Connecting today for a greener tomorrow

Hybrid and Electric Vehicle Connection Systems Portfolio
About Delphi

Delphi Automotive PLC (NYSE: DLPH) is a leading global supplier of technologies for the automotive and commercial vehicle markets. Headquartered in Gillingham, England, Delphi operates major technical centers, manufacturing sites and customer support services in 32 countries, with regional headquarters in Bascharage, Luxembourg; São Paulo, Brazil; Shanghai, China and Troy, Michigan, U.S. Delphi delivers innovation for the real world with technologies that make cars and trucks safer as well as more powerful, efficient and connected. Visit www.delphi.com

A world of electrification

Delphi has been researching and developing safe, reliable and high performance products for vehicle electrification for more than 20 years. 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.

Hybrid and electric vehicles present unique challenges when it comes to electrical architecture.

They demand performance requirements including shielding to protect against electromagnetic interference, sealing to prevent short circuits, and management 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.
Did you know?

Hybrid and electric vehicles are creating a host of challenges, including the demand for a new generation of high performance, high power connectors and charging solutions. Many additional power electronics devices are added to the vehicle architecture including Lithium-ion (Li-ion) batteries, inverters and DC (Direct Current) converters. Their impact on connector design results in handling operating voltages that range from 400V up to 750V and carrying currents as high as 400A.
Driven by rising fuel costs, environmental concerns and a combination of government regulations and incentives, the market for EVs (Electric Vehicles) and HEVs (Hybrid Electric Vehicles) is now becoming a reality. Vehicle specifications and infrastructure deployment have reached a certain level of industrialization. Standards have already been established for vehicle charging interfaces used on plug in HEVs and EVs. There are three standards used throughout the world including SAE J1772 in North America and Japan, IEC62196 Type II in Europe, and GB/T 20234 in China. In addition, SAE has established a common footprint for DC (Direct Current) fast charging in North America and Europe. Delphi offers a complete line of all global charging standards.
Delphi is currently driving the innovations required for future multivoltage architectures. Our research and development teams have leveraged the lessons learned from the collaboration with OEM’s to focus on technological excellence and to provide real-life electrification performance.

Superior Sealing Performances
All our connection systems feature external IP67 sealing performance. To ensure optimum sealing performance, our connectors are designed for the harshest conditions due to a back sealing feature.

Superior Shielding Performances
EV and HEV electrical and electronic systems generate unwanted electromagnetic interference (EMI) which radiate from the interconnecting cables. The connection systems are designed by minimizing the paths which these signals can escape. Our connectors and cabling designs provide high levels of shielding effectiveness to ensure EMI free performance of the complete system.

Superior Safety Performances
Our connectors provide finger-proof, touch safe and 2-step disconnection technologies to guarantee optimum safety during all handling operations. They continue to meet with changing requirement of the OEM’s in regard to HVIL on a vehicle system and connection system level. Additionally, the company’s ErgoMate™ axial mating system helps achieve a lower profile solution while reducing mating forces. Once connected, a CPA (Connector Position Assurance) device must be activated to ensure a 100% safe mating.

With a unique expertise in architecture optimization and systems integration, the company has created one of the most comprehensive portfolios of high power connection systems.
A comprehensive product portfolio

High Voltage Auxiliary Modules
High Voltage connection systems designed specifically for the voltage and current needs of auxiliary modules, such as A/C compressor, heater, coolant control module, on-board charger, DC converter, and battery accessory output.

High Voltage Power Conversion
High Voltage connection systems designed specifically for the voltage and current needs up to 250A. Power conversion modules consist of inverters, drive motors/generators, and High Current/High Voltage battery outputs.

Chargers and Charging Cables
Unique technologies to help facilitate a global charging infrastructure, from Delphi’s Portable Electric Vehicle Charger and Charge Coupler pigtails for integration into Electric Vehicle Supply Equipment (EVSE). With Delphi products hybrid and electric vehicles can be powered safely and efficiently at home or away.

Charging Inlets
All global standard vehicle interfaces critical for vehicle charging including SAE J1772, IEC62196 Type II, and GB/T 20234.
Internal Battery Connections
Full portfolio of products including Manual Service Disconnects used for safe vehicle service, battery electrical centers, battery interconnects, and High Voltage/Low Voltage wiring assemblies.

High Voltage Electrical Centers
High Voltage Electrical Centers help provide safe power distribution of High Voltage circuits. Delphi provides electrical centers designed specifically for managing battery power.

