

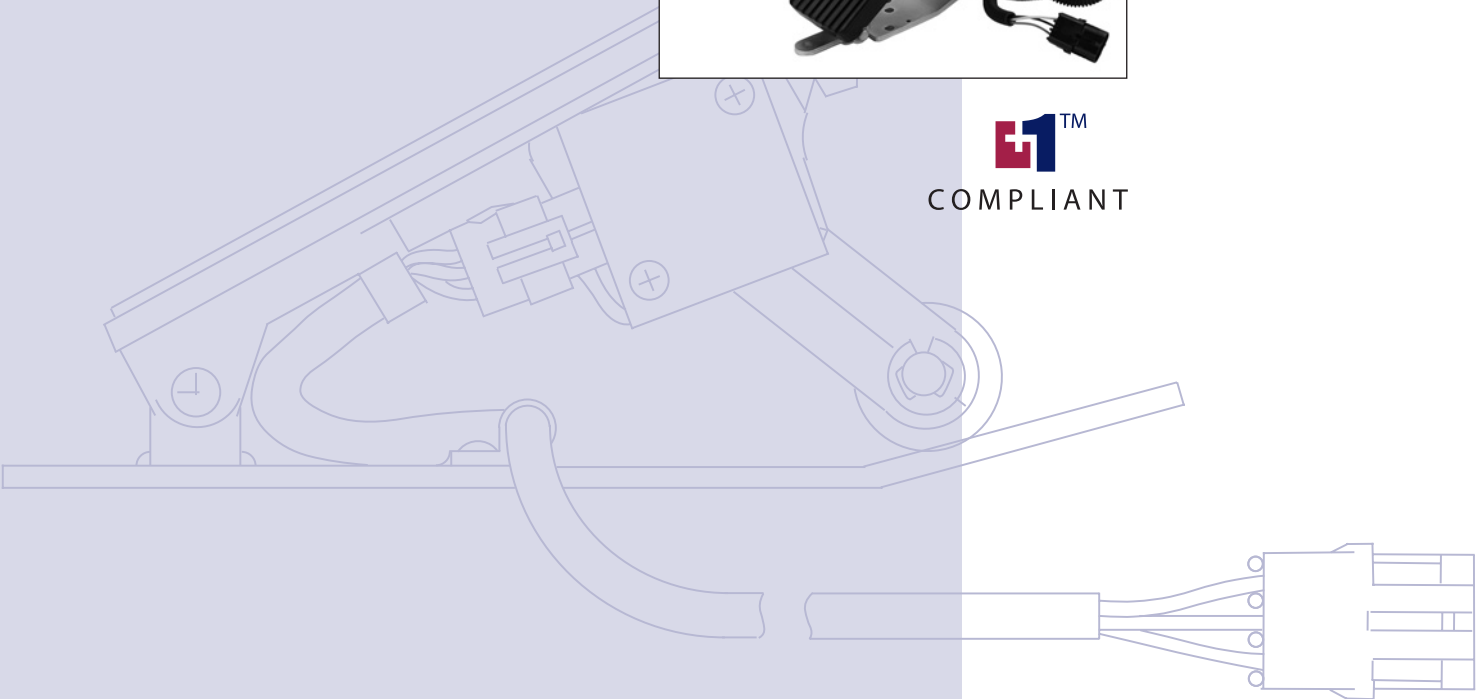


Electronic Foot Pedal

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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Overview

Description4
 Features4
 Uni-directional Model Type.....4
 Bi-directional Model Type.....4
 Operation4
 Uni-directional Model Type4
 Bi-directional Model Type.....4
 Ordering Information.....5
 Uni-directional Model Type.....5
 Bi-directional Model Type.....5

Technical Data

Electrical and Environmental6
 Uni-directional Model Type.....6
 Bi-directional Model Type.....7

Installation

Dimensions.....8
 Uni-directional Model Type.....8
 Bi-directional Model Type.....9
 Output Characteristics.....10
 Uni-Directional Model Type10
 Bi-Directional Model Type10
 Electrical Connections11
 Uni-directional Model Type11
 Bi-directional Model Type.....12
 Wiring Harness.....12
 Connecting Foot Pedal to a PLUS+1 Module13
 Example.....13

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° ¹	10% to 90%		2500 Ohms ² KEPA14181 ³
KEPA14161	Uni-directional	Rubber	Packard Electric Weather Pack	35° ¹	10% to 90%		2500 Ohms ² KEPA14161 ³ 791681N ⁴
KEPA14171	Uni-directional	Rubber	Packard Electric Weather Pack	45° ¹	10% to 90%		2500 Ohms ² KEPA14171 ⁵

¹ Refer to *Technical Specification*, pages 6 to 7.

