

# Nissan R32-R34 Plug-in

USER  
MANUAL  
Rev 1.0

R32 – R34



**EMtron**  
Australia

## Contents

---

1.0 Introduction .....	2
2.0 Plugin Features.....	3
3.0 Installation .....	4
3.1 Expansion Port .....	4
3.2 CAN Bus 1 Wiring .....	5
3.3 Analog Sensor Wiring.....	7
3.4 Ethanol Content Sensor Wiring .....	8
4.0 ECU Channel Assignment.....	10
5.0 Plug-in Specific Information.....	13
5.1 Fuel Model .....	13
5.2 Inlet Air Temperature .....	13
5.3 ECU User Pins 111, 102 .....	13
5.3 EGT Light .....	13
5.4 Crank(120) and Crank (1) Signal Selection.....	14
6.0 Diagnostic Trouble Codes (DTCs) .....	15
7.0 Ordering Information.....	16
Appendix A – Nissan R32-R34 ECU Pinout.....	17

## 1.0 Introduction

The Nissan R32-R34 ECU is designed to be plugged into the OEM harness to allow for a true “Plug and Play” install. The system is based on the KV Series Motorsport ECU, so all the same features are available excluding any limitations based around the OEM connector system. An Expansion port is included giving access to unused Input channels. CAN Bus 1 is also available providing additional I/O expandability.

## 2.0 Plugin Features

### General

- KV8 ECU based platform.
  - Dual 100MHz processors
  - 32MB ECU logging memory
  - Over 1000 logging channels available
  - 1Hz to 500Hz logging rate
- Aluminium 6061 Grade CNC billet enclosure
- Compatible with all Emtron proven motorsport features(Launch Control, Rolling Launch, Anti-Lag, Traction Control)
- Upgradeable to run the Emtron fuel model through installation of a flex meter, fuel temperature and fuel pressure sensor
- Idle speed closed loop control using DBW with advanced Throttle Mass Flow (TMF) airflow calculations
- Knock control with high speed digital filtering for each cylinder using the OEM sensor with selectable centre frequency and bandwidth
- Pre-configured Calibration file loaded providing a comprehension tuning platform
- Input Expansion Capabilities through DTM connector
  - 3x User Analog Volt Inputs (Fuel Temperature, Fuel Pressure, Inlet Temperature)
  - 1x User Digital Input (Flex Meter Input and switch inputs)
  - 2x User Analog Inputs
- Emtune software for tuning and data analysis

### Communications

- CAN 2.0B Bus 1: User CAN Bus for I/O expansion (Lambda, EGT)
- High Speed Ethernet 100Mbps for tuning software connection

### Operating Temperature

- Recommended operating range: -30 to 85°C (-22 to 185°F)

### Physical

- Enclosure Size 160 mm x 162 mm x 38 mm
- 890g

## 3.0 Installation

### 3.1 Expansion Port

The ECU's input capabilities can be expanded using the expansion connection which is a male DTM 12 Way. See Table 3.0.

These additional inputs can be connected to any sensor, but the recommended sensors are indicated in brackets.

Pin	Function
1	Analog Sensor 0V Reference
2	5V Vref2 Supply
3	AN 8 (e.g. Fuel Temp or Inlet Temp)
4	AN 9 (e.g. Fuel Temp or Inlet Temp)
5	AN 10 (e.g. Fuel Pressure)
6	DI 6 (e.g. Ethanol Content Sensor)
7	ANV 13
8	ANV 14
9	14V Out Protected (e.g. ELC2 Power Supply)
10	ECU Ground (e.g. ELC2 or E85 Sensor Ground)
11	CAN 1 Hi
12	CAN 1 Lo

Table 3.0 - Expansion Port Pinout (DTM06-12SA)



## 3.2 CAN Bus 1 Wiring

The ECU CAN Bus 1 is reserved for Emtron CAN Bus devices, expanding the IO capability of the ECU. The following devices can be connected:

- ELC1/2 (Emtron Lambda to CAN 1/2 channel)
- ETC4/ETC8M (Emtron Thermocouple to CAN 4/8 channels)
- EIC10/EIC16M (Emtron Input to CAN 10/16 Channel)

For more information on each device refer to the downloads section on the website: ([emtron.world/downloads](http://emtron.world/downloads))

### Emtron ELC/ETC4/EIC10 to CAN

All these CAN devices share a common power, ground and CAN pinout using a 4-way DTM. See Table 3.1.

