Document Information

Location: Hybrid / Electrical

Topic: McLaren Artura eMotor Overtemperature Diagnosis Guide

Condition: N/A

Diagnostic Trouble Codes: P0A2A29 P160068 P0A2A1C P0A2B98

Code	Details	Comments
P0A2A29	Drive Motor "A" Temperature Sensor "A" Circuit - Signal Invalid	
P160068	Drive Motor "A" Temperature Sensor "A" Causing Inverter Cutback Event Information	
P0A2A1C	Drive Motor "A" Temperature Sensor "A" Circuit - Circuit Voltage Out of Range	Triggered by a short circuit or wire break for the eMotor temperature sensor
P0A2B98	Drive Motor "A" Temperature Sensor "A" Circuit Range/Performance Component or System Over Temperature	If this DTC is stored without P0A2A1C, it is likely there will be a cooling system concern (dielectric or LTR)

Measure

If you are presented with an Artura with a hybrid warning displayed in the instrument cluster and the associated DTCs listed under Diagnostic Trouble Codes, please proceed as follows:

Care Point: A TR must be raised with detailed description of the concern and highlight your intention of working through this KA BEFORE proceeding.

1. Switch the vehicle on to ignition state 5 and touch the dielectric pump.

Is the working noise and vibration consistent?

Is the flow when seen from looking in from the top of the dielectric reservoir consistent and continuous? Please remove cap and capture a video from the top for better viewing due to difficult access.

If the answer to both above questions is yes, please proceed to step 2.

2. Perform a MDS 2 actual value log following the instructions in KA-01661 to set up the log.

Ensure the log is printed in landscape and the colour key for the log is included. Please log the following 8 signals:

time: ---

	ECU	Signal	Value	Unit
1	P16_MCU	Engine Coolant Temperature	---	
2	P16_MCU	Engine RPM	---	
3	P16_MCU	Encoder Speed	---	
4	P16_MCU	Inverter Hottest Junction Temp	---	
5	P16_MCU	Motor Stator Measured Temperature	---	
6	P16_MCU	Motor Rotor Measured Temperature	---	
7	P16_MCU	Motor Cavity Estimated Temperature	---	
8	P16_MCU	Estimated Torque IOP	---	

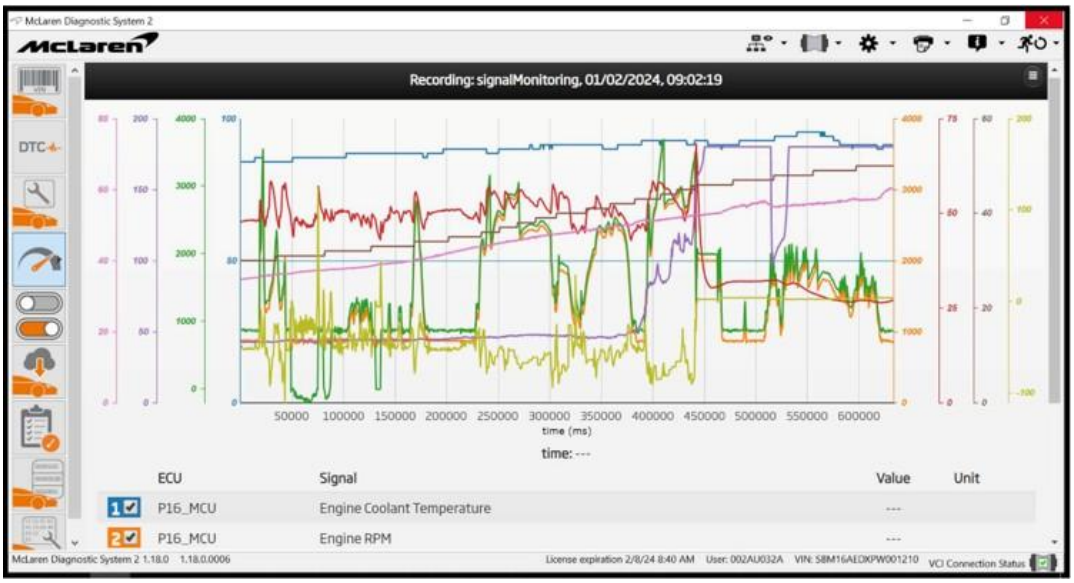
Colour matrix key for logs

Steps to follow while capturing the log:

