DATA PANEL
A Murrelektronik Company

xtremeDB

DP-34044-3 User Manual
xDB16-PWM

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* This user manual applies to firmware revision 34044-563-0200 or higher

1. CONCERNING THIS MANUAL

The text, illustrations, diagrams and examples used in this manual exist solely for the purpose of explaning the operation and usage of xtremeDB Input/Output modules. If you have any further questions regarding the installation and set-up of the equipment described in this manual, please do not hesitate to contact us. We will be glad to assist you. Murrelektronik reserves the right to make technical changes or modifications to this manual without prior notice.

2. SAFETY INFORMATION

2.1 DESIGNATED USE

The input/output modules of the xtremeDB series are designated for use only in those areas as described in this manual. Strict adherence to the data specified in this manual must be ensured. The products have been developed, manufactured, tested and documented in compliance with currently valid safety codes. The equipment poses no danger to operating personnel or material if configuration, assembly and operation are performed in compliance with the stated handling and safety regulations. Unqualified intervention in the hardware and software of our equipment, disregard of warning labels found on the equipment or non-observance of the information in this manual can result in injury or serious damage to man and/or material. Any application or usage beyond and above this shall be regarded as non-designated.

Warning!
Good chemical and oil resistance. When using aggressive mediums, material resistance based on application must be checked.

2.2 TARGET GROUPS

This manual addresses itself exclusively to qualified and trained electricians knowledgeable in the safety standards of automation technology. Only a qualified, trained electrical tradesman knowledgeable in the safety standards of mobile industry may perform configuration, installation, set-up, maintenance and testing of the equipment.

2.3 REGULATIONS

Current safety and accident prevention laws valid for a specific application must be observed in the configuration, installation, setup, and maintenance and testing of the equipment.

2.3.1 GENERAL INFORMATION

a) The designated function of this equipment is guaranteed only if the conditions for installation, system extension, operation and maintenance are complied with.
b) Only system accessories and cables are allowed that meet the requirements and regulations for safety, electromagnetic compatibility and, where applicable, telecommunications transmission equipment and specifications.
The installation of other accessories may violate these requirements and regulations or damage the equipment.
Information concerning the type of authorized system extensions and cables can be obtained from your Murrelektronik distributor or taken from this manual.
c) The designated operation of the equipment is guaranteed only with the housing fully installed.
d) This product is designed and manufactured to assure protection against damage and hazards if designated usage and proper maintenance are observed.

2.4 LICENSE DISCLAIMER

o the maximum extent permitted by applicable law, in no event shall Data Panel or Murrelektronik be liable for any special, incidental, indirect, or consequential damages whatsoever (including, but not limited to, damages for loss of profits or confidential or other information, for business interruption, for personal injury, for loss of privacy, for failure to meet any duty including of good faith or of reasonable care, for negligence, and for any other pecuniary or other loss whatsoever) arising out of or in any way related to the use of or inability to use the software product, the provision of or failure to provide support services, or otherwise under or in connection with any provision of this End User License, even in the event of the fault, tort (including negligence), strict liability, breach of contract

or breach of warranty of Data Panel or Murrelektronik, or any supplier, and even if Data Panel or Murrelektronik or any supplier has been advised of the possibility of such damages.

2.5 EXAMPLE OF SYMBOLS

2.5.1 USE OF ATTENTION SIGNS

Notes containing important information are specially marked. These are illustrated as follows:

Attention text...

2.5.2 USE OF DANGER SIGNS

Danger signs are indicated by text and a corresponding symbol inside of a frame

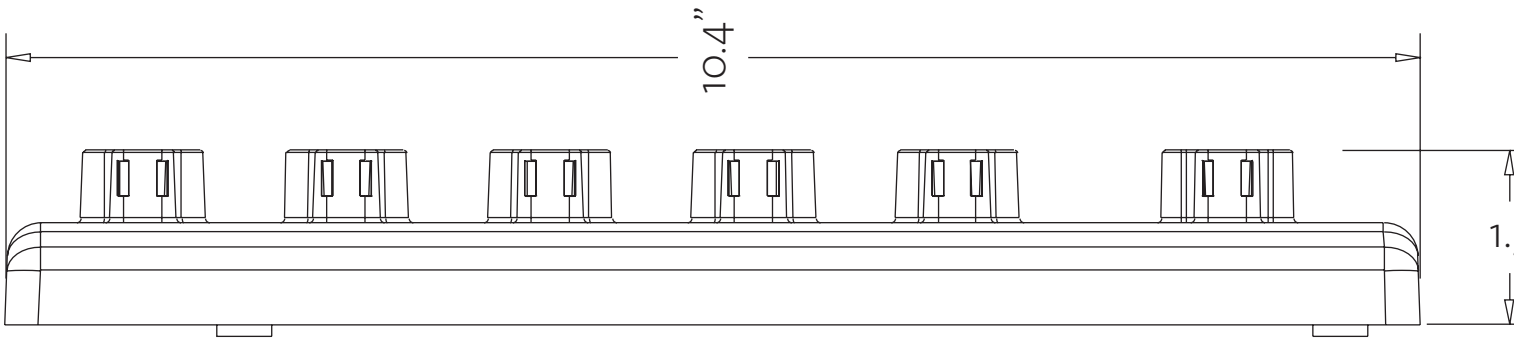
CAUTION!
Disregard of safety measures may result in damage to equipment and other serious consequences.

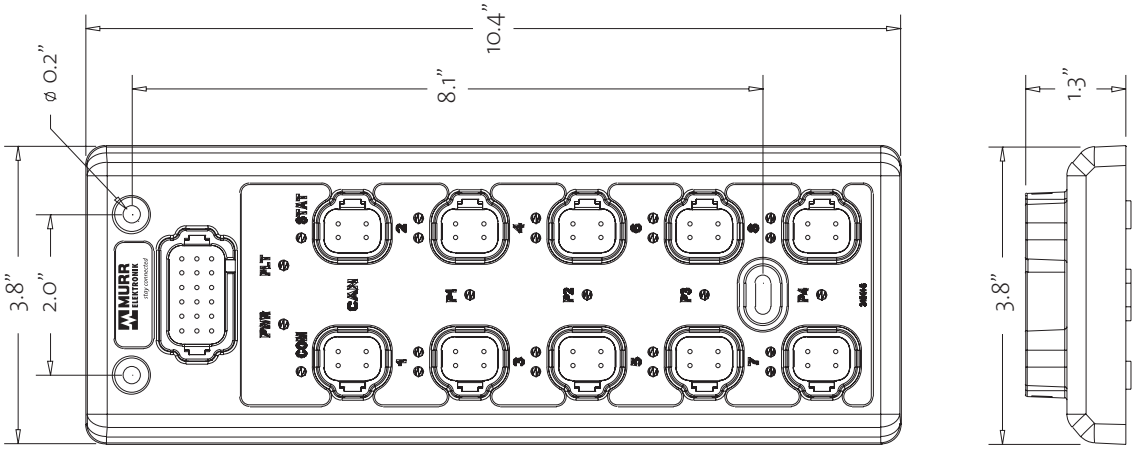
3. INSTALLATION

3.1 xtremeDB INSTALLATION

The xtremeDB blocks can be mounted directly on an installation panel or on a machine. The module features three mounting holes for this purpose. It must be assured that the mounting surface is smooth and flat to prevent mechanical stress in the module housing.

Proper installation and operation of the xtremeDB blocks requires the use of all ground connections. This includes Ground (A) for module power and Ground (B) for port power on the 18 pin configuration and power plug.





ATTENTION!
Modules must be mounted a minimum of 3mm from each other.

4. MODULE OVERVIEW

Configuration & Power Plug

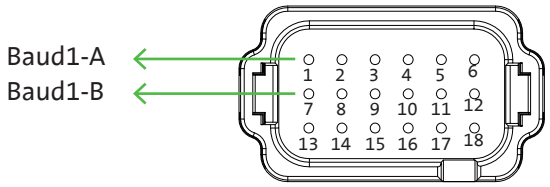
CAN Ports, Non-Isolated

16 Outputs

4.1 CONFIGURING THE BAUD RATE

Configuration of the baud rate is done using pins 1 & 7 of the Power and Configuration plug shown below. Currently there are 2 baud rates supported, 250kb and 500kb. If you are connecting to a 250kb network no jumpers are required. If connecting to a 500kb network, jumper pin 1 to pin 7.

Configuration & Power Plug



Baud Rate
No Jumper = 250kb
Baud1-A to Baud1-B = 500kb

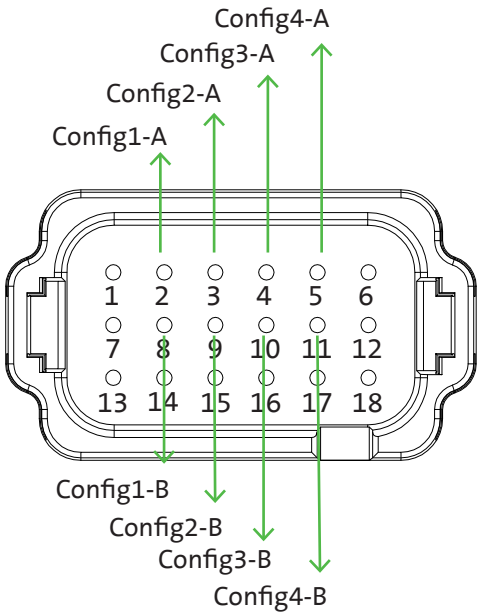
Please note that all devices on the same J1939 network must have the same baud rate

All unused pins need to be plugged with a DEUTSCH #114017 sealing plug to maintain the IP67 rating

A power cycle is required to "set" the baud rate

4.2 CONFIGURING THE NODE ID

The Node Source Address (SA) is configured by jumpering the matching Config-A to Config-B. The Node SA starts with a base address of **224** (0xE0h) with no jumpers installed. The offset is configured with the use of Binary Coded Decimal (BCD). A power cycle is required when changing the Node SA. If a duplicate source address is on the network on a power up our module will stay in address arbitration mode and will not function.



Node SA Offset (0-15) in BCD

Config1-A (pin 2) to Config1-B (pin 8) = 1's
Config2-A (pin 3) to Config2-B (pin 9) = 2's
Config3-A (pin 4) to Config3-B (pin 10) = 4's
Config4-A (pin 5) to Config4-B (pin 11) = 8's

Offset	1's	2's	4's	8's	Source Address	
0	0	0	0	0	**(0xE0h)**	224
1	1	0	0	0	**(0xE1h)**	225
2	0	1	0	0	**(0xE2h)**	226
3	1	1	0	0	**(0xE3h)**	227
4	0	0	1	0	**(0xE4h)**	228
5	1	0	1	0	**(0xE5h)**	229
6	0	1	1	0	**(0xE6h)**	230
7	1	1	1	0	**(0xE7h)**	231
8	0	0	0	1	**(0xE8h)**	232
9	1	0	0	1	**(0xE9h)**	233
10	0	1	0	1	**(0xEAh)**	234
11	1	1	0	1	**(0xEBh)**	235
12	0	0	1	1	**(0xECh)**	236
13	1	0	1	1	**(0xEDh)**	237
14	0	1	1	1	**(0xEEh)**	238
15	1	1	1	1	**(0xEFh)**	239

| EXAMPLE

Jumpers from pin 2 to pin 8 (1's) and pin 4 to pin 10 (4's) offset= 1+4=5
224 (base address) + 5 (offset) = 229)

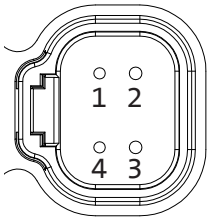
Please note that all devices on the same J1939 network must have a different Source Address

All unused pins need to be plugged with a DEUTSCH #114017 sealing plug to maintain the IP67 rating

4.3 POWERING THE MODULE

The module recieves its power from the CAN ports. The module power is limited to 13 amps and is used to power connected modules down the line. This power is also used for all input ports as well.

CAN Ports, Non-Isolated



CAN	**Power**
(J1939)	
Pin 2 = CAN High	Pin 1 = 8-32V DC
Pin 4 = CAN Low	Pin 3 = Ground (A)

The connection between CAN1 & CAN2 for the power feed is not fused (protected from short circuit current). During installation the module power wiring on CAN1 & CAN2 pin 1 should have a 10-12A fuse before the modules

Please note that module power should NOT be used to power any output devices

The network must have a 120 Ohm terminating resistor at each end

4.4 LEDs

During start up the LEDs will come on for 3-5 seconds to verify that they are working (bulb test).

PWR LED - Blue
Indicates module power is connected

COM LED - Green
Communication Status

Bus Power - Blue
P1 = Power for ports 1 & 2
P2 = Power for ports 3 & 4
P3 = Power for ports 5 & 6
P4 = Power for ports 7 & 8

FLT LED - Red
Fault Status

STAT LED - Green
Module Status

PORT I/O LED - Yellow
Left LED = Output A
Right LED = Output B

4.4.1 LED STATUS

COM LED - Green

Communication Status

ID	COM Fault Description	ON	OFF
n/a	Bootload Mode	Indicates traffic on bus	N/A
C0	Valid Communication Network	ON	
C1	Source Address (SA) Arbitration	1 Short	1 Long
C2	CANBUS Hardware Fault	2 Short	
C3	Output Control Message Missing	3 Short	
C4	DM13 Detected*	4 Short	

* See J1939-73 diagnostics, another device has requested module to stop broadcasting

FLT LED - Red

Fault Status

ID	Fault Description	ON	OFF
F0	Bootload Mode	1 Short	1 Short
F1	Output Over Current Fault	1 Short	1 Long
F2	Low Voltage Warning	2 Short	
F3	Over Voltage Warning	3 Short	
F4	Over Temperature Warning	4 Short	
F5	Spare	5 Short	
F6	Spare	6 Short	
F7	Internal Module Fault	7 Short	

Over voltage is defined as input voltage > 32V DC, low voltage is defined as < 10V DC.

