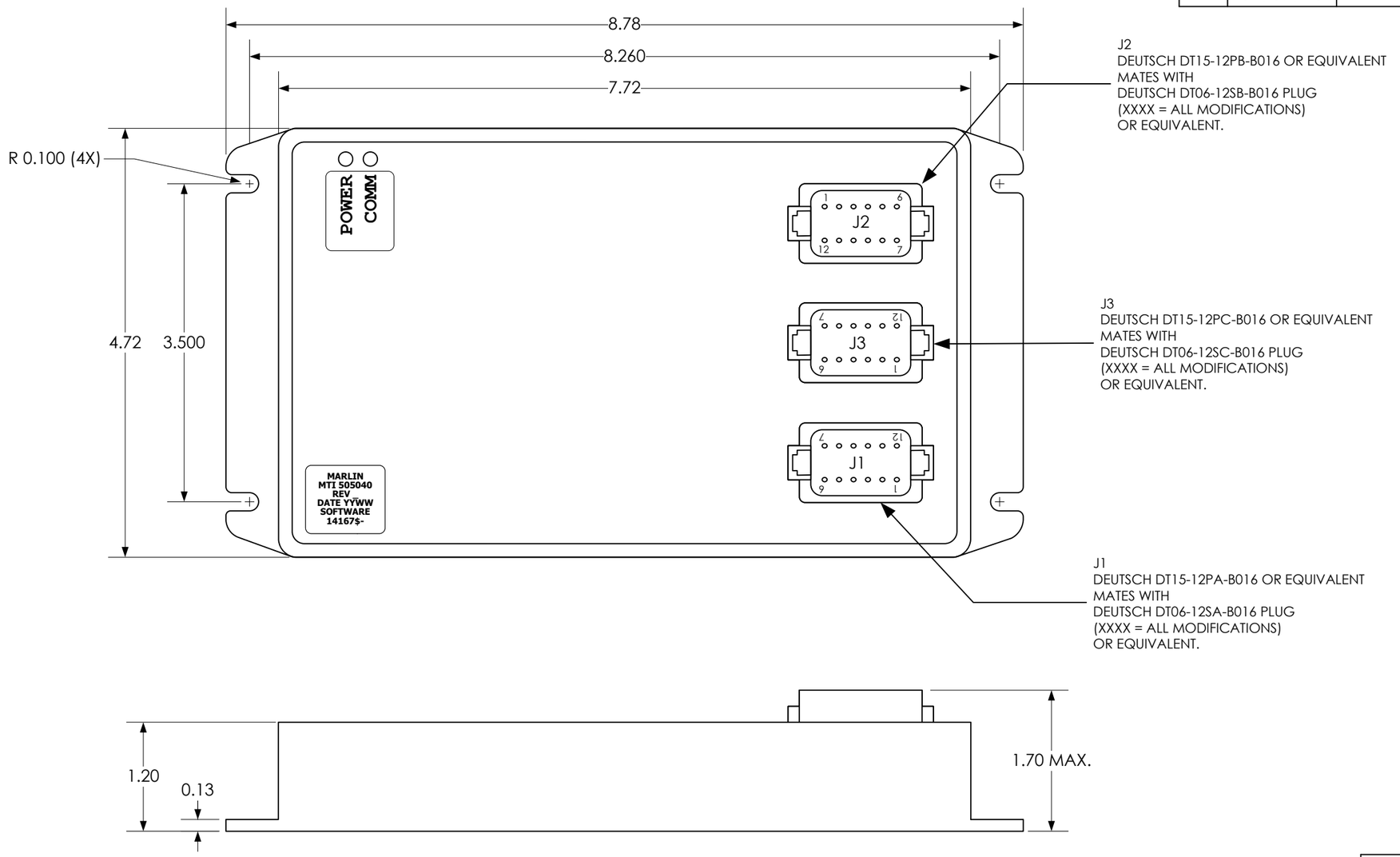
Overview: Module Physical Dimensions

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX



UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL	THREE PLACE DECIMAL	ANGLES
+/- 0.05	+/- 0.020	+/-

DO NOT SCALE DRAWING

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CHECKED	J. COOPER	DATE 02/10/2025
APPROVED	J. COOPER	DATE 02/10/2025

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

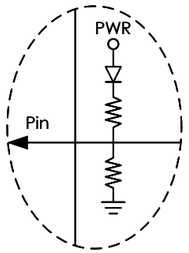
SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE	DATE 06/21/22	SHEET 1 OF 25

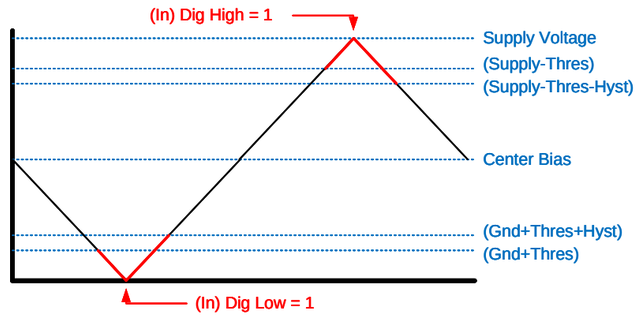
Overview: Input/Output Configurations

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

(* NOTE: Analog Input Circuit and Best Practices)

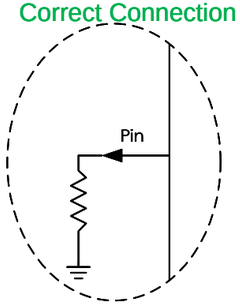


- Generated Analog Signal
- Analog Potentiometer (5k or less)
- On/Off Switch to Power (No Pull-Down)
- On/Off Switch to Gnd (No Pull-Up)
- 3-way Switch to Pwr/Gnd (No PU/PD)
- Frequency Input (0-5V, LS_Output)
- PWM Duty Cycle (0-5V, LS_Output)
- Quadrature Input (0-5V, LS_Output)

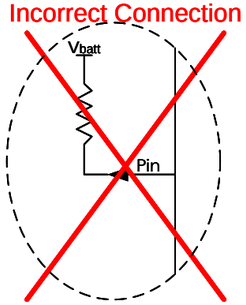


(* NOTE: Resistance Input Circuit and Best Practices)

Correct Connection



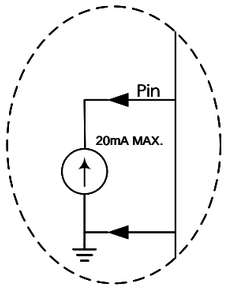
Incorrect Connection



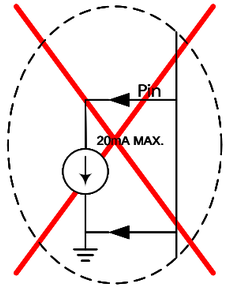
- An improper resistor connection can damage the module.

(* NOTE: Current Input Circuit and Best Practices)

Correct Connection



Incorrect Connection



- Voltage on the input Pin must not exceed 6V when configured for current input.

- Improper wiring can damage the module.

Input/Output Configuration Options

Input Type	#1	#2	#3	#4	#5	#6	#7	#8
Digital Active High - Thres	●	●	●	●	●	●	●	●
Digital Active Low - Thres	●	●	●	●	●	●	●	●
Analog 0-36V	●	●	●	●	●	●	●	●
Frequency	●	●	●	●				
PWM Duty Cycle	●	●	●	●				
Resistance	●	●	●	●				
Current (0-20mA)	●	●	●	●				
Quadrature – X1	●*	●*	●*	●*	●*	●*	●*	
Quadrature – X2	●*	●*	●*	●*	●*	●*	●*	
Quadrature – X4	●*	●*	●*	●*	●*	●*	●*	
Quadrature – B		●	●	●	●	●	●	●

*When configured as Quadrature, The next adjacent input is automatically configured as the channel B input. (i.e. If In1 = QuadX_, then In2 = Quad Channel B)

Output Type	#1	#2	#3	#4	#5	#6	#7	#8
00 - Disabled	●	●	●	●	●	●	●	●
01 – Active HI Digital	●	●	●	●	●	●	●	●
02 – Active LO Digital	●	●	●	●	●	●	●	●
03 – HS PWM Closed Loop	●	●	●	●	●	●	●	●
04 – HS PWM Open Loop	●	●	●	●	●	●	●	●
03 – LS PWM Closed Loop	●	●	●	●	●	●	●	●
04 – LS PWM Open Loop	●	●	●	●	●	●	●	●

In/Out Tolerances (@25C)	
Analog Input	+/-50mV
Resistance Input	+/-2%
Current Input (0-20mA)	+/-100uA
Current Control Output	+/-50mA

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

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DRAWN M. PETZKE | DATE 06/21/22 | SHEET 2 OF 25

Programming

REVISIONS				
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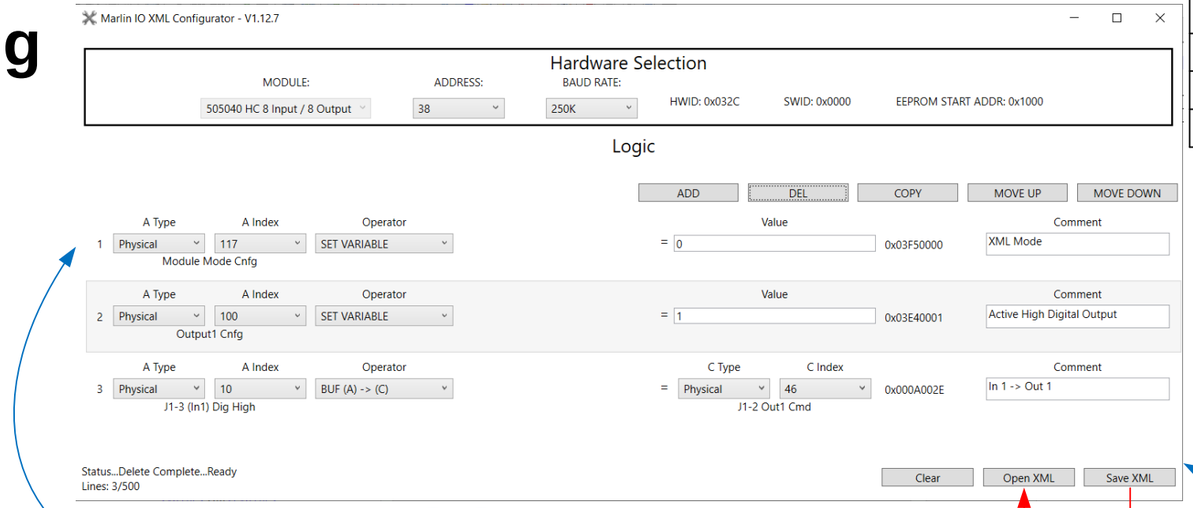
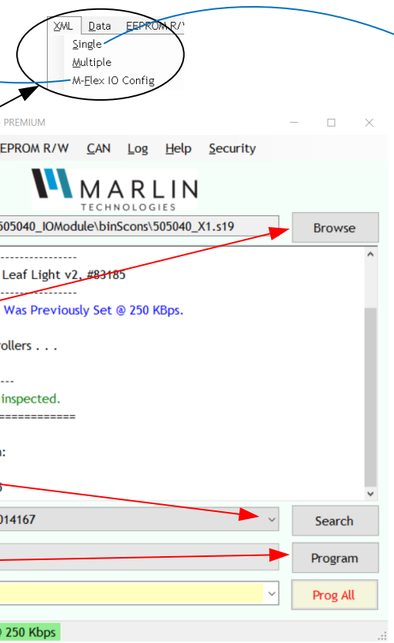
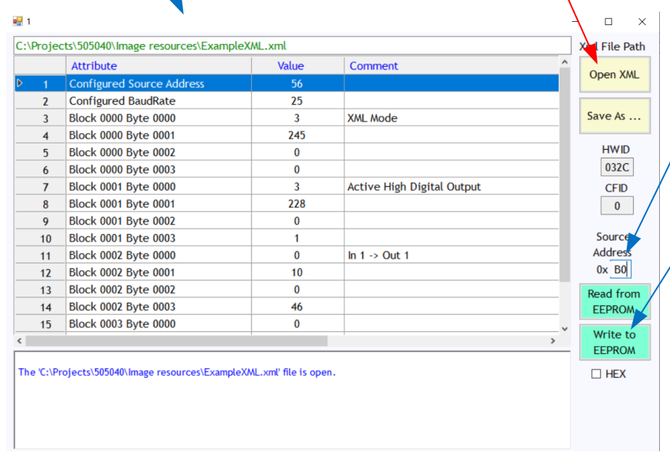




XML Logic
File (*.XML)



Programing/Updating XML Instruction Logic Marlin Tool

1) Select "XML>M-Flex-IO Config" to open the Configurator Tool Window

2) Create or change the XML Logic and save to an XML file

3) Select "XML>Single" to open the XML download window

4) Enter the Module Source Address that you are downloading to.

