



QUICK START GUIDE

NEXUS T2/T1 ECU OVERVIEW



The Nexus T2/T1 ECUs stand at the forefront of engine management systems, featuring cutting edge technology and innovative features. Designed for the next generation of automotive enthusiasts and professionals, these state of the art ECUs seamlessly combine powerful engine control with a range of additional functionalities, making them versatile and comprehensive solutions for everything from everyday driving to high performance racing.

The Nexus T2/T1 ECUs are fully compatible with a myriad of Haltech devices, streamlining the configuration of engine parameters and additional functionalities, all programmable using a single piece of software.

Experience high-speed USB and wireless connectivity, allowing for seamless communication between the ECU and your tuning device. The Nexus T2/T1 ECUs are revolutionary engine management systems that transcend conventional boundaries, offering a comprehensive solution for performance tuning and control. With their advanced features, user-friendly interface, and seamless connectivity, they redefine the standard for engine management systems in the automotive industry.

Optional accessories (sold separately)

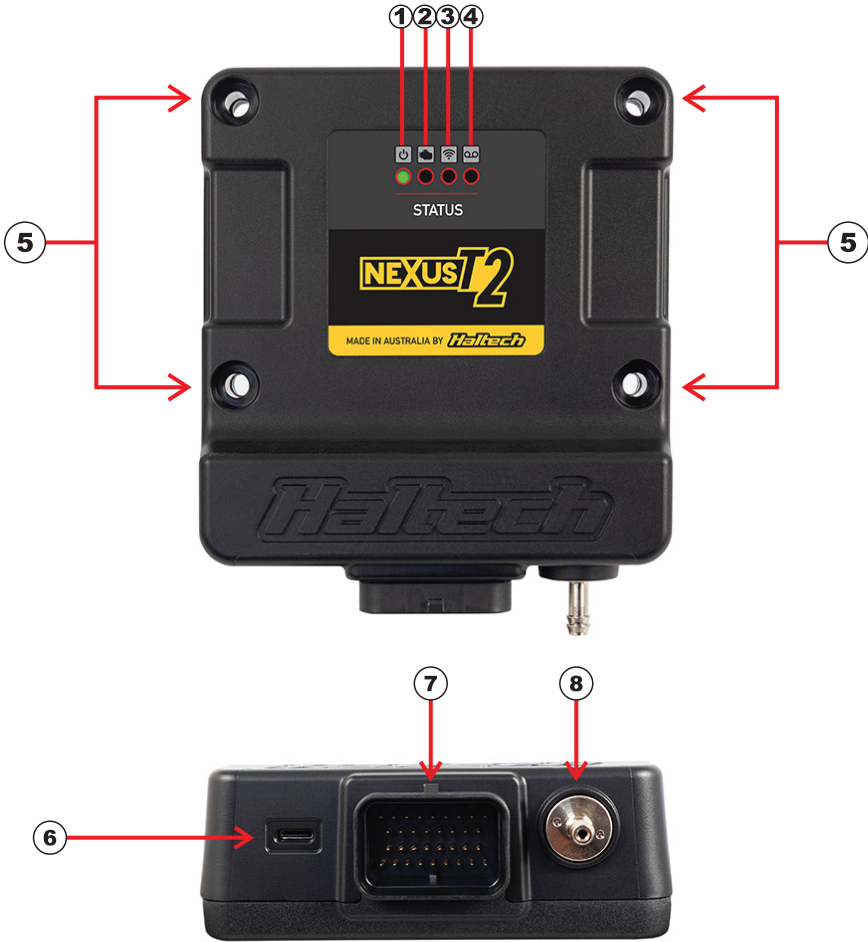
- HT-030009 - AMP 34-pin Key 1 plug and pins set
- HT-181200 - Nexus T2/T1 Basic universal wiring harness 2.5m (8')
- HT-181201 - Nexus T2/T1 Premium universal wiring harness 2.5m (8')
- HT-159976 - WB1 Bosch LSU 4.9 Single Channel CAN O2 Wideband Controller Kit
- HT-159986 - WB2 Bosch LSU 4.9 Dual Channel CAN O2 Wideband Controller Kit

What's in the box?

