

BH12 Series

# 20A Current, Compact, Waterproof Power/Signal Hybrid Connector



Compact



High-Current



Waterproof



NEW

## Overview

The BH12 Series is a power/signal hybrid connector ideal for the battery connection of micro-mobility applications. BH12 can also be used in other industrial applications as well. The BH12 Series is an IPX6/IPX7 waterproof connector (when mated) with lock lever design and enhances cable wiring efficiency. Additionally, the power/signal hybrid design contributes to reducing connector occupied mounting space.

## Features

### 1. Compact connector with $\phi$ 13.8 diameter that supports high current up to 20A.

Although the total length is 36mm and the diameter is  $\phi$  13.8mm, BH12 is compatible with 14 AWG size cables and enables a high current of 20A.

Plug Outer Diameter :  $\phi$  13.8

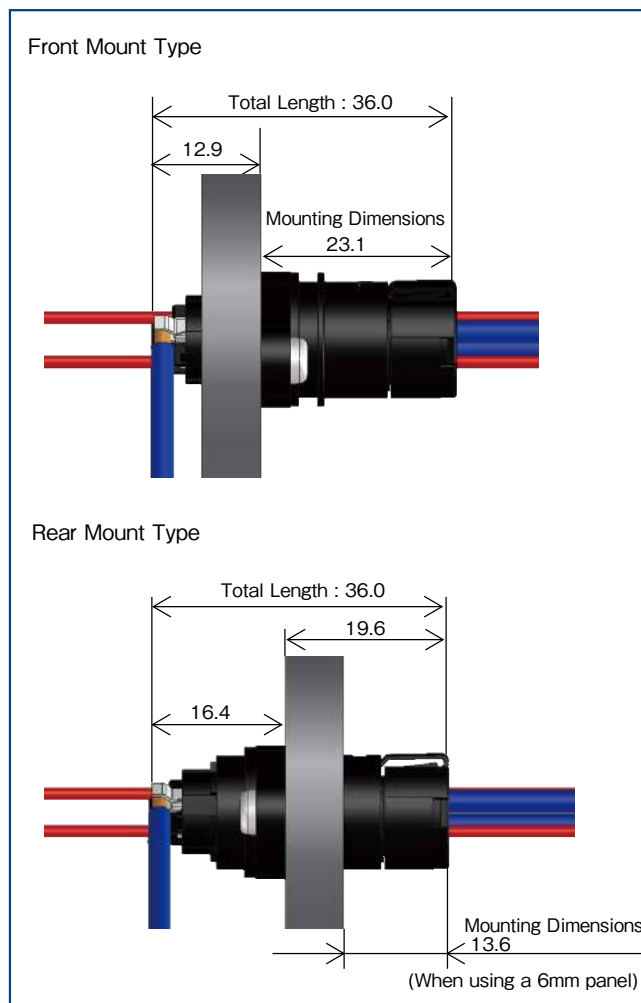
Maximum Outer Diameter :  $\phi$  15.8

Mounting Dimensions

Front Mount Type : 23.1mm

Rear Mount Type : 13.6mm

(When using a 6mm panel)



Mated State Diagram

### 2. The hybrid power/signal design enables application size reduction.

Connector occupied mounting space is reduced by combining power and signal. Supports Power 20Ax2pos., Signal 1Ax2pos. (or Signal 1Ax1pos.)

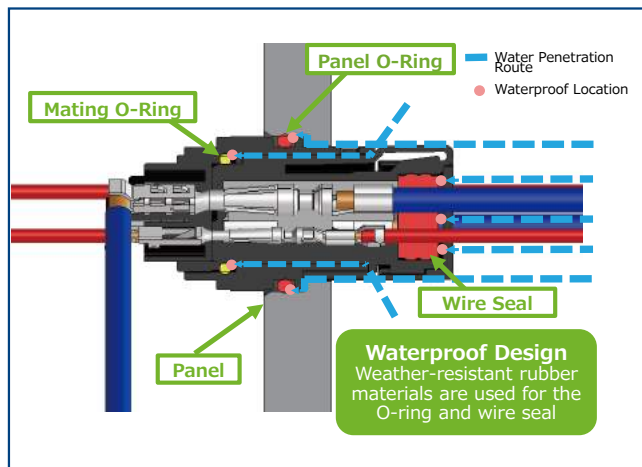
### 3. Waterproof Design

#### IPX6/IPX7 Waterproof Performance in the Mated State

IPX6 : Jet water of 100 L / min. in all directions from a distance of 3 m for 3 minutes in mated condition.

