

ETREL

**ELECTRIC VEHICLE CHARGING
STATION**

ETREL INCH

USER MANUAL

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FOREWORD

Etrel INCH charging station has been designed and tested in accordance with current and past versions of international standards. The charging station is compliant with IEC 61851 (Part 1, Part 21-2, Part 22) international standard which defines conductive AC electric vehicle charging and supports Mode 3 charging for safe recharging of standard electric vehicle.

The charging station for electric vehicles is a part of the integrated charging system that has been designed and developed by Etrel. The system consists of EV charging station(s) described in this manual and the accompanying multi-tier software for EV charging infrastructure operators, and end users.



Figure 1: Etrel INCH charging station (with socket, with cable)

The system enables safe and simple EV charging for the user and gives a comprehensive oversight and control of the charging for the operator, including the data for billing of the consumed energy and service.

The manual contains the latest information at the time of purchase. Any unauthorized modification or tampering with the product may void the product warranty.

Etrel d.o.o. reserves the right to make changes to the product without further notice. Customer support department will assist with any further inquiries about the product.

Notes to the installer:

- Carefully read the installation instructions before installing the station. Follow all the instructions and recommendations.
- After the installation is completed, make sure to leave these instructions with the customer.

Notes to the customer:

- Use the charging station only in accordance with instructions for use. Carefully read these instructions and make sure to keep them for further reference. Ensure that the charging station is installed by a licensed electrician.
- Preparation of charging station installation site and installation are described in separate documents. In this document it is predisposed that charging station is installed properly and already working.

GENERAL INFORMATION

INTENDED USE

Etrel INCH charging station is intended only for charging of electric vehicles and should not be used to charge other appliances or for any other purpose.

- No flammable materials or liquids should be used or stored in the direct vicinity of the charging station.
- The manufacturer accepts no responsibility for damage or injuries resulting from incorrect installation or inappropriate use of the product.
- Different types of charging connectors and converters are available as a part of optional equipment to allow safe charging of any standard electric vehicle.

OPERATION

The device must be used in accordance with the instructions contained in this manual.



- Do not operate charging station if there is visible damage to the unit or charging cable. Call manufacturer's or reseller's support department for advice how to proceed.
- Do not put fingers into the charging connector.

- Do not operate the charging station with wet hands.
- The charging station manufacturer cannot be made liable for damage or injury caused by improper handling, installation, or use of the product.
- Any usage of the product not covered in this document is not allowed and could cause injury or even death.

MAINTENANCE

- Charging station can be maintained and repaired by qualified personnel only.
- Charging station's power supply should always be switched off during the maintenance and repair.
- Avoid hazardous risks. Only the manufacturer, an authorized service technician, or technically qualified personnel may replace damaged charging station or its components.

PROCEDURE IN CASE OF IRREGULARITY OR INTERFERENCE AT OPERATION

In the event of irregularities or interference in the operation of the device, immediately stop using the charging station and inform the charging station operator of the situation by phone number located on the housing or other place.

DESIGN CONSIDERATIONS

Special care has been put into selection of components and materials and their compliance to requirements set in standards, technical directives and rules of good practice.

The internal wiring was carefully designed, and the propriety of whole assembly thoroughly evaluated. Basic design considerations include voltage, insulating materials, time under voltage stress and degree of pollution at the location. Creepage distances, clearance between circuits and spacing to metal enclosures are important requirements for insulation coordination. Thus, calculation and measurement of clearance and creepage distances, in accordance with requirements, are one of the significant parts in design of our products.

They are dimensioned to withstand the required impulse withstand voltage and to withstand the long-term continuous operation. A charging station operates with an RCD device, which is designed to protect against the risks of electrocution and in addition offers protection against fire caused by earth faults. It is a sensitive safety

device that switches off electricity automatically if there is a fault.

The ingress protection class of IP54 proves, that the enclosure of the charging station is protecting the internals against ingress of solid objects, permits only limited ingress of dust and is protected against water splashes from all directions. Impact protection, of at least IK10 states, that the charging station can withstand impacts, equivalent to 5 kg dropped from height of 40 cm. As required, tests for the IK class were performed before testing of IP class.

FIRE SAFETY MEASURES

At the location of car charging, the fire hazards and thus the threats are increased during the process of charging. The overall design of our products is made on the basis assumption that the fault could occur on any element of the system. Either in the electrical wiring of power supply, in wiring or inside of the charging station, or in the car.

The enclosure and the assembly design are made in such a way that the contact of the user to hazardous parts is not possible. In the event of fire, metal enclosure would constrain a fire and would not allow the propagation outside of the enclosure. Regarding the fire safety in all possible cases of installation, that are out of control of our company, several recommendations are listed:

- **The charger must be installed outside the hazardous area.**
- The installation of the charging station can be performed only by professional electrician and must comply with the installation manual and local installation rules.
- Ensure that there is enough space to manoeuvre vehicles into their designated charging areas and that in event of fire the escape and rescue routes are not obstructed.
- No flammable or combustible material should be stored within the charging area.
- Provision of suitable portable fire extinguisher at the location of the charging station is proposed.
- When the charging station without integral RCD device is installed, the proper RCD device should be installed in the main electrical cabinet.

FIREFIGHTING MEASURES

In case of fire please follow these steps:

- In the event of a fire, immediately stop using the charging station and call the appropriate services (fire brigade).

- If possible, disconnect the station from the power supply by pressing the fire protection switch (if present) or another switch responsible for cutting off the power supply to the station.
- Retreat from fire area.
- Extinguishing should be carried out with extinguishers intended for extinguishing electrical devices up to 1000 V.

Do not extinguish live electrical installations and devices with water!

ENVIRONMENTAL SAFETY MEASURES

When implementing protection measures, environmental protection must also be observed. For this reason, special care has been put into selection of the components and their compliance with the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS). This directive restricts use of hazardous materials in the manufacture of various types of electronic and electrical equipment.

The substances banned under RoHS are heavy metals, lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (CrVI), polybrominated biphenyls (PBB), polybrominated diphenyl ethers (PBDE), and four different phthalates (DEHP, BBP, DBP, DIBP). The restricted materials are hazardous to the environment and pollute landfills and are dangerous in terms of occupational exposure during manufacturing and recycling.

Another example of use of environmentally friendly materials in our products is compliance to REACH, which is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals. REACH regulation also promotes alternative methods for the hazard assessment of substances in order to reduce the number of tests on animals. Packaging of our products is environmentally friendly and materials degradable.

CORRECT DISPOSAL OF THIS PRODUCT (INFORMATION ABOUT WEEE DIRECTIVE)



Of major importance is the compliancy with the Waste Electrical and Electronic Equipment Directive (WEEE) as well. The scope of this Directive is the reuse, recycling and disposal of electrical equipment during complete lifecycle and after their end of life.

The product and its electronic accessories should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste

