



**KEMPOWER**

**Charging solutions**

**Defining Charging**





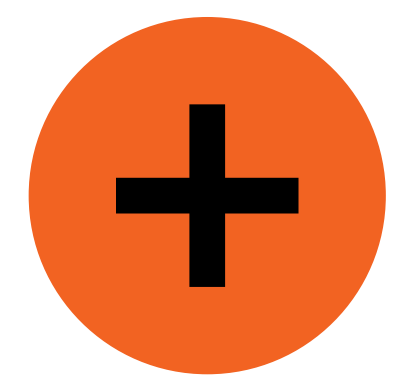
**T** SERIES 16



**C** SERIES 20



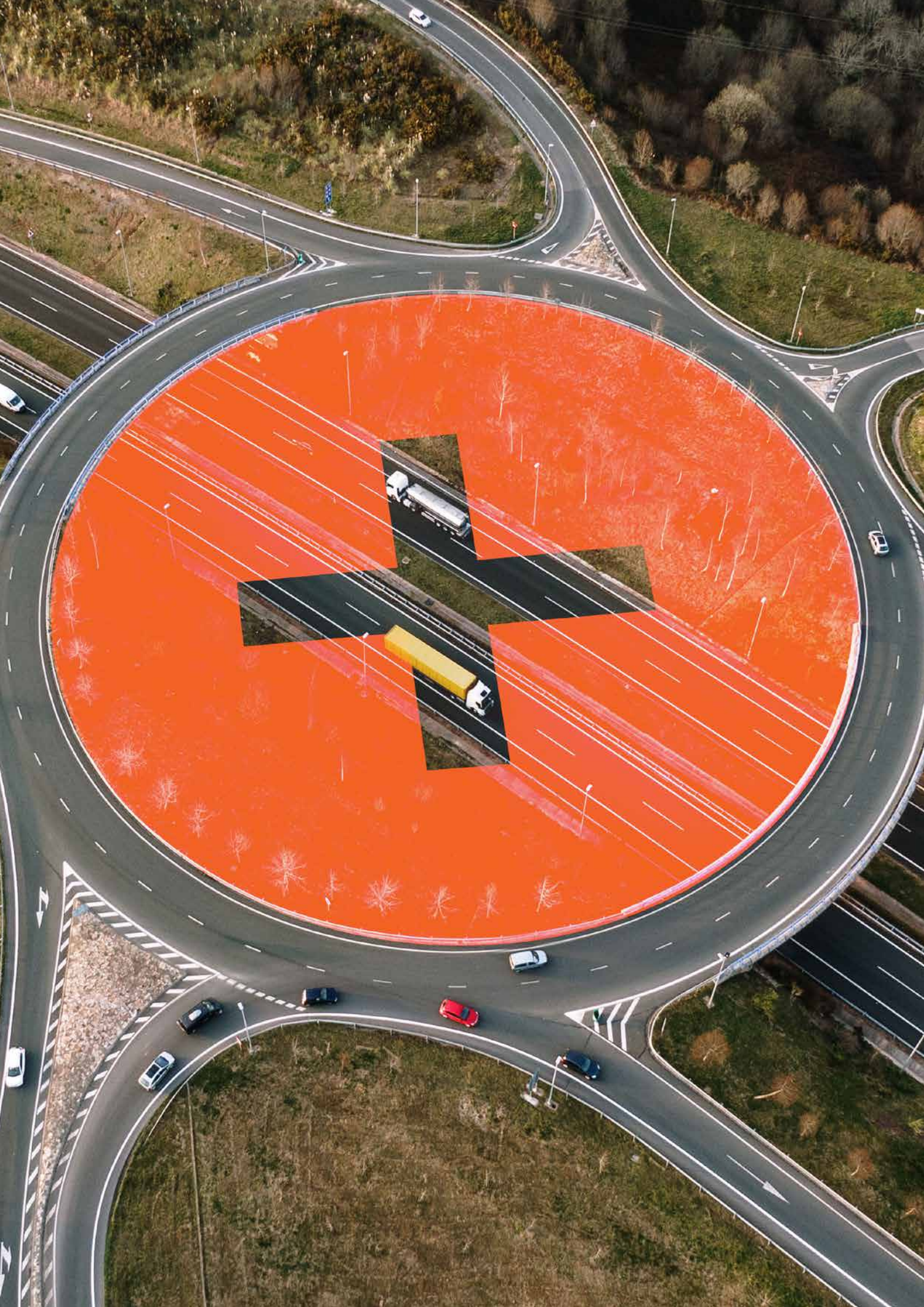
**S** SERIES 24



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***Over the last 100 years the need to transport people and goods has been based on boats, wagons, trains, cars and airplanes – hulls, wheels and wings.***