Hybrid/Electric Vehicle Wiring Assemblies
Delphi's High Voltage wiring assemblies are developed with the customer to meet their specifications. They 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.
## Delphi High Voltage Connection Application Guide

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High Voltage Auxiliary Modules
Shield-Pack™ HV280
With Internal HVIL Shunted in Harness Connector

Application
• High voltage accessories connection system

Description
• Sealed connection system
• Panel mount to device with face seal
• Internal HVIL (shunt in harness connector)
• Two options available
  - Two-stage locking system for HVIL time delay
  - Toolless mating system
• Two HV power circuits (2.8 mm terminal)
• Flange size: 39 mm x 39 mm
• Finger proof/touch safe
• Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
• Three keys/indexes

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

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Shield-Pack™ HV280

2 Piece Header with Pluggable Inner Connector

**Application**
- Ideal for internal battery harnesses/high voltage connection system

**Description**
- Inner Connector with TPA can be plugged into header during device assembly
- Sealed connection system
- Panel mount to device with face seal
- Internal HVIL (shunt in harness connector)
- Two options available
  - Two-stage locking system for HVIL time delay
  - Toolless mating system
- Two HV power circuits (2.8 mm terminal)
- Flange size: 38 mm x 43 mm
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
- Three keys/indexes

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

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Shield-Pack™ HV280
PCB Mount or Pluggable Inner Connector

Application
- High voltage accessories connection system

Description
- Ideal for high corrosion environments with no exposed fasteners on device case
- Sealed connection system
- Panel mount to device with face seal
- Internal HVIL (shunt in harness connector)
- Two options available
  - Two-stage locking system for HVIL time delay
  - Toolless mating system
- Two HV power circuits (2.8 mm terminal)
- Flange size: 41 mm
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
- One key/index

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

Availability
- Call for availability

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Shield-Pack™ HV280
With HVIL Shunted in Header

Application
• High voltage accessories connection system

Description
• Sealed connection system
• Panel mount to device with face seal
• Internal HVIL (shunt in header connector)
• Two-stage locking system for HVIL time delay
• Two HV power circuits (2.8 mm terminal)
• Flange size: 42 mm x 42 mm
• Finger proof/touch safe
• Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
• Three keys/indexes

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

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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 (2.8 mm terminal)
- HVIL shunted in header with five-second time delay
- Flange size: 43 mm x 49 mm
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
- Three keys/indexes

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

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Shield-Pack™ HV280
2 Way Connection System without HVIL

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

**Description**
- Sealed to device case
- Two HV power circuits (2.8 mm terminal)
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm² power circuit
- One key/index

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

### Key/ Index | Header Connector | Mating Device Detail | HV Connector
--- | --- | --- | ---
101 | 13743443 | 13849778 | 13861584

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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 (2.8 mm terminal)
• HVIL available in two configurations: pass-through header, shunted in header
• HVIL with five-second time delay
• Finger proof/touch safe
• Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
• Three keys/indexes

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

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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 (2.8 mm terminal)
- Two-stage locking system for HVIL time delay
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
- Two keys/indexes

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

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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 (2.8 mm terminal)
- HVIL with five-second time delay
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm² power circuit; 0.5 mm² HVIL circuit
- Two keys/indexes

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

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APEX® HV280
2 Way Connection System with HVIL

Application

- High voltage peripheral equipment connection system: Air conditioning, PTC, Charger

Description

- Bundle shielding with external braid
- Dual sealing connection system: mated and unmated header
- Panel mount to device with face seal
- Unique integrated electric interlock
  - HVIL shunted in harness connector
- Two-stage disconnect for safe unmating
- ErgoMate™ Axial Mating Assist System on harness connector
- Two HV power circuits (2.8 mm terminal)
- Flange size: 46 mm x 53 mm
- IP2XB Finger proof/touch safe
- Cable range: 2.5 to 4 mm² power circuit; 0.5 to 0.75 mm² HVIL circuit
- Two keys/indexes

Performance

- Current capacity: 35 A at 70°C
- Voltage: 750V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IPX9K
- Electrical protection: IP2XB

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High Voltage Unshielded Connection System
2 Way and 3 Way

Application
• High voltage connection internal to modules requiring unsealed/unshielded cable such as battery electrical centers

Description
• Cavity isolation for high voltage applications
• Unsealed/unshielded connection system
• Finger proof/touch safe
• Cable range: 2 mm² to 5 mm² power circuit
• Hinged terminal secondary lock

Performance
• Current capacity: 40A at 85°C
• Voltage: 600V
• Temperature range: -40°C to +125°C
• Electrical protection: IP2XB

