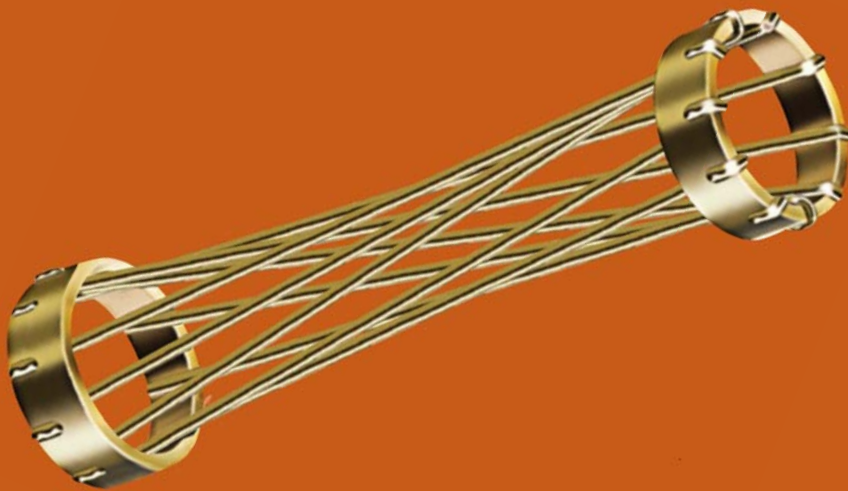


## HYPERBOLOID CONNECTORS

FOR SUPERIOR PERFORMANCE IN ALL APPLICATIONS

IEH CORPORATION ISO 9001:2000

SMALL BUSINESS-HUB-ZONE CERTIFIED



## **CONTENTS**

### **HGC/HGS SERIES**

**PAGE**

2 Introduction

3 Specifications

---

#### **2-ROW CONNECTORS**

4 Ordering Chart

5 Pin Carrier - MDG

6 Plug, Stacking - MAH

7 Plug, Straight - MDH, MSH, MCH

8 Plug, Right Angle - MEH

9 Receptacle, Stacking - FAH

10 Receptacle, Straight - FDH, FSH, FCH

11 Receptacle, Right Angle - FEH

---

#### **3-ROW CONNECTORS**

12 Plug, Straight - MDH

13 Receptacle, Straight - FDH

---

#### **APPENDIX, 2-ROW**

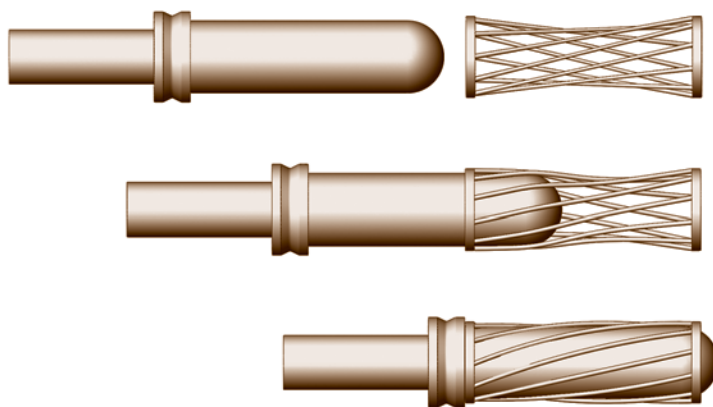
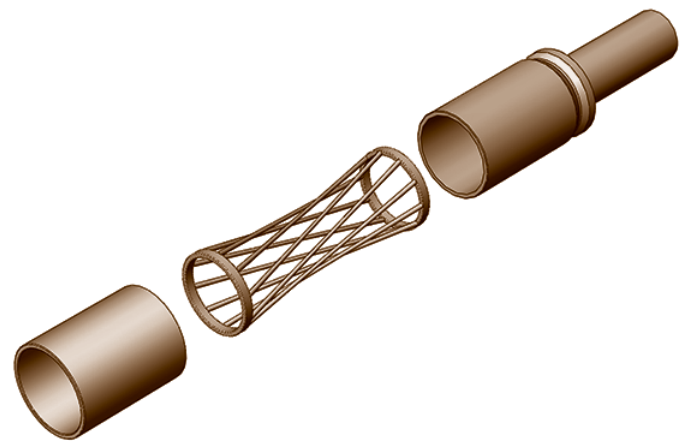
14 Termination Style

15 Hardware Style & PWB Pattern

16 Pin Carrier Application Instructions

The HYPERBOLOID contact is an advanced design that satisfies performance requirements previously considered impossible. Radically different in concept, it is used in connectors having the highest standards of performance. The distinguishing feature of the HYPERBOLOID socket is the hyper-boloid-shaped sleeve formed by straight wires strung at an angle to the longitudinal axis. Viewed from the side, you see a curve defined by a series of apparent short straight line segments which are tangent lines to points along a hyperbolic curve. This geometry provides for a design which has a decreasing circumscribed circle when viewed from the entry. It begins larger than the pin acceptance diameter and is less than this same diameter at the center. When the pin is inserted into this sleeve, the wires stretch, well within elastic limits, to accommodate it. In so doing, the wires wrap themselves around the pin providing a number of continuous line contact paths. The illustration below will assist in visualization.

The unique geometry, precision processing, and careful attention to quality result in a highly desirable contact design which provides:



The actual physical construction of the contact involves several components. The wires are strung on an internal wire carrier (inner sleeve) which is subsequently capped or enclosed by a front outer ring (front sleeve) and rear ring which includes the termination configuration (terminal). All components to the assembly are completely finished with the specified electroplating prior to assembly. The wires are continuous process plated on reel before use. In this manner, interface finish requirements can be controlled very closely without the common problems of gradient, shadow, or other finish imperfections often appearing in alternative designs. Very often, this processing feature permits the specifier to reduce precious metal content with resultant savings. Joints are calculated interference fits, insuring gas tight interfaces between all elements of the HYPERBOLOID construction. An exploded view is provided next.