Since 2010 and the introduction of fully electric cars such as the Nissan Leaf, the development of electric drivetrains for all types of vehicles has boomed significantly.

New and traditional OEMs have joined the movement in replacing old fossil-fuel powered engines with electric drivetrains. Each one of these electric vehicles needs to be recharged to continue their journey.

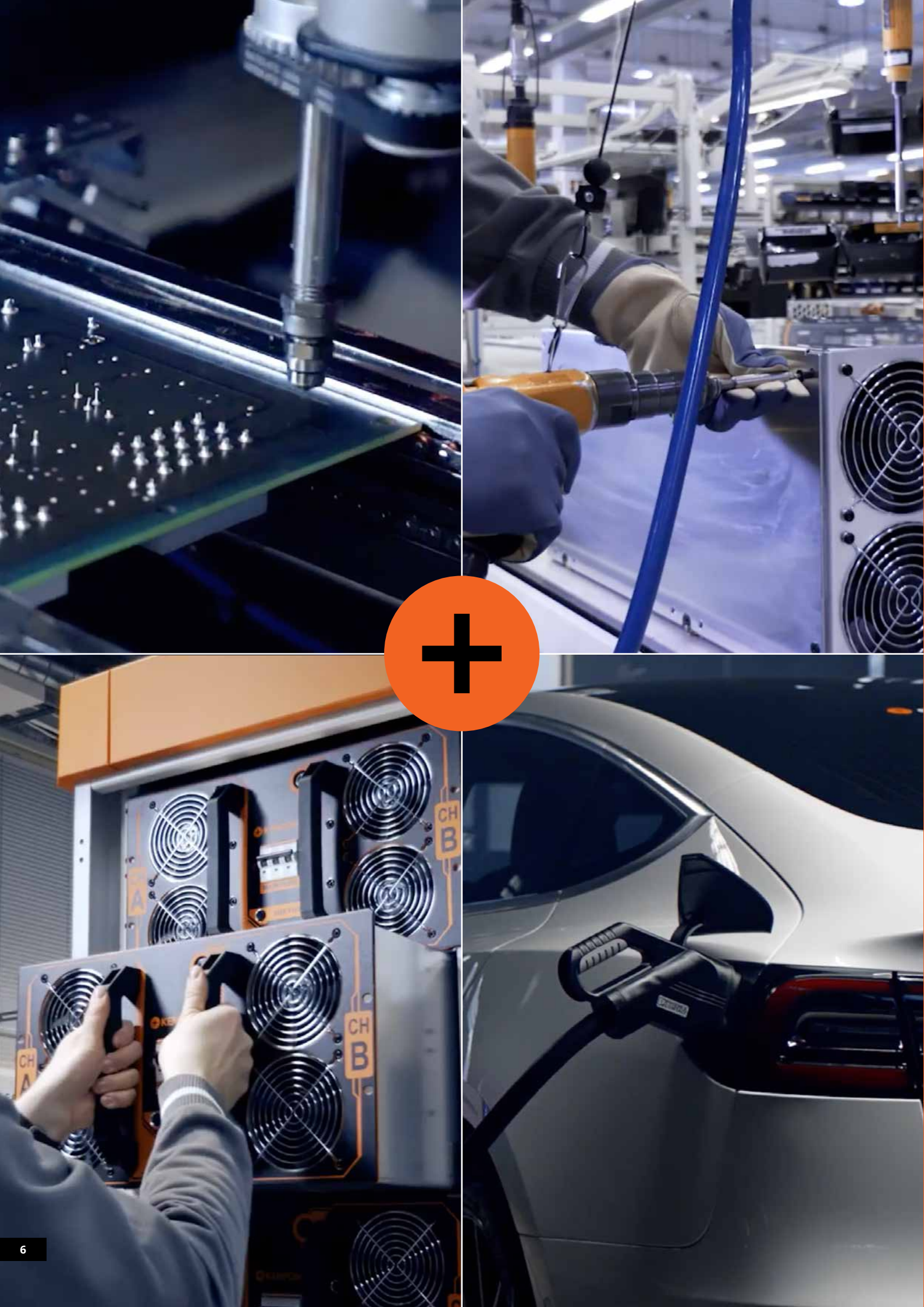
To meet this need and keep the wheels rolling, a network of DC chargers is a necessity. Our charging solutions exceed the usual recharging needs by providing the highest reliability, as well as the best user experience, on the market.