and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

SAFETY RISK ANALYSIS

DANGER OR RISK	RELEVANT	PROTECTIVE MEASURES	IN ACCORDANCE WITH
Preliminary observations	YES	Application of Annex A of CENELEC Guide 32, Safety aspects relating to low voltage equipment.	CENELEC Guide 32
Safety integration	YES	Application of Annex A of CENELEC Guide 32, Safety aspects relating to low voltage equipment, in particular the "3-step-method": 1) Inherent design measures, 2) Technical safety measures, 3) Information for use.	CENELEC Guide 32
General	YES	Charging station complies to all requirements of the standards of the EN 61851 family, to all parts relevant to AC conductive charging and is compliant to all versions, current and old. This family of standards covers requirements for charging stations from all aspects, however some details are covered in other standards, as listed in this table.	EN 61851-1:2001, EN 61851-1:2011, EN 61851-1:2019, EN 61851-21:2002, EN 61851-22:2002
Protection against electrical hazards			
Leakage current	YES	To prevent leakage currents, the suitable RCD protection device is used either in charging station, or in an installation. Each socket must be protected by individual RCD. The power supply was selected to have a negligible leakage current.	Directive LVD 2006/95/ED (through April 19, 2016) and Directive 2015/30/EU (from April 20, 2016),
Energy supply	YES	Overload and short-circuit protection is ensured with use of suitable MCB. Additional surge protective device could be required by national legislation. Protective devices can be installed either in charger, or in an installation upstream. Coordination and selectivity of protection devices with upstream devices should be ensured, so that only the protection device, the closest to the fault, operates.	EN 60947-1:2007, EN 60947-2:2006, EN 60947-3:2009, EN 60947-4-1:2010, EN 61008-1:2004, EN 61008-1:2012, EN 61009-1:2004, EN 61009-1:2012, EN 60309-1:1999, EN 60309-2:1999, EN 60947-1:2007, EN 60947-2:2006,
Stored charges	YES	The components are dimensioned in such a way that they cannot cause a charge that would be hazardous to human health. In case of vehicle malfunction, the possible hazard of stored charge is mitigated by the use of RCD.	EN 60947-2:2017, EN 60947-3:2009, EN 60947-4-1:2010, EN 62196-1:2012, EN 62196-1:2014, EN 62196-2:2012,
Arcs	YES	The use of suitable switching and protective devices ensures that possible arcs are extinguished quickly and without causing damage.	EN 60947-2:2017, EN 60947-3:2009, EN 60947-4-1:2010, EN 62196-1:2012, EN 62196-1:2014, EN 62196-2:2012,
Electric shock	YES	Basic protection is provided with selection of appropriate insulation of all components and in addition live parts are not accessible during charging. Fault protection is achieved with earthing of all exposed conductive parts and with automatic disconnection of the supply in case of a fault. Additional protection is also provided, with use of high sensitivity RCD's.	EN 62196-3:2014, EN 50065-1:2011, EN 50065-4-2:2001, EN 60950-1:2006, EN 50065-4-7:2005, IEC TS 61439-7:2018,
Burns	YES	Electrical burns and other injuries are prevented with use of appropriate protective devices, properly designed insulation and prevention of arcs.	IEC Guide 116:2018, ISO/IEC Guide 51:2014
Protection against mechanical hazards			
Instability	YES	The use of quality housing with use of additional structural supports ensures high resistance on mechanical stress. The proper installation of mounting anchor ensures that the charger is rigidly supported and can not turn over. Our charging stations are tested to determine the IK code (degree of protection provided by enclosure) in combination with tests to determine IP code (ingress protection).	EN 62262:2002, EN 60529:1991
Break-down during operation	YES	Charger construction ensures that break-down during operation is not possible in normal conditions. This would be possible only with high enough external force, e.g. vehicle collision. For this reason the recommendation for public charging stations is to use protective bollards.	
Ingress	YES	The use of quality housing with use of sealing foam and filters ensures high resistance to ingress of particles. Our charging stations are tested to determine the IP code (ingress protection) in combination with tests to determine IK code (degree of protection provided by enclosure).	
Falling or ejected objects	NO	/	/
Sharp edges or corners and inadequate surfaces	YES	There is a possibility that sharp edges occur during the production process during the cutting and assembly of the housing. For this reason, possible sharp edges that could harm a person, were identified and are grinded away after the assembly. The wires are also protected so that they do not come into contact with the remaining sharp edges. Proper processing, finishing and coloring procedures of the surfaces ensure high quality product.	Directive LVD 2006/95/ED (through April 19, 2016) and Directive 2015/30/EU (from April 20, 2016)
Moving parts, especially where there may be variations in the rotational speed of parts	YES	The only moving part representing the hazard is the opening and closing of the doors. The doors should be closed only if there is nothing blocking them (either mechanical object, or human hand). This risk is also mitigated with the explanation in the user and installation manual.	IEC 60335
Vibration	YES	The major concern with vibrations is the loosening of electrical connections. For this reason, special care is made during the production process to use the optimum torque and tightening sequence for fasteners with use of tools with settable screwing torque.	IEC 60335
Improper fitting of parts	YES	The tolerances of parts are high enough to not represent a problem during the manufacturing process. In addition, the manufacturing instructions are covering all possible improper fittings of connectors and other components. All charging stations are put on the testing line after assembly where possible improper fitting would be identified.	IEC 60335

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DANGER OR RISK	RELEVANT	PROTECTIVE MEASURES	IN ACCORDANCE WITH
Protection against other hazards			
Explosion	NO	/	/
Hazards arising from electric, magnetic, and electromagnetic fields, other ionizing and nonionizing radiation	YES	Our charging stations are subjected to tests and certification to ensure safe operation from the view of electromagnetic compatibility (EMC) and electromagnetic interference (EMI). The compliance with EMC limits ensures that the charging station is not emitting electromagnetic fields that could affect other devices and compliance with EMI limits ensures immunity of the charging station and safe operation when subjected to electromagnetic fields that could occur in the vicinity of the charging station. In addition the charging station are tested and certified in accordance with radio equipment directive (RED) when applicable. The certification proves that the electromagnetic fields generated by the charger are limited to the extend necessary for the operation.	EMC Directive 2004/108/EC (through April 19, 2016) and EMC Directive 2014/30/EU (from April 20, 2016), EN 61000-6-1:2007, EN 61000-6-2:2005, EN 61000-6-3:2007, EN 61000-6-4:2007
Electric, magnetic or electromagnetic disturbances	YES		
Optical radiation	NO	/	/
Fire	YES	In the event of fire, metal enclosure would constrain a fire and would not allow the propagation outside of the enclosure. Used materials are resistant to ignition and spread of fire. External parts of insulating material and insulating parts are resistant to abnormal heat and to fire. Installed RCD device protects against fire aswell.	EN 61439-1:2011, HD 60364-4-42:2011
Temperature	YES	Using the equipment beyond its environmental specifications may give rise to temperature hazard. This is well mitigated with selection of appropriate materials.	EN 61439-1:2011, IEC TS 61439-7:2018, HD 60364-4-42:2011, EN 60068-1:2014
Humidity	YES	High humidity inside of charging station can damage the electrical components. To avoid the risk, during the installation, the base of charging station should be covered with polyurethane foam or similar filling. The charging station has vents to enable natural ventilation. The finishing of the external surfaces offers high protection against environmental conditions and prevents the corrosion and rust. Additional measures can be the addition of silica gel or similar hygroscopic material. Also, the option to install a small heater preventing condensation inside of charger is provided.	EN 60068-1:2014
Acoustic noise	NO	No significant noise levels are being produced. Noise that the electronic components emit is negligent in comparison with noise of vehicle's internal charger.	EN 60068-1:2014
Biological and chemical effects	YES	Special care has been put into selection of the components and their compliance with the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS). Another example of use of environmentally friendly materials in our products is compliance to REACH, which is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals.	REACH, RoHS
Emissions, production and/or use of hazardous substances (e.g. gases, liquids, dusts, mists, vapour)	YES		
Unattended operation	YES	After the starting of charging process no additional inputs are needed as charging stations are designed to be able to charge without supervision. The implemented protection measures would operate independently of human presence.	EN 61851
Connection to and interruption from power supply	YES	The charging station does not connect EV to the electrical grid under full load. Firstly, the connection to the electric vehicle is made only after security checks and mitigation between charger and vehicle. The charging current is then gradually increased to full allowed current. Thusly, the connection of the load does not represent a "spike" in consumed power. In case of interruption the charging station shuts down gracefully to not damage any components. The proper earthing also promotes the quick discharge of possible built-up charge.	EN 61851
Combination of equipment	NO	/	/
Implosion	NO	/	/
Hygiene conditions	NO	/	/
Ergonomics	YES	The user interface is carefully designed, to offer the user complete and concise information in a clear manner. The ergonomic principles relevant to safe movement and handling are covered .	IEC 60335
Functional safety and reliability			
Equipment design	YES	Charging station design was made in accordance with all major international standards that are considered in scope of e-mobility and is designed and constructed to be safe and reliable to prevent hazards arising and withstand normal use in foreseeable environmental conditions, misuse and errors in logic.	Directive 2006/95/EC, EN 61508-1:2010
Type related hazards	YES	Protection against unexpected start and stop was executed with emphasis on hazards resulting from failure to stop.	EN 61851
System faults	YES	In case of foreseeable system faults, or during and after interruptions or fluctuation of the power supply the monitoring, protection and disconnection means ensure safe operation.	EN 61851
Safety-related security			
Protection against casual or coincidental violation	YES	The control system provides the capability for human user identification and authentication.	EN 61851
Protection against intentional violation using simple means with low resources, generic skills and low motivation	YES	The control system provides the capability for unique human user identification and authentication.	EN 61851
Protection against intentional violation using sophisticated means with moderate resources, specific skills related to the considered equipment and moderate motivation	YES	The control system provides the capability to employ multifactor authentication for human user access to the control system.	EN 61851
Protection against intentional violation using sophisticated means with extended resources, specific skills related to the considered equipment and high motivation	NO	The control system provides the capability to employ multifactor authentication for all human user access to the control system.	/
Information requirements			
Information requirements	YES	Information requirements are defined in several documents and standards. These documents and requirements were identified and taken into account for the preparation of user manuals and other documents.	GPSD, LVD, EMC, EN 60335-1, EN 60335-2-15, EN 62079, RoHS, REACH

* Although standards listed in the table are referenced only as CENELEC versions (EN - European Standard, or HD - Harmonization Document), compliancy applies to their international counterpart versions as well (IEC prefix). However, the designation of the year of the standard can be different for IEC versions.