² Plus a 1K internal current limiting resistor.

³ US part number.

⁴ EU part number.

⁵ 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	12066317
	Six Terminals	12013881

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

**Electrical and
 Environmental**

Uni-directional Model Type

Specifications

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

Materials

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

Mechanical Ratings

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

Signal Output

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

**Electrical and
 Environmental
 (Continued)**

Bi-directional Model Type

Specifications

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

Material

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

Mechanical Ratings

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

Signal Output

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

Option 1, Signal Level

Signal 1 range nominal (APS1)	90% +2% and -4% → A
	10% +4% and -2% → B
Signal 2 range nominal (APS2)	10% +4% and -2% → A
	90% +2% and -4% → B
Neutral 1 range nominal (APS1)	50% ± 4%
Neutral 2 range nominal (APS2)	50% ± 4%

Option 2, Signal Level

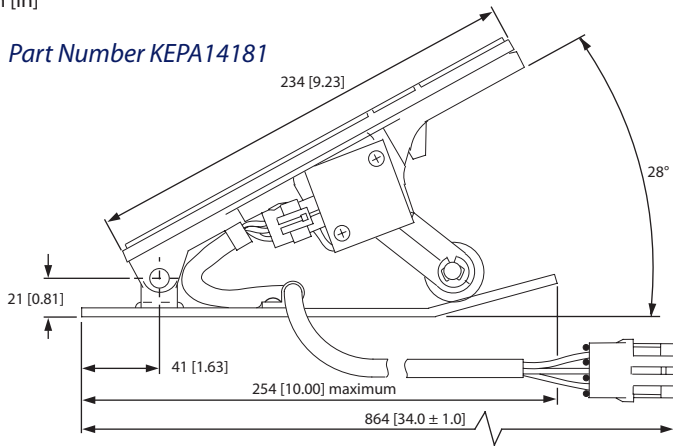
Signal 1 range nominal (APS1)	10% +4% and -2% → A
	80% +2% and -4% → B
Signal 2 range nominal (APS2)	20% +4% and -2% → A
	90% +2% and -4% → B
Neutral 1 range nominal (APS1)	45% ± 4%
Neutral 2 range nominal (APS2)	55% ± 4%

Dimensions

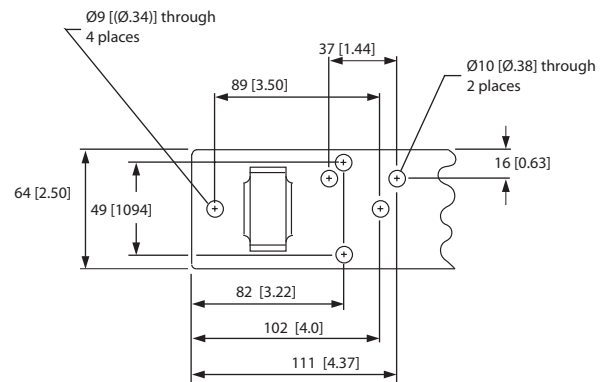
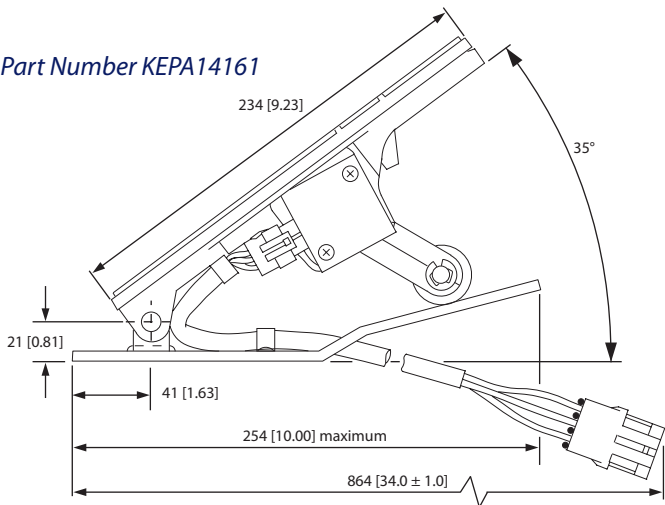
Uni-directional Model Type

mm [in]