- Nexus T2 or T1 ECU
- USB-C Cable
- USB-C Dust Cap
- Mounting Bolts

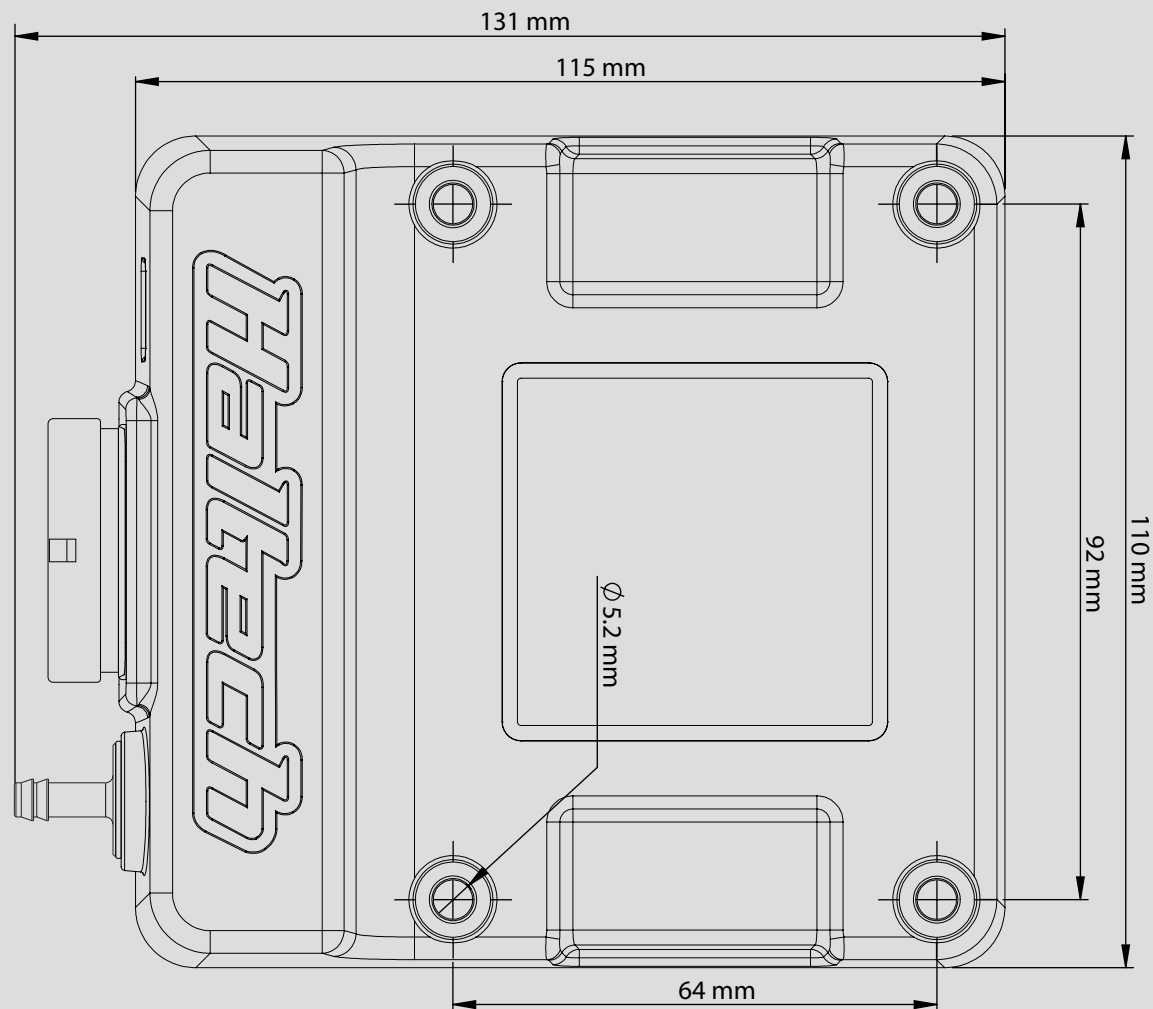


NEXUS T2/T1 ECU OVERVIEW



- 1 Power LED
- 2 DTC LED
- 3 Wireless LED
- 4 Datalog LED
- 5 Mounting Holes
- 6 USB-C Port (Comms)
- 7 Connector A (AMP 34 pin Keyway 1)
- 8 Onboard MAP sensor (4 BAR)

MOUNTING TEMPLATE



NEXUS T2/T1 LED BEHAVIOR

LED	COLOR	CONDITION
	Power	Green
		Blue
		Red
	DTC	None
		Yellow
	Wireless	None
		Green solid
		Green flashing
	Datalog	None
		Yellow flashing
		Yellow

NEXUS T2/T1 SPECIFICATIONS



FEATURES	
Throttle Support	Cable Throttle
Flex Fuel	Yes
Closed Loop O2 Control	Dual Bank
Knock Sensor Input	Single
Variable Cam Control	Up to 2 channels
Long Term Learning	Up to 4D
Data Logging	Laptop + Onboard
Anti-Lag Rotational Idle	Yes
Launch Control	Yes
Traction Control	Yes
Tuning Table Resolution	32 x 32 x 8 4D
Engine Protection	Multi Level

FEATURES continued	
CAN Networks	1
Nitrous Control Stage	6
Boost Control	4D Closed Loop
CO2 Control	Yes
Intake Air Bleed Control	Yes
Flat Shift Control	Advanced
Shock Travel & Ride Height	Yes
Trans Brake	Yes
Race Timer	Yes
Advanced Torque Management	Yes
Wideband O2 support	via Haltech WB1/WB2

OUTPUTS	
Ignition	Nexus T2: 6 Nexus T1: 4
Injector (peak and hold)	Nexus T2: 6 Nexus T1: 4
Digital Pulsed Outputs (DPO)	5

INPUTS	
Onboard MAP sensor (4 bar)	1
Analog Voltage Inputs (AVI)	5
Differential Engine Position Inputs	2 (Trigger and Home)
Synchronised Pulsed Inputs (SPI 1)	1
Knock Input / SPI 2	1

OTHER	
4 Channel Oscilloscope	50kSa/s per channel, 2ms/Div limit, optional external trigger
5V Sensor Supply	1
Sensor Ground	1

