Marlin 505060 High Current IO Module

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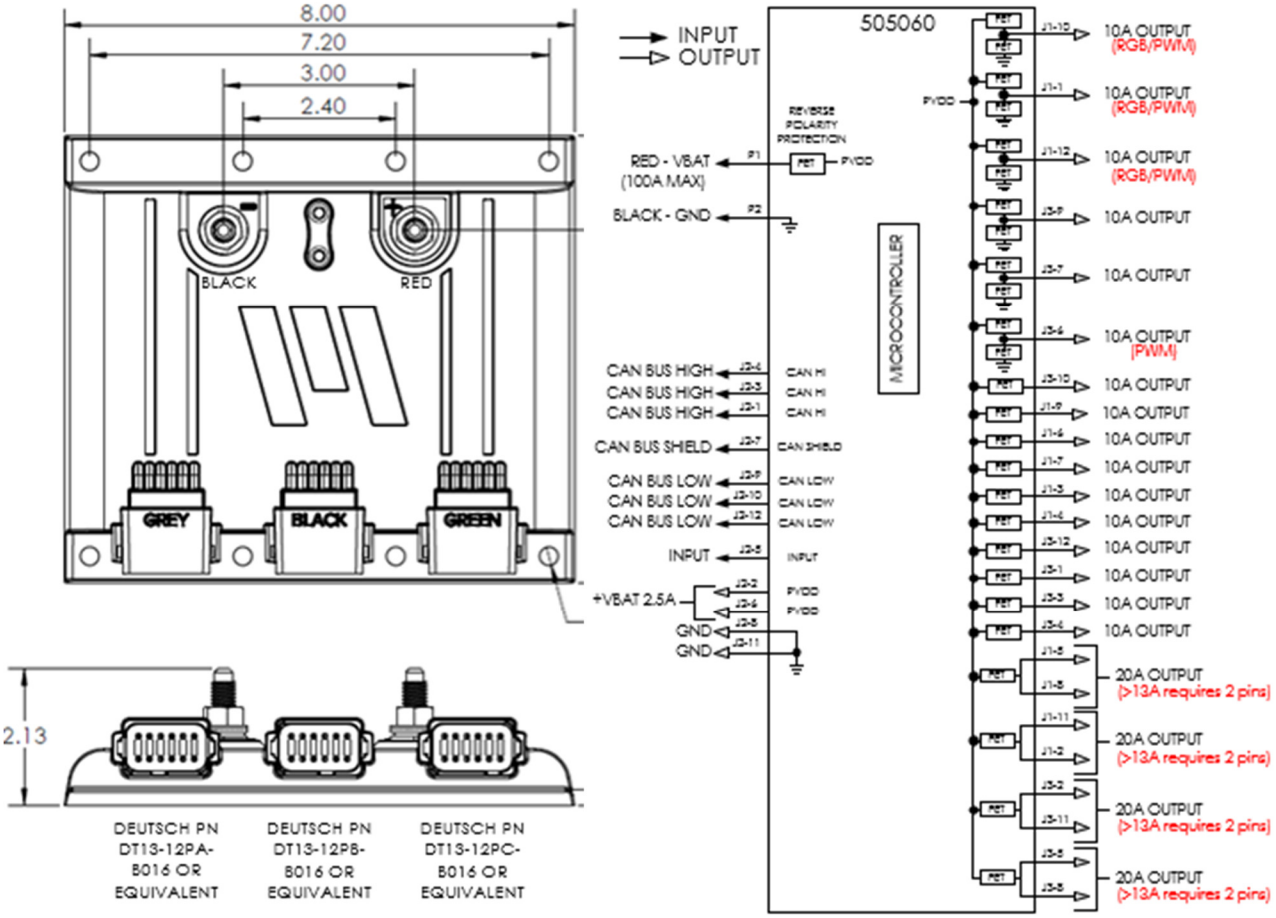
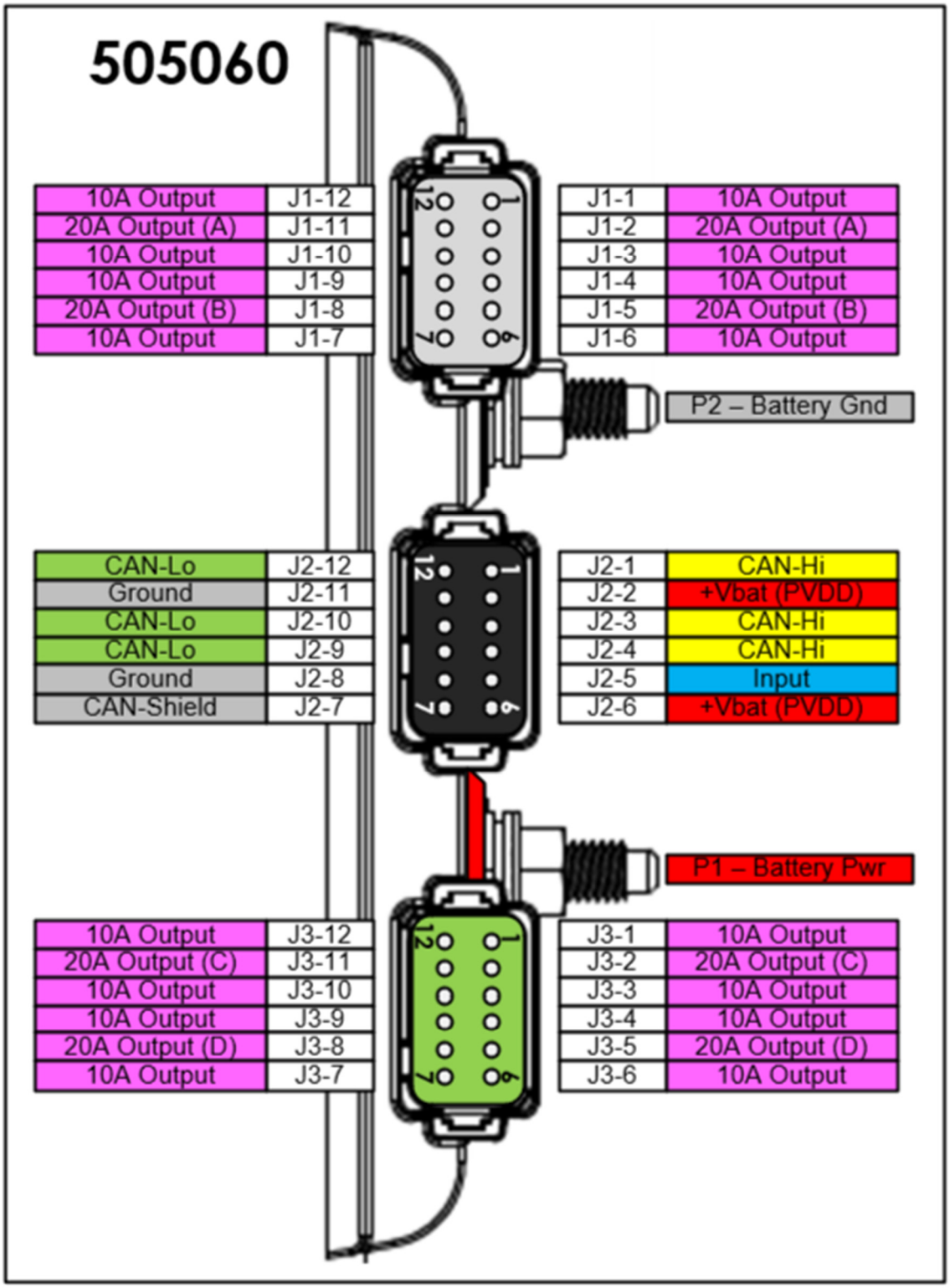
CHECKED: J. COOPER DATE: 04/08/24
APPROVED: J. COOPER DATE: 04/10/24
ECN: 18512E DATE: 03/26/25