- Ensure HV SOC is above 40%
- Run vehicle for 10 minutes at idle in track mode
- Drive vehicle for 10 minutes in eDrive and hybrid drive (5 min each)
- Ensure HV SOC is above 40% - if below 40%, drive in sport mode until 40% HV SOC reached
- 2x Acceleration in eMode 0 to 55 mph (full wide-open throttle) Stop and save the log
- At the end of the drive cycle, read DTC's and AV's for MCU & IPU
- If during the drive any fault appears we need to know after which step and if a lack of power has been felt. It needs to be understood as well if
- it happens during straight line acceleration, cornering or over a rough/ bumpy road

Review of the motor stator measured temperature log Scenario 1

If the motor stator measured temperature (purple trace) jumps from circa 30 - 120°C to 180°C instantaneously, this indicates a break in the line (open circuit) somewhere between the MCU and the temperature sensor in the eMotor.



@45000ms temperature instantaneously rises, drops then rises again

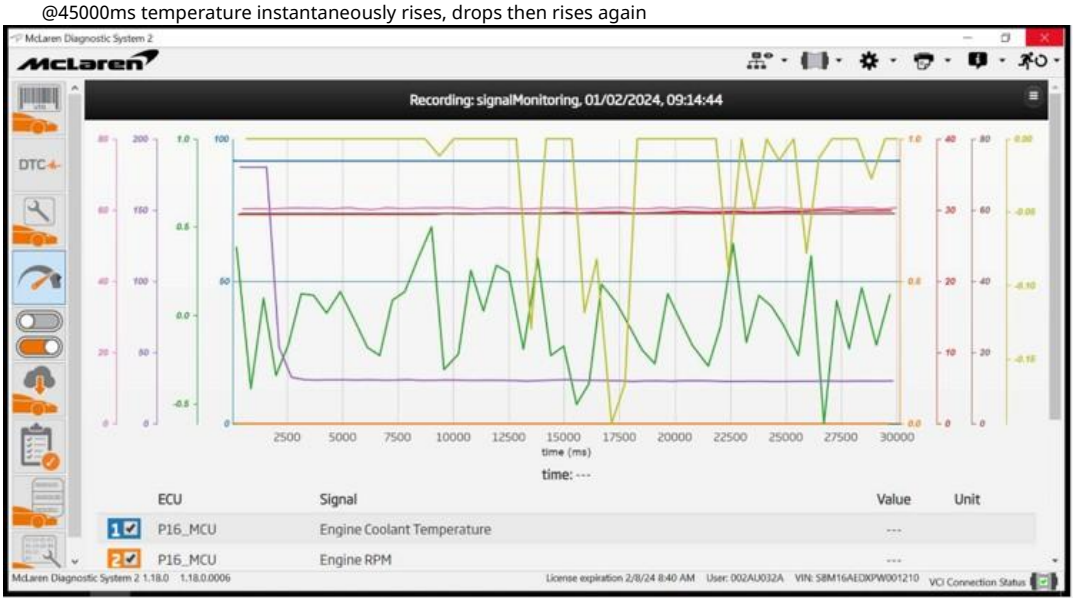


Diagram shows temperature at 180°c dropping to 40°c (Purple Trace)

If the temperature on the purple trace drops down to - 40°c instantaneously this indicates a short circuit.
If any of the above symptoms are presented in the log, please submit your findings on the TR before advancing to step 3.

Scenario 2

If the temperature rises gradually to values exceeding 120°c and does not drop in line with the thermostats opening, this indicates a coolant issue. Either dielectric fluid/ pump or the LTR system.
Proceed to thoroughly check LTR system for flow, blockages, and air locks (displacement) in the system.

