

# Hirose Wire-to-Board Connectors

- Purpose
  - To introduce Hirose’s Wire-to-Board (Discrete wire type) connectors
- Objective
  - To explain features and benefits
- Content
  - 32 pages
- Learning time

Welcome to the Hirose Wire-to-Board Connector Product Training Module (PTM). This module is intended to introduce various connectors manufactured by Hirose and to share some of the features and benefits.

# Hirose Product Lineup

Hirose's Wire-to-board connectors offer innovative, cost effective answers for a variety of applications. With contact pitches ranging from 1mm to 10.16mm, multiple pin counts, locking features, and various current ratings, Hirose interconnects are able to solve many engineering problems.



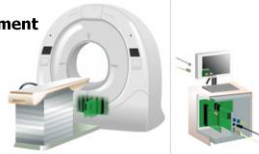
Office Equipment



Servo Motor



Industrial Control Units





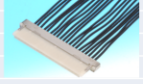

Medical Equipment



Measurement Instruments

Hirose's Wire-to-board connectors offer innovative, cost effective answers for a variety of applications. With contact pitches ranging from 1mm to 10.16mm, multiple pin counts, locking features, and various current ratings, Hirose interconnects are able to solve many engineering problems.


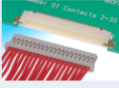

## Wire-to-Board Connectors (Discrete Type)

	Series	Pitch	Positions Available	AWG	Current Rating (Amp Max.)
	DF50	1.0mm	Single row 2-16	#30	1.0
			Double row- 20, 30, 40, 50	#28	1.0
	FX15	1.0mm	Single row 21, 31, 41, 51	#32	0.5
				#30	0.5
				#28	0.5
	DF19	1.0mm	Single row 8, 14, 20, 30,	#36	0.5
				#32	0.8
				#30	0.9
				#28	1.0
	DF20	1.0mm	Double row 10, 20, 30, 40, 50	#36	0.3
				#32	0.7
				#30	0.9
				#30	0.9
				#28	1.0

Quick Reference Guide

The next few slides are a quick reference guide to many of the discrete wire connectors Hirose has to offer. Each series will be discussed in this training module.

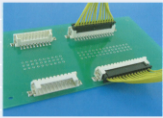

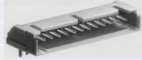
## Wire-to-Board Connectors (Discrete Type)

	Series	Pitch	Positions Available	AWG	Current Rating (Amp Max.)
	DF13	1.25mm	Single row 2-15	#32	1.0
			Double row 10, 20, 30, 40	#30	1.0
				#28	1.0
				#26	1.0
	DF14	1.25mm	Single row 2-10, 15, 20, 25, 30	#32	1.0
				#30	1.0
				#28	1.0
				#26	1.0
	GT8E	2.0mm	Single row 2-8, 10, 14	#28	1.0
			Double row 12, 16, 20, 24	#26	1.0
				#24	1.0
				#22	3.0
				#20	3.0

Quick Reference Guide

As you can see, Hirose offers a wide variety of contact pitch, current rating and styles of wire-to-board connectors.

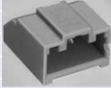


## Wire-to-Board Connectors (Discrete Type)

	Series	Pitch	Positions Available	AWG	Current Rating (Amp Max.)
	DF3	2.0mm	Single row 2-15	#28	1.0
				#26	2.0
				#24	3.0
				#22	3.0
	DF11	2.0mm	Double row 4-32, 40	#30	0.5
				#28	1.0
				#26	2.0
				#24	2.0
	DF1B	2.5mm	Single row 2-16, 18, 20	#30	0.5
			Double row 4-30, 34, 36, 40	#28	1.0
				#26	2.0
				#24	3.0

Quick Reference Guide

The selection includes products for power supply and data transmission

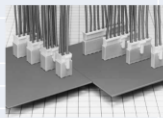
## Wire-to-Board Connectors (Discrete Type)

	Series	Pitch	Positions Available	AWG	Current Rating (Amp Max.)	
	DF1E	2.5mm	Single row 2-15	#30	0.5	
				#28	1.0	
				#26	2.0	
				#24	3.0	
				#22	3.0	
				#20	3.0	
	DF33C	3.3mm	Single row 2-6	#22	5A for single row	4A for double row
			Double row 4, 6, 8, 10, 12,	#20	5A for single row	5A for double row
	DF63	3.96mm	Single row 2,3	#18	7	
				#16	10	

Quick Reference Guide

Contact pitches range from 1mm to 10.16mm and features double row or single row construction. Some series are available with both single and double row construction, so please check the individual connector specifications.



