

# Specialist Connectors



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### FEATURES AND BENEFITS

- ❖ Constructed using Spring Loaded contacts, maintaining a positive force against the mating connector.
- ❖ Low mating force enables rapid and effortless connection for a user-friendly connection system.
- ❖ Rugged and robust, made from highly durable mould materials and designed to withstand dust, water and chemical agent ingress – ensuring continued reliability throughout the product's lifecycle.
- ❖ Tolerant to mating misalignment.
- ❖ Ideal for use in portable equipment where separate battery modules are used, and for data transfer docking stations.

### TYPICAL APPLICATIONS

- ❖ Military radio systems
- ❖ Thermal imaging cameras
- ❖ Hand-held scanners
- ❖ Docking stations
- ❖ Powerboat gantry connection system
- ❖ Disposable modules in medical applications
- ❖ Hand-held commercial radios
- ❖ Portable datacoms equipment

### SPECIFICATIONS

#### ❖ Materials

Mouldings:	High Temperature Plastic, UL94V-0
Seals:	Thermoplastic Elastomer
Contacts:	Brass
Threaded Inserts:	Brass
Finish:	Gold

#### ❖ Electrical

Current Rating:	1A per contact
Voltage Rating:	240V DC
Contact Resistance:	Male: 10 mΩ max. Female: 30 mΩ max.
Insulation Resistance:	1,000 MΩ min.

#### ❖ Environmental

Temperature Range:	-40°C to +100°C
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#### ❖ Mechanical

Durability:	10,000 cycles
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All preferred sizes of this range are held in stock.  
Check [www.harwin.com](http://www.harwin.com) for availability.

[www.harwin.com](http://www.harwin.com)

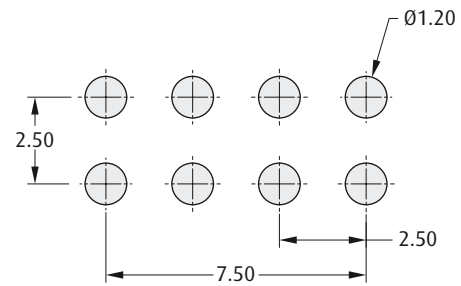
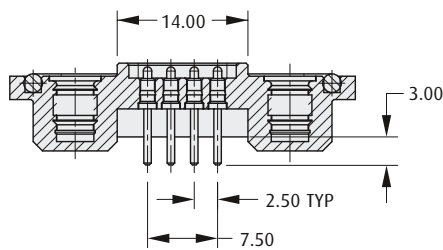
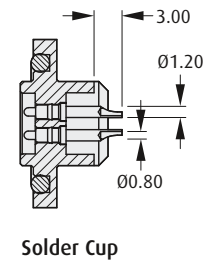
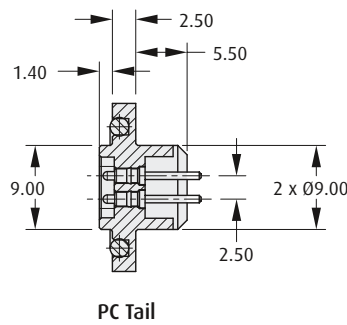
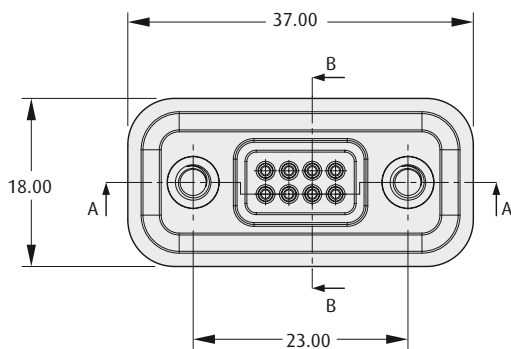


# M90 Connectors

## Female PC Tail Hot Shoe Connector

- ❖ Contact [technical@harwin.com](mailto:technical@harwin.com) for alternative contact configurations and designs.
- ❖ Spring probe design for maintaining a positive force against the mating connector – see page 142.

### SPRING PROBE ASSEMBLY



Recommended PC Board Pattern

### HOW TO ORDER

**M90 - 60X XX 45**

#### SERIES CODE

#### TYPE

601	PC Tail
602	Solder Cup Tail

#### FINISH

45

Gold



#### TOTAL NO. OF CONTACTS

08, 12, 16

[www.harwin.com](http://www.harwin.com)

All dimensions in mm.



