IDEX CORPORATION

Class 1

ISO 9001 CERTIFIED

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SUITABLE FOR OEM DISTRIBUTION ONLY

TECHNICAL PRODUCT DATASHEET

High Density PDM

21 Output / 10 Input

P/N 120727

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TECHNICAL DATA SHEET

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1. Revision Log

Rev	Date	Changes
1.00	4/22/2010	Initial revision
1.10	11/2/2010	Updated password section. Added address conflict indication in section **Error! Reference source not found.**. Added warning about combining outputs to increase load capability.

Product specifications in this manual are subject to change without notice.

2. Part Numbers

2.1. PDM part numbers

ES-Key High Density PDM	120727

Documentation (available from Class 1's website - www.class1.com)

Full Manual (this manual)	120741
Quick Manual	120742

2.2. Miscellaneous part numbers

PDM connector items

Deutsch 12-position mating plug - GRAY	DT06-12SA
Deutsch 12- position mating plug - BLACK	DT06-12SB
Deutsch 12- position mating plug - GREEN	DT06-12SC
Deutsch 12- position mating plug wedge lock	W12S
Deutsch DT series socket (16 GA)	0462-201-16141
Deutsch DT series socket (16 GA) - GOLD	0462-201-1631
Cannon 1-way circular high power plug	121583-0013
Cannon 2 AWG socket	031-8521-020
Cannon 4 AWG socket	031-8521-010
Cannon Hexagonal nut	217-8516-010
Cannon cable seal - 0.409in [10.4mm] to 0.472in [12.0mm]	351-8697-001

CAN connector items

Deutsch 3- position mating plug - GRAY	DT06-3S
Deutsch 3- position mating plug wedge lock - BLUE	W3S-1939
Deutsch 3- position mating plug wedge lock - ORANGE	W3S
Deutsch DT series socket (16 GA) - GOLD	0462-201-1631
Deutsch DT series 3-way "Y" receptacle	DT04-3P-P007
Deutsch 3- position mating plug with terminating resistor	DT06-3S-P006

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3. Overview

3.1. Product description

The High Density PDM (p/n 120727) is a Class 1 ES-Key™ module with 20 high current positive outputs, 1 low current ground output, and 10 selectable polarity inputs designed for use within an ES-Key electrical system network.

3.2. Features

- **20** positive polarity solid state outputs (13 Amps each) section 4.1
- **1** ground polarity solid state outputs (2 Amps) section 4.2
- **10** selectable polarity (positive or ground) digital inputs section 4.3
- Digital Circuit Breakers on all positive polarity outputs section 4.1.1
- Output PWM control *(outputs 16 through 19 only)* section 4.1.3
- Output FLASH control *(only when configured for dual addresses)* section 4.1.2

3.3. Indicators and buttons

The High Density PDM has a 7-segment display, three LED indicators, and two buttons for diagnostic, indication, and configuration purposes.

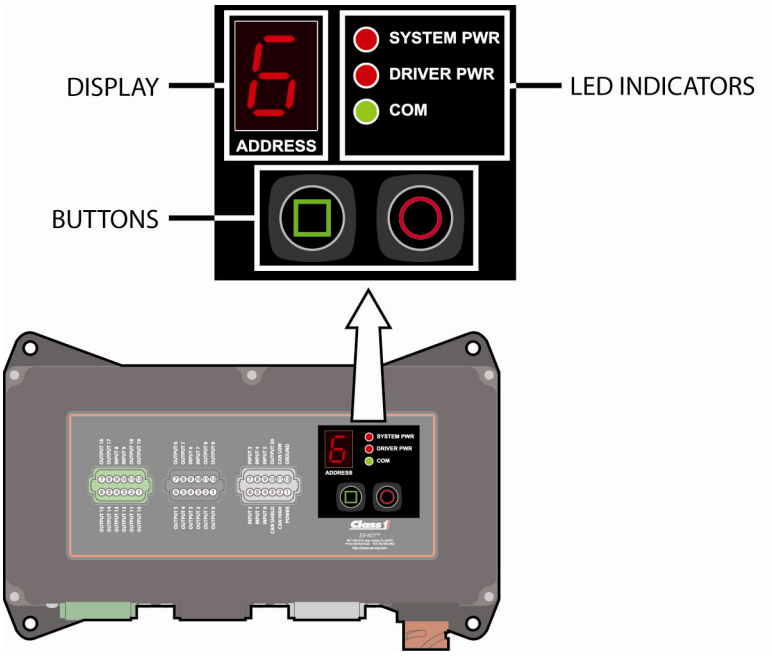

Figure 1. *High Density PDM indicators and buttons.*

3.3.1. Display

The High Density PDM has a 7-segment LED display to show operational information.

