



**UNIVERSAL
WIRE-IN HARNESS
FOR NEXUS R3 VCU
(2.5m)**

QUICK START GUIDE

HT-183200



HARNESS OVERVIEW

Congratulations on purchasing a Haltech universal wire-in harness for a Nexus R3 VCU.

This universal harness plugs directly into the Nexus R3 VCU, and has unterminated cables that can be wired to suit most popular engines at the other end. All the unterminated wires are colour coded and labelled in groups for easy identification.

This harness, in conjunction with the Nexus R3 VCU, 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 common engine components.

Harness Features:

Haltech Nexus R3 VCU connectors

Firewall grommet (51mm outer diameter)

All wires grouped, colour coded and labelled for ease of identification

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

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

11 x analog voltage inputs (AVIs) to connect to voltage type sensors (eg MAP, temperature, pressure, position)

6 x synchronised pulsed inputs (SPIs) for frequency type sensors (eg speed sensors, flex fuel sensors)

2 x knock sensor inputs

1 x terminated wideband lambda sensor input

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

6 x digital pulsed outputs (DPOs)

6 x half bridge outputs (HBOs)

8 x ignition outputs

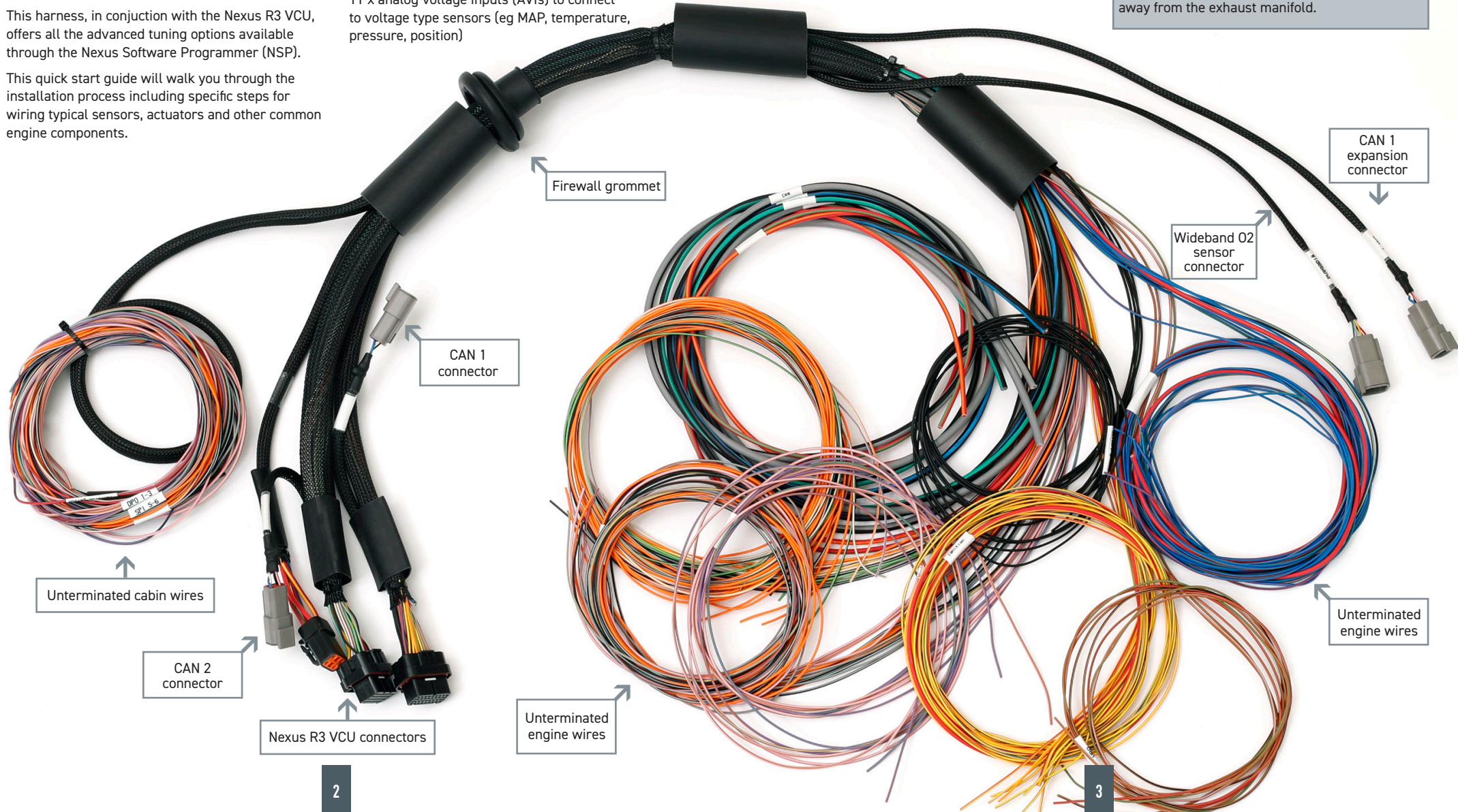
8 x injector outputs

What's in the bag?

Nexus R3 VCU universal wire-in harness, 2.5m (HT-183200).

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.



Unterminated cabin wires

Firewall grommet

CAN 1 connector

CAN 2 connector

Nexus R3 VCU connectors

Underminated engine wires

Wideband O2 sensor connector

CAN 1 expansion connector

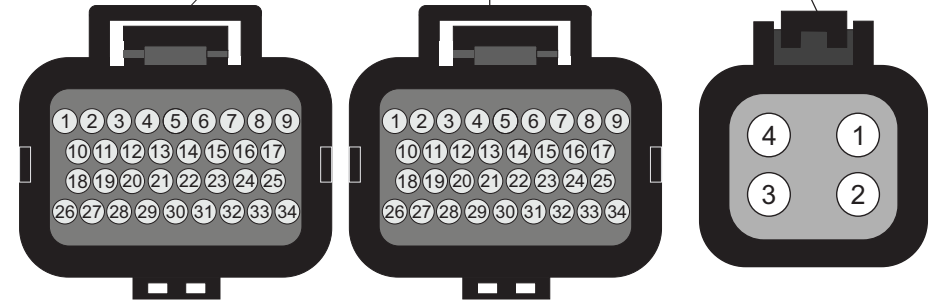
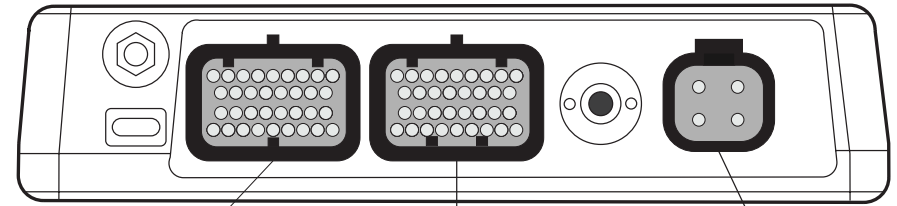
Unterminated engine wires

HARNES PINOUT DIAGRAM

CONNECTOR A (KEYWAY TYPE 1)		
Pin	Function	Colour
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	+12V (HBO 5, see page 12)	Pink/Red
A19	HBO 1	Brown/Black
A20	HBO 2	Brown/Red
A21	HBO 3	Brown/Green
A22	HBO 4	Brown/Pink
A23	CAN1 H	White
A24	CAN1 L	Blue
A25	+12V (HBO 6, see page 12)	Pink/Brown
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 C (KEYWAY TYPE 2)		
Pin	Function	Colour
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	CAN2 H	White
C22	CAN2 L	Blue
C23	Knock 1	Black/Blue
C24	Knock 2	Black/Green
C25	+5V Sensor Power	Orange
C26	Signal Ground	Black/White
C27	AVI 10	L.Green
C28	AVI 11	L.Green/Black
C29	1: WB Heater +	Gray
C30	2: WB Input	Yellow
C31	3: WB Pump	Red
C32	4: WB Nernst	Black
C33	5: WB Heater -	White
C34	6: WB Cal	Green