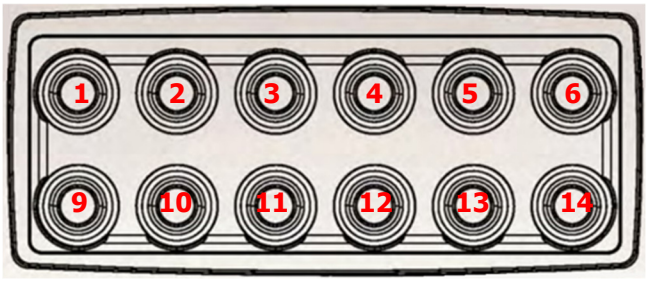


The Marlin 505060 High Current IO Module is a severe duty controller providing power distribution to up to 20 "fused" outputs and pairs with the 505004(4i4o) or 505000(8i8o) for additional inputs and outputs. Six of the outputs are Bi-Directional (Half-Bridge style) 10A outputs, ten of the outputs are Hi-Side 10A outputs, and four of the outputs are Hi-Side 20A outputs. When enabled, the module will turn on when power is applied to Ignition pin J2-5 and will shut off after the defined time when Ignition power is removed. The module is fully controlled when linked to a pair of keypads that allow simple and effect control of the outputs and you can choose a variety of output functionalities. This is all configurable through the Marlin Programming Tool. Button assignments assume Buttons are arranged in Rows of 8 (regardless of the Keypad size)

