

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 conjuction with the Nexus R3 VCU, offers all the advanced tuning options available through the Nexus Software Programmer (NSP).

Harness Features:

pressure, position)

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 reluctor or hall effect sensor types

to voltage type sensors (eg MAP, temperature,

11 x analog voltage inputs (AVIs) to connect

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?

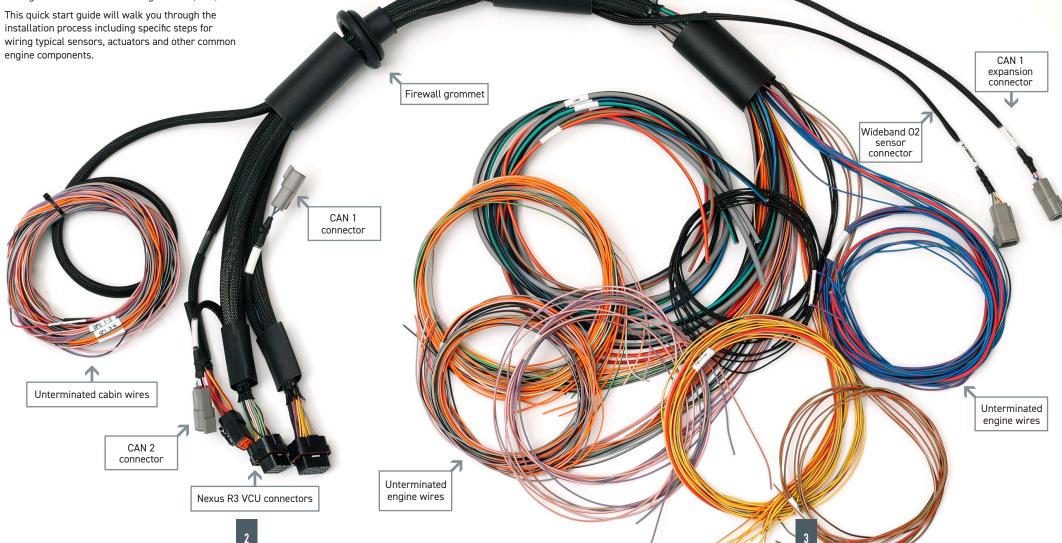
Nexus R3 VCU universal wire-in harness, 2.5m (HT-183200).

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.

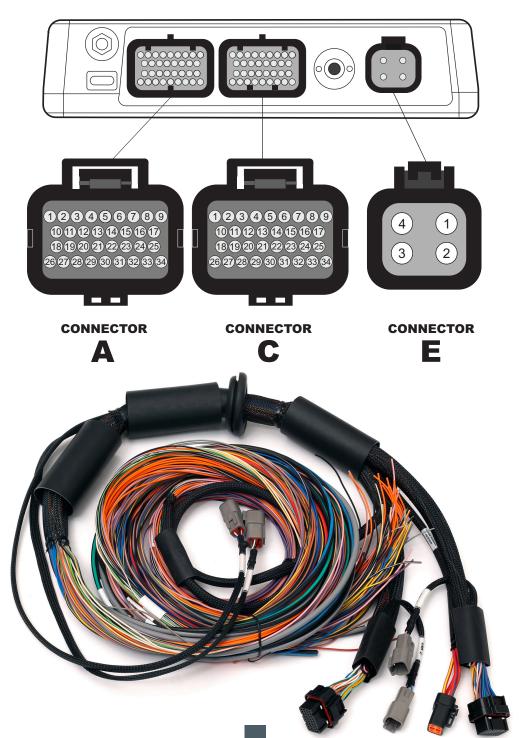


HARNESS PINOUT DIAGRAM

	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	HB0 1	Brown/Black
A20	HB0 2	Brown/Red
A21	HB0 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 (KEYW	AY 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	

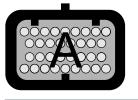


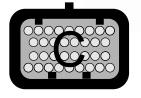
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NEXUS R3 CONNECTIONS

Nexus R3 VCU Connection

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







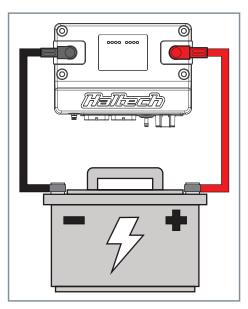
Connector A: 34-pin, Keyway Type 1 Connector C: 34-pin, Keyway Type 2 Connector E: 4-pin, DTP

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).



