

**CHARGING STATION 50KW**  
Ref: CHBRN011436 & CHBRN012230

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*Quick Charger for Electric Vehicles*

# DC QUICK CHARGER INSTALLATION AND MAINTENANCE MANUAL



For Production Line  
Ref: CHBRN011436



For Service Garage  
Ref: CHBRN012230

Ref.: DUM018129-EN\_V001



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# SAVE THESE INSTRUCTIONS

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## HOW TO USE THIS MANUAL

Read this manual carefully before starting the unit.  
Keep this manual where the operator can find it easily.

IES SYNERGY guarantees safe, reliable operation when the following rules are observed:



Read the entire User Manual.

The user must know about and understand the warning messages.

The unit must be operated in accordance with the instructions given in this manual.

# IMPORTANT SAFETY INSTRUCTIONS

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## WARNING ELECTRICAL:

THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR DC QUICK CHARGER MODELS THAT SHALL BE FOLLOWED DURING INSTALLATION, OPERATION AND MAINTENANCE OF THE UNIT.

THIS EQUIPMENT SHOULD BE INSTALLED, ADJUSTED, AND SERVICED BY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS TYPE OF EQUIPMENT AND THE HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DEATH OR SEVERE INJURY.

DO NOT USE THIS PRODUCT IF THE CABLES (INPUT OR OUTPUT) ARE FRAYED, HAVE DAMAGED INSULATION OR ANY OTHER SIGN OF DAMAGE.

DO NOT USE THIS PRODUCT IF THE ENCLOSURE OR THE EV CONNECTORS ARE BROKEN, CRACKED, OPEN, OR SHOW ANY OTHER INDICATION OF DAMAGE.

INTENDED FOR USE WITH DESCRIBED HEREAFTER CABLE ASSEMBLY FOR PLUG-IN ELECTRIC VEHICLES ONLY.

THE INFORMATION CONTAINED IN THIS MANUAL IS SUBJECT TO CHANGE WITHOUT NOTICE.

2

## DEFINITIONS - SYMBOLS

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**WARNING ELECTRICAL:**

HIGH VOLTAGE, THIS SYMBOL INDICATES HIGH VOLTAGE. IT CALLS YOUR ATTENTION TO ITEMS OR OPERATIONS THAT COULD BE DANGEROUS TO YOU AND OTHER PERSONS OPERATING THIS EQUIPMENT. READ THE MESSAGE AND FOLLOW THE INSTRUCTIONS CAREFULLY.



**WARNING:**

TO AVOID INJURY, DEATH OF PERSONNEL, OR DAMAGE TO THE UNIT, THE OPERATOR MUST REFER TO AN EXPLANATION IN THE USER MANUAL.

**CAUTION:**

INDICATES A POTENTIAL HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN MINOR TO MODERATE INJURY, OR SERIOUS DAMAGE TO THE EQUIPMENT. THE SITUATION DESCRIBED IN THE CAUTION MAY, IF NOT AVOIDED, LEAD TO SERIOUS RESULTS. IMPORTANT SAFETY MEASURES ARE DESCRIBED IN CAUTION (AS WELL AS WARNING).

**PROHIBITED:**

INDICATES AN ACTION OR PROCEDURE THAT IS NOT ALLOWED.

F

**PROTECTIVE EARTH TERMINAL:**

TO PROTECT AGAINST ELECTRICAL SHOCK IF THERE IS A FAULT. THIS SYMBOL INDICATES THAT THE TERMINAL MUST BE CONNECTED TO EARTH BEFORE OPERATING THE EQUIPMENT.

# LIST OF DANGERS AND CAUTIONS

## [Installation]

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### **CAUTION:**

USE UNDER ENVIRONMENTS SPECIFIED IN THE SPECIFICATION.

THE DEVICE IS DESIGNED FOR INDOOR USE ONLY. DO NOT EXPOSE THE DEVICE TO WATER OR MOISTURE. DO NOT USE THE DEVICE IF INTERNAL OR EXTERNAL COMPONENTS ARE WET.

THIS EQUIPMENT EMPLOYS PARTS, SUCH AS SWITCHES AND RELAYS, THAT TEND TO PRODUCE ARCS OR SPARKS AND THEREFORE, WHEN USED IN A GARAGE, LOCATE IN A ROOM OR ENCLOSURE PROVIDED FOR THE PURPOSE OR NOT LESS THAN 18 INCHES (457.2 MM) ABOVE THE FLOOR.

CONFIRM THAT YOUR INSTALLATION SITE HAS A LOAD CAPACITY SUFFICIENT TO SUPPORT THIS DEVICE.

DO NOT BLOCK BOTH OF THE INTAKE AND EXHAUST PORTS. BLOCKING THE INTAKE OR EXHAUST PORT MAY CAUSE AN INCREASE IN THE INTERNAL TEMPERATURE OF THE DEVICE AND RESULT IN FAILURE.

# F

### **PROTECTIVE EARTH TERMINAL:**

THIS DEVICE MUST BE GROUNDED

# LIST OF DANGERS AND CAUTIONS

## [Distribution Work and Maintenance]

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2

**DANGER: THERE IS A DANGER OF ELECTRIC SHOCK, INJURY, AND/OR BURNING**

PERSONS SKILLED IN ELECTRIC SERVICES AND/OR RELATED REGULATIONS (PROFESSIONAL ENGINEERS OR TECHNICIANS) SHALL INSTALL ELECTRICAL WIRING AND PERFORM MAINTENANCE CHECKS.

DO NOT PERFORM LIVE-WIRE OPERATIONS. DO NOT FORGET TO SHUT OFF THE POWER SUPPLY.

DO NOT TOUCH THE INSIDE OF THE DEVICE WHILE IT IS RUNNING.

THIS DEVICE INCLUDES CAPACITIVE COMPONENTS SUCH AS ELECTROLYTIC CAPACITORS. PROFESSIONAL ELECTRICIANS SHALL PERFORM SUCH OPERATIONS WITH CAREFUL ATTENTION TO CHARGED PARTS AFTER DISCHARGING THE ELECTROLYTIC CAPACITORS.

WHILE THE UNIT IS DISCONNECTING FROM ALL SOURCES OF SUPPLY, WAIT 5 MINUTES BEFORE USING INTERNAL COMPONENTS.

MAKE SURE NO VOLTAGE IS APPLIED WHEN YOU CHECK INSIDE THE DEVICE.

DO NOT FORGET TO RETURN THE PROTECTIVE COVER TO ITS ORIGINAL STATE AFTER THE INSPECTION.

**PROHIBITED:**

DISCONNECT THE POWER FEED CONNECTOR DURING CHARGING.

DO NOT TOUCH THE LEADING END PART OF THE POWER FEED CONNECTOR.