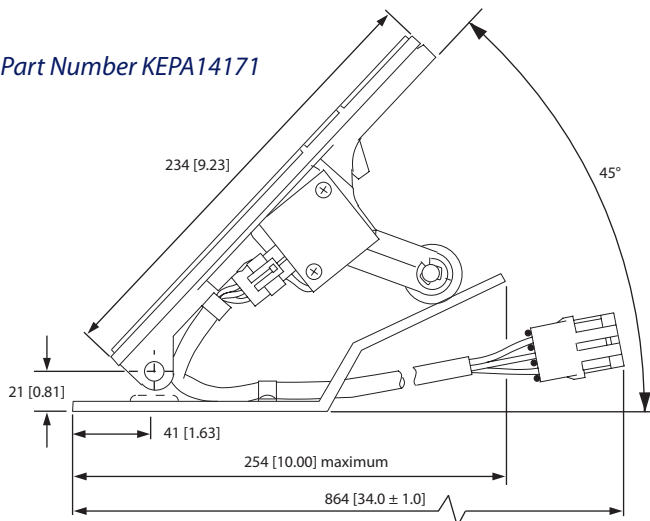
Part Number KEPA14181



Part Number KEPA14161

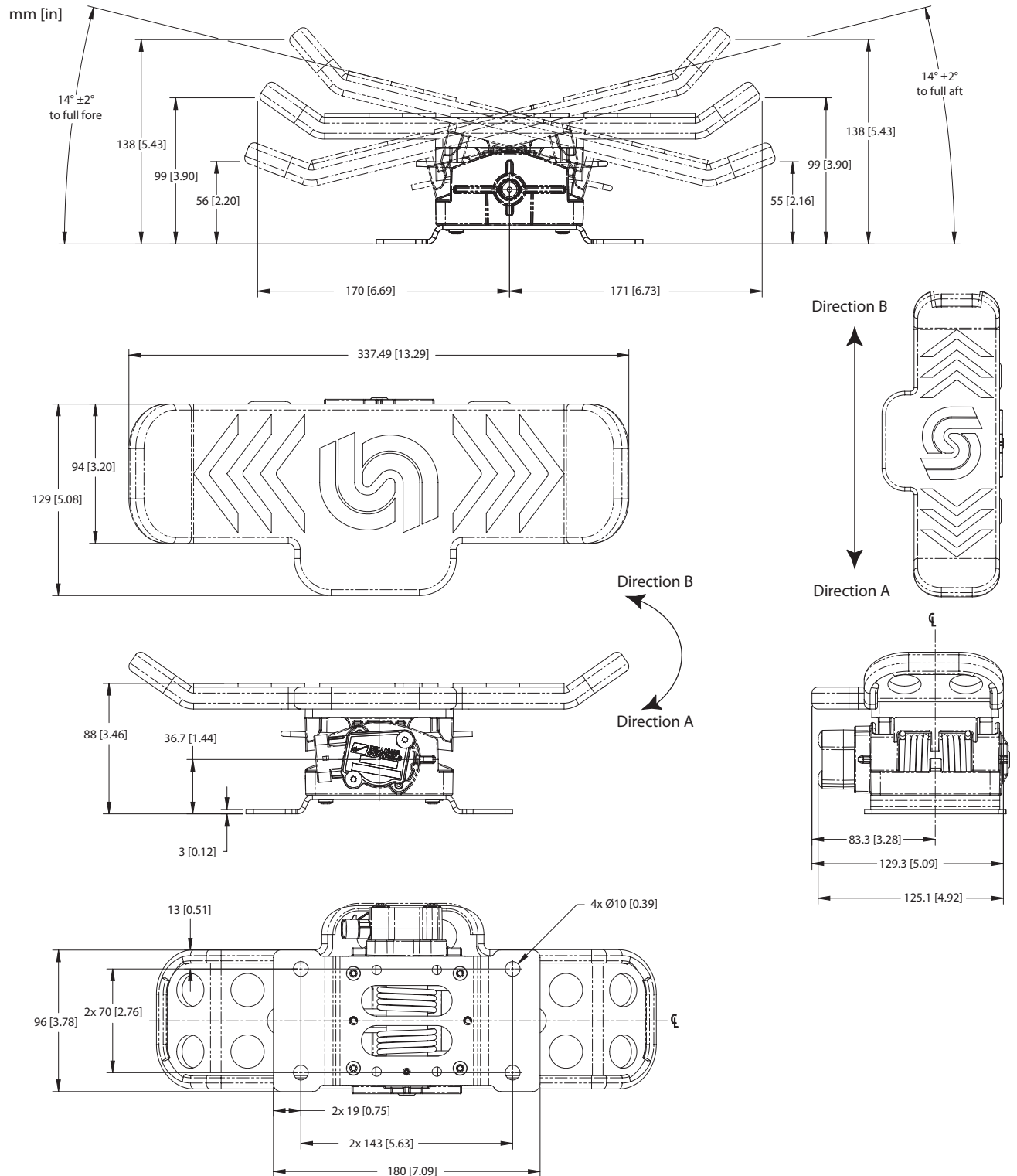


Part Number KEPA14171



**Dimensions
(continued)**

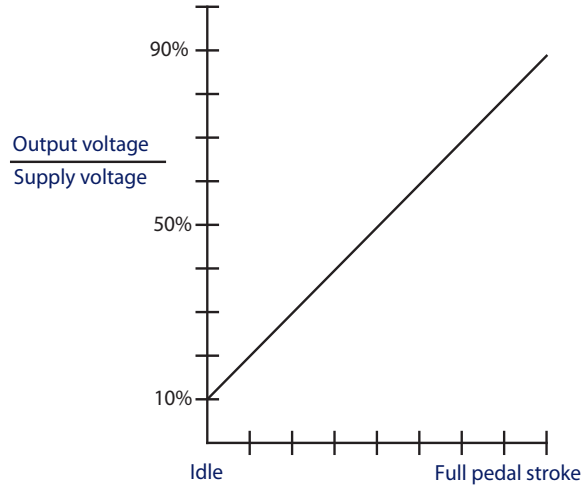
Bi-directional Model Type



P108 071E

