DATA PANEL
A Murrelektronik Company

xtremeDB

DP-34044-7 User Manual
xDB08-PVE

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* This user manual applies to firmware revision 34044-567-0005 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. Data Panel 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. These devices are not to used as safety devices and machine safety is the sole responsibility of the machine designer.

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 Data Panel 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

EXCLUSION OF INCIDENTAL, CONSEQUENTIAL AND CERTAIN OTHER DAMAGES:
To the maximum extent permitted by applicable law, in no event shall Data Panel or Murrelektronikbe 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

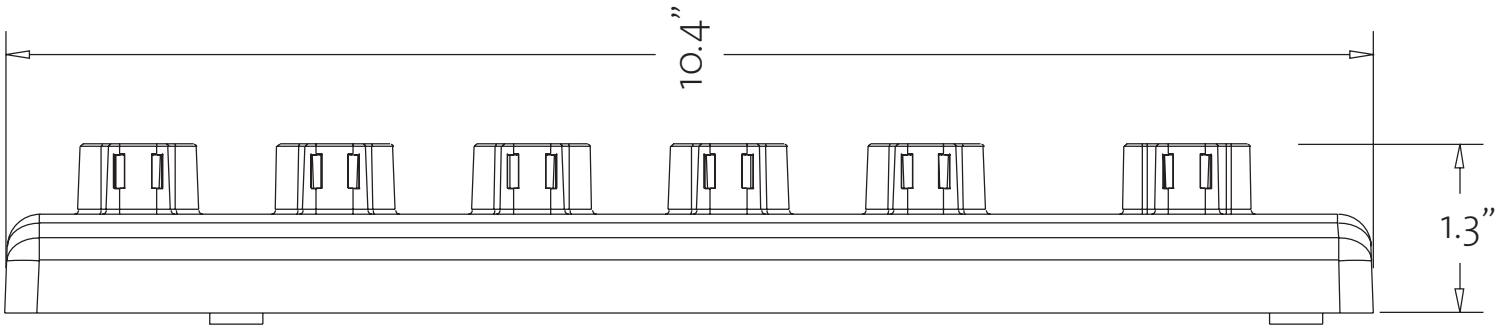
CAUTION!
Disregard of safety measures may result in damage to equipment and other serious consequences.

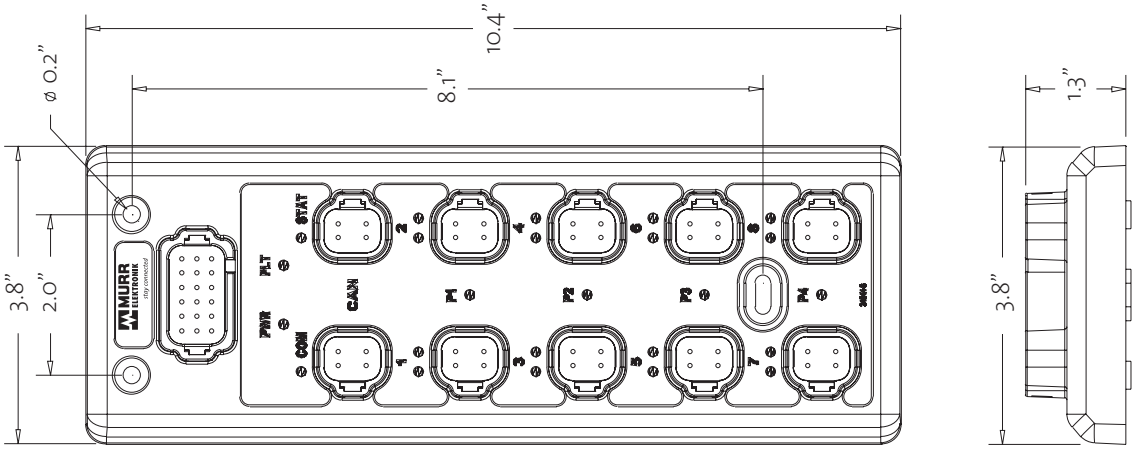
3. INSTALLATION

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.

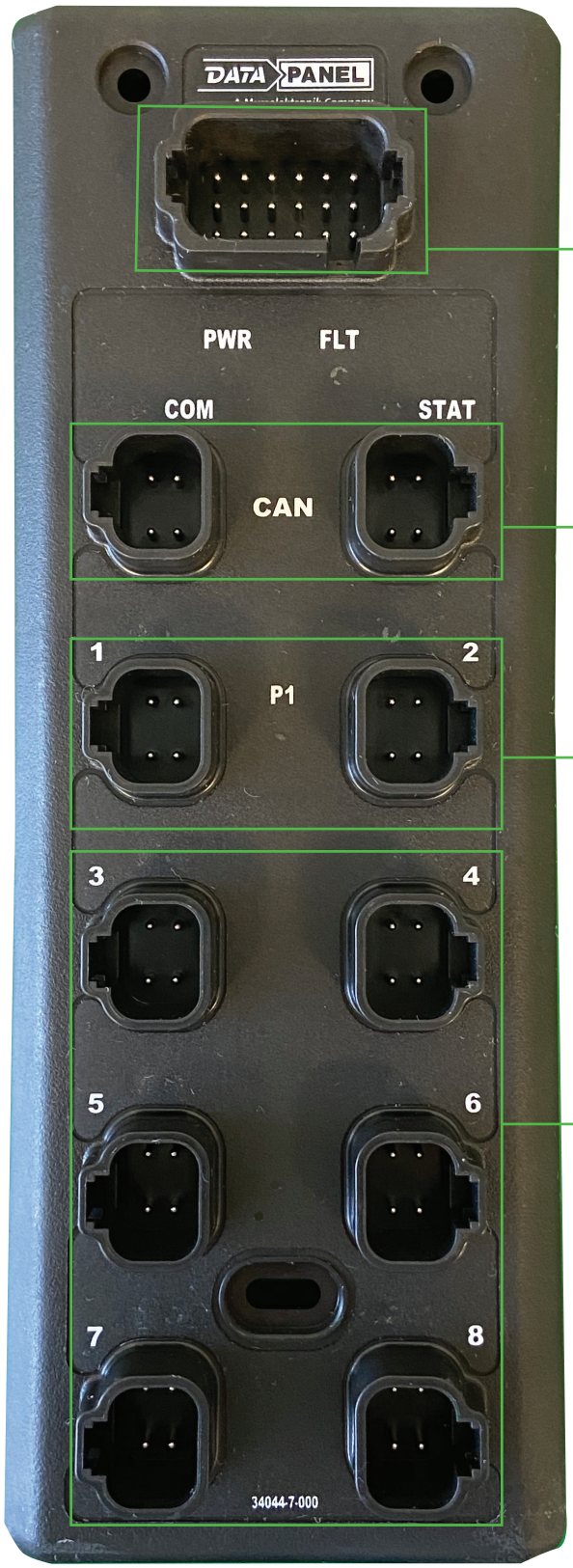
Proper installation and operation of the xtremeDB blocks requires the use of all ground connections. This is Ground (B) on the 18 pin configuration and power plug. Ground (B) is used for module power and for all ports IO grounding.





