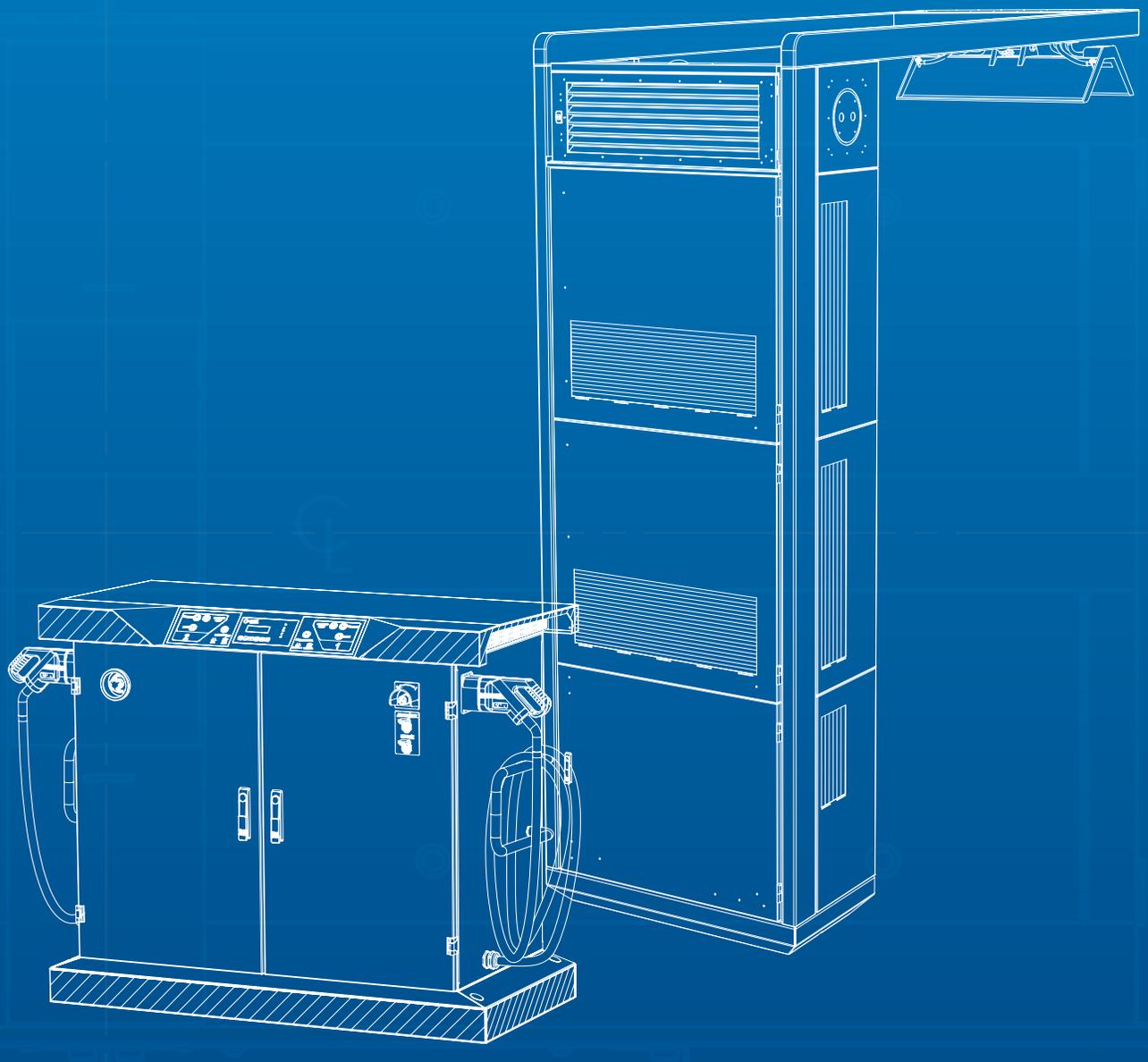

CHARGERS FOR ELECTRIC VEHICLES

EBC series

MEDCOM

electrify.

The material presented in this catalogue is of informative nature. Due to the constant introduction of the latest technological accomplishments, our products may be subject to modifications. Therefore, some parts of presented description may no longer be valid.

CHARGERS FOR ELECTRICAL VEHICLES

EBC Series

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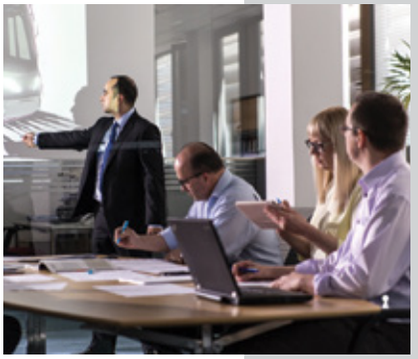
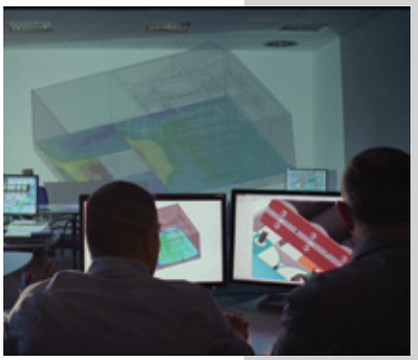
ABOUT US

MEDCOM is one of the most innovative manufacturers of power electronic devices in the world. For more than 30 years, we have been delivering solutions supporting advanced public transport systems and power supply systems for industrial installations and the power sector.

We specialize in the design, production, and integration of proprietary systems for railway vehicles (rail, metro, tramways), trolleybuses, electric buses, and other electric vehicles operating in all the traction power supply systems in the world. We offer a number of specialized solutions dedicated to specific types of vehicles – including comprehensive propulsion systems, power supply, control, and passenger information systems – as well as charging devices.

MEDCOM's AC & DC power supply systems work with systems responsible for the safety of key industrial installations, power systems, and telecommunications systems. The range of our products for the power sector and industry includes advanced DC power adapters and inverters for emergency power supply systems, supercapacitor-based energy recovery systems, active filters, and static transfer switches.





EXPERIENCE

We have developed and manufactured more than 28,000 devices dedicated to various applications and specific requirements of our customers.

Our products set in motion thousands of public transport vehicles worldwide and guarantee superior comfort of travel. Electric vehicles equipped with MEDCOM's solutions carry millions of passengers a week within the EU, as well as in the USA, Canada, Brazil, Russia, Turkey, Ukraine, and Belarus.

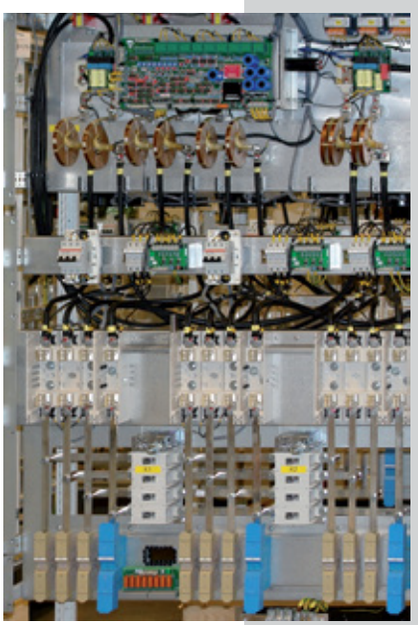
MEDCOM's products are used by the largest companies from the industrial, power, chemical, mining, and telecommunications sectors, including Tauron, EDF, PGE, RWE, Energa, NCBJ Świerk, PGNiG, PSE, Navy Ports of Gdynia and Świnoujście, Orlen, and ZA Puławy.