CONNECTOR E		
Pin	Function	Colour
E1	+12V Injector (25A-HCO 1)	Red/Blue
E2	+12V Ignition (25A-HCO 2)	Red/Yellow
E3	25A-HCO 3	Red/Orange
E4	25A-HCO 4	Red/Green



CONNECTOR A

CONNECTOR C

CONNECTOR E

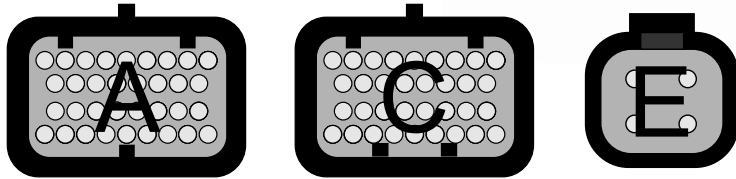


NEXUS R3 CONNECTIONS



Nexus R3 VCU Connection

With the unit powered off, connect the 3 VCU plugs on the main harness to the Nexus R3:



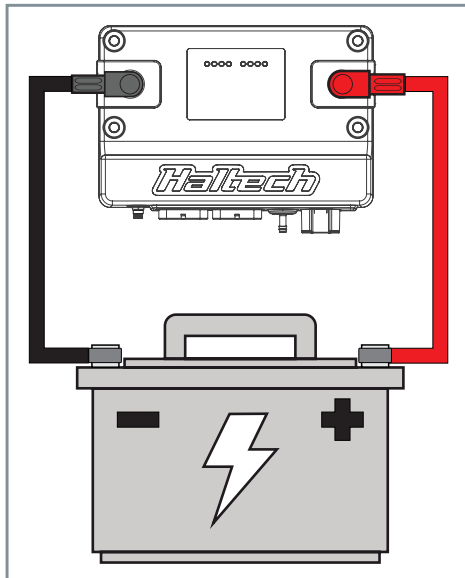
Connector A:
34-pin, Keyway Type 1
Connector C:
34-pin, Keyway Type 2
Connector E:
4-pin, DTP

Battery Positive and Battery Negative (Nexus R3 VCU)

The battery positive and battery negative must be connected to the Nexus R3 VCU at all times.

Connect the Positive (+) battery terminal to the Positive terminal (RED) on the Nexus R3 using the RED SurLok connector provided and a RED 4AWG battery cable (sold separately).

Connect the Negative (-) battery terminal to the Negative terminal (BLACK) on the Nexus R3 using the BLACK SurLok connector provided and a BLACK 4AWG battery cable (sold separately).



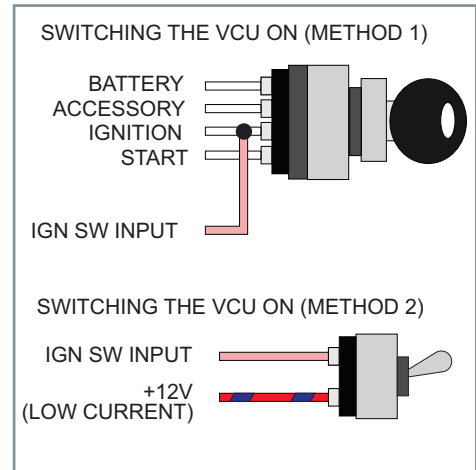
Ignition Switch

(Label: Ignition Switch)

The ignition switch input (pink) wire must be connected to a switched +12V source to turn the Nexus R3 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 lose power while the engine is cranking causing the VCU to momentarily turn off.

