Hirose's Connector Offerings for Storage Battery Systems

NOTE: Conditions for safety standards vary depending on submitted applications of current and voltage ratings. Contact Hirose for details.

Issued: Oct. 24, 2016

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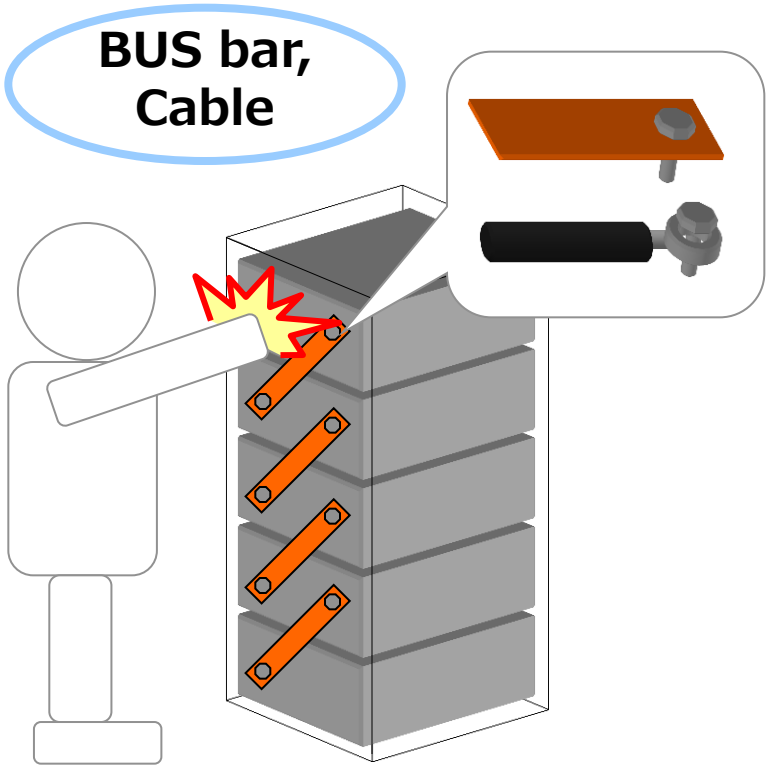
Current Configuration of Storage Battery Systems

<Problems in case that connectors are not used>
To connect BUS bar or cable to electrode directly, installation needs to be done on site.
In that case, securing safety and the same quality with all workers are required.



✓ *Installation*

- **Screwing directly to electrodes** — Danger
- **Screw loosening by inexperienced workers**
- **Mis-wiring due to no polarity**

✓ *Maintenance* — Danger

- **Removes screws directly from electrodes.**
  => Needs to repeat dangerous installation again after that.

✓ *Safety* — Danger

- **Workers could touch conductor. Insulation protection is required.**

It takes time and labor cost to secure safety.

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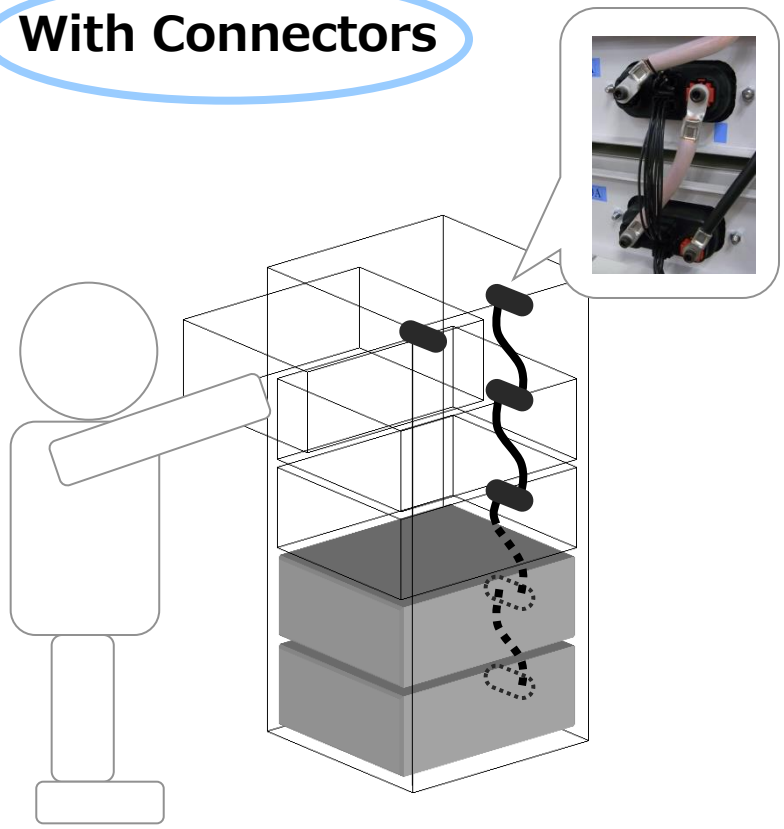
Advantages Using Connector