DO NOT PUT FOREIGN ARTICLES IN THE LEADING END PART OF THE POWER FEED CONNECTOR



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# 1. OVERVIEW

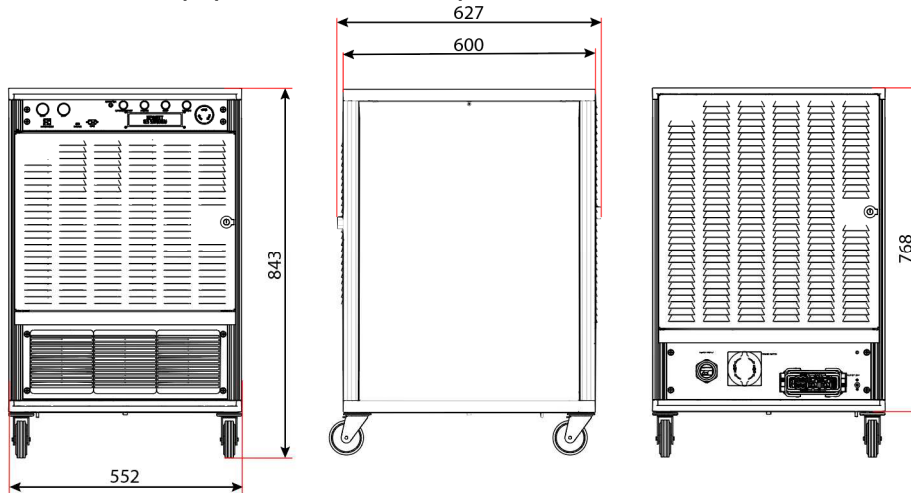
IES Synergy's DC Quick Charger converts a 400-480VAC three phase voltage into DC current to directly charge an electric vehicle's lithium ion battery.

The 50kW charger housing consists of 4 individual 12.5kW power drawers. This allows for flexibility to offer a 12.5kW, 25kW, 37.5kW, or 50kW configuration.

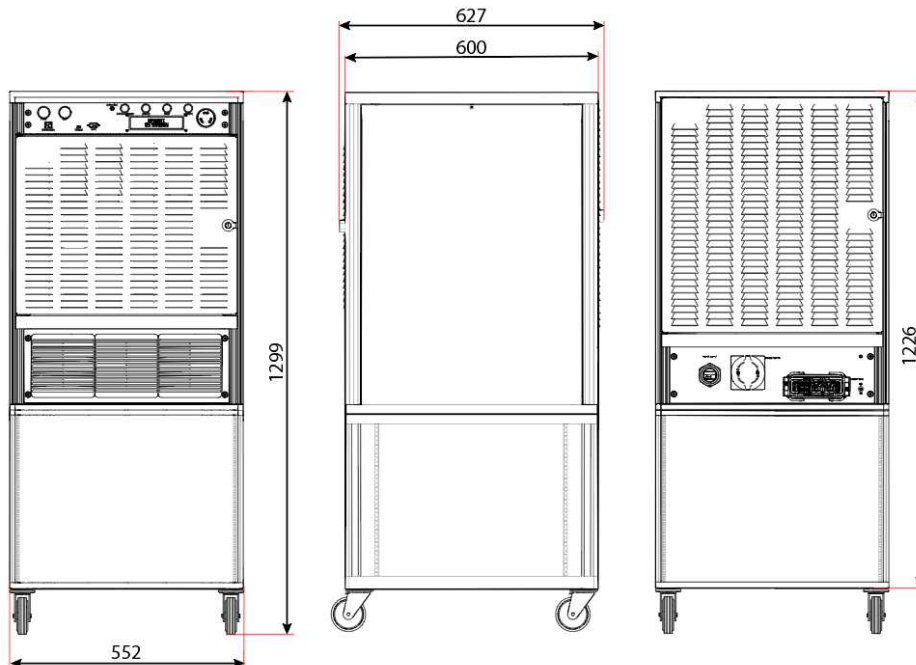
In addition, the DC Quick electric vehicle charger utilizes a CHAdeMO and COMBO compliant communications protocol and power connector.

There are two DC Quick Chargers configuration:

- For equipment located in production line:



- "18 inches heightened" for equipment located in service garage:



This product is a prototype.

## 2. ELECTRICAL AND MECHANICAL CHARACTERISTICS

### INPUT RATING:

Rated Voltage	400 - 480V 50/60Hz	3 pole 4 wire
Input current	100A Max 70A Nominal	under 400V at max output capacity under 480V at max output capacity
Efficiency	> 94%	or more in rated operation
Input power factor	> 0,93	or more in rated operation

### OUTPUT RATING:

Output voltage range	200 - 500 VDC	
Max Rated current	100 ADC	4 lines of 25A in parallel
Rated Output capacity	50KW	4 lines of 12.5KW in parallel
Insulation system	High frequency transformer insulation	
Output grounding system	DC ungrounded	

### PROTECTION:

Upstream Breaker	3-pole 100A breaker on dedicated circuit, non-GFCI type or 3 fuses minimum rating 100A or preferred rating 125A (1 fuse per phase and each fuse must be identical)	
Output protection	Power output is terminated upon detection of charging connector plug-out	
Electrical Protection	UVP, OCP, OPP, OTP, FAN	

### ENVIRONMENTAL:

Rated Temperature	-10°C to 40°C.	
Cooling system	Forced air cooling	
Humidity	90% relative humidity, non-condensing	

### MECHANICAL:

Charging Cable Length	13 ft, straight cable ( 3 various lead extension set are allowed)	
Input Power Feed Cable Length	16 ft, straight cable	
Dimensions HxLxD	1299 x 552 x 600 mm (Ref : CHBRN012230) 843 x 552 x 600 mm (Ref : CHBRN011436)	
Weight	165 Kg (Ref : CHBRN012230) 155 Kg (Ref : CHBRN011436)	



### 3. MOVING, TRANSPORTING AND STORAGE

Improper storage or handling may cause damage to the unit



**CAUTION: THERE IS A DANGER OF INJURY DUE TO DROPPING OR FALLING**

DO NOT FORGET TO FOLLOW SPECIFIED PROCEDURES FOR HOISTING OPERATIONS.

TAKE MEASURES TO PREVENT FALLING WHEN YOU CARRY OR TRANSFER THE DEVICE.

## 4. INSTALLATION

### 4.1. Checking the Electrical Requirements

The DC Quick Charger's electric requirements and wiring installation procedure can be performed by any qualified electrician. The unit has an integrated UL listed 100 Amp breaker. Please see NEC Article 625 for installation requirements and check in the installed jurisdiction for any other electrical requirements.

### 4.2. Connecting the charging station

The DC Quick Charger provides a 16ft oil resistant suitable 3 pole 4 wire flexible AC input cable 4AWG 80°C min 600V min.



