



InPOWER
the systems people

NEW

INSTRUMENTATION PRODUCTS

Monitors your Vehicle Electrical System Performance

DIGITAL METERS

High functionality at a low cost!



DSP Series Voltmeter/Alarm/Ammeter

- Comprehensive vehicle instrumentation package
- Low battery voltage alarm
- No calibration required
- Panel mounted

DC CURRENT SENSORS

A wide selection to meet your specific needs!



DCS Series Electronic DC Current Sensors

- Current capacities from 100 amps to 600 amps
- Models to operate standard analog ammeters
- Environmentally sealed case and connector
- Models to interface to electronic instrument systems

SOLUTIONS
you can count on



Off Road Engineering LLC

www.offroadengineering.com

(949) 581 2991

InPOWER

the systems people

INSTRUMENTATION PRODUCTS

InPower has the best selection of Hall-Effect DC current sensors in the industry! Visit our website at www.InPowerLLC.com for details on our highly reliable and cost effective current sensors and digital meter products.

InPower DSP-DCS1

DSP-DCS 1 Digital Meter

This complete vehicle instrumentation package includes a DC voltmeter, a single or dual ammeter capability, and a low battery voltage alarm. InPower DCS35-300-1 current sensors are used to provide up to two channels with a range of ± 300 amps per channel. Automatic display configuration provides volts only, volts and amps, or volts and Amps 1 & Amps 2. The meter is panel mounted and requires no calibration.

InPower DSP30/31 Series Hall-Effect Current Sensors

DCS 30/31 Series Current Sensors

This family of electronic current sensors replace the traditional 50 or 100 millivolt shunts used to operate analog ammeters. These sensors are available in current capacities from 100 to 600 amps.

InPower DSP35/36 Series Hall-Effect Current Sensors

DCS 35/36 Series Current Sensors

This family of electronic current sensors provide an analog voltage output compatible with electronic instruments such as digital meters, instrument clusters or vehicle multiplex systems. These sensors are available in current capacities from 100 to 600 amps.

For more information visit www.offroadengineering.com • 949.581.2991

Contents

	<u>Document</u>
<i>Digital Voltmeter/Ammeter</i>	
DSP-DCS1 Voltmeter and Dual Ammeter:	PDS-69B
• Battery Voltage Digital Display	
• Dual ± 300 Amp Current Display	
• Low Battery Voltage Alarm	
<i>Hall-Effect DC Current Sensors</i>	
Meter Interface Models:	
• DCS30/31 Series 100 to 300 Amps	PDS-76A
• DCS30/31 Series 400 to 600 Amps	PDS-77A
Instrument Interface Models:	
• DCS35/36 Series 100 to 300 Amps	PDS-78A
• DCS35/36 Series 400 to 600 Amps	PDS-79A
Accessories:	
• CA-DCS-12 Cable	PDS-49A

Digital Voltmeter/Ammeter



Digital battery monitor and alarm displays battery voltage and up to two ammeters

The InPower DSP-DCS1 is a multifunction instrument that includes a DC voltmeter and two ammeters. Its backlit liquid crystal display (LCD) is easy to read in low ambient light conditions as well as in direct sunlight. A built-in low battery voltage alarm is provided that complies with Federal Specification KKK-A-1822F, Paragraph 3.7.6.2 (*Voltmeter and Voltage Monitor*). This alarm function provides a flashing battery voltage display and sets the Alarm output (+12 volts @ 0.5 amps) when the battery voltage drops below 11.8 volts for 120 seconds. Also provided is a Silence Alarm control input. If the Alarm output is set and a ground is applied to the Silence Alarm input the Alarm output will be turned off, but the voltage display will continue to flash until the battery voltage rises above 12.25 volts for two minutes.

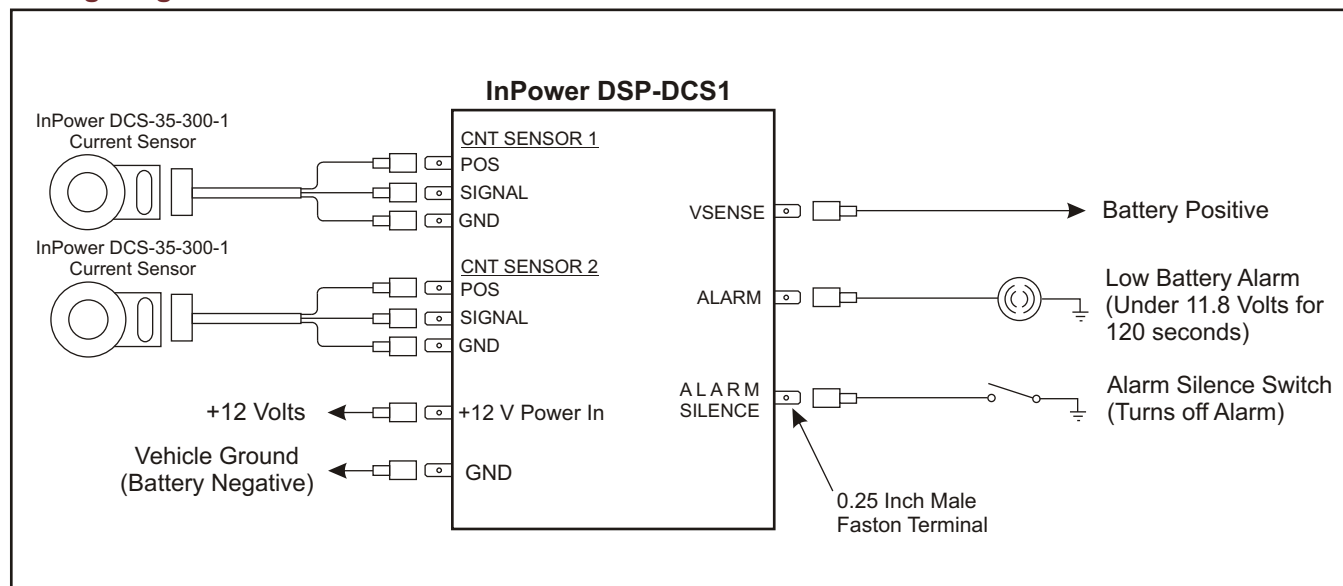
Key Features

- **Battery DC Voltage Display**
- **Dual DC Ammeter Display**
- **Backlit LCD Digital Display**
- **Low Battery Voltage Alarm (KKK-A-1822F)**
- **Auto-Configures Number of Ammeters**
- **Uses Standard InPower DC Current Sensors**
- **No Calibration Required**

The dual ammeter function utilizes InPower Model DCS-37-300-1 Hall-effect current sensors to measure DC current in the range of -300 to +300 amps. As the system is pre-calibrated there is no need for adjustments at installation. The system provides an automatic configuration that detects if one, two, or no current sensors are connected, and automatically formats the digital display accordingly. For example, if no current sensors are detected the display will only show the battery voltage information.