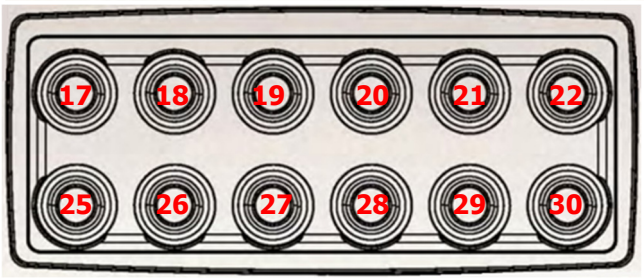
Pictorial Representation from the Connector End



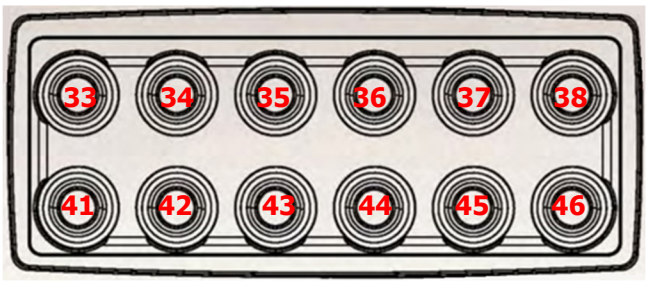
Keypad #1



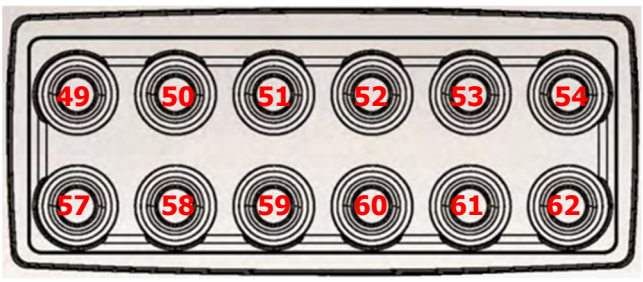
Keypad #2



Keypad #3

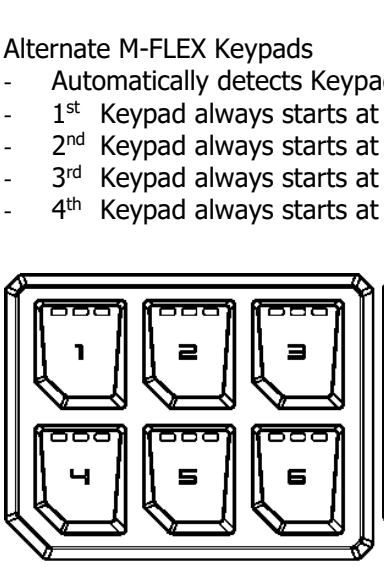


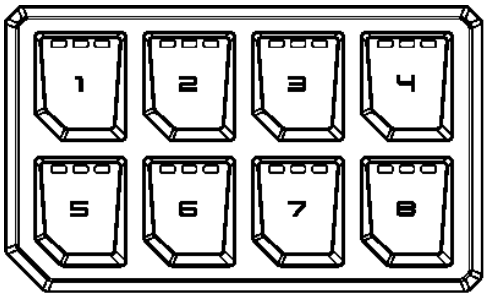
Keypad #4

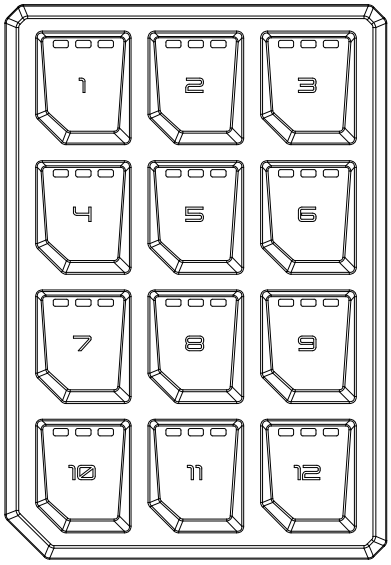


Alternate M-FLEX Keypads

- Automatically detects Keypad type for each position.
- 1st Keypad always starts at Button 1 for the first Button
- 2nd Keypad always starts at Button 17 for the first Button
- 3rd Keypad always starts at Button 33 for the first Button
- 4th Keypad always starts at Button 49 for the first Button







Individual Button Color Selection (Any Button)

Enter by pressing and holding the button for 10 seconds. The buttons will start to pulse with the primary Button Color when you have entered this mode. Each press of the button will change its color to the next one in the RGB button color binary sequence.