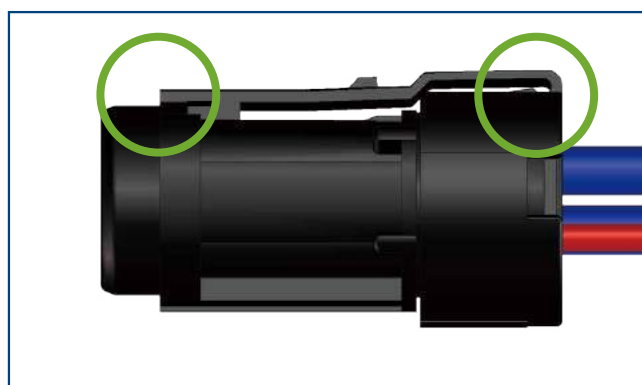
IPX7 : At a depth of 1m for 30 min.

(IPX8 class is also available)



### 4. Lever lock for easy wiring.

The lock lever is locked in one action: simply push the plug straight into the receptacle. The lock lever on both sides of the plug prevents cable entanglement, lock deformation and damage during cable assembly and transportation.

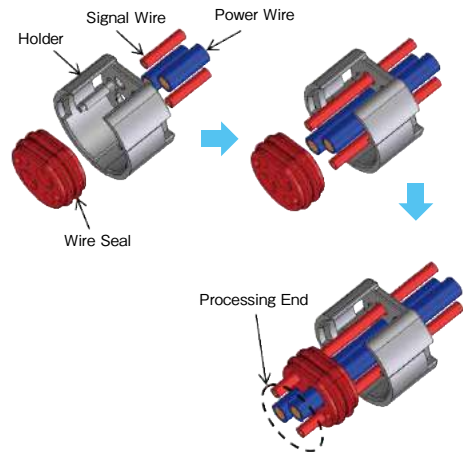


Lock Supports Both Ends

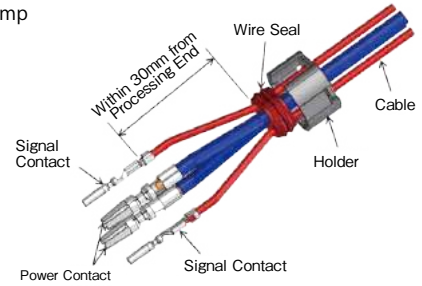
## 5. Easy cable assembly

The plug side utilizes Hirose's original design of inserting the contacts to the case from the side. It can be used with an overall short cable assembly length and no tools are required.

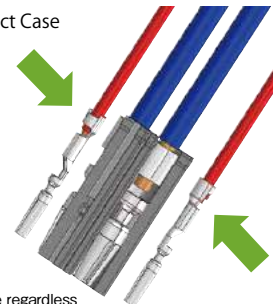
### ① Push through materials



### ② Crimp

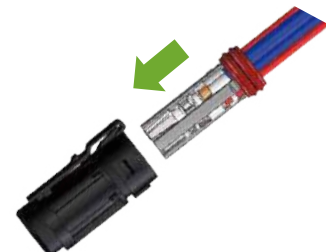


### ③ Insert into Contact Case



Assembly possible regardless of contact direction.  
The contact is secured to the case and does not come loose.

### ④ Insert Contact Case into Insulation Case



### ⑤ Completed



## 6. Mis-mating Prevention

Multiple guide keys for secure alignment and mating even in areas with poor visibility.

## 7. Light weight

The lightweight of 7g (plug+receptacle) contributes to equipment weight reduction as well as reduced power consumption of micro-mobility applications.

## 8. Both front and rear mount available

The receptacle is available in both front and rear mount types for selection based on the usage conditions. The front mount type is effective for reducing space used inside the panel. With the rear mount type, pre-assembled cable assemblies can be attached to the panel. Additionally, screws are not visible from the panel exterior.

