

# Packard Electrical/Electronic Architecture Hybrid & Electric Vehicle Portfolio

*Connection Systems, Electrical Centers,  
Wiring Assemblies and Charging Solutions*



**DELPHI**

Innovation for the Real World

## Delphi's extensive HEV/EV product portfolio

Hybrid and electric vehicles present unique challenges when it comes to electrical/electronic (E/E) architecture. They demand performance requirements including shielding to protect against electromagnetic interference, sealing to prevent short circuits and arcing, and the incorporation of a hazardous voltage interlock loop, or HVIL. To help keep drivers and service technicians safe in high-voltage environments, a number of complex factors in the electrical system must be addressed and engineered for reliability and peak performance.

Delphi's extensive HEV/EV product portfolio offers a complete range of E/E architecture systems and components for every high-power, high-voltage application, whether off-the-shelf or customized. Delphi has E/E architecture technologies specific for battery-powered transportation, including harness protection systems such as bent aluminum tubes or molded channels, battery monitoring devices, plug-in charging, and a new series of connection systems that incorporate the shielding, sealing, and high-voltage safety interconnects required for high-voltage/high-power applications.

Delphi's vast systems knowledge, innovative automotive component design and integration skills helps reduce costs, provide peak performance and offer a robust portfolio of hybrid and electric vehicle components and systems.

## We are where you need us to be

Delphi has a strong global engineering team with Global Hybrid Development Centers dedicated to Electrical/Electronic Architecture in Champion, OH USA, Wuppertal, Germany and Shanghai, China. Our exclusive Velocity Tool Suite™ of proprietary analysis, design and simulation tools allow us to look at all the options, seamlessly import customer data, and speed development through virtual testing and validation, wherever we are around the globe.

We have custom, optimized E/E architecture solutions that offer significant benefits for today's hybrid and electric vehicles, including:

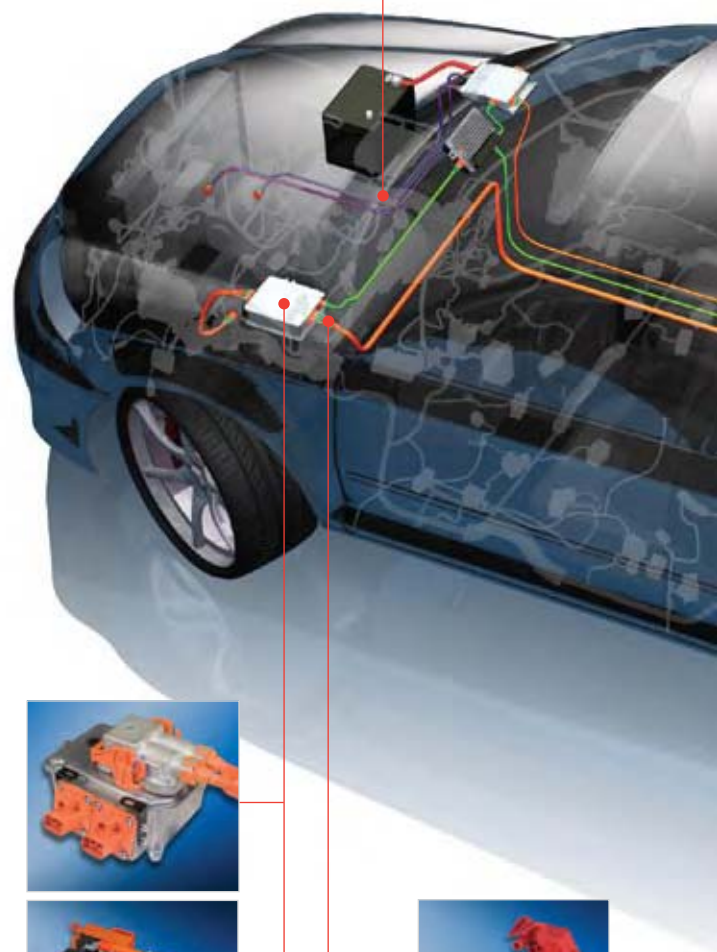
- Greater functionality
- Reduced mass and packaging space
- Cost savings
- Improved reliability
- Environmental friendliness



Shield-Pack™ High-Power Connection Systems



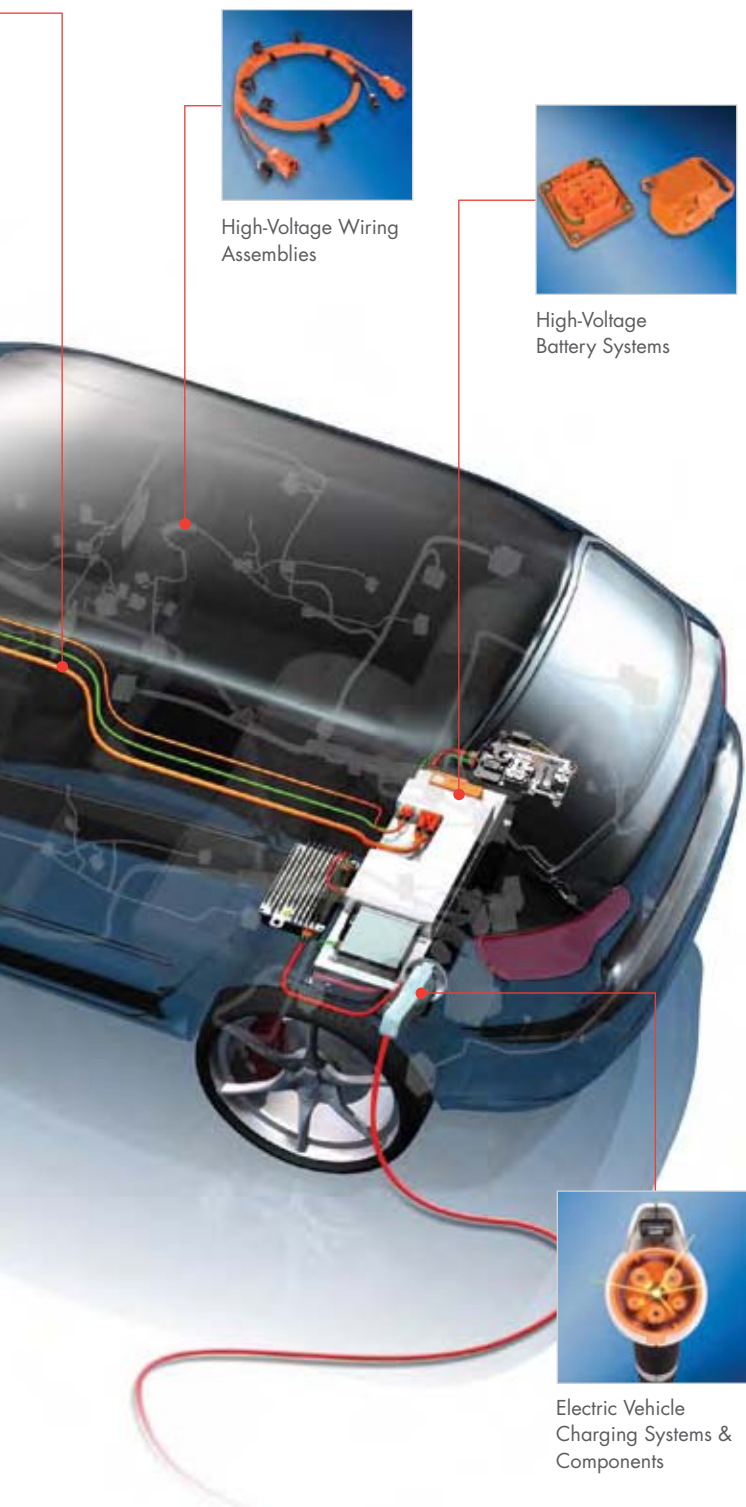
Power Pack Unshielded High-Current Connection Systems



High-Voltage Electrical Centers



Application Specific High-Power Products



High-Voltage Wiring Assemblies

High-Voltage Battery Systems

Electric Vehicle Charging Systems & Components

## Table of Contents

Delphi Shield-Pack™ Application Guideline . . . . .	4
Delphi Shield-Pack™ High-Power Connection Systems . . . . .	5
Power Pack Unshielded High-Current Connection Systems . . . . .	19
Application Specific High-Power Products . . . . .	25
Hybrid & Electric Vehicle Charging Systems & Components . . . . .	35
High-Voltage Battery Systems . . . . .	39
High-Voltage Electrical Centers . . . . .	43
High-Voltage Wiring Assemblies . . . . .	45

At Delphi, we recognize the importance of vehicle manufacturers offering more comfort, more efficiency, more fuel economy and more environmentally friendly cars and trucks accessible to more consumers. We believe in working together to create the most value for our customers. Our systems knowledge, innovative automotive component design and integration skills extend through our entire organization. This helps us reduce costs, provide peak performance and offer a robust portfolio of hybrid and electric vehicle components and systems including:

- Charging Systems
- Energy Storage Systems
- Thermal Systems
- Connection Systems
- Power Electronics
- Service Solutions
- Electrical Centers
- Powertrain Systems
- Wiring Assemblies

For more information, visit [www.delphi.com/hybrid](http://www.delphi.com/hybrid)

# DELPHI

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# Delphi Shield-Pack™ Application Guideline