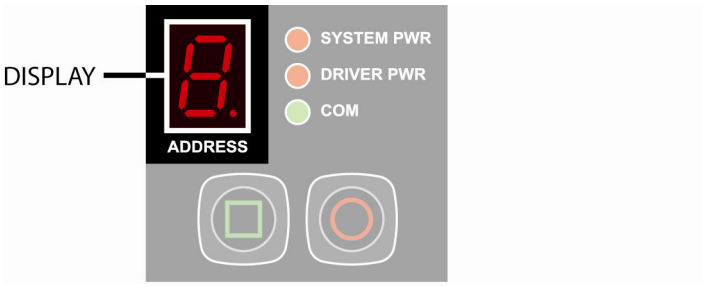

Figure 2. *High Density PDM display.*

During normal operation the display shows the High Density PDM's ES-Key address (Table 1). The display's decimal indicates the state of the FLASH output memory space: decimal ON indicates FLASH output memory space is enabled, decimal OFF indicates FLASH output memory space is disabled.

Display	Address
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
b	11
C	12
d	13
E	14
F	15

Table 1. *Normal operation address display.*

The display is also used to show password and configuration information.

A flashing address display indicates a PRIMARY address conflict with another module of the same device type.
A flashing decimal point indicates a FLASH address conflict with another module of the same device type.

3.3.2. LED diagnostic indicators

The High Density PDM has three LED diagnostic indicators: SYSTEM PWR, DRIVER PWR, and COM.

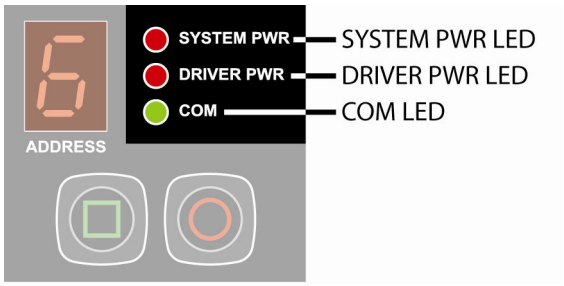

Figure 3. *High Density PDM LED indicators.*

SYSTEM PWR LED

The red system power (SYSTEM PWR) LED indicates the state of the system power input (pin 1) and system ground input (pin 12) of the gray connector.

LED state	Description
ON	**Power is applied to pin 1 and ground applied to pin 12 of the gray connector.**
OFF	*Either power (pin 1) and/or ground (pin 12) is missing.*

Table 2. *SYSTEM PWR LED states.*

DRIVER PWR LED

The red driver power (DRIVER PWR) LED indicates the state of the driver power input (large single pin Cannon connector).

LED state	Description
ON	**Power is applied to the driver power pin.**
OFF	*Power is NOT applied to the driver power pin.*

Table 3. *DRIVER PWR LED states.*

COM LED

The green communication (COM) LED indicates the state of the High Density PDM's CAN communication.

LED state	Description
ON	**CAN communication active.**
OFF	*LED or module is inoperative*
SLOW FLASH (1 Hz)	*CAN bus okay, no communication with ECU.* *Verify CAN bus connection to ECU.*
FAST FLASH (10 Hz)	*CAN bus error (passive).* *Verify terminating resistors are correctly installed on CAN bus.*
DOUBLE BLINK	*CAN bus error (active).* *Evaluate CAN bus wiring for shorts, improper wiring, etc.*

Table 4. *COM LED states.*

3.3.3. Buttons

The High Density PDM has two buttons (green SQUARE, red CIRCLE) which are used to enter passwords (see section 6.1). The display will show a "1" momentarily when the green SQUARE button is pressed and a "0" momentarily when the red CIRCLE button is pressed.

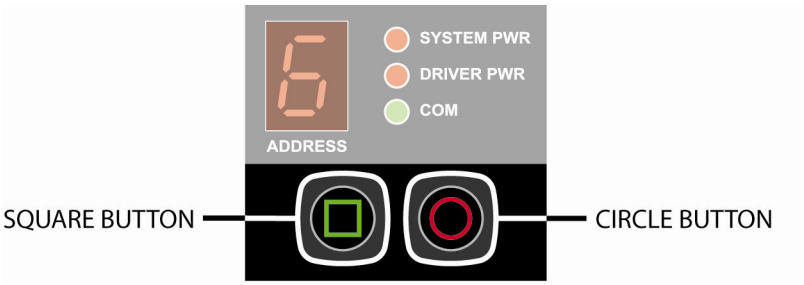

Figure 4. *High Density PDM buttons.*

Surface may be HOT when operating with high current. Use caution when operating buttons.

3.4. Device type and address

The High Density PDM is recognized by the ES-Key Professional software as a **Power Distribution Module** (default), but may be configured via password as an Input Output Module (see section 6.4.1).

The High Density PDM's **address is 0** (default), but may be configured to any valid ES-Key address by entering a password (see section 6.3).

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4. Input / Output Detail

4.1. Solid state positive outputs

Outputs 0 through 19 utilize solid state, fully protected high-side drivers that feature overload protection, current limitation, and transient protection. These output drivers replace the requirement of a relay and circuit breaker.