Pin	Function	Wire Colour
1	Ground	BLACK
2	CAN Lo	GREEN
3	CAN Hi	YELLOW
4	12V Supply	RED

Table 3.1. CAN Device Power and CAN Deutsch Connector Pinout

To help with installation time, each CAN Device pin can be directly connected into the ECU IO Expansion Port. Pinout information is shown Table 3.2.

Name	ECU IO Expansion 12-Way DTM	CAN Device 4-Way DTM
Ground	Pin 8	Pin 1
CAN 1 Lo	Pin 12	Pin 2
CAN 1 Hi	Pin 11	Pin 3
Power	Pin 7	Pin 4

Table 3.2. IO Expansion to CAN Device wiring

The following points should be noted when using the CAN Bus:

- CAN Bus High and Low are differential signals, so twisted pair **MUST** be used. Failing to do so will compromise the entire CAN Bus System. It is recommended to twist the CAN wire pairs at a minimum one twist per 40mm of cable.
- In some extreme environments, shielded twisted pair may be required to help with reliability and data integrity.
- The less connectors in any transmission system the better. Unnecessary connectors are almost guaranteed to present an impedance discontinuity and hence may cause reflections and data loss.
- CAN Bus termination must be done correctly by using a 120 ohm 0.25W resistor at each END of the bus system. See the example in Figure 3.1.
- Maximum Stub length to a device from the main Bus is recommended at 0.3m, in accordance with High-Speed ISO 11898 Standard specification. See Figure 3.2.

ALL Emtron CAN devices do **not** include an on-board CAN termination resistor, allowing the device to be wired at any position on the Bus. CAN Bus termination must be done correctly by using a 120 ohm 0.25W resistor at each end of the bus system as mentioned above.

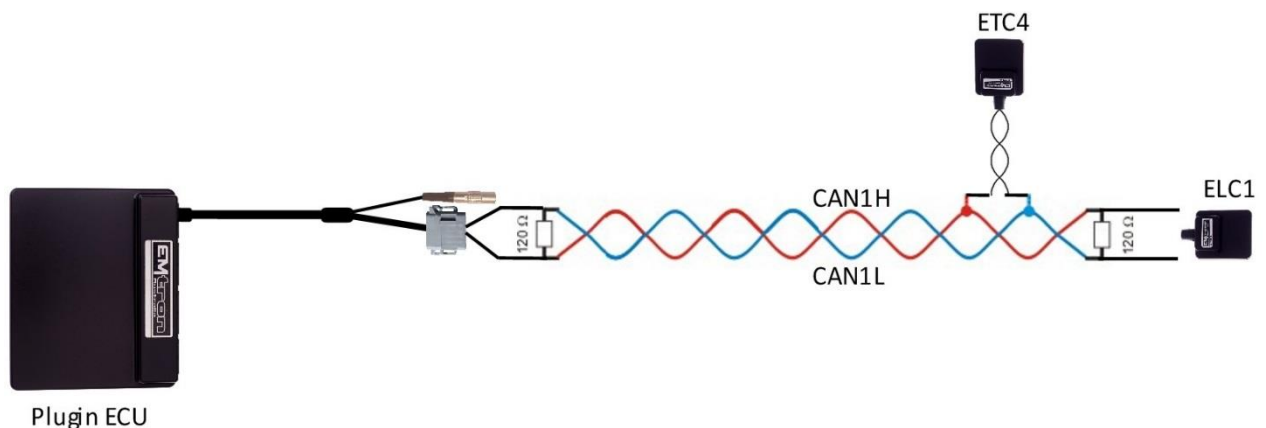


Figure 3.1. CAN Bus Wiring Example. ECU and ELC1 at each end with 120 Ohm Termination

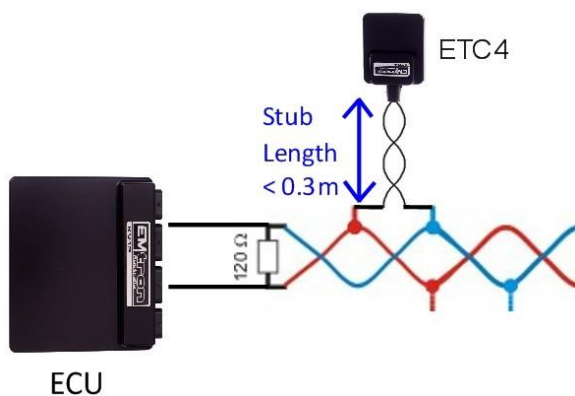


Figure 3.2. CAN Bus Wiring Example. Stub Length less than 0.3m

### 3.3 Analog Sensor Wiring

#### **5V VRef2 Sensor Supply Pin (Pin 2 of Expansion port)**

This is a 250mA 5V output designed to supply automotive sensors.