The DSP-DCS1 battery monitor mounts easily on a flat panel with cutout. No fasteners are visible from the front. It contains 0.25 inch Faston male blade terminals on the rear of the unit for the interface connections.

Wiring Diagram



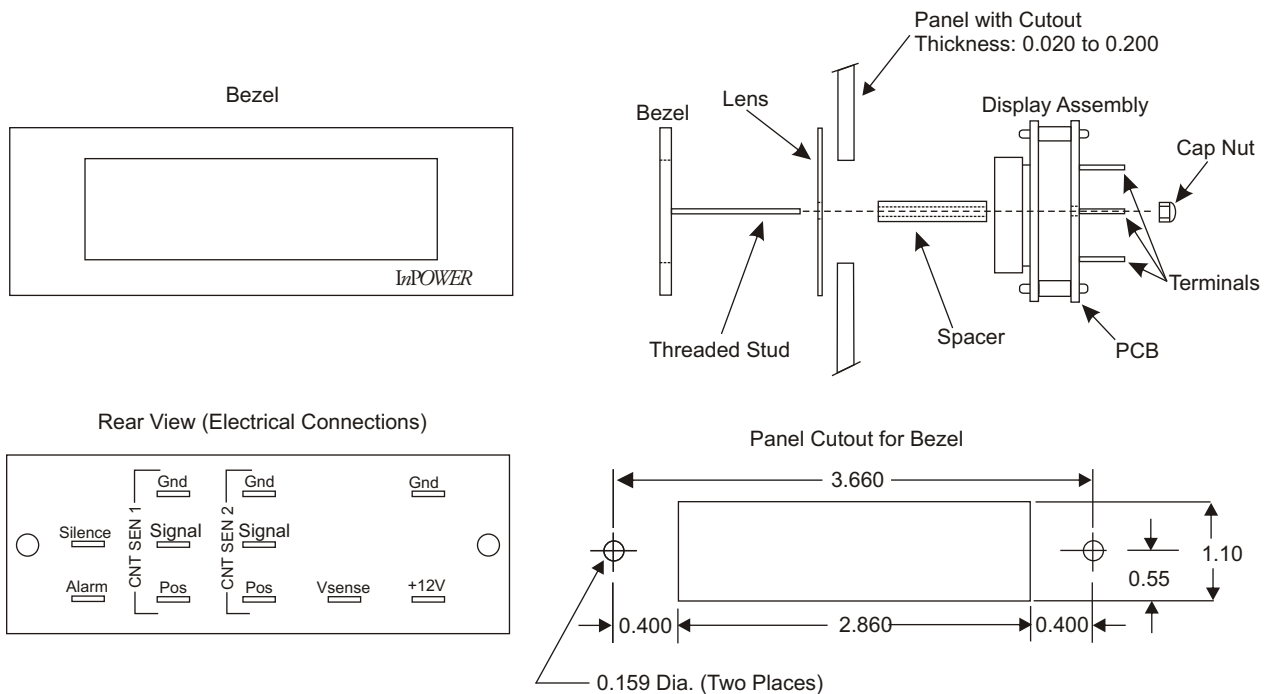
DSP-DCS1

Digital Voltmeter/Ammeter

Specifications

Operating Voltage Range:	+8 to +16 Vdc
Operating Current Range:	0.065 amps for the display, plus the current used by the Alarm control output (0-0.5 amps)
Voltmeter Measurement Range:	0 Vdc to 20 Vdc
Ammeter Range:	-300 to +300 amps
Ammeter Sensor:	InPower Model DC35-300-1 (One or two Required)
Terminals:	Male 0.25 inch Faston (blade)
Display Type:	Backlit LCD
Display Character Height:	0.20 Inch (20 mm)
Alarm System:	
Compliance:	Federal specification KKK-A-1822F, Paragraph 3.7.6.2
Low Voltage Indication:	The voltage display will flash when the Battery Sense is <11.8 Vdc for 120 seconds
Alarm Control Output:	+12 volts @ 0.5 amps when Battery Sense is <11.8 Vdc for >120 seconds
Silence Alarm Control Input:	Apply ground to turn off Alarm output. Resets when Battery Sense returns to above 12.25 Vdc for two minutes
Operating Temperature:	-20° C to +80° C

Outline Drawing



All dimensions in inches. Not to scale.

Offered by:

ORE
Off Road Engineering LLC
www.offroadengineering.com
 (949) 581 2991

Hall-Effect DC Current Sensor 100, 200 and 300 Amps

“Electronic Shunt” Battery Current Sensor Supports Standard 50 or 100 Millivolt Ammeters.



The DCS30/31 Series is a family of highly accurate electronic sensors for measuring dc current, and are available in maximum capacities of 100, 200 and 300 amps. The current sensor consists of a Hall-effect based sensor unit with an electronic interface circuit that operates conventional 50 or 100 millivolt ammeter meter movements. The non-intrusive design allows the sensors to be installed without the need to cut and re-terminate the high current dc cables as required with the installation of mechanical meter shunts. Also, the DCS30/31 sensors occupies less space, do not generate heat, and have no exposed electrical potentials as with mechanical meter shunts.

The sensor's opening is 1.23 inches, which will accommodate typical battery cables. It utilizes a four-pin Packard Metri-Pak 150 sealed connector.

The DCS30/31 sensors are designed to operate with standard 50 or 100 millivolt ammeters with internal resistance of 20 ohms or greater. They requires a power source of +12 volts @ 8.1 milliamps. The DCS30 models measure bi-directional current (e.g., -100 to +100 amps). The DCS31 models measure unidirectional current (e.g., Zero to 100 amps).