Device	I/O Detail	General Specification	Delphi Portfolio
<b>Battery Pack</b>	Main Power Output	2W < 250A; 600 VDC Shielded	Shield-Pack™ HV2000
	High-Current Charge Input	2W < 200A; 600 VDC Shielded	
	Charger Input	2W < 40A; 600 VDC Shielded	Shield-Pack™ HV280
	DC/DC Converter Output	2W < 40A; 600 VDC Shielded	
	HV Contactor Center	Customer Specific	Delphi Contactor Center
	Manual Service Disconnect	< 225A; 600 VDC	Delphi MSD
<b>Inverter</b>	DC Input	2W < 250A; 600 VDC Shielded	Shield-Pack™ HV2000
	AC Output	3W < 145A; 600 VAC Shielded	Shield-Pack™ HV1000
		< 250A 600; VAC Shielded	High-Voltage Pass-Through
<b>DC/DC Converter</b>	DC Input	2W < 40A; 600 VDC Shielded	Shield-Pack™ HV280
	14V Output	1W Filtered/1W Unfiltered 200A	Delphi 14V Filtered Output
<b>On-Board Charger</b>	AC Input	3W < 40A; 240 VAC Unshielded	HV150; On-Board Charger
	DC Output	2W < 40A; 600 VDC Shielded	Shield-Pack™ HV280
<b>Electric Motor</b>	AC Input	3W < 145A; 600 VAC Shielded	Shield-Pack™ HV1000
		< 250A; 600 VAC Shielded	High-Voltage Pass-Through
<b>Accessories</b>	Electric Air Conditioning	2W < 40A; 600 VDC Shielded	Shield-Pack™ HV280
	Electric Heater		
	Electric Power Steering		
	Electric Coolant Control		
<b>Vehicle Charging</b>	Level 1, Level 2	< 30A; 120VAC, 240 VAC	Delphi Charging Cordset, Inlets


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## Delphi Shield-Pack™ High-Power Connection Systems

Delphi Shield-Pack™ connection systems have been specifically designed for high-voltage applications used on hybrid and electric vehicles. They provide power terminal isolation for 600V applications, finger proof/touch safe protection, and HVIL circuit integration into the connection system design. The Shield-Pack™ family comes in three series to cover high-voltage applications up to 250 amps. The HV280 series is suitable for applications up to 40 amps, HV1000 up to 145 amps, and HV2000 up to 250 amps. The Delphi Shield-Pack™ family provides customers with one of the largest globally available connection systems portfolios for HEV/EV system optimization.



*Special attention is required for high-voltage connection systems. All applications of Delphi Shield-Pack™ series should be discussed with Delphi to ensure proper application of the connection system. Please consult Delphi for technical support.*

**DELPHI**

# Shield-Pack™ HV280

## With Internal HVIL Header



### Application

High-voltage accessories connection system

### Description

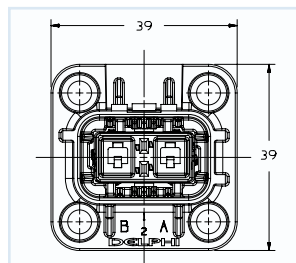
- Sealed connection system
- Panel mount to device with face seal
- Internal HVIL (shunt on harness connector)
- Two-stage locking system for HVIL time delay
- Two HV power circuits (2.8mm terminal)
- Flange size: 39mm x 39mm
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Three keys/indexes

### Performance

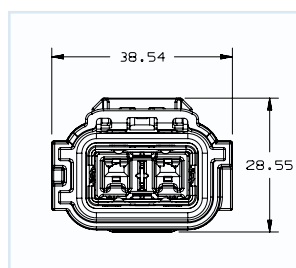
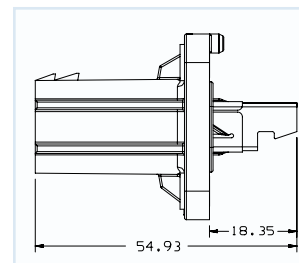
- Current capacity: 40A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

### Part Number Information

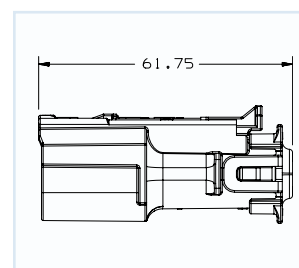
Key/ Index	Header Connector	Mating Information	
		Mating Device Detail	HV Connector
101	13824830	13837174	13824784
102	13830171		13830159
103	13830172		13830160



13824830



13824784



Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

## Shield-Pack™ HV280

### HVIL Shunt in Header, Face Seal to Device



#### Application

High-voltage accessories connection system

#### Description

- Sealed connection system
- Panel mount to device with face seal
- Two HV power circuits (2.8mm terminal)
- HVIL shunted-in header with five-second time delay
- Flange size: 43mm x 49mm
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Three keys/indexes

#### Performance

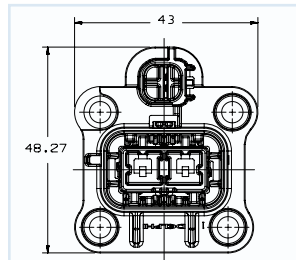
- Current capacity: 40A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

#### Part Number Information

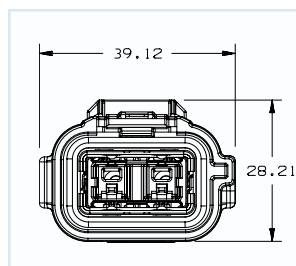
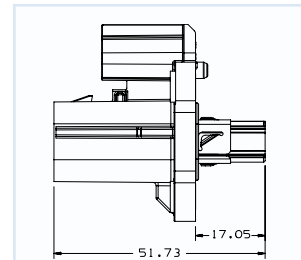
Key/ Index	Header Connector	Mating Information		
		Mating Device Detail	HV Connector	HVIL Connector
101	13829178	13834720	13861584 (13737728)*	13738743
102	13829179		13861585 (13737729)*	13738744
103	13829180		13861586 (13766034)*	13766241

\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

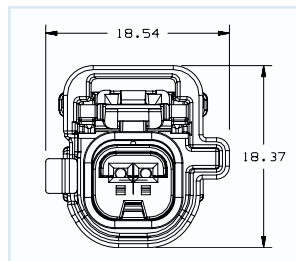
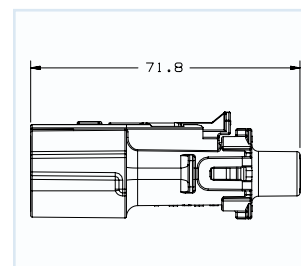
Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.



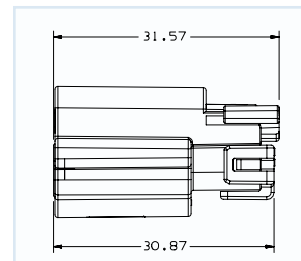
13829178



13861584 (13737728)\*



13738743



## Shield-Pack™ HV280

## HVIL Shunt in Header, Bore Seal to Device

**Application**

High-voltage accessories connection system

**Description**

- Sealed connection system
- Sealed to device case through bore seal
- Two HV power circuits (2.8mm terminal)
- HVIL shunted-in header with five-second time delay
- Flange size: 43mm x 49mm
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Three keys/indexes

**Performance**

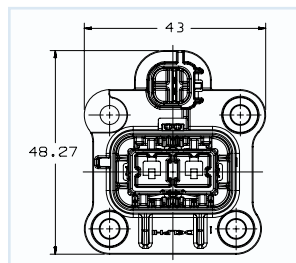
- Current capacity: 40A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

**Part Number Information**

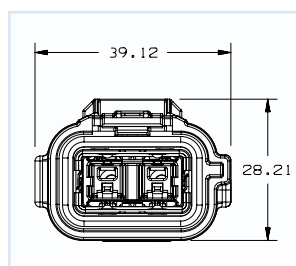
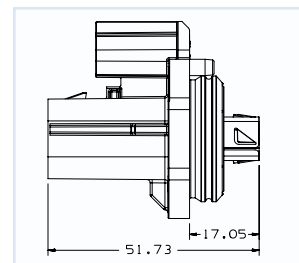
Key/ Index	Header Connector	Mating Information		
		Mating Device Detail	HV Connector	HVIL Connector
101	13830674	13831228	13861584 (13737728)*	13738743
102	13830675		13861585 (13737729)*	13738744
103	13830676		13861586 (13766034)*	13766241

\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

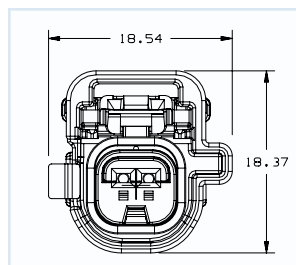
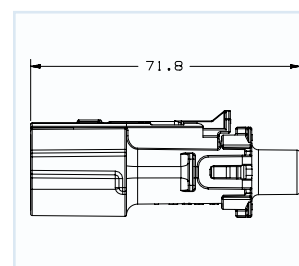
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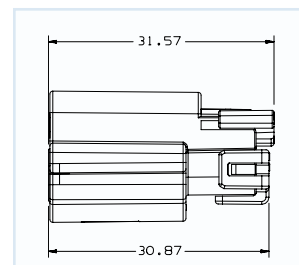
13830674



13861584 (13737728)\*



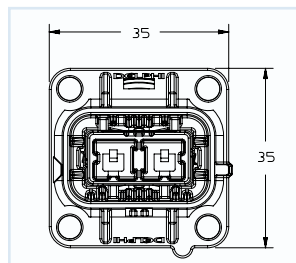
13738743



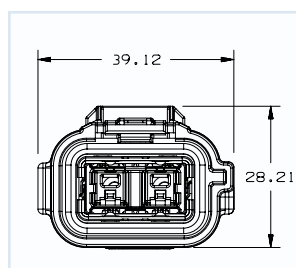
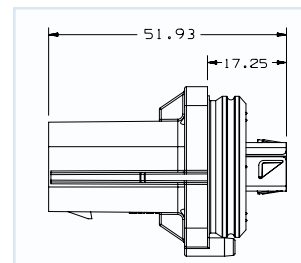