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

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
- One-stage locking system also available
- Finger proof/touch safe
- Cable range: 2 mm² to 5 mm²
- Capable of multiple keys/indexes

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

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

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: 2 mm² to 5 mm²
- Capable of multiple keys/indexes

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

<table>
<thead>
<tr>
<th>Male Connector Level 1</th>
<th>Male Connector Level 2</th>
<th>Female Connector Level 1</th>
<th>Female Connector Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>13990593 (2+2)</td>
<td>13990590 (2+2)</td>
<td>13879051 (2+2)</td>
<td>13879048 (2+2)</td>
</tr>
<tr>
<td>13990592 (3+2)</td>
<td>13990589 (3+2)</td>
<td>13879050 (3+2)</td>
<td>13879047 (3+2)</td>
</tr>
<tr>
<td>13990591 (4+2)</td>
<td>13990588 (4+2)</td>
<td>13879049 (4+2)</td>
<td>13879046 (4+2)</td>
</tr>
</tbody>
</table>
APEX® 950 On-Board Charger Connector
4 + 1 Way Connection System with HVIL

**Application**
- High voltage unshielded system for on-board charger applications

**Description**
- Sealed in mated or unmated position
- Unshielded 4 + 1 way connector
- Panel mount to device with face seal to module
- Unique integrated electric interlock
  - HVIL shunted in harness connector
- ErgoMate™ slider for easy handling and reduced mating force
- 5 HV power circuits (four 9.5 mm and one 2.8 mm terminals)
- Flange size: 111 mm x 52 mm
- IP2XB Finger proof/touch safe
- Cable range: 10 to 16 mm² power circuit; 0.5 to 0.75 mm² electric interlock
- 1 key/index

**Performance**
- Current capacity: 125A at 70°C
- Voltage: 750V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IPX9K
- Electrical protection: IP2XB

<table>
<thead>
<tr>
<th>Key/ Index</th>
<th>Header Connector</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33402137</td>
<td>33402139</td>
</tr>
</tbody>
</table>
Filtered High Current Headers

**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 at 85°C
- Voltage: 14V
- Temperature range: -40°C to +105°C
- Insertion loss: 40dB at 200kHz

<table>
<thead>
<tr>
<th>Header Connector</th>
<th>Mating Device Detail</th>
<th>Ring Terminal</th>
<th>Ferrule</th>
</tr>
</thead>
<tbody>
<tr>
<td>28115977</td>
<td>See print for information</td>
<td>12146425</td>
<td>28105377</td>
</tr>
</tbody>
</table>
Filtered High Current Headers
Sealed to Device

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 60µF, 25V
• Cover with multiple cable dress

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

<table>
<thead>
<tr>
<th>Header Connector</th>
<th>Mating Device Detail</th>
<th>Ring Terminal</th>
<th>Ferrule</th>
</tr>
</thead>
<tbody>
<tr>
<td>28105350</td>
<td>See print for information</td>
<td>12146429</td>
<td>28105377</td>
</tr>
</tbody>
</table>
High Voltage Power Conversion

Products include:

- High voltage shielded/sealed connections
- Shielded ring terminal pass-through systems
- High current sealed connection systems
Shield-Pack™ HV2000
1 Way Right Angle Connection System with Internal or External HVIL

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 shunt in harness connector
- Two-stage lever for HVIL time delay
- External HVIL blocks lever from moving
- Finger proof/touch safe
- Cable range: 25 mm² to 50 mm²
- One key/index

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

<table>
<thead>
<tr>
<th>Terminal (Device Side)</th>
<th>Header with Terminal</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mating Device Detail</td>
</tr>
<tr>
<td>Straight</td>
<td>13928223</td>
<td>See print for information</td>
</tr>
<tr>
<td>90°</td>
<td>13928224</td>
<td></td>
</tr>
</tbody>
</table>
Shield-Pack™ HV2000
2 Way Connection System with Internal or External HVIL, Inline Mating Direction

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 shunt in harness connector
- Two-stage locking system for HVIL time delay
- External HVIL blocks lever from moving
- Finger proof/touch safe
- Cable range: 25 mm² to 50 mm²
- Multiple keys/indexes

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

<table>
<thead>
<tr>
<th>Key/Index</th>
<th>Header with Terminal</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mating Device Detail</td>
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<tr>
<td>101</td>
<td>15514006</td>
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</tr>
<tr>
<td>102</td>
<td>15514007</td>
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</tr>
</tbody>
</table>

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

**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 size: 35 mm²
- One key/index

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

---

<table>
<thead>
<tr>
<th>Key/ Index</th>
<th>Header without Terminal</th>
<th>Header with Terminal</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
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<td>13986176</td>
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</table>