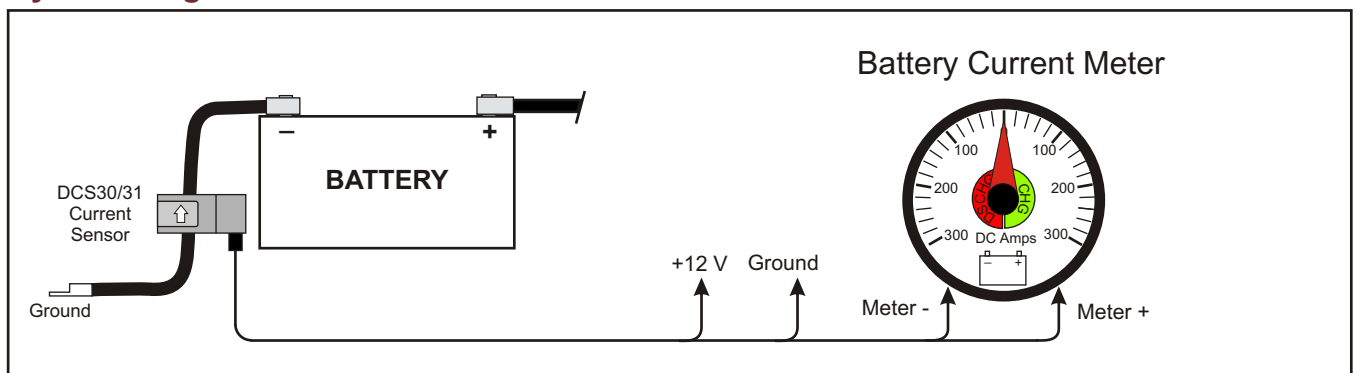
Key Features

- *Electronic Hall-Effect Sensor Design* - Eliminates the need for heat-producing mechanical shunts.
- *Sealed Construction* - No exposed electrical potentials as in mechanical meter shunts.
- *Non-Intrusive* - No need to cut and re-crimp battery cables.
- *Operates Common Ammeters* - Industry standard 50 and 100 millivolts meter movements.
- *Fits Most Vehicle and Marine Applications* - Available in 100 through 300 Amp Capacities.
- *Weather Resistant Connector* - Allows use in severe environments.

DC Current Sensor Models

Model	Current Range	Sensor Output
DCS30-100-1	± 100 Amps	± 50 Millivolts
DCS30-200-1	± 200 Amps	± 50 Millivolts
DCS30-300-1	± 300 Amps	± 50 Millivolts
DCS30-100-2	± 100 Amps	± 100 Millivolts
DCS30-200-2	± 200 Amps	± 100 Millivolts
DCS30-300-2	± 300 Amps	± 100 Millivolts
DCS31-100-1	0 to 100 Amps	0 to 50 Millivolts
DCS31-200-1	0 to 200 Amps	0 to 50 Millivolts
DCS31-300-1	0 to 300 Amps	0 to 50 Millivolts
DCS31-100-2	0 to 100 Amps	0 to 100 Millivolts
DCS31-200-2	0 to 200 Amps	0 to 100 Millivolts
DCS31-300-2	0 to 300 Amps	0 to 100 Millivolts

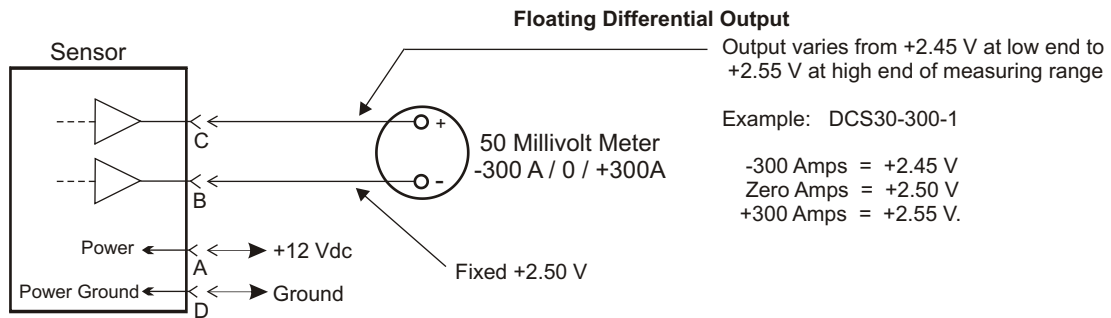
System Diagram



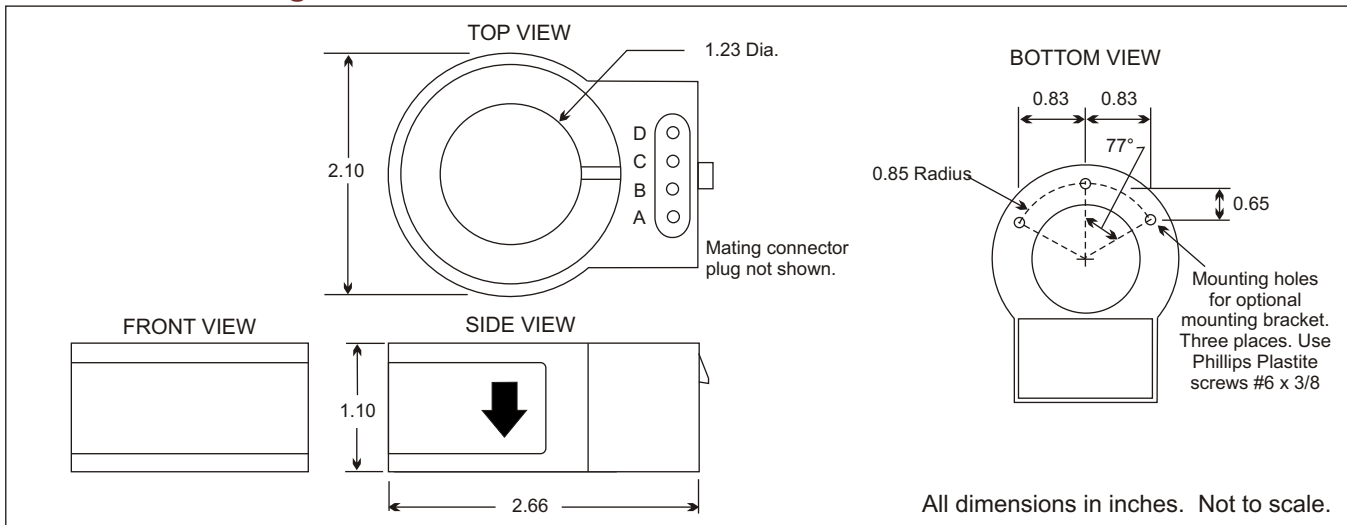
DCS30/31 Series Hall-Effect DC Current Sensor

Specifications

Sensor Type:	Open loop Hall-effect		
Linearity:	1.5%		
Supply Voltage Range:	+7 to + 20 Vdc		
Current Consumption:	8.1 milliamps maximum		
Output to Meter:	Models DCS30/31-XXX-1 ±50 millivolts Models DCS30/31-XXX-2 ±100 millivolts Note - Meter internal resistance must be 20 ohms or greater.		
Operating Temperature:	-40° C to +125° C		
Storage Temperature:	-40° C to +125° C		
Aperture Size:	1.23 inches		
Weight:	0.30 lbs		
Connector System:	Packard Sealed Metri-Pak 150. Note - Mating plug not supplied with sensor. (See InPower Technical Bulletin TB-31 for details and purchasing source).		
Connector Interface:	Pin A + Vdc Supply	Pin C Output to Meter (+)	
Sensor Wiring:	Pin B Output to Meter (-)	Pin D Ground	



Mechanical Drawing



Offered by:



Off Road Engineering LLC

www.offroadengineering.com

(949) 581 2991

Hall-Effect DC Current Sensor 400, 500 and 600 Amps

"Electronic Shunt" Battery Current Sensor Supports Standard 50 or 100 Millivolt Ammeters.



