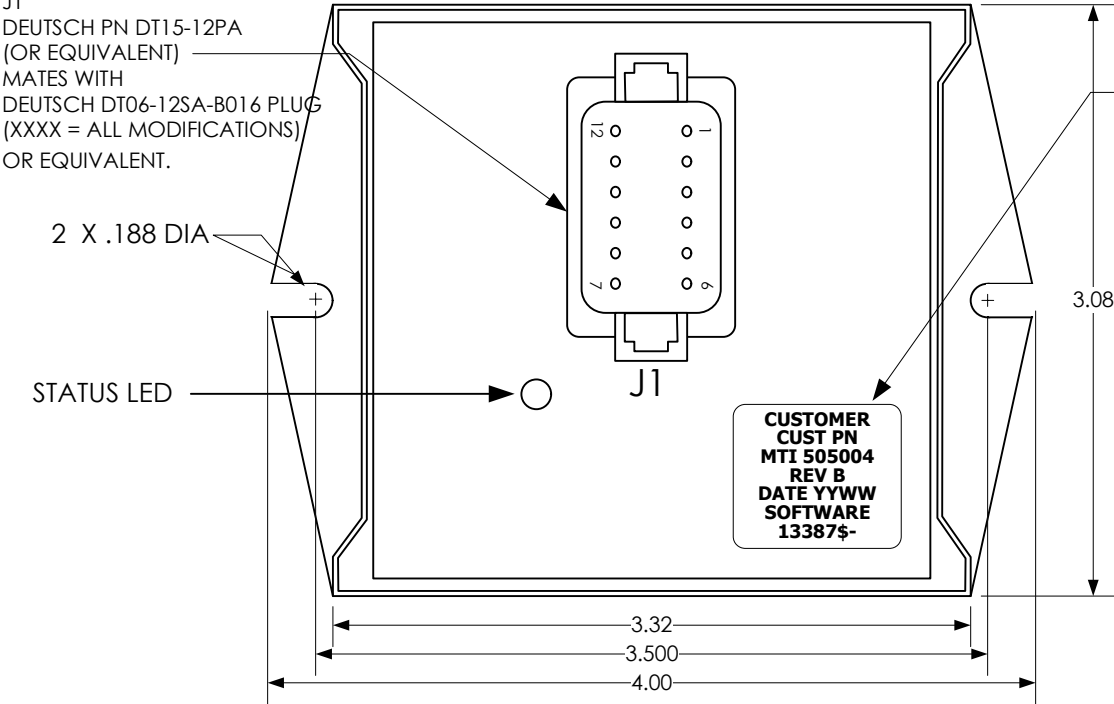
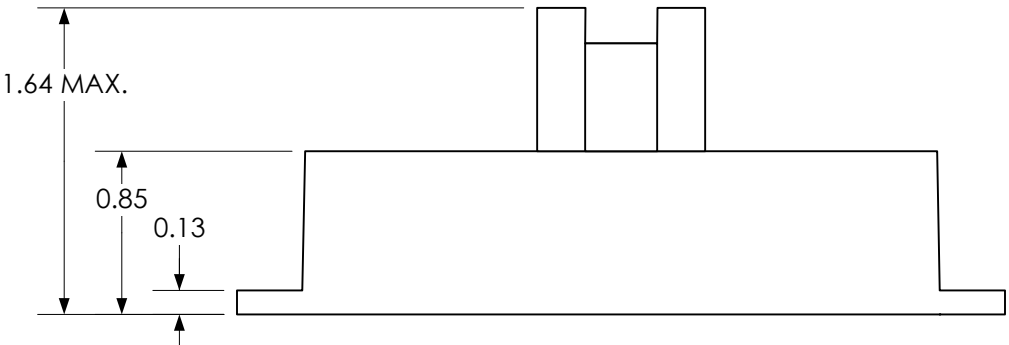


Overview

J1
DEUTSCH PN DT15-12PA
(OR EQUIVALENT)
MATES WITH
DEUTSCH DT06-12SA-B016 PLUG
(XXXX = ALL MODIFICATIONS)
OR EQUIVALENT.



PRODUCT LABEL
REV=BOM REVISION
LABEL DATE CODE:
YY=YEAR OF MANUFACTURE
WW=WEEK OF MANUFACTURE



CAN-Bus 2.0B Hardware
250k, 500k, and 1M Baudrate supported
11-bit and 29-bit Identifiers supported

Source Address of 0x00-0xEF are supported
and set thru the XML configuration file.

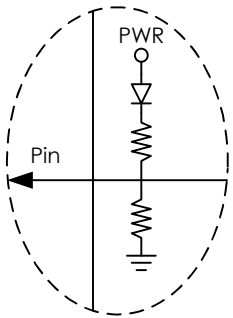
REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

Input Type	#1	#2	#3	#4
Digital Active High - Thres	●	●	●	●
Digital Active Low - Thres	●	●	●	●
Analog 0-37V	●	●	●	●
Frequency	●	●		
PWM Duty Cycle	●	●		
Quadrature X1	●			
Quadrature X2	●			
Quadrature X4	●			
Quadrature B		●*		

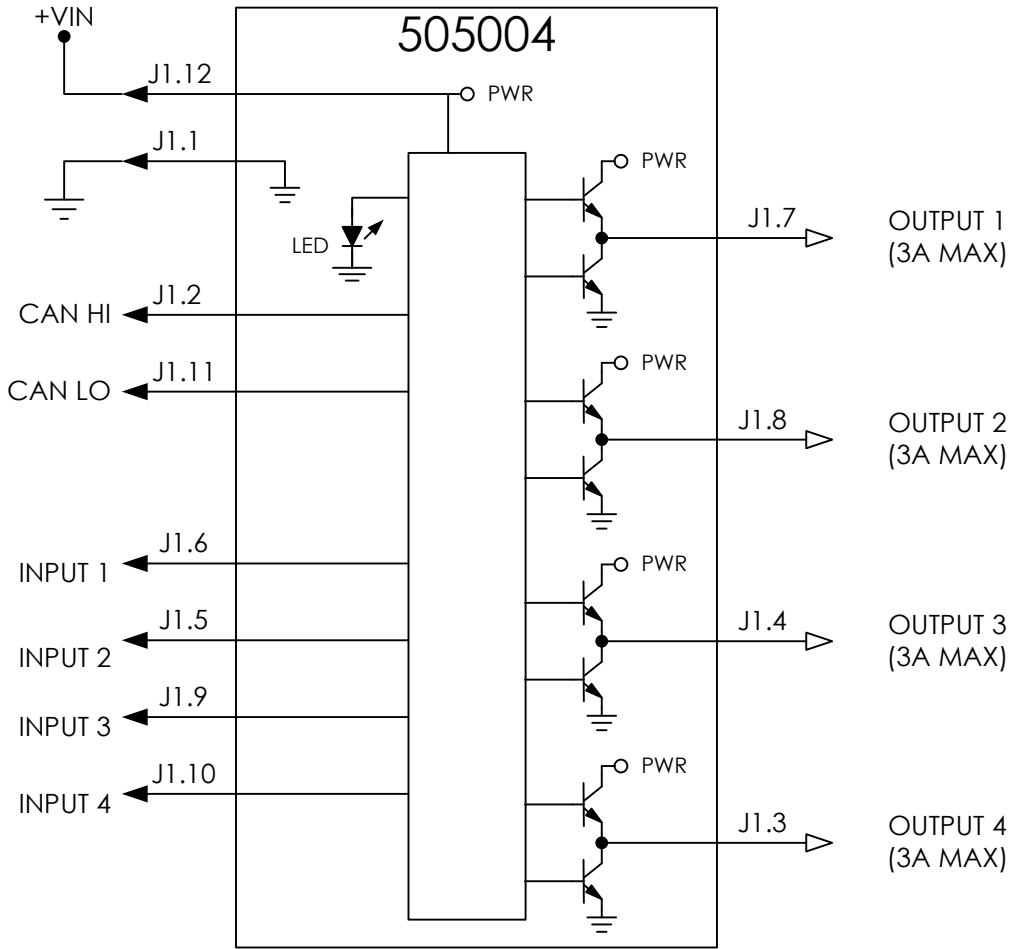
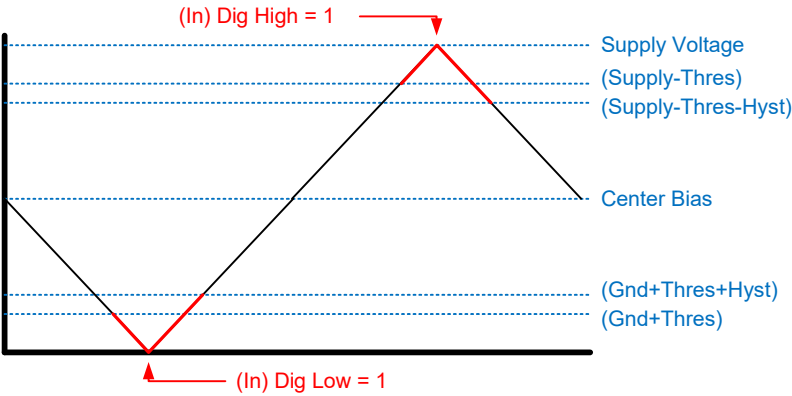
Output Type	#1	#2	#3	#4
00 - Disabled	●	●	●	●
01 – HS Digital (Active Hi)	●	●	●	●
02 – LS Digital (Active Lo)	●	●	●	●
03 – HS PWM Closed Loop	●	●	●	●
04 – HS PWM Open Loop	●	●	●	●
05 – LS PWM Closed Loop	●	●	●	●
06 – LS PWM Open Loop	●	●	●	●
07 – Bi-Dir Digital (Half Bridge)	●	●	●	●

*Note: Input 2 automatically configured to Quadrature B when Input 1 is configured as Quadrature.

