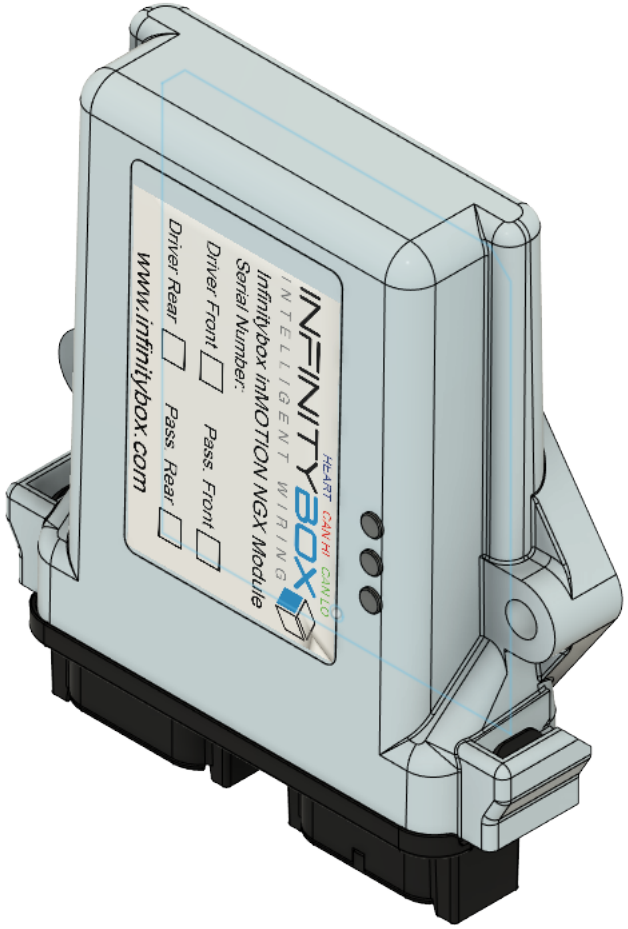
INFINITYBOX
INTELLIGENT WIRING

15th ANNIVERSARY



Infinitybox

inMOTION NGX
852-086A8
Quick Start Guide
Software REV2

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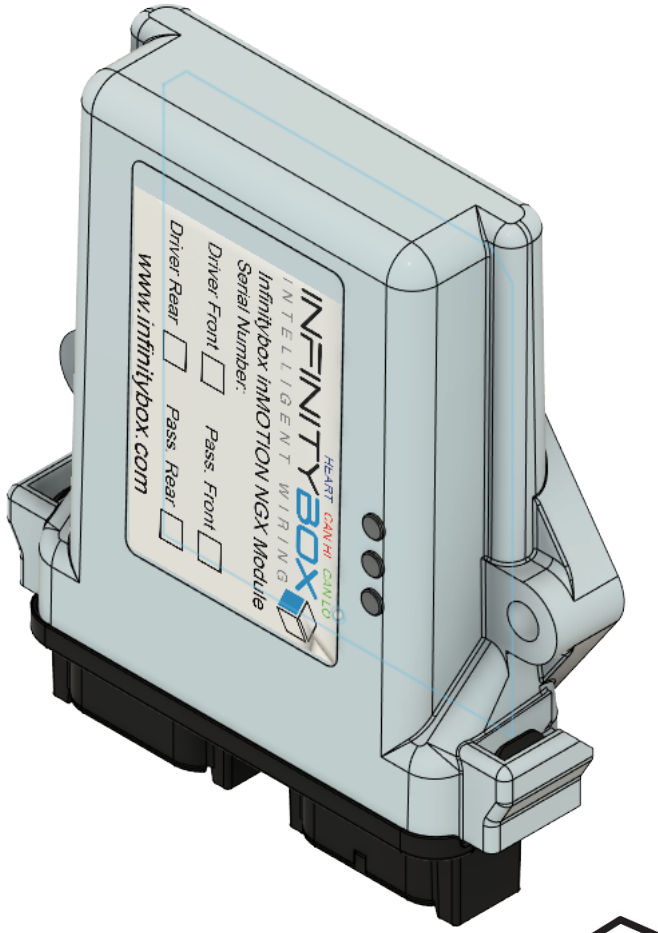
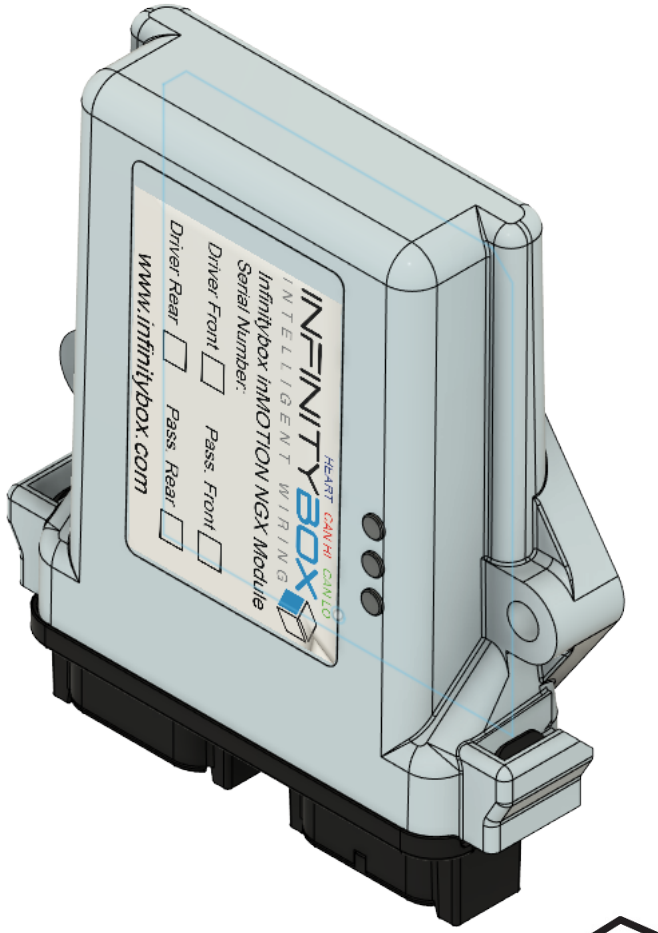
inMOTION NGX

