ioBLOC 6 Expansion Module

6 Input

Part Number

PN 100001262 (58-0150)

Product Manual

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Contents

Overview & Specifications:

Overview

This module uses a 12-pin sealed Deutsch connector (DT04-12PA equivalent). All 6 inputs on this module may be configured as either a sourcing digital input, a 32V analog input, a 4-20mA current-reading analog input, a 0-5V ratiometric input, or a frequency-reading input. This module uses J1939 Proprietary Peer-to-Peer Messaging.

Electrical/Mechanical/Environmental Specifications

Parameter	Min	Nominal	Max	Notes
Functional Battery Voltage	8VDC	28VDC	32VDC	12VDC or 24VDC supply supported.
Reverse Battery Protection	-	-	-32VDC	
Unit Current Consumption	-	-	34.8mA	All I/O turned off, 12VDC Supply.
Digital Input Logic High Threshold	-	7.0VDC	32.0VDC	+7VDC at any input is a guaranteed logic high in the digital input configuration.
Digital Input Logic Low Threshold	0.0VDC	5.5VDC	-	+5.5VDC at any input is a guaranteed logic low in the digital input configuration.
4-20mA Input Accuracy	0mA	-	22mA	+/- 3% Accuracy.
0-32V Analog Input Accuracy	0VDC	-	32VDC	+/- 3% Accuracy.
0-5V Ratiometric Input	0V	-	5V	+/- 3% Accuracy.
Frequency reading inputs threshold	20Hz	-	20kHz	+/- 3% Accuracy.
Frequency Input “High” Threshold	3.25VDC	-	32VDC	+3.25VDC min at any input is registered as a signal “high” in the frequency reading input configuration.
Frequency Input “Low” Threshold	0VDC	-	1.75VDC	+1.75VDC max at any input is registered as a signal “low” in the frequency reading input configuration.
ESD Protection		8KV	15KV	15KV air discharge, 8KV contact discharge on all pins.
Storage Temperature	-40°C	-	125°C	
Operating Temperature	-40°C	-	105°C	SAE J1455 Section 4.1.3, 8hr cycle.
CAN Baud Rate	-	250kbps	-	J1939 Proprietary Peer-to-Peer and Broadcast Messaging.

Parameter	Test
Thermal Shock, Thermal Shock Immersion	ISO 16750-4 Section 5.3.2, 5.4.3.
Humidity and Temperature Cycle	SAE J1455 Section 4.2.3, 4A, 8-hour cycle.
Ingress Protection	IP67 IEC 60519.
Mechanical Shock	50g Operational.
Fluid Compatibility	SAE J1455 Section 4.4, ISO16750-5 Engine Compartment Fluids.

Connector Specification and Pinout

All connectors shall be rated to IP67 standards. The recommended mating connector to this module is the DT04-12PA or any equivalent part. The recommended socket for this mating connector is the TE Connectivity/Deutsch 0462-201-16141.

Mating Connector
DT04-12PA

1 – Input 1
2 – Input 2
3 – Input 3
4 – Input 4
5 – Input 5
6 – Input 6
7 – ADDR2
8 – ADDR1
9 – CAN L
10 – CAN H
11 – GND
12 – +BATT

Description of Operation

Indicators & Lighting

Green (Power) LED

The green LED will illuminate when the module has been connected to power. It will remain on until the unit has been disconnected from its power supply.

Red (CAN) LED

The top-level red LED will flash for 10 seconds by default when it is powered on and connected to the CAN bus. It will turn off once the CAN timeout value has been reached. This indicates that the 6-Input Module has not received a message within the CAN timeout period.

Red (Input) LED's

There are six input LEDs on this module. When one of these LEDs is solidly on, it indicates that the corresponding input is configured successfully. If the LED is off, the corresponding input is unconfigured. If an input's LED is blinking, the input is configured in 4-20mA mode and has detected an overcurrent fault.