(* NOTE: Input Circuit and Input Circuit 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)



UNLESS OTHERWISE SPECIFIED, DIMENSIONS
ARE IN INCHES AND TOLERANCES ARE

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

DO NOT SCALE DRAWING

CHECKED	S. JOHNSON	DATE 12/28/20
APPROVED	S. JOHNSON	DATE 01/08/21

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	013388	S	C
DRAWN BRB	DATE 12/28/20	SHEET 1	OF 18

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Programming

Marlin IO XML Configurator - V1.11

Hardware Selection

MODULE: 505004 4I/4O ADDRESS: B8 BAUD RATE: 250K HWID: 0x031D SWID: 0x0000 EEPROM START ADDR: 0x0010

Logic

ADD DEL COPY MOVE UP MOVE DOWN

A Type A Index Operator Value Comment

Physical 63 SET VARIABLE = 0 0x03BF0000 XML Mode

Module Mode Cnfg

A Type A Index Operator Value Comment

Physical 54 SET VARIABLE = 1 0x03B60001 Output1=HS_Dig

Output1 Cnfg

A Type A Index Operator B Type B Index C Type C Index Comment

Physical 6 (A) OR (B) -> (C) Physical 7 Physical 24 0x0068718 In1 -> Out1

J1-6 (In1) Dig High J1-6 (In1) Dig Low J1-7 Out1 Cmd

Status...Add Complete...Ready Lines: 3/250

Open XML Save XML

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

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

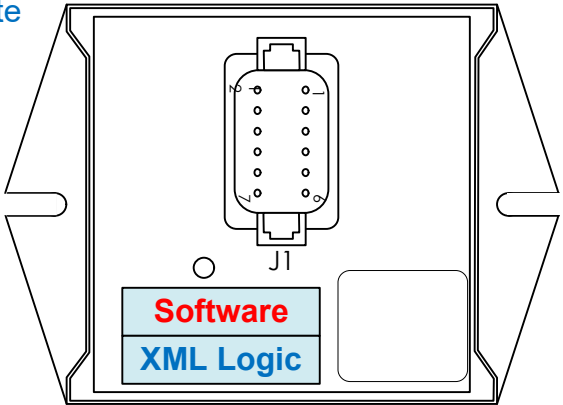
XML Logic File (*.XML)

C:\Example\XML_Logic.xml

Attribute	Value	Comment
1 Configured Source Address	0	
2 Block 0000 Byte 0000	3	XML Mode
3 Block 0000 Byte 0001	191	
4 Block 0000 Byte 0002	0	
5 Block 0000 Byte 0003	0	
6 Block 0001 Byte 0000	3	Output1=HS_Dig
7 Block 0001 Byte 0001	182	
8 Block 0001 Byte 0002	0	
9 Block 0001 Byte 0003	1	
10 Block 0002 Byte 0000	0	In1 -> Out1
11 Block 0002 Byte 0001	62	
12 Block 0002 Byte 0002	0	
13 Block 0002 Byte 0003	24	
14 Block 0003 Byte 0000	0	
15 Block 0003 Byte 0001	0	

The "C:\Bertolas\New Relay Module\133875XML Support\X34_Kypd_SA100_B1_Momen.xml" file is open.
The "C:\Example\XML_Logic.xml" file is open.

Controller ready to install on the Vehicle



Updating Base Software via Marlin Tool (if required)

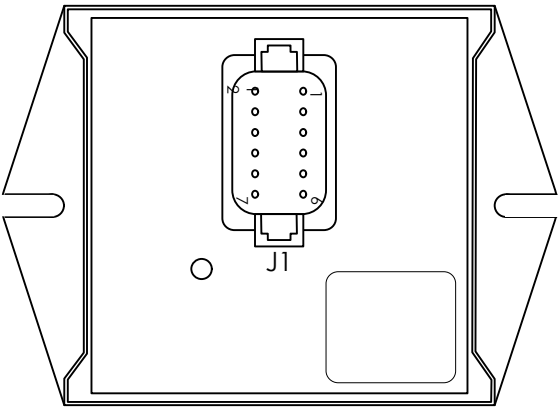
- 1) Select S19 Software file

Base Software (013387\$.S19)

- 2) Select Controller to Program

Confirm HWID matches

- 3) Program the Controller



Marlin CAN USB Programmer V2.6.0 - PREMIUM

File Tool XML Data EEPROM R/W CAN Log Help Security

0x031D HWID in File

C:\Example\013387\$.S19

Browse

Selected Kvaser Tool: Kvaser Leaf Light v2, #30435

'Kvaser' Tool's CAN Bus Speed Was Previously Set @ 250 Kbps.

Searching For Available Controllers . . .

Total 2 modules found.

All modules on CAN bus were inspected.

Selected .s19 file information:

Size: 109,700 bytes

Number of hex records: 1,444

505004 0xB8 \$X34 031D 013387

Search

Kvaser Leaf Light v2

Prog All

Kvaser Leaf Light v2, #30435 @ 250 Kbps

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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APPROVED	S. JOHNSON	DATE 01/08/21

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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS

SIZE	DRAWING NUMBER	TYPE	REV
B	013388	S	C
DRAWN BRB	DATE 12/28/20	SHEET 2 OF 18	

Programming

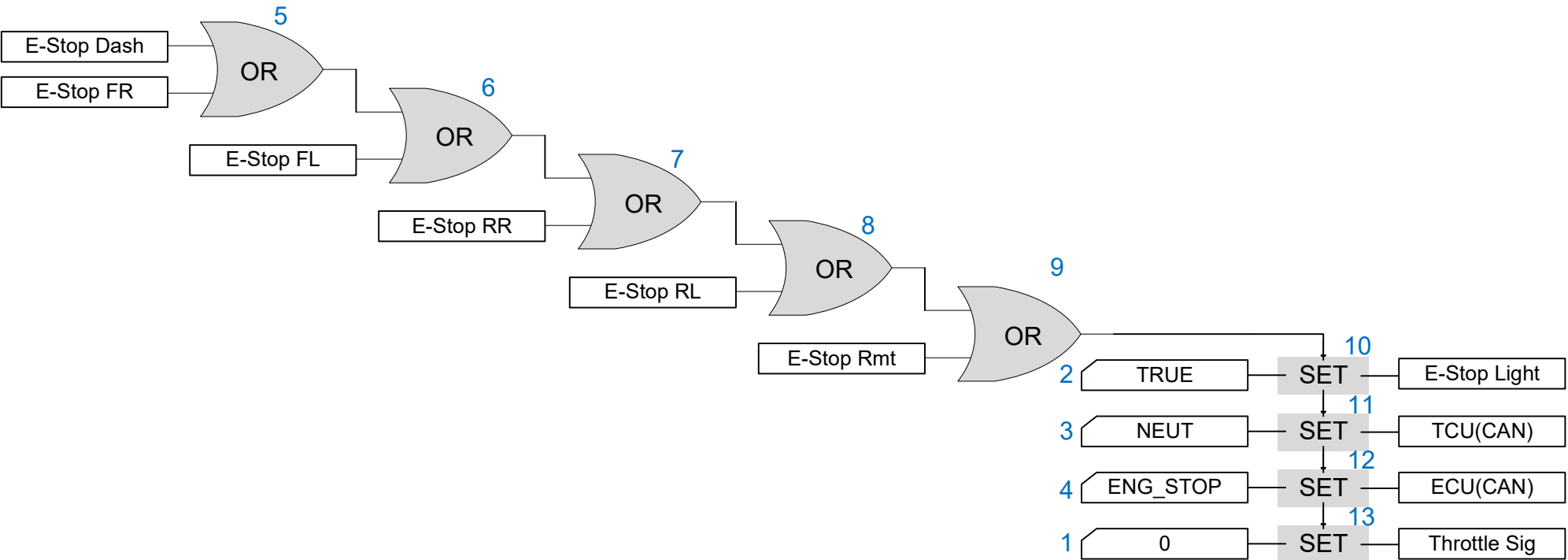
REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