- *J1939-based H-bridge polarity control module*
- Small and space efficient
- Deutsch Enclosure- Sealed IP67
- Active current monitoring for all outputs
- User Configurable via USB or J1939



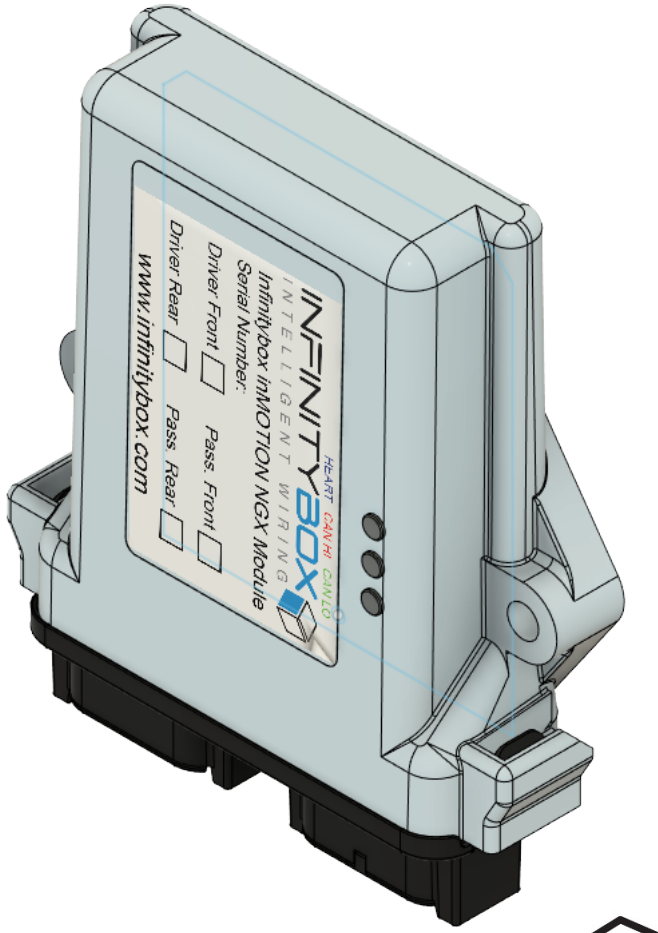
inMOTION NGX- Inputs & Outputs

- Two 25-amp H-Bridge relays
  - Relay 1: A & B, Relay 2: A & B
- Four 1-Amp outputs
  - Output 1 through Output 4
- Eight local inputs, low-side switched
  - Local control of outputs or broadcast J1939 Messages
  - Input 1 through Input 8
- Outputs can be controlled locally or via J1939
- Selectable Output Personalities
- inMOTION NGX learns current profile for outputs