## 9. Height inside panel is reduced by connecting the power contacts at a right angle.

The power contacts on the receptacle side are soldered at a right angle, contributing to height reduction inside the panel.

## Product Specifications

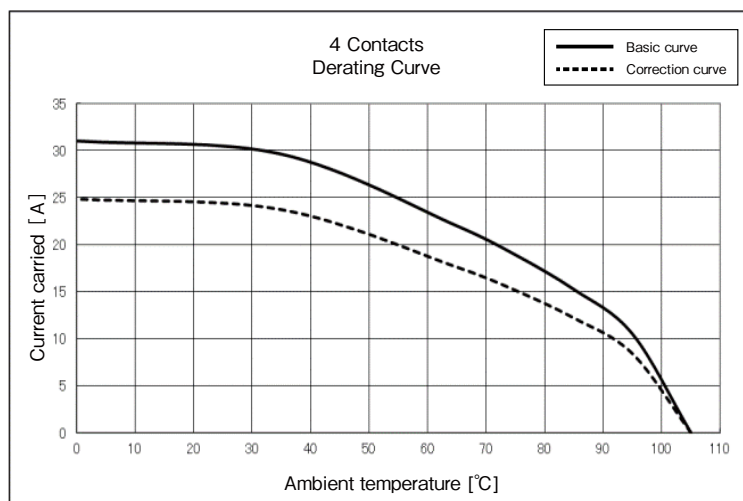
|                        |   |                                |               |
|------------------------|---|--------------------------------|---------------|
| Rated Current (Note 1) | Power Contact : 20A<br>Signal Contact : 1A                        | Operating Temperature (Note 2) | -40 to +105°C |
| Rated Voltage          | Power Contact : 30V AC, 42V DC<br>Signal Contact : 30V AC, 42V DC | Storage Temperature Range      | -10 to +60°C  |

| Item  | Specifications   | Conditions  |
|---|--|---|
| Contact Resistance                            | 10mΩ Max. (Power Contact)<br>15mΩ Max. (Signal Contact)  | 1A DC   |
| Insulation Resistance                         | 1000MΩ Min.  | 500V DC   |
| Withstanding Voltage                          | No flashover or insulation breakdown   | 600V AC for 2 min.  |
| Mating Durability<br>(Insertion / Withdrawal) | Contact Resistance :<br>10mΩ Max. (Power Contact)<br>15mΩ Max. (Signal Contact)  | 30 times  |
| Vibration                                     | No electrical discontinuity of 10 μs or more<br>No damage, cracks, or parts dislocation  | Frequency : 10 to 55 to 10Hz / cycles, Single Amplitude 0.75 mm,<br>5 min./ cycles, 10 cycles in each of the 3 directions   |
| Shock   | No electrical discontinuity of 10 μs or more<br>No damage, cracks, or parts dislocation  | Acceleration of 500m/s <sup>2</sup> , duration of 11ms, sine half-wave waveform, 3 cycles in each of the 3 axes   |
| Steady State Moisture Resistance              | ① Insulation Resistance : 10MΩ Min.<br>(When high humidity)<br>② Insulation Resistance : 100MΩ Min.<br>(When dry)<br>No damage, cracks, or parts dislocation | 96 hours at temperature of 40°C and humidity of 90 to 95%   |
| Temperature Cycle                             | Insulation resistance : 100MΩ Min.<br>No damage, cracks, or parts dislocation  | Temperature : -40 → room temperature → +105°C → room temperature<br>Time : 30 → 2 to 3 → 30 → 2 to 3 (Minutes)<br>5 cycles  |
| Waterproof                                    | No water inside the connector  | IPX7 :<br>At a water depth of 1m for 30 minutes in mated condition.<br>IPX6 :<br>Jet water of 100L / min. in all directions from a distance of 3m for 3 minutes in mated condition. |

Note 1 : Depends on the ambient temperature at which the connector is used.

Note 2 : Includes the temperature rise due to current flow.

## [Reference] Derating Curve



Note 1 : The derating curve is derived from the basic curve multiplied by the derating factor of 0.8.

Note 2 : The rated current varies depending on the ambient temperature at which the connector is used in. We recommend using it within the correction curve (dotted line).

Note 3 : The measurement method of the derating curve is shown below.