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

4. MODULE OVERVIEW



Configuration & Power Plug

CAN Ports, Non-Isolated

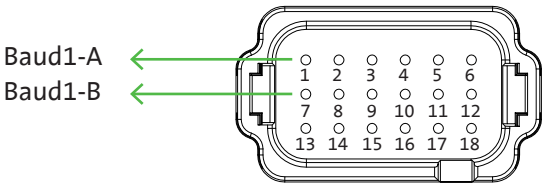
2 Outputs - PVE, Ratiometric/Proportional Only

6 Outputs - PVE/PVEO

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

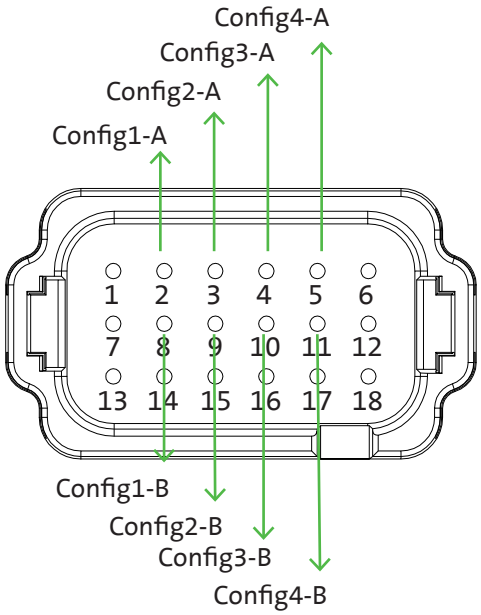
Please note that all devices on the same J1939 network must have the same baud rate

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

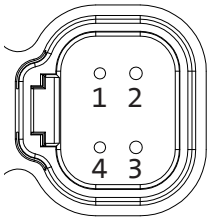
4.3 POWERING THE MODULE

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.

Module Ground

Pin 12 Pin 16 Pin 17 Pin 18	Module ground is provided in the 18 pin Configuration & Power plug

CAN Ports, Non-Isolated



CAN (J1939)	Power
Pin 2 = CAN High Pin 4 = CAN Low	Pin 1 = 8-32V DC Pin 3 = Pass Through

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

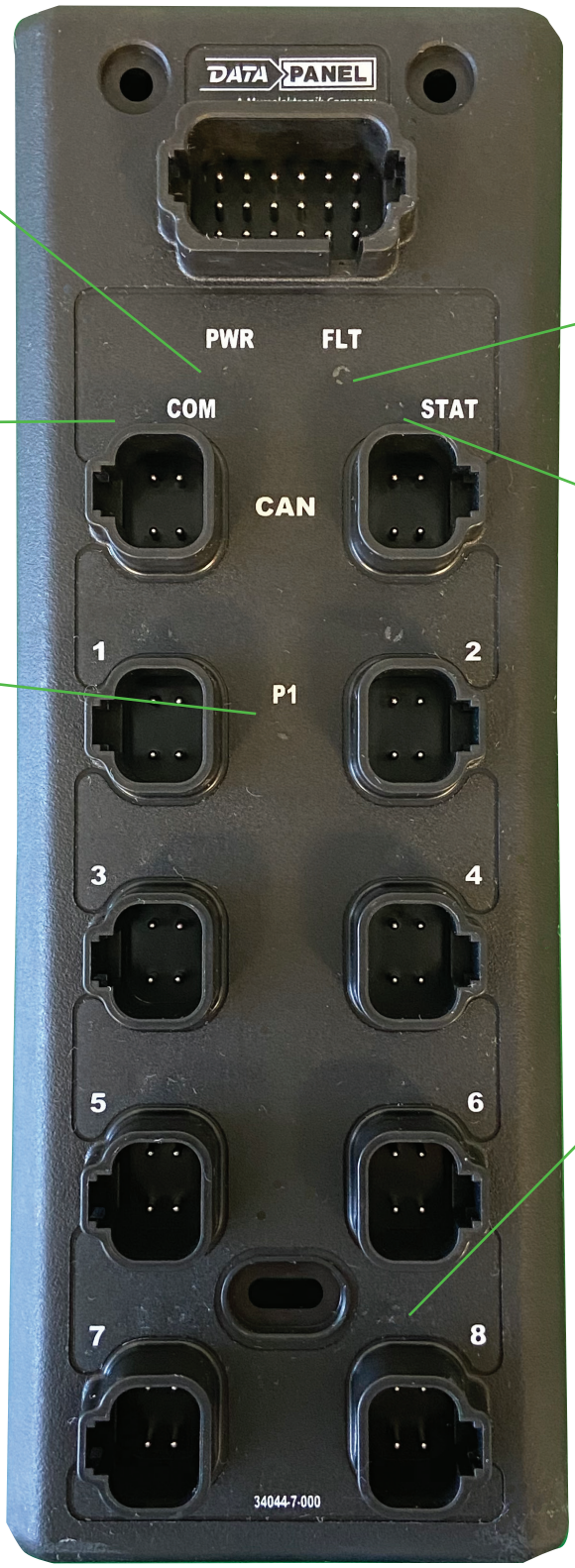
4.4 LEDs

During start up all 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 1-8



FLT LED - Red
Fault Status

STAT LED - Green
Module Status

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

Status
1. Steady On = Output/Input is on
2. Flashing On (Output Port)= Output has a fault
3. Flashing On (Input Port)= Input is pulsing
4. Both flashing with FLT LED indicates a sensor power fault

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	

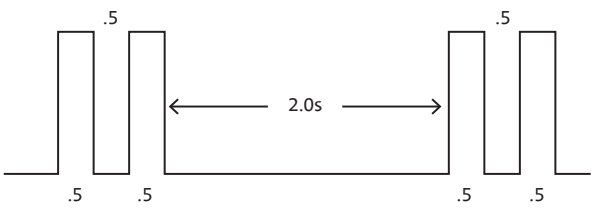
For 12V DC system, over voltage is defined as input voltage > 18V DC, low voltage is defined as < 11V DC.
For 24V DC system, over voltage is defined as input voltage > 32V DC, low voltage is defined as < 20V DC.

STAT LED - Green

ID	Fault Description	ON	OFF
S0	Configuration Saved	ON	
S1	Low Voltage Hold	1 Short	1 Long

PORT Output Mode		LED A		LED B	
		Status	Fault	Status	Fault
Mode 1	A: Digital Output Pin 1 B: Switched DC Power Pin 4	On/Off	Flash Pin 1 Fault	On/Off	Flash Pin 4 Fault
Mode 5-7	A: Analog Output Pin 1 B: Digital Input Pin 2	On/Off	Flash Pin 1 Fault	On/Off	Flash Pin 2 Fault
Mode 5-7	Switched DC Power Pin 4	n/a	Flash Pin 4 Fault	n/a	Flash Pin 4 Fault

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

4.5 CIRCUIT PROTECTION

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 on outputs.

P1 = Ports 1 - 8 power, 13 amps.
P2 = Ports 1 - 8 power, 13 amps.
P3 = Ports 1 - 8 power, 13 amps.

Module Power

The CAN port does not provide a module ground.

Output Power

This module has 3 amp outputs. The outputs have both short circuit and overcurrent protection. (See Figure 1)

(8) 3A outputs

Reseting 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.

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 0x52h 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
	Enable 24 vdc		3	1,2	Enables the low and over voltage fault limits for 24V DC system
	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		Not Used
			6		Not Used
	MODE1	4 Bit	7	1-4	Set the global configuration of the outputs. 0=MODE1 Not Used, 1=Digital PVEO Output, 5=Ratiometric Percent (20% - 80%), 6=Ratiometric Percent (20% - 50% - 80%), 7=Analog 0-10 V DC
	MODE2	4 Bit		5-8	Sets the global configuration of ALL the outputs, overides 0x53h and 0x54h. 0=MODE2 Not Used, 1=Digital Positive, 2=Digital Ground (No analog 3-7 cannot be used in global configuration mode)
	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.
- Enable 24V DC: Enables the low and over voltage fault limits for 24V DC system, otherwise feeding 24V DC to 12V DC system would cause system over voltage error. This is also used for the output overcurrent and short circuit detection.
- FREQ1: Not used.
- MODE1: Configure all the outputs at the same time, override Command 0x53h.
  Mode 0x1h is not available on Port1 or Port2.
  Mode 0x1h disables the digital input on the Port.
  Mode 0x7h Analog output 0-10 Vdc applies to Ports in pairs.
  (e.g. Port3 and Port4, Port5 and Port 6)
- MODE 2: Configure all the inputs at the same time, override Command 0x53h and 0x54h.
- ID1: This is used to give a reference 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 “the” 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.