COMMUNICATIONS	
CAN Bus Networks 1000, 500 or 250 kbit/s	1
High Speed USB 2.0 (USB-C interface) 480 Mbit/s connection	1
Power up over USB	Datalogging, settings and firmware upgrade available
Wireless	900 kB/s datalog extraction, Hardware lockout for security

DATA LOGGING	
Location	Onboard
Storage	32MB
Max sampling frequency	1kHz
Maximum channels per log	300

DIMENSIONS	
Enclosure	115 x 110 x 40 mm (4.5 x 4.3 x 1.6 in)
Overall (inc. connector protrusion)	131 x 110 x 40 mm (5.2 x 4.3 x 1.6 in)
Weight	0.39 kg (0.86 lbs)
Operating Temperature (ambient)	-40 to +85°C (-40 to +185°F)

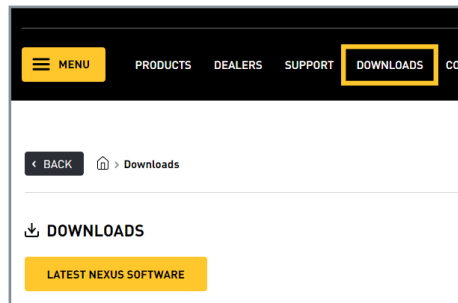
ELECTRICAL	
Power Supply (across power terminals)	8 to 22V
No output static current draw	< 1A
Low Power Mode (USB)	4 to 5.5V
Static current draw from USB port	< 500mA

NEXUS SOFTWARE PROGRAMMER

Installing the NSP software

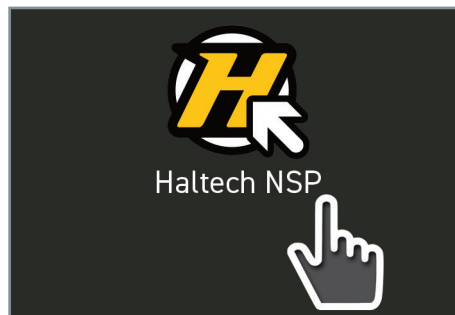
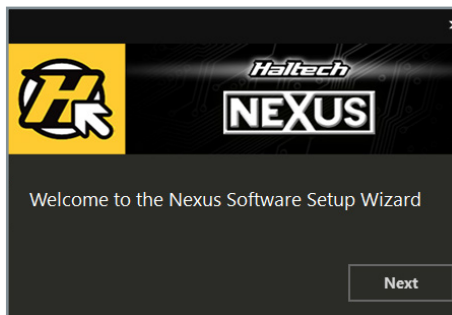
Haltech NSP (Nexus Software Programmer) is the software used for tuning and programming the Nexus T2/T1 ECUs. Follow these steps to install the Haltech NSP software:

1. Download the NSP installer - Go to the Haltech website (www.haltech.com), navigate to the 'Downloads' section, and click on the download link.



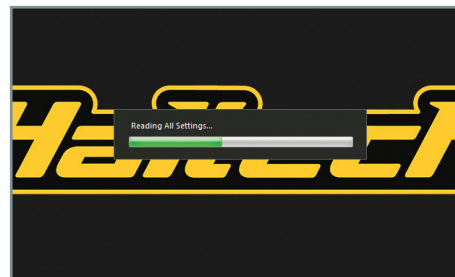
2. Run the installer file - Once the download is complete, locate the downloaded file (usually in the 'Downloads' folder of your computer) and double-click on the file to run the Nexus Software Setup Wizard.

3. Launch Haltech NSP - Once the installation is complete, you can launch the Haltech NSP software from the Windows 'Start' menu or using the desktop shortcut that was created.



Going online with the ECU

With the NSP software open, connect the supplied Haltech USB cable between your laptop and the USB-C port on the front of the Nexus T2/T1 ECU.



The USB connection allows the NSP software to automatically recognize the ECU and activate it in low-power mode. This enables you to either upload a basemap or create a new one before installing the ECU into the vehicle. In low-power mode, the ECU's inputs and outputs are disabled, allowing you to safely configure your vehicle setup before installation and full power activation.

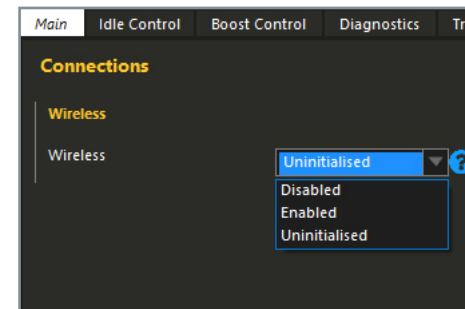
Setting up Wireless communications

Wireless communication is another method for connecting the Nexus T2/T1 ECU to your laptop or mobile device (see Haltech Connect App), serving as an alternative to a USB connection once the Wireless module is enabled.