With Connectors



✓ *Installation*

- **Preinstalled in a factory**
  => No risk to touch electrodes

Safe

- **Mis-insertion prevention with coding key**
- **Cable assy in a factory allows torque management.**
  => The same quality with all workers

✓ *Maintenance*

Safe

- **Modules can be removed without touching electrodes.**
- **Mis-insertion prevention with coding key**
- **Screwing is not required = No torque management**

Safe

✓ *Safety*

- **Contacts are surrounded by housing for safety.**

Deep consideration of safety yet short working time
=> Big cost advantage

Issued: Oct. 24, 2016

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Hirose's Proposals Depending on the Types of Storage System

✓ Which type of storage battery do you use? (Standard rack, container type or others?)
✓ How much capacity (ampere-hour) does your cell module has?

▶ ***We can offer the ideal connector for your batteries!***

Storage Battery Type	Rack Type					Container Type (Plug-In Connection / Front Access)
	Standard Rack (19-inch) (Plug-In Connection)		Custom Size Rack (Front Mount)			
	18650 Cells (Thick Drawer)	Laminated Cells (Thin Drawer)	Large Size (High Power)		Small Size (Low Power)	
Power Line	PS2 	PS3 	PS3C 	EM12M 	DF60 	PS3F 
Rated Current	100/200/300A	150A	150A	90A	25-50A	100A
Service Plug	EM30MSD 					

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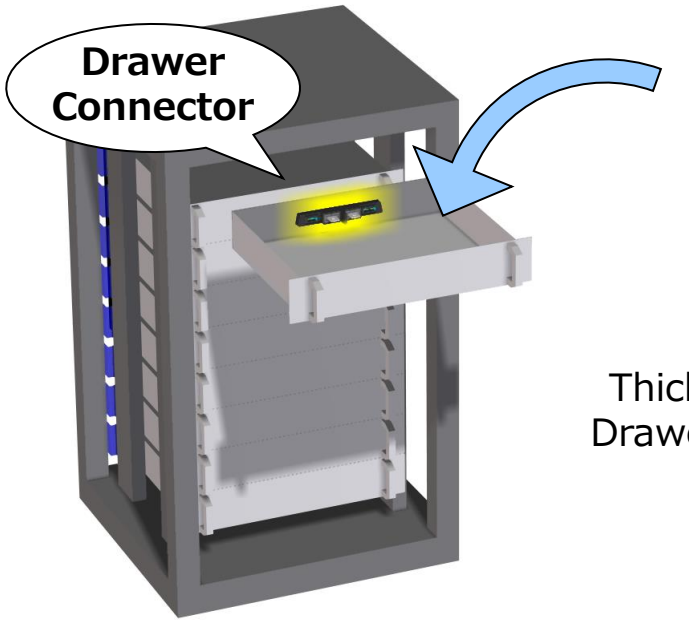
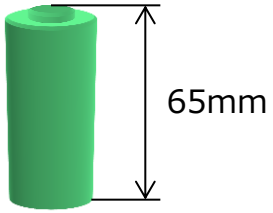
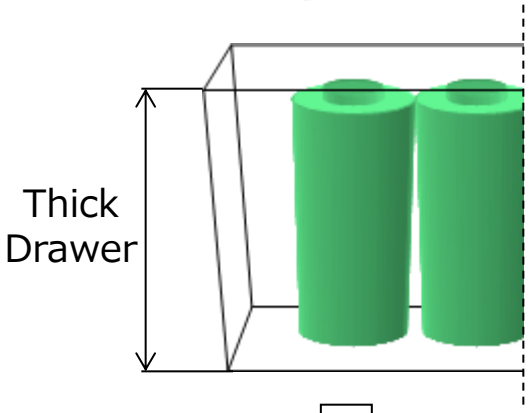
For Standard Rack (19-inch)

