

## SYSTEM OUTLINE

The engine control system utilizes a microcomputer and maintains overall control of the engine, transmission etc. An outline of the engine control is given here.

### 1. INPUT SIGNALS

#### (1) Engine coolant temp. signal circuit

The water temp. sensor detects the engine coolant temp. and has a built-in thermister with a resistance, which varies according to the engine coolant temp.. The engine coolant temp. which is input into **TERMINAL THW** of the engine and ECT ECU as a control signal.

#### (2) Intake air temp. signal circuit

The intake air temp. sensor is installed in the air flow meter and detects the intake air temp. which is input as a control signal to **TERMINAL THA** of the engine and ECT ECU.

#### (3) Oxygen density signal circuit

The oxygen density in the exhaust emission is detected by the heated oxygen sensors and input as a control signal to **TERMINALS OX1A, OX2A, OX1B** and **OX2B** of the engine and ECT ECU.

#### (4) RPM signal circuit

Camshaft position is detected by the camshaft position sensor and its signal is input to **TERMINAL G2** of the engine and ECT ECU as a control signal.

Also, engine RPM is detected by the crankshaft position sensor and is input as a control signal to **TERMINAL NE+**.

#### (5) Throttle position signal circuit

The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into **TERMINAL VTA** of the engine and ECT ECU.

#### (6) Vehicle speed circuit

The speed sensor (ECT) detects the vehicle speed and inputs a control signal to **TERMINAL SP2+** of the engine and ECT ECU.

#### (7) Battery signal circuit

Voltage is constantly applied to **TERMINAL BATT** of the engine and ECT ECU. With the ignition SW turned on, the voltage for engine and ECT ECU start-up power supply is applied to **TERMINALS +B, B2** of the engine and ECT ECU via the EFI relay.

The current flowing through the **IGN** fuse flows to **TERMINAL IGSW** of the engine and ECT ECU.

Voltage is constantly applied to **TERMINAL BM** of the engine and ECT ECU.

#### (8) Intake air volume signal circuit

Intake air volume is detected by the air flow meter and the signal is input to **TERMINAL VG** of the engine and ECT ECU as a control signal.

#### (9) Stop light SW signal circuit

The stop light SW is used to detect whether the vehicle is braking or not and the signal is input into **TERMINAL STP** of the engine and ECT ECU as a control signal.

#### (10) Starter signal circuit

To confirm whether the engine is cranking, the voltage is applied to the starter motor during cranking is detected and the signal is input into **TERMINAL STA** of the engine and ECT ECU as a control signal.

#### (11) Engine knock signal circuit

Engine knocking is detected by knock sensors and the signal is input into **TERMINALS KNK1** and **KNK2** as a control signal.

## 2. CONTROL SYSTEM

- \* EFI system

The EFI system monitors the engine condition through the signals input from each sensor (Input signals from (1) to (11) etc.) to the engine and ECT ECU. And the control signal is output to **TERMINALS #10, #20, #30, #40, #50 and #60** of the engine and ECT ECU to operate the injector (Inject the fuel). The EFI system controls the fuel injection operation by the engine and ECT ECU in response to the driving conditions.

- \* ESA system

The ESA system monitors the engine condition through the signals input to the engine and ECT ECU from each sensor (Input signals from (1), (2), (4), to (11) etc.). The best ignition timing is decided according to this data and the memorized data in the engine and ECT ECU and the control signal is output to **TERMINALS IGT, IGT2, IGT3**. This signal controls the igniter to provide the best ignition timing for the driving conditions.

- \* Heated oxygen sensor heater control system

The heated oxygen sensor heater control system turns the heater on when the intake air volume is low (Temp. of exhaust emissions is low), and warms up the oxygen sensors to improve detection performance of the sensors. The engine and ECT ECU evaluates the signals from each sensor (Input signals from (1), (2), (4), (7), to (9) etc.), and outputs current to **TERMINALS HT1A, HT2A, HT1B and HT2B** to control the heater.

