

# *RaceGrade* Motorsport Keypad

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Part # M KEYPAD 8H

Part # M KEYPAD 15



# *RaceGrade* Motorsport Keypad

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9 December, 2015

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# Introduction

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This manual details the installation of **RaceGrade** Motorsport Keypads for use with a MoTeC Power Distribution Module (PDM) utilizing the CANopen Standard. In this method the PDM controls all aspects of the keypad operation. If you are using a RaceGrade Gateway with J1939 standard comms, please refer to Keypad with Gateway Manual.

The **RaceGrade** Motorsport Keypad is a fully customized keypad designed specifically for your vehicle. Each button features a custom icon representing its function and three LED indicators to provide feedback to the user. Keypads are available in eight and fifteen button models.

## Keypad Operation

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To activate a button, simply press on its icon. The button press will momentarily activate a channel in the MoTeC PDM which can be used in any type of function or to activate an output.

**Note:** All buttons on the keypad are “Momentary” not “Latching”. If a power cycle occurs in the vehicle, and the PDM is restarted, most PDM outputs controlled by the keypad will turn off and remain off until reactivated. Application critical switches which must latch should be hard wired with latching switches.

## Button Icons

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Each button on the keypad has a unique icon. These are specified at the time of order and applied to the keypad before shipment. If a button function changes, these labels may be removed and new ones applied. Please contact **RaceGrade** for a list of available symbols.



# LED Indicators

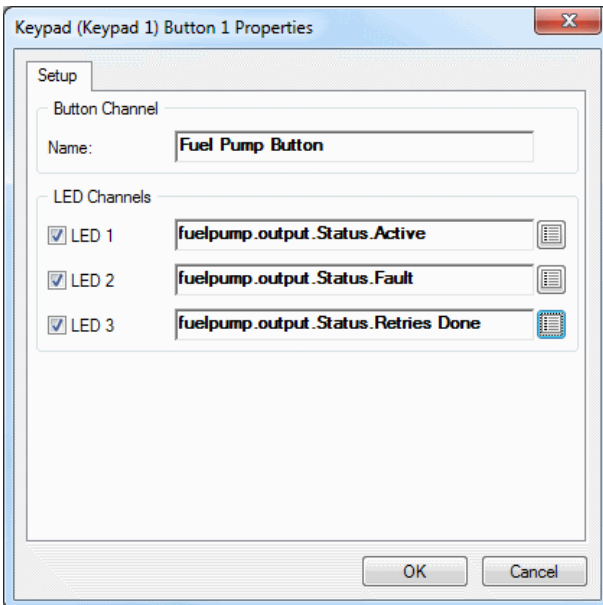
Each button has three indicator lights along the top. These lights are programmed in the PDM to inform the user of the state of the output.

Most commonly:

LED 1: Left (Green) – Output is on

LED 2: Middle (Orange) – Output has an over current error

LED 3: Right (Red) – Output has faulted off and no retries exist



# Installation

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## Wiring

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The keypad is wired directly into the CAN bus that the PDM resides on. See the specifications in the appendix for mating connector and pin out information.

**Note:** CAN bus wiring specifications are very strict and failure to follow these specifications during wiring harness construction can lead to problematic and non-functional installations.

**WARNING:** Keypads do not have built in CAN resistors. These must be added per CAN specifications. For most installations a single resistor at the keypad connector will work as the length of the CAN bus is often less than 7 feet.

## Multiple Keypads

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It is possible to use up to four keypads on the same CAN bus. To achieve this each keypad must be configured with a different CAN ID. To configure a keypad, disconnect or power off all other devices on the CAN bus and run the "Keypad Configurator Tool" from PDM Manager. It is highly recommended to use the default settings.

Default Settings:

	Node ID	Key Press ID	LEDs ID	Brightness ID
Keypad 1	0x0A	0x506	0x507	0x508
Keypad 2	0x0B	0x516	0x517	0x518
Keypad 3	0x0C	0x526	0x527	0x528
Keypad 4	0x0D	0x536	0x537	0x538

# Setup with PDM Manager

Setting up a keypad for use with a PDM is fast and easy in PDM Manager.

