

GENERIC · POWERTRAIN

P2CA2

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P2CA2

Charge Air Cooler Coolant Pump Sense Circuit Low

P2CA2 indicates that the powertrain control module has detected a low voltage condition on the sense circuit for the charge air cooler coolant pump, which is the electric pump that circulates coolant through the air-to-liquid intercooler. The computer expects a specific voltage range on this circuit and sees a value below the acceptable threshold, which can be caused by a short to ground, an open circuit, or a faulty pump.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Intermediate	Hybrid propulsion

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms
- Reduced engine power or limp mode under heavy load or during sustained acceleration
- Poor fuel economy or sluggish throttle response due to elevated intake air temperatures
- Overheating of the charge air cooler system, which may cause the engine to derate power
- In rare cases, a burning smell or visible coolant leak near the pump or intercooler
- Intermittent warning light that appears during cold starts or wet conditions

Common causes, most likely first

- 1 A short to ground in the sense circuit wiring, often due to chafed insulation or pinched harness
- 2 An open circuit in the sense wire, such as a broken wire or corroded connector terminal
- 3 A failed charge air cooler coolant pump, where the internal sensor or motor winding has failed
- 4 Corrosion or water intrusion at the pump electrical connector, leading to high resistance
- 5 A faulty powertrain control module, though this is rare and should be diagnosed last
- 6 Low coolant level or air lock in the system causing the pump to overheat and fail
- 7 Damage to the wiring harness from road debris, heat, or previous repairs



How to diagnose and fix it

- 1 Verify the code with a scan tool and check for any related codes in other modules
- 2 Inspect the coolant level and condition, and pressure test the cooling system for leaks
- 3 Visually inspect the pump connector and wiring for corrosion, damage, or loose pins
- 4 Disconnect the pump and measure resistance across the pump terminals to check for an open or short
- 5 Backprobe the sense circuit at the pump connector and at the PCM to check for continuity and short to ground
- 6 If the circuit tests good, command the pump on with a scan tool and verify operation and current draw
- 7 Replace the faulty pump or repair the wiring as needed, then clear codes and verify the repair

What Most Techs Miss on P2CA2

- A low coolant level or air pocket in the charge air cooler system can cause the pump to run dry and overheat, leading to a false sense circuit low code even when the wiring is intact.
- The sense circuit is often shared with other sensors or modules, so a short in a different component on the same reference voltage circuit can set this code.
- After replacing the pump, some vehicles require a coolant bleed procedure or a pump activation routine with a scan tool to remove air and prevent repeat codes.
- Intermittent codes often occur due to water intrusion into the pump connector after driving through puddles or car washes, so check for signs of moisture.
- A failed pump may not always set a pump circuit code; the sense circuit can report low voltage if the pump motor is seized and draws excessive current, so always test the pump mechanically.

Can I keep driving with P2CA2?

You can usually drive the vehicle with this code, but avoid heavy acceleration or sustained high-load conditions because the charge air cooler may not function properly, leading to reduced power and potential engine derating. If the check engine light flashes or you notice overheating, stop driving and seek service.

Tools that help

- OBD-II scan tool with bidirectional control
- Digital multimeter
- Wiring diagram for the specific vehicle
- Coolant pressure tester
- Basic hand tools and terminal pick set



Reading P2CA2

- P** Powertrain: engine, transmission and emissions.
- 2** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- C** Hybrid propulsion.
- A2** The exact fault within that area.

Often seen with

P023A Charge Air Cooler Coolant Pump A Control Circuit/Open · **P023B** Charge Air Cooler Coolant Pump A Control Circuit Low · **P2CA1** Charge Air Cooler Coolant Pump Sense Circuit High · **P2CA3** Charge Air Cooler Coolant Pump Sense Circuit Performance · **P2CA4** Particulate Filter Pressure Sensor Signals Swapped A/B

See it working

Watch the animated explainer [Turbocharger Trainer: Boost, Wastegate and Intercooler](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2ca2/>