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.
RCS800 High Voltage
2 Way Connection System with HVIL

Application
- High voltage/high current modules: inverter, battery, junction box, power electric box

Description
- Bundle shielding with external braid
- Dual sealing connection system: mated and unmated header
- Panel mount to device with face seal to module
- Unique integrated electric interlock
  - HVIL shunted in harness connector
- Two-stage disconnect for safe unmating
- ErgoMate™ Axial Mating Assist System on harness connector
- Two HV power circuits (8.0 mm round terminal)
- Flange size: 53 mm x 83 mm
- IP2XB Finger proof/touch safe
- Cable range: 35 to 50 mm² power circuit; 0.5 to 0.75 mm² HVIL circuit
- Two keys/indexes

Performance
- Current capacity: 230 A at 70°C
- Voltage: 750V
- Temperature range: -40°C to +125°C
- Sealing protection: IP67, IPX9K
- Electrical protection: IP2XB

<table>
<thead>
<tr>
<th>Key/Index</th>
<th>Header Connector</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>HV Connector</td>
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<tr>
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<td>F673110</td>
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<tr>
<td>2</td>
<td>F573110</td>
<td>F773110</td>
</tr>
</tbody>
</table>
RCS890 High Voltage
2 Way Right Angle Connection System with HVIL

Application
• High voltage/high current modules: inverter, battery, junction box, power electric box

Description
• Bundle shielding with external braid
• Dual sealing connection system: mated and unmated header
• Panel mount to device with face seal to module
• Unique integrated electric interlock
  - HVIL shunted in harness connector
• Two-stage disconnect for safe unmating
• Slider Mating Assist System on harness connector
• Two HV power circuits (8.0 mm round terminal)
• Flange size: 51 mm x 62 mm
• IP2XB Finger proof/touch safe
• Cable range: 35 to 50 mm² power circuit; 0.5 to 0.75 mm² HVIL circuit
• One key/index

Performance
• Current capacity: 230A at 70°C
• Voltage: 750V
• Temperature range: -40°C to +125°C
• Sealing protection: IP67, IPX9K
• Electrical protection: IP2XB

<table>
<thead>
<tr>
<th>Key/ Index</th>
<th>Header Connector</th>
<th>Mating Information</th>
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</table>

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™ HV1000 Connection System
3 Way Panel Mount Connection System

**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: 16 mm² to 25 mm² power circuit; 0.5 mm² HVIL circuit
- Two keys/indexes

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

<table>
<thead>
<tr>
<th>Key/ Index</th>
<th>Header Connector</th>
<th>Mating Information</th>
</tr>
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<tr>
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<tr>
<td>102</td>
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<td>13879067</td>
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</table>

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.
High Voltage Pass-Through
Bolted Pass-Through Connections

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: 25 mm² to 50 mm²
- Multiple keys/indexes

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

<table>
<thead>
<tr>
<th>Key/Index</th>
<th>25 mm² Cable Size</th>
<th>35 mm² Cable Size</th>
<th>50 mm² Cable Size</th>
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<tbody>
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<td>33112598</td>
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<td>-</td>
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<td>33112599</td>
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<td>4</td>
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<td>13888011</td>
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<tr>
<td>5</td>
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<td>6</td>
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<td>-</td>
<td>15504147</td>
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</tr>
<tr>
<td>9</td>
<td>-</td>
<td>15504148</td>
<td>-</td>
</tr>
</tbody>
</table>
Power Pack 1000
1 Way Inline Connectors

**Application**
- High current wiring harness inline

**Description**
- Sealed connection system
- Silver-plated, multi-contact terminal system
- Cable range: 6 mm² to 25 mm²
- One key/index
- Capable of additional indexes

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

**Availability**
- Call for availability

<table>
<thead>
<tr>
<th>Female 1Way</th>
<th>Male 1Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>13952702</td>
<td>13882980</td>
</tr>
</tbody>
</table>
Power Pack 1000
2 Way Inline Connectors

Application
• High current wiring harness inline

Description
• Sealed connection system
• Silver-plated, multi-contact terminal system
• Cable range: 6 mm² to 25 mm²
• Two keys/indexes

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

<table>
<thead>
<tr>
<th>Key/ Index</th>
<th>Female 2Way</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13849756</td>
<td>13849747</td>
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<tr>
<td>Index Right</td>
<td>13849756</td>
<td></td>
</tr>
<tr>
<td>Index Left</td>
<td>13849757</td>
<td>13849748</td>
</tr>
</tbody>
</table>
Power Pack 1000
2 Way Device and Pass-Through Connectors