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HotShoe

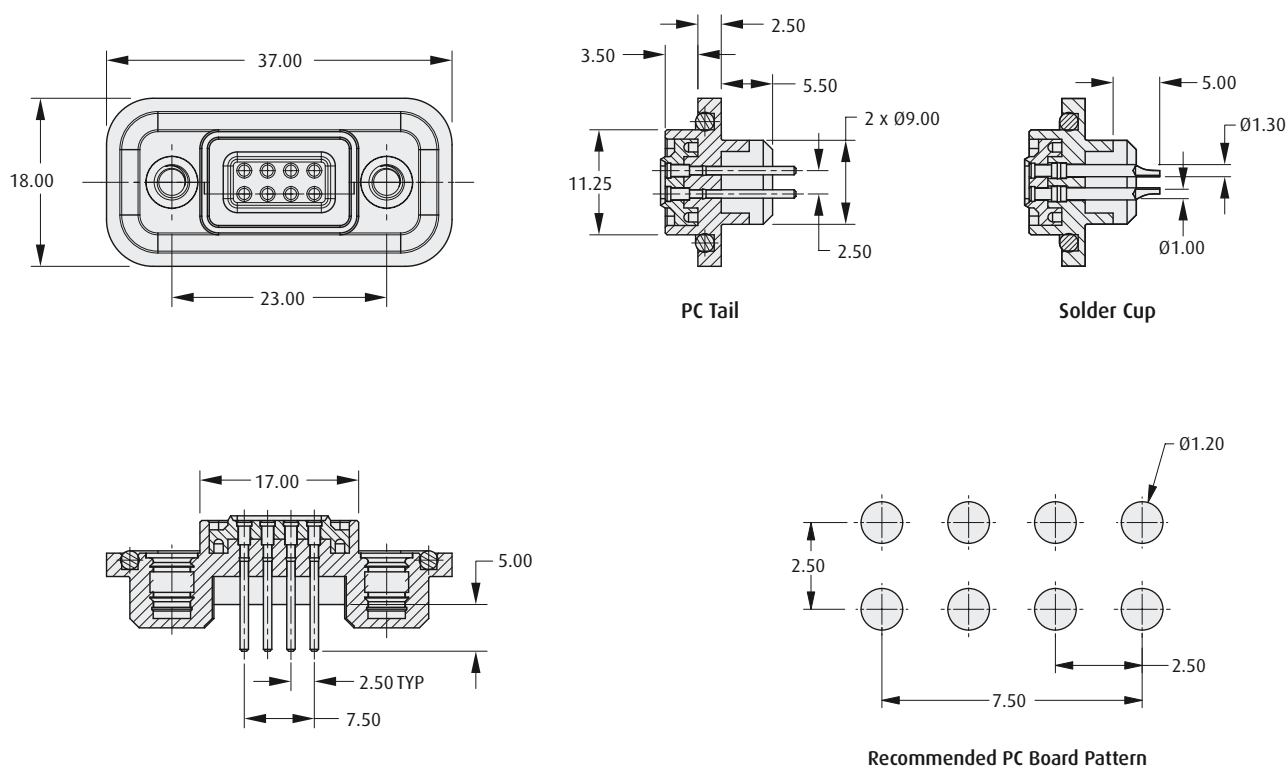
# M90 Connectors

## Male PC Tail Hot Shoe Connector

- ❖ Contact [technical@harwin.com](mailto:technical@harwin.com) for alternative contact configurations and designs.
- ❖ Designed to mate with a spring probe connector – see page 141.



### FIXED CONTACT ASSEMBLY



### HOW TO ORDER

**M90 - 70X XX 45**

#### SERIES CODE

#### TYPE

<b>701</b>	PC Tail
<b>702</b>	Solder Cup Tail

#### FINISH

**45**

Gold



#### TOTAL NO. OF CONTACTS

**08, 12, 16**

PC Tail

**08**

Solder Cup Tail

All dimensions in mm.

[www.harwin.com](http://www.harwin.com)





## ➤ Materials

Mouldings:	High Temp Thermoplastic, UL94V-0		
Contacts:	Plunger:	Brass	
	Barrel:	Brass	
	Spring:	Stainless Steel or Gold-plated Steel	
Finish:	Plunger:	Gold	
	Barrel:	Gold	

## ➤ Electrical

Current rating:	1.0A max
Voltage rating:	12V DC
Contact resistance:	50 mΩ max
Insulation resistance:	100 MΩ min

## ➤ Environmental

Operating Temperature:	-40°C to +85°C
Solderability:	235°C for 5 seconds
Soldering heat resistance:	260°C for 10 seconds

## ➤ Mechanical

Durability:	10,000 operations	
Working height:	2-way	3.9mm
	3-way, 4-way	3.4mm
	5-way	4.5mm
Spring force at working height:	2-way	1.1N ±20%
	3-way, 4-way	1.2N ±20%
	5-way	0.8N ±20%

All preferred sizes of this range are held in stock.  
Check [www.harwin.com](http://www.harwin.com) for availability.

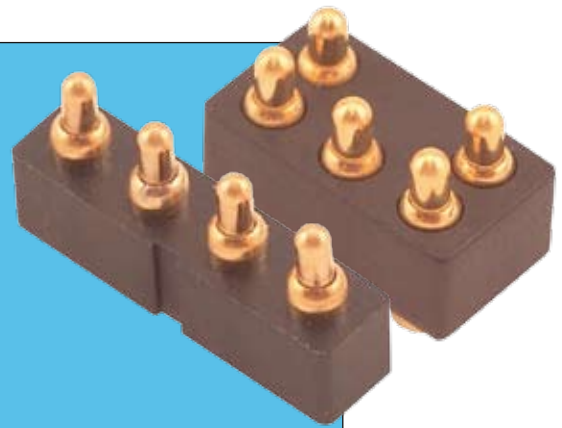
[www.harwin.com](http://www.harwin.com)



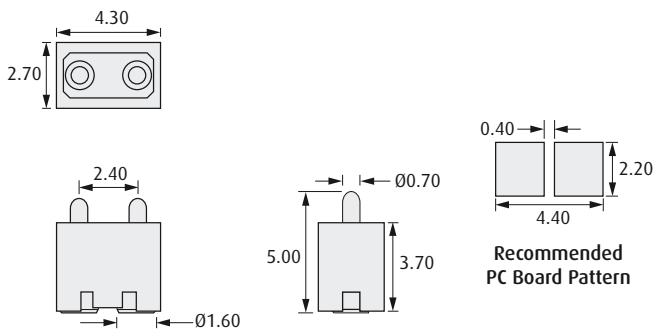
# Spring Contact Connectors

A range of spring contact connectors for maintaining a positive force against a mating surface.

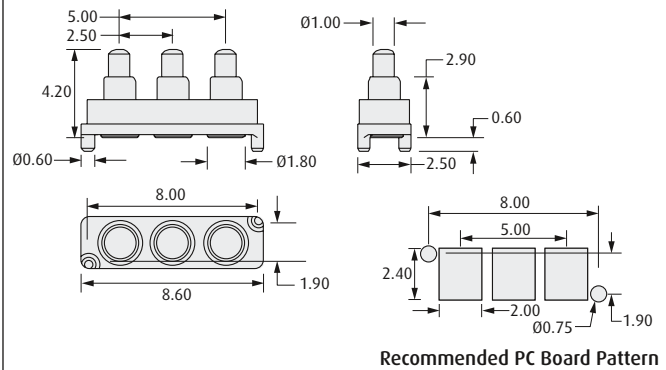
- ❖ Low mating force enables rapid and effortless connection for a user friendly system.
- ❖ Tolerates significant mating misalignment.
- ❖ Ideal for use in portable equipment where separate battery modules are used and for data transfer docking stations.



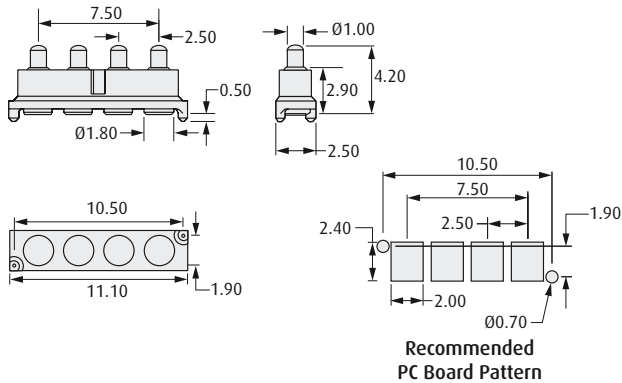
## 2 CONTACTS



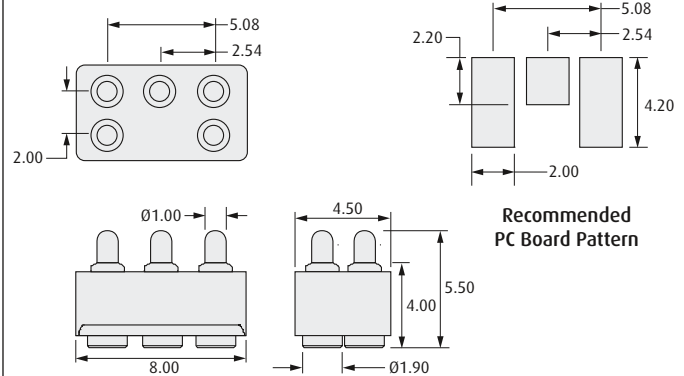
## 3 CONTACTS



## 4 CONTACTS



## 5 CONTACTS



## HOW TO ORDER

**P20 - XX 45 R**

SERIES CODE

TOTAL NO. OF CONTACTS

02 to 05

TAPE AND REEL

FINISH

45 Gold



All dimensions in mm.