**DANGER:**

READ AND FOLLOW THE “SAFETY INSTRUCTIONS” AT THE BEGINNING OF THIS MANUAL BEFORE INSTALLING THIS DEVICE.



**WARNING: THERE IS A DANGER OF ELECTRIC SHOCK**

BE SURE THE POWER IS OFF BEFORE STARTING INSTALLATION



**WARNING:** THE UNIT IS TO BE CONNECTED TO A PERMANENT GROUND AS A GROUNDED WIRING PERMANENT SYSTEM OR AN APPROPRIATE GROUNDED PIN AND SLEEVE PLUG THAT COMPLY WITH ALL LOCAL CODES AND ORDINANCES. DO NOT USE ANY CONNECTOR SYSTEM



**CAUTION:** The charging station must only be connected to the mains power supply with the authorised input cable assembly types described below.

Authorised input cable assembly types are:

CSA Type/UL Style	Specification	Manufacturer
SOOW	SOOW Cable - 2AWG - 4 conductors – Rated 600V 80A - Min Temp 90°C	Various

# 2

**WARNING:**

- Before connecting the mains input cable assembly to the rear panel mains input socket, **first check that the mains input connector is not connected to power supply.**
- To protect against an electric shock in the event of a fault, make sure that the protective earth of the mains power supply is correctly connected before turning on the power.

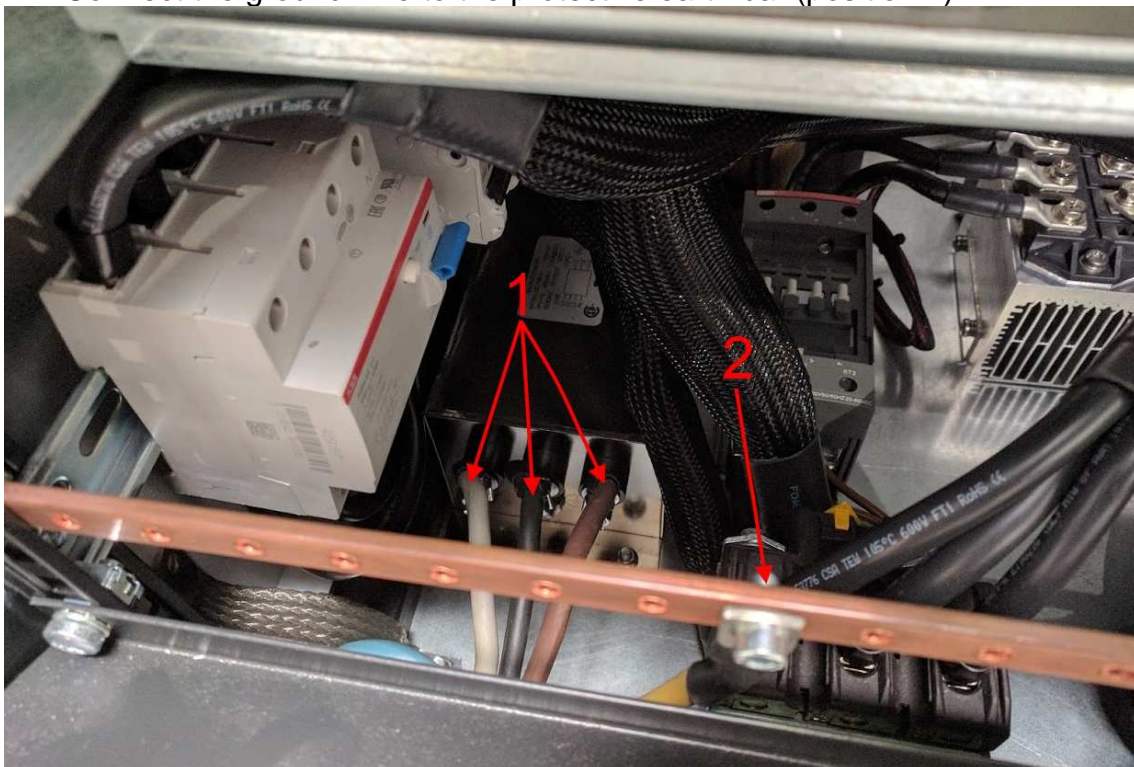
- The input must be connected to the power supply by CCID (Charging Circuit Interrupting Device rated 80A) with an opening contact distance for all poles that provides full disconnection in Category III over-voltage.

To connect you must:

- Remove the rear door for greater accessibility.



- Remove the 4 screws holding the panel connector which is located on the rear.
- Pass the 4-strands cable (3 phases + ground) through the cable gland
- Put an M6 eye terminal on each phase wire
- Put an M5 eye terminal on the ground wire
- Connect the 3 phases wires to the input filter (position 1)
- Connect the ground wire to the protective earth bar (position 2)



# 2

**WARNING** – This device must be correctly connected to earth in accordance with the local specifications. Incorrect connection of the earth wire can lead to an electric shock. Check with an electrician if there is any doubt about the charger’s earth.

- Tighten the 4 screws holding the plate connector.
- Replace the back door,

- Before closing the door, check that the internal charger input breaker is turned on.



## 4.3. DC Output Charging Cable



### CAUTION:

A LEAD EXTENSION SET OR CABLE ASSEMBLY OTHER THAN THAT DESCRIBED BELOW MUST NOT BE USED IN ADDITION TO THE CABLE ASSEMBLY FOR THE CONNECTION OF THE EV TO THE CHARGING STATION.

Output cable and connector types are:

IES Part No.	Description	Manufacturer
FLPLA009956	COMBO 1 CHARGING CABLE	IES
FLPLA009957	COMBO 2 CHARGING CABLE	IES
FLPLA016599	CHADEMO CHARGING CABLE	IES

CHADEMO OUTPUT CABLE



COMBO 2 OUTPUT CABLE



COMBO 1 OUTPUT CABLE



## 2

**WARNING:**

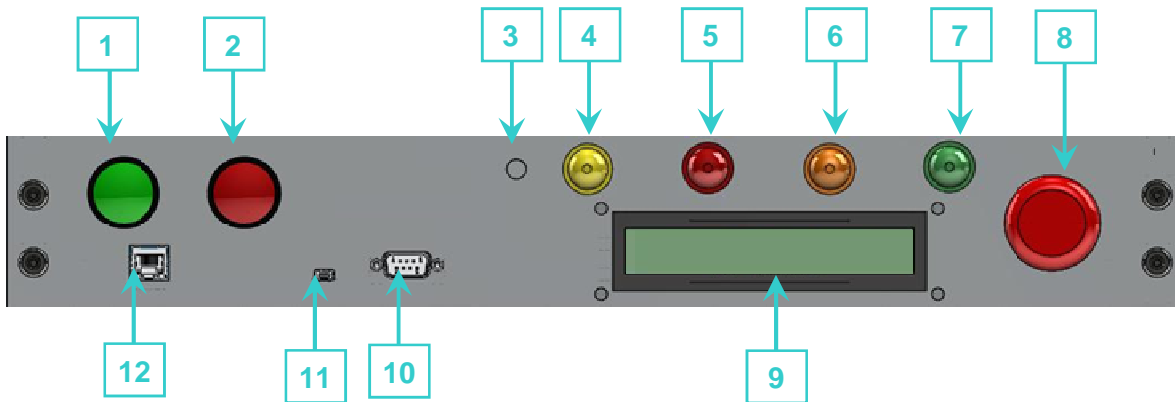
BEFORE CONNECTING THE OUTPUT CABLE ASSEMBLY TO THE REAR PANEL CHARGER OUTPUT SOCKET, ***FIRST CHECK THAT THE DC OUTPUT CONNECTOR IS NOT CONNECTED TO THE ELECTRIC VEHICLE BATTERIES.***