The reliability of our products is based on our extensive knowledge of power electronics and usability gained from the heavy welding industry. Our solutions range from single DC charging stations through to satellite charging areas for traffic hubs and shopping malls, to extensive fleet-wide depot charging systems.

Let us help you succeed with your recharging applications – it's not only a question of how to distribute energy but also how to utilize the full potential of the charging system.

***Kempower – Defining charging***





## About Kempower

### *The need to recharge is here*

Power conversion using power modules is well known in industry and it is used in wide range of applications. Since the early 50s KEMPPI has delivered thousands of power modules for welding machines and other applications, including the CERN particle accelerator in early 2010. Based on this extensive knowledge, Kempower was kick-started in 2018 to employ power modules in recharging applications.

At Kempower, we believe that high quality power modules with connectivity services are the key elements for succeeding in electro-mobilization. Our administration, research, engineering and manufacturing facilities are all located in Lahti, some 100 km north of Helsinki, Finland.

### *Our mission*

We provide world class recharging solutions with over 70 years of knowledge in power electronics and user experience.

### *Our vision*

We are the preferred DC charging solution provider in the global market.

### *Why choose Kempower?*

Small details in our charging technology make a big difference to your business/application.





## Connected Services

*To keep track of each individual charger in large charging networks we provide you with a remote control platform called **ChargEye**. This provides you with super-user tools to manage user authorization, vehicles, energy and other charging session details.*

Although each of our chargers can work in unplugged mode or connected directly to your back-end system, some value-added features are available at your fingertips through our **ChargEye** platform.

Thanks to its connectivity and remote monitoring, problem solving is easy – and this is needed because new users, vehicles and standard upgrades are introduced on an almost monthly basis. At Kempower, we keep track of these changes and provide upgrades for your charging network.

Each Kempower charger can be connected over IP and communication is based on OCPP (OpenCharge Point Protocol). Connection between chargers and the OCPP server can be via Ethernet, Wi-Fi, LTE or 4G. Your back-end system can utilize either refined information from **ChargEye** or use direct connections between each charger and your back-end system's OCPP server. For more details, see page 28-31.



### AUTHORIZATION

User authorization can be enabled using RFID cards/tags or a smartphone application, or it can be disabled in closed systems



### ACCORDING TO YOUR NEEDS

**ChargEye** has three levels Basic - Advanced - Master. Depending on your charging application and your charging network size, you can select the contents of your toolbox.



### CONTROLLED UPGRADES

Whenever firmware needs upgraded, whether it's for a single charger or a large charging network, you will always be notified in advance so you can keep your system up and running.

# Heavy commercial

## vehicle charging



*Replacing traditional drivetrains with electric ones is a step towards the future. Our charging solutions support your operations, providing the highest reliability to keep your wheels rolling.*

### WHY SELECT AN ELECTRIC DRIVETRAIN FOR HEAVY COMMERCIAL VEHICLES?

- Lower emissions and an easier way to meet emission reduction targets
- Lower Total Cost of Ownership (TCO) compared to combustion engine-based heavy vehicles
- Reduced fuel delivery traffic to your site



#### EASY ACCESS

Kempower charging stations are easy to operate locally through the touch screen and they can be accessed remotely through the ChargeEye dashboard.



#### FIELD UPGRADES

Power cabinets and satellites can be upgraded for higher power. Optimized rack-style power cabinets can be either upgraded in the field or the power can be increased with an additional parallel/serial cabinet.



#### REDUNDANCY

The high charging reliability is based on the redundant electro-mechanical design of the power cabinet. In event of a fault, your recharging will continue at a lower power level and an automated fault report will be sent to the maintenance team.