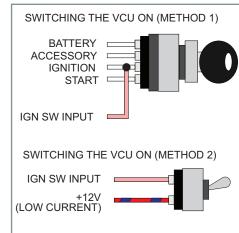
Ignition Switch

(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 loose 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.

SAMPLE USE OF THE BATTERY GROUND OUTPUT AVI BATTERY GROUND OUTPUT HIGH / LOW BOOST SWITCH OUTPUT

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 HB05 in this harness. A +8V supply and a +5V wire is also available in the harness if required.

Reluctor sensor

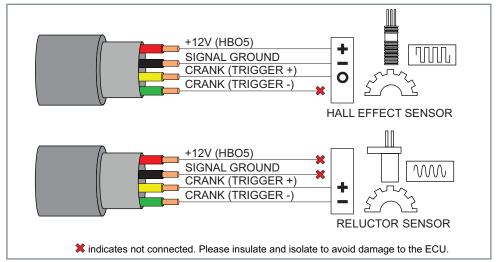
This type of sensor sends out a sine wave type of signal. Reluctor sensors do not require external power. These sensors can generate their own

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-cour 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 senor.

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



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.

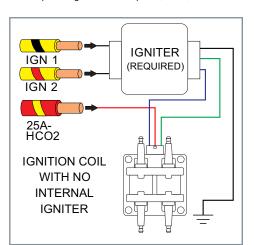
Ignition coils without internal igniters draw large amounts of current and thus must use an external igniter module to be safely triggered by the VCU's ignition outputs. Connecting directly to a coil without internal igniters will damage the VCU.

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)

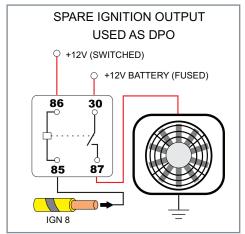


8-CYL DIRECT FIRE IGNITION (WIRE AS PER CYLINDER ORDER) IGN 1 IGN 2 IGN 3 IGN 4 IGN 5 IGN 6 IGN 7 IGN 8 25A-HCO2

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 ignitor 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.



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.

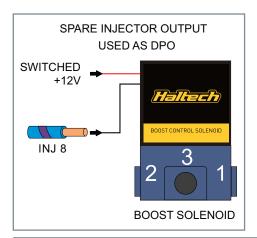
When not used for injector control, the spare injector outputs can be used as generic digital pulsed outputs (DPO) capable of switching to ground or pulse width modulation (PWM).

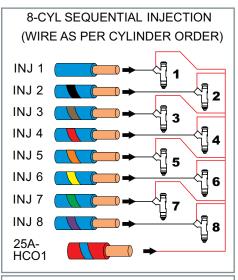
Specs:

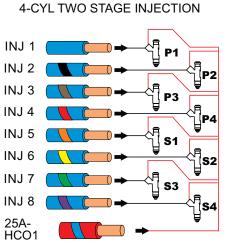
- · Number of channels: 8
- · Current controlled output
- · 8A Peak, 2A Hold
- · 0 to 55V voltage feedback

Unused injector outputs can also be used as:

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







Wideband 02 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 02 sensor kits (sold separately):

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



NEXUS R3 CONNECTIONS

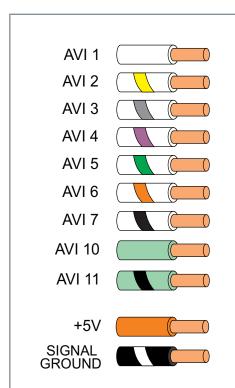
Analog Voltage Inputs

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

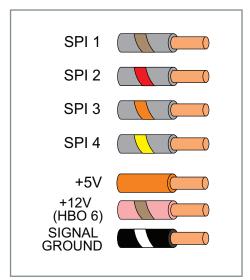
Synchronised Pulsed Inputs are capable of measuring the position, duty cycle, frequency or state of a signal, as well as analog voltage inputs.

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 reluctor (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



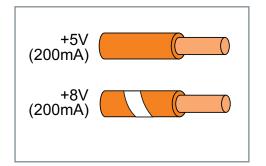
NOTE:

Multiple +5V and +12V (HB06) 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.

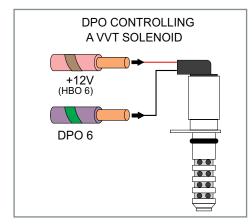
Three DPOs are fitted for engine bay devices but more can be reallocated from the cabin side of the harness if the application requires.