All our charging stations are tested and proved compliant with EN 61851 Part 1, Part 21-2 and requirements of harmonized standards to fulfil LVD and EMC directive. These tests and judgement of compliancy was performed by external accredited organization, SIQ - Slovenian Institute of Quality and Metrology, Mašera - Spasičeva ulica 10, 1000 Ljubljana, Slovenia, www.siq.si.

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PRODUCT DESCRIPTION

BASIC FUNCTIONALITIES

Etrel INCH is a smart charging station that can predict EV charging habits and help charge the car by the time it is needed, at the lowest possible cost.

Charging station comes with the LCD screen that guides through the charging process and provides charging information. Charging station comes with several connectivity options (including Wi-Fi, GSM and Ethernet) and open protocol support and can be seamlessly integrated in smart home.

To connect Etrel INCH charging station, it either comes with the socket or cable. Depending on the type of charging station.



1. LCD screen
2. Status light
3. Settings button
4. Confirmation button
5. Socket
6. Maintenance doors
7. Charging cable



Figure 2: Etrel INCH with socket

Figure 3: Etrel INCH with cable

BASE SPECIFICATIONS



- **Input:** 2x230/400V~; 3W+N+PE; 50/60 Hz; 32A_{max}
- **Output:** 2x230/400V~; 3W+N+PE; 50/60 Hz; 32A_{max}
- **Maximum charging power:** 7.4 kW (1P), 22 kW (3P)
- **Device power consumption:**
From 5 W, depending on actual configuration

Specification of frequency bands and transmitting power (it is possible that not all modules are part of an actual device).

<p>LTE module</p> <p><u>Frequency bands:</u></p> <p>LTE-FDD: B1 (2100 MHz), B3 (1800 MHz), B5 (850 MHz), B7 (2600 MHz), B8 (900 MHz), B20 (800 MHz)</p> <p>LTE-TDD: B38 (2600 MHz), B40 (2300 MHz), B41 (2500 MHz)</p> <p>WCDMA: B1 (2100 MHz), B5 (850 MHz), B8 (900 MHz)</p> <p>GSM/EDGE: B3 (1800 MHz), B8 (900 MHz)</p> <p><u>Transmitting power:</u></p> <p>33dBm±2dB for GSM</p> <p>24dBm+1/-3dB for WCDMA</p> <p>23dBm±2dB for LTE-FDD</p> <p>23dBm±2dB for LTE-TDD</p>	<p>LTE Router</p> <p><u>Frequency bands:</u></p> <p>4G (LTE-FDD): B1 (2100 MHz), B3 (1800 MHz), B5 (850 MHz), B7 (2600 MHz), B8 (900 MHz), B20 (800 MHz)</p> <p>4G (LTE-TDD): B38 (2600 MHz), B40 (2300 MHz), B41 (2500 MHz)</p> <p>3G: B1 (2100 MHz), B5 (850 MHz), B8 (900 MHz)</p> <p>2G: B3 (1800 MHz), B8 (900 MHz)</p> <p><u>Transmitting power:</u></p> <p>21.9 dB</p>
<p>Wi-Fi module</p> <p><u>Frequency band:</u></p> <p>2.4 - 2.4835 GHz</p> <p><u>Transmitting power:</u></p> <p>up to 15 dBm</p>	<p>RFID module</p> <p><u>Frequency band:</u></p> <p>13.56 MHz (HF)</p> <p><u>Transmitting power:</u></p> <p>up to 8 dBm</p>

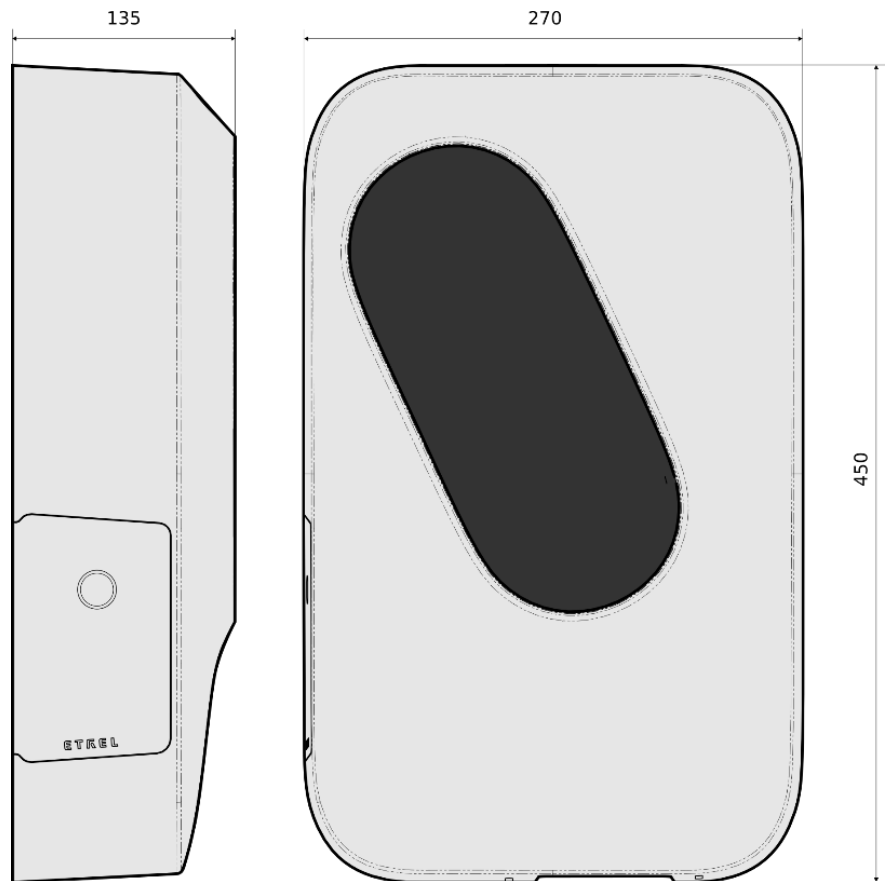


Figure 4: Dimensions of the charging station

OPTIONAL AND EXTRA EQUIPMENT

CONTENT AND ACCESSORIES

- Charging station (with Type 2 cable or Type 2 socket),
- Wall mounting bracket,
- 9 × wall plugs for securing the mounting bracket using screws to the wall,
- 9 × screws to mount the bracket to the wall,
 - Screws dimensions: 4.5 x 40 and 4.5 x 60 [mm],
- Cable gland rubber seal for smaller cable dimensions
- *9 × wall spacers
- *2 × keys to open charging station service doors,
- *Hex key to open charging station maintenance doors,
 - Hex key dimensions: 2.5
- *PLC LAN module,
- *Load Guard device,
- *Magnetic cable holder (different version for longer cables > 3 m).

**Optional depending on the purchased model.*

IDENTIFY PRODUCT VARIANT

Etrel INCH has multiple variants that differ based on connector type and connectivity option. In order to identify charging station, there are two possibilities. Either checking the manufacturer sticker or on the Web interface in Diagnostics menu.

Model number is located on all stickers. Identification of charging station is sometimes needed by the support, so they can identify potential issue.

Regular user will get all the needed information on the sticker located on the inside of maintenance doors. Also, on the web interface of Etrel INCH charging station information about charging station model, serial number, software version and version of cc hardware, cc driver and cc firmware can be obtained.

Charging station or its packaging has 3 stickers, presented on the following figure. Sticker with basic information is located on the delivery package **a)**, one at the back of service doors has all the technical information **b)** and last one is located inside the side maintenance doors, containing information about connectivity **c)**.

