UNIVERSAL
WIRE-IN HARNESS
FOR NEXUS R5 VCU
5.0m (16')

QUICK START GUIDE

HT-185201

9 356450 009737

HARNESS OVERVIEW

Congratulations on purchasing a Haltech universal wire-in harness for a Nexus R5 VCU.

This universal harness plugs directly into the Nexus R5 VCU and has unterminated cables that can be wired to suit most popular engines at the other end. All the unterminated wires are color-coded and labeled in groups for easy identification.

In conjunction with the Nexus R5 VCU, this harness offers all the advanced tuning options available through the Nexus Software Programmer (NSP).

This quick start guide will walk you through the installation process including specific steps for wiring typical sensors, actuators, and other typical engine components.

Harness Features:

Haltech Nexus R5 VCU connectors

Firewall grommet (63.5mm / 2.5" outer diameter)

All wires grouped, color-coded, and labeled for ease of identification

Connections for Haltech CAN devices (e.g. digital displays, keypads, etc.)

Shielded crank (trigger) and cam (home) sensor wires for reluctor or hall effect sensor types

23 x analog voltage inputs (AVIs) to connect to voltage type sensors (e.g. MAP, temperature, pressure, position)

10 x synchronized pulsed inputs (SPIs) for frequency type sensors (e.g. speed sensors, flex fuel sensors)

2 x knock sensor inputs

2 x terminated wideband lambda sensor input

4 x 25A high current outputs (25A HCO)

12 x 8A high current outputs (8A HCO)

8 x digital pulsed outputs (DPOs)

4 x half bridge outputs (HBOs)

12 x ignition outputs

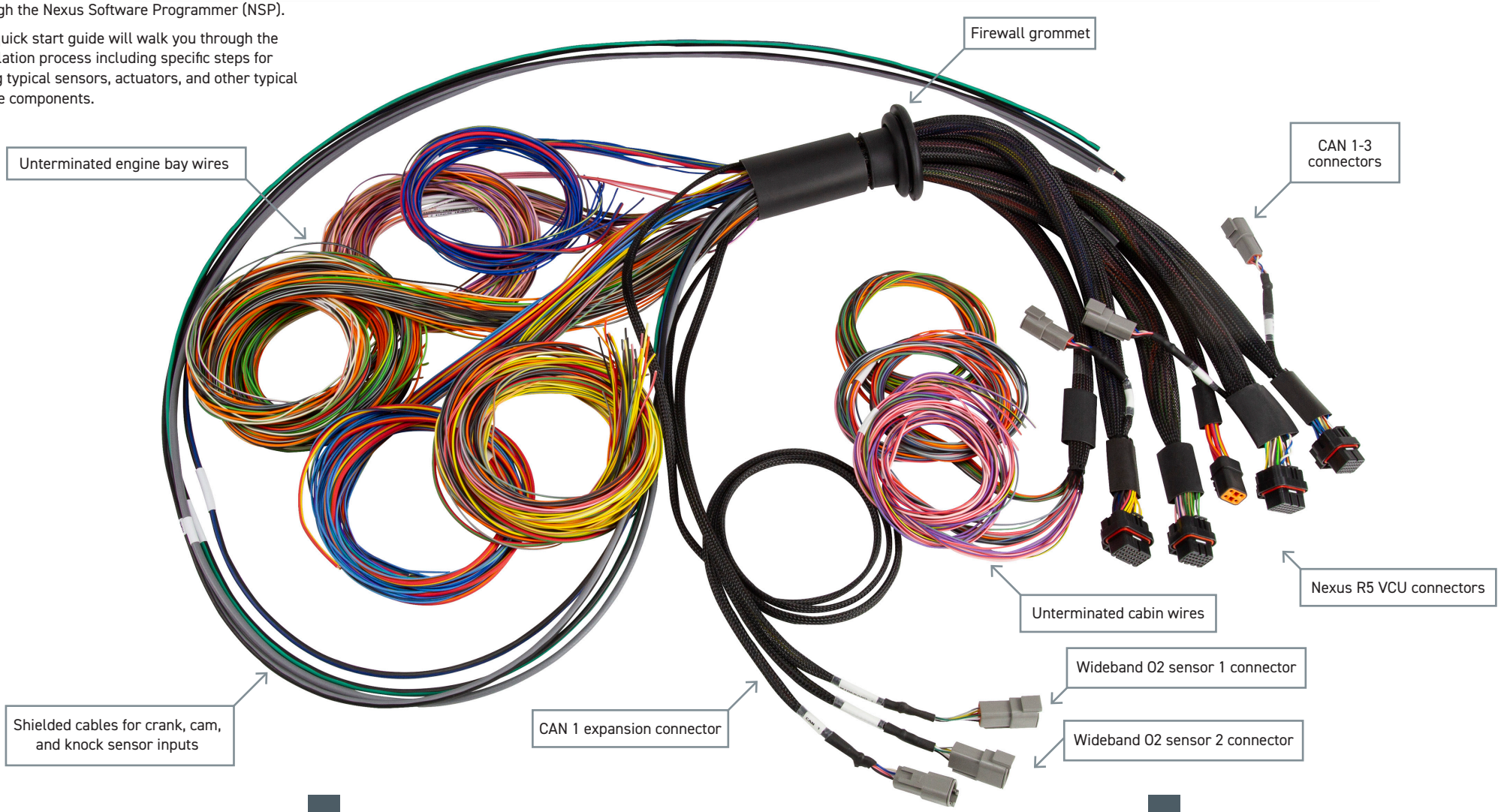
18 x injector outputs

What's in the bag?

