

EV Charging Station

Practical Inspection & Maintenance Notes

Routine checks, preventive maintenance and first-line troubleshooting for AC and DC chargers

1. Safety and working boundary

EV chargers combine mains power, high current, controls and communications. DC fast chargers also contain high-voltage DC power electronics. First-line work should focus on inspection, fault identification and safe isolation - not energized internal repair.

- Stop using the charger if there is smoke, burning smell, visible arcing, exposed conductors, severe connector damage, water ingress, impact damage, or repeated protective-device trips.
- Use the emergency stop only when an emergency or the manufacturer's procedure requires it; reset only after the cause is understood.
- Before opening an electrical enclosure, apply the site's approved isolation / lockout-tagout procedure and verify absence of voltage.
- Internal power-module, DC bus, insulation-monitoring, contactor, protection-device and high-voltage cable work should be handled by qualified personnel.
- After any repair, complete a functional charging test and record the fault, action, parts used and return-to-service result.

When to escalate: simple external checks and approved resets can be handled at operator level. Internal electrical checks require a qualified technician. Any safety-related, repeated or unresolved fault should be taken out of service and escalated to the OEM, network provider or service team.

2. Routine inspection

A good routine is simple: keep the charger clean, protect the cable and connector, check the same key items each visit, and record anything abnormal before it becomes a larger fault.

Frequency	Item	What to check
Daily / each visit	Enclosure and pedestal	No impact damage, open panels, corrosion, water ingress, abnormal noise or smell.
Daily / each visit	Connector and cable	No cuts, crushing, exposed conductors, bent pins, overheating marks or damaged latch.
Daily / each visit	Screen / LEDs	Readable, normal status, no persistent fault indication.
Daily / each visit	Emergency stop	Not damaged or unintentionally activated; follow manufacturer procedure for functional testing.
Daily / each visit	Site condition	No standing water, blocked access, trip hazards, damaged bollards or unsafe parking condition.
Daily / each visit	Charging test	Where practical, start a short test session and confirm stable charging.
Weekly	Cable management	Cable retractors/holders work and cables do not drag or kink.
Weekly	Ventilation	Air inlets/outlets clear; filters not visibly blocked.
Weekly	Network / backend	Charger online, correct time/status, sessions reported to backend/OCPP platform.
Monthly	Electrical visual check	No heat discoloration, loose external glands, damaged seals or signs of pest/water ingress.
Monthly	Cooling system	Fans operate normally; filters/heatsinks clean according to manufacturer limits.
Monthly	Safety devices	Check RCD/GFCI/CCID or protective-device status according to manufacturer/local procedure.

Frequency	Item	What to check
Planned service	Internal electrical	Torque, earthing, breakers/fuses/contactors, insulation and internal cleaning by qualified personnel per OEM schedule.

3. Preventive maintenance

Mechanical / environmental

- Clean enclosure, display, connector holster and ventilation openings with OEM-approved methods.
- Inspect seals, door locks, mounting bolts, pedestal/base, cable glands and bollards.
- Remove dust/debris and keep drainage around the charger clear.

Electrical - qualified personnel

- Inspect and, where specified by OEM, verify torque of input/output terminals and protective-earth connections.
- Inspect breakers, fuses, contactors, relays and wiring for heat damage or looseness.
- Verify earthing/grounding and protective devices according to local code and OEM procedure.
- For DC chargers, inspect power modules, DC output path, cooling system and insulation-monitoring related alarms using OEM diagnostics.

Communication / software

- Confirm cellular/Ethernet/Wi-Fi connectivity and backend visibility.
- Check OCPP/network logs for repeated disconnects, authorization failures or session errors.
- Record firmware/software versions before and after any update, and avoid changing configuration without a rollback record.

Functional verification

- Complete a test charge after maintenance.
- Confirm connector lock/unlock, start/stop sequence, power delivery and session termination.
- Confirm transaction/session data appears correctly in the backend where applicable.

4. Common faults - first checks

Use the table below for first checks only. Error codes, LED patterns and reset methods vary by charger model, so final diagnosis should follow the exact OEM manual.