High current rating

Each high current output is capable of supplying 13 Amps continuously. However, each Deutsch connector must be limited to a maximum of 100 Amps. The high current outputs are located on the black and green Deutsch connectors.

The OEM is responsible for limiting each Deutsch connector to a maximum of 100 Amps of output current and to ensure than no more than 200 Amps is permitted through the power supply cable.

Combining multiple outputs in an effort to increase load carrying capability is NOT recommended due to current balancing issues which may cause over-current conditions.

4.1.1. Circuit protection (software circuit breaker)

An output will automatically turn OFF when its current exceeds 13.5 Amps for 3 seconds. The module will attempt to turn ON and verify the load two more times at 5 second intervals. If the output is still overloaded it will remain OFF.

An output's "circuit breaker" feature can be reset by de-activating the output and then re-activating the output through the ES-Key network.
When an output is in an over-current situation a fault is logged to the USM and data logger.

4.1.2. Flash outputs

The High Density PDM has the integrated capability to flash outputs for use with flashing lights, wig-wag lights, etc. The *flash outputs* feature must be enabled by entering a password (see section 6.5.1). This configures the High Density PDM to use two addresses in order to accommodate the required number of output memory spaces (refer to the extended I/O memory space table in section 5.1.2).

The outputs have the capability to flash at two flash rates: 150 pulses per minute (2.5 Hz) and 75 pulses per minute (1.25 Hz). Outputs 0 - 9 flash on the "BANK A" pulse, and outputs 10 - 20 flash on the "BANK B" pulse. This logic makes implementing alternating flashers quite simple.

Extended output memory spaces 0 through 20 control the output flash feature and extended output memory spaces 21 (BANK A) and 22 (BANK B) control the flash rate (see section 5.1.2).

Activate an output's flash output (extended output memory space 0-20) to begin flashing the output. The physical output (standard output memory space 0-20) should be OFF.

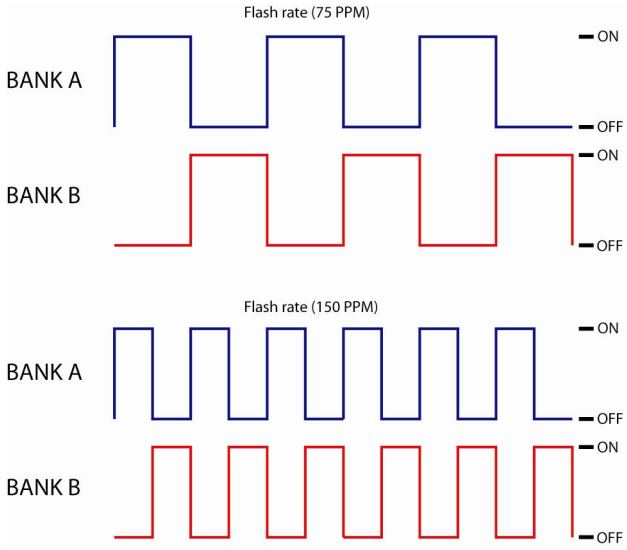

Figure 5. *Output banks A and B flash rates.*

An output's flash occurs on the opposite bank when its flash output is ON ***and*** its physical output is ON. For example, output 0 normally flashes on the "BANK A" pulse (its primary BANK), but when its flash output (extended output memory space 0) and its physical output (standard output memory space 0) are activated together output 0 flashes on the "BANK B" pulse (its alternate BANK).

Output memory space	Flash memory space	Result
OFF	OFF	Physical output is OFF
ON	OFF	Physical output is ON
OFF	**ON**	**Physical output is flashing on its primary BANK pulse**
ON	**ON**	**Physical output is flashing on its alternate BANK pulse**

Table 5. *Flash logic.*

4.1.3. Pulse Width Modulate (PWM) outputs

Outputs 16, 17, 18, and 19 can be controlled ON at reduced power by activating the output's associated PWM control in the standard output memory space (refer to the output memory space table in section 5.1.1).

For example, activating output memory space 22 (PWM control of physical output 16) while NOT activating output memory space 16 (output control of physical output 16) will cause physical output 16 to be ON with PWM. This feature is useful for dimming lights, etc.

The table below shows the interaction of a physical output's control and PWM controls in the output memory space.

Output control memory space	PWM control memory space	Result
OFF	OFF	Physical output is OFF
ON	OFF	Physical output is ON
OFF	**ON**	**Physical output is ON with PWM**
ON	ON	Physical output is ON (no PWM)

Table 6. *PWM logic.*

The PWM duty cycle for all of the PWM-able outputs (16-19) is controlled by standard output memory spaces 27 through 31 and can be set to 10%, 20%, 30%, 40%, 50%, or 60%. When none of the PWM duty cycle memory space outputs are active the PWM duty cycle is set to 60%. If more than one of the PWM duty cycle memory space outputs are active, the lower numbered memory output space will have priority. For example, when output memory spaces 28 (20%) and 30 (40%) are both activated the PWM duty cycle is set to 20%.