STAT LED - Green

ID	Fault Description	ON	OFF
S0	Configuration Saved	ON	

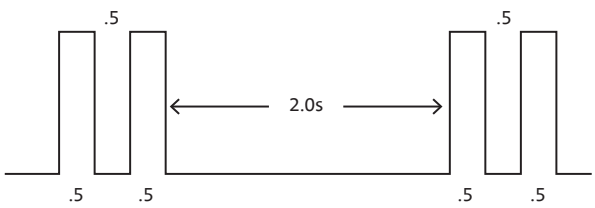
PORT I/O LED - Yellow

Left LED = Output A
Right LED = Output B

1. Steady on indicated output is on
2. Flashing indicates output is faulted

For All Tables:

Short = ON 500ms and OFF 500ms
Long = OFF defined as 2.0 s
Pulse Width is ± 50ms



Example: C2 CANBUS Hardware Fault

Bus Power

The module shall monitor Power Bus Bank current and shut off all bank outputs if the maximum current exceeds 13 amps per bus. Both short circuit and overcurrent protection is provided.

P1 = Ports 1 & 2 power, 13 amps.
P2 = Ports 3 & 4 power, 13 amps.
P3 = Ports 5 & 6 power, 13 amps.
P4 = Ports 7 & 8 power, 13 amps.

Module Power

This circuit has a separate ground that is supplied by the CAN port. Ground (A)

Output Power

This module has both 10 amp and 4 amp outputs. The outputs have both short circuit and overcurrent protection. (See Figure 1)

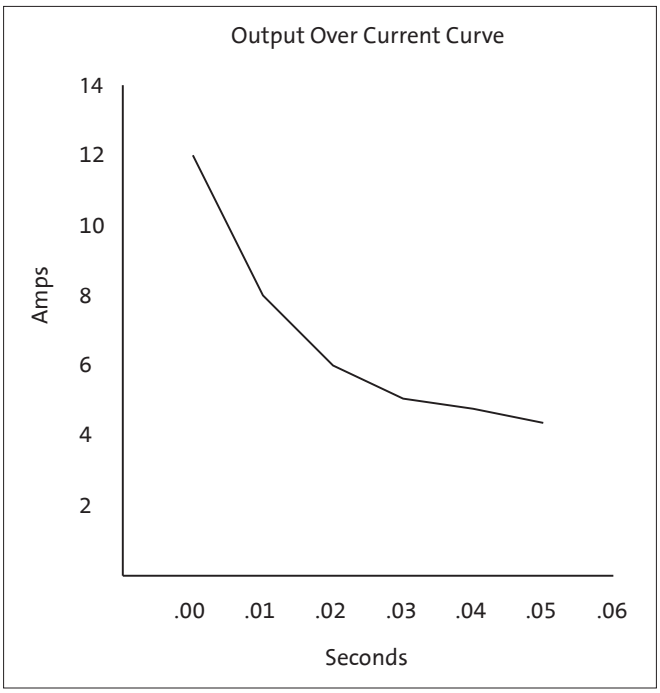
(14) 4A
(2) 10A

Resetting an output fault will require cycling of the module power unless the Controller Mode Output Reset is enabled. If the Controller Mode Output Reset is enabled the fault will be reset if the output is turned off, limit of 5 times before a cycle of module power will be required.

An output fault will not effect other outputs on the module.

Sec	Amps
.00	12
.01	8
.02	6
.03	5.3
.04	4.8
.05	4.4

Figure 1



5. MODULE CONFIGURATION

5.1 CONFIGURATION STEPS

Module default configuration:

- Factory Default Config returns 1 in Status message 1-Status 1, this should not be on if the module has been configured.
- Default operation of the module is on/off digital control. PWM control messages are not needed.
- Default configuration does not require a Command 0x52 message to enable operation.

Command 0x52h (This message needs to be sent until the message confirmation bit is set true):

Value	Name	Data Type	Byte	Bits	Description
82 (0x52h)	Command	Byte	1		Command for index pointer (which message you are sending)
	Ctrl Mode Reset	2 bit	2	1,2	Enables Controller Mode Output Reset
	Enable Status 1 Msg			3,4	Enables the constant transmission of status message 1
	Enable Status 2 Msg			5,6	Enables the constant transmission of status message 2
	Enable Amp Msg			7,8	Enables the constant transmission of amperage messages
	Not Used		3	1,2	Set 0x00b
	Save Configuration			3,4	Saves the configuration to the module (otherwise changes only valid until a power cycle occurs), set to 1 to write configuration to module
	Analog Raw Value			5,6	Sets all analog to be read in raw value as opposed to scaled (.005668/bit)
				7,8	
			4	1,2	
				3,4	
				5,6	
				7,8	
	FREQ1	Word	5		Sets the global configuration of the frequency for all channels. Low Byte FREQ1: Value in decimal (40 - 1100 Hz). Example: 0xC8h = 200d = 200 Hz.
			6		High Byte FREQ1
	MODE1	4 Bit	7	1,2,3,4	Sets the global configuration of ALL the outputs, overides 0x53h and 0x54h. 0=Mode 1 Not Used, 1=ON/OFF, 2=Data 0-4000, 3= Percent 0-100.0%(0-1000), (4= Amps (0-4000ma) Cannot be used in this mode.)
	MODE2	4 Bit		5,6,7,8	Not used, set 0
	ID1	Byte	8		User defined byte for configuration ID, this will be transimitted in the STAT message.

- Module configuration message, needed when not using module default configuration.
- All Status messages need to be turned on (set to value of 1) to be received.
- FREQ1: There needs to be a value put in this parameter or the outputs won't work.

- PWM(i) mode requires the frequency to be in the range of 100Hz to 700Hz.
- Output frequency for data or percent mode can use the range of 40Hz to 1100Hz
- The default frequency is set to 200Hz if Command 82, 0x52h, is not used"
- Mode 1: Configure all the outputs at the same time, override Command 0x53.
- Mode 2: Configure all the inputs at the same time, override Command 0x53 and 0x54.
- ID1: This is used to give a number to the node that will be transmitted back in Status Message 1-User ID. Default as 0, please note this User ID is not node ID (node address), please see "Configuring the Node ID" for setting node address.
- Save Configuration: Turn on the bits (value of 1) after configuring module, inputs and outputs, otherwise changes will only be saved until power cycle.

Command 0x53h & 54h (These messages need to be sent until the message confirmation bit is set True):
- Configure individual input and output modes if they haven't been configured in Mode 1 and Mode 2 in Command 0x52h.

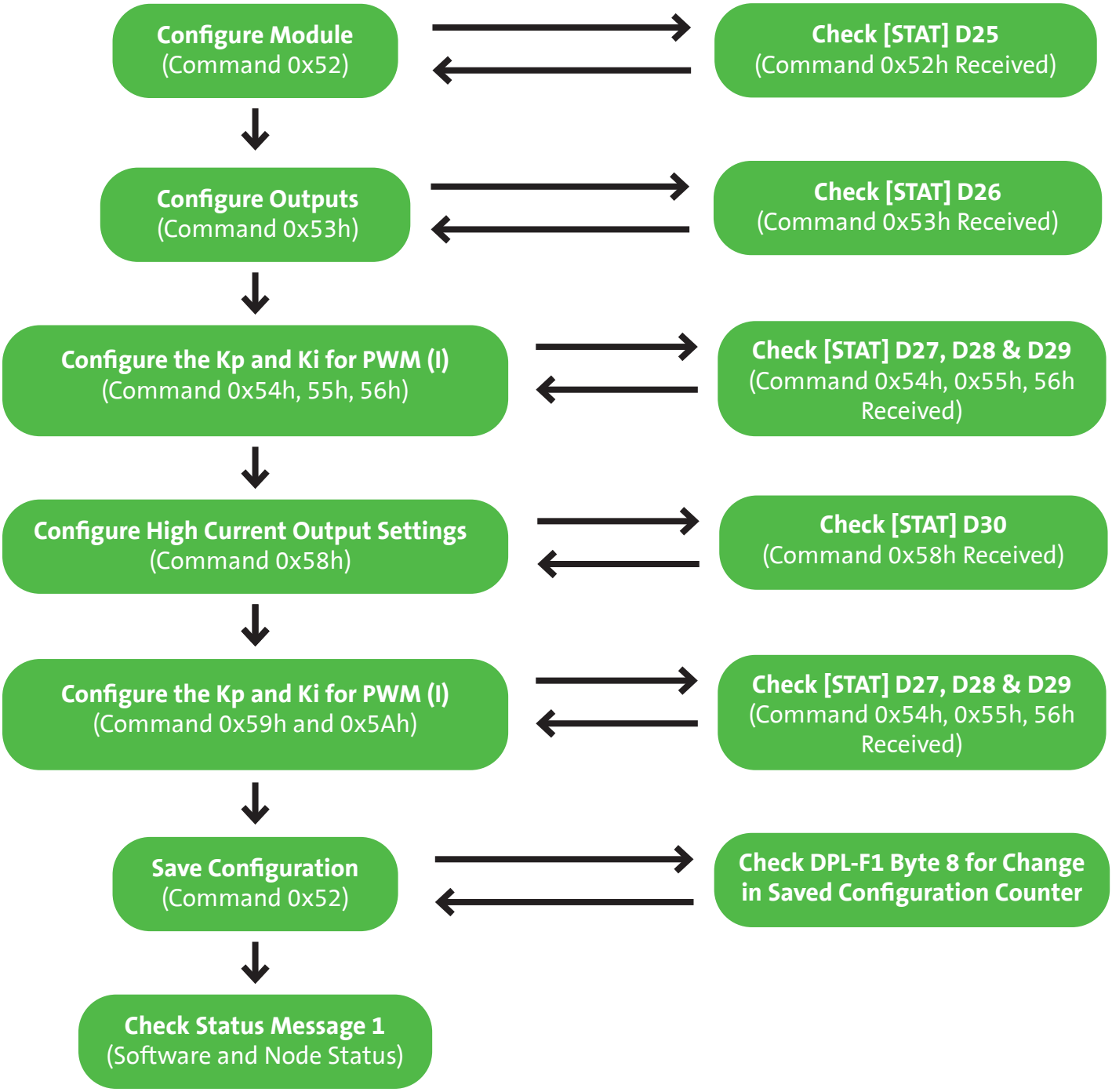
Command 0x54h, 55h, 56h, 59h, & 5Ah (These messages need to be sent until the message confirmation bit is set True):
- Configure the Kp and Ki for any PWM current controls.

Status messages - STAT PGN (EF(Controller Source Address)):
- Status 1 – Factory default configuration returns a value of 1, this should not be on if a module has been configured.
- Status 2 – Configuration Saved returns a value of 1 if the alternate configuration was on (value of 1) and saved the configuration using "Save Configuration" in Command 52.
- Status 3 – Alternate configuration, a new configuration was made to the module but hasn't been saved.
- Status 7, 9-14 – Returns a value of 1 each time a Command message 52-58 is sent, to ensure each configuration has been sent. This is on for a brief moment and then resets.

Command 0x51h (Outputs digital control and Inputs power control) and PWM control messages need to be consistently sent. Please note PGNs are changing based on Node SA, see section "PGNs USED" for details.

Configuration messages on 0x52h-0x5Ah h should only be sent until receipt is confirmed, DO NOT send continuously.

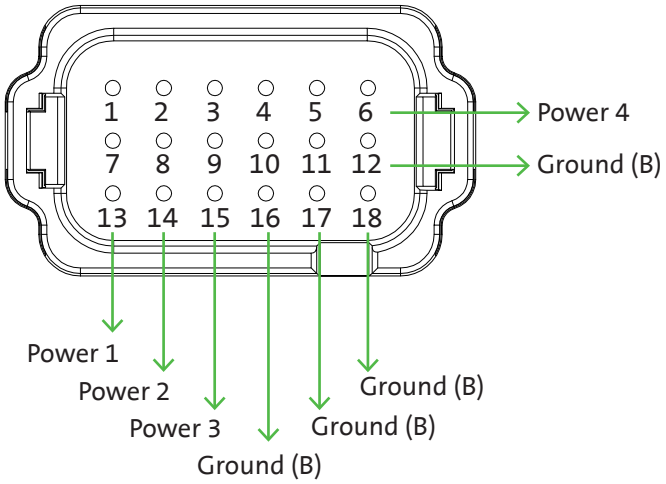
Configuration Sample Flowchart:



5.2 OUTPUT CONFIGURATION

5.2.1 POWERING THE OUTPUTS

Configuration & Power Plug



Power (Output only)
Power 1 = 13 amps for ports 1 & 2 (Outputs 1A, 1B, 2A, 2B)
Power 2 = 13 amps for ports 3 & 4 (Outputs 3A, 3B, 4A, 4B)
Power 3 = 13 amps for ports 5 & 6 (Outputs 5A, 5B, 6A, 6B)
Power 4 = 13 amps for ports 7 & 8 (Outputs 7A, 7B, 8A, 8B)

Ground (B)=
output ground, internally connected to all Ground (B) pins

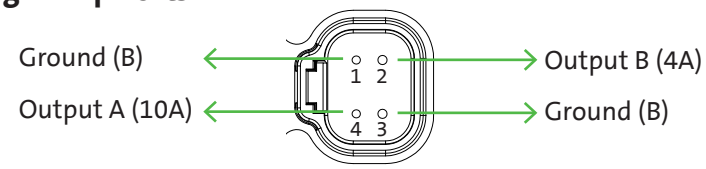
Please note that ALL module power connections need to be made in order to receive power on all output ports

All Ground (B) connections are internally connected. All connections must be made to achieve the current rating of the block

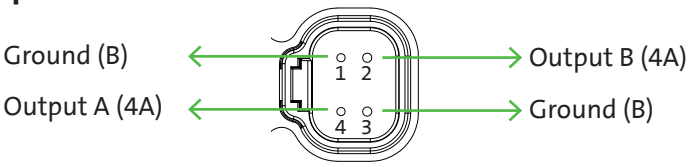
A Ground (B) connection must be made for every 13A consumed by the block

5.2.2 OUTPUT LAYOUT

High Amp Ports



Output Ports



Power
Pin 1 = Ground B
Pin 3 = Ground B

Configurations
Ports 1A, 3A (10 Amp):
- Digital high side

Ports 1B, 2, 3B, 4-8 (4 Amp):
- Digital high side
- PWM
- PWM(i) Current Controlled

Amperage
Output 1A & 3A = 10A
All other outputs = 4A

Outputs
Ports 1 & 3: 10A, 4A
Ports 2, 4-8: 4A, 4A

- Port 1, Pin 4: Output 1A
- Port 1, Pin 2: Output 1B

- Port 2, Pin 4: Output 2A
- Port 2, Pin 2: Output 2B

- Port 3, Pin 4: Output 3A
- Port 3, Pin 2: Output 3B

- Port 4, Pin 4: Output 4A
- Port 4, Pin 2: Output 4B

- Port 5, Pin 4: Output 5A
- Port 5, Pin 2: Output 5B

- Port 6, Pin 4: Output 6A
- Port 6, Pin 2: Output 6B

- Port 7, Pin 4: Output 7A
- Port 7, Pin 2: Output 7B

- Port 8, Pin 4: Output 8A
- Port 8, Pin 2: Output 8B

All Ground (B) connections must be made in order to achieve the total specified current "Chassis Grounding" is not supported

5.2.3 CONFIGURING OUTPUTS

Output Mode

There are two ways to configure the outputs. All configuration is done through the same PGN. PGN 61408 is used for multiple messages by use of a different value put into the "command" byte of the PGN. This value is used as an index or pointer as to where the information goes in the module.