- \* Fuel pump control system

The engine and ECT ECU outputs current to **TERMINAL FPC** and controls the fuel pump control ECU and fuel pump drive speed in response to the driving conditions.

- \* ACIS

ACIS includes a valve in the bulkhead separating the surge tank into two parts. This valve is opened and closed in accordance with the driving conditions to control the intake manifold length in two stages for increased engine output in all ranges from low to high speeds.

- \* ETCS-i

The ETCS-i controls the engine output at its optimal level corresponding to the opening of the accel. pedal under all driving conditions.

- \* MPX

The MPX communicates with the combination meter, A/C control assembly, as well as body ECU of the multiplex communication system

## 3. DIAGNOSIS SYSTEM

With the diagnosis system, when there is a malfunction in the engine and ECT ECU signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed by the check engine warning light.

## 4. FAIL-SAFE SYSTEM

When a malfunction has occurred in any system, if there is a possibility of engine trouble being caused by continued control based on the signals from that system, the fail-safe system either controls the system by using data (Standard values) recorded in the engine and ECT ECU memory or else stops the engine.

## SERVICE HINTS

### EFI RELAY

5-3 : Closed with ignition SW at **ON** or **ST** position

### W3 WATER TEMP. SENSOR

1-2 : Approx. **15.0 kΩ** (**-20°C**, **-4°F**)  
 Approx. **2.45 kΩ** (**20°C**, **68°F**)  
 Approx. **0.32 kΩ** (**80°C**, **176°F**)  
 Approx. **0.14 kΩ** (**110°C**, **230°F**)

### E2 (A), E3 (B), E5 (D), E6 (E) ENGINE AND ECT ECU

BATT-GROUND : Always approx. **12** volts  
 BM-GROUND : Always approx. **12** volts  
 IGSW-GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position  
 +B, B2-GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position  
 VC-GROUND : **4.5-5.5** volts with ignition SW on  
 VTA2-GROUND : **2.0-2.9** volts with ignition SW on and throttle valve fully closed  
                   **4.6-5.0** volts with ignition SW on and throttle valve fully opened  
 VTA-GROUND : **0.4-1.0** volts with ignition SW on and throttle valve fully closed  
                   **3.2-4.8** volts with ignition SW on and throttle valve fully opened  
 VPA-GROUND : **0.25-0.9** volts with ignition SW at on and accelerator fully closed  
                   **3.2-4.8** volts with ignition SW at on and accelerator fully opened  
 VPA2-GROUND : **1.8-2.7** volts with ignition SW at on and accelerator fully closed  
                   **4.7-5.0** volts with ignition SW at on and accelerator fully opened  
 THA-GROUND : **0.5-3.4** volts with idling, intake air temp. **20°C (68°F)**  
 THW-GROUND : **0.2-1.0** volts with idling, coolant temp. **80°C (176°F)**  
 STA-GROUND : **6.0** volts or more with cranking  
 TC-GROUND : **9.0-14.0** volts with ignition SW on  
 W-GROUND : **9.0-14.0** volts with idling  
                   **0-3.0** volts with ignition SW on  
 ACMG-GROUND : **0-1.5** volts with A/C SW on (at idling)  
                   **7.5-14.0** volts with A/C SW off and throttle valve fully open  
 #10, #20, #30, #40, #50, #60-GROUND : **9.0-14.0** volts with ignition SW on pulse generation with idling