4.2. Solid state ground output

Output 20 is a fully protected (overload, short circuit, and overvoltage) ground output capable of 2 Amps continuous load current. Output 20 may also be flashed (see section 4.1.2).

4.3. Selectable polarity inputs

The High Density PDM has 10 selectable polarity inputs (positive or ground). The state of the inputs is reported in the standard input memory space (see section 5.1.1).
The **default polarity** of the inputs is **positive**, but they may be change by entering a special password (see section 6.2).

4.3.1. Viewing the configured input polarity

The input's configured polarity may be verified by entering a password and watching the display (see section 6.2.2).

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5. ES-Key Network Detail

5.1. Input/output memory space

The High Density PDM uses ES-Key defined input and output memory space. The High Density PDM uses the standard I/O memory space for the polarity selectable inputs, physical outputs, and PWM control.

The High Density PDM may also be configured to use the extended I/O memory space for output flash control (see section 6.5.1).

5.1.1. Standard I/O memory space

INPUT MEMORY SPACE	
INPUT	DESCRIPTION
0	Physical input 0
1	Physical input 1
2	Physical input 2
3	Physical input 3
4	Physical input 4
5	Physical input 5
6	Physical input 6
7	Physical input 7
8	Physical input 8
9	Physical input 9
10	*reserved*
11	*reserved*
12	*reserved*
13	*reserved*
14	*reserved*
15	*reserved*
16	*reserved*
17	*reserved*
18	*reserved*
19	*reserved*
20	*reserved*
21	*reserved*
22	*reserved*
23	*reserved*
24	*reserved*
25	*reserved*
26	*reserved*
27	*reserved*
28	*reserved*
29	*reserved*
30	*reserved*
31	*reserved*

OUTPUT MEMORY SPACE		
OUTPUT	LOCATION	
0	Physical output 0	13A, positive
1	Physical output 1	13A, positive
2	Physical output 2	13A, positive
3	Physical output 3	13A, positive
4	Physical output 4	13A, positive
5	Physical output 5	13A, positive
6	Physical output 6	13A, positive
7	Physical output 7	13A, positive
8	Physical output 8	13A, positive
9	Physical output 9	13A, positive
10	Physical output 10	13A, positive
11	Physical output 11	13A, positive
12	Physical output 12	13A, positive
13	Physical output 13	13A, positive
14	Physical output 14	13A, positive
15	Physical output 15	13A, positive
16	Physical output 16	13A, positive
17	Physical output 17	13A, positive
18	Physical output 18	13A, positive
19	Physical output 19	13A, positive
20	Physical output 20	2A, ground
21	*reserved*	
22	PWM output 16	
23	PWM output 17	
24	PWM output 18	
25	PWM output 19	
26	*reserved*	
27	PWM duty cycle 10%	
28	PWM duty cycle 20%	
29	PWM duty cycle 30%	
30	PWM duty cycle 40%	
31	PWM duty cycle 50%	

Table 7. *Standard I/O memory space.*

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5.1.2. Extended I/O memory space (flash memory space)

INPUT MEMORY SPACE	
INPUT	DESCRIPTION
0	*reserved*
1	*reserved*
2	*reserved*
3	*reserved*
4	*reserved*
5	*reserved*
6	*reserved*
7	*reserved*
8	*reserved*
9	*reserved*
10	*reserved*
11	*reserved*
12	*reserved*
13	*reserved*
14	*reserved*
15	*reserved*
16	*reserved*
17	*reserved*
18	*reserved*
19	*reserved*
20	*reserved*
21	*reserved*
22	*reserved*
23	*reserved*
24	*reserved*
25	*reserved*
26	*reserved*
27	*reserved*
28	*reserved*
29	*reserved*
30	*reserved*
31	*reserved*

OUTPUT MEMORY SPACE		
OUTPUT	LOCATION	
0	Flash output 0 (1)	BANK A
1	Flash output 1 (1)	
2	Flash output 2 (1)	
3	Flash output 3 (1)	
4	Flash output 4 (1)	
5	Flash output 5 (1)	
6	Flash output 6 (1)	
7	Flash output 7 (1)	
8	Flash output 8 (1)	
9	Flash output 9 (1)	
10	Flash output 10 (2)	BANK B
11	Flash output 11 (2)	
12	Flash output 12 (2)	
13	Flash output 13 (2)	
14	Flash output 14 (2)	
15	Flash output 15 (2)	
16	Flash output 16 (2)	
17	Flash output 17 (2)	
18	Flash output 18 (2)	
19	Flash output 19 (2)	
20	Flash output 20 (2)	
21	Flash rate (ON = 2.5Hz, OFF = 1.25Hz) (3)	BANK A
22	Flash rate (ON = 2.5Hz, OFF = 1.25Hz) (4)	BANK B
23	*reserved*	
24	*reserved*	
25	*reserved*	
26	*reserved*	
27	*reserved*	
28	*reserved*	
29	*reserved*	
30	*reserved*	
31	*reserved*	

Table 8. *Extended I/O memory space.*

(1) These outputs are flash bank A.
(2) These outputs are flash bank B.
(3) This flash rate controls bank A flash speed.
(4) This flash rate controls bank B flash speed.