## Shield-Pack™ HV280

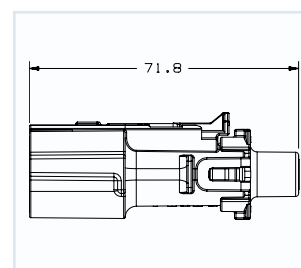
### 2 Way Connection System Without HVIL



13743443



13861584 (13737728)\*



#### Application

- High-voltage accessories connection system when no HVIL is required

#### Description

- Sealed to device case
- Two HV power circuits (2.8mm terminal)
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup> power circuit
- One key/index

#### Performance

- Current capacity: 40A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

#### Part Number Information

Key/ Index	Header Connector	Mating Information	
		Mating Device Detail	HV Connector
101	13743443	13849778	13861584 (13737728)*

\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

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## Shield-Pack™ HV280

## 2 Way Connection System With Multiple HVIL Options

**Application**

- High-voltage accessories connection system

**Description**

- Sealed to device case
- Two HV power circuits (2.8mm terminal)
- HVIL available in two configurations: pass-through header, shunted-in header
- HVIL with five-second time delay
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Three keys/indexes

**Performance**

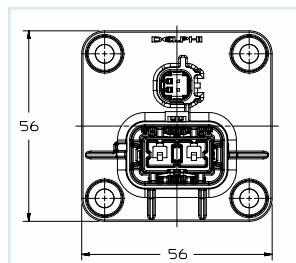
- Current capacity: 40A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

**Part Number Information**

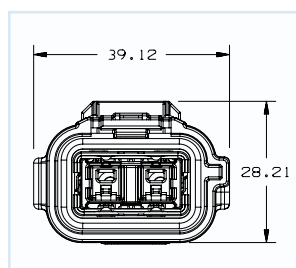
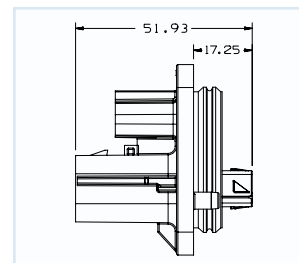
Key/ Index	Header with HVIL Shunted	Header with HVIL Pass-Through to Module	Mating Information		
			Mating Device Detail	HV Connector	HVIL Connector
101	13756860	13737767	13739582	13861584 (13737728)*	13738743
102	13757523	13737768		13861585 (13737729)*	13738744
103	13766024	13766022		13861586 (13766034)*	13766241

\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

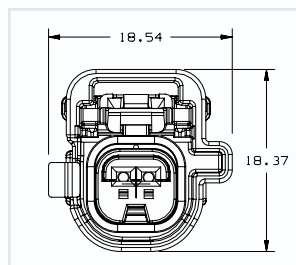
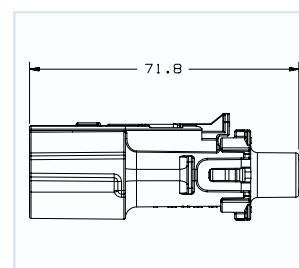
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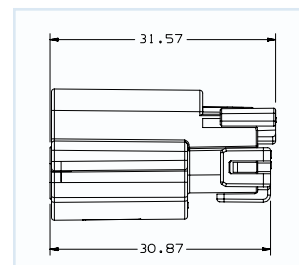
13737767



13861584 (13737728)\*



13738743



## Shield-Pack™ HV280

### 2 Way Inline Connection System With HVIL Shunt



#### Application

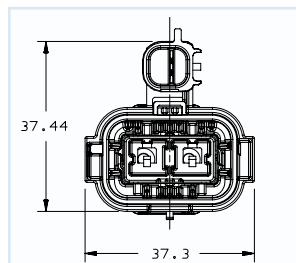
- Inline connection system for high-voltage accessories

#### Description

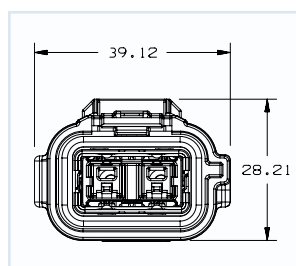
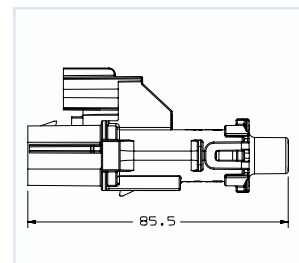
- Sealed connection system
- Two HV power circuits (2.8mm terminal)
- HVIL with five-second time delay
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Two keys/indexes

#### Performance

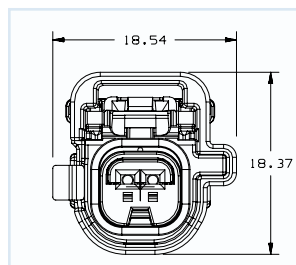
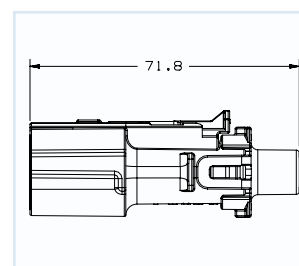
- Current capacity: 40A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB



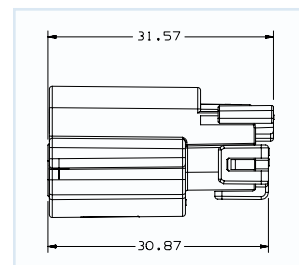
13737736



13861584 (13737728)\*



13738743



#### Part Number Information

Key/ Index	Male Connector	Mating Information	
		Female Connector	HVIL Connector
101	13737736	13861584 (13737728)*	13738743
102	13737737	13861585 (13737729)*	13738744

\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

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# Shield-Pack™ HV1000 3 Way Panel Mount



## Application

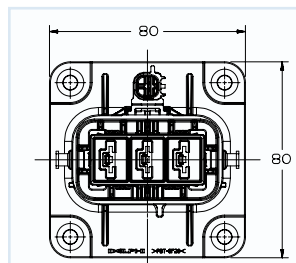
- High-voltage/high-current devices (inverters)

## Description

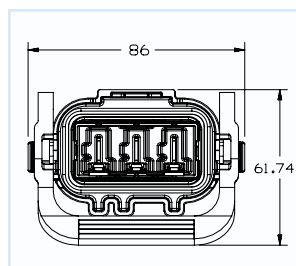
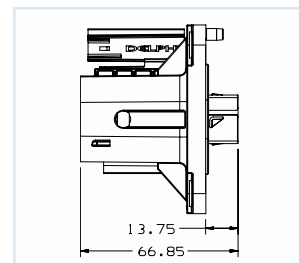
- High-voltage panel mount connection system
- Three high-voltage power circuits (Power Pack 1000 terminal)
- HVIL with five-second time delay
- Cable range: 16mm<sup>2</sup> to 25mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Two keys/indexes

## Performance

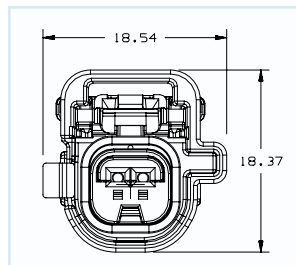
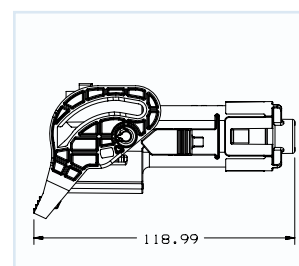
- Current capacity: 145A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB female connector only



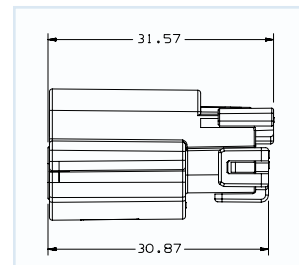
13879064



13879062



13738743



## Part Number Information

Key/ Index	Header Connector	Mating Information		
		Mating Device Detail	Female Connector	HVIL Connector
101	13879064	13879066	13879062	13738743
102	13879065	13879067	13879063	13738743

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## Shield-Pack™ HV1000 3 Way Inline Connection System



### Application

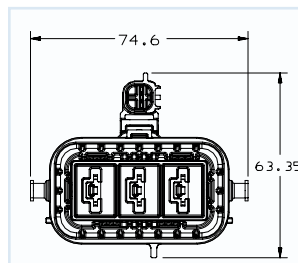
- High-voltage, 3 Way high-current inline applications

### Description

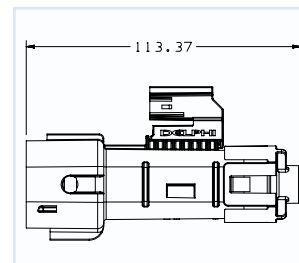
- High-voltage inline connection system
- Power Pack 1000 terminal
- HVIL with five-second time delay
- Cable range: 16mm<sup>2</sup> to 25mm<sup>2</sup> power circuit; 0.5mm<sup>2</sup> HVIL circuit
- Two keys/indexes

### Performance

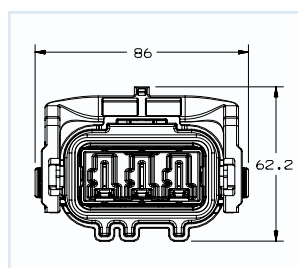
- Current capacity: 145A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB female connector only