<19-inch Rack>



<18650 Cell>

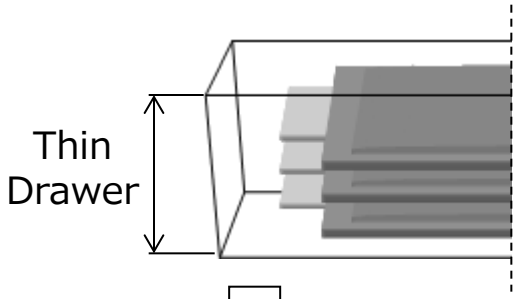




PS2
➤ Page 5

<Laminated Cell>

Thickness: Approx. 10mm



PS3
➤ Page 6

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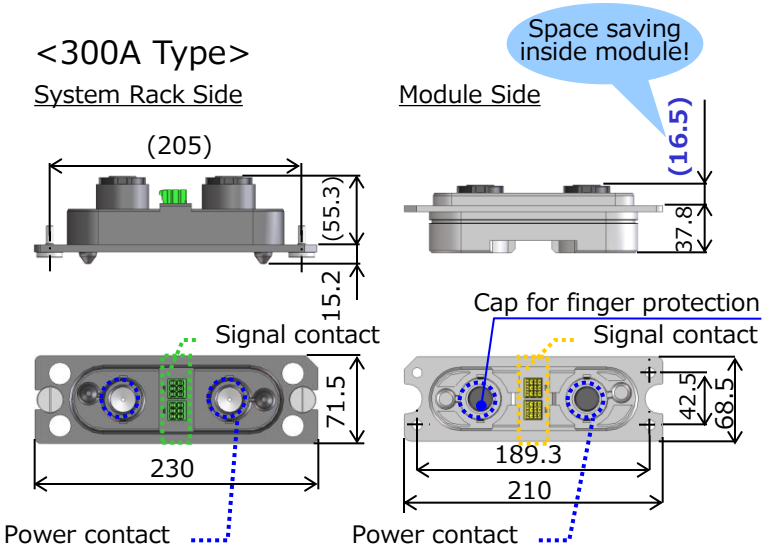
PS2 Series

Plug-In Connector for Storage Battery
Capable up to 100 / 200 / 300A

- ✓ Floating screw allows ± 2.5mm floating mate
- ✓ Multiple contact springs on power contact decrease heat generation in connector by current carrying
- ✓ Sequential contacts detect incomplete mating for safety
- ✓ Safety design with finger protection cap
- ✓ UL, TÜV certified.