The DCS30/31 Series is a family of highly accurate electronic sensors for measuring dc current, and are available in maximum capacities of 400, 500 and 600 amps. The current sensor consists of a Hall-effect based sensor unit with an electronic interface circuit that operates conventional 50 or 100 millivolt ammeter meter movements. The non-intrusive design allows the sensors to be installed without the need to cut and re-terminate the high current dc cables as required with the installation of mechanical meter shunts. Also, the DCS30/31 sensors occupies less space, do not generate heat, and have no exposed electrical potentials as with mechanical meter shunts.

The sensor's opening is 1.23 inches, which will accommodate typical battery cables. It utilizes a four-pin Packard Metri-Pak 150 sealed connector.

The DCS30/31 sensors are designed to operate with standard 50 or 100 millivolt ammeters with internal resistance of 20 ohms or greater. They requires a power source of +12 volts @ 8.1 milliamps. The DCS30 models measure bi-directional current (e.g., -400 to +400 amps). The DCS31 models measure unidirectional current (e.g., Zero to 400 amps).

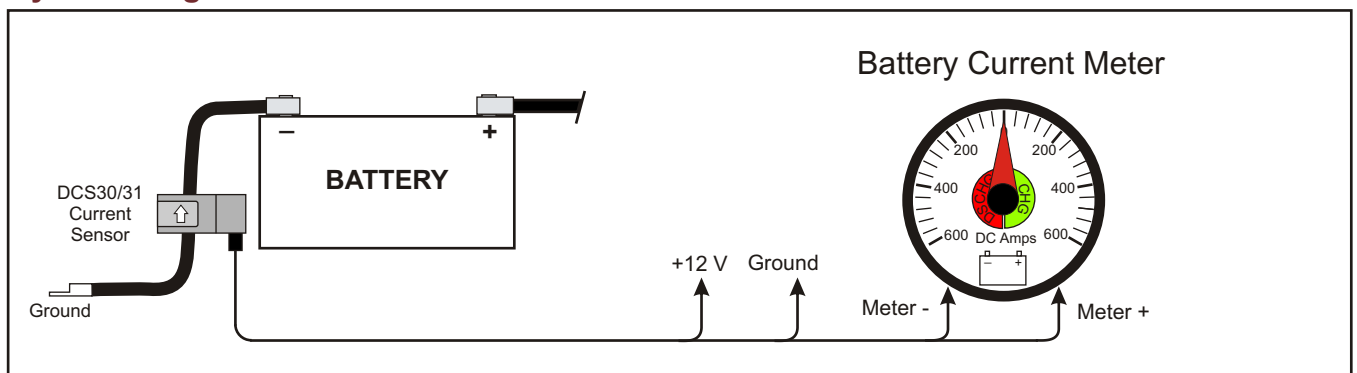
Key Features

- *Electronic Hall-Effect Sensor Design* - Eliminates the need for heat-producing mechanical shunts.
- *Sealed Construction* - No exposed electrical potentials as in mechanical meter shunts.
- *Non-Intrusive* - No need to cut and re-crimp battery cables.
- *Operates Common Ammeters* - Industry standard 50 and 100 millivolts meter movements.
- *Fits Most Vehicle and Marine Applications* - Available in 400 through 600 Amp Capacities.
- *Weather Resistant Connector* - Allows use in severe environments.

DC Current Sensor Models

Model	Current Range	Sensor Output
DCS30-400-1	± 400 Amps	± 50 Millivolts
DCS30-500-1	± 500 Amps	± 50 Millivolts
DCS30-600-1	± 600 Amps	± 50 Millivolts
DCS30-400-2	± 400 Amps	± 100 Millivolts
DCS30-500-2	± 500 Amps	± 100 Millivolts
DCS30-600-2	± 600 Amps	± 100 Millivolts
DCS31-400-1	0 to 400 Amps	0 to 50 Millivolts
DCS31-500-1	0 to 500 Amps	0 to 50 Millivolts
DCS31-600-1	0 to 600 Amps	0 to 50 Millivolts
DCS31-400-2	0 to 400 Amps	0 to 100 Millivolts
DCS31-500-2	0 to 500 Amps	0 to 100 Millivolts
DCS31-600-2	0 to 600 Amps	0 to 100 Millivolts