CONNECT THE SELECTED OUTPUT CABLE ASSEMBLY TO THE REAR PANEL OUTPUT SOCKET AND SECURE THE LOCKING BRACKET FIRMLY TO AVOID ACCIDENTAL DISCONNECTION.

LETHAL VOLTAGE. THE DC SOURCE MAY PROVIDE 500V CONTINUOUS VOLTAGE. TOUCHING THE CONNECTED CIRCUIT OR THE OUTPUT TERMINAL WHEN THE POWER IS ON MAY CAUSE DEATH.

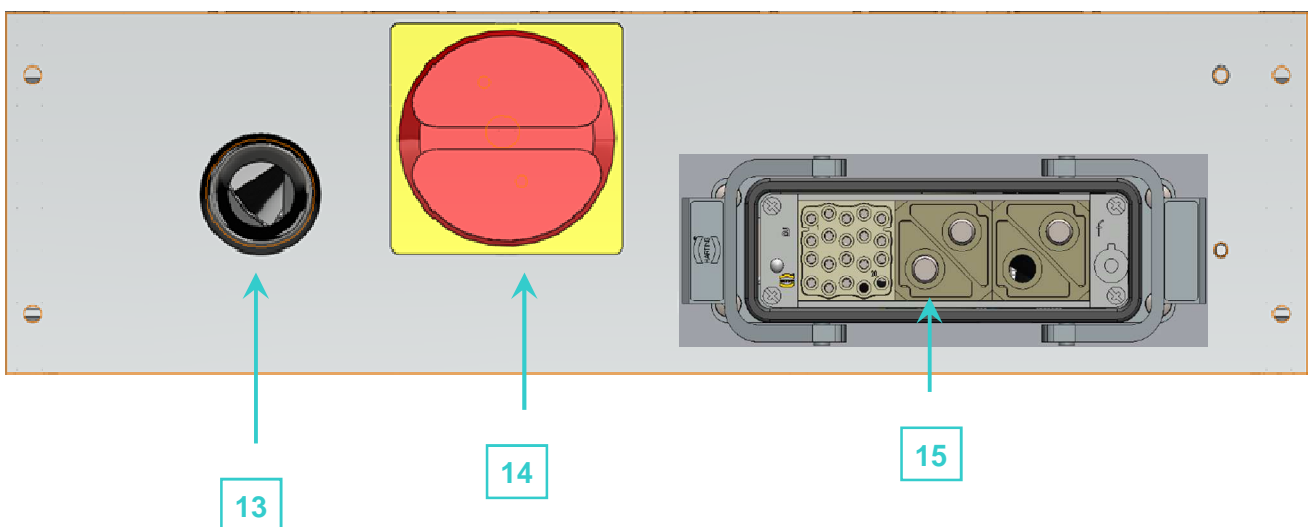
## 5. USE AND START-UP

### 5.1. Description of the control panel



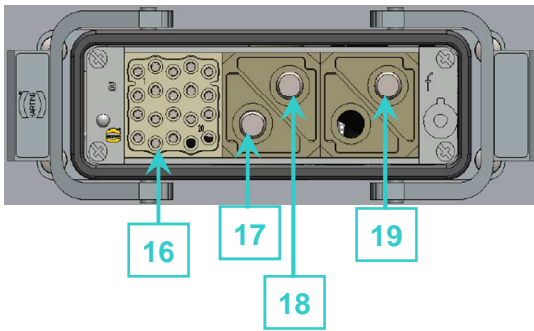
1. "START" button to start charging
2. "STOP" button to stop charging
3. "SUPPLY ON" white light
4. "CHARGER READY" flashing yellow light
5. "FAILURE" flashing red light
6. "SLEEP/REFRESH" flashing orange light
7. "CHARGE" flashing green light
8. "EMERGENCY STOP" button
9. Display
10. CAN bus connection on SUB-D9 port
11. USB port service
12. Ethernet network connection

### 5.2. Description of the connector panel



13. AC input cable gland
14. Input Mains switch isolator for charging station
15. Harting connector for battery connection

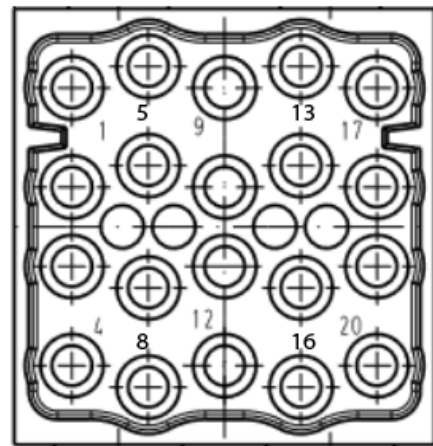
### 5.3. Pin allocation of the Harting battery connector



- 16.** Module, 20-pin signal parts
- 17.** Module, GND
- 18.** Module, 100A + BAT
- 19.** Module, 100A - BAT

#### Signal module pin allocation:

- 1 : Charge Start & Stop 2
- 2 : +12V
- 3 : Connector Lock
- 4 : Verification of connector connection
- 5 : GND
- 6 : CANL
- 7 : Charge Start & Stop 1
- 8 : RC
- 9 : Control Pilot
- 10 : Charge Permission & Prohibition
- 11 : GND
- 12 : CANH
- 13 : NC
- 14 : NC
- 15 : TEMP
- 16 : GND
- 17 : QSD
- 18 : QSD
- 19 : NC
- 20 : NC





## 5.4. Start a battery charge

Before starting a battery charge :

- The mains input plug must already be connected to the mains power supply receptacle
- The CHAdeMO or COMBO charging output cable plug must be connected to charger rear panel socket.
- The power feed connector CHAdeMO or COMBO must be attached to the vehicle.

### 5.4.1. Step1 Power up the Charger

**Turn the input switch to the "1" position.**

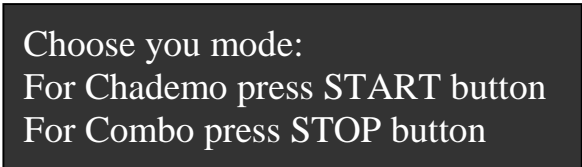
The charger displays its name.