Alternatively, the pink and red/blue wires, labelled 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.

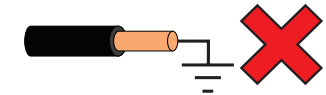
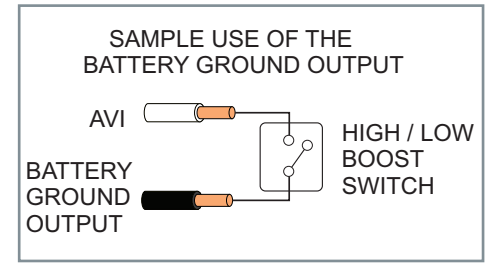


Battery Ground Output

The battery ground output wires are capable of sinking 3A per pin on the Nexus R3 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 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 a +12V power wire which is supplied by HBO5 in this harness. A +8V supply and a +5V wire is also available in the harness if required.

Reluctor sensor

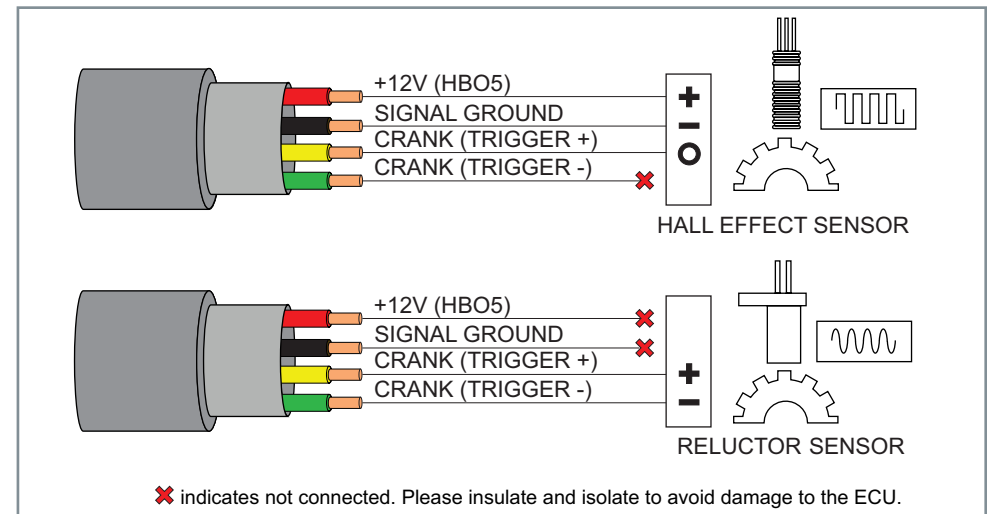
This type of sensor sends out a sine wave type of signal. Reluctor sensors do not require external power. These sensors can generate their own

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:

- 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



X indicates not connected. Please insulate and isolate to avoid damage to the ECU.

IGNITION AND INJECTION

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.

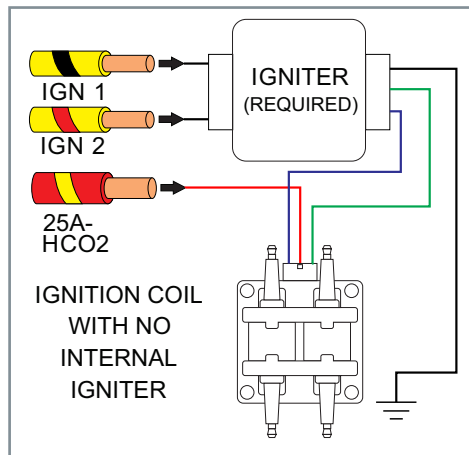
Ignition coils without internal igniters draw large amounts of current and thus must use an external igniter module to be safely triggered by the VCU's ignition outputs. Connecting directly to a coil without internal igniters will damage the VCU.