5) Download the XML logic

6) Cycle power to the module to complete the update

Updating Base Software via Marlin Tool (if required)

1) Select S19 Software file

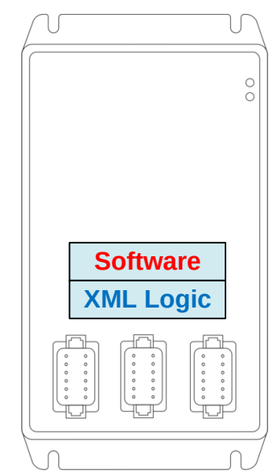
Base Software
(014167$__.S19)

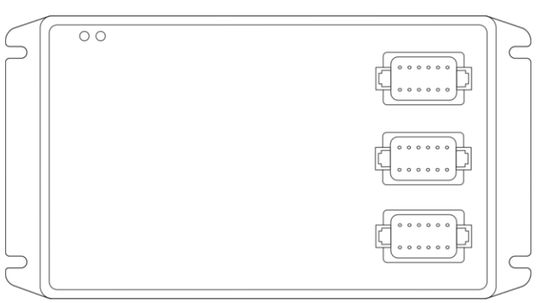
2) Select Controller to Program

Confirm HWID matches

3) Program the Controller

Controller ready to install on the Vehicle





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DRAWN M. PETZKE | DATE 06/21/22 | SHEET 3 OF 25

Programming

REVISIONS				
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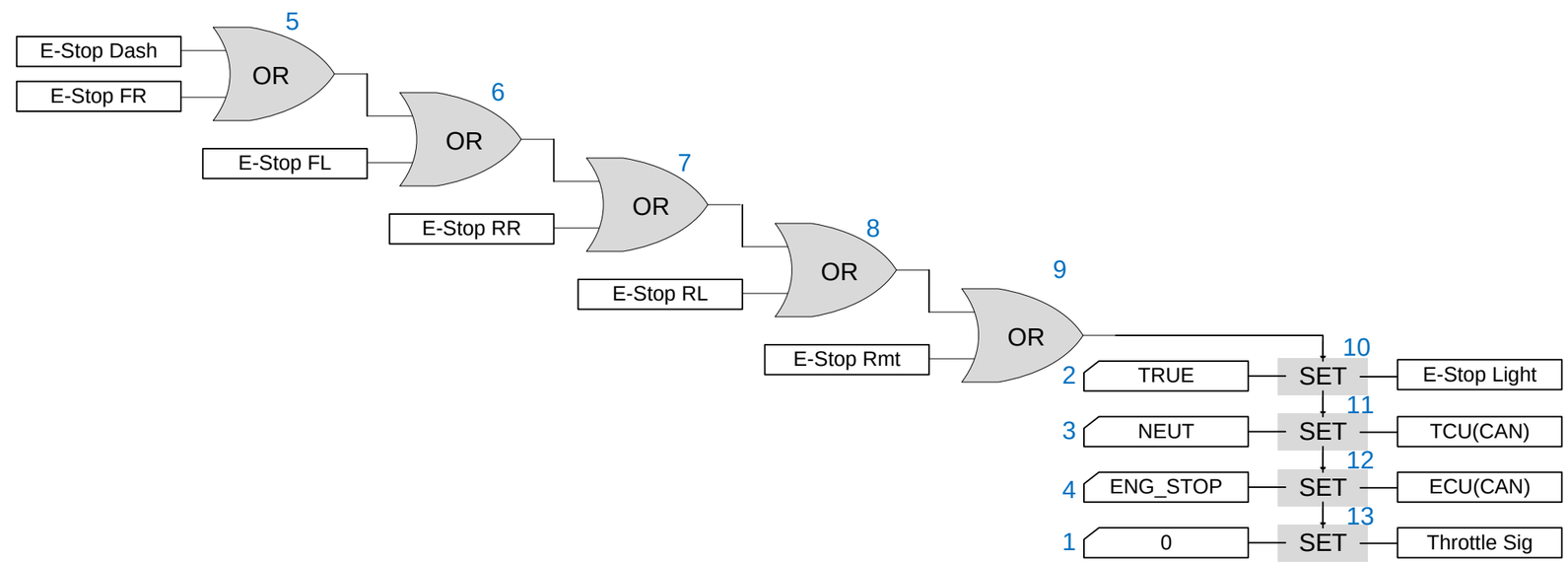
Current Stacked User Logic Builder Approach (Closest to Actual Code)

		Var_A	Cmd	Var_B		Var_C
(*)	1	PHY #63	Set Var		=	XML Mode
(*)	2	CONST #1	Set Var		=	Zero
(*)	3	CONST #2	Set Var		=	True
(*)	4	CONST #3	Set Var		=	Neut Value
(*)	5	CONST #4	Set Var		=	EngStop Value
	6	E-Stop Dash	OR	E-Stop FR	=	TEMP1
	7	TEMP 1	OR	E-Stop FL	=	TEMP1
	8	TEMP 1	OR	E-Stop RR	=	TEMP1
	9	TEMP 1	OR	E-Stop RL	=	TEMP1
	10	TEMP 1	OR	E-Stop Rmt	=	TEMP1
	11	TEMP 1	IF (SET)	Const =True	=	E-Stop Light
	12	TEMP 1	IF (SET)	Const =Neut	=	TCU (CAN)
	13	TEMP 1	IF (SET)	Const =EngStop	=	ECM (CAN)
	14	TEMP 1	ZERO	Zero	=	ThrottleSig

(* NOTE: Ensure that all configurations and hard values to be used must be set at the beginning of the XML instructions list)

Future Graphical User Logic Builder Concept



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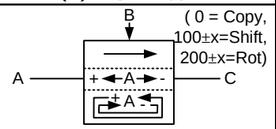
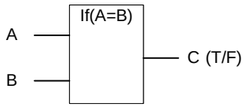
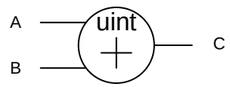
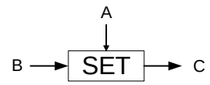
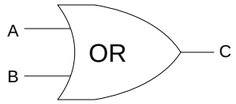
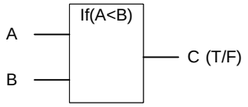
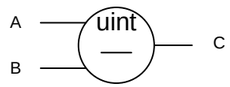
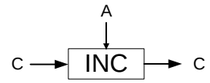
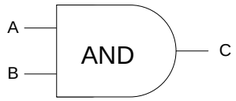
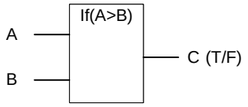
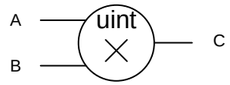
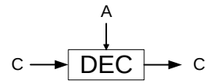
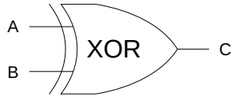
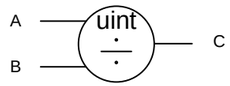
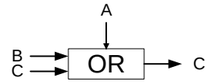
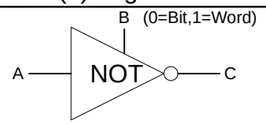
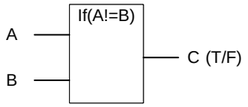
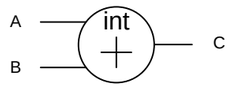
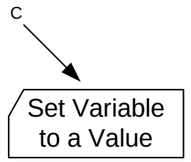
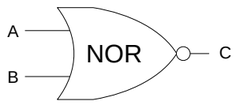
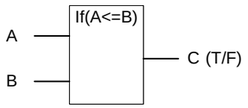
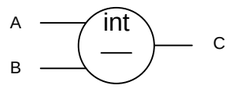
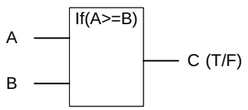
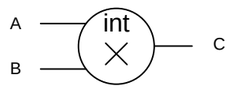
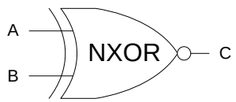
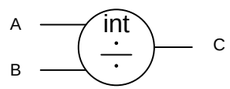
Logical Operands	Comparative Operands	Mathmatical Operands	Output Action Operands
00000 (0) Logic Copy/Shift/Rot	01000 (8) IF_EQ	10000 (16) U_ADD	11000 (24) IF(SET)
			
00001 (1) Logic OR	01001 (9) IF_LT	10001 (17) U_SUB	11001 (25) IF(INC)
			
00010 (2) Logic AND	01010 (10) IF_GT	10010 (18) U_MUL	11010 (26) IF(DEC)
			
00011 (3) Logic XOR	01011 (11)	10011 (19) U_DIV	11011 (27) IF(OR)
	UNUSED AT THE MOMENT		
00100 (4) Logic NOT	01100 (12) If_NEQ	10100 (20) S_ADD	111xx (28-31) Set_Value
			
00101 (5) Logic NOR	01101 (13) IF_LTEQ	10101 (21) S_SUB	
			
00110 (6) Logic NAND	01110 (14) IF_GTEQ	10110 (22) S_MUL	
			
00111 (7) Logic XNOR	01111 (15)	10111 (23) S_DIV	
	UNUSED AT THE MOMENT		

Logic Commands

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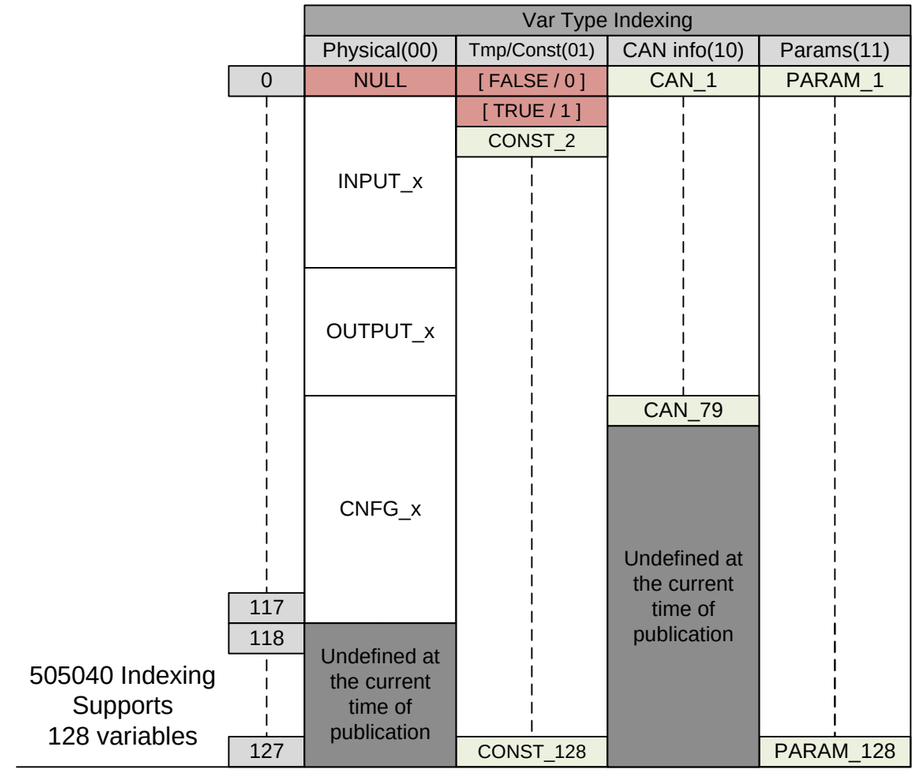
REVISIONS

REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX



- Params type parameters are non-volatile. Values stored here are remembered after a module power cycle. SET VARIABLE operations on these parameters are ignored. Writes (see below) occur only when the stored value is changed.
- Temp type parameters are volatile. Values stored here are forgotten after a module power cycle.