A. Global Output Configuration

(only used if you want all the outputs to be configured the same)
Configuring all of the outputs is done through the "MODE1" byte in PGN 61408. The J1939 message structure,

PGN
61408 (0xEFE0) SA Offset of 0
PDU Format
239 (0xEF)
PDU Specific
224 (0xE0) SA Offset of 0
Source Address
(0x?? (CSA*))
Built Message
(0x18EFE0??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Command Value
82 (0x52)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Ctrl Mode Reset	2 bit	2	1,2	Enables Controller Mode Output Reset. Enabled (01) = cycling the output will reset the fault, if (00) power cycle required for fault reset
Enable (Status Msg 1)			3,4	Enables the constant transmission of status message 1
Enable (Status Msg 2)			5,6	Enables the constant transmission of status message 2
Enable (Amp Msg)			7,8	Enable the constant transmission of amperage message
Not Used		3	1,2	Set 0x00b
Save Configuration			3,4	Saves the configuration to the module (otherwise changes only valid until a power cycle occurs), set to 1 to write configuration to module
			5,6	
			7,8	
		4	1,2	
			3,4	
			5,6	
			7,8	
FREQ1	Word	5		Sets the global configuration of the frequency for all channels. Low Byte FREQ1: Value in decimal (40 - 1100 Hz). Example: 0xC8h = 200d = 200 Hz
		6		High Byte FREQ1
MODE1	4 bit	7		Sets the global configuration of ALL the outputs, overides 0x53h and 0x54h. 0=Mode 1 Not Used, 1=ON/OFF, 2=Data 0-4000, 3= Percent 0-100.0%(0-1000), (4= Amps (0-4000ma) Cannot be used in this mode.)
MODE2	4 bit			Sets the configuration of **ALL** the inputs. **(NOT USED ON THIS MODULE)**
ID1	Byte	8		User defined byte for configuration ID, this will be transimitted in the STAT message.

*CSA - Controller Source Address
MODE1: See 5.2.4 for description of settings.

B. Individual Configuration

Individual output configuration is done through the “output mode” nibble in PGN 61408

PGN
61408 (0xEFE0) SA Offset of 0
PDU Format
239 (0xEF)
PDU Specific
224 (0xE0) SA Offset of 0
Source Address
(0x?? (CSA*))
Built Message
(0x18EFE0??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Command Value
83 (0x53)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Mode 1A	4 bit	2	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off
Mode 1B			5,6,7,8	
Mode 2A		3	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 2B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 3A		4	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off
Mode 3B			5,6,7,8	
Mode 4A		5	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 4B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 5A		6	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 5B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 6A		7	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 6B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 7A		8	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 7B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)

MODE: See 5.2.4 for description of settings.

C. High Current Output Configuration

PGN
61408 (0xEFE0)
PDU Format
239 (0xEF)
PDU Specific
224 (0xE0)
Source Address
(0x?? (CSA*))
Built Message
(0x18EFE0??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Command Value
88 (0x58)

Name	Data Type	Byte	Bits	Description
Command	Byte	1	All	Command for index pointer
Port 1A Output 1A (0-100)		2		Set amp range 0.0-10.0A = Data Range 0-100
Port 1A Output 1B (Not Used)		3		
Port 1A Output 2A (0-100)		4		
Port 1A Output 2B (Not Used)		5		
Port 1A Output 3A (0-100)		6		Set amp range 0.0-10.0A = Data Range 0-100
Port 1A Output 3B (Not Used)		7		
Not Used		8		

5.2.4 OUTPUT OPERATION

The output operation will be different depending on the configuration chosen for the output.

A. Output Modes

Using a value of 0 - 4 will select the configuration of the output.

[MODE#X]	Output Operation	Notes
0x0h	Disabled	Not Used
0x1h	ON/OFF	ON/OFF
0x2h	Data (0 – 4000)	PWMx = 12 bits 0-4000
0x3h	Percent (0% – 100.0%)	PWMx = 12 bits 0-1000
0x4h	Amps (0A – 4.000)	PWMx = 12 bits 0-4000
0xFh	Not Used	Invalid Output Configuration

B. Disabled, MODE = 0

It is recommended to disable any outputs that aren't being used. Putting a "0" in the mode for an output disables the output and prevents it from being turned on.

C. On/Off, MODE = 1 (Used for Discrete Operation)

This puts the output into the standard discrete operation mode. The use of bit pairs in Control Message 1 of PGN 61408 will turn the output on or off.

	High Bit	Low Bit
On	0	1
Off	0	0

D. Data, MODE = 2 (Used for PWM Control using a value of 0-4000)

This puts the output into PWM control with a value of 0 - 4000 equaling 0 - 100% of the duty cycle. Two bytes are allocated for each of the PWM control messages with the first 12 bits being used for the value. The first byte and the first 4 bits of the second byte are put together for 12 bit control of the output.

Example	Second Byte				First Byte							
50%	Bit 4	Bit 3	Bit 2	Bit 1	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
2000	0	1	1	1	1	1	0	1	0	0	0	0

E. Percent, MODE = 3 (Used for PWM Control using a value of 0-1000 (= 0-100.0%))

This puts the output into PWM control with a value of 0 - 1000 equaling 0 - 100.0% of the duty cycle. Two bytes are allocated for each of the PWM control messages with the first 12 bits being used for the value. The first byte and the first 4 bits of the second byte are put together for 12 bit control of the output.

Example	Second Byte				First Byte							
50%	Bit 4	Bit 3	Bit 2	Bit 1	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
2000	0	1	1	1	1	1	0	1	0	0	0	0

F. Amps, MODE = 4 (Used for PWM (i) Control)

This puts the output into PWM(i) current control with a value of 0 - 4000 equaling 0 - 4000 mA. Two bytes are allocated for each of the PWM control messages with the first 12 bits being used for the value. The first byte and the first 4 bits of the second byte are put together for 12 bit control of the output.

Example	Second Byte				First Byte							
2000mV	Bit 4	Bit 3	Bit 2	Bit 1	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
2000	0	1	1	1	1	1	0	1	0	0	0	0

PWM (i) Commands

The PWM(i) control has more status and control commands than the standard PWM control. The module takes a setpoint for the current control and closes the loop according to the values put into the Kp and Ki. The module also sends the current reading back via a current status message. All commands and status are shown below.

A. Loop Tuning (Kp and Ki)

J1939 Output Configuration 3					
Value	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
84 (0x54)	Command	Byte	1		Command for index pointer (which message your sending)
	Mode 8A	4 bit	2	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	Mode 8B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	Port 1A Kp*	Byte	3		Port 1A proportional set point not used
	Port 1A Ki*		4		Port 1A integral set point not used
	Port 1B Kp		5		Port 1B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 1B Ki		6		Port 1B integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 2A Kp		7		Port 2A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 2A Ki		8		Port 2A integral set point (0-250 = 0-2.50, >250=0) **default 100**

*Not used on this module

J1939 Output Configuration 4					
Value	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
85 (0x55)	Command	Byte	1		Command for index pointer (which message your sending)
	Port 2B Kp		2		Port 2B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 2B Ki		3		Port 2B integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 3A Kp*		4		Port 3A proportional set point not used
	Port 3A Ki*		5		Port 3A integral set point not used
	Port 3B Kp		6		Port 3B proportional (0-250 = 0-2.50, >250=0) **default 100**
	Port 3B Ki		7		Port 3B integral (0-250 = 0-2.50, >250=0) **default 100**
	Port 4A Kp		8		Port 4A proportional set point (0-250 = 0-2.50, >250=0) **default 100**

J1939 Output Configuration 5					
Value	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
86 (0x56)	Command	Byte	1		Command for index pointer (which message your sending)
	Port 4A Ki		2		Port 4A integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 4B Kp		3		Port 4B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 4B Ki		4		Port 4B integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 5A Kp		5		Port 5A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 5A Ki		6		Port 5A integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 5B Kp		7		Port 5B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 5B Ki		8		Port 5B integral set point (0-250 = 0-2.50, >250=0) **default 100**

J1939 Output Configuration 6					
Value	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
89 (0x59)	Command	Byte	1		Command for index pointer (which message your sending)
	Port 6A Kp		2		Port 6A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 6A Ki		3		Port 6A integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 6B Kp		4		Port 6B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 6B Ki		5		Port 6B integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 7A Kp		6		Port 7A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 7A Ki		7		Port 7A integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 7B Kp		8		Port 7B proportional set point (0-250 = 0-2.50, >250=0) **default 100**

J1939 Output Configuration 7					
Value	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
90 (0x5A)	Command	Byte	1		Command for index pointer (which message your sending)
	Port 7B Ki		2		Port 7B integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 8A Kp		3		Port 8A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 8A Ki		4		Port 8A integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 8B Kp		5		Port 8B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
	Port 8B Ki		6		Port 8B integral set point (0-250 = 0-2.50, >250=0) **default 100**
	Not used		7		
	Not used		8		

Amperage Feedback

Status Message 4 (Ouput Amperage Feedback OUT 1A-4B)				
Name	**Data Type**	**Byte**	**Bits**	**Description**
Output 1A Feedback (Amps)	Byte	1		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 1B Feedback (Amps)		2		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 2A Feedback (Amps)		3		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 2B Feedback (Amps)		4		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 3A Feedback (Amps)		5		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 3B Feedback (Amps)		6		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 4A Feedback (Amps)		7		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 4B Feedback (Amps)		8		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]

Status Message 5 (Ouput Amperage Feedback OUT 5A-8B)				
Name	**Data Type**	**Byte**	**Bits**	**Description**
Output 5A Feedback (Amps)	Byte	1		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 5B Feedback (Amps)		2		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 6A Feedback (Amps)		3		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 6B Feedback (Amps)		4		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 7A Feedback (Amps)		5		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 7B Feedback (Amps)		6		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 8A Feedback (Amps)		7		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 8B Feedback (Amps)		8		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]

5.3 STATUS MESSAGES

5.3.1 MODULE STATUS

Status Message 1 (Software and Node Status)					
PGN	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
(0xEF(CSA))*	Software Version	Byte	1		Version of the current software
	Software Revision		2		Revision of the current software
	Status 1	2 Bit	3	1,2	Factory Default Configuration
	Status 2			3,4	Configuration Saved (module is configured)
	Status 3			5,6	Alternate Configuration Received
	Status 4			7,8	Node Alive
	Status 5		4	1,2	Node Fault Present
	Status 6			3,4	Fault Count not Zero
	Status 7			5,6	True when Message Command = 0x58 received
	Status 8			7,8	True when Message Command = 0x59 received
	Fault Code	Byte	5		Active fault code
	User ID		6		The User ID of the module configured in CTRL1 message
	Status 9	2 Bit	7	1,2	True when Message Command = 0x52 received
	Status 10			3,4	True when Message Command = 0x53 received
	Status 11			5,6	True when Message Command = 0x54 received
	Status 12			7,8	True when Message Command = 0x55 received
	Status 13		8	1,2	True when Message Command = 0x56 received
	Status 14			3,4	True when Message Command = 0x57 received
	Hardware Version	4 Bit		5,6,7,8	Version of the current hardware

* (0xEF(Controller Source Address))
This is the only PGN that uses the controller source address as it is a reply to the controller.