Also check the dielectric oil level and flow.
If the symptoms in scenario 2 are present in the logs, attach your findings and results from the LTR and dielectric system checks to the TR and await further instructions.

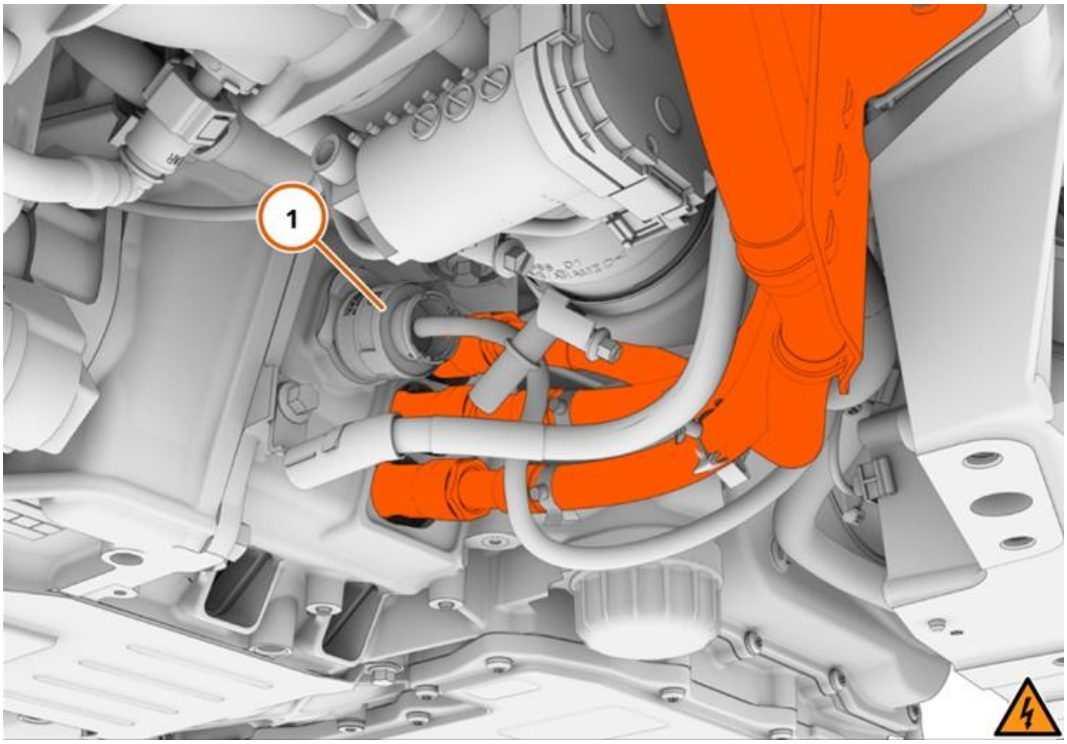
Care Point: Please submit your findings up to this point on the TR and await further instruction to continue.

Step 3.

Connector Checks

Care Point: The vehicles Hazardous Voltage (HV) system MUST be de-activated BEFORE continuing. Please follow McLaren Service Portal instructions Remove/Install Manual Service Disconnect (MSD).