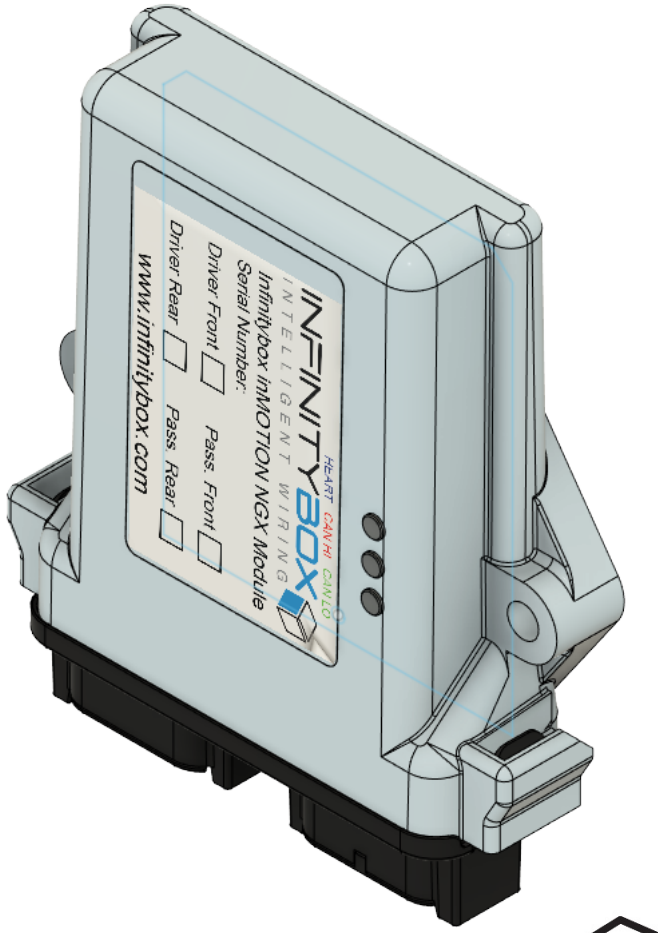
inMOTION NGX- Configurability

- User Configurable via USB or J1939
  - Switches can be configured to track, timed or express
  - Inbound and outbound CAN parameters can be set
  - Outbound CAN messages can be set for each input



inMOTION NGX- Applications

- Power Window & Power Lock Control in Doors
- 2-Axis Control of Nozzles & Sprayers
- 2-Axis Lighting Gimbals
- Electric Parking Brake Control



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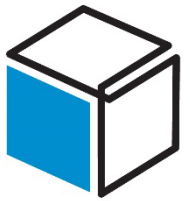
Electrical Specifications

- Operating Voltage Range: 10.0 to 18.0 VDC
- Nominal Quiescent Current Draw: 0.020 Amps
- Maximum Current on H-Bridge Outputs:
  - 10-Amps Continuously
  - 25-Amps 10% Duty Cycle
- Maximum Current MOSFET Outputs: 1-Amp per output
- Module protected against Load Dump per ISO 16750-2
- TVS protection built onto all outputs for back EMF suppression



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Electrical Warnings

- Do Not Reverse Primary Power Polarity
- All inputs are intended to be ground switched. Do not apply battery voltage to inputs.

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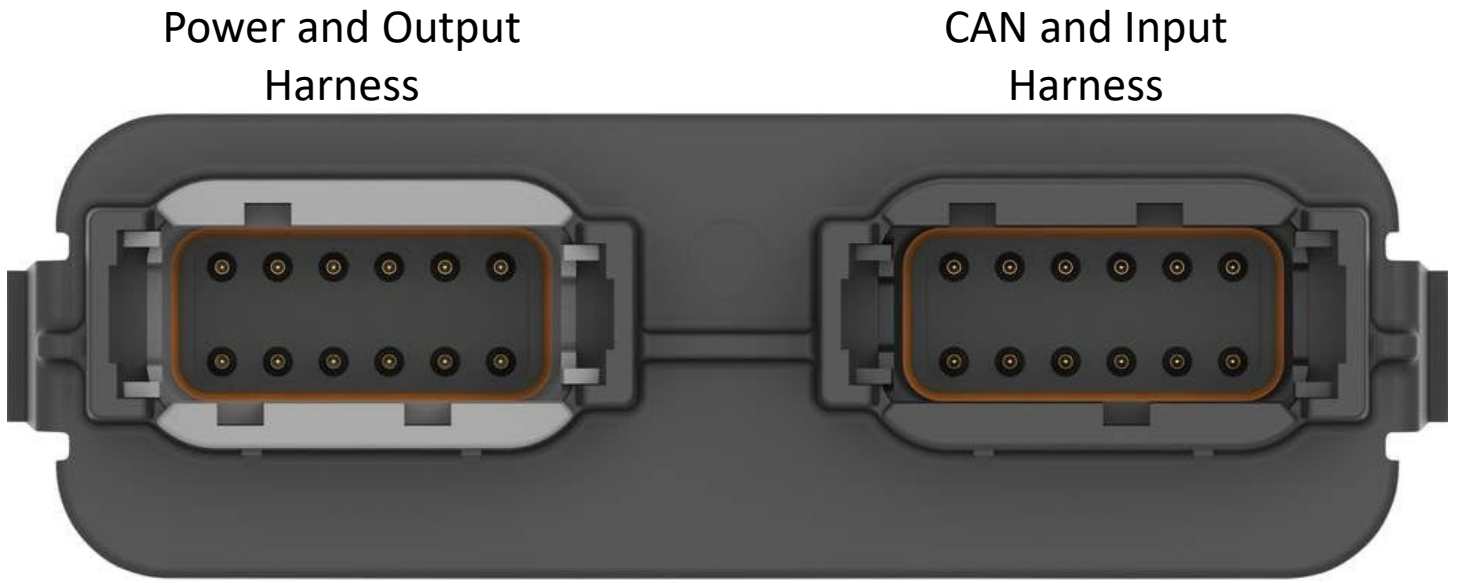
Connector Details



- Power & Output Harness
  - Connector: DTM06-12SA
  - Wedgelock: WM-12S
  - Terminal: 1062-20-0622
- CAN & Input Harness
  - Connector: DTM06-12SB
  - Wedgelock: WM-12S
  - Terminal: 1062-20-0222

