HPH Series

High Density Signal Connectors
Hypertac® Hyperboloid Technology

Smiths Interconnect offers an extensive range of superior contact technologies suitable for standard and custom solutions. Hypertac® (HYPERboloid conTACt) is the original superior performing hyperboloid contact technology designed for use in all applications and in harsh and demanding environments where high reliability and safety are critical. The inherent electrical and mechanical characteristics of the Hypertac hyperboloid contact ensures unrivalled performance in terms of reliability, number of mating cycles, low contact force and minimal contact resistance. The shape of the contact sleeve is formed by hyperbolically arranged contact wires, which align themselves elastically as contact lines around the pin, providing a number of linear contact paths.

### Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low insertion/extraction forces</td>
<td>High density interconnect systems</td>
</tr>
<tr>
<td>The angle of the socket wires allows tight control of the pin insertion and extraction forces. The spring wires are smoothly deflected to make line contact with the pin.</td>
<td>Significant reductions in size and weight of sub-system designs. No additional hardware is required to overcome mating and un-mating forces.</td>
</tr>
<tr>
<td>Long contact life</td>
<td>Low cost of ownership</td>
</tr>
<tr>
<td>The smooth and light wiping action minimizes wear on the contact surfaces. Contacts perform up to 100,000 insertion/extraction cycles with minimal degradation in performance.</td>
<td>The Hypertac contact technology will surpass most product requirements, thus eliminating the burden and cost of having to replace the connector or the entire subsystem.</td>
</tr>
<tr>
<td>Lower contact resistance</td>
<td>Low power consumption</td>
</tr>
<tr>
<td>The design provides a far greater contact area and the wiping action of the wires insures a clean and polished contact surface. Our contact technology has about half the resistance of conventional contact designs.</td>
<td>The lower contact resistance of our technology results in a lower voltage drop across the connector reducing the power consumption and heat generation within the system.</td>
</tr>
<tr>
<td>Higher current ratings</td>
<td>Maximum contact performance</td>
</tr>
<tr>
<td>The design parameters of the contact (e.g., the number, diameter and angle of the wires) may be modified for any requirement. The number of wires can be increased so the contact area is distributed over a larger surface. Thus, the high current carried by each wire because of its intimate line contact, can be multiplied many times.</td>
<td>The lower contact resistance of the Hypertac contact reduces heat build-up; therefore Hypertac contacts are able to handle far greater current in smaller contact assemblies without the detrimental effects of high temperature.</td>
</tr>
<tr>
<td>Immunity to shock &amp; vibration</td>
<td>Reliability under harsh environments</td>
</tr>
<tr>
<td>The low mass and resultant low inertia of the wires enable them to follow the most abrupt or extreme excursions of the pin without loss of contact. The contact area extends 360° around the pin and is uniform over its entire length. The 3 dimensional symmetry of the Hypertac contact design guarantees electrical continuity in all circumstances.</td>
<td>Harsh environmental conditions require connectors that will sustain their electrical integrity even under the most demanding conditions such as shock and vibration. The Hypertac contact provides unmatched stability in demanding environments when failure is not an option.</td>
</tr>
</tbody>
</table>
Product Description

Smiths Interconnect’s HPH Series is a high density signal PCB connector designed for harsh environments within the aerospace, defense and industrial market segments.

With a 0.6mm contact diameter, the HPH Series comes in 3-6 row configurations and is available up to 303 signal contacts on a 1.901mm staggered grid. Contacts are removable for ease of maintenance. Using the proven Hypertac® hyperboloid contact system, the connectors ensure a low contact resistance under high levels of shocks and vibrations and over 2000 mating cycles. They provide low engagement and withdrawal force; long life and low rate of wear for high reliability and enhanced quality performance.

