ISO 9001 CERTIFIED

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OPERATION MANUAL

ES-Key
16 Output module (selectable polarity)
P/N 610-00031

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FOR EXTERNAL DISTRIBUTION

OPERATION MANUAL

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DATE	9/05/2014				
PRODUCT GROUP	ES-Key	P/N	FSG-MNL-00109	REV	1.00
PRODUCT	16 output module			BY	GMC

1. Revision Log

Rev	Date	Approved	Changes
1.00	9-05-2014	GMC	Initial requirements

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2. Module Overview

2.1. Scope

The ES-Key™ 16 output module is a Class 1 ES-Key network module designed for use in a ES-Key™ electrical system network. This module has sixteen (16) configurable polarity outputs (positive or ground). The outputs are controlled from the ES-Key network via J1939 CAN messages and can be tied to desired functionality through the ES-Key database by using the ES-Key professional software.

2.2. Part numbers

Dual Analog to CAN with Accelerometer Hale – p/n 610-00031

2.3. Setup

When the module leaves the factory it is configured with the following default configurations.

Function	Mode	Position	Function	Mode	Position	Function	Mode	Position	Function	Mode	Position
OUT 0	POS	DOWN	OUT 4	POS	DOWN	OUT 8	POS	DOWN	OUT 12	POS	DOWN
OUT 1	POS	DOWN	OUT 5	POS	DOWN	OUT 9	POS	DOWN	OUT 13	POS	DOWN
OUT 2	POS	DOWN	OUT 6	POS	DOWN	OUT 10	POS	DOWN	OUT 14	POS	DOWN
OUT 3	POS	DOWN	OUT 7	POS	DOWN	OUT 11	POS	DOWN	OUT 15	POS	DOWN

(Note: Selection switches are only read on power up).

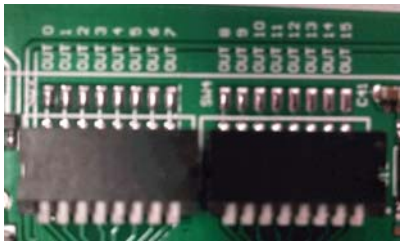

Figure 1. ***Output polarity selection switches.***

3. Es-Key Operation

3.1. Selectable polarity outputs

The module has 16 outputs that can be configured for either positive or ground output polarity (see section 3.1.1). These outputs are activated through associations within the ES-Key database and are designed to drive inductive, capacitive, or resistive loads (relays, solenoids, indicators, etc). These outputs are overload and short circuit protected. The maximum load tied to each output should be limited to 0.25 Amps (loads more than this may cause the output to shutdown due to thermal overload). The outputs will report an over current condition to the Es-key network and if any of the outputs are in an over current situation the COM LED on the module will be flashing at a fast rate to give the user an indication that one of the outputs is in over current condition. When an output goes into an over current situation the affected output will shut down and attempt to turn back on three times. If on the third try and the over current situation is still present the output will shut down until the output is physically shut off to reset it.

3.1.1. Output polarity selection

The polarity of each output is selected by setting the output polarity selection switches (located inside of the case) to the desired positions. The switches are labeled OUT 0 through OUT 15 and are directly related to the physical outputs. Each output can be placed in the POS (positive) or NEG (ground) position. When the switch is down it is in the positive position. When the switch is up it is in the negative position.

(Note: Selection switches are only read at power up).

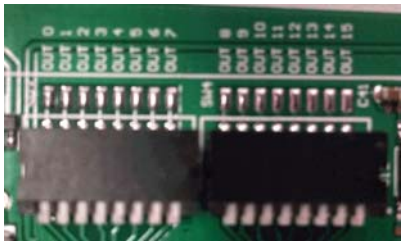

Figure 2. ***Output polarity selection switches.***

3.2. Module type and address

The 16 output Module is recognized by the ES-Key Professional software as a *switch output* module (device type 3). The module address is selected by the address switch (see section 3.2.1).

3.2.1. Address selection

The address is selected by rotating the address switch to the desired value (0-15). Use an address selection tool (or a #1 Philips screwdriver) to set the position of the switch to the desired address.

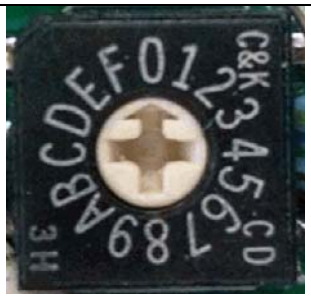

Figure 3. ***Address switch***

Figure 4 *Address selection tool.*

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3.3. Output memory space

The 16 Output Module uses standard ES-Key defined output memory space. The polarity selectable outputs are mapped into the output space.