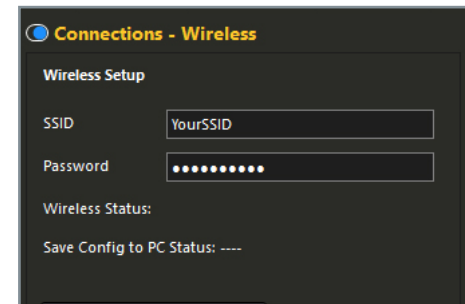
To set up your Wireless connection follow these steps:

1. Open NSP and connect your Nexus T2/T1 ECU using the provided USB-C cable.

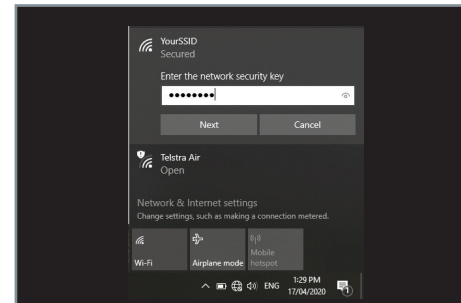
2. Click on 'Connections' in the navigation tree and enable the Wireless module.



3. Under 'Connections', select 'Wireless' to set up your SSID and password. Note that your SSID must be at least 1 character long, and your password at least 8 characters. Click 'Apply'.



4. Power up the ECU using main power (ignition switch on), then go to your computer's Network settings. Connect to your Nexus T2/T1 ECU by selecting your chosen SSID and entering your password.



NOTE: The Wireless antenna is internal on the Nexus T2/T1 ECU. The unit must be powered by the main power source for Wireless communication. Up to two computers can connect to the ECU via Wireless, and one via USB-C, at any given time. When the Wireless module is disabled, it is completely inactive and held in an OFF state.

Haltech Connect App

The Haltech Connect App enables you to connect wirelessly to and interact with your Haltech Nexus T2/T1 ECU via your smartphone or tablet. View real-time data from the ECU, set up basic gauges, clear DTCs, assign wiring, and adjust select parameters. Available for free on Google Play (Android) and the Apple App Store (iOS).



Power and Ground Pins

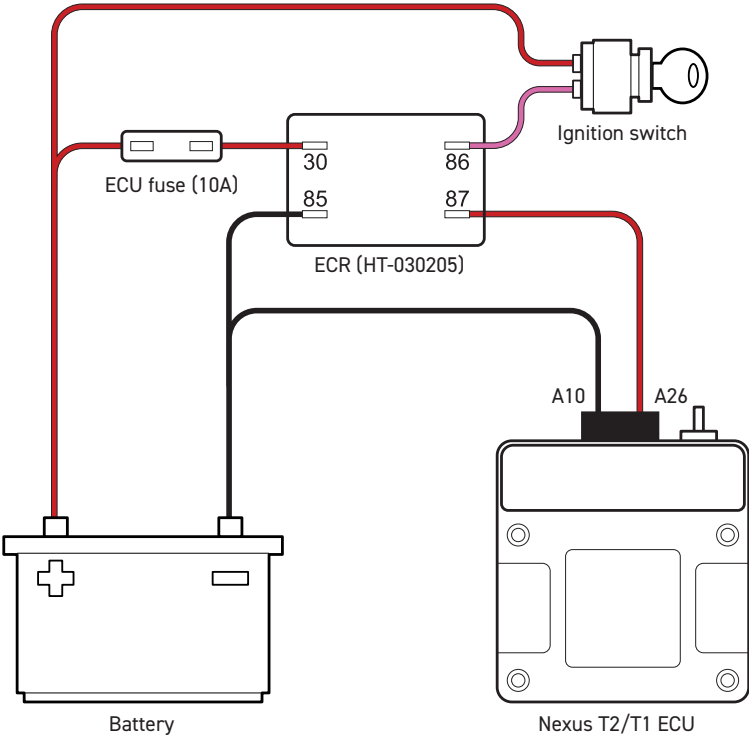
The Nexus T2 or Nexus T1 ECU power (A26) and ground (A10) pins must be wired correctly to ensure reliable and effective operation.

The ECU ground pin must be wired directly to the battery negative terminal. The power supply pin must be fused and switched through an Engine Control Relay (ECR) to provide a stable and protected power supply.

The ECR must be wired so that the relay receives a switched 12V signal from the ignition switch, and that this signal remains active when the ignition key is in both the ON and START positions. This ensures the ECU remains powered during ignition and engine cranking, preventing start-up issues that could place unnecessary strain on engine components.

The wiring diagram provided below illustrates this configuration in detail. The relay shown in the wiring diagram is a HT-030205 micro relay using the following internal schematic:

If you are using a different relay, ensure that it is wired according to that relay's specific switching schematic.



Example wiring configuration for the ECU's main power and ground, with the ignition key switch controlling the Engine Control Relay (ECR).

Crank (Trigger) and Cam (Home) Inputs

The crank and cam position sensors are necessary for providing the ECU with vital information to determine engine speed and position at any given moment. Typically, two sensors are required – one for cam position and one for crank position. However, many engines may only have a cam position sensor capable of supplying sufficient information for the ECU to effectively manage engine operation.