Technical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Rating</td>
<td>4 A</td>
</tr>
<tr>
<td>Contact Resistance</td>
<td>7 mΩ maximum</td>
</tr>
<tr>
<td>Insulation</td>
<td>5 GΩ minimum at 500 Vdc</td>
</tr>
<tr>
<td>Mechanical Endurance</td>
<td>In excess of 2000 operations</td>
</tr>
<tr>
<td>Engagement/withdrawal forces</td>
<td>0.42 N (1.5 oz) nominal per contact</td>
</tr>
<tr>
<td>Temperature</td>
<td>+55°C to +125°C</td>
</tr>
<tr>
<td>Voltage Rating</td>
<td>170 Vdc or ac peak nominal</td>
</tr>
<tr>
<td>Proof Voltage</td>
<td>800 V minimum</td>
</tr>
<tr>
<td>Male Pin Diameter</td>
<td>0.6 mm nominal</td>
</tr>
<tr>
<td>Material</td>
<td>Polyphenylene sulphide</td>
</tr>
<tr>
<td></td>
<td>- Insulator</td>
</tr>
<tr>
<td></td>
<td>- Contact pin &amp; socket</td>
</tr>
<tr>
<td></td>
<td>- Socket wires</td>
</tr>
<tr>
<td></td>
<td>- Guides</td>
</tr>
<tr>
<td></td>
<td>- Contact plating</td>
</tr>
<tr>
<td></td>
<td>Copper alloy</td>
</tr>
<tr>
<td></td>
<td>Beryllium copper</td>
</tr>
<tr>
<td></td>
<td>Stainless steel</td>
</tr>
<tr>
<td></td>
<td>MIL-G-45204 gold plate</td>
</tr>
</tbody>
</table>
How To Order

1 Connector family

2 No. of cavities

3 Contact plating

4 Contact gender

5 Contact termination

6 Polarising/Guides

7 Standard variations

1 Off the shelf  2 Off the shelf male  3 Off the shelf female  4 Subject to availability  5 Made to order

Other termination, guide and insulator styles exist but might carry a premium both in cost and lead time. Please consult the sales office for further information.
Insulators

3 row male and female half

4 row male and female half

Dimension are in mm and inches
Insulators

5 row male and female half

6 row male and female half

Dimension are in mm and inches
Insulators, Pin Carrier and Guides

Shrouded pin carrier

Shrouded insulator shown with pins and guides. Ready to mate with standard female connector fitted with suitable female pin carrier guides.

Shrouded pin carrier guides

Style AM
Non Polarised Guide Socket. Vertical Mounting

Style 9A
Non Polarised Guide Pin. Vertical Mounting

Dimension are in mm
HPH Stacking Insulators

Stacking connector application

Stacking connectors are currently available in 50, 77 & 102 way only.
For insulator dimensions please refer to previous pages.
If you have further requirements please contact sales offices.

Dimension are in mm
Standard PCB Terminations

Female 90° PCB

![Female 90° PCB diagram]

Male 90° PCB

![Male 90° PCB diagram]

Dimensions applicable to 3, 4 and 5 row insulators also.

<table>
<thead>
<tr>
<th>Termination</th>
<th>Dim A</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>0.112</td>
</tr>
<tr>
<td>L</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>0.157</td>
</tr>
</tbody>
</table>

(1) Made to order  (2) Off the shelf male

Female vertical PCB

![Female vertical PCB diagram]

Male vertical PCB

![Male vertical PCB diagram]

<table>
<thead>
<tr>
<th>Termination</th>
<th>Dim A</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>4.50</td>
</tr>
<tr>
<td></td>
<td>0.177</td>
</tr>
<tr>
<td>K</td>
<td>6.70</td>
</tr>
<tr>
<td></td>
<td>0.264</td>
</tr>
</tbody>
</table>

(1) Off the shelf  (2) Off the shelf female

Dimensions are in mm and inches
Cable Terminations

Male crimp contact (26-22 AWG)

Dimension are in mm
**Standard Guides Male/Female**

### Female guide index

<table>
<thead>
<tr>
<th>Style</th>
<th>Type</th>
<th>Polarisation</th>
<th>Mounting</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>Stacking</td>
<td>Non-polarised</td>
<td>Vertical</td>
<td>10</td>
</tr>
<tr>
<td>HA</td>
<td>Stacking</td>
<td>Polarised</td>
<td>Vertical</td>
<td>10</td>
</tr>
<tr>
<td>HD</td>
<td>Stacking</td>
<td>Polarised</td>
<td>Vertical</td>
<td>10</td>
</tr>
<tr>
<td>HN</td>
<td>Stacking</td>
<td>Polarised</td>
<td>Vertical</td>
<td>10</td>
</tr>
<tr>
<td>SC</td>
<td>Jack socket</td>
<td>Non-polarised</td>
<td>Vertical</td>
<td>10</td>
</tr>
<tr>
<td>TJ</td>
<td>T-Jack</td>
<td>Non-polarised</td>
<td>Transverse</td>
<td>10</td>
</tr>
<tr>
<td>TP</td>
<td>T-Jack</td>
<td>Non-polarised</td>
<td>Transverse</td>
<td>10</td>
</tr>
<tr>
<td>TT</td>
<td>T-Jack</td>
<td>Non-polarised</td>
<td>Transverse</td>
<td>10</td>
</tr>
</tbody>
</table>