[www.harwin.com](http://www.harwin.com)



A new range of high reliability, rugged, RoHS-compliant Circular Connectors released by Harwin to meet the high standards of MIL-DTL-5015, yet priced to be cost-effective for commercial and industrial applications.

Designed for use in harsh and demanding environments, the high specification, cadmium- and hexavalent chromium-free range features free plug, panel mount and cable connector orientations in a number of popular shell and layout options.

## Features

- ❖ Intermateable with MIL-DTL-5015
- ❖ Low cost, highly durable & rugged connector system
- ❖ Solder termination
- ❖ Full environmental sealing with the use of backshells and sealing gaskets, exceeds IP-67
- ❖ Threaded and polarised coupling
- ❖ Zinc & Black Chromate-plated shells
- ❖ COTS applications where MIL Spec is not mandatory

## Materials

Outer Shell:	Aluminium Alloy, Zinc with Black Chromate finish
Inner Contacts:	Copper Alloy, Silver finish
Insulator, Grommet:	Polychloroprene

## Electrical

Current Rating:	13A
Voltage Rating:	10SL shell: 500V AC, 700V DC 12S shell: 500V AC, 700V DC 14S shell: 200V AC, 250V DC
Voltage proof:	10SL shell: 2,000V AC 12S shell: 2,000V AC 14S shell: 1,000V AC
Insulation Resistance:	5,000 MΩ min.

## Environmental

Operating Temperature:	-55°C to +125°C
Vibration sensitivity:	10Hz to 500Hz, 98mm/s <sup>2</sup> (10G)
Shock severity:	490m/s <sup>2</sup> (50G) for 11ms
Water Resistance (sealing):	1.8m for 48 hours – exceeds IP67

## Mechanical

Durability:	500 operations
Wire size:	16 to 22 AWG

All preferred sizes of this range are held in stock.  
Check [www.harwin.com](http://www.harwin.com) for availability.

## HOW TO ORDER

**M90 - 310X# XXXX-X X**

### SERIES CODE

#### TYPE

<b>3101F</b>	Cable connector with backshell
<b>3102R</b>	Panel mount connector with gasket
<b>3106F</b>	Straight plug with backshell

### CONTACT GENDER

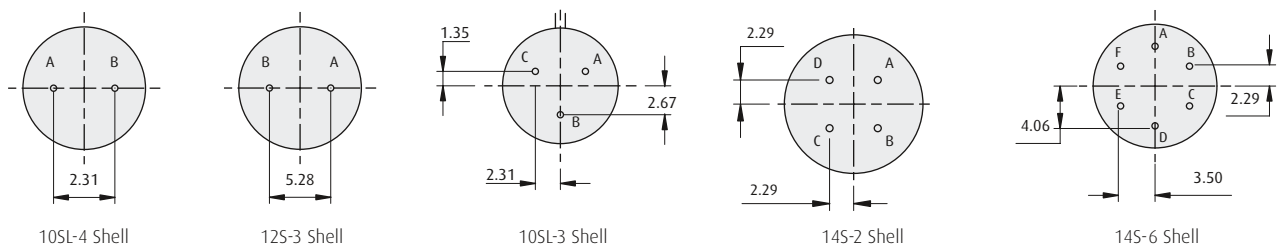
<b>P</b>	Male
<b>S</b>	Female

### SHELL SIZE

<b>10SL-3</b>	Thread 5/8-24UNEF, 3 contacts
<b>10SL-4</b>	Thread 5/8-24UNEF, 2 contacts
<b>12S-3</b>	Thread 3/4-20UNEF, 2 contacts
<b>14S-2</b>	Thread 7/8-20UNEF, 4 contacts
<b>14S-6</b>	Thread 7/8-20UNEF, 6 contacts

## CONTACT CONFIGURATION

Contact numbering is shown looking onto the mating face of the male connector.



[www.harwin.com](http://www.harwin.com)

All dimensions in mm.



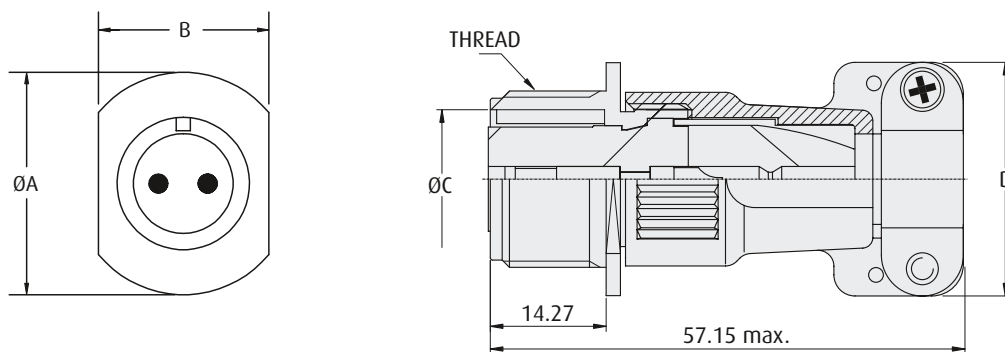
# Commercial MIL-DTL-5015

## Cable Connector & Straight Plug

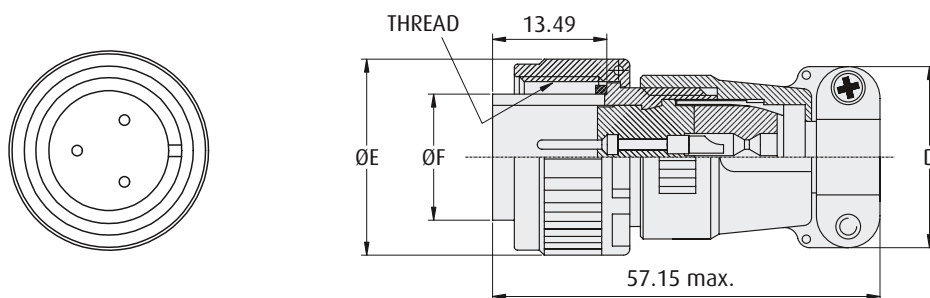
- ❖ Male & Female Circular Connectors intermateable with MIL-DTL-5015.
- ❖ Rugged connector system for harsh environments.
- ❖ Cable assembly service available.
- ❖ Exceeds IP-67.