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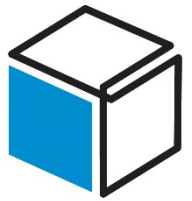
Power & Output Harness

Infinitybox Harness Part Number: 858-501

Cavity ID	Function	Wire Color	Wire Gauge
1	Relay 2A Output	Yellow	14-AWG
2	Relay 1A Output	White	14-AWG
3	Output 3	Light Green	14-AWG
4	Output 1	Brown	14-AWG
5	Chassis Ground	Black	14-AWG
6	Chassis Ground	Black	14-AWG
7	+ Battery Voltage	Red	14-AWG
8	+ Battery Voltage	Red	14-AWG
9	Output 2	Violet	14-AWG
10	Output 4	Light Blue	14-AWG
11	Relay 1B	Grey	14-AWG
12	Relay 2B	Orange	14-AWG



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CAN & Input Harness

Infinitybox Harness Part Number: 858-502

Cavity ID	Function	Wire Color	Wire Gauge
1	CAN LO	Green	22-AWG
2	CAN HI	Yellow	22-AWG
3	Input 2	White-Red	22-AWG
4	Input 4	White-Yellow	22-AWG
5	Input 6	Blue-Black	22-AWG
6	Input 8	Blue-Grey	22-AWG
7	Input 7	Blue-Red	22-AWG
8	Input 5	White-Green	22-AWG
9	Input 3	White-Blue	22-AWG
10	Input 1	White-Black	22-AWG
11	Ground (Reference for Switches)	Black	22-AWG
12	Ground (Reference for Switches)	Black	22-AWG

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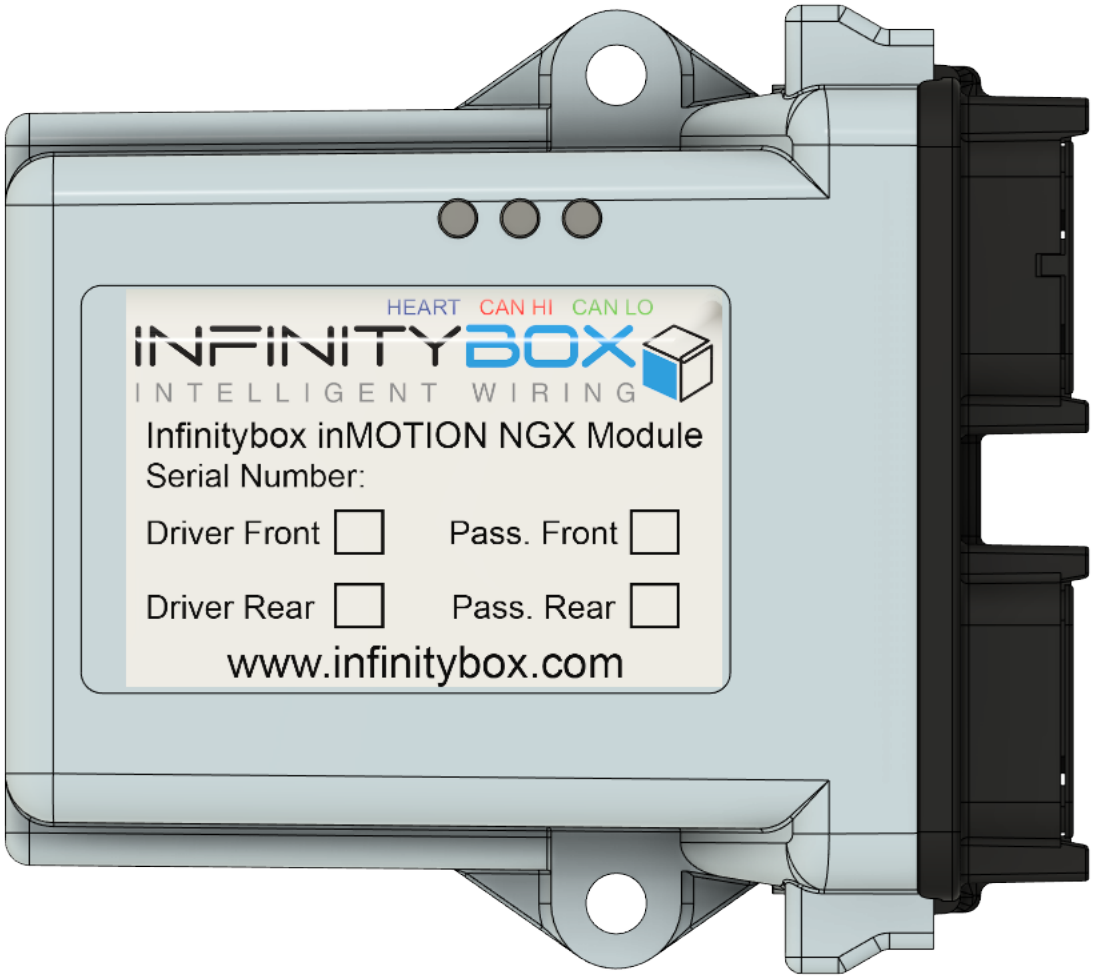
inMOTION NGX Indicator Lights