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

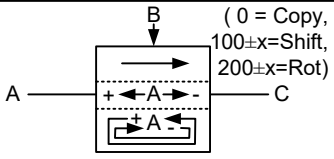
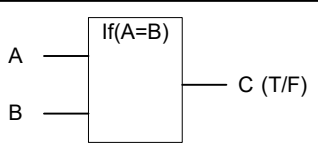
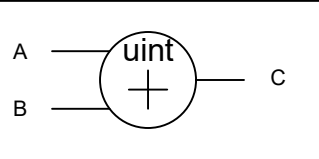
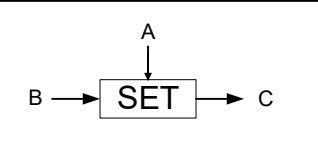
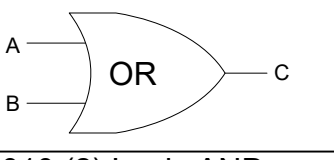
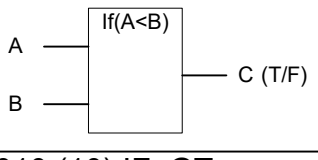
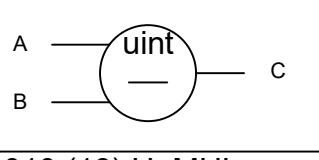
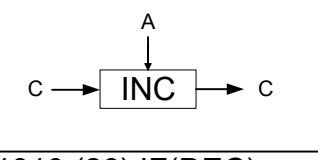
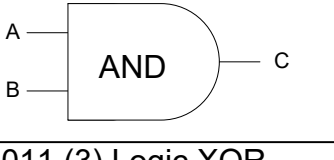
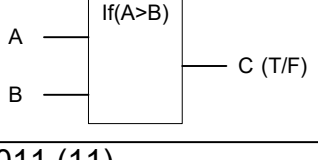
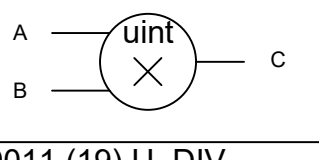
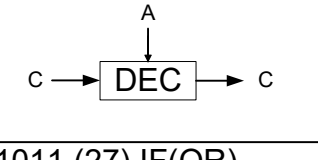
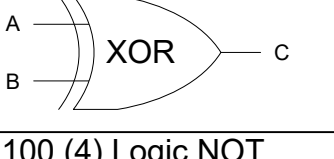
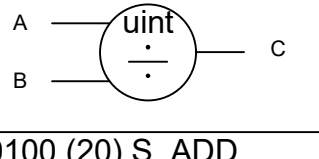
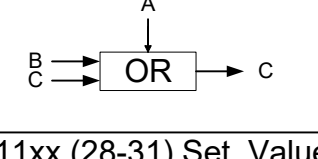
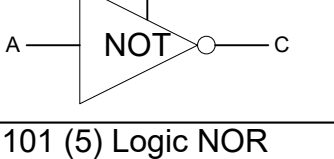
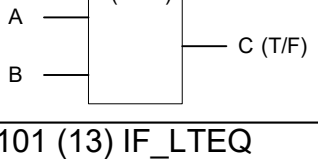
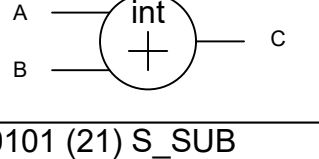
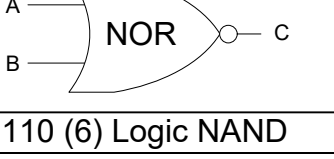
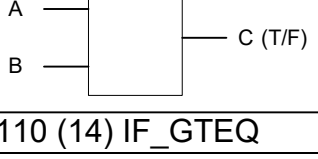
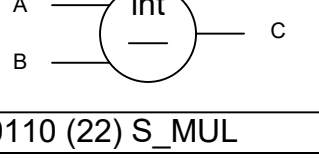
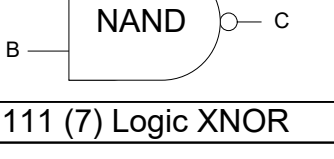
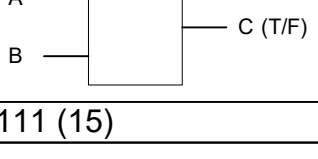
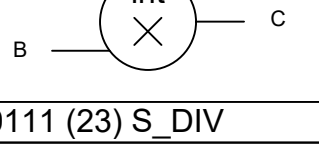
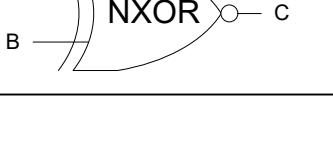
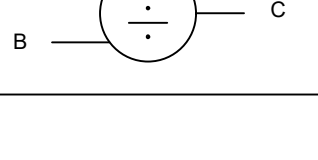
(* NOTE: Ensure that all configurations and constants to be used must be set at the beginning of the XML instructions list using SET VARIABLE instructions.)

Future Graphical User Logic Builder Concept



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			TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS				
TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-	SIZE B	DRAWING NUMBER 013388		TYPE S	REV C
DO NOT SCALE DRAWING							
CHECKED	S. JOHNSON	DATE 12/28/20					
APPROVED	S. JOHNSON	DATE 01/08/21	DRAWN BRB		DATE 12/28/20	SHEET 3 OF 18	

Logical Operands	Comparative Operands	Mathematical 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) UNUSED AT THE MOMENT	10011 (19) U_DIV 	11011 (27) IF(OR) 
00100 (4) Logic NOT 	01100 (12) If_NEQ 	10100 (20) S_ADD 	<div>505004 Indexing only supports upto 65 variables</div> <div>64</div> <div>Set Variable to a Value</div>
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) UNUSED AT THE MOMENT	10111 (23) S_DIV 	

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

Var Type Indexing				
	Physical(00)	Tmp/Const(01)	CAN info(10)	Params(11)
0	NULL	[FALSE / 0]	CAN_1	PARAM_1
		[TRUE / 1]		
		CONST_2		
	INPUT_x			
	OUTPUT_x			
	CNFG_x			
		CONST_63	CAN_63	PARAM_63

Logic Commands

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TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-	MARLIN TECHNOLOGIES INC.	
DO NOT SCALE DRAWING			TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS	
CHECKED	S. JOHNSON	DATE 12/28/20	SIZE B	DRAWING NUMBER 013388
APPROVED	S. JOHNSON	DATE 01/08/21	TYPE S	REV C
DRAWN BRB			DATE 12/28/20	SHEET 4 OF 18

505004 Physical Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

Physical Variables Type (00b) – Index List of Values				
0	NULL	DO NOT USE!		
1	J1-12	Input	Analog	Battery Voltage [0-43,554 mV, 1mV/bit]
2	J1-6	Input	Analog	Input 1 Voltage [0-43,554 mV, 1mV/bit] / Count [1cnt/bit, Unsigned]
3	J1-5	Input	Analog	Input 2 Voltage [0-43,554 mV, 1mV/bit]
4	J1-9	Input	Analog	Input 3 Voltage [0-43,554 mV, 1mV/bit]
5	J1-10	Input	Analog	Input 4 Voltage [0-43,554 mV, 1mV/bit]
6	J1-6	Input	Digital	Input 1 Digital High [1=Active High, 0=otherwise]
7	J1-6	Input	Digital	Input 1 Digital Low [1=Active Low, 0=otherwise]
8	J1-5	Input	Digital	Input 2 Digital High [1=Active High, 0=otherwise]
9	J1-5	Input	Digital	Input 2 Digital Low [1=Active Low, 0=otherwise]
10	J1-9	Input	Digital	Input 3 Digital High [1=Active High, 0=otherwise]
11	J1-9	Input	Digital	Input 3 Digital Low [1=Active Low, 0=otherwise]
12	J1-10	Input	Digital	Input 4 Digital High [1=Active High, 0=otherwise]
13	J1-10	Input	Digital	Input 4 Digital Low [1=Active Low, 0=otherwise]
14	J1-7	Input	Analog	Output 1 Current [0-4200mA, 1mA/bit]
15	J1-8	Input	Analog	Output 2 Current [0-4200mA, 1mA/bit]
16	J1-4	Input	Analog	Output 3 Current [0-4200mA, 1mA/bit]
17	J1-3	Input	Analog	Output 4 Current [0-4200mA, 1mA/bit]
18	J1-6	Input	D.C.	Digital Input 1 Duty Cycle [0-100%, 0.1%/bit]
19	J1-6	Input	Period	Digital Input 1 Period [0-65535uS, 1 uS/bit]
20	J1-6	Input	Freq	Digital Input 1 Frequency [32-10,000Hz, 0.1 Hz/bit]
21	J1-5	Input	D.C.	Digital Input 2 Duty Cycle [0-100%, 0.1%/bit]
22	J1-5	Input	Period	Digital Input 2 Period [0-65535uS, 1 uS/bit]
23	J1-5	Input	Period	Digital Input 2 Frequency [32-10,000Hz, 0.1 Hz/bit]
24	J1-7	Output	Digital	Output 1 Digital Cmd [1=On, 0=Off]
25	J1-8	Output	Digital	Output 2 Digital Cmd [1=On, 0=Off]
26	J1-4	Output	Digital	Output 3 Digital Cmd [1=On, 0=Off]
27	J1-3	Output	Digital	Output 4 Digital Cmd [1=On, 0=Off]
28	J1-7	Output	DC/mA	Output 1 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
29	J1-8	Output	DC/mA	Output 2 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
30	J1-4	Output	DC/mA	Output 3 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
31	J1-3	Output	DC/mA	Output 4 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
32	Cnfg	Load	mΩ	Output 1 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
33	Cnfg	Load	mΩ	Output 2 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
34	Cnfg	Load	mΩ	Output 3 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
35	Cnfg	Load	mΩ	Output 4 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]

