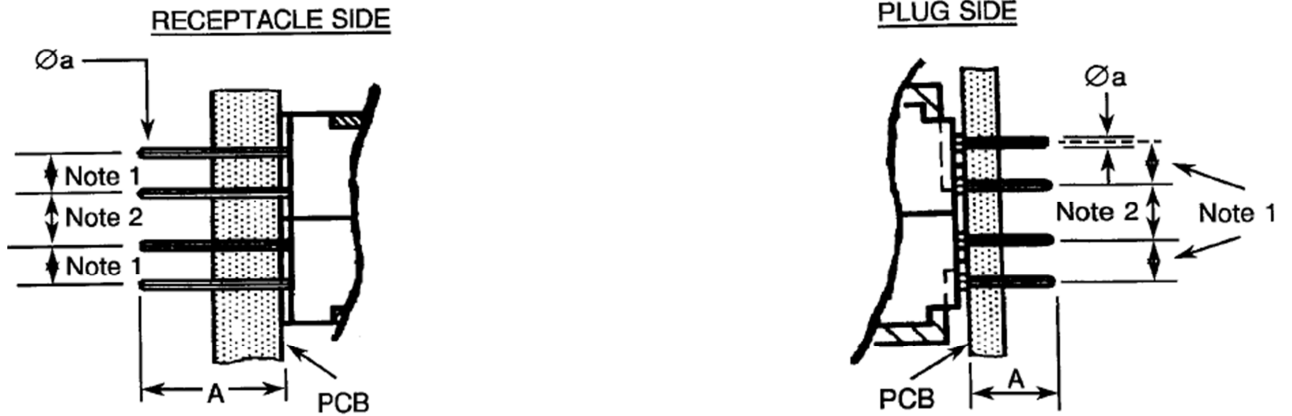
Symbol	Code 10 Plug and Receptacle		Code 11 Receptacle Only		Code 12 Plug Only		
	Millimetres						
Symbol	Min.	Max.	Min.	Max.	Min.	Max.	
A	2.6	3.8	3.1	4.3	4.1	5.3	
B	Plug	3.4	3.6	-	-	3.4	3.6
	Recept.	3.2	3.8	3.2	3.8	-	-

Symbol	Millimetres	
	Minimum	Maximum
Øa	0.36	0.44
D	2.6	2.7

**NOTES:**

1. Pitch: 1.905mm.

CODES 30 AND 31  
STRAIGHT SOLDER CONTACTS



	Code 30		Code 31		Code 31	
	Plug and Receptacle		Receptacle		Plug	
	Millimetres					
Symbol	Min.	Max.	Min.	Max.	Min.	Max.
A	3.5	4	6.1	6.6	4.6	5.1

Symbol	Millimetres	
	Minimum	Maximum
Øa	0.36	0.44

**NOTES:**

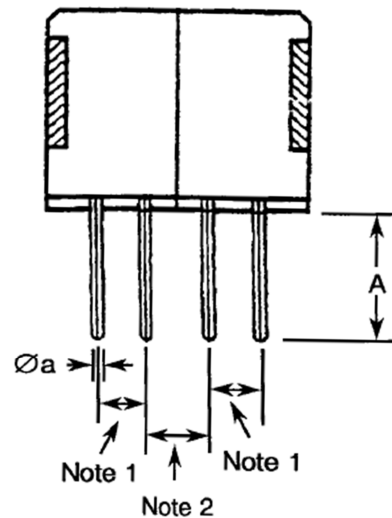
1. Pitch: 1.905mm.
2. Pitch: 2.54mm.