#### **Sensor 0V Reference Pin (Pin 1 of Expansion port)**

This pin should be connected directly to the 0V (Ground) pin on any low current analog sensor, for example Pressure or Temperature. Figures 3.3 and 3.4 show the correct and incorrect wiring system.

- **DO NOT** connect the 0V Reference pin directly to the Engine Block or ECU Ground. This is a dedicated and specialised 0V/ground output for analog sensors.
- **DO NOT** connect frequency-based sensor grounds to the 0V Reference pin; for example, an Ethanol content sensor. Use Pin 8 (Ground) in the Expansion port.

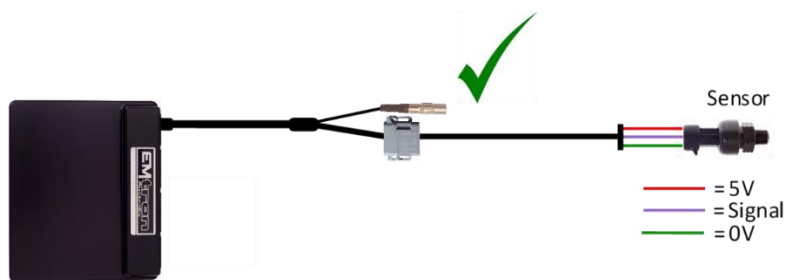


Figure 3.3. Correct Pressure Sensor 0V Wiring

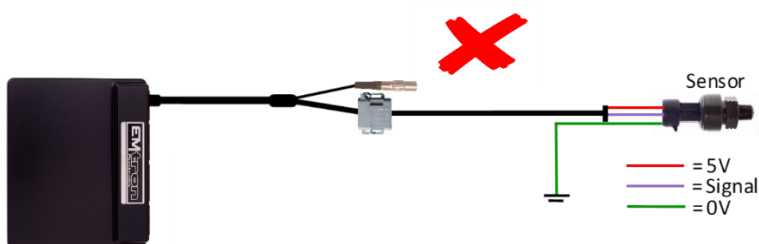


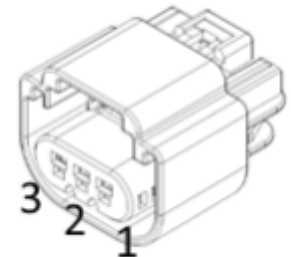
Figure 3.4. Incorrect Pressure Sensor 0V Wiring



### 3.4 Ethanol Content Sensor Wiring

An Ethanol Content sensor can be wired into the ECU using the Expansion port. The following channel assignment is recommended for the GM sensor:

GM Sensor Pinout	Expansion Port	Description
Pin 1	Pin 9. 14V Protected	Supply, 8V or 14V
Pin 2	Pin 10. ECU Ground	Ground
Pin 3	Pin 6. DI 6	Output. Temperature and Ethanol Content



**NOTE:**

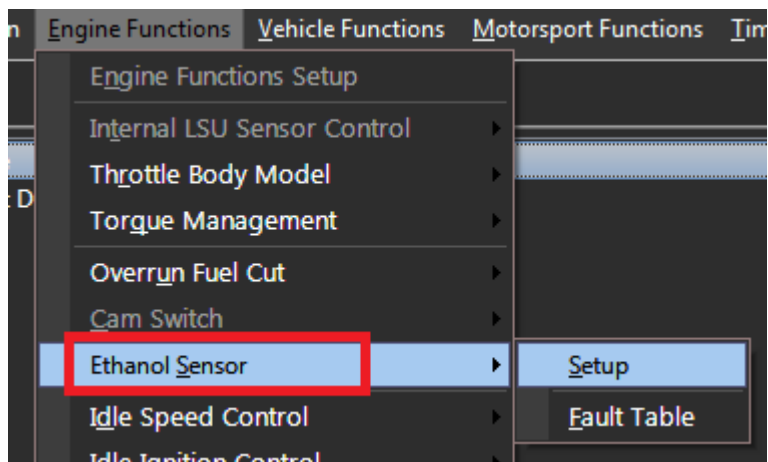
- **DO NOT** connect the Ethanol Content sensor ground to the “Analog Sensor 0V Reference”. Use the ECU Ground from Pin 10 in the Expansion port.
- The Ethanol sensor produces a frequency based output. Suitable ECU channels are DI 1-8.