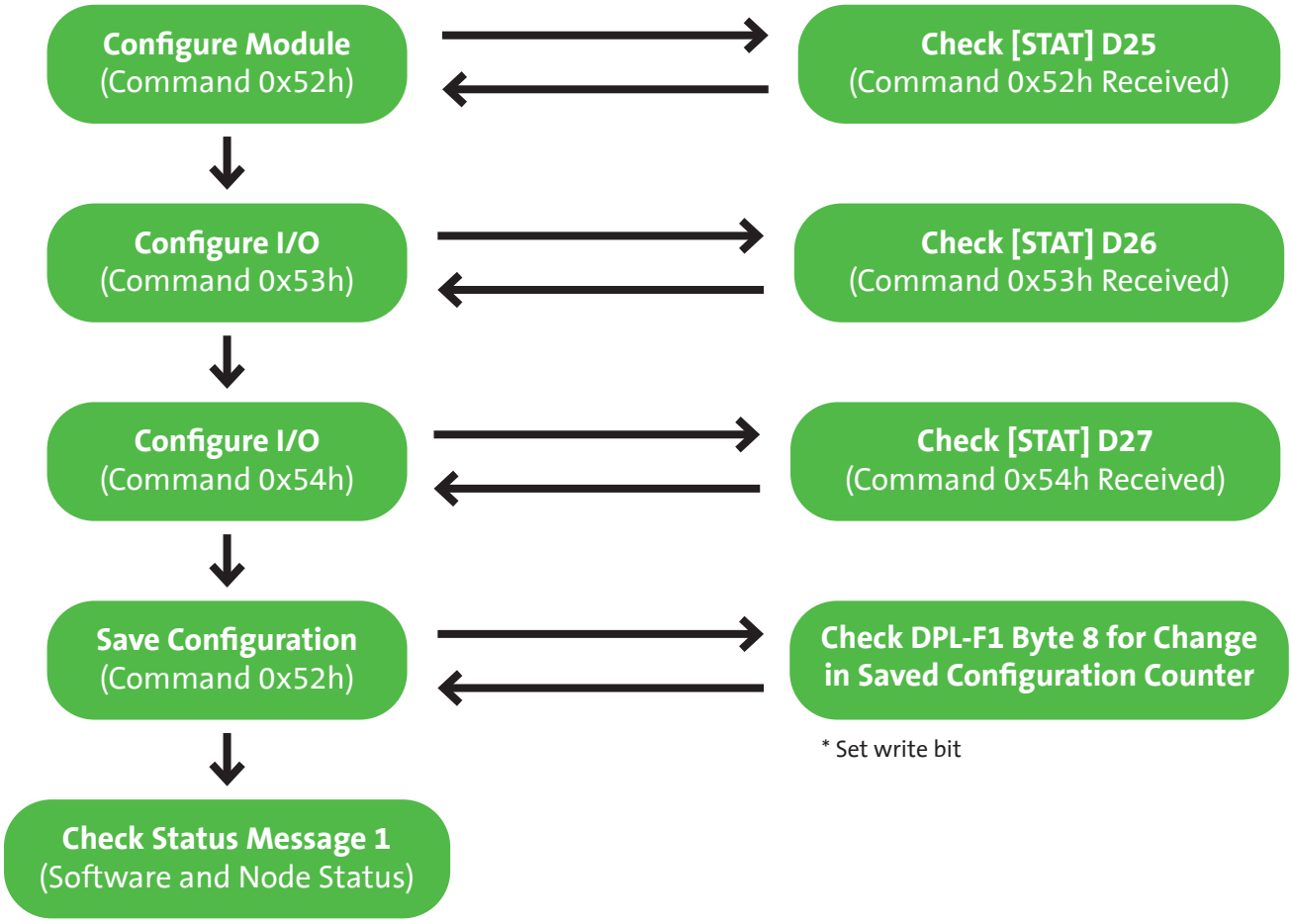
Command 0x53h & 54h (This message needs to be sent until the message confirmation bit is set true):
- Configure individual input and output modes if they haven't been configured in MODE1 and MODE2 in Command 0x52.

Status messages - Status message 1 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 9-14 – Returns a value of 1 each time a Command message 52-57 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 switched DC power output) and PWM control message needs to be consistently sent. Please note PGNs are changing based on Node source address, see section "PGNs USED" for details.

Configuration messages on 0x52h-0x57h should only be sent until receipt is confirmed, DO NOT send continuously.

Configuration Sample Flowchart:

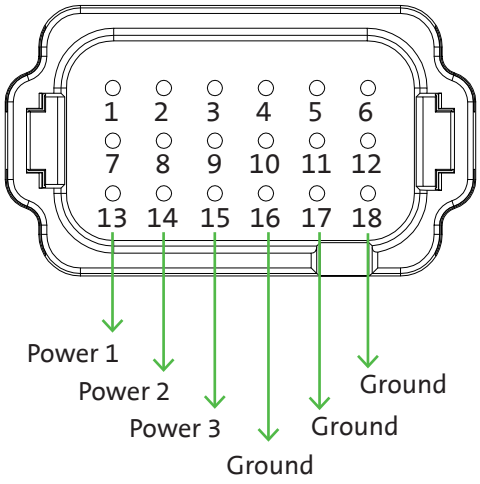


* Set write bit

5.2 OUTPUT CONFIGURATION

5.2.1 POWERING THE OUTPUTS

Configuration & Power Plug



Power (Output only)
Power 1 = 13A for ports 1-8
Power 2 = 13A for ports 1-8
Power 3 = 13A for ports 1-8

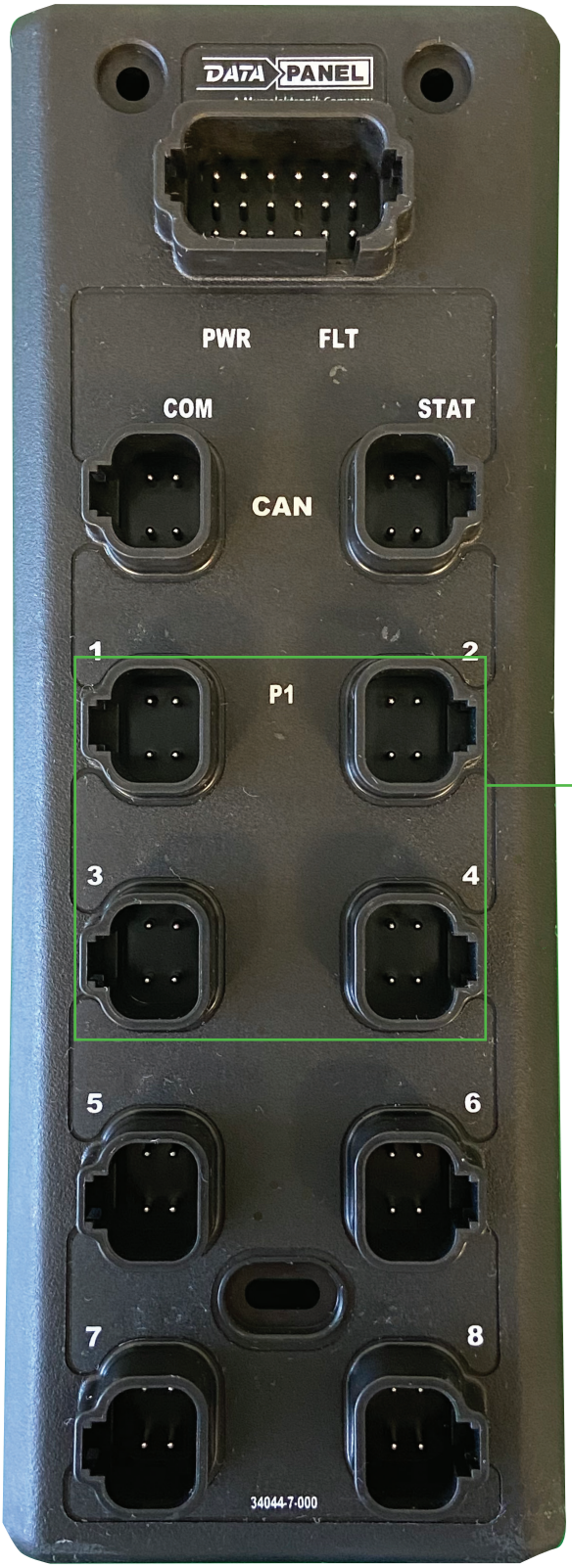
Ground (B) =
Output ground, internally connected to all port Ground pins