### CABLE CONNECTOR



### STRAIGHT PLUG



### CALCULATION

SHELL SIZE	THREAD*	DIMENSION					
		$\varnothing A \text{ max.}$	$B \text{ max.}$	$\varnothing C \text{ min.}$	$D \text{ max.}$	$\varnothing E \text{ max.}$	$\varnothing F \text{ min.}$
<b>10SL-3</b>	5/8-24UNEF-2A/2B	24.61	16.66	11.38	24.61	24.61	11.33
<b>10SL-4</b>	5/8-24UNEF-2A/2B	24.61	16.66	11.38	22.20	24.61	11.33
<b>12S-3</b>	3/4-20UNEF-2A/2B	26.97	19.43	14.15	22.70	26.97	14.10
<b>14S-2</b>	7/8-20UNEF-2A/2B	29.63	22.60	17.32	27.00	29.36	17.15
<b>14S-6</b>	7/8-20UNEF-2A/2B	29.63	22.60	17.32	27.00	29.36	17.15

\*2A class for external threads, 2B class for internal threads

All dimensions in mm.

[www.harwin.com](http://www.harwin.com)



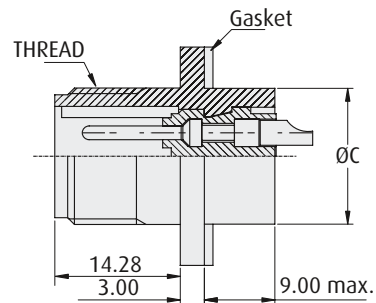
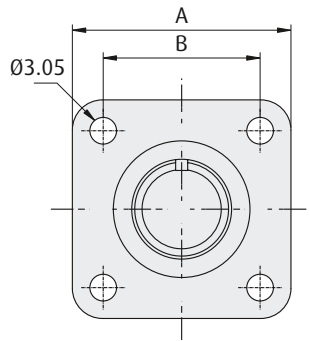


# Commercial MIL-DTL-5015

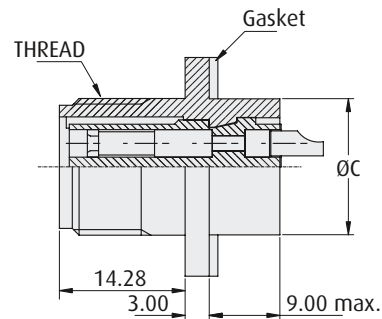
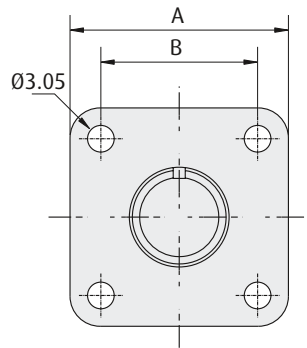
## Panel Mount Connector, Receptacle Style

- ❖ Male & Female Circular Connectors intermateable with MIL-DTL-5015.
- ❖ Features screw holes for panel mounting.
- ❖ Gaskets provide additional sealing.
- ❖ 13A power.

### MALE



### FEMALE



### CALCULATION

SHELL SIZE	THREAD	DIMENSION		
		A $\pm 0.79$	B $\pm 0.12$	C max.
<b>10SL-3</b>	5/8-24UNEF-2A	25.40	18.26	19.35
<b>10SL-4</b>	5/8-24UNEF-2A	25.40	18.26	19.35
<b>12S-3</b>	3/4-20UNEF-2A	27.79	20.62	19.86
<b>14S-2</b>	7/8-20UNEF-2A	30.18	23.01	23.01
<b>14S-6</b>	7/8-20UNEF-2A	30.18	23.01	23.01

[www.harwin.com](http://www.harwin.com)

All dimensions in mm.



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CIRCULAR CONNECTORS

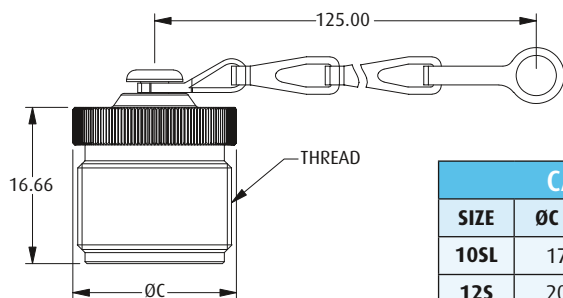
# Commercial MIL-DTL-5015

## Dust Caps & Rubber Bushing

- ❖ Dust cap with external thread for use with Straight Plugs (M90-3106F).
- ❖ Dust cap with internal thread for use with Cable connectors (M90-3101F) and Panel Mount connectors (M90-3102R).
- ❖ Dust caps supplied fitted with chain.
- ❖ Rubber Bushing for use with Cable connectors (M90-3101F) and Straight Plugs (M90-3106F).

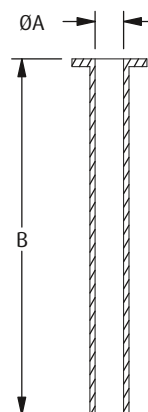


### DUST CAP – EXTERNAL THREAD



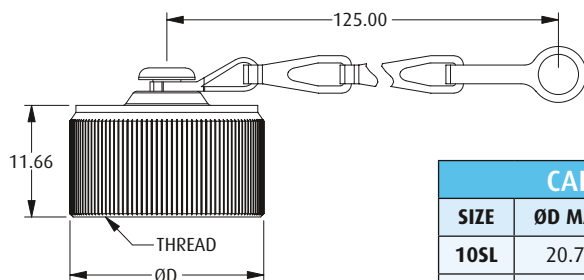
CALCULATION		
SIZE	ØC MAX	THREAD
10SL	17.45	5/8-24UNEF-2A
12S	20.62	3/4-20UNEF-2A
14S	23.8	7/8-20UNEF-2A

### RUBBER BUSHING



CALCULATION		
SIZE	ØA	B
4	5.59	69.85
6	7.92	66.68

### DUST CAP – INTERNAL THREAD



CALCULATION		
SIZE	ØD MAX	THREAD
10SL	20.70	5/8-24UNEF-2B
12S	25.40	3/4-20UNEF-2B
14S	28.58	7/8-20UNEF-2B

### HOW TO ORDER

**M90 - XXXXX - XXXX**

#### SERIES CODE

TYPE	
25042	Dust Cap – External thread
25043	Dust Cap – Internal thread
3420	Rubber Bushing

#### SIZE

10SL	For use with 10SL shell size (Dust caps)
12S	For use with 12S shell size (Dust caps)
14S	For use with 14S shell size (Dust caps)
4	For use with 10SL & 12S shell sizes (Bushing)
6	For use with 14S shell size (Bushing)

All dimensions in mm.