Nexus R5 VCU universal wire-in harness, 5.0m (16'), HT-185201.

WARNING!

This harness DOES NOT ground your engine. Make sure your engine is sufficiently grounded. A ground/earthing strap should be used to ground your engine to the battery. Keep all wires away from the exhaust manifold.

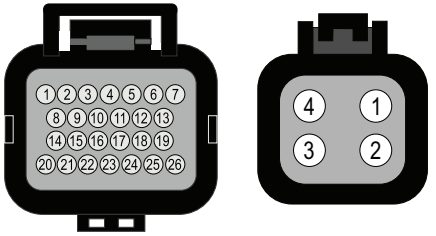


CONNECTOR A		
Pin	**Function**	**Color**
A1	Injector 1	Blue
A2	Injector 2	Blue/Black
A3	Injector 3	Blue/Brown
A4	Injector 4	Blue/Red
A5	Injector 5	Blue/Orange
A6	Injector 6	Blue/Yellow
A7	Injector 7	Blue/Green
A8	Injector 8	Blue/Violet
A9	DPO 1	Violet/Black
A10	Battery Ground Output	Black
A11	Battery Ground Output	Black
A12	DPO 2	Violet/Brown
A13	Ignition Switch Input	Pink
A14	DPO 3	Violet/Red
A15	DPO 4	Violet/Orange
A16	DPO 5	Violet/Yellow
A17	DPO 6	Violet/Green
A18	DPO 7	Black/Yellow
A19	HBO 1	Brown/Black
A20	HBO 2	Brown/Red
A21	HBO 3	Brown/Green
A22	HBO 4	Brown/Pink
A23	CAN 1 H	White
A24	CAN 1 L	Blue
A25	DPO 8	Violet
A26	+12V Low Current Output	Red/Blue
A27	Ignition 1	Yellow/Black
A28	Ignition 2	Yellow/Red
A29	Ignition 3	Yellow/Orange
A30	Ignition 4	Yellow/Green
A31	Ignition 5	Yellow/Brown
A32	Ignition 6	Yellow/Blue
A33	Ignition 7	Yellow/Violet
A34	Ignition 8	Yellow/Gray

CONNECTOR B		
Pin	**Function**	**Color**
B1	Injector 9	L.Blue
B2	Injector 10	L.Blue/Black
B3	Injector 11	L.Blue/Brown
B4	Injector 12	L.Blue/Red
B5	Injector 13	L.Blue/Orange
B6	Injector 14	L.Blue/Yellow
B7	Injector 15	L.Blue/Green
B8	Injector 16	L.Blue/Violet
B9	SPI 7	Gray/Green
B10	SPI 8	Gray/Violet
B11	SPI 9	Gray/Blue
B12	SPI 10	Gray/White
B13	CAN 3 H	White
B14	Injector 17	L.Blue/Gray
B15	Ignition 9	L.Yellow/Black
B16	Ignition 10	L.Yellow/Red
B17	Ignition 11	L.Yellow/Orange
B18	Ignition 12	L.Yellow/Green
B19	CAN 3 L	Blue
B20	Injector 18	L.Blue/Blue
B21	Wideband 2 : Heater +	Gray
B22	Wideband 2 : Input	Yellow
B23	Wideband 2 : Pump	Red
B24	Wideband 2 : Nernst	Black
B25	Wideband 2 : Heater-	White
B26	Wideband 2 : Cal	Green

NOTE: Connectors are viewed from the wire side.

CONNECTOR C		
Pin	**Function**	**Color**
C1	Trigger +	Yellow
C2	Trigger -	Green
C3	Home +	Yellow
C4	Home -	Green
C5	SPI 1	Gray/Brown
C6	SPI 2	Gray/Red
C7	SPI 3	Gray/Orange
C8	SPI 4	Gray/Yellow
C9	8V sensor power	Orange/White
C10	AVI 1	White
C11	AVI 2	White/Yellow
C12	AVI 3	White/Gray
C13	AVI 4	White/Violet
C14	AVI 5	White/Green
C15	AVI 6	White/Orange
C16	AVI 7	White/Black
C17	AVI 8	White/Brown
C18	AVI 9	White/Red
C19	SPI 5	Gray/Pink
C20	SPI 6	Gray/L.Green
C21	CAN 2 H	White
C22	CAN 2 L	Blue
C23	Knock 1	White
C24	Knock 2	White
C25	5V sensor power A	Orange
C26	Signal ground A	Black/White
C27	AVI 10	L.Green
C28	AVI 11	L.Green/Black
C29	Wideband 1 : Heater +	Gray
C30	Wideband 1 : Input	Yellow
C31	Wideband 1 : Pump	Red
C32	Wideband 1 : Nernst	Black
C33	Wideband 1 : Heater -	White
C34	Wideband 1 : Cal	Green