XS50 Keywatt Combo  
Chademo DC Charger

<<Display

After about two seconds the charger requests the charge mode:



Choose you mode:  
For Chademo press START button  
For Combo press STOP button

<<Display

After pressing the corresponding button for the required mode, the charger displays the mode and you must confirm by pressing the START button or cancel by pressing the STOP button.

### 5.4.2. Chademo mode

After selecting the Chademo mode, the charger performs an internal check and initialisation.

Please wait for several seconds.



Initialisation...

<<Display



→ The “CHARGER READY“ flashing yellow lights every1 second.  
When initialisation is successful:

Connect vehicle and  
Press ON to start.

<<Display

In case of error:

Pwr Module Failure  
0 OK and 2 Fail

Display  
Two kind of internal fault

No Power Module

## Step2 Start a new charge

**Connect the charging plug to the vehicle (secure firmly).**

**Then press the “ON” Button.**

→ the “CHARGE” flashing green lights every 1 second.

The Charger is starting to communicate with the vehicle.

STARTING SEQUENCE



START COMMUNICATION

<<Display

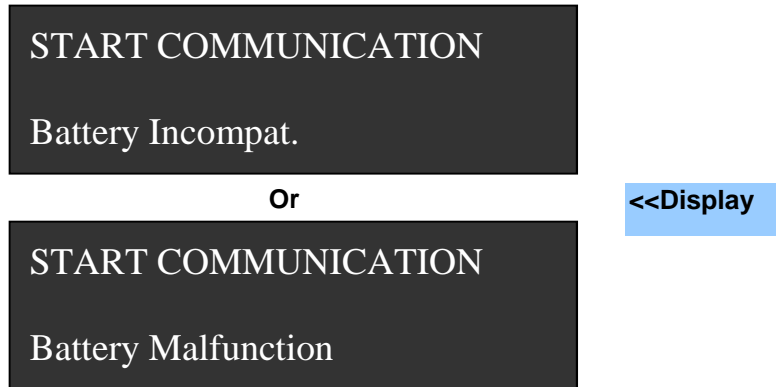
Communication has been established.

LOCKING CONNECTOR

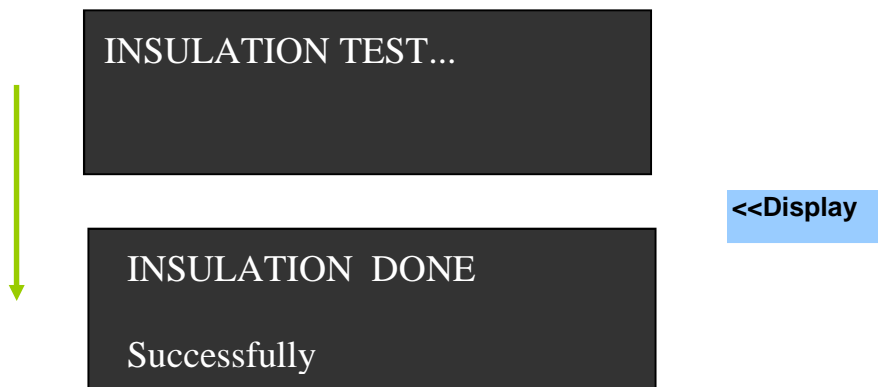
<<Display

If there is a communication fault:

Communication problem with Battery BMS



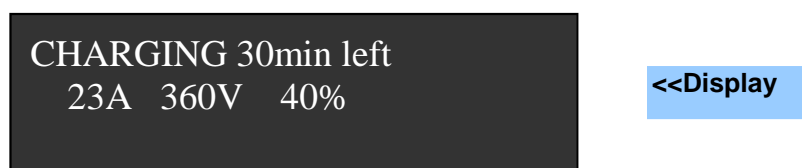
Then the charger locks the charging plug and performs the insulation test.



If there is an insulation failure:



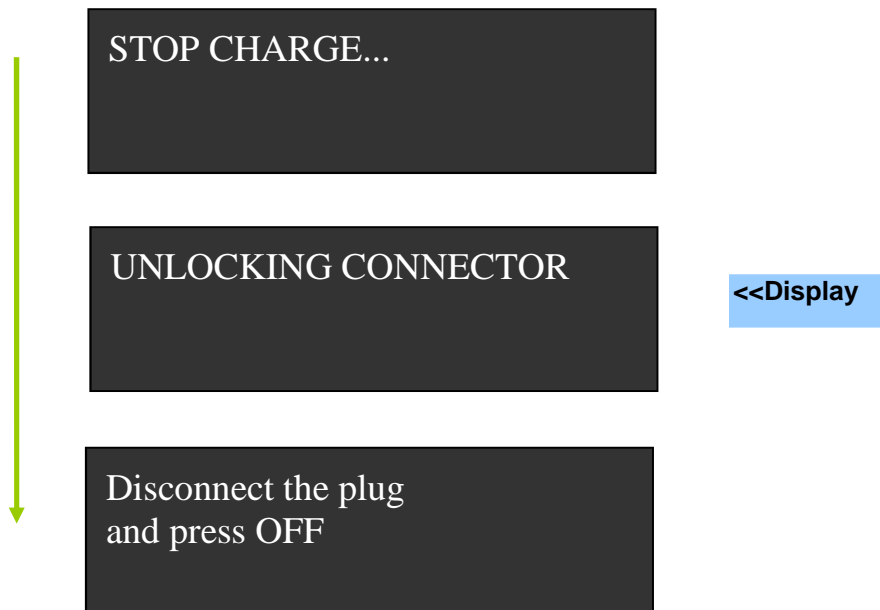
Charging is now in progress.



After pressing the "START" button, the Display indicates the time left, the charging current and voltage and the present battery capacity.

→ the "CHARGE" flashing green lights every 2 second with a long pulse.