### I5, I6, I7, I8, I9, I10 INJECTOR NO.1, NO.2, NO.3, NO.4, NO.5, NO.6

1-2 : **13.4-14.2 Ω**

## ○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A10	82 (RHD)	H14	82 (RHD)	J37	88 (RHD)
A11	82 (RHD)	H15	82 (RHD)	J38	88 (RHD)
A16	86 (RHD)	H16	82 (RHD)	J39	88 (RHD)
A23	86 (RHD)	H23	86 (RHD)	J42	88 (RHD)
B5	86 (RHD)	I1	84 (RHD)	J44	90 (RHD)
C1	82 (RHD)	I5	84 (RHD)	K1	84 (RHD)
C2	82 (RHD)	I6	84 (RHD)	K2	84 (RHD)
C3	82 (RHD)	I7	84 (RHD)	M2	88 (RHD)
C4	82 (RHD)	I8	84 (RHD)	N1	84 (RHD)
C11	A 86 (RHD)	I9	84 (RHD)	P1	84 (RHD)
C12	B 86 (RHD)	I10	84 (RHD)	S1	84 (RHD)
D2	86 (RHD)	I12	86 (RHD)	S12	88 (RHD)
E2	A 82 (RHD)	J26	84 (RHD)	T2	84 (RHD)
E3	B 82 (RHD)	J27	A 84 (RHD)	T3	84 (RHD)
E4	C 82 (RHD)	J28	B 84 (RHD)	T5	88 (RHD)
E5	D 82 (RHD)	J29	84 (RHD)	T6	88 (RHD)
E6	E 82 (RHD)	J31	88 (RHD)	V2	84 (RHD)
E7	F 82 (RHD)	J32	88 (RHD)	V3	84 (RHD)
F15	90 (RHD)	J34	88 (RHD)	W3	84 (RHD)
F16	90 (RHD)	J36	88 (RHD)		

# ENGINE CONTROL (RHD)

## : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	54 (RHD)	Engine Room No.1 R/B (Engine Compartment Left)

## : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	58 (RHD)	Engine Room Main Wire and Driver Side J/B (Right Kick Panel)
1D	58 (RHD)	Instrument Panel Wire and Driver Side J/B (Right Kick Panel)
1F	58 (RHD)	Cowl Wire and Driver Side J/B (Right Kick Panel)
1G	59 (RHD)	
1H		
1J		

## : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	106 (RHD)	Engine Wire and Cowl Wire (Inside of the ECU Box)
EA2		
EA3		
EA4		
EB1	106 (RHD)	Cowl Wire and Relay Block Wire (Inside of the ECU Box)
IA1	108 (RHD)	Engine Room Main Wire and Cowl Wire (Near the Passenger Side R/B)
IA2		
IA3		
IC2	108 (RHD)	Floor No.2 Wire and Cowl Wire (Left Kick Panel)
IC3		
ID1	108 (RHD)	Instrument Panel Wire and Cowl Wire (Right Side of the Blower Unit)
IJ1	110 (RHD)	Instrument Panel Wire and Cowl Wire (Right Side of the Steering Column)
IK1	110 (RHD)	Engine Room Main Wire and Cowl Wire (Near the Driver Side J/B)

## : GROUND POINTS

Code	See Page	Ground Points Location
EB	106 (RHD)	Left Fender
EC	106 (RHD)	Front Side of the Intake Manifold
ED	106 (RHD)	Rear Side of the Intake Manifold
EE	106 (RHD)	Under the ABS & TRC & VSC Actuator
IF	108 (RHD)	Left Kick Panel
IG	108 (RHD)	Behind the Combination Meter
II	108 (RHD)	Cowl Side Panel RH
BJ	112 (RHD)	Rear Floor Partition Panel LH
BK	112 (RHD)	Quarter Panel LH

## : SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	106 (RHD)	Engine Wire	E3	106 (RHD)	Engine Wire
E2			E4	106 (RHD)	Cowl Wire

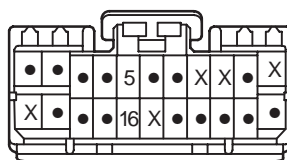
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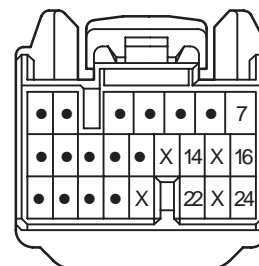
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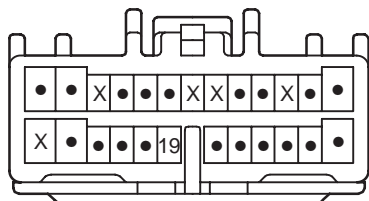
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A23



