



LS4 MINI

Assembly instructions / End User Instructions (EN)



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GARO®

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About this manual

This document contains general descriptions which are verified to be accurate at the time of printing. However, because continuous improvement is a goal at GARO, we reserve the right to make product and software modifications at any time. This range is subject to continual product development. Errors, typos and omissions excepted. Latest manuals can always be found at <https://www.garo.se/en/volvo-trucks/manuals>

INFORMATION

GARO LS4 MINI is an EVSE station for Mode-3 AC charging up to 43kW.

Below are some example of standard features:

- Fixed cable for Mode-3 EV charging.
- Suitable for installation on wall or ground.
- LED status indication.
- Upgradeable firmware*
- Visible energymeter
- OCPP via 4G or LAN*
- RFID reader for secure authorization (not activated as default)*

LS4 MINI supports following features:




- External DIM energy meter*
- Cluster installation of multiple LS4 MINI via Ethernet*
- Cluster installation of multiple LS4 MINI, LS4 and GLB+ via Ethernet*

* Require certified technician











Warnings

- ⚠ Dielectric Voltage Withstand Test is not allowed on LS4 MINI
- ⚠ This equipment should not be used by anyone (including children) with reduced physical, sensory or mental capacity, or anyone lacking in experience or knowledge, unless they are provided with supervision or prior instruction in how to use the equipment by the person responsible for their safety.
- ⚠ LS4 MINI is designed exclusively for charging electric vehicles.
- ⚠ LS4 MINI must be grounded according to local country installation requirements.
- ⚠ Do not install or use the LS4 MINI near flammable, explosive, harsh, or combustible materials, chemicals, or vapors.
- ⚠ Turn off the electrical power at the circuit breaker before installing, cleaning or maintenance.
- ⚠ Use LS4 MINI only within the specified parameters.
- ⚠ Never spray water or any other liquid directly at LS4 MINI. Never spray any liquid onto the charge handle or submerge the charge handle in liquid. Store the charge handle in the dock to prevent unnecessary exposure to contamination or moisture.
- ⚠ Do not modify the equipment installation or any part of the product.
- ⚠ Do not touch the terminals with fingers or any other objects.
- ⚠ Do not insert foreign objects into any part of LS4 MINI
- ⚠ Do not use the charging station if you notice a damaged cable/connector or any other damaged part on the outside of the charging station.
- ⚠ Do not use the charging station if you notice a damaged cable/connector or any other damaged part on the outside of the charging station.

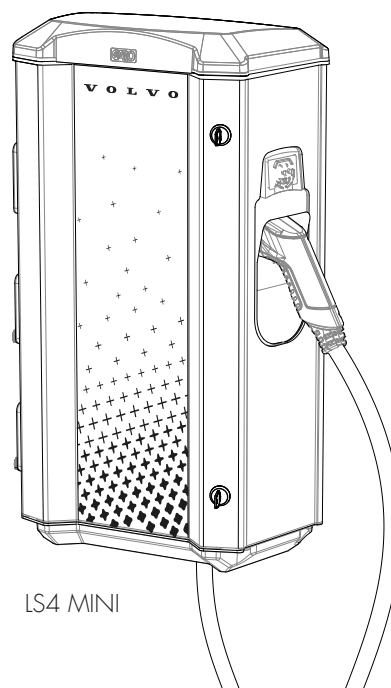
Cautions

-  Incorrect installation and testing of the LS4 MINI could potentially damage either the vehicle and/or the LS4 MINI itself.
-  Poor quality electricity may harm the LS4 MINI and or the vehicle. An example of such source of poor quality electricity may be private power generators.
-  Do not operate the LS4 MINI in temperatures outside its operating range – see technical specifications.

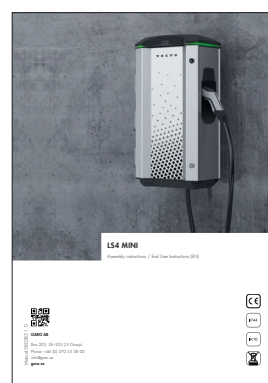
Notes

-  All installation must be carried out by an professional electrician and comply with local installation regulations. If any questions, please contact your local electrical authority.
-  Ensure that the charging cable is positioned so it will not be stepped on, driven over, tripped on, or subjected to damage or stress.
-  Unroll the charging cable to prevent it from overheating.
-  Do not use cleaning solvents to clean any of the components. The outside of the LS4 MINI, the charging cable, and the end of the charging cable should be periodically wiped with a clean, dry cloth to remove accumulation of dirt and dust.
-  Refer to local standards and regulations not to exceed charging current limitations.
-  The front door and the left side transparent windows must always be locked in order to ensure compliance with IP Code IP44.
-  Ventilation signal from EV is not supported.
-  Adapters for charging connectors are not allowed to be used.
-  Cord extension sets for charging cable is not allowed to be used.
-  Installation in direct sunlight may affect the performance of the Charging station.