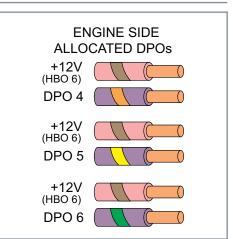
Specs:

- 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
- \cdot Low speed digital switch inputs (0-12V) with pullup enable.



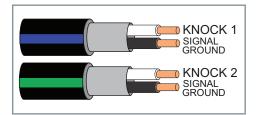


Knock Inputs

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.

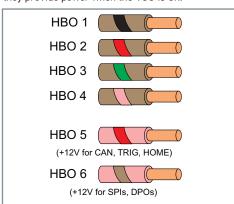
Specs:

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

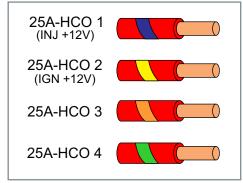
High current outputs 25A-HC01 and 25A-HC02 are allocated in this harness for injector and ignition +12V sources respectively.

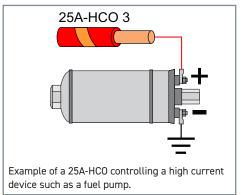
Two spare 25A high current outputs, 25A-HC03 and 25-HC04, are available to control high current devices such as fuel pumps, thermo fans, transbrake solenoids, etc.

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





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 AVI 8 **SIGNAL** GROUND +5\ AVI 9 **SIGNAL** GROUND SYNCHRONISED PULSED INPUTS +12V (HBO 6) SPI 5 **SIGNAL** GROUND SPI₆ **SIGNAL** GROUND DIGITAL PULSED OUTPUTS (HBO 6) DPO (HBO 6) DPO 2

Haltech CAN connection

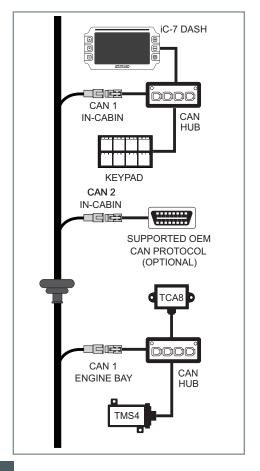
(Label: CAN 1 and CAN 2)

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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WIRING NOTES

		CONNECTOR A		
Pin	Function	Colour	Notes	
A1	INJ 1	Blue		
A2	INJ 2	Blue/Black		
А3	INJ 3	Blue/Brown		
A4	INJ 4	Blue/Red		
A5	INJ 5	Blue/Orange		
A6	INJ 6	Blue/Yellow		
A7	INJ 7	Blue/Green		
A8	INJ 8	Blue/Violet		
A9	DPO 1	Violet/Black		
A10	PGND OUT	Black		
A11	PGND OUT	Black		
A12	DP0 2	Violet/Brown		
A13	IGN SW IN	Pink		
A14	DP0 3	Violet/Red		
A15	DPO 4	Violet/Orange		
A16	DP0 5	Violet/Yellow		
A17	DPO 6	Violet/Green		
A18	HB05 (12V)	Pink/Red		
A19	HBO 1	Brown/Black		
A20	HBO 2	Brown/Red		
A21	HBO 3	Brown/Green		
A22	HBO 4	Brown/Pink		
A23	CAN1H	White		
A24	CAN1L	Blue		
A25	HB06(12V)	Pink/Brown		
A26	+12V LOW	Red/Blue		
A27	IGN 1	Yellow/Black		
A28	IGN 2	Yellow/Red		
A29	IGN 3	Yellow/Orange		
A30	IGN 4	Yellow/Green		
A31	IGN 5	Yellow/Brown		
A32	IGN 6	Yellow/Blue		
A33	IGN 7	Yellow/Violet		
A34	IGN 8	Yellow/Gray		
Notes	Notes:			

Pin	Function	Colour	Notes
C1	TRIG+	Yellow	
C2	TRIG -	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	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	CAN2H	White	
C22	CAN2L	Blue	
C23	Knock 1	Black/Blue	
C24	Knock 2	Black/Green	
C25	+5V	Orange	
C26	SGND A	Black/White	
C27	AVI 10	L.Green	
C28	AVI 11	L.Green/Black	
C29	WB Heater+	Gray	
C30	WB Input	Yellow	
C31	WB Pump	Red	
C32	WB Nernst	Black	
C33	WB Heater-	White	
C34	WB Cal	Green	
Notes:			

CONNECTOR E			
Pin	Function	Colour	Notes
E1	INJ 12V	Red/Blue	
E2	IGN 12V	Red/Yellow	
E3	25A-HC0 3	Red/Orange	
E4	25A-HCO 4	Red/Green	
Notes:			



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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