Configuration Status

- Factory Default = From the factory configuration
- Configuration Saved = Configuration other than factory has been saved
- Alternate Congifuration Received = A configuration setting has been changed and is different than the saved configuration. This will be on until the new configuration is saved to the module

Status Message 2 (Configuration and Output Status)					
PGN	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
65531 (0xFFFB)	Config Pair 1	2 Bit	1	1,2	Baud rate configuration jumper is applied
	Config Pair 2			3,4	Node ID 1's configuration jumper is applied
	Config Pair 3			5,6	Node ID 2's configuration jumper is applied
	Config Pair 4			7,8	Node ID 3's configuration jumper is applied
	Config Pair 5		2	1,2	Node ID 4's configuration jumper is applied
				3,4	
				5,6	
				7,8	
	Output 1A Status		3	1,2	Status of Output 1A, (00 = off), (01 = on), (10 = fault)
	Output 1B Status			3,4	Status of Output 1B, (00 = off), (01 = on), (10 = fault)
	Output 2A Status			5,6	Status of Output 2A, (00 = off), (01 = on), (10 = fault)
	Output 2B Status			7,8	Status of Output 2B, (00 = off), (01 = on), (10 = fault)
	Output 3A Status		4	1,2	Status of Output 3A, (00 = off), (01 = on), (10 = fault)
	Output 3B Status			3,4	Status of Output 3B, (00 = off), (01 = on), (10 = fault)
	Output 4A Status			5,6	Status of Output 4A, (00 = off), (01 = on), (10 = fault)
	Output 4B Status			7,8	Status of Output 4B, (00 = off), (01 = on), (10 = fault)
	Output 5A Status		5	1,2	Status of Output 5A, (00 = off), (01 = on), (10 = fault)
	Output 5B Status			3,4	Status of Output 5B, (00 = off), (01 = on), (10 = fault)
	Output 6A Status			5,6	Status of Output 6A, (00 = off), (01 = on), (10 = fault)
	Output 6B Status			7,8	Status of Output 6B, (00 = off), (01 = on), (10 = fault)
	Output 7A Status		6	1,2	Status of Output 7A, (00 = off), (01 = on), (10 = fault)
	Output 7B Status			3,4	Status of Output 7B, (00 = off), (01 = on), (10 = fault)
	Output 8A Status			5,6	Status of Output 8A, (00 = off), (01 = on), (10 = fault)
	Output 8B Status			7,8	Status of Output 8B, (00 = off), (01 = on), (10 = fault)
	Power Bus P1		7	1,2	Status of Power Bus P1 (00 = off), (01 = on), (10 = fault)
	Power Bus P2			3,4	Status of Power Bus P2 (00 = off), (01 = on), (10 = fault)
	Power Bus P3			5,6	Status of Power Bus P3 (00 = off), (01 = on), (10 = fault)
	Power Bus P4			7,8	Status of Power Bus P4 (00 = off), (01 = on), (10 = fault)
	Save Config Counter	Byte	8		Count of how many times the configuration has been saved to the module

Status Message 3 (Controller Information)					
PGN	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
65532 (0xFFFC)	CNFG1	Byte	1		Hardware Configuration
	CNFG2		2	All	PCB Assembly Revision
	VBAT	10 Bit	3	1, 2	Battery Voltage 100 mV per bit [0 - 360]
			4		
	TEMP	12 Bit	5	All	Module Temperature
			6		
	CNFG3	Byte	7	All	Additional Configuration
			8		Not Used

Module Temperature: Resolution: 0.1 °F/bit
Offset: -100.0 °F
Data Range: -100.0 °F to +300.0 °F [0 – 4000]
Example: 1234 = 23.4 °F

6. J1939 INFORMATION

6.1 MESSAGE STRUCTURE

All PGNs are shown as module configured with no jumpers (Offset = 0)

PGN
61408 (0xEFE0) SA Offset of 0
Source Address
(0x?? (CSA*))
PDU Format
239 (0xEF)
PDU Specific
224 (0xE0) SA Offset of 0
Built Message
(0x18EFE0??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Value
82 (0x52)

*CSA = Controller Source Address

Output Configuration 1

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message you're sending)
Ctrl Mode Reset	2 bit	2	1,2	Enables Controller Mode Output Reset. Enabled (0,1) = cycling the output will reset the fault.
Enable (Status DPLF1)			3,4	Enables the constant transmission of status message DPLF1
Enable (Status DPLF2)			5,6	Enables the constant transmission of status message DPLF2
Enable (Amp Msg)			7,8	Enable the constant transmission of amperage message
Not Used		3	1,2	Not used
Save Configuration			3,4	Saves the configuration to the module (otherwise changes only valid until a power cycle occurs), set to 1 to write configuration to module
			5,6	
			7,8	
		4	1,2	
			3,4	
			5,6	
			7,8	
FREQ1	Word	5	Low Byte	Sets the global configuration of the frequency for all channels. Low Byte FREQ1: Value in decimal (40 - 1100 Hz). Example: 0xC8h = 200d = 200 Hz
		6	High Byte	
MODE1	4 bit	7		Sets the configuration of ALL the outputs, overides Command 53 and 54. (0=Mode 1 Not Used, 1=ON/OFF, 2=Data 0-4000, 3= Percent 0-100.0%(0-1000), **4= Amps (0-4000ma) Can't be used in this mode.**
MODE2				Sets the configuration of **ALL** the inputs. **(NOT USED ON THIS MODULE)**
ID1	Byte	8		User defined byte for configuration ID, this will be transimitted in the STAT message.

Output Control - Control Message 1 (Output Control)

Command Value
81 (0x51)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message you're sending)
Output1A	2 bit	2	1,2	Turns the output on when in "On/Off" Mode, (not used when using any other mode)
Output1B			3,4	
Output2A			5,6	
Output2B			7,8	
Output3A		3	1,2	
Output3B			3,4	
Output4A			5,6	
Output4B			7,8	
Output5A		4	1,2	
Output5B			3,4	
Output6A			5,6	
Output6B			7,8	
Output7A		5	1,2	
Output7B			3,4	
Output8A			5,6	
Output8B			7,8	
	Byte	6		
		7		
		8		

Output Configuration 2

Command Value
83 (0x53)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Mode 1A	4 bit	2	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off
Mode 1B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 2A		3	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 2B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 3A		4	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off
Mode 3B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 4A		5	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 4B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 5A		6	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 5B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 6A		7	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 6B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 7A		8	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 7B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)

Output Configuration 3

Command Value
84 (0x54)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Mode 8A	4 bit	2	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Mode 8B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
Port 1A Kp (not used on this module)	Byte	3		Port 1A proportional set point not used
Port 1A Ki (not used on this module)		4		Port 1A integral set point not used
Port 1B Kp		5		Port 1B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 1B Ki		6		Port 1B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 2A Kp		7		Port 2A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 2A Ki		8		Port 2A integral set point (0-250 = 0-2.50, >250=0) **default 100**

Output Configuration 4

Command Value
85 (0x55)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Port 2B Kp		2		Port 2B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 2B Ki		3		Port 2B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 3A Kp (not used on this module)		4		Port 3A proportional set point not used
Port 3A Ki (not used on this module)		5		Port 3A integral set point not used
Port 3B Kp		6		Port 3B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 3B Ki		7		Port 3B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 4A Kp		8		Port 4A proportional set point (0-250 = 0-2.50, >250=0) **default 100**

Output Configuration 5

Command Value
86 (0x56)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Port 4A Ki		2		Port 4A integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 4B Kp		3		Port 4B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 4B Ki		4		Port 4B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 5A Kp		5		Port 5A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 5A Ki		6		Port 5A integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 5B Kp		7		Port 5B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 5B Ki		8		Port 5B integral set point (0-250 = 0-2.50, >250=0) **default 100**

Output Configuration 6

Command Value
88 (0x58)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer
Port 1 Output 1A (0-100)		2	All	Set amp range 0.0-10.0A = Data Range 0-100
Port 1 Output 1B (Not Used)		3		
Port 2 Output 2A (0-100)		4		
Port 2 Output 2B (Not Used)		5		
Port 3 Output 3A (0-100)		6		Set amp range 0.0-10.0A = Data Range 0-100
Port 3 Output 3B (Not Used)		7		
Not Used		8		

Output Configuration 7

Command Value
89 (0x59)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Port 6A Kp		2		Port 6A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 6A Ki		3		Port 6A integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 6B Kp		4		Port 6B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 6B Ki		5		Port 6B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 7A Kp		6		Port 7A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 7A Ki		7		Port 7A integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 7B Kp		8		Port 7B proportional set point (0-250 = 0-2.50, >250=0) **default 100**

Output Configuration 8

Command Value
90 (0x5A)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your sending)
Port 7B Ki		2		Port 7B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 8A Kp		3		Port 8A proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 8A Ki		4		Port 8A integral set point (0-250 = 0-2.50, >250=0) **default 100**
Port 8B Kp		5		Port 8B proportional set point (0-250 = 0-2.50, >250=0) **default 100**
Port 8B Ki		6		Port 8B integral set point (0-250 = 0-2.50, >250=0) **default 100**
Not used		7		
Not used		8		

Control Message (PWM1)

PGN
65308 (0xFF1C) SA Offset of 0
PDU Format
255 (0xEF)
PDU Specific
28 (0x1C)
Source Address
(0x?? (CSA*))
Built Message
(0x12FF1C??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
3
DP
0

Name	Data Type	Byte	Bits	Description
PWM Ctrl Output 1A	12 Bit	1	All	Not used
		2	1, 2, 3, 4	
PWM Ctrl Output 1B	12 Bit	3	All	PWM Output 1B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		4	1, 2, 3, 4	
PWM Ctrl Output 2A	12 Bit	5	All	PWM Output 2A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		6	1, 2, 3, 4	
PWM Ctrl Output 2B	12 Bit	7	All	PWM Output 2B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		8	1, 2, 3, 4	

Control Message (PWM2)

PGN
65309 (0xFF1D) SA Offset of 0
PDU Format
255 (0xEF)
PDU Specific
29 (0x1D)
Source Address
(0x?? (CSA*))
Built Message
(0x18FF1D??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
3
DP
0

Name	Data Type	Byte	Bits	Description
PWM Ctrl Output 3A	12 Bit	1	All	Not used
		2	1, 2, 3, 4	
PWM Ctrl Output 3B	12 Bit	3	All	PWM Output 3B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		4	1, 2, 3, 4	
PWM Ctrl Output 4A	12 Bit	5	All	PWM Output 4A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		6	1, 2, 3, 4	
PWM Ctrl Output 4B	12 Bit	7	All	PWM Output 4B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		8	1, 2, 3, 4	

Control Message (PWM3)

PGN
65310 (0xFF1E) SA Offset of 0
PDU Format
255 (0xEF)
PDU Specific
30 (0x1E)
Source Address
(0x?? (CSA*))
Built Message
(0x26FF1E??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
3
DP
0

Name	Data Type	Byte	Bits	Description
PWM Ctrl Output 5A	12 Bit	1	All	PWM Output 5A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		2	1, 2, 3, 4	
PWM Ctrl Output 5B	12 Bit	3	All	PWM Output 5B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		4	1, 2, 3, 4	
PWM Ctrl Output 6A	12 Bit	5	All	PWM Output 6A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		6	1, 2, 3, 4	
PWM Ctrl Output 6B	12 Bit	7	All	PWM Output 6B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		8	1, 2, 3, 4	

Control Message (PWM4)

PGN
65311 (0xFF1F) SA Offset of 0
PDU Format
255 (0xEF)
PDU Specific
31 (0x1F)
Source Address
(0x?? (CSA*))
Built Message
(0x34FF1F??)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
3
DP
0

Name	Data Type	Byte	Bits	Description
PWM Ctrl Output 7A	12 Bit	1	All	PWM Output 7A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		2	1, 2, 3, 4	
PWM Ctrl Output 7B	12 Bit	3	All	PWM Output 7B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		4	1, 2, 3, 4	
PWM Ctrl Output 8A	12 Bit	5	All	PWM Output 8A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		6	1, 2, 3, 4	
PWM Ctrl Output 8B	12 Bit	7	All	PWM Output 8B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
		8	1, 2, 3, 4	

STATUS MESSAGES

Status Message STAT Proprietary A Default Response Message

PGN
(0xEF(CSA))
PDU Format
239 (0xEF)
PDU Specific
(0x??(CSA))
Source Address
224 (0xE0) SA Offset of 0
Built Message
(0x18FF??E0)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Name	Data Type	Byte	Bits	Description
Software Version	Byte	1		Version of the current software
Software Revision		2		Revision of the current software
Status 1	2 Bit	3	1,2	Factory Default Configuration
Status 2			3,4	Configuration Saved (module is configured)
Status 3			5,6	Alternate Configuration Received
Status 4			7,8	Node Alive
Status 5		4	1,2	Node Fault Present
Status 6			3,4	Fault Count not Zero
Status 7			5,6	True when Message Command = 0x58 received
Status 8			7,8	
Fault Code	Byte	5		Active fault code
User ID		6		The User ID of the module configured in CTRL1 message
Status 9	2 Bit	7	1,2	True when Message Command = 0x52 received
Status 10			3,4	True when Message Command = 0x53 received
Status 11			5,6	True when Message Command = 0x54 received
Status 12			7,8	True when Message Command = 0x55 received
Status 13		8	1,2	True when Message Command = 0x56 received
Status 14			3,4	True when Message Command = 0x57 received
Hardware Version			5,6,7,8	Version of the current hardware