<300A Type>



<Variations>

*: P → Module Side
S → System Rack Side

Power		Signal		
300A PS2-2W*/6C/6C	**150sq Cable (M8 Screw)**	**6 + 6pos.** PS2-6*C	**16-18 AWG**	Crimp Contact: PS2-1618PCFA PS2-1618SCFA
200A PS2-2V*/42C	**80sq Cable (M6 Screw)**	**18 + 18pos.** PS2-18*C	**18-22 AWG 24-28 AWG**	Crimp Contact: PQ50SA-1822PCFA PQ50S-1822SCFA
		42pos. PS2-42*C		PQ50SA-2428PCFA PQ50S-2428SCFA
100A PS2-2R*/9C/9C	**38sq Cable (M6 Screw)**	**9 + 9pos.** PS2-9*C		

<Specifications>

Rated Voltage	1000V AC
Operation Temp. Range	- 40˚C to + 105˚C
Contact Resistance	300A: 0.3mΩ, 200A: 0.5mΩ, 100A: 0.6mΩ max. (1A DC)
Durability	50 cycles

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PS3 Series

Plug-In Connectors for Storage Battery
Capable up to 150A

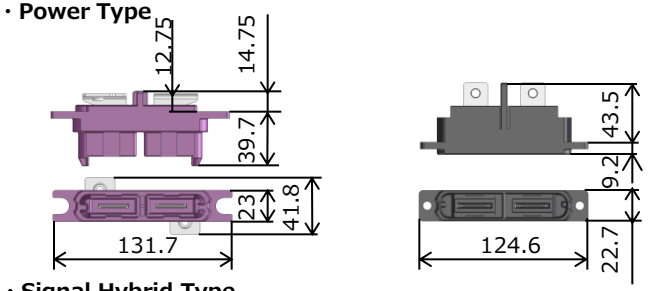
▾ Power Type

▾ Signal Hybrid Type

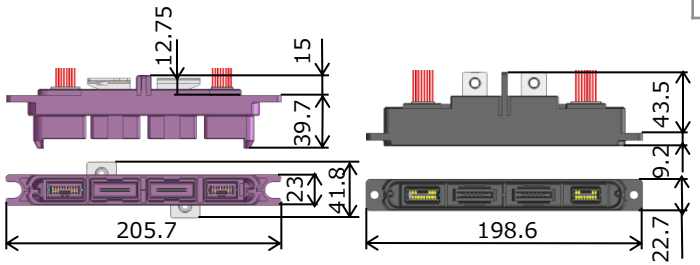
- ✓ Slim design achieved by employing unique blade contact allows application to standard 1U rack.
- ✓ Floating screw allows ± 2mm floating mate
- ✓ Safety design with IP2X finger protection (Female power contact only)
- ✓ Dust cap is available.
- ✓ Power type: UL, C-UL, TÜV certified
  Signal hybrid type: UL, C-UL, TÜV certified.

System Rack Side / Module Side

・Power Type



・Signal Hybrid Type



Applicable wire: 14-50sq (WL1, WL2)

<Variation>

	Power		Signal	
Power Type	**150A** PS3-2U*	**50sq Cable (M6 Screw)**	N/A	
Signal Hybrid Type	**150A** PS3-2U*/12*/16*	**50sq Cable (M6 Screw)**	**12pos. + 16pos.** GT8E-12DS-HU GT8E-16DS-HU	**20-28 AWG**

*: P → Module Side
S → System Rack Side

<Specifications>

Rated Voltage	500V AC / DC
Operation Temp. Range	- 40˚C to + 105˚C
Contact Resistance	0.3mΩ max. (1A DC)
Durability	100 cycles

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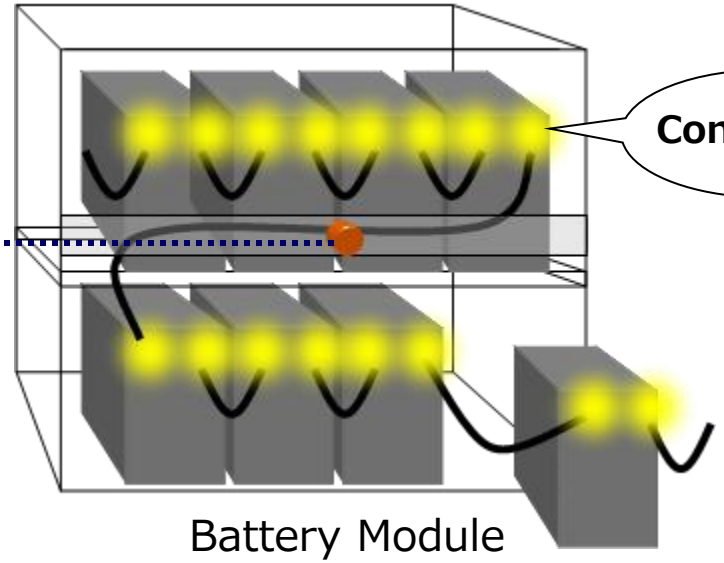
For Custom Size Rack