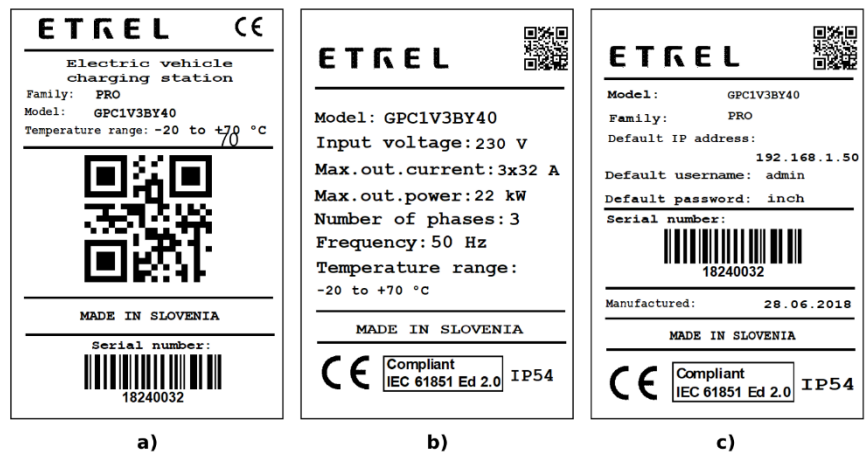
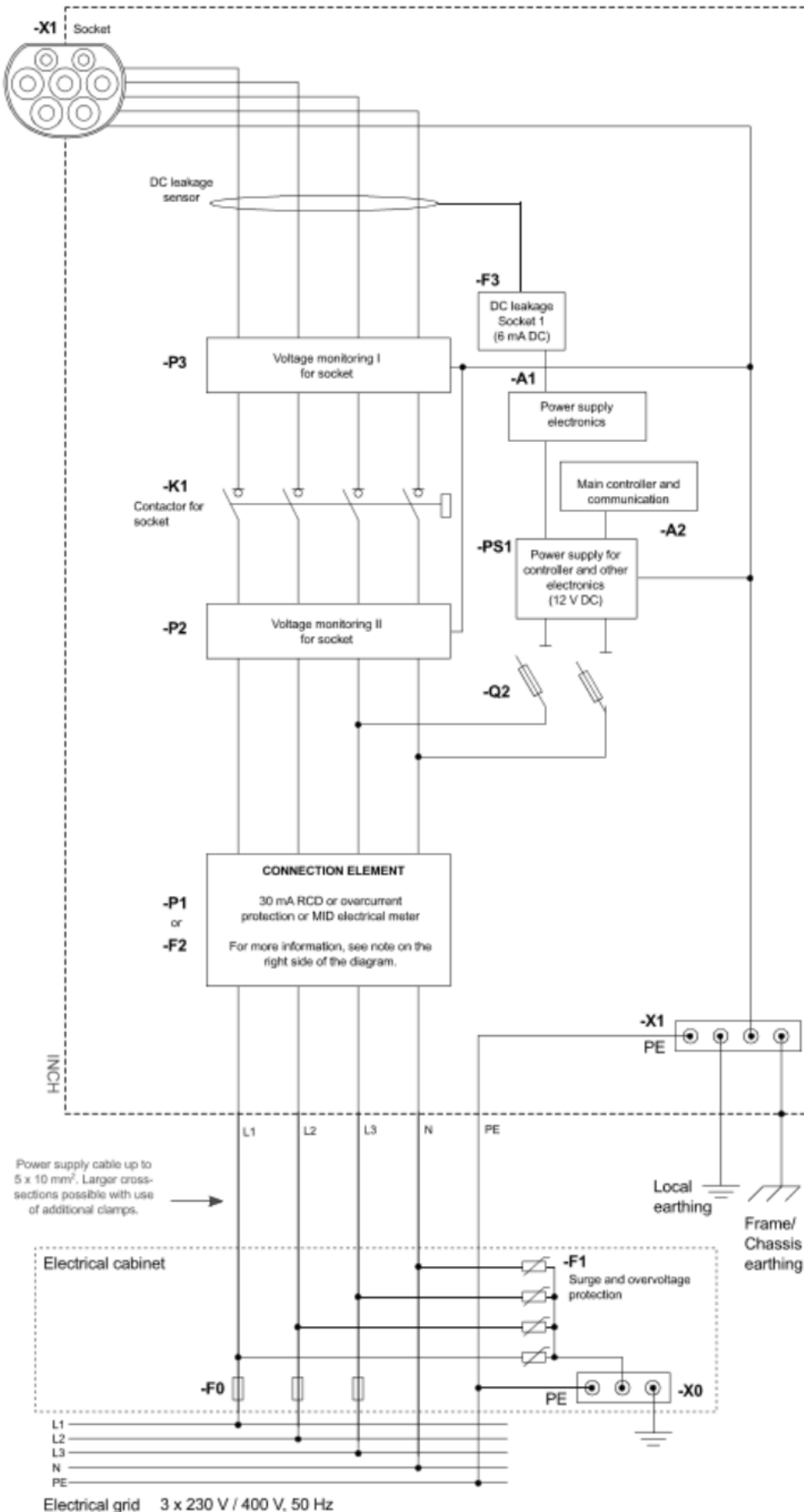


Figure 5: Three different stickers, sticker on the delivery package, on the maintenance doors and inside the maintenance space, behind maintenance doors

CIRCUIT DIAGRAM



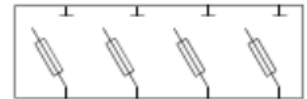
NOTE:

CONNECTION ELEMENT

Connection element is used to connect supply cables to the charging station. It can be either of the three components specified below (A, B or C), depending on the version of the product.

(A) Overcurrent protection

-F2 Miniature circuit breaker, MCB 40 A



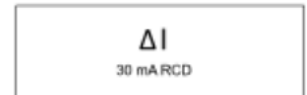
(B) Measurement of the consumed energy

-P1 MID electrical meter



(C) Residual current device

-F2 Residual current device, RCD Type A or Type B, 30 mA



Actual wiring of a product can be different across different versions of the product.

3

OPERATION AND CHARGING PROCEDURE

FIRST POWER UP

Before starting the station, it is absolutely necessary to read this manual and the technical specification of the device.

When the charging station is power up for the first time it can take several minutes for station to get ready to start using it to charge EV. Charging station is powered up automatically when it is connected to the electricity. In the table below, all possible events that can occur at the power up of the station are listed with the procedure what to do in case something is wrong.

STATUS LIGHT	NORMAL OPERATION	PROBLEM	SOLUTION
Fast blinking green light	Charging station's backup batteries are charging. At the first power, up it can take up to 10 min. If backup battery is full green light will blink slowly.	If the light is blinking fast more than 10 min there might be a problem with the backup battery.	Inform the support about the status of the charging station.
Slowly blinking green light	LCD screen is preparing to turn on. Heating system is trying to heat the LCD before it is turned ON.	If the green light is blinking slowly for more than 10 minutes and the LCD hasn't been turned on, there might be a problem with the LCD.	Support should be called.
Steady glowing green light	Charging station is ready to be used.	/	/
No lights	/	If charging station is not responding after it is powered up, something might be wrong with connection.	Check the protection elements if either RCD or overcurrent protection has been tripped. Activate the

			protection. If nothing helps call the support or installer.
Green light is blinking	LCD is turned on and charging station is ready to be used. When the LCD starts the logo will be first displayed and after that the charging station can be used.	LCD is turned on but freezes and is unresponsive.	Try resetting the charging station. If the problem repeats there might be a problem with the software. Support should be called.

FIRST CHARGING SESSION

When the charging station is ready to be used, follow the procedures described on the LCD screen. Two charging modes can be selected:

- Fast charging (default)
- Interactive charging

Charging modes are chosen during the charging session.

During the fast charging EV will be charged with the max available charging power as fast as possible. Max power is set by the installer based on the grid capabilities where charging station is installed.

When Interactive charging is chosen the charging schedule will be modified based on the inserted departure time. If it is not inserted, it will be based on the default value. Historic data are recorded from the first charging session onward and can only be used after the first charging session is finished.

More charging session means more accurate session prognosis and schedules. Charging schedule will be created based on electricity prices, other loads and PV production to make sure EV is charged in appropriate time while taking in consideration other constraints.

CHARGING PROCEDURE

STEP 1: WAKE

In normal conditions, the charging station's LCD screen will likely be in the screen saver mode. Charging station can be woken up by simply tapping the screen.



Figure 6: Screen saver

Screen saver mode can be chosen in the charging station's web interface. Three options of display setting exist: turned on all the time, blinking or turned off until touched.

STEP 2: AUTHORISATION

Depending on the charging station authentication mode chosen different screens will be shown that will need different actions from user in order to continue with the charging session. What authorization is allowed can be setup in the charging station's web interface Configuration menu.

Plug and charge mode

In the plug and charge mode message is shown to insert the cable and start the charging session.