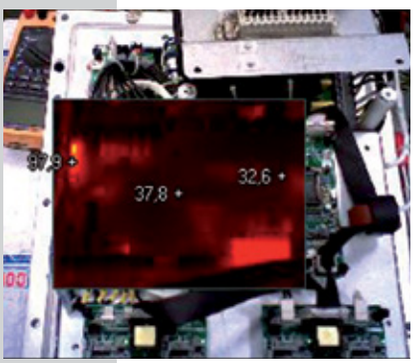
INNOVATION

We follow our own path of development and we are not afraid to look for innovative and groundbreaking solutions. Together with our customers, we want to create the technologies of tomorrow, while increasing the comfort of life of people all over the world.

All the devices manufactured by MEDCOM are proprietary designs created thanks to the knowledge and vision of our specialists.

Designers and engineers constitute as much as one fourth of the company's workforce of 250 employees. Our extensive Research and Development Department, modern production facilities, and proprietary know-how let us design and deploy new products in a record time – just a few months from the moment of beginning work on the design.





We have developed a whole range of innovative solutions for transport, the power sector, and industry. We were the first to introduce the E-recycler and products based on the SiC technology to the Polish market. In 2014, in cooperation with Siemens and Corvus, Medcom set a Guinness World Record for the longest distance covered by a tramway with a battery supply system. In August 2015, Impuls 45WE commissioned by Koleje Mazowieckie set a new speed record (226 km/h) on the test track and is the fastest passenger vehicle produced in Poland to date.

QUALITY

Our way of winning customers' trust is simple: proven components, proprietary engineering solutions, and reliable devices.

From the very beginning, we have been identified by solid solutions with the highest technical parameters, based on the best quality components available on the global market.

We comply with all the quality standards (IRIS rev. 2.0, ISO 9001, ISO 3834, PN-EN 15085, and ISO 14000). Before we introduce a product into our offer, we subject it to detailed, long-term tests with the use of strict procedures.

To us, high quality means more than just reliable products – it also includes comprehensive technical support, sales, and maintenance services. We offer our customers commissioning and service teams ready to help 24 hours a day. We also provide technical consulting and advisory services on an ongoing basis and organize regular training courses on service and operation, as well as seminars for the designers and users of guaranteed power supply systems.

ECOLOGY

Following the concept of sustainable development, MEDCOM has been developing proprietary technologies which help protect the natural environment and minimize energy consumption.

We realize that the development of the contemporary industry, power industry, and public transport, is possible only thanks to the implementation of new solutions which help reduce energy consumption. And this is why in 2013 we developed the E-recycler – an innovative proprietary system for recovering energy generated during the breaking of traction vehicles.

Our company is also a leader in the dissemination of solutions based on the innovative silicone carbide (SiC) technology, which is likely to revolutionize the market in the coming years.

We manufacture our devices based on environmentally friendly components. We want our proprietary solutions to support the economy efficiently managing energy resources, help reduce air pollution and CO_2 emissions, and build a world based on electromobility.

AWARDS AND DISTINCTIONS

Over the years, MEDCOM has received numerous awards and distinctions. Below, we present some of them:

2001 The Economic Award of the President of Poland for the Best Small Polish Enterprise

2005 Honorable Mention in the Prof. Czesław Jaworski Competition at the TRAKO 2005 fair for the 2xFT-300-3000 asynchronous traction drive

2007 Honorable Mention in the Prof. Czesław Jaworski Competition at the TRAKO 2007 fair for the FT series traction inverters for 3 kV asynchronous drives. (The Polish Association of Engineers and Technicians of Transportation [SITK RP] Prof. Czesław Jaworski Competition for the best solutions in the technology and manufacture of devices for electrical traction)

Locomotive of the Railway Market 2007

1999 Medal of the ENERGETAB'99 International Trade Fair for the FA-2000 active filter

Medal of the ENEX'99 International Trade Fair for the SZPW auxiliaries power supply system

Award of the TRAKO'99 International Trade Fair for the PSM-25 static converter

Award of the Prime Minister of Poland – Polish Product of the Future 1999, for the FA-2000 active filter

2012 The "New Impulse" title for 2012 awarded by Miesięcznik Gospodarczy Nowy Przemysł (New Industry Economic Monthly) and the wnp.pl web portal for effective operation on the market of modern electrotechnical equipment for industry and transport and one of the most dynamic examples of growth among medium-sized innovative Polish companies

Forbes Diamonds 2012 (No. 126 nationwide, companies from PLN 50 to 250 million)

2014 27th ENERGETAB 2014 International Power Industry Fair in Bielsko-Biała – Kazimierz Szpotański Lion Award for the E-recycler, a supercapacitor-based energy storage system

2013 Forbes Diamonds 2013 (No. 14 nationwide, companies from PLN 50 to 250 million)

Grand Award in the Prof. Czesław Jaworski Competition (TRAKO'2013) for the 2xFT-500-3000 asynchronous traction drive

2019 Medcom wins the "Polish Industry Changer" title
Medcom won the title of "Polish Industry Changer" for successful expansion in the global market and an innovative approach to the design and manufacture of power electronic devices for electric vehicles, industrial installations and power systems.

Medcom's awards at TRAKO 2019:
Professor Jan Podolski Award in the railway stock parts, sub-assemblies, and equipment category for the PSM-145 SiC static converter for the metro in Turkey.

Professor Czesław Jaworski Grand Prix of the Polish Association of Engineers and Technicians of Transportation (SITK RP) in the Vehicles category for the PSM-175 SiC static converter for Newag's Dragon 2 locomotive.

The award from the "Rzeczpospolita" daily's editorial team and the logistyka.rp.pl portal for contributions to the development of eco-friendly, zero-emission public transport and for the ability to use new technologies and alternative energy sources in public transport.

E-BUS CHARGERS

EBC series

EBC (E-Bus Charger) is a family of chargers for electric vehicles including devices with output power from 30 kW up to 950 kW. Thanks to such a power range, the devices can be used for fast charging via the CCS Type 2 and/or CHAdeMO interface and ultra fast charging via a pantograph.

The supply equipment complies with the latest standards for charging and communication with electric vehicles, including e-buses, adjusting the charging parameters to the requirements of the vehicle. It also provides high efficiency of voltage conversion and a low level of interference generated into the network.

The chargers are characterized by their incorporation of a redundant design feature. If one module becomes damaged, the remaining modules ensure operation with rated or lowered power.

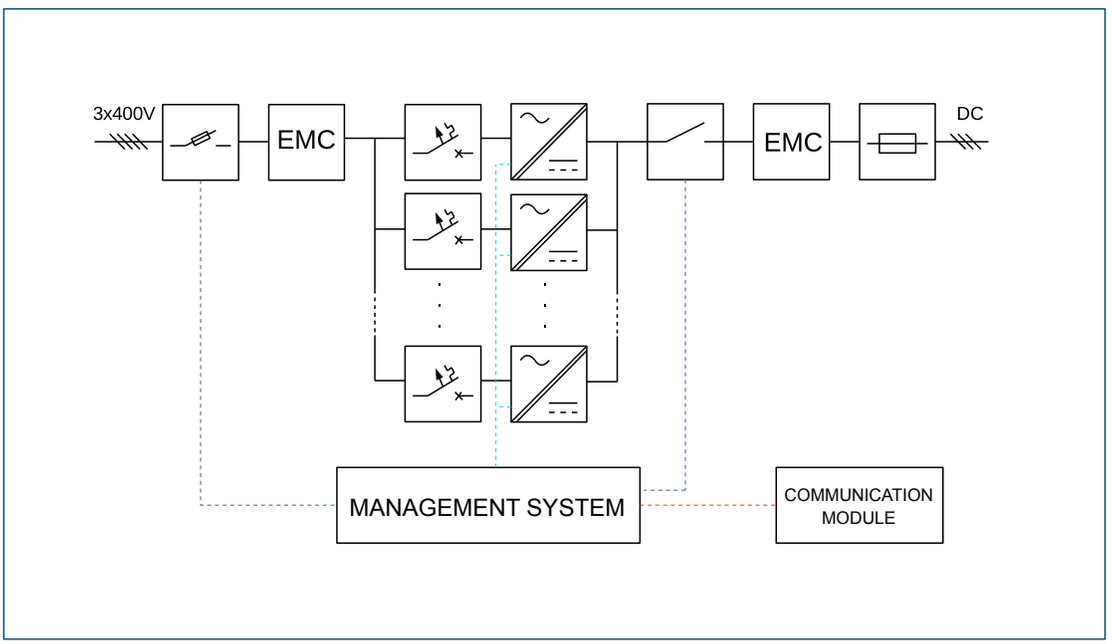
EBC devices are available in two power supply variants: 1 – from the network (e.g. 3×400 VAC 50Hz); 2 – from the traction (e.g. 600 VDC).