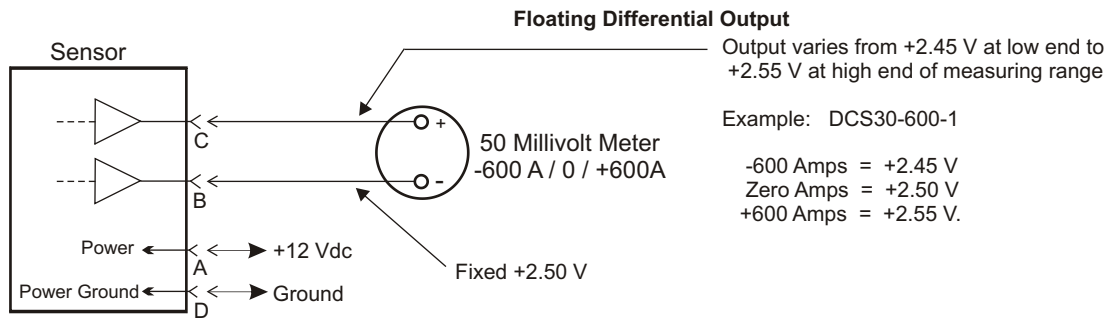
System Diagram



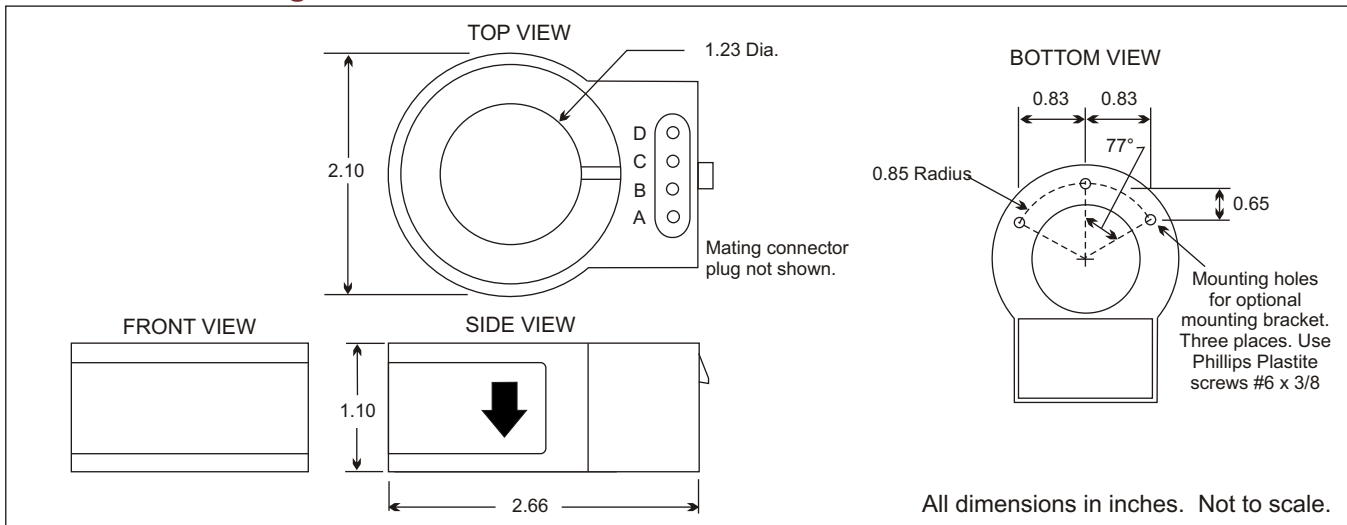
DCS30/31 Series Hall-Effect DC Current Sensor

Specifications

Sensor Type:	Open loop Hall-effect		
Linearity:	1.5%		
Supply Voltage Range:	+7 to + 20 Vdc		
Current Consumption:	8.1 milliamps maximum		
Output to Meter:	Models DCS30/31-XXX-1 ±50 millivolts Models DCS30/31-XXX-2 ±100 millivolts Note - Meter internal resistance must be 20 ohms or greater.		
Operating Temperature:	-40° C to +125° C		
Storage Temperature:	-40° C to +125° C		
Aperture Size:	1.23 inches		
Weight:	0.30 lbs		
Connector System:	Packard Sealed Metri-Pak 150. Note - Mating plug not supplied with sensor. See InPower Technical Bulletin TB-31 for details and purchasing source.		
Connector Interface:	Pin A + Vdc Supply	Pin C	Output to Meter (+)
Sensor Wiring:	Pin B Output to Meter (-)	Pin D	Ground



Mechanical Drawing



Offered by:

ORE
Off Road Engineering LLC
www.offroadengineering.com
 (949) 581 2991

Hall-Effect DC Current Sensor 100, 200 and 300 Amps

Electronic Battery Current Sensor Interfaces to Electronic Instrument Systems.



The DCS35/36 Series is a family of highly accurate electronic sensors for measuring dc current, and are available in maximum capacities of 100, 200 and 300 amps. The current sensor consists of a Hall-effect based sensor unit with an output interface that is compatible with electronic instrument systems. The non-intrusive design allows the sensors to be installed without the need to cut and re-terminate the high current dc cables as required with the installation of mechanical meter shunts. Also, the DCS35/36 sensors occupies less space, do not generate heat, and have no exposed electrical potentials as with mechanical meter shunts.

The sensor's opening is 1.23 inches, which will accommodate typical battery cables. It utilizes a four-pin Packard Metri-Pak 150 sealed connector.

The DCS35/36 sensors are designed to interface to electronic vehicle systems such as instrument clusters and multiplex systems. Sensor outputs are available in 0.5 to 4.5 Volt and 0 to 5.0 Volt, with ground reference. They require a power source of +12 Vdc @ 8.1 milliamps. The DCS35 models measure bi-directional current (e.g., -100 to +100 amps). The DCS36 models measure unidirectional current (e.g., Zero to 100 amps).

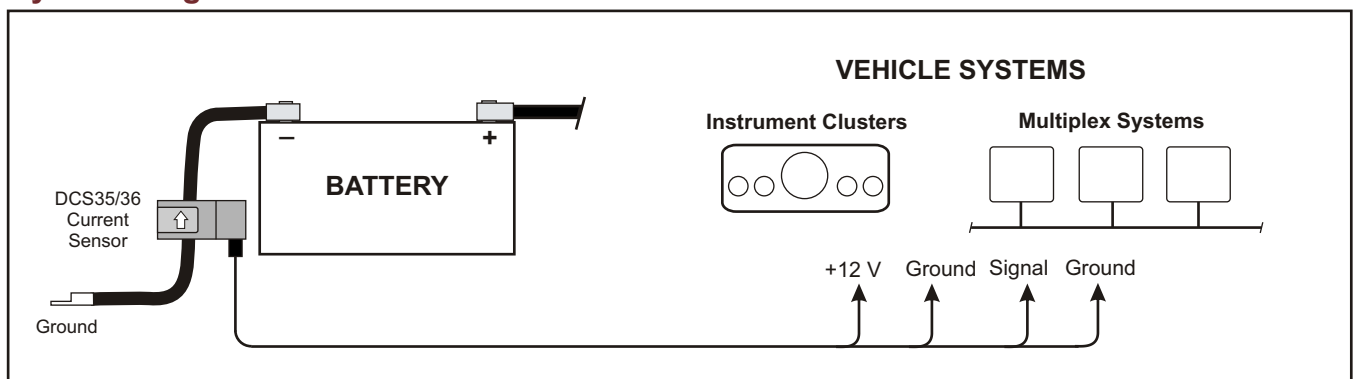
Key Features

- *Electronic Hall-Effect Sensor Design* - Eliminates the need for heat-producing mechanical shunts.
- *Sealed Construction* - No exposed electrical potentials as in mechanical meter shunts.
- *Non-Intrusive* - No need to cut and re-crimp battery cables.
- *Analog Output* - 0.5 - 4.5 V or 0 - 5.0 V output interfaces to electronic instrument systems.
- *Fits Most Vehicle and Marine Applications* - Available in 100, 200 and 300 Amp Capacities.
- *Weather Resistant Connector* - Allows use in severe environments.