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

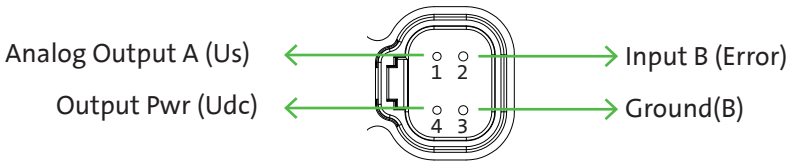
All Ground connections are internally connected. All connections must be made to achieve the current rating of the block

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

5.2.2 OUTPUT LAYOUT



Outputs (Ports 1-8)



Power
Pin 3 = Ground (B)

Amperage
Output Pwr = 3A

Inputs/Outputs
- Port 1-2, Pin 1: Analog Output 1A
- Port 1-2, Pin 2: Digital Input 1B
- Port 1-2, Pin 4: Output Pwr

- Port 3-8, Pin 1: Analog Output 1A, Digital Output 1A
- Port 3-8, Pin 2: Digital Input 1B, Digital Ground
- Port 3-8, Pin 4: Output Pwr

Each Load must use the return Ground (B) pin. "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 1 of the data bytes. This value is used as an index or pointer 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 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
Enable 24V DC		3	1,2	Enables the low and over voltage fault limits for 24V DC system
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	Internal Use Only
			7,8	
		4	1,2	
			3,4	
			5,6	
			7,8	
FREQ1	Word	5		Not Used
		6		High Byte FREQ1: Not Used
MODE1	4 Bit	7	1,2,3,4	Set the global configuration of the outputs. 0=MODE1 Not Used, 1=Digital PVEO Output, 5=Ratiometric Percent (20% - 80%), 6=Ratiometric Percent (20% - 50% - 80%), 7=Analog 0-10 V DC
MODE2	4 Bit	7	5,6,7,8	Sets the configuration of the inputs.(0=MODE2 Not Used, 1=Digital Positive, 2=Digital Ground)
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??)

Command Value
83 (0x53)

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

Name	Byte	Bits	Description
Command	1		Command for index pointer (which message you’re sending)
OUTMODE1A	2	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE1B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE2A	3	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE2B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE3A	4	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE3B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE7A	8	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE7B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground

OUTMODE: See 5.2.4 for description of settings.

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 - 7 will select the configuration of the output

OUTMODE#	Output Operation	Notes
0x0h	Disabled	Not Used
0x1h	Digital PVEO Output	Disables Digital Input on Port
0x2h - 0x4h	Reserved	Not Used
0x5h	Ratiometric 20 80	Percent (20% - 80%)
0x6h	Ratiometric 50	Percent (20% - 50% - 80%)
0x7h	Analog 0-10 Vdc	0.0 - 10.0 Vdc
0xFh	Not Used	Invalid Output Configuration

1. 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.

2. Digital PVEO Output, MODE = 1

This puts the Port into PVEO output mode with two digital outputs for A and B direction control. Pin 1 and 2 are digital positive at system voltage for A and B direction control respectively with Pin 2 and 3 being the corresponding grounds. The mode applies to Port3 – Port8 only. The use of bit pairs in Control Message 1 (command 81, 0x51h) of PGN 61408 will turn the outputs on and off.

Bit Pair	High Bit	Low Bit
On	0	1
Off	0	0

3. Ratiometric 20 80 Mode, MODE = 5 (Percent Control 20% - 80%)

This puts the Port into Ratiometric output mode with an analog (proportional) output for A and a digital input B for the PVE error signal. The mode can be used on any of the ports Port1 – Port8. The analog output on pin 1 is a controlled percentage of the measured voltage VBAT at the Power and Configuration Plug (P0). Output control is 0.1% per bit in the control message AN01 and AN02 (e.g. 70% is 700). In Ratiometric 20 80 Mode, control values below 20% (200) and above 80% (800) are invalid and the analog (proportional) output goes to 0%.

Example	Second Byte				First Byte							
70%	Bit 4	Bit 3	Bit 2	Bit 1	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
700	0	0	1	0	1	0	1	1	1	1	0	0

4. Ratiometric 50 Mode, MODE = 6 (Percent Control 20% - 50% - 80%)

This puts the Port into Ratiometric output mode with an analog (proportional) output for A and a digital input for the PVE error B. The mode applies to any/all of ports Port1 – Port8. The analog output on pin 1 is a controlled percentage of the measured voltage VBAT at the Power and Configuration Plug (P0). Output control is 0.1% per bit in the control message AN01 and AN02 (e.g. 40% is 400). In Ratiometric 50 Mode, control values below 20% (200) and above 80% (800) are invalid and the value 50% and the analog (proportional) output goes to 50%.

Example	Second Byte				First Byte							
40%	Bit 4	Bit 3	Bit 2	Bit 1	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
400	0	0	0	1	1	0	0	1	0	0	0	0

5. Analog 10 V DC Mode, MODE = 7 (0.0 – 10.0 V DC)

This puts the Port into Voltage output mode with an analog output for A and a digital input for B. The mode applies to all ports Port1 – Port8. The analog output on pin 1 is a controlled voltage from 0.0 to 10.0 V DC. Output control is 0.01Vdc per bit in the control message AN01 and AN02 (e.g. 100% is 1.0 V DC). In Voltage 10 V DC Mode, values above 1000 (10.00 V DC) are invalid and the analog output goes to 0 V DC.

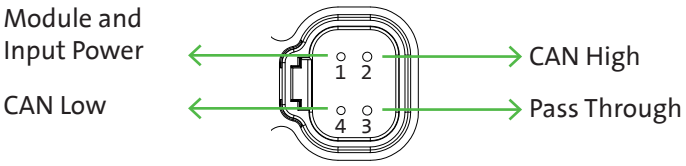
!!! Voltage 10 V DC Mode requires two adjacent Ports to be paired (i.e. Port1 and Port2, Port3 and Port4, Port5 and Port6, or Port7 and Port8). When Port1, Port3, Port5, and Port7 are configured for MODE = 7 the associated configuration values for Port2, Port4, Port6, and Port8 are ignored.

Example	Second Byte				First Byte							
8.3 V DC	Bit 4	Bit 3	Bit 2	Bit 1	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
830	0	0	1	1	0	0	1	1	1	1	1	0

5.3 PORT CONFIGURATION

5.3.1 POWERING THE INPUTS

CAN Ports, Non-Isolated



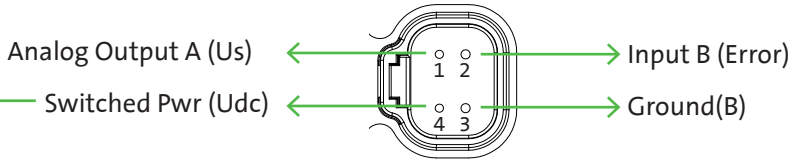
Power (Module and Input, 13A)
Pin 1 = 8-32V DC

Please note that module and input power is provided via the CAN port

Module ground connections provided in the JO 18-pin connector.