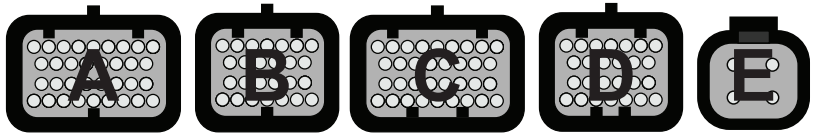
CONNECTOR D		
Pin	**Function**	**Color**
D1	8A HCO 1	Pink/Red
D2	8A HCO 2	Pink/Brown
D3	8A HCO 3	Pink/Black
D4	8A HCO 4	Pink/Orange
D5	8A HCO 5	Pink/Yellow
D6	8A HCO 6	Pink/Green
D7	8A HCO 7	Pink/Violet
D8	8A HCO 8	Pink/Blue
D9	Signal ground B	Black/Gray
D10	AVI 12	L.Green/Brown
D11	AVI 13	L.Green/Red
D12	AVI 14	L.Green/Orange
D13	8A HCO 9	Pink/Gray
D14	8A HCO 10	Pink/White
D15	5V sensor power B	Orange/Red
D16	AVI 15	L.Green/Yellow
D17	AVI 16	L.Green/Green
D18	AVI 17	L.Green/Violet
D19	8A HCO 11	Pink/L.Green
D20	8A HCO 12	Pink/L.Blue
D21	AVI 18	Green/Black
D22	AVI 19	Green/Brown
D23	AVI 20	Green/Red
D24	AVI 21	Green/Orange
D25	AVI 22	Green/Yellow
D26	AVI 23	Green/Violet

CONNECTOR E		
Pin	**Function**	**Color**
E1	25A HCO 1	Red/Blue
E2	25A HCO 2	Red/Yellow
E3	25A HCO 3	Red/Orange
E4	25A HCO 4	Red/Green

Nexus R5 VCU Connection

With the unit powered off, connect the 5 VCU plugs on the main harness to the Nexus R5:

Connector A: 34-pin, Keyway Type 1
Connector B: 26-pin, Keyway Type 1
Connector C: 34-pin, Keyway Type 2
Connector D: 26-pin, Keyway Type 3
Connector E: 4-pin DTP



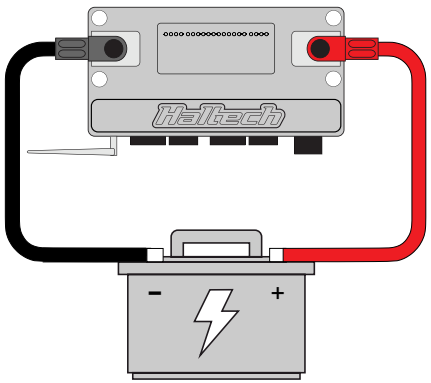
Battery Positive and Battery Negative (Nexus R5 VCU)

The battery positive and battery negative must be connected to the Nexus R5 VCU at all times.

Connect the Positive (+) battery terminal to the positive terminal (RED) on the Nexus R5 using the RED SurLok connector provided and a RED 1AWG battery cable (sold separately).

Connect the Negative (-) battery terminal to the Negative terminal (BLACK) on the Nexus R5 using the BLACK SurLok connector provided and a BLACK 1AWG battery cable (sold separately).

Note: There is an internal 32VDC 200A positive inline fuse inside the VCU for overcurrent protection (this fuse is not user-serviceable)



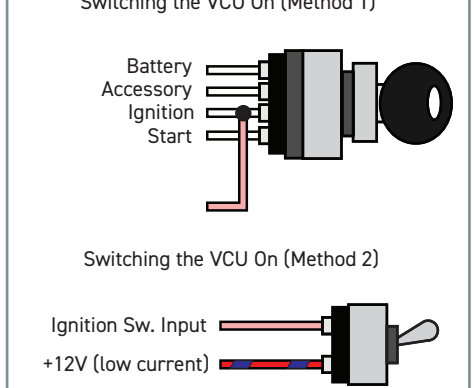
Ignition Switch

(Label: Ignition Switch)

The ignition switch input (pink) wire must be connected to a switched +12V source to turn the Nexus R5 on. If wiring to an ignition key switch, it is important to make sure to connect to the main ignition wire (i.e. not accessory) so it doesn't loose power while the engine is cranking causing the VCU to momentarily turn off.

Alternatively, the pink and red/blue wires, labeled together as "Ignition Switch" in the harness can be connected to a switch to turn the VCU On or Off.