6. Configuration

6.1. Entering passwords

The High Density PDM utilizes passwords to modify its operational parameters. All operational parameters are stored in memory and will not be lost when power is disconnected.

Use the green **SQUARE** and red **CIRCLE** buttons to enter passwords. Each button press will show either a 1 or a 0 on the display to indicate the button pressed: **1** for the green SQUARE button and **0** for the red CIRCLE button. Each password button press must occur within 4 seconds of the last button press otherwise the attempted password is cleared.

6.1.1. List of passwords

Function	Root password	Remaining password	Section
Set polarity	○ ○ ○ □	Enter desired polarity with 10 presses (□ = positive, ○ = ground).	6.2.1
View polarity	○ ○ □ ○	None. Flashes back the input number and polarity (using decimal).	6.2.2
Set address	○ ○ □ □	Enter desired address with 4 presses (□ = bit 1, ○ = bit 0).	6.3
Set device type	○ □ ○ ○	Enter desired device type with 4 presses (○○○□ = PDM, ○□○○ = IOM).	6.4.1
View device type	○ □ ○ □	None. Flashes back the device type number (1 = PDM, 4 = SOM).	6.4.2
Configure flash address space	○ □ □ ○	Enter 4 presses (□□□□ = flash enabled, ○○○○ = flash disabled).	6.5
Load defaults	□ ○ ○ ○	□ □ □ ○ ○ □ ○ □	6.6

Table 9. *Password list.*

6.2. Input polarity

Each of the 10 physical inputs can be configured for positive or ground polarity input (**positive** polarity is the **default**).

6.2.1. Set polarity

The password to set the polarity consists of 14 button presses. The root password is the first 4 button presses (○ ○ ○ □) and the remaining 10 button presses indicate the desired polarity of the inputs. Use the table below to configure the remaining 10 bits of the password (□ = positive, ○ = ground).

ROOT PASSWORD				IN 9	IN 8	IN 7	IN 6	IN 5	IN 4	IN 3	IN 2	IN 1	IN 0
○	○	○	□	□ or ○	□ or ○	□ or ○	□ or ○	□ or ○	□ or ○	□ or ○	□ or ○	□ or ○	□ or ○

For example, inputs 0,1, 2, 6, and 9 are desired to be positive polarity and inputs 3, 4, 5, 7, and 8 are desired to be ground polarity – the password would be: ○ ○ ○ □ □ ○ ○ □ ○ ○ ○ □ □ □.

6.2.2. View polarity

The password to view the configured input polarities consists of 4 button presses.

ROOT PASSWORD			
○	○	□	○

After entering the "view polarity" password the High Density PDM's display will scroll through the input numbers (0 through 9). If the display's decimal is ON then the input is configured for positive polarity, if the display's decimal is OFF the input is configured for ground polarity. Each input and its polarity will be shown for two seconds. After all ten inputs are shown the High Density PDM will return to normal operation.

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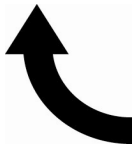
6.3. Address configuration

The High Density PDM's address can be set to any of the valid ES-Key addresses (0 through 15). Address 14 **cannot** be used if the device type is the default PDM (device type 1) because this *device type/address* combination is reserved for the ES-Key USM's use.

The password to set the address consists of 8 button presses. The root password is the first 4 button presses (○ ○ □ □) and the remaining 4 button presses indicate the desired address in binary coded decimal.

ROOT PASSWORD				ADDRESS			
○	○	□	□	□ or ○	□ or ○	□ or ○	□ or ○



Address	Password
0	○ ○ ○ ○
1	○ ○ ○ □
2	○ ○ □ ○
3	○ ○ □ □
4	○ □ ○ ○
5	○ □ ○ □
6	○ □ □ ○
7	○ □ □ □

Address	Password
8	□ ○ ○ ○
9	□ ○ ○ □
10	□ ○ □ ○
11	□ ○ □ □
12	□ □ ○ ○
13	□ □ ○ □
14	□ □ □ ○
15	□ □ □ □

The address may be viewed at anytime during normal operation on the High Density PDM's display.

6.4. Device Type configuration

The High Density PDM's device type can be set as an Input Output Module (IOM, device type 4) or a Power Distribution Module (PDM, device type 1). The High Density PDM's **default device** type is a **Power Distribution Module.**

6.4.1. Set device type

Set the High Density PDM to Power Distribution Module device type.