5.3.2 PORT LAYOUT

Inputs/Outputs (Ports 1-8)



Power
Pin 3 = Ground (B)

Amperage
Switched Pwr = 3A

Inputs/Outputs
- Port 1-2, Pin 1: Analog Output 1A
- Port 1-2, Pin 2: Digital Input 1B
- Port 1-2, Pin 4: Switched Pwr

- Port 3-8, Pin 1: Analog Output 1A, Digital Output 1A
- Port 3-8, Pin 2: Digital Input 1B, Digital Ground
- Port 3-8, Pin 4: Switched Pwr

Each Load must use the return Ground (B) pin. "Chassis Grounding" is not supported.

5.3.3 CONFIGURING INPUTS

Input Mode

Inputs can be configured in 2 ways, globally, or individually. Both configurations types use 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 Input Configuration

Only used if you want all the inputs to be configured the same. Configuring all of the inputs is done through the "MODE2" 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 you're 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
Enable 24V DC		3	1,2	Enables the low and over voltage fault limits for 24V DC system
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	Internal Use Only
			7,8	
		4	1,2	
			3,4	
			5,6	
			7,8	
FREQ1	Word	5		Not used
		6		Not used
MODE1	4 Bit	7	1,2,3,4	
MODE2	4 Bit	7	5,6,7,8	Sets the configuration of the inputs.(0=MODE2 Not Used, 1=Digital Positive, 2=Digital Ground)
ID1	Byte	8		User defined byte for configuration ID, this will be transimitted in the STAT message.

*CSA - Controller Source Address

B. Individual Configuration

Individual input configuration is done through the “input 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 (0x53h)

Name	Byte	Bits	Description
Command	1		Command for index pointer (which message you’re sending)
OUTMODE1A	2	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE1B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE2A	3	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE2B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE3A	4	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE3B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE4A	5	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE4B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE5A	6	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE5B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE6A	7	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE6B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE7A	8	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE7B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground

INMODE: See 5.3.3 C for settings.

Value
84 (0x54)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message you are sending)
OUTMODE8A	4 bit	2	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE8B			5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground

C. Modes

Input A

Using a value of 0x0h - 0x8h, 0xAh will select the configuration of input A

[MODE#X]	Input Operation	Notes
0x0h	Disabled	This Mode Not Used
0x1h	Positive	ON/OFF
0x2h	Ground	ON/OFF
0xFh	Not Used	Invalid Output Configuration

5.3.4 INPUT OPERATION

The input operation will be different depending on the configuration chosen for the input and the input pin being configured.
Sensor power for each port needs to be enabled to receive 9-32V DC on pin1, See Control Message 1.

A. Disabled, MODE = 0

It is recommended to disable any inputs that aren't being used. Putting a "0" in the mode for an input disables the input.

B. Positive On/Off, MODE = 1

This puts the input into the standard discrete positive operation mode. When a positive voltage is present on the input pin, the low bit will turn on.

	High Bit	Low Bit
On	0	1
Off	0	0

C. Ground On/Off, MODE = 2

This puts the input into the standard discrete ground operation mode. When a ground is present on the input pin, the low bit will turn on.

5.4 STATUS MESSAGES

5.4.1 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	
	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 = 0x52h received. See note 1 below.
	Status 10			3,4	True when Message Command = 0x52h received. See note 1 below.
	Status 11			5,6	True when Message Command = 0x52h received. See note 1 below.
	Status 12			7,8	True when Message Command = 0x52h received. See note 1 below.
	Status 13		8	1,2	True when Message Command = 0x52h received. See note 1 below.
	Status 14			3,4	True when Message Command = 0x52h received. See note 1 below.
	Hardware Version	4 Bit		5,6,7,8	Version of the current hardware

* (0xEF(Controller Source Address))
Note 1: The Message received True status (0x01b) will time out after 1 second and reset to False or Off (0x00b).

Status Message DPLF1 (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	Not used, will see (11b)
				5,6	
				7,8	
	Output 1A Status	2 Bit	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 Port 1	2 Bit	5	1,2	Status of Port 1 Output (Pin 4)
	Output 1A			3,4	Status of Output 1A
	Output Port 2			5,6	Status of Port 2 Output (Pin 4)
	Output 2A			7,8	Status of Output 2A
	Output Port 3		6	1,2	Status of Port 3 Output (Pin 4)
	Output 3A			3,4	Status of Output 3A
	Output Port 4			5,6	Status of Port 4 Output (Pin 4)
	Output 4A			7,8	Status of Output 4A
	Output Port 5	2 Bit	7	1,2	Status of Port 5 Output (Pin 4)
	Output 5A			3,4	Status of Output 5A
	Output Port 6			5,6	Status of Port 6 Output (Pin 4)
	Output 6A			7,8	
	Output Port 7	Byte	8		Status of Port 7 Output (Pin 4)
	Output 7A				Status of Output 7A
	Output Port 8				Status of Port 8 Output (Pin 4)
	Output 8A				Status of Output 8A

Bit Pair Status: 0x00b = OFF, 0x01b = ON, 0x10b = FAULT.

Status Message DPLF2 (Controller Information)					
PGN	**Name**	**Data Type**	**Byte**	**Bits**	**Description**
65532 (0xFFFC)	CNFG1	Byte	1	All	Hardware Configuration
	CNFG2		2		PCB Assembly Revision
	VBAT	10 Bit	3		Battery Voltage 100mV/bit, data range 0 - 320 (32.0V DC max).
			4	1, 2	
	TEMP	12 Bit	5	All	Module Temperature , -100.0°F to +300.0°F, data range 0 – 4000 bits.
			6	1, 2, 3, 3	
	CNFG3	Byte	7	All	Additional Configuration
			8		Not Used

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
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 (0x52h)

*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
Enable DPLF1 Msg			3,4	Enables the constant transmission of status message DPLF1
Enable DPLF2 Msg			5,6	Enables the constant transmission of status message DPLF2
Enable Amp Msg			7,8	Enables the constant transmission of amperage messages
Enable 24 vdc		3	1,2	Enables the low and over voltage fault limits for 24V DC system
Save Configura-tion			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	1,2	Not used
		6	3,4	Not used
MODE1	4 Bit	7	5,6	Set the global configuration of the outputs. 0=MODE1 Not Used, 1=Digital PVEO Output, 5=Ratiometric Percent (20% - 80%), 6=Ratiometric Percent (20% - 50% - 80%), 7=Analog 0-10 V DC
MODE2		7	7,8	Sets the configuration of the inputs.(0=MODE2 Not Used, 1=Digital Positive, 2=Digital Ground)
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 (0x51h)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message your 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	Digital output control (Pin1) Outmode = 0x1h
Output3B			3,4	Not used
Output4A			5,6	Digital output control (Pin1) Outmode = 0x1h
Output4B			7,8	Not used
Output5A		4	1,2	Digital output control (Pin1) Outmode = 0x1h
Output5B			3,4	Not used
Output6A			5,6	Digital output control (Pin1) Outmode = 0x1h
Output6B			7,8	Not used
Output7A		5	1,2	Digital output control (Pin1) Outmode = 0x1h
Output7B			3,4	Not used
Output8A			5,6	Digital output control (Pin1) Outmode = 0x1h
Output8B			7,8	Not used
Output Port 1 (Pin 4)		6	1,2	Enable for Port 1 Power, (00 = off), (01 = on)
Output Port 2 (Pin 4)			3,4	Enable for Port 2 Power, (00 = off), (01 = on)
Output Port 3 (Pin 4)			5,6	Enable for Port 3 Power, (00 = off), (01 = on)
Output Port 4 (Pin 4)			7,8	Enable for Port 4 Power, (00 = off), (01 = on)
Output Port 5 (Pin 4)		7	1,2	Enable for Port 5 Power, (00 = off), (01 = on)
Output Port 6 (Pin 4)			3,4	Enable for Port 6 Power, (00 = off), (01 = on)
Output Port 7 (Pin 4)			5,6	Enable for Port 7 Power, (00 = off), (01 = on)
Output Port 8 (Pin 4)			7,8	Enable for Port 8 Power, (00 = off), (01 = on)
Not Used	Byte	8		