- **VLIF (Very Low Insertion Force):** Common sizes #22 and less average under one ounce per contact.
- **Extraordinary Resistance to Shock & Vibration:** Tests exceeding 300 g's without discontinuity.
- **Duty Cycle Exceeding 100,000 Mate/Demate:** The burnishing action of the wires on the pin surface is non-destructive. Unlike the "plow" and scrape action of common designs, HYPERBOLOID's gentle mating action enhances life.
- **Low, Low Contact Resistance:** The multiplicity of line contact, as opposed to point contact in other designs, provides an excellent interface exhibiting low contact resistance (often less than 1/2 of MIL spec. allowances). This characteristic also provides for a cooler running contact under load.
- **Improved Current Carrying Capacity:** The low contact resistance gives a lower °C rise from ambient under load. This feature often allows the user to operate the same size contact under higher load.
- **Highest Reliability:** In use for over 40 years under the most demanding conditions HYPERBOLOID has proven itself to be the leading design for integrity and reliability. On space platforms, ships and boats at sea, land vehicles, fighter and transport aircraft, missiles, torpedoes, medical and transplant electronics, industrial and environmental controls, rail, construction, ATE and test equipment, PGA sockets, test interface stations, and other applications, HYPERBOLOID has lived up to its promise of the highest reliability connector available.

## SPECIFICATIONS

### MATERIALS:

Pin Contacts:	Brass per ASTM B16, B121, B453, B455
Diameter:	0.018"
Socket Contacts:	
Contact Wires:	BeCu per ASTM B196, B197
Terminations & Support Elements:	Brass per ASTM B16, B121, B453, B455
Hardware:	Corrosion resistant steel per ASTM A582
Insulator:	
Pin Carrier:	GR Polyester, Disposable
Plug & Receptacle:	GR Polyphthalamide, V0 rated

### FINISHES:

Pin Contacts:	Gold per ASTM B488-01 Type II, Class 1.25, Code C, over Nickel, 0.000050 min., per MIL-DTL-55302, over Copper per SAE-AMS-2418
Socket Contacts:	
Contact Wires:	Gold per ASTM B488-01 Type II, Class 1.25, Code C, over Nickel, 0.000050 min., per MIL-DTL-55302, over Copper per SAE-AMS-2418
Terminations:	Gold per ASTM B488-01 Type II, Class 0.50, Code C, over Nickel, 0.000050 min., per MIL-DTL-55302, over Copper per SAE-AMS2418
Support Elements:	Nickel, 0.000050 min., over Copper per SAE-AMS2418
Hardware:	Passivate per SAE-AMS2700

### PERFORMANCE:

Current Rating:	2.5* ampere continuous (higher ratings may be supported-contact factory)
Insulation Resistance:	>5000 megohms
Contact Resistance:	<5 milliohm
Test Voltage (DWV):	>1000 VRMS
Operating Temperature:	-65°C to +125°C
Mating Force:	0.5 oz. avg.
De-mating Force:	>0.2 oz.
Durability:	100,000 mating cycles
Solderability:	IPC/EIA J-STD-002, Category 3

### DIMENSIONS:

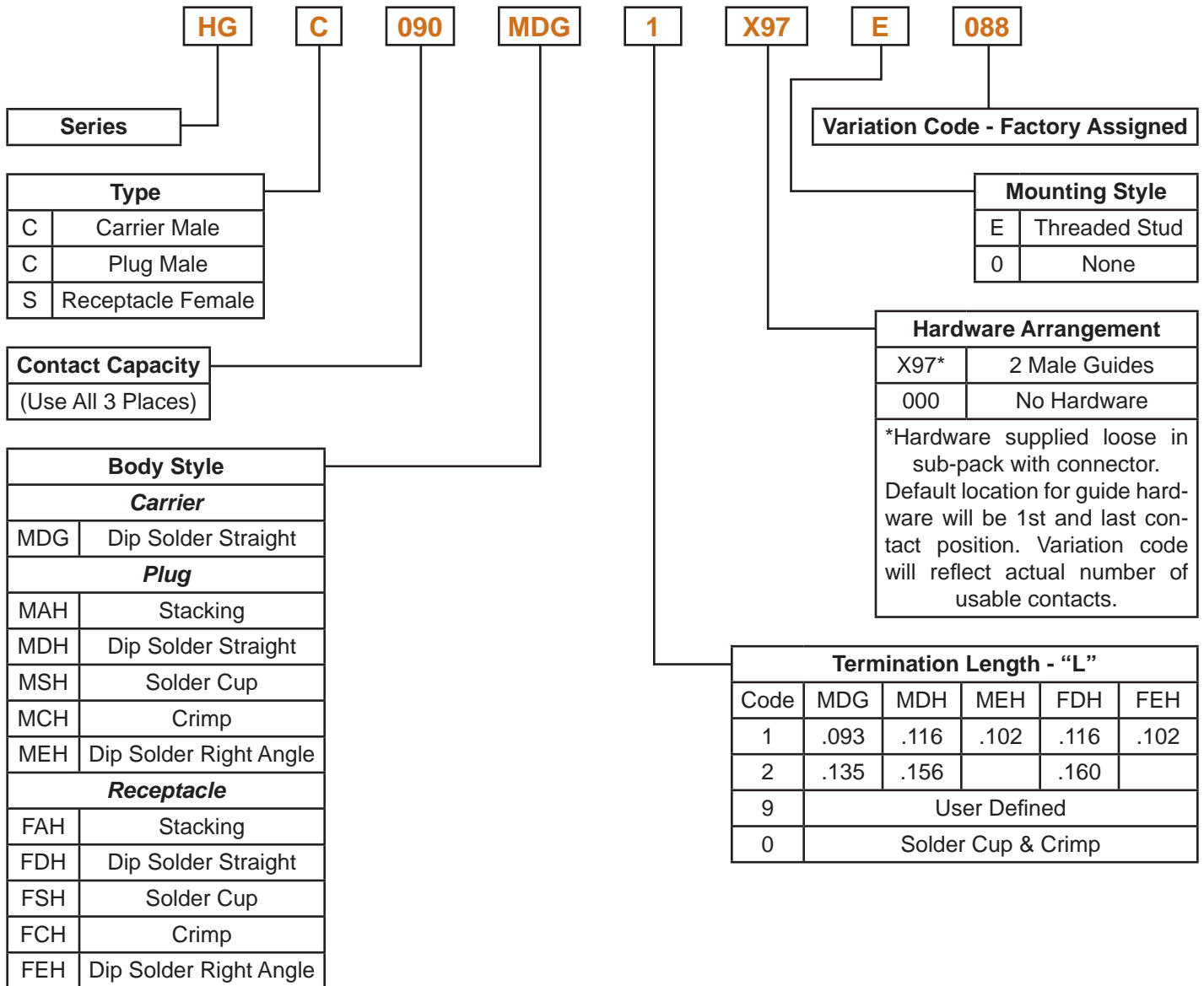
Catalog product dimensions are nominal.  
For linear and positional tolerances, contact factory.