CODE 91 – SAVER

Symbol	Millimetres	
	Minimum	Maximum
A	4.5	5.5
Øa	0.42	0.44

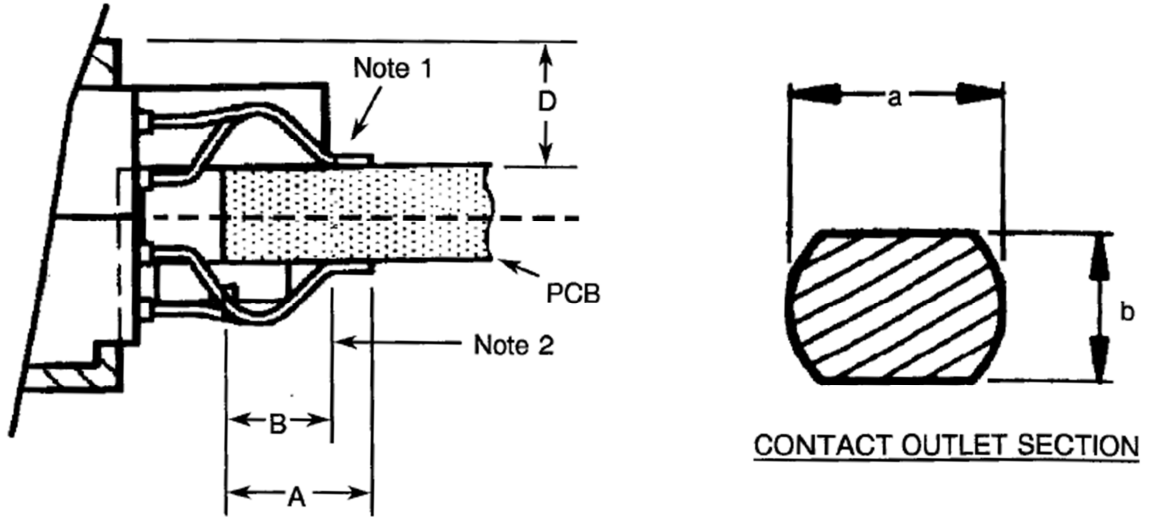
**NOTES:**

1. Pitch: 1.905mm.
2. Pitch: 2.54mm.



CODE 43

SURFACE MOUNT – APPLICABLE TO PLUGS ONLY



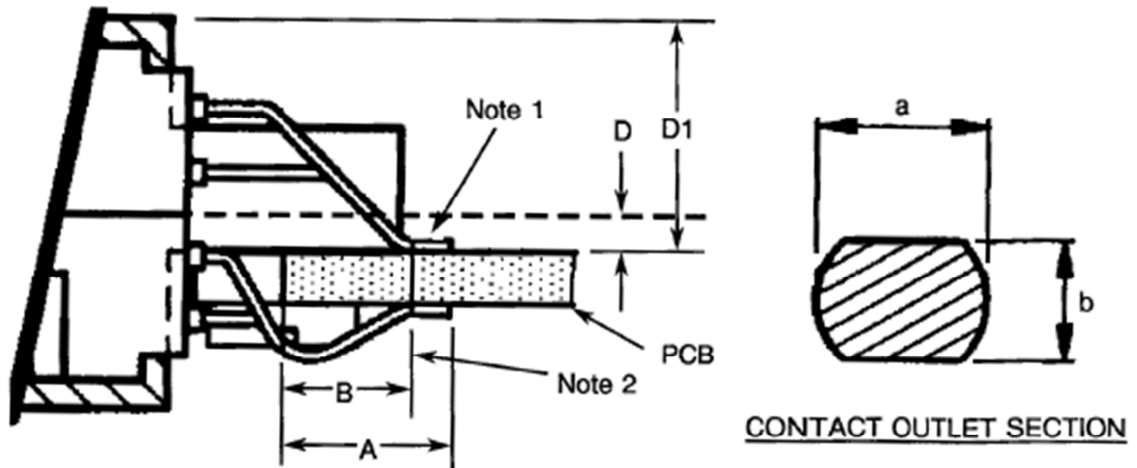
Symbol	Millimetres	
	Min.	Max.
a	0.25	0.45
A	-	5.5
b	0.2	0.4
B	3	4.1
D	-	4.8