- Test specimen : BH12 unused prior to testing.
- Test cable conductor cross sectional area :  
Power 14 AWG (1.946mm<sup>2</sup>)  
Signal 22 AWG (0.372mm<sup>2</sup>)
- Power supplied while the specimen is in a stationary state and then measured.

## Materials / Finish

| Item           | Component             | Materials       | Color / Finish | UL Standard |
|----------------|-----------------------|-----------------|----------------|-------------|
| Plug           | Insulation Case       | PBT             | Black          | UL94V-0     |
|                | Contact Case          |                 |                |             |
|                | Holder A              |                 |                |             |
|                | Holder B              |                 |                |             |
|                | Wire Seal             |                 |                |             |
| Receptacle     | Housing               | PBT             | Black          | UL94V-0     |
|                | O-ring A              | Silicone Rubber | Yellow         | -           |
|                | O-ring B              |                 | Red            | -           |
| Crimp Contact  | Female Power Contact  | Copper Alloy    | Tin Plating    | -           |
|                | Female Signal Contact |                 |                |             |
| Solder Contact | Male Power Contact    | Copper Alloy    | Tin Plating    | -           |
|                | Male Signal Contact   |                 |                |             |

## 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

## BH12 W P - 4 S C

①      ②      ③      ④      ⑤      ⑥

|                    |  |                              |  |
|--------------------|--|------------------------------|--|
| ① Series Name      | BH12   | ④ No. of Pos.                | 3, 4                                   |
| ② Special Features | W : Waterproof   | ⑤ Contact Gender             | S : Female Contact<br>P : Male Contact |
| ③ Connector Type   | P : Plug<br>R : Receptacle (Front Mount)<br>RA : Receptacle (Rear Mount) | ⑥ Contact Termination Method | N/A : Soldering<br>C : Crimping        |

### ● Contact

## BH12 - S C 1 - 2 1 3

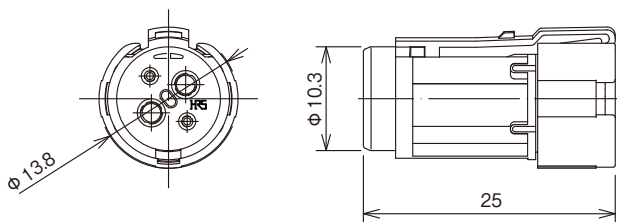
①      ②      ③      ④      ⑤      ⑥      ⑦

|                              |  |                           |   |
|------------------------------|--|---------------------------|---|
| ① Series Name                | BH12                                   | ④ Contact Type            | N/A : Power Contact<br>1 : Signal Contact                                 |
| ② Contact Gender             | S : Female Contact<br>P : Male Contact | ⑤ Packaging               | 2 : Reel Contact  |
| ③ Contact Termination Method | N/A : Soldering<br>C : Crimping        | ⑥ Design                  | 1 : Denotes the compatible wire gauge and are identified by 1, 2, 3, etc. |
|                              |  | ⑦ Contact Portion Plating | 3 : Tin Plating   |



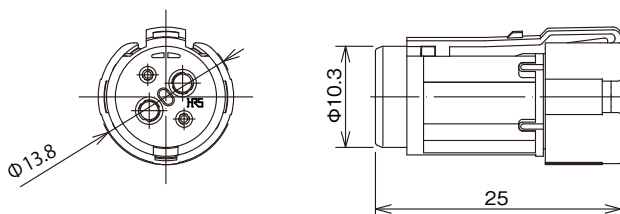
## Plug

### ●4pos. (Power 2pos. + Signal 2pos.)



| Part No.   | HRS No.          | No. of Pos. | Purchase Unit  |
|------------|------------------|-------------|----------------|
| BH12WP-4SC | CL0140-0010-0-00 | 4           | 100pcs per bag |

