

# 3.96mm pitch compact waterproof connectors for internal power supplies

## DF63W Series



The slim, smooth, rounded shape is optimized for wiring inside conduits and small spaces.

Smooth, round external shape

Metal parts are completely covered

Fig.1

### ■ Features

#### 1. Max current of 14A

This compact connector is rated up to 14A in the 2 positions version, using 16 AWG wire.

#### 2. Compact shape designed for wiring through narrow areas

The design is optimized for wiring inside conduits and small structures, with a smooth, rounded contour that reduces the chance of snagging or catching inside the conduit or other objects.

A plastic housing covers the connector, so no metal is exposed to the conduit, preventing accidental shorting. (Fig.1)

#### 3. IP67 Rated

IP67 water resistant when mated. (Fig.2)

#### 4. Simplified wire insertion

Wire and housing seals are pre-installed to provide water proofing. A simple insertion of the crimped contact into the housing completes the assembly. Contacts and housing are designed to prevent damaging the seals when inserting the contacts.

#### 5. Positive lock structure

A robust locking structure provides a tactile click when mating to prevent incomplete mating and disconnection during wiring.

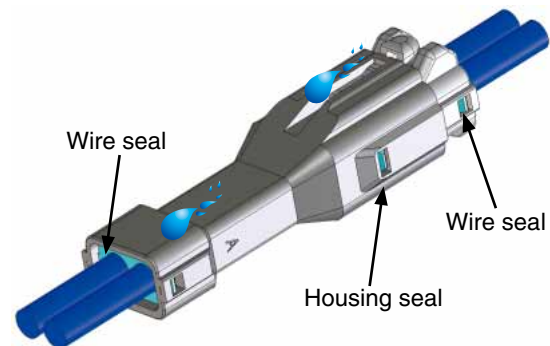
#### 6. Compatible with a wide variety of cables

Two versions are available with different waterproof wire seal diameters. This variation helps to support the use of a wide array of cable sizes.

#### 7. Mis-mating prevention with color and guide key options

Two housings are available each with different colors and guide keys. This helps to prevent incorrect mating when multiple connectors are used on the same design with the same pin count.

### IP67 Waterproof



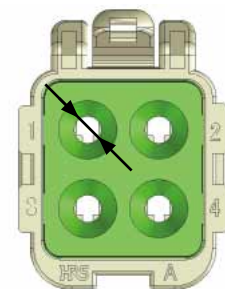
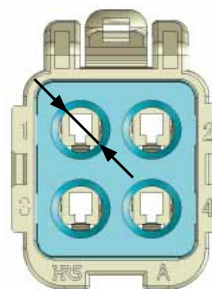
IP67 waterproof when mated

Fig.2

### Compatible with a wide variety of cables

<DF63W>

<DF63WA>



Recommended insulation outer diameter  $\phi$ 2.8 to 3.2

Recommended insulation outer diameter  $\phi$ 1.7 to 2.4

Fig.3

## Product Specifications

|                |                         |                 |        |        |        |                                                                                                |                                                                                            |
|----------------|-------------------------|-----------------|--------|--------|--------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Ratings        | Current rating (Note 1) | No. of contacts | 16 AWG | 18 AWG | 20 AWG | 22 AWG                                                                                         | Operating temperature range -40°C to 105°C (Note 2)<br>Operating humidity range 20% to 80% |
|                |                         | 2               | 14A    | 11A    | 9A     | 8A                                                                                             |                                                                                            |
|                |                         | 3               | 13A    | 10A    | 8A     | 7A                                                                                             |                                                                                            |
|                | 4                       | 12A             | 9A     | 7A     | 6A     |                                                                                                |                                                                                            |
| Voltage rating | AC/DC 630V              |                 |        |        |        | Storage temperature range -10°C to 60°C (Note 3)<br>Storage humidity range 40% to 70% (Note 3) |                                                                                            |