**NOTES:**

1. See section. Pitch: 0.9525mm.
2. Contact point.

CODES 45 AND 47

SURFACE MOUNT OFF-CENTRE – APPLICABLE TO PLUGS ONLY



Symbol	Code 45		Code 47	
	Millimetres			
	Min.	Max.	Min.	Max.
A	-	5	-	5

Symbol	Millimetres	
	Minimum	Maximum
a	0.25	0.45
b	0.2	0.4
B	3	4.1
D	0.9	1.2
D1	-	7

**NOTES:**

1. See section. Pitch: 0.9525mm.
2. Contact point.

**4 REQUIREMENTS**

**4.1 GENERAL**

The complete requirements for procurement of the connectors specified herein are stated in this specification and ESCC Generic Specification No. 3401. Deviations from the Generic Specification, applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

## 4.2 DEVIATIONS FROM GENERIC SPECIFICATION

### 4.2.1 Deviations from Special In-process Controls

None.

### 4.2.2 Deviations from Final Production Tests (Chart II)

- (a) Para. 9.1.1.4, Mated Shell Conductivity: Not applicable.
- (b) Para. 9.4, Contact Capability: Sampling in accordance with Para. 9.6 of ESCC No. 3401.
- (c) Para. 9.5, Magnetism Level: Not applicable.
- (d) Para. 9.9, Seal Test: Not applicable.

### 4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

Chart III is not applicable.

### 4.2.4 Deviations from Qualification Tests (Chart IV)

- (a) Para. 9.1.1.4, Mated Shell Conductivity: Not applicable.
- (b) Para. 9.9, Seal Test: Not applicable.
- (c) Para. 9.15, Joint Strength: Not applicable.
- (d) Para. 9.24, Jackscrew Retention: Not applicable.
- (e) Para. 9.27, Maintenance Aging: Not applicable.
- (f) Para. 9.30, Probe Damage: Not applicable.

### 4.2.5 Deviations from Lot Acceptance Tests (Chart V)

- (a) Para. 9.1.1.4, Mated Shell Conductivity: Not applicable.
- (b) Para. 9.9, Seal Test: Not applicable.
- (c) Para. 9.15, Joint Strength: Not applicable.
- (d) Para. 9.27, Maintenance Aging: Not applicable.
- (e) Para. 9.30, Probe Damage: Not applicable.

## 4.3 MECHANICAL REQUIREMENTS

### 4.3.1 Dimension Check

The dimensions of the connectors specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESCC Generic Specification No. 3401 and shall conform to those shown in Figure 2 of this specification. Only the following dimensions shall be checked during procurement:

#### Figure 2(a)

- Between centres of guiding or locking device. (Dimensions C, C2 and C3).
- Dimension E1 (where applicable).

#### Figure 2(b)

- Protrusion of guiding/locking devices.
- Overall dimensions of guiding/locking devices.

#### Figure 2(c)

All dimensions, except pitch.

### 4.3.2 Weight

The maximum weight of the connectors, with contacts and guiding and locking devices specified herein, shall be as specified in Table 1(a).



4.3.3 Contact Capability

For the purpose of this test, the pick-up and drop weights shall be as follows.

	Pick-up Weight	Drop Weight
Weight (g)	5	70
Pin Diameter (mm)	0.415 - 0.42	0.44 - 0.445
Insertion Depth (mm)	5	5

4.3.4 Contact Retention (In Insert)

The contact retention force (compression) within the insert shall be 40N.

4.3.5 Mating and Unmating Forces

The forces applied for mating and unmating of the connectors shall not exceed the values specified in Table 1(a).

4.3.6 Insert Retention (In Shell)

Connector inserts shall withstand a pressure of 25N/cm<sup>2</sup> without being dislodged from the shell.

4.3.7 Jackscrew Retention

Not applicable.