## Commercial vehicles &

## electric bus fleet charging



*Cleaner public transportation and goods delivery are on their way to cities across the globe. Kempower's market leading depot and end stop charging stations can provide you with a cutting edge network of chargers for a range of commercial electric vehicles in the traffic system.*

### HOW DO YOU GET OPTIMAL CHARGING NETWORK USE FOR RANGE-BASED BATTERIES?

- Static and dynamic power management is the key element
- By optimizing depot location versus operated routes and utilizing daily charging at the depot
- By utilizing ChargeEye connected services you can manage and optimize your fleet



#### PLUG OR PANTOGRAPH CHARGING

DC charging with, e.g. a CCS 2 plug, ensures battery balancing at low power or pop-up route charging at high power by the depot. An automated pantograph charging station with an integrated spare cable charging satellite provides not only high power at the end stop but also improved reliability. Intelligent power management can be achieved with a dynamic module for total power routing flexibility.



#### ADVANCED CABLE HANDLING

Spring supported cable handling makes operating the plug on and off the vehicle easier and prevents the cable from scuffing the ground. The slim design of the satellite is also optimal for tight spaces between vehicles in column charging areas in the depot.



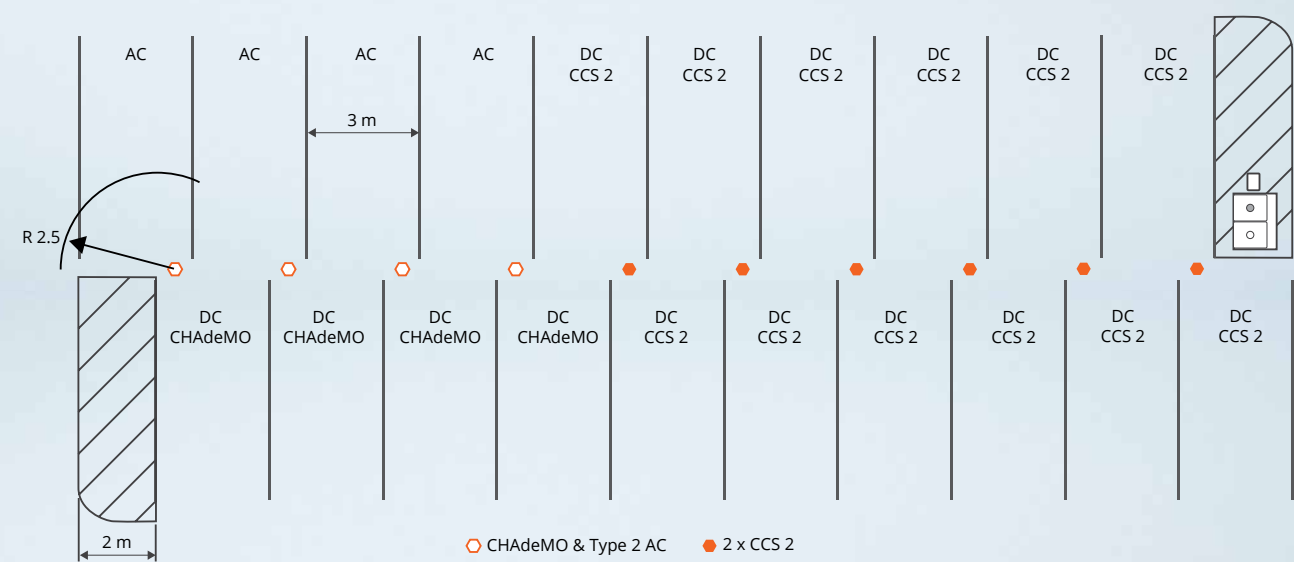
#### MASTERING DEPOT OPERATIONS

Kempower's ChargeEye connected services have three levels: Basic, Advanced and Master. With Basic, charging operations can be followed remotely. With Advanced, data can be forwarded in refined form via the API to the backend, and remote control is more sophisticated. With Master, you can optimize depot operations to improve cost efficiency.

# Electric passenger car charging



✓ For an optimized 16 + 4 charging area, parking slots need to be 3 meters wide to ensure sufficient space between vehicles. Satellites should be located in the upper left or right corners so they are not run over and for optimal charging cable handling.