[www.harwin.com](http://www.harwin.com)



## PC/104 Connectors – 2.54mm PITCH (M20)

### Materials

Mouldings:	Glass-filled PBT or PPS (High temp) UL94V-0
Contacts:	Phosphor Bronze
Finish:	Gold

### Electrical

Current rating:	Solder Tail: 3A max Press-Fit Tail: 2A max
Voltage rating:	12V DC
Voltage proof:	1,000V AC
Contact resistance:	30 mΩ max
Insulation resistance:	1,000 MΩ min

### Environmental

Temperature Range:	-55° to +105°C
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### Mechanical

Durability:	Mating: 10 operations Press-fit: 3 operations
Insertion force (max):	1.5N per contact
Withdrawal force (min):	0.25N per contact
Insertion force to board (max):	Press-Fit: 60N per contact

All preferred sizes of this range are held in stock.  
Check [www.harwin.com](http://www.harwin.com) for availability.

## PC/104 Plus – 2.00mm PITCH (M22)

### Materials:

Mouldings:	High Temperature Nylon or PPS, UL94V-0
Contacts:	M22-602: Brass Others: Phosphor Bronze
Finish:	See order code

### Electrical

Current rating:	Solder Tail – 1A Press-Fit Tail – 2A max
Voltage rating:	12V DC
Voltage proof:	500V AC
Contact resistance:	30 mΩ max
Insulation resistance:	1,000 MΩ min

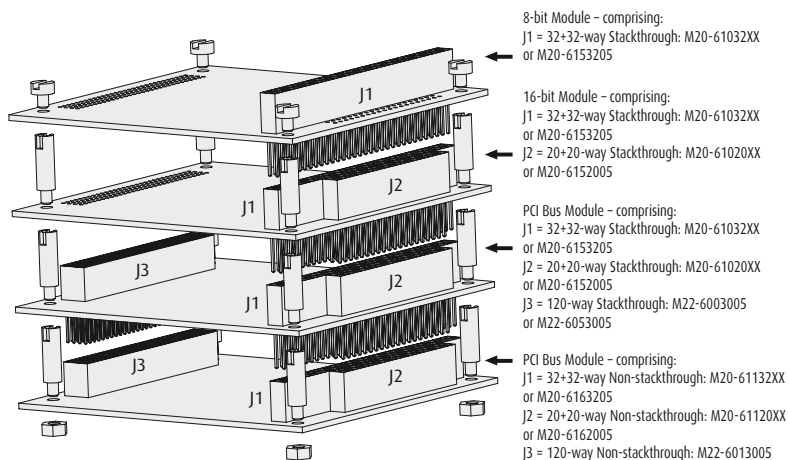
### Environmental

Temperature Range:	-40° to +105°C
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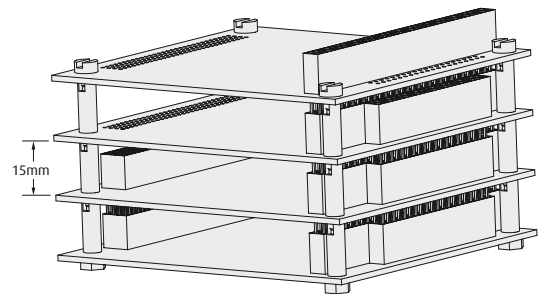
### Mechanical

Durability:	Mating – 10 operations Press-fit – 3 operations
Insertion force:	M22-603: 1.6N avg per contact Others: 1.2N max per contact
Withdrawal force:	M22-603: 1.4N avg per contact Others: 0.2N max per contact
Insertion force to board (max):	Press-Fit: 60N per contact

## TYPICAL PC/104 & PC/104-PLUS MODULE STACK



Assembled PC/104 stack (4 Modules)

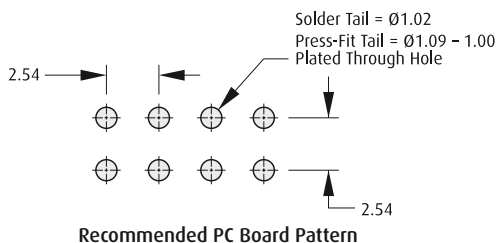
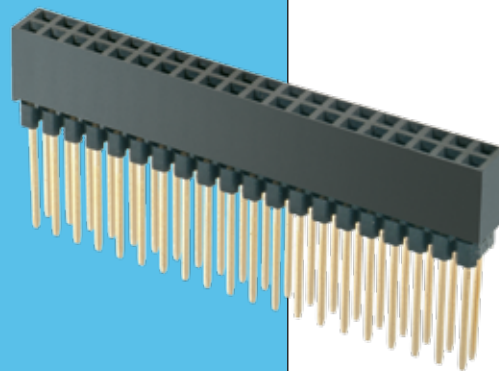




# PC/104 Connectors

A range of bus connectors compatible with the PC/104 industry standard for embedded pc applications, designed for stacking boards with a common bus.

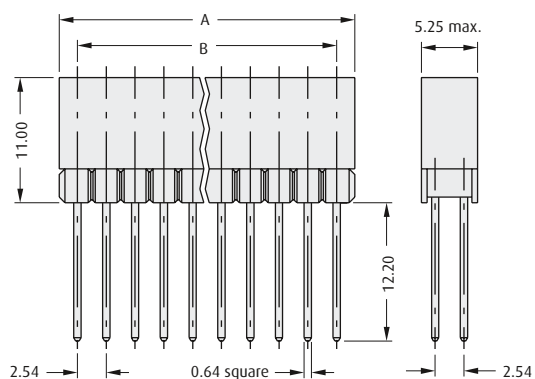
- ❖ 32+32 ways Supports an 8-bit system.
- ❖ 20+20 ways combined with 32+32 ways supports a 16-bit system.



## CALCULATION

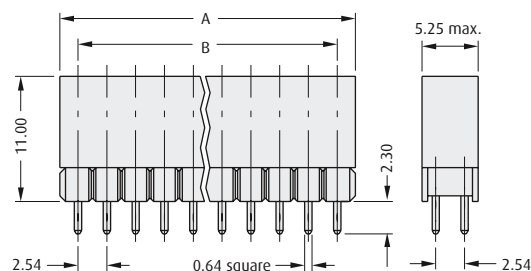
<b>A</b>	$B + 3.56$
<b>B</b>	$2.54 \times (\text{No of ways per row} - 1)$
<b>C</b>	$2.54 \times \text{No of ways per row}$

## STACKTHROUGH CONNECTOR



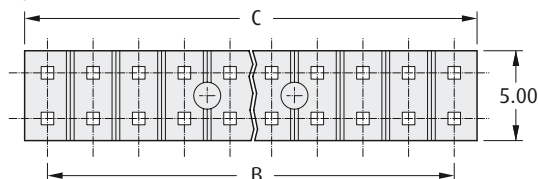
- ❖ Press-Fit connector M20-615 supplied with spacer moulding M20-614