36	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-3000mA]
37	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-3000mA]
38	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-3000mA]
39	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-3000mA]
40	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65,535mV, 1mV/bit]
41	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65,535mV, 1mV/bit]
42	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
43	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
44	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
45	Cnfg	OnDly1	Time	Output 1 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
46	Cnfg	OnDly2	Time	Output 2 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
47	Cnfg	OnDly3	Time	Output 3 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
48	Cnfg	OnDly4	Time	Output 4 HW_InOut Mode On Delay [0-65,535mS, 1mS/bit]
49	Cnfg	OffDly1	Time	Output 1 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
50	Cnfg	OffDly2	Time	Output 2 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
51	Cnfg	OffDly3	Time	Output 3 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
52	Cnfg	OffDly4	Time	Output 4 HW_InOut Mode Off Delay [0-65,535mS, 1mS/bit]
53	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
54	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
55	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
56	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
57	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
58	Cnfg	Kypd	B1	Output 1 – Button Index# [Refer to Spec 11713S__]
59	Cnfg	Kypd	B2	Output 2 – Button Index# [Refer to Spec 11713S__]
60	Cnfg	Kypd	B3	Output 3 – Button Index# [Refer to Spec 11713S__]
61	Cnfg	Kypd	B4	Output 4 – Button Index# [Refer to Spec 11713S__]
62	Cnfg	Kypd	SA	Keypad Source Address
63	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]
64	Cnfg	In1	Type	Input 1 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

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

DO NOT SCALE DRAWING

CHECKED S. JOHNSON DATE 12/28/20

APPROVED S. JOHNSON DATE 01/08/21

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE

B

DRAWING NUMBER

013388

TYPE

S

REV

C

DRAWN BRB

DATE 12/28/20

SHEET 5 OF 18

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505004 Temporary Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

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>	
50	<Blank>	
51	<Blank>	
52	<Blank>	
53	<Blank>	
54	<Blank>	
55	<Blank>	
56	<Blank>	
57	<Blank>	
58	<Blank>	
59	<Blank>	
60	<Blank>	
61	<Blank>	
62	<Blank>	
63	<Blank>	

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE			MARLIN TECHNOLOGIES INC.			
			TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS			
TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-	SIZE B	DRAWING NUMBER 013388	TYPE S	REV C
DO NOT SCALE DRAWING						
CHECKED	S. JOHNSON	DATE 12/28/20				
APPROVED	S. JOHNSON	DATE 01/08/21	DRAWN BRB		DATE 12/28/20	SHEET 6 OF 18

505004 CAN-Bus Variables Listing (XML Mode)

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

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	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		Msg #3	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	<Blank>		J1939 CAN Or Pre- Define Rx Values	Undefined at the current time of publication Reserved for future CAN message information
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>			
50	<Blank>			
51	<Blank>			
52	<Blank>			
53	<Blank>			
54	<Blank>			
55	Kypd	Input	Digital	Keypad Input 1 [0=Up,1=Down,2=Err,3=No Key]
56	Kypd	Input	Digital	Keypad Input 2 [0=Up,1=Down,2=Err,3=No Key]
57	Kypd	Input	Digital	Keypad Input 3 [0=Up,1=Down,2=Err,3=No Key]
58	Kypd	Input	Digital	Keypad Input 4 [0=Up,1=Down,2=Err,3=No Key]
59	Kypd	Output	6-bit	Keypad Out1 LEDs [0=Off,1=On,2=Blink,3=NoChg]
60	Kypd	Output	6-bit	Keypad Out2 LEDs [0=Off,1=On,2=Blink,3=NoChg]
61	Kypd	Output	6-bit	Keypad Out3 LEDs [0=Off,1=On,2=Blink,3=NoChg]
62	Kypd	Output	6-bit	Keypad Out4 LEDs [0=Off,1=On,2=Blink,3=NoChg]
63	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]

(*) 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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UNLESS OTHERWISE SPECIFIED, DIMENSIONS
ARE IN INCHES AND TOLERANCES ARE

TWO PLACE
DECIMAL
+/- 0.05

THREE PLACE
DECIMAL
+/- 0.020

ANGLES
+/-

DO NOT SCALE DRAWING

CHECKED S. JOHNSON

DATE 12/28/20

APPROVED S. JOHNSON

DATE 01/08/21

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE
B

DRAWING NUMBER
013388

TYPE
S

REV
C

DRAWN BRB

DATE 12/28/20

SHEET 7 OF 18

505004 CAN-Bus Variables List(CAN/HW I/O Modes)

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

CAN Variables for CAN_ I/O Mode				
CAN Variables Type (10b) – Index List of Values				
0	Cnfg	Tx Rate	Time	CAN Msg FF40 Tx Rate [10mS/bit, 0=Off]
1	Cnfg	Tx Rate	Time	CAN Msg FF41 Tx Rate [10mS/bit, 0=Off]
2	Cnfg	Tx Rate	Time	CAN Msg FF43 Tx Rate [10mS/bit, 0=Off]
3	Cnfg	Tx Rate	Time	CAN Msg FF60 Tx Rate [10mS/bit, 0=Off]
4	Cnfg	Tx Rate	Time	CAN Msg FF61 Tx Rate [10mS/bit, 0=Off]
5	Cnfg	Tx Rate	Time	CAN Msg FF63 Tx Rate [10mS/bit, 0=Off]
6	Cnfg	Tx Rate	Time	CAN Msg FF64 Tx Rate [10mS/bit, 0=Off]
7	<Blank>		Undefined at the current time of publication Reserved for future CAN message information	
8	<Blank>			
9	<Blank>			
10	<Blank>			
11	<Blank>			

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL
+/- 0.05

THREE PLACE DECIMAL
+/- 0.020

ANGLES
+/-

DO NOT SCALE DRAWING

CHECKED S. JOHNSON

APPROVED S. JOHNSON

DATE 12/28/20

DATE 01/08/21

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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE B

DRAWING NUMBER 013388

TYPE S

REV C

DRAWN BRB

DATE 12/28/20

SHEET 8 OF 18

505004 Parameter Variables Listing

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

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>	
49	<Blank>	
50	<Blank>	
51	<Blank>	
52	<Blank>	
53	<Blank>	
54	<Blank>	
55	<Blank>	
56	<Blank>	
57	<Blank>	
58	<Blank>	
59	<Blank>	
60	<Blank>	
61	<Blank>	
62	<Blank>	
63	<Blank>	

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE
DECIMAL
+/- 0.05

THREE PLACE
DECIMAL
+/- 0.020

ANGLES

+/-

DO NOT SCALE DRAWING

CHECKED S. JOHNSON

DATE 12/28/20

APPROVED S. JOHNSON

DATE 01/08/21

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE
B

DRAWING NUMBER
013388

TYPE
S

REV
C

DRAWN BRB

DATE 12/28/20

SHEET 9 OF 18

505004 Physical Variables for XML_Mode

List of Configurations used in XML_Mode

Phy	40	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65.535mV, 1mV/bit]
Phy	41	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65.535mV, 1mV/bit]
Phy	42	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	43	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	44	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]

Phy	32	Cnfg	Load	mΩ	Output 1 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	33	Cnfg	Load	mΩ	Output 2 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	34	Cnfg	Load	mΩ	Output 3 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	35	Cnfg	Load	mΩ	Output 4 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]

Phy	36	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-3000mA]
Phy	37	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-3000mA]
Phy	38	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-3000mA]
Phy	39	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-3000mA]

Phy	53	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	54	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	55	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	56	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	57	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]