NOTE: The red/blue wire is a low current +12V source (from pin A26) and must not be used to power any other device in the vehicle. Insulate and isolate if not used.

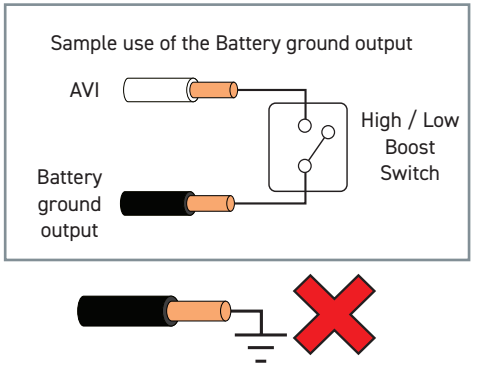


Battery Ground Output

The battery ground output wires are capable of sinking 3A per pin on the Nexus R5 and are directly linked to the battery negative stud internal to the VCU.

These wires can be used for cable shielding connections or to ground low current CAN devices, digital sensors, or switch grounds.

WARNING! The battery ground output wires are NOT meant to ground the VCU and should not be connected to battery negative or to the engine or chassis.



Crank (Trigger) and Cam (Home) Inputs

The crank and cam position sensors are required so that the ECU has the necessary information available to determine engine speed and engine position at any point in time. Generally there are two types of sensor for these inputs:

Hall Effect / Optical sensor

This type of sensor sends out a digital square wave signal. Hall Effect sensors will usually have three pins: signal, signal ground, and power, which is supplied by 8A HCO 1 in this harness. If required, 8V and 5V wires are also available in the harness to power up these digital sensors.

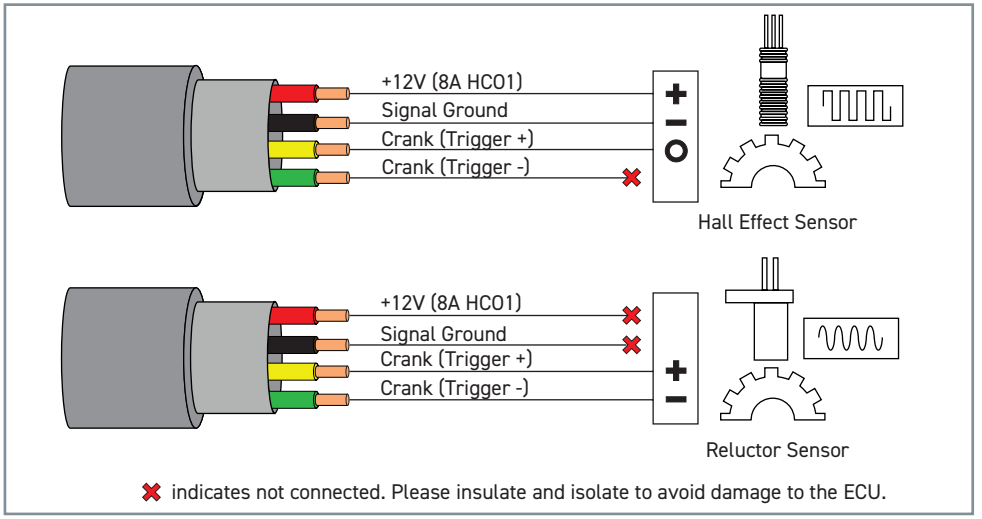
Reluctor sensor

This type of sensor sends out a sine wave signal. Reluctor sensors do not require external power as these sensors can generate their own voltage signal as the sensor reads a moving tooth or trigger.

This harness uses a four-core shielded gray cable for the crank (Trigger) sensor, and a four-core shielded gray/black cable for the cam (Home) sensor. Shields are already connected to the power ground wire within the harness and will not require further grounding. Refer to the diagram below for wires required to connect to a Hall Effect or Reluctor sensor.

Specs:

- -5V to +5V input
- Selectable 1k1 or 440R pull-up to 5V
- Selectable ground reference (full differential standard mode)
- -75 to +75V indefinite withstand
- 48kHz max signal frequency



Ignition Outputs

Ignition outputs are used to control the ignition system of the engine. The ignition outputs can be connected directly to ignition coils only if the coils are equipped with internal igniters.

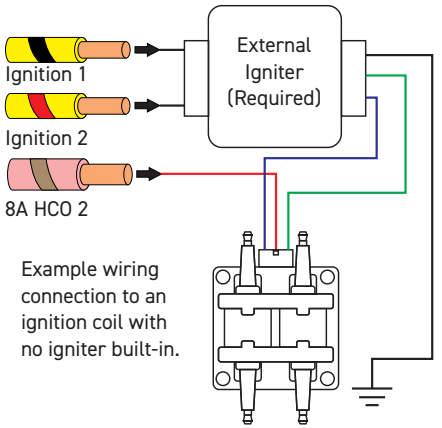
Ignition coils without internal igniters draw large amounts of current and must use an external igniter module to be safely triggered by the VCU's ignition outputs. Connecting directly to a coil without internal igniters will damage the VCU.