Description	Calibration
Ethanol Content (%)	50Hz = 0% Ethanol 150Hz = 100% Ethanol
Fuel Temperature	1ms = -40 DegC 5ms = 125 DegC

To config the ECU for this sensor, select the Ethanol Sensor Input Source to DI6. The ECU will automatically decode the Ethanol Content and Fuel Temperature.

Inputs Setup							
Engine	Vehicle	Switches	VVT	Speed	DBW/Servo	Lambda Cyls	EGT
Channel Name			Abrv	Input			
Longitudinal G Force			G Long	Internal G-Force			
Lateral G Force			G Lat	Internal G-Force			
Vertical G Force			G Vert	Internal G-Force			
Roll			Roll	OFF			
Pitch			Pitch	OFF			
Vehicle Yaw Rate			Yaw	OFF			
Ethanol Sensor			E85	DI 6			

Once the Ethanol Sensor has been assigned an input, more settings become available in the Tuning View -> Engine Functions menu.



## 4.0 ECU Channel Assignment

ECU Channel - Injection	Function
Injection Channel 1	Fuel Injector Cylinder 1
Injection Channel 2	Fuel Injector Cylinder 2
Injection Channel 3	Fuel Injector Cylinder 3
Injection Channel 4	Fuel Injector Cylinder 4
Injection Channel 5	Fuel Injector Cylinder 5
Injection Channel 6	Fuel Injector Cylinder 6
Injection Channel 7	O2 Heater
Injection Channel 8	Not Used
Injection Channel 9	Not Used
Injection Channel 10	Not Used
Injection Channel 11	Not Used
Injection Channel 12	Not Used

ECU Channel - Ignition	Function
Ignition Channel 1	Ignition Cylinder 1
Ignition Channel 2	Ignition Cylinder 2
Ignition Channel 3	Ignition Cylinder 3
Ignition Channel 4	Ignition Cylinder 4
Ignition Channel 5	Ignition Cylinder 5
Ignition Channel 6	Ignition Cylinder 6
Ignition Channel 7	FPCM1
Ignition Channel 8	FPCM1
Ignition Channel 9	Trigger Sensor 120/1 Control
Ignition Channel 10	Not Used
Ignition Channel 11	Not Used
Injection Channel 12	Not Used

ECU Channel - Analog Inputs	Function
Analog Voltage 1	TPS
Analog Voltage 2	O2 Front
Analog Voltage 3	O2 Rear
Analog Voltage 4	MAF (Rear R32)
Analog Voltage 5	MAF Front R32
Analog Voltage 6	Not Used
Analog Voltage 7 (Pull-up Channel)	Engine Temperature
Analog Voltage 8 (Pull-up Channel)	(IO Expansion port)
Analog Voltage 9 (Pull-up Channel)	(IO Expansion port)
Analog Voltage 10 (Pull-up Channel)	(IO Expansion port)
Analog Voltage 11 (Pull-up Channel)	Not Used
Analog Voltage 12 (Pull-up Channel)	Not Used
Analog Voltage 13	Not Used
Analog Voltage 14	Not Used

**NOTE:** Analog Voltage Channels 7-12 have switchable pull-ups which are suitable for temperature measurement.

ECU Channel - Digital Inputs	Function
Digital Input 1	Vehicle Speed
Digital Input 2	Neutral Switch
Digital Input 3	Start Switch
Digital Input 4	AC Request Switch
Digital Input 5	Alternator FR Signal
Digital Input 6	(IO Expansion port (Ethanol Sensor))
Digital Input 7	Power Steer Pressure Switch
Digital Input 8	Not Used
Digital Input 9	Not Used
Digital Input 10	Not Used
Digital Input 11	Not Used
Digital Input 12	Not Used
Digital Input 13	Not Used
Digital Input 14	Not Used