Note: Params and Temp parameters should not be treated as interchangeable. Degradation of non-volatile memory will start after 1,000,000 writes. Writing to fully degraded memory will fail to properly store the written value. Reading has no effect on memory lifespan.
Use the below equation to estimate the lifespan of a single Params location:

1,000,000 / [Number of writes per second] = [expected number of seconds before earliest memory failure]

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL	THREE PLACE DECIMAL	ANGLES
+/- 0.05	+/- 0.020	+/-

DO NOT SCALE DRAWING

CHECKED	J. COOPER	DATE 02/10/2025
APPROVED	J. COOPER	DATE 02/10/2025

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 5 OF 25

505040 Physical Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Physical Variables Type (00b) – Index List of Values				
0	NULL	DO NOT USE!		
1	J1-8	Input	Analog	Battery Voltage [0-43,554 mV, 1mV/bit]
2	J1-3	Input	Analog	Input 1 Voltage/Amps/Ohms/Count (Mode Based) [1mV,uA,Ω/bit]*
3	J1-5	Input	Analog	Input 2 Voltage/Amps/Ohms/Count (Mode Based) [1mV,uA,Ω/bit]*
4	J2-6	Input	Analog	Input 3 Voltage/Amps/Ohms/Count (Mode Based) [1mV,uA,Ω/bit]*
5	J2-8	Input	Analog	Input 4 Voltage/Amps/Ohms/Count (Mode Based) [1mV,uA,Ω/bit]*
6	J1-11	Input	Analog	Input 5 Voltage/Count (Mode Based) [1mV/bit]*
7	J1-10	Input	Analog	Input 6 Voltage/Count (Mode Based) [1mV/bit]*
8	J2-9	Input	Analog	Input 7 Voltage/Count (Mode Based) [1mV/bit]*
9	J2-4	Input	Analog	Input 8 Voltage (Mode Based) [1mV/bit]*
10	J1-3	Input	Digital	Input 1 Digital High [1=Active High, 0=otherwise]
11	J1-3	Input	Digital	Input 1 Digital Low [1=Active Low, 0=otherwise]
12	J1-5	Input	Digital	Input 2 Digital High [1=Active High, 0=otherwise]
13	J1-5	Input	Digital	Input 2 Digital Low [1=Active Low, 0=otherwise]
14	J2-6	Input	Digital	Input 3 Digital High [1=Active High, 0=otherwise]
15	J2-6	Input	Digital	Input 3 Digital Low [1=Active Low, 0=otherwise]
16	J2-8	Input	Digital	Input 4 Digital High [1=Active High, 0=otherwise]
17	J2-8	Input	Digital	Input 4 Digital Low [1=Active Low, 0=otherwise]
18	J1-11	Input	Digital	Input 5 Digital High [1=Active High, 0=otherwise]
19	J1-11	Input	Digital	Input 5 Digital Low [1=Active Low, 0=otherwise]
20	J1-10	Input	Digital	Input 6 Digital High [1=Active High, 0=otherwise]
21	J1-10	Input	Digital	Input 6 Digital Low [1=Active Low, 0=otherwise]
22	J2-9	Input	Digital	Input 7 Digital High [1=Active High, 0=otherwise]
23	J2-9	Input	Digital	Input 7 Digital Low [1=Active Low, 0=otherwise]
24	J2-4	Input	Digital	Input 8 Digital High [1=Active High, 0=otherwise]
25	J2-4	Input	Digital	Input 8 Digital Low [1=Active Low, 0=otherwise]
26	J1-2	Input	Analog	Output 1 Current [0-11000mA, 1mA/bit]
27	J1-4	Input	Analog	Output 2 Current [0-11000mA, 1mA/bit]
28	J2-3	Input	Analog	Output 3 Current [0-11000mA, 1mA/bit]
29	J2-5	Input	Analog	Output 4 Current [0-11000mA, 1mA/bit]
30	J1-6	Input	Analog	Output 5 Current [0-11000mA, 1mA/bit]
31	J1-7	Input	Analog	Output 6 Current [0-11000mA, 1mA/bit]
32	J2-12	Input	Analog	Output 7 Current [0-11000mA, 1mA/bit]
33	J2-1	Input	Analog	Output 8 Current [0-11000mA, 1mA/bit]
34	J1-3	Input	D.C.	Digital Input 1 Duty Cycle [0-100%, 0.1%/bit]
35	J1-3	Input	Period	Digital Input 1 Period [0-65535uS, 1 uS/bit]
36	J1-3	Input	Freq	Digital Input 1 Frequency [32-6,553Hz, 0.1 Hz/bit]
37	J1-5	Input	D.C.	Digital Input 2 Duty Cycle [0-100%, 0.1%/bit]
38	J1-5	Input	Period	Digital Input 2 Period [0-65535uS, 1 uS/bit]
39	J1-5	Input	Freq	Digital Input 2 Frequency [32-6,553Hz, 0.1 Hz/bit]
40	J2-6	Input	D.C.	Digital Input 3 Duty Cycle [0-100%, 0.1%/bit]
41	J2-6	Input	Period	Digital Input 3 Period [0-65535uS, 1 uS/bit]
42	J2-6	Input	Freq	Digital Input 3 Frequency [32-6,553Hz, 0.1 Hz/bit]
43	J2-8	Input	D.C.	Digital Input 4 Duty Cycle [0-100%, 0.1%/bit]
44	J2-8	Input	Period	Digital Input 4 Period [0-65535uS, 1 uS/bit]
45	J2-8	Input	Freq	Digital Input 4 Frequency [32-6,553Hz, 0.1 Hz/bit]
46	J1-2	Output	Digital	Output 1 Digital Cmd [1=On, 0=Off]
47	J1-4	Output	Digital	Output 2 Digital Cmd [1=On, 0=Off]
48	J2-3	Output	Digital	Output 3 Digital Cmd [1=On, 0=Off]
49	J2-5	Output	Digital	Output 4 Digital Cmd [1=On, 0=Off]
50	J1-6	Output	Digital	Output 5 Digital Cmd [1=On, 0=Off]
51	J1-7	Output	Digital	Output 6 Digital Cmd [1=On, 0=Off]
52	J2-1	Output	Digital	Output 7 Digital Cmd [1=On, 0=Off]
53	J2-12	Output	Digital	Output 8 Digital Cmd [1=On, 0=Off]
54	J1-2	Output	DC/mA	Output 1 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
55	J1-4	Output	DC/mA	Output 2 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
56	J2-3	Output	DC/mA	Output 3 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
57	J2-5	Output	DC/mA	Output 4 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
58	J1-6	Output	DC/mA	Output 5 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
59	J1-7	Output	DC/mA	Output 6 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
60	J2-12	Output	DC/mA	Output 7 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
61	J2-1	Output	DC/mA	Output 8 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]

*When configured as Quadrature, the count is stored in the Channel A array location.
Reading Channel B location will always return 0.

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TWO PLACE DECIMAL	THREE PLACE DECIMAL	ANGLES
+/- 0.05	+/- 0.020	+/-

DO NOT SCALE DRAWING

CHECKED	J. COOPER	DATE 02/10/2025
APPROVED	J. COOPER	DATE 02/10/2025

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 6 OF 25

505040 Physical Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Physical Variables Type (00b) – Index List of Values				
62	Cnfg	In1	Type	Input 1 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
63	Cnfg	In2	Type	Input 2 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
64	Cnfg	In3	Type	Input 3 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
65	Cnfg	In4	Type	Input 4 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
66	Cnfg	In5	Type	Input 5 [0=Analog/Digital, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
67	Cnfg	In6	Type	Input 6 [0=Analog/Digital, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
68	Cnfg	In7	Type	Input 7 [0=Analog/Digital, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
69	Cnfg	In8	Type	Input 8 [0=Analog/Digital, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
70	J1-2	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-10000mA]
71	J1-4	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-10000mA]
72	J2-3	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-10000mA]
73	J2-5	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-10000mA]
74	J1-6	Limit	mA	Output 5 Current Limit [1 mA /bit, 0-10000mA]
75	J1-7	Limit	mA	Output 6 Current Limit [1 mA /bit, 0-10000mA]
76	J2-1	Limit	mA	Output 7 Current Limit [1 mA /bit, 0-10000mA]
77	J2-12	Limit	mA	Output 8 Current Limit [1 mA /bit, 0-10000mA]
78	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65,535mV, 1mV/bit]
79	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65,535mV, 1mV/bit]
80	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
81	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
82	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
83	Cnfg	OnDly1	Time	Output 1 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
84	Cnfg	OnDly2	Time	Output 2 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
85	Cnfg	OnDly3	Time	Output 3 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
86	Cnfg	OnDly4	Time	Output 4 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
87	Cnfg	OnDly5	Time	Output 5 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
88	Cnfg	OnDly6	Time	Output 6 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
89	Cnfg	OnDly7	Time	Output 7 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
90	Cnfg	OnDly8	Time	Output 8 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
91	Cnfg	OffDly1	Time	Output 1 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
92	Cnfg	OffDly2	Time	Output 2 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
93	Cnfg	OffDly3	Time	Output 3 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
94	Cnfg	OffDly4	Time	Output 4 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
95	Cnfg	OffDly5	Time	Output 5 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
96	Cnfg	OffDly6	Time	Output 6 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
97	Cnfg	OffDly7	Time	Output 7 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
98	Cnfg	OffDly8	Time	Output 8 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
99	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]

100	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
101	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
102	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
103	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
104	Cnfg	Out5	Type	Output 5 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
105	Cnfg	Out6	Type	Output 6 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
106	Cnfg	Out7	Type	Output 7 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
107	Cnfg	Out8	Type	Output 8 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
108	Cnfg	Kypd	B1	Output 1 Keypad Button Config – Index# [Refer to Spec 11713S__]
109	Cnfg	Kypd	B2	Output 2 Keypad Button Config – Index# [Refer to Spec 11713S__]
110	Cnfg	Kypd	B3	Output 3 Keypad Button Config – Index# [Refer to Spec 11713S__]
111	Cnfg	Kypd	B4	Output 4 Keypad Button Config – Index# [Refer to Spec 11713S__]
112	Cnfg	Kypd	B5	Output 5 Keypad Button Config – Index# [Refer to Spec 11713S__]
113	Cnfg	Kypd	B6	Output 6 Keypad Button Config – Index# [Refer to Spec 11713S__]
114	Cnfg	Kypd	B7	Output 7 Keypad Button Config – Index# [Refer to Spec 11713S__]
115	Cnfg	Kypd	B8	Output 8 Keypad Button Config – Index# [Refer to Spec 11713S__]
116	Cnfg	Kypd	SA	Keypad Source Address
117	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]
118	<Blank>			Undefined at the current time of publication Reserved for future PHY Variable information
119	<Blank>			
120	<Blank>			
123	<Blank>			
124	<Blank>			
125	<Blank>			
126	<Blank>			
127	<Blank>			

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL	THREE PLACE DECIMAL	ANGLES
+/- 0.05	+/- 0.020	+/-