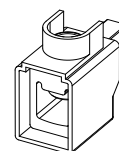
Content



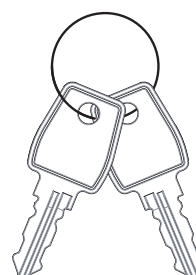
LS4 MINI



Manual



4x ALU-CU adapters



Keys

INSTALLATION

- Before start of installation, perform a visual inspect the charging station during unpacking. Do not start installation process if any damaged parts are discovered.
- Use conductors that are dimensioned in accordance with local electrical regulations. The selected cable must be able to sustain long periods of constant load of up to 63A.
- The installation must be carried out by an professional electrician.

1. Select suitable group fuse and cable dimension for the electrical installation. Make sure to consider the cable length during calculation to avoid risk of voltage drop.

Note: Due to high currents for a long time in the cable, there is a high risk of voltage drop if the cable is under-dimensioned which can damage the electronics in an EV.

2. Fill in the fuse and cable information in the Installation form located in the installation manual that is included in the box.

3. Mount the LS4 MINI on a wall or on a pedestal, figure 1-5.

Note: Wall installation requires a minimum 20mm distance between the wall and the LS4 MINI to ensure correct cooling, (figure 4) Recommendation is to use the included wallbracket.

4. Install the electric supply cable L1, L2, L3 and N to the Main Switch and PE to PE terminal, (figure 3).

5. Fill in the Installation form in the manual.

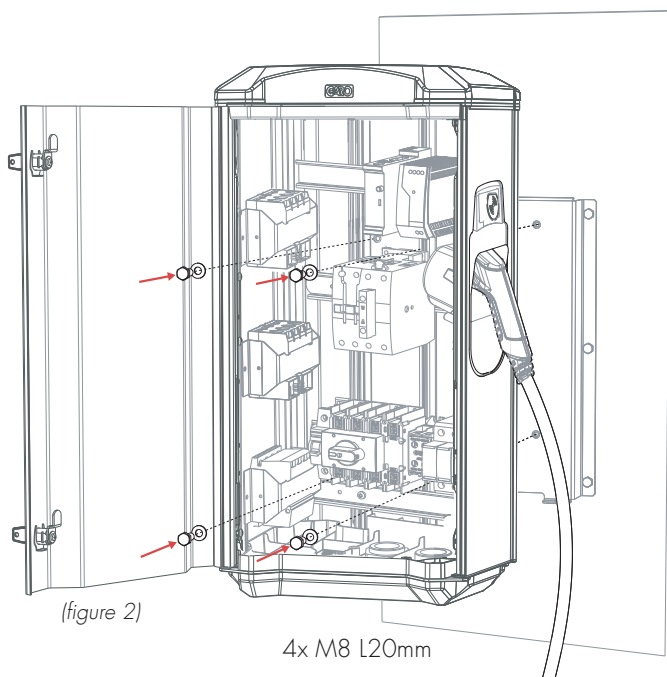
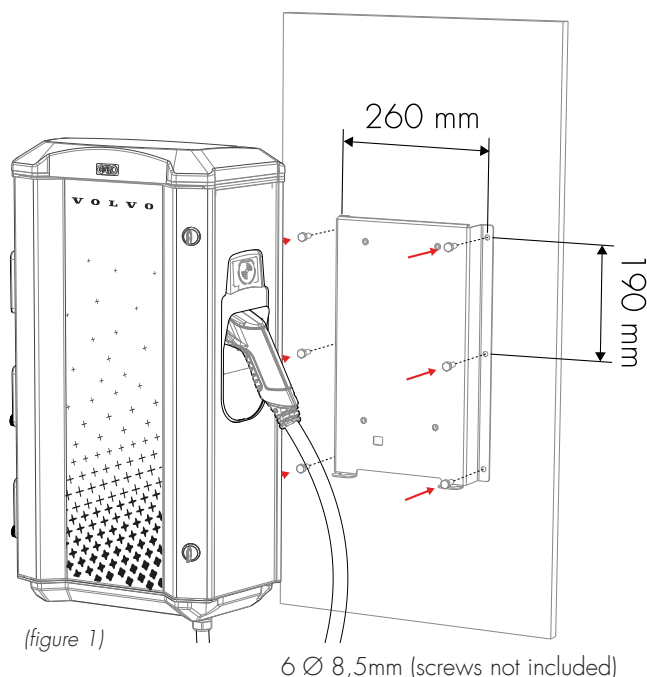
6. Assemble the protection cover and close the front door, (figure 5)