Symptom	First checks	Safe first-line action	Escalate when
Charger offline / not visible in backend	Local power; screen/LED state; router/modem; Ethernet/cellular signal; network cable; backend status.	Restore local/network power if safe; reboot only if permitted; confirm network path.	Repeated offline state, internal comms fault, damaged modem/router, or backend authentication issue.
Cannot start charging	Connector fully inserted; vehicle ready; RFID/app authorization; charger available; emergency stop; visible fault.	Retry authorization; reseal connector; try another known-good vehicle/card if available.	Persistent fault, protective trip, internal contactor/CCID/GFCI fault.
Charging stops unexpectedly	Vehicle messages; connector temperature; charger temperature; input voltage; network/session log.	Allow cooling if OEM permits; inspect connector; retry after fault clears.	Repeated overtemperature, overcurrent, insulation/ground fault, power-module fault.
Connector cannot lock / release	Vehicle state; session ended; latch/lock obstruction; cable tension.	End session correctly; remove cable tension; follow OEM release procedure.	Mechanical lock damage or internal actuator fault.
Ground / leakage fault	Wet/damaged connector or cable; water ingress; vehicle-side issue if another charger available.	Stop use; visually inspect; dry only by approved method; do not bypass protection.	Any repeated RCD/GFCI/CCID/ground fault - qualified technician required.
Over-temperature	Blocked ventilation; dirty filter; fan operation; high ambient temperature; connector heating.	Stop/derate as OEM directs; clear external airflow; allow cooling.	Failed fan, repeated thermal alarm, burnt connector/terminal.
Over / under voltage	Site supply voltage; upstream breaker; other site loads; grid event.	Wait for supply to normalize; verify upstream condition.	Persistent abnormal supply, internal sensing fault, repeated trip.
Over-current / breaker trip	Vehicle demand; charger current setting; cable/connector condition; upstream breaker rating.	Do not repeatedly reset. Verify load/settings against approved design.	Repeated trip, heat damage, internal short/contactors/power-stage issue.

Symptom	First checks	Safe first-line action	Escalate when
RFID / payment / app failure	Network status; reader response; card/account validity; backend service.	Try known-good credential/payment method; confirm backend online.	Reader hardware failure or persistent backend/payment integration fault.
HMI / screen blank	Charger power; brightness/status LEDs; external damage.	If charger otherwise powered, use approved reboot procedure.	No display after power verification; internal supply/HMI fault.
Emergency stop active	Check whether E-stop is physically pressed and why.	Only reset after confirming no emergency remains and OEM procedure allows.	Damaged E-stop circuit or repeated alarm.
DC isolation / insulation fault	Connector/cable condition; moisture; vehicle comparison if safe; OEM error code.	Stop charging; isolate charger according to site procedure.	Qualified technician/OEM diagnosis required - never bypass insulation monitoring.
Low charging power	Vehicle SOC/temperature; vehicle limit; charger/site load management; thermal derating.	Compare with known conditions; check load-management status and cooling.	Persistent charger-side derating, module fault, site power limitation requiring engineering review.

5. Basic fault response

1. Confirm the complaint: charger ID, connector, time, vehicle, user symptom and displayed error code.
2. Make the area safe. If there is electrical, fire, impact or water hazard, isolate and stop use.
3. Check simple external causes: site power, emergency stop, connector condition, network status, authorization and ventilation.
4. Read the charger status/error code and backend/OCPP log where available.
5. Perform only OEM-permitted first-line reset or power cycle. Never repeatedly reset a protective trip without identifying the cause.
6. Retest with a controlled charging session.
7. If unresolved or repeated, escalate with evidence: photos, error code, logs, firmware version, charger serial number and actions already taken.
8. Record what was done and confirm the charger is back online and can complete a normal charging session.

6. AC and DC chargers - practical differences

Area	AC charger	DC fast charger
Power conversion	Main conversion is largely in the vehicle's onboard charger.	High-power AC/DC conversion occurs inside charger cabinets/power modules.
Typical first-line issues	Authorization, connector/lock, RCD/GFCI/CCID, network, vehicle handshake.	All AC issues plus power modules, DC contactors, insulation monitoring, cooling, high-voltage output.
Cooling	Usually simpler; model dependent.	Critical to availability; filters, fans, liquid/air cooling may require scheduled service.
Service boundary	Internal energized work requires qualified personnel.	Even stricter HV/DC service boundary; follow OEM isolation/discharge procedures.