### Male guide index

<table>
<thead>
<tr>
<th>Style</th>
<th>Type</th>
<th>Polarisation</th>
<th>Mounting</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>Stacking</td>
<td>Non-polarised</td>
<td>Vertical</td>
<td>11</td>
</tr>
<tr>
<td>PE</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>PF</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>PG</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>PN</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>PP</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>PQ</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>PT</td>
<td>T-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>QC</td>
<td>L-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>QF</td>
<td>L-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>QQ</td>
<td>L-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>Q3</td>
<td>L-bracket</td>
<td>Polarised</td>
<td>Transverse</td>
<td>11</td>
</tr>
<tr>
<td>3C</td>
<td>Jacking</td>
<td>Non-polarised</td>
<td>Rotating</td>
<td>11</td>
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<tr>
<td>3F</td>
<td>Jacking</td>
<td>Non-polarised</td>
<td>Vertical</td>
<td>12</td>
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<tr>
<td>NA</td>
<td>Jacking</td>
<td>Polarised</td>
<td>Vertical</td>
<td>12</td>
</tr>
<tr>
<td>NB</td>
<td>Jacking</td>
<td>Polarised</td>
<td>Vertical</td>
<td>12</td>
</tr>
</tbody>
</table>

### Male guides

![Male guides table]

**Note**: For pin carrier guides please refer to: HPH Insulators/Pin Carrier/Guides
### Standard Guide Female

#### Style AU
Non-polarised Vertical Mounting Stacking

![Style AU Diagram]

#### Style T
Jack Socket Non-polarised Transverse Mounting T-Bracket

![Style T Diagram]

Above guides can also be used for male connectors

<table>
<thead>
<tr>
<th>Style 3 row</th>
<th>Style 4 row</th>
<th>Style 5 row</th>
<th>Board thickness</th>
<th>Dim A max</th>
</tr>
</thead>
<tbody>
<tr>
<td>TJ</td>
<td></td>
<td></td>
<td>2.54&quot;</td>
<td>5.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.100&quot;</td>
<td>0.224&quot;</td>
</tr>
<tr>
<td>TP</td>
<td>TT</td>
<td></td>
<td>3.20&quot;</td>
<td>6.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.393&quot;</td>
<td>0.248&quot;</td>
</tr>
</tbody>
</table>

#### Style H
Polarised Vertical Mounting

![Style H Diagram]

<table>
<thead>
<tr>
<th>Style</th>
<th>Board thickness</th>
<th>Dim A max</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA</td>
<td>2.54&quot; 0.100&quot;</td>
<td>6.55&quot; 0.257&quot;</td>
</tr>
<tr>
<td>HD</td>
<td>3.20&quot; 0.125&quot;</td>
<td>7.20&quot; 0.283&quot;</td>
</tr>
<tr>
<td>HN</td>
<td>4.00&quot; 0.157&quot;</td>
<td>9.00&quot; 0.354&quot;</td>
</tr>
</tbody>
</table>

#### Style SC
Jack Socket Non-polarised Transverse Vertical Mounting

![Style SC Diagram]

<table>
<thead>
<tr>
<th>Style</th>
<th>Board thickness</th>
<th>Dim A max</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>2.50&quot; 0.098&quot;</td>
<td>4.30&quot; 0.169&quot;</td>
</tr>
</tbody>
</table>

Dimension are in mm and inches
Standard Guide Male

**Style AT**
Non-polarised Vertical Mounting Stacking

- Self jigging press
- Fit guides
- M3 washer
- M3 nut

**Style P**
Polarised Transverse Mounting
(showing 5 row style)

**Style Q**
Polarised Transverse Mounting L-Bracket

**Style 9A**
Jacking Guide Non-polarised Rotating Free Connector

### Table

<table>
<thead>
<tr>
<th>Style</th>
<th>No. of rows</th>
<th>Board thickness</th>
<th>Dim A max</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE/PF/PG</td>
<td>3/4/5</td>
<td>2.00 0.078*</td>
<td>5.10 0.200*</td>
</tr>
<tr>
<td>PN/PP/PQ</td>
<td>3/4/5</td>
<td>3.20 0.125*</td>
<td>6.30 0.248*</td>
</tr>
<tr>
<td>PT</td>
<td>6</td>
<td>2.60 0.102*</td>
<td>5.70 0.224*</td>
</tr>
</tbody>
</table>