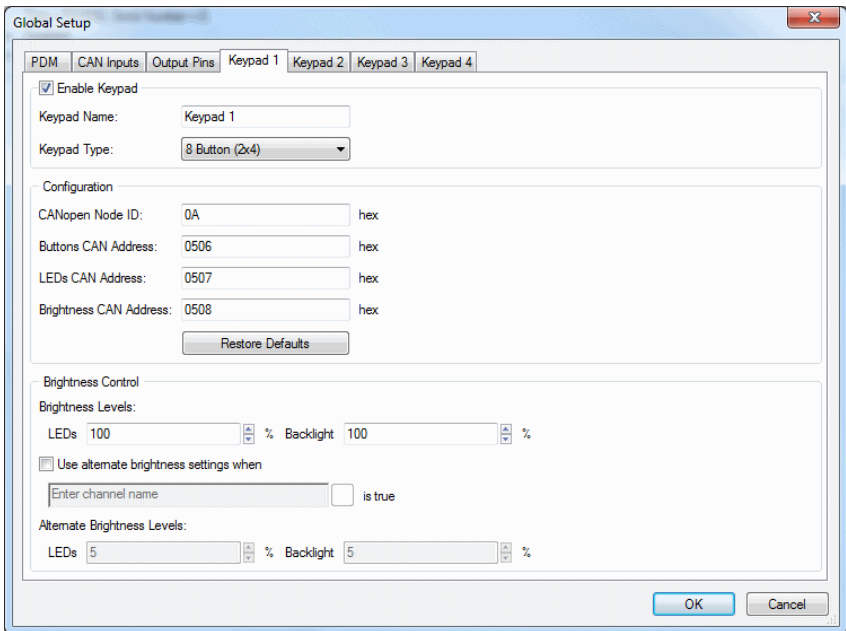
## Global Setup

After each keypad is properly configured it must be enabled in the Global Setup in PDM Manager. Here you can specify a name, model, and CAN IDs for each keypad. These CAN IDs must match the configuration in the keypad therefore it is highly recommended to use the defaults.

This is also where you select brightness settings for the button LEDs and backlights. It is typical to have a night/day channel in the PDM, often controlled by a keypad button, to toggle the brightness settings. Typical values:

Daytime: LED = 100% Backlight = 0%

Nighttime: LED = 30% Backlight = 100%



## ***Keypad Setup***

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Once enabled in Global Setup, a branch for the keypad will be added to the PDM Configuration Tree. This menu lets you specify a name for each button channel and select the channels to control the button's LED lights. The LED channels are typically assigned to the various status channels of an output pin but any channel can be used. If you want to make an LED blink, you can create a function that produces a channel that will flash in a user definable pattern given a set of conditions.



# Appendix

## Specifications

Operating Voltage: 8v to 30v

Operating Temperature: -40°C to 85°C

M Keypad 8H

Size: 105 mm x 63 mm x 16 mm

Weight: 105 grams

M Keypad 15

Size: 130 mm x 90 mm x 16 mm

Weight: 175 grams

## Connection for Keypad

Mating Connector PN: DT-04

Pin 1 - Power (12v)

Pin 2 - Ground

Pin 3 - CAN HI

Pin 4 - CAN LO

## Receiving Button Presses on CAN

Button press messages may be received by other CAN devices on the same bus as the keypad and the PDM for logging or other utility. The CAN ID for a keypad's button press message is configured in PDM Manager's Keypad Setup. Each button corresponds to a bit in the first two bytes of the key press message. By applying a hexadecimal bit mask then dividing by the same value in decimal we get a value of 0 or 1 for our button pressed channel:

M Keypad 8H				
Channel	Offset	Length	Bit Mask	Divisor
Button 1	0	1	0x01	1
Button 2	0	1	0x02	2
Button 3	0	1	0x04	4
Button 4	0	1	0x08	8
Button 5	0	1	0x10	16
Button 6	0	1	0x20	32
Button 7	0	1	0x40	64
Button 8	0	1	0x80	128

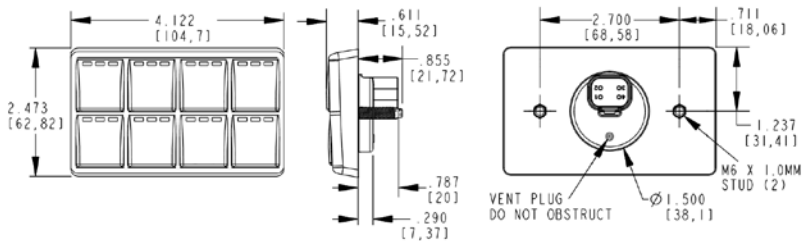
M Keypad 15				
Channel	Offset	Length	Bit Mask	Divisor
Button 1	0	1	0x01	1
Button 2	0	1	0x02	2
Button 3	0	1	0x04	4
Button 4	0	1	0x08	8
Button 5	0	1	0x10	16
Button 6	0	1	0x20	32
Button 7	0	1	0x40	64
Button 8	0	1	0x80	128
Button 9	1	1	0x01	1
Button 10	1	1	0x02	2
Button 11	1	1	0x04	4
Button 12	1	1	0x08	8
Button 13	1	1	0x10	16
Button 14	1	1	0x20	32
Button 15	1	1	0x40	64

MoTeC can supply templates for current MoTeC dash products on request.

**Note:** A PDM is still required to control the keypad!

## Dimensions

### M Keypad 8H



### M Keypad 15