<b>ECU Channel - Auxiliary Outputs</b>	<b>Function</b>
Auxiliary 1	VTC Solenoid
Auxiliary 2	Wastegate Solenoid
Auxiliary 3	Tacho
Auxiliary 4	ISC Solenoid
Auxiliary 5	Fuel Pump Relay
Auxiliary 6	A/C Clutch Relay
Auxiliary 7	CE Light
Auxiliary 8	Fan Relay (R32)
Auxiliary 9	EGT Light (R33)
Auxiliary 10	Injector %DC Display
Auxiliary 11	Connected to pin 111 (user output – 5A)
Auxiliary 12	Connected to pin 112 (user output – 5A)
Auxiliary 13	Not Used
Auxiliary 14	Not Used
Auxiliary 15	Not Used
Auxiliary 16	Not Used

<b>ECU Channel - Crank/Cam</b>	<b>Function</b>
Crank Index	Crank Position Sensor (120 Deg)
Sync Sensor	Crank Position Sensor (1 Deg)

## 5.0 Plug-in Specific Information

### 5.1 Fuel Model

The ECU has the ability of using any Emtron based Fuel Model however the base calibration provided implements a simple version of Speed Density. The Main VE Table has the Efficiency Calculation configured to span against TPS. This allows the mapping process to be simplified. The fuel calculation will still account for Inlet Manifold Pressure. The Lambda Target is modified by a combination of Engine Speed and Manifold Pressure in the base calibration and allows for increasing enrichment based on an increase in the engine load.

### 5.2 Inlet Air Temperature

Factory Inlet Air Temperature using ECU input ANV 8 is available on most models. If the input shows 4.85V or higher this sensor is not connected and will need to be fitted and wired in using the Expansion port. Refer to section 3.1.

### 5.3 ECU User Pins 111, 102

ECU pins 111 and 102 are unused OEM pins which connect directly to Aux 11 and 12 respectively. These are Half Bridge drivers with the following current rating:

- 5A continuous and 8A limit. Can be used as Low Side, High Side or together for DC motor control.

### 5.3 EGT Light

The R33 models has an EGT Light on Auxiliary 9. This can be configured and controlled from a User Channel.

Function Setup							
Engine Functions	Vehicle Functions 1	Vehicle Functions 2	Motorsport Functions	Timer Functions	User Functions		
Channel Name	Output Channel Assign	Type	Mode	Invert	Pullup	Frequency	
User Output 1 - R3x Trigger	Ignition Channel 9	Low	Switched	OFF	OFF		
User Output 2 - EGT Light	Auxiliary Channel 9	Low	Switched	OFF	OFF		
User Output 3 -	OFF						
User Output 4 -	OFF						

### 5.4 Crank(120) and Crank (1) Signal Selection

For the correct engine decoding, the ECU Crank Index input should be connected to the Nissan 120 degree signal and Sync input connected to the Nissan 1 degree signal. The R32 and R33 should not require the signal swap enabled. The R34 will require the enabling of the Crank (120) and Crank (1) signal swap which will prevent the engine from starting; cranking RPM will read extremely high if the pin swap is not enabled. These signals can be swapped using internal circuitry controlled by Ignition 9 i.e. it doesn't require any physical pins to be swapped. Table 5.0 shows the Ignition 9 control options. A User channel can be configured to control this.

Function Setup							
Engine Functions	Vehicle Functions 1	Vehicle Functions 2	Motorsport Functions	Timer Functions	User Functions		
Channel Name	Output Channel Assign	Type	Mode	Invert	Pullup	Frequency	
User Output 1 - R3x Triqer	Ignition Channel 9	Low	Switched	OFF	OFF		
User Output 2 - EGI Light	Auxiliary Channel 9	Low	Switched	OFF	OFF		
User Output 3 -	OFF						
User Output 4 -	OFF						

	Ignition 9 OFF	Ignition 9 ON
ECU Pin 41/51	Crank Signal 120 degree	Crank Signal 1 Degree
ECU Pin 42/52	Crank Signal 1 Degree	Crank Signal 120 degree

Table 5.0. Ignition 9 Crank Signal Configuration.

## 6.0 Diagnostic Trouble Codes (DTCs)

On initial installation it is advised to clear all the DTC's if error(s) are reported. To check: connect to Emtune and look at the DTC status in the bottom toolbar. If there are Errors the status box will be Red as shown in Figure 6.0.