| Items                    | Specifications                                                         | Conditions                                                                                                             |
|--------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 1. Insulation resistance | 1,000MΩ min.                                                           | Measured at DC 500V                                                                                                    |
| 2. Withstanding voltage  | No flashover or dielectric breakdown.                                  | 1,500V AC applied for 1minute.                                                                                         |
| 3. Contact resistance    | 10mΩ max.                                                              | Measured at a maximum of 20mΩ, 100mA (DC or 1,000Hz)                                                                   |
| 4. Vibration resistance  | No electrical discontinuity for more than 1μs                          | 10 cycles in each of three axis directions at 10-55Hz, half amplitude 0.75mm                                           |
| 5. Shock resistance      | No electrical discontinuity for more than 1μs                          | Acceleration of 490m/s <sup>2</sup> , 11ms, both directions in 3 axes (semi-sinusoidal), 3cycle each direction         |
| 6. Moisture resistance   | Contact resistance : 20mΩ max.<br>Insulation resistance : 500MΩ max.   | Temperature : 40±2°C, relative humidity : 90 to 95%, left for 96hours                                                  |
| 7. Temperature cycle     | Contact resistance : 20mΩ max.<br>Insulation resistance : 1,000MΩ max. | -55°C for 30 minutes → 5 to 35°C for 2 to 3 minutes → 105°C for 30 minutes → 5 to 35°C for 2 to 3 minutes, in 5 cycles |
| 8. Mating cycles         | Contact resistance : 20mΩ max.                                         | Mating/unmating : 30 times                                                                                             |

Note 1 : Indicates the allowable current when the maximum current is applied to all pins.  
Please note that a current could exceed the rated value when a higher current is applied through multiple circuits in a branched configuration.

Note 2 : Includes temperature rise caused by current flow.

Note 3 : The term "storage" refers to the long-term storage condition of unused products before PCB mounting. Operating temperature/humidity range refers to the non powered state after PCB mounting, and temporary storage during transportation.

## Materials / Finish

| Product                    | Parts    | Materials       | Finish        | UL flame retardant grade |
|----------------------------|----------|-----------------|---------------|--------------------------|
| In-line plug crimp contact | Contacts | Copper alloy    | Tin plated    | —                        |
| Socket crimp contact       | Contacts | Copper alloy    | Tin plated    | —                        |
| In-line plug               | Housing  | PBT             | Black         | UL94V-0                  |
|                            | Seal     | Silicone rubber | Blue or green | —                        |
| Crimp socket               | Housing  | PBT             | Black         | UL94V-0                  |
|                            | Seal     | Silicone rubber | Blue or green | —                        |

## Product Number Structure

Refer to the chart below when determining the product specifications from the product number.  
Please select from the product numbers listed in this catalog when placing orders.

### Connector

**DF 63W**      - \* **S** - **3.96 C**

①    ②    ③    ④    ⑤    ⑥    ⑦

|                                                                            |                                                     |
|----------------------------------------------------------------------------|-----------------------------------------------------|
| ① Series name : DF                                                         | ⑤ Connector type<br>S : Socket<br>EP : In-line plug |
| ② Series No. : 63W                                                         |                                                     |
| ③ Outer diameter of wire insulation<br>None : 2.8 to 3.2<br>A : 1.7 to 2.4 | ⑥ Contact pitch : 3.96mm                            |
| ④ Number of contacts : 2, 3, 4                                             | ⑦ Termination style<br>C : Crimp socket             |

### Contact

**DF 63W** - **1618 PCF**

①    ②    ③    ④

|                                                                      |                                                                                                                                                                                             |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① Series name : DF                                                   | ④ Contact type/Packaging type<br>SCF : Socket crimp contact, reel<br>SC : Socket crimp contact, pieces<br>PCF : In-line plug crimp contact, reel<br>PC : In-line plug crimp contact, pieces |
| ② Series No. : 63 (W)                                                |                                                                                                                                                                                             |
| ③ Applicable wire size<br>1618 : 16 to 18 AWG<br>2022 : 20 to 22 AWG |                                                                                                                                                                                             |