\* Ampacity ratings shown are derated in accordance with the published military specifications. For stand-alone, full service ratings, supported by test data, please refer to IEH's Contacts Catalog, or contact the factory.

All information contained herein is believed to be reliable as of the date of publication, but is subject to change without notice. Current product drawings and specifications are available upon request from IEH.

IEH warrants its products to be free of defects affecting normal use. If any shipment is found to be defective we will accept return for repair or replacement at our option within one year of shipment. IEH is not responsible for incidental or consequential damages arising out of the use of our products.

ORDERING CHART



**Series**

Type	
C	Carrier Male
C	Plug Male
S	Receptacle Female

**Contact Capacity**  
(Use All 3 Places)

Body Style	
Carrier	
MDG	Dip Solder Straight
Plug	
MAH	Stacking
MDH	Dip Solder Straight
MSH	Solder Cup
MCH	Crimp
MEH	Dip Solder Right Angle
Receptacle	
FAH	Stacking
FDH	Dip Solder Straight
FSH	Solder Cup
FCH	Crimp
FEH	Dip Solder Right Angle

**Variation Code - Factory Assigned**

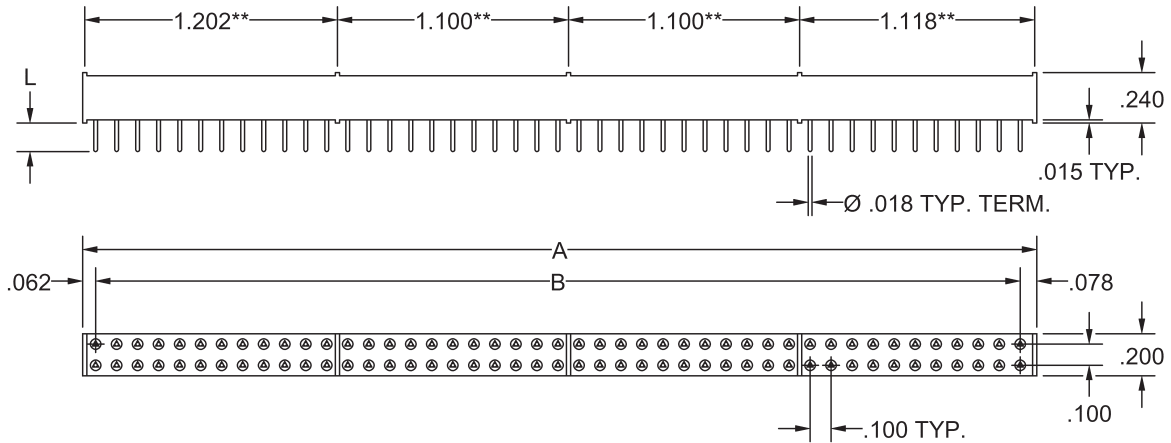
Mounting Style	
E	Threaded Stud
0	None

Hardware Arrangement	
X97*	2 Male Guides
000	No Hardware

\*Hardware supplied loose in sub-pack with connector. Default location for guide hardware will be 1st and last contact position. Variation code will reflect actual number of usable contacts.

Termination Length - "L"					
Code	MDG	MDH	MEH	FDH	FEH
1	.093	.116	.102	.116	.102
2	.135	.156		.160	
9	User Defined				
0	Solder Cup & Crimp				

## PIN CARRIER STYLE MDG


**NOTES:**

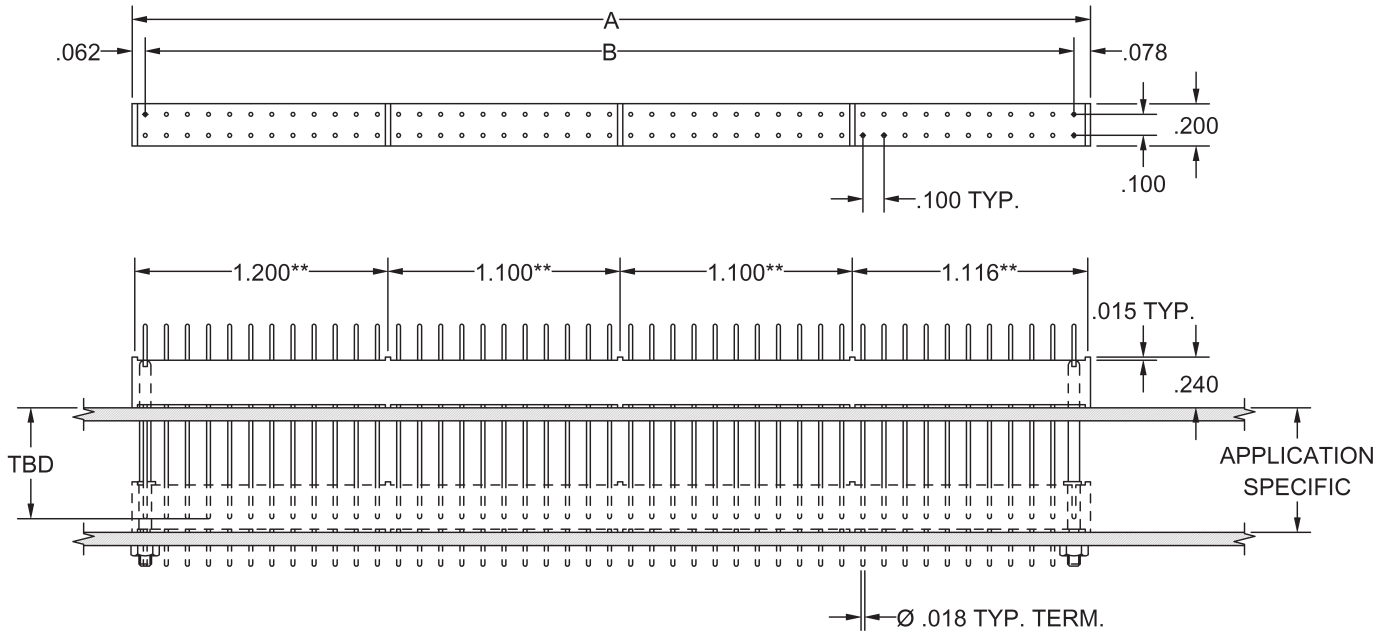
1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400

