



CHARGING STATIONS FOR ELECTRIC VEHICLES

To reduce the climate and environmental impacts of transport measures are required in several areas. Electrification of the transport sector will contribute to reducing total energy use for transportation. Electric and hybrid vehicles are more energy efficient and are far less environmentally harmful than regular vehicles.

Green Mobility Solutions

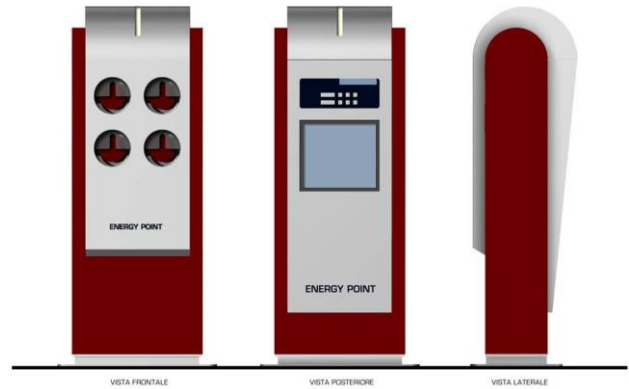
The partnership cooperation between Biog, ePower Synergies Europe and ACI Consult has resulted in bringing together the best of sustainable mobility solutions which ranges from Electric and Serial Hybrid vehicle Power Drive Trains to infrastructures such as Recharge Stations.

Together the group offers unlimited resources, innovative technologies and Engineering project design making us an ideal partner for sustainable mobility projects.

In response to the increasing attention of the institutions for environmental problems and the consequential commitment of the Public entities for the use of electric and plug-in hybrid vehicles, we offer infrastructure solutions such as EV Recharge Stations.

Our charging points have been installed in major Italian cities and abroad. We have contracted known designers to build state-of-art towers with no environmental impact and at the same time keeping a high technical profile through its proprietary software which handles all the data flow and maintenance.

Our mission is to set the challenge for today's future for the Public Administrations and Private Businesses in which they are not simple spectators but major players.



Scope

Charging stations for electric vehicles will power on-board plug-in electric vehicles.

Charging Stations are designed specifically for outdoor charging and can charge one or more vehicles simultaneously.

Type of vehicle that can be charged are vehicles with two, three or four wheels. Charging Connectors follow the EU standard.

Overview

The following is a brief overview of the main capabilities and infrastructure for recharging of electric cars.

The stations are designed to be located on public places and the current flow is alternating current.

Type charger

Charging occurs through direct contact between the electric vehicle and charging station in AC.

The charging station has all the necessary security controls.

The primary control function confirms continuous internal circuit integrity.

The verifications are carried out in accordance with the EU safety norms.

The principal characteristics

They are in conformity with CE standards and regulations

Internal structure of the Charge Point towers are in inox steel

Access control to system is made through a free or pre-paid SMART CARD

User friendly with multilingual voice and written instructions

System works with Master Charge point station and sub-station charge points similar to a computer network with a Server pc and a sub-station pc

All stations (towers) have a light on top to alert customers with different colors on whether the charge point is in use (green), free (white) or is malfunctioning (red)

Communications with Remote Control Centers that have supervising functions and handling of the Recharge stations diagnostics



Each Tower (charge point) will initially supply power to a minimum of one (1) electric vehicle. Each Power Outlet and all recharge systems are CE approved.

Each Power Outlet has a robust and sturdy design and includes a closing cover. The Towers are built with weather resistant properties which protect the electronic and technical components inside against moisture and condensation.

The power outlet cannot be opened by standard tools. The Towers (Master Stations and Sub-Stations) do not have sharp corners and/or edges.

RECHARGE STATION: One or more Towers; a group of one Master Station and one or more Sub-Stations to recharge electric plug-in vehicles. The Recharge Stations hardware and software are scalable.

RECHARGE TOWERS: Recharge Towers are Master Stations and/or sub-Stations. They have the following characteristics:

1, 2 or 4 power outlets

Each Tower has a custom Kw power allowance specified by the Operator, (example 1, 2, 3, 6, 12 Kw, etc...) Since the SMART CARD identifies the type of vehicle requesting the recharge, the Master Station will enable the power outlet which has the appropriate Kw for that particular recharge.

POWER OUTLETS: each Tower may have one, two or four power outlets.

Each single power outlet will have:

- 1) 230V 16 amp with a common grounded MVU Schuko connector per outlet
- 2) Automatic fuses for each power outlet
- 3) Earth switch for each single power outlet
- 4) Cover locks down during charge
- 5) Standard key-lock R118 for each Tower
- 6) Color by choice and surfaces are powder coated
- 7) A power reading meter indicating the amount of power supplied from the 1st day of activation
- 8) A circuit breaker
- 9) Residual power device



- A. **SMART CARD:** electronic card with microchip. The Smart Card identifies the type of vehicle requesting the recharge and activates the power outlet.
- B. **LED INDICATORS:** each power outlet has a led indicator- no light means no power is being supplied, blinking light means that the power outlet is on standby and steady light means that power is being supplied to the User.
- C. **PROTECTIVE SHUTTER (COVER):** each power outlet has its own protective cover which is opened only after the SMART CARD has been enabled. The opening and closing of the cover is done automatically with an electromechanical mechanism which is activated upon the first insertion of the SMART CARD, when the recharge has concluded and in case of malfunction. During Recharge the cover is blocked.