When charging has finished:

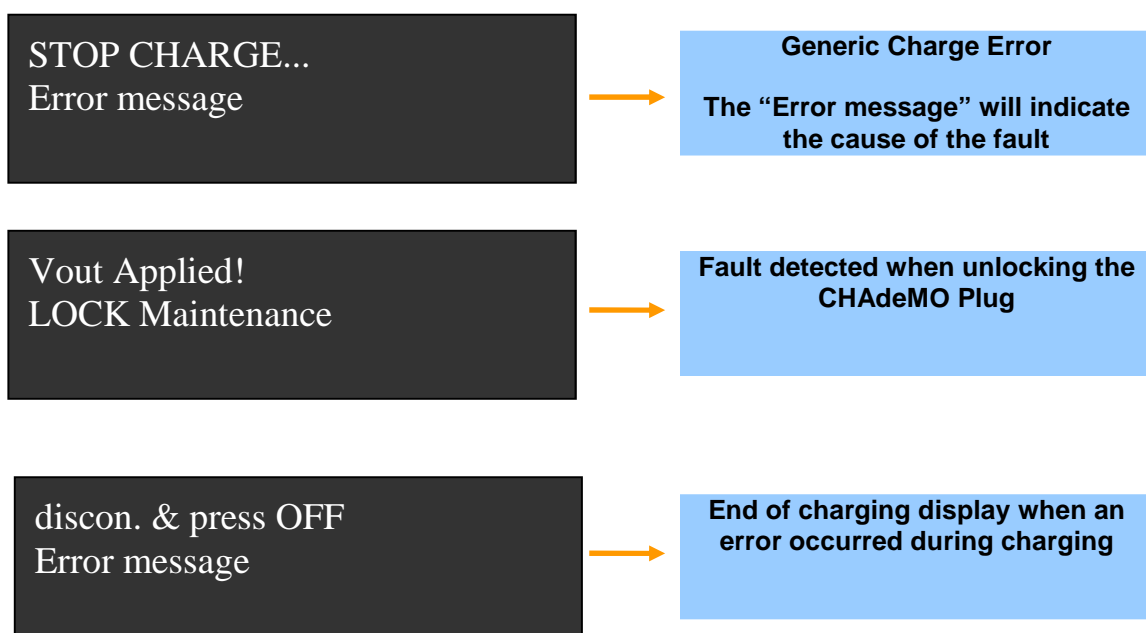


The charger performs the stop charge procedure. Charging is stopped either by the battery BMS or the operator by pressing the "OFF" Button.

→ the "CHARGE" flashing green lights every 2 second with a long pulse.

- **Charge Error messages:**

The various displays when an error has occurred during the charge.



### 5.4.3. Combo mode

After selecting the combo mode, the charger performs an internal check and initialisation.

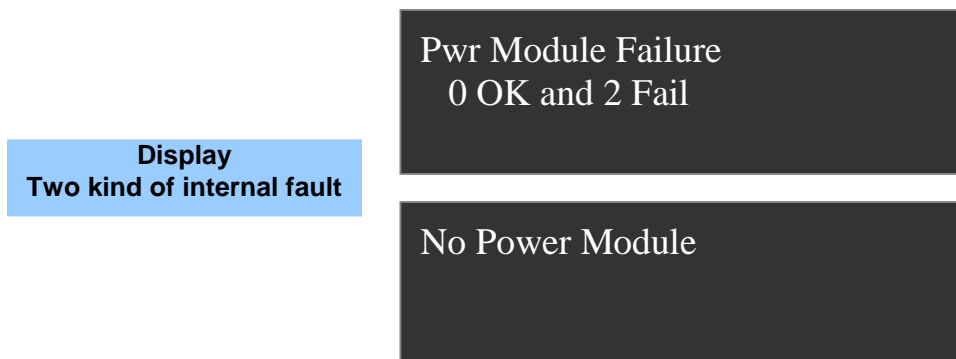
Please wait for several seconds.



→ The "CHARGER READY" flashing yellow lights every second.  
When initialisation is successful:



In case of error:



### Step2 Start a new charge

**Connect the charging plug to the vehicle (secure firmly).**

→ the "CHARGE" flashing green lights every second.

The charger is waiting to communicate with the vehicle.

Vehicle connected  
Wait EV Communication



Communication in progress...

<<Display

Communication has been established.

Then the charger performs the insulation test.

INSULATION TEST...



INSULATION DONE  
Successfully

<<Display

If there is an insulation failure:

Cancel charge...  
!INSULATION FAILURE!

<<Display

Then the charger performs the pre-charge phase.

PRECHARGING...  
1000 mA    320V



CHARGING...

<<Display

When the pre-charge target is reached and after receiving the charge permission the charger displays:

CHARGING...

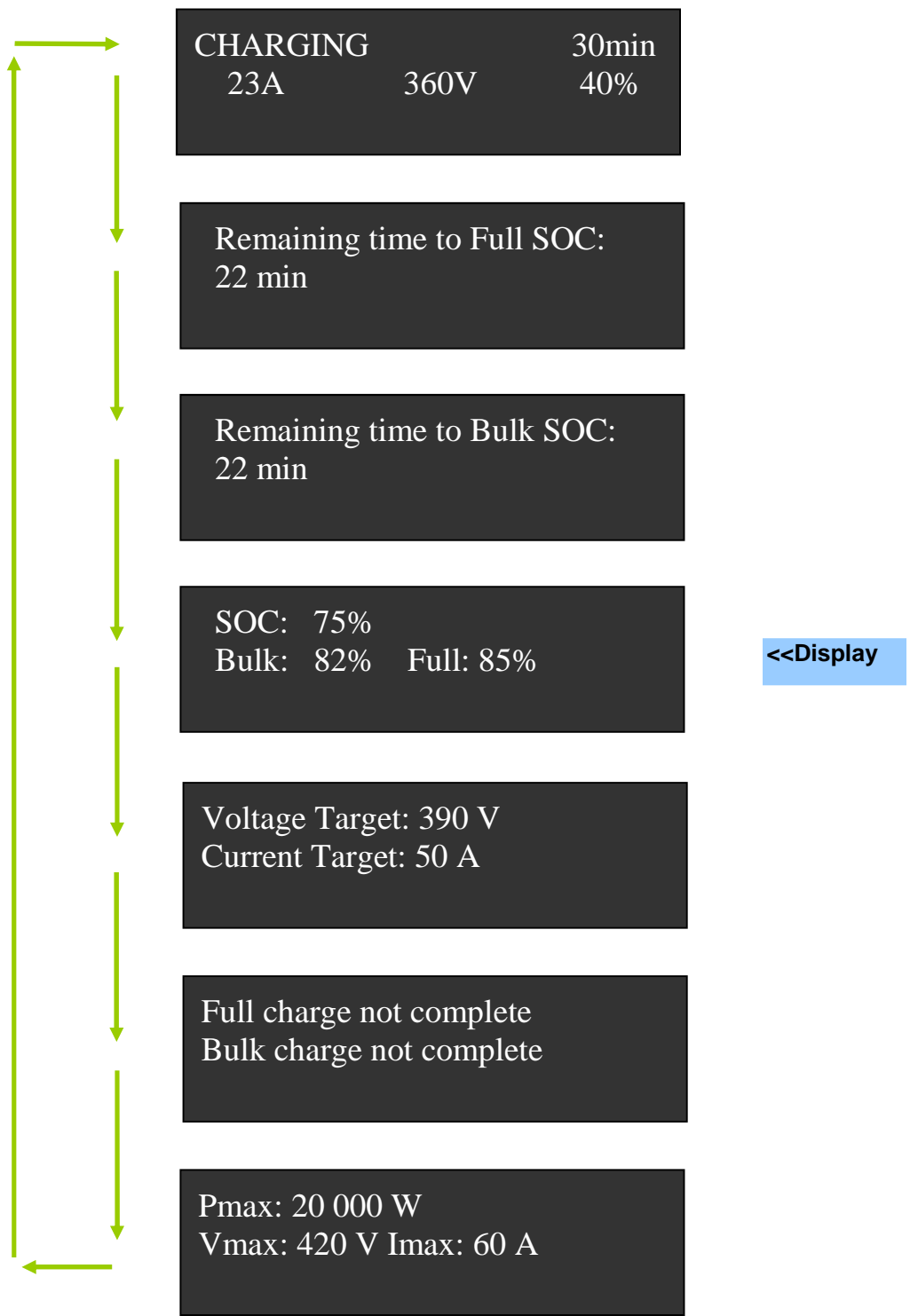
<<Display

Charging is now in progress.