**PLUG, STACKING  
STYLE MAH**



**NOTES:**

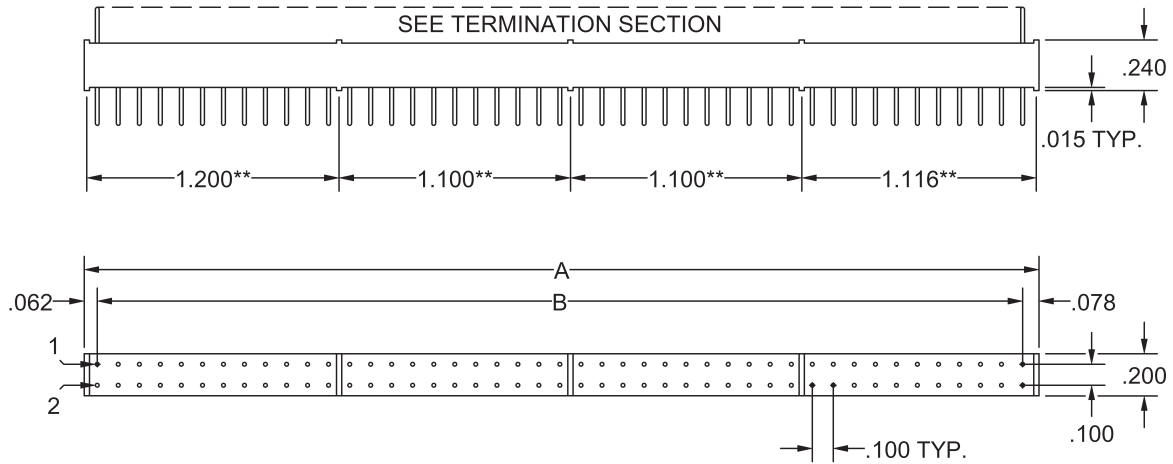
1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400

## PLUG, STRAIGHT STYLE MDH, MSH, MCH


**NOTES:**

1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

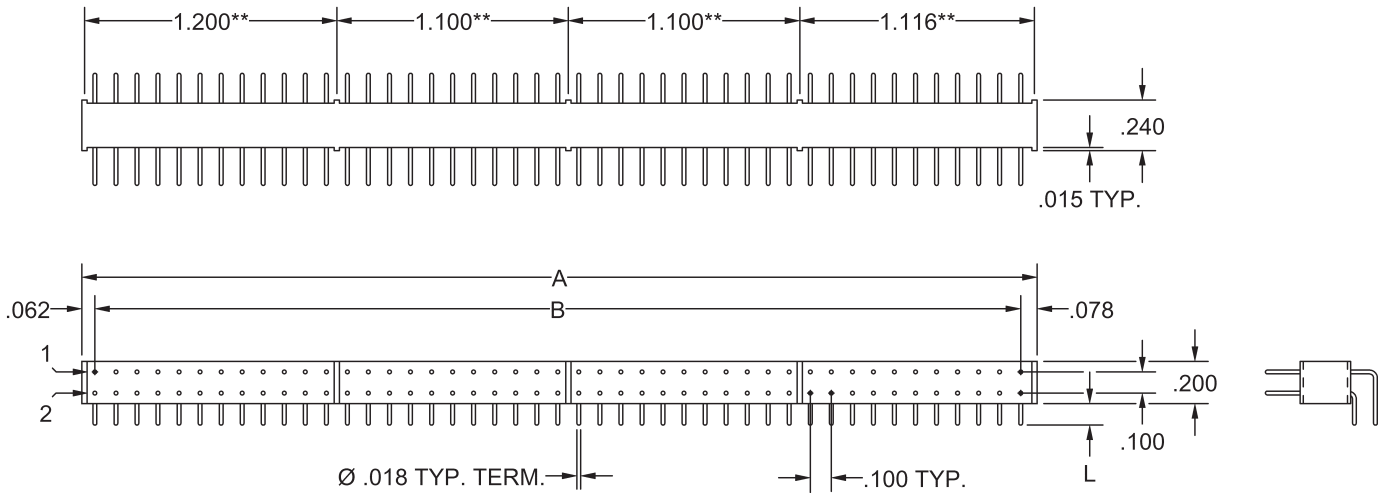
SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400



**PLUG, RIGHT ANGLE  
STYLE MEH**



**NOTES:**

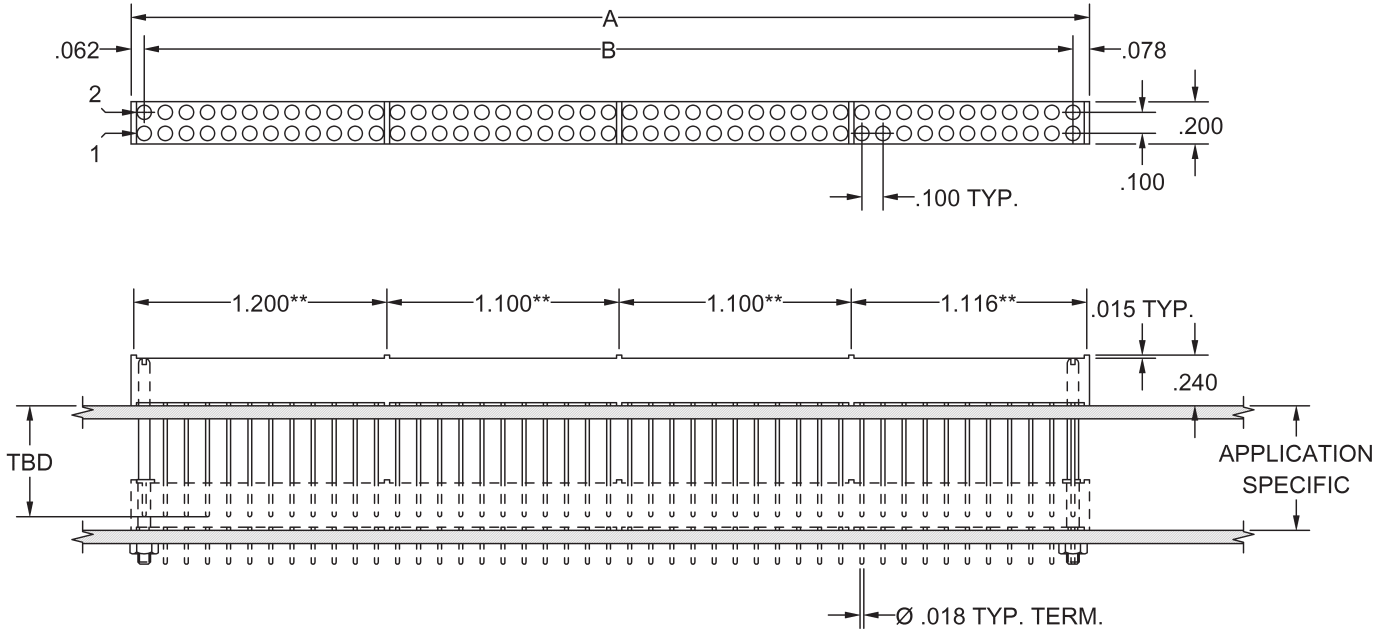
1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400