Status Message DPLF1

PGN
65531 (0xFFFB)
PDU Format
255 (0xFF)
PDU Specific
251 (0xFB)
Source Address
224 (0xE0) SA Offset of 0
Built Message
(0x18FFFBE0)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Name	Data Type	Byte	Bits	Description
Config Pair 1	2 Bit	1	1,2	Baud rate configuration jumper is applied
Config Pair 2			3,4	Node ID 1's configuration jumper is applied
Config Pair 3			5,6	Node ID 2's configuration jumper is applied
Config Pair 4			7,8	Node ID 3's configuration jumper is applied
Config Pair 5		2	1,2	Node ID 4's configuration jumper is applied
			3,4	
			5,6	
			7,8	
Output 1A Status		3	1,2	Status of Output 1A, (00 = off), (01 = on), (10 = fault)
Output 1B Status			3,4	Status of Output 1B, (00 = off), (01 = on), (10 = fault)
Output 2A Status			5,6	Status of Output 2A, (00 = off), (01 = on), (10 = fault)
Output 2B Status			7,8	Status of Output 2B, (00 = off), (01 = on), (10 = fault)
Output 3A Status		4	1,2	Status of Output 3A, (00 = off), (01 = on), (10 = fault)
Output 3B Status			3,4	Status of Output 3B, (00 = off), (01 = on), (10 = fault)
Output 4A Status			5,6	Status of Output 4A, (00 = off), (01 = on), (10 = fault)
Output 4B Status			7,8	Status of Output 4B, (00 = off), (01 = on), (10 = fault)
Output 5A Status		5	1,2	Status of Output 5A, (00 = off), (01 = on), (10 = fault)
Output 5B Status			3,4	Status of Output 5B, (00 = off), (01 = on), (10 = fault)
Output 6A Status			5,6	Status of Output 6A, (00 = off), (01 = on), (10 = fault)
Output 6B Status			7,8	Status of Output 6B, (00 = off), (01 = on), (10 = fault)
Output 7A Status		6	1,2	Status of Output 7A, (00 = off), (01 = on), (10 = fault)
Output 7B Status			3,4	Status of Output 7B, (00 = off), (01 = on), (10 = fault)
Output 8A Status			5,6	Status of Output 8A, (00 = off), (01 = on), (10 = fault)
Output 8B Status			7,8	Status of Output 8B, (00 = off), (01 = on), (10 = fault)
Power Bus P1		7	1,2	Status of Power Bus P1 (00 = off), (01 = on), (10 = fault)
Power Bus P2			3,4	Status of Power Bus P2 (00 = off), (01 = on), (10 = fault)
Power Bus P3			5,6	Status of Power Bus P3 (00 = off), (01 = on), (10 = fault)
Power Bus P4			7,8	Status of Power Bus P4 (00 = off), (01 = on), (10 = fault)
Save Config Counter	Byte	8		Count of how many times the configuration has been saved to the module

Status Message DPLF2

PGN
65532 (0xFFFC)
PDU Format
255 (0xFF)
PDU Specific
252 (0xFC)
Source Address
224 (0xE0) SA Offset of 0
Built Message
(0x18FFFCE0)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Name	Data Type	Byte	Bits	Description
CNFG1	Byte	1	All	Hardware Configuration
CNFG2		2		PCB Assembly Revision
VBAT	10 Bit	3		Battery Voltage
		4	1, 2	
TEMP	12 Bit	5	All	Module Temperature
		6	1, 2, 3, 3	
CNFG3	Byte	7	All	Additional Configuration
		8		Not Used

Status Message DPLT1

PGN
65532 (0xFFF3)
PDU Format
255 (0xFF)
PDU Specific
243 (0xF3)
Source Address
224 (0xE0) SA Offset of 0
Built Message
(0x18FFF3E0)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Status Message 4 (Ouput Amperage Feedback OUT 1A-4B)				
Name	**Data Type**	**Byte**	**Bits**	**Description**
Output 1A Feedback (Amps)	Byte	1		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 1B Feedback (Amps)		2		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 2A Feedback (Amps)		3		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 2B Feedback (Amps)		4		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 3A Feedback (Amps)		5		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 3B Feedback (Amps)		6		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 4A Feedback (Amps)		7		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 4B Feedback (Amps)		8		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]

Status Message DPLT2

PGN 5
65524 (0xFFF4)
PDU Format
255 (0xFF)
PDU Specific
243 (0xF4)
Source Address
224 (0xE0) SA Offset of 0
Built Message
(0x18FFF4E0)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
6
DP
0

Status Message 5 (Ouput Amperage Feedback OUT 5A-8B)				
Name	**Data Type**	**Byte**	**Bits**	**Description**
Output 5A Feedback (Amps)	Byte	1		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 5B Feedback (Amps)		2		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 6A Feedback (Amps)		3		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 6B Feedback (Amps)		4		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 7A Feedback (Amps)		5		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 7B Feedback (Amps)		6		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 8A Feedback (Amps)		7		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]
Output 8B Feedback (Amps)		8		Amp Data Range 0.0 to 22.0 Amps [0 – 220 decimal]

6.2 PGNs USED

Depending on the Node ID selected for the module, the PGNs and source address will be different for the module. The section below shows which are used for each Node ID.

SA Offset	Control	PWM1	PWM2	PWM3	PWM4	Module Status	Output Status	Analog Status	Amp Data 1-8	Amp Data 9-16	Fault Count
0	EFE0	FF1C	FF1D	FF1E	FF1F	(EF(CSA)) (SA=E0)	FFFB (SA=E0)	FFFC (SA=E0)	FFF3 (SA=E0)	FFF4 (SA=E0)	FFE6 (SA=E0)
1	EFE1	FF20	FF21	FF22	FF23	(EF(CSA)) (SA=E1)	FFFB (SA=E1)	FFFC (SA=E1)	FFF3 (SA=E1)	FFF4 (SA=E1)	FFE6 (SA=E1)
2	EFE2	FF24	FF25	FF26	FF27	(EF(CSA)) (SA=E2)	FFFB (SA=E2)	FFFC (SA=E2)	FFF3 (SA=E2)	FFF4 (SA=E2)	FFE6 (SA=E2)
3	EFE3	FF28	FF29	FF2A	FF2B	(EF(CSA)) (SA=E3)	FFFB (SA=E3)	FFFC (SA=E3)	FFF3 (SA=E3)	FFF4 (SA=E3)	FFE6 (SA=E3)
4	EFE4	FF2C	FF2D	FF2E	FF2F	(EF(CSA)) (SA=E4)	FFFB (SA=E4)	FFFC (SA=E4)	FFF3 (SA=E4)	FFF4 (SA=E4)	FFE6 (SA=E4)
5	EFE5	FF30	FF31	FF32	FF33	(EF(CSA)) (SA=E5)	FFFB (SA=E5)	FFFC (SA=E5)	FFF3 (SA=E5)	FFF4 (SA=E5)	FFE6 (SA=E5)
6	EFE6	FF34	FF35	FF36	FF37	(EF(CSA)) (SA=E6)	FFFB (SA=E6)	FFFC (SA=E6)	FFF3 (SA=E6)	FFF4 (SA=E6)	FFE6 (SA=E6)
7	EFE7	FF38	FF39	FF3A	FF3B	(EF(CSA)) (SA=E7)	FFFB (SA=E7)	FFFC (SA=E7)	FFF3 (SA=E7)	FFF4 (SA=E7)	FFE6 (SA=E7)
8	EFE8	FF3C	FF3D	FF3E	FF3F	(EF(CSA)) (SA=E8)	FFFB (SA=E8)	FFFC (SA=E8)	FFF3 (SA=E8)	FFF4 (SA=E8)	FFE6 (SA=E8)
9	EFE9	FF40	FF41	FF42	FF43	(EF(CSA)) (SA=E9)	FFFB (SA=E9)	FFFC (SA=E9)	FFF3 (SA=E9)	FFF4 (SA=E9)	FFE6 (SA=E9)
10	EFEA	FF44	FF45	FF46	FF47	(EF(CSA)) (SA=EA)	FFFB (SA=EA)	FFFC (SA=EA)	FFF3 (SA=EA)	FFF4 (SA=EA)	FFE6 (SA=EA)
11	EFEB	FF48	FF49	FF4A	FF4B	(EF(CSA)) (SA=EB)	FFFB (SA=EB)	FFFC (SA=EB)	FFF3 (SA=EB)	FFF4 (SA=EB)	FFE6 (SA=EB)
12	EFEC	FF4C	FF4D	FF4E	FF4F	(EF(CSA)) (SA=EC)	FFFB (SA=EC)	FFFC (SA=EC)	FFF3 (SA=EC)	FFF4 (SA=EC)	FFE6 (SA=EC)
13	EFED	FF50	FF51	FF52	FF53	(EF(CSA)) (SA=ED)	FFFB (SA=ED)	FFFC (SA=ED)	FFF3 (SA=ED)	FFF4 (SA=ED)	FFE6 (SA=ED)
14	EFEE	FF54	FF55	FF56	FF57	(EF(CSA)) (SA=EE)	FFFB (SA=EE)	FFFC (SA=EE)	FFF3 (SA=EE)	FFF4 (SA=EE)	FFE6 (SA=EE)
15	EFFF	FF58	FF59	FF5A	FF5B	(EF(CSA)) (SA=EF)	FFFB (SA=EF)	FFFC (SA=EF)	FFF3 (SA=EF)	FFF4 (SA=EF)	FFE6 (SA=EF)

*SA = CSA (Controller Source Address)

7. CANopen INFORMATION

7.1 Node ID / Baud Rate

- The BAUD1 jumper selects between the default CANBUS baud rate of 250k bits/sec and the HS baud rate of 500k bits/sec
- The default baud rate is 250 kbit/sec
- The default Node ID is 1
- The CNFG1 – CNFG4 jumpers select the Node ID Offset using binary coded decimal (BCD) for Offset = +1 to +15
- Node ID = 1 + Offset (0 to 15)

ID	Configuration Description
BAUD1	0 : 250k bits/sec
	1 : 500k bits/sec
CNFG1	Node ID offset +1
CNFG2	Node ID offset +2
CNFG3	Node ID offset +4
CNFG4	Node ID offset +8

			Jumper Wire	
Offset	CNFG1 A/B	CNFG2 A/B	CNFG3 A/B	CNFG4 A/B
0				
1	X			
2		X		
3	X	X		
4			X	
5	X		X	
6		X	X	
7	X	X	X	
8				X
9	X			X
10		X		X
11	X	X		X
12			X	X
13	X		X	X
14		X	X	X
15	X	X	X	X

7.2 LED Description

The function of the LED is defined according to the CiA standard DR 303-3 V 1.4.0

7.2.1 CANopen Error LED

The CANopen error LED shall indicate the status of the CAN physical layer and errors due to missing CAN messages (sync, guard or heartbeat). The following Table provides the CANopen Error LED truth table.

ERR LED	State	Description
Off	No error	The device is in working condition
Flickering	AutoBitrate/ LSS	The auto-bitrate detection is in progress or LSS services are in progress (alternately flickering with run LED) (See NOTE.)
Blinking	Invalid configuration	General configuration error
Single Flash	Warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames)
Double Flash	Error control event	A guard event (NMT-slave or NMTmaster) or a heartbeat event (heartbeat consumer) has occurred
Triple Flash	Sync error	The sync message has not been received within the configured communication cycle period time out (see object dictionary entry 1006h)
Quadruple Flash	Event-timer error	An expected PDO has not been received before the event-timer elapsed
On	Bus off	The CAN controller is bus off

7.2.2 CANopen Run LED

The CANopen Run LED shall indicate the status of the CANopen network state machine. Whilst the device is executing a reset the CANopen Run LED shall be off. The following Table provides the CANopen Run LED truth table.

CAN Run LED	State	Description
Flickering	Auto Bitrate/LSS	The auto-bitrate detection is in progress or LSS services are in progress (alternately flickering with error LED)
Blinking	PRE-OPERATIONAL	The device is in state PRE-OPERATIONAL
Single Flash	STOPPED	The device is in state STOPPED
Double Flash		Reserved for further use
On	OPERATIONAL	The device is in state OPERATIONAL

7.2.3 LED STAT Operation

The CANopen run LED shall indicate the errors in the module.

ID	Fault Description	ON	OFF
F0	Bootload Mode	1 Short	1 Short
F1	Output Over Current Fault	1 Short	1 Long
F2	Low Voltage Warning	2 Short	1 Long
F3	Over Voltage Warning	3 Short	1 Long
F4	Over Temperature Warning	4 Short	1 Long
F5	Input Over Voltage Fault	5 Short	1 Long
F6	Spare	6 Short	1 Long
F7	Node Faults	7 Short	1 Long

Over voltage is defined as input voltage >32V DC, low voltage is defined as >10V DC

7.3 EMERGENCY MESSAGE FORMAT

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Emergency Code		Error Register	Manufacturer Specific Error Field				

Emergency Code	Description	Manufacturer Specific Error Code				
		Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0000h	Error reset or no error	0	0	0	0	0
0106h	Duplicate Node ID	NodeID	0	0	0	0
1000h	Generic error	1	0	0	0	0
2310h	Current at outputs too high (overload)	Port	Port	0	0	0
3110h	Input voltage too high	Voltage	Voltage	0	0	0
3120h	Input voltage too low	Voltage	Voltage	0	0	0
3210h	Internal voltage too high	0	0	0	0	0
4200h	Device temperature – generic	Temperature	Temperature	0	0	0
6000h	CANopen device software – generic error	Type	Location	0	0	0