## In-line plug



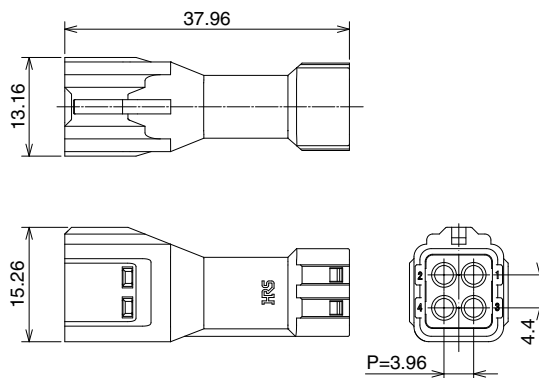
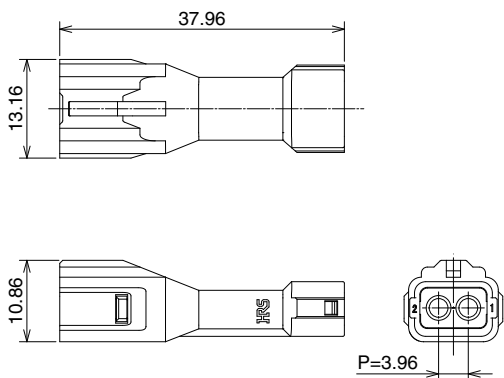
Unit : mm

| Part No.         | HRS No.    | No. of contacts | Outer diameter of wire insulation |
|------------------|------------|-----------------|-----------------------------------|
| DF63W-2EP-3.96C  | 680-0605-9 | 2               | 2.8 to 3.2                        |
| DF63W-3EP-3.96C  | 680-0606-1 | 3               |                                   |
| DF63W-4EP-3.96C  | 680-0607-4 | 4               |                                   |
| DF63WA-2EP-3.96C | 680-0609-0 | 2               | 1.7 to 2.4                        |
| DF63WA-3EP-3.96C | 680-0610-9 | 3               |                                   |
| DF63WA-4EP-3.96C | 680-0611-1 | 4               |                                   |

Note 1 : Standard packaging is 100 pcs/pack. Please place orders in full package quantities.

### [Dimensions for 2 contact position connector]

### [Dimensions for 3 and 4 contact position connector]



## Crimp socket



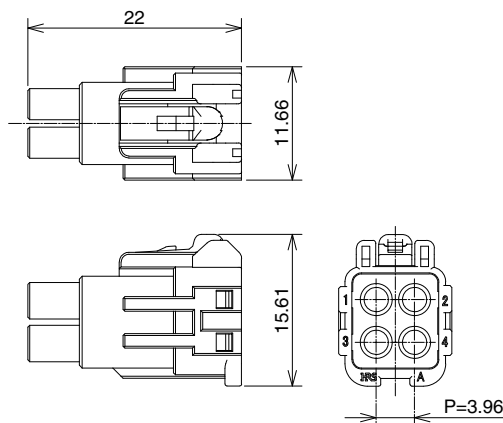
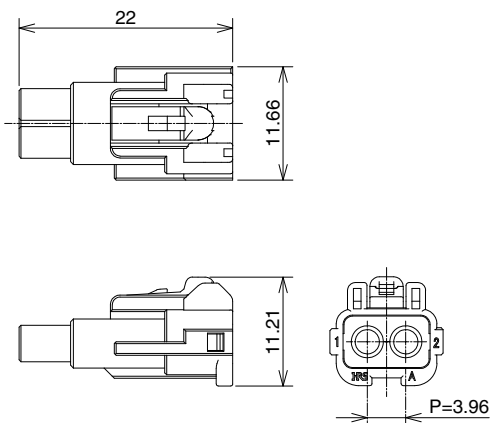
Unit : mm