Normal Input Operation and Input Faults

Inputs may be configured in one of five different modes by the user:

Digital Sourcing Input

This input mode is a typical logic high/logic low input used to read the state of the input. The input will be high when the voltage at the sourcing digital input is between +7-32VDC. The input will report low when the voltage at the sourcing digital input is below +5.5VDC. Values between +5.6VDC and +6.9VDC are a "Do Not Care" condition and High/Low values are not guaranteed to be accurate in this range.

32V Analog Input

This input mode reads the voltage at an input and converts for the controller. Do not exceed 32V at this input. The scaling factor for an input configured in this mode is 0.008416V/unit. This means that the controller should multiply the decimal value of the data received from the input module by the scaling factor to get the voltage at the input. See the functional example at the end of this specification for a practical example of this mode.

4-20mA Analog Input

This input mode reads currents between 4mA and 20mA. The scaling factor for an input configured in this mode is 0.00548mA/unit. This means that the controller should multiply the decimal value of the data received from the 6-Input Module by the scaling factor to get the current (in mA) at the input. Currents below 4mA are read accurately and do not trigger a fault.

This mode has over-current protection. If the module reads a current higher than 22mA, the input will turn off and its corresponding LED will begin blinking. To reset the input, the user must disable the input and reconfigure it to 4-20mA Input Mode. See the 0xAC "Reset Faults" Message.

Ratiometric (0-5V) Input

This input mode is used to read a ratio of the measured input voltage compared to the reference voltage of 5.0V. The scaling factor for an input configured in this mode is 0.0012207V/unit. This means that the controller should multiply the decimal value of the data received from the input module by the scaling factor to get the ratiometric DC voltage (VDC) at the input.

20Hz to 20kHz Frequency Input

This input mode allows the user to read frequencies up to 20kHz at an input. Frequencies that fall below 20Hz cannot be read. The input signal "low" level is +1.75VDC **MAX** and input signal "high" level is +3.25VDC **MIN**.

Addressing Input Table (CAN ID)

Pins 7 and 8 are reserved as addressing input pins. The CAN-ID is changed on startup if connected. There are four possible CAN-IDs for this module that range from 0x50 to 0x53. To set the desired ID, reference the table below:

Addressing Input Table

ADDR 1	ADDR 2	CAN ID:
0	0	0x53
0	1	0x52
1	0	0x51
1	1	0x50

Key:
0 = Pin grounded
1 = Pin connected to +Battery or "floating"

The range of CAN ID's may be changed at the customer's request

J1939 Proprietary Messaging

Broadcast Message

This message is broadcasted from the 6-Input Module every second until a configuration message is received (0xA4 or 0xA5 message). This broadcast message contains the software date and revision.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Command	Month	Day	MSB Year	LSB Year	Major Revision	Minor Revision	Reserved
0x01	0x??	0x??	0x??	0x??	0x??	0x??	0xFF

Parameter	Parameter Description
Month	Indicates the month the software revision was completed: 0x01 Jan 0x07 Jul 0x02 Feb 0x08 Aug 0x03 Mar 0x09 Sep 0x04 Apr 0x0A Oct 0x05 May 0x0B Nov 0x06 Jun 0x0C Dec
Day	Indicates the day the software revision was completed: 0x01-0x1F = (1-31)
Year	Separated into two bytes, this data indicates the year the software revision was released: 0x07 0xE5 = (2021)
Major Revision	Major Revision starts at 0x01
Minor Revision	Minor Revision starts at 0x00

Input Configuration

This message is sent from the controller to module and allows the controller to individually configure any of the six inputs. The controller may configure only one input at a time. An input may be configured in any of the five input modes. This is also the message used to turn an input off.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Mode	Input	Reserved	Reserved	Reserved	Reserved	Reserved
0xA4	0x??	0x??	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Mode	Sets the configuration of each input: 0x00 Input Disabled (Turns input off if already configured) 0x01 Sourcing Digital Input 0x02 32V Analog Input 0x03 4-20mA Current-Reading Input 0x04 0-5VDC Ratiometric Input 0x05 20Hz-20kHz Frequency-Reading Input Note: To change input from one configuration to another, **you MUST disable the input first**, then you can re-configure the input as desired.
Input	This byte contains the input that is being configured: 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6