B5



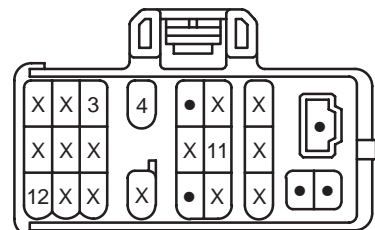
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C2 BLACK



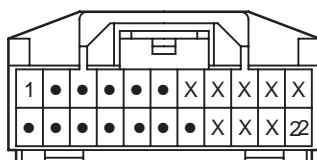
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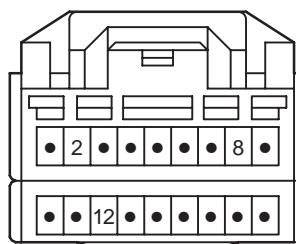
C4 DARK GARY



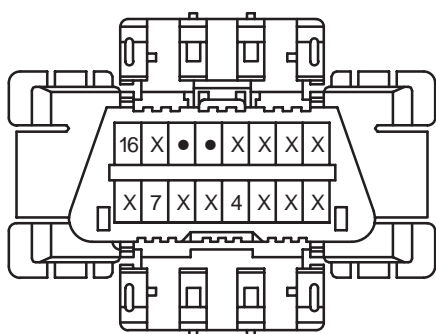
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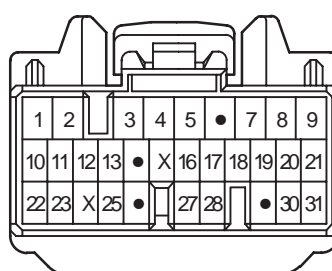
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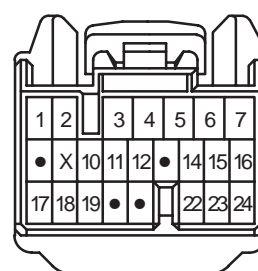
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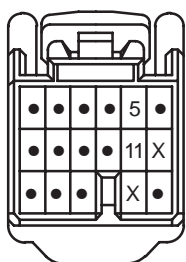
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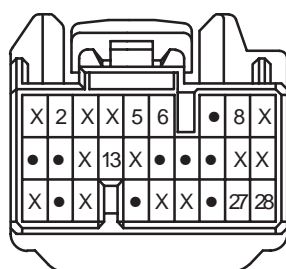
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E4 (C)