7.4 COMMUNICATION SEGMENT

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
1000	Device Type	Variable		UNSIGNED32		RO	No	0x000E0191
1001	Error Register	Variable		UNSIGNED8		RO	No	0x00
1003	Pre-defined Error Field	Array	0	UNSIGNED32	Number of Errors	RW	No	0x00000000
			1	UNSIGNED32	Standard Error Field	RO	No	0x00000000
			2	UNSIGNED32	Standard Error Field_2	RO	No	0x00000000
			3	UNSIGNED32	Standard Error Field_3	RO	No	0x00000000
			4	UNSIGNED32	Standard Error Field_4	RO	No	0x00000000
			5	UNSIGNED32	Standard Error Field_5	RO	No	0x00000000
1008	Manufacturer Device Name	Variable		VISIBLE_STRING		CONST	No	34044_3_200
1009	Manufacturer Hardware Version	Variable		VISIBLE_STRING		CONST	No	34044_204
100A	Manufacturer Software Version	Variable		VISIBLE_STRING		CONST	No	0x02
1010	Store Parameter Field	Array	0	UNSIGNED32	Highest sub-index supported	RO	No	0x03
			1	UNSIGNED32	Save all Parameters	RW	No	0x00000000
			2	UNSIGNED32	Save Communication Parameters	RW	No	0x00000000
			3	UNSIGNED32	Save Application Parameters	RW	No	0x00000000
1011	Restore Default Parameters	Array	0	UNSIGNED32	Highest sub-index supported	RO	No	0x03
			1	UNSIGNED32	Restore all Default Parameters	RW	No	0x00000000
			2	UNSIGNED32	Restore Communication Default Parameters	RW	No	0x00000000
			3	UNSIGNED32	Restore Application Default Parameters	RW	No	0x00000000
1014	COB-ID EMCY	Variable		UNSIGNED32		RO	No	0x00000080
1015	Inhibit Time Emergency	Variable		UNSIGNED16		RW	No	0x0000
1017	Producer Heartbeat Time	Variable		UNSIGNED16		RW	No	0x000007D0
1018	Identity Object	Record	0	IDENTITY	number of entries	RO	No	0x04
			1	UNSIGNED32	Vendor Id	RO	No	0x000004FB
			2	UNSIGNED32	Product Code	RO	No	0x340443
			3	UNSIGNED32	Revision number	RO	No	0x00020000
			4	UNSIGNED32	Serial number	RO	No	0x00
1200	Server SDO Parameter 1	Record	0	SDO_PARAMETER	Highest sub-index supported	RO	No	0x02
			1	UNSIGNED32	COB-ID Client -> Server	RO	No	600h+NodeID
			2	UNSIGNED32	COB-ID Server -> Client	RO	No	580h+NodeID
1400	Receive PDO Communication Parameter 1	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x200+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFF
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1401	Receive PDO Communication Parameter 2	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x300+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFF
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
1402	Receive PDO Communication Parameter 3	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x400+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFF
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1403	Receive PDO Communication Parameter 4	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x500+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFF
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1404	Receive PDO Communication Parameter 5	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x220+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1600	Receive PDO Mapping Parameter 1	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x02
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x62000108
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x62000208
1601	Receive PDO Mapping Parameter 2	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x64110110
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x64110210
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x64110310
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x64110410
1602	Receive PDO Mapping Parameter 3	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x64110510
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x64110610
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x64110710
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x64110810
1603	Receive PDO Mapping Parameter 4	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x64110910
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x64110A10
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x64110B10
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x64110C10
1604	Receive PDO Mapping Parameter 5	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x64110D10
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x64110E10
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x64110F10
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x64111010

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
1804	Transmit PDO Communication Parameter 5	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x1A0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1805	Transmit PDO Communication Parameter 6	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x1C0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1806	Transmit PDO Communication Parameter 7	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x1E0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1807	Transmit PDO Communication Parameter 8	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x2A0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1808	Transmit PDO Communication Parameter 9	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x2C0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1809	Transmit PDO Communication Parameter 10	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x2E0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
180A	Transmit PDO Communication Parameter 11	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x3A0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
180B	Transmit PDO Communication Parameter 12	Record	0	PDO_COMM_PAR	Highest sub-index supported	RO	No	0x05
			1	UNSIGNED32	COB-ID	RW	No	0x3C0+NodeID
			2	UNSIGNED8	Transmission Type	RW	No	0xFE
			3	UNSIGNED16	Inhibit Time	RW	No	0x0
			4	UNSIGNED8	Compatibility Entry	RW	No	0x00
			5	UNSIGNED16	Event Timer	RW	No	0x0
1A04	Transmit PDO Mapping Parameter 5	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	4
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50000108
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50000208
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50000308
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50000408
1A05	Transmit PDO Mapping Parameter 6	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x08
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50010108
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50010208
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50010308
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50010408
			5	UNSIGNED32	Mapping Entry 5	CONST	No	0x50010508
			6	UNSIGNED32	Mapping Entry 6	CONST	No	0x50010608
			7	UNSIGNED32	Mapping Entry 7	CONST	No	0x50010708
			8	UNSIGNED32	Mapping Entry 8	CONST	No	0x50010808
1A06	Transmit PDO Mapping Parameter 7	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50020110
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50020210
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50020310
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50020410
1A07	Transmit PDO Mapping Parameter 8	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50030110
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50030210
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50030310
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50030410
1A08	Transmit PDO Mapping Parameter 9	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	4
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50030510
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50030610
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50030710
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50030810
1A09	Transmit PDO Mapping Parameter 10	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50030910
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50030A10
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50030B10
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50030C10

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
1A0A	Transmit PDO Mapping Parameter 11	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x04
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50030D10
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50030E10
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50030F10
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50031010
1A0B	Transmit PDO Mapping Parameter 12	Record	0	PDO_MAPPING	Number of mapped objects	CONST	No	0x08
			1	UNSIGNED32	Mapping Entry 1	CONST	No	0x50040108
			2	UNSIGNED32	Mapping Entry 2	CONST	No	0x50040208
			3	UNSIGNED32	Mapping Entry 3	CONST	No	0x50040308
			4	UNSIGNED32	Mapping Entry 4	CONST	No	0x50040408
			5	UNSIGNED32	Mapping Entry 5	CONST	No	0x50040508
			6	UNSIGNED32	Mapping Entry 6	CONST	No	0x50040608
			7	UNSIGNED32	Mapping Entry 7	CONST	No	0x50040708
			8	UNSIGNED32	Mapping Entry 8	CONST	No	0x50040808

7.5 MANUFACTURER SEGMENT

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
2000	Module Global Configuration	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x04
			1	UNSIGNED8	d1 - d8_Enable	RW	No	0x00
			2	UNSIGNED8	d9 - d16_Enable	RW	No	0x00
			3	UNSIGNED8	Output_Mode	RW	No	0x01
			4	UNSIGNED8	ID	RW	No	0x00
2001	Module Output Configuration	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x08
			1	UNSIGNED8	OUTMODE_1	RW	No	0x11
			2	UNSIGNED8	OUTMODE_2	RW	No	0x11
			3	UNSIGNED8	OUTMODE_3	RW	No	0x11
			4	UNSIGNED8	OUTMODE_4	RW	No	0x11
			5	UNSIGNED8	OUTMODE_5	RW	No	0x11
			6	UNSIGNED8	OUTMODE_6	RW	No	0x11
			7	UNSIGNED8	OUTMODE_7	RW	No	0x11
			8	UNSIGNED8	OUTMODE_8	RW	No	0x11

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
2002	Module PWMi PID Configuration	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x20
			1	UNSIGNED8	Port1A_Kp	RW	No	0x64
			2	UNSIGNED8	Port1A_Ki	RW	No	0x64
			3	UNSIGNED8	Port1B_Kp	RW	No	0x64
			4	UNSIGNED8	Port1B_Ki	RW	No	0x64
			5	UNSIGNED8	Port2A_Kp	RW	No	0x64
			6	UNSIGNED8	Port2A_Ki	RW	No	0x64
			7	UNSIGNED8	Port2B_Kp	RW	No	0x64
			8	UNSIGNED8	Port2B_Ki	RW	No	0x64
			9	UNSIGNED8	Port3A_Kp	RW	No	0x64
			10	UNSIGNED8	Port3A_Ki	RW	No	0x64
			11	UNSIGNED8	Port3B_Kp	RW	No	0x64
			12	UNSIGNED8	Port3B_Ki	RW	No	0x64
			13	UNSIGNED8	Port4A_Kp	RW	No	0x64
			14	UNSIGNED8	Port4A_Ki	RW	No	0x64
			15	UNSIGNED8	Port4B_Kp	RW	No	0x64
			16	UNSIGNED8	Port4B_Ki	RW	No	0x64
			17	UNSIGNED8	Port5A_Kp	RW	No	0x64
			18	UNSIGNED8	Port5A_Ki	RW	No	0x64
			19	UNSIGNED8	Port5B_Kp	RW	No	0x64
			20	UNSIGNED8	Port5B_Ki	RW	No	0x64
			21	UNSIGNED8	Port6A_Kp	RW	No	0x64
			22	UNSIGNED8	Port6A_Ki	RW	No	0x64
			23	UNSIGNED8	Port6B_Kp	RW	No	0x64
			24	UNSIGNED8	Port6B_Ki	RW	No	0x64
			25	UNSIGNED8	Port7A_Kp	RW	No	0x64
			26	UNSIGNED8	Port7A_Ki	RW	No	0x64
			27	UNSIGNED8	Port7B_Kp	RW	No	0x64
			28	UNSIGNED8	Port7B_Ki	RW	No	0x64
			29	UNSIGNED8	Port8A_Kp	RW	No	0x64
			30	UNSIGNED8	Port8A_Ki	RW	No	0x64
			31	UNSIGNED8	Port8B_Kp	RW	No	0x64
			32	UNSIGNED8	Port8B_Ki	RW	No	0x64
2004	Module 10A Limit Configuration	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x02
			1	UNSIGNED8	Port_1A	RW	No	0x64
			2	UNSIGNED8	Port_3A	RW	No	0x64
3000	Frequency	Variable		UNSIGNED16		RW	No	0x41
5000	Response Message	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x04
			1	UNSIGNED8	d1-d8	RO	Yes	0x00
			2	UNSIGNED8	d9-d16	RO	Yes	0x00
			3	UNSIGNED8	Active_Fault_Code	RO	Yes	0x00
			4	UNSIGNED8	Configuration_ID	RO	Yes	0x00

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
5001	Status Message F1	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x08
			1	UNSIGNED8	d1-d8_Message	RO	Yes	0x00
			2	UNSIGNED8	d9-d16_Message	RO	Yes	0x00
			3	UNSIGNED8	Status_Output1-2	RO	Yes	0x00
			4	UNSIGNED8	Status_Output3-4	RO	Yes	0x00
			5	UNSIGNED8	Status_Output5-6	RO	Yes	0x00
			6	UNSIGNED8	Status_Output7-8	RO	Yes	0x00
			7	UNSIGNED8	Power	RO	Yes	0x00
			8	UNSIGNED8	Save_Counter	RO	Yes	0x00
5002	Status Message F2	Array	0	UNSIGNED16	Highest sub-index supported	RW	No	0x05
			1	UNSIGNED16	VBAT	RO	Yes	0x0000
			2	UNSIGNED16	TEMP	RO	Yes	0x0000
			3	UNSIGNED16	CNFG1	RO	Yes	0x0000
			4	UNSIGNED16	CNFG2	RO	Yes	0x0000
			5	UNSIGNED16	CNFG3	RO	No	0x0000
5003	Status Message Amp	Array	0	UNSIGNED16	Highest sub-index supported	RW	No	0x10
			1	UNSIGNED16	Port_1A	RO	Yes	0x0000
			2	UNSIGNED16	Port_1B	RO	Yes	0x0000
			3	UNSIGNED16	Port_2A	RO	Yes	0x0000
			4	UNSIGNED16	Port_2B	RO	Yes	0x0000
			5	UNSIGNED16	Port_3A	RO	Yes	0x0000
			6	UNSIGNED16	Port_3B	RO	Yes	0x0000
			7	UNSIGNED16	Port_4A	RO	Yes	0x0000
			8	UNSIGNED16	Port_4B	RO	Yes	0x0000
			9	UNSIGNED16	Port_5A	RO	Yes	0x0000
			10	UNSIGNED16	Port_5B	RO	Yes	0x0000
			11	UNSIGNED16	Port_6A	RO	Yes	0x0000
			12	UNSIGNED16	Port_6B	RO	Yes	0x0000
			13	UNSIGNED16	Port_7A	RO	Yes	0x0000
			14	UNSIGNED16	Port_7B	RO	Yes	0x0000
			15	UNSIGNED16	Port_8A	RO	Yes	0x0000
			16	UNSIGNED16	Port_8B	RO	Yes	0x0000
5004	Fault Message	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x08
			1	UNSIGNED8	Counter_F1	RO	Yes	0x00
			2	UNSIGNED8	Counter_F2	RO	Yes	0x00
			3	UNSIGNED8	Counter_F3	RO	Yes	0x00
			4	UNSIGNED8	Counter_F4	RO	Yes	0x00
			5	UNSIGNED8	Counter_F5	RO	Yes	0x00
			6	UNSIGNED8	Counter_F6	RO	Yes	0x00
			7	UNSIGNED8	Counter_F7	RO	Yes	0x00
			8	UNSIGNED8	Counter_F8	RO	Yes	0x00

7.6 DEVICE PROFILE SEGMENT

Index	Name	Object Code	Sub-Index	Data Type	Description	Access	PDO Mapping	Default Value
6200	Write Output 8-Bit	Array	0	UNSIGNED8	Highest sub-index supported	RW	No	0x02
			1	UNSIGNED8	Output_1	RWW	Yes	0x00
			2	UNSIGNED8	Output_2	RWW	Yes	0x00
6411	Write Analogue Output 16-Bit	Array	0	UNSIGNED16	Highest sub-index supported	RW	No	0x10
			1	UNSIGNED16	Port_1A	RWW	Yes	0x0000
			2	UNSIGNED16	Port_1B	RWW	Yes	0x0000
			3	UNSIGNED16	Port_2A	RWW	Yes	0x0000
			4	UNSIGNED16	Port_2B	RWW	Yes	0x0000
			5	UNSIGNED16	Port_3A	RWW	Yes	0x0000
			6	UNSIGNED16	Port_3B	RWW	Yes	0x0000
			7	UNSIGNED16	Port_4A	RWW	Yes	0x0000
			8	UNSIGNED16	Port_4B	RWW	Yes	0x0000
			9	UNSIGNED16	Port_5A	RWW	Yes	0x0000
			10	UNSIGNED16	Port_5B	RWW	Yes	0x0000
			11	UNSIGNED16	Port_6A	RWW	Yes	0x0000
			12	UNSIGNED16	Port_6B	RWW	Yes	0x0000
			13	UNSIGNED16	Port_7A	RWW	Yes	0x0000
			14	UNSIGNED16	Port_7B	RWW	Yes	0x0000
			15	UNSIGNED16	Port_8A	RWW	Yes	0x0000
			16	UNSIGNED16	Port_8B	RWW	Yes	0x0000

7.7 HEARTBEAT

A Heartbeat producer cyclically transmits a Heartbeat message. By default, the heartbeat producer time is set at 2000ms. This can be changed by setting the time in object 1017h, sub-index 0.