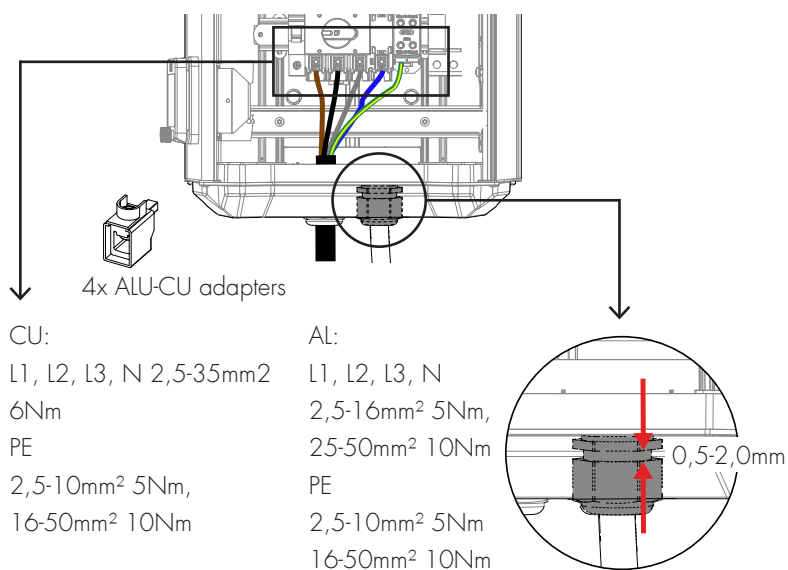
7. Turn on electrical power.

8. Wait a few minutes until the LS4 MINI have finished the startup process and test the LS4 MINI with a EVSE-tester or an EV.

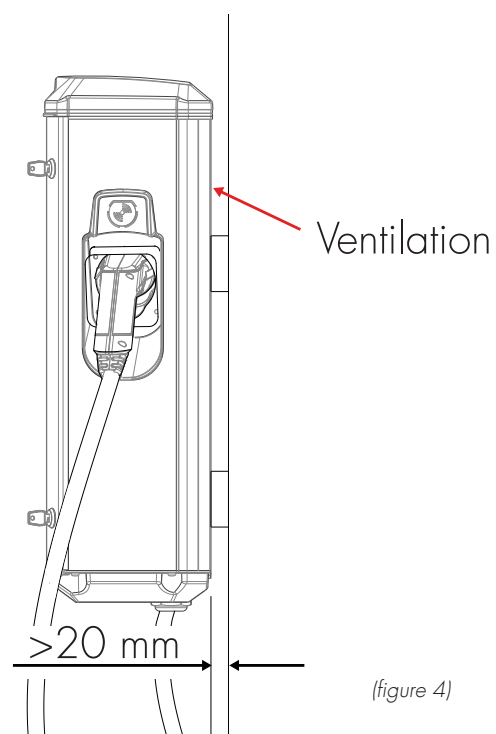
9. Complete the Installation form with all required information. The completed form shall be handed over to the owner of the LS4 MINI.

10. With a mobile phone, scan the QR code on the ID-label located on the side of the LS4 MINI and follow the on-screen instructions to complete commissioning of the LS4 MINI.