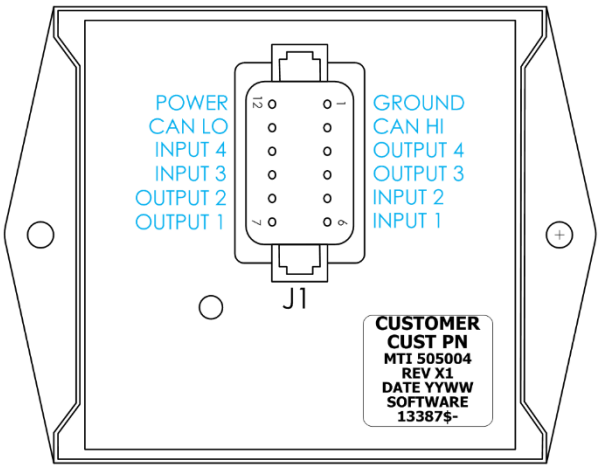
(BLU / GRN / CYA / RED / YEL / MAG / WHT / USER1 / USER2 / USER3 / USER4 / USER5 / USER6 / repeat).

Once the primary color has been selected, if the button is not pressed for 10 seconds, then the button will start to pulse with the secondary Button Color. Press the Button to change the secondary color.

Once the secondary color has been selected, if the button is not pressed for 10 seconds, then the button will start to pulse with the 3rd Button Color. Press the Button to change the 3rd color.

Once the 3rd color has been selected, if the button is not pressed for 10 seconds, then the button will exit the color Selection Mode. If the Button is not pressed after entering the Color Selection Mode, then it will drop through the colors, 10 seconds each, and exit back to normal operation.

External 505004 M-Flex 4i4o Module support



The Digital Switcher can link to a Marlin M-Flex 4i4o Module to provide additional Inputs and Outputs to the Digital Switcher. Possible configuration of the 4i4o Module would be as follows:

Phy_63 = 1	Configure Mode to CAN_IO
Phy_54 = 1	Config Output1 to HS_Dig (*)
Phy_55 = 1	Config Output1 to HS_Dig (*)
Phy_56 = 1	Config Output1 to HS_Dig (*)
Phy_57 = 1	Config Output1 to HS_Dig (*)
	(* - Or as needed)
Can_00 = 10	Tx Rate of Dig In Msg PGN: FF40
Can_63 = 25	CAN Cmd MessageTimeouts

External 505000 M-Flex 8i8o Module support

Please refer to the 11697SB 8i8o CAN IO Module Specification.

Configuration using the Marlin Programming Tool

Module Information:

Source Address: Module Source Address on CAN [0xB0 - 0xBF]
BaudRate: CAN Network Baud-rate [25,50, or 100 *10kBaud]

Enable Debug Messages: Turn on CAN messages to Debug Inputs and various Logic States
Enable Current Messages: Turn on FF60-FF64 CAN messages to report all output currents
Enable 501009 LED SrcAddr: Forces FFD7 Msg to pair with the 501009 LED Service Module

Keypad 1A Source Address: Which Keypad is the first Keypad #1
Keypad 1B Source Address: Which Keypad is the second Keypad #1 (If more than one)
Keypad 1C Source Address: Which Keypad is the third Keypad #1 (If more than two)

Keypad 2A Source Address: Which Keypad is the first Keypad #2
Keypad 2B Source Address: Which Keypad is the second Keypad #2 (If more than one)
Keypad 2C Source Address: Which Keypad is the third Keypad #2 (If more than two)

Keypad 3A Source Address: Which Keypad is the first Keypad #3
Keypad 3B Source Address: Which Keypad is the second Keypad #3 (If more than one)
Keypad 3C Source Address: Which Keypad is the third Keypad #3 (If more than two)
(Note: Keypad 3 does not support the M-Flex

Keypad 4A Source Address: Which Keypad is the first Keypad #4
Keypad 4B Source Address: Which Keypad is the second Keypad #4 (If more than one)
Keypad 4C Source Address: Which Keypad is the third Keypad #4 (If more than two)

Keypad MsgPGN Options: Bit 0 (+1) = to Shift Keypad Msg PGNs by +20h
Bit 1 (+2) = to Stop sending the Keypad Msgs if J2-5 is Active(High)

M-Flex 8I8O/1st 4I4O Source Address: Source Address of the M-Flex I/O module to pair with

M-Flex 2nd 4I4O Source Address: Source Address of 2nd 4I4O M-Flex I/O module to pair with

Custom User Colors Source Address: Source Address of Node sending new User Color Msgs

Master Digital Switcher Source Address: Source Address of the Master Digital Switcher Msgs

Ignition Off Sleep Delay: Time until module goes to sleep after J2-5 Ignition turns off
[in 0.1sec/bit] (Allowed range of 0.0 to 25.0 seconds)