4.3.8 Contact Insertion and Withdrawal Forces

Not applicable.

4.3.9 Engagement and Separation Forces

The diameter of the test pin and the engagement and separation forces of the female contacts shall be as specified hereunder.

	Diameter (mm)		Engagement Max. (N)	Separation (N)	
	Min.	Max.		Min.	Max.
Minimum Diameter Test Pin	0.415	0.42	-	0.05	-
Maximum Diameter Test Pin	0.44	0.445	0.7	-	0.7

4.3.10 Oversize Pin Exclusion

The diameter of the test pin shall be 0.598mm minimum and 0.602mm maximum and the force applied to it shall be 0.7N.

4.3.11 Probe Damage

Not applicable.

4.3.12 Solderability

No special conditions.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the connectors specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Shells

Shells shall be made of aluminium alloy with an appropriate surface treatment against corrosion.

#### 4.4.2 Inserts

The inserts shall be made of glass-fibre-filled diallylphthalate resin.

#### 4.4.3 Contacts

##### 4.4.3.1 *Body*

The contact body shall be made of copper alloy.

- Male Contact and Saver: The plating shall be 1.27µm minimum gold over 1.27µm minimum nickel.
- Female Contact: The plating shall be 0.25µm minimum gold over 1.27µm minimum nickel.

##### 4.4.3.2 *Female Contact Wire*

The wire shall be made of copper alloy.

The plating shall be 1.27µm minimum gold over 0.2µm minimum nickel.

##### 4.4.3.3 *Female Contact Sleeve*

The sleeve shall be made of copper alloy. The plating shall be 0.25µm minimum gold over 0.8µm minimum nickel.

##### 4.4.3.4 *Tinned Terminations (Insert Codes 46 and 57)*

Solder dipped, tin/lead 63/37, minimum thickness 1µm, minimum length 3.5mm.

#### 4.4.4 Contact Retaining Clip

Not applicable.

#### 4.4.5 Guiding and Locking Devices

Guiding and locking devices shall be made of brass (nickel-plated), stainless steel or arcap alloy.

#### 4.4.6 Magnetism Level

Not applicable.

### 4.5 MARKING

#### 4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking as specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked, and the order of precedence, shall be as follows:

- (a) Contact Position.
- (b) The ESCC Component Number.
- (c) Characteristics.
- (d) Traceability information.

#### 4.5.2 Contact Position

Contact position shall be marked on the inserts in accordance with Figure 2(a).

#### 4.5.3 The ESCC Component Number

Each component shall be marked with the ESCC Component Number which shall be constituted and marked as follows:

Example: 340106501B

- Detail Specification Number: 3401065
- Type Variant (Note 1): 01
- Testing Level: B

#### **NOTES:**

1. Marking of the Type Variant is mandatory. No further reference to type variants is made in this specification.

#### 4.5.4 Characteristics

The characteristics to be marked in the following order of precedence are (example):

052 44 10 110

- Number of contacts (52): 052
- Insert type: 44
- Type of contacts: 10
- Guiding and locking devices: 110

##### 4.5.4.1 *Number of Contacts*

052 – 100 – 152 – 200 – 252 – 300 – 352 – 400.

##### 4.5.4.2 *Insert*

Inserts shall be designated by the following code numbers.

Code No.	Description
44	Receptacle (female contacts)
46	Receptacle (female contact pre-tinned termination)
55	Plug (male contacts)
57	Plug (male contact pre-tinned termination)

##### 4.5.4.3 *Contacts*

Contact rear configurations shall be designated by the codes given in Table 1(a) and Figure 2(c).

##### 4.5.4.4 *Guiding and Locking Devices*

Guiding and locking devices shall be designated by the codes given in Figure 2(b).

#### **N.B.**

If the purchase order does not specify any guiding or locking devices, receptacles shall be delivered without.

#### 4.5.5 Traceability Information

Traceability information shall be marked in accordance with the requirements of ESCC Basic Specification No. 21700.