### ●3pos. (Power 2pos. + Signal 1pos.)

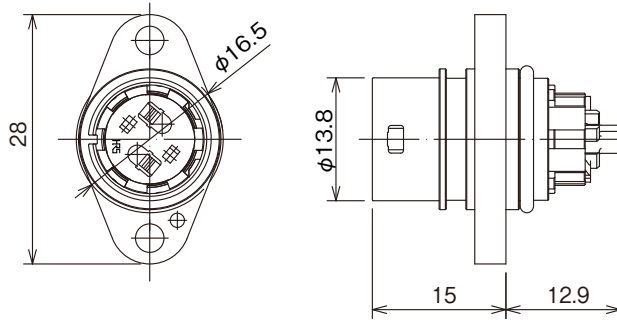


| Part No.   | HRS No.          | No. of Pos. | Purchase Unit  |
|------------|------------------|-------------|----------------|
| BH12WP-3SC | CL0140-0011-0-00 | 3           | 100pcs per bag |

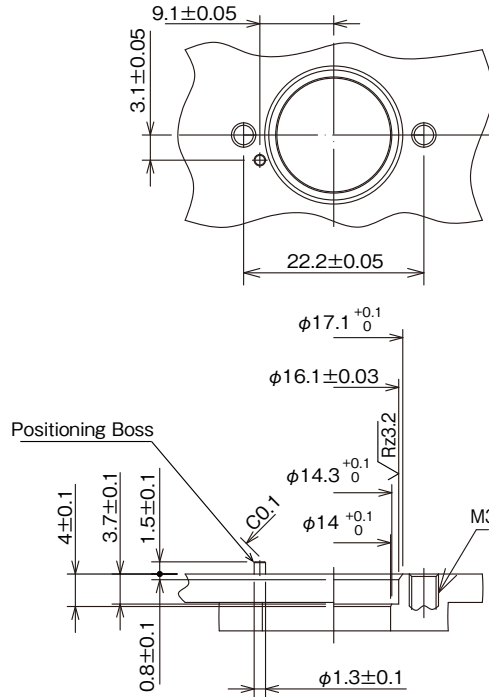
Note : The 3pos. plug mates with the 4pos. receptacle.

## Receptacle

### ●Front Mount Type



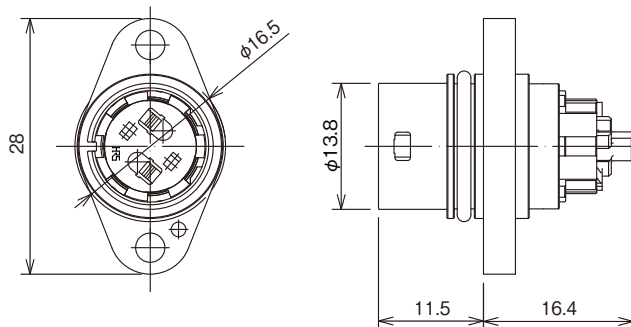
### Recommended Panel Mounting Dimensions (Recommended Panel Thickness : 6-7.5mm)



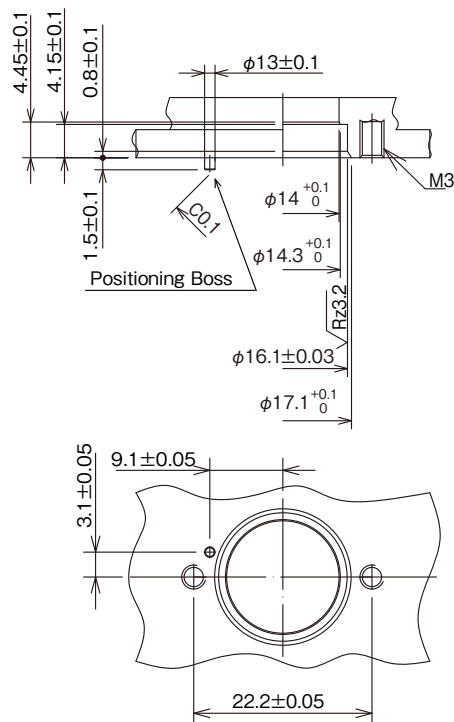
| Part No.  | HRS No.          | No. of Pos. | Purchase Unit  |
|-----------|------------------|-------------|----------------|
| BH12WR-4P | CL0140-0012-0-00 | 4           | 50pcs per tray |

Note : For 3pos. (power 2pos.+ signal 1pos.), insert only 1 signal contact.