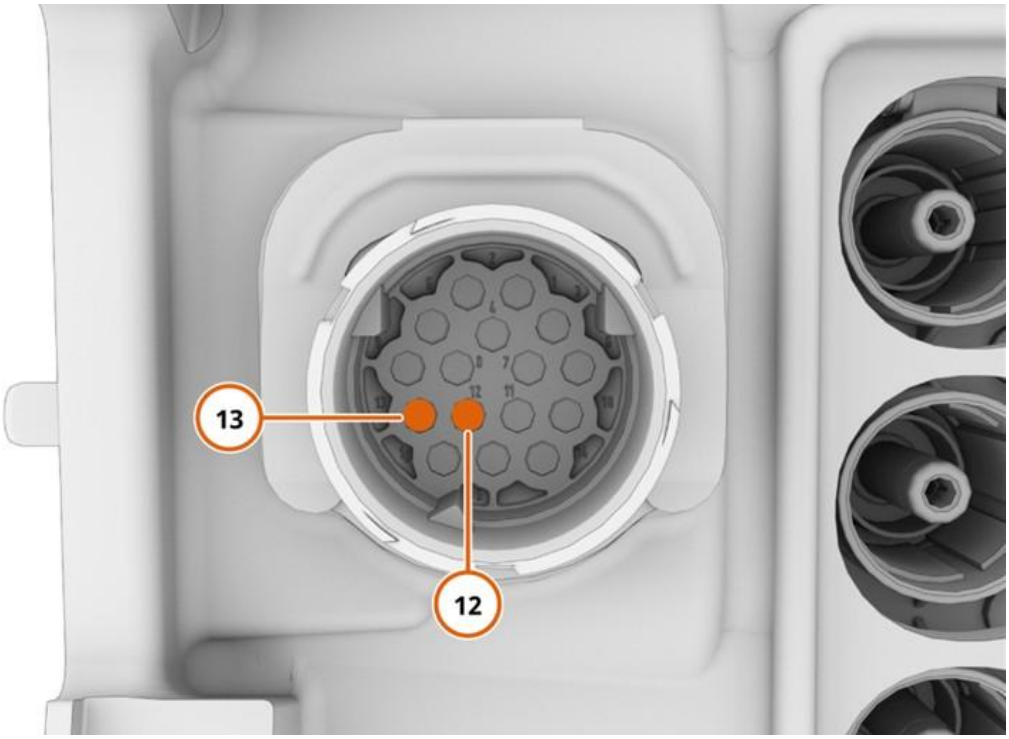
Care Point: During the following resistance checks, please wiggle wiring where possible at each tested connector to try and identify poor connections. Also check each connector for signs of water/corrosion and damaged/backed out pins.
For convenience it is recommended to start checking the round transmission connector first.



transmission connector: transmissionexternal-to-transmissionhtm Disconnect

the round connector (1) in the image above.

The male connector is as follows:



transmissionexternal-to-transmissionhtm (Round connector – male) Check

connectors for:

- Connectors not fully engaged
- Corrosion
- Pins backed out from connectors

The Stator winding thermistor pins are 12 and 13 (blue section) as per the above schematic .
Locate pins 12 and 13 in the round connector as shown in the image above. Set
a multimeter in resistance mode as shown in the image below:

Connect the multimeter positive probe to pin 12.
Connect the multimeter negative probe to pin 13.

According to the specification, the resistance at ambient temperature should be between **1077.9 Ω** and **1155.4 Ω** as shown in the example below:

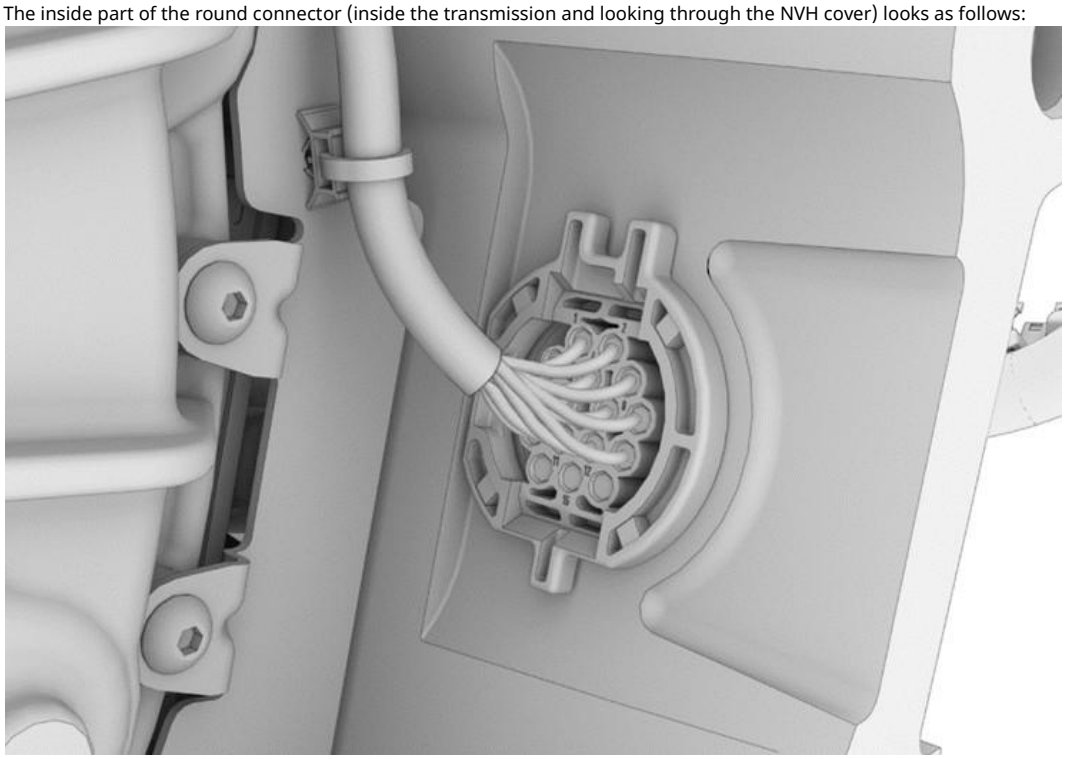
Stator winding thermistor resistance at ambient temperature pins 12 & 13

If the resistance value is not between the range specified above, please take a picture of the value and the measuring points on the connector, and attach your findings to the TR.

If the resistance value is within the expected range proceed to the next check.

Additional Check

The inside part of the round connector (inside the transmission and looking through the NVH cover) looks as follows:



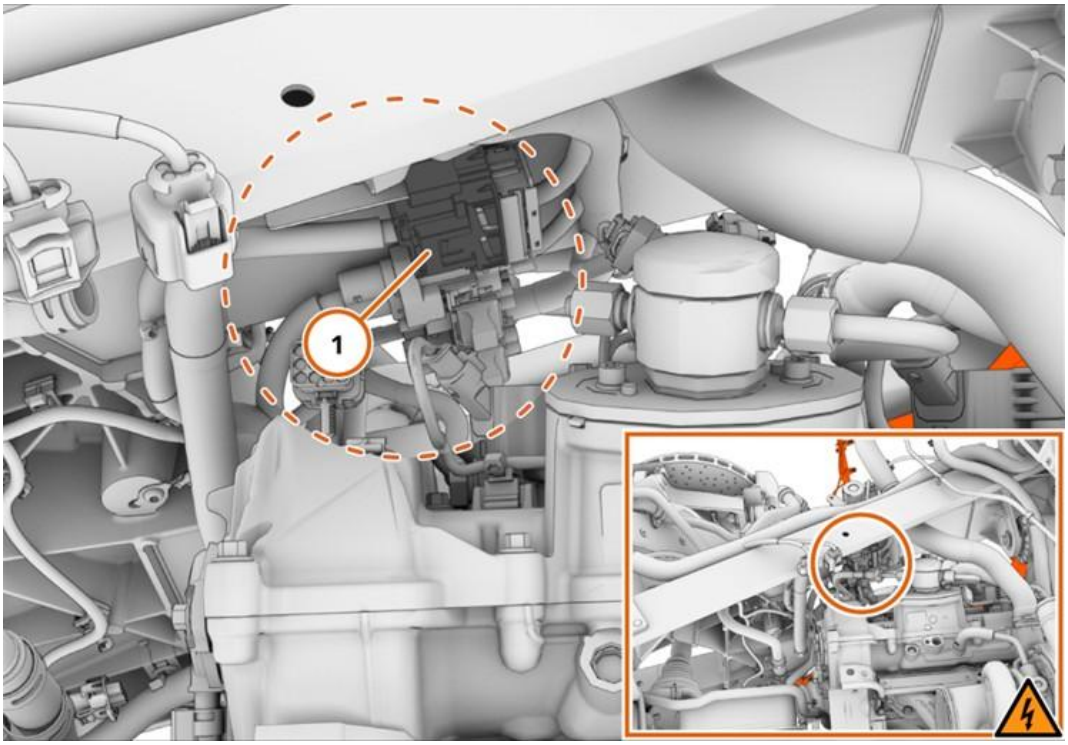
Round connector inside transmission

Please take a close look at this part of the connector and take a picture. In addition, spot if there is any presence of water traces or backed out pins.