DC Current Sensor Models

Model	Current Range	Sensor Output
DCS35-100-1	± 100 Amps	2.5 V ± 2.0 V
DCS35-200-1	± 200 Amps	2.5 V ± 2.0 V
DCS35-300-1	± 300 Amps	2.5 V ± 2.0 V
DCS35-100-2	± 100 Amps	2.5 V ± 2.5 V
DCS35-200-2	± 200 Amps	2.5 V ± 2.5 V
DCS35-300-2	± 300 Amps	2.5 V ± 2.5 V
DCS36-100-1	0 to 100 Amps	0.5 V to 4.5 V
DCS36-200-1	0 to 200 Amps	0.5 V to 4.5 V
DCS36-250-1	0 to 250 Amps	0.5 V to 4.5 V
DCS36-300-1	0 to 300 Amps	0.5 V to 4.5 V
DCS36-100-2	0 to 100 Amps	0 V to 5.0 V
DCS36-200-2	0 to 200 Amps	0 V to 5.0 V
DCS36-300-2	0 to 300 Amps	0 V to 5.0 V

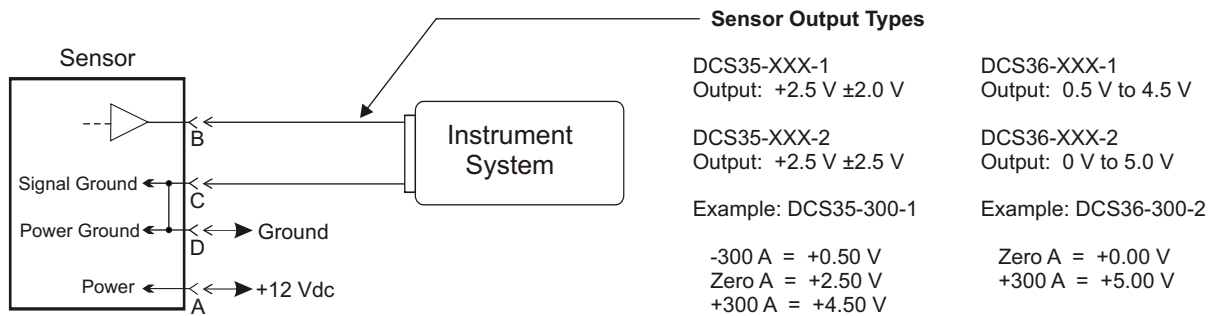
System Diagram



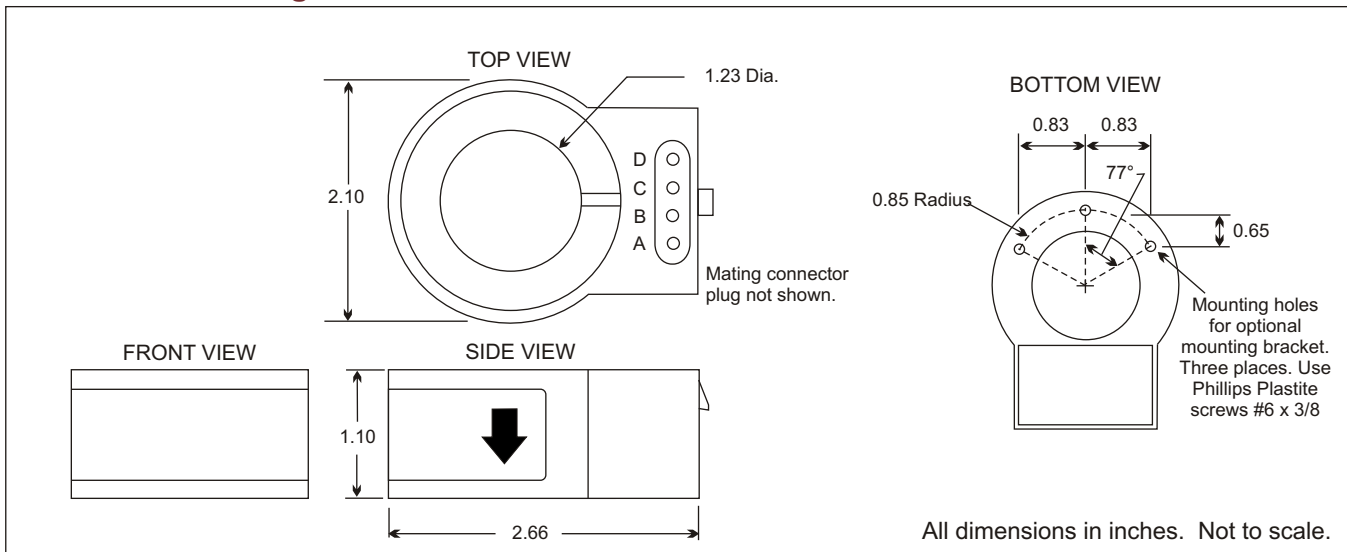
DCS35/36 Series Hall-Effect DC Current Sensor

Specifications

Sensor Type:	Open loop Hall-effect		
Linearity:	1.5%		
Supply Voltage Range:	+7 to +20 Vdc		
Current Consumption:	8.1 milliamps maximum		
Output:	0.5 to 4.5 Vdc or 0 to 5.0 Vdc		
Operating Temperature:	-40° C to +125° C		
Storage Temperature:	-40° C to +125° C		
Aperture Size:	1.23 inches		
Weight:	0.30 lbs		
Connector System:	Packard Sealed Metri-Pak 150. Note - Mating plug not supplied with sensor. See InPower Technical Bulletin TB-31 for details and purchasing source.		
Connector Interface:	Pin A +Vdc	Pin C	Ground (Signal Return)
Sensor Wiring:	Pin B Output	Pin D	Ground (Power Return)



Mechanical Drawing



Offered by:

ORE
Off Road Engineering LLC
www.offroadengineering.com
 (949) 581 2991

Hall-Effect DC Current Sensor 400, 500 and 600 Amps

Electronic Battery Current Sensor Interfaces to Electronic Instrument Systems.



The DCS35/36 Series is a family of highly accurate electronic sensors for measuring dc current, and are available in maximum capacities of 400, 500 and 600 amps. The current sensor consists of a Hall-effect based sensor unit with an output interface that is compatible with electronic instrument systems. The non-intrusive design allows the sensors to be installed without the need to cut and re-terminate the high current dc cables as required with the installation of mechanical meter shunts. Also, the DCS35/36 sensors occupies less space, do not generate heat, and have no exposed electrical potentials as with mechanical meter shunts.

The sensor's opening is 1.23 inches, which will accommodate typical battery cables. It utilizes a four-pin Packard Metri-Pak 150 sealed connector.

The DCS35/36 sensors are designed to interface to electronic vehicle systems such as instrument clusters and multiplex systems. Sensor outputs are available in 0.5 to 4.5 Volt and 0 to 5.0 Volt, with ground reference. They require a power source of +12 Vdc @ 8.1 milliamps. The DCS35 models measure bi-directional current (e.g., -100 to +100 amps). The DCS36 models measure unidirectional current (e.g., Zero to 100 amps).