DO NOT SCALE DRAWING

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

CHECKED	J. COOPER	DATE 02/10/2025	
APPROVED	J. COOPER	DATE 02/10/2025	
DRAWN	M. PETZKE	DATE 06/21/22	SHEET 7 OF 25

505040 Temporary Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Tmp Variables Type (01b) – Index List of Values			
0	FALSE	Binary	FALSE / 0 value
1	TRUE	Binary	TRUE / 1 value
2	<Blank>	Variables are open and available for the User	
3	<Blank>		
4	<Blank>		
5	<Blank>		
6	<Blank>		
7	<Blank>		
8	<Blank>		
9	<Blank>		
10	<Blank>		
11	<Blank>		
12	<Blank>		
13	<Blank>		
14	<Blank>		
15	<Blank>		
16	<Blank>		
17	<Blank>		
18	<Blank>		
19	<Blank>		
20	<Blank>		
21	<Blank>		
22	<Blank>		
23	<Blank>		
24	<Blank>		
25	<Blank>		
26	<Blank>		
27	<Blank>		
28	<Blank>		
29	<Blank>		
30	<Blank>		
31	<Blank>		

32	<Blank>	Variables are open and available for the User
33	<Blank>	
34	<Blank>	
35	<Blank>	
36	<Blank>	
37	<Blank>	
38	<Blank>	
39	<Blank>	
40	<Blank>	
41	<Blank>	
42	<Blank>	
43	<Blank>	
44	<Blank>	
45	<Blank>	
46	<Blank>	
47	<Blank>	
48	<Blank>	
49	<Blank>	
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51	<Blank>	
52	<Blank>	
53	<Blank>	
54	<Blank>	
55	<Blank>	
56	<Blank>	
57	<Blank>	
⋮	⋮	
126	<Blank>	
127	<Blank>	

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL	THREE PLACE DECIMAL	ANGLES
+/- 0.05	+/- 0.020	+/-

DO NOT SCALE DRAWING

CHECKED	J. COOPER	DATE 02/10/2025	
APPROVED	J. COOPER	DATE 02/10/2025	

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE	DATE 06/21/22	SHEET 8 OF 25

505030 CAN-Bus Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

CAN Variables Type (10b) – Index List of Values			
0	Rx1 PGN	Rx CAN Msg #1	PGN of CAN Message to be received (*)
1	Rx1 SrcAddr		Source Address of CAN Message to be received (**)
2	Rx1 Data 1:0		Data Bytes 1[MSB] & 0[LSB] of message Received
3	Rx1 Data 3:2		Data Bytes 3[MSB] & 2[LSB] of message Received
4	Rx1 Data 5:4		Data Bytes 5[MSB] & 4[LSB] of message Received
5	Rx1 Data 7:6		Data Bytes 7[MSB] & 6[LSB] of message Received
6	Tx1 PGN	Tx CAN Msg #1	PGN of CAN Message to be Transmitted (*)
7	Tx1 MsgRate		Std/Ext ID Flag : Message Transmit Rate [10mS/bit, 0-32,000mS] (***)
8	Tx1 Data 1:0		Data Bytes 1[MSB] & 0[LSB] to send
9	Tx1 Data 3:2		Data Bytes 3[MSB] & 2[LSB] to send
10	Tx1 Data 5:4		Data Bytes 5[MSB] & 4[LSB] to send
11	Tx1 Data 7:6		Data Bytes 7[MSB] & 6[LSB] to send
12	Rx2 PGN	Rx CAN Msg #2	PGN of CAN Message to be received (*)
13	Rx2 SrcAddr		Source Address of CAN Message to be received (**)
14	Rx2 Data 1:0		Data Bytes 1[MSB] & 0[LSB] of message Received
15	Rx2 Data 3:2		Data Bytes 3[MSB] & 2[LSB] of message Received
16	Rx2 Data 5:4		Data Bytes 5[MSB] & 4[LSB] of message Received
17	Rx2 Data 7:6		Data Bytes 7[MSB] & 6[LSB] of message Received
18	Tx2 PGN	Tx CAN Msg #2	PGN of CAN Message to be Transmitted (*)
19	Tx2 MsgRate		Std/Ext ID Flag : Message Transmit Rate [10mS/bit, 0-32,000mS] (***)
20	Tx2 Data 1:0		Data Bytes 1[MSB] & 0[LSB] to send
21	Tx2 Data 3:2		Data Bytes 3[MSB] & 2[LSB] to send
22	Tx2 Data 5:4		Data Bytes 5[MSB] & 4[LSB] to send
23	Tx2 Data 7:6		Data Bytes 7[MSB] & 6[LSB] to send
24	Rx3 PGN	Rx CAN Msg #3	PGN of CAN Message to be received (*)
25	Rx3 SrcAdr		Source Address of CAN Message to be received (**)
26	Rx3 Data 1:0		Data Bytes 1[MSB] & 0[LSB] of message Received
27	Rx3 Data 3:2		Data Bytes 3[MSB] & 2[LSB] of message Received
28	Rx3 Data 5:4		Data Bytes 5[MSB] & 4[LSB] of message Received
29	Rx3 Data 7:6		Data Bytes 7[MSB] & 6[LSB] of message Received
30	Tx3 PGN	Tx CAN Msg #3	PGN of CAN Message to be Transmitted (*)
31	Tx3 MsgRate		Std/Ext ID Flag : Message Transmit Rate [10mS/bit, 0-32,000mS] (***)
32	Tx3 Data 1:0		Data Bytes 1[MSB] & 0[LSB] to send
33	Tx3 Data 3:2		Data Bytes 3[MSB] & 2[LSB] to send
34	Tx3 Data 5:4		Data Bytes 5[MSB] & 4[LSB] to send
35	Tx3 Data 7:6		Data Bytes 7[MSB] & 6[LSB] to send

36	Rx4 PGN	Rx CAN Msg #4	PGN of CAN Message to be received (*)
37	Rx4 SrcAddr		Source Address of CAN Message to be received (**)
38	Rx4 Data 1:0		Data Bytes 1[MSB] & 0[LSB] of message Received
39	Rx4 Data 3:2		Data Bytes 3[MSB] & 2[LSB] of message Received
40	Rx4 Data 5:4		Data Bytes 5[MSB] & 4[LSB] of message Received
41	Rx4 Data 7:6		Data Bytes 7[MSB] & 6[LSB] of message Received
42	Tx4 PGN	Tx CAN Msg #4	PGN of CAN Message to be Transmitted (*)
43	Tx4 MsgRate		Std/Ext ID Flag : Message Transmit Rate [10mS/bit, 0-32,000mS] (***)
44	Tx4 Data 1:0		Data Bytes 1[MSB] & 0[LSB] to send
45	Tx4 Data 3:2		Data Bytes 3[MSB] & 2[LSB] to send
46	Tx4 Data 5:4		Data Bytes 5[MSB] & 4[LSB] to send
47	Tx4 Data 7:6		Data Bytes 7[MSB] & 6[LSB] to send

59	Tx1 Priority	Tx CAN Msg Pri	Tx1 Msg Priority bits [0-7]
60	Tx2 Priority		Tx2 Msg Priority bits [0-7]
61	Tx3 Priority		Tx3 Msg Priority bits [0-7]
62	Tx4 Priority		Tx4 Msg Priority bits [0-7]

81	Rx5 PGN	Rx CAN Msg #5	PGN of CAN Message to be received (*)
82	Rx5 SrcAddr		Source Address of CAN Message to be received (**)
83	Rx5 Data 1:0		Data Bytes 1[MSB] & 0[LSB] of message Received
84	Rx5 Data 3:2		Data Bytes 3[MSB] & 2[LSB] of message Received
85	Rx5 Data 5:4		Data Bytes 5[MSB] & 4[LSB] of message Received
86	Rx5 Data 7:6		Data Bytes 7[MSB] & 6[LSB] of message Received
87	Tx5 Priority	Priority	Tx5 Msg Priority bits [0-7]
88	Tx5 PGN	Tx CAN Msg #5	PGN of CAN Message to be Transmitted (*)
89	Tx5 MsgRate		Std/Ext ID Flag : Message Transmit Rate [10mS/bit, 0-32,000mS] (***)
90	Tx5 Data 1:0		Data Bytes 1[MSB] & 0[LSB] to send
91	Tx5 Data 3:2		Data Bytes 3[MSB] & 2[LSB] to send
92	Tx5 Data 5:4		Data Bytes 5[MSB] & 4[LSB] to send
93	Tx5 Data 7:6		Data Bytes 7[MSB] & 6[LSB] to send

(*) NOTE: 11-bit Std_ID: PGN is Message ID (Full Std ID range 0-2047 [0x000-0x7FF])
29-bit Ext_ID: PGN is PDU:Format and PDU:Specific of Message ID
Priority is ignored on Received messages, and default of 6 for Transmitted messages.

(**) NOTE: 11-bit Std_ID: Not Applicable, set as 65535.
29-bit Ext_ID: SourceAddress of Message ID

(***) NOTE: Add 32768 to the desired transmit rate to send the PGN value as a Standard ID.

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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

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505040 CAN-Bus Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

CAN Variables Type (10b) – Index List of Values				
48	Cnfg	Tx Rate	Time	CAN Msg FF40 Tx Rate [10mS/bit, 0=Off]
49	Cnfg	Tx Rate	Time	CAN Msg FF41 Tx Rate [10mS/bit, 0=Off]
50	Cnfg	Tx Rate	Time	CAN Msg FF42 Tx Rate [10mS/bit, 0=Off]
51	Cnfg	Tx Rate	Time	CAN Msg FF43 Tx Rate [10mS/bit, 0=Off]
52	Cnfg	Tx Rate	Time	CAN Msg FF44 Tx Rate [10mS/bit, 0=Off]
53	Cnfg	Tx Rate	Time	CAN Msg FF60 Tx Rate [10mS/bit, 0=Off]
54	Cnfg	Tx Rate	Time	CAN Msg FF61 Tx Rate [10mS/bit, 0=Off]
55	Cnfg	Tx Rate	Time	CAN Msg FF63 Tx Rate [10mS/bit, 0=Off]
56	Cnfg	Tx Rate	Time	CAN Msg FF64 Tx Rate [10mS/bit, 0=Off]
57	Cnfg	Tx Rate	Time	CAN Msg FF65 Tx Rate [10mS/bit, 0=Off]
58	Cnfg	Tx Rate	Time	CAN Msg FF66 Tx Rate [10mS/bit, 0=Off]
63	Kypd	Input	Digital	Keypad Input 1 [0=Up,1=Down,2=Err,3=No Key]
64	Kypd	Input	Digital	Keypad Input 2 [0=Up,1=Down,2=Err,3=No Key]
65	Kypd	Input	Digital	Keypad Input 3 [0=Up,1=Down,2=Err,3=No Key]
66	Kypd	Input	Digital	Keypad Input 4 [0=Up,1=Down,2=Err,3=No Key]
67	Kypd	Input	Digital	Keypad Input 5 [0=Up,1=Down,2=Err,3=No Key]
68	Kypd	Input	Digital	Keypad Input 6 [0=Up,1=Down,2=Err,3=No Key]
69	Kypd	Input	Digital	Keypad Input 7 [0=Up,1=Down,2=Err,3=No Key]
70	Kypd	Input	Digital	Keypad Input 8 [0=Up,1=Down,2=Err,3=No Key]
71	Kypd	Output	6-bit	Keypad Out1 LEDs [0=Off,1=On,2=Blink,3=NoChg]
72	Kypd	Output	6-bit	Keypad Out2 LEDs [0=Off,1=On,2=Blink,3=NoChg]
73	Kypd	Output	6-bit	Keypad Out3 LEDs [0=Off,1=On,2=Blink,3=NoChg]
74	Kypd	Output	6-bit	Keypad Out4 LEDs [0=Off,1=On,2=Blink,3=NoChg]
75	Kypd	Output	6-bit	Keypad Out5 LEDs [0=Off,1=On,2=Blink,3=NoChg]
76	Kypd	Output	6-bit	Keypad Out6 LEDs [0=Off,1=On,2=Blink,3=NoChg]
77	Kypd	Output	6-bit	Keypad Out7 LEDs [0=Off,1=On,2=Blink,3=NoChg]
78	Kypd	Output	6-bit	Keypad Out8 LEDs [0=Off,1=On,2=Blink,3=NoChg]
79	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]
80	Cnfg	Tx Rate	Time	LED status Message Transmit Rate [10mS/bit, 0=No Transmit]
93	<Blank>	J1939 CAN Or Pre-Define Rx Values	Undefined at the current time of publication Reserved for future CAN message information	
94	<Blank>			
⋮	⋮			
127	<Blank>			
128	<Blank>			