Innovative electric bus charging systems:

- Plug-in service chargers
- Stationary plug-in chargers
- Stationary pantograph charger

The systems of communication between the charger and the bus have to be integrated and compliant with the following standards:

- **DIN70121** – Vehicle to charger communication interface
- **PN-EN 61851-1** – Electric vehicle conductive charging system – Part 1: General requirements
- **PN-EN 61851-23** – Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station
- **PN-EN 61851-24** – Electric vehicle conductive charging system – Part 24: Digital communication between a DC EV charging station and an electric vehicle for control of DC charging
- **PN-EN ISO 15118-1** – Road vehicles – Vehicle to grid communication interface – Part 1: General information and use-case definition
- **PN-EN ISO 15118-2** – Road vehicles – Vehicle to grid communication interface – Part 2: Network and application protocol requirements
- **PN-EN ISO 15118-3** – Road vehicles – Vehicle to grid communication interface – Part 3: Physical and data link layer requirements
- **ISO 15118-8** – Road vehicles – Vehicle to grid communication interface – Part 8: Physical layer and data link layer requirements for wireless communication



Simplified diagram of the EBC charger

E-BUS CHARGERS

EBC series

SERVICE/MOBILE CHARGERS

Mobile devices with power up to 100 kW. They are characterized by comfort of use and small dimensions. The mobile equipment is fitted with wheels. Charging takes place via the CCS Type 2 or CHAdeMO interface. The device has a communication interface for remote dispatcher monitoring.

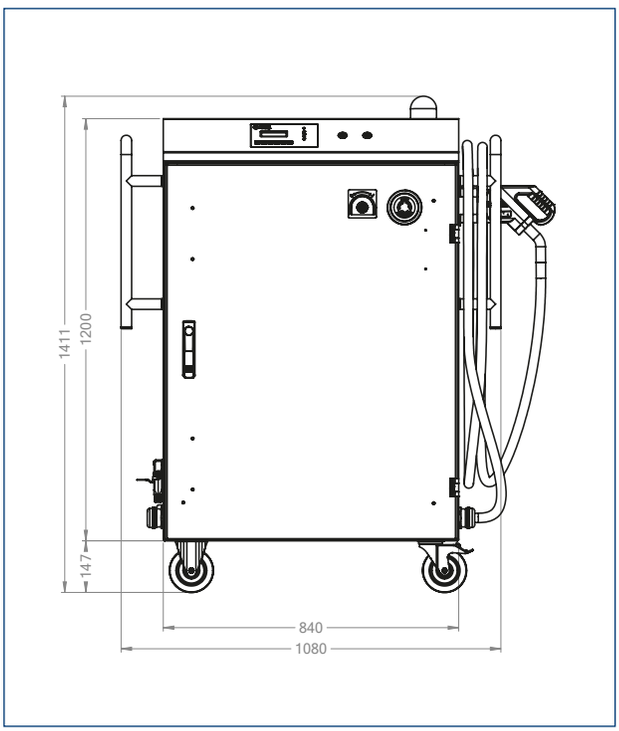
The devices are equipped with:

- LED signals informing about the charger status
- OLED operator panel
- Acoustic signal informing about end of operation
- Emergency button
- Visual error signalling
- Battery charge status signalling
- Operation authorization key switch
- Limiting of output power possible

OCPP communication interface available as an option.

Service/mobile charger	
Catalog designation	**EBC**
Charging type	**DC**
Station rated power [kW]	**40-100**
Maximum charging current [A]	**60-200**
Charging rated voltage [V]	**200-800 VDC**
Efficiency [%]	**≥95**
THDi [%]	**≤5**
Active power factor cos (Φ)	**≥0.99**
Operating temperature [°C]	**-30°C to +45°C**
Interface type	**CCS type 2, CHAdeMO**
Degree of protection provided by the housing (IP code)	**IP 54**

MEDCOM service chargers



Dimensions of an example plug-in service charger with power of 60 kW

E-BUS CHARGERS

EBC series

STATIONARY PLUG-IN CHARGERS

A free-standing device used to charge one or two electric vehicles at the same time. Wireless communication via Wi-Fi, LTE possible. The possibility of monitoring via mobile applications with the option of saving data in the cloud, reporting, data archiving, using the OCPP or MODBUS TCP protocol.

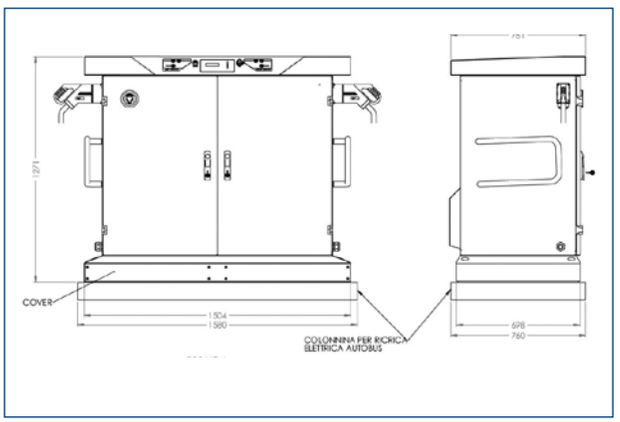
Just like service chargers, the devices are equipped with:

- LED signals informing about the charger status
- OLED operator panel
- Acoustic signal informing about end of operation
- Emergency button
- Operation clearance station
- Visual error signalling
- Battery charge status signalling
- Operation authorization key switch
- Limiting of output power possible

OCPP communication interface available as an option.

Stationary plug-in charger	
Catalog designation	**EBC**
Charging type	**DC**
Station rated power [kW]	**60-120**
Maximum charging current [A]	**120-240**
Charging rated voltage [V]	**200-800 VDC**
Efficiency [%]	**≥95**
THDi [%]	**≤5**
Active power factor cos (Φ)	**≥0.99**
Operating temperature [°C]	**-30°C to +45°C**
Interface type	**CCS type 2, CHAdeMO**
Degree of protection provided by the housing (IP code)	**IP 54**

Example stationary plug-in charger



Dimensions of an example stationary plug-in charger

PANTOGRAPH CHARGERS

Fast modular chargers with a pantograph interface. Fully individual design with no standardized dimensions. The station makes it possible to charge electric vehicles via a pantograph interface with power from 150 up to 950 kW. It is also equipped with an emergency plug-in interface up to 200 A. Wireless communication via Wi-Fi, LTE is possible. In the case of chargers of this type, there is also the possibility of monitoring via mobile applications with the option of saving data in the cloud, reporting, data archiving, using the OCPP and MODBUS TCP protocol. Furthermore, MEDCOM's pantograph chargers can be fitted with the OppCharge system with the use of the MKZ-1 module.