# Wire-to-Board (Discrete Type) Connectors

					Current Rating (Amp Max.)		
	DF64	4.5mm	Single 2,3	AWG			
				#22	3		
				#20	4		
				#18	5		
	DF5	5.0mm	Single row: 2-10 Double row: 4, 6, 8, 10, 12, 14, 16	Pin Count	Cable Size		
					AWG#18	AWG#20	AWG#22
				4	8 A	6 A	5 A
				6	8 A	6 A	5 A
				8	7 A	6 A	5 A
				10	7 A	6 A	5 A
				12	7 A	6 A	4 A
				14	7 A	5 A	4 A
16	7 A	5 A	4 A				

Quick Reference Guide

Wire gauges begin as fine as AWG#36 and range as large as AWG#8.

# Wire-to-Board (Discrete Type) Connectors

					Current Rating (Amp Max.)			
	DF22	7.92mm	Single row: 1-5	Pin Count	Cable Size			
				1	AWG#10	AWG#12	AWG#14	AWG#16
				2	30 A	25 A	20 A	15 A
				3	25 A	20 A	18 A	15 A
				4	25 A	20 A	18 A	15 A
				5	22 A	18 A	15 A	13 A
	DF60	10.16 mm	Single row 1-6	Pin Count	Cable Size			
					DF60			
					AWG#8	AWG#10	AWG#12	
				1	45A	38A	30A	
				2	40A	31A	26A	
				3	40A	31A	26A	
				4	38A	30A	25A	
5	38A	30A	25A					
6	38A	30A	25A					

Quick Reference Guide

The highest current rating for the DF60 series shown in the training module is 45 Amps.



## DF50 1mm Pitch Wire-to-Board with Positive Lock

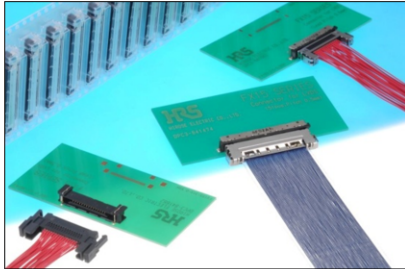


### Features:

- 1mm pitch design reduces required mounting area
- Metal lock provides clear tactile click and secure mating
- Resistant to wrenching forces
- Robust and reliable lance structure
- Lock feature on header eliminates chance of cable entanglement
- High contact reliability with long effective mating length and 2-point contact

The DF50 series is a 1mm pitch connector that is rated for 1 Amp and will accept AWG#28 and AWG#30 wire. The locking function and contact mating occur simultaneously for a clear tactile click. The robust structure is resistant to wrenching forces. The DF50 is available in single row and double row configurations

## FX15 Wire-to-Board Connectors Supporting LVDS Signal



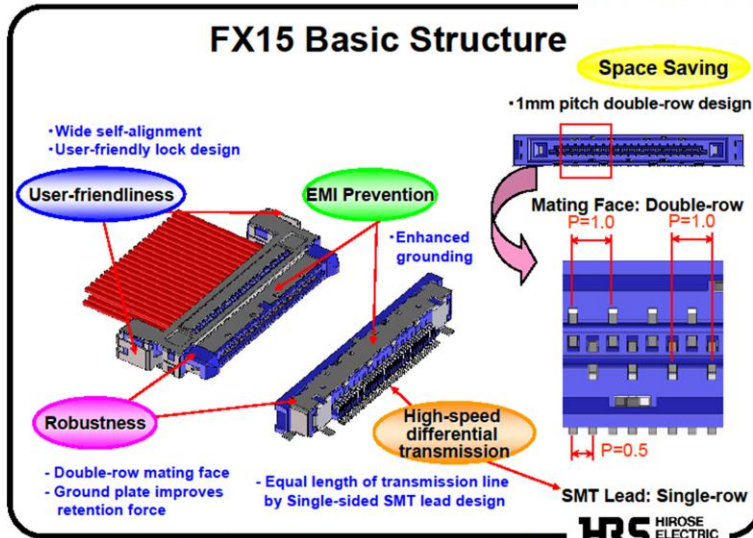
### Features:

- Space saving design with 2-row staggered 1mm pitch on the mating side and on a single row 0.5mm pitch on the termination side
- Equal length transmission lines
- Available with or without metal shields
- Built in guide posts allow secure self-alignment with in  $\pm 1.5\text{mm}$
- Side lock design enables user-friendly operation
- All components and materials comply with EU Directive 2002/95/EC

The Hirose FX15 series is a 1mm pitch connector that is rated for 0.5 Amps using AWG#28-#32 wire and is available with or without metal shields. Built in guide posts allow secure self-alignment range within  $\pm 1.5\text{mm}$ . This series was designed for LVDS applications using FPD displays and FPD televisions. Versions for both discreet wire and micro-coax cable are available.