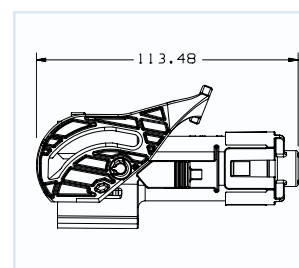
13879060



13879058



13738743



### Part Number Information

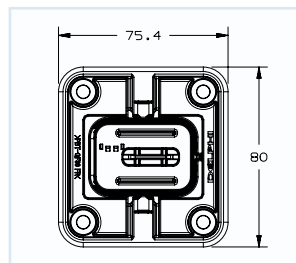
Key/ Index	Male Connector	Mating Information	
		Female Connector	HVIL Connector
101	13879060	13879058	13738743
102	13879061	13879059	13738743

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

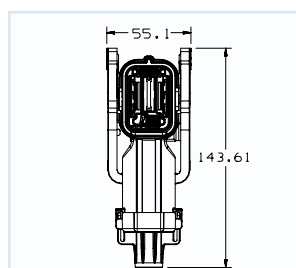
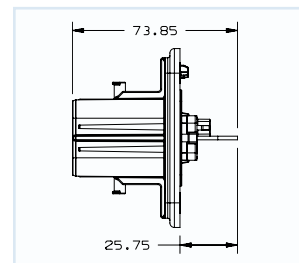


# Shield-Pack™ HV2000

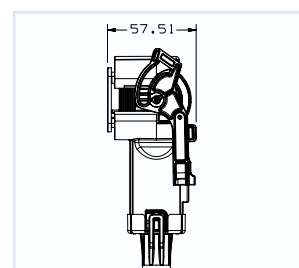
## 1 Way Right Angle Connection System With Internal or External HVIL



13827768



13827756



### Application

- High-voltage/high-current modules: inverter, battery

### Description

- Panel mount to device with face seal to module
- Terminal provided as part of header
- Lever arm for mechanical advantage
- Internal HVIL shunts in harness connector
- Two-stage lever for HVIL time delay
- External HVIL blocks lever from moving
- Finger proof/touch safe
- Cable range: 25mm<sup>2</sup> to 50mm<sup>2</sup>
- One key/index

### Performance

- Current capacity: 250A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

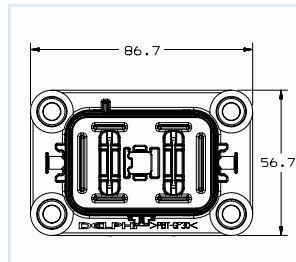
### Part Number Information

Key/ Index	Header with Terminal	Mating Information	
		Mating Device Detail	HV Connector
101	13827768	See print for information	13827756

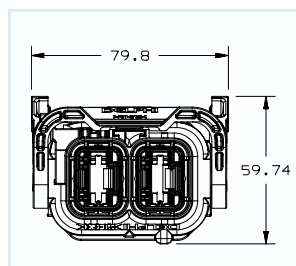
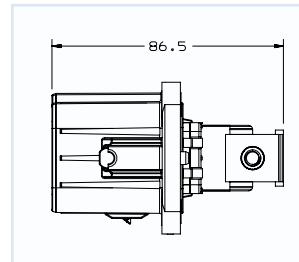
Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

## Shield-Pack™ HV2000

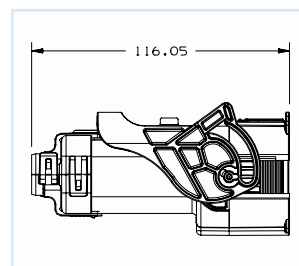
2 Way Connection System With Internal or External HVIL, Inline Mating Direction



13848968



13848961



### Application

- High-voltage/high-current modules: inverter, battery

### Description

- Panel mount to device with face seal to module
- Terminal provided as part of header
- Anti-rotation for attachment to terminal in three orientations
- Internal HVIL shunts in harness connector
- Two-stage locking system for HVIL time delay
- External HVIL blocks lever from moving
- Finger proof/touch safe
- Cable range: 25mm<sup>2</sup> to 50mm<sup>2</sup>
- Multiple keys/indexes

### Performance

- Current capacity: 250A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

### Part Number Information

Key/ Index	Header with Terminal	Mating Information	
		Mating Device Detail	HV Connector
101	13848968	See print for information	13848961

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

# Shield-Pack™ HV2000

## 2 Way Right Angle Connection System With Internal HVIL



### Application

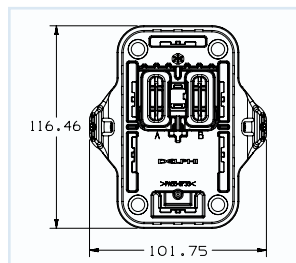
- High-voltage/high-current modules: inverter, battery

### Description

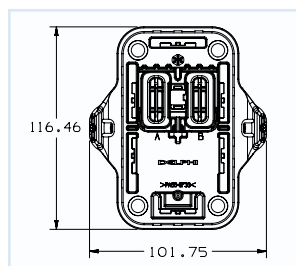
- Panel mount to device with face seal to module
- Header available with or without terminals
- Internal HVIL
- Harness connector mates in right angle direction
- Finger proof/touch safe
- Cable range: 25mm<sup>2</sup> to 50mm<sup>2</sup>
- One key/index

### Performance

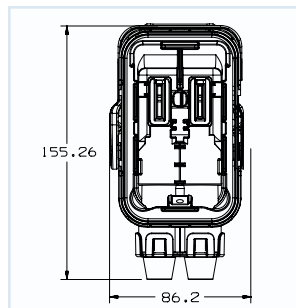
- Current capacity: 250A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB



13878909



13878907



13878910

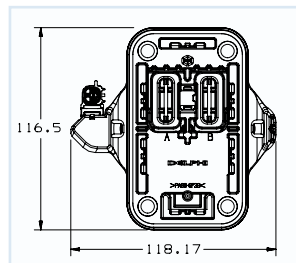
### Part Number Information

Key/ Index	Header without Terminal	Header with Terminal	Mating Information		
			Mating Device Detail	HV Connector	HVIL Connector
101	13878909	13878907	See print for information	13878910	13848934

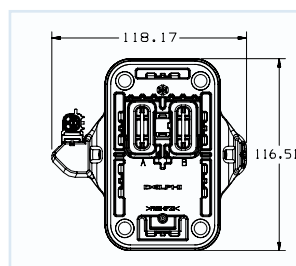
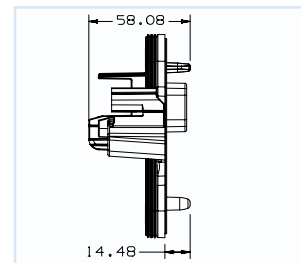
Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

## Shield-Pack™ HV2000

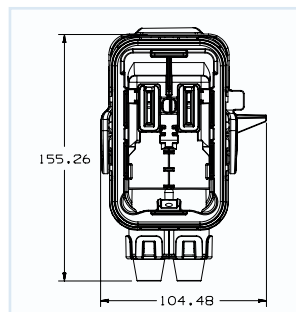
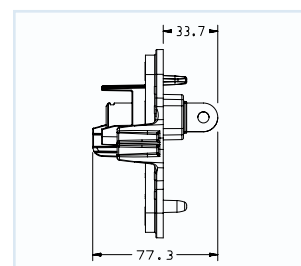
### 2 Way Right Angle Connection System With External HVIL



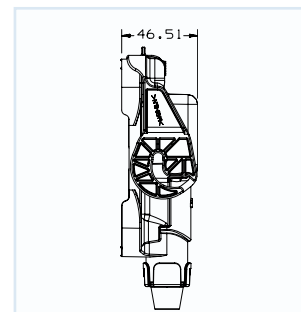
13838943



13878908



13838941



#### Application

- High-voltage/high-current modules: inverter, battery

#### Description

- Panel mount to device with face seal to module
- Header available with or without terminals
- External HVIL with five-second time delay
- Harness connector mates in right angle direction
- Finger proof/touch safe
- Cable range: 25mm<sup>2</sup> to 50mm<sup>2</sup>
- One key/index

#### Performance

- Current capacity: 250A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

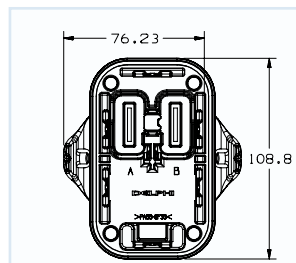
#### Part Number Information

Key/ Index	Header without Terminal	Header with Terminal	Mating Information		
			Mating Device Detail	HV Connector	HVIL Connector
101	13838943	13878908	See print for information	13838941	13738743

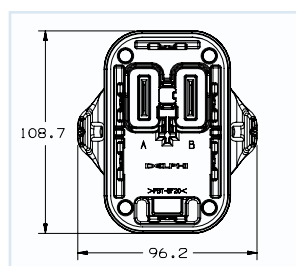
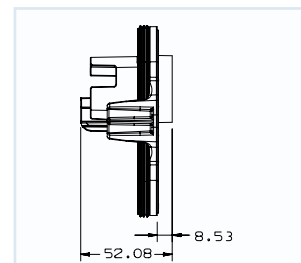
Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