Phy	63	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]
-----	----	------	--------	------	---

Phy	64	Cnfg	In1	Type	Input 1 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
-----	----	------	-----	------	--

Can	63	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]
-----	----	------	---------	------	--

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

Example XML Configuration

Operator

Set_Var

Variable

Phy63

Value

0

Mode = XML

Set_Var

Phy54

1

Output1 = HS_Dig

Set_Var

Phy55

2

Output2 = LS_Dig

Set_Var

Phy56

4

Output3 = HS_DC

Set_Var

Phy57

6

Output4 = LS_DC

Set_Var

Phy53

100

PWM Freq = 100Hz

XML Logic

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TWO PLACE DECIMAL +/- 0.05					TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS			
DO NOT SCALE DRAWING					SIZE B	DRAWING NUMBER 013388	TYPE S	REV C
CHECKED	S. JOHNSON	DATE	12/28/20		DRAWN	BRB	DATE	12/28/20
APPROVED	S. JOHNSON	DATE	01/08/21		SHEET 10 OF 18			

505004 Physical Variables for CAN_I/O Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

List of Configurations used in CAN_I/O Mode

Phy	40	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65.535mV, 1mV/bit]
Phy	41	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65.535mV, 1mV/bit]
Phy	42	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	43	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	44	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]

Phy	32	Cnfg	Load	mΩ	Output 1 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	33	Cnfg	Load	mΩ	Output 2 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	34	Cnfg	Load	mΩ	Output 3 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	35	Cnfg	Load	mΩ	Output 4 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]

Phy	36	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-3000mA]
Phy	37	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-3000mA]
Phy	38	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-3000mA]
Phy	39	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-3000mA]

Phy	53	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	54	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	55	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	56	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	57	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]

Phy	63	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]
-----	----	------	--------	------	---

Phy	64	Cnfg	In1	Type	Input 1 [0=Analog/Digital/Freq, 1=Current, 2=Resistance, 3=QuadX1, 4=QuadX2, 5=QuadX4]
-----	----	------	-----	------	--

Can	0	Cnfg	Tx Rate	Time	CAN Msg FF40 Tx Rate [10mS/bit, 0=Off]
Can	1	Cnfg	Tx Rate	Time	CAN Msg FF41 Tx Rate [10mS/bit, 0=Off]
Can	2	Cnfg	Tx Rate	Time	CAN Msg FF43 Tx Rate [10mS/bit, 0=Off]
Can	3	Cnfg	Tx Rate	Time	CAN Msg FF60 Tx Rate [10mS/bit, 0=Off]
Can	4	Cnfg	Tx Rate	Time	CAN Msg FF61 Tx Rate [10mS/bit, 0=Off]
Can	5	Cnfg	Tx Rate	Time	CAN Msg FF63 Tx Rate [10mS/bit, 0=Off]
Can	6	Cnfg	Tx Rate	Time	CAN Msg FF64 Tx Rate [10mS/bit, 0=Off]

Can	63	Cnfg	TimeOut	Time	Cmd Message Timeouts [10mS/bit, 0=NoTimeout]
-----	----	------	---------	------	--

Example XML Configuration

Operator	Variable		Value	
Set_Var	Phy	63	1	Mode = CAN_I/O
Set_Var	Phy	54	1	Output1 = HS_Dig
Set_Var	Phy	55	2	Output2 = LS_Dig
Set_Var	Phy	56	4	Output3 = HS_DC
Set_Var	Phy	57	6	Output4 = LS_DC
Set_Var	Phy	53	100	PWM Freq = 100Hz
Set_Var	Can	1	10	CAN Msg 0xFF41 Tx Rate = 100ms
Set_Var	Can	63	100	CAN Cmd Timeout = 1s

UNLESS OTHERWISE SPECIFIED, DIMENSIONS
ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-
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DO NOT SCALE DRAWING

CHECKED	S. JOHNSON	DATE 12/28/20
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APPROVED	S. JOHNSON	DATE 01/08/21
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MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE B	DRAWING NUMBER 013388	TYPE S	REV C
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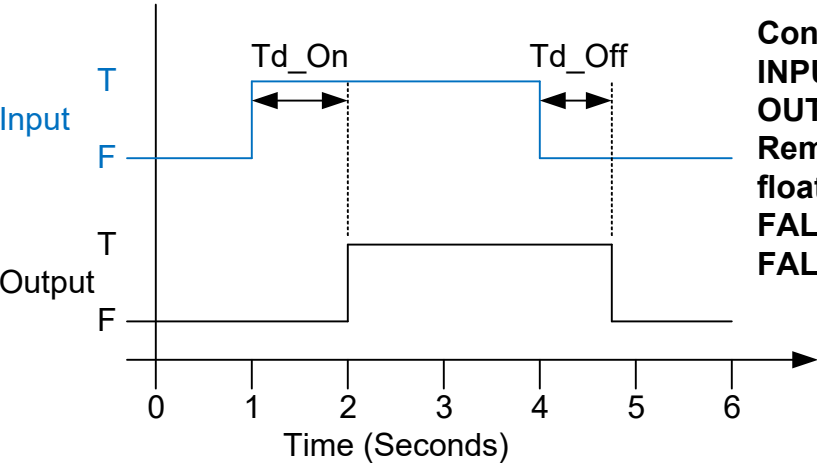
DRAWN BRB	DATE 12/28/20	SHEET 11 OF 18
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505004 Physical Variables for HW_I/O Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

List of Configurations used in HW_I/O Mode					
Phy	28	J1-7	Output	DC/mA	Output 1 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	29	J1-8	Output	DC/mA	Output 2 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	30	J1-4	Output	DC/mA	Output 3 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	31	J1-3	Output	DC/mA	Output 4 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	32	Cnfg	Load	mΩ	Output 1 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	33	Cnfg	Load	mΩ	Output 2 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	34	Cnfg	Load	mΩ	Output 3 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	35	Cnfg	Load	mΩ	Output 4 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	36	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-3000mA]
Phy	37	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-3000mA]
Phy	38	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-3000mA]
Phy	39	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-3000mA]
Phy	40	Cnfg	Thres	factor	Threshold Voltage for Digital inputs to be set to Active [65.535mV, 1mV/bit]
Phy	41	Cnfg	Hyst	factor	Hysteresis Voltage for Digital inputs to return to Inactive [65.535mV, 1mV/bit]
Phy	42	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	43	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	44	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	45	Cnfg	OnDly1	Time	Output 1 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	46	Cnfg	OnDly2	Time	Output 2 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	47	Cnfg	OnDly3	Time	Output 3 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	48	Cnfg	OnDly4	Time	Output 4 Relay Style On Delay [0-655,350mS, 10mS/bit]
Phy	49	Cnfg	OffDly1	Time	Output 1 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	50	Cnfg	OffDly2	Time	Output 2 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	51	Cnfg	OffDly3	Time	Output 3 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	52	Cnfg	OffDly4	Time	Output 4 Relay Style Off Delay [0-655,350mS, 10mS/bit]
Phy	53	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	54	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	55	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	56	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	57	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	63	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O 3=HW_Keypad]



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.

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Example XML Configuration

Operator	Variable		Value	
Set_Var	Phy	63	2	Mode = HW_I/O
Set_Var	Phy	54	1	Output1 = HS_Dig
Set_Var	Phy	55	2	Output2 = LS_Dig
Set_Var	Phy	56	4	Output3 = HS_DC
Set_Var	Phy	57	6	Output4 = LS_DC
Set_Var	Phy	53	100	PWM Freq = 100Hz
Set_Var	Phy	28	1000	OutCmd1 = 100%
Set_Var	Phy	29	1000	OutCmd2 = 100%
Set_Var	Phy	30	1000	OutCmd3 = 100%
Set_Var	Phy	31	1000	OutCmd4 = 100%
Set_Var	Phy	45	100	Out1 On Delay = 1.0s
Set_Var	Phy	49	150	Out1 Off Delay = 1.5s
Set_Var	Phy	46	200	Out2 On Delay = 2.0s
Set_Var	Phy	50	250	Out2 Off Delay = 2.5s
Set_Var	Phy	47	300	Out3 On Delay = 3.0s
Set_Var	Phy	51	350	Out3 Off Delay = 3.5s
Set_Var	Phy	48	400	Out4 Onf Delay = 4.0s
Set_Var	Phy	52	450	Out4 Off Delay = 4.5s

MARLIN TECHNOLOGIES INC.				
TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS				
SIZE	DRAWING NUMBER		TYPE	REV
B	013388		S	C
CHECKED	S. JOHNSON	DATE 12/28/20		
APPROVED	S. JOHNSON	DATE 01/08/21	DRAWN BRB	DATE 12/28/20 SHEET 12 OF 18