OUTPUT MEMORY SPACE	
Output	**DESCRIPTION**
0	Physical Output 0
1	Physical Output 1
2	Physical Output 2
3	Physical Output 3
4	Physical Output 4
5	Physical Output 5
6	Physical Output 6
7	Physical Output 7
8	Physical Output 8
9	Physical Output 9
10	Physical Output 10
11	Physical Output 11
12	Physical Output 12
13	Physical Output 13
14	Physical Output 14
15	Physical Output 15

4. Connector Description

The module has two connectors and the following definitions apply:

4.1. Connector A (gray)

Mating connector: Deutsch DTM06-12SA (GRAY)
Mating sockets: 0462-201-20141
Wedge lock: WM12S Recommended wire gage: 18-24 AWG

PIN	CIRCUIT	DESCRIPTION
1	Supply +	Module supply (+9VDC…+32VDC) [fused 750mA]
2	CAN High	ES-Key CAN, SAE J1939 Proprietary, 250 kbits/S
3	CAN Shield	ES-Key CAN, SAE J1939 Proprietary, 250 kbits/S
4		
5	Output 12	Digital Output (polarity selectable – positive or ground)
6	Output 14	Digital Output (polarity selectable – positive or ground)
7	Output 15	Digital Output (polarity selectable – positive or ground)
8	Output 13	Digital Output (polarity selectable – positive or ground)
9		
10		
11	CAN Low	ES-Key CAN, SAE J1939 Proprietary, 250 kbits/S
12	Supply -	Module supply (vehicle ground)

4.2. Connector B (black)

Mating connector: Deutsch DTM06-12SB (BLACK)
Mating sockets: 0462-201-20141
Wedge lock: WM12S Recommended wire gage: 18-24 AWG

PIN	CIRCUIT	DESCRIPTION
1	Output 11	Digital Output (polarity selectable – positive or ground)
2	Output 9	Digital Output (polarity selectable – positive or ground)
3	Output 7	Digital Output (polarity selectable – positive or ground)
4	Output 5	Digital Output (polarity selectable – positive or ground)
5	Output 3	Digital Output (polarity selectable – positive or ground)
6	Output 1	Digital Output (polarity selectable – positive or ground)
7	Output 0	Digital Output (polarity selectable – positive or ground)
8	Output 2	Digital Output (polarity selectable – positive or ground)
9	Output 4	Digital Output (polarity selectable – positive or ground)
10	Output 6	Digital Output (polarity selectable – positive or ground)
11	Output 8	Digital Output (polarity selectable – positive or ground)
12	Output 10	Digital Output (polarity selectable – positive or ground)

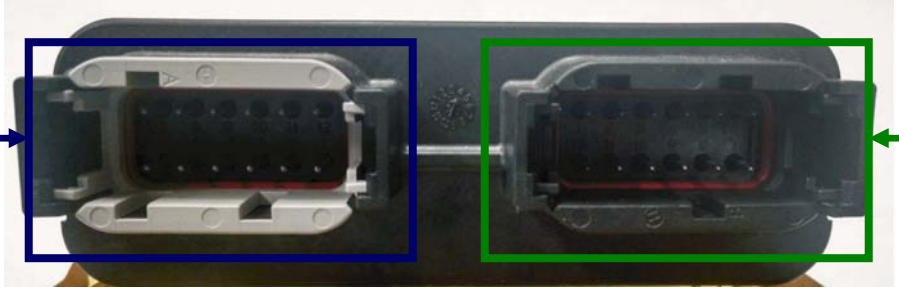

Figure 5. *Connector identification.*

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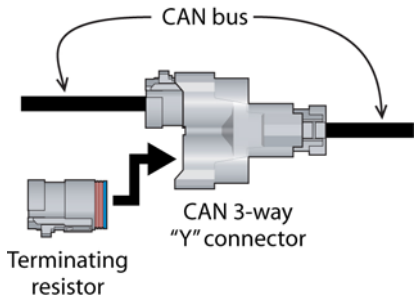
4.2.1. Terminating resistor requirement (CAN communication)

Two terminating resistors (120 Ohm) are required on the CAN bus for proper operation (one at each end of the CAN bus). Only two terminating resistors are allowed on a CAN bus.