# Shield-Pack™ HV2000

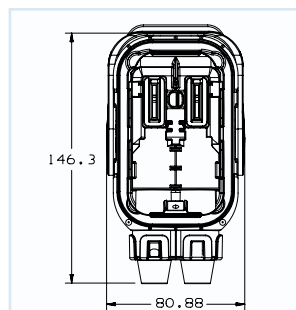
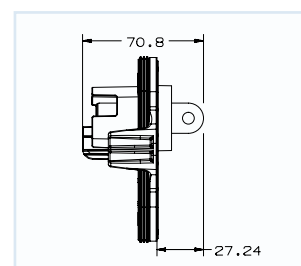
2 Way Right Angle Connection System With Internal HVIL; IP2XB Harness Connector Only



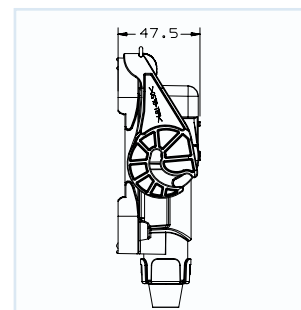
13832577



13832578



13832576



## Application

- High-voltage/high-current modules: inverter, battery

## Description

- Panel mount to device with face seal to module
- Header available with or without terminals
- Internal HVIL
- Harness connector mates in right angle direction
- Finger proof/touch safe harness connector only
- Cable range: 25mm<sup>2</sup> to 50mm<sup>2</sup>
- One key/index

## Performance

- Current capacity: 250A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB harness connector only

## Part Number Information

Key/ Index	Header without Terminal	Header with Terminal	Mating Information		
			Mating Device Detail	HV Connector	HVIL Connector
101	13832577	13832578	See print for information	13832576	13848934

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

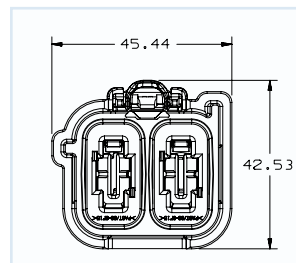


## Power Pack Unshielded High-Current Connection Systems

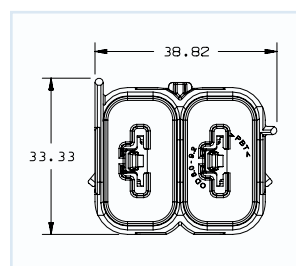
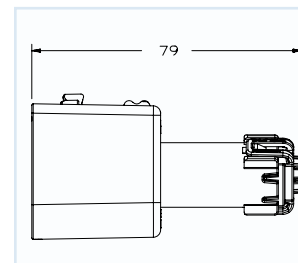
Power Pack Connection Systems meet the increasing demand for high-current/ high-power, hand-pluggable connections. The patented Power Pack portfolio offers two product sizes— the Power Pack 1000 for current demand to 145 amps, and the Power Pack 2000 for current demands to 250 amps. The highlight of the Power Pack family is the terminal system, which allows Power Pack connectors to mate in either inline or right-angle direction, which enables easy routing of large cables typical in high-current applications.

**DELPHI**

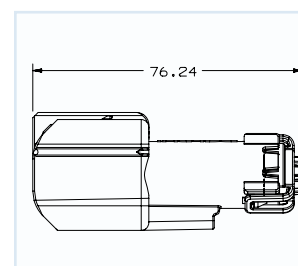
## Power Pack 1000 2 Way Inline Connectors



13849756



13849747



### Application

- High-current wiring harness inline

### Description

- Sealed connection system
- Silver-plated, multi-contact terminal system
- Cable range: 6mm<sup>2</sup> to 25mm<sup>2</sup>
- Two keys/indexes

### Performance

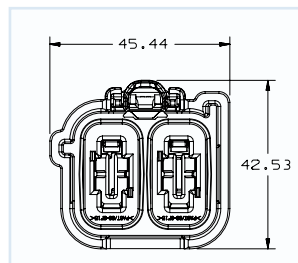
- Current capacity: 145A continuous at 85°C
- Voltage: 12V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K

### Part Number Information

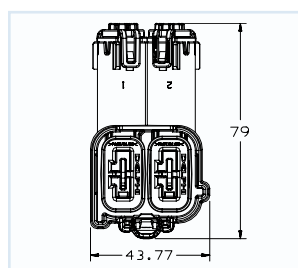
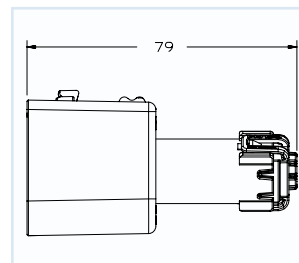
Key/ Index	Female 2 Way	Mating Information
		Male 2 Way
Index Right	13849756	13849747
Index Left	13849757	13849748

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

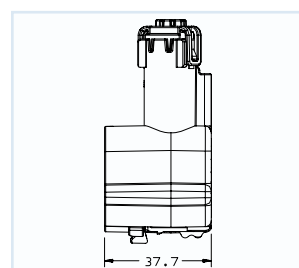
## Power Pack 1000 2 Way Device Connectors



13849756



13849758



### Application

- High-current device applications

### Description

- Sealed connection system
- Silver-plated, multi-contact terminal system
- Cable range: 6mm<sup>2</sup> to 25mm<sup>2</sup>
- Two keys/indexes

### Performance

- Current capacity: 145A continuous at 85°C
- Voltage: 12V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K

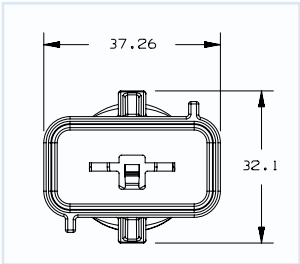
### Part Number Information

Key/ Index	Female Straight	Female Right Angle	Mating Information	
			Mating Device Detail - Straight	Mating Device Detail - Right Angle
Index Right	13849756	13849758	13790784	13790786
Index Left	13849757	13849759	13790785	13790787

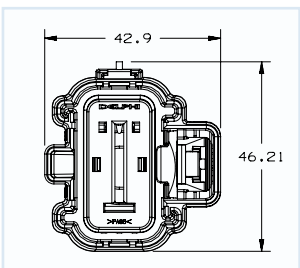
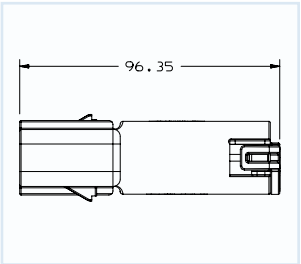
Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

# Power Pack 2000

## 1 Way Inline Connectors



13520909



13520916

**Application**

- Inline connections up to 250A

**Description**

- Sealed system
- Silver-plated, multi-contact terminal system
- Cable range: 19mm<sup>2</sup> to 62mm<sup>2</sup>
- One key/index

**Performance**

- Current capacity: 250A continuous at 85°C
- Voltage: 12V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K

**Part Number Information**

Key/ Index	Male 1 Way	Mating Information
		Female 1 Way
Index 0	13520909	13520916

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

## Power Pack 2000

### 1 Way Device and Pass-Through Connectors



#### Application

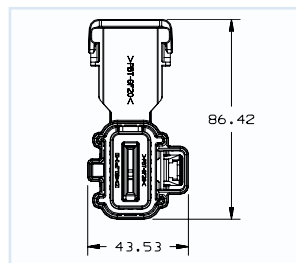
- Device connections up to 250A
- Sealed pass-through header

#### Description

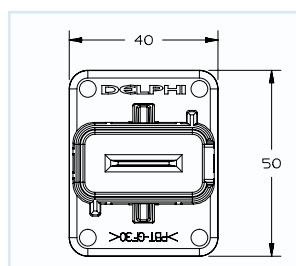
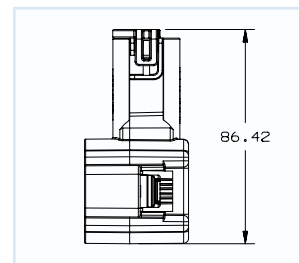
- Sealed system
- Silver-plated, multi-contact terminal system
- Cable range: 19mm<sup>2</sup> to 62mm<sup>2</sup>
- One key/index

#### Performance

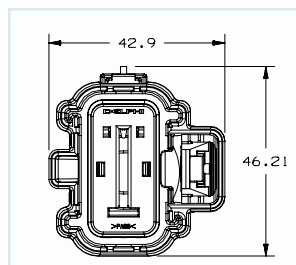
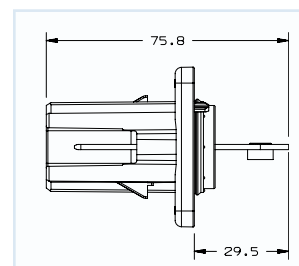
- Current capacity: 250A continuous at 85°C
- Voltage: 12V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K



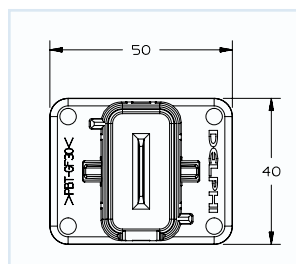
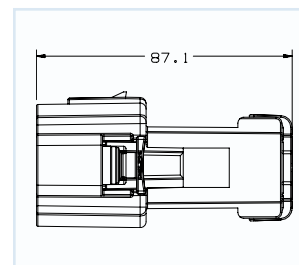
13878926