<Custom Size Rack (Example)>
Several module sizes / Flexible Wiring



Service plug for the safety during maintenance

EM30MSD
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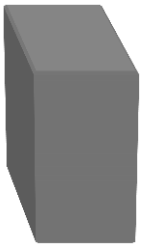
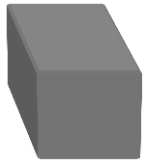
<Large Size Module><Small Size Module>





PS3C
➤ Page 9

DF60
➤ Page 11

EM12M
➤ Page 10

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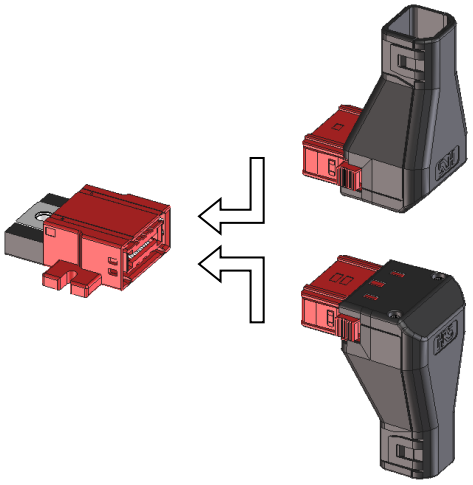
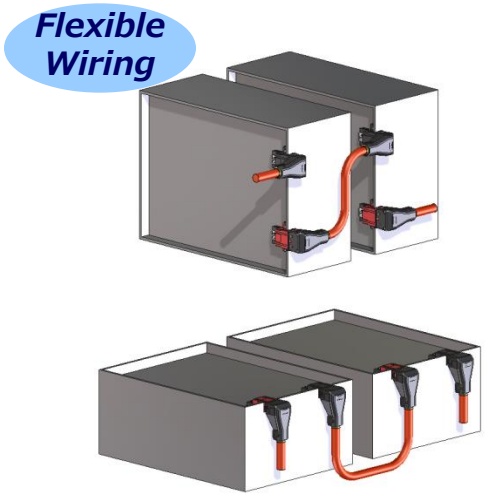
PS3C Series

Single Pos. Connector for Storage Batteries Capable Up to 150A

<Two-Way Reversible Mating>

- ✓ Two-way reversible mating plug for flexible & space saving cable wiring
- ✓ Downsized receptacle reduces occupied mounting area on battery module.
- ✓ A wide range of cable size is acceptable. (14-50sq)
- ✓ Safety design with IP2X finger protection
- ✓ Keying and colored housings prevents mis-wiring between positive and negative electrodes.
- ✓ UL , C-UL, TÜV certified.





<Performance Characteristics>

Rated Current	150A (with 50mm^2 cable)
Rated Voltage	1000V AC/DC
Operating Temp. Range	-40°C to + 60°C
Contact Resistance	0.3mΩ Max. (1A DC)
Insulation Resistance	5000MΩ Min. (250V DC)
Withstanding voltage	2000V AC, 1 minute
Durability	100 times

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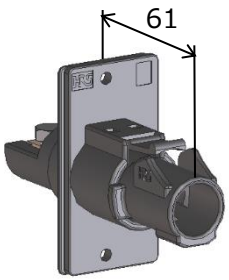
EM12M Series

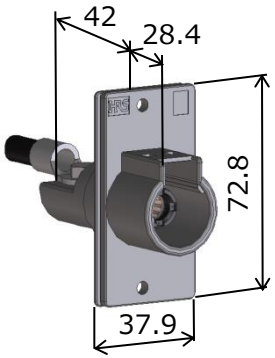
Single Pos. Snap-in Lock Power Connector up to 90A

- ✓ Quick and secure snap-in inertia lock
- ✓ Safety design with finger protection
- ✓ Crimp termination with commercially available crimp tool.
- ✓ Keying and colored housings prevents mis-wiring
- ✓ UL, TÜV certified.