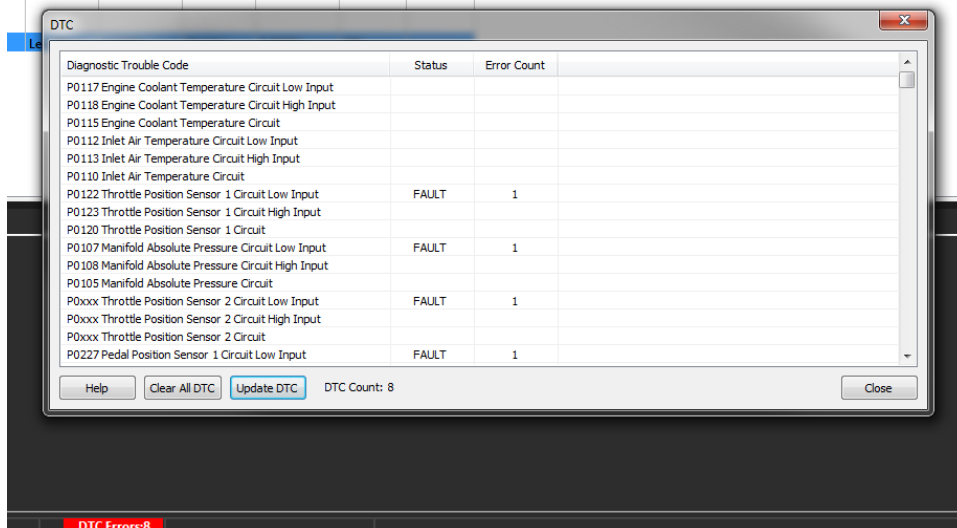


Figure 6.0. DTC example showing 8 errors.

To open the DTC window, click on the DTC Status box in the bottom toolbar OR use the File menu -> Open DTC. Next select "Clear ALL DTCs" and confirm all the Error Codes have been removed; the DTC Status box should go Green indicating this as shown in Figure 6.1. Close the DTC window.

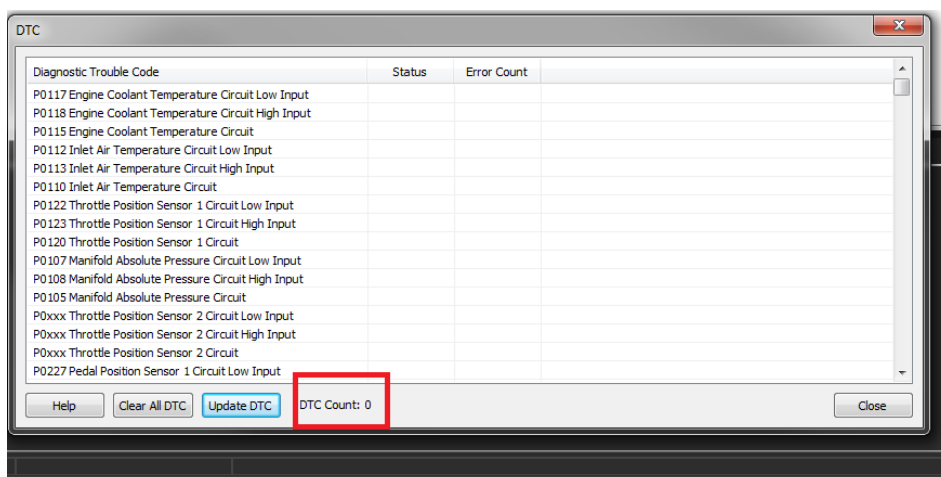


Figure 6.1. DTC example showing no errors.

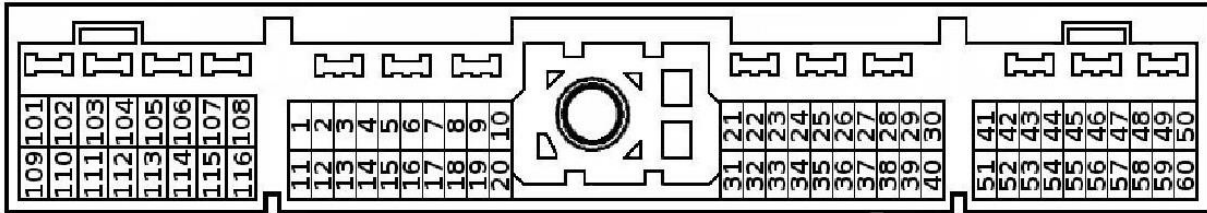
If the Error Codes have not all been removed, select "Update DTC" then use the DTC window to locate the sensor that is on fault.