**RECEPTACLE, STACKING  
STYLE FAH**



**NOTES:**

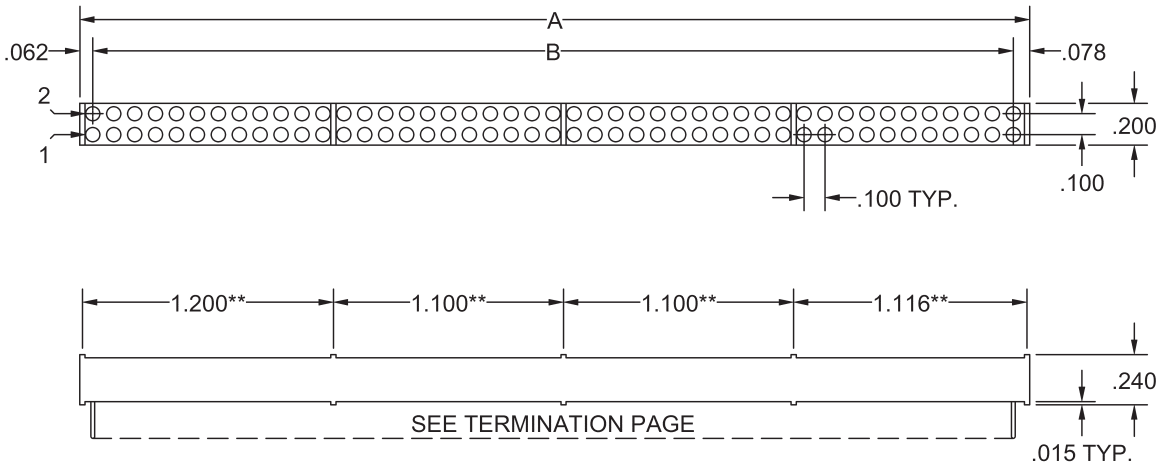
1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400

**RECEPTACLE, STRAIGHT  
STYLE FDH, FSH, FCH**



**NOTES:**

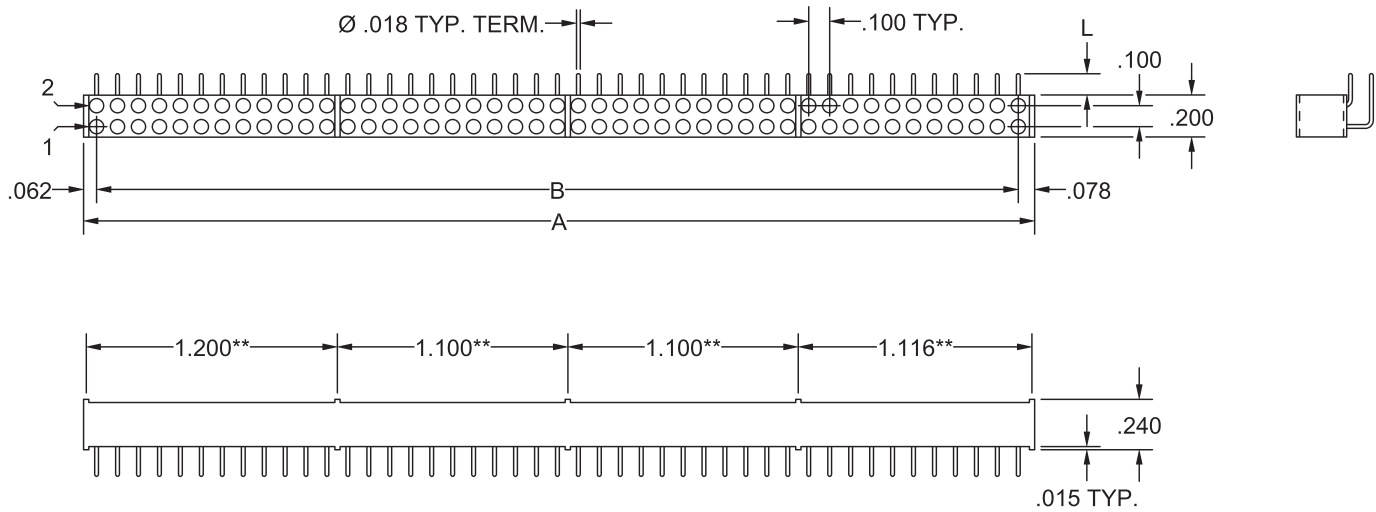
1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400