The devices are equipped with:

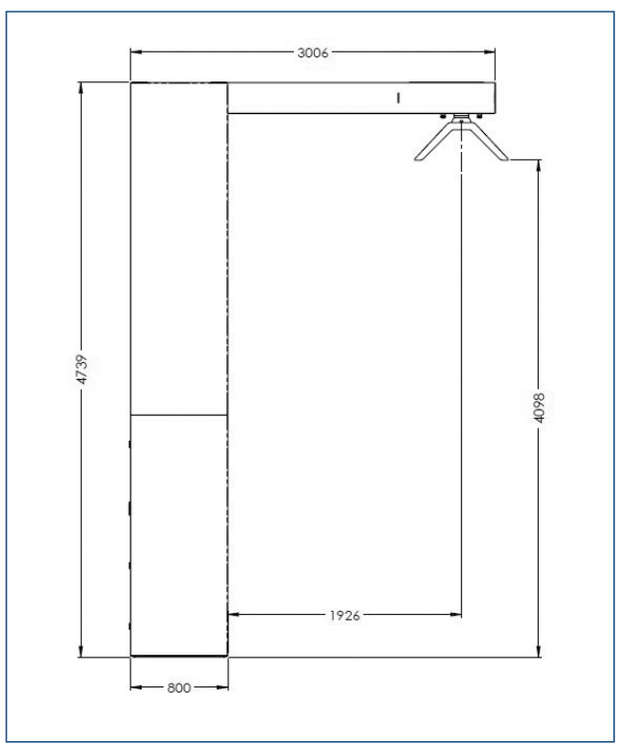
- Charger operation light signaling
- Battery charge level signaling
- A communication interface for remote dispatcher monitoring

The OppCharge system is available as an option.

Battery charge level signaling is located on the vehicle.

Fast charging station with a pantograph interface	
Catalog designation	**EBC**
Charging type	**DC**
Station rated power [kW]	**150-420 kW**
Maximum charging current [A]	**300-840**
Charging rated voltage [V]	**200-800 VDC**
Efficiency [%]	**≥95**
THDi [%]	**≤5**
Active power factor cos (Φ)	**≥0.99**
Operating temperature [°C]	**-30°C to +45°C**
Interface type	**pantograph interface, emergency plug-in interface as an option**
Degree of protection provided by the housing (IP code)	**IP 54**

Example pantograph charging station



Dimensions of an example pantograph charging station

E-BUS CHARGERS

EBC series

PANTOGRAPH CHARGERS

Rapid, modular chargers with pantograph connectors (docking stations/reversed pantograph). Completely individual design, dimensions have not been standardized. The station allows charging of an electric vehicle via a pantograph connector with a capacity of 150 to 950 kW. Optionally equipped with a plug-in emergency connector up to 250 A. Wireless communication via Wi-Fi, LTE possible. With this type of chargers also there is the po-ssibility of supervision via mobile applications with cloud storage, reporting, data archiving, following OCPP and MODBUS TCP proto-cols. In addition, reverse pantograph charger can be equipped with OppCharge system using MKZ-1 module.

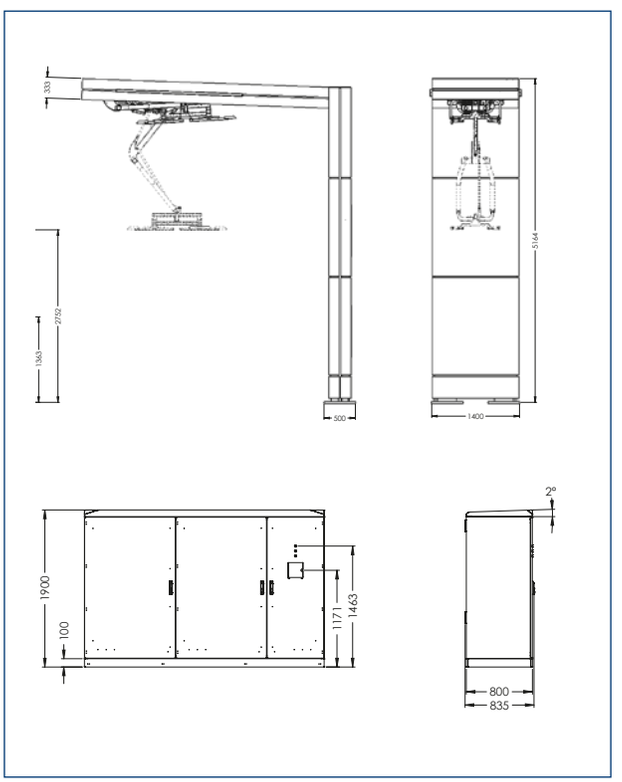
The devices are equipped with:

- Light indication of power supply operation
- Battery charge status indication
- Communication interface for remote dispatcher supervision

OppCharge system (for reversed pantograph version) available as an option. Battery charge status signaling is located on the vehicle.

Fast charging station with a pantograph interface	
Catalog designation	**EBC**
Charging type	**DC**
Station rated power [kW]	**150-900 kW**
Maximum charging current [A]	**300-1200**
Charging rated voltage [V]	**200-800 VDC**
Efficiency [%]	**≥95**
THDi [%]	**≤5**
Active power factor cos (Φ)	**≥0.99**
Operating temperature [°C]	**-30°C to +45°C**
Interface type	**pantograph interface, emergency plug-in interface as an option**
Degree of protection provided by the housing (IP code)	**IP 54**

Sample pantograph charging station (charger and pole) with the reversed pantograph.



Dimensions of an example pantograph charging station (charger and pole) with a reversed pantograph

CHARGER SERIES OF TYPES (E-bus)

Type		Maximum battery charging current	Maximum charging power
MOBILE CHARGERS	EBC-30M	**60 A**	**30 kW**
	EBC-40M	**80 A**	**40 kW**
	EBC-50M	**100 A**	**50 kW**
	EBC-60M	**120 A**	**60 kW**
	EBC-80M	**160 A**	**80 kW**
	EBC-100M	**200 A**	**100 kW**
	EBC-120M	**240 A**	**120 kW**
STATIONARY CHARGERS	EBC-30S	**60 A**	**30 kW**
	EBC-40S	**80 A**	**40 kW**
	EBC-50S	**100 A**	**50 kW**
	EBC-60S	**120 A**	**60 kW**
	EBC-80S	**160 A**	**80 kW**
	EBC-100S	**200 A**	**100 kW**
	EBC-120S	**240 A**	**120 kW**
PANTOGRAPH CHARGERS	EBC-150	**300 A**	**150 kW**
	EBC-180	**360 A**	**180 kW**
	EBC-200	**400 A**	**200 kW**
	EBC-240	**480 A**	**240 kW**
	EBC-300	**600 A**	**300 kW**
	EBC-350	**700 A**	**350 kW**
	EBC-360	**720 A**	**360 kW**
	EBC-420	**840 A**	**420 kW**
	EBC-450	**900 A**	**450 kW**
	EBC-480	**960 A**	**480 kW**
	EBC-500	**1000 A**	**500 kW**
	EBC-540	**1080 A**	**540 kW**
	EBC-600	**1200 A**	**600 kW**
	EBC-650	**1200 A**	**650 kW**

Other executions available on Customer request.