CAN Timeout Configuration

This message sent from the controller to the module, allows the controller to configure their desired CAN communication timeout.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Timeout Mode	Timeout Value	Reserved	Reserved	Reserved	Reserved	Reserved
0xA5	0x??	0x??	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Timeout Mode	0x00 Turns inputs off when CAN Message has not been received within the Timeout Value 0x01 Inputs stay in last configured state when CAN Message has not been received within the Timeout Value
Timeout Value (seconds)	The value transmitted to the input module in this byte sets the CAN Timeout in seconds. Range: 0x00-0xFF (0 seconds – 255 seconds) Note: Default timeout value is 10 seconds

Reset Input Faults

This message is sent from the controller to the module and allows the controller to reset the fault status of all the inputs. If an input is on and does not have a fault, this message will not have an effect on the input. In order for the input to be operational after having a fault reset, the input must be disabled/re-enabled or the module must be power cycled.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xAC	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Module Configuration Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the “Module Configuration Reply” message (0x20). A module will only report as unconfigured if no input configuration messages have been received yet.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xBB	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Module Configuration Reply

This is a message sent from the module to the controller and is response to the 0xBB message. This message contains the module's configuration state. If any input is configured successfully, this message will reply configured.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Configuration Status	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0x20	0x??	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Configuration Status	0x00 No Configuration 0x01 Configured

Input Configurations Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Input Configurations Reply" message (0x23).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xB3	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Input Configurations Reply

This is a message sent from the module to the controller and is response to the 0xB3 message. The data in this message contains the configuration of each input.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input 1 Configuration	Input 2 Configuration	Input 3 Configuration	Input 4 Configuration	Input 5 Configuration	Input 6 Configuration	Reserved
0x23	0x??	0x??	0x??	0x??	0x??	0x??	0xFF

Parameter	Parameter Description	
Configuration Status	0x00	Input Disabled or Turned Off
	0x01	Sourcing Digital Input
	0x02	32V Analog Input
	0x03	4-20mA Current-Reading Input
	0x04	0-5VDC Ratiometric Input
	0x05	20Hz-20kHz Frequency-Reading Input

CAN Timeout Value Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "CAN Timeout Value Reply" message (0x24).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xB4	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

CAN Timeout Value Reply

This is a message sent from the module to the controller and is response to the 0xB4 message. The data in this message contains the timeout configuration of the 6-Input module.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	CAN Timeout Value	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0x24	0x??	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
CAN Timeout Value	Timeout duration Note: Possible range of values is [0x00 - 0xFF] or [0-255] seconds.

Digital Input State Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Digital Input States Reply" message (0x30).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Subset	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC0	0x00	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Subset	This module only has one subset of inputs 0x00 Subset 1 (Inputs 1-6)

Digital Input State Reply

This is a message sent from the module to the controller and is response to the 0xC0 message. The data in this message contains the digital input states of each input.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Subset	Input 1 Digital State	Input 2 Digital State	Input 3 Digital State	Input 4 Digital State	Input 5 Digital State	Input 6 Digital State
0x30	0x00	0x??	0x??	0x??	0x??	0x??	0x??

Parameter	Parameter Description
Subset	This module only has one subset of inputs: 0x00 Subset 1 (Inputs 1-6)
Input State	Bytes[2-7] contain the digital input state of each input: 0x00 LOW 0x01 HIGH

Analog Input Value Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Analog Input Value Reply" message (0x31).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC1	0x??	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input that the analog value of is desired. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6

Analog Input Value Reply

This is a message sent from the module to the controller and is response to the 0xC1 message. The data in this message contains the analog input value of the specified input.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	MSB Data	LSB Data	Reserved	Reserved	Reserved	Reserved
0x31	0x00	0x??	0x??	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which the data being reported. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6
MSB/LSB Input Data	Bytes [2,3] contain the analog input value for the requested input: 0x0000-0x0FFF (0-4095) **Note:** The scaling factor for these 32V Analog inputs is 0.008416V/unit. The analog input value is a 12-bit measurement. **Example:** The value 0x0A 0x7C is transmitted to the controller, 0x0A7C is 2684 in decimal. (2684 x 0.008416V) = 22.59V at the requested input.