CHARGING		30min
23A	360V	40%

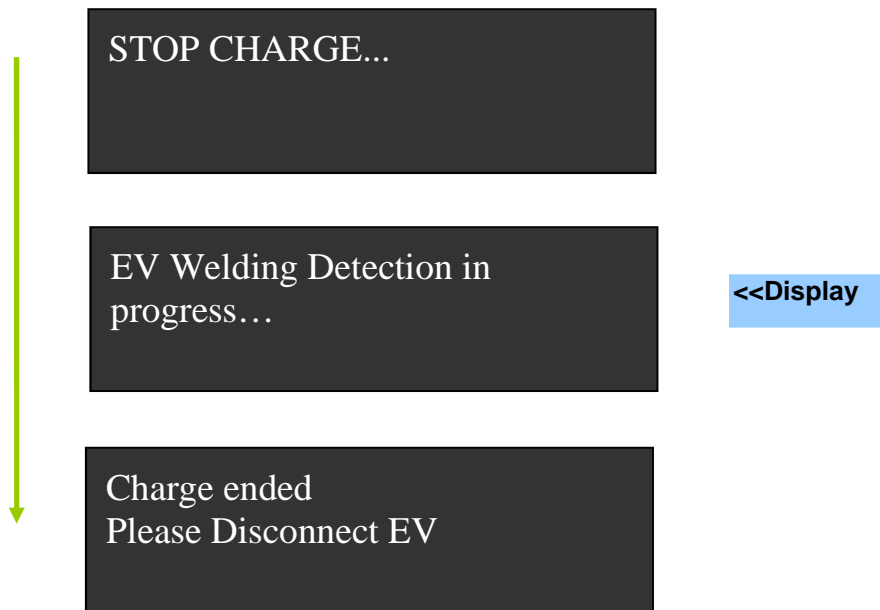
<<Display

The display indicates the charge duration, the charging current and voltage and the present battery charge status. The user can display other parameters and information by pressing the start button.





When charging is complete:

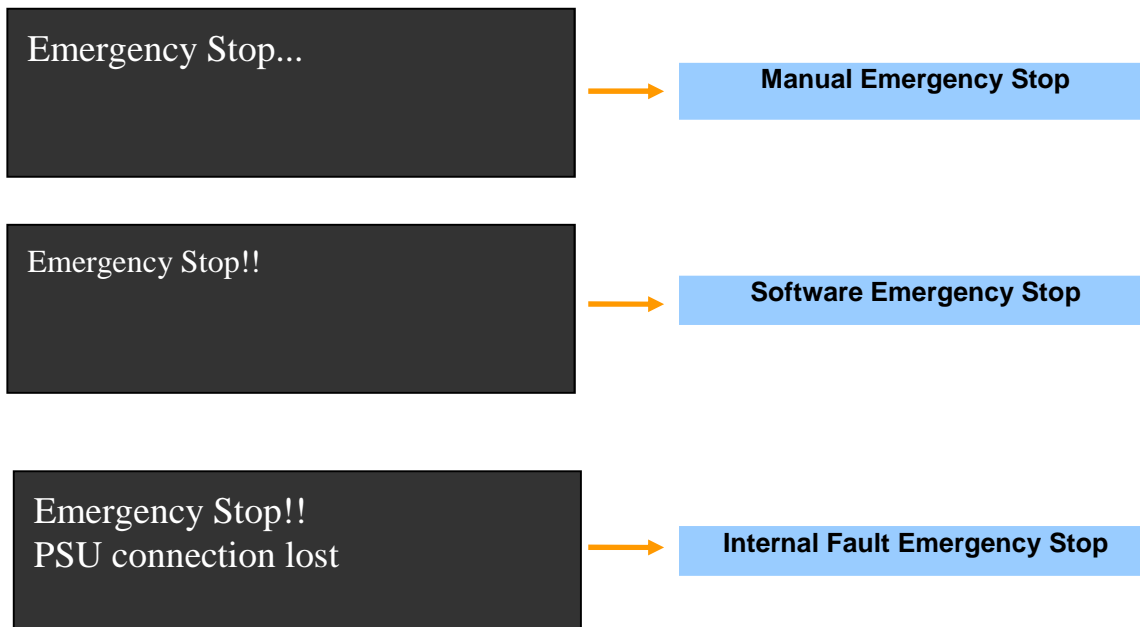


The charger performs the stop charge procedure. Charging is stopped either by the vehicle or by the operator pressing the “OFF” Button.

→ the "CHARGE" flashing green lights every 2 second with a long pulse.

#### 5.4.4. *Emergency Stop messages*

→ The Emergency Stop message blinks every second



## 5. FAULT MESSAGES LIST

Message	Description
"EXT_Emergency_Stop"	Push Button Emergency Stop has been activated
"ERR Vout_at_start"	Abnormal Output voltage at charger start up
"Out_Pwr_Switch_Fail."	Defective Charger Output DC contactor
"Can_Data_invalid"	Incorrect Data frame send by the vehicle on CAN Vehicle does not update output current request when charging starts
"Can_Frame_absent"	No CAN communication
"ShortCircuit"	2 cases - Output Current above I <sub>max</sub> . - Output current above 5amps during insulation test.
"OverVoltage"	Charger output voltage exceeds maximum voltage limit
"ChargerOverHeating"	Cooling defect. Internal power modules reach the maximum permitted operating temperature
"Over Limit I"	The vehicle requires too high a current according to the start of charging calculation.
"PSU Absent"	No response from power supervisor (internal fault)
"PSU Timeout Change"	Power supervisor timeout during state transition (internal fault)
"PSU bad state"	Power supervisor goes into incoherent state (internal fault)
"Connector_Lock"	CHAdeMO plug locking coil defect.
"BatteryIncompatib."	Battery voltage range not suitable for the charger
"BatteryMalfunction"	Battery vehicle fault: - No CAN communication at charge start up. - Incorrect Current or Voltage data. - Abnormal voltage at charge start up.
"ChargingStopCtl"	Charge start up denied (CAN or physical i/o line).
"VehicleShiftPosition"	Gear Shift is not in neutral (Vehicle fault)
"VehicleOtherFaults"	Vehicle fault. Check vehicle supervisor.
"BatteryOverVoltage"	Over-voltage detected by the vehicle.
"BatteryUnderVoltage"	Too low a voltage detected by the vehicle.
"BatteryCurrentDiff."	Current measurements mismatch from vehicle measurement and charger CAN data, detected by the vehicle.
"HighBatteryTemp."	Battery overheating detected by the vehicle.
"VoltageDifferential"	Voltage measurements mismatch from vehicle measurement and charger CAN data, detected by the vehicle.
"InsulationFailure"	Earth fault current detected by charger