PGN with SA offset and Command Value = 0x51h must be sent periodic to prevent sensor power outputs from timing out

Output Configuration 2

Command Value
83 (0x53h)

Name	Byte	Bits	Description
Command	1		Command for index pointer (which message you're sending)
OUTMODE1A	2	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE1B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE2A	3	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE2B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE3A	4	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE3B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE4A	5	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE4B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE5A	6	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE5B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE6A	7	1,2,3,4	Mode 0x0h=Disabled, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE6B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground
OUTMODE7A	8	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE7B		5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground

Output Configuration 3

Command Value
84 (0x54h)

Name	Data Type	Byte	Bits	Description
Command	Byte	1		Command for index pointer (which message you're sending)
OUTMODE8A	4 bit	2	1,2,3,4	Mode 0x0h=Disabled, 0x1h=Digital PVEO Output, 0x5h=Ratiometric Percent (20% - 80%), 0x6h= Ratiometric Percent (20% - 50% - 80%), 0x7h=Analog 0-10 V DC
INMODE8B			5,6,7,8	Mode 0x0h=Disabled, 0x1h=Digital Positive, 0x2 Digital Ground

Control Message 2 (AN01)

PGN
65308 (0xFF1C)
PDU Format
255 (0xFF)
PDU Specific
28 (0x1C)
Source Address
(0x?? (CSA*))
Built Message
(0x0CFF1C??)

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

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

Outmode #A	Description	Data Range
0x5h	Percent (20% – 80%)	0 – 1000 (0.1% per bit)
0x6h	Percent (20% - 50% - 80%)	0 – 1000 (0.1% per bit)
0x7h	Analog 0-10.00 Vdc	0 – 1000 (0.01 Vdc per bit)

PVE proportional coils use an effective range of 25% of Vbatt (full shift in the A Direction) to 75% of VBatt (full shift B Direction) with 50% of V Bat being neutral.

The xtremeDB for PVG uses an envelope of 20% to 80% of Vbatt to allow the PVE to function as intended.

Control Message 3 (AN02)

PGN
65309 (0xFF1D)
PDU Format
255 (0xFF)
PDU Specific
29 (0x1D)
Source Address
(0x?? (CSA*))
Built Message
(0x0CFF1D??)

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

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

Outmode #A	Description	Data Range
0x5h	Percent (20% – 80%)	0 – 1000 (0.1% per bit)
0x6h	Percent (20% - 50% - 80%)	0 – 1000 (0.1% per bit)
0x7h	Analog 0-10.00 Vdc	0 – 1000 (0.01 Vdc per bit)

PVE proportional coils use an effective range of 25% of Vbatt (full shift in the A Direction) to 75% of VBatt (full shift B Direction) with 50% of V Bat being neutral.

The xtremeDB for PVG uses an envelope of 20% to 80% of Vbatt to allow the PVE to function as intended.

J1939 Digital Status

PGN
65301 (0xFF15) E0=SA

PDU Format	Transmit rate
255 (0xFF)	50 ms
PDU Specific	**Msg timeout**
21 (0x15)	200 ms
Source Address	**Priority**
224 (0xE0)	6
Built Message	**DP**
(0x18FF15E0)	0

Name	Data Type	Byte	Bits	Description
Input1A	2 bit	1	1,2	Not Used
Input1B			3,4	0x00b = off, 0x01b = on
Input2A			5,6	Not Used
Input2B			7,8	0x00b = off, 0x01b = on
Input3A		2	1,2	Not Used
Input3B			3,4	0x00b = off, 0x01b = on
Input4A			5,6	Not Used
Input4B			7,8	0x00b = off, 0x01b = on
Input5A		3	1,2	Not Used
Input5B			3,4	0x00b = off, 0x01b = on
Input6A			5,6	Not Used
Input6B			7,8	0x00b = off, 0x01b = on
Input7A		4	1,2	Not Used
Input7B			3,4	0x00b = off, 0x01b = on
Input8A			5,6	Not Used
Input8B			7,8	0x00b = off, 0x01b = on
Not used	Byte	5		
		6		
		7		
		8		

STATUS MESSAGES

Status Message STAT Proprietary A Default Response Message

PGN
(0xEF(Controller Source Address))
PDU Format
239 (0xEF)
PDU Specific
(0xController Source Address)
Source Address
224 (0xE0)
Built Message
(0x18EF??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	Not used, will see (11b)
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	4 Bit		5,6,7,8	Version of the current hardware

Status9 – Status14 message confirmation bit pairs:
True when Message Configuration Command received.
The bit pair status for message configuration received will time out after 2 seconds.

Status Message DPLF1

PGN
65531 (0xFFFB)
PDU Format
255 (0xFF)
PDU Specific
251 (0xFB)
Source Address
224 (0xE0)
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	Not used, will see (11b)
			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)
Input Power Port 5		5	1,2	Status of output for Input Power on Port 5, (00 = off), (01 = on), (10 = fault)
			3,4	Not used, will see (11b)
Input Power Port 6			5,6	Status of output for Input Power on Port 6, (00 = off), (01 = on), (10 = fault)
			7,8	Not used, will see (11b)
Input Power Port 7		6	1,2	Status of output for Input Power on Port 7, (00 = off), (01 = on), (10 = fault)
			3,4	Not used, will see (11b)
Input Power Port 8			5,6	Status of output for Input Power on Port 8, (00 = off), (01 = on), (10 = fault)
			7,8	Not used, will see (11b)
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	Not used, will see (11b)
Power Bus P4			7,8	
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)
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

J1939 Analog Status DPLT1

PGN
65523 (0xFFF3)
PDU Format
255 (0xFF)
PDU Specific
243 (0xF3)
Source Address
224 (0xE0)
Built Message
(0x18FFF3E0)

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

Name	Data Type	Byte	Bits	Description
Analog Output Port 1	Word	1	Low Byte	**1 mV per bit (0.000 to 30.000 V DC)**
		2	High Byte	
Analog Output Port 2	Word	3	Low Byte	1 mV per bit (0.000 to 30.000 V DC)
		4	High Byte	
Analog Output Port 3	Word	5	Low Byte	**1 mV per bit (0.000 to 30.000 V DC)**
		6	High Byte	
Analog Output Port 4	Word	7	Low Byte	1 mV per bit (0.000 to 30.000 V DC)
		8	High Byte	

J1939 Analog Status DPLT2

PGN
65523 (0xFFF4)
PDU Format
255 (0xFF)
PDU Specific
244 (0xF4)
Source Address
224 (0xE0)
Built Message
(0x18FFF4E0)

Transmit rate
50 ms
Msg timeout
200 ms
Priority
24 (0x18)

Name	Data Type	Byte	Bits	Description
Analog Output Port 5	Word	1	Low Byte	**1 mV per bit (0.000 to 30.000 V DC)**
		2	High Byte	
Analog Output Port 6	Word	3	Low Byte	1 mV per bit (0.000 to 30.000 V DC)
		4	High Byte	
Analog Output Port 7	Word	5	Low Byte	**1 mV per bit (0.000 to 30.000 V DC)**
		6	High Byte	
Analog Output Port 8	Word	7	Low Byte	1 mV per bit (0.000 to 30.000 V DC)
		8	High Byte	

Status Message 4 (Output Amperage Feedback OUT 1A-2B)

PGN
65523 (0xFFF3)
PDU Format
255 (0xFF)
PDU Specific
243 (0xF3)
Source Address
224 (0xE0)
Built Message
(0x18FFF3E0)