4-20mA Current-Reading Analog Input Value Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "4-20mA Current Reading Input Reply" message (0x32).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC2	0x??	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which current reading data is desired. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6

4-20mA Current-Reading Analog Input Value Reply

This is a message sent from the module to the controller and is response to the 0xC2 message. The data in this message contains the current reading of the requested input.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	MSB Data	LSB Data	Reserved	Reserved	Reserved	Reserved
0x32	0x00	0x??	0x??	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which current reading data is being reported. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6
MSB/LSB Input Data	Bytes [2,3] contain the current reading value for the requested input: 0x0000-0x0FFF (0-4095) **Note:** The scaling factor for these 4-20mA Current-Reading Analog inputs is 0.00548mA/unit. The input value is a 12-bit measurement. **Example:** The value 0x08 0xD1 is transmitted to the controller, 0x08D1 is 2257 in decimal. (2257 x 0.00548mA) = 12.36mA at the requested input.

0-5V Ratiometric Analog Input Value Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Ratiometric Analog Input Value Reply" message (0x33).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC3	0x??	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which the ratiometric analog value is desired. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6

0-5V Ratiometric Analog Input Value Reply

This is a message sent from the module to the controller and is response to the 0xC3 message. The data in this message contains the 0-5V analog input value.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	MSB Data	LSB Data	Reserved	Reserved	Reserved	Reserved
0x33	0x00	0x??	0x??	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which the ratiometric analog value is being reported. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6
MSB/LSB Input Data	Bytes [2,3] contain the ratiometric analog input data for the requested input: 0x0000-0x0FFF (0-4095) **Note:** The scaling factor for these 0-5V Ratiometric Analog inputs is 0.0012207V/unit. The input value is a 12-bit measurement. **Example:** The value 0x0D 0x8C is transmitted to the controller, 0x0D8C is 3468 in decimal. (3468 x 0.0012207V) = 4.23V at the requested input.

Frequency Reading Input Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Frequency Reading Input Reply" message (0x34).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC4	0x??	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which the frequency reading is desired. 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6

Frequency Reading Input Reply

This is a message sent from the module to the controller and is response to the 0xC4 message. The data in this message contains the frequency at the requested input.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input	MSB Data	LSB Data	Reserved	Reserved	Reserved	Reserved
0x34	0x00	0x??	0x??	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Input	This byte contains the input of which the frequency data is being reported 0x00 Input 1 0x01 Input 2 0x02 Input 3 0x03 Input 4 0x04 Input 5 0x05 Input 6
MSB/LSB Input Data	Bytes [2,3] contain the frequency reading data for the requested input. 0x0000-0xFFF0 (0-65,520) **Note:** These frequency inputs cannot read frequencies under 20Hz. **Example:** The value 0x30 0xD4 is transmitted to the controller, 0x30D4 is 12,500 in decimal. This means that the frequency at the input is 12.5kHz.

Input Fault State Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Input Fault State Reply" message (0x35).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC5	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Input Fault State Reply

This is a message sent from the module to the controller and is response to the 0xC5 message. The data in this message contains the fault state of each input.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Input 1	Input 2	Input 3	Input 4	Input 5	Input 6	Reserved
0x35	0x00	0x??	0x??	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Fault Condition	0x00 No Fault 0x01 Short Circuit Fault 0x02 Overcurrent Fault

Battery Voltage Request

This is a message sent from the controller to the module. When this message is received by the module, it will reply with the "Battery Voltage Reply" message (0x36).

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
0xC6	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF

Battery Voltage Reply

This is a message sent from the module to the controller and is response to the (0xC6) message. The data in this message contains the Battery Voltage as a 12-bit measurement.

BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Multiplex	MSB Battery Voltage	LSB Battery Voltage	Reserved	Reserved	Reserved	Reserved	Reserved
0x36	0x??	0x??	0xFF	0xFF	0xFF	0xFF	0xFF

Parameter	Parameter Description
Battery Voltage Data	Bytes [1,2] contain a 12-bit measurement of the battery voltage. **Note:** The scaling factor for the battery voltage reading is 0.0075. **Example:** The value 0x0E 0x17 is transmitted to the controller, 0x0E17 is 3607 in decimal. (3607 x 0.0075) = 27.05V as the measured battery voltage.