Application
- High current device applications
- Sealed pass-through panel mount system

Description
- Sealed connection system
- Sealed panel mount prestages prior to fastening
- Panel mount secures in place through self tapping screws
- Pass-through connection accepts both straight and right angle connectors
- Silver-plated, multi-contact terminal system
- Cable range: 6 mm² to 25 mm²
- Two keys/indexes

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

Availability
- Call for pass-through availability

<table>
<thead>
<tr>
<th>Key/Index</th>
<th>Female Right Angle</th>
<th>Female Straight</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index Right</td>
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<td>13849756</td>
<td>13959822</td>
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<tr>
<td>Index Left</td>
<td>13849759</td>
<td>13849757</td>
<td>13959823</td>
</tr>
</tbody>
</table>

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.
High Current Sealed Connection Systems

Power Pack 2000
1 Way Inline Connectors

Application
- Inline connections up to 250A

Description
- Sealed system
- Silver-plated, multi-contact terminal system
- Cable range: 19 mm² to 62 mm²
- One key/index

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

Key/ Index | Male 1Way | Mating Information | Female 1Way
---|---|---|---
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: 19 mm² to 62 mm²
- One key/index

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

<table>
<thead>
<tr>
<th>Key/Index</th>
<th>Female 1 Way</th>
<th>Mating Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index 0</td>
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<tr>
<td></td>
<td></td>
<td>13520386</td>
</tr>
</tbody>
</table>
Filtered High Current Connection Systems

1 Way Sealed Hand Mateable Connectors

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
- Silverplated multi-contact terminal system
- M5 captive nut for internal electrical attachment
- Filter capacitance 60µF, 25V
- Three keys/indexes

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

<table>
<thead>
<tr>
<th>Key/ Index</th>
<th>Header Connector</th>
<th>Mating Device Detail</th>
<th>PP 2000 Connector</th>
<th>Ferrule</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
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<tr>
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<tr>
<td>104</td>
<td>28259497</td>
<td></td>
<td></td>
<td>13817281</td>
</tr>
</tbody>
</table>
Chargers and Charging Cables
Portable Electric Vehicle Charger

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

Description
- Vehicle interface through three global standards
- EVSE provides restart in the event of power grid fault
- Programmable for multiple charge currents
- NEMA 4 construction
- UL/CE certified

Available Options
- 120V/12A
- 240V/10A, 13A, or 16A
- SAE J1772/IEC62196 Type I, IEC62196 Type II, and GB/T 20234 vehicle interface
- Grid cord as required by country of use
- Call for additional configurations
Charge Coupler Connector Pigtails

Application
- Cable assemblies for integration into charging stations or portable cordsets per customer requirements

Description
- SAE J1772/IEC62196 Type I, IEC62196 Type II, and GB/T 20234 compliant connections
- Wiring crimps sealed from environment
- Rubber overmold and plastic grip options available

Performance
- Current capacity: 15A to 32A
- Voltage range: 120V to 480V
- Temperature range: -40°C to +50°C
- Validation: See part number information
# Charge Coupler Connector Pigtails