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

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505040 Parameter Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Parameters Variables Type (11b) – Index List of Values		
0	<Blank>	Variables are open and available for the User
1	<Blank>	
2	<Blank>	
3	<Blank>	
4	<Blank>	
5	<Blank>	
6	<Blank>	
7	<Blank>	
8	<Blank>	
9	<Blank>	
10	<Blank>	
11	<Blank>	
12	<Blank>	
13	<Blank>	
14	<Blank>	
15	<Blank>	
16	<Blank>	
17	<Blank>	
18	<Blank>	
19	<Blank>	
20	<Blank>	
21	<Blank>	
22	<Blank>	
23	<Blank>	
24	<Blank>	
25	<Blank>	
26	<Blank>	
27	<Blank>	
28	<Blank>	
29	<Blank>	
30	<Blank>	
31	<Blank>	

32	<Blank>	Variables are open and available for the User
33	<Blank>	
34	<Blank>	
35	<Blank>	
36	<Blank>	
37	<Blank>	
38	<Blank>	
39	<Blank>	
40	<Blank>	
41	<Blank>	
42	<Blank>	
43	<Blank>	
44	<Blank>	
45	<Blank>	
46	<Blank>	
47	<Blank>	
48	<Blank>	
126	<Blank>	
127	<Blank>	

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

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505040 Physical Config Variables for XML_Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

List of Configurations used in XML_Mode

Phy	78	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65.535mV, 1mV/bit]
Phy	79	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65.535mV, 1mV/bit]
Phy	80	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	81	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	82	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]

Phy	70	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-10000mA]
Phy	71	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-10000mA]
Phy	72	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-10000mA]
Phy	73	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-10000mA]
Phy	74	Cnfg	Limit	mA	Output 5 Current Limit [1 mA /bit, 0-10000mA]
Phy	75	Cnfg	Limit	mA	Output 6 Current Limit [1 mA /bit, 0-10000mA]
Phy	76	Cnfg	Limit	mA	Output 7 Current Limit [1 mA /bit, 0-10000mA]
Phy	77	Cnfg	Limit	mA	Output 8 Current Limit [1 mA /bit, 0-10000mA]

Phy	99	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	100	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	101	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	102	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	103	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	104	Cnfg	Out5	Type	Output 5 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	105	Cnfg	Out6	Type	Output 6 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	106	Cnfg	Out7	Type	Output 7 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	107	Cnfg	Out8	Type	Output 8 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]

Phy	62	Cnfg	In1	Type	Input 1 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	63	Cnfg	In2	Type	Input 2 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	64	Cnfg	In3	Type	Input 3 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	65	Cnfg	In4	Type	Input 4 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	66	Cnfg	In5	Type	Input 5 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	67	Cnfg	In6	Type	Input 6 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	68	Cnfg	In7	Type	Input 7 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	69	Cnfg	In8	Type	Input 8 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]

Phy	117	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]

Can	79	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]

Example XML Configuration

Operator	Variable		Value	
Set_Var	Phy	117	0	Mode = XML
Set_Var	Phy	100	1	Output1 = HS_Dig
Set_Var	Phy	101	2	Output2 = LS_Dig
Set_Var	Phy	102	4	Output3 = HS_DC
Set_Var	Phy	103	3	Output4 = HS_mA
Set_Var	Phy	104	1	Output5 = HS_Dig
Set_Var	Phy	105	2	Output6 = LS_Dig
Set_Var	Phy	106	5	Output7 = LS_mA
Set_Var	Phy	107	6	Output8 = LS_DC
Set_Var	Phy	99	100	PWM Freq = 100Hz
Set_Var	Phy	62	0	Input 1 = Analog/Digital/Freq
Set_Var	Phy	63	1	Input 2 = Current
Set_Var	Phy	64	2	Input 3 = Resistance
Set_Var	Phy	65	3	Input 4/5 = Quadrature X1
Set_Var	Phy	67	4	Input 6/7 = Quadrature X2
Set_Var	Phy	69	0	Input 8 = Analog/Digital
Set_Var	Phy	80	2500	P-Term Closed Loop Cnfg
Set_Var	Phy	81	750	I-Term Closed Loop Cnfg
Set_Var	Phy	82	0	D-Term Closed Loop Cnfg

XML Logic

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

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505040 XML_Mode Additional Example

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Example XML for Custom Keypad Behavior

Operator	Variable		Value	
Set_Var	Phy	117	0	Mode = XML
Set_Var	Phy	116	192	Keypad SA = 0xC0
Set_Var	Phy	108	2	Output 1 controlled by Button 2; Type = Momentary
Set_Var	Phy	109	521	Output 2 controlled by Button 9; Type = Tri-State
Set_Var	Phy	100	1	Output1 = Dig Active Hi
Set_Var	Phy	101	1	Output2 = Dig Active Hi
Set_Var	Tmp	3	68	Constant for LED command (Reference Pg. 19 & 23)
Set_Var	Tmp	4	2	Constant for Button State that turns on output (Reference Pg. 19)

XML Logic

Operator	A Variable		B Variable		C Variable		
Buf	Can	63			Phy	46	Output 1 state = Button 2 state
Buf	Tmp	0			Tmp	5	Clear Flag before use
IF(A = B)-> C=1	Can	64	Tmp	4	Tmp	5	If button 9 state is 2, then set flag
IF(A = 1) B->C	Tmp	5	Tmp	1	Phy	25	If flag is set, then turn ON output 2
Buf	Tmp	0			Can	71	Clear Button 1 LED command
If A=true; B->C	Can	63	Tmp	3	Can	71	If Button 1 is pressed, Send custom LED command

*Button 9 will use standard LED command, not a custom one, so it doesn't need to be set.

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 13 OF 25

505040 Physical Config Variables for CAN_I/O Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

List of Configurations used in CAN_I/O Mode

Phy	78	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65.535mV, 1mV/bit]
Phy	79	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65.535mV, 1mV/bit]
Phy	80	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	81	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	82	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	70	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-10000mA]
Phy	71	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-10000mA]
Phy	72	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-10000mA]
Phy	73	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-10000mA]
Phy	74	Cnfg	Limit	mA	Output 5 Current Limit [1 mA /bit, 0-10000mA]
Phy	75	Cnfg	Limit	mA	Output 6 Current Limit [1 mA /bit, 0-10000mA]
Phy	76	Cnfg	Limit	mA	Output 7 Current Limit [1 mA /bit, 0-10000mA]
Phy	77	Cnfg	Limit	mA	Output 8 Current Limit [1 mA /bit, 0-10000mA]
Phy	62	Cnfg	In1	Type	Input 1 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	63	Cnfg	In2	Type	Input 2 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	64	Cnfg	In3	Type	Input 3 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	65	Cnfg	In4	Type	Input 4 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	66	Cnfg	In5	Type	Input 5 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	67	Cnfg	In6	Type	Input 6 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	68	Cnfg	In7	Type	Input 7 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	69	Cnfg	In8	Type	Input 8 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
Phy	99	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	100	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	101	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	102	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	103	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	104	Cnfg	Out5	Type	Output 5 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	105	Cnfg	Out6	Type	Output 6 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	106	Cnfg	Out7	Type	Output 7 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	107	Cnfg	Out8	Type	Output 8 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	117	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]

Can	48	Cnfg	Tx Rate	Time	CAN Msg FF40 Tx Rate [10mS/bit, 0=Off]
Can	49	Cnfg	Tx Rate	Time	CAN Msg FF41 Tx Rate [10mS/bit, 0=Off]
Can	50	Cnfg	Tx Rate	Time	CAN Msg FF42 Tx Rate [10mS/bit, 0=Off]
Can	51	Cnfg	Tx Rate	Time	CAN Msg FF43 Tx Rate [10mS/bit, 0=Off]
Can	52	Cnfg	Tx Rate	Time	CAN Msg FF44 Tx Rate [10mS/bit, 0=Off]
Can	53	Cnfg	Tx Rate	Time	CAN Msg FF60 Tx Rate [10mS/bit, 0=Off]
Can	54	Cnfg	Tx Rate	Time	CAN Msg FF61 Tx Rate [10mS/bit, 0=Off]
Can	55	Cnfg	Tx Rate	Time	CAN Msg FF63 Tx Rate [10mS/bit, 0=Off]
Can	56	Cnfg	Tx Rate	Time	CAN Msg FF64 Tx Rate [10mS/bit, 0=Off]
Can	57	Cnfg	Tx Rate	Time	CAN Msg FF63 Tx Rate [10mS/bit, 0=Off]
Can	58	Cnfg	Tx Rate	Time	CAN Msg FF64 Tx Rate [10mS/bit, 0=Off]
Can	79	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]

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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 14 OF 25

505040 Physical Config Variables for CAN_I/O Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Example XML Configuration

Operator	Variable		Value	
Set_Var	Phy	117	1	Mode = CAN_I/O
Set_Var	Phy	100	1	Output1 = HS_Dig
Set_Var	Phy	101	2	Output2 = LS_Dig
Set_Var	Phy	102	4	Output3 = HS_DC
Set_Var	Phy	103	3	Output4 = HS_mA
Set_Var	Phy	104	1	Output5 = HS_Dig
Set_Var	Phy	105	2	Output6 = LS_Dig
Set_Var	Phy	106	5	Output7 = LS_mA
Set_Var	Phy	107	6	Output8 = LS_DC
Set_Var	Phy	99	100	PWM Freq = 100Hz
Set_Var	Phy	62	1	Input 1 = Current
Set_Var	Phy	63	2	Input 2 = Resistance
Set_Var	Phy	64	0	Input 3 = Analog/Digital/Freq
Set_Var	Phy	65	4	Input 4/5 = Quadrature X2
Set_Var	Phy	67	5	Input 6/7 = Quadrature X4
Set_Var	Phy	69	0	Input 8 = Analog/Digital
Set_Var	Phy	80	2500	P-Term Closed Loop Cnfg
Set_Var	Phy	81	750	I-Term Closed Loop Cnfg
Set_Var	Phy	82	0	D-Term Closed Loop Cnfg
Set_Var	Can	79	0	CAN Timeout = 0 (No timeout)

Continued at Right

Set_Var	Can	48	5	PGN 0xFF40 transmit rate = 50ms
Set_Var	Can	49	10	PGN 0xFF41 transmit rate = 100ms
Set_Var	Can	50	15	PGN 0xFF42 transmit rate = 150ms
Set_Var	Can	51	20	PGN 0xFF43 transmit rate = 200ms
Set_Var	Can	52	25	PGN 0xFF44 transmit rate = 250ms
Set_Var	Can	53	30	PGN 0xFF60 transmit rate = 300ms
Set_Var	Can	54	35	PGN 0xFF61 transmit rate = 350ms
Set_Var	Can	55	45	PGN 0xFF63 transmit rate = 450ms
Set_Var	Can	56	50	PGN 0xFF64 transmit rate = 500ms
Set_Var	Can	57	750	PGN 0xFF65 transmit rate = 7.5s
Set_Var	Can	58	100	PGN 0xFF66 transmit rate = 1s