505004 Physical Variables for HW_Keypad Mode

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

List of Configurations used in HW_Keypad_Mode					
Phy	28	J1-7	Output	DC/mA	Output 1 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	29	J1-8	Output	DC/mA	Output 2 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	30	J1-4	Output	DC/mA	Output 3 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	31	J1-3	Output	DC/mA	Output 4 DutyCycle/Current Cmds (Mode based) [1 mA or 0.1% /bit]
Phy	32	Cnfg	Load	mΩ	Output 1 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	33	Cnfg	Load	mΩ	Output 2 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	34	Cnfg	Load	mΩ	Output 3 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	35	Cnfg	Load	mΩ	Output 4 Closed Loop PWM Nominal Load Resistance [10mΩ/bit]
Phy	42	Cnfg	P-term	factor	P-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	43	Cnfg	I-term	factor	I-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	44	Cnfg	D-term	factor	D-term for Closed-Loop of all outputs [0-655.35%, 0.01%/bit]
Phy	36	Cnfg	Limit	mA	Output 1 Current Limit [1 mA /bit, 0-3000mA]
Phy	37	Cnfg	Limit	mA	Output 2 Current Limit [1 mA /bit, 0-3000mA]
Phy	38	Cnfg	Limit	mA	Output 3 Current Limit [1 mA /bit, 0-3000mA]
Phy	39	Cnfg	Limit	mA	Output 4 Current Limit [1 mA /bit, 0-3000mA]
Phy	53	Cnfg	PWMs	Freq	Set Base Frequency of all PWM Outputs [30-1000Hz, 1Hz/bit]
Phy	54	Cnfg	Out1	Type	Output 1 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	55	Cnfg	Out2	Type	Output 2 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	56	Cnfg	Out3	Type	Output 3 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	57	Cnfg	Out4	Type	Output 4 [0=Off,1=HS,2=LS,3=HS_mA,4=HS_DC,5=LS_mA,6=LS_DC,7=BiDir]
Phy	58	Cnfg	Kypd	B1	Keypad Button 1 Cnfg – Index# [Spec 11713S_] & Type (Note 2)
Phy	59	Cnfg	Kypd	B2	Keypad Button 2 Cnfg – Index# [Spec 11713S_] & Type (Note 2)
Phy	60	Cnfg	Kypd	B3	Keypad Button 3 Cnfg – Index# [Spec 11713S_] & Type (Note 2)
Phy	61	Cnfg	Kypd	B4	Keypad Button 4 Cnfg – Index# [Spec 11713S_] & Type (Note 2)
Phy	62	Cnfg	Kypd	SA	Keypad Source Address
Phy	63	Cnfg	Module	Mode	Config Module [0=XML, 1=CAN_I/O, 2=HW_I/O, 3=HW_Keypad]
Can	63	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.		

Mode

2=O/L/M/H

1=On/Off

0=Momentary

Button

1 (33%)

2 (66%)

3 (100%)

1 (33%)

1 (On)

1 (On)

1 (On)

1(On)

1

1

1

1

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL
+/- 0.05

THREE PLACE DECIMAL
+/- 0.020

ANGLES
+/-

DO NOT SCALE DRAWING

CHECKED S. JOHNSON

DATE 12/28/20

APPROVED S. JOHNSON

DATE 01/08/21

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS

SIZE B

DRAWING NUMBER 013388

TYPE S

REV C

DRAWN BRB

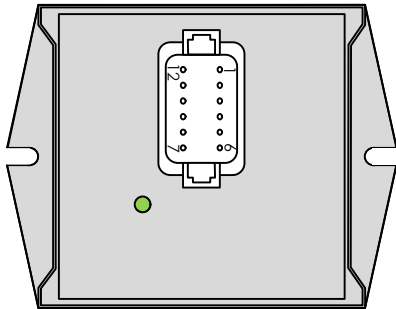
DATE 12/28/20

SHEET 13 OF 18

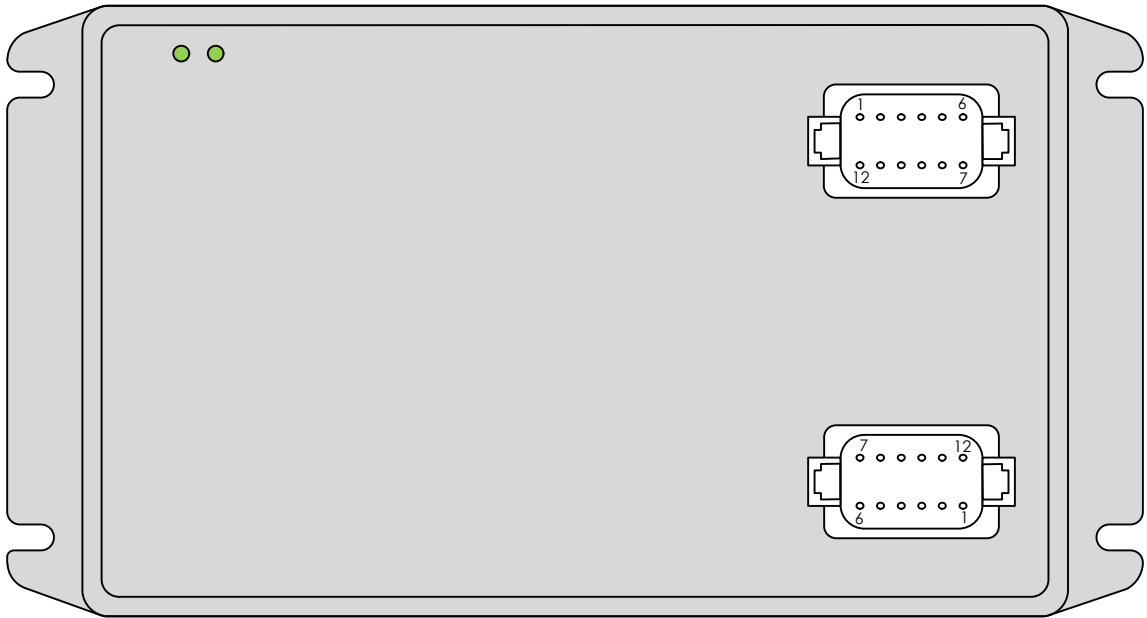
Built-In Support for CAN I/O Mode of the Marlin 5050xx Modules

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

505004
(4i4o Module)



505030
(8i8o Module)



TRANSMITTED

Digital Status Msg	18FF40sa	In1-4(Hi)	In1-4(Lo)	0x00	0x00	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: 0-42000 [0-42,000mV, 1mV/bit] \ Count: 0-65535 [1cnt/bit, Unsigned]									
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]			
Module Status Msg	18FF60sa	Supply Voltage		0xFFFF		Supply Raw ADC		Module HWID	
Output Fault Msg	18FF61sa	Out1Err	Out2Err	Out3Err	Out4Err	0xFF	0xFF	0xFF	0xFF
Output Setpoint Msg	18FF63sa	Out 1 Cmd (16-bit)		Out 2 Cmd (16-bit)		Out 3 Cmd (16-bit)		Out 4 Cmd (16-bit)	
Output Feedback Msg	18FF64sa	Output 1 Current		Output 2 Current		Output 3 Current		Output 4 Current	
Current: 0-4200 [0-4,200mA, 1mA/bit]									

RECEIVED

Cmd Msg: Outputs	18EFsaxx	0x60	0xFF	0x00	0x00	Out 1-4	0x00	0x00	0x00
		0x61	0xFF	0x00	0x00	Out1 Cmd	Out2 Cmd	Out3 Cmd	Out4 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)	
						DC: 0-1000 [0-100.0%, 0.1%/bit] mA: 0-3000 [0-3000mA, 1mA/bit]			
		0x70	0xFF	0x00	0x00	In 1 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 505004 Module
xx = Source Address of the controller commanding the 505004 Module