#### 4.6 ELECTRICAL MEASUREMENTS

##### 4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3$  °C.

##### 4.6.2 Electrical Measurements at High and Low Temperatures (Table 3)

Not applicable.

##### 4.6.3 Circuits for Electrical Measurements (Figure 4)

Not applicable.

#### 4.7 BURN-IN AND ELECTRICAL MEASUREMENTS (TABLES 4 AND 5)

Not applicable.

#### 4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION NO. 3401)

##### 4.8.1 Measurements and Inspections on Completion of Environmental Tests

The parameters to be measured and inspections to be performed on completion of environmental testing shall be those specified in Table 6. Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3$  °C.

##### 4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests

Not applicable.

##### 4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured and inspections to be performed on completion of endurance testing are scheduled in Table 6. Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3$  °C.

##### 4.8.4 Conditions for Operating Life Test (Part of Endurance Testing)

Not applicable.

##### 4.8.5 Electrical Circuits for Operating Life Test

Not applicable.

##### 4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in Section 9 of ESCC Generic Specification No. 3401. The conditions for high temperature storage testing shall be the maximum storage temperature specified in Table 1(b) of this specification.

**TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE**

No.	Characteristics	Symbol	Spec. and/or Test Method	Test Condition	Limits		Unit
					Min.	Max.	
1	Insulation Resistance	Ri	ESCC No. 3401 Para. 9.1.1.1	Para. 9.1.1.1	10000	-	MΩ
2	Voltage Proof Leakage Current (Sea Level)	I <sub>L</sub>	ESCC No. 3401 Para. 9.1.1.2	800Vrms		1	mA
3	Mated Shell Conductivity (Voltage Drop)	Vd	ESCC No. 3401 Para. 9.1.1.4	Para. 9.1.1.4	Not applicable		mV
4	Contact Resistance (Low Level Current)	Rcl	ESCC No. 3401 Para. 9.1.1.3	All	-	12	mΩ
5	Contact Resistance (Rated Current) (1)	Rcr	ESCC No. 3401 Para. 9.1.1.3	2A	-	12	mΩ

**NOTES:**

- Contact Resistance at Rated Current is guaranteed but not tested during Final Production Tests (Chart II).

**TABLES 3, 4 AND 5**

Not applicable.

**TABLE 6 – MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS**

No.	ESCC Generic No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min.	Max.	
01	Seal Test	Para. 9.9	Not applicable			Not applicable		
02	Wiring	Para. 9.10				-	-	
03	Vibration	Para. 9.11	<b>Initial Measurements</b> Coupling Screw(s) Unlocking Torque  <b>Final Measurements</b> Full Engagement Coupling Screw(s) Unlocking Torque Drift Visual Examination	-	-	Record Values		
				-	Δ	-25	+25	%
				-	-	-	-	
04	Shock or Bump	Para. 9.12	Full Engagement Visual Examination	- -	- -	-	-	
05	Climatic Sequence	Para. 9.13	<b>Dry Heat</b> Insulation Resistance  <b>Low Air Pressure</b> Voltage Proof Leakage Curr.  <b>Damp Heat</b> Insulation Resistance  <b>Final Measurements</b> External Visual Inspection  Insulation Resistance Voltage Proof Leakage Curr.	Table 2 Item 1  Figure 1  <b>Immediately after test</b> Table 2 Item 1  <b>After 1-24 hrs Recovery</b> ESCC 3401 Para. 9.7  Table 2 Item 1 Table 2 Item 2	Ri  I <sub>L</sub>  Ri  -  Ri I <sub>L</sub>	1000  ESCC 3401 Para. 9.13.5  100  ESCC 3401 Para. 9.7  Table 2 Item 1 Table 2 Item 2	-  -  -  -  -	MΩ  MΩ  MΩ  MΩ
06	Plating Thickness	Para. 9.14	Thickness			Para. 4.4.3 of this spec.		
07	Joint Strength	Para. 9.15	ESCC 3401 Para. 9.15			Not applicable		
08	Rapid Change of Temperature	Para. 9.16	Visual Examination Insulation Resistance Voltage Proof Leakage Curr.	- Table 2 Item 1 Table 2 Item 2	- Ri I <sub>L</sub>	- Table 2 Item 1 Table 2 Item 2	- -	
09	Contact Retention (In Insert)	Para. 9.17 & Para. 4.3.4 of spec.	Contact Displacement	-	-	ESCC 3401 Para. 9.17		