## NON-STACKTHROUGH CONNECTOR



## SPACER MOULDING

- ❖ 3.8mm Thick



## HOW TO ORDER

**M20 - 61 X XX XX**

### SERIES CODE

### CONNECTOR TYPE

<b>0</b>	Stackthrough, Solder Tail
<b>1</b>	Non-Stackthrough, Solder Tail
<b>4</b>	Spacer Moulding
<b>5</b>	Stackthrough, Press-Fit Tail
<b>6</b>	Non-Stackthrough, Press-Fit Tail

### FINISH

<b>05</b>	Gold	PG
<b>45</b>	Gold + Hi Temp Mould (M20-610, M20-611)	PG
<b>98</b>	Spacer Moulding	PG

### NO. OF WAYS PER ROW

**20, 32**

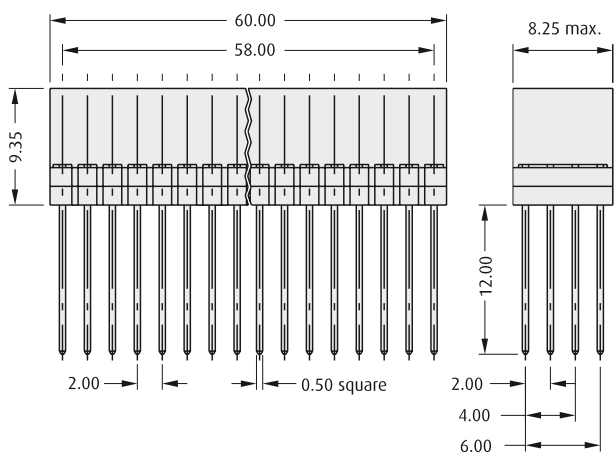
All dimensions in mm.

[www.harwin.com](http://www.harwin.com)

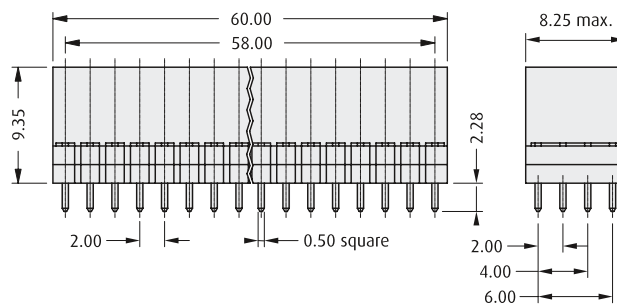


- 
- 2.00
- 6.00
- 4.00
- 2.00
- Solder Tail - Ø0.80  
Press-fit Tail - Ø0.94 - 0.85  
Plated Through Hole

## STACKTHROUGH CONNECTOR



## NON-STACKTHROUGH CONNECTOR



**M22 - 60 X 30 05**

## CONNECTOR TYPE

<b>0</b>	Stackthrough, Solder Tail
<b>1</b>	Non-Stackthrough, Solder Tail
<b>5</b>	Stackthrough, Press-Fit Tail
<b>6</b>	Non-Stackthrough, Press Fit Tail

## 05

Gold



NO. OF WAYS PER ROW	
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
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99	99
100	100

30

All dimensions in mm.

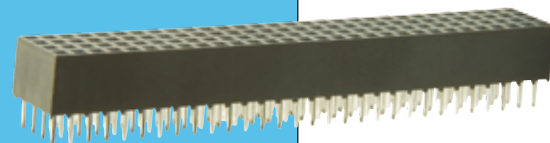


# HARWIN

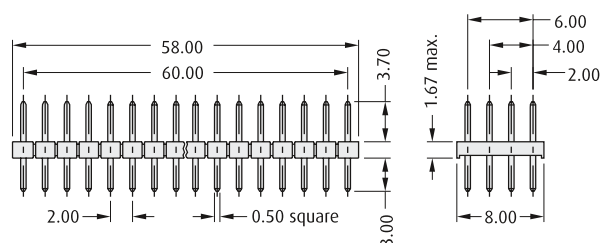
# PC/104 Plus Connectors

## Accessories

- ❖ Accessory connectors and components for use with the PC/104 Plus range.
- ❖ Shroud is used to protect the square tails of stackthrough connectors and is fitted to the underside of the PCB following soldering.
- ❖ Shroud ensures alignment of the tails with the mating receptacle and self retains by latching into the four mounting holes.

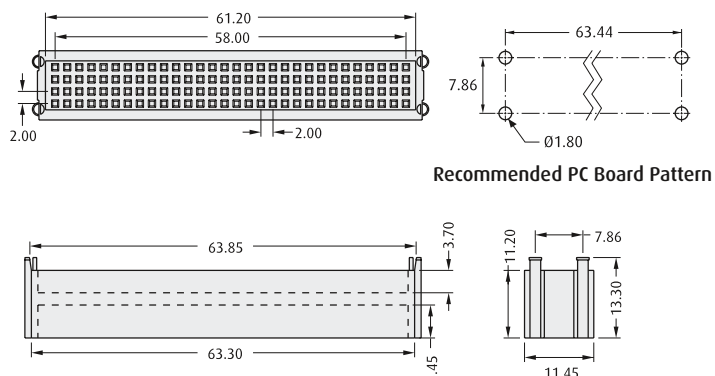


### PC/104 PLUS POST HEADER

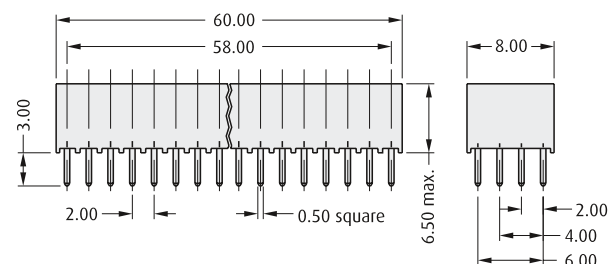


See previous page for pcb layout

### PC/104 PLUS SHROUD



### PC/104 PLUS POST HEADER RECEPTACLE

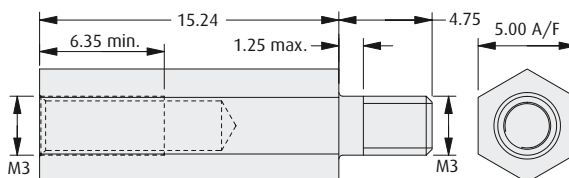


See previous page for pcb layout

### PC/104 SPACER

#### ORDER CODE

R6104-02



## HOW TO ORDER

**M22 - 60 X 30 XX**

#### SERIES CODE

#### CONNECTOR TYPE

2	Post Header
3	Post Receptacle
4	Shroud

#### FINISH

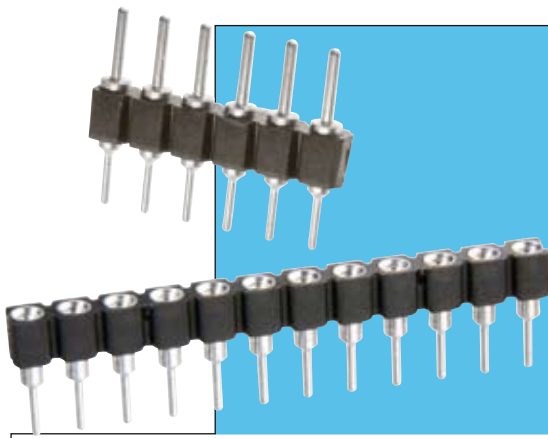
42	Gold + Tin (M22-602, 603)	PG
98	Shroud (M22-604)	PG

#### NO. OF WAYS PER ROW

30

All dimensions in mm.