- Heart
  - Heartbeat Indicator
  - Blinks once per second
  - Blinks when switch state changes
  - Blinks when CAN message is received or sent
- CAN HI
  - CAN HI Indicator
    - Will flash to indicate CAN traffic
- CAN LO
  - CAN LO Indicator
    - Will flash to indicate CAN traffic

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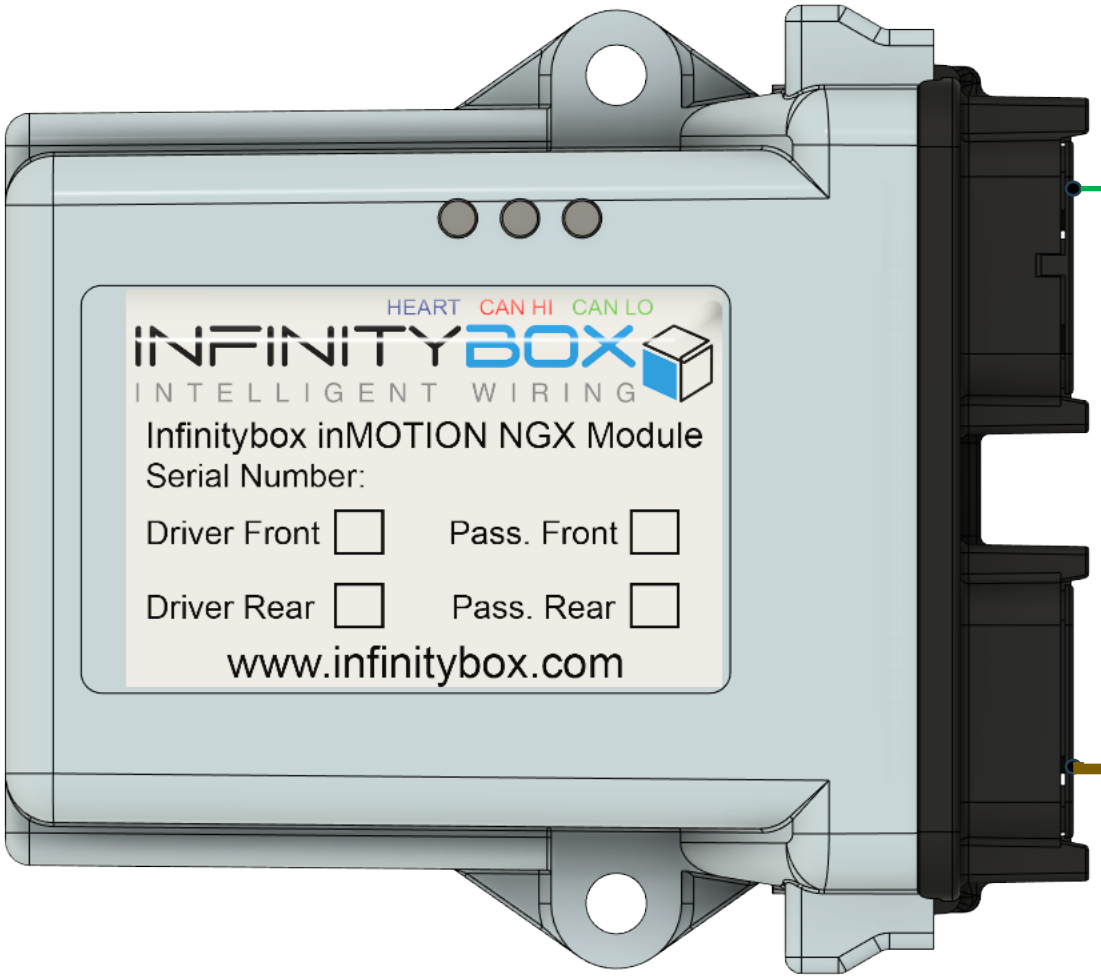
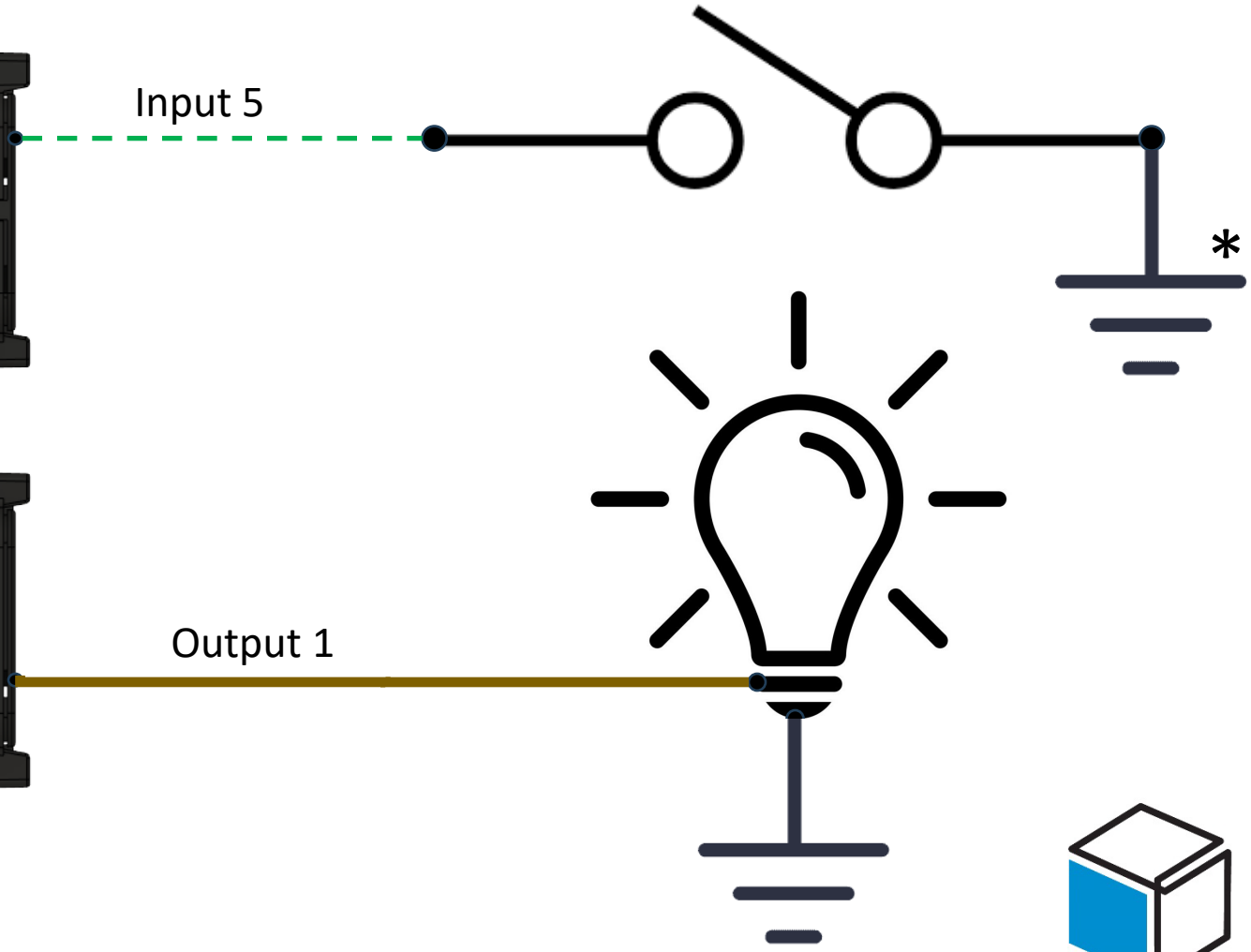
Simple Output Control