ROOT PASSWORD				PDM DEVICE TYPE			
○	□	○	○	○	○	○	□

Set the High Density PDM to Input Output Module device type.

ROOT PASSWORD				IOM DEVICE TYPE			
○	□	○	○	○	□	○	○

6.4.2. View device type

The password to view the configured device type consists of 4 button presses.

ROOT PASSWORD			
○	□	○	□

After entering the "view device type" password the High Density PDM's display will flash a number corresponding to the device type for 2.5 seconds. A number 1 is a Power Distribution Module (PDM), and a number 4 is an Input Output Module (IOM). The High Density PDM returns to normal operation after flashing the configured device type.

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6.5. Output flash configuration

The High Density PDM uses standard I/O memory space (section 5.1.1) for reporting its inputs to the ES-Key database and to allow control of its outputs and PWM functions.

To include flash control of the outputs the High Density PDM must add the extended I/O memory space (section 5.1.2). Enabling the extended I/O memory space causes the High Density PDM to use two addresses due to the 32 output limitation of the ES-Key database. A High Density PDM that is set for address 0 will use addresses 0 and 1 when the extended I/O memory space is enabled.

A High Density PDM that has the extended I/O memory space enabled will show the address in the display window with the decimal ON. The decimal indicates that the High Density PDM is using two addresses (the address displayed plus the next address).

CONFIGURED ADDRESS	ADDRESS DISPLAYED	ADDRESSES USED
0	**0.**	0 and 1
1	**0.**	0 and 1
2	**2.**	2 and 3
3	**2.**	2 and 3
4	**4.**	4 and 5
5	**4.**	4 and 5
6	**6.**	6 and 7
7	**6.**	6 and 7
8	**8.**	8 and 9
9	**8.**	8 and 9
10	**A.**	A and B
11	**A.**	A and B
12	**C.**	C and D
13	**C.**	C and D
14	**E.**	E and F
15	**E.**	E and F

6.5.1. Enable output flash memory space

The password to enable the extended (flash) I/O memory space consists of 8 button presses.

ROOT PASSWORD				ENABLE FLASH			
○	□	□	○	□	□	□	□

6.5.2. Disable output flash memory space

The password to disable the extended (flash) I/O memory space consists of 8 button presses.

ROOT PASSWORD				DISABLE FLASH			
○	□	□	○	○	○	○	○

6.6. Load defaults

The High Density PDM's default configuration may be reloaded at anytime by entering a password.

ROOT PASSWORD				LOAD DEFAULTS							
□	○	○	○	□	□	□	○	○	□	○	□

The High Density PDM's default configurations are:

Input polarity for all inputs:	Positive
Device type:	Power Distribution Module, device type 1
Device address:	0
Extended I/O memory space:	Disabled
Circuit protection over-current level for all outputs:	13 Amps

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Ph: 352-629-5020 or 1-800-533-3569
Fax : 352-629-2902 or 1-800-520-3473

7. Mounting and Installation

7.1. Overall dimensions

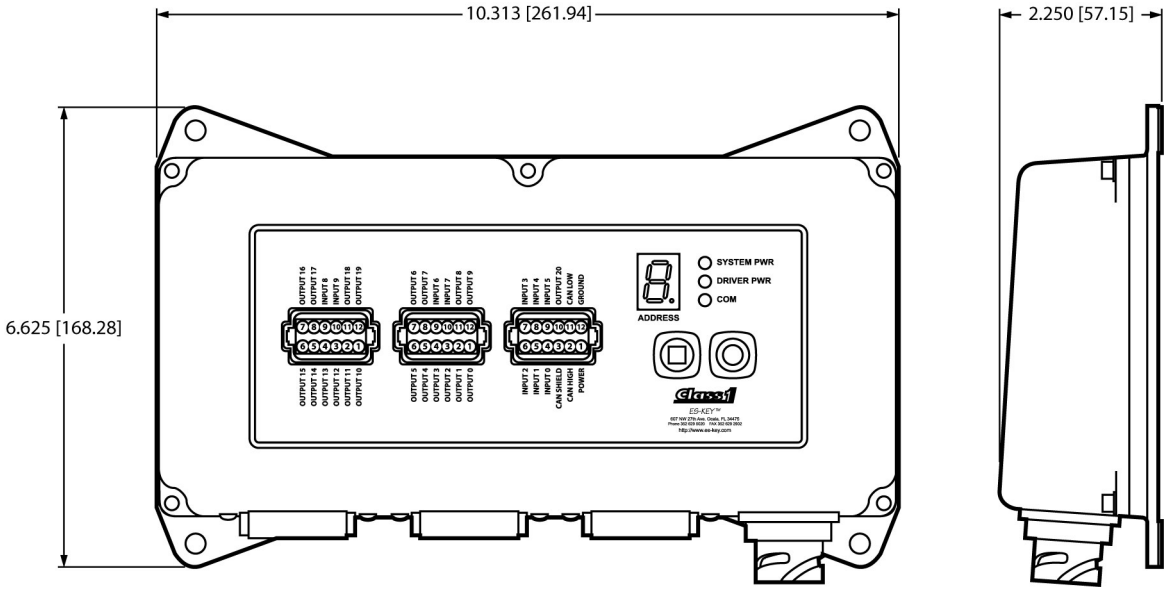

Figure 6. *Overall dimensions in inches [millimeters].*

7.2. Mounting dimensions

Mount the High Density PDM with four screws and nuts.