[www.harwin.com](http://www.harwin.com)

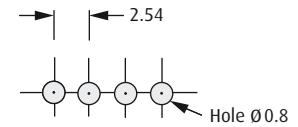
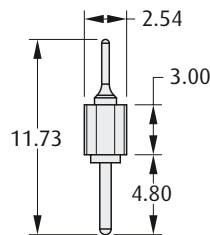
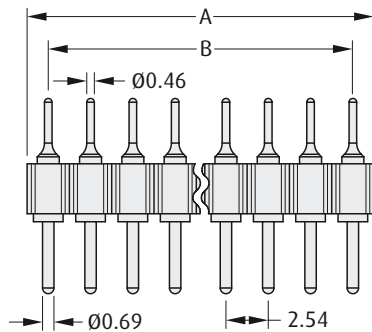


# IC Sockets

## Modular Single Row Male & Female

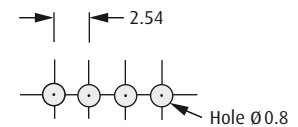
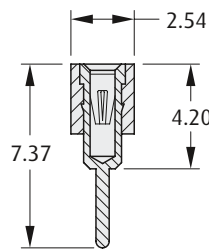
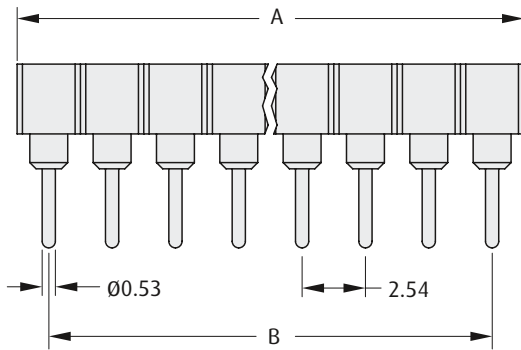
- ❖ Connectors can be cut to smaller sizes.
- ❖ Socket accepts mating pin Ø0.40 to 0.56mm, using four finger Beryllium Copper Contact technology (see the Datamate range for more detail).
- ❖ Please consult drawings for specification.

### MALE



Recommended PC Board Pattern

### FEMALE



Recommended PC Board Pattern

### CALCULATION

<b>A</b>	2.54 x No. of ways per row
<b>B</b>	2.54 x (No. of ways per row -1)

### HOW TO ORDER

**D01 - 99 X XX XX**

#### SERIES CODE

#### TYPE

2	Male
7	Female

#### FINISH

42	Gold + Tin (Female)	PG
46	Tin (Male)	PG

#### NO OF WAYS PER ROW

20, 32

[www.harwin.com](http://www.harwin.com)

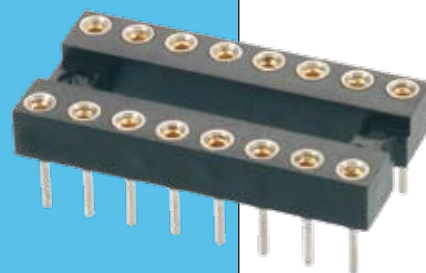
All dimensions in mm.



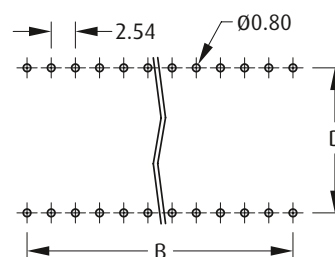
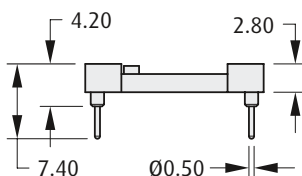
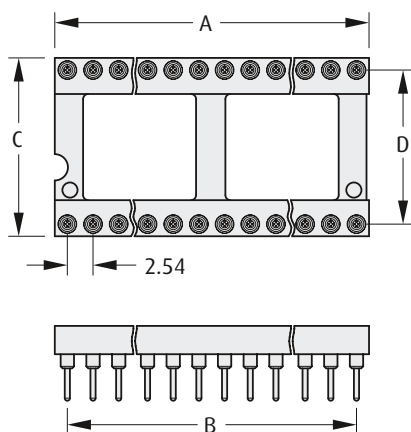
# HARWIN

## Dual Row IC Socket

- ❖ Socket accepts IC leads 00.41 to 0.53mm.
- ❖ End and side stackable.
- ❖ Utilises four finger Beryllium Copper Contact technology (see the Datamate range for more detail).
- ❖ Please consult drawings for specifications.



## IC SOCKET



### Recommended PC Board Pattern

A	B	C	D	No. OF CONTACTS	ORDER CODE
7.60	5.08	10.02	7.62 (0.3")	6	<b>D2806-42</b>
10.10	7.62	10.02	7.62 (0.3")	8	<b>D2808-42</b>
17.70	15.24	10.02	7.62 (0.3")	14	<b>D2814-42</b>
20.30	17.78	10.02	7.62 (0.3")	16	<b>D2816-42</b>
22.80	20.32	10.02	7.62 (0.3")	18	<b>D2818-42</b>
25.30	22.86	10.02	7.62 (0.3")	20	<b>D2820-42</b>
27.80	25.40	10.02	7.62 (0.3")	22	<b>D2922-42</b>
27.80	25.40	12.60	10.16 (0.4")	22	<b>D2822-42</b>

A	B	C	D	No. OF CONTACTS	ORDER CODE
30.40	27.94	10.02	7.62 (0.3")	24	<b>D2924-42</b>
30.40	27.94	12.60	10.16 (0.4")	24	<b>D2724-42</b>
30.40	27.94	17.64	15.24 (0.6")	24	<b>D2824-42</b>
35.50	33.02	10.02	7.62 (0.3")	28	<b>D2928-42</b>
35.50	33.02	17.64	15.24 (0.6")	28	<b>D2828-42</b>
40.60	38.10	17.64	15.24 (0.6")	32	<b>D2832-42</b>
50.80	48.26	17.64	15.24 (0.6")	40	<b>D2840-42</b>
60.90	58.42	17.64	15.24 (0.6")	48	<b>D2948-42</b>
81.2	78.74	25.4	22.86 (0.9")	64	<b>D2864-42</b>