Specs:

- Number of channels: 12
- Software selectable global 12V or 5V pull-up voltage
- Software selectable individual 270R pull-up enable
- Flyback protected
- 3A sink current
- 10kHz switching speed
- Automatic overtemperature / overcurrent protection
- 0 to 27V voltage feedback

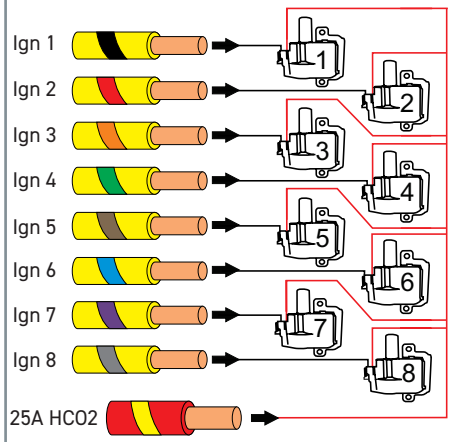
Unused ignition outputs can also be used as:

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



Example wiring connection to an ignition coil with no igniter built-in.

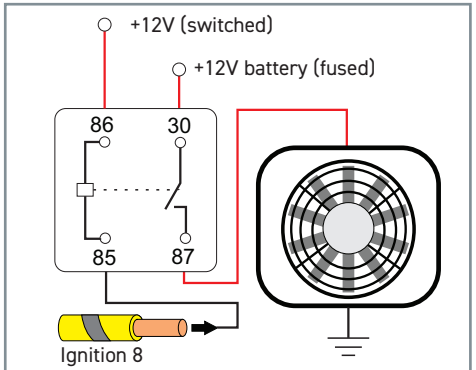
8-Cylinder Direct Fire Ignition
(Wire as per cylinder order)



NOTE: The coils (HT-020102) depicted in this diagram have internal igniters. Do not connect ignition outputs directly to coils unless they have internal igniters as this will damage the VCU. If your coils are without internal igniters an external igniter module must be used.

WARNING!

Connecting the VCU 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 setup and configured.



Example wiring connection using an ignition output as a digital switched output to control a fan through a relay.

Injector Outputs

All injectors are to be wired directly to the ECU's corresponding cylinder output pins and must be wired to a common +12V power supply from one of the high current outputs on the Nexus R5.

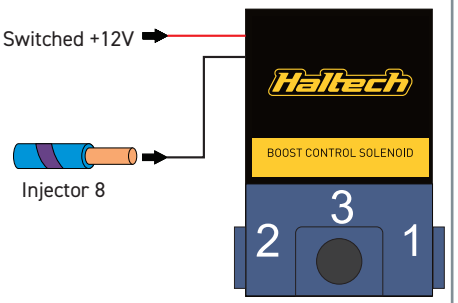
When not used for injector control, the spare injector outputs can be used as generic digital pulsed outputs (DPO) capable of switching to ground or pulse width modulation (PWM).

Specs:

- Number of channels: 18
- Current controlled output
- 8A Peak, 2A Hold
- 0 to 55V voltage feedback

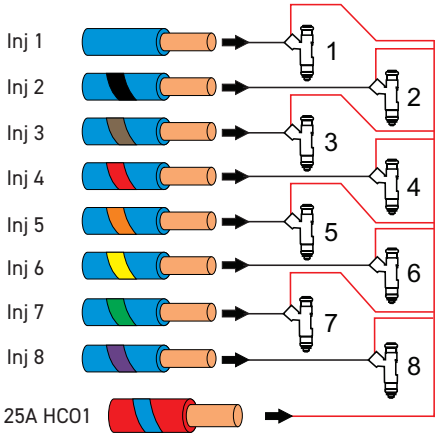
Unused injector outputs can also be used as:

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

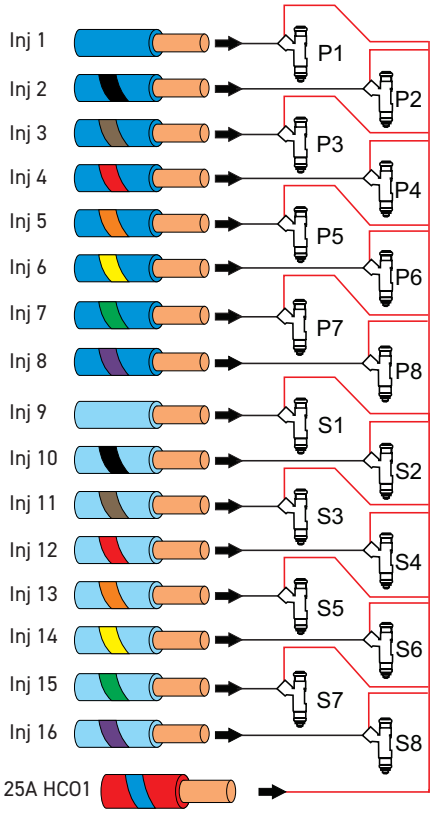


Example wiring connection using a spare injector output to digitally pulse a boost control solenoid.