Specs:

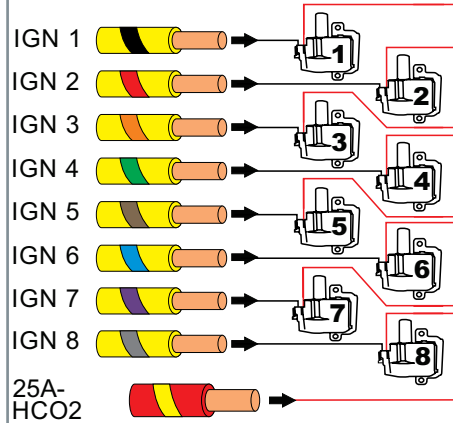
- Number of channels: 8
- Software selectable global 12V or 5V pull-up voltage
- Software selectable individual 270R pull-up enable
- Flyback protected
- 3A sink current
- 10kHz switching speed
- Automatic overtemperature / overcurrent protection
- 0 to 27V voltage feedback

Unused ignition outputs can also be used as:

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



8-CYL DIRECT FIRE IGNITION (WIRE AS PER CYLINDER ORDER)

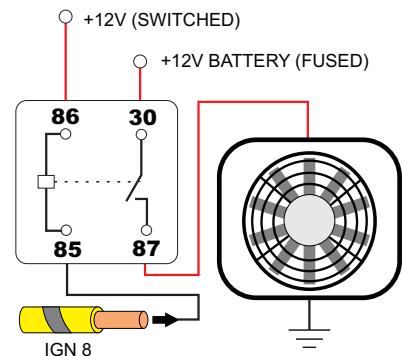


NOTE: The coils (HT-020102) depicted in this diagram have internal igniters. Do not connect ignition outputs directly to coils unless they have internal igniters as this will damage the VCU. If your coils are without internal igniters an external igniter module must be used.

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.

SPARE IGNITION OUTPUT USED AS DPO



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 supply from one of the 25 Amp high current outputs on the Nexus R3.

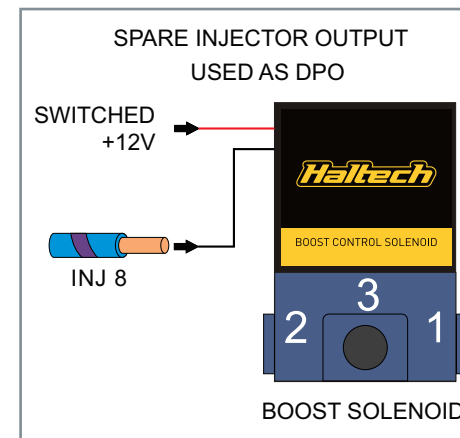
When not used for injector control, the spare injector outputs can be used as generic digital pulsed outputs (DPO) capable of switching to ground or pulse width modulation (PWM).

Specs:

- Number of channels: 8
- 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)



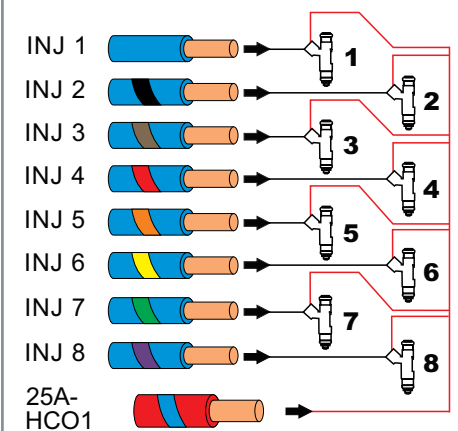
Wideband O2 Sensor

The Nexus R3 provides on-board wideband O2 sensor control and directly connects to Haltech Bosch or NTK wideband O2 sensor kits using the DTM-6 Wideband plug fitted in the harness. Adding a wideband lambda sensor is recommended to properly tune the engine for fuel and enables the VCU to use features such as closed loop O2 control.