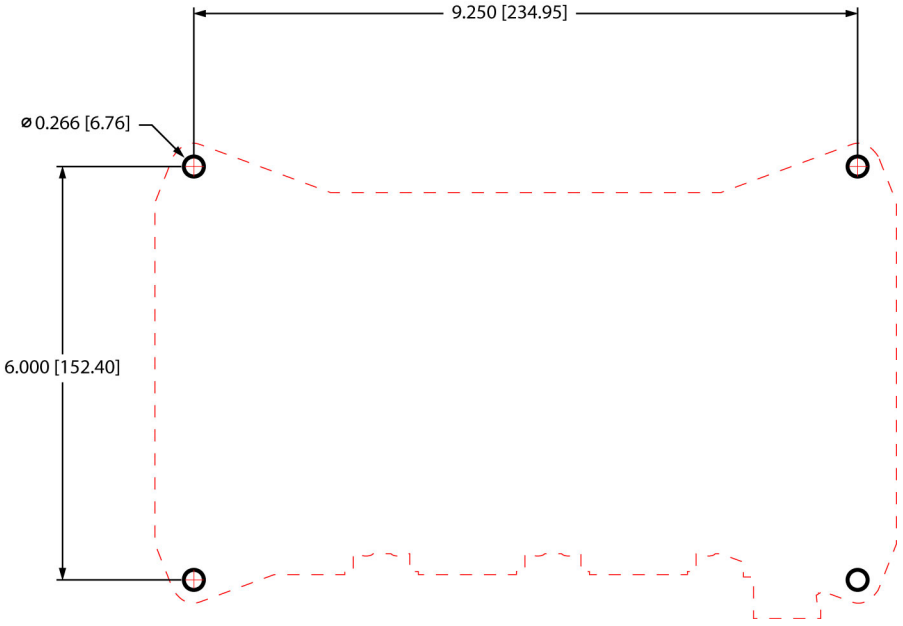

Figure 7. *Installation dimensions in inches [millimeters].*

Class 1
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8. Connector Descriptions

8.1. Gray connector

Mating connector: Deutsch DT06-12SA GRAY
Mating sockets: Deutsch 0462-201-16141
Gold mating sockets: Deutsch 0462-201-1631
Recommended wire gage: 16-20 AWG
Wedge lock: W12S

PIN	CIRCUIT	DESCRIPTION
1	SYS POWER	(INPUT) – battery voltage (+9VDC…+32VDC)
2	CAN HIGH	(DATA) – SAE J1939 CAN 2.0B, 250Kbits/s *
3	CAN SHIELD	(DATA) – SAE J1939 CAN 2.0B, 250Kbits/s *
4	INPUT 0	(INPUT) – Positive/Ground polarity (configurable)
5	INPUT 1	(INPUT) – Positive/Ground polarity (configurable)
6	INPUT 2	(INPUT) – Positive/Ground polarity (configurable)
7	INPUT 3	(INPUT) – Positive/Ground polarity (configurable)
8	INPUT 4	(INPUT) – Positive/Ground polarity (configurable)
9	INPUT 5	(INPUT) – Positive/Ground polarity (configurable)
10	OUTPUT 20	(OUTPUT) – Ground polarity (2 Amps)
11	CAN LOW	(DATA) – SAE J1939 CAN 2.0B, 250Kbits/s *
12	SYS GROUND	(INPUT) – battery ground

* *Gold sockets recommended for CAN connections.*

8.2. Black connector

Mating connector: Deutsch DT06-12SB BLACK
Mating sockets: Deutsch 0462-201-16141
Recommended wire gage: 16-20 AWG
Wedge lock: W12S

PIN	CIRCUIT	DESCRIPTION
1	OUTPUT 0	(OUTPUT) – Positive polarity (13 Amps)
2	OUTPUT 1	(OUTPUT) – Positive polarity (13 Amps)
3	OUTPUT 2	(OUTPUT) – Positive polarity (13 Amps)
4	OUTPUT 3	(OUTPUT) – Positive polarity (13 Amps)
5	OUTPUT 4	(OUTPUT) – Positive polarity (13 Amps)
6	OUTPUT 5	(OUTPUT) – Positive polarity (13 Amps)
7	OUTPUT 6	(OUTPUT) – Positive polarity (13 Amps)
8	OUTPUT 7	(OUTPUT) – Positive polarity (13 Amps)
9	INPUT 6	(INPUT) – Positive/Ground polarity (configurable)
10	INPUT 7	(INPUT) – Positive/Ground polarity (configurable)
11	OUTPUT 8	(OUTPUT) – Positive polarity (13 Amps)
12	OUTPUT 9	(OUTPUT) – Positive polarity (13 Amps)

