

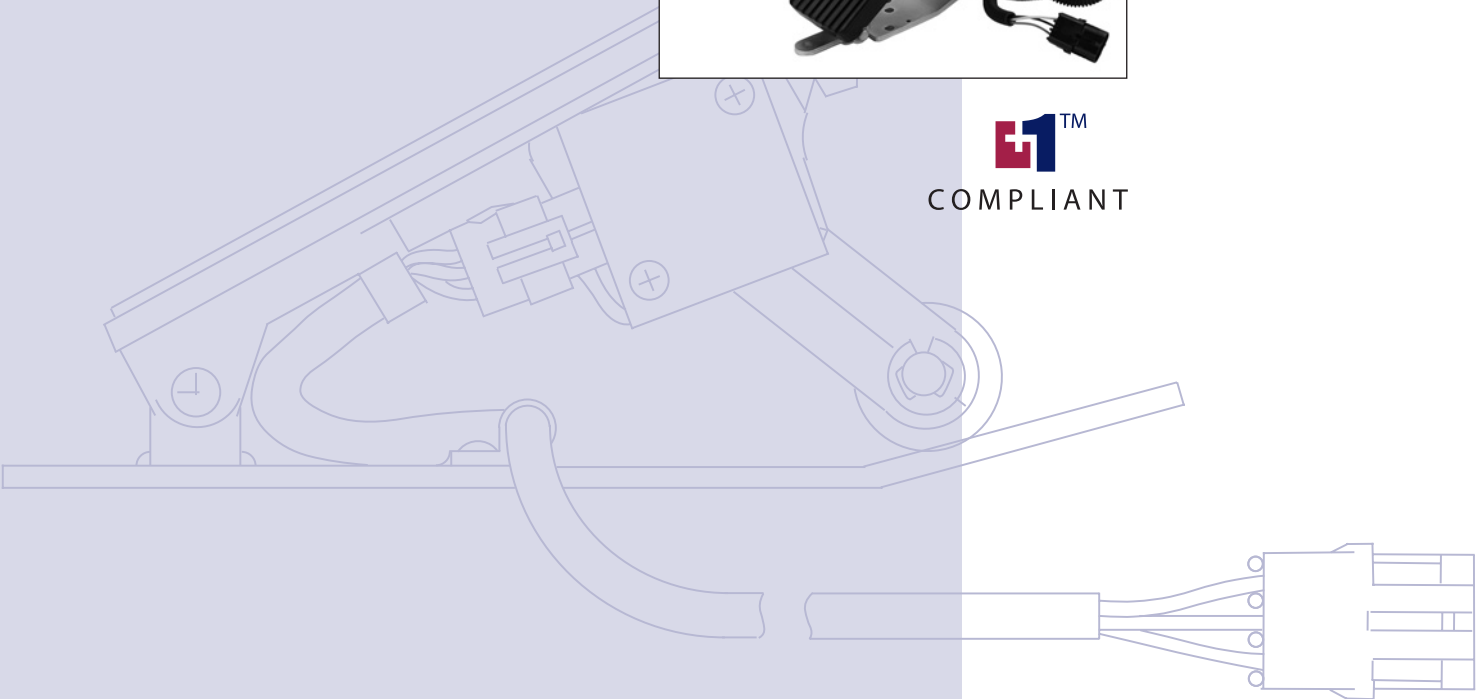


# Electronic Foot Pedal

## Technical Information



COMPLIANT



**Revision History***Table of Revisions*

Date	Page	Changed	Rev
28 Nov, 2011	10	Corrected Option 1 and 2 drawing	DA
11 Oct, 2011	5	Added interchangeable part number reference to Uni-directional Model Type table.	CB
03 Sep, 2010		Major update	CA
12 Jan, 2010		Major update	BA
14 Jan, 2009		Initial Release	AB

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**Description**

The Electronic Foot Pedal is used to drive vehicles equipped with hydrostatic transmissions and/or electronically-controlled engines. It provides an electrical signal to the engine's electronics proportional to the degree of pedal actuation. The electronic foot pedal features a sensor specifically designed for heavy vehicle applications.

Sauer-Danfoss offers two types of foot pedals: Uni-directional and Bi-directional. The uni-directional uses a potentiometer sensor and was the first electronic foot pedal introduced by Sauer-Danfoss in 1993. The new bi-directional type uses Hall effect sensors. Both types of foot pedals are PLUS+1™ compliant.