<b>Message</b>	<b>Description</b>
"ChargerMalfunction"	During battery charge - Charger power supervisor (not CCU) stops charge, detecting output over-voltage. - Charge aborted by pressing "OFF" button.
"PSU ERROR ARU"	Software emergency stop requested by the power supervisor (internal).
"PSU Modules COM"	Power module communication lost (internal).
"PSU CCU COM"	Communication interruption between power supervisor and CCU (internal).
"PSU OVERVOLTAGE"	Over-voltage detected by power supervisor (internal).
"PSU OVERHEATING"	Overheating detected by power supervisor (internal).
"PSU COHERENCY"	Coherency error detected by power supervisor (internal).
"PSU INSULATION"	Earth fault detected by power supervisor (internal).
"PSU LIMIT Vmax"	Output voltage limit exceeded (+5V) detected by power supervisor (internal).
"PSU SHORT CIRCUIT"	Output short-circuit detected by power supervisor (internal).
"PSU Bad Vred"	Input voltage out of range detected by power supervisor (internal).
"OverCurrent"	Output Current exceed the Maximum Value
"ERR EV Charge Status Not Ready"	The vehicle requests a charge but its status is not ready.
"ERR Bad Pilot State during charge"	Control pilot wire changes from State C during charge
"EV bad pilot state at start"	Control pilot wire state is not A or B at start
"Error EV Not Ready"	The ready flag of the EV is not ready
"Error Timeout : EV Session Setup Request not received"	The Charger did not receive the session setup request (Timeout is 20 s)
"Error Timeout : EV Ready to Charge State not received"	The Charger did not receive the ready to charge flag (Timeout is 40s)
"Error No message or Client Disconnected"	The Charger detects the EV presence but the EV does not send any request.

## 6. MAINTENANCE CHECK



### **DANGER:**

READ AND FOLLOW THE "SAFETY CONCERNS" AT THE BEGINNING OF THIS MANUAL BEFORE USING THIS DEVICE.



### **DANGER:**

A KEY IS ATTACHED TO THE LOCKING BRACKET OF THE DC OUTPUT CONNECTOR. KEEP THE DOOR LOCKED AT ALL TIMES TO PREVENT UNNECESSARY OPENING OF THE DOOR. KEEP THE KEY IN A SAFE PLACE.

### 6.1. Maintenance Check Precautions

Each of the capacitors in this device has a high voltage for a time after shutting off the input power supply. Check for the voltage of each part before performing maintenance checks.

### 6.2. Maintenance Check Items

Perform periodic checks.

The check items and cycle of this device vary depending on its installation environment, service conditions, etc. Refer to Section 6.5 - Maintenance Check Item List as a guide.

### 6.3. Visual Check Items

1. Check for abnormal sound from running fans and power units. If there is abnormal sound, please contact an IES Synergy representative for further assistance.
2. Check for abnormal odours, changes of inner materials, corrosion, anomaly in appearance, etc., in this device. If there are any anomalies, please contact an IES Synergy representative for further assistance.
3. Check for dust and dirt in this device regularly and, if any is found, clean using appropriate procedures.

### 6.4. Replacement of Fixed-Life Components

To prevent the device from failure due to worn out components, it is necessary to replace the components before they reach the end of their lifespan. Use the following replacement intervals as a guideline for the estimate of the total running time. Please contact an IES Synergy representative for further assistance when you replace the parts.

1. Input Power feed cable: Approximately three (3) years.
2. Charging cable: Approximately three (3) years.
3. Intake and exhaust filters: Approximately three (3) years.

**Note:** Please keep in mind that the replacement interval of each part can vary depending on, for example, the usage environment of the device.

## 6.5. Maintenance Check Item List

The following table is a list of general check items and cycles for periodic maintenance. Use this for reference.

Maintenance Item and Method	Criterion	Action	Cycle		
			Daily or at Every 50 Chargings	3 to 6 months	3 to 7 years
Abnormal sound	Presence of abnormal sound	If the abnormal sound has gotten gradually louder, check for defective parts at your convenience. If sound becomes loud suddenly, shut the device down immediately and check defective parts	x		
Check inside device	Presence of abnormal odour, transitions of inner materials, corrosion, anomaly in appearance , etc.	If there are any anomalies, please contact an IES Synergy representative for further assistance		x	
Cleaning of intake and exhaust filters		Detach the filters, remove dust using a vacuum cleaner or similar device, and attach the filters again		x	

## 7. DESCRIPTION OF GUARANTEE

THIS EQUIPMENT IS GUARANTEED AGAINST ANY MATERIAL OR MANUFACTURING DEFECTS, IN ACCORDANCE WITH THE GENERAL CONDITIONS OF SALE. DURING THE WARRANTY PERIOD, THE UNIT MAY ONLY BE REPAIRED BY THE MANUFACTURER, WHICH RESERVES THE RIGHT TO REPAIR THE UNIT OR TO EXCHANGE ALL OR PART OF IT. IF THE EQUIPMENT IS RETURNED TO THE MANUFACTURER, THE OUTGOING TRANSPORT COSTS ARE BORNE BY THE CUSTOMER.

THE WARRANTY IS NOT APPLICABLE IN THE FOLLOWING CASES:

1. *IMPROPER USE OF THE EQUIPMENT OR USE OF IT IN CONJUNCTION WITH INCOMPATIBLE EQUIPMENT.*
2. *MODIFICATIONS TO THE EQUIPMENT WITHOUT THE EXPLICIT AUTHORISATION OF THE MANUFACTURER'S TECHNICAL DEPARTMENT.*
3. *WORK CARRIED OUT ON THE UNIT BY A PERSON NOT APPROVED BY THE MANUFACTURER.*
4. *ADAPTATION FOR A SPECIFIC APPLICATION NOT INCLUDED IN THE DEFINITION OF THE EQUIPMENT OR THE USER MANUAL'*
5. *KNOCKS, FALLS OR FLOODING.*