*The number of electric driven vehicles keeps growing worldwide. To ensure a positive customer experience, shopping centers, convention centers and other customer service institutions should be ready to promote EV chargers for their customers.*

### WHY PROMOTE EV CHARGING?

- The transition from fuel-powered to electric vehicles is accelerating, demand for electric vehicle recharging using charger networks is rising
- Customers are re-learning where to recharge their vehicles and selecting the charging points that are easiest to operate
- Join the electromobility movement



### EV CHARGING OPTIONS

By selecting our Satellite charging system you will be ahead of the game as you can furnish 4/5 of the charging area with DC charging for BEV and 1/5 with AC charging for PHEV customers. You can also choose different satellite types to combine CCS 2, CHAdeMO and Type 2 charging.



### FULL CHARGING POWER

Charging time depends on the vehicle's parameters and available charging power level. With our charging concept you can utilize different power distribution schemes according to customer needs, with full power for people in a hurry and a lower charging power level for longer visiting times.



### BEST USER EXPERIENCE

Satellite posts provide users with an inspiring experience thanks to their advanced cable handling and user-friendly touchscreens. Authentication can be based on RFID cards or smartphone applications.





## Movable DC – fast charging

### anywhere you need it

*The T-series is built to follow you wherever you need to recharge your electric vehicle. It's tough, weatherproof and easy to use.*

The T-series is a movable EV charger that is suitable for all types of electric vehicles such as personal cars, commercial vehicles, trucks, buses and heavy commercial electric vehicles. It is weatherproof and suitable for both outdoor and indoor use. All you need is your EV and an electrical supply and you are good to go. Simply plug the charger into the wall, allow a few

minutes for the charger to turn on and you are ready to charge.

The T-series charging station is well balanced and, as a two wheeler, it is easy to move to the next location. Its durable design can handle dirt, water, dust and snow, and it's so user-friendly that everyone can use it.



#### THE PLUG IS NOT AN ISSUE

The T-series is suitable for 63 A and 32 A sockets. It also supports all the most common charging standards: CCS 2, CHAdeMO and Type 2.



#### DUAL CHARGING

The T-series is not a one-trick pony. It offers a dual charging option for charging two vehicles at the same time, with 40 kW of pure charging power or 20 kW from each charging channel.



#### AS EASY AS CHARGING GETS

All the best bits of a traditional fast charging station packed in a mobile solution that is easy to move and doesn't require a fixed installation.



- ✓ The intuitive and user-friendly 7" touch screen ensures a smooth and convenient charging experience.

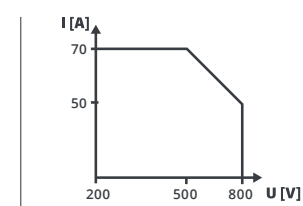
- ✓ Suitable for most common charging standards: CHAdeMO, CCS2 and Type 2.

- ✓ Suitable for 63 A and 32 A sockets. Maximum 40 kW with 63 A, 20 kW achievable with 32 A.

## TECHNICAL DATA

### T800-series DC Charging Trolley

Mainly for vehicles with a maximum battery voltage of 500 VDC to 800 VDC — typical in heavy commercial vehicles and mobile machinery.



#### INPUT

AC power connection	3 ph, 63 A plug
Input voltage range	380 - 440 V +/-10%
Nominal input power	43.6 kVA
Input Frequency	50 - 60 Hz
Power Factor (@ full load)	0.93
Efficiency	95% @ nominal output power

#### OUTPUT

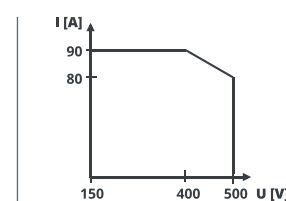
Maximum output power	40 kW
Maximum output current	70 A
Output voltage range	200 - 800 V

#### GENERAL

DC connection standard	CCS2, CHAdeMO
DC cable length	5 m
AC Connection standard	Type 2 socket
Protection	IP54
Operational noise level	< 60 dB
Operation temperature	-30°C to +40°C
Humidity	< 95% relative humidity
Cooling	Forced air
Dimensions	ca. DxWxH 670x640x1220 mm
Weight	120 kg
Electrical safety	IEC 61851-1, IEC61851-23
User Interface	Main switch, 7" touch screen, start/stop buttons, charge status indication LED bars

### T500-series DC Charging Trolley

Mainly for vehicles with a maximum battery voltage below 500 VDC — typical in private passenger cars, as well as light commercial vehicles and mobile machinery.