Terminating resistor	p/n DT06-3S-P006
CAN 3-way “Y” connector	p/n DT04-3P-P007



4.3. System compatibility

The 16 Output Module is compatible with other Class 1 CAN devices.

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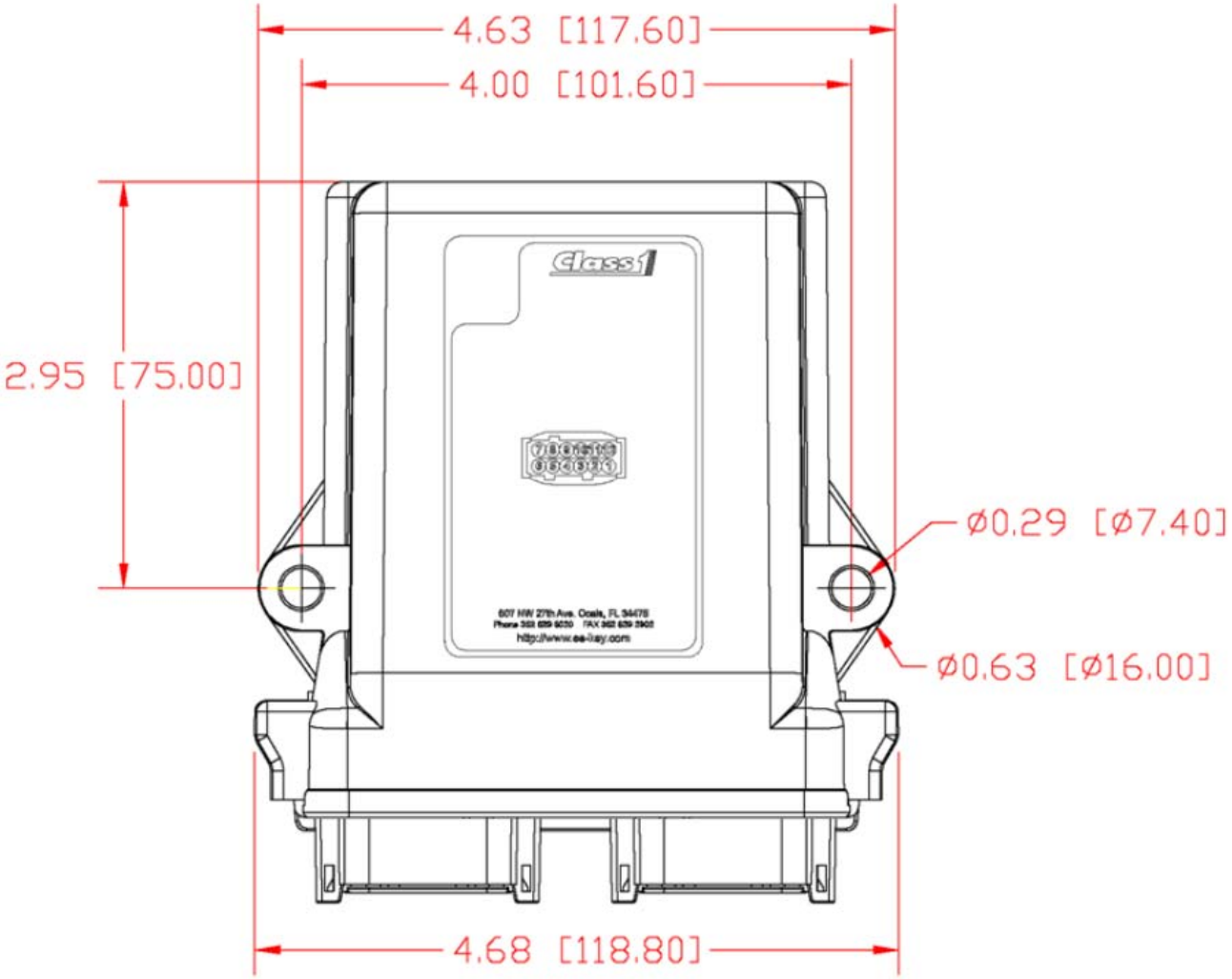
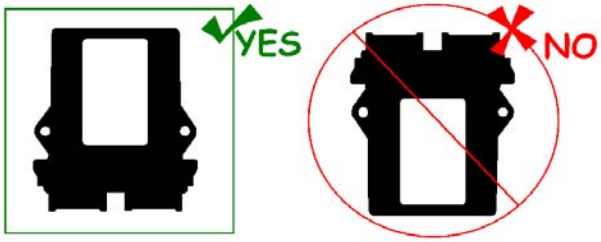
5. Mounting



Mounting and package dimensions – inches [millimeters].