●Rear Mount Type



Recommended Panel Mounting Dimensions  
(Recommended Panel Thickness : 6-7.5mm)

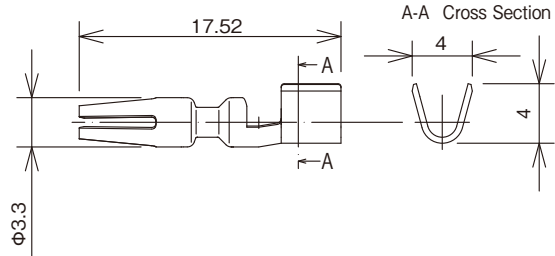


| Part No.   | HRS No.          | No. of Pos. | Purchase Unit  |
|------------|------------------|-------------|----------------|
| BH12WRA-4P | CL0140-0013-0-00 | 4           | 50pcs per tray |

Note : For 3pos. (power 2pos.+ signal 1pos.), insert only 1 signal contact.

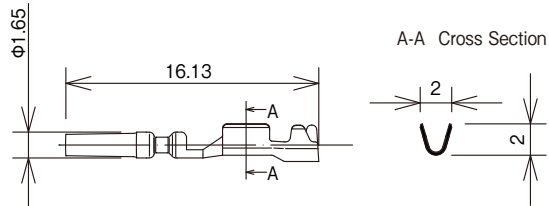
## Plug Crimp Contact

### ●Female Power Contact



| Part No.    | HRS No.          | Applicable Wire                          | Purchase Unit     |
|-------------|------------------|--|-------------------|
| BH12-SC-213 | CL0140-0014-0-00 | 14-16 AWG, Outer Diameter $\phi$ 2.6-3.0 | 5,000pcs per reel |

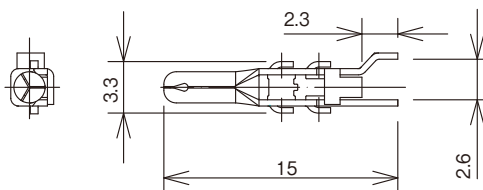
### ●Female Signal Contact



| Part No.     | HRS No.          | Applicable Wire                          | Purchase Unit      |
|--------------|------------------|--|--------------------|
| BH12-SC1-213 | CL0140-0015-0-00 | 22-24 AWG, Outer Diameter $\phi$ 2.6-3.0 | 10,000pcs per reel |

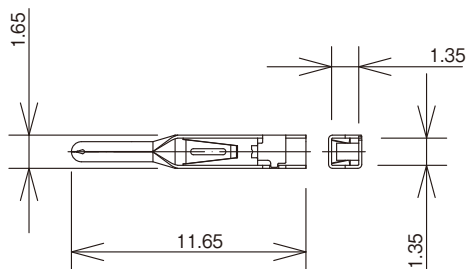
## Receptacle Solder Contact

### ● Male Power Contact



| Part No.   | HRS No.          | Applicable Wire                          | Purchase Unit     |
|------------|------------------|--|-------------------|
| BH12-P-213 | CL0140-0016-0-00 | 14-16 AWG, Outer Diameter $\phi$ 2.6-3.0 | 5,000pcs per reel |

### ● Male Signal Contact



| Part No.    | HRS No.          | Applicable Wire                          | Purchase Unit      |
|-------------|------------------|--|--------------------|
| BH12-P1-213 | CL0140-0017-0-00 | 22-24 AWG, Outer Diameter $\phi$ 1.4-1.6 | 10,000pcs per reel |

## Applicable Tools

| Item           | Type                  | Part No.          | HRS No.          | Applicable Contact | Applicable Wire                          |
|----------------|-----------------------|-------------------|------------------|--------------------|--|
| Crimping Tool  | Automatic Crimp Press | CM-105C           | CL0901-0001-0-00 | -                  | -  |
|                | Applicator            | AP105-BH12-SC-1   | CL0901-2057-0-00 | BH12-SC-213        | 14-16 AWG<br>Outer Diameter<br>φ 2.6-3.0 |
|                |                       | AP105-BH12-SC1-1  | CL0901-2058-0-00 | BH12-SC1-213       | 22-24 AWG<br>Outer Diameter<br>φ 1.4-1.6 |
|                | Manual Crimp Tool     | HT804/BH12-SC-1   | CL0150-0409-0-00 | BH12-SC-213        | AVSS2.0                                  |
|                |                       | HT802/BH12-SC1-1  | CL0150-0410-0-00 | BH12-SC1-213       | AVSS0.3                                  |
| Soldering Tool | Soldering Base        | BH12-P-213/SO/MD  | CL0902-1525-0-00 | BH12-P-213         | 14-16 AWG<br>Outer Diameter<br>φ 2.6-3.0 |
|                |                       | BH12-P1-213/SO/MD | CL0902-1526-0-00 | BH12-P1-213        | 22-24 AWG<br>Outer Diameter<br>φ 1.4-1.6 |

## Crimping Precautions

### Items Required Prior to Crimping

The work-related documents shown below are required before starting the harness assembly.