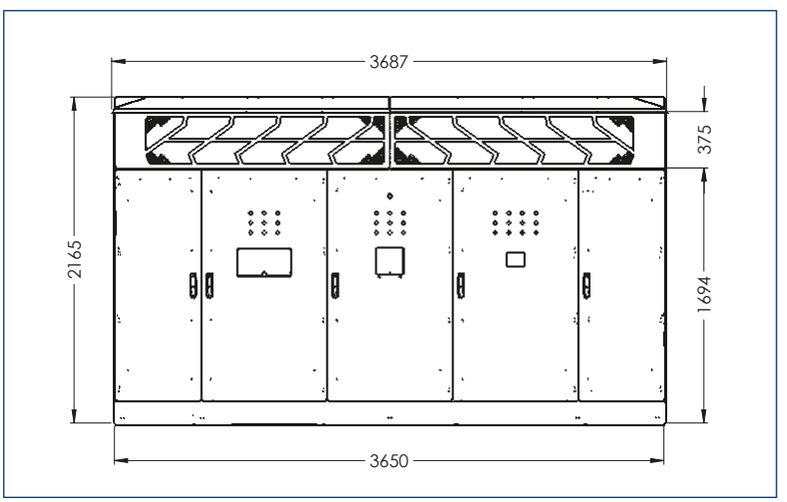
SPECIAL DESIGN - OSLO, NORWAY

Implementation at Oslo depot - 139 charging points, including chargers with reversed pantographs, docking stations and CCS Type 2 connectors. Power configuration according to design requirements, different for each charging zone. Local and remote (via OCPP system) switching of power configuration. Ability to charge buses traveling in both directions from a single charging point. Sixteen units of

300-450 kW chargers have been produced, examples :

- EBC-450SP-9, a 450 kW charger with nine outputs -docking stations, power configuration of 1 x 450 kW or 9 x 50 kW
- EBC-450SP-10, 450 kW charger with ten outputs -docking stations, plug-in, power configuration 1 x 450 or 3 x 150 kW or 9 x 50 kW
- EBC-300SP-7, 300 kW charger with seven outputs - reverse pantograph, plug-in, power configuration 1 x 300 kW or 2 x 150 kW or 6 x 50 kW

Example charger: EBC-450SP-10										
Output number	**CH1**	**CH2**	**CH3**	**CH4**	**CH5**	**CH6**	**CH7**	**CH8**	**CH9**	**CH10**
Output voltage range	**200-800 VDC**									
Maximum charging current	**450 kW**	**150 kW / 50 kW**	**50 kW**	**50 kW**	**150 kW / 50 kW**	**50 kW**	**50 kW**	**150 kW / 50 kW**	**50 kW**	**50 kW**
Maximum charging current	**900 A**	**300 A / 100 A**	**100 A**	**100 A**	**300 A / 100 A**	**100 A**	**100 A**	**300 / 100 A**	**100 A**	**100 A**
Efficiency	**≥ 95%**									
THDi	**≤ 5%**									
Active power factor cos (Φ)	**≥ 0,99**									
Operating temperature	**from -30°C to +40°C**									
Connector type	**dropdown pantograph / docking station**	**docking station / CCS Type 2**								
Degree of protection of the enclosure (IP code)	**IP 54**									



Dimensions of a sample pantograph charger EBC-450SP-10

CAR CHARGERS

An electric car charging station comprising a charger and a distribution post. The charger supplies the distribution post, from which vehicles may be charged via three types of interface: CHAdeMO, CCS Type 2, CCS AC. The charger makes it possible to charge from one of the DC interfaces (CHAdeMO, CCS Type 2) and the CCS AC interface at the same time. The device must be located at a distance of up to 200 m from the distribution post and may work with two distribution posts at a time. Wireless communication via Wi-Fi, LTE is possible. The possibility of monitoring via mobile applications with the option of saving data in the cloud, reporting, data archiving, using the OCPP or MODBUS TCP protocol.

The distribution post is equipped with:

- A screen visualizing the charger's operation
- Three types of interfaces
- Operation buttons for each of the interfaces separately
- Emergency button

Car charger – charger parameters	
Catalog designation	**EBC**
Charging type	**DC**
Station rated power [kW]	**2×40 kW/1×80 kW**
Maximum charging current [A]	**2×80A/1×160 A**
Charging rated voltage [V]	**50-500 VDC**
Efficiency [%]	**≥94**
THDi [%]	**≤5**
Active power factor cos (Φ)	**≥0.99**
Operating temperature [°C]	**-25°C to +45°C**

Car charger – distribution post parameters	
Catalog designation	**EBC-SC**
Rated power CCS Type 2 output [kW]	**80**
Rated power CHAdeMO output [kW]	**62.5**
Rated power CCS AC output [kW]	**22 or 44**
Maximum charging current CCS Type 2 output [A]	**160**
Maximum charging current CHAdeMO output [A]	**125**
Maximum charging current CCS AC output [A]	**3×32 or 3×63**
Rated voltage, CCS Type 2 and CHAdeMO output [V]	**50-500 VDC**
Rated voltage CCS AC output [kW]	**3×400 VAC**
Operating temperature [°C]	**-25°C to +45°C**
Interface type	**CCS type 2, CHAdeMO, CCS AC**
Degree of protection provided by the housing (IP code)	**IP 54**

DEDICATED CHARGERS FOR THE V2G SYSTEM

Devices are designed using a future-proof approach for the V2G (Vehicle to Grid) system. The system ensures a bidirectional power flow between the electric vehicle and the grid. The vehicle not only draws power, but also constitutes an element of the grid, and so it does not just increase load on the grid, but, as a mobile energy storage, it provides the opportunity to support and enhance its operation.

MEDCOM manufactured the following dedicated devices for the V2G technology:

- **BGI-250**

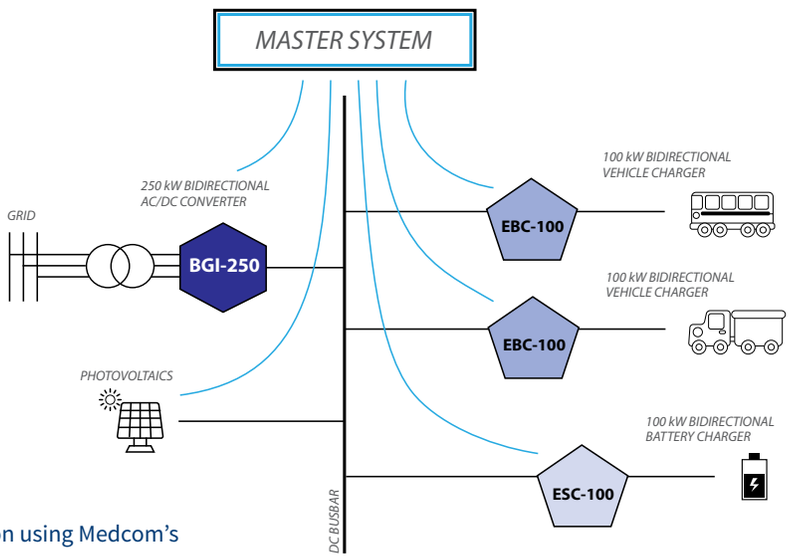
  250 kW bidirectional, three-phase AC/DC converter. A device capable of controlling the direction and amount of power in order to maintain the DC busbar. Reactive input power control possible in the master system. Communication: Modbus/TCP via Ethernet.

- **EBC-100**

  100 kW bidirectional DC/DC converter with modular design (2x50 kW). Device fitted with the CHAdeMO connector capable of charging and discharging electric vehicles. Communication: Modbus/TCP, communication with the vehicle: CHAdeMO protocol.

- **ESC-100**

  100 kW bidirectional DC/DC converter with modular design (2x50 kW). Device capable of charging and discharging the batteries of the energy storage device. Communication: Modbus/TCP.