| Part No.        | HRS No.    | No. of contacts | Outer diameter of wire insulation |
|-----------------|------------|-----------------|-----------------------------------|
| DF63W-2S-3.96C  | 680-0613-7 | 2               | 2.8 to 3.2                        |
| DF63W-3S-3.96C  | 680-0614-0 | 3               |                                   |
| DF63W-4S-3.96C  | 680-0615-2 | 4               |                                   |
| DF63WA-2S-3.96C | 680-0617-8 | 2               | 1.7 to 2.4                        |
| DF63WA-3S-3.96C | 680-0618-0 | 3               |                                   |
| DF63WA-4S-3.96C | 680-0619-3 | 4               |                                   |

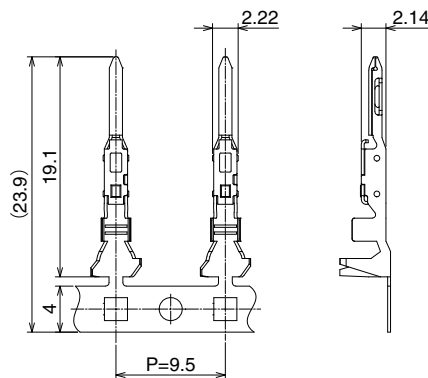
Note 1 : Standard packaging is 100 pcs/pack. Please place orders in full package quantities.

### [Dimensions for 2 contact position connector]

### [Dimensions for 3 and 4 contact position connector]



## In-line plug crimp contact



| Part No.     | HRS No.    | Type                          | Quantity       | Finish     |
|--------------|------------|-------------------------------|----------------|------------|
| DF63-1618PCF | 680-0529-2 | Reel contacts (Note 1)        | 4,000 pcs/reel | Tin plated |
| DF63-1618PC  | 680-0536-8 | Loose piece contacts (Note 2) | 100 pcs/pack   |            |
| DF63-2022PCF | 680-0538-3 | Reel contacts (Note 1)        | 4,000 pcs/reel |            |
| DF63-2022PC  | 680-0539-6 | Loose piece contacts (Note 2) | 100 pcs/pack   |            |

Note 1 : Please place orders in full reel quantities.

Note 2 : Please place orders in full pack quantities.

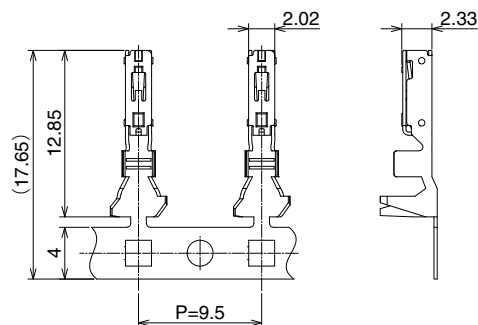
### ● Applicable wire (Tinned Annealed Copper Wire)

| Conductor size (Core structure) | Wire type and outer diameter of insulation |
|---------------------------------|--------------------------------------------|
| 16AWG (26/0.254mm)              | UL1007 (2.4mm)                             |
|                                 | UL1015 (3.2mm)                             |
| 18AWG (34/0.18mm)               | UL1007 (2.1mm)                             |
|                                 | UL1015 (2.9mm)                             |
| 20AWG (21/0.18mm)               | UL1007 (1.9mm)                             |
| 22AWG (17/0.16mm)               | UL1430 (1.7mm)                             |

Note 1 : Please contact our Sales Dept. when using wires other than those recommended above.

Note 2 : In case of hard to insert crimped contact to plug socket as like using low stiffness wire which consists of thinner stranded conductor or insulation with soft material, please contact to Hirose representative.