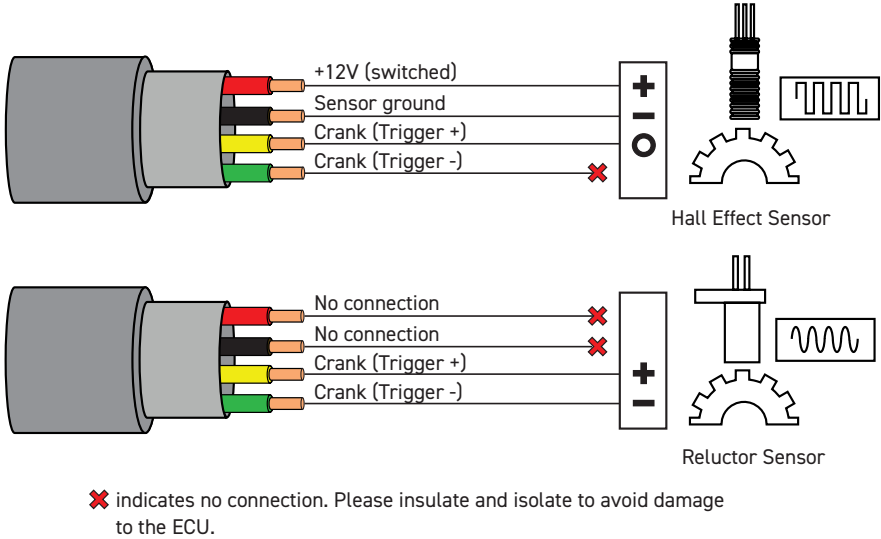
Vehicles equipped solely with a crank position sensor lack the capability to differentiate between compression and exhaust strokes, making them unsuitable for sequential fire applications. In such cases, it may be necessary to add a cam position sensor.

It is recommended to use four-core or twin-core shielded cable for crank and cam position sensors. Shields must be terminated to battery ground at one end only.

Specs:

- -10V to +10V input
- Selectable 1k2 or 440R pull-up to 5V
- Selectable ground reference (full differential standard mode)
- -75 to +75V indefinite withstand
- 48kHz max signal frequency

Example Wiring Connections



There are two common types of crank/cam sensor signals:

- **Hall effect/optical signal** (0-5V digital square wave signal)

This type of sensor sends out a digital square wave signal. Hall effect sensors typically have three wires: a power supply, sensor ground, and a signal output wire.

The power supply can be drawn from the ECU's +12V supply pin (A26) or the +5V pin (A9) as required by the sensor used. The internal pull-up

will typically need to be enabled in the software settings for Hall effect/optical sensors.

- **Reluctor signal** (analog style signal)

This type of sensor generates a sine wave signal and typically uses two wires: signal positive (+) and signal negative (-).

Reluctor sensors do not require external power, as they are passive sensors and can generate their voltage signal by sensing a moving tooth or trigger. It is important to disable the internal pull-up in the NSP settings for reluctor sensors.

Injector Outputs

All injectors should be directly wired to the ECU's corresponding cylinder output pins. During an injection event, the ECU grounds the output pin, prompting the injector to open and flow fuel for a specified duration.

It is essential to wire all injectors to a common +12V supply switched by a relay.

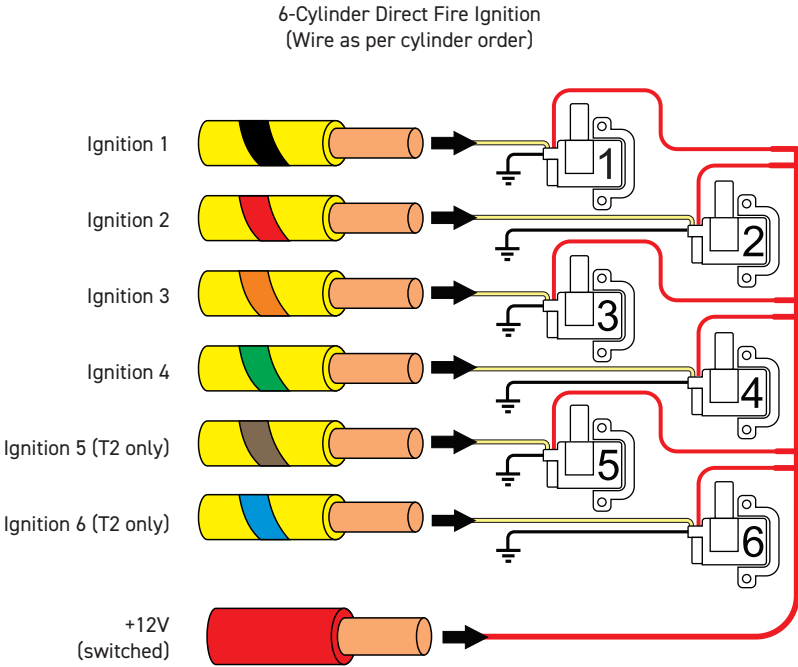
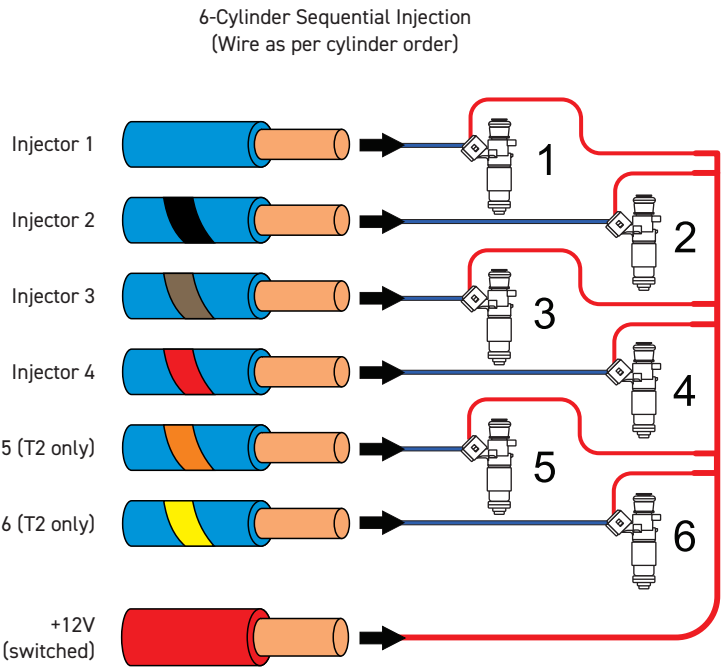
When not used for injection, these pins can be utilized as generic Digital Pulsed Outputs (DPO), capable of switching 2A to ground.