# FX15 Wire-to-Board

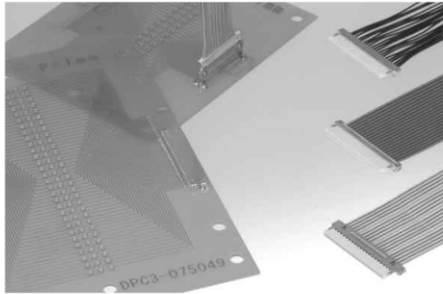
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The FX15 basic structure includes wide self-alignment and user friendly lock design. It has EMI prevention and enhanced grounding. The ground plate improves retention force. Contact configuration creates equal length transmission lines preventing deterioration of LVDS signal within the connector. Side latch-locks assure and confirm complete and secure mating of plugs to receptacles while permitting ease of disconnection.

## DF19 Series

### 1mm Pitch Wire-to-Board, Board-to-FPC, Board-to-Micro Coax Cable connectors



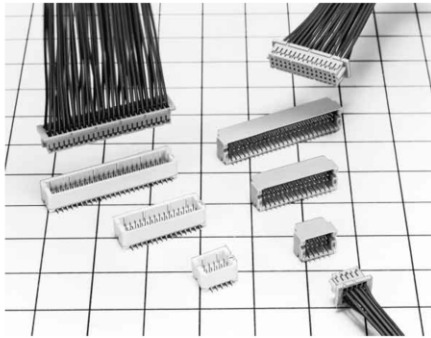
#### Features:

- Header can connect with one of three different sockets (discrete wire, FPC, or fine coaxial cable).
- Ultra low profile, thin coaxial type: 1.5mm thick (Max.1.6mm thick), FPC type: Max. 1.7mm thick
- The three socket connectors have the same outside dimensions to allow for complete design flexibility
- Header connector is available with either a on-board, offset, or reverse offset mounting options
- Ground lines can be connected to the metal shell for shielding
- Contact positions: 8, 14, 20, 30

The DF19 series is a 1mm pitch board to cable, board to FPC, and board to micro-coax cable connector solution. Each header can connect to one of three different type of socket. It has an ultra low profile with a maximum height of 1.1mm. Ground lines can be connected to the metal shell for shielding. High performance connectors for LVDS high speed differential signals.

## DF20 Series

### 1mm Pitch, Double Row, Low Profile Connectors



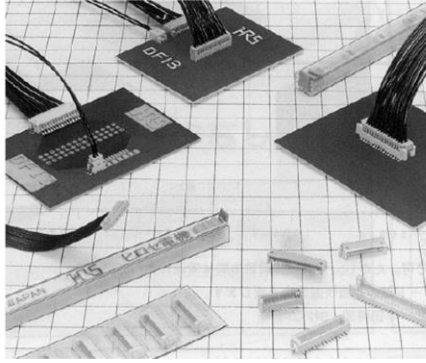
#### Features:

- 1mm contact spacing and low profile design with a mated height of 5.8mm above the PCB.
- Redesigned thin metal hold-downs decrease the overall length of the connector
- The header is provided with vacuum pick-up cap, which allows for standard vacuum nozzle to be used
- The pin header is offered with or without guide posts for PCB positioning
- Keyed to prevent mis-insertion

The DF20 series is a 1mm contact spacing and low profile design with a mated height above the PCB of only 5.8mm. The connector is keyed to prevent mis-insertion. The DF20 fits well with applications in small electronic devices.

## DF13 Series

### 1.25mm Pitch Wire-to-Board and Board-to-Board connectors



#### Features:

- Space saving, a low profile design
- Available in thru-hole (DIP) and SMT mounting styles and with straight or right angle orientations
- Double or single row available
- Suitable for automatic placement
- Many pin counts

The space saving design of the 1.25mm pitch DF13 series is available in wire-to-board and board-to-board configurations. It is suitable for automatic placement and applicable wire sizes are 26-32 AWG.