NOTE: When mounting the module vertically, make certain the connectors are pointed down so as to eliminate the possibility of standing water in the connector.



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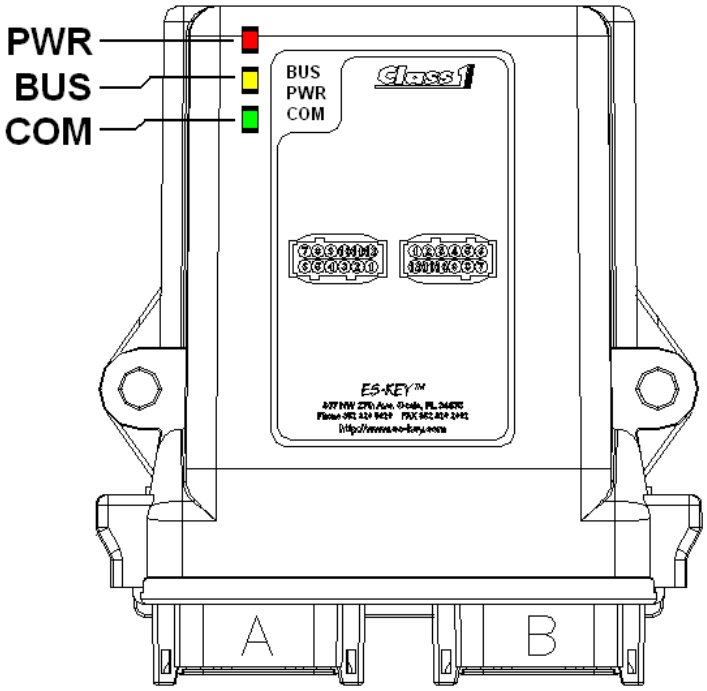
6. Diagnostics

The **18 digital, 1 analog input module** has 3 diagnostic LEDs which are viewable through the top of its amber enclosure.



PWR - +5VDC logic power
BUS - +9…+32VDC Module power
COM - Module status indicator

The COM LED indicates the module's CAN communication status.

On Solid
Module on-line

Flashing slow (2Hz)
CAN bus okay, but the module is not receiving messages from the Universal System Manager (USM).

Flashing fast (8Hz)
CAN bus error, no communications or not connected.

Flashing fast (20Hz)
Output Over Current Indication

Double flash
CAN bus has an *ACTIVE* error, no communications.

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7. Glossary

LED	Light Emitting Diode. The lights on the display used to show tank level and information.
CAN	Controller Area Network. SAE J1939 communication method.
EEPROM	Electrically Erasable Programmable Read-Only Memory. The memory of the tank level display, used to store the display information (tank level points, display type, dim value, etc).
OEM	Original Equipment Manufacturer.
SAE	Society of Automotive Engineers.
ESD	ElectroStatic Discharge.
IP	Ingress Protection (IP 67, etc).
p/n	part number

8. Technical details

Product category	ES-KEY
Voltage range	+9VDC…+32VDC
Power consumption @13.8VDC @27.6VDC	Logic supply+ input (pin 1) 62mA (1) 83mA (1)
Output current capability	25mA per output
Operational temperature range	-40ºC…+85ºC
Environmental range	IP 67
CAN specification	SAE J1939 proprietary, 250 Kbits/second
Protection	Internal thermal fuse (750mA on pin 1) Reverse voltage protection (pins 1 and 12) CAN buses protected to 24V ESD voltage protected to SAE J1113 specification 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) Outputs protected for short circuit and thermal overload
Dimensions (W x L x H) in inches [mm]	4.680 [118.80] x 5.240 [133.10] x 1.420 [36.07]

(1) *Does not include current draw due to connected external loads on outputs 0, 1, and 2.*

8.1. WEEE (Waste of Electrical and Electronic Equipment) directive

This symbol [crossed-out wheeled bin WEEE Annex IV] indicates separate collection of waste electrical and electronic equipment in the European Union countries.
Please do not throw the equipment into the domestic refuse.
Each individual European Union member state has implemented the WEEE regulations into national law in slightly different ways. Please follow your national law when you want to dispose of any electrical or electronic products.

More details can be obtained from your national WEEE recycling agency.