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 15 OF 25

505040 Physical Variables for HW_I/O Mode

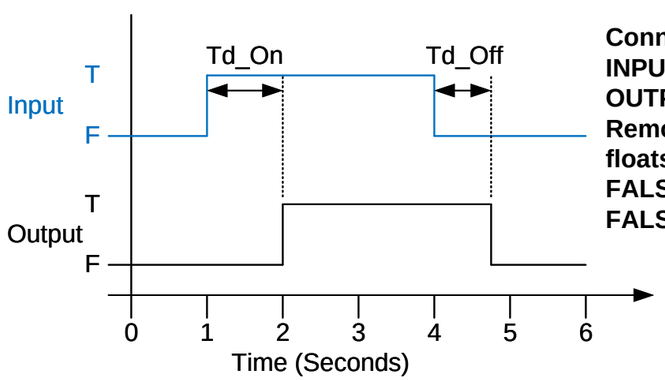
REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

List of Configurations used in HW_I/O Mode

Phy	54	J1-2	Output	DC/mA	Output 1 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	55	J1-4	Output	DC/mA	Output 2 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	56	J2-3	Output	DC/mA	Output 3 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	57	J2-5	Output	DC/mA	Output 4 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	58	J1-6	Output	DC/mA	Output 5 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	59	J1-7	Output	DC/mA	Output 6 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	60	J2-12	Output	DC/mA	Output 7 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	61	J2-1	Output	DC/mA	Output 8 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]

Phy	70	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-10000mA]
Phy	71	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-10000mA]
Phy	72	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-10000mA]
Phy	73	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-10000mA]
Phy	74	Cnfg	Limit	mA	Output 5 Current Limit [1 mA /bit, 0-10000mA]
Phy	75	Cnfg	Limit	mA	Output 6 Current Limit [1 mA /bit, 0-10000mA]
Phy	76	Cnfg	Limit	mA	Output 7 Current Limit [1 mA /bit, 0-10000mA]
Phy	77	Cnfg	Limit	mA	Output 8 Current Limit [1 mA /bit, 0-10000mA]

Phy	78	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65.535mV, 1mV/bit]
Phy	79	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65.535mV, 1mV/bit]
Phy	80	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	81	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	82	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]



Connecting the input to power OR ground will set the INPUT = TRUE. After the ON_DELAY time then the OUTPUT = TRUE (On if Digital or DC/mA Cmd if PWM). Remove the Power or Ground from the input and it floats at ½ system voltage which sets the INPUT = FALSE. After the OFF_DELAY time then the OUTPUT = FALSE.

*In HW I/O Mode, Inputs are not configurable and default to Digital.

Phy	83	Cnfg	OnDly1	Time	Output 1 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	84	Cnfg	OnDly2	Time	Output 2 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	85	Cnfg	OnDly3	Time	Output 3 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	86	Cnfg	OnDly4	Time	Output 4 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	87	Cnfg	OnDly5	Time	Output 5 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	88	Cnfg	OnDly6	Time	Output 6 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	89	Cnfg	OnDly7	Time	Output 7 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	90	Cnfg	OnDly8	Time	Output 8 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	91	Cnfg	OffDly1	Time	Output 1 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	92	Cnfg	OffDly2	Time	Output 2 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	93	Cnfg	OffDly3	Time	Output 3 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	94	Cnfg	OffDly4	Time	Output 4 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	95	Cnfg	OffDly5	Time	Output 5 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	96	Cnfg	OffDly6	Time	Output 6 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	97	Cnfg	OffDly7	Time	Output 7 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	98	Cnfg	OffDly8	Time	Output 8 Relay Style Off Delay [0-655,350mS, 10mS/bit]

Phy	99	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	100	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	101	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	102	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	103	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	104	Cnfg	Out5	Type	Output 5 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	105	Cnfg	Out6	Type	Output 6 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	106	Cnfg	Out7	Type	Output 7 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	107	Cnfg	Out8	Type	Output 8 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]

Phy	117	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]

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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 16 OF 25

505040 Physical Variables for HW_I/O Mode Example XML Configuration

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Operator	Variable		Value	
Set_Var	Phy	117	2	Mode = HW_I/O
Set_Var	Phy	100	1	Output1 = Active High Digital
Set_Var	Phy	101	2	Output2 = Active Low Digital
Set_Var	Phy	102	4	Output3 = Actvie High Open Loop
Set_Var	Phy	103	3	Output4 = Active High Closed Loop
Set_Var	Phy	104	1	Output5 = Active High Digital
Set_Var	Phy	105	2	Output6 = Active Low Digital
Set_Var	Phy	106	6	Output7 = Actvie Low Open Loop
Set_Var	Phy	107	5	Output8 = Active Low Closed Loop
Set_Var	Phy	87	100	PWM Freq = 100Hz
Set_Var	Phy	56	1000	Out3 DC/mA Cmd = 100%
Set_Var	Phy	57	500	Out4 DC/mA Cmd = 500mA
Set_Var	Phy	60	250	Out7 DC/mA Cmd = 25%
Set_Var	Phy	61	333	Out8 DC/mA Cmd = 333 mA
Set_Var	Phy	68	2500	P-Term Closed Loop Cnfg
Set_Var	Phy	69	750	I-Term Closed Loop Cnfg
Set_Var	Phy	70	0	D-Term Closed Loop Cnfg

Operator	Variable		Value	
Set_Var	Phy	78	2000	Input Voltage Threshold = 2V
Set_Var	Phy	79	1000	Input Voltage Hysteresis = 1V
Set_Var	Phy	83	100	Out1 On Delay = 1.0s
Set_Var	Phy	91	150	Out1 Off Delay = 1.5s
Set_Var	Phy	84	200	Out2 On Delay = 2.0s
Set_Var	Phy	92	250	Out2 Off Delay = 2.5s
Set_Var	Phy	85	300	Out3 On Delay = 3.0s
Set_Var	Phy	93	350	Out3 Off Delay = 3.5s
Set_Var	Phy	86	400	Out4 On Delay = 4.0s
Set_Var	Phy	94	450	Out4 Off Delay = 4.5s
Set_Var	Phy	95	500	Out5 On Delay = 5.0s
Set_Var	Phy	79	550	Out5 Off Delay = 5.5s
Set_Var	Phy	96	600	Out6 On Delay = 6.0s
Set_Var	Phy	97	650	Out6 Off Delay = 6.5s
Set_Var	Phy	89	700	Out7 On Delay = 7.0s
Set_Var	Phy	98	750	Out7 Off Delay = 7.5s
Set_Var	Phy	90	800	Out8 On Delay = 8.0s
Set_Var	Phy	99	850	Out8 Off Delay = 8.5s

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 17 OF 25

505040 Physical Config Variables for HW_Keypad Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

List of Configurations used in HW_Keypad_Mode					
Phy	54	J1-1	Output	DC/mA	Output 1 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	55	J1-3	Output	DC/mA	Output 2 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	56	J2-4	Output	DC/mA	Output 3 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	57	J2-6	Output	DC/mA	Output 4 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	58	J1-5	Output	DC/mA	Output 5 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	59	J1-6	Output	DC/mA	Output 6 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	60	J2-2	Output	DC/mA	Output 7 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	61	J2-3	Output	DC/mA	Output 8 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	80	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	81	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	82	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	70	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-10000mA]
Phy	71	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-10000mA]
Phy	72	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-10000mA]
Phy	73	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-10000mA]
Phy	74	Cnfg	Limit	mA	Output 5 Current Limit [1 mA /bit, 0-10000mA]
Phy	75	Cnfg	Limit	mA	Output 6 Current Limit [1 mA /bit, 0-10000mA]
Phy	76	Cnfg	Limit	mA	Output 7 Current Limit [1 mA /bit, 0-10000mA]
Phy	77	Cnfg	Limit	mA	Output 8 Current Limit [1 mA /bit, 0-10000mA]

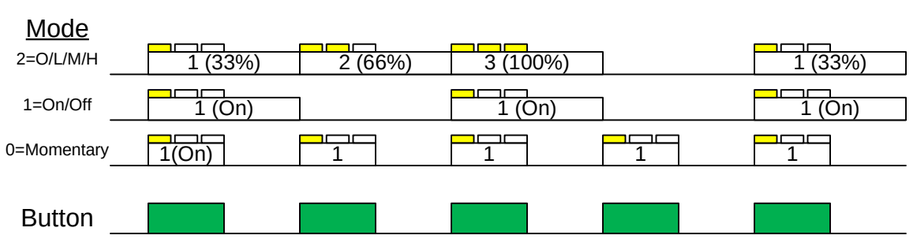
Phy	99	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	100	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	101	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	102	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	103	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	104	Cnfg	Out5	Type	Output 5 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	105	Cnfg	Out6	Type	Output 6 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	106	Cnfg	Out7	Type	Output 7 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	107	Cnfg	Out8	Type	Output 8 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC]
Phy	108	Cnfg	Kypd	B1	Output 1 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	109	Cnfg	Kypd	B2	Output 2 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	110	Cnfg	Kypd	B3	Output 3 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	111	Cnfg	Kypd	B4	Output 4 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	112	Cnfg	Kypd	B5	Output 5 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	113	Cnfg	Kypd	B6	Output 6 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	114	Cnfg	Kypd	B7	Output 7 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	115	Cnfg	Kypd	B8	Output 8 Keypad Button Config – Index# [Refer to Spec 11713S__]
Phy	116	Cnfg	Kypd	SA	Keypad Source Address
Phy	117	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]
Can	79	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Left LED		Middle LED		Right LED			

Note1)
Each LED cmd is a 2-bit flag 0=Off, 1=On, 2=Blink 2Hz, 3=No Change

Bit15:10	Bit 9:8	Bit 7:0
	Type	Index#

Note2)
Index# of Button per Marlin Spec 11713S_.
Type is 0=Momentary, 1=On/Off Toggle, 2=Off/Low/Med/High
Output is On if Digital or DC/mA Cmd if Type[0-1], else if [Type2] then the output is 33%(1/Low), 66%(2/Med), or 100%(3/High) of the DC/mA Cmd.



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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 18 OF 25

505030 Physical Config Variables for HW_Keypad Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Example XML Configuration

Operator	Variable		Value	
Set_Var	Phy	117	3	Mode = Keypad
Set_Var	Phy	100	1	Output1 = HS_Dig
Set_Var	Phy	101	2	Output2 = LS_Dig
Set_Var	Phy	102	4	Output3 = HS_DC
Set_Var	Phy	103	3	Output4 = HS_mA
Set_Var	Phy	104	1	Output5 = HS_Dig
Set_Var	Phy	105	2	Output6 = LS_Dig
Set_Var	Phy	106	4	Output7 = LS_DC
Set_Var	Phy	107	3	Output8 = LS_mA
Set_Var	Phy	99	100	PWM Freq = 100Hz
Set_Var	Phy	56	1000	Out3 DC/mA Cmd = 100%
Set_Var	Phy	57	500	Out4 DC/mA Cmd = 500mA
Set_Var	Phy	60	250	Out7 DC/mA Cmd = 25%
Set_Var	Phy	61	333	Out8 DC/mA Cmd = 333 mA
Set_Var	Phy	80	2500	P-Term Closed Loop Cnfg
Set_Var	Phy	81	750	I-Term Closed Loop Cnfg
Set_Var	Phy	82	0	D-Term Closed Loop Cnfg

Continued at Right

Operator	Variable		Value	
Set_Var	Phy	116	64	Keypad SourceAddr = 0x40(64)
Set_Var	Phy	108	1	Output1 controlled by Button1, Type = Momentary
Set_Var	Phy	109	34	Output2 controlled by Button2, Type = O/L/M/H
Set_Var	Phy	110	259	Output3 controlled by Button3, Type = Toggle
Set_Var	Phy	111	5	Output4 controlled by Button5, Type = Momentary
Set_Var	Phy	112	6	Output5 controlled by Button6, Type = Momentary
Set_Var	Phy	113	522	Output6 controlled by Button10, Type = O/L/M/H
Set_Var	Phy	114	268	Output7 controlled by Button12, Type = Toggle
Set_Var	Phy	115	8	Output8 controlled by Button8, Type = Momentary