# DF13 Series

1.25mm Contact Pitch Wire- to-Board, Board-to-Board Connectors

## Varieties of DF13 Series

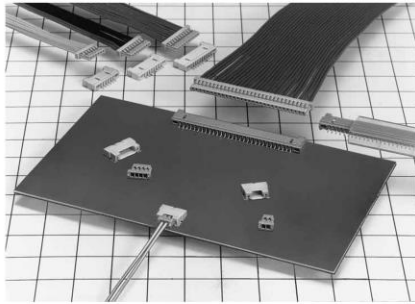
Products			Number of Contact Positions																
			2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	30	40
Single row	Socket		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	Pin Header	DIP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
		Right-angle type	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓			
	SMT	Straight type with wall	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓			
		Straight type without wall	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓			
		Right-angle type	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓			
Double row	Socket										✓					✓	✓		
	Pin Header	SMT									✓					✓	✓ <sup>2</sup>		
		Straight type with guide post									✓					✓	✓ <sup>2</sup>		
	Receptacle	DIP									✓ <sup>1</sup>					✓	✓ <sup>1</sup>		
		SMT									✓ <sup>1</sup>					✓ <sup>1</sup>	✓ <sup>1</sup>		

\*1 Under planning (As of Apr. 2002)  
 \*2 Only gold-plating type is available for 30 and 40pos.

This slide shows the wide variation available in the DF13 series.

## DF14 Series

### 1.25mm Pitch Low Profile Connectors



#### Features:

- Low profile design
  - Top-mount type: 2.5mm height
  - Offset-mount type: 1.6mm height
- Four wall structure encloses the socket so it does not drag on the PCB
- Wide variety of contact positions, pin header types and socket types

The DF14 series is a low profile, 1.25mm pitch, right angle interconnect solution that is available for discrete wire in #26-32AWG, IDC in #28 and #30AWG and FPC designs. The 1.6mm mounted height connector is off-set, mid board mounting style and requires the PCB to be notched.



## GT8E Series

### 2.0mm Pitch, Board-to-Wire Connectors



#### Features:

- Satisfies automotive requirements
- Wide variations: SMT/DIP mounting, single/double row, right angle/straight orientation, etc.
- Waterproof, in-line plugs are available
- Clear tactile click with positive lock
- Unique contact structure for stable contact performance
- Pin-in-hole intrusive reflow for simple soldering process
- RoHS compliant

The GT8E series is a 2mm pitch lock connectors for discreet cable, wire-to-board, and cable-to-cable applications. It is highly reliable in terms of vibration, heat and environmental resistance. This series was developed for harsh environments and is used in applications such as industrial equipment and vehicle equipment.

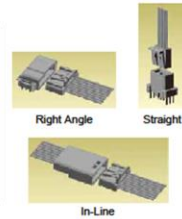
# GT8E Series

## 2.0mm Pitch, Board-to-Wire Connectors

### Wide Variations

	Header					
	Through Hole Soldering			SMT		
	Right Angle		Straight	Right Angle		Straight
	Single Row	Double Row	Single Row	Single Row	Double Row	Single Row
Appearance						
Available No. of Pos.	2, 3, 4, 5, 6, 7, 8, 10	12, 16, 20, 24	4, 6, 7	2, 3, 4	-	-
Under Development	-	-	2, 5	5, 6, 8	12, 16, 24	2

	In-Line Plug	Waterproof* In-Line Plug	Socket	
	Single Row	Single Row	Single Row	Double Row
	Appearance			
Available No. of Pos.	3, 4, 8	4	2, 3, 4, 5, 6, 7, 8, 10	12, 16, 20, 24
Under Development	-	-	-	-



\*Test Conditions: No water intrusion, while submerged in 1.8 meter water depth for 48 hours in mated condition.

Specifications herein are subject to change without notice.  
Contact Hirose for latest specifications, drawings, or availabilities.

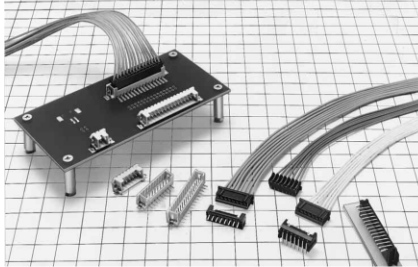
Issued: Sept. 29, 2011



This slide shows the wide variations that makes up the GT8E series

## DF3 Series

### 2mm Pitch, Wire-to-Board Connectors



#### Features:

- The board mount pin headers come with kinked contacts to temporarily help keep the connectors in position before soldering
- A wide variety of options are available including IDC and crimp contact receptacles, in-line plugs, board mount receptacles, right angle and straight pin headers and adapters
- UL/CSA Standard

The DF3 series is a 2mm pitch connector system that offers a wide variation of product styles including IDC and crimp contacts receptacles, in-line plugs and board mount receptacles. The series is also available in right angle and straight pin headers and adapters. This small but robust connector series can handle up to 3 Amps of current.