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8.3. Green connector

Mating connector: Deutsch DT06-12SC GREEN
Mating sockets: Deutsch 0462-201-16141
Recommended wire gage: 16-20 AWG
Wedge lock: W12S

PIN	CIRCUIT	DESCRIPTION
1	OUTPUT 10	(OUTPUT) – Positive polarity (13 Amps)
2	OUTPUT 11	(OUTPUT) – Positive polarity (13 Amps)
3	OUTPUT 12	(OUTPUT) – Positive polarity (13 Amps)
4	OUTPUT 13	(OUTPUT) – Positive polarity (13 Amps)
5	OUTPUT 14	(OUTPUT) – Positive polarity (13 Amps)
6	OUTPUT 15	(OUTPUT) – Positive polarity (13 Amps)
7	OUTPUT 16	(OUTPUT) – Positive polarity (13 Amps)
8	OUTPUT 17	(OUTPUT) – Positive polarity (13 Amps)
9	INPUT 8	(INPUT) – Positive/Ground polarity (configurable)
10	INPUT 9	(INPUT) – Positive/Ground polarity (configurable)
11	OUTPUT 18	(OUTPUT) – Positive polarity (13 Amps)
12	OUTPUT 19	(OUTPUT) – Positive polarity (13 Amps)

8.4. High power connector

Mating connector: Cannon 121583-0013
Mating socket: Cannon 031-8521-020 (2 AWG)
Cannon 031-8521-010 (4 AWG)
Hexagonal nut: Cannon 217-8516-010
Cable seal: Cannon 351-8697-001
0.409 in – 0.472 in [10.4mm – 12.0mm]
Recommended wire gage: 2 AWG

For more information -
Cannon website: http://www.ittcannon.com

PIN	CIRCUIT	DESCRIPTION
1	OUTPUT PWR	(INPUT) – battery voltage (+9VDC…+32VDC) *

The output power feed line should be fused to limit current to 200 Amps maximum.

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9. Technical Details and Compliances

Product category	ES-Key	
Voltage range	+9VDC…+32VDC	
Maximum current draw @13.8VDC @27.6VDC	Logic supply+ input (pin 1 of 12-pin gray connector) 73 mA 82 mA	
Temperature range	-40ºF…+185ºF (-40ºC…+85ºC)	
Environmental range	IP 67	
CAN specification	SAE J1939, 250 Kbits/second	
LED	3 LEDs (two green and one red) to indicate status	
Electrical protection	Internal thermal fuse (2500 mA on pin 1 of gray 12-pin connector) CAN bus protected for heavy duty trucks (24V) Transient voltage protected to SAE J1113 specification for heavy duty trucks (24V) Load dump voltage protected to SAE J1113 specification for heavy duty trucks (24V)	
Electrical performance	Immunity to Radiated Electromagnetic Fields– Bulk Current Injection (BCI) method, Class C device	SAE J1113-4
	Reverse voltage protection on power leads (pins 1 and 2 of 12-pin gray connector), Class C device	ISO 16750-2
	Overvoltage due to failing generator, Class A device	ISO 16750-2
	Immunity to conducted transients on power leads, L4 requirements (24V)	SAE J1113-11
	Immunity to Electrostatic Discharge – powered and unpowered modes	SAE J1113-13
	Immunity to radiated electromagnetic fields, Class C device	SAE J1113-21
	Conducted emission on power leads (Class 3 average and Class 5 peak limits)	CISPR 25
	Radiated emissions, absorber-lined shielded enclosure (Class 1 average and Class 3 peak limits)	CISPR 25
	Reset behavior on voltage drop 24V, Class C device	ISO 16750-2
Environmental performance	Thermal shock	SAE J1455 (sec 4.1.3.2)
	Exposure to humidity	MIL-STD-810F (method 507.4)
	Thermal shock due to splash	Class 1 (STD-0001)
	Pressure cleaning	Class 1
	Exposure to salt spray atmosphere/fog	SAE J1455 (sec 4.3)
	Exposure to outdoor UV	ISO 4892-2 (method A)
	Exposure to chemicals	Class 1
Mechanical performance	Resonance dwell	SAE J1455 (sec 4.9.4.1)
	Random vibration	SAE J1455 (sec 4.9.4.2)
	Mechanical shock	SAE J1455 (sec 4.10.3.4)
Dimensions (W x H x D) in inches [millimeters]	10.313 [261.94] x 6.625 [168.28] x 2.250 [57.15]	
Weight in ounces [grams]	55.7 [1579.1]	

10. References

10.1. List of figures

10.2. List of tables