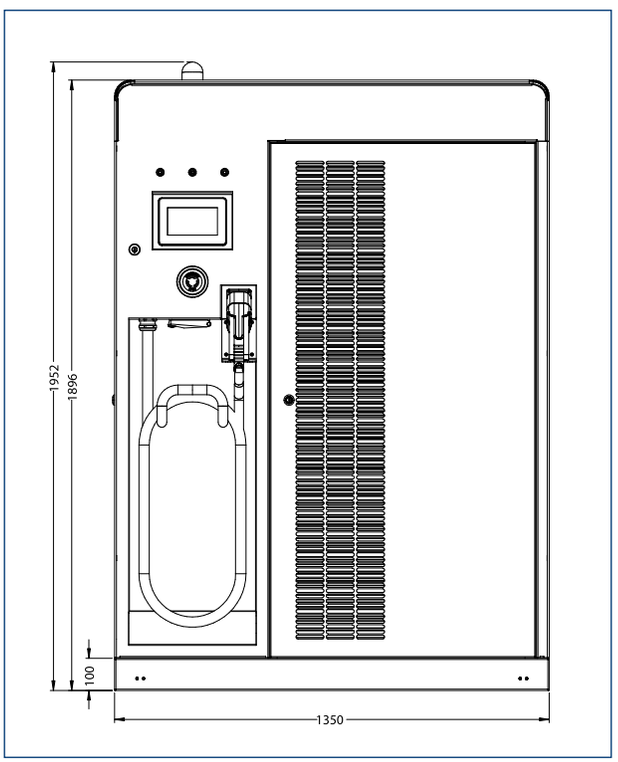
Example system configuration using Medcom's devices described above

BASIC DEVICE SPECIFICATIONS			
	BGI-250	**EBC-100**	**ESC-100**
Rated power	**250 kW**	**100 kW**	**100 kW**
Input voltage	**400 V AC /±10%**	**660-780 V DC**	**660-780 V DC**
Frequency	**50/60 Hz**	-	-
Output voltage	**660-780 V DC**	**50-500 V DC**	**50-500 V DC**
THDi	**≤5%**	-	-
Efficiency	**≥98%**	**97,5%**	**97,5%**
Operating temperature	**-25 ÷ 40°C**	**-25 ÷ 40°C**	**-25 ÷ 40°C**
Housing protection rating	**IP23**	**IP54/IP23 (cooling system)**	**IP54/IP23 (cooling system)**
Active power factor with the reactive power compensation function switched off	**≥0,99**	-	-

DEDICATED CHARGERS FOR THE V2G SYSTEM

The EBC-B-150S charger is a bidirectional device. Depending on the operating mode, the device converts the AC supply voltage into DC voltage for charging the traction batteries located on the electric vehicle. The charger cabinet is supplied with 3 x 400 VAC and converts AC voltage to DC voltage in the range of 200 ÷ 800 VDC. The unit also allows the return of power to the grid when the energy storage (traction batteries) is discharged.

EBC-B-150S	
Maximum output power	**150kW**
Maximum battery charging current	**250A**
Input voltage	**3x400 V ±10%**
Frequency	**50Hz**
Output voltage	**200-800VDC**
Efficiency at rated point	**≥ 96%**
THDi	**≤ 5%**
Power factor	**≥ 0,99**
Operating temperature	**from -30°C to +40°C**
Connector type	**CCS 2 / CHAdeMO**
Degree of protection of the enclosure (IP code)	**IP 54**

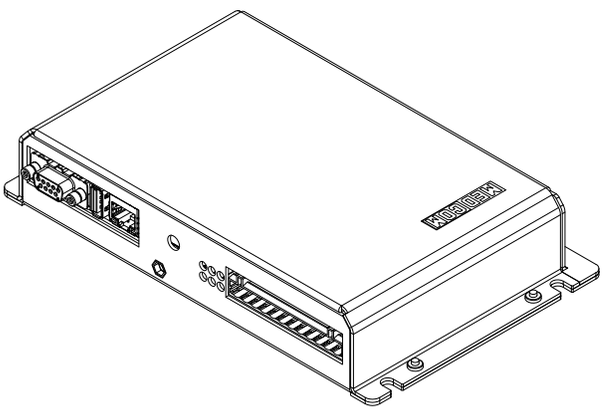


Dimensions of the EBC-B-150S charger

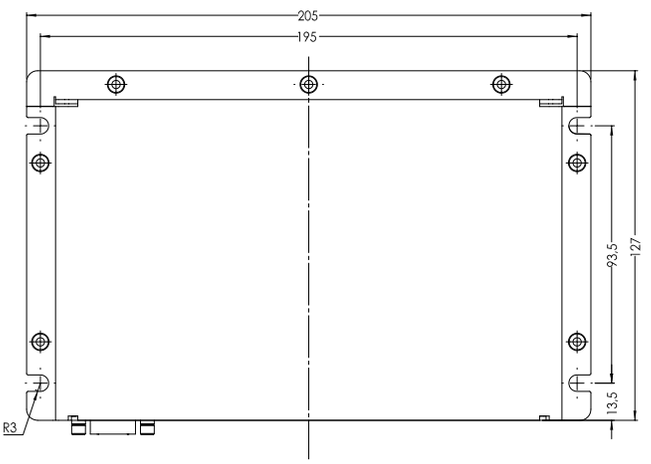
MKZ-1 MODULE
FOR THE OPPCHARGE STANDARD

MKZ-1 is an electric vehicle communication controller (EVCC) compliant with the ISO 15118 standard. The device is used for OppCharge applications. The module can communicate via the Control Pilot line or wirelessly in the inverted pantograph application.

Basic information about the MKZ-1 module		
1	Power supply range	9 – 36 VDC (24 VDC rated voltage)
2	Power consumption	4 W
3	WLAN	IEEE 802.11 a/b/g/n 2.4 GHZ and 5 GHz (compliance with ISO 15118-8)
4	CAN bus	250 kBps, extended (internal protocol)
5	Control Pilot	-12V - +12V
6	Operating temperature range	-25 °C - +45 °C
7	Dimensions	203 mm x 127 mm x 39,2 mm
8	Weight	ca. 0,6 kg
9	Standards	ISO 15118-1: 2019 ISO 15118-2: 2016 ISO 15118-3: 2016 ISO 15118-8: 2018 PN-EN 61851-1 PN-EN 61851-23 PN-EN 61851-24



General view



Dimensions

MASTER SYSTEM

The MODBUS TCP type of monitoring system is an advanced application intended for comprehensive management of fast charging stations. It enables remote control, as well as monitoring and logging the operating status. We use the latest version of the OCPP protocol for communication between the systems and the charging station. The protocol makes it possible to establish an encrypted connection with the charging station and to obtain charging process parameters and diagnostics.

The charging station sends its status in real time: available, charging, paused, unavailable, failure. In the case of failure, detailed information about the cause is sent out. The start and finish of the charging process are signaled by a message including the date and time and the current status of the power meter.

Data available in the monitoring system:

a) Real-time access to current demand for input power of the charger, output power of the charger, output voltage, charging current, set power limit

b) Data transfer in order to prepare historical analyses (demand for power, energy consumption, energy consumption per vehicle, currents, voltages, failures, charger operating hours, charging parameters including as expected by the vehicle and actual ones, etc.)

c) Information about the charger's operating status

d) The possibility of remote power management, e.g. in the case of energy supply limitations

e) The possibility of dynamic power management, depending on unused power, taking into consideration charger priority

f) The possibility of sending alerts, among others concerning failures or lack of connection with the charger, to an e-mail address or via text messages

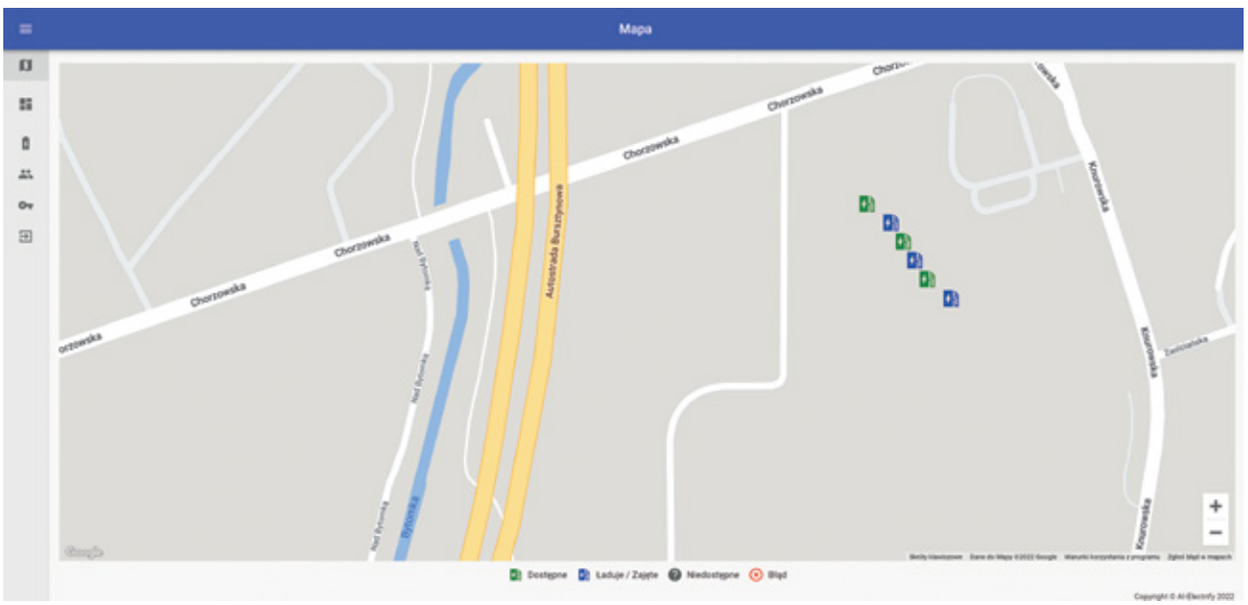
g) The possibility of e-mail notifications about completed charging