<table>
<thead>
<tr>
<th>Assembly Part Number</th>
<th>Charge Coupler</th>
<th>Handle</th>
<th>Picture</th>
<th>Electrical Rating</th>
<th>Cable Description</th>
<th>Cable Length (m/ft)</th>
<th>Certifications/Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>33105172</td>
<td>SAE J1772/IEC62196 Type I</td>
<td>Rubber overmold</td>
<td>1</td>
<td>15A, 120 VAC</td>
<td>3 - 2.0 mm² + 1 - 0.8 mm² UL cable</td>
<td>6.20 m/20.33 ft</td>
<td>UL, CE</td>
</tr>
<tr>
<td>33105194</td>
<td>Type I</td>
<td>Plastic handle</td>
<td>2</td>
<td>16A, 240 VAC</td>
<td>3 - 2.5 mm² + 1 - 0.75 mm² IEC cable</td>
<td>6.20 m/20.33 ft</td>
<td>UL, CE</td>
</tr>
<tr>
<td>33105183</td>
<td>Type II</td>
<td>Plastic handle</td>
<td>2</td>
<td>20A, 240 VAC</td>
<td>3 - 3.0 mm² + 1 - 0.8 mm² UL cable</td>
<td>7.725 m/25.00 ft</td>
<td>UL, CE</td>
</tr>
<tr>
<td>33105199</td>
<td>GB/T 20234</td>
<td>Plastic handle</td>
<td>2</td>
<td>30A, 240 VAC</td>
<td>3 - 5.0 mm² + 1 - 0.8 mm² UL cable</td>
<td>7.725 m/25.00 ft</td>
<td>UL, CE</td>
</tr>
<tr>
<td>33155747</td>
<td>SAE J1772/IEC62196 Type II</td>
<td>Rubber overmold</td>
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<td>20A - 1-Phase, 240 VAC</td>
<td>3 - 2.5 mm² + 1 - 0.5 mm² IEC cable</td>
<td>5.0 m/16.4 ft</td>
<td>CE</td>
</tr>
<tr>
<td>33155746</td>
<td>SAE J1772/IEC62196 Type II</td>
<td>Rubber overmold</td>
<td>3</td>
<td>20A - 3-Phase, 480 VAC</td>
<td>5 - 2.5 mm² + 1 - 0.5 mm² IEC cable</td>
<td>5.0 m/16.4 ft</td>
<td>CE</td>
</tr>
<tr>
<td>33155745</td>
<td>SAE J1772/IEC62196 Type II</td>
<td>Rubber overmold</td>
<td>3</td>
<td>32A - 3-Phase, 480 VAC</td>
<td>5 - 6.0 mm² + 1 - 0.5 mm² IEC cable</td>
<td>5.0 m/16.4 ft</td>
<td>CE</td>
</tr>
<tr>
<td>33400850</td>
<td>Plastic</td>
<td>Plastic handle</td>
<td>4</td>
<td>32A - 3-Phase, 480 VAC</td>
<td>5 - 4.0 mm² + 1 - 0.75 mm² IEC cable</td>
<td>6.5 m/21.3 ft</td>
<td>CE</td>
</tr>
<tr>
<td>13960876</td>
<td>GB/T 20234</td>
<td>Rubber overmold</td>
<td>5</td>
<td>16A - 1-Phase, 250 VAC</td>
<td>3 - 2.5 mm²</td>
<td>5.0 m/16.4 ft</td>
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<td>13937383</td>
<td>GB/T 20234</td>
<td>Rubber overmold</td>
<td>5</td>
<td>16A - 1-Phase, 250 VAC</td>
<td>3 - 2.5 mm²</td>
<td>2.7 m/8.86 ft</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Mode 3 Charging Cable Assemblies

**Application**
- Cable assemblies for plugging to charging station

**Description**
- Vehicle to infrastructure connection
- Wiring crimps sealed from environment
- Rubber overmold and plastic handle options available
- Single-phase and three-phase charging

**Performance**
- Current capacity: up to 32A
- Voltage range: 240V to 480V
- Temperature range: -40°C to +50°C
- Validation: See part number information

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.
Mode 3 Charging Cable Assemblies

Infrastructure Drawings

Type II – Rubber Overmold

Type II – Plastic Handle

GB/T – Rubber Overmold

Type III – Plastic Handle

*Please reference page 45 for the vehicle interface drawings.

<table>
<thead>
<tr>
<th>Assembly Part Number</th>
<th>Vehicle Interface</th>
<th>Grip</th>
<th>Infrastructure Interface</th>
<th>Picture</th>
<th>Electrical Rating</th>
<th>Cable Description</th>
<th>Cable Length (m/ft)</th>
<th>Certifications Approvals</th>
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<tbody>
<tr>
<td>33401184</td>
<td>SAE J1772/IEC62196 Type I</td>
<td>Plastic</td>
<td>IEC62196 Type II</td>
<td>1</td>
<td>16A - 1-Phase, 240 VAC</td>
<td>3 - 2.5 mm² + 1 - 0.75 mm² IEC cable</td>
<td>6.0 m/15.7 ft</td>
<td>CE</td>
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<td>33403378</td>
<td>IEC62196 Type II</td>
<td>Plastic</td>
<td>IEC62196 Type II</td>
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<td>16A - 1-Phase, 240 VAC</td>
<td>3 - 2.5 mm² + 1 - 0.5 mm² IEC cable</td>
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<td>33401185</td>
<td>Call for availability</td>
<td>Rubber overmold</td>
<td>IEC62196 Type II</td>
<td>3</td>
<td>16A - 3-Phase, 480 VAC</td>
<td>5 - 2.5 mm² + 1 - 0.75 mm² IEC cable</td>
<td>4.0 m/13.1 ft</td>
<td>CE</td>
</tr>
<tr>
<td>33401404</td>
<td>IEC62196 Type II</td>
<td>Plastic</td>
<td>IEC62196 Type II</td>
<td>4</td>
<td>32A - 3-Phase, 480 VAC</td>
<td>5 - 4.0 mm² + 1 - 0.75 mm² IEC cable</td>
<td>6.5 m/21.3 ft</td>
<td>CE</td>
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<tr>
<td>33403734</td>
<td>IEC62196 Type II</td>
<td>Plastic</td>
<td>IEC62196 Type II</td>
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<td>32A - 3-Phase, 480 VAC</td>
<td>5 - 4.0 mm² + 1 - 0.75 mm² IEC cable</td>
<td>4.0 m/13.1 ft</td>
<td>CE</td>
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<tr>
<td>33401403</td>
<td>Call for availability</td>
<td>Rubber overmold</td>
<td>GB/T 20234</td>
<td>6</td>
<td>16A - 1-Phase, 250 VAC</td>
<td>3 - 2.5 mm² + 1 - 0.5 mm² IEC cable</td>
<td>5.0 m/16.4 ft</td>
<td>N/A</td>
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<tr>
<td></td>
<td>GB/T 20234</td>
<td>Rubber overmold</td>
<td>GB/T 20234</td>
<td>6</td>
<td>32A - 1-Phase, 250 VAC</td>
<td>3 - 6.0 mm² + 1 - 0.75 mm² IEC cable</td>
<td>5.0 m/16.4 ft</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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Charging Inlets
Charge Inlet
Level 1 & 2 Vehicle Charging Inlet