**Features****Uni-directional Model Type**

- Potentiometer sensor
- Meets or exceeds FMVSS-124 requirements
- Low pivot point eliminates need for external heel rest
- Controls acceleration and deceleration smoothly
- Potentiometer mounting location minimizes mounting space requirements and reduces vulnerability to dirt, water, and foreign contaminants
- 3 pin Packard Electric Weather Pack™ compatible connector

**Bi-directional Model Type**

- Hall effect sensors
- $14\pm 2^\circ$  angular rotation, fore and aft
- FMVSS 124 and 302 compliant
- Dual ratiometric Automatic Protection Switching (APS) output
  - This feature provides redundancy
- Independent, isolated APS circuits
- Protected against electrical misconnection
- 6 pin Packard Electric Metri-Pack™ 150 Series connector directly on the sensor
- Two 3 pin Packard Electric Weather Pack compatible connector
  - These connectors are used with the recommended cable (reference page 13)
- Non contact sensor
- Black coated steel base and treadle
- Chromate conversion module components

**Operation****Uni-directional Model Type**

The electronic foot pedal accepts a typical supply voltage of 5 Vdc and varies the output from 10% to 90% of supply through the pedal's rated angle. Three standard accelerator position sensor models are available for vehicle toeboard angles ranging from 0° to 25°. Custom mounting, termination, and electrical characteristics are available upon factory request.

**Bi-directional Model Type**

The electronic foot pedal contains two independent non-contact transducers (Hall elements). The transducers are designed to operate at 5 Vdc.

The signal range for each transducer can be configured to match a machine's requirements. Currently, two different signal options are offered, reference *Bi-directional Model Type Technical Data*, page 7.

**Ordering Information**

Use the table below with code numbers for ordering the Electronic Foot Pedals. For more technical data refer to *Technical Data*, pages 6 to 7. For mounting data refer to *Dimensions*, pages 8, 9 and 10.

**Uni-directional Model Type**

Description	Foot pad	Mating connector	Angle	Signal 1	Signal 2	Transducer	Part number
KEPA14181	Uni-directional	Rubber	Packard Electric Weather Pack	28° <sup>1</sup>	10% to 90%		2500 Ohms <sup>2</sup> KEPA14181 <sup>3</sup>
KEPA14161	Uni-directional	Rubber	Packard Electric Weather Pack	35° <sup>1</sup>	10% to 90%		2500 Ohms <sup>2</sup> KEPA14161 <sup>3</sup> 791681N <sup>4</sup>
KEPA14171	Uni-directional	Rubber	Packard Electric Weather Pack	45° <sup>1</sup>	10% to 90%		2500 Ohms <sup>2</sup> KEPA14171 <sup>5</sup>

<sup>1</sup> Refer to *Technical Specification*, pages 6 to 7.

<sup>2</sup> Plus a 1K internal current limiting resistor.

<sup>3</sup> US part number.

<sup>4</sup> EU part number.

<sup>5</sup> Interchangeable US part number is 11044101.

*Mating Electrical Connector*

Description	Part number
3 pin Packard Electric Weather Pack kit	K08620

**Bi-directional Model Type**

Description	Foot pad	Mating connector	Angle	Signal 1	Signal 2	Part number
Option 1	Bi-directional	Rubber	6 pin Packard Electric Metri-Pack 150 Series	+/- 14°	10% to 90%	90% to 10% 11065877
Option 2	Bi-directional	Rubber	6 pin Packard Electric Metri-Pack 150 Series	+/- 14°	10% to 80%	20% to 90% 11065874

*Sauer-Danfoss Recommended Mating Electrical Wire Harness and Connectors*

Description	Part number
6 pin Packard Electric Metri-Pack 150 Series	100 cm (39.37 in) from end to end 11065878
Two 3 pin Packard Electric Weather Pack	
3 pin Packard Electric Weather Pack tower kit	Used with wire harness, Sauer-Danfoss part number 11065878 K08620
3 pin Packard Electric Weather Pack shroud kit	K08630

The following mating electrical connector must be ordered directly from a Packard Electric supplier.

**⚠ Caution**

The electrical connection may be at risk. Wiring directly to the 6 pin Metri-Pack connector, which is integral to the sensor, may not provide the flexibility and overall integrity that can otherwise be obtained by using the Sauer-Danfoss recommended harness (Sauer-Danfoss part number 11065878, see table above).