Max Current Limit: Maximum Total Current Limit for the Module [10-100A, 1A/bit]

J1-(1, 10, 12) Output Type: Select Bi-Directional or High-Side Only [1=Hi-Side, else Bi-Dir]

J3-(6, 7, 9) Output Type: Select Bi-Directional or High-Side Only [1=Hi-Side, else Bi-Dir]

System Information:

System Option Flags:
Bit 0 (+1) = Use Input J2-5 as a True Ignition Switch [0=Disabled, 1=Enabled]
(Digital Switcher will go to Sleep [low power] after Ignition Sleep Delay)
Bit 1 (+2) = Lock the RGB Color Change by Button [0=Disabled, 1=Enabled]
(When enabled, you can only set the RGB button colors in the XML)
Bit 2 (+4) = RGB_Color_Override Disable [0=RGB Color, 1=Button Colors]
(Forces all buttons to copy RGB button colors [0] or be individual [1])
Bit 3 (+8) = Enable "Save Button Information" feature for each button on Key-Off

DayTimeBrightness(On): Set the Brightness of the Keypad backlights during the day when the associated Output is On. [0-100%, 0.4%/bit]
(Used as the Button LED Daytime brightness on the M-Flex Keypad)

DayTimeMinBrightness(Off): Set the Brightness of the Keypad backlights during the day when the associated Output is Off. [0-100%, 0.4%/bit]
(Used as the Background Daytime brightness on the M-Flex Keypad)
DayTimeMin_TurnOffDelay: Set time for ButtonLights when Off to go dark [0=Off, 1 Min/bit]

NightTimeBrightness(On): Set the Brightness of the Keypad backlights during night time when the associated Output is On. [0-100%, 0.4%/bit]
(Used as the Button LED Nighttime brightness on the M-Flex Keypad)

NightTimeMinBrightness(Off): Set the Brightness of the Keypad backlights during night time when the associated Output is Off. [0-100%, 0.4%/bit]
(Used as the Background Nighttime brightness on the M-Flex Keypad)

NightTimeButtonNumber: Designate which Button will switch the buttons to NightTime mode.

NightTimeButtonStates: Designate which Button State triggers the NightTime Mode
If zero, then NightTimeMode is active if any output is on.
Bit0 = State1 (Lo)
Bit1 = State2 (Med)
Bit2 = State3 (Hi)

Fault Indicator Button: Select which button to use for SystemOutput Fault Status

Fault Indicator Button Color: Set what color the Button is when there No Faults

Button Off Color: Select default color for all Buttons when Output is off [0=Off, Index# 1-15]

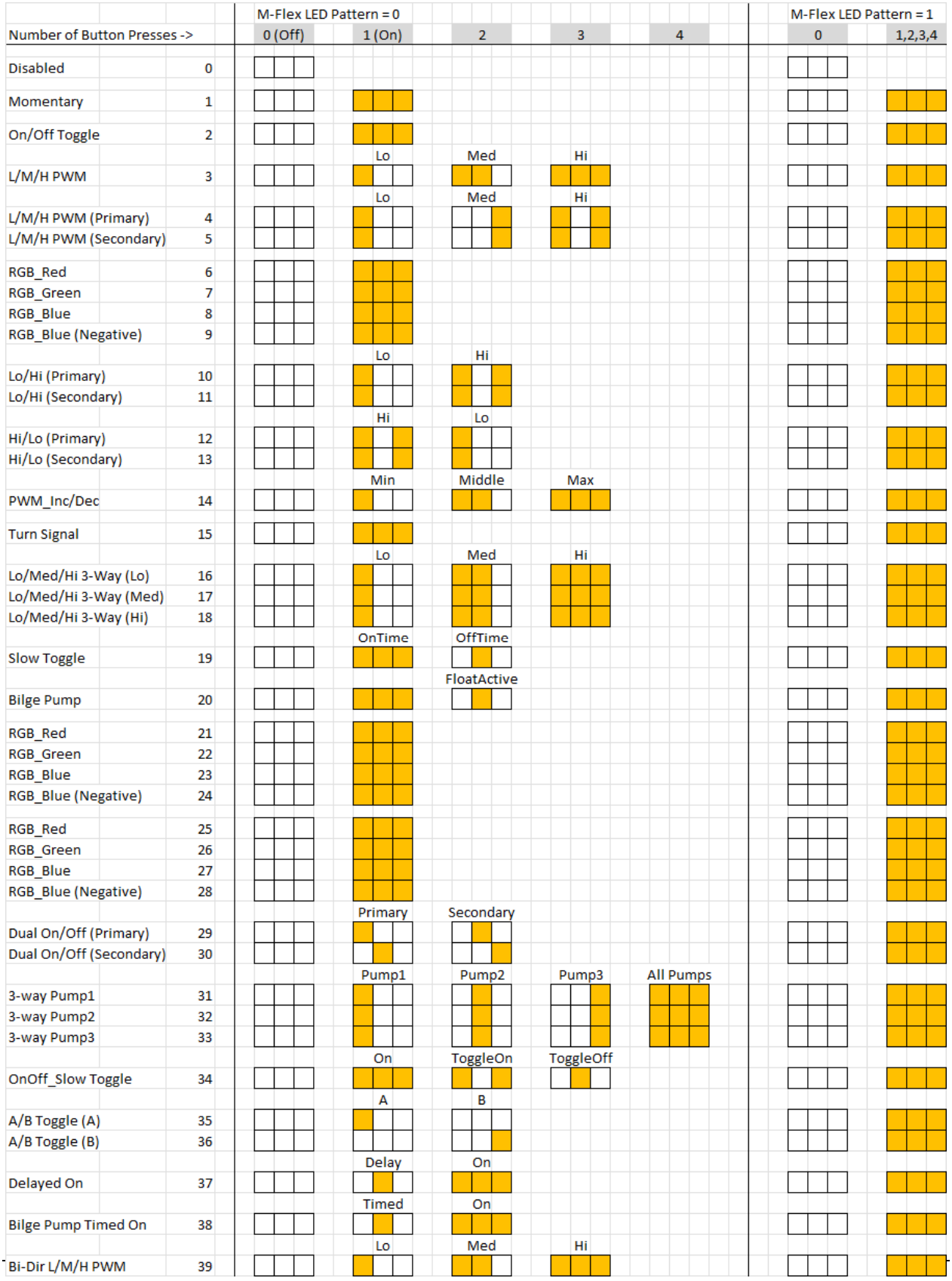
RGB Color Change Delay: Select how long (in seconds) before you can select the RGB color