**Application**
- Plug-in hybrid and electric vehicle charge inlet

**Description**
- Interface complies with SAE J1772 and IEC62196 Type I 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 range: -40°C to +85°C
- Validation: UL recognized, Delphi GTP
- Electrical protection: IP2XB
- Design life: 10,000 mating cycles

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Assembly Part Number</th>
<th>Mating Information</th>
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</thead>
<tbody>
<tr>
<td>No cover</td>
<td>13829165</td>
<td></td>
</tr>
<tr>
<td>Cover opens left</td>
<td>13826395</td>
<td></td>
</tr>
<tr>
<td>Cover opens right, with upper plate</td>
<td>Call for availability</td>
<td>13827259</td>
</tr>
<tr>
<td>Cover opens left, with upper plate</td>
<td>Call for availability</td>
<td>-</td>
</tr>
<tr>
<td>Cover opens right, without upper plate</td>
<td>Call for availability</td>
<td>-</td>
</tr>
</tbody>
</table>
Charge Inlet
Type II Vehicle Charging Inlet

Application
- Plug-in hybrid and electric vehicle charge inlet

Description
- Interface complies with IEC62196 Type II standard
- Panel mounts to vehicle
- Integrated thermal circuit breaker to prevent abnormal temperature increase inlet connector only
- Cover provides dust protection
- Designed to drain fluid if introduced to inlet
- Holes provided for coupler lock actuator
- Available with cover opening right or left

Performance
- Supports single-phase or three-phase power supply
- Supports: (16A, 230V) and (63A, 480V)
- Voltage: 400V maximum rating
- Temperature range: -40°C to +85°C
- Electrical protection: IP2XB
- Sealing protection: IP44 (connector/inlet mated)
- Design life: 10,000+ mating cycles

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Assembly Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right open cover, wires exit left</td>
<td>33402098</td>
</tr>
<tr>
<td>Left open cover, wires exit right</td>
<td>33402097</td>
</tr>
</tbody>
</table>
# Charge Inlet

**GB/T 20234 Level 1 & 2 Vehicle Charging Inlet**

## Application
- Plug-in hybrid and electric vehicle charge inlet

## Description
- Interface complies with GB/T 20234 standard
- Optional electrical lock and emergency release function
- Optional cover for cable routing
- Available with latching cover, plugging cover or without cover
- Cover mounting features allow latch to open left or right

## Performance
- Supports: AC 220V/50Hz, 10A/16A/32A
- Voltage: 600V maximum rating
- Temperature range: -40°C to +85°C
- Validation: CCC recognized, Delphi GTP
- Electrical protection: IP2XB
- Sealing protection: IP6X4, IP6X5
- Design life: 10,000 mating cycles

## Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Assembly Part Number</th>
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</thead>
<tbody>
<tr>
<td>No cover</td>
<td>13947629</td>
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<tr>
<td>With latching cover, opens right</td>
<td>13937834</td>
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</table>
Combo 1 AC/DC Vehicle Charging Inlet
High Voltage/High Current Power Charging for SAE

Application
- COMBO 1 charging interface for slow AC (Type I) and fast DC charging applications