The COB-ID that is used is 0700h + Node ID

The Hearbeat Producer gives its status, which can be any of the following values, in the first byte of the message:
00h BOOTUP
04h STOPPED
05h OPERATIONAL
7Fh PRE-OPERATIONAL

7.8 PROCESS DATA OBJECTS (PDO)

This Module uses 5 Receive PDOs and 8 Transmit PDOs. The PDO 5 to 12 are used to transmit the Status, Response and Fault messages.

By Default, TPDO 5 to 12 are not transmitted. The Transmission rate can be changed using Sub Index 5: Event Timer of the TPDO.
In case for RPDO, Sub Index 5: Event Timer can be used for Output timeout. If the Module does not receive RPDO in the set Event Time, the output will timeout and will be turned off.

7.9 RECEIVE PDO

Index	Mapped Index	Mapped Sub-Index	Object	Function	Message	COB-ID
1400	6200	1-2	RPDO1	Digital Output	Digital Output	0x200+NodeID
1401	6411	1-4	RPDO2	Analog Output	Analog Output	0x300+NodeID
1402	6411	5-8	RPDO3	Analog Output	Analog Output	0x400+NodeID
1403	6411	9-12	RPDO4	Analog Output	Analog Output	0x500+NodeID
1404	6411	13-16	RPDO5	Analog Output	Analog Output	0x220+NodeID

7.10 TRANSMIT PDO

Index	Mapped Index	Mapped Sub-Index	Object	Function	Message	COB-ID
1804	5000	1-4	TPDO5	PropA Response	Response Message	0x1A0+NodeID
1805	5001	1-8	TPDO6	Status Message	Status Message F1	0x1C0+NodeID
1806	5002	1-4	TPDO7	Status Message	Status Message F2	0x1E0+NodeID
1807	5003	1-4	TPDO8	Status Message	Status Message Amp Data	0x2A0+NodeID
1808	5003	5-8	TPDO9	Status Message	Status Message Amp Data	0x2C0+NodeID
1809	5003	9-12	TPDO10	Status Message	Status Message Amp Data	0x2E0+NodeID
180A	5003	13-16	TPDO11	Status Message	Status Message Amp Data	0x3A0+NodeID
180B	5004	1-8	TPDO12	Fault Message	Fault Message	0x3C0+NodeID

7.11 STORE/RESTORE PARAMETERS

User can store and load application settings by writing the value 0x65766173 to object index 1010h and also restore the factory default values by writing the value 0x64616F6C to the object index 1011h. The table below lists the objects which will be stored.

Index	Sub-Index	Name	Default Value
1015	0	Inhibit Time Emergency	0x00
1017	0	Producer Heartbeat Time	0x7D0
1400	5	Event Timer	0x00
1401	5	Event Timer	0x00
1402	5	Event Timer	0x00
1403	5	Event Timer	0x00
1404	5	Event Timer	0x00

Index	Sub-Index	Name	Default Value
1804	5	Event Timer	0x00
1805	5	Event Timer	0x00
1806	5	Event Timer	0x00
1807	5	Event Timer	0x00
1808	5	Event Timer	0x00
1809	5	Event Timer	0x00
180A	5	Event Timer	0x00
180B	6	Event Timer	0x00

Index	Sub-Index	Name	Default Value
2000	1	d1 - d8_Enable	0x00
	2	d9 - d16_Enable	0x00
	3	Output_Mode	0x01
	5	ID	0x00
2001	1	OUTMODE_1	0x11
	2	OUTMODE_2	0x11
	3	OUTMODE_3	0x11
	4	OUTMODE_4	0x11
	5	OUTMODE_5	0x11
	6	OUTMODE_6	0x11
	7	OUTMODE_7	0x11
	8	OUTMODE_8	0x11
2002	1	Port1A_Kp	0x64
	2	Port1A_Ki	0x64
	3	Port1B_Kp	0x64
	4	Port1B_Ki	0x64
	5	Port2A_Kp	0x64
	6	Port2A_Ki	0x64
	7	Port2B_Kp	0x64
	8	Port2B_Ki	0x64
	9	Port3A_Kp	0x64
	10	Port3A_Ki	0x64
	11	Port3B_Kp	0x64
	12	Port3B_Ki	0x64
	13	Port4A_Kp	0x64
	14	Port4A_Ki	0x64
	15	Port4B_Kp	0x64
	16	Port4B_Ki	0x64
	17	Port5A_Kp	0x64
	18	Port5A_Ki	0x64
	19	Port5B_Kp	0x64
	20	Port5B_Ki	0x64
	21	Port6A_Kp	0x64
	22	Port6A_Ki	0x64
	23	Port6B_Kp	0x64
	24	Port6B_Ki	0x64
	25	Port7A_Kp	0x64
	26	Port7A_Ki	0x64
	27	Port7B_Kp	0x64
	28	Port7B_Ki	0x64
	29	Port8A_Kp	0x64
	30	Port8A_Ki	0x64
	31	Port8B_Kp	0x64
	32	Port8B_Ki	0x64

Index	Sub-Index	Name	Default Value
2004	1	Port_1A	0x64
	2	Port_3A	0x64
3000	1	Frequency	0x41

7.12 MODULE GLOBAL CONFIGURATION

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
2000	1	Ctrl Mode Reset	2 bit	1	1,2	Enables Controller Mode Output Reset
					3,4	
					5,6	
					7,8	
	2	Enable 24 vdc		2	1,2	Enables the low and over voltage fault limits for 24V DC system
		Analog raw value			3,4	Sets all analog to be read in raw value as opposed to scaled (.005668/bit)
					5,6	
					7,8	
	3	Output Mode	Byte	3		Sets the global configuration of ALL the outputs, overrides Index 2001. 0=Mode 1 Not Used, 1=ON/OFF, 2=Data 0-4000, 3= Percent 0-100.0%(0-1000), (4= Amps (0-4000ma) Cannot be used in this mode.)
	4	ID1	Byte	4		User defined byte for configuration ID, this will be transimitted in the STAT message.

Digital Control / Status Bit Pairs	
00	OFF / FALSE
01	ON / TRUE
10	NOT USED
11	NOT USED

7.13 MODULE OUTPUT CONFIGURATION

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
2001	1	Mode 1A	4 bit	1	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off
		Mode 1B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	2	Mode 2A		2	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
		Mode 2B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	3	Mode 3A		3	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off
		Mode 3B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	4	Mode 4A		4	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
		Mode 4B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	5	Mode 5A		5	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
		Mode 5B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	6	Mode 6A		6	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
		Mode 6B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	7	Mode 7A		7	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
		Mode 7B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
	8	Mode 8A		8	1,2,3,4	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)
		Mode 8B			5,6,7,8	Mode 0x0=disabled, 0x1=On/Off, 0x2=Data(0-4000), 0x3=Percent(0-1000 = 0-100.0%), 0x4=Amps(0-4000 = 0-4.000 amps)

OUTMODE#	Output Operation	Notes
0x0h	Disabled	
0x1h	Digital ON/OFF	
0x2h	Data (0 – 4000)	PWMx = 12 bits 0-4000, >4000=0
0x3h	Percent (0% – 100.0%)	PWMx = 12 bits 0-1000, >1000=0
0x4h	Amps (0.100A – 4.000)	PWMx = 12 bits 100-4000, >4000=0
0xFh	Not Used	Invalid Output Configuration

Note: The Global Output Configuration must be zero for individual configuration.

7.14 MODULE PWMi PID CONFIGURATION

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
2002	1	Port1A_Kp	Byte	1		Port 1A proportional set point (0-250 = 0-2.50, >250=0) default 100 (Not Used)
	2	Port1A_Ki				Port 1A integral set point (0-250 = 0-2.50, >250=0) default 100 (Not Used)
	3	Port1B_Kp		2		Port 1B proportional set point (0-250 = 0-2.50, >250=0) default 100
	4	Port1B_Ki				Port 1B integral set point (0-250 = 0-2.50, >250=0) default 100
	5	Port2A_Kp		3		Port 2A proportional set point (0-250 = 0-2.50, >250=0) default 100
	6	Port2A_Ki				Port 2A integral set point (0-250 = 0-2.50, >250=0) default 100
	7	Port2B_Kp		4		Port 2B proportional set point (0-250 = 0-2.50, >250=0) default 100
	8	Port2B_Ki				Port 2B integral set point (0-250 = 0-2.50, >250=0) default 100
	9	Port3A_Kp		5		Port 3A proportional set point (0-250 = 0-2.50, >250=0) default 100 (Not Used)
	10	Port3A_Ki				Port 3A integral set point (0-250 = 0-2.50, >250=0) default 100 (Not Used)
	11	Port3B_Kp		6		Port 3B proportional set point (0-250 = 0-2.50, >250=0) default 100
	12	Port3B_Ki				Port 3B integral set point (0-250 = 0-2.50, >250=0) default 100
	13	Port4A_Kp		7		Port 4A proportional set point (0-250 = 0-2.50, >250=0) default 100
	14	Port4A_Ki				Port 4A integral set point (0-250 = 0-2.50, >250=0) default 100
	15	Port4B_Kp		8		Port 4B proportional set point (0-250 = 0-2.50, >250=0) default 100
	16	Port4B_Ki				Port 4B integral set point (0-250 = 0-2.50, >250=0) default 100
	17	Port5A_Kp		9		Port 5A proportional set point (0-250 = 0-2.50, >250=0) default 100
	18	Port5A_Ki				Port 5A integral set point (0-250 = 0-2.50, >250=0) default 100
	19	Port5B_Kp		10		Port 5B proportional set point (0-250 = 0-2.50, >250=0) default 100
	20	Port5B_Ki				Port 5B integral set point (0-250 = 0-2.50, >250=0) default 100
	21	Port6A_Kp		11		Port 6A proportional set point (0-250 = 0-2.50, >250=0) default 100
	22	Port6A_Ki				Port 6A integral set point (0-250 = 0-2.50, >250=0) default 100
	23	Port6B_Kp		12		Port 6B proportional set point (0-250 = 0-2.50, >250=0) default 100
	24	Port6B_Ki				Port 6B integral set point (0-250 = 0-2.50, >250=0) default 100
	25	Port7A_Kp		13		Port 7A proportional set point (0-250 = 0-2.50, >250=0) default 100
	26	Port7A_Ki				Port 7A integral set point (0-250 = 0-2.50, >250=0) default 100
	27	Port7B_Kp		14		Port 7B proportional set point (0-250 = 0-2.50, >250=0) default 100
	28	Port7B_Ki				Port 7B integral set point (0-250 = 0-2.50, >250=0) default 100
	29	Port8A_Kp		15		Port 8A proportional set point (0-250 = 0-2.50, >250=0) default 100
	30	Port8A_Ki				Port 8A integral set point (0-250 = 0-2.50, >250=0) default 100
	31	Port8B_Kp		16		Port 8B proportional set point (0-250 = 0-2.50, >250=0) default 100
	32	Port8B_Ki				Port 8B integral set point (0-250 = 0-2.50, >250=0) default 100

7.15 MODULE 10A LIMIT CONFIGURATION

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
2004	1	Port_1A	Byte	1		Set amp range 0.0-10.0A = Data Range 0-100
	2	Port_3A		2		Set amp range 0.0-10.0A = Data Range 0-100

7.16 FREQUENCY

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
3000	-	Frequency	Word	1		Sets the configuration of the frequency for all channels (30-1140 Hz)
				2		

7.17 RESPONSE MESSAGE

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5000	1	Status 1	2 Bit	1	1,2	Factory Default Configuration
		Status 2			3,4	Configuration Saved (module is configured)
		Status 3			5,6	Alternate Configuration Received
		Status 4			7,8	Node Alive
	2	Status 5		2	1,2	Node Fault Present
		Status 6			3,4	Fault Count not Zero
		Status 7			5,6	Not used, will see (11b)
		Status 8			7,8	
	3	Fault Code	Byte	3		Active fault code
	4	User ID		4		The User ID of the module configured in Index 2000

7.18 STATUS MESSAGE F1

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5001	1	Config Pair 1	2 bit	1	1,2	Baud rate configuration jumper is applied
		Config Pair 2			3,4	Node ID 1's configuration jumper is applied
		Config Pair 3			5,6	Node ID 2's configuration jumper is applied
		Config Pair 4			7,8	Node ID 3's configuration jumper is applied
	2	Config Pair 5		2	1,2	Node ID 4's configuration jumper is applied
					3,4	
					5,6	
					7,8	
	3	Output 1A Status		3	1,2	Status of Output 1A, (00 = off), (01 = on), (10 = fault)
		Output 1B Status			3,4	Status of Output 1B, (00 = off), (01 = on), (10 = fault)
		Output 2A Status			5,6	Status of Output 2A, (00 = off), (01 = on), (10 = fault)
		Output 2B Status			7,8	Status of Output 2B, (00 = off), (01 = on), (10 = fault)
	4	Output 3A Status		4	1,2	Status of Output 3A, (00 = off), (01 = on), (10 = fault)
		Output 3B Status			3,4	Status of Output 3B, (00 = off), (01 = on), (10 = fault)
		Output 4A Status			5,6	Status of Output 4A, (00 = off), (01 = on), (10 = fault)
		Output 4B Status			7,8	Status of Output 4B, (00 = off), (01 = on), (10 = fault)
	5	Output 5A Status		5	1,2	Status of Output 5A, (00 = off), (01 = on), (10 = fault)
		Output 5B Status			3,4	Status of Output 5B, (00 = off), (01 = on), (10 = fault)
		Output 6A Status			5,6	Status of Output 6A, (00 = off), (01 = on), (10 = fault)
		Output 6B Status			7,8	Status of Output 6B, (00 = off), (01 = on), (10 = fault)