RGB MinPWM: Sets the lowest PWM value allowed for the RGB Output [12-240]

PWM MinPWM: Sets the lowest PWM value allowed for the PWM Output [12-240]

3-Way Slow Toggle Time: Set time to toggle 3-way Pump Outputs [1Sec/bit, 1-255]
3-Way Pump Floats Group1: Set which Button# first Float Switch Grouping is assigned to
3-Way Pump Floats Group2: Set which Button# second Float Switch Grouping is assigned to

M-Flex LED Pattern: Select use of the Patterns below if 0, or All 3 LEDs on if Output(s) are on



Output RGB Color Information:

For the RGB option, the controller provides the option to tune the Red, Green, and Blue portion of the RGB outputs to match the Keypad colors for all color options with a value from 0(off) to 255(full on). The defaults are:

Index#	Name	Red	Green	Blue	
0-	Black	0	0	0	
1-	Blue	0	0	255	
2-	Green	0	255	0	
3-	Cyan	0	255	255	
4-	Red	255	0	0	
5-	Magenta	255	0	255	
6-	Yellow	255	255	0	
7-	White	255	255	255	
8-	Orange	255	64	0	
9-	Pink	128	128	255	
10-	User1(Bright Pink)	255	0	128	(Or received User Color1)
11-	User2(Marlin Teal)	0	255	255	(Or received User Color2)
12-	User3(Marlin Blue)	0	80	255	(Or received User Color3)
13-	User4(Packer Gold)	255	128	0	(Or received User Color4)
14-	User5(Packer Green)	0	255	0	(Or received User Color5)
15-	User6(Gater Orange)	255	32	0	(Or received User Color6)

Output Channel and (*) Ignition Function Information:

Initial Output State(*): Set the initial state of the output when the unit turns on
0=Off
1=On … or First Condition on Dual Outputs or multi-level outputs
>1=On … sub-sequent conditions on Dual Outputs or multi-level output
(For multi-output options, make sure all outputs have the same Initial State)

Button Type: Set how the Button controls the output (0=Output Disabled)

0=Disabled	No Button Controls this
1=Momentary	Output is On only while button(1 or 2) is pressed
2=On/Off Toggle	Press button(1 or 2) to turn output On, press again to turn Off
3=Lo/Med/High PWM	Press button(1 or 2) to toggle Output = 0/33/66/100 % PWM
4=Lo/Med/Hi Primary	Dual Out: First Output, Button Toggles Off/On/Off/On
5=Lo/Med/Hi Secondary	Dual Out: Second Output, Button Toggles Off/Off/On/On
6=RGB – Red Out	Red Output color of RGB
7=RGB – Green Out	Green Output color of RGB
8=RGB – Blue Out	Blue Output color of RGB
9=RGB – (Neg)Blue Out	Blue Output color of RGB (all 3 are Inverted)
10=Lo/Hi PrimarySw	Dual Out: First Output, Button Toggles Off/On/On
11=Lo/Hi Secondary Sw	Dual Out: Second Output, Button Toggles Off/Off/On
12=Hi/Lo PrimarySw	Dual Out: First Output, Button Toggles Off/On/On
13=Hi/Lo Secondary Sw	Dual Out: Second Output, Button Toggles Off/On/Off