* Black wires in CAN & Input Harness can be used for switch ground

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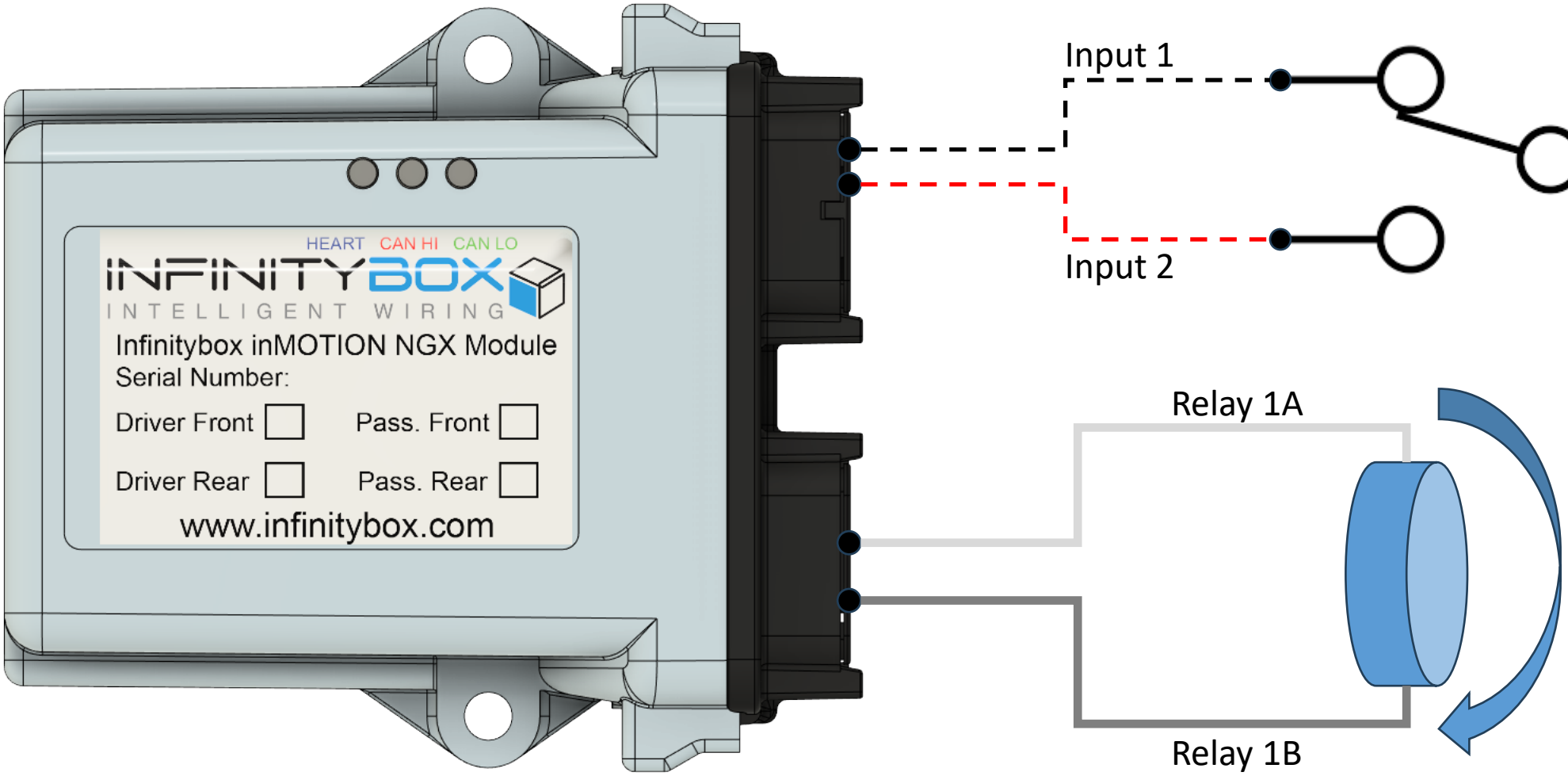
Simple H-Bridge Control