*Optional Mating Electrical Connector Piece Parts*

Description	Packard Electric part number
6 pin Packard Electric Metri-Pack 150 Series	One Connector and Seal
	Six Terminals
	12066317
	12013881

See pages 11 to 12 for *Electrical Connections* details.

**Electrical and  
 Environmental**

**Uni-directional Model Type**

*Specifications*

<b>Supply voltage</b>	Typical: 5.0 Vdc
	Maximum: 16 Vdc (5 minutes)
<b>Operating temperature</b>	-40 to +70° C [-40 to +158° F]
<b>Maximum rated output current</b>	20 mA
<b>Pedal potentiometer resistance</b>	2500 ± 500 Ohms, plus a 1K internal current limiting resistor
<b>Sealing of electronics</b>	IP 66

*Materials*

<b>Castings</b>	Iridited aluminum
<b>Potentiometer shaft</b>	Stainless steel
<b>Roller and spring sleeve</b>	Glass filled nylon
<b>Base plate</b>	Zinc plated steel
<b>Springs</b>	Stainless steel

*Mechanical Ratings*

<b>Pedal angle (toeboard angle)</b>	28°	(16° to 25°)
	35°	(6° to 15°)
	45°	(0° to 5°)
<b>Activation force</b>	Typical: 2.3 Kg [5 lbs] (at start) 5.5 Kg [12 lbs] (at full travel)	
<b>Activations, full stroke</b>	Minimum: 3 million	

*Signal Output*

<b>Signal current</b>	Maximum: 20 mA
<b>Idle position</b>	Minimum: 10% ± 2%
<b>Full pedal stroke</b>	Maximum: 90% + 2%, - 7%
<b>Pedal potentiometer resistance</b>	2500 ± 500 Ohms, plus a 1K internal current limiting resistor

**Electrical and  
 Environmental  
 (Continued)**

**Bi-directional Model Type**

*Specifications*

<b>Supply voltage (Ucc1, Ucc2)</b>	5 Vdc $\pm$ 0.5 Vdc
<b>Current consumption (each Hall element)</b>	Maximum: 10 mA (for both Hall elements 20 mA)
<b>Operating temperature</b>	-40 to +85° C [-40 to +185° F]
<b>Sealing of electronics</b>	IP 66

*Material*

<b>Casting</b>	Iridited aluminum
<b>Hall element shaft</b>	Stainless steel
<b>Base plate</b>	Zinc plated steel
<b>Spring</b>	Stainless steel
<b>Weight</b>	Typical: 2.6 Kg [5.6 lbs]

*Mechanical Ratings*

<b>Pedal angle (toeboard angle)</b>	Maximum: 14° $\pm$ 2°
<b>Activations (full stroke)</b>	Minimum: 3 million
<b>Static load limit (forward or reverse)</b>	Maximum: 1500 N (measured 150mm from pivot)
<b>Side load limit</b>	Maximum: 500 N (measured 150mm from pivot)
<b>Vertical load limit (neutral)</b>	Maximum: 1000 N (measured center of treadle on pivot axis)

*Signal Output*

<b>Signal current (APS1, APS2)</b>	Maximum: 0.5 mA
<b>Signal load</b>	Maximum: 10 K Ohms
<b>Short circuit of signal (APS1, APS2)</b>	Maximum: 20 minutes

*Option 1, Signal Level*

<b>Signal 1 range nominal (APS1)</b>	90% +2% and -4% $\rightarrow$ A
	10% +4% and -2% $\rightarrow$ B
<b>Signal 2 range nominal (APS2)</b>	10% +4% and -2% $\rightarrow$ A
	90% +2% and -4% $\rightarrow$ B
<b>Neutral 1 range nominal (APS1)</b>	50% $\pm$ 4%
<b>Neutral 2 range nominal (APS2)</b>	50% $\pm$ 4%