**Dimension are in mm and inches**
Standard Guide Male

Style 3F
Jacking Guide Non-polarised
Vertical Mounting

Style N
Polarised Vertical Mounting

PCB Preparations Details
PCB 90° Alignment Comb Details

<table>
<thead>
<tr>
<th>Style</th>
<th>Board thickness</th>
<th>Dim A max</th>
</tr>
</thead>
<tbody>
<tr>
<td>3F</td>
<td>2.95 - 3.45</td>
<td>6.25</td>
</tr>
<tr>
<td></td>
<td>0.116&quot; - 0.136&quot;</td>
<td>0.246&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Style</th>
<th>Board thickness</th>
<th>Dim A max</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>2.54</td>
<td>6.55</td>
</tr>
<tr>
<td></td>
<td>0.100&quot;</td>
<td>0.258&quot;</td>
</tr>
<tr>
<td>NB</td>
<td>5.08</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>0.200&quot;</td>
<td>0.354&quot;</td>
</tr>
</tbody>
</table>

303 way showing typical clearance dimensions (applies to all 90° styles)

Important
Please allow the following clearance dimensions around all 90° PCB layout configurations to accommodate the alignment comb shown below.

Dimension are in mm and inches
PCB Standard 90° Preparations Details

Male

20 Way 90° PCB Layout

Female

50 Way 90° PCB Layout

77 Way 90° PCB Layout

Dimension are in mm
PCB Standard 90° Preparations Details

102 Way 90° PCB Layout

- Male
- Female

119 Way 90° PCB Layout

- Male
- Female

128 Way 90° PCB Layout

- Male
- Female

Non standard style 5 guides require 2.3 dia hole

Please note that these dimensions are different from all other 90° PCB layouts

Dimension are in mm
PCB Standard 90° Preparations Details

Male

152 Way 90° PCB Layout

202 Way 90° PCB Layout

253 Way 90° PCB Layout

303 Way 90° PCB Layout

Female

Non standard style
5 guides require
2.3 dia hole

Dimension are in mm
PCB Standard Vertical Preparations Details

Layout Male

20 Way vertical PCB

50 Way vertical PCB

77 Way vertical PCB

Note
Vertical guide centres align with the centre of the PCB contact layout.

Dimension are in mm
PCB Standard Vertical Preparations Details

Layout Male

102 Way vertical PCB

![102 Way vertical PCB Diagram]

119 Way vertical PCB

![119 Way vertical PCB Diagram]

128 Way vertical PCB

![128 Way vertical PCB Diagram]

Note

Vertical guide centres align with the centre of the PCB contact layout.

Dimension are in mm
### PCB Standard Vertical Preparations Details

#### Layout Male

**152 Way vertical PCB**

```
1.905 TYP Between
Contacts
0.953 TYP Between
Contacts
```

**202 Way vertical PCB**

```
1.905 TYP Between
Contacts
0.953 TYP Between
Contacts
```

**253 Way vertical PCB**

```
1.905 TYP Between
Contacts
0.953 TYP Between
Contacts
```

**303 Way vertical PCB**

```
1.905 TYP Between
Contacts
0.953 TYP Between
Contacts
```

#### Layout Female

```
106.68
```

**152 Way vertical PCB**

```
106.68
```

**202 Way vertical PCB**

```
106.68
```

**253 Way vertical PCB**

```
106.68
```

**303 Way vertical PCB**

```
106.68
```

### Note

Vertical guide centres align with the centre of the PCB contact layout.

Dimension are in mm

---

**106.68**

**5.72**

**Ø 2.8 Hole Standard Guides**
PCB Stacking Preparations Details

Layout viewed from Male side  Layout viewed from Female side

50 Way vertical PCB

77 Way vertical PCB

102 Way vertical PCB

Note

Stacking guide centres align with the centre of the PCB contact layout.
Stacking connectors are currently only available in 50, 77 & 102 ways.
If you have further requirements please contact our local sales offices.

Dimension are in mm
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- Millimeter-Wave Solutions
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