#### INPUT

AC power connection	3 ph, 63 A plug
Input voltage range	380 - 440 V +/-10%
Nominal input power	43.6 kVA
Input Frequency	50 - 60 Hz
Power Factor (@ full load)	0.93
Efficiency	95% @ nominal output power

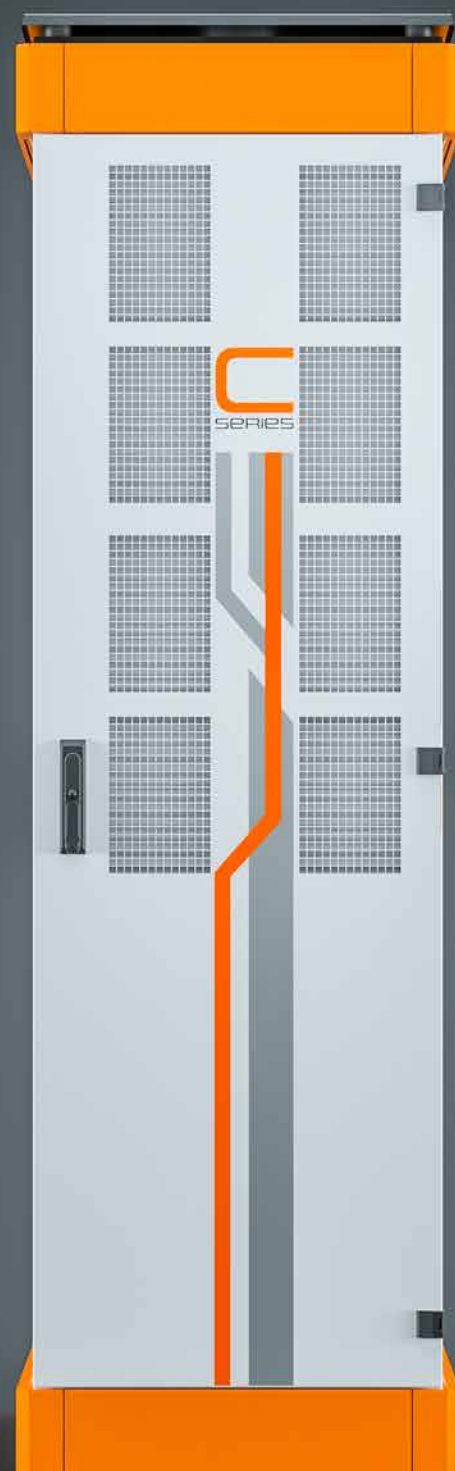
#### OUTPUT

Maximum output power	40 kW
Maximum output current	90 A
Output voltage range	150 - 500 V

#### GENERAL

DC connection standard	CCS2, CHAdeMO
DC cable length	5 m
AC Connection standard	Type 2 socket
Protection	IP54
Operational noise level	< 60 dB
Operation temperature	-30°C to +40°C
Humidity	< 95% relative humidity
Cooling	Forced air
Dimensions	ca. DxWxH 670x640x1220 mm
Weight	120 kg
Electrical safety	IEC 61851-1, IEC61851-23
User Interface	Main switch, 7" touch screen, start/stop buttons, charge status indication LED bars





## A modular and scalable charging power unit

*The C-series is an EV charging power unit cabinet that lets you scale charging power to meet your needs now, and in the future.*

The C-series is a modular and scalable charging power unit (CPU) for various types of electric, commercial and heavy commercial vehicles. It is also suitable for electric marine charging operations. Whether you need a lot of EV charging power in a shopping center, in a car park or for charging a large fleet at a depot, the C-series CPU will fulfill your needs.

Thanks to its modular structure, the standard C-series CPU offers power levels from 40 kW to 480 kW. When your vehicle fleet/battery sizes grows and you need more charging power, the C-series CPU can be expanded by adding an extra power module or new cabinet. The charging power can be distributed in a static or dynamic manner to multiple satellite posts or pantograph.