14= PWM Inc/Dec	20-step PWM Output	1st Btn=On/Inc, 2nd Btn=Off/Dec
15=Turn Signal	Flashes Output	1st Btn=On/Off, 2nd Btn=Hazard
16=L/M/H 3-Way (Lo)	3-way: Lo Output	Button Toggles Off/ On/ On/On
17=L/M/H 3-Way (Med)	3-way: Med Output	Button Toggles Off/Off/On/On
18=L/M/H 3-Way (Hi)	3-way: Hi Output	Button Toggles Off/Off/Off/On
19=Slow Toggle	Output On(1) or Off(2) for xx Seconds and then toggles state.	
20=Bilge Pump	Press button to turn output On/Off, Button2 for Float Status	
21=RGB2 – Red Out	Red Output color of RGB2	
22=RGB2 – Green Out	Green Output color of RGB2	
23=RGB2 – Blue Out	Blue Output color of RGB2	
24=RGB2 – (Neg)Blue Out	Blue Output color of RGB2 (all 3 are Inverted)	
25=RGB3 – Red Out	Red Output color of RGB3	
26=RGB3 – Green Out	Green Output color of RGB2	
27=RGB3 – Blue Out	Blue Output color of RGB2	
28=RGB3 – (Neg)Blue Out	Blue Output color of RGB2 (all 3 are Inverted)	
29=Dual Toggle Primary	Press Btn1 to turn On, again to turn off, or Btn2 to swap	
30=Dual Toggle Secondary	Press Btn2 to turn On, again to turn off, or Btn1 to swap	
31= 3Way Pump1 Sw	3-Way Pump#1 Function	Button Toggles Off/On/Off/Off/On
32= 3Way Pump2 Sw	3-Way Pump#2 Function	Button Toggles Off/Off/On/Off/On
33= 3Way Pump3 Sw	3-Way Pump#3 Function	Button Toggles Off/Off/Off/On/On
34= On/Off Slow Toggle	Output On, then Output Toggles	
35= A/B Toggle (A)	Alternating A/B Toggle (A)	Button Toggles On/Off/Off
36= A/B Toggle (B)	Alternating A/B Toggle (B)	Button Toggles Off/On/Off
37= Delayed On	Output delays Turn On for xx Seconds	
38= Timed Output	Output On for xx Seconds and then turns Off	
39= BiDir Lo/M/Hi PWM	Press Btn1(Up)or 2(Dn) to toggle Output=0/33/66/100%PWM	

Button Number(*): Set which Button Input controls the Output

0 No Button [NOTE: Button=0 AND Type=0 forces Output to be Off]

1- 8 Keypad #1, Top Row (starting from the left)
9-16 Keypad #1, Bottom Row (starting from the left)
(M-Flex Keypad #1 is 1-16 starting top left going right, then down)

17-24 Keypad #2, Top Row (starting from the left)
25-32 Keypad #2, Bottom Row (starting from the left)
(M-Flex Keypad #2 is 17-32 starting top left going right, then down)

Button Number (Continued):

33-40 Keypad #3, Top Row (starting from the left)
41-48 Keypad #3, Bottom Row (starting from the left)
(M-Flex Keypad not supported in Keypad #3 positions)

49-56 Keypad #4, Top Row (starting from the left)
57-64 Keypad #4, Bottom Row (starting from the left)
(M-Flex Keypad not supported in Keypad #4 positions)

(M-Flex 505000 [8i8o] Inputs)
220 = Input 5 (Assignable?), Hi State
221 = Input 5 (Assignable?), Lo State
222 = Input 6 (Assignable?), Hi State
223 = Input 6 (Assignable?), Lo State
224 = Input 7 (Assignable?), Hi State
225 = Input 7 (Assignable?), Lo State
226 = Input 8 (Assignable?), Hi State
227 = Input 8 (Assignable?), Lo State

(M-Flex 505000/505004 [8i8o/4i4o] Inputs)
230 = Input 1 (Assignable? / Pin 6), Hi State
231 = Input 1 (Assignable? / Pin 6), Lo State
232 = Input 2 (Assignable? / Pin 5), Hi State
233 = Input 2 (Assignable? / Pin 5), Lo State
234 = Input 3 (Assignable? / Pin 9), Hi State
235 = Input 3 (Assignable? / Pin 9), Lo State
236 = Input 4 (Assignable? / Pin 10), Hi State
237 = Input 4 (Assignable? / Pin 10), Lo State