Description
- Interface complies with SAE J1772 and IEC62196
- Combined charging system for electrical vehicle
- AC/DC: slow + fast charge (600V, 125A)
- Actuator pin for locking connector to inlet during charging
- Optional thermistor for additional thermal protection during DC charging
- Wire Cross Section: Contact Pin/Present Pin (0.5 mm²), PE (16 mm²), L1/N (6.0 mm²), DC+/-(40 mm²)

Performance
- Temperature range: -40°C to +80°C
- Voltage: 600V DC
- Max. current capacity: 32A AC/ 125A DC
- Sealing Protection: IP55 with cover, IP44 when mated
- Connector/Inlet mating and unmating force < 100N
- Number of mating cycles > 10,000

Availability
- Call for availability

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.
Combo 2 AC/DC Vehicle Charging Inlet
High Voltage/High Current Power Charging for IEC

Application
- COMBO 2 charging interface for slow AC (Type II) and fast DC charging applications

Description
- Interface complies with IEC62196
- Combined charging system for electrical vehicle
- AC/DC: slow + fast charge (600V, 125A)
- Actuator pin for locking connector to inlet during charging
- Optional thermistor for additional thermal protection during DC charging
- Wire Cross Section: Contact Pin/Present Pin (0.5 mm²), PE (16 mm²), L1/N (6.0 mm²), DC+/-(40 mm²)

Performance
- Temperature range: -40°C to +80°C
- Voltage: 600V DC
- Max. current capacity: 32A AC/ 125A DC
- Sealing Protection: IP55 with cover, IP44 when mated
- Connector/Inlet mating and unmating force < 100N
- Number of mating cycles > 10,000

Availability
- Call for availability
DC Charge Inlet
Level 1 & Level 2 Vehicle Charging Inlet

Application
- Plug-in hybrid and electric vehicle DC Charge inlet

Description
- Interface complies with GB/T 20234 standard
- Optional Shielding function
- Optional 90° Adapter
- Latching cover
- Cover mounting features allow latch to open left

Performance
- Supports: 125A/250A
- Voltage: 600V maximum rating
- Temperature range: -40°C to +85°C
- Validation: CCC recognized, Delphi GTP
- Electrical protection: IP2XB
- Sealing protection: IP6X4, IP6X5
- Design life: 10,000 mating cycles

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Assembly Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>With latching cover, opens left</td>
<td>33103831</td>
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Internal Battery Connections
High Voltage Battery I/O Junction Block
Custom 2 Way, 3 Way Bolted Connection

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

<table>
<thead>
<tr>
<th>2 Way System</th>
<th>3 Way System</th>
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</thead>
<tbody>
<tr>
<td>13658746</td>
<td>28115976</td>
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</table>
High Voltage Electrical Centers
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: 268 mm L x 200 mm W x 78 mm 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
Hybrid/Electric Vehicle Wiring Assemblies
Delphi Supports All Electrification Architectures
Delphi Offers System Solutions for All HEV Vehicles

**Micro-Hybrid**
- HV High Power Wiring
  Delphi HV Shielded Cable and Connectors
- HV Accessory Wiring
  Delphi HV Shielded Cable and Connectors
- Custom Routing / Harness Covering Solutions

**Mild-Hybrid**
- HV High Power Wiring
  Delphi HV Shielded Cable and Connectors
- HV Accessory Wiring
  Delphi HV Shielded Cable and Connectors
- Battery Pack Wiring
  Delphi HV and LV Cable and Connectors
- Custom Routing / Harness Covering Solutions

**Fully Hybrid**
- HV High Power Wiring
  Delphi HV Shielded Cable and Connectors
- HV Accessory Wiring
  Delphi HV Shielded Cable and Connectors
- Battery Pack Wiring
  Delphi HV and LV Cable and Connectors
- Custom Routing / Harness Covering Solutions

**Electric Vehicle**
- HV High Power Wiring
  Delphi HV Shielded Cable and Connectors
- HV Accessory Wiring
  Delphi HV Shielded Cable and Connectors
- Battery Pack Wiring
  Delphi HV and LV Cable and Connectors
- Charger Wiring
- Custom Routing / Harness Covering Solutions

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HV Product Development and Manufacturing in All Major Regions

Application
• High voltage wiring assemblies for hybrid/electric vehicles

Description
• Ability to process Delphi and/or industry HV connections
• Quality systems for high voltage safety concerns
• High potential, pressure, and seal testing of wiring assemblies
• Delphi local customer support for HEV wire assemblies
For more information:
delphi.com/highpower
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Authorized Distributor

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