Output Characteristics

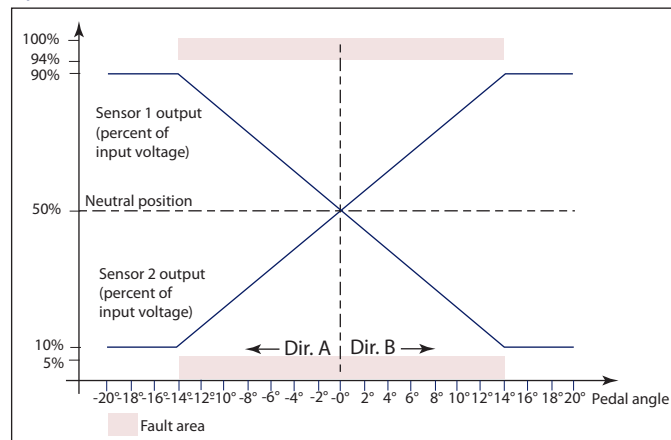
Uni-Directional Model Type



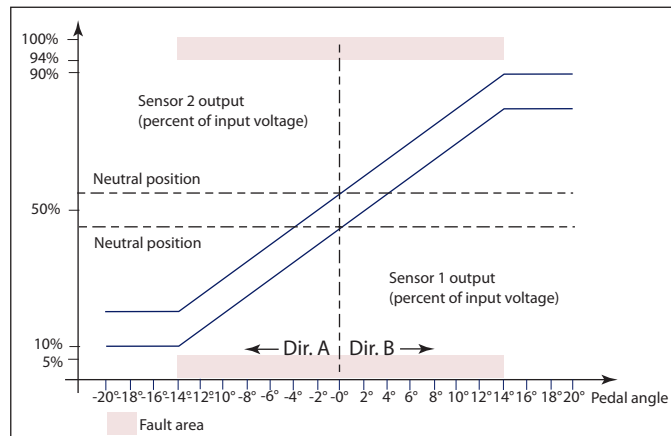
P200 011

Bi-Directional Model Type

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



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