Needed authentication

If authentication is needed, select the type of authentication that will be used to authorize and continue with the charging session.

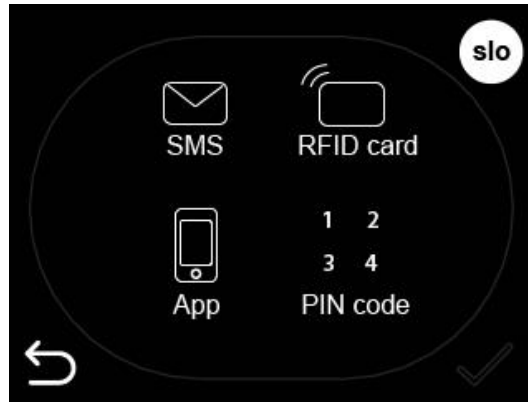


Figure 7: Chose authorisation method

- a. Insert PIN code

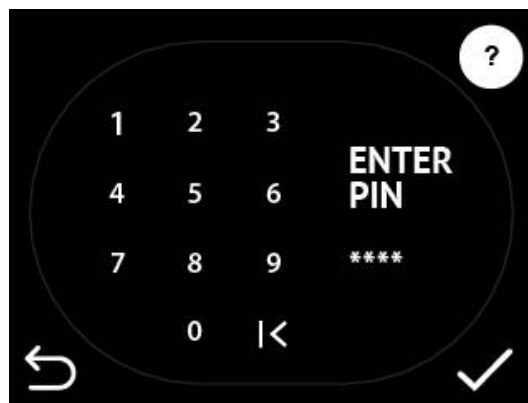


Figure 8: Insert PIN code

- b. Use mobile app to authenticate

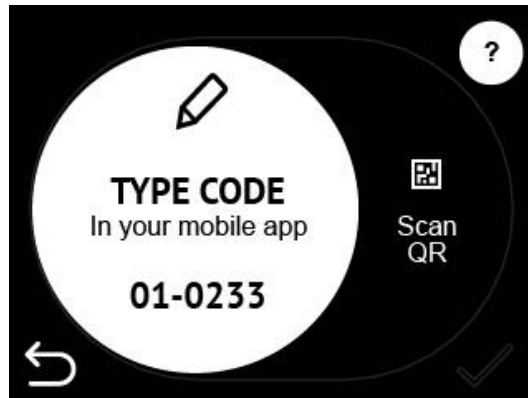


Figure 9: Insert charging station's EVSE code



Figure 10: Scan QR code

Either type the code of the station to the mobile app or scan QR code with mobile.

c. Swipe RFID card

By simply swiping the RFID card below the LCD touch screen where the RFID module is installed, the authorization on the charging station is made and the charging session can begin.

STEP 3: CONNECTING THE CABLE

After the successful authorization, the screen with the description to connect the cable is shown.

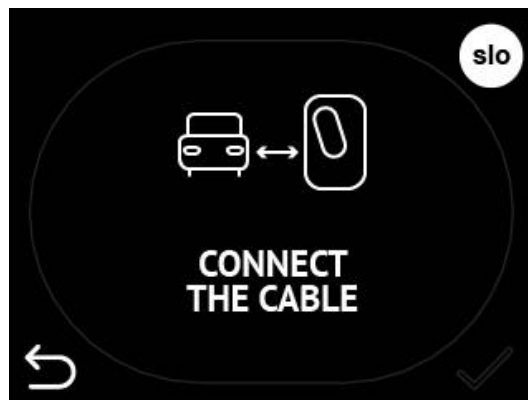


Figure 11: Connect the cable to charging station and EV

If the cable is connected before the authorization this screen will be left out and after the authorization next screen “Waiting for vehicle to respond” will be shown. When the cable is connected charging station will start charging as soon as EV responds.



Figure 12: Charging station is waiting for EV to respond and starts charging

STEP 4: DEPARTURE TIME INPUT

As soon as the charging session begins, the screen to input departure time is shown. Presented departure time is the one calculated by the charging station based on previous charging habits. The presented departure time can be changed to make sure that the EV is charged.

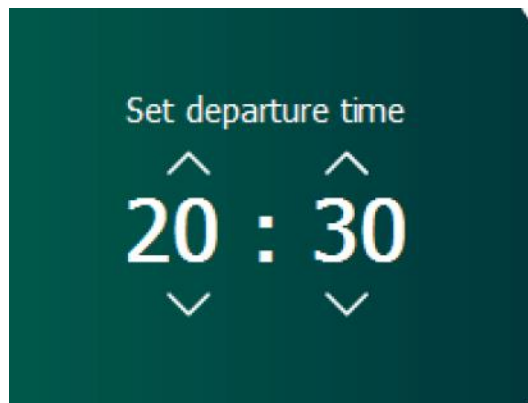


Figure 13: Set the departure time

When the departure time is set, or default setting is let through charging data will be shown. What charging information is shown depends on the settings of Web interface.



Figure 14: Example of shown energy on the LCD screen

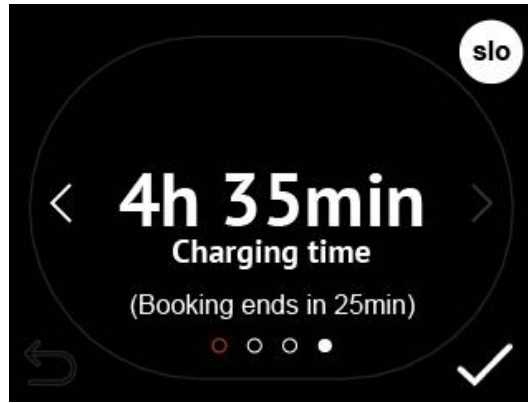


Figure 15: Display of charging time

CHECK STATUS OF THE CHARGING STATION

In the web interface the information of the current session can be seen. The departure time can be changed using web interface by pressing the »Interactive mode« button.

STOP THE CHARGING SESSION

Charging station can be stopped locally or remotely.

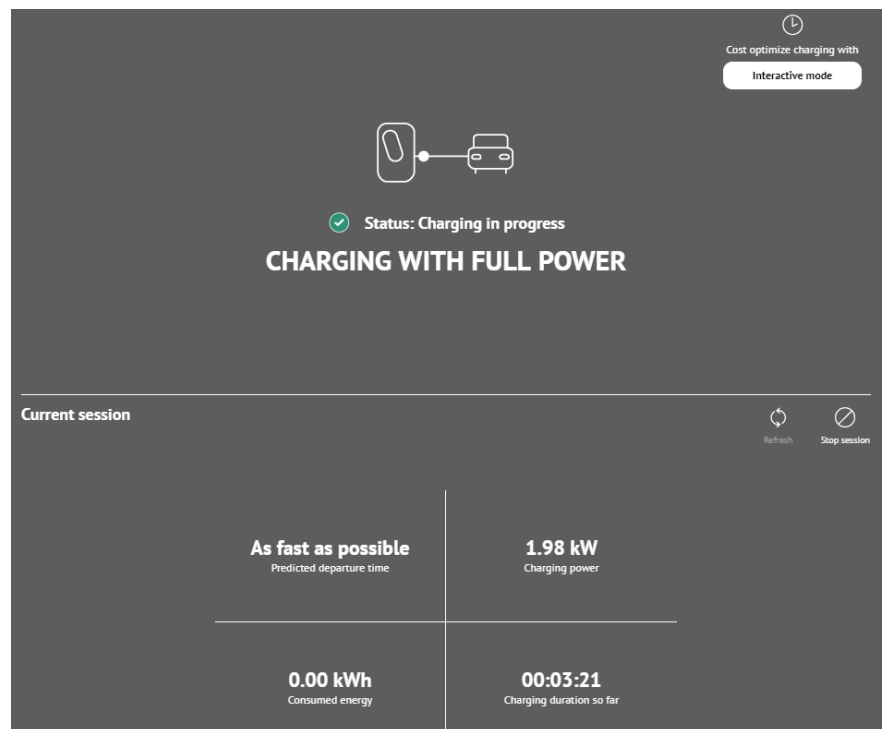


Figure 16: Current session information displayed in the web interface

LOCALLY

When located at the charging station, the charging can be simply ended directly from the car and by disconnecting the charging cable.

REMOTELY

Stop of charging session can be done remotely with the use of Web interface. On the picture above, the button “Stop session” is shown. When pressing this button new window will pop up to confirm the action. After that the session will stop. In similar fashion the charging can be stopped using app on the mobile phone.