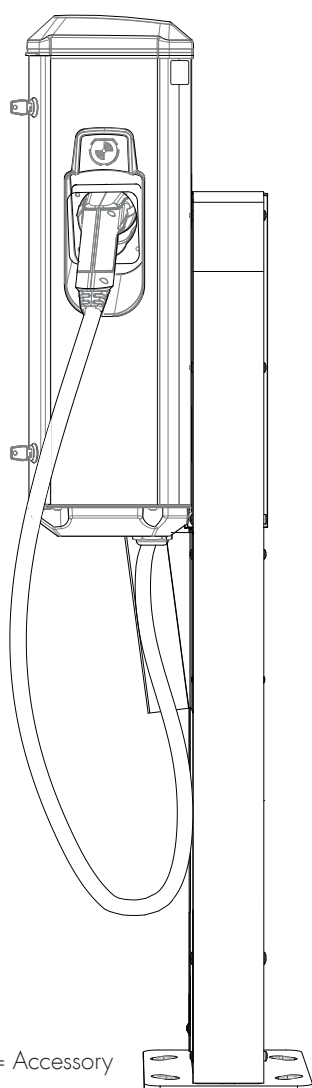




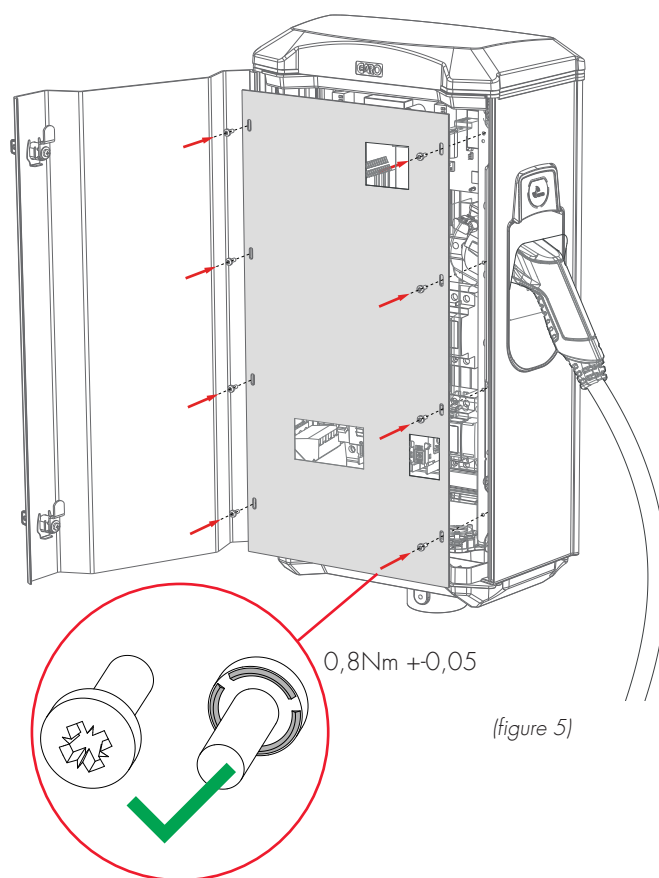
(figure 3)



(figure 4)



(figure 6)











(figure 5)





USER MANUAL




Normal use








Connect the charging cable to the EV (Electric Vehicle). If authorization is activated, please hold a valid RFID-tag against the RFID reader on the side of the LS4 you want to use or use the operator app to authorize charging. Charging will start instantly if the EV is ready for charging. See your EV charging manual. When finishing charging, follow the EV's instructions. After charging: Release the charging cable from your EV and place the charging cable at designated place.