No.	ESCC Generic No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min.	Max.	
10	Endurance	Para. 9.18	<b>Initial Measurements</b> Mating/Unmating Forces Low Level Contact Resist. Mated Shell Conductivity <b>Final Measurements</b> Visual Examination Mating/Unmating Forces Low Level Contact Resistance Drift Mated Shell Conductivity Insulation Resistance Voltage Proof Leakage Curr.	- Table 2 Item 4 Table 2 Item 3 - - Table 2 Item 4 Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	F Rcl Vd - F ΔRcl Vd Ri I <sub>L</sub>	Para. 4.3.5 of this spec. Record Values Not applicable -   - Para. 4.3.5 of this spec. -   4 Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	mΩ	
11	Permanence of Marking	Para. 9.19	As applicable		-	-	-	
12	Mating/Unmating Forces	Para. 9.20	Force		F	Para. 4.3.5 of this spec.		
13	High Temperature Storage	Para. 9.21	<b>Initial Measurements</b> Low Level Contact Resist. Mated Shell Conductivity <b>Final Measurements</b> Visual Examination Mating/Unmating Forces Low Level Contact Resistance Drift Rated Current Contact Resistance Mated Shell Conductivity Insulation Resistance Voltage Proof Leakage Curr. Contact Retention (In Insert)	Table 2 Item 4 Table 2 Item 3 - - Table 2 Item 4 Table 2 Item 5 Table 2 Item 3 Table 2 Item 1 Table 2 Item 2 Para. 4.3.4 of this spec.	Rcl Vd - F ΔRcl Rcr Vd Ri I <sub>L</sub> -	Record Values Not applicable -   - Para. 4.3.5 of this spec. -   4 Table 2 Item 5 Not applicable Table 2 Item 1 Table 2 Item 2 ESCC 3401 Para. 9.17	mΩ	
14	Corrosion	Para. 9.22	Visual Examination	-	-	Not applicable		
15	Insert Retention (In Shell)	Para. 9.23 & Para. 4.3.6 of this spec.	Visual Examination	-	-	Para. 4.3.6 of this spec.		
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	Visual Examination	-	-	Not applicable		
17	High Temperature Measurements	Para. 9.25	Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ

No.	ESCC Generic No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min.	Max.	
18	Overload Test	Para. 9.26	Internal Temperature Rated Current Contact Resistance Mated Shell Conductivity Insulation Resistance Voltage Proof Leakage Curr.	Table 2 Item 5  Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	T Rcr  Vd Ri I <sub>L</sub>	-	+100	°C
19	Maintenance Aging	Para. 9.27	Visual Examination Contact Retention Contact Insertion and Withdrawal Forces	- Para. 4.3.4 of this spec. Para. 4.3.8 of this spec.	-	-	-	Not applicable Not applicable
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force		F			Para. 4.3.9 of this spec.
21	Oversize Pin Exclusion	Para. 9.29 & Para. 4.3.10 of this spec.						ESCC 3401 Para. 9.29
22	Probe Damage	Para. 9.30 & Para. 4.3.11 of this spec.	Contact Separation Force	Para. 4.3.9 of this spec.				Not applicable
23	Solderability	Para. 9.31 & Para. 4.3.12 of this spec.						ESCC 3401 Para. 9.31

**NOTES:**

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.