7. Field inspection checklist

Check	Status	Notes
Charger ID / location confirmed	☐ OK ☐ Not OK	
No enclosure or pedestal damage	☐ OK ☐ Not OK	
No water ingress / standing water	☐ OK ☐ Not OK	
Connector body and pins visually normal	☐ OK ☐ Not OK	
Cable free of cuts/crushing/exposed conductor	☐ OK ☐ Not OK	
Cable holder/retractor works	☐ OK ☐ Not OK	
Display/LEDs normal and readable	☐ OK ☐ Not OK	
Emergency stop condition normal	☐ OK ☐ Not OK	
Ventilation openings clear	☐ OK ☐ Not OK	
No abnormal smell/noise/heat marks	☐ OK ☐ Not OK	

Check	Status	Notes
Charger online in backend	☐ OK ☐ Not OK	
RFID/app/payment test (if applicable)	☐ OK ☐ Not OK	
Short charging test completed	☐ OK ☐ Not OK	
Session starts/stops normally	☐ OK ☐ Not OK	
Fault/error code recorded if present	☐ OK ☐ Not OK	
Photos taken for abnormal condition	☐ OK ☐ Not OK	
Corrective action assigned	☐ OK ☐ Not OK	
Return-to-service verified	☐ OK ☐ Not OK	

8. Maintenance / fault record

Date & time: _____
Site / charger ID: _____
Charger model / serial no.: _____
Reported by: _____
Vehicle (if relevant): _____
Fault code / symptom: _____
Safety isolation required?: _____
Initial checks performed: _____
Action taken: _____
Parts replaced: _____
Firmware / configuration change: _____
Test result: _____
Returned to service by: _____
Follow-up required: _____

9. Information to send to OEM support

- Charger model, serial number and connector/port number
- Exact error code and timestamp
- Clear photos of display, connector, cable and any visible damage
- Backend/OCPP logs or screenshots if available
- Site input voltage / breaker status if safely measured by qualified personnel
- Vehicle make/model and whether the issue occurs with other vehicles
- Firmware/software version
- Actions already attempted and whether the fault returned
- Recent maintenance, impact, weather/water event or electrical work at the site

10. DC fast charger troubleshooting notes

Before any internal inspection or measurement, isolate the charger and upstream supply, wait the required discharge time and verify that hazardous voltage is absent. Do not bypass interlocks, insulation monitoring, grounding protection, RCD/GFCI/CCID functions or contactor safety logic.

Fault / symptom	Likely causes	Recommended diagnostic sequence	Escalation trigger
Connector lock / unlock failure	Connector not fully seated; mechanical latch obstructed; lock actuator or feedback abnormal; cable tension; vehicle/session not fully released.	End the session normally; remove cable tension; reseal the connector; inspect latch/lock area; use only the OEM-approved emergency release method if normal release fails.	Repeated lock failure, damaged latch/actuator, abnormal lock feedback, or repeated need for emergency release.