*Option 2, Signal Level*

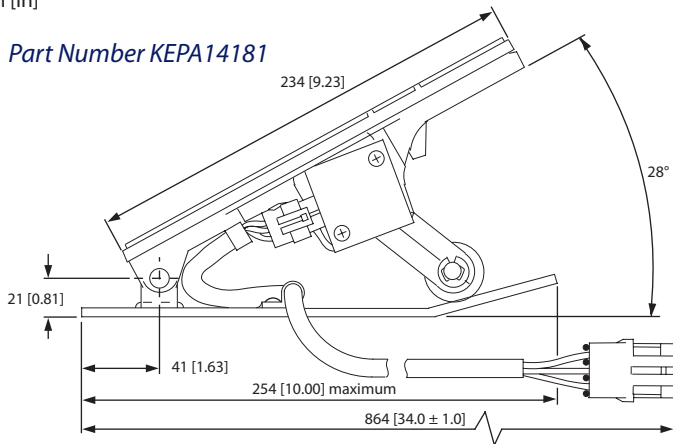
<b>Signal 1 range nominal (APS1)</b>	10% +4% and -2% $\rightarrow$ A
	80% +2% and -4% $\rightarrow$ B
<b>Signal 2 range nominal (APS2)</b>	20% +4% and -2% $\rightarrow$ A
	90% +2% and -4% $\rightarrow$ B
<b>Neutral 1 range nominal (APS1)</b>	45% $\pm$ 4%
<b>Neutral 2 range nominal (APS2)</b>	55% $\pm$ 4%

**Dimensions**

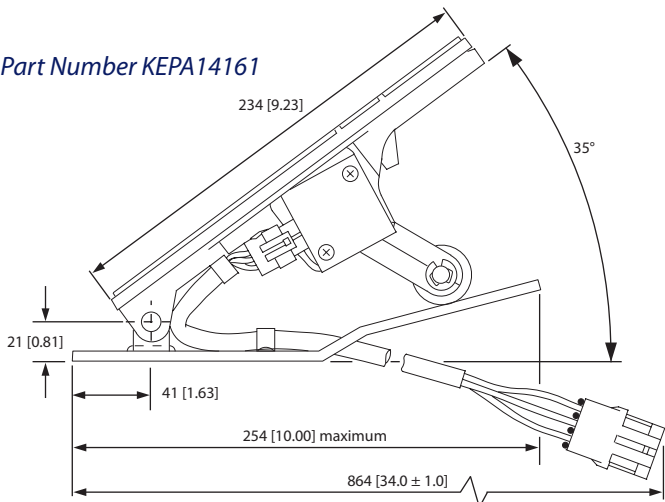
**Uni-directional Model Type**

mm [in]

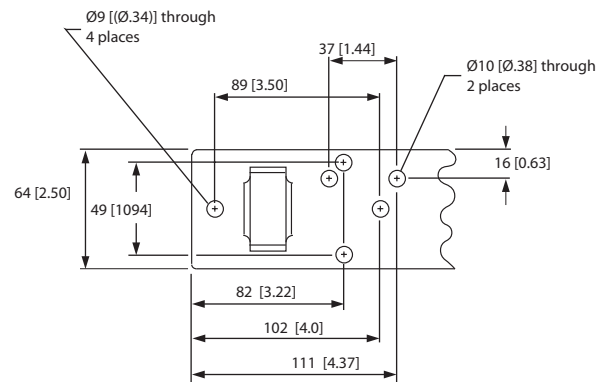
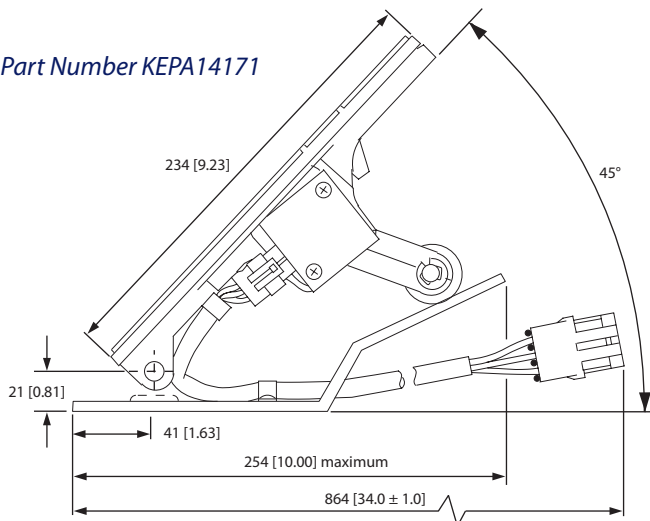
*Part Number KEPA14181*