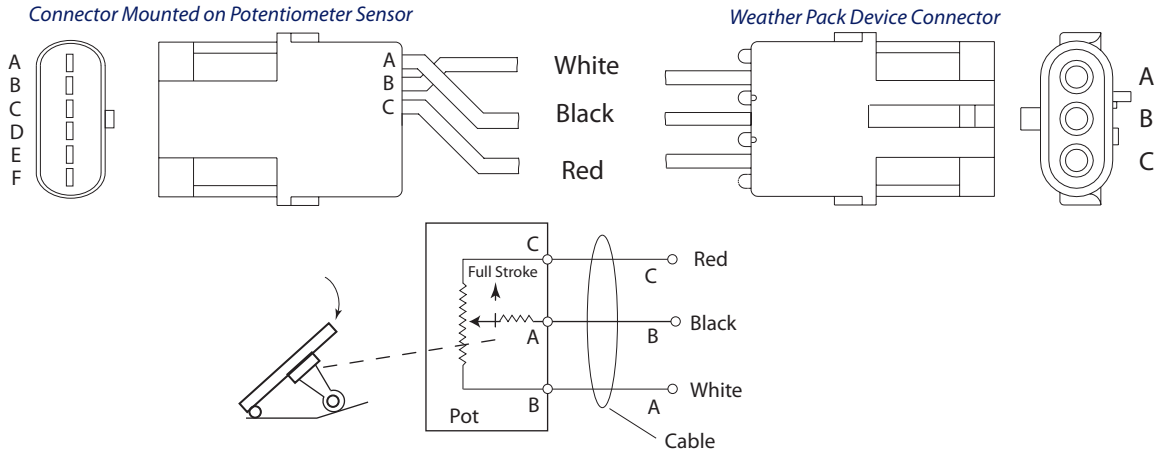


P108 076E

Electrical Connections

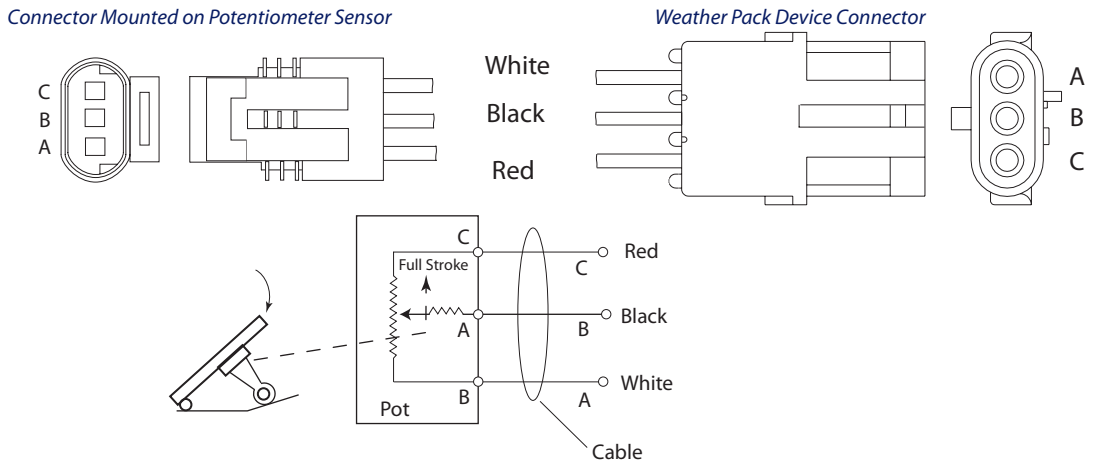
Uni-directional Model Type

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

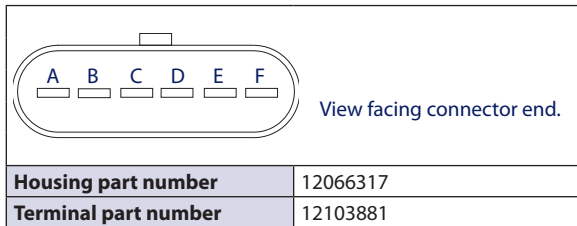
Electrical Connections (continued)