Fault / symptom	Likely causes	Recommended diagnostic sequence	Escalation trigger
Controller communication timeout	Loss of communication between charge controller, main controller, switch/router or internal Ethernet path.	Confirm controller and switch equipment are powered; check Ethernet connectors/link LEDs; reseal accessible network cables after safe isolation; check whether one or multiple terminals are affected.	Communication remains absent after power/cabling checks; suspected controller, switch, network board or software fault.
DC contactor does not close / opens unexpectedly	Contactor failure; control-board output fault; interlock not satisfied; protection condition active.	Do not force or bridge the contactor; check active protection/interlock alarms and DC-side status; qualified technicians may use OEM diagnostic actuation tests.	Repeated refusal/misoperation, abnormal heating/noise, failed OEM test or suspected control-board fault.
DC power module start timeout	Module breaker open/tripped; module fault; address/configuration mismatch; shared-module relay/control fault; software/control-board issue.	Check breaker/protective-device status; do not repeatedly reset a tripped breaker; check module alarm/address/configuration and shared-module relay status in OEM diagnostics.	Breaker trips again, module remains unavailable, or relay/control-board/software fault is suspected.
Connector inserted but no charging response	Vehicle not ready; connector/communication problem; auxiliary supply fault; cable continuity or communication-conductor fault; controller interface fault.	Confirm vehicle ready state; reseal connector; test with another compatible vehicle if practical; inspect cable/connector; qualified technicians may test auxiliary supply, cable continuity and communication circuits.	Several vehicles fail on the same connector, visible cable damage exists, or electrical/control-board diagnosis is required.
Vehicle BMS communication / BRM timeout	Vehicle battery full; vehicle-side BMS timing/compatibility; CAN/communication path issue; connector/cable fault; charger controller issue.	Check vehicle SOC; compare one vehicle versus several; retry after normal session termination; review charger/BMS communication logs if available.	Fault occurs across multiple vehicles/connectors or logs indicate charger-side communication failure.
Emergency-stop / stop circuit active	Emergency stop pressed; stop circuit open; switch/contact fault; safety input abnormal.	Confirm why stop was activated; remove hazard; reset only by OEM-approved method; verify normal charger state before use.	Alarm remains after correct reset or stop circuit/switch is damaged.
Door / access interlock protection	Cabinet door not fully closed; door microswitch/interlock misaligned or failed.	Confirm service doors/panels are fully closed and latched; inspect accessible interlock alignment without defeating it.	Alarm persists with doors correctly closed or interlock/wiring fault is suspected.
Insulation / isolation fault	Wet/damaged connector or cable; vehicle insulation issue; moisture ingress; DC-side insulation degradation; module/power-stage sealing issue.	Stop charging; inspect for moisture/damage; compare one vehicle versus several; review weather and site-wide alarm history; qualified personnel may perform OEM-approved DC-side insulation testing after isolation.	Repeated insulation alarm, multiple vehicles/chargers affected, visible moisture/damage, or insulation testing is required.
Charger / backend offline - wired network	Wrong charger ID/IP/port/server parameters; Ethernet cable fault; router/switch failure; backend port/service issue; controller network-interface fault.	Check charger ID/server/IP/domain/port; check cable and link LEDs; test router/network path if permitted; compare other chargers; confirm backend service availability.	Local network works but charger remains offline, or controller/backend authentication/configuration requires support.
Charger / backend offline - cellular	Incorrect APN/server/port/charger ID; weak signal; SIM/data issue; modem fault; backend configuration issue.	Verify server/domain, port and charger ID; check signal/modem/SIM; compare another charger; preserve logs before reboot for recurring faults.	Parameters are correct but connection remains unavailable, modem/SIM is abnormal, or OEM logs are required.
Input breaker / input power fault	Upstream supply loss; breaker trip; overcurrent/short circuit; phase/voltage abnormality; internal input fault.	Confirm site supply and breaker status; check for visible/smell/heat evidence; qualified personnel verify input voltage/phase; reset only after cause is understood.	Repeated breaker trip, persistent abnormal supply, or suspected internal short/protection fault.

11. Quick fault separation: vehicle / charger / site / network

- One vehicle fails, other vehicles charge normally: first suspect vehicle-side compatibility, BMS state, connector seating or vehicle insulation.
- Several vehicles fail on one connector only: first suspect that connector, cable, lock, auxiliary supply or its controller channel.
- Several connectors on one charger fail: investigate charger controller, shared power modules, internal communication, input power and common protection.
- Several chargers at the same site fail simultaneously: investigate site supply, router/network, backend/platform, weather/environment or common upstream equipment.
- Fault appears mainly after rain/high humidity: prioritize water ingress, connector/cable condition and insulation-related evidence; do not assume the charger is safe after a simple reset.
- Fault disappears after reboot but returns: treat the reboot as temporary recovery, not root-cause closure. Preserve logs and escalate recurring faults.

12. Before resetting or rebooting

For a non-hazardous fault, record the following before rebooting or resetting whenever possible. A reboot can clear useful fault information.

- Exact alarm/error text or code and timestamp.
- Charger ID, connector number, model and serial number.
- LED/display state and photos of connector, cable and enclosure.
- Vehicle make/model, SOC and whether other vehicles show the same problem.
- Whether one connector, one charger or multiple chargers are affected.
- Weather/site condition, especially rain, flooding, high temperature or recent electrical work.
- Backend/OCPP event log, controller log and communication status where available.
- Firmware/software version and recent configuration changes.
- Protective-device status: breaker, RCD/GFCI/CCID, emergency stop, door interlock and insulation alarm.

13. Before putting the charger back into service

- A likely root cause or corrective action is known; the charger is not simply "working after reboot".
- All covers, doors, interlocks and protective devices are restored to normal condition.
- No tools, temporary jumpers or service materials remain inside the equipment.
- A controlled test session starts, delivers stable power and terminates normally.
- The charger returns online to the backend/platform and reports the session correctly.
- The maintenance record includes fault, evidence, action, parts/configuration changes and technician sign-off.

14. Model-specific notes

Signal names, connector standards, measurement values, service menus and reset procedures differ by manufacturer and market. Use the exact OEM manual when the work moves beyond first-line checks.