## DF11 Series 2mm Pitch, Double Row Connectors



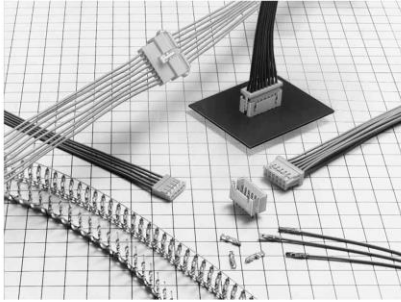
### Features:

- Double rows of 2mm pitch contact has been condensed within the 5mm width
- Crimping or IDC contact type terminations are available
- PCB to cable, cable to cable, and PCB to PCB mating options are available
- SMT and dip solder board mount headers and receptacles
- Gold or tin contacts available
- RoHS compliant

The DF11 product series is a 2mm pitch, double-row system that is available in crimp and IDC contact terminations. Contacts are either gold or tin plated and applicable wire sizes range from 22 to 30 AWG. This connector series lends itself well to many applications.

## DF1B Series

### 2.5mm Pitch, Wire-to-Board Connectors



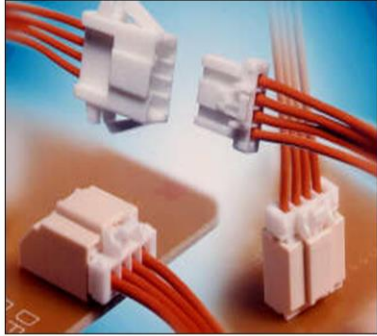
#### Features

- IDC (insulation displacement) and regular crimp contacts
- A high profile header is available for applications requiring resin potting of the PCB
- Single or double row contact arrangements are available for wire-to-board and in-line mated connectors and adapters
- Offered with tin or gold plating contacts

The DF1B series is available in both IDC and crimp contact styles, single and double row arrangements and both tin and gold plated contacts.

## DF1E Series

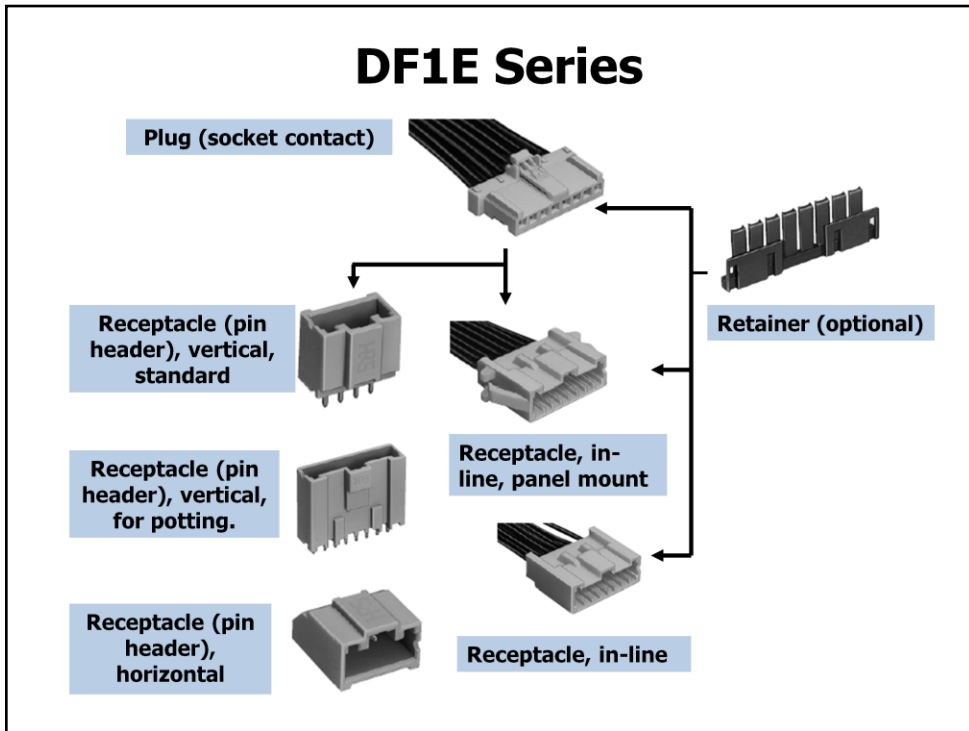
### 2.5mm Pitch, Wire-to-Board and Wire-to-Wire Connectors



#### Features

- Full, mechanical lock
- Optional retainer for increased contact retention and prevention of partial insertion
- Molded lance adopted
- Contact mis-insertion prevention
- Header material prevents solder cracks with potting
- Uses DF1B contacts and tooling

The DF1E series is a 2.5mm pitch connector solution that has a full mechanical lock. Hirose offers an optional retainer for increased contact retention and prevents partial contact insertion.