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

Name	Data Type	Byte	Bits	Description
OUT 1A AMP FEEDBACK	Word	1		Current reading on Output 1A, 0-4,000 = 0-4000 mA
		2		
OUT 1B AMP FEEDBACK	Word	3		Current reading on Output 1B, 0-4,000 = 0-4000 mA
		4		
OUT 2A AMP FEEDBACK	Word	5		Current reading on Output 2A, 0-4,000 = 0-4000 mA
		6		
OUT 2B AMP FEEDBACK	Word	7		Current reading on Output 2B, 0-4,000 = 0-4000 mA
		8		

Status Message 5 (Output Amperage Feedback OUT 3A-4B)

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

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

Name	Data Type	Byte	Bits	Description
OUT 3A AMP FEEDBACK	Word	1		Current reading on Output 3A, 0-4,000 = 0-4000 mA
		2		
OUT 3B AMP FEEDBACK	Word	3		Current reading on Output 3B, 0-4,000 = 0-4000 mA
		4		
OUT 4A AMP FEEDBACK	Word	5		Current reading on Output 4A, 0-4,000 = 0-4000 mA
		6		
OUT 4B AMP FEEDBACK	Word	7		Current reading on Output 4B, 0-4,000 = 0-4000 mA
		8		

6.2 PGNs USED

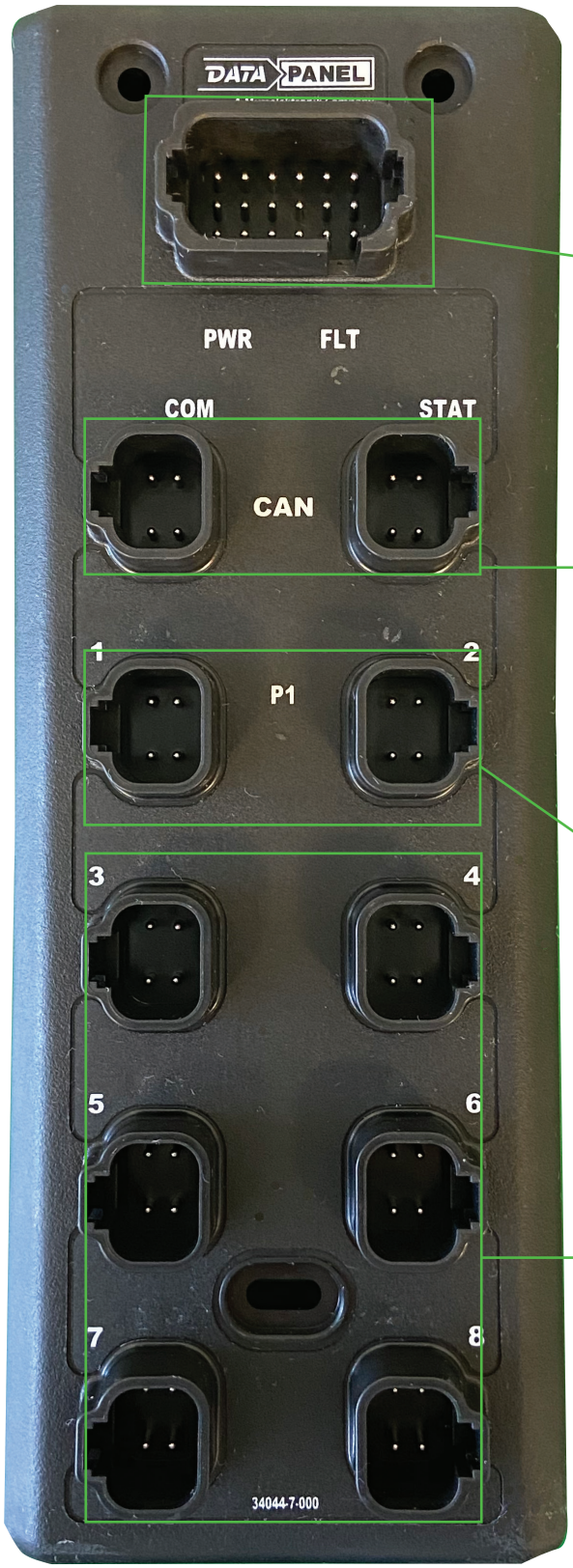
Depending on the Node ID selected for the module, the PGNs and source address will be different for the module. The section below shows which are used for each Node ID.

Source Address	Control*	AN01	AN02	Module Status	Digital Input Status	Analog Inputs 5A-6B	Analog Inputs 7A-8B	Freq. Inputs 7A-8A
224	EFE0	FF1C	FF1D	(EF(CSA)) (SA=E0)	FF15 (SA=E0)	FF18 (SA=E0)	FF19 (SA=E0)	FF1B (SA=E0)
225	EFE1	FF20	FF21	(EF(CSA)) (SA=E1)	FF15 (SA=E1)	FF18 (SA=E1)	FF19 (SA=E1)	FF1B (SA=E1)
226	EFE2	FF24	FF25	(EF(CSA)) (SA=E2)	FF15 (SA=E2)	FF18 (SA=E2)	FF19 (SA=E2)	FF1B (SA=E2)
227	EFE3	FF28	FF29	(EF(CSA)) (SA=E3)	FF15 (SA=E3)	FF18 (SA=E3)	FF19 (SA=E3)	FF1B (SA=E3)
228	EFE4	FF2C	FF2D	(EF(CSA)) (SA=E4)	FF15 (SA=E4)	FF18 (SA=E4)	FF19 (SA=E4)	FF1B (SA=E4)
229	EFE5	FF30	FF31	(EF(CSA)) (SA=E5)	FF15 (SA=E5)	FF18 (SA=E5)	FF19 (SA=E5)	FF1B (SA=E5)
230	EFE6	FF34	FF35	(EF(CSA)) (SA=E6)	FF15 (SA=E6)	FF18 (SA=E6)	FF19 (SA=E6)	FF1B (SA=E6)
231	EFE7	FF38	FF39	(EF(CSA)) (SA=E7)	FF15 (SA=E7)	FF18 (SA=E7)	FF19 (SA=E7)	FF1B (SA=E7)
232	EFE8	FF3C	FF3D	(EF(CSA)) (SA=E8)	FF15 (SA=E8)	FF18 (SA=E8)	FF19 (SA=E8)	FF1B (SA=E8)
233	EFE9	FF40	FF41	(EF(CSA)) (SA=E9)	FF15 (SA=E9)	FF18 (SA=E9)	FF19 (SA=E9)	FF1B (SA=E9)
234	EFEA	FF44	FF45	(EF(CSA)) (SA=EA)	FF15 (SA=EA)	FF18 (SA=EA)	FF19 (SA=EA)	FF1B (SA=EA)
235	EFEB	FF48	FF49	(EF(CSA)) (SA=EB)	FF15 (SA=EB)	FF18 (SA=EB)	FF19 (SA=EB)	FF1B (SA=EB)
236	EFEC	FF4C	FF4D	(EF(CSA)) (SA=EC)	FF15 (SA=EC)	FF18 (SA=EC)	FF19 (SA=EC)	FF1B (SA=EC)
237	EFED	FF50	FF51	(EF(CSA)) (SA=ED)	FF15 (SA=ED)	FF18 (SA=ED)	FF19 (SA=ED)	FF1B (SA=ED)
238	EFEE	FF54	FF55	(EF(CSA)) (SA=EE)	FF15 (SA=EE)	FF18 (SA=EE)	FF19 (SA=EE)	FF1B (SA=EE)
239	EFFF	FF58	FF59	(EF(CSA)) (SA=EF)	FF15 (SA=EF)	FF18 (SA=EF)	FF19 (SA=EF)	FF1B (SA=EF)