Bi-directional Model Type

Sensor Connections

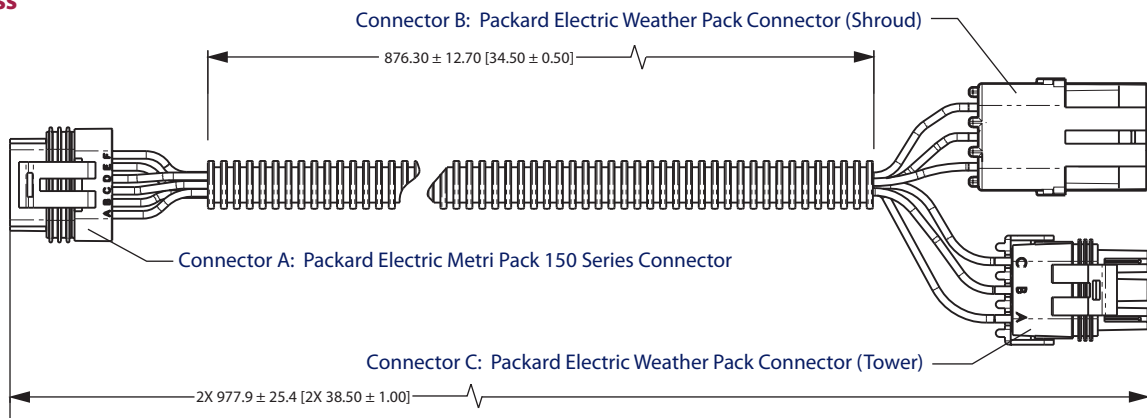
Pin	Function	Wire color
A	Signal 1 = Us1	Black
B	Ground 1 = GND1	White
C	Supply 1 = Ucc1	Red
D	Supply 2 = Ucc2	Green
E	Ground 2 = GND2	Blue
F	Signal 2 = Us2	Orange

Packard Electric Metri-Pack Series 150



P108 180E

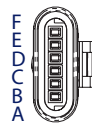
Wiring Harness



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)

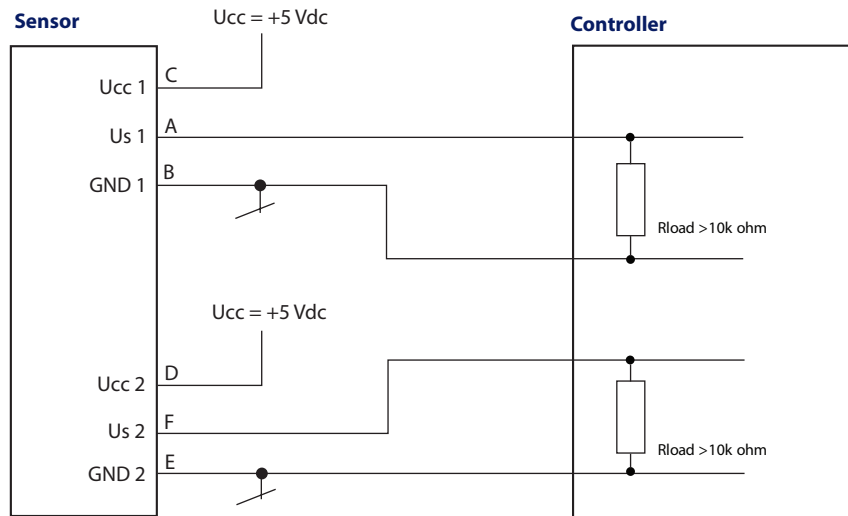
Pin	Function	Wire color
C	Supply 2 = Ucc2	Green
B	Ground 2 = GND2	Blue
A	Signal 2 = Us2	Orange



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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