LED indications

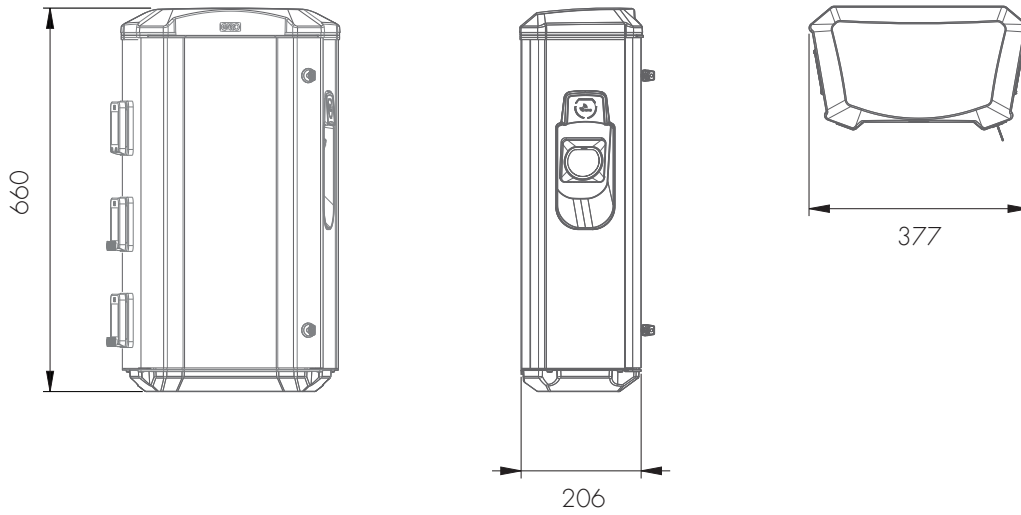
 Green LED = Charging station ready/stand by				
LED light indication	When	Status or Cause of error	Action/Measure 1	Action/Measure 2
 Firm green	No EV connected	Charging station available and ready for charging	No error	Have you tried everything without success? Contac Your retailer and as 2nd option, contact Volvo Action Service 24/7. (Please have M-number available)
	EV connected	State B: EV connected but not yet ready for charging	Check EV settings that can influence charging, i.e gear in parking mode, doors closed, EV locked etc.	
	EV connected	State C: EV connected and ready for charging, but charging	Present a valid RFID to the RFID card reader (look for RFID symbol), start charging via mobile app or contact charging station operator to start charging remote via backend. If the charger is supposed to work without RFID / app authentication, contact the backend operator and ask them to verify that "Free charging" is set to ON.	
 Blinking green (30 second blink)	Whenever during operation	Charging station have received command from backend to start charging and is waiting for EV to connect.	Connect the charging cable, or verify that cable is connected correctly. Check the intake on the EV for obstructions / dirt.	
 Yellow LED = RFID communication				
LED light indication	When	Status or Cause of error	Action/Measure 1	Action/Measure 2
 Blinking yellow	When RFID is presented	Charging station is verifying the RFID in backend cloud service.	No error	
 Blue LED = Charging mode				
LED light indication	When	Status or Cause of error	Action/Measure 1	Action/Measure 2
 Firm blue	EV connected	Charging is ongoing (state C)	No error	Have you tried everything without success? Contac Your retailer and as 2nd option, contact Volvo Action Service 24/7. (Please have M-number available)
	EV connected	Charging is paused (state B)	No error	
 Blinking blue	Whenever during operation	Charging station/point is reserved for a specific user	No error (contact backend operator if this is not the desired mode)	

 Red LED = Error				
LED light indication	When	Status or Cause of error	Action/Measure 1	Action/Measure 2
 Firm red	When connecting EV	Charging cable is damaged.	Check charging cable and connectors for damages. Verify that CP connection pin and wire (red wire inside charging cable) is not loose or having bad connections in either end, including inside the wall-box. Verify grounding of charging station.	Have you tried everything without success? Contact Your retailer and as 2nd option, contact Volvo Action Service 24/7. (Please have M-number available) Firm Red light will always generate an alarm to the backend operator.
	Whenever during charging	Residual Circuit Current Breaker (RCCB) triggered.	Reset the RCCB on the side of the charging station. Verify that the 8-pole quick connection on the charge controller is properly connected. Verify correct grounding and phases in building electrical system	
	Whenever during charging	DC fault detected.	When EV is connected: Disconnect charging cable from the vehicle, then the LED indication shall return to GREEN. Reconnect charging cable to start charging. The charging will restart automatically after 15 minutes if cable is not disconnected.	
	Whenever during charging	Miniature Circuit Breaker (MCB) triggered - Overload / short circuit	Reset miniature circuit breaker (MCB). Check internal wiring and components for possible reasons for short circuit. Verify allowed maximum current in backend charger configuration (OperatorCurrentLimit).	
	Whenever during charging	DC fault monitor may be defect.	If the orange "alarm" LED indicator on the charge controller is lit, then the charge controller needs to be replaced.	
 Firm red (3 seconds)	When RFID is presented	RFID card is not valid or not approved by backend.	Verify that the RFID card/tag is approved by backend (contact backend operator). Verify that the RFID card/tag is stored in charger internal memory / whitelist (requires certified technician)	
 Blinking red	Whenever during operation	Charging station / point is deactivated.	Contact backend operator and ask for remote activation.	