(The ● mark represents required documents.)

Please contact your Hirose sales representative if you do not have these documents.

| Document Title   | Description   | Automatic Crimping Machine | Hand Crimping Tool | Remarks   |
|--|---|----------------------------|--------------------|---|
| (1) Main unit of crimping machine instruction manual           | Explanation for main press machine unit                           | ●                          | —                  | Bundled with the purchase of the main press machine unit. |
| (2) Applicator Spare Parts Identification                      | Explanation for Applicator installation                           | ●                          | —                  | Bundled with the purchase of applicator.                  |
| (3) Crimp Conditions   | Standard values of :<br>Crimp height Tensile strength             | ●                          | —                  |   |
| (4) Crimp Quality Standards                                    | Various standards for crimping conditions                         | ●                          | —                  |   |
| (5) Operating Instructions for Hand Tool                       | Inspection items of :<br>Crimp height Tensile strength and others | —                          | ●                  | Bundled with the purchase of hand tool.                   |
| (6) Harness Procedure Manual<br>BH12 Series :<br>ETAD-C0454-00 | Harness procedure   | ●                          | ●                  | Ask a HRS sales representative.                           |

## ■ Tools

- Use tools designated by Hirose when crimping.
- Crimping performed using tools other than those specified is outside the scope of warranty.
- The operating instructions are available for the crimping machine and the applicator. Be sure to carefully read the operating instructions manual before beginning work.

## ■ Applicable Cables

Check that the cables to be used are within the applicable range.

If you intend to use a cable other than those recommended, contact a sales representative.

[Precautions]

- Cables applicable to crimp connectors are tin-plated stranded soft-copper wire.
- Avoid crimping solid wire, wires with polyester threads or tin coated wires.
- Avoid crimping two cables together.
- The crimp height setting values (Note) may vary depending on the difference in the core wire configuration even if the computed cross-sectional area is the same.

Note : The crimp height is an important item that determines crimp quality. Hirose conducts crimp testing on each wire in order to set the optimum crimp height accurately.

## Precautions when using Connectors

1. When assembling the connector and installing to equipment, refer to the separate procedure manual and drawings. Please also make sure to use the specified tightening torque. If the torque is too low or high, it may result in loosening or product damage. (Contact a Hirose sales representative for the procedure manual.)
2. Once mated, pull lightly on the cable to confirm the mated status and that the connector does not come off.
3. Excessive external force applied to the connector may cause deformation or damage, resulting in poor conduction or waterproofing performance issues. Please avoid forceful insertion/removal, impact and pulling, routing or twisting of the cables. Also, when routing inside equipment, make sure to provide sufficient slack to the cable so that a load is not applied directly to the connector such as through excessive cable bending or tension on the cable.
4. When packing and storing assembled products, make sure not to apply excessive load on the spring portion of the plug insulation case due to connector overlapping. If the lock is left in a high temperature and high humidity environment for a long period of time with a load applied, the lock may deform resulting in mating failure.
5. Damage of the waterproof seal or waterproof surface may result in issues with the waterproof performance, so please refrain from using a damaged product.

## While Taking into Consideration

Specifications mentioned in this catalog are reference values.

When considering to order or use this product, please confirm the Drawing and Product Specifications sheets.

Use an appropriate cable when using the connector in combination with cables.

If considering usage of a non-specified cable, please contact your sales representative.

If assembly process is done by jigs & tools which are not identified by Hirose, assurance will not be given.

If considering usage for below mentioned applications, please contact your sales representative.

In cases where the application will demand a high level of reliability, such as automotive, medical instruments, public infrastructure, aerospace/ defense etc. Hirose must review before assurance of reliability can be given.