### MODULAR DESIGN

The two-channel 40 kW Kempower Power Module is the core of all our EV chargers. When you need more power, just add a module to the rack-style cabinet.



### EASY MAINTENANCE

Each rack-style cabinet can have up to 4 power modules and one control module, which are fast and easy to service thanks to the multi-quick-connectors and sliding module trays.



### THE ALL SEEING EYE

Our ChargeEye connected services provide you with a set of tools for remote monitoring and diagnostics that can cover everything from a single charging station to a network of chargers.





✓ We offer 160/ 320/ 480 kW versions depending on your charging needs. Each of the C800 versions have an output voltage range of 200 to 800 V.

## TECHNICAL DATA

### GENERAL

Input Voltage	380 - 400 V <sub>AC</sub> +/-10%, 50 - 60 Hz
Input current	See table below
Output Power	C500-Series: 40 - 600 kW C800-Series: 40 - 480 kW
Output current	See table below
Output Voltage	C500-Series: 150 - 500 V <sub>DC</sub> C800-Series: 200 - 800 V <sub>DC</sub>
Max. Output V	C500-Series: 580 V <sub>DC</sub> with 400 V <sub>AC</sub> C800-Series: 920 V <sub>DC</sub> with 400 V <sub>AC</sub>
Power factor	0.94 at P <sub>N</sub>
Efficiency	95% @ output P <sub>N</sub>
Output delivery	Cable + plug / Pantograph
Operating Temperature	-30 to +40°C
Derating high ambients	1.5%/1°C up to +50°C max
Altitude derating	1%/100 m above 2000 m
Storage Temperature	-40 to +60°C

Enclosure class	IP54, IK08
Humidity	< 95% relative humidity
Operational noise level	< 60 dB
Features	3G/4G, OCPP 1.6/2.0, cloud based back-end, service and management dashboard
Electrical Protections	Over/under voltage, Surge protection, Short circuit, Earth leakage current, Over temperature
Electrical safety	IEC 61851-1, IEC 61851-23
EMC	EN 61000-1, -2, -3, -4
Harmonics	61000-3-12
Mechanical dimensions (W x H x D)	C501/C801: 650 x 2150 x 825 mm C502/C802: 1250 x 2150 x 825 mm C503/C803: 1850 x 2150 x 825 mm

### C500-SERIES, CHARGING VOLTAGE 150 - 500 V<sub>DC</sub>

Product	Light Duty Rating				Heavy Duty Rating				Weight [kg]
	P <sub>LD</sub> Charging power at 400 V <sub>DC</sub> [kW]	Charging current I <sub>LD</sub> at +40 °C [A <sub>DC</sub> ]	Input power P <sub>IN</sub> at P <sub>LD</sub> [kVA]	Input current I <sub>IN</sub> at P <sub>LD</sub> [A]	P <sub>LD</sub> Charging power at 400 V <sub>DC</sub> [kW]	Charging current I <sub>LD</sub> at +40 °C [A <sub>DC</sub> ]	Input power P <sub>IN</sub> at P <sub>LD</sub> [kVA]	Input current I <sub>IN</sub> at P <sub>LD</sub> [A]	
C501 P40 N	50	125	67	82	40	100	45	63	280
C501 P80 N	100	250	113	164	80	200	90	126	320
C501 P120 N	150	375	170	245	120	300	136	192	360
C501 P160 N	200	500	226	327	160	400	181	256	400
C502 P200 N	250	625	283	408	200	500	226	320	680
C502 P240 N	300	750	340	490	240	600	272	384	720
C502 P280 N	350	875	396	572	280	700	317	448	760
C502 P320 N	400	1000	452	654	320	800	362	512	800
C503 P360 N	450	1125	509	735	360	900	407	576	1080
C503 P400 N	500	1250	566	820	400	1000	453	640	1120
C503 P440 N	550	1375	623	900	440	1100	498	704	1160
C503 P480 N	600	1500	680	908	480	1200	543	768	1200