	No LED = Power failure			
LED light indication	When	Status or Cause of error	Action/Measure 1	Action/Measure 2
  NO LIGHT	Charging station and left side energymeter (P1) is powerless.	The upstream circuit breaker (grid fuse) have tripped.	Reset or replace circuit breaker (grid fuse) in upstream switchboard.	Have you tried everything without success? Contact Your retailer and as 2nd option, contact Volvo Action Service 24/7. (Please have M-number available)
		4-pole main circuit breaker inside the bottom of charging station is deactivated.	Check mainbreaker, reset it if it is deactivated.	
	Charging station is powerless (no LED light), but the left side energymeter (P1) have power.	1-pole 10 A circuit breaker (Fuse) inside the bottom of charging station is deactivated.	Check 1-pole 10A circuit breaker (Fuse), reset it if it is deactivated.	
		The 12V power supply unit is deactivated (Green LED-light [DC OK] on 12V supply unit is not lit).	Verify that 12V power supply unit is receiving 220V AC power via terminals L & N.	
		Upper Top Card (PCB) is not receiving power (DC 12V).	Disconnect red/black cables from the power supply unit terminals marked "+/-". If the power supply unit delivers 12DC on the output terminals when red/black cables were disconnected, then it has detected an earth fault in one of the DC powered components (controllers, upper Top Card (PCB), router/switch etc.) inside the charging station. If LED-light [DC OK] remains turned off, consider replacing the 12V power supply unit.	
		The 12V power supply unit has power, but the charging controller/controllers still do not indicate green on LED-light [Ready]. When operating normally, the LED-light on the charge controller should show blinking green.	Check red/black cable and connection between DC terminal and upper Top Card (PCB) quick connection (located on far left side of upper Top Card (PCB) in the charging station). Verify that the controller has 12 V DC power supplied (4-pole quick connection on down-side of controller -> terminal 1 & 2 from the left) and that the LED-light [Ready] is blinking green. If power supply is ok, but no blinking green, then consider replacing charging controller. If the orange "alarm" LED indicator on the charge controller is firm lit, then the charge controller needs to be replaced.	

Fault codes in Web User Interface via USB&PC		
LED light indication	Indication / fault code in Web UI	Ocpp fault code
 Firm green	IDLE (available) - (A) Vehicle not connected	
	IDLE (available) - (B) Vehicle connected not ready	
	IDLE (available) - (C) Vehicle connected ready	
 Blinking green (3 blinks)	IDLE (available) - (A) Vehicle not connected	
 Blinking green (30 second blink)	AUTHORIZED (available) - (A) Vehicle not connected	
 Firm blue	CHARGING (occupied) - (C) Vehicle connected ready	
	CHARGING (suspendedEV) - (B) Vehicle connected not ready	
 Blinking blue		Reserved
 Firm red	RCCB triggered	groundFailure
	Residual current detected via sensor	groundFailure
	MCB of type 2 socket triggered	overCurrentFailure
	Actuator unlocked while charging	connectorLockFailure
	Plug locking failed on the EV side	connectorLockFailure
 Blinking red	Possible CP and PP wiring issue.	otherError
	UNAVAILABLE (unavailable)	Unavailable

Dimensional sketch



Technical specifications

Product type	LS4 MINI
Standards / Directives	IEC 61851-1 and IEC 61439-7
	  RoHS 
EMC Classification:	2014/30/EU
Installation method:	Wall / Ground*
Installation environment:	Indoor / Outdoor
Location type:	Non-restricted Access
Rated Voltage:	230V / 400V 50Hz
Installation systems:	TT, TN
Charging type:	Mode 3
Charging method:	AC Charging
Protection class:	IP44
Mechanical impact resistance:	IK10
Temperature range:	-25C - +40C
Weight:	25kg
Standard cable length	7.5m
Rated current withstand	10kA
Rated short-time withstand current	10kA
Rated conditional short-circuit current of an assembly	10kA
Rated impulse withstand voltage	4kV
Rated insulation voltage	230/400V
Rated current	63A
Rated diversity factor	RDF=1
EMC environmental condition	A and B

* Ground pedestal is an accessory ordered separately.