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+/- 0.05	+/- 0.020	+/-

DO NOT SCALE DRAWING

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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 19 OF 25

Built-In Support for CAN I/O Mode of the Marlin 505040 Module

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Transmitted by 505040

	PGN	LSB							MSB
Digital Status Msg	18FF40sa	In1-4(Hi)	In1-4(Lo)	In5-8(Hi)	In5-8(Lo)	0x00	0x00	0x00	0x00
		2-bit Status Flags[00=False, 01=True, 10=Error, 11=Not Applicable]							
Analog Status Msg	18FF41sa	Input Analog 1		Input Analog 2		Input Analog 3		Input Analog 4	
		Voltage/Amps/Ohms/Count (Mode Based) [1mV,uA,Ω/bit]							
Analog Status Msg	18FF42sa	Input Analog 5		Input Analog 6		Input Analog 7		Input Analog 8	
		Voltage/Amps/Ohms/Count (Mode Based) [1mV,uA,Ω/bit]							
Analog Status Msg	18FF43sa	Input 1 Frequency		Input 2 Frequency		Input 1 Duty Cycle		Input 2 Duty Cycle	
		Frequency: 32.0-10,000.0Hz [0.1Hz/bit]				Duty Cycle: 0.0-100.0% [0.1%/bit]			
Analog Status Msg	18FF43sa	Input 3 Frequency		Input 4 Frequency		Input 3 Duty Cycle		Input 4 Duty Cycle	
		Frequency: 32.0-10,000.0Hz [0.1Hz/bit]				Duty Cycle: 0.0-100.0% [0.1%/bit]			
Module Status Msg	18FF60sa	Supply Voltage		System Temperature		Sys. Internal Ref V		Module HWID	
Output Fault Msg	18FF61sa	Out1Err	Out2Err	Out3Err	Out4Err	Out5Err	Out6Err	Out7Err	Out8Err
Output Setpoint Msg	18FF63sa	Out 1 Cmd (16-bit)		Out 2 Cmd (16-bit)		Out 3 Cmd (16-bit)		Out 4 Cmd (16-bit)	
		Current: 0-10000 [0-10,000mA, 1mA/bit]							
Output Setpoint Msg	18FF64sa	Out 5 Cmd (16-bit)		Out 6 Cmd (16-bit)		Out 7 Cmd (16-bit)		Out 8 Cmd (16-bit)	
		Current: 0-10000 [0-10,000mA, 1mA/bit]							
Output Feedback Msg	18FF65sa	Output 1 Current		Output 2 Current		Output 3 Current		Output 4 Current	
		Current: 0-11000 [0-11,000mA, 1mA/bit]							
Output Feedback Msg	18FF66sa	Output 5 Current		Output 6 Current		Output 7 Current		Output 8 Current	
		Current: 0-11000 [0-11000mA, 1mA/bit]							

sa = Source Address of the 505040 Module
xx = Source Address of the controller commanding the 505040 Module

Beacon: Flashes the status LED so you can identify which Module you are sending Command/Config Messages to.

***All multi-byte status feedback data is little endian**

Binary Active Hi/Lo Status – Detailed View

In1-4(Hi)	In1-4(Lo)	In5-8(Hi)	In5-8(Lo)	0x00	0x00	0x00	0x00
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input 4		Input 3		Input 2		Input 1	

Note: Each input has a 2-bit flag: 00 – Input is Digital Low
01 – Input is Digital High
1X – Error

Fault Status – Detailed View

Out1Err	Out2Err	Out3Err	Out4Err	Out5Err	Out6Err	Out7Err	Out8Err
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Timeout	Fault Flag	Output Over-voltage Fault	Output Under-voltage Fault	Power Under Voltage Fault	Over Temperature Fault	Over Temperature Warning	Over-Current/Short Circuit Fault

*All 1's (0xFF) means output is inactive (not configured)

**If Bit 6 is a 1, then Bit 0 is a short circuit fault. If Bit 6 is 0, then Bit 0 is an over-current fault.

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 20 OF 25

Built-In Support for CAN I/O Mode of the Marlin 505040 Module

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Received by 505040

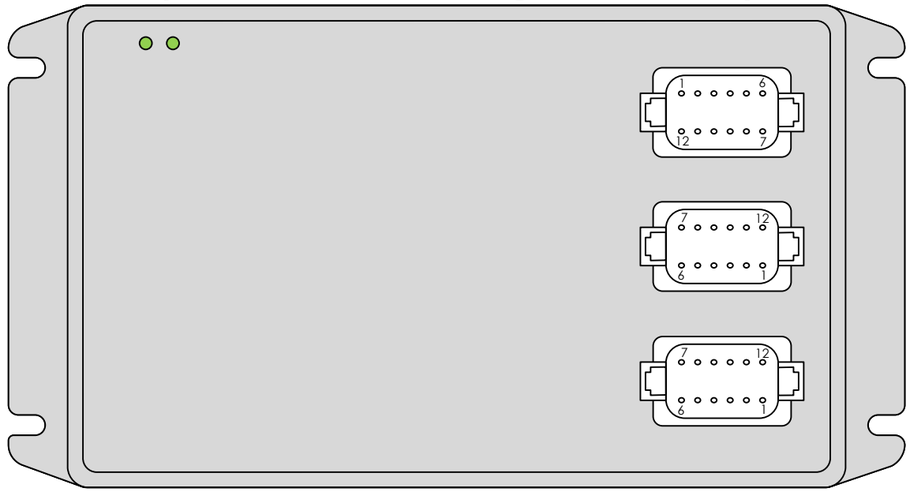
	PGN	LSB							MSB
Cmd Msg: Outputs	18EFsaxx	0x60	0xFF	0x00	0x00	Out 1-4	Out 5-8	Reserved	Reserved
		0x61	0xFF	0x00	0x00	Out1 Cmd	Out2 Cmd	Out3 Cmd	Out4 Cmd
					0x01	Out5 Cmd	Out6 Cmd	Out7 Cmd	Out8 Cmd
						DC: 0-250 [0-100.0%, 0.4%/bit]			
		0x62	0xFF	0x00	0x00	Out 1 Cmd (16-bit)*		Out 2 Cmd (16-bit)*	
					0x01	Out 3 Cmd (16-bit)*		Out 4 Cmd (16-bit)*	
					0x02	Out 5 Cmd (16-bit)*		Out 6 Cmd (16-bit)*	
					0x03	Out 7 Cmd (16-bit)*		Out 8 Cmd (16-bit)*	
						DC: 0-1000 [0-100.0%, 0.1%/bit] mA: 0-10000 [0-10,000mA, 1mA/bit]			
		0x70	0xFF	0x00	0x00	In 1 Quad Cnt Cmd*		In 2 Quad Cnt Cmd*	
					0x01	In 3 Quad Cnt Cmd*		In 4 Quad Cnt Cmd*	
					0x02	In 5 Quad Cnt Cmd*		In 6 Quad Cnt Cmd*	
					0x03	In 7 Quad Cnt Cmd*		Reserved (leave as 0x00)	
						Count Setpoint [0-65535]			
Cmd Msg: Beacon On	18EFsaF9	0x15	0xFF	0xF9	0xB0	0x44	0x55	0x66	0x77
Cmd Msg: Beacon Off	18EFsaF9	0x16	0xFF	0xF9	0xB0	0x44	0x55	0x66	0x77

sa = Source Address of the 505040 Module
xx = Source Address of the controller commanding the 505040 Module

Beacon: Flashes the comm LED so you can identify which Module you are sending Command/Config Messages to.

***All multi-byte status feedback data is little endian**

505040
(8i8o Module High Current)



*Not to scale

Binary Active Hi/Lo Control – Detailed View

0x60	0xFF	0x00	0x00	Out 1-4	Out 5-8	Reserved	Reserved

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Output 4		Output 3		Output 2		Output 1	

Note: Each output cmd is a 2-bit flag:
00 – OFF
01 – ON
10 – Reserved
11 – Reserved

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+/- 0.05	+/- 0.020	+/-

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

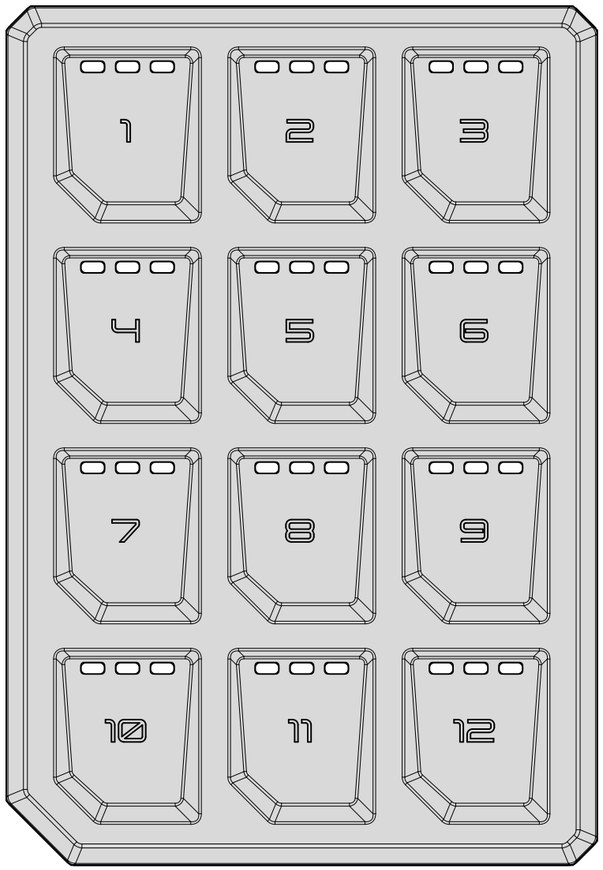
SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 21 OF 25

Built-In Support for Marlin 5052xx Keypad Module (via CAN)

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX

Example of 3x4 Keypad shown



Transmitted by 505040

Indicator LED Msg	18A7kksa	LED1-4	LED5-8	LED9-12	LED13-16	LED17-20	LED21-24	LED25-28	LED29-32
		2-bit flags [00=Off, 01=On, 10=Blink 2Hz, 11=No Change]							
Indicator LED Msg	18A6kksa	LED33-36	LED37-40	LED41-44	LED45-48	LED49-52	LED53-56	LED57-60	LED61-64
		2-bit flags [00=Off, 01=On, 10=Blink 2Hz, 11=No Change]							

LED1-4	LED5-8	LED9-12	LED13-16	LED17-20	LED21-24	LED25-28	LED29-32

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
LED 1		LED 2		LED 3		LED 4	

Refer to page 19 for clarification on format of LED commands

Received by 505040

Button Status Msg	18FED9kk	Btn1-4	Btn5-8	Btn9-12	Btn13-16	Btn17-20	Btn21-24	Btn25-28	Btn29-32
		2-bit Status Flags[00=False, 01=True, 10=Error, 11=Not Applicable]							

Btn1-4	Btn5-8	Btn9-12	Btn13-16	Btn17-20	Btn21-24	Btn25-28	Btn29-32

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
BTN 1		BTN 2		BTN 3		BTN 4	

Indicator LED Status Messages are sent every 100mS
sa = Source Address of the 505040 Module
kk = Source Address of the Keypad Module