The MASTER STATION tower performs the following functions:

1. Controls the insertion of the SMART CARD and reads the data content
2. Through voice synthesis and an integrated loudspeaker recharge instructions are given to the User
3. Manages the led indicators on each single power outlet
4. Manages the power data polling and diagnostic data on all stations
5. Sends operation commands to all the towers of the Recharge Stations such as, blocking and opening of the protective covers and recharge time
6. Transmits diagnostic data to a notebook computer connected to the station via RS232
7. Manages local data which memorizes the recharge events with local download on a notebook computer
8. Supplies power to the battery recharger through a voltage transformer
9. 2 service batteries 12V, 1.5 Ah for emergency backup and operations
10. SMART CARD reader unit for User recharge operations
11. Local electronic diagnostics of all Towers and verification of error codes
12. Measurement of the power supplied to each power outlet
13. Software allows for activation of a pre-paid electronic debit SMART CARD
14. The Master Station can channel the power to each Power Outlet based on the actual need of the EV being charged
15. Functions of Data Management of the Master Station:
 - a) Indicates the location of the Recharge Station
 - b) Verifies the I.D. of the SMART CARD in which by direct association indicates the type of vehicle being charged and the Kw power being supplied.
 - c) Recharge time; the Master Station can associate for each User the charge time for each single recharge or for cumulative recharges in a time frame determined by the Operator.
 - d) Frequency of use of the Towers
 - e) Error codes and malfunctions for each single Power Outlet



Besides the synthetic voice instructions given by the Tower to guide the User in the recharge operations written instructions will be on each Tower indicating the correct usage of the recharge operation. The electronics and software of the Towers are accessible only to the Operator who can have access to the inside of the Tower which has an anti-theft and anti-vandal key-lock R118. All Stations may be equipped with one (1), two (2) or four (4) standard recharge points and local diagnostics.

The SUB STATION tower performs the following functions:

By definition Sub-Station is a tower that has the basic function to recharge electric and hybrid plug-in vehicles with one (1), two (2) or four (4) recharge points.

Type: “Free or Pre-Paid Payment System”

Electronic Cards are given to users for up to 250 hours of power supply without charge and the Cards give free accessibility to the Users to the Energy Points. The Cards are inserted in the MASTER STATION which enables the energy supply on the Sub-Stations.

The power absorption for each Station is determined by the Company (Public or Private entity) which has set up the Recharge Stations. The power absorption for each tower of the Recharge Stations is determined by the customer who takes into account the type of vehicles to be powered such as, electric bikes and cycle up to 3Kw, electric and hybrid plug-in vehicles up to 6 Kw etc

Each Power Outlet is protected by a robust plexi-glass electro-mechanical shutter which blocks the plug during supply of power; The blockage mechanism of the shutter is released only after the SMART CARD has been inserted in the MASTER STATION and identified, the shutter is then blocked once the power is being supplied and released when the recharge operation is concluded and the User has once again inserted the SMART CARD in the Station. Power will be supplied only if the shutter (cover) is locked. Opening of the shutter by inserting the SMART CARD in the Master station during recharge of the vehicle will automatically terminate charging operations and power supply will end in order to guarantee the maximum safety for the User.

The Towers are designed to withstand adverse weather conditions and do not allow for the internal formation of humidity or condensation. The design avoids water to settle on the top or bottom.

System Controls: Verification that the EV plug is properly connected to the Power Outlet of the Station. In case of negative test power supply is not enabled. Non-stop continuous verification of the grounding of the EV and the recharge station.

Any interruption and/or fault on the power line detected by the system will immediately interrupt the power supply,

Detection by the system of excessive nominal A.C power the Power Outlet will shut-down.



Power Supply for each Outlet:

Main power: 220-230 Vac

Amperage: 16 Amperers

Backup voltage: 12Vdc (batteries 1.5Ah)

Power voltage: RS485 - 5V optoisolated and protected

Backup battery: 12Vdc (1.5Ah)

CPU maximum absorption: 100mA

Backup battery life: 8 hours

Earth isolation 2500 Vac \grave{u}

Format of data:

Data Management between the “SMART CARD and Tower” processes all data inherent to the use of the Recharge Stations and may be retrieved directly from the Remote Control Center or if not available directly from the MASTER STATION with a lap top using an RS232 interface.

The data which is transmitted and received from the Remote Control Centers and the Diagnostics are:

Location of the Master Station and Sub-Station Towers, SMART CARD ID from which the Remote Control Center is able to identify by direct association, the type of vehicle which is connected, Recharge time, Frequency of usage of the Towers; Malfunction and Error codes.

The MASTER STATION associates each vehicle to the recharge time for a single charge or for a cumulative number of charges during a pre-determined time with the capability to modify the selected criteria before downloading the data.