*Part Number KEPA14161*



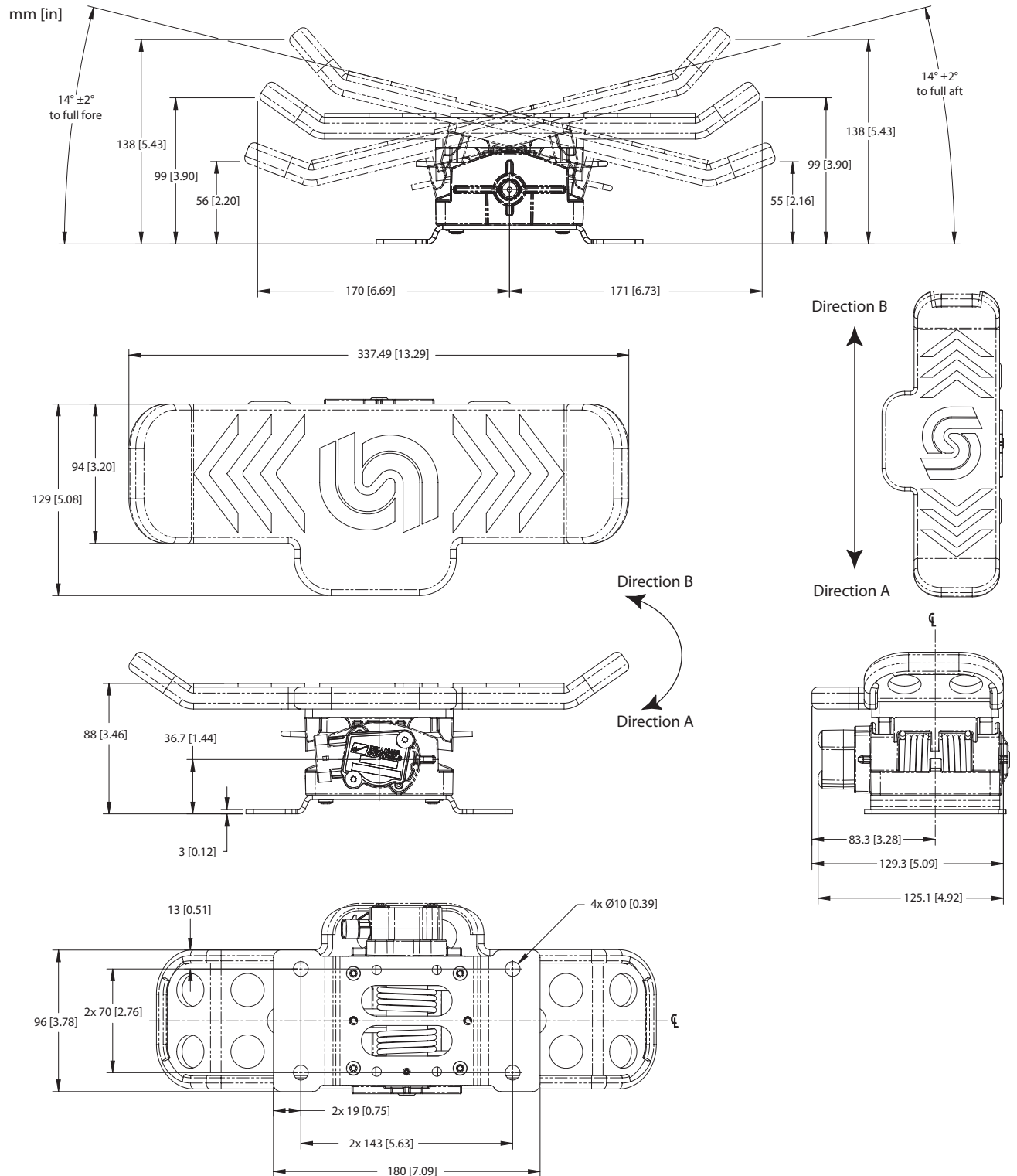
*Part Number KEPA14171*





**Dimensions  
(continued)**

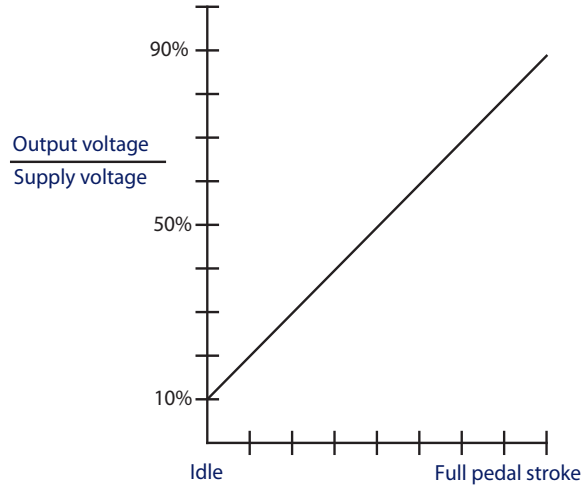
**Bi-directional Model Type**



P108 071E

Output  
 Characteristics

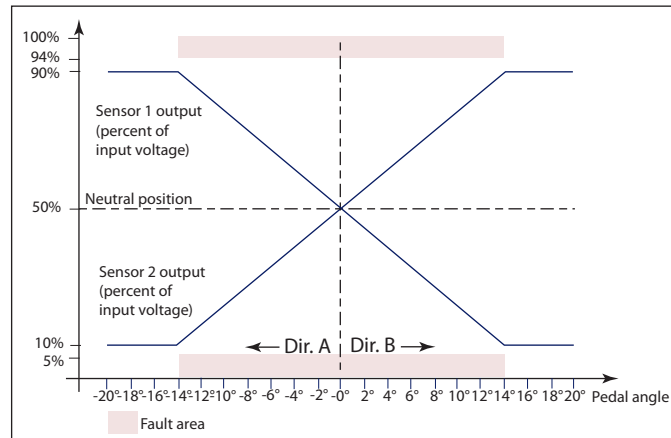
Uni-Directional Model Type



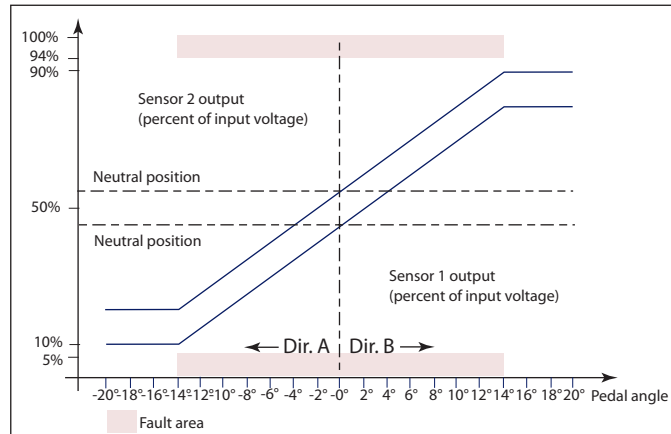
P200 011

Bi-Directional Model Type

Option 1, 10%-90% and 90%-10%



Option 2, 20%-90% and 10%-80%