h) The possibility of remotely introducing charger software updates and remote device diagnostics

i) Measuring and recording at least the following data during the charging process: current voltage and strength for the given vehicle, vehicle identification, start, finish, and duration of the charging process with reference to the car's identification number, through the recording of the start and finish date and time, power meter status – energy input, vehicle energy input, current charging power, voltage of the supply network, charging station temperatures (in places significant for the continuity of the charging process, e.g.: transformer, power modules, interfaces)

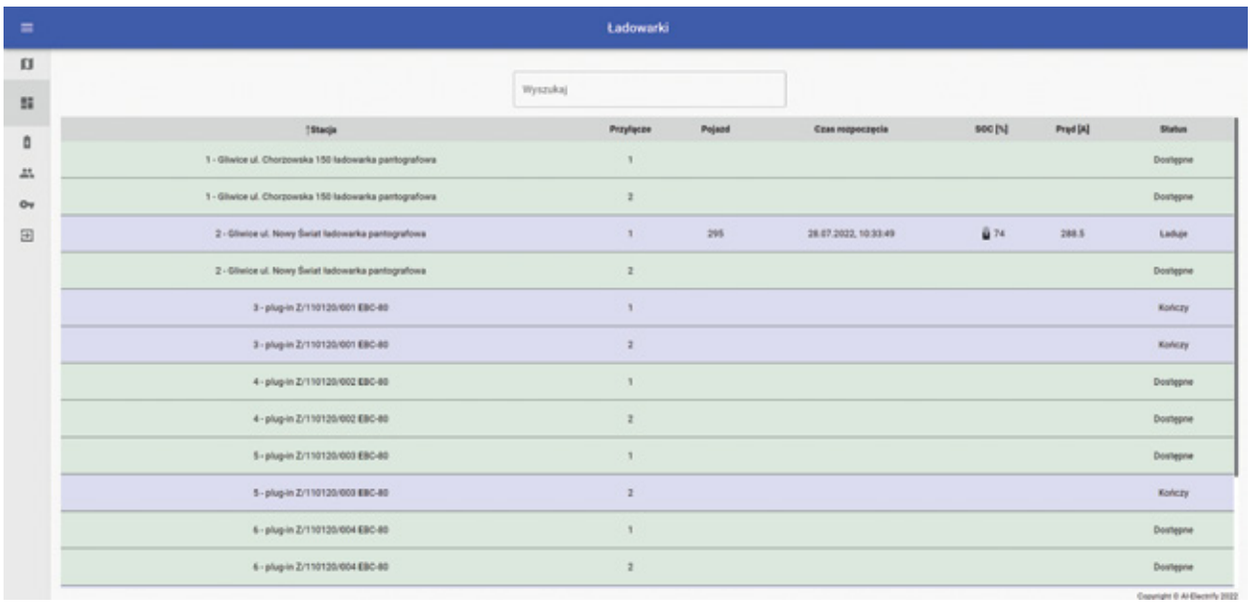
j) Charging start/stop/pause, charger reset, disabling the visibility (availability) of the charger in the system

The master system helps obtain detailed data about the devices, which makes it possible to control both individual chargers and the entire group of chargers. Thanks to the analysis of the available information and proper management of the knowledge gained, it is possible to examine the needs and in consequence, optimize and manage the whole infrastructure and vehicle fleet in terms of energy management. Example information provided by the master system is presented below. The information is collected within the time specified by the administrator.