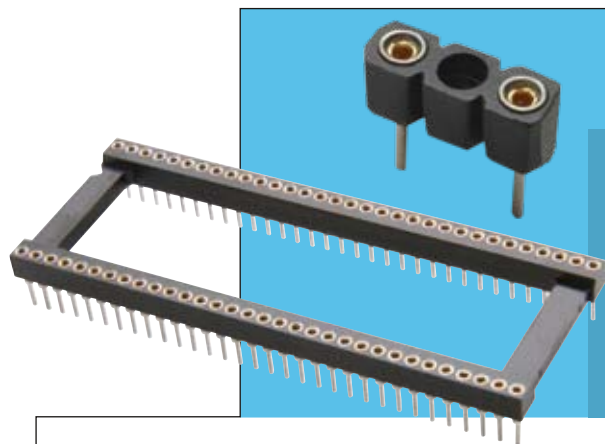
## HOW TO ORDER

**D2 XXX - 42**

<b>SERIES CODE</b>						
<b>TYPE</b>						
See table above						
<b>FINISH</b>						
<b>42</b>	Gold + Tin	PG				

All dimensions in mm.

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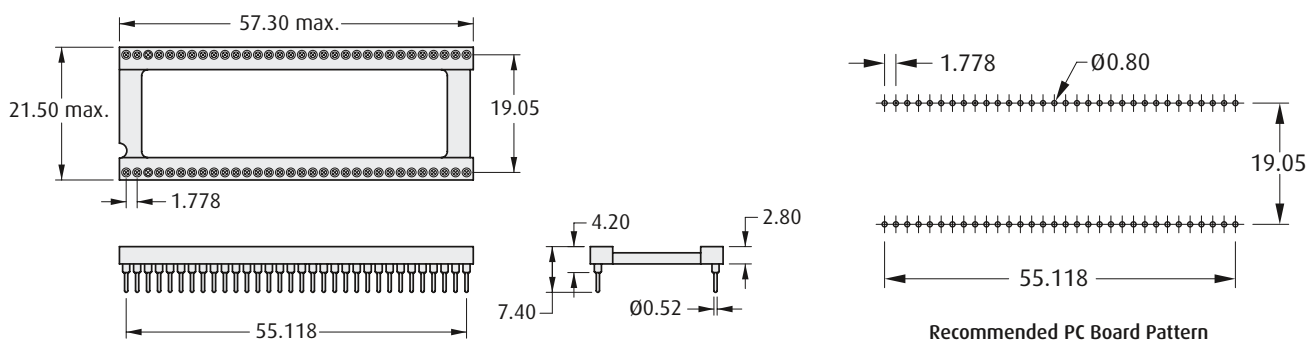


# IC Sockets

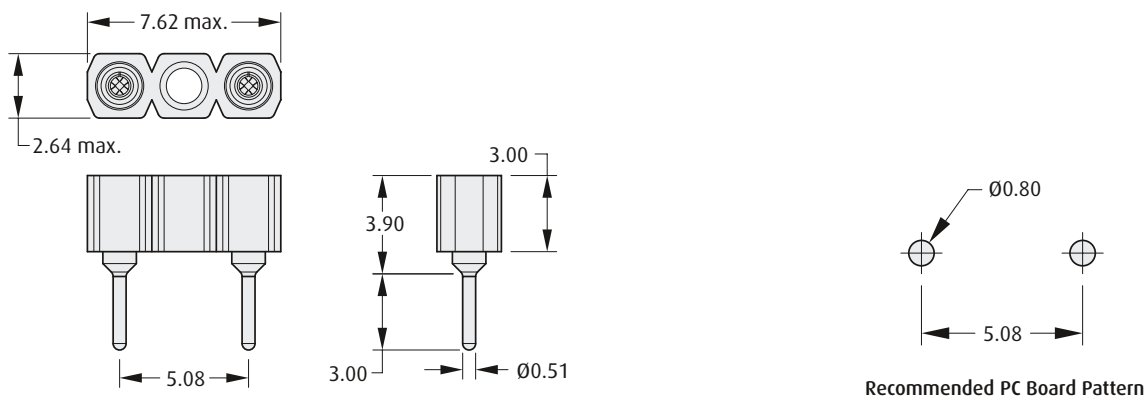
## Special Purpose Connectors

- ❖ "Shrink Dip" Socket for high density IC leads – 1.778mm pitch, Ø0.40 to 0.56mm.
- ❖ Fuse socket accepts leads of Ø0.40 to 0.56mm.
- ❖ Please consult drawings for specifications.

### SHRINK DIP IC SOCKET



### FUSE SOCKET



### HOW TO ORDER

**D XXXX - 42**

**SERIES CODE**

**TYPE**

<b>8864</b>	Shrink Dip
<b>2899</b>	Fuse Socket

**FINISH**

**42** Gold + Tin

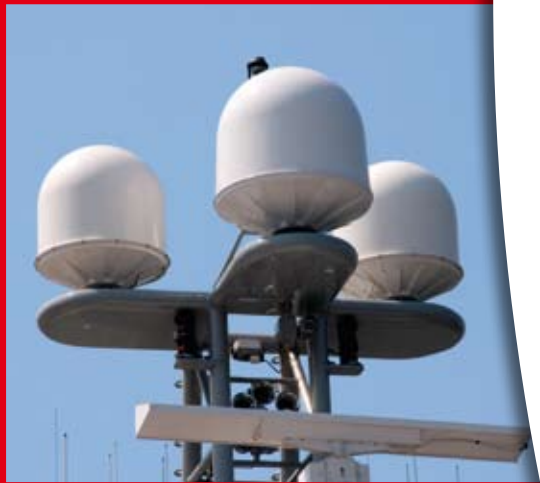


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All dimensions in mm.



**HARWIN**



# HARWIN

INTERCONNECT DESIGN & MANUFACTURE

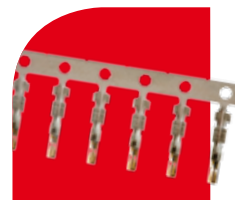
## Automated High-Rel Crimping

### Datamate **Trio-Tek**

Performing to the same high-reliability standards as conventional Datamate, the Trio-Tek open barrel crimp contact automates the crimp process to significantly save on assembly time and reduce process costs.

**Key performance benefits:**

- 2mm Pitch
- 3A low frequency signal contacts
- Reduced assembly costs in high volume applications
- Crimp design offers increased strain relief



Visit [www.harwin.com/trio-tek](http://www.harwin.com/trio-tek)  
to order samples

# HARWIN

For more information  
see **page 30**