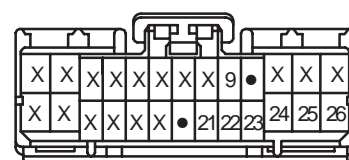
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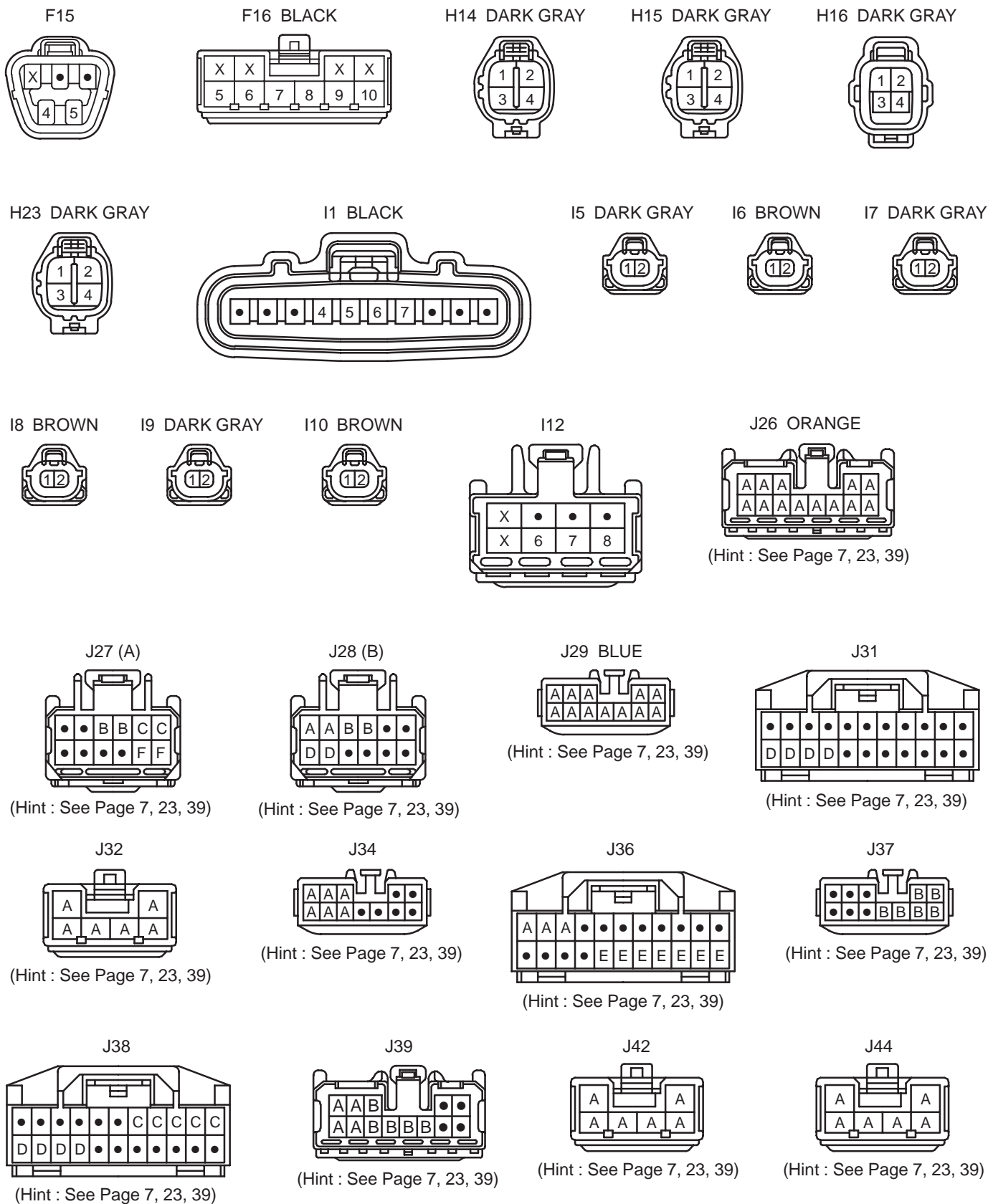
E6 (E)



E7 (F)



# ENGINE CONTROL (RHD)



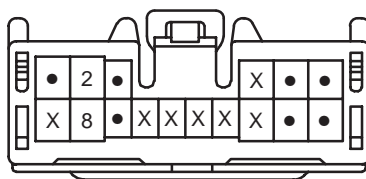
K1 DARK GRAY



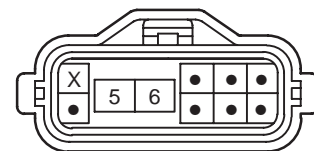
K2 DARK GRAY



M2 BLUE



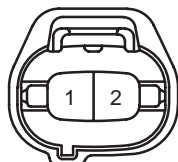
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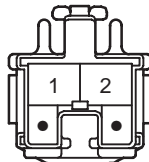
P1 DARK GRAY



S1 BLACK



S12 BLUE



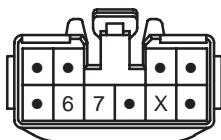
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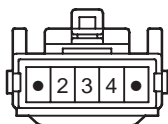
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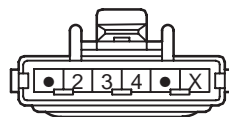
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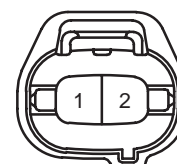
(Europe) T6



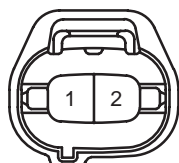
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V2 BROWN



V3 BLUE



W3 BLACK