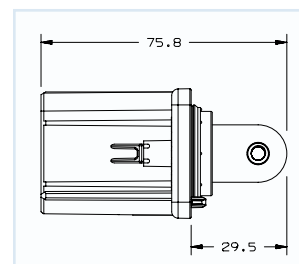
13520386



13520916



13878930

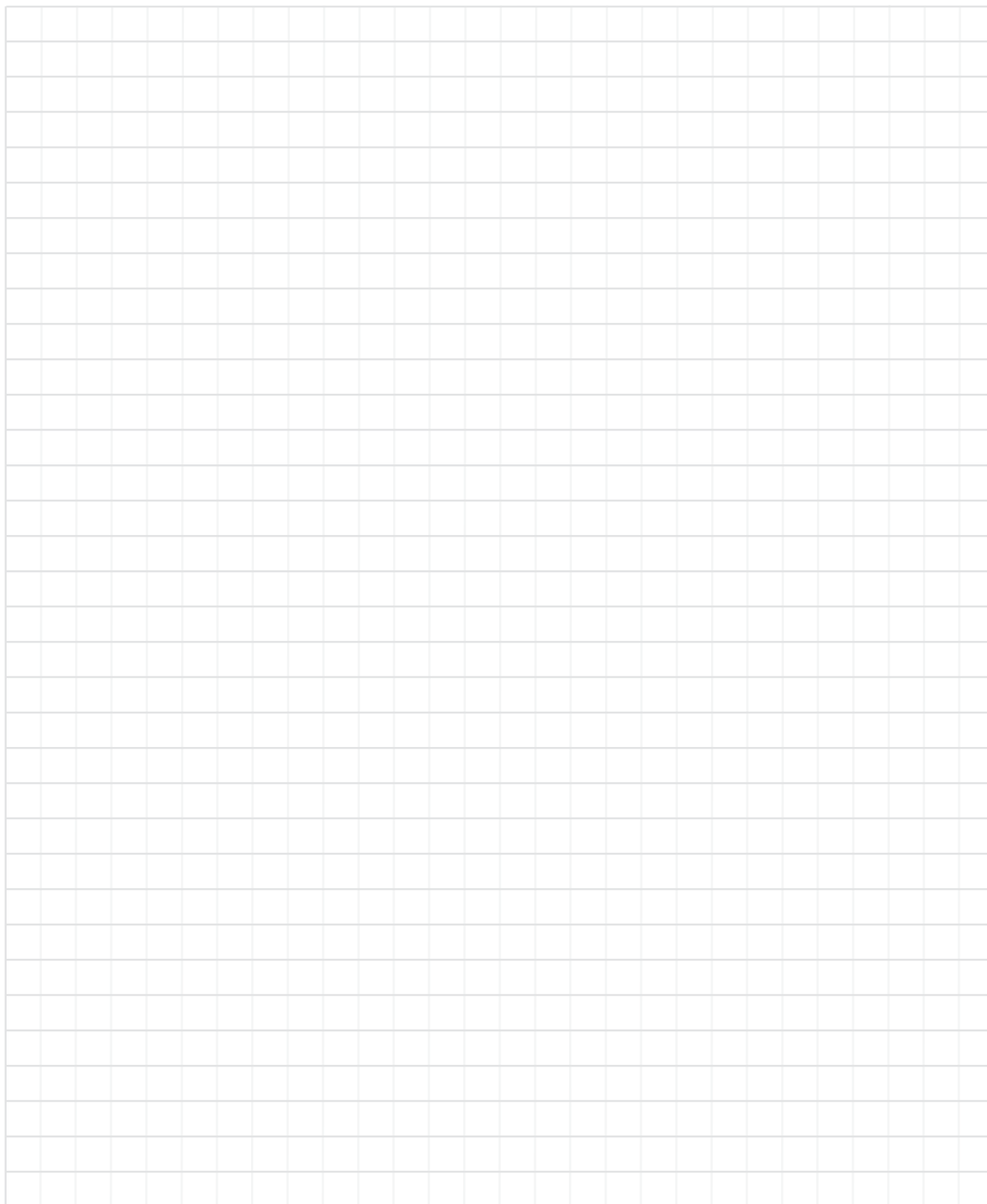


#### Part Number Information

Key/ Index	Female Right Angle	Female Straight	Mating Information	
			Header Right Angle	Header Straight
Index 0	13878926	13520916	13878930	13520386

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.





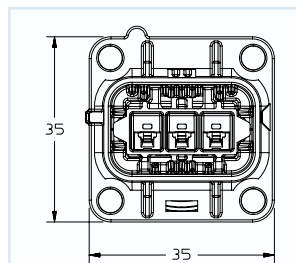
# Application Specific High-Power Products

Delphi Application Specific Connection Systems are uniquely designed for the Input/Output (I/O) needs of various power electronic modules. Delphi's Application Specific Connection Systems include on-board charger connections to address the high-voltage/unshielded circuit isolation, 14V high-current, filtered headers to protect other vehicle systems from interference, shielded pass-through systems to motors or other devices. Delphi also provides custom design solutions to specific system requirements. Contact Delphi to discuss your specific system needs.

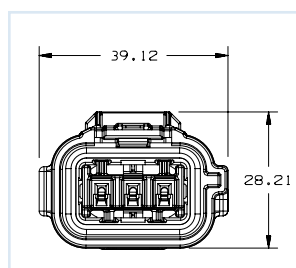
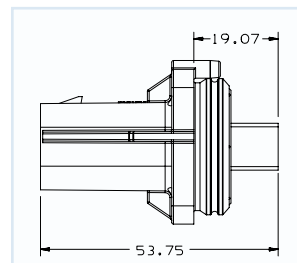


**DELPHI**

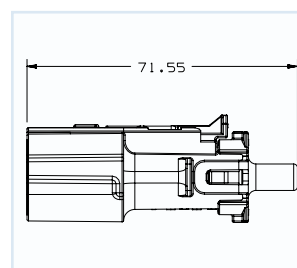
## HV150 On-Board Charger Connectors 3 Way High-Voltage Unshielded Connection System



13863040



13861587 (13737750)\*



### Application

- High-voltage unshielded system for on-board charger applications (Level 1)

### Description

- Sealed connection system
- 1.5mm terminal
- Unshielded with terminal spacing for HV applications
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup>
- One key/index

### Performance

- Current capacity: 16A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to + 125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

### Part Number Information

Key/ Index	Header Connector	Mating Information	
		Mating Device Detail	HV Connector
101	13863040	See print for information	13861587 (13737750)*

\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

## HV150 On-Board Charger Connectors 3 Way Unshielded With HVIL



### Application

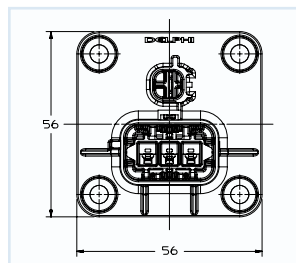
- High-voltage unshielded system for on-board charger applications (Level 1)

### Description

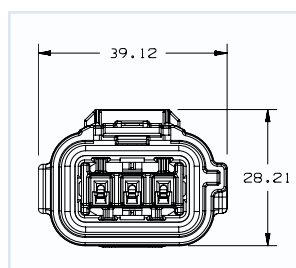
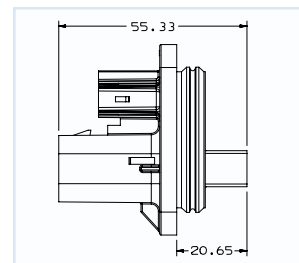
- Sealed connection system
- 1.5mm terminal
- Unshielded with terminal spacing for HV applications
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup>
- Two keys/indexes

### Performance

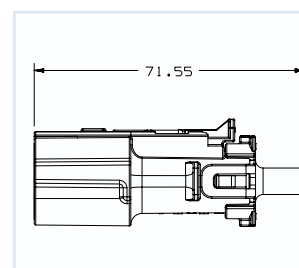
- Current capacity: 16A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB



13737769



13861587 (13737750)\*



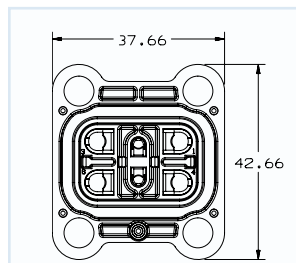
### Part Number Information

Key/ Index	Header Connector	Mating Information		
		Mating Device Detail	HV Connector	Signal Connector
101	13737769	13739582	13861587 (13737750)*	13738743
102	13757521		13861588 (13737751)*	13738744

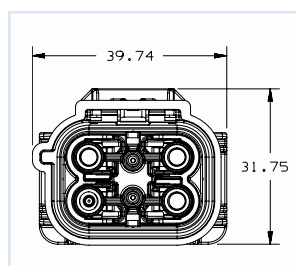
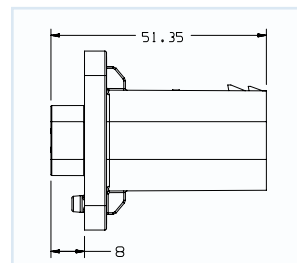
\*Part numbers in parentheses to be replaced in 2011. Contact Delphi for details.

Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.

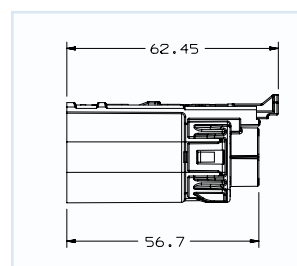
## On-Board Charger Connectors Level 1/Level 2 6 Way Device Connection System



13879038



13879047



### Application

- High-voltage unshielded system for on-board charger applications (Level 1 and 2)

### Description

- Sealed connection system
- Capability for four power circuits and two signal circuits
- Unshielded with terminal spacing for HV applications
- Two-stage locking system for electrical protection
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup>
- Capable of multiple keys/indexes

### Performance

- Current capacity: 30A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

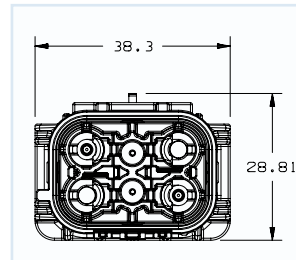
### Part Number Information

Key/ Index	Header Connection	Mating Information	
		Level 1 Connection	Level 2 Connection
101	13879038	13879051 (2+2)	13879048 (2+2)
		13879050 (3+2)	13879047 (3+2)
		13879049 (4+2)	13879046 (4+2)

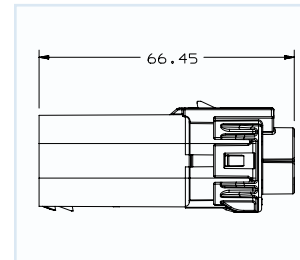
Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.