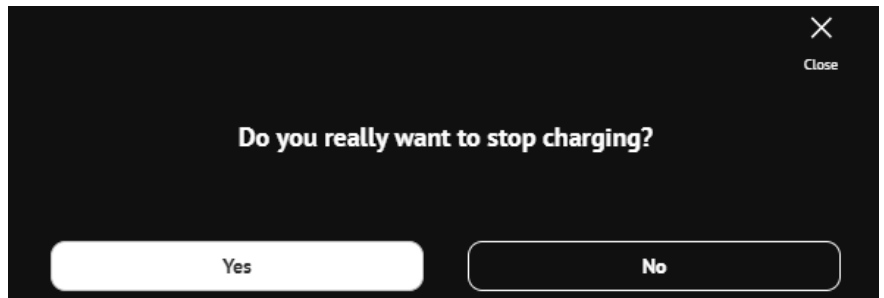


Figure 17: Confirmation window to stop the charging session using web interface

4

CHARGING STATION WEB INTERFACE

Charging station's web interface allows the connection to the charging station platform, configuration of its settings as well as check of the charging session and station data, check of the connectivity status and errors description when they occur.

CONNECT TO WEB INTERFACE

Users can connect to the charging station web interface using the charging station IP address. Default IP address can be found on the information sticker on the inner part of the maintenance doors. IP address of the charging station can be manually changed.

When IP was changed and forgotten, it can be obtained with pressing for several seconds on the "three dots" on the display. IP can also be obtained with pressing the reset key for several seconds.

When IP address is written in the internet browser and the computer is in the same local network, the charging station will be connected to the web interface.



Figure 18: Insert the default IP into the browser to connect to web interface

PING CHARGING STATION FROM COMPUTER IN SAME NETWORK**WINDOWS**

To determine if the computer is in the same network as charging station ping the station using the CMD command ping with the IP of the station. Computer network can be changed in the network settings.

To ping the station, connect to Command Prompt by searching for it in windows search functionality.

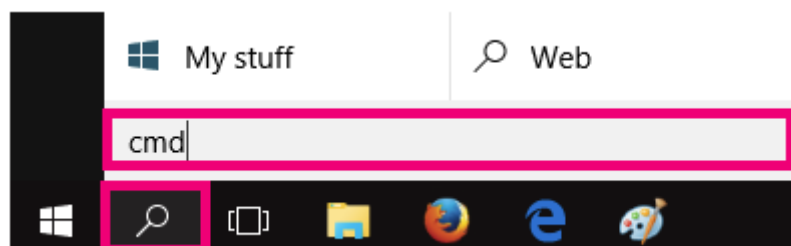


Figure 19: Search for CMD using Windows Search

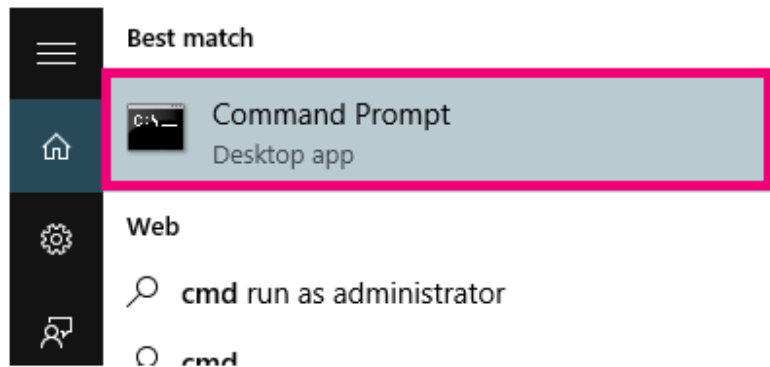


Figure 20: Open Command Prompt

In the Command Prompt write “ping” and IP address (e.g. ping 192.168.1.190).

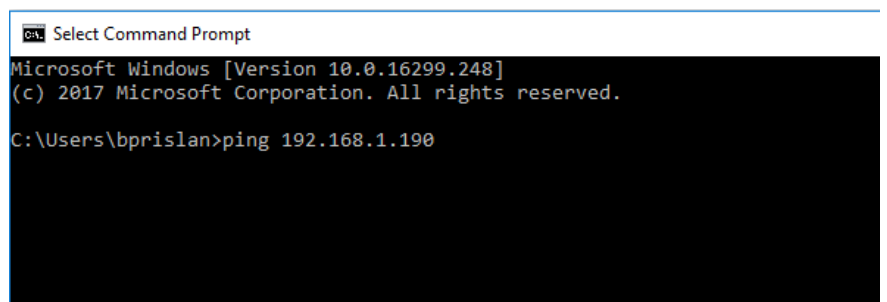


Figure 21: Ping the charging station IP address

If the ping is not successful, the computer might be in different network segment. In this case it, the segment need to be changed in network settings to the one of the charging stations.

APPLE COMPUTER

When using apple computers, pinging of the station can be performed using Terminal. It can be accessed by going to the “Applications” and selecting “Utilities”. Search for “Terminal” and run it.

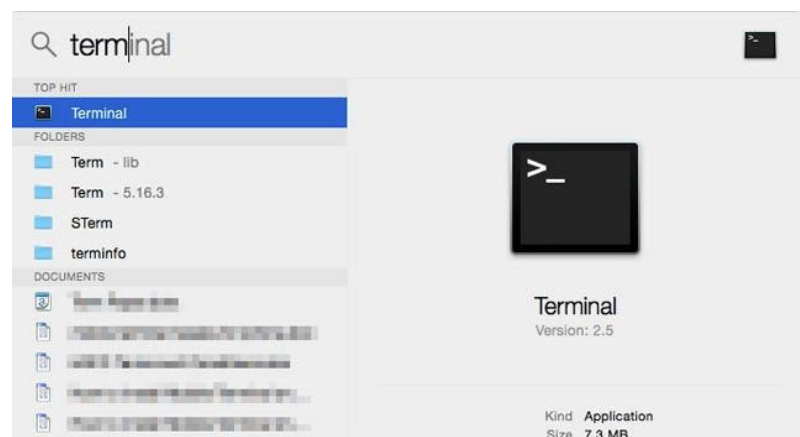


Figure 22: Run Terminal software

When Terminal is running, write ping and IP (e.g. ping 192.168.1.250).

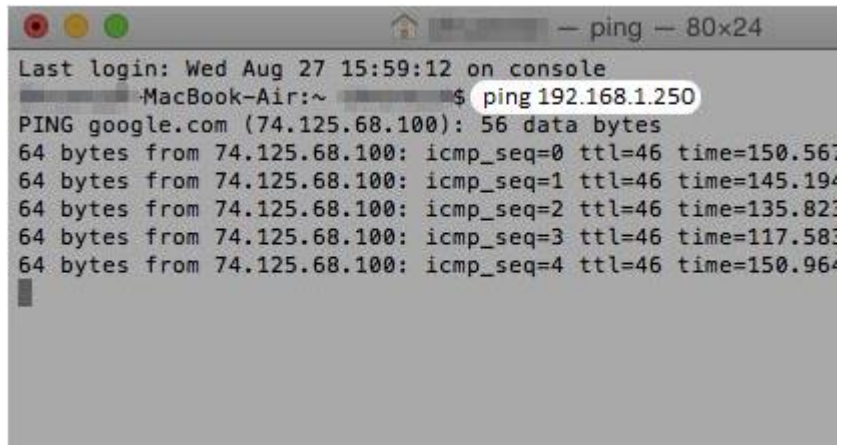


Figure 23: Ping charging station by writing ping and charging station's IP

CHANGE THE COMPUTER NETWORK SETTINGS

If pinging of the charging station is not working, also the connection to the charging station's web interface will not work. The computer's IP and network settings will need to be changed in order to configure the charging station.

WINDOWS

In order to change the network of the computer in Windows OS, network settings in the Control panel need to be located. First, open the Control panel with click on the icon or searching in the Start menu.

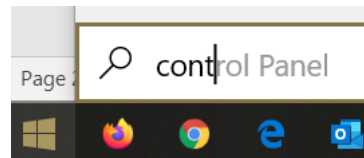


Figure 24: Search for Control Panel using Windows Search

First select "Network and Internet" and then "Network Connections". Depending on the version of the Windows operation system, instead of "Network Connection", the option "Network and Sharing Centre" could also be the right one.

Click on the Ethernet Connection that is being used.

In the Internet protocol Version 4 (TCP/IPv4), "Properties" need to be selected and this will show a new window where the new IP address of the computer that is in the same network segment as the station's IP can be written.