Care Point: New transmissions will have the back of this connector covered in resin but the wires should still be visible.

Transmission in-line connector check (ICTE2)

This connector is located in the left part of the rear subframe as shown in the picture below:



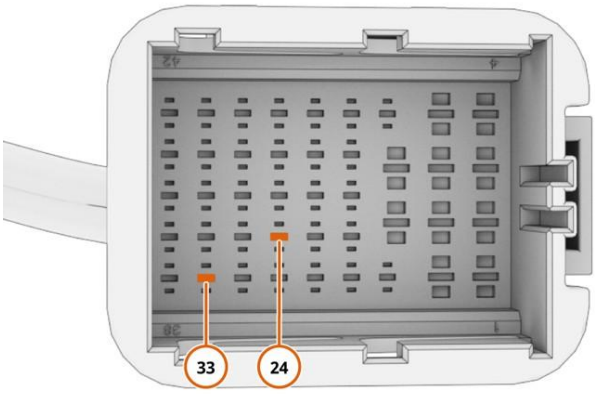
Transmission in-line connector

This connector can be accessed by removing the rear left wheel arch liner or through the top service hatch.

Please take a photograph of the male connector and comment in the TR if a white seal is fitted as shown in the picture below.

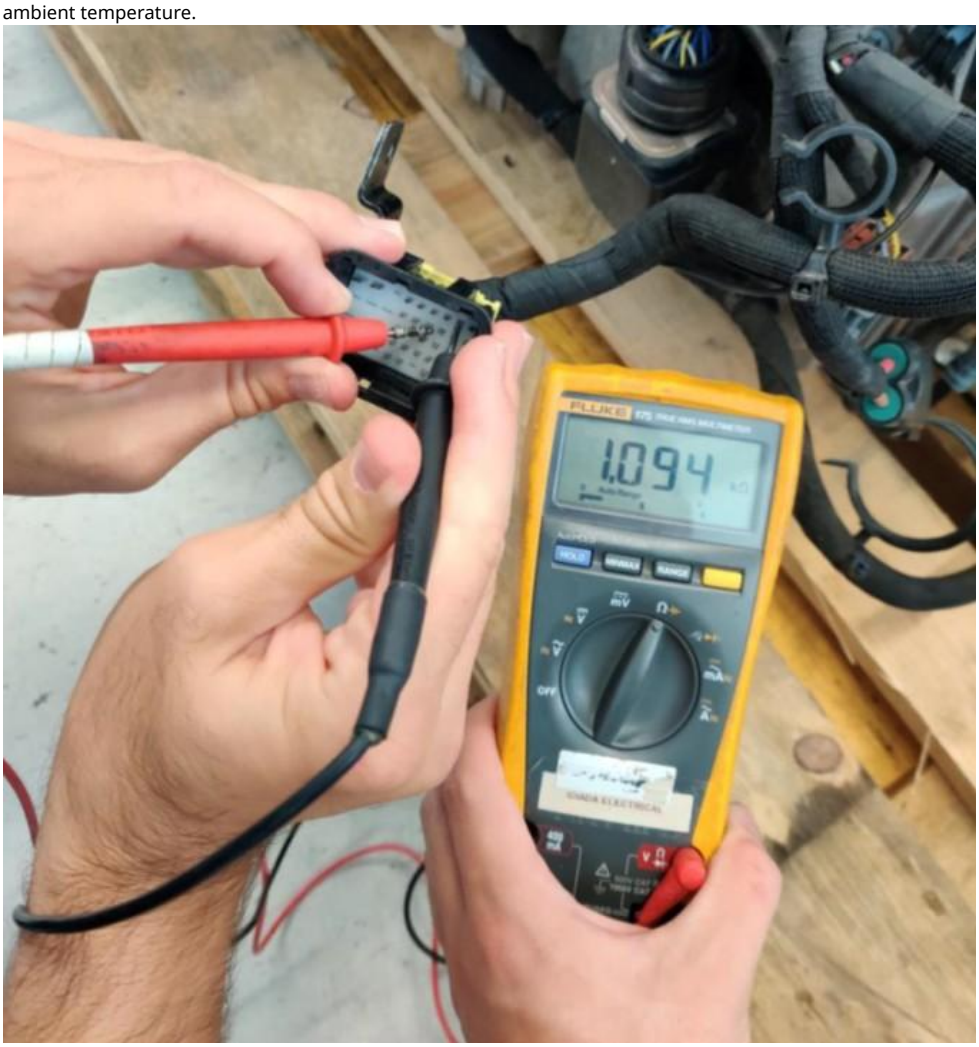
Check both (male & female) connectors for any signs of corrosion, water ingress or backed out pins as shown in the images below:

If the round connector is still disconnected, please re-connect it.
Now set the multimeter in resistance mode.
The aim now is checking the Stator Winding thermistor in the male connector between pins 24 & 33.



In-line transmission connector (ICTE2), Thermistor check between pins 24 & 33

As shown in the image below, the measured resistance should be Similar to the one previously read and should be within the range of **1077.9 Ω** and **1155.4 Ω** at ambient temperature.



Stator winding temperature thermistor checks at the transmission in-line connector pins 24 & 33

If the resistance value is outside of the specified range, please note the resistance value and take a picture similar to the above example and attach it to the TR. Wiggle the back of the connector and wires, to see if the resistance fluctuates.

If the resistance value is within the expected range, please proceed to the next step.

MCU Connector check.

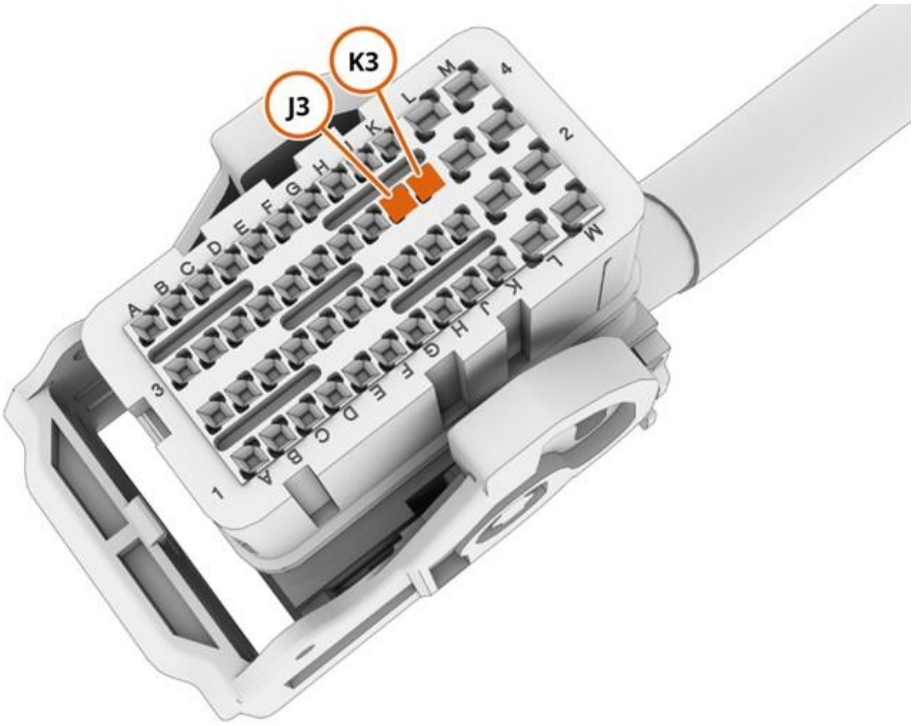
To perform this check, it is required to have access to the low voltage (LV) connector on the MCU.
For this reason, it will be necessary to remove the HV battery and the fuel tank. Once
there is access to the MCU the steps are as follows:

Disconnect the LV connector in the MCU

MCU connector location

If the in-line connector from the previous step is still disconnected, please re-connect again.