## 7.0 Ordering Information

Product	Part Number
Emtron Nissan R32-R34 Plugin	1609-1834
Emtron Ethernet Tuning Cable (1.5m)	553-15

## Appendix A – Nissan R32-R34 ECU Pinout



Pin	Function	Channel Assignment
101	Injector 1	INJ 1
102	N/C	AUX 12
103	Injector 3	INJ 3
104	Fuel Pump Control #1	IGN 7
105	Injector 2	INJ 2
106	Fuel Pump Control #2	IGN 8
107	Injector Ground	ECU GROUND
108	Injector Ground	ECU GROUND
109	N/C	
110	Injector 5	INJ 5
111	N/C	AUX 11
112	Injector 6	INJ 6
113	VTC Solenoid (R33)	AUX 1
114	Injector 4	INJ 4
115	O2 Heater Rear (R33/R34)	INJ 7
116	Injector Ground	ECU GROUND

Pin	Function	Channel Assignment
1	Ignition 1	IGN 1
2	Ignition 5	IGN 5
3	Ignition 3	IGN 3
4	Idle Speed Control Solenoid	AUX 4
5	AT Shift Request	DI 5
6	Engine Fan Relay (R32)	AUX 8
7	Tacho	AUX 3
8	Ignition Switch (some models only)	Ignition Switch
9	A/C Clutch Relay	AUX 6
10	Ignition Ground	ECU GROUND
11	Ignition 6	IGN 6
12	Ignition 2	IGN 2
13	Ignition 4	IGN 4
14	N/C	
15	N/C	
16	ECCS Relay	EFI RELAY
17	Injector %DC Display (or E85)	AUX 10
18	Fuel Pump Relay	AUX 5
19	Power Steer Pressure Switch	DI 7
20	Ignition Ground	ECU GROUND

Pin	Function	Channel Assignment
21	N/C	
22	N/C	
23	Knock Sensor 1	Knock 1+
24	Knock Sensor 2	Knock 2+
25	Wastegate Solenoid	AUX 2
26	MAF Ground	ECU GROUND
27	Mass Air Flow Sensor (Rear)	ANV 4
28	Engine Coolant temperature	ANV 7
29	O2 Sensor Front	ANV 2
30	Sensor Ground (Coolant, O2)	Sensor 0V Reference
31	Clock (Sync Signal)	
32	CE Light	AUX 7
33	EGT Light (R33)	AUX 9
34	MAF Ground	ECU GROUND
35	Mass Air Flow Sensor (Front)	ANV 5
36	Inlet Air Temperature (some models only)	ANV 8
37	N/C	
38	Throttle Closed Switch	ANV 1
39	N/C	
40	Sensor Ground (MAP, TPS)	Sensor 0V Reference

<b>Pin</b>	<b>Function</b>	<b>Channel Assignment</b>
41	Crank Position Sensor (120)	<b>Crank Index</b>
42	Crank Position Sensor (1)	<b>Sync Sensor</b>
43	Start Switch	<b>DI 3</b>
44	Neutral Switch	<b>DI 2</b>
45	Ignition Switch	<b>Ignition Switch</b>
46	A/C Request Switch	<b>DI 4</b>
47	N/C	
48	TPS +5V Supply	+ 5V Supply
49	Control Unit Power Supply	<b>ECU SUPPLY</b>
50	<b>Control Unit Ground</b>	<b>ECU GROUND</b>
51	Crank Position Sensor (120)	<b>Crank Index</b>
52	Crank Position Sensor (1)	<b>Sync Sensor</b>
53	Vehicle Speed Sensor	<b>DI 1</b>
54	N/C	
55	O2 Sensor Rear	<b>ANV 3</b>
56	Throttle Position Out	<b>AV OUT 1</b>
57	N/C	
58	Battery Backup (+12 Constant)	<b>Internal Flywheel Supply</b>
59	Control Unit Power Supply	<b>ECU SUPPLY</b>
60	<b>Control Unit Ground</b>	<b>ECU GROUND</b>

**Emtron Australia Pty Ltd**  
Unit 8, 36 Lidco Street  
Arndell Park NSW 2148  
**Australia**

(See the www for contact information)

[www.emtron.world](http://www.emtron.world)  
[www.emtronaustralia.com.au](http://www.emtronaustralia.com.au)