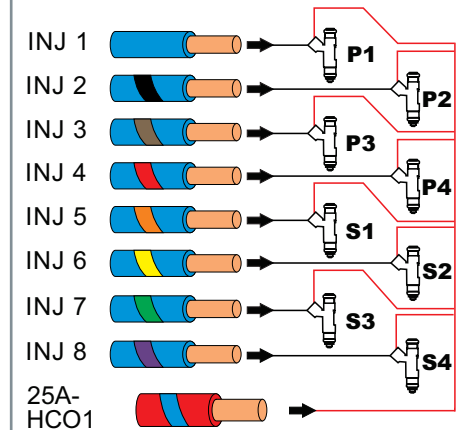
Haltech wideband O2 sensor kits (sold separately):

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

8-CYL SEQUENTIAL INJECTION (WIRE AS PER CYLINDER ORDER)



4-CYL TWO STAGE INJECTION



NEXUS R3 CONNECTIONS

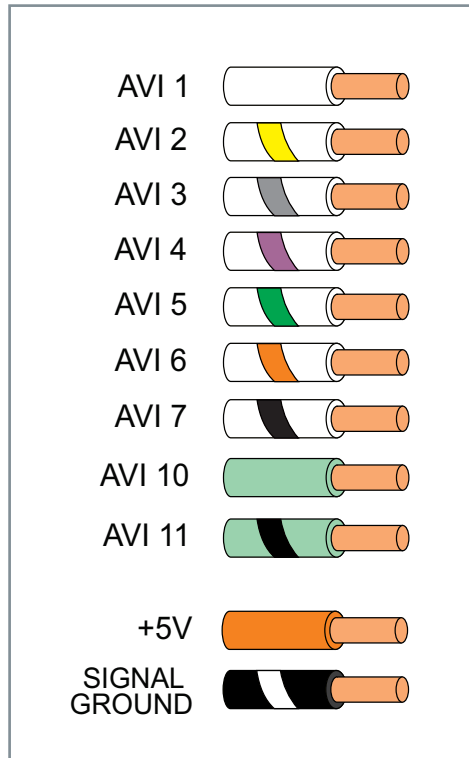
Analog Voltage Inputs

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: 11
- 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



Synchronised Pulsed Inputs

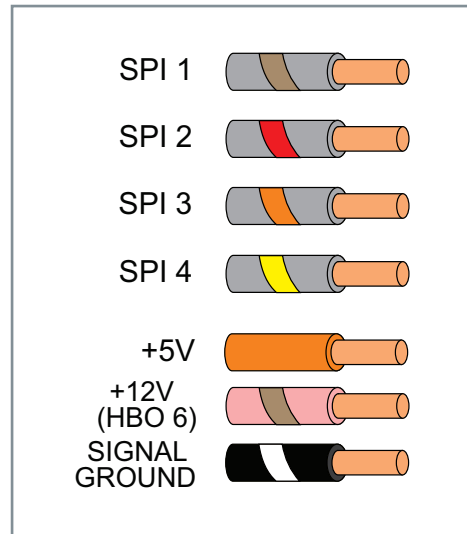
Synchronised Pulsed Inputs are capable of measuring the position, duty cycle, frequency or state of a signal, as well as analog voltage inputs.

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

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

Specs:

- Number of channels: 6
- -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



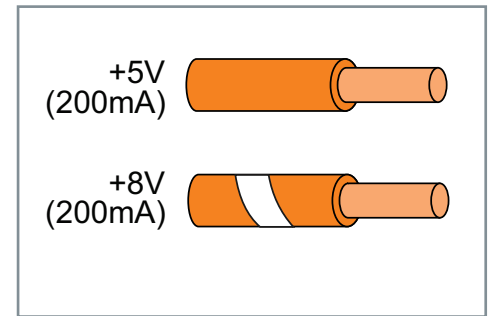
NOTE:

Multiple +5V and +12V (HBO6) power and signal ground wires are fitted in the harness for use with AVIs and SPIs. Any signal ground wire can be paired with any power wire required by the sensor.