Specs:

- Number of channels - Nexus T2: 6 | Nexus T1: 4
- Current controlled output
- 8A Peak, 2A Hold
- 0 to 55V voltage feedback

Unused injector outputs can also be used as:

- Generic switched or PWM outputs (2A)
- Low speed digital switch inputs (0-12V)



NOTE: The coils (HT-020102) illustrated in this diagram are equipped with internal igniters. Do not connect ignition outputs directly to coils unless they have internal igniters, as doing so will damage the ECU. For coils without internal igniters, an external igniter module is required.

Ignition Outputs

The ignition outputs generate a signal between 12V and ground to control the charging and firing of an ignition coil. Ignition outputs can be connected directly to ignition coils only if the coils are equipped with internal igniters. Ignition coils without internal igniters draw large amounts of current and, as such, must use an external ignitor module to be safely triggered by the ECU. Connecting directly to ignition coils without internal igniters will result in damage to the ECU.

Specs:

- Number of channels - Nexus T2: 6 | Nexus T1: 4
- Software selectable global 12V or 5V pull-up
- Software selectable individual 270R pull-up
- 10kHz switching speed
- Automatic overtemp, overcurrent, flyback protection
- 0 to 27V voltage feedback

Unused ignition outputs can also be used as:

- Generic DPO (3A sink) or PWM outputs
- Low speed digital switch inputs (0-12V)

WARNING

Connecting the ECU to an ignition module before setting the ignition firing edge correctly may damage the module and coils. Therefore, it is advised to disconnect the module or disable the power to the ignition system until the unit has been set up and configured.

NEXUS T2/T1 ECU WIRING

Digital Pulsed Outputs (DPO)

Digital Pulsed Outputs (DPO) are designed to ground-switch devices or to provide frequency-based control or pulse width modulation as needed.

Each DPO channel has a maximum sink current of 3A and directly drive low current devices such as boost control solenoids, VVT oil control valves, idle air control valves, etc.

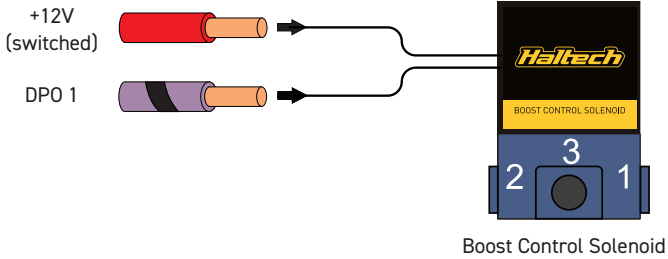
Devices that draw more current can still be controlled by DPOs by wiring a relay in between to drive high current devices such as fuel pumps or thermofans.

Unused DPOs can also function as low-speed digital switch inputs (0-12V).

Specs:

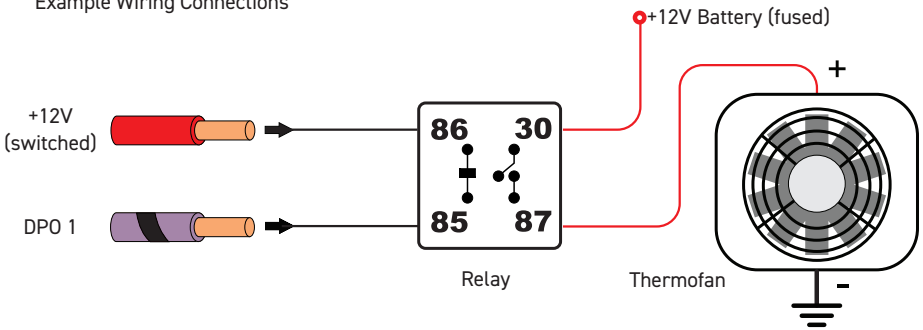
- Number of channels: 5
- Low side drive (3A max current)
- Software selectable 4k7 pullup to +12V or +5V
- Overcurrent and flyback protection
- Over temperature protection
- 10kHz switching speed
- 0 to 27V feedback

Example Wiring Connections



Example of a wiring connection for a DPO controlling a low-current device (less than 3A), such as a boost control solenoid.