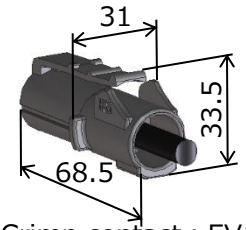
Mated



Receptacle
EM12MR-1SC* (*)



Plug
EM12MP-1PC* (*)



- Use commercially available crimp terminal
  38mm², 22mm², 14mm² sizes are applicable

- Crimp contact : EV1-PC-112
  EV1-PC1-112
- Applicable cable:
  Nominal sectional area,
  22 (16.78-26.66)mm²

<Performance Characteristics>

Rated Current	90A (with 22mm² cable)
Rated Voltage	600V AC/DC
Operating Temp. Range	-25°C to + 105°C
Contact Resistance	0.5mΩ Max. (1A DC)
Insulation Resistance	1000MΩ Min. (500V DC)
Withstanding voltage	3310V AC, 1 minute
Durability	30 times

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DF60 Series

Small Size Board to Wire Connector
Up to 45A

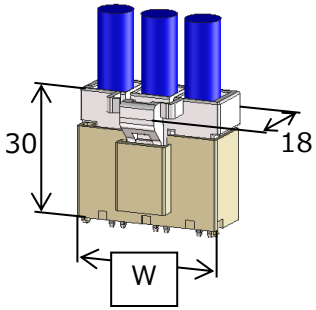
- ✓ Secure mating with clear tactile click
- ✓ Highly reliable 5-point contact with independent contact springs
- ✓ Connection style varieties: straight, right angle and in-line
- ✓ Accepts 8-12 AWG cables size with 1-6pos.
- ✓ Keying variations available
- ✓ UL, TÜV certified

Rated Current

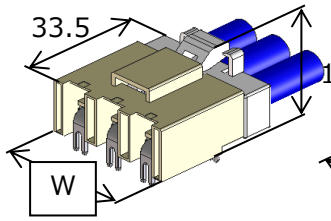
No. of Pos.	8 AWG	10 AWG	12 AWG
1	50A	38A	30A
2, 3	48A	31A	26A
4, 5, 6	38A	30A	25A

<Variations>

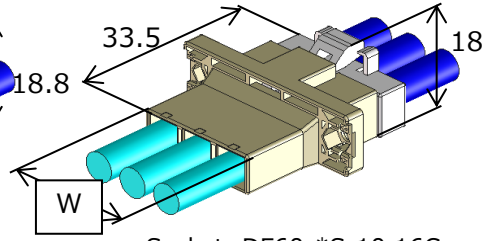
[Straight]
DF60-*P-10.16DSA



[Right Angle]
DF60-*P-10.16DS



[In-Line with Flange]
DF60-*EP-10.16C



Width		
No. of Pos.	Straight, Right Angle	In-Line
1	15.8	32.2
2	22.36	39.36
3	32.52	49.52
4	42.68	59.68
5	52.84	69.84
6	63	-

Contact Pitch: 10.16mm
Effective Mating Length: (3.0mm)