8-Cylinder Sequential Injection
(Wire as per cylinder order)



8-Cylinder Two Stage Sequential Injection
(Wire as per cylinder order)



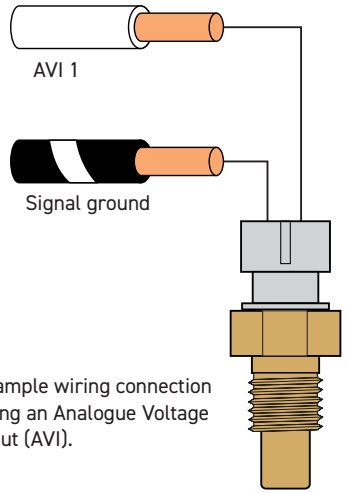
Analog Voltage Inputs

Analog Voltage Inputs (AVIs) are inputs to the ECU that accept variable voltage such as signals from pressure, temperature and position sensors. These inputs can also accept switch signals that change between two different voltage levels.

AVIs have a software selectable 1K pull-up resistor to 5V, which can be enabled in the software for use with temperature related sensors and switched to ground inputs.

Specs:

- Number of channels: 23
- 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 connection using an Analogue Voltage Input (AVI).

Synchronized Pulsed Inputs

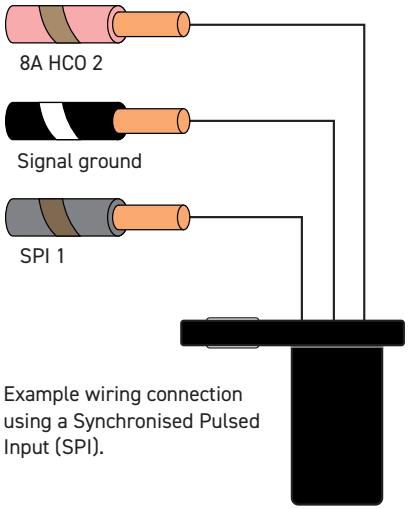
Synchronized Pulsed Inputs are capable of measuring the position, duty cycle, frequency, or state of a signal. These inputs can be used to measure 0-5V analog voltage sensors as well.

These inputs are suitable for sensors such as cam position sensors, fuel composition sensors, road speed sensors and flat shift switches.

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

Specs:

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



Example wiring connection using a Synchronised Pulsed Input (SPI).

Digital Pulsed Outputs

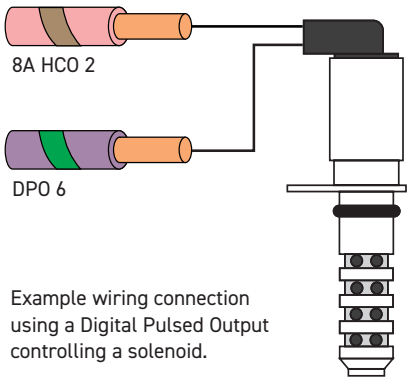
Digital pulsed outputs are used to switch devices to ground or provide frequency or pulse width modulation control (PWM) if required. Typical low current devices used with DPOs are relays, idle air control valves, boost control solenoids, tachometer outputs, etc.

Specs:

- Number of channels: 8
- Selectable 4k7 pull-up to 12V, to 5V, or disable.
- Overcurrent, overheat, and flyback protection
- Low side drive (3A max current)
- 10kHz switching speed
- 0 to 27V feedback

Unused DPOs can be also be used as:

- Generic PWM outputs
- Low speed digital switch inputs (0-12V) with pull-up enable.



Example wiring connection using a Digital Pulsed Output controlling a solenoid.

Half Bridge Outputs

Half bridge outputs are push-pull pulse width modulated outputs that can be used to control stepper motors, DBW throttle motors, or electronic wastegates.

HBOs can also be used to provide 12V 8A power to high-side driven devices such as VTEC solenoids or high-side switched automatic transmission solenoids.

Specs:

- Number of channels: 4
- 8A to 12V (high), or 8A to ground (low) output
- 5A max when used as push-pull PWM (e.g. DBW)
- Automatic overcurrent and overtemperature protection
- 0 to 27V feedback
- High side current feedback
- 18kHz switching speed in DBW mode

Unused HBOs can be used as:

- Generic push/pull 2.2kHz PWM output

8A High Current Outputs

The Nexus R5 universal wire-in harness features 12 high side output wires which are capable of driving 8A to 12V.

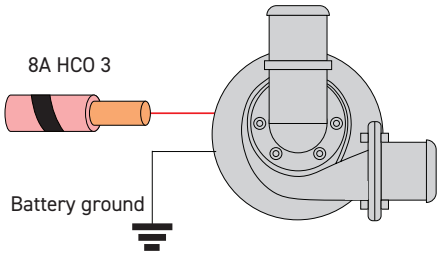
Each output has a software programmable fuse current. Once the electronic fuse blows the output turns off for a software programmable delay duration, before reactivating the output again.