The thermistor resistance can be read in the PINs K3 & J3 of the MCU female connector as per the electrical schematic:



Winding thermistor pins K3 & J3 in the MCU female connector

As the pin holes are small, use a suitable piece of wire of a diameter no greater than 0.7mm to insert in the correct location as in the example below:

Care Point: Please take extreme care when inserting wire into pin holes to prevent damage to the pins.

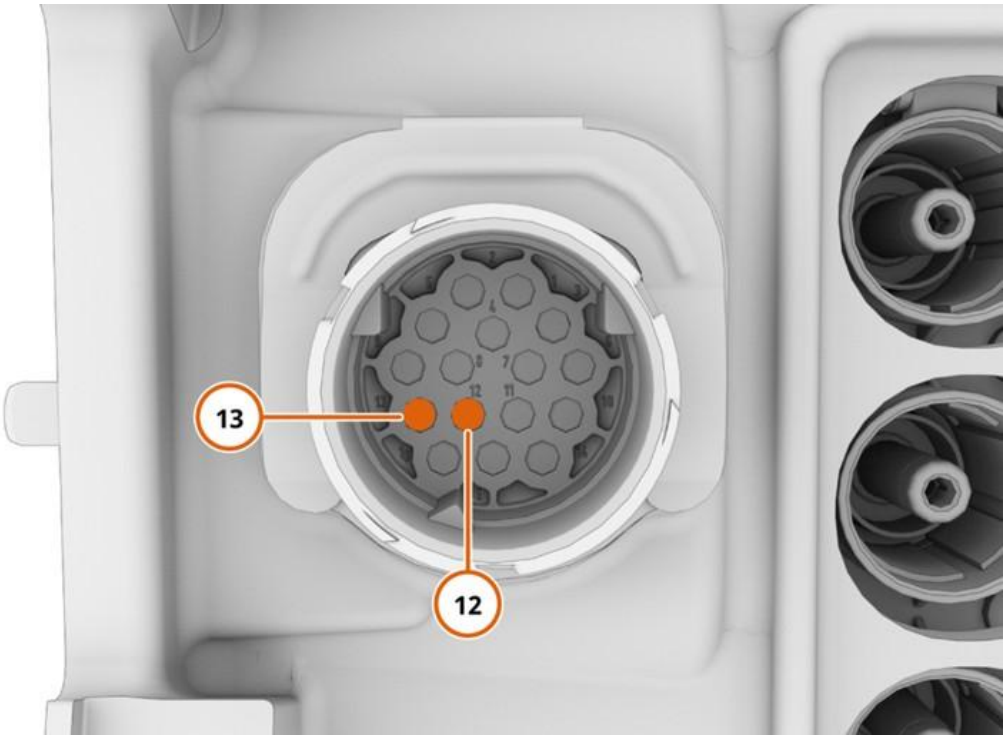
Thermistor resistance check in the MCU connector

The resistance reading should be similar to the one previously read and should be within the range of **1077.9 Ω** and **1155.4 Ω** at ambient temperature.
Wiggle the back of the connector and wires, to see if the resistance fluctuates.
If the resistance seen is outside of the specified range, please take a picture of the reading and set up and attach to the TR.

Please ensure that there are no water traces in all the checked connectors, all connectors fit securely and there are no backed out pins. Please attach all pictures of the process to the TR.

Additional Check

If advised through the TR to remove the transmission, please re-check the resistance at pins 12 and 13 again of the round connector. Check for resistance fluctuations while wiggling all transmission harness cables.



Parts
N/A

Repair Time
N/A

Attachments
Wiring diagram