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

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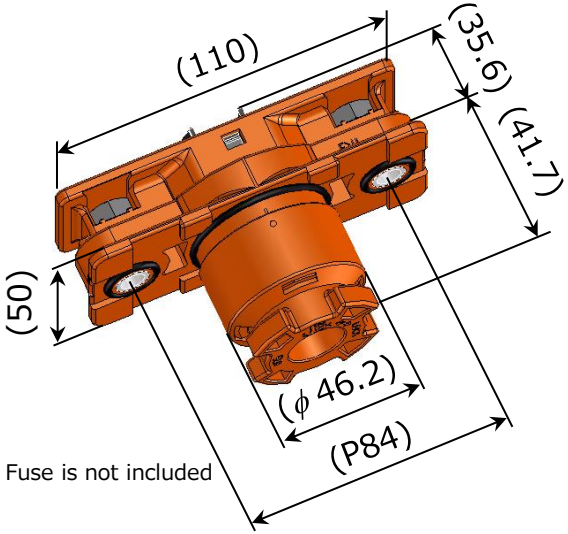
EM30MSD Series

Service Plug Supporting 200A



NOTE: Fuse is not included

- ✓ 200A capability with small size
- ✓ Signal contact with interlocking switch to detect mating status
- ✓ Shock resistant multi-contact & bayonet lock systems
- ✓ IP68* water resistant
- ✓ Commercially available crimp terminal is applicable
- ✓ Safety design with IP2X finger protection
- ✓ UL certified, TÜV pending

*Our test conditions:
No water intrusion, while submerged in 2 meter water depth for 14 days.

<Performance Characteristics>

	Power Contact	Signal Contact
Rated Current	200A	1A
Rated Voltage	1500V AC/DC	250V AC/DC
Contact Resistance	0.5mΩ Max. (1A DC)	90mΩ Max. (1A DC)
Operating Temp. Range	-40°C to +105°C	
Insulation Resistance	5000MΩ Min. (500V DC)	
Withstanding Voltage	4500V AC, for 1 minute	
Durability	50 times (Plug – Receptacle) 30 times (Signal connector, GT)	

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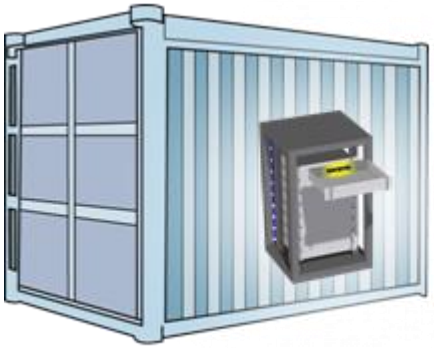
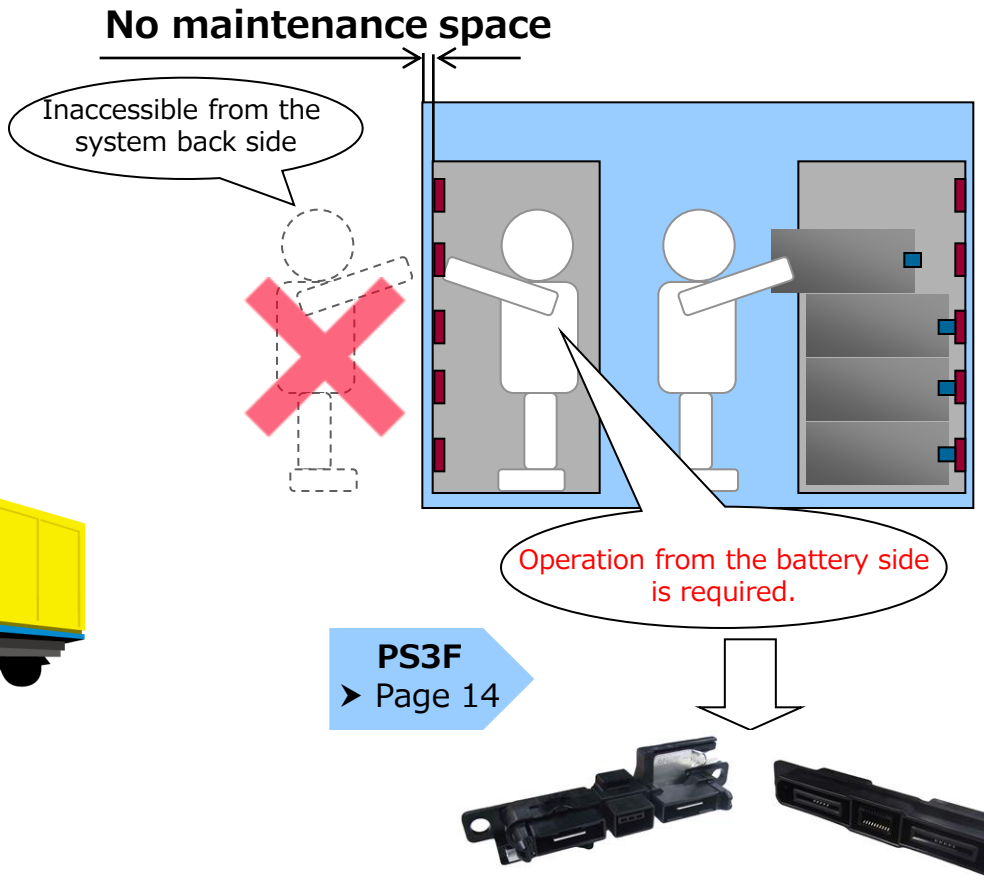
Container Type