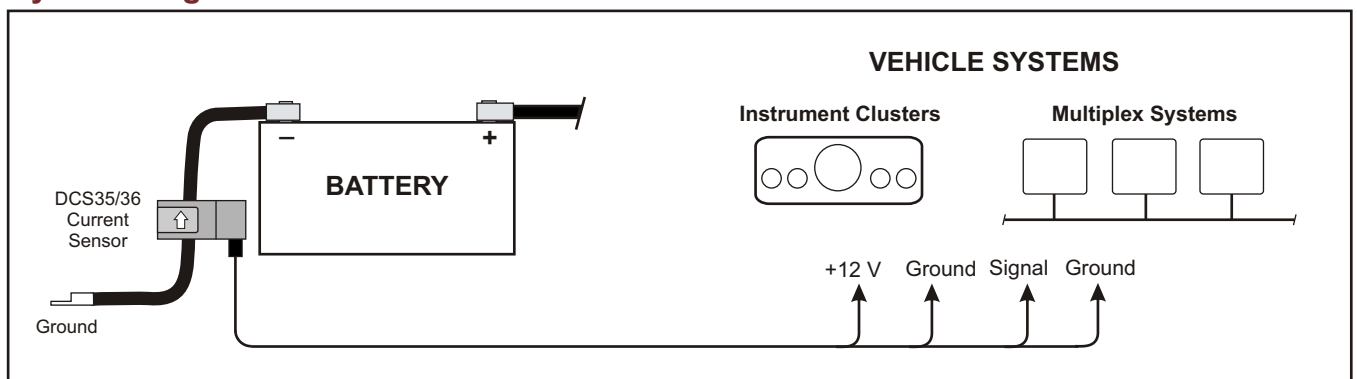
Key Features

- *Electronic Hall-Effect Sensor Design* - Eliminates the need for heat-producing mechanical shunts.
- *Sealed Construction* - No exposed electrical potentials as in mechanical meter shunts.
- *Non-Intrusive* - No need to cut and re-crimp battery cables.
- *Analog Output* - 0.5 - 4.5 V or 0 - 5.0 V output interfaces to electronic instrument systems.
- *Fits Most Vehicle and Marine Applications* - Available in 400 through 600 Amp Capacities.
- *Weather Resistant Connector* - Allows use in severe environments.

DC Current Sensor Models

Model	Current Range	Sensor Output
DCS35-400-1	± 400 Amps	2.5 V ± 2.0 V
DCS35-500-1	± 500 Amps	2.5 V ± 2.0 V
DCS35-600-1	± 600 Amps	2.5 V ± 2.0 V
DCS35-400-2	± 400 Amps	2.5 V ± 2.5 V
DCS35-500-2	± 500 Amps	2.5 V ± 2.5 V
DCS35-600-2	± 600 Amps	2.5 V ± 2.5 V
DCS36-400-1	0 to 400 Amps	0.5 to 4.5 V
DCS36-500-1	0 to 500 Amps	0.5 to 4.5 V
DCS36-600-1	0 to 600 Amps	0.5 to 4.5 V
DCS36-400-2	0 to 400 Amps	0 to 5.0 V
DCS36-500-2	0 to 500 Amps	0 to 5.0 V
DCS36-600-2	0 to 600 Amps	0 to 5.0 V

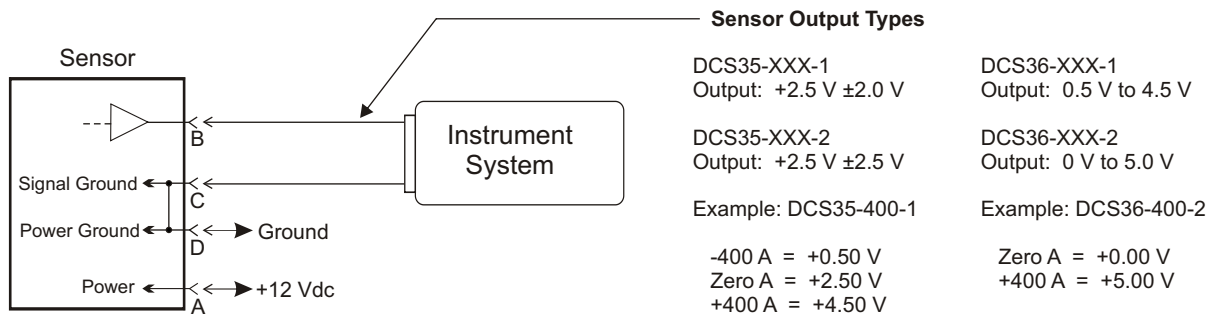
System Diagram



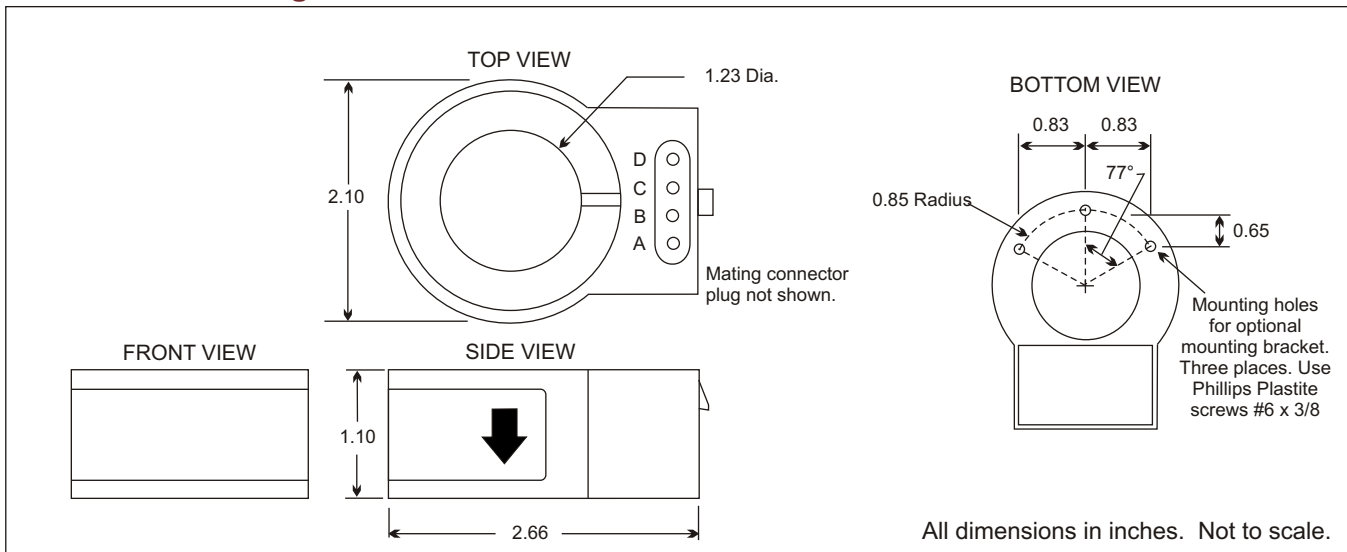
DCS35/36 Series Hall-Effect DC Current Sensor