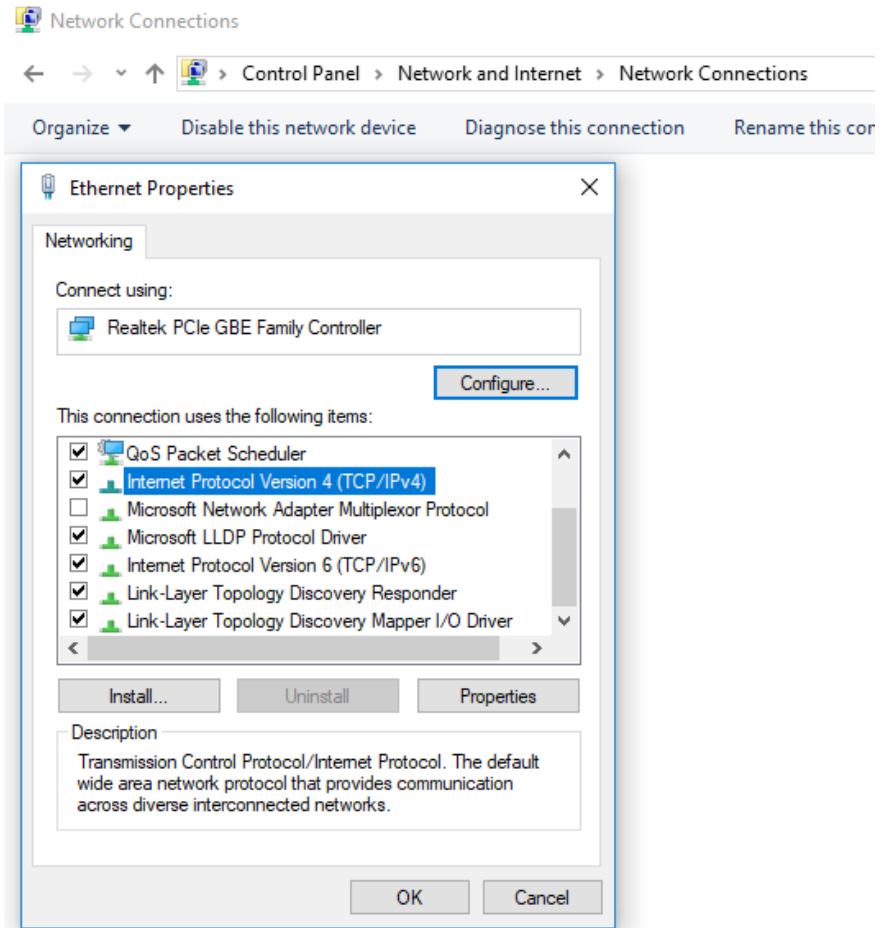


Figure 25: Locate Internet Protocol Version 4(TCP/IPv4) in network properties

If the station default IP is 192.168.1.250 the computer IP address should be changed to 192.168.1.1.

Last bolded number can be a random number as long as it is different than 250 (used by station) and is not used by any other appliance in the network. In many cases, the number 1 is already taken by the router and other numbers can be used by other computers. The IP address that we set to the computer must be unique for that network.

For the subnet mask the 255.255.255.0. should be written. After these settings the pinging should work.

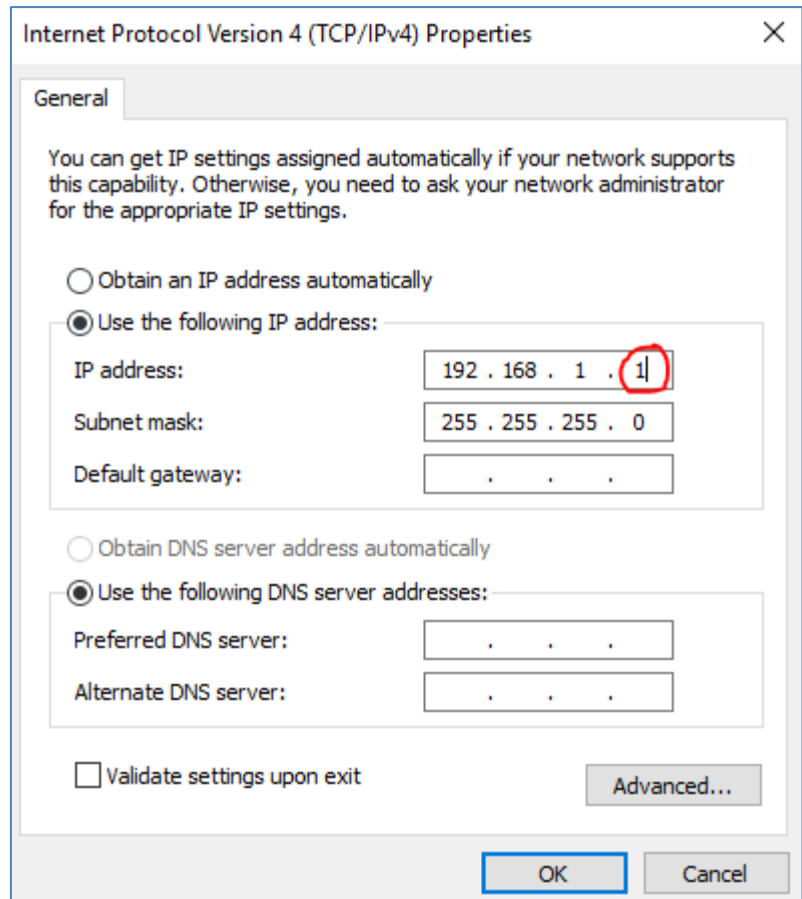


Figure 26: Change the IP of the computer and subnet mask

APPLE COMPUTER

To change the IP settings of Apple computer, the »Apple« button need to be pressed to access the »System preferences«



Figure 27: Locate System Preferences

Click the Network icon.



Figure 28: Click Network icon

Click on the Wi-Fi or Ethernet connection (Depends on which one is used) and press Advanced button in the bottom right.



Figure 29: Go to advanced settings of internet connection

Choose TCP/IP. In the Configure IPv4 option choose Manual and change IPv4 Address to 192.168.1.1. Last bolded number can be a random number as long as it is different than 250 (used by station) and is not used by any other appliance in the network. Set subnet mask to 255.255.255.0. After these settings the pinging should work.

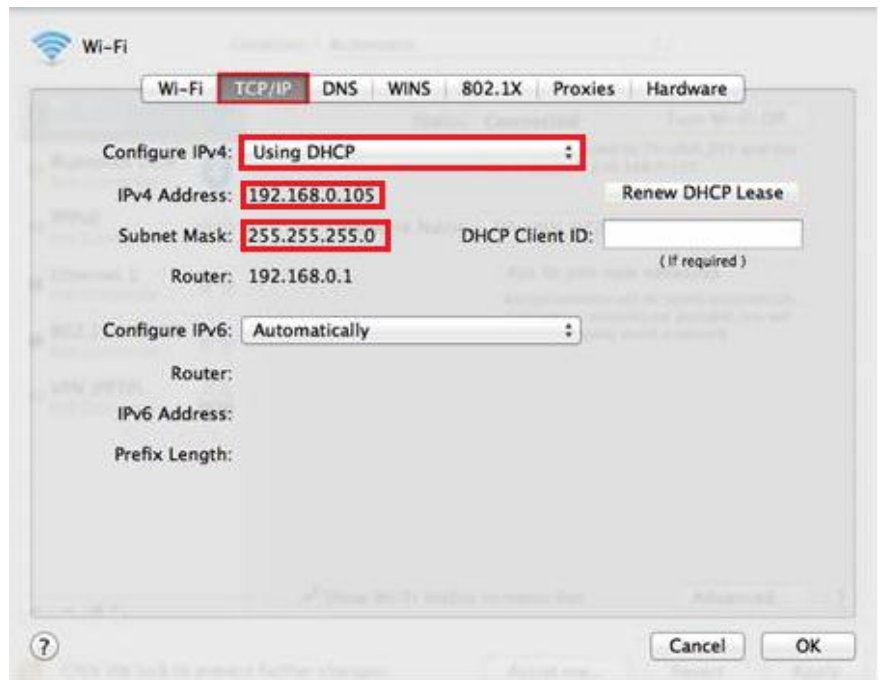


Figure 30: Set network settings

USING DHCP FOR CONNECTION

When DHCP is used router automatically assigns IP address to the charging station connected to it. To acquire DHCP address the charging station reset button need to be pressed for 4 s until the first beep sound is heard. Address will be displayed on the LCD screen.