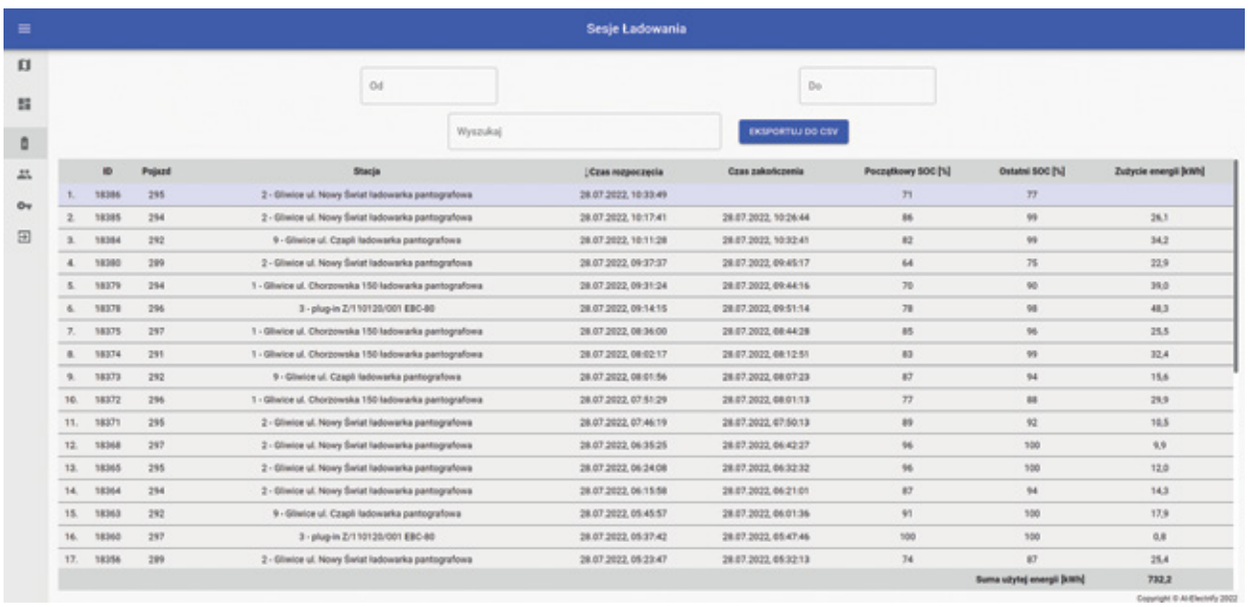


Map of chargers' localizations and their actual status

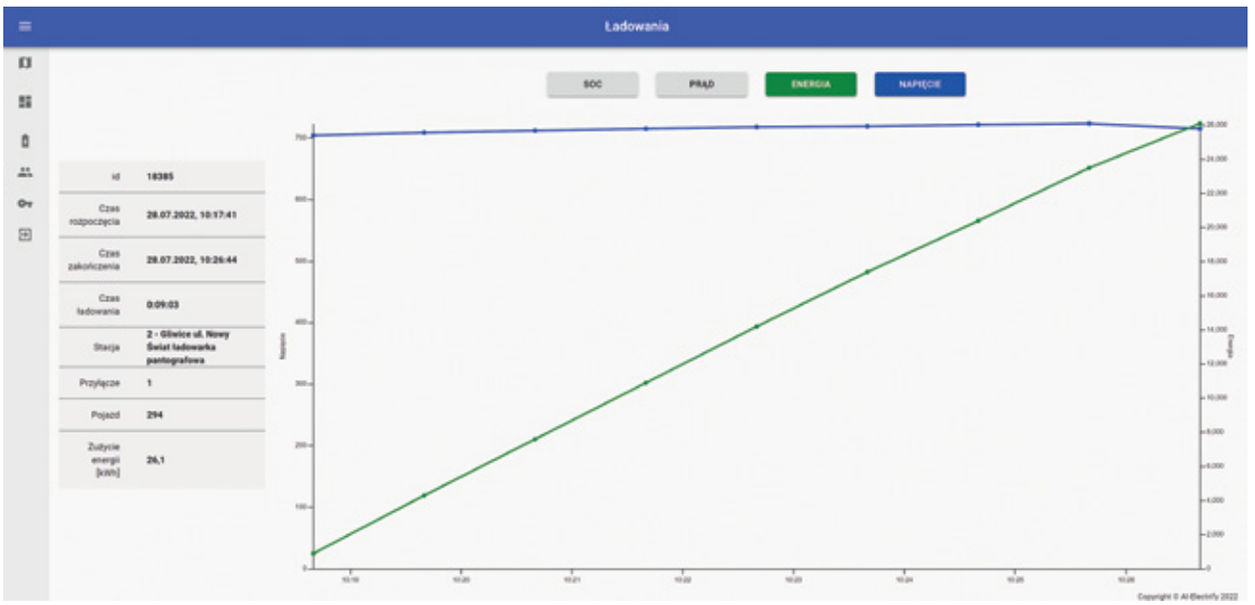
MASTER SYSTEM



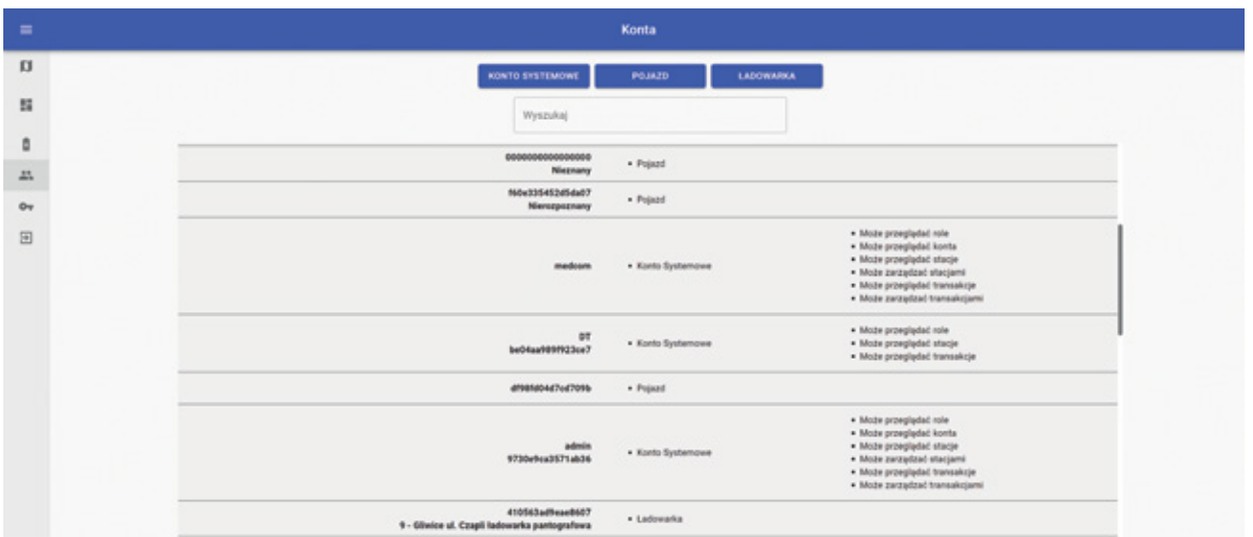
Information about current status of battery charger



Reports and information about stations and charging sessions



Graphical charging reports: power and voltage during charging (incl. SoC and current consummed from power grid)



Users' accounts

EXAMPLES OF COMPLETED PROJECTS
EBC type charging stations

Oslo

Total of 16 chargers (300-450 kW) with reversed pantographs/dock stations or CCS Type 2 connector. 50-450 kW charging capability in agreed configuration. Remote and local power configuration switching. Almost 140 charging points.

Poznań

EBC-540SP-3 battery charger with 540 kW power; 2 x 270 kW or 1 x 540 kW charging modes; including emergency plug-in connector.

Gliwice

Rapid chargers with reversed pantographs (3x) 200 kW.
Depot chargers (10x) 80 kW.
Mobile charger (1x) 40 kW.
Project scope: delivery, assembly, connection to power grid.

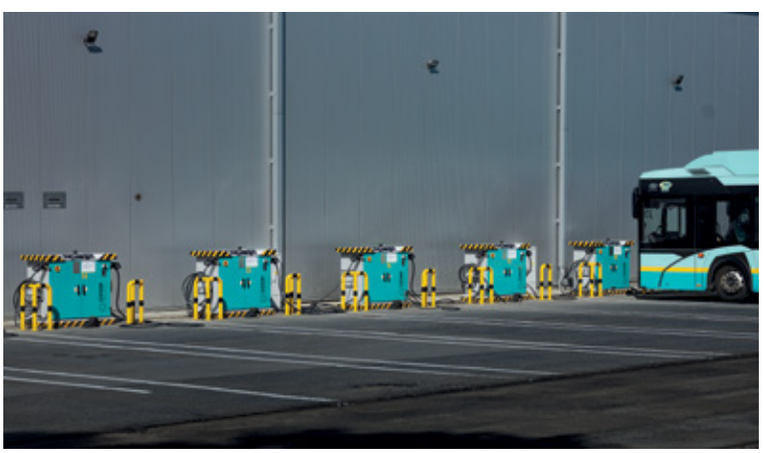
EXAMPLES OF COMPLETED PROJECTS
EBC type charging stations

Bergamo

80 kW stationary charger with the possibility of charging 2×40 kW, type EBC-80S/2x40SB.

Brussels

75 kW stationary chargers,
type EBC-75SB.



PKM Jaworzno

85 kW plug-in chargers,
type EBC-85S-2
with power supply infrastructure.

EXAMPLES OF COMPLETED PROJECTS
EBC type charging stations

PKM Jaworzno

Fast charging stations with their power supply infrastructure, type EBC-180P-2 with power supply infrastructure.

Bolzano

80 kW stationary chargers, type EBC-80S (5x).
25 kW mobile charger, type EBC-25M (5x).
300 kW fast charging station, type EBC-300SP with Schunk's system.

Bolzano

300 kW integrated charger.

EXAMPLES OF COMPLETED PROJECTS
EBC type charging stations

MPK Rzeszów

35 kW stationary chargers, type EBC-35S (10x).

300 kW fast charging stations, type EBC-300SP with an inverted pantograph (2).

MPK Kraków

40 kW mobile chargers, type EBC-40M2, and 60 kW mobile chargers, type EBC-60M1 with power supply infrastructure.

Kraków

Fast charging station, type EBC-250K with power supply infrastructure (design, medium-voltage connection, transformer station).

EXAMPLES OF COMPLETED PROJECTS
EBC type charging stations

MZA Warsaw

Fast charging station design with output power of 200 kW, type EBC-200 W, and with output power of 400 kW, type EBC-400 W with power supply infrastructure.

Oslo

Stationary chargers with the total power of 300 kW, with distribution heads suspended on the truss. 1x300 kW or 6x50 kW charging.

Świdnica

250 kW fast charging station with an inverted pantograph, according to the OppCharge standard.

NOTES

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MEDCOM

electrify.