240 Ignition **Input (J2-5)** controls this Output
241 RGB1 On/Off status controls this Output
242 RGB2 On/Off status controls this Output
243 RGB3 On/Off status controls this Output
245 Master Digital Switcher Signal State (for IgnSw/NightTimeActive/MasterEn only)
250 System Fault State controls this Output

Button2 Number: Set which Button is the secondary Input *(if used by Button Type)*
(2nd Button for PWM Inc/Dec Type is the Off/Down Button)
(2nd Button for Turn Signal Type is the Hazards Button)

Button Color(*): Set the Buttons Primary Color Index# for outputs 1st state/On [Index# 1-15]

Button 2nd Color: Set the Buttons Color Index# for outputs 2nd state [Index# 1-15]
(Hazard Button color for Turn Signal option)

Button 3rd Color: Set the Buttons Color Index# for outputs 3rd state [Index# 1-15]
(Refer to Color Information Index# List)

Button Fault Color: Set the Buttons Color Index # when an output fault is active [Index# 1-15]
(Refer to Color Information Index# List)

Fuse Type: Set the Fuse Style [0=Fast Blow, 1=Slow Blow] *(Future Option)*

Fuse Rating: Set the Output Fuse Rating/Current Limit [in 0.1A/bit]

Fuse Priority: Set the Priority of the output from 1(Highest) to 20(Lowest) for which outputs are turned off to keep the total current load below the Max Module Current. When current drops back below (MaxCurrent – 10A), then each increasing priority number is turned back on.

Button Option Flags:

Bit 0 (+ 1) = Ignition Dependence, Output only allowed to turn on if Ignition Signal is On
Bit 1 (+ 2) = Save Button Information on Ignition Key Off sequence
Bit 2 (+ 4) = Invert Toggle Sequence of the Switch Type (L/M/H to H/M/L)
Bit 3 (+ 8) = Nav Light Dependence, Output will shut off if Nav Lights are turned on
Bit 4 (+16) = Nav Light Source, This output is defined as the Nav Light output
Bit 5 (+32) = Enable the Slow Toggle Option for the 3-Way Pump Output
Bit 6 (+64) = Check for the MasterEnable Sw to allow Output Button Functionality

Button Conditional Value: The usage of this value depends on the Button Type.

Button Type:	Usage Definition
(1) Momentary:	If not zero, then used as Minimum Output Current Rating [0.1A/bit]
(2) On/Off Toggle:	If not zero, then used as Minimum Output Current Rating [0.1A/bit]
(3) L/M/H PWM:	If not zero, then used as Minimum Output Current Rating [0.1A/bit]
(4-5) L/M/H Dual:	If not zero, then used as Minimum Output Current Rating [0.1A/bit]
(16-18) L/M/H 3-way:	If not zero, then used as Minimum Output Current Rating [0.1A/bit]
(6-9) RGB_Colors:	PWM value to use when Output is turned On [0.4%/bit]
(14) PWM Inc/Dec:	PWM value to use when Output is turned On [0.4%/bit]
(15) Turn Signal:	Flash Period of the Output [10mS/bit, 1-255]
(19) Slow Toggle:	Time in Seconds of when to toggle Output State [1Sec/bit, 1-255]
(20) Bilge Pump:	If not zero, then used as Minimum Output Current Rating [0.1A/bit]

(21-24) RGB2_Colors: Brightness to use when Output is turned On [0.4%/bit]

(25-28) RGB3_Colors: Brightness to use when Output is turned On [0.4%/bit]

(29-30) Dual Toggle: If not zero, then used as Minimum Output Current Rating [0.1A/bit]

(31-33) 3-way Pump: If not zero, then used as Minimum Output Current Rating [0.1A/bit]

(34) On/Off_Toggle: If not zero, then Time in Seconds to toggle Output [1Sec/bit, 1-255]

(35-36) A/B_Toggle: If not zero, then used as Minimum Output Current Rating [0.1A/bit]

(37) Delayed On: If not zero, then Time in Seconds to toggle Output [1Sec/bit, 1-255]

(38) Timed Output: If not zero, then Time in Seconds for Output to Stay On [1Sec/bit, 1-255]

(39) Bi-Dir L/M/H PWM: If not zero, then used as Minimum Output Current Rating [0.1A/bit]

LED Module Support

The 505060 Digital Switcher also has built-in support for the Marlin 5010xx LED Module, which can be used to monitor the module's I/O for diagnostic purposes. The module's I/O statuses are transmitted to the LED module via a CAN message. No configuration is necessary to enable the LED module to work with the 505060 module.