<Racks stored in container>



<Image inside containers>



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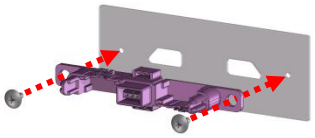
PS3F Series

Signal Hybrid 100A Power Supply, Front Access Plug-in Connector

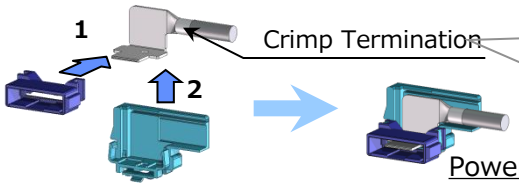
- ✓ ”Front Access” on system rack side allows cable assembly from mating side.
- ✓ For signal lines, GT8E connector with a good track record in automotive market is applied.
- ✓ Floating screw allows ± 2.5mm floating mate
- ✓ Finger protection meeting IP2X requirements contributes to operators’ safety.
- ✓ UL, C-UL, TÜV certified.

<Assembly Procedures on System Rack Side>

1. Attach the housing on the panel with screws.

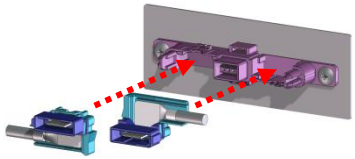


2. Assemble the power unit. Crimp the contact to the cable and install into the case

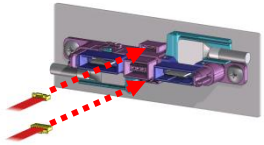


Recommended Tool: Pneumatic desk crimp tool NA 20 manufactured by Nichifu Co., Ltd.
Some tool is not applicable due to a possible interference with contact.
Handle with care before and after the cable assembly as heat by brazing at the crimp area soften the copper base material.

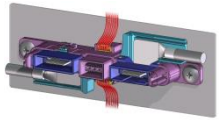
3. Assemble the power unit to the housing from its front



4. Assemble the signal connector to the housing from its front.



5. Completed



<Specifications>

Rated Voltage	1000V AC / DC
Operation Temp. Range	- 40˚C to + 105˚C
Contact Resistance	0.3mΩ max. at 1A DC
Durability	100 times (GT8E: 30 times)

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Any Questions?

Thank you for learning Hirose's offerings for the battery storage systems!

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UL, TÜV Approval Status / Schedule

		UL	TÜV
PS2	100A	✓	✓
	200A	✓	✓
	300A	✓	✓
PS3	Power	✓	✓
	Signal Hybrid	✓	✓
EM30MSD		✓	**January, 2017**
PS3C		✓	✓
EM12M		✓	✓
DF60		✓	✓
PS3F		✓	✓

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

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