The MASTER STATION is enabled with data management technology through which the SMART CARD interface will perform the following functions for all Towers

1. Interface with the user through a two line alphanumeric display
2. Self-diagnosis system
3. Management of Recharge procedures
4. Distribution Control of Electric supply
5. Acquisition of User/electric vehicle data and usage in each Recharge Station
6. Communications with Remote Control Centers that have supervising functions and handling of the Recharge stations diagnostics



Mounting Plate and Foundation.

Each tower has a metal plate mounting at its base to make assembly sturdy and easy. The metal plate will be complete with threaded screws for insertion in a concrete block.

To facilitate the assembly each RECHARGE STATION AND SUB-STATION tower is equipped with a metal plate at its base complete with 6 Nm threaded screws and inserted into a concrete block.

The height of the block from earth level is not inferior to 20cm and not superior to 25 cm.

Anchorage in the ground of the tower will be made taking into account the bottom of the sidewalk, making sure that the anchor systems to be used are reliable and used taking into account the consistency of the material at ground level and all the vibrations which the structure of the towers will withstand, excluding damage by a direct hit from a vehicle.

The Recharge Station towers will be anchored to the ground in a steadfast manner and will not constitute impediment and/or obstacle and/or danger to the pedestrians: specifically, no element aside from the vertical structure of the tower will protrude in relation to the level of the sidewalk.

Furthermore, the Stations are designed with rounded edges and in no such case are there any cutting edges (90° or less).

Temperatures:

▪ *Transmission*

RS232 connection with Control Center: 1200 Bps

Bus Connection between stations: 300 Bps

▪ *Temperature*

Internal electronic circuits: -25 ÷ +60 °C

Modem: -25 ÷ +60 °C



Bearing Structure

The unique Italian designed Recharge Station towers are functional furnishings which totally integrate in the community environment.

Our designers have taken into account the historic and architectural surroundings which characterize most European cities and the structural habitat of the environment such as sidewalks, pedestrian flow, parking areas and pre-existing activities.

Particular attention was paid to the form of the towers which will have a low visual and environmental impact and a linear profile to facilitate the insertion of information notices concerning the usage and promotion for eventual sponsors.

Each MASTER STATION and SUB-STATION Tower is built internally and externally in fused zinc steel.

Price List (EUROS) € + VAT

Optionals

MASTER STATION CHARGE POINT:

1	Charger point including 1 power outlet, mounting bracket and base	€ 4,577.00
2	Charger point including 2 power outlet, mounting bracket and base	€ 4,865.00
3	Charger point including 4 power outlet, mounting bracket and base	€ 5,765.00

SUB-STATION CHARGE POINT:

1	Charger point including 1 power outlet, mounting bracket and base	€ 3,298.00
2	Charger point including 2 power outlet, mounting bracket and base	€ 3,648.00
3	Charger point including 4 power outlet, mounting bracket and base	€ 4,548.00

Warranty

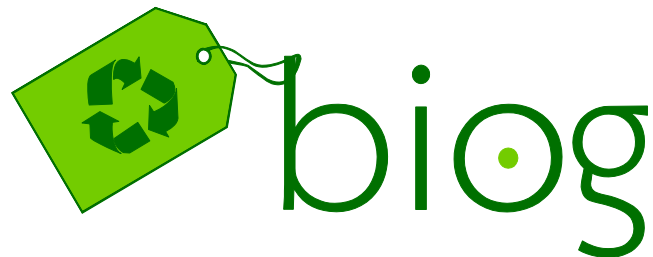
The WARRANTY Aci-Consult, S.p.A. applies on the Recharge Stations is valid for two (2) years from the installation date. The WARRANTY applies to malfunctions of the electronic and electro-technical problems derived from the standard usage of the systems.

The WARRANTY applies in case of malfunction and/or breaking of the body parts, hardware and software components.

1. EACH ADDITIONAL SINGLE POWER OUTLET: **450.00 + VAT**
2. LCD DISPLAY WITH UMTS AND CONTROL UNIT MANAGEMENT: **988.00 + VAT**
(For display of information and/or Advertisement)
3. FOR SUB-STATION TOWERS: integration of software and electronics for Networking with Operation control Center: **1,090.00 + VAT**
4. GSM/GPRS WiFi COMMUNICATION SYSTEM WITH REMOTE CONTROL CENTER: **150.00 + VAT**
5. REMOTE CONTROL OPERATION CENTER APPLICATION SOFTWARE: no. 1 proprietary program software license for recharge station network database and configuration of each single station, testing, activation and Operator training: **10,400.00 + VAT**
6. Qty. 1,000 SMART Cards, with user instructions and advertisement: **1,950.00 + VAT**
7. GSM WiFi COMMUNICATION SYSTEM TO BE INSTALLED IN OPERATION CENTER: **290.00 + VAT**
8. CUSTOM GRAPHIC DESIGNS (ADHESIVES, WRITINGS, INCISIONS, LOGOS, ETC) AS REQUESTED BY CUSTOMER: **FREE**



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