Functional Example

1. **With power off, connect the 6-Input Module to power (pin 12) and ground (pin 11). Connect pin 10 to CAN_H and pin 9 to CAN_L. Connect Addr1 (pin 8) and Addr2 (pin 7) to ground.**
    a. Power provided must be in the range of 8-32VDC, 24VDC used in this example.
    b. CAN Communication is 250k baud rate for this module.
    c. Addr1 and Addr2 connected to ground sets the 6-Input Module Address to **53**.
2. **Turn power on and verify the CAN LED starts blinking; Broadcast message (0x01) should be transmitted once per second.**
    a. The default CAN timeout is 255 seconds.
    b. Verify the 6-Input Module is broadcasting the software revision.
        i. CAN ID: 0x10FF0053
        ii. Data (Bytes 0-7): 0x01 0x04 0x0E 0xE5 0x07 0x02 0x00 0xFF (Note: the data will be different if SW revision has been updated after this example was written)
3. **Configure the CAN timeout from the controller to the input module.**
    a. Send the CAN Configuration Timeout message (0xA5). It will be configured for 10 seconds and to shut off inputs in this example.
        i. CAN ID: 10EF5300
        ii. Data (Bytes 0-7): 0xA5 0x00 0x0A 0xFF 0xFF 0xFF 0xFF 0xFF
    b. Verify the CAN LED blinks for 10 seconds, and then turns off. When the CAN LED turns off, it indicates a message has not been received in last 10 seconds.
4. **Send the input configuration message to the input module.**
    a. This message is sent from the controller to the input module to configure an input. In this example, Input 4 will be configured as a 32V analog input. Do not connect input 4 to anything yet.
        i. CAN ID: 10EF5300
        ii. Data (Bytes 0-7): 0xA4 0x02 0x03 0xFF 0xFF 0xFF 0xFF 0xFF
    b. Verify the Input 4 LED turns on and stays on after sending message.

5. **Send the Analog Input Value Request message on a cycle to the input module.**
    a. This request message is sent from the controller to the input module and will cause the input module to reply to the controller. Set up this message to send once every 1000ms.
        i. CAN ID: 10EF5300
        ii. Data (Bytes 0-7): 0xC1 **0x03** 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF (0x03 in byte[1] specifies input 4 is being requested).
    b. The Analog Input Value Response message will be sent back to the controller.
        i. CAN ID: 10EF0053
        ii. Data (Bytes 0-7): 0x31 **0x00 0x00** 0xFF 0xFF 0xFF 0xFF 0xFF
        iii. Since the analog input is not connected to anything, a value of zero is observed.
6. **Connect input 4 to the 24V power supply and send the Analog Input Value Request message again.**
    a. Connect Input 4 (pin 4) to the +24VDC power supply.
    b. The Analog Input Value Response message will be send back to the controller:
        i. CAN ID: 10EF0053
        ii. Now that the analog input is connected to battery, the controller will get non-zero data back in bytes [1,2].
        iii. Data (Bytes 0-7): 0x31 **0x0B 0x24** 0xFF 0xFF 0xFF 0xFF 0xFF
        iv. A hex value of 0x0B 0x24 is exactly 24.0VDC, so the accepted range will be 0x0A 0xCE (2766d or 23.28V) to 0x0B 0x7A (2938d or 24.73VDC).
7. **Disable the input**
    a. Send the Input Configuration message (0xA4) to disable input 4.
        i. CAN ID: 10EF5300
        ii. Data (Bytes 0-7): 0xA4 **0x00** 0x03 0xFF 0xFF 0xFF 0xFF 0xFF (0x00 in byte[1] disables the input specified in byte[2])
    b. The Input 4 LED should turn off once this message is sent.
        i. If the Analog Input Value Request message is sent again, the Analog Input Value Response message will report:
        Data (Bytes 0-7): 0x31 **0x00 0x00** 0xFF 0xFF 0xFF 0xFF 0xFF