5V Sensor Power Supply

Multiple +5V power supply wires are fitted into this harness to power typical 3-pin analog voltage devices such as pressure sensors, throttle position sensors, rotary trim switches, etc. The total current supplied by the Nexus R3 for these +5v power wires is 200mA.

If the application specifically requires, a +8V power supply wire is also available for use and can also source current up to 200mA.



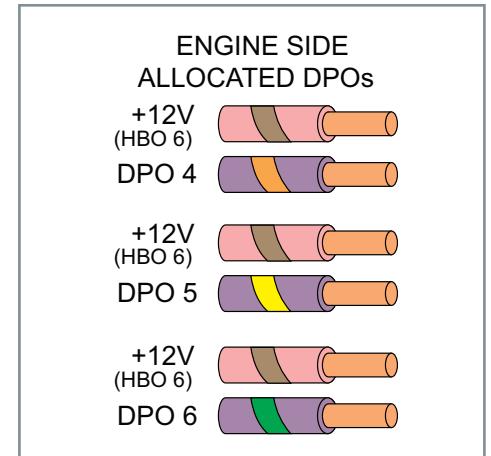
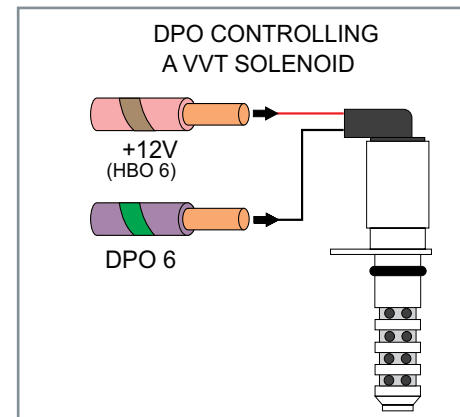
Digital Pulsed Outputs

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, etc.

Three DPOs are fitted for engine bay devices but more can be reallocated from the cabin side of the harness if the application requires.

Specs:

- Number of channels: 6
 - Selectable 4k7 pullup 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 pullup enable.

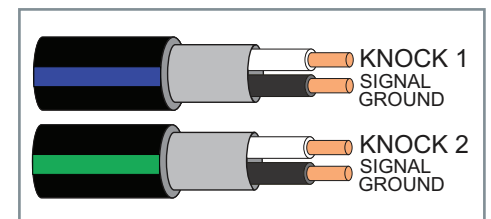


Knock Inputs

The Nexus R3 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



NEXUS R3 CONNECTIONS

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.

The Nexus R3 universal harness is fitted with six HBO wires with the last two allocated to provide power to the CAN plug, sensors, and other devices.

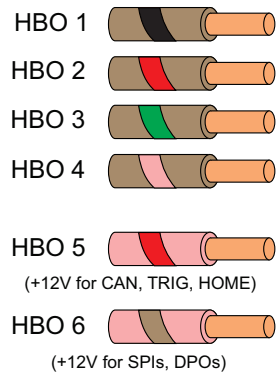
Specs:

- Number of channels: 6
- 8A to 12V (high), or 8A to ground (low) output
- 5A max when used as push-pull PWM (eg 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

Note: Half bridge output HBO 5 and HBO 6 are allocated in this harness to provide power for CAN devices, cam and crank sensors, and SPI/DPO power connections. Ensure these HBOs are set as engine control relay outputs in your VCU map so they provide power when the VCU is On.