## RECEPTACLE, RIGHT ANGLE STYLE FEH


**NOTES:**

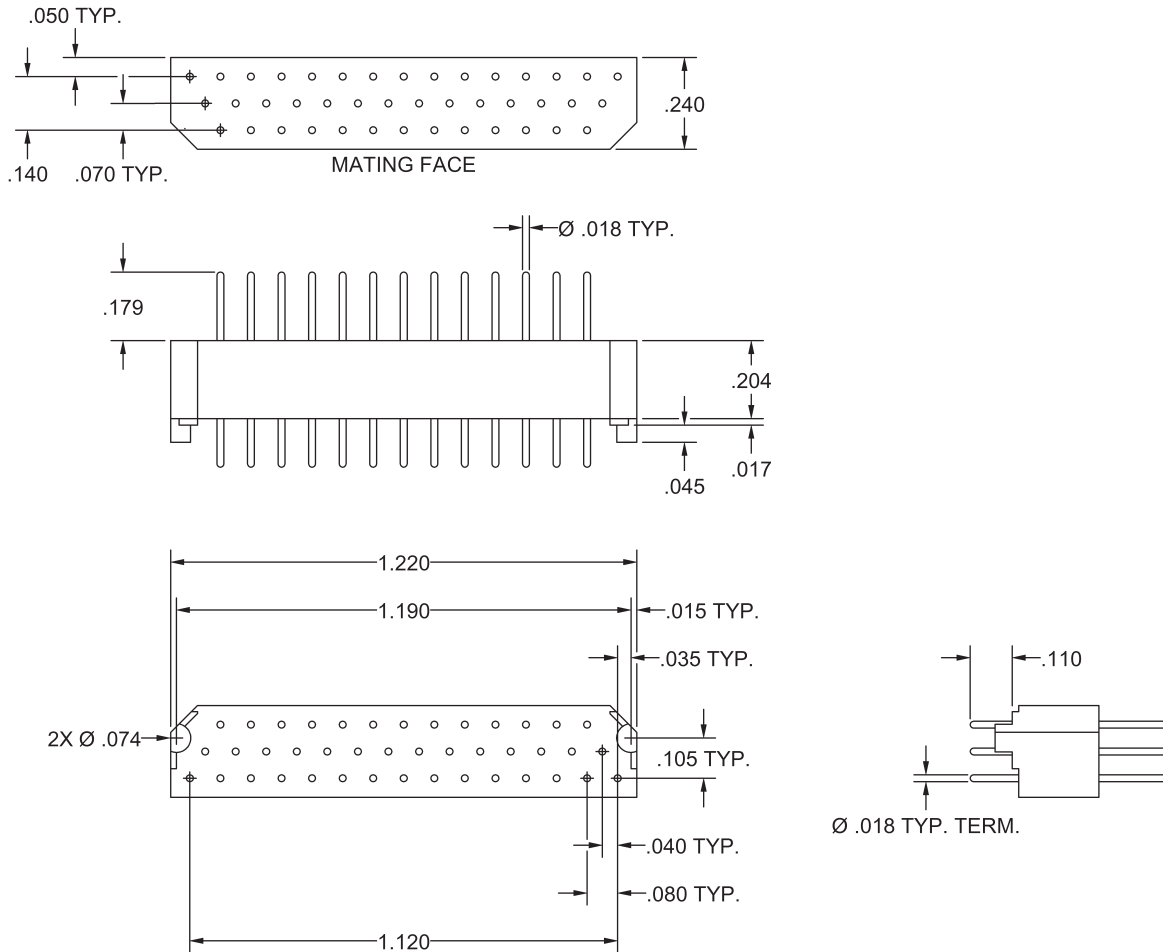
1. SEE APPENDIX FOR GUIDE HARDWARE OPTIONS. GUIDES ARE INSTALLED IN CONTACT LOCATIONS AND RESULT IN THE LOSS OF ONE CONTACT FOR EACH GUIDE; E.G. A 22 CONTACT SIZE CONNECTOR WITH 2 GUIDES WILL HAVE 20 CONTACTS. THIS WILL BE REFLECTED IN THE VARIATION CODE. EXAMPLE: HGC022MDG9---E020.
2. \*SIZES BELOW 22 CONTACT WILL RESULT IN THE LOSS OF ONE OR MORE SOLDER RELIEF STANDOFFS UNLESS GUIDE PINS ARE EMPLOYED.
3. \*\*DIMENSIONS ARE FOR THE 90 CONTACT VERSION AND ARE SUPPLIED TO SHOW LOCATION OF SOLDER RELIEF STANDOFFS.

SIZE*	A	B
22	1.14	1.000
24	1.22	1.100
26	1.32	1.200
28	1.42	1.300
30	1.52	1.400
32	1.62	1.500
34	1.72	1.600
36	1.82	1.700
38	1.92	1.800
40	2.02	1.900
42	2.12	2.000
44	2.22	2.100

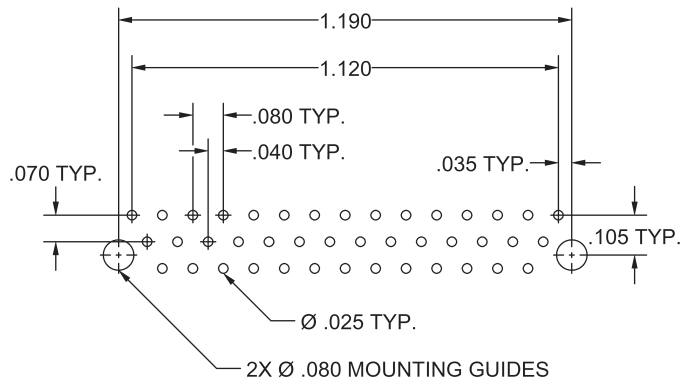
SIZE*	A	B
46	2.32	2.200
48	2.42	2.300
50	2.52	2.400
52	2.62	2.500
54	2.72	2.600
56	2.82	2.700
58	2.92	2.800
60	3.02	2.900
62	3.12	3.000
64	3.22	3.100
66	3.32	3.200
68	3.42	3.300

SIZE*	A	B
70	3.52	3.400
72	3.62	3.500
74	3.72	3.600
76	3.82	3.700
78	3.92	3.800
80	4.02	3.900
82	4.12	4.000
84	4.22	4.100
86	4.32	4.200
88	4.42	4.300
90	4.54	4.400

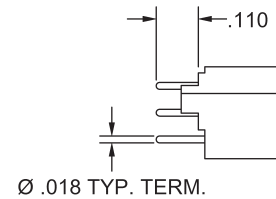
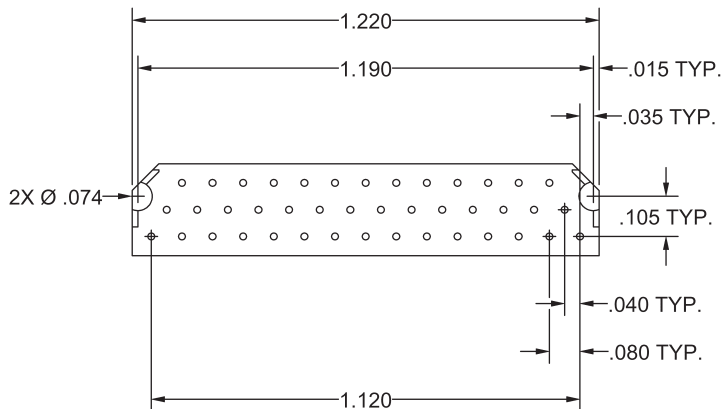
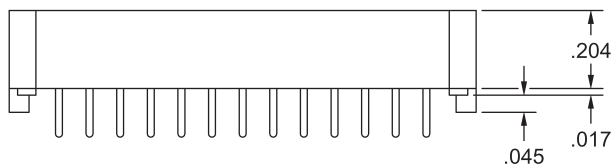
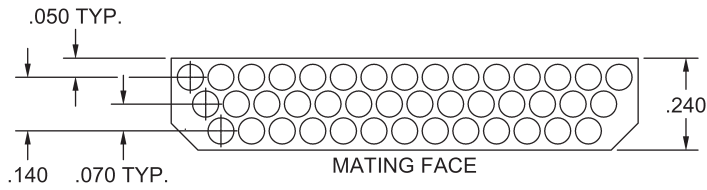
**PLUG, STRAIGHT**  
**HGC042MDH9000000**