## Socket crimp contact



| Part No.      | HRS No.    | Type                          | Quantity       | Finish     |
|---------------|------------|-------------------------------|----------------|------------|
| DF63W-1618SCF | 680-0600-5 | Reel contacts (Note 1)        | 4,000 pcs/reel | Tin plated |
| DF63W-1618SC  | 680-0601-8 | Loose piece contacts (Note 2) | 100 pcs/pack   |            |
| DF63W-2022SCF | 680-0602-0 | Reel contacts (Note 1)        | 4,000 pcs/reel |            |
| DF63W-2022SC  | 680-0603-3 | Loose piece contacts (Note 2) | 100 pcs/pack   |            |

Note 1 : Please place orders in full reel quantities.

Note 2 : Please place orders in full pack quantities.

### ● Applicable wire (Tinned Annealed Copper Wire)

| Conductor size (Core structure) | Wire type and outer diameter of insulation |
|---------------------------------|--------------------------------------------|
| 16AWG (26/0.254mm)              | UL1007 (2.4mm)                             |
|                                 | UL1015 (3.2mm)                             |
| 18AWG (34/0.18mm)               | UL1007 (2.1mm)                             |
|                                 | UL1015 (2.9mm)                             |
| 20AWG (21/0.18mm)               | UL1007 (1.9mm)                             |
| 22AWG (17/0.16mm)               | UL1430 (1.7mm)                             |

Note 1 : Please contact our Sales Dept. when using wires other than those recommended above.

Note 2 : In case of hard to insert crimped contact to socket as like using low stiffness wire which consists of thinner stranded conductor or insulation with soft material, please contact to Hirose representative.

## ◆ Applicable crimping tools

| Type       | Part No.               | HRS No.    | Applicable wire size                         | Applicable contact            |
|------------|------------------------|------------|----------------------------------------------|-------------------------------|
| Applicator | AP105-DF63-1618-3      | 901-4642-0 | UL1007 (Note 3)                              | DF63-1618PCF<br>DF63W-1618SCF |
|            | AP105-DF63-1618-4      | 901-4643-2 | UL1015 (Note 3)                              |                               |
|            | CHS893500H-UP (Note 6) | —          | UL1015                                       | DF63-2022PCF<br>DF63W-2022SCF |
|            | AP105-DF63-2022-3      | 901-4646-0 | UL1007<br>20 AWG : UL1007<br>22 AWG : UL1430 |                               |

| Type               | Part No.             | HRS No.    | Recommended wire size (Note 5)     | Applicable contact |
|--------------------|----------------------|------------|------------------------------------|--------------------|
| Hand tool (Note 4) | HT802/DF63-1618P-1   | 550-0423-1 | 16, 18 AWG : UL1007                | DF63-1618PC        |
|                    | HT802/DF63-1618P-2   | 550-0424-4 | 16, 18 AWG : UL1015                |                    |
|                    | HT802/DF63-2022P-1   | 550-0433-0 | 20, 22 AWG : UL1007                | DF63-2022PC        |
|                    | HT802/DF63W-1618S-1  | 550-0425-7 | 16, 18 AWG : UL1007                | DF63W-1618SC       |
|                    | HT802/DF63W-1618S-2  | 550-0426-0 | 16, 18 AWG : UL1015                |                    |
|                    | HT802/DF63W-2022S-1A | 550-0441-0 | 20 AWG : UL1007<br>22 AWG : UL1430 | DF63W-2022SC       |

Note 1 : Please follow the "Crimping quality standards (ETAD-H0810, ETAD-H0811)" and "Table of crimping conditions" when crimping contacts.

Note 2 : Any problems that occur from using tools other than those specified by Hirose, are not covered by warranty.

Note 3 : Applicator components (sold separately) can be changed out to accommodate different wire sizes.

Note 4 : Hand tool dies cannot be changed out for different wire sizes.

Note 5 : Please only use the recommended wires shown in the table.