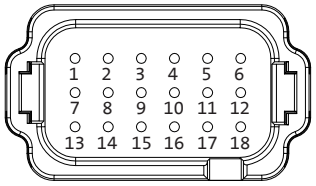
Source Address	Control*	PWM1*	PWM2*	Output Status	Analog Status	Amp Data 1-4	Amp Data 5-8	Fault Count
224	EFE0	FF1C	FF1D	FFFB (SA=E0)	FFFC (SA=E0)	FFF3 (SA=E0)	FFF4 (SA=E0)	FFE6 (SA=E0)
225	EFE1	FF20	FF21	FFFB (SA=E1)	FFFC (SA=E1)	FFF3 (SA=E1)	FFF4 (SA=E1)	FFE6 (SA=E1)
226	EFE2	FF24	FF25	FFFB (SA=E2)	FFFC (SA=E2)	FFF3 (SA=E2)	FFF4 (SA=E2)	FFE6 (SA=E2)
227	EFE3	FF28	FF29	FFFB (SA=E3)	FFFC (SA=E3)	FFF3 (SA=E3)	FFF4 (SA=E3)	FFE6 (SA=E3)
228	EFE4	FF2C	FF2D	FFFB (SA=E4)	FFFC (SA=E4)	FFF3 (SA=E4)	FFF4 (SA=E4)	FFE6 (SA=E4)
229	EFE5	FF30	FF31	FFFB (SA=E5)	FFFC (SA=E5)	FFF3 (SA=E5)	FFF4 (SA=E5)	FFE6 (SA=E5)
230	EFE6	FF34	FF35	FFFB (SA=E6)	FFFC (SA=E6)	FFF3 (SA=E6)	FFF4 (SA=E6)	FFE6 (SA=E6)
231	EFE7	FF38	FF39	FFFB (SA=E7)	FFFC (SA=E7)	FFF3 (SA=E7)	FFF4 (SA=E7)	FFE6 (SA=E7)
232	EFE8	FF3C	FF3D	FFFB (SA=E8)	FFFC (SA=E8)	FFF3 (SA=E8)	FFF4 (SA=E8)	FFE6 (SA=E8)
233	EFE9	FF40	FF41	FFFB (SA=E9)	FFFC (SA=E9)	FFF3 (SA=E9)	FFF4 (SA=E9)	FFE6 (SA=E9)
234	EFEA	FF44	FF45	FFFB (SA=EA)	FFFC (SA=EA)	FFF3 (SA=EA)	FFF4 (SA=EA)	FFE6 (SA=EA)
235	EFEB	FF48	FF49	FFFB (SA=EB)	FFFC (SA=EB)	FFF3 (SA=EB)	FFF4 (SA=EB)	FFE6 (SA=EB)
236	EFEC	FF4C	FF4D	FFFB (SA=EC)	FFFC (SA=EC)	FFF3 (SA=EC)	FFF4 (SA=EC)	FFE6 (SA=EC)
237	EFED	FF50	FF51	FFFB (SA=ED)	FFFC (SA=ED)	FFF3 (SA=ED)	FFF4 (SA=ED)	FFE6 (SA=ED)
238	EFEE	FF54	FF55	FFFB (SA=EE)	FFFC (SA=EE)	FFF3 (SA=EE)	FFF4 (SA=EE)	FFE6 (SA=EE)
239	EFFF	FF58	FF59	FFFB (SA=EF)	FFFC (SA=EF)	FFF3 (SA=EF)	FFF4 (SA=EF)	FFE6 (SA=EF)

*SA = CSA (Controller Source Address)

7.1 PORT CONFIGURATION

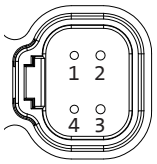


Configuration & Power Plug



See page 33 for pinout guide

CAN Ports 1 & 2 Non-Isolated

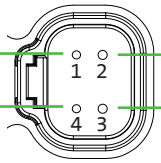


CAN
(J1939)
Pin 2 = CAN High
Pin 4 = CAN Low

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

Ports 1-2

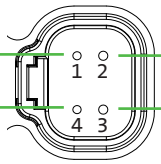
Analog Output A
Output Pwr (3A)



Input B
Ground(B)

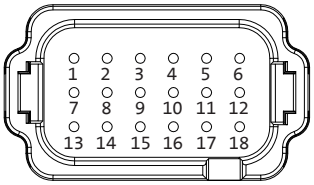
Ports 3-8

Analog Output A /
Digital Output A
Output Pwr (3A)



Input B/
PVEO Gnd
Ground(B)

Configuration & Power Plug Pinouts



1. Baud1-A
2. Config 1-A
3. Config 2-A
4. Config 3-A
5. Config 4-A
6. N/C
7. Baud1-B
8. Config 1-B
9. Config 2-B
10. Config 3-B
11. Config 4-B
12. N/C
13. Battery P1
14. Battery P1
15. Battery P1
16. Ground (B)
17. Ground (B)
18. Ground (B)

Baud Rate
No Jumper = 250kb
Baud1-A to Baud1-B = 500kb7.

Power (Output Only)
Battery P1 = 13A per pin for ports 1–8
Ground (B) = 13A per pin for ports 1-8

Node ID (0-15)
Config1-A to Config1-B = 1s
Config2-A to Config2-B = 2s
Config3-A to Config3-B = 4s
Config4-A to Config4-B = 8s

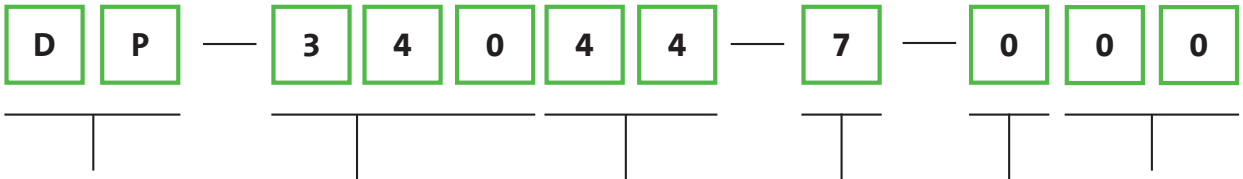
7.2 TECHNICAL DATA

Art. No. / Description	DP-34044-7
Dimension	3.802" x 10.427"
Installation	(3) M5 x 1 screws
Communication	2 non-isolated J1939 ports (250kb & 500kb)
Voltage Range	8-32V DC
Operating Temperature	(-40 to 80°C)
Storage Temperature	(-40 to 85°C)
Protection	IP67
Number of Ports	8
Total Number of I/O	16
Total Number of Inputs	8
Number of Digital	4 to 8
Number of Config. Inputs	8 Digital
Digital Input Configurations	Digital Positive, Digital Ground,
Analog Resolution	12 bit, 1% Full Scale Accuracy
Total Number of Outputs	8
Number of Config. Outputs	8
Output Configurations	PVEO, Ratiometric, Analog
Output Diagnostics	Short Circuit and Overcurrent
Total Output Current	26A
J1939 Port	1=+V DC (Module Pwr), 2=CAN H, 3=NC, 4=CANL
Node ID Offset	0-15
Baud Rate	250 Kbits/s, 500 Kbits/s
LEDs	(1)blue (PWR), (1) green CAN, (1) red FLT, (16) yellow status

Characteristics of the Outputs		
Outputs	Voltage Output Output Voltage Switching Current	 8...32V DC 3A

Port Deutsch Plugs Needed	
Power Port Connector	DT16-18SA-K004
CAN & I/O Port Connector	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	0413-217-1605

7.3 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-34044-1-000
is a J1939 standard combo unit.

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

8. FIRMWARE UPDATES

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

DATA PANEL

A Murrelektronik Company

181 Cheshire Lane North, Suite 300 | Plymouth, MN 55441
P: 952-941-3511 | F: 952-941-3931 | datapanel.com

DP-34044-7 | US xtremeDB | October 2020 | DP-34044-7_hdb_e_04