Specifications

Sensor Type:	Open loop Hall-effect		
Linearity:	1.5 %		
Supply Voltage Range:	+7 to + 20 Vdc		
Current Consumption:	8.1 milliamps maximum		
Output:	0.5 to 4.5 Vdc or 0 to 5.0 Vdc		
Operating Temperature:	-40° C to +125° C		
Storage Temperature:	-40° C to +125° C		
Aperture Size:	1.23 inches		
Weight:	0.30 lbs		
Connector System:	Packard Sealed Metri-Pak 150. Note - Mating plug not supplied with sensor. See InPower Technical Bulletin TB-31 for details and purchasing source.		
Connector Interface:	Pin A +Vdc	Pin C	Ground (Signal Return)
Sensor Wiring:	Pin B Output	Pin D	Ground (Power Return)



Mechanical Drawing



Offered by:

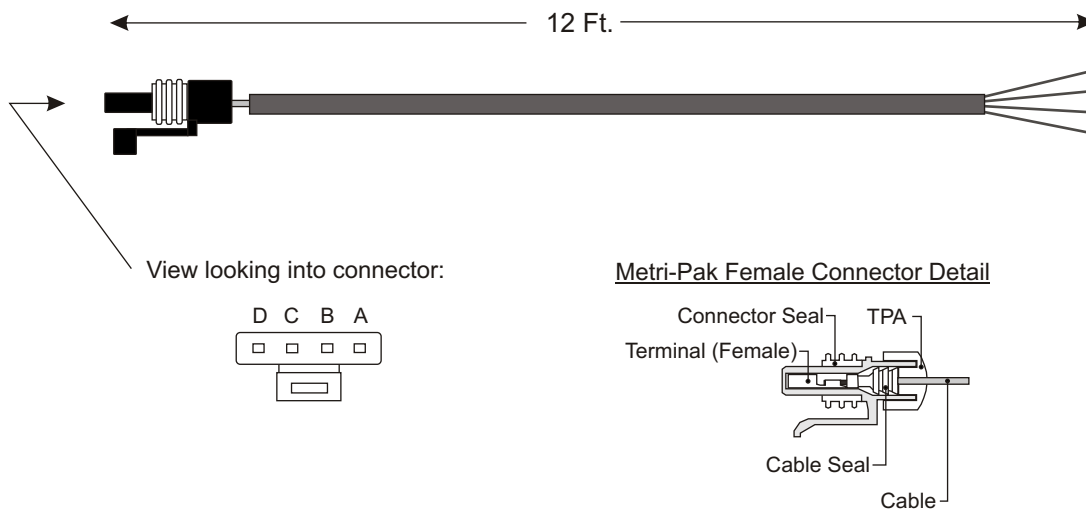
ORE
Off Road Engineering LLC
www.offroadengineering.com
 (949) 581 2991

12 foot cable assembly for InPower DCS Series dc current sensors

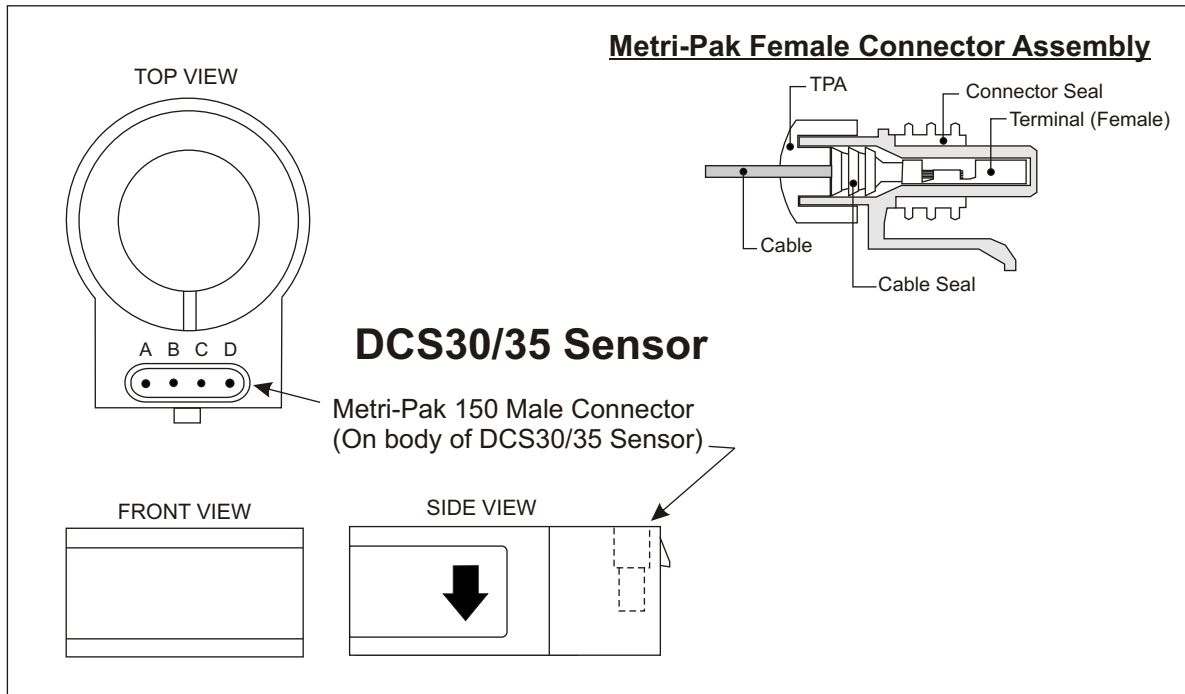
This cable assembly is designed for use with InPower's DCS30, DCS31, DCS35 and DCS36 Hall-effect current sensors. The cable contains a Metri-Pack 150 Sealed connector at one end and blunt-cut wires at the other end. The four wires are 20 AWG type TXL, and are covered with a 1/4 inch Flex-Guard FPE braided sleeve. The total cable length is 12 feet.

Pin assignments are:

- Pin A Red wire
- Pin B Green wire
- Pin C White wire
- Pin D Black wire



InPower Model DCS30/35 Current Sensor Mating Connector Reference Information



Packard Metri-Pak 150 Connector Reference

Purchasing Source:

Packard Electric Connectors:

Power & Signal Group
Tel: 800-722-5273
www.powerandsignal.com

Waytek, Inc.
Tel: 800-328-2724
www.waytekwire.com

Female Connector Assembly Parts:

<u>Part Description</u>	<u>Part Number</u>
Female connector assy.	12162144
Female terminals (20-22 AWG)	12084200
TPA (Terminal Position Assurance)	12047948
Cable seal	Part number depends on wire diameter and form (loose or on reel)
Cavity plug*	12059168
Crimping tool (20-14 Ga.)	12155975

* Required if any cavity is not occupied with a terminal/cable seal.