Service / Maintenance

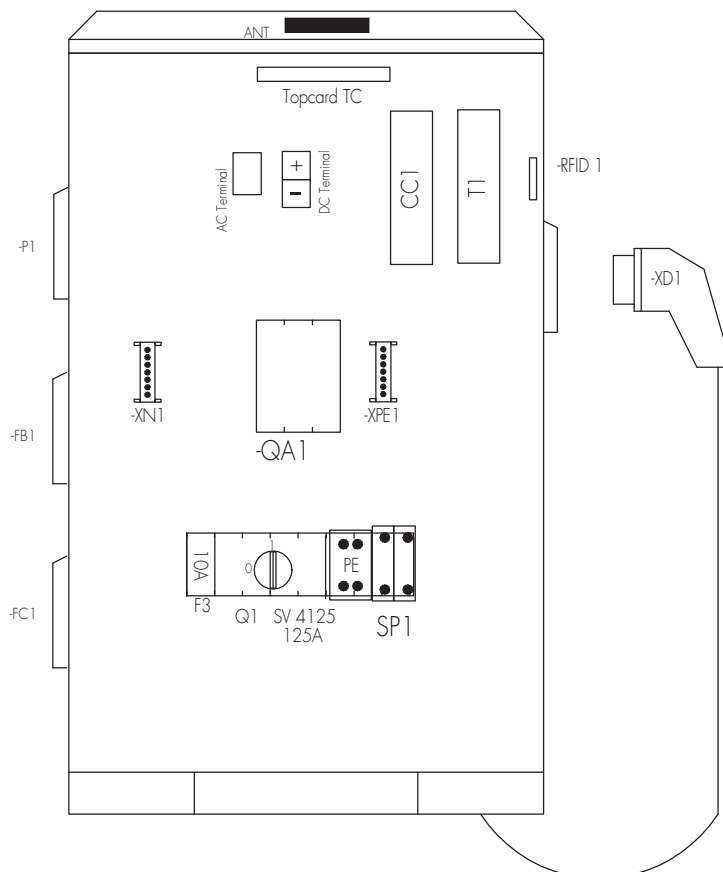
The service must be performed by a professional electrician.

A service form can be found at <https://www.garo.se/en/volvo-trucks/manuals>

In order for the warranty to apply, it is required that a completed service form/forms, (depending on the age of the product), can be presented when contacting Volvo Action Service.

The most recent service form may not be older than 12 months. Service is performed by visual inspecting both outside and inside of the LS4 MINI, conditioning of components as well as functional tests. Specific service points can be found in the service form.

If your LS4 MINI is connected to Backend Operator or other external supervised system, GARO recommends that you contact the operator, to plan the service in advance, in order to avoid unnecessary errors and warning messages that could lead to expensive emergency call outs from other service partners. You can normally find information inside the LS4 MINI if it is connected to a supervised system.



(figure 7)

Service and maintenance form

Plant ID:

Name:

Date:

Check point for annual maintenance:	Status/ Value	Comment/remark
Visual check outside cabinet		
LED indication lit		
Check cables, connectors, connector pins		
Check color, foil and instructions		
Check fastening/fixing to ground/wall		
Clean LS4 MINI outside surface		
Check both RCCB by pressing "T" button. Check that LED indication switches to red color for both sides		
Function test by GARO test-equipment or similar		
Check that electrical power is delivered by indications on test equipment		
Check RFID reader (when available). Indication by 2 or 3 flashes from LED:s		
Turn off the electrical power		
Check torque on the terminals for following components, (figure 7), page 14: F3 MCB: 2,4Nm PE: 8Nm Q1 Main switch: 5Nm QA1 contactor: 5Nm SP1 surge protection: 3Nm T1 DC PSU: 0,6Nm XN1 Neutral terminal: 2Nm XPE1 PE terminal: 2Nm		
Check connectors on CCU module (CC1), (figure 7), page 14		
Check torque for fixing screws towards ground/wall		
Check charging cable's cable gland, and that the charging cable cannot be rotated in the cable gland. Tighten according to (figure 3), page 6		
Open the Type 2 plug (XD1) and check the screw tightening torque, (figure 7), page 14 L1-L3, N, PE: 2,5Nm CP (red wire): 1Nm		
Measure the earthing resistans (Ohm) on charging cable with a multimeter. Should be <2 Ohm		
Clean inside if necessary with a dry cloth		
Turn on the electrical power		
Check charging function		

Installation Form

LS4 MINI Model: _____
M nr: _____

Electrical installation data

Group fuse (A): _____
Supply cable dimension: _____

Function Test

Testbox: _____

Date: _____

Sign Installer: _____

Company Name: _____

Owner/Customer Name: _____

Installation address: _____



IP44

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