25A High Current Outputs

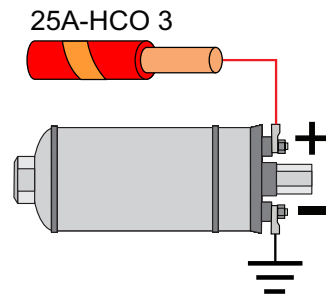
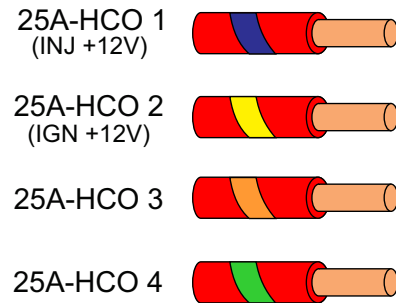
High current outputs 25A-HCO1 and 25A-HCO2 are allocated in this harness for injector and ignition +12V sources respectively.

Two spare 25A high current outputs, 25A-HCO3 and 25-HCO4, are available to control high current devices such as fuel pumps, thermo fans, transbrake solenoids, etc.

These outputs have automatic high and low side overcurrent and undervoltage lockout protection and are PWM capable as well.

Specs:

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



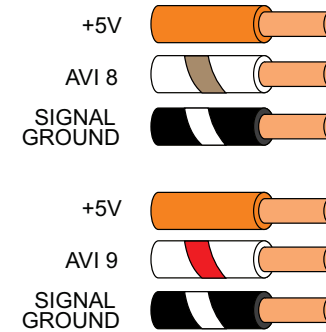
Example of a 25A-HCO controlling a high current device such as a fuel pump.

In-cabin connections

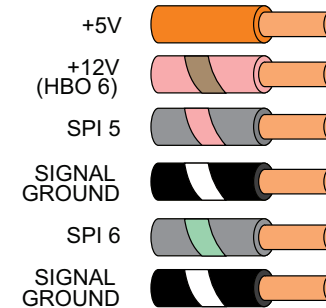
The Nexus R3 universal wire in harness has multiple input and output wires allocated for in-cabin connections. This group of in-cabin wires are labelled and grouped together with power and ground sources to make it easy to wire in sensors, switches, relays or other devices.

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

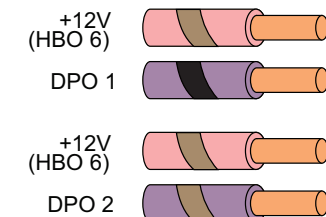
ANALOGUE VOLTAGE INPUTS



SYNCHRONISED PULSED INPUTS



DIGITAL PULSED OUTPUTS



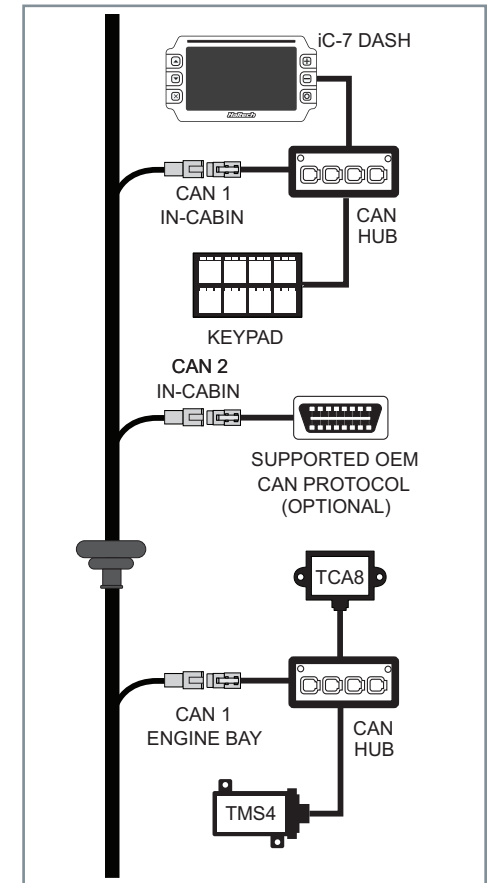
Haltech CAN connection (Label: CAN 1 and CAN 2)

This harness is fitted with two CAN channels 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 with CAN 1 and CAN 2 in-cabin connections, and another CAN 1 connection extended to the engine bay side.

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)





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