Example Wiring Connections



Example of a wiring connection for a DPO controlling a high-current device, such as a thermofan, via a relay.

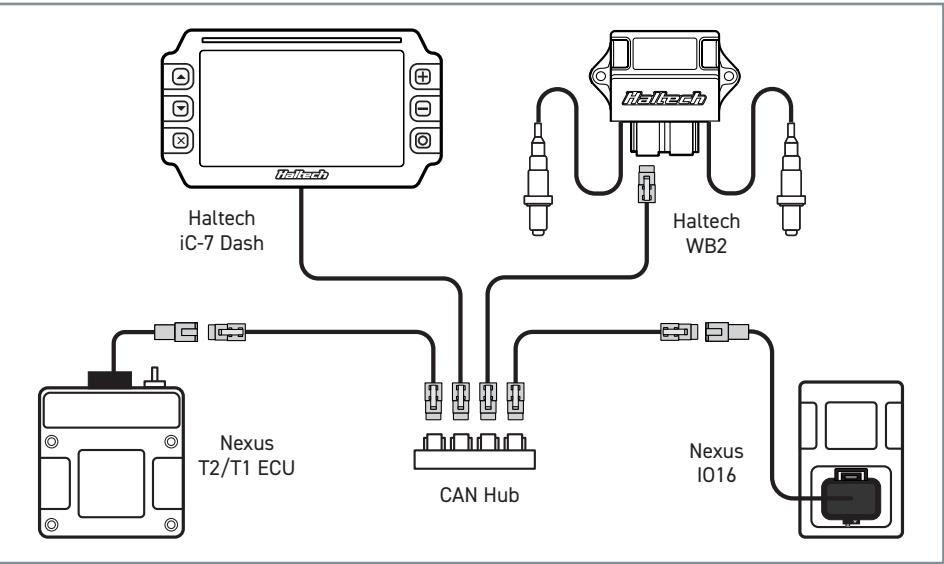
Haltech CAN System

The Nexus T2/T1 ECU features CAN connectivity through the main ECU connector. This single CAN channel can be used with a wide range of Haltech CAN devices such as Wideband O2 modules, dash displays, CAN keypads, and the Nexus IO16 Input and Output Expander, via a Haltech CAN Hub.

The diagram on the right illustrates an example of how multiple Haltech CAN devices can be connected (sold separately).

Specs

- Supports CAN speeds up to 1 Mbit/s
- Selectable 120ohm termination resistor
- Supports all Haltech CAN expansion products
- Selectable preconfigured vehicle CAN interface (OBDII compliant)



NEXUS T2/T1 ECU WIRING

Analog Voltage Inputs (AVI)

Analog Voltage Inputs are inputs to the Nexus T2/T1 ECU that accept variable voltage signals ranging from 0V to 5V, such as signals from pressure, temperature, and position sensors.

These inputs can also accept switched inputs that change between two different voltage levels. The On Voltage and Off Voltage set in NSP define the thresholds between the On and Off states. Common examples of switched inputs include the A/C Request switch or a Launch Control Enable switch.

AVIs feature a software-selectable 1K pull-up resistor to 5V, which can be enabled or disabled within the setup page. Pull-up resistors are generally enabled for temperature-related sensors and switched-to-ground inputs, and disabled for inputs with an external +5V supply, such as a MAP sensor or throttle position sensor.

Specs:

- Number of channels: 5
- 0 to 5V analog inputs
- 1000 samples per second
- Selectable 1k pull-up to 5V
- -10 to +30V indefinite withstand
- 1.5kHz signal frequency max



Example Wiring Connections

AVI

Sensor ground

Temperature Sensor

Example Wiring Connections

AVI

Sensor ground

+5V

Rotary Trim Switch

Sensors with a +5V supply do not require the pull-up resistor be enabled, for example, rotary trim modules. Any Sensor +5V pin can be used with any Sensor Ground pin for sensors.

Synchronized Pulsed Inputs (SPI)

Synchronized Pulsed Inputs are capable of measuring the position, duty cycle, frequency, or state of a signal. These inputs are suitable for sensors such as a cam sensor for variable valve timing, flex fuel composition sensors, and vehicle speed sensors.

Synchronized Pulsed Inputs are compatible with both digital (hall effect or optical) and analog (reluctor) based sensors. They have a maximum input voltage rating of 25V and can measure up to a maximum frequency of 22.5kHz.

Specs:

- Number of channels: 2 (SPI 1 + Knock/SPI 2)
- -10 to +10V digital input
- 0 to 5V analog input
- Selectable 1k pull-up to 5V
- -15 to +30V indefinite withstand
- 22.5kHz signal frequency max



Example Wiring Connections

+12V (switched)

Sensor ground

SPI

Haltech Flex Fuel Sensor

Example Wiring Connections

Knock / SPI 2

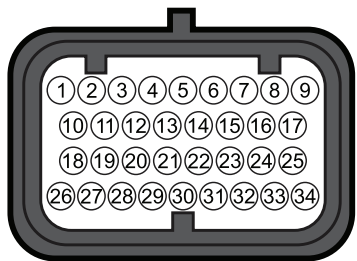
Sensor ground

Knock Sensor

Specs:

- Number of channels: 1
- -2.5 to +2.5V AC input only
- 160Hz to 20kHz signal frequency band
- +/-3V indefinite AC voltage withstand
- 50V indefinite DC withstand

NOTE: If not used with a knock sensor, this input on the Nexus T2 or T1 ECU can be used as SPI 2 and will operate as per the SPI specifications.