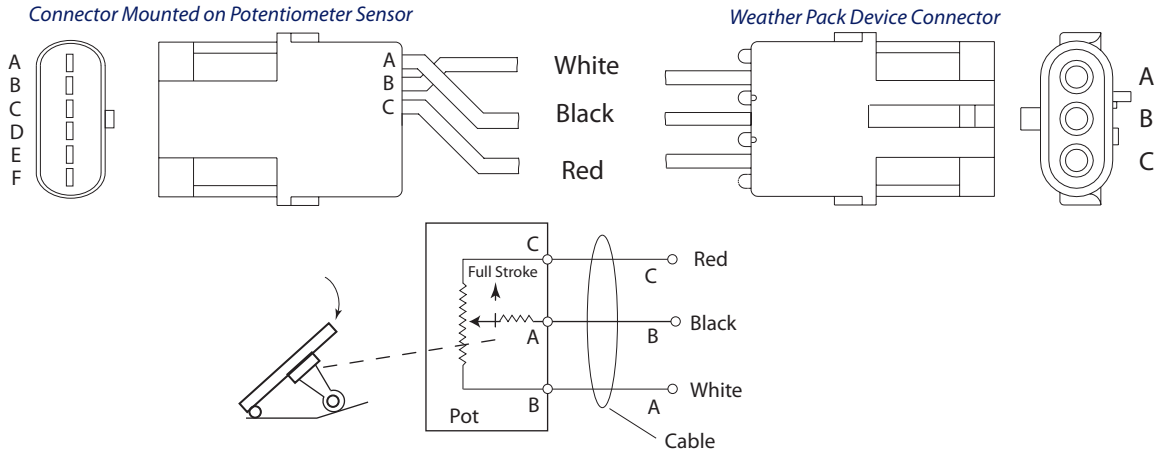


P108 076E

**Electrical Connections**

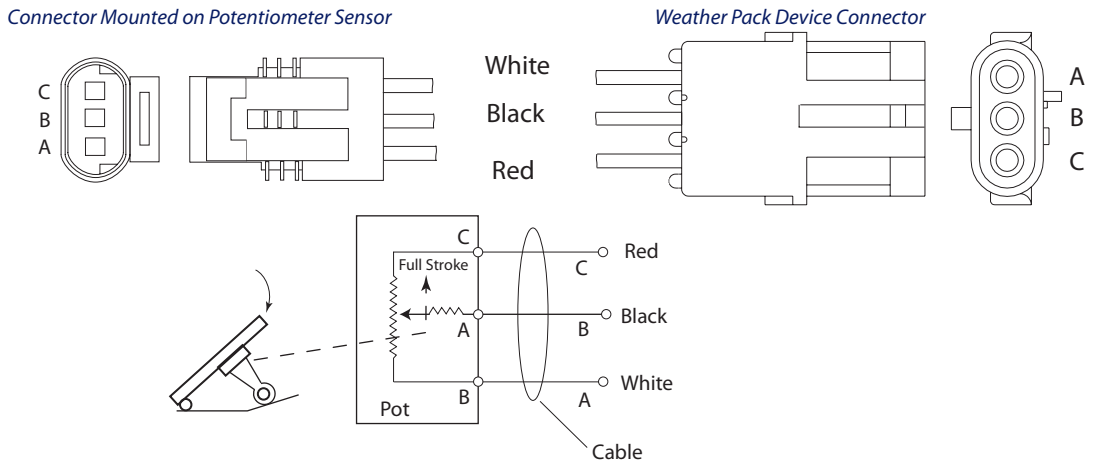
**Uni-directional Model Type**

*Current Configuration*



P108 074E

*Configuration Before Feb 2006*



P108 075E

*A PLUS+1 Module Pin Connections Example*

Pin	Sensor	Connector
Power ground -	Not used	Not used
Power supply +	Not used	Not used
Sensor power +	C,	C
Sensor power -	B,	A
AIN/CAN0 shield	A,	B