Based on Marlin 11713S__ spec for Keypad Modules

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+/- 0.05	+/- 0.020	+/-

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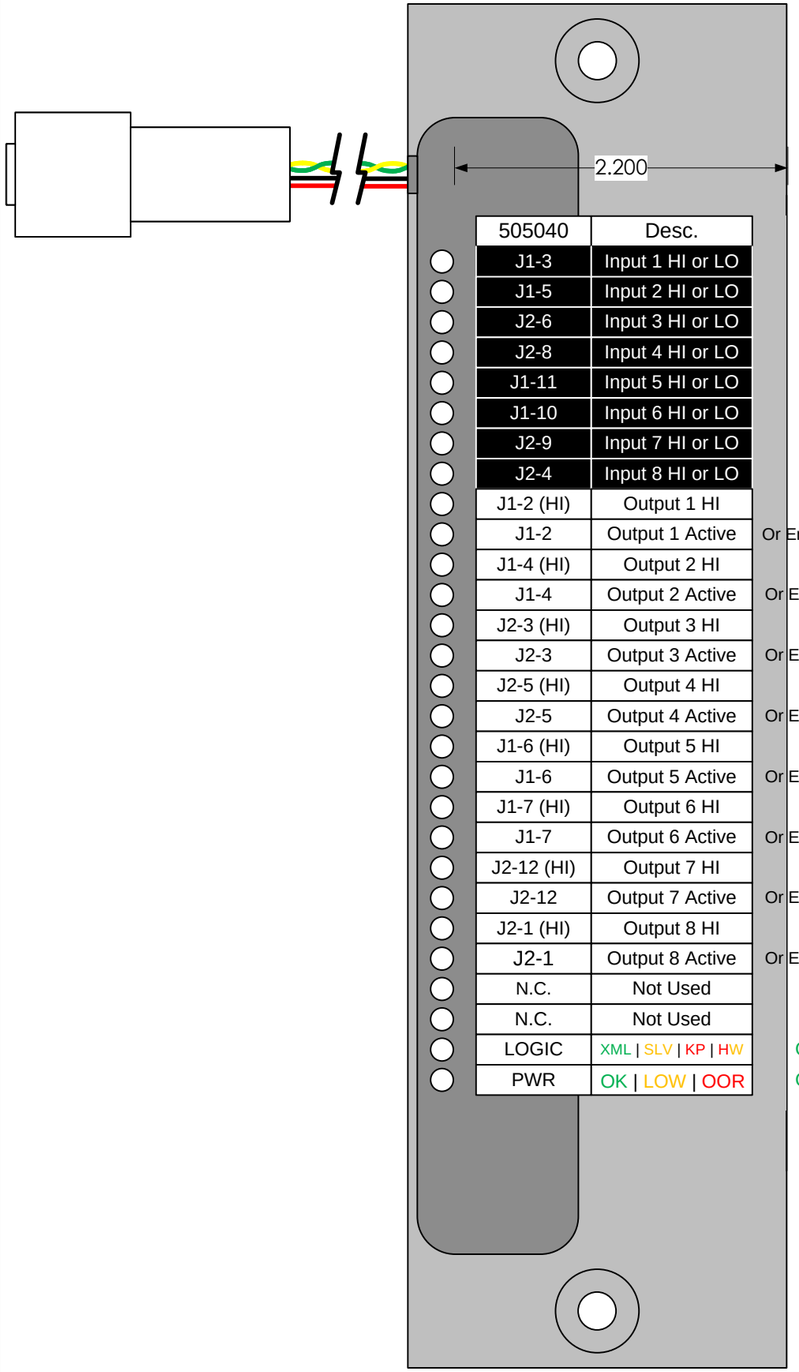
TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 22 OF 25

Built-In Support for Marlin 5010xx LED Module (via CAN)

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX



505040	Desc.	
J1-3	Input 1 HI or LO	
J1-5	Input 2 HI or LO	
J2-6	Input 3 HI or LO	
J2-8	Input 4 HI or LO	
J1-11	Input 5 HI or LO	
J1-10	Input 6 HI or LO	
J2-9	Input 7 HI or LO	
J2-4	Input 8 HI or LO	
J1-2 (HI)	Output 1 HI	
J1-2	Output 1 Active	Or Error
J1-4 (HI)	Output 2 HI	
J1-4	Output 2 Active	Or Error
J2-3 (HI)	Output 3 HI	
J2-3	Output 3 Active	Or Error
J2-5 (HI)	Output 4 HI	
J2-5	Output 4 Active	Or Error
J1-6 (HI)	Output 5 HI	
J1-6	Output 5 Active	Or Error
J1-7 (HI)	Output 6 HI	
J1-7	Output 6 Active	Or Error
J2-12 (HI)	Output 7 HI	
J2-12	Output 7 Active	Or Error
J2-1 (HI)	Output 8 HI	
J2-1	Output 8 Active	Or Error
N.C.	Not Used	
N.C.	Not Used	
LOGIC	XML | SLV | KP | HW	
PWR	OK | LOW | OOR	

GRN=XML Logic, YEL = CAN I/O Mode, RED= Keypad Mode, RED/YEL=HW Mode

GRN=Batt Ok, YEL = Batt <10V, RED= Batt Out of Range

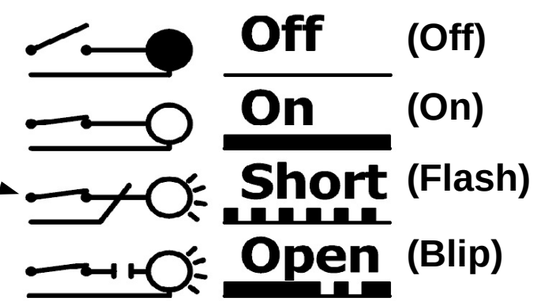
TRANSMITTED

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
LED 25	LED 26	LED 27 G	LED 27 R	LED 28 G	LED 28 R	Not Used	Not Used

I/O Status Msg	18FFD7sa	ON 1-8	ON 9-16	ON 17-24	ON 25-28	Flash1-8	Flash9-16	Flash17-24	Flash25-28
		LED Status [0=Off, 1=On]				LED Status Flash [1=Flash, 0=No Flash]*			

Status Messages are sent every 1 Sec (or on Status Change)
sa = Source Address of the 505040 Module

***Flash pattern determined by LED Status Flash bit. Refer to the below chart for more information.**



(Off)
(On)
(Flash)
(Blip)

LED xx FLASH bit	LED xx STAT bit
0	0
0	1
1	0
1	1

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

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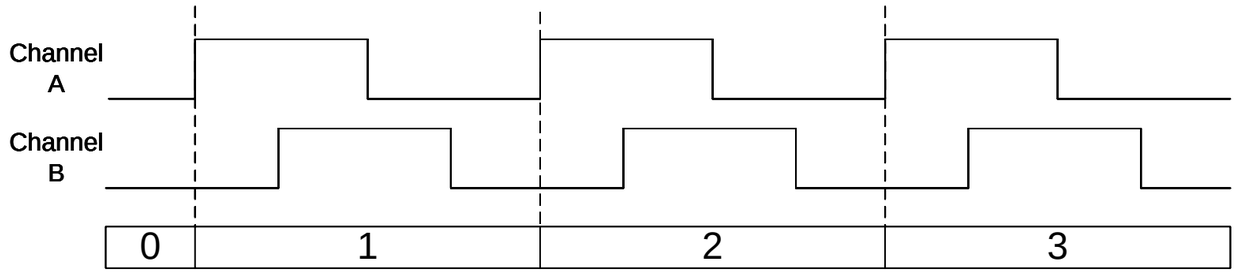
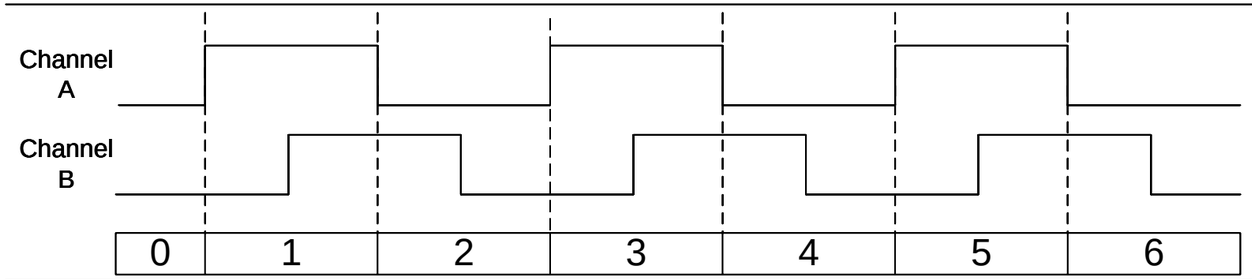
505040 Quadrature Input Type Information

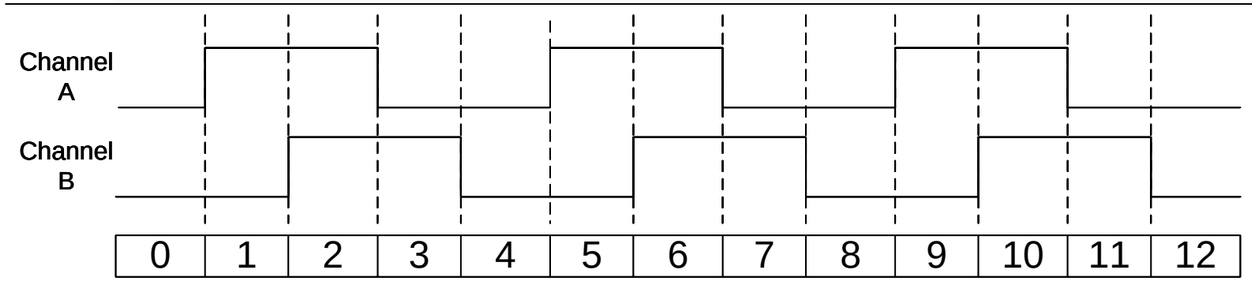
REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
C	08/25/23	17442E	UPDATED CUR. IN TOLERANCE	JC
D	02/07/25	18375E	VARIOUS	XX



X1 Encoding:
Counting occurs on the rising edge of Channel A



X2 Encoding:
Counting occurs on the rising and falling edges of channel A



X4 Encoding:
Counting occurs on rising and falling edges of both Channel A and B

*Counting direction in relation to clockwise direction can be encoder specific and is not always consistent. If counting direction in relation to clockwise direction is wrong, try swapping the A & B channel connections.

**In the provided example, inputs 1 & 3 are configured as Quadrature. Information pertaining to inputs 2 & 4 are overridden and not transmitted as they are operating as quadrature channel B inputs.

Quadrature Inputs in CAN I/O Mode

Analog Status Msg	18FF41sa	Input 1 Total Count	Input 1 Interval Count	Input 3 Total Count	Input 3 Interval Count **

When configured in CAN I/O mode, the total quadrature count and the interval count are transmitted in place of Input ‘n’ & Input ‘n+1’ Analog data respectively. The interval count calculation rate is equal to the transmit rate of the 0xFF41 Input Status message.

Cmd Msg: Inputs	18EFsaxx	0x70	0xFF	0x00	0x00	In 1 Quad Cnt Cmd	In 2 Quad Cnt Cmd
						Count Setpoint [0-65535]	

When configured for CAN I/O mode, the total quadrature count can be commanded to a specified value using the output command PGN 0xEF00 with the command operation of 0x70. This is useful for initializing the count after power up or zeroing of the count without power cycling the module. The interval count is not resettable and will reflect any change in count associated with this command in the next 0xFF41 transmission. Additionally, commanding the count of an input operating as Quadrature channel B will have no effect on the total count.

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TITLE SPECIFICATION, 505040 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	014168	S	D

DRAWN M. PETZKE | DATE 06/21/22 | SHEET 24 OF 25

Document Release Notes

Rev	Revision Changes
A	Production Release of Document
B	Updated current input type tolerance on page 3.
C	Updated current input type tolerance on page 3.
D	Pg 6: Input frequency range is now correct for what can actually be reported. - Pg9,10: Updated for new messages and changes to CAN messaging - Added 2 additional Rx and Tx message - Status messages no longer locked behind CAN I/O mode - XML mode message priority is now configurable - LED message is now configurable

REVISIONS

REV	DATE	ECN	DESCRIPTION	APVD
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