* Black wires in CAN & Input Harness can be used for switch ground

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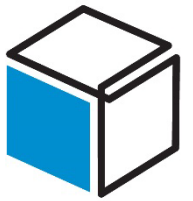
Output Personality

- Track
  - Output tracks state of input or CAN bit.
    - If switch is on, output is on. If switch is off, output is off.
    - If CAN bit is high, output is on. If CAN bit is low, output is off
  - Output will turn off if current draw exceeds limit set in EEPROM
- Timed
  - For Wired Inputs, timer starts when switch turns on.
    - Timed value set in EEPROM. Range is 0.25 to 4 seconds in 0.25 second steps.
    - Output will turn on and stay on until timer elapses, regardless of switch state.
    - Cycling input during timer period will restart timer.
    - Output will turn off if current value exceeds value stored in EEPROM.
  - For CAN control, timer starts when control bit is set high.
    - Timer value is set in CAN message (0.25 to 4 seconds in 0.25 second steps)
    - Cycling CAN bit during timer period will restart timer.
    - Output will turn off if current value exceeds value stored in EEPROM.
- Express (Only Applies to H-Bridge Relay Outputs)
  - Output turns on when switch turns on or CAN bit is set high.
  - Output will stay on until current limit exceeds value stored in EEPROM
  - Output will turn off if Express Safety Timer set in EEPROM is exceeded



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Default Input Details

Pin	Designation	Function	Details	Default Output	Default Personality
10	Input 1	Input 1	Low-Side Switched Input	Relay 1A	Track
3	Input 2	Input 2	Low-Side Switched Input	Relay 1B	Track
9	Input 3	Input 3	Low-Side Switched Input	Relay 2A	Track
4	Input 4	Input 4	Low-Side Switched Input	Relay 2B	Track
8	Input 5	Input 5	Low-Side Switched Input	Output 1	Track
5	Input 6	Input 6	Low-Side Switched Input	Output 2	Track
7	Input 7	Input 7	Low-Side Switched Input	Output 3	Track
6	Input 8	Input 8	Low-Side Switched Input	Output 4	Track

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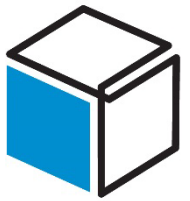
Default CAN Parameters

- J1939 Data Rate: 250 kb/s
- Inbound J1939 CAN PGN: FF03 SA 1A (Selectable in EEPROM)
- Outbound J1939 CAN PGN: FF33 SA 1B (Selectable in EEPROM)
- Message Priority: 18 (Selectable in EEPROM)
- CAN lines must be terminated to 60 Ohms externally



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Outbound J1939 Messaging

Byte 0								Byte 1								Byte 2								Byte 3							
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Relay 1A State				Relay 1B State				Relay 2A State				Relay 2B State				Output 01 State				Output 02 State				Output 03 State				Output 04 State			
Open	Relay 1A Current Limit	OPEN	Relay 1A ON	Open	Relay 1B Current Limit	OPEN	Relay 1B ON	Open	Relay 2A Current Limit	OPEN	Relay 2A ON	Open	Relay 2B Current Limit	OPEN	Relay 2B ON	Open	MOSFET Current Limit	OPEN	Output 01 ON	Open	MOSFET Current Limit	OPEN	Output 02 ON	Open	MOSFET Current Limit	OPEN	Output 03	Open	MOSFET Current Limit	OPEN	Output 04