AIN/CAN1 shield	A,	B
DIN	Not used	Not used
DIN/AIN	A,	B
DIN/AIN/FreqIN	A,	B
AIN/Temp/Rheo	A,	B

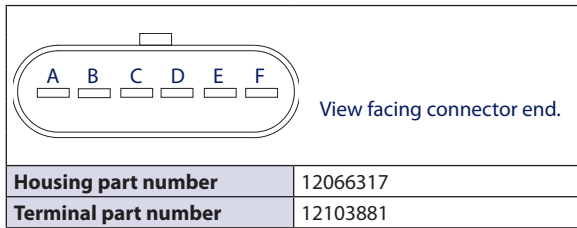
**Electrical Connections (continued)**

**Bi-directional Model Type**

*Sensor Connections*

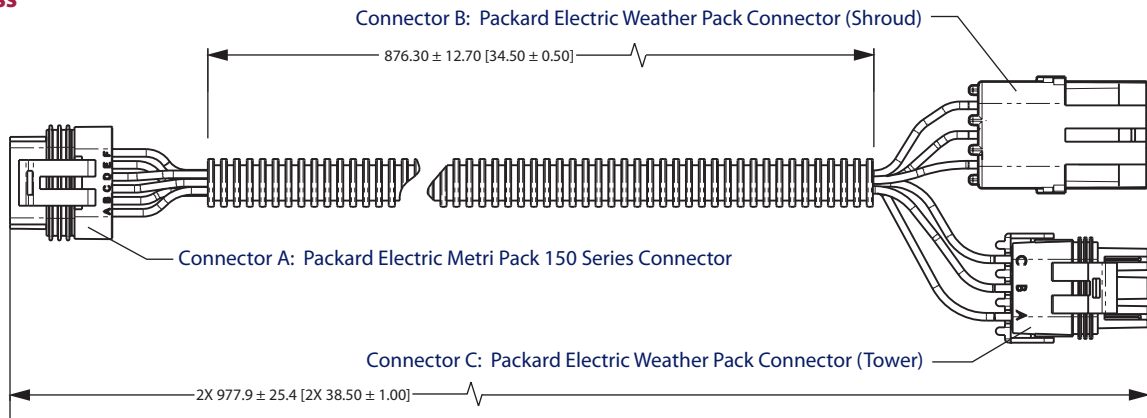
Pin	Function	Wire color
A	Signal 1 = Us1	Black
B	Ground 1 = GND1	White
C	Supply 1 = Ucc1	Red
D	Supply 2 = Ucc2	Green
E	Ground 2 = GND2	Blue
F	Signal 2 = Us2	Orange