Use the NSP software to define the maximum number of retries before the output is deactivated until the next ECU reboot.

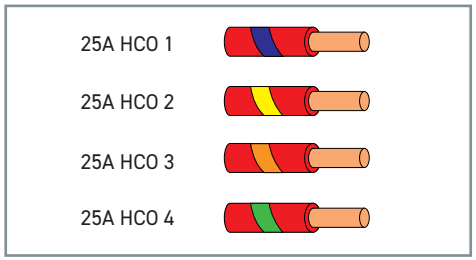
8A HCOs are PWM capable and can be used to power CAN devices or solenoids. They can also control automatic transmission shift solenoids, water pumps, some nitrous and transbrake solenoids etc.

Specs:

- Number of channels: 12
- 8A source current output
- Automatic overcurrent and flyback protection
- 0 to 30V voltage feedback
- High side current feedback
- 100Hz max switching speed
- Capable of 0-100% duty cycle



Example of a 8A HCO controlling a high current device such as an electric water pump.



25A High Current Outputs

This harness also features four 12AWG wires that are capable of driving 25A to 12V, or sinking 25A to ground. Each 25A HCO wire, through the Nexus R5, has a programmable fuse current, slow-start current and duration, which can all be set through the NSP software.

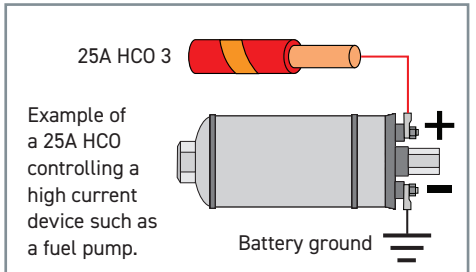
Once the electronic fuse blows the output turns off for a pre-programmed delay duration before reactivating the output.

You can also use the NSP software to define the maximum number of retries before the output is deactivated until the next ECU reboot.

25A HCOs are PWM capable and can be used for ignition power and injector power or other devices such as thermofans and fuel pumps.

Specs:

- Number of channels: 4
- 25A source or sink current output
- Automatic overcurrent and flyback protection
- -30 to +30V voltage feedback
- High side current feedback
- 1kHz max switching speed
- Capable of 0-100% duty cycle