This slide shows the DF1E product variations.

## DF33C Series

### 3.3mm Pitch, Wire-to-Board Connectors



#### Features:

- Compact in size, but capable of handling up to 5 Amps of current
- Stable connection prevents fretting corrosion
- Allows potting/resin sealing for dust-proof requirements
- Positive lock with clear tactile lock
- Incorrect mating prevention
- Wide variety of options
- RoHS compliant

The DF33C series features a secure latch mechanism and can handle up to 5 Amps of current with AWG #20 wire. Can be potted with resin to for dust-proof requirements or applications, and has incorrect mating prevention.

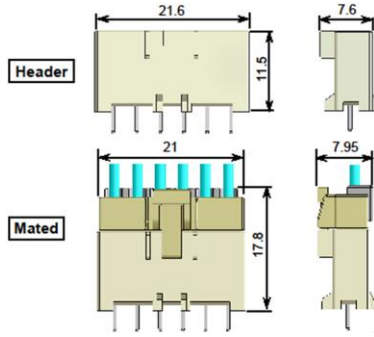


# DF33C Series

Compact on size, but big on performance

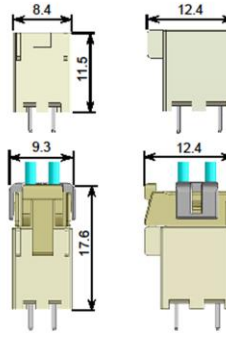
- **Single-row**

Ex. 6 pos. with retainer



- **Double-row**

Ex. 4 pos. with retainer



Saves 30% or more space compared to conventional products.

Specifications herein are subject to change without notice.  
Contact Hirose for latest specifications, drawings, or availabilities.

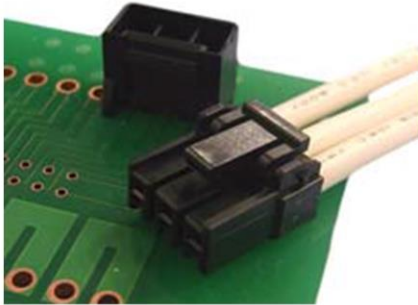
Issued: June 30, 2014

**HRS** HIROSE  
ELECTRIC  
CO., LTD.

Shown here are the dimensions for this small but robust connector.

## DF63 Series

### 3.96mm Pitch, Wire-to-Board Connectors



#### Features:

- Small size and rated up to 10 Amps/pin using AWG #16 cable
- High reliability with multi-point contact
- Secure mating with a clear tactile click
- designed to prevent incorrect mounting and mating
- Accepts potting/resin sealing up to 5mm height

The DF63 series is rated for up to 10 Amps using #16AWG wire. It has a locking mechanism that ensures a secure and complete connection with a tactile click. A mechanism has been added to the design to prevent incomplete insertion of the crimp contacts. The pin header is equipped with a guide post to prevent reverse insertion on the PCB. This connector is capable of being potted up to 5mm.

# DF64 Series

## 4.5mm Pitch, Wire-to-Board and Board-to-Board connectors



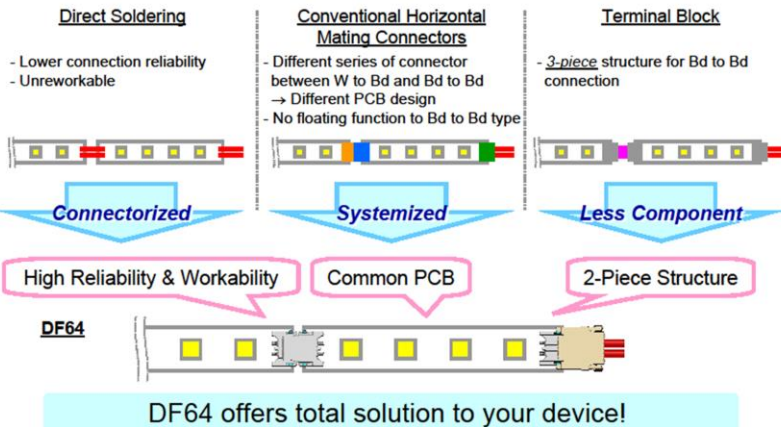
### Features:

- Horizontal mating header and cable plug are use a common receptacle. DF64 are available in 2 and 3 positions
- Floating design structure allows for a mating tolerance range  $\pm 0.5\text{mm}$  in the X direction and 2mm in the Y direction
- Reliable contact design that guards against accidental shocks
- Uses AWG #22 to #18 with 2.4 to 2.9mm insulation diameters
- Long creepage distance (3.2mm MIN.) satisfies 350 V to meet UL1977

The DF64 series is a 4.5mm pitch Horizontal mating 2-piece system. It is a board-to-board connector and a wire-to-board connector that utilizes a unique floating structure. The wire-to-board side-locking structure provides a clear tactile click to confirm completion of the matting process and allows for a visual check on the side locks.

# DF64 Series

## Advantages over Other Connections



Specifications herein are subject to change without notice. Contact Hirose for latest specifications, drawings, or availabilities.

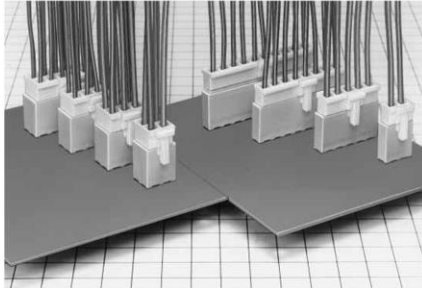
Issued: May 30, 2013



This slide shows the comparison to other types of products and the advantages of the Hirose DF64 solution.

## DF5 Series

### 5mm Pitch, Wire-to-Board Connectors



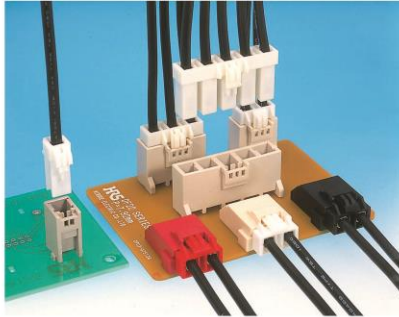
#### Features:

- Accepts potting depths of up to 9mm with a mounting height of 22.5mm
- Prevents mis-insertion
- Material prevents solder cracks when potting
- Design to prevent reverse insertion on the PCB
- Full lock mechanism
- Current capacity of 8A
- RoHS compliant

The DF5 series is a 5mm pitch solution with a current capacity of 8 Amps. It is capable of potting 9mm maximum and prevents mis-insertion.

## DF22 Series

### 7.92mm Pitch, Board-to-Wire Connectors



#### Features:

- High current capacity: Max. 30A with AWG#10 cable
- Complete locking function
- Prevention of incorrect connections
- Molded-in contact retention tabs
- Designed to prevent incorrect board placement
- Accepts potting depths of up to 10mm
- Listed by UL, C-UL and TÜV

The DF22 series is a 7.92mm pitch power supply connector for high current applications. The current capacity is 30 Amp max with #10 AWG cable. The series utilizes high conductive contact material for lower power loss. The headers are available in both right angle and straight configurations. Three keying/color options are available to avoid mis-mating when using more than one DF22 on the same PCB.

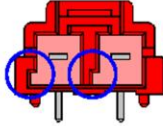
# DF22 Series

## 7.92mm Pitch, Board-to-Wire Connectors

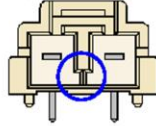
### Mis-insertion Prevention Design

- Three (3) mating variations are available with different color and keying in order to avoid mis-insertion for the application using multiple connectors with the same positions.

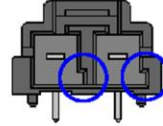
Ex. in right angle header, 2 pos.



L type  
Key on the left side  
Color: Red



Standard type  
Key on the center  
Color : Natural (Beige)



R type  
Key on the right side  
Color: Black

Specifications herein are subject to change without notice.  
Contact Hirose for latest specifications, drawings, or availabilities.

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**HRS** HIROSE  
ELECTRIC  
CO.,LTD.

The DF22 is offered with product specific keying options to prevent mis-insertion.