## On-Board Charger Connectors Level 1/Level 2 6 Way Inline Connection System



13879042



13879048

### Application

- Inline between inlet and on-board charger for cable routing (Level 1 and 2)

### Description

- Sealed connection system
- Capability for four power circuits and two signal circuits
- Unshielded with terminal spacing for HV applications
- Two-stage locking system for electrical protection
- Finger proof/touch safe
- Cable range: 2mm<sup>2</sup> to 5mm<sup>2</sup>
- Capable of multiple keys/indexes

### Performance

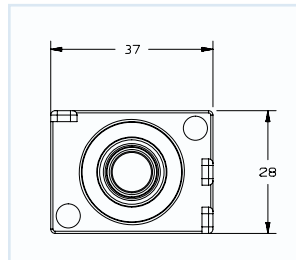
- Current capacity: 30A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB

### Part Number Information

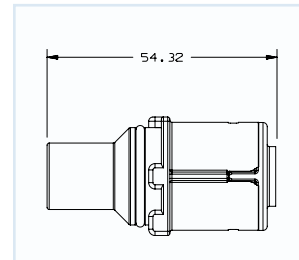
Male Connection Level 1	Male Connection Level 2	Mating Information	
		Female Connection Level 1	Female Connection Level 2
13879045 (2+2)	13879042 (2+2)	13879051 (2+2)	13879048 (2+2)
13879044 (3+2)	13879041 (3+2)	13879050 (3+2)	13879047 (3+2)
13879043 (4+2)	13879040 (4+2)	13879049 (4+2)	13879046 (4+2)

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## High-Voltage Pass-Through Bolted Pass-Through Connections



13879437



### Application

- High-voltage/High vibration connections for motors or power electronics

### Description

- 1 Way sealed and shielded
- Ring terminal bolted to device
- Shield bolted to device case
- Cable range: 25mm<sup>2</sup> to 35mm<sup>2</sup>
- Three keys/indexes

### Performance

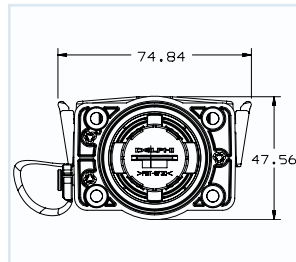
- Continuous current: 250A continuous at 85°C
- Voltage: 600V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K

### Part Number Information

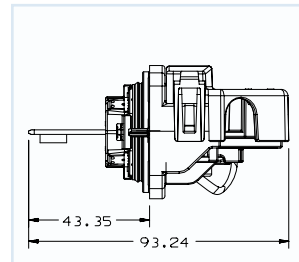
Key/ Index	25mm <sup>2</sup> Cable Size	35mm <sup>2</sup> Cable Size
1	13879429	13879437
2	13879430	13879438
3	13879431	13879439

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## Filtered High-Current Headers Sealed to Device



28105350



### Application

- High-current filtered header on DC converter

### Description

- Panel mount to device with bore seal and ground to case
- Vertical M8 stud for external ring terminal attachment
- M5 captive nut for internal electrical attachment
- Filter capacitance 60 $\mu$ F, 25V
- Cover with multiple cable dress

### Performance

- Current capacity: 250°A continuous at 85°C
- Voltage: 14V
- Temperature: -40°C to +105°C
- Insertion loss: 40dB at 200kHz

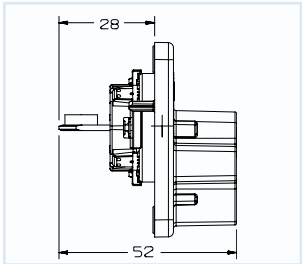
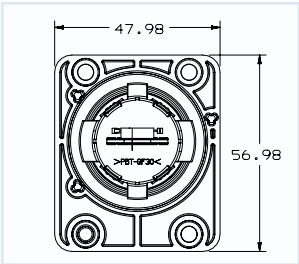
### Part Number Information

Header Connector	Mating Information		
	Mating Device Detail	Ring Terminal	Ferrule
28105350	See print for information	12146429	28105377

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Filtered High-Current Headers

Application Specific



28115977

Application

- High-current filtered pass-through header

Description

- Panel mount to device with bore ground contact to case
- Horizontal M6 stud for external ring terminal attachment
- M5 captive nut for internal electrical attachment
- Filter capacitance 60µF, 25V

Performance

- Current capacity: 170A continuous at 85°C
- Voltage: 14V
- Temperature: -40°C to +105°C
- Insertion loss: 40dB at 200kHz

Part Number Information

Header Connector	Mating Information		
	Mating Device Detail	Ring Terminal	Ferrule
28115977	See print for information	12146425	28105377

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## Filtered High-Current Connection Systems 1 Way Sealed Hand Mateable



### Application

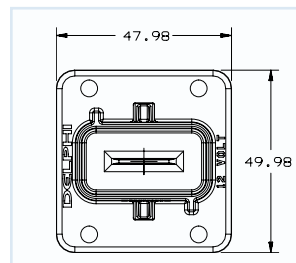
- High-current filtered pass-through header

### Description

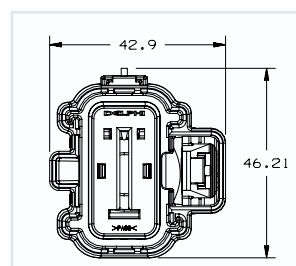
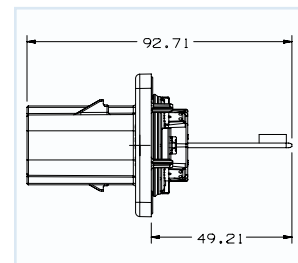
- Panel mount to device with bore seal and ground to case
- Pluggable mating Power Pack 2000 connector
- Silver-plated multi-contact terminal system
- M5 captive nut for internal electrical attachment
- Filter capacitance 60µF, 25V
- Three keys/indexes

### Performance

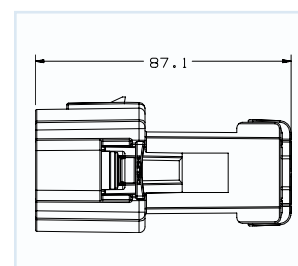
- Current capacity: 250A continuous at 85°C
- Voltage: 14V
- Temperature: -40°C to +105°C
- Insertion loss: 40dB at 200kHz
- Sealing protection: IP67, IP6K9K
- Electrical protection: IP2XB female connector only



28257913



13520916



### Part Number Information

Key/ Index	Header Connector	Mating Information		
		Mating Device Detail	PP2000 Connector	Ferrule
101	28257913	See print for information	13520916	28105377
103	28257912		13817280	
104	28259497		13817281	

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# Hybrid & Electric Vehicle Charging Systems & Components

Delphi believes that in order for hybrid and electric vehicles to become mainstream, they need to be made accessible and practical for the average consumer. That's why we are investing in technology to help facilitate a global charging infrastructure. From the Delphi Charge Coupler Connector with Cable for integration into Electric Vehicle Supply Equipment (EVSE), to the UL recognized Portable Electric Vehicle Charger and SAE J1772 Charge Inlets, hybrid and electric vehicles can be powered safely and efficiently at home or away. We're developing a Delphi Wireless Charging System for EVs to offer the utmost in comfortable, convenient charging. We can help you deliver the fast, safe, reliable charge today's EV drivers are looking for.



**DELPHI**

## Portable Electric Vehicle Charger



### Application

- Portable Electric Vehicle Supply Equipment (EVSE) for electric vehicle charging

### Description

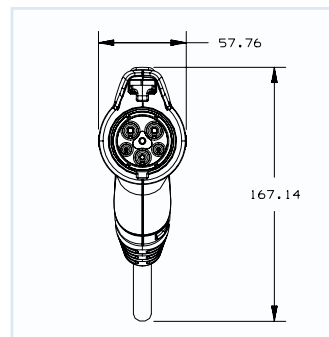
- Vehicle interface through SAE J1772 standard
- Flashlight feature in vehicle interface
- Rubber grip on handle for ergonomics
- EVSE provides restart in the event of power grid fault
- EVSE available for global grid plug and voltage levels
- Programmable for multiple charge currents
- NEMA 4 construction

### Available Options

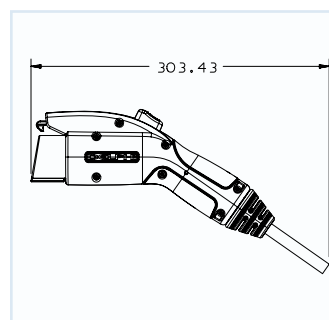
- 120V/12A
- 240V/15A
- Call for additional configurations

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## Charge Coupler Connector Level 1 & Level 2 Charging Cable Assembly



13859796



### Application

- SAE J1772 cable assembly for integration into charging stations or portable cordsets per customer requirements