*Packard Electric Metri-Pack Series 150*



P108 180E

**Wiring Harness**



P200 006

*Connector A: Packard Electric Metri-Pack Connector*

Pin	Function	Wire color
A	Signal 1 = Us1	Black
B	Ground 1 = GND1	White
C	Supply 1 = Ucc1	Red
D	Supply 2 = Ucc2	Green
E	Ground 2 = GND2	Blue
F	Signal 2 = Us2	Orange



P200 007

*Connector B: Packard Electric Weather Pack Connector (Shroud)*

Pin	Function	Wire color
A	Ground 1 = GND1	White
B	Signal 1 = Us1	Black
C	Supply 1 = Ucc1	Red



P200 008

*Connector C: Packard Electric Weather Pack Connector (Tower)*

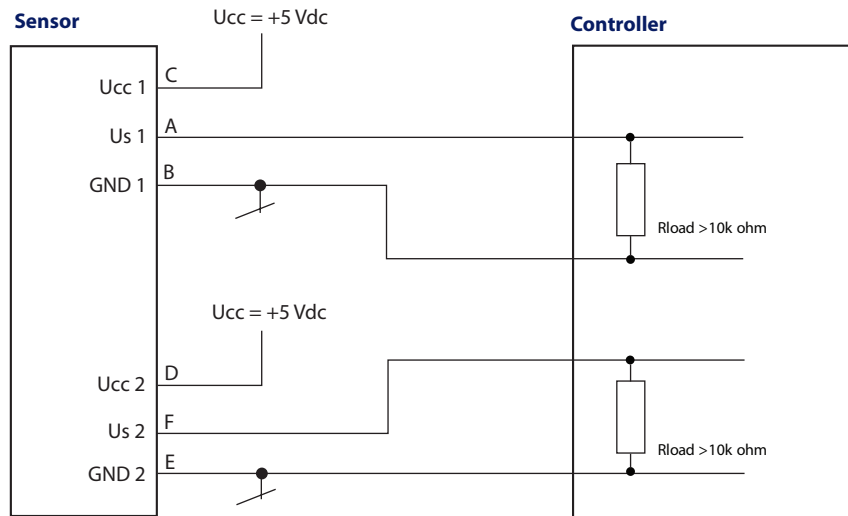
Pin	Function	Wire color
C	Supply 2 = Ucc2	Green
B	Ground 2 = GND2	Blue
A	Signal 2 = Us2	Orange



P200 009

Connecting  
 Foot Pedal to a  
 PLUS+1 Module

Example



P108 072E

Foot Pedal

Function	Pin
Signal 1 = Us1	A
Ground 1 = GND1	B
Supply 1 = Ucc1	C
Supply 2 = Ucc2	D
Ground 2 = GND2	E
Signal 2 = Us2	F

Connector 2

Pin	Controller function
C2-P1	DIN
C2-P2	DIN/AIN/FreqIN
C2-P3	DIN/AIN/FreqIN
C2-P4	DIN/AIN/FreqIN
C2-P5	DIN/AIN/FreqIN
C2-P6	DIN/AIN/FreqIN
C2-P7	AIN/Temp/Rheo
C2-P8	AIN/Temp/Rheo
C2-P9	PWMOUT/DOUT/PVGOUT
C2-P10	PWMOUT/DOUT/PVGOUT
C2-P11	PWMOUT/DOUT/PVGOUT
C2-P12	PWMOUT/DOUT/PVGOUT

Power supply	
12/24 Vdc	-
12/24 Vdc	+

Connector 1

Pin	Controller function
C1-P1	Power ground -
C1-P2	Power supply +
C1-P3	CAN +
C1-P4	CAN -
C1-P5	AIN/CAN shield
C1-P6	DIN
C1-P7	DIN
C1-P8	5 Vdc sensor power +
C1-P9	Sensor power ground -
C1-P10	DIN
C1-P11	DIN
C1-P12	DIN

P108 073E

**Connecting  
 Foot Pedal to a  
 PLUS+1 Module  
 (continued)**

*PLUS+1 Module Pin Connections Example*

Pin	Sensor
Power ground -	Not used
Power supply +	Not used
Sensor power +	C, D
Sensor power -	B, E
AIN/CAN0 shield	A, F
AIN/CAN1 shield	A, F
DIN	Not used
DIN/AIN	A, F
DIN/AIN/FreqIN	A, F
AIN/Temp/Rheo	A, F



Electronic Foot Pedal  
Technical Information  
Notes



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