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5001	6	Output 7A Status	2 Bit	6	1,2	Status of Output 7A, (00 = off), (01 = on), (10 = fault)
		Output 7B Status			3,4	Status of Output 7B, (00 = off), (01 = on), (10 = fault)
		Output 8A Status			5,6	Status of Output 8A, (00 = off), (01 = on), (10 = fault)
		Output 8B Status			7,8	Status of Output 8B, (00 = off), (01 = on), (10 = fault)
	7	Power Bus P1		7	1,2	Status of Power Bus P1 (00 = off), (01 = on), (10 = fault)
		Power Bus P2			3,4	Status of Power Bus P2 (00 = off), (01 = on), (10 = fault)
		Power Bus P3			5,6	Status of Power Bus P3 (00 = off), (01 = on), (10 = fault)
		Power Bus P4			7,8	Status of Power Bus P4 (00 = off), (01 = on), (10 = fault)
	8	Save Config Counter	Byte	8		Count of how many times the configuration has been saved to the module

7.19 STATUS MESSAGE F2

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5002	1	VBAT	10 Bit	1	All	Battery Voltage
				2	1,2	
	2	TEMP	12 Bit	3	All	Module Temperature
				4	1, 2, 3, 4	
	3	CNFG1	Word	5		Hardware Configuration
				6		
	4	CNFG2		7		PCB Assembly Revision
				8		
	5	CNFG3		9		Additional Configuration
				10		

7.20 STATUS MESSAGE AMP DATA

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5003	1	PORT 1A AMP FEEDBACK	Word	1		Current reading on Port 1A, 0-4,000 = 0-4000 mA
				2		
	2	PORT 1B AMP FEEDBACK		3		Current reading on Port 1B, 0-4,000 = 0-4000 mA
				4		
	3	PORT 2A AMP FEEDBACK		5		Current reading on Port 2A, 0-4,000 = 0-4000 mA
				6		
	4	PORT 2B AMP FEEDBACK		7		Current reading on Port 2B, 0-4,000 = 0-4000 mA
				8		
	5	PORT 3A AMP FEEDBACK		9		Current reading on Port 3A, 0-4,000 = 0-4000 mA
				10		
	6	PORT 3B AMP FEEDBACK		11		Current reading on Port 3B, 0-4,000 = 0-4000 mA
				12		
	7	PORT 4A AMP FEEDBACK		13		Current reading on Port 4A, 0-4,000 = 0-4000 mA
				14		
	8	PORT 4B AMP FEEDBACK		15		Current reading on Port 4B, 0-4,000 = 0-4000 mA
				16		
	9	PORT 5A AMP FEEDBACK		17		Current reading on Port 5A, 0-4,000 = 0-4000 mA
				18		

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5003	10	PORT 5B AMP FEEDBACK	Word	19		Current reading on Port 5B, 0-4,000 = 0-4000 mA
				20		
	11	PORT 6A AMP FEEDBACK		21		Current reading on Port 6A, 0-4,000 = 0-4000 mA
				22		
	12	PORT 6B AMP FEEDBACK		23		Current reading on Port 6B, 0-4,000 = 0-4000 mA
				24		
	13	PORT 7A AMP FEEDBACK		25		Current reading on Port 7A, 0-4,000 = 0-4000 mA
				26		
	14	PORT 7B AMP FEEDBACK		27		Current reading on Port 7B, 0-4,000 = 0-4000 mA
				28		
	15	PORT 8A AMP FEEDBACK		29		Current reading on Port 8A, 0-4,000 = 0-4000 mA
				30		
	16	PORT 8B AMP FEEDBACK		31		Current reading on Port 8B, 0-4,000 = 0-4000 mA
				32		

7.21 FAULT MESSAGE

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
5004	1	Counter_F1	Byte	1		Fault Counter F1
	2	Counter_F2		2		Fault Counter F2
	3	Counter_F3		3		Fault Counter F3
	4	Counter_F4		4		Fault Counter F4
	5	Counter_F5		5		Fault Counter F5
	6	Counter_F6		6		Fault Counter F6
	7	Counter_F7		7		Fault Counter F7
	8	Counter_F8		8		Fault Counter F8

7.22 WRITE OUTPUTS 8-BIT

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
6200	1	Output1A	1 bit	1	1	Turns the output on when in “On/Off” Mode (not used when using any other mode)
		Output1B			2	
		Output2A			3	
		Output2B			4	
		Output3A			5	
		Output3B			6	
		Output4A			7	
		Output4B			8	
	2	Output5A		2	1	
		Output5B			2	
		Output6A			3	
		Output6B			4	
		Output7A			5	
		Output7B			6	
		Output8A			7	
		Output8B			8	

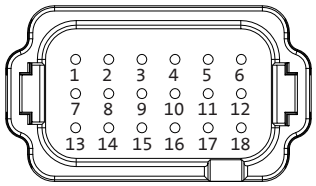
7.23 WRITE ANALOG OUTPUT 16-BIT

Index	Sub-Index	Name	Data Type	Byte	Bits	Description
6411	1	PWM Ctrl Port 1A	12 bit	1	All	Not used
				2	1, 2, 3, 4	
	2	PWM Ctrl Port 1B		3	All	PWM Output 1B, (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				4	1, 2, 3, 4	
	3	PWM Ctrl Port 2A		5	All	PWM Output 2A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				6	1, 2, 3, 4	
	4	PWM Ctrl Port 2B		7	All	PWM Output 2B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				8	1, 2, 3, 4	
	5	PWM Ctrl Port 3A		9	All	Not used
				10	1, 2, 3, 4	
	6	PWM Ctrl Port 3B		11	All	PWM Output 3B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				12	1, 2, 3, 4	
	7	PWM Ctrl Port 4A		13	All	PWM Output 4A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				14	1, 2, 3, 4	
	8	PWM Ctrl Port 4B		15	All	PWM Output 4B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				16	1, 2, 3, 4	
	9	PWM Ctrl Port 5A		17	All	PWM Output 5A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				18	1, 2, 3, 4	
	10	PWM Ctrl Port 5B		19	All	PWM Output 5B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				20	1, 2, 3, 4	
	11	PWM Ctrl Port 6A		21	All	PWM Output 6A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				22	1, 2, 3, 4	
	12	PWM Ctrl Port 6B		23	All	PWM Output 6B (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				24	1, 2, 3, 4	
	13	PWM Ctrl Port 5A		25	All	PWM Output 7A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				26	1, 2, 3, 4	
	14	PWM Ctrl Port 7B		27	All	PWM Output 7A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				28	1, 2, 3, 4	
	15	PWM Ctrl Port 8A		29	All	PWM Output 8A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				30	1, 2, 3, 4	
	16	PWM Ctrl Port 8B		31	All	PWM Output 8A (12 bit, uses the 1st byte and the first 4 bits of the 2nd byte)
				32	1, 2, 3, 4	

8. DATA SHEET

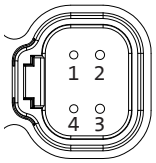
8.1 PORT CONFIGURATION

Configuration & Power Plug



See next page for pinout guide

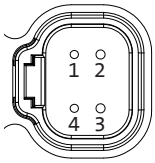
CAN Ports 1 & 2 Non-Isolated



CAN
(J1939)
Pin 2 = CAN High
Pin 4 = CAN Low

Power
(Module & Input-13A)
Pin 1 = 8-32V DC
Pin 3 = Ground (A)

Output Ports



Power
Pin 1 = Ground B
Pin 3 = Ground B

Configurations
Ports 1A, 3A (10 Amp):
- Digital high side

Ports 1B, 2, 3B, 4-8 (4 Amp):
- Digital high side
- PWM
- PWM(i) Current Controlled

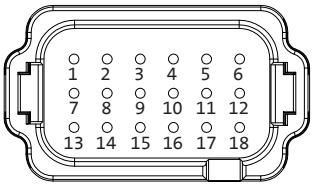
Amperage
Output 1A & 3A = 10A
All other outputs = 4A

Outputs
Ports 1 & 3: 10A, 4A
Ports 2, 4-8: 4A, 4A

- Port 1, Pin 4: Output 1A
- Port 1, Pin 2: Output 1B
- Port 2, Pin 4: Output 2A
- Port 2, Pin 2: Output 2B
- Port 3, Pin 4: Output 3A
- Port 3, Pin 2: Output 3B
- Port 4, Pin 4: Output 4A
- Port 4, Pin 2: Output 4B
- Port 5, Pin 4: Output 5A
- Port 5, Pin 2: Output 5B
- Port 6, Pin 4: Output 6A
- Port 6, Pin 2: Output 6B
- Port 7, Pin 4: Output 7A
- Port 7, Pin 2: Output 7B
- Port 8, Pin 4: Output 8A
- Port 8, Pin 2: Output 8B

Configuration & Power Plug Pinouts

Jumper from A to B to configure



Baud Rate
No Jumper = 250kb
1. Baud1-A
7. Baud1-B
Baud1-A to Baud1-B = 500kb

Node ID (0-15)
2. Config1-A
8. Config1-B
= 1s

3. Config2-A
9. Config2-B
= 2s

4. Config3-A
10. Config3-B
= 4s

5. Config4-A
11. Config4-B
= 8s

Power (Output Only)
13. Power 1 = 13A for ports 1 & 2 (Outputs 1A, 1B, 2A, 2B)
14. Power 2 = 13A for ports 3 & 4 (Outputs 3A, 3B, 4A, 4B)
15. Power 3 = 13A for ports 5 & 6 (Outputs 5A, 5B, 6A, 6B)
6. Power 4 = 13A for ports 7 & 8 (Outputs 7A, 7B, 8A, 8B)

16. Ground 1B = for ports 1 & 2 (Outputs 1A, 1B, 2A, 2B)
17. Ground 2B = for ports 3 & 4 (Outputs 3A, 3B, 4A, 4B)
18. Ground 3B = for ports 5 & 6 (Outputs 5A, 5B, 6A, 6B)
12. Ground 4B = for ports 7 & 8 (Outputs 7A, 7B, 8A, 8B)

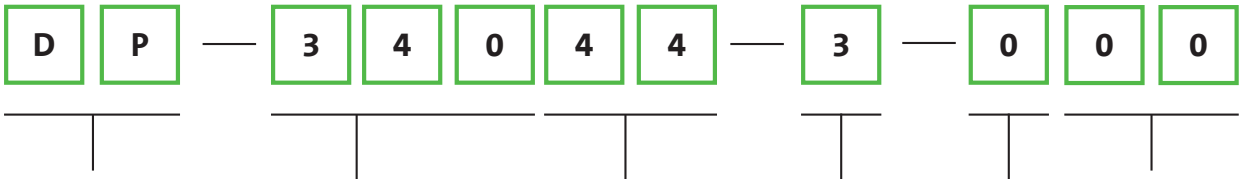
8.2 TECHNICAL DATA

Art. No. / Description	DP-34044-3 / Output Block w/PWM (I)
Dimension	3.802" (97.03mm) x 10.427" (264.85mm)
Installation	(3) M5 x 1 screws
Communication	2 non-isolated J1939 ports (250kb and 500kb)
Voltage Range	8...32V DC
Operating/Storage Temp	-40 to 85°C/-45 to 85°C
Protection	IP67
# of Ports	8
Total # of I/O	16
Total # of Outputs	16
# of Configurable Outputs	12
# of Paired Outputs	12
Output Configurations	Digital (+), PWM, PWM(i)
Output Diagnostics	Short Circuit and Overcurrent
Total Output Current	52A
J1939 Port	1=+V DC (Module Pwr), 2=CANH, 3=Ground A, 4=CANL
SA ID Offset	0-15
Baud Rate	250 Kbits/s, 500 Kbits/s
LEDs	5 Blue PWR, 1 Green CAN, 1 Green STAT, 1 Red FLT, 16 Yellow Status
Ports 1-8	1=Ground B, 2=OUT B, 3=Ground B, 4=OUT A

Characteristics of the Inputs / Outputs		
Outputs	Digital Output	
Port 1: 1B, 1A	Output Voltage	8...32V DC
Port 2: 2B, 2A	Switching Current	4A, 10A (1A, 3A)
Port 3: 3B, 3A		
Port 4: 4B, 4A	PWM & PWM(i) Output	
Port 5: 5B, 5A	PWM Frequency	40-1100 Hz
Port 6: 6B, 6A	PWM(i) Frequency	100-700 Hz
Port 7: 7B, 7A	Switching Current	4A
Port 8: 8B, 8A		

Port DEUTSCH Plugs Needed	
Power Port	DT16-18SA-K004
CAN & I/O Port	DT06-4S
Wedgelock DT Series 4-pin Socket	W4S
Size 16, Solid Socket, 16 - 20 AWG	0462-201-16141
Size 16, Solid Socket, 14 AWG	0462-209-16141
Size 16, Locking Sealing Plug	114017

8.3 MODEL CODE PART NUMBER STRUCTURE



Data Panel Product Group
Made in the USA

xtremeDB Family

xtremeDB Type
44 - Active Modules

Variant
1 - Combo Block, 8 Inputs/8 Outputs (Includes all in/output types)
2 - All Inputs
3 - All Outputs (PWM)
4 - All Outputs (PWMi)
5 - All Outputs (Digital)
7 - PVG Valve Driver, 8 Sections (Ratiometric or On/Off)

Communication
0 - J1939, Slave Only
1 - DPLogic Enabled, Master or Slave
2 - CANopen, Slave Only

Special Features
00 = Standard

Example: DP-34044-3-000
is a J1939 standard combo unit.

First generation part numbers will be updated by adding “-000” to indicate standard J1939 Murr product.

9. FIRMWARE UPDATES

All modules are capable of in the field firmware updates with the use of the xtreme DB Programming Kit (DP-34005-12). DP Loader is the software used to download the firmware to the xtreme DB blocks. Please reference the DP Loader User Manual for instructions.

DATA PANEL

A Murrelektronik Company

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