USING WEB INTERFACE

In the web interface each type of user has different rights what he can see and edit in the web interface. Operators will have the highest rights in order to set up all the configuration and connectivity settings. A regular home user only has basic rights that will allow him to see Dashboard and Diagnostics module.

MAIN DASHBOARD

Main dashboard window allows to see current power, cluster power if the charging station is part of the cluster, building power load, charging station availability and information about the last session.

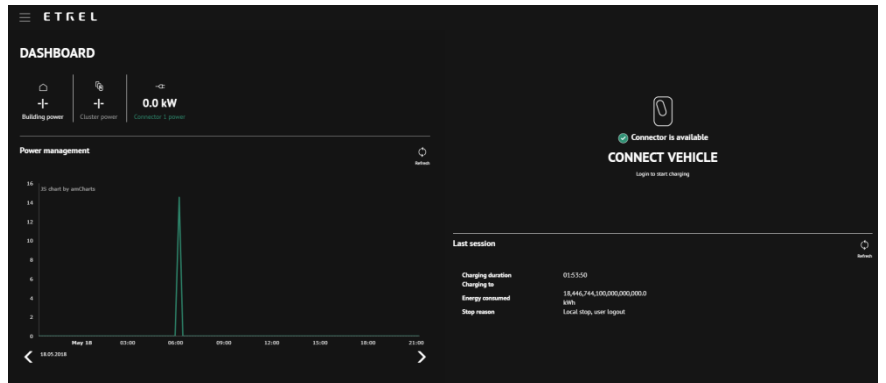


Figure 31: Web interface main Dashboard view

Last session status will be shown on the screen right. If anything went wrong during the session, additional information can be acquired in the Diagnostics menu.

DIAGNOSTICS

When experiencing problems, go to the “Diagnostic” menu where the logs can be downloaded and then sent to the operator to check what is wrong with charging station. Also, basic information about the charging station can be seen:

- Model,
- Serial number,
- Hardware version,
- Software version,
- Connector controller hardware version,
- Connector controller driver version and
- Connector controller firmware version.

“Diagnostic” module can also be used to upgrade firmware, restore data and backup charging session data and reset charging station remotely.

Backup configuration gives operator option to restore charging station to the same configuration if something malfunctions with the system and charging station needs to be restored to default settings.

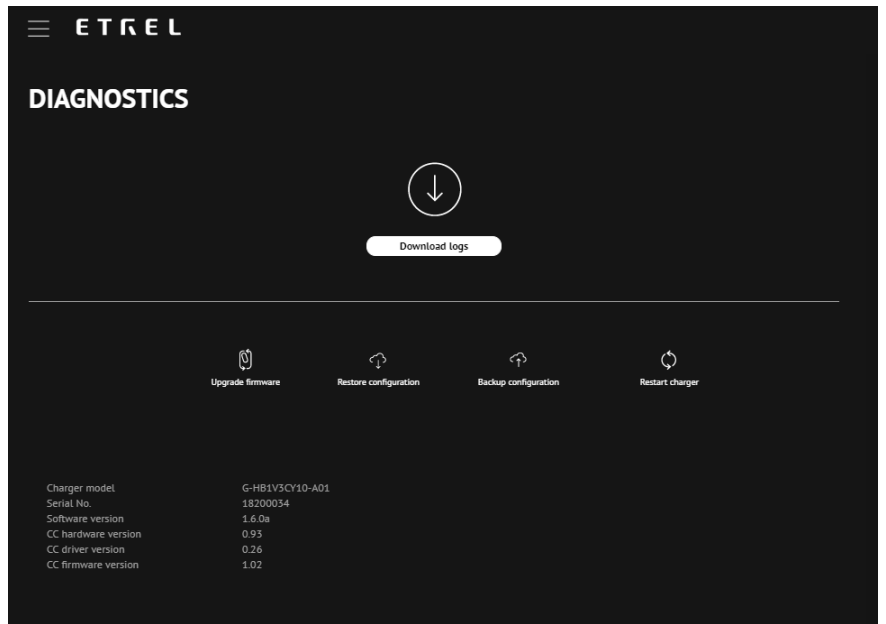


Figure 32: Diagnostics web interface module

CHANGE THE WEB INTERFACE LANGUAGE

The language of web interface can be changed by pressing the burger menu and selecting the language at the bottom left corner. Only languages supported by web interface are available.

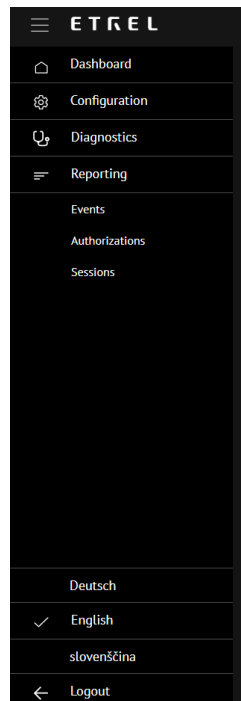


Figure 33: Menu with the language choices

5

REGULAR MAINTENANCE

Etrell charging station does not require any periodic maintenance. However, it is recommended to perform a visual check and test of the protection elements once per year.

Detailed descriptions of security checks and their intervals are included in the service manual.

RESET AND TEST THE PROTECTION ELEMENTS

OVERCURRENT PROTECTION

Check the overcurrent protection (if installed) once a year for any visible damages on the surface. If the overcurrent protection is tripped and the switches cannot return to the active position something is wrong with the protection and needs to be changed by maintenance crew.

SURGE AND OVERVOLTAGE PROTECTION

Check the surge and overvoltage protection (if installed) once a year for any visible damages on the surface. If the surge and overvoltage protection is tripped it needs to be changed by maintenance crew.

RCD

The regulations require that residual current protective device (RCD) is tested regularly, and an audit log should also be kept. The test button on the RCD unit allows user to verify the correct operation of the device by passing a small current through the RCD unit. This simulates a fault by creating an imbalance in the sense coil. If the RCD does not trip when this button is pressed, then the device must be replaced by licensed electrician. The device must be changed also when the RCD was tripped but the switch cannot be moved back into active position. RCD testing must be completed every three months and documented.



Figure 34: RCD test button

6

TROUBLESHOOTING

Errors dangerous to device users:

Dangerous voltage present on enclosure or device under fire. In this case the device should be turned off immediately. Switch off device power supply of device in the distribution board from where device is supplied and not on device itself. Do not touch device. If vehicle is connected at that moment, disconnect plug from the vehicle and not from the charging station, but only after the power supply was switched off. In the case of fire use fire extinguisher appropriate for electrical fire.

Faults occurred because of external conditions:

Undervoltage, overvoltage, short and long power supply outages or wrong vehicle behaviour. In these cases, no action is needed to re-establish normal operating conditions. Once fault is gone, normal operation conditions will be established automatically. If temporary fault was caused by vehicle, user will have to reinitiate charging session.

Device hardware failure preventing normal operation:

Example: Broken socket, broken LCD, electronics failure. If after restart device does not start normally, contact supplier support.

Charging station software failure:

Check that latest version of firmware is running on the charging station. If the latest version is installed and problem persist, then check if problem is caused by the charged vehicle. To check this, the charging could be tried on another charging station. If problem is not in the vehicle send diagnostic logs to the supplier.

The web interface of the charging station can also be used for troubleshooting.

ACCESS TO THE MAINTENANCE AREA

Etrel INCH charging station provides quick access to the side maintenance area to execute basic troubleshooting and to reset the charging station in case there are some problems. The reset of the charging station can be made from the web interface as well.

Side maintenance area is protected by the side maintenance doors. Depending on the type of Etrel INCH charging station, two different doors are available. One with the regular key lock and one with hex screw (2.5 mm). To access the area, either key or a hex screwdriver is needed.



Figure 35: Doors with keylock



Figure 36: Doors with hex screw

There is a sticker on the inside of maintenance doors, with technical information including basic charging station information, model type and serial number. When support is contacted it is important that the charging station model type is known so the support can quickly help solve the issue. This information can be gathered on the web interface in the Diagnostics menu.

RESETING THE CHARGING STATION

Charging station can be reset by opening the side maintenance doors and pressing the button inside the maintenance opening.

After holding the button for 4 s, the charging station will respond with the beep after which the options on the screen to check the IP address of the station or to reset the station will be presented. Basic reset and factory reset, which will restore charging station's factory settings (username, password, default IP and other settings) can be made.



Figure 37: Reset button inside the maintenance opening

7

CONTACT INFORMATION

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