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

Reference

Marlin 13953S__ spec for 505030 Modules
Marlin 13544S__ spec for 505004 Modules

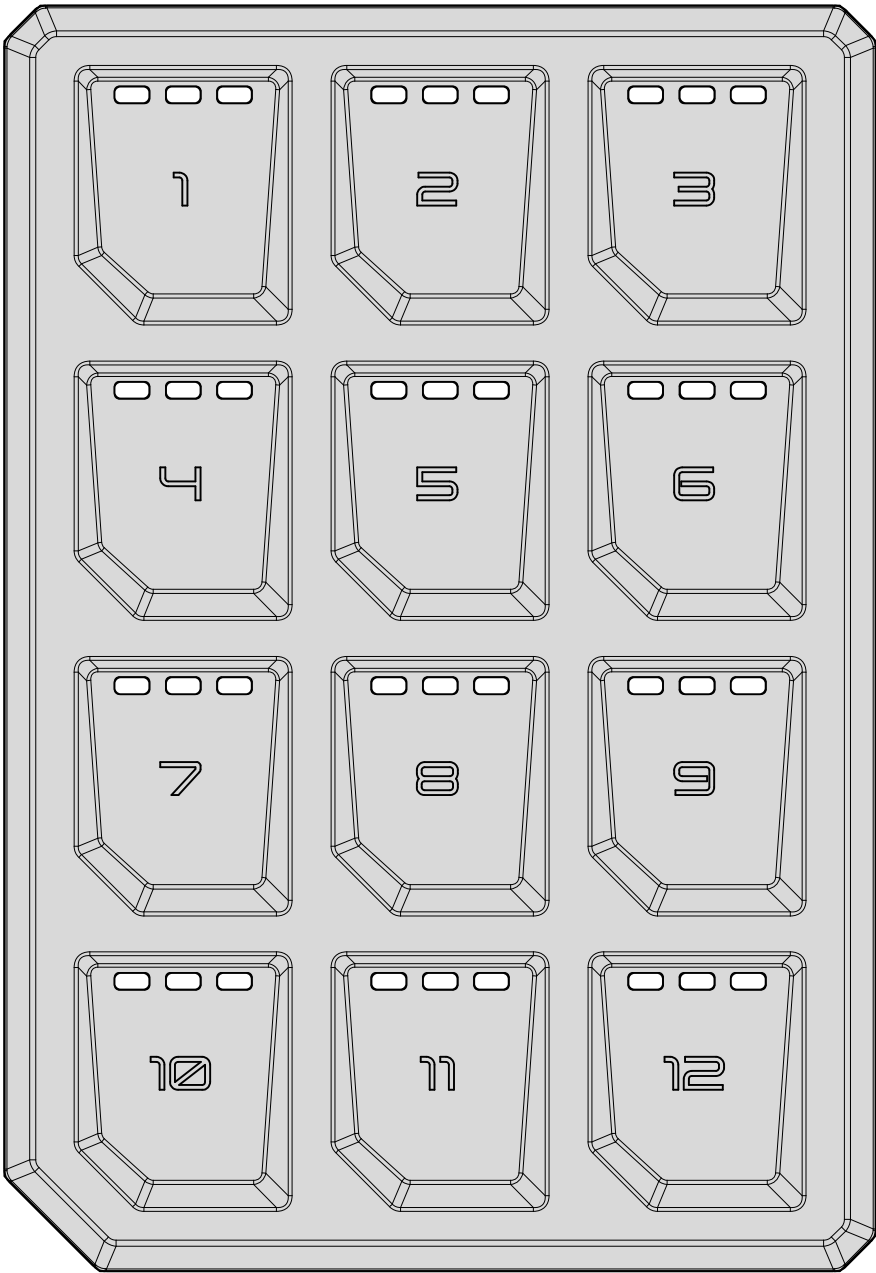
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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE		
TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-
DO NOT SCALE DRAWING		
CHECKED	S. JOHNSON	DATE 12/28/20
APPROVED	S. JOHNSON	DATE 01/08/21

MARLIN TECHNOLOGIES INC.			
TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS			
SIZE B	DRAWING NUMBER 013388		TYPE S
DRAWN BRB		DATE 12/28/20	REV C
		SHEET 14 OF 18	

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

Example of 3x4 Keypad shown



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Indicator LED Status Messages are sent every 100mS
sa = Source Address of the 505004 Module
kk = Source Address of the Keypad Module

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

T R A N S M I T T E D	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]									
R E C E I V E D	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]									

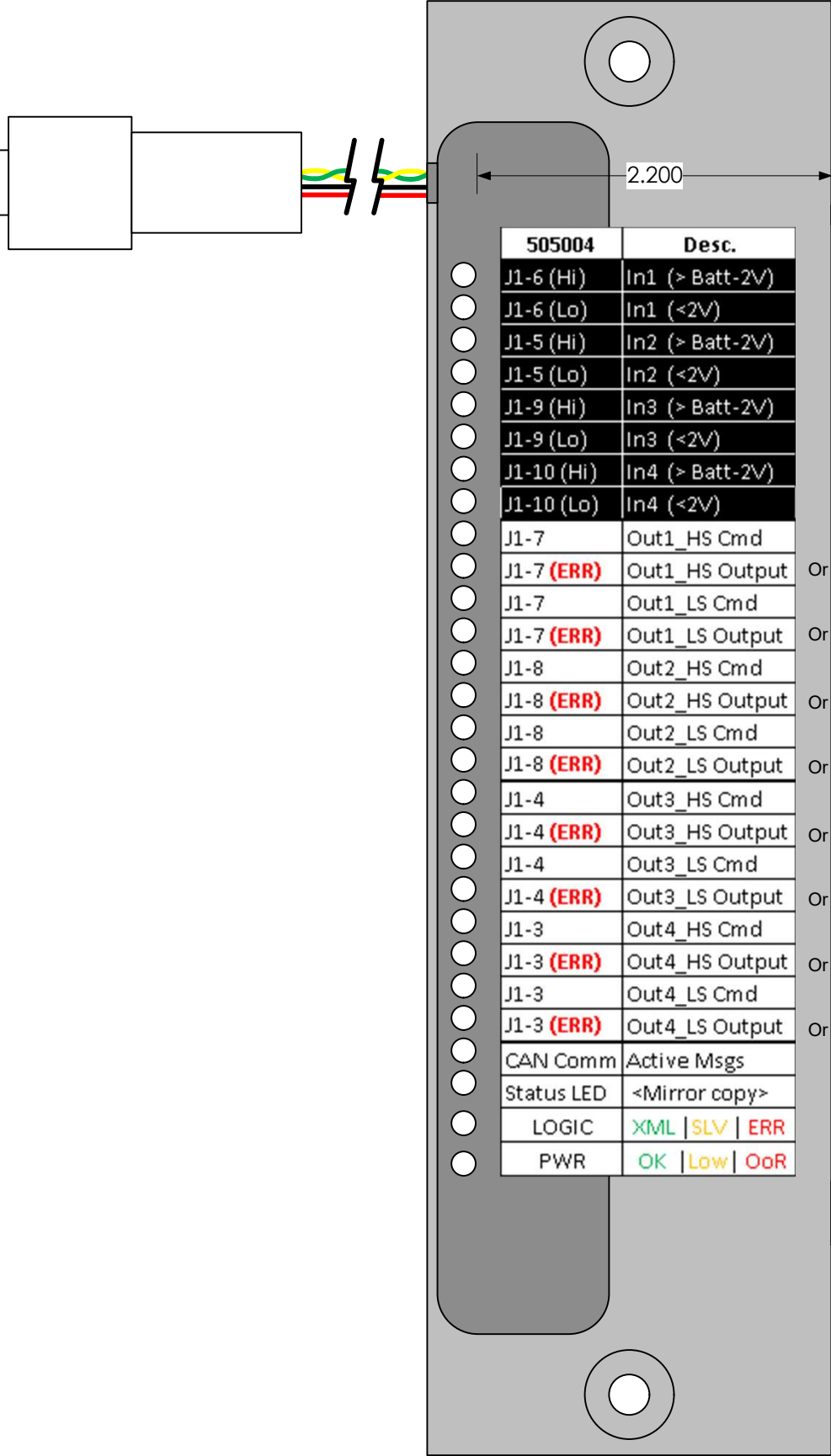
Based on Marlin 11713S__ spec for Keypad Modules

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE			MARLIN TECHNOLOGIES INC.			
			TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS			
TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-	SIZE B	DRAWING NUMBER 013388	TYPE S	REV C
DO NOT SCALE DRAWING			DRAWN BRB DATE 12/28/20 SHEET 15 OF 18			
CHECKED	S. JOHNSON	DATE 12/28/20				
APPROVED	S. JOHNSON	DATE 01/08/21				

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

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC



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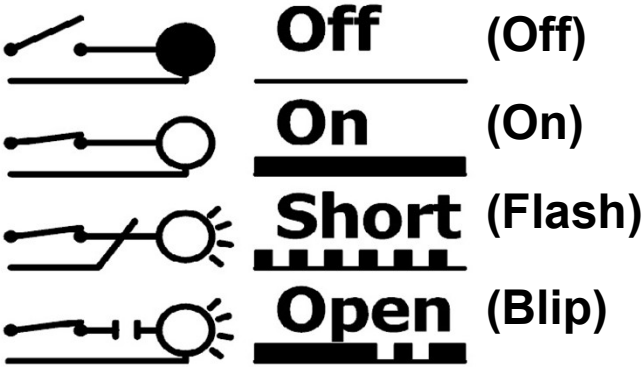
Button Status Msg 18FFD7sa

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

ON 1-8	ON 9-16	ON 17-24	ON 25-28	Flash1-8	Flash9-16	Flash17-24	Flash25-28
LED Status Flash/On [00=Off, 01=On, 10=Flash, 11=Blip]							

Status Messages are sent every 1 Sec (or on Status Change)
sa = Source Address of the 505004 Module

Or HS_PWM
Or LS_PWM
Or HS_PWM
Or LS_PWM
Or HS_PWM
Or LS_PWM
Or HS_PWM
Or LS_PWM



LED xx FLASH bit	LED xx ON bit
0	0
0	1
1	0
1	1

GRN=XML logic, YEL=Slave Mode, RED=HW Mode
GRN=Batt Ok, YEL=Batt < 10V, RED= Batt Out of Range

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL
+/- 0.05

THREE PLACE DECIMAL
+/- 0.020

ANGLES
+/-

DO NOT SCALE DRAWING

CHECKED S. JOHNSON

APPROVED S. JOHNSON

DATE 12/28/20

DATE 01/08/21

MARLIN TECHNOLOGIES INC.

TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE B

DRAWING NUMBER 013388

TYPE S

REV C

DRAWN BRB

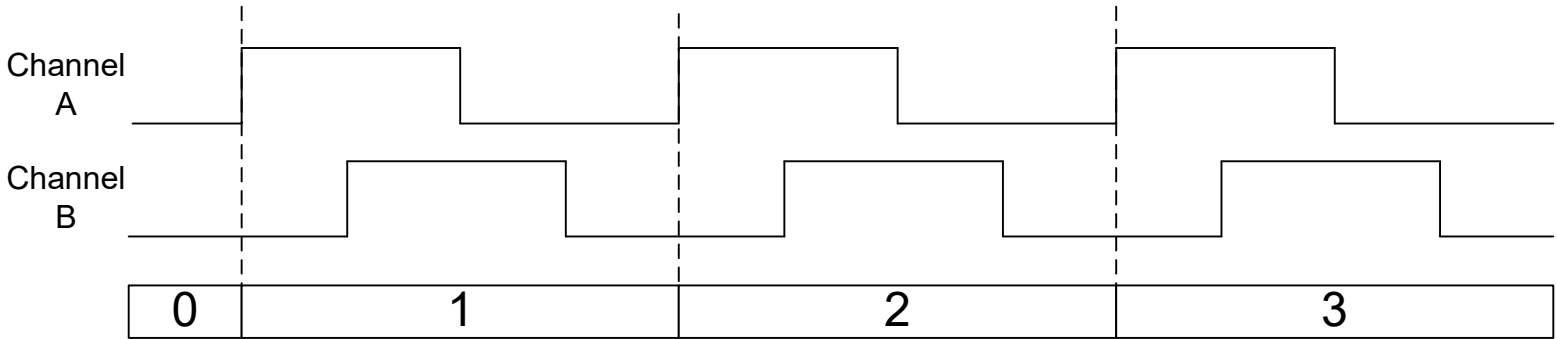
DATE 12/28/20

SHEET 16 OF 18

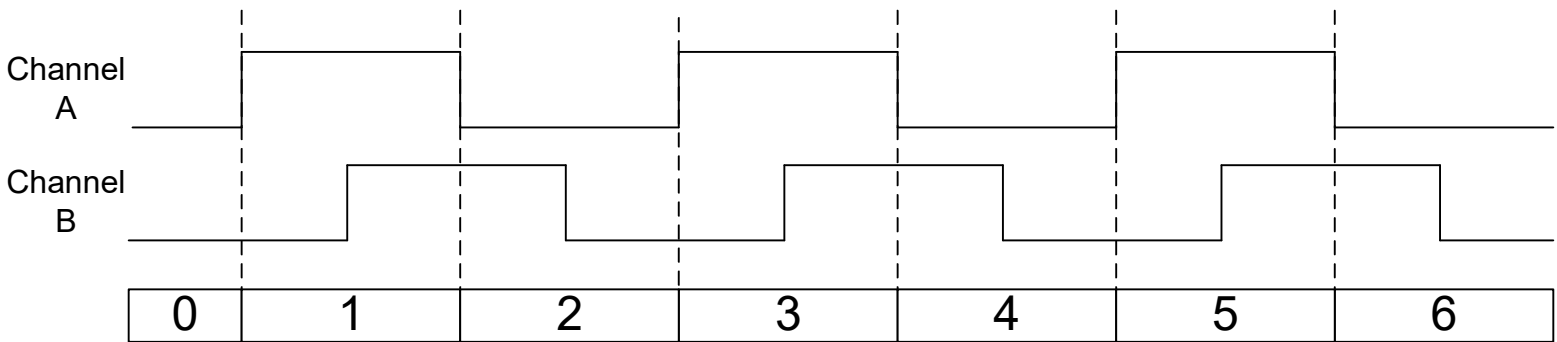
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505004 Quadrature Input Type Information

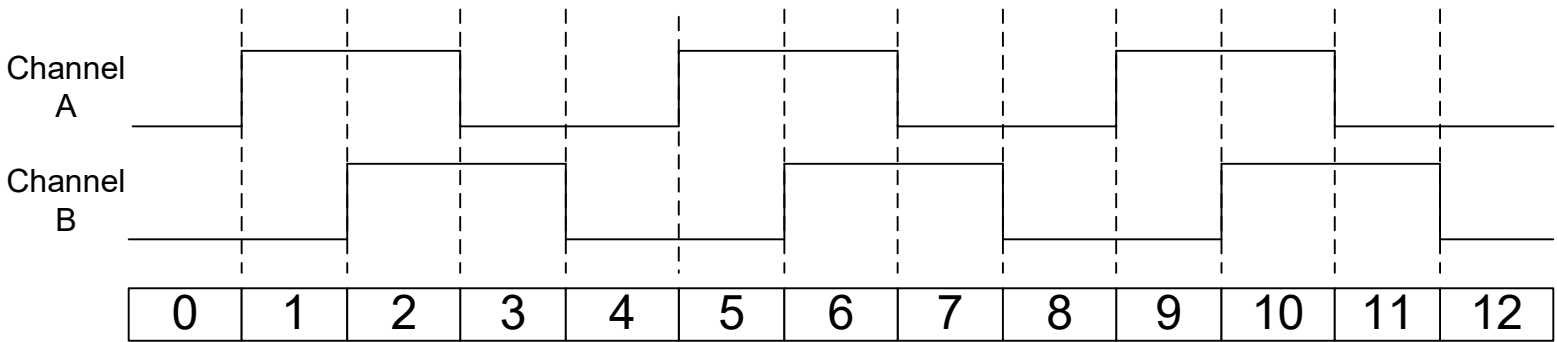
REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC



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

Quadrature Inputs in CAN I/O Mode

Analog Status Msg	18FF41sa	Input 1 Total Count	Input 1 Interval Count	N/A	N/A
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When configured in CAN I/O mode, the total quadrature count and the interval count is transmitted in place of Input 'n' & Input 'n+1' Analog data respectively. The time between count samples is equal to the transmit rate of the 0xFF41 Input Status message.

Cmd Msg: Outputs	18EFsaxx	0x70	0xFF	0x00	0x00	In 1 Quad Cnt Cmd	Reserved (leave as 0x00)
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.

*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.

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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE			MARLIN TECHNOLOGIES INC.				
			TITLE SPECIFICATION, 505004 CONFIGURABLE INSTRUCTIONS				
TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-	SIZE B	DRAWING NUMBER 013388		TYPE S	REV C
DO NOT SCALE DRAWING							
CHECKED	S. JOHNSON	DATE 12/28/20					
APPROVED	S. JOHNSON	DATE 01/08/21	DRAWN BRB		DATE 12/28/20	SHEET 17 OF 18	

A	Production Release of Document
B	Pg1,5,10-13: Added Bi-Dir (Half-Bridge) Output Type
C	Pg1: Added details about input circuit and digital Hi/Lo state decisions, added quadrature option. Pg2: Updated Programming information. Pg5,10,11,14: Added Quadrature Input Type Pag16: Added detailed view of CAN message data byte 3 content Pg17: Added to document

REVISIONS				
REV	DATE	ECN	DESCRIPTION	APVD
B	09-22-21	13815E	ADDED HALF-BRIDGE OUTPUT	SMJ
C	05-09-22	14092E	ADDED QUADRATURE INPUT	JC

UNLESS OTHERWISE SPECIFIED, DIMENSIONS
ARE IN INCHES AND TOLERANCES ARE

TWO PLACE DECIMAL +/- 0.05	THREE PLACE DECIMAL +/- 0.020	ANGLES +/-
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DO NOT SCALE DRAWING

CHECKED	S. JOHNSON	DATE 12/28/20
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APPROVED	S. JOHNSON	DATE 01/08/21
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TITLE SPECIFICATION, 505004
CONFIGURABLE INSTRUCTIONS

SIZE B	DRAWING NUMBER 013388	TYPE S	REV C
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DRAWN BRB	DATE 12/28/20	SHEET 18 OF 18
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