Note 6 : Applicator manufactured by JAPAN AUTOMATIC MACHINE (J.A.M.). Please access to HP of J.A.M., if you make inquiries about the applicator or crimp defect. (URL : <http://www.jam-net.co.jp>)

## ◆ Crimping

### ■ Items required prior to start crimping

The work-related documents shown below are required before starting the harness connections. (The ● mark shows the document required.)

When the documents shown below are not available, ask our sales personnel to provide them.

| Document Title                                       | Description                                                              | Automatic Crimping Machine | Hand Crimping Tool | Remarks                                                 |
|------------------------------------------------------|--------------------------------------------------------------------------|----------------------------|--------------------|---------------------------------------------------------|
| (1) Main unit of crimping machine instruction manual | Explanation of main press machine unit                                   | ●                          | —                  | When purchasing main press machine unit, it is bundled. |
| (2) Applicator Spare Parts Identification            | Explanation for Applicator installation                                  | ●                          | —                  | When purchasing Applicator, it is bundled.              |
| (3) Crimp Conditions                                 | Standard values of :<br>Crimp height ;<br>Tensile strength               | ●                          | —                  |                                                         |
| (4) Crimp Quality Standards                          | Various standards for crimping conditions                                | ●                          | —                  |                                                         |
| (5) Operating Instructions for Hand Tool             | Inspection items of :<br>Crimp height ;<br>Tensile strength ; and others | —                          | ●                  | When purchasing Hand Tool, it is bundled.               |
| (6) Harness Procedure Manual ETAD-H0814-00           | Harness procedure                                                        | ●                          | ●                  | Ask our sales personal to provide them.                 |

### ■ Tools

When crimping work is applied to our contacts, the tool designated by Hirose should be used. Crimping work by using tools other than as designated must not be done because it may result in contact failure, disconnection of cable, etc.

\*The operating instructions manual is available for the crimping machine and the applicator. Be sure to carefully read the operating instructions manual before implementing the work.

### ■ Applicable electric wires

Check that the electric wire to be used is in the range of application.

If you intend to use an electric wire other than the recommended one, ask our sales personnel.

#### [Precautions]

- Electric wires that are applicable for crimping connectors shall, principally, be the tin-plated stranded soft-copper wire.
- Crimping of electric wires wherein single wires, polyester yarns, etc., exist and crimping of tin-coated wires should be avoided.
- Avoid crimping two electric wires together.
- The setting values of crimp height (Note 1) may vary between tin-plated and gold-plated terminals even if the same electric wires are used.
- The setting values of crimp height (Note 1) may vary depending on the difference in the core wire configuration even if the computed cross-sectional area is the same.

Note 1 : The crimp height is an important item that determines crimping quality. We execute crimping tests for each electric wire to ensure the optimal value for the crimp height with high precision, thereby ensuring optimal setup values.

## ◆ Precautions

1. Forcibly removing a connector may damage it. If it is stuck, first push it in slightly and then release the lock to remove.
2. Please use care when connecting a short, thick wire so as not to twist it. If twisted, damage to the contact may occur.
3. Be sure to turn the power off before mating/unmating the connector.
4. To avoid electrical shock, do not touch the powered contacts.
5. Please refer to the following documents.
  - Harness Procedure Manual (ETAD-H0814-00) · Mating un mating Procedure Manual (ETAD-H0926-00) · User Guide for Wire-to-Board Connector.

## ◆ About the ratings

Do not use connectors with currents and voltages that exceed their ratings. Do not mate/unmate powered contacts (Note 1)

Note 1 : "Live" contacts refer to the contacts that are in a powered or energized state. Mating or unmating "live" contacts can result in electrical shock and injury.

## ◆ About operating environments

Please contact us if you wish to use the connectors in an environment with repeated temperature fluctuations.

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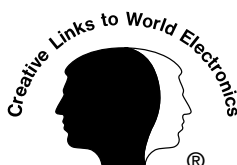
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