- Message broadcast every 500 ms or upon change of switch state or receipt of valid CAN frame or if a current limit is reached
- Current Limit Bit strobes high when current limit is exceeded
- ON Bit is high when output is turned on

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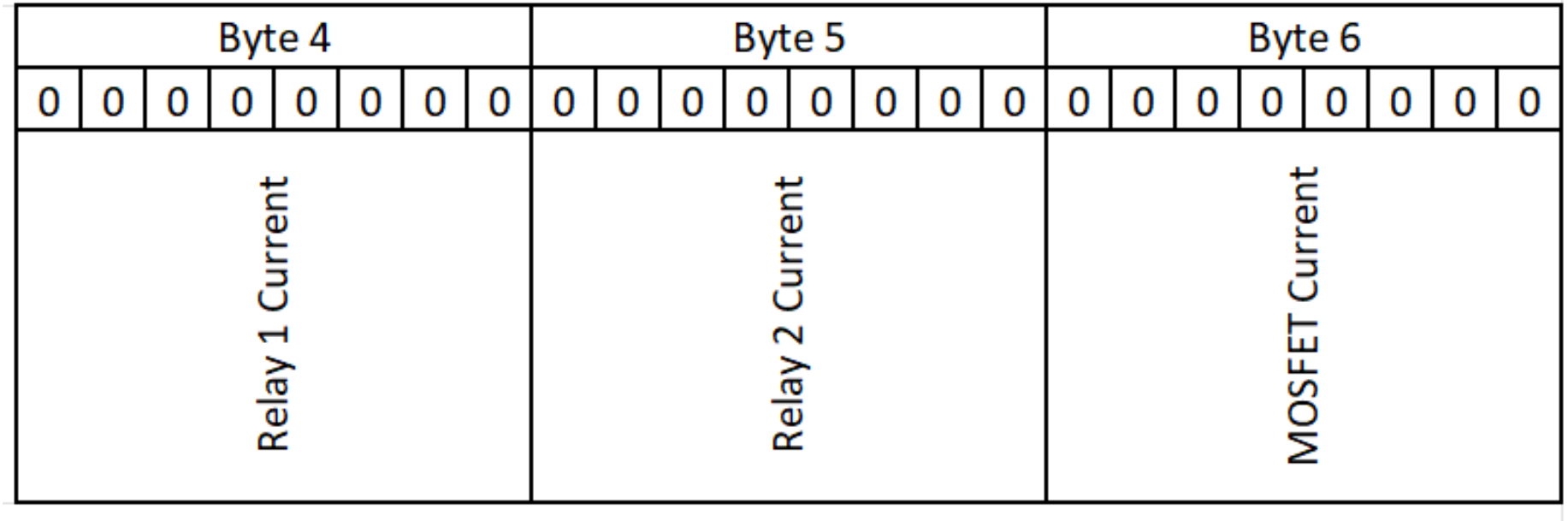
Outbound J1939 Messaging



Byte 4								Byte 5								Byte 6							
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Relay 1 Current								Relay 2 Current								MOSFET Current							

- Relay 1 and Relay 2 Current: 196 mA per count
- MOSFET Current: 20 mA per count
  - MOSFET Current is the Aggregate of all 4 Outputs

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Inbound J1939 Messaging

Byte 0								Byte 1								Byte 2								Byte 3							
1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Relay 1A							Timed value	Relay 1B							Timed value	Relay 2A							Timed value	Relay 2B							Timed value
Byte 4								Byte 5								Byte 6								Byte 7							
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mosfet 1							Timed value	Mosfet 2							Timed value	Mosfet 3							Timed value	Mosfet 4							Timed value
00 Off | 01 On | 10 Timed | 11 Express																															

- BIT 0: Modifier bit:
  - Set bit to 1 to change output
  - Message will be ignored if set to 0
- BIT 1: Unused
- BIT 2-3: Output Personality
  - 00 Sets output state to OFF
  - 01 Sets output state to ON
  - 10 Sets output state to Timed
  - 11 Sets output state to Express
    - (Only Applicable to Relay Outputs)
- BIT 4-7: Timer Value
  - Each count is 0.25 seconds
  - Only applicable when Timer personality is set

Byte 0							
1	0	1	0	0	1	1	0
Relay 1A							Timed value

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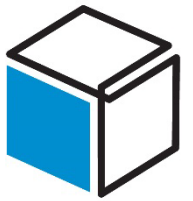
Inbound J1939 Examples

- Turn on Relay 1A to Track
  - CAN ID: FF031A Byte 0: 10010000
  - Returned Message: FF331B Byte 0: 00010000 Byte 4: Data for Current Flow
- Turn off Relay 1A
  - CAN ID: FF031A Byte 0: 10000000
  - Returned Message: FF331B Byte 0: 00000000 Byte 4: 00000000
- Turn on Output 1 for 1 second
  - CAN ID: FF031A Byte 4: 10100100
  - Returned Message: FF331B Byte 2: 00010000 Byte 6: Data for Current Flow



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Contact Infinitybox

Infinitybox, LLC
6460 W Cortland Street
Chicago, IL 60707
(847) 232-1991
www.infinitybox.com