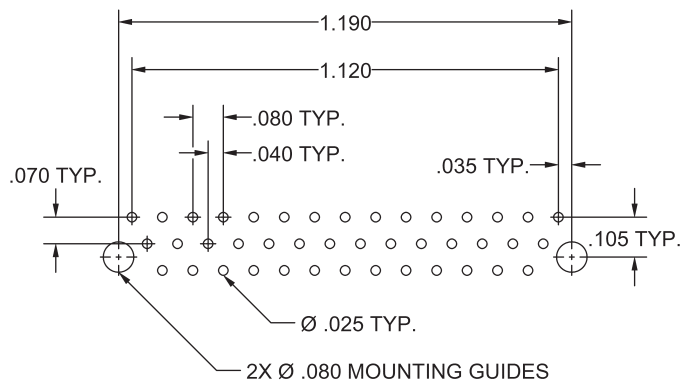
**PWB PATTERN**  
**VIEWED FROM COMPONENT FACE**



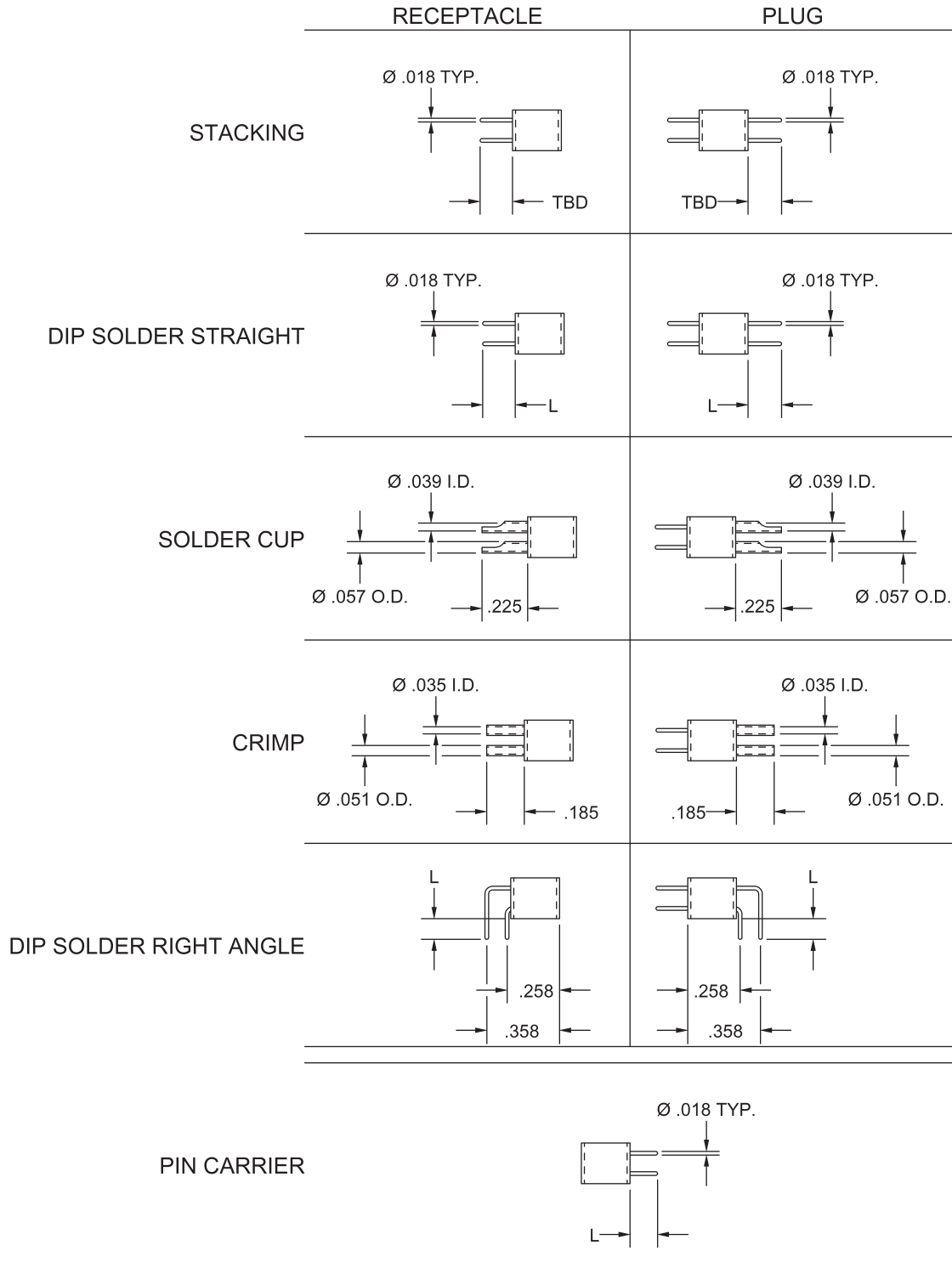
**RECEPTACLE, STRAIGHT**  
**HGS042FDH9000000**