PIN	FUNCTION	WIRE COLOUR
1	DPO 2	Violet / Brown
2	AVI 1	White
3	Ignition 1	Yellow / Black
4	Ignition 2	Yellow / Red
5	Ignition 3	Yellow / Orange
6	Ignition 4	Yellow / Green
7	Ignition 5 (Nexus T2 only)	Yellow / Brown
8	Ignition 6 (Nexus T2 only)	Yellow / Blue
9	+5V sensor supply	Orange
10	Power ground	Black
11	Sensor ground	Black / White
12	SPI 1	Grey / Brown
13	Knock / SPI 2	White
14	AVI 2	White / Yellow
15	AVI 3	White / Grey
16	CAN High	White
17	CAN Low	Blue

PIN	FUNCTION	WIRE COLOUR
18	DPO 1	Violet / Black
19	Injector 1	Blue
20	Injector 2	Blue / Black
21	Injector 3	Blue / Brown
22	Injector 4	Blue / Red
23	DPO 3	Violet / Red
24	DPO 5	Violet / Yellow
25	DPO 4	Violet / Orange
26	+12V ECU power supply	Red
27	Injector 5 (Nexus T2 only)	Blue / Orange
28	Injector 6 (Nexus T2 only)	Blue / Yellow
29	AVI 4	White / Violet
30	AVI 5	White / Green
31	Trigger +	Yellow
32	Home +	Yellow
33	Trigger -	Green
34	Home -	Green



WARRANTY CERTIFICATE

At Haltech we make every effort to design and manufacture fault-free products that perform up to or above the market expectations. All our products are covered by a Limited 12 Month Warranty.

Haltech Limited Warranty

Unless specified otherwise, Haltech warrants its products to be free from defects in material or workmanship for a period of 12 months from the date of purchase.

If the Haltech product is found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of purchase. Proof of purchase in the form of a copy of the original purchase invoice, receipt or bill of sale which indicates that the product is within the warranty period, must be presented to obtain warranty service.

Replacement or repair of a defective product shall constitute the sole liability of Haltech. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations, either expressed or implied, including any implied warranty of merchantability or fitness. In no event shall Haltech, be liable for special or consequential damages.

Product Returns

Please include a copy of the original purchase invoice, receipt or bill of sale along with the unused, undamaged product and its original packaging. Any product returned with missing accessory items or packaging will incur extra charges to return the item to a re-saleable condition.

All product returns must be sent via a freight method with adequate tracking, insurance and proof of delivery services. Haltech will not be held responsible for product returns lost during transit.

Returns of Products Supplied in Sealed Packaging

The sale of any sensor or accessory supplied in sealed packaging is strictly non-refundable if the sealed packaging has been opened or tampered with. This will be clearly noted on the product packaging. If you do not accept these terms please return the sensor in its original unopened packaging within 30 days for a full refund.

A sensor or accessory product may be returned after 30 days of purchase (with its sealed packaging intact) for credit only (no refunds given) and will be subject to a 10% restocking fee.

Installation of Haltech Products

No responsibility whatsoever is accepted by Haltech for the fitment of Haltech Products. The onus is clearly on the installer to ensure that both their knowledge and the parts selected are correct for that particular application. Any damage to parts or consequential damage or costs resulting from the incorrect installation of Haltech products are totally the responsibility of the installer.

Always disconnect the battery when doing electrical work on your vehicle. Avoid sparks, open flames or use of electrical devices near flammable substances. Do not run the engine with a battery charger connected as this could damage the ECU and other electrical equipment.

Do not overcharge the battery or reverse the polarity of the battery or any charging unit. Disconnect the Haltech ECU from the electrical system whenever doing any welding on the vehicle by unplugging the wiring harness connector from the ECU.

After completing the ECU installation, make sure there is no wiring left un-insulated. Uninsulated wiring can cause sparks, short circuits and in some cases fire. Before attempting to run the engine ensure there are no leaks in the fuel system.

All fuel system components and wiring should be mounted away from heat sources, shielded if necessary and well ventilated. Always ensure that you follow workshop safety procedures. If you're working underneath a jacked-up car, always use safety stands!

Haltech Off-Road Usage Policy

In many states it is unlawful to tamper with your vehicle's emissions equipment. Haltech products are designed and sold for sanctioned off-road/competition non-emissions controlled vehicles only and may never be used on a public road or highway.

Using Haltech products for street/road use on public roads or highways is prohibited by law unless a specific regulatory exemption exists (more information can be found on the SEMA Action Network website www.semasan.com/emissions for state by state details in the USA).

It is the responsibility of the installer and/or user of this product to ensure compliance with all applicable local and federal laws and regulations. Please check with your local vehicle authority before purchasing, using or installing any Haltech product.



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