### Description

- SAE J1772 compliant connection
- Flashlight for easy mate in dark conditions
- Wiring crimps sealed from environment
- Rubber grip on handle for ergonomics
- Available with or without flashlight
- UL recognized
- AC Level 1 (15A @ 120V) and Level 2 (30A @ 240V)

### Performance

- Current capacity: 15A and 30A
- Voltage range: 120V and 240V
- Temperature: -40°C to +60°C
- Validation: UL 2251

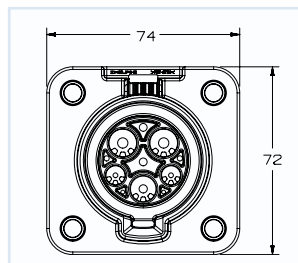
### Available Options

- Call for additional configurations

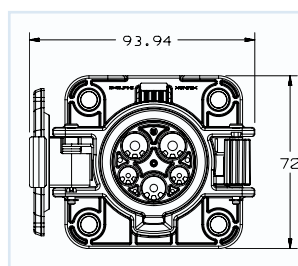
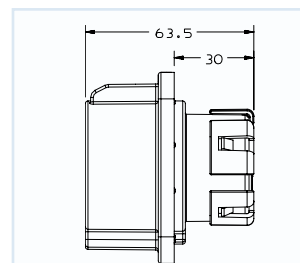
*Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.*

## Charge Inlet

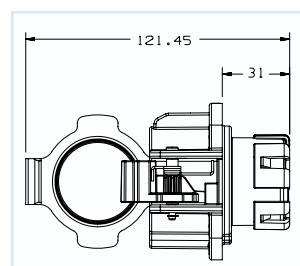
### Level 1 & 2 Vehicle Charging Inlet



13829165



13826395



#### Application

- Plug-in hybrid and electric vehicle charge inlet

#### Description

- Interface complies with SAE J1772 and IEC 62196-2-1 standard
- Panel mounts to vehicle
- Protective grommet/wire dress mounts to inlet
- Available with latching cover or without cover
- Cover mounting features allow latch to open left or right

#### Performance

- Supports: AC Level 1 (15A, 120V) and AC Level 2 (30A, 240V)
- Voltage: 600V maximum rating
- Temperature: -40°C to +85°C
- Validation: UL recognized, Delphi GTP
- Electrical protection: IP2XB
- Design life: 10,000 mating cycles

#### Part Number Information

Configuration	Assembly Part Number	Mating Information
		Vehicle Mounting Detail
No cover	13829165	13827259
With latching cover, opens left	13826395	

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# High-Voltage Battery Systems

The high-voltage battery is critical to the optimal performance of hybrid and electric vehicles. Delphi products for battery applications include Manual Service Disconnects used for safe vehicle service. Other products include battery electrical centers, battery interconnects, and high-voltage/low-voltage wiring assemblies. Delphi Shield-Pack™ Connections are optimal for high-voltage I/O covering all current ranges.



**DELPHI**

Sealed Battery Manual Service Disconnect (MSD)  
Sealed for Protection from the Environment



Application

- Sealed battery manual service disconnect used for servicing HV system

Description

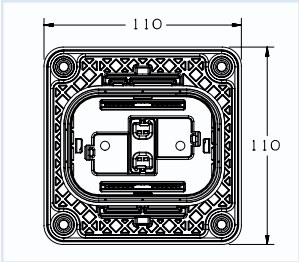
- Panel mount to device with face seal to case
- Base mounts from inside with threaded inserts to attach to battery
- Optional splash proof base
- Two-stage lever provides HVIL time delay
- Integrated HVIL with shunt in MSD portion
- High speed fuse with various ratings in same package size
- MSD keyed/indexed per fuse rating

Performance

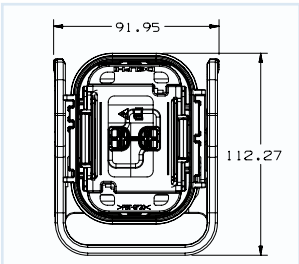
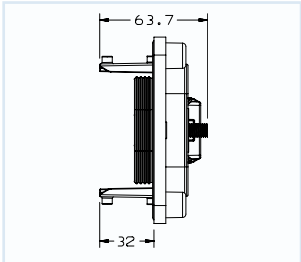
- Current capacity: 200-225A at 85°C
- Voltage: 690V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IP6K9K (N.A. to splash version)
- Electrical protection: IP2XB

Part Number Information

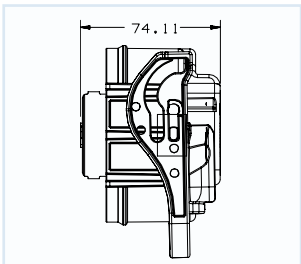
Design	Base Assembly	Mating Information		
		Mating Device Detail	Fuse Assembly (fuse rating)	HVIL Connector
Sealed	13839629	PE198939	13839573 (350A)	13685168
Splash	13839630		13839574 (160A)	13685168



13839629



13839573



Part numbers, specifications, dimensions and performance data in this catalog are for general reference only and are subject to change without notice. To verify product information, please contact a Delphi representative.



## Custom Battery Manual Service Disconnect (MSD)



### Application

- Custom Battery Manual Service Disconnect (MSD) used for servicing HV systems

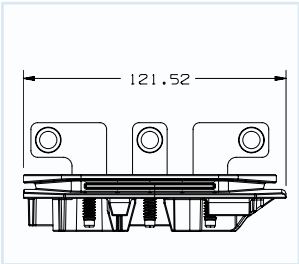
### Description

- Custom solutions per battery pack specifications
- Sealed or unsealed
- Shunted or fused
- Packaging of various fuse manufacturers
- Ability to apply HVIL with resistors
- Time delay for HVIL

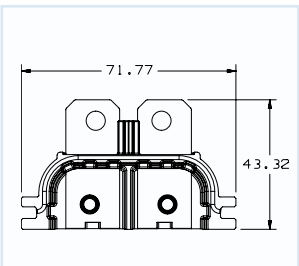
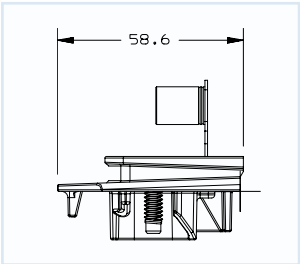
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# High-Voltage Battery I/O Junction Block

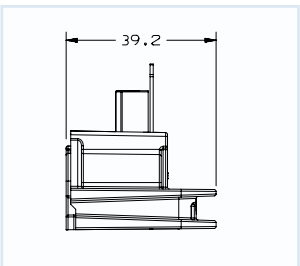
## Custom 2 Way, 3 Way Bolted Connection



28115976



13658746



**Application**

- High-voltage/unshielded bolted connections for battery I/O

**Description**

- Custom 2 Way and/or 3 Way high-voltage
- Fit to device case per customer requirements
- Ability to fasten direct to PCB
- Isolation between HV circuits through isolation towers
- Insert molded terminals and/or studs

**Performance**

- Continuous current: Per customer requirements
- Voltage: 600V
- Temperature range: -40°C to +125°C

**Part Number Information**

2 Way System	3 Way System
13658746	28115976

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# High-Voltage Electrical Centers

Delphi High-Voltage Electrical Centers help provide safe power distribution of high-voltage circuits. Delphi provides electrical centers designed specifically for managing battery power. Delphi battery electrical centers integrate contactors, pre-charge resistors, circuit protection for auxiliary loads, and current sensors to meet system requirements. Delphi also provides custom shielded electrical centers integrating devices such as contactors, high-voltage fuses, bussing, and I/O managed through Shield-Pack™ Connection Systems.



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## High-Voltage Battery Electrical Center



### Application

- High-voltage battery electrical center

### Description

- Battery pack mounted contactor and sensing device
- Provides galvanic isolation of the high-voltage battery
- Pre-charge protects contactors from high-current in-rush
- Sensing of battery current and voltage
- Provides circuit protection for auxiliary loads
- Size: 268mm L x 200mm W x 78mm H

## High-Voltage Electrical Center



### Application

- High-voltage electrical center

### Description

- Custom solutions to system requirements
- Integration of terminal, contactor, and/or HV fuses
- Shielded and sealed system
- Harness connections through Shield-Pack™ connection systems
- Venting for pressure variations

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## High-Voltage Wiring Assemblies

Delphi's High-Voltage (HV) Wiring Assemblies integrate Shield-Pack™ Connections and HV electrical centers, providing customers with an optimized design. Delphi's High-Voltage Wiring Assemblies are developed with the customer to meet their specifications. Our HV harnesses are available with both shielded and unshielded cables, addressing the full range of HEV/EV product requirements. Delphi has years of experience in the processing of HV wiring assemblies. All Delphi High-Voltage Wiring Assemblies are tested to verify the cable sealing, ensuring quality and providing safety. Delphi's High-Voltage Wiring Assemblies can be used for applications that range from 36V to 600V and cable sizes as large as 103mm<sup>2</sup>.

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## High-Voltage Wiring Assemblies



### Application

- High-voltage wiring assemblies for hybrid/electric vehicles

### Description

- High-voltage wiring assemblies pigtailed to modules
- Full vehicle high-voltage assemblies
- Ability to process Delphi Shield-Pack™ and/or industry HV connections
- Quality systems for high-voltage safety concerns
- High potential, pressure, and seal testing of wiring assemblies
- Delphi customer support for high-voltage wire harness design

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Delphi has made every effort to ensure that the information contained in this document is accurate. We recommend that you use this catalog as a guide only.

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**DELPHI**

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Innovation for the Real World

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