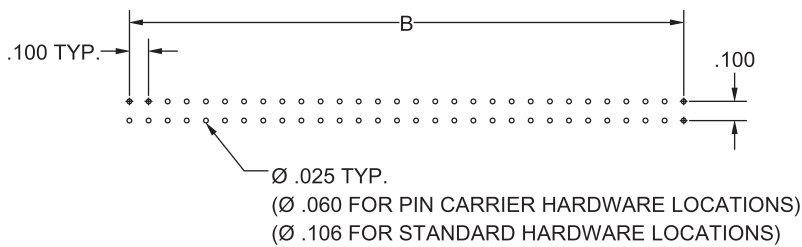
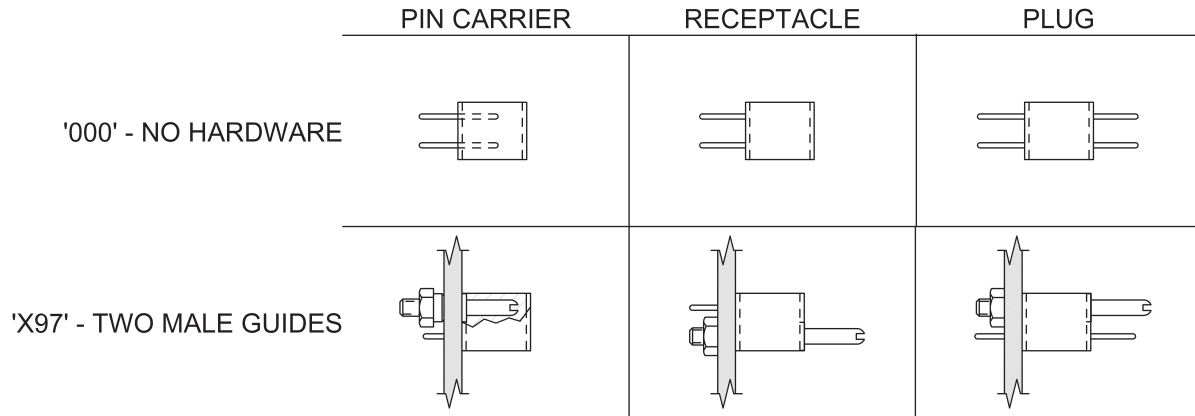
**PWB PATTERN**  
**VIEWED FROM COMPONENT FACE**



## TERMINATION STYLE 2 ROW



## HARDWARE STYLE & PWB PATTERN 2 ROW

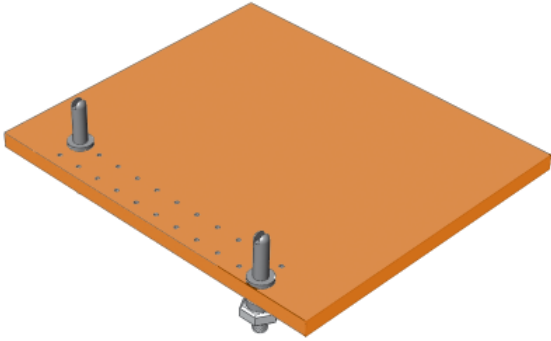


SIZE*	B
22	1.000
24	1.100
26	1.200
28	1.300
30	1.400
32	1.500
34	1.600
36	1.700
38	1.800
40	1.900
42	2.000
44	2.100
46	2.200
48	2.300
50	2.400
52	2.500
54	2.600
56	2.700

SIZE*	B
58	2.800
60	2.900
62	3.000
64	3.100
66	3.200
68	3.300
70	3.400
72	3.500
74	3.600
76	3.700
78	3.800
80	3.900
82	4.000
84	4.100
86	4.200
88	4.300
90	4.400

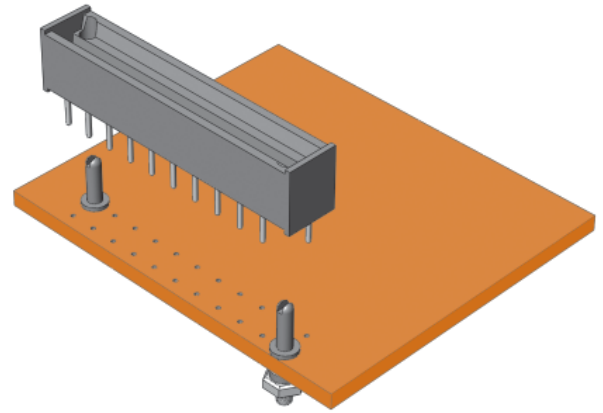


## PIN CARRIER APPLICATION INSTRUCTIONS 2 ROW

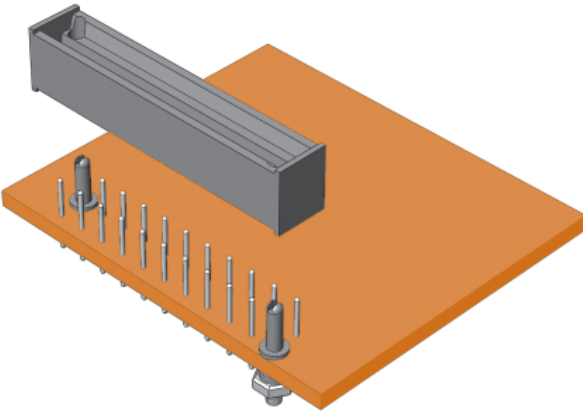


1. INSTALL GUIDE PINS ON PRINTED WIRING BOARD. ASSEMBLE NUTS "FINGER" TIGHT ONLY.

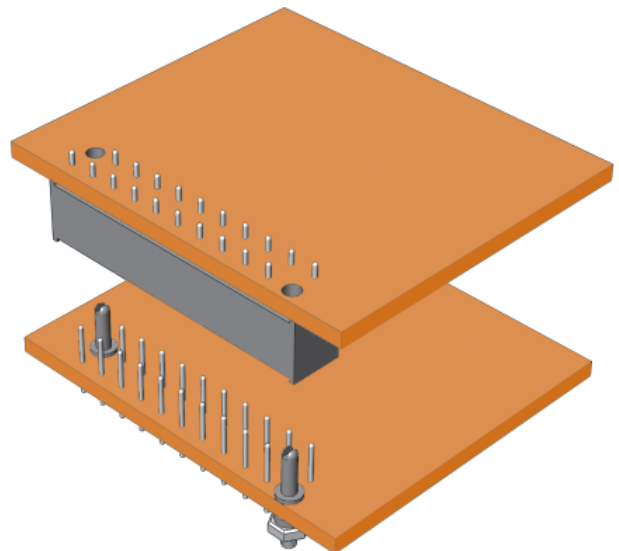
2. POSITION THE LOADED PIN CARRIER ONTO THE BOARD, USING THE GUIDES FOR ALIGNMENT. TORQUE NUTS ON GUIDE HARDWARE. THEN SOLDER THE CONTACTS ON UNDER SIDE OF BOARD.



3. CARRIER MAY NOW BE REMOVED FOR MATING WITH A RECEPTACLE OR LEFT IN PLACE AS A PIN PROTECTOR.



4. WHEN MATED WITH A RECEPTACLE, ASSEMBLY CAN BE COMPLETED IN THE LEAST AMOUNT OF SPACE (.240 INCHES).





## **IEH CORPORATION**

140 58TH STREET, 8E, BROOKLYN, NY 11220

PHONE (718) 492-4448 • FAX (718) 492-9898

[www.iehcorp.com](http://www.iehcorp.com) • [ieh@iehcorp.com](mailto:ieh@iehcorp.com)