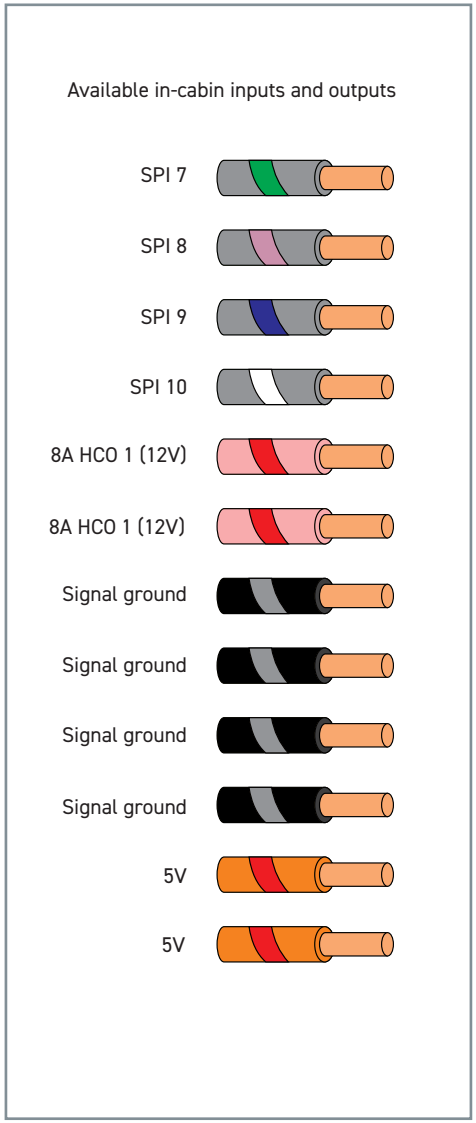


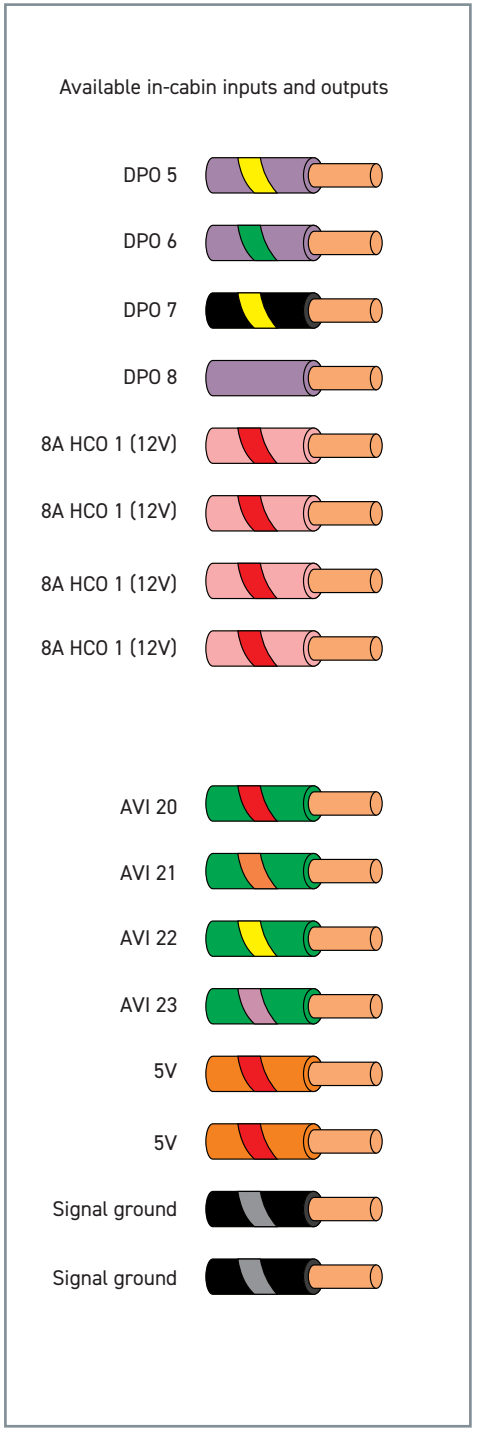
Example of a 25A HCO controlling a high current device such as a fuel pump.

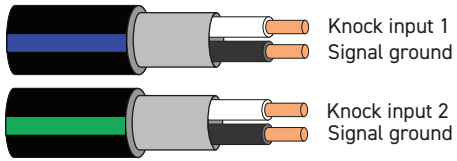
In-cabin connections

The Nexus R5 universal wire-in harness has multiple input and output wires allocated for in-cabin connections. This group of in-cabin wires are labeled and sub-grouped together with power and ground sources to make it easier to wire in sensors, switches, relays or other devices.

Refer to the diagram below for the available connections. Unused wires can be reallocated to the engine bay to suit your specific application.







Knock Inputs

The Nexus R5 universal wire-in harness has allocated dual knock sensor input shielded cables. Knock detection can be performed by the VCU by installing a compatible piezoelectric knock sensor mounted to the engine block.

Specs:

- Number of channels: 2
- -2.5 to +2.5V AC input only
- 160Hz to 48kHz signal frequency band
- +/-3V indefinite AC voltage withstand
- 50V indefinite DC withstand

Wideband O2 Sensors (sold separately)

This harness provides two channels of on-board wideband O2 sensor control. The two DTM-6 connectors, labeled Wideband, directly plug to Haltech Bosch or NTK wideband kits:

HT-010746 - Bosch LSU4.9 wideband sensor
HT-010747 - NTK LZA08-H5 wideband sensor

Using wideband lambda sensors is recommended to properly tune the engine fueling, and enables the Nexus R5 VCU to use features such as closed loop O2 control or engine lean out protection.

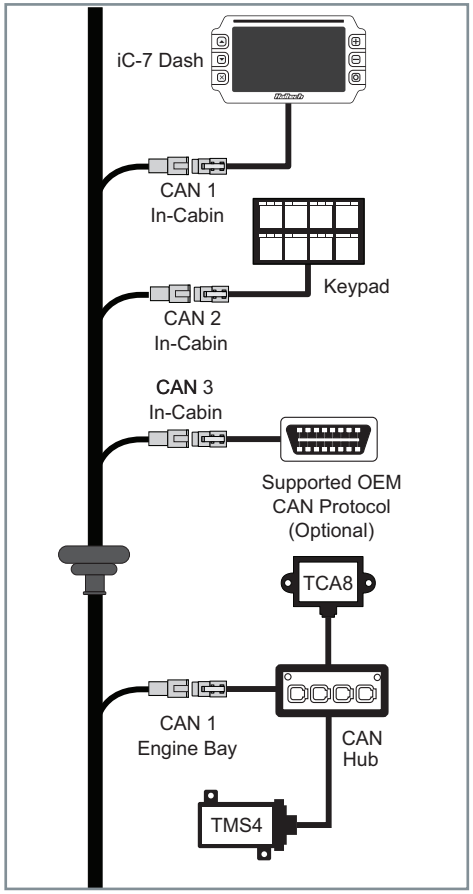
Haltech CAN connection
(Label: CAN 1, CAN 2, CAN 3)

This harness is fitted with multiple CAN connectors that you can use with a range of Haltech CAN expansion devices (displays, keypads, TMS4, etc.) or integrate to a supported factory CAN system.

Three DTM-4 CAN plugs are available in-cabin for CAN channels 1-3, and another connector allocated in the engine bay for CAN 1 expansion.

Specs:

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



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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