## DF60 Series

### 10.16mm Pitch, Wire-to-Board Connectors



#### Features:

- Small size with a high of 45 Amps current capacity using AWG #18 in the 1 position connector.
- Secure mating with clear tactile click
- Highly reliable 5-point contact with independent contact springs
- Connection style varieties: straight, right angle and in-line
- Keying variations available
- UL, TÜV certified

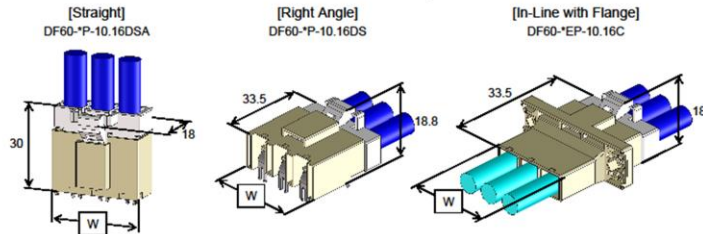
The DF60 series is a compact wire-to-board connector that utilizes a 10.16mm pitch and can handle up to 45 Amps. Pin counts range from 1 to 4 and are suitable for AWG #8-#12. Available in vertical, right-angle and in-line configurations. It has a 5-point contact design, high density mounting capability and various keying options.



# DF60 Series

## 10.16mm Pitch Connectors

### Connection Style



No. of Pos.	Width	
	Straight / Right Angle	In-Line
1	15.2	-
2	22.36	39.36
3	32.52	49.52
4	42.68	59.68
5	52.84	69.84
6	63	-

Socket: DF60-S-10.16C  
 Crimp Contact (Reel)  
 Female Contact: DF60-SCFA  
 Male Contact for In-Line: DF60-PCFA

All dimensions in millimeters

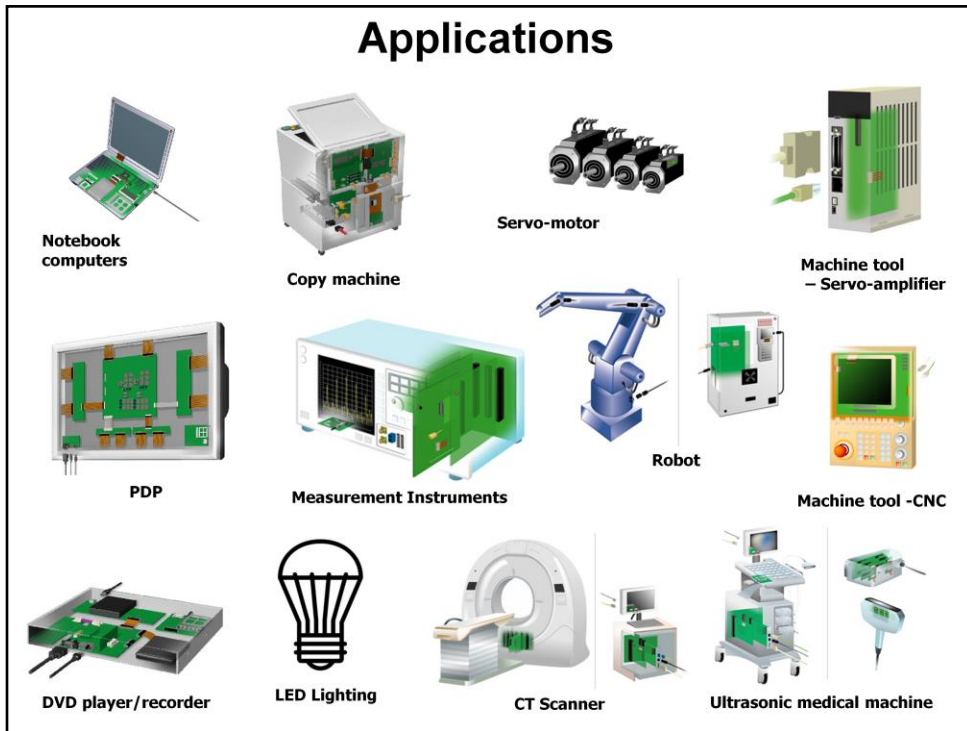


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Available in vertical, right-angle and in-line configurations, the DF60 has a 5-point contact design, high density mounting capability and various keying options.

# Applications



Hirose Wire-to-Board series connectors can be utilized in almost any application where two or more PCBs need to be connected to each other.

## In Summary

- Hirose has a broad range of interconnect solutions for wire-to-board applications.
- Several series have many different configurations so you can choose the right connector for the job.
- Multiple pin counts, keying options and low profile are available in many styles.

In summary, Hirose has a broad range of interconnect solutions for wire-to-board applications that support various current ratings, pin counts, keying options, plating options and more . And all connectors are RoHS compliant. Thank you.