### C800-SERIES, CHARGING VOLTAGE 200 - 800 V<sub>DC</sub>

Product	P <sub>HD</sub> Charging power at 400 V <sub>DC</sub> [kW]	Charging current I <sub>HD</sub> at +40 °C [A <sub>DC</sub> ]	Input power P <sub>IN</sub> at P <sub>HD</sub> [kVA]	Input current I <sub>IN</sub> at P <sub>HD</sub> [A]	Weight [kg]
C801 P40 N	40	60	44	63	280
C801 P80 N	80	120	86	125	320
C801 P120 N	120	180	132	190	360
C801 P160 N	160	240	174	250	400
C802 P200 N	200	300	219	315	680
C802 P240 N	240	360	263	380	720
C802 P280 N	280	420	305	440	760
C802 P320 N	320	480	347	500	800
C803 P360 N	360	540	389	565	1080
C803 P400 N	400	600	431	630	1120
C803 P440 N	440	660	473	690	1160
C803 P480 N	480	720	515	750	1200



## Advanced EV charging system

### with satellite charging posts

*The S-series is an advanced EV charging solution utilizing satellite charging posts which provides distributed fast-charging points with an inspiring design.*

S-series charging solutions are ideal for locations with heavy-duty usage and where a high number of charging points are needed – such as gas stations, shopping centers, logistics centers, and large bus and truck depots and the like. Seven variations of this user-friendly satellite post can be selected to meet your charging system topology.

Its dynamically controlled power distribution enables charging system optimization. Combining the C-series twin cabinet with 8 -16 satellite posts lets you use up to 16 charging points and/or pantograph.



#### MULTIPLE CHARGING POINTS

Use up to 16 satellite posts and/or pantograph with static or dynamic power distribution. Each charging point can charge at a charging power level of 20 -120 kW with dynamic control according to the available power.



#### SMALL FOOTPRINT

The highest power to footprint ratio in the fast charging market. Satellite posts can be located up to 50 meters from the C-series cabinet, giving you more flexibility to optimize the whole system layout. See one optimal layout recommendation on page 14.



#### EASY TO USE

Satellite posts are furnished with advanced cable support springs to provide a premium user experience. The intuitive and user-friendly 7" touch screen ensures a smooth and convenient charging experience.





✓ Up to 12 Kempower Power Modules in a 480kW cabinet provide dynamic charging power to selected satellite posts. Each power module creates 40 kW of charging power.



✓ Suitable for the most common DC charging standards: CCS 2 and CHAdeMO.



✓ Class-leading charging cable handling makes the charging easier for EV drivers and prevents the cable from scuffing the ground.



## OUTDOOR PARKING

Our charging solutions can easily be tailored to meet the needs of all outdoor parking areas, from small to extra large sites. Whether its just one charging station you need – all the way to a network of multiple charging satellite posts – we've got you covered.



## BUS DEPOT CHARGING

Our advanced S-series satellite charging system is the perfect match for any size of bus depot. In addition to depot charging, our DC charging converter cabinets deliver charging power using pantographs at a busline's final stop – both up or down pantographs are available.



## PARKING GARAGES

Adaptive load management and dynamic power management can be included in each building's microgrid. This enables both peak power and multiple user groups to be managed for parking garages, apartment buildings and other private facilities.



## CHARGING HUBS

In the future, gas stations will be replaced with EV charging hubs. Together, our solutions provide the perfect selection of chargers, ranging from T-series movable DC to S-series charging satellite posts.



## Charging accuracy

### with Artificial Intelligence

*ChargEye is embedded control and monitoring software that provides powerful tools over the charging network. It is a user license-based SaaS-package that includes three levels, which can be selected for various charging applications.*

In the close future, charging stations will deliver energy to all types of electric vehicles, superseding gas pumps one by one. In order to ensure flawless charging services, Kempower's charging stations are both locally controlled and remotely monitored by the all seeing ChargEye control system.

The level of connected services can be selected according to charging network size and to achieve the required accuracy. Our control software includes several algorithms that use A.I. (Artificial Intelligence) machine learning, cross referenced with recorded data to help you get the highest up-time.



#### THREE LEVELS

ChargEye has three levels to meet your remote monitoring and diagnostic needs: Basic, Advanced and Master levels. Depending on your charging application and your charging network size, you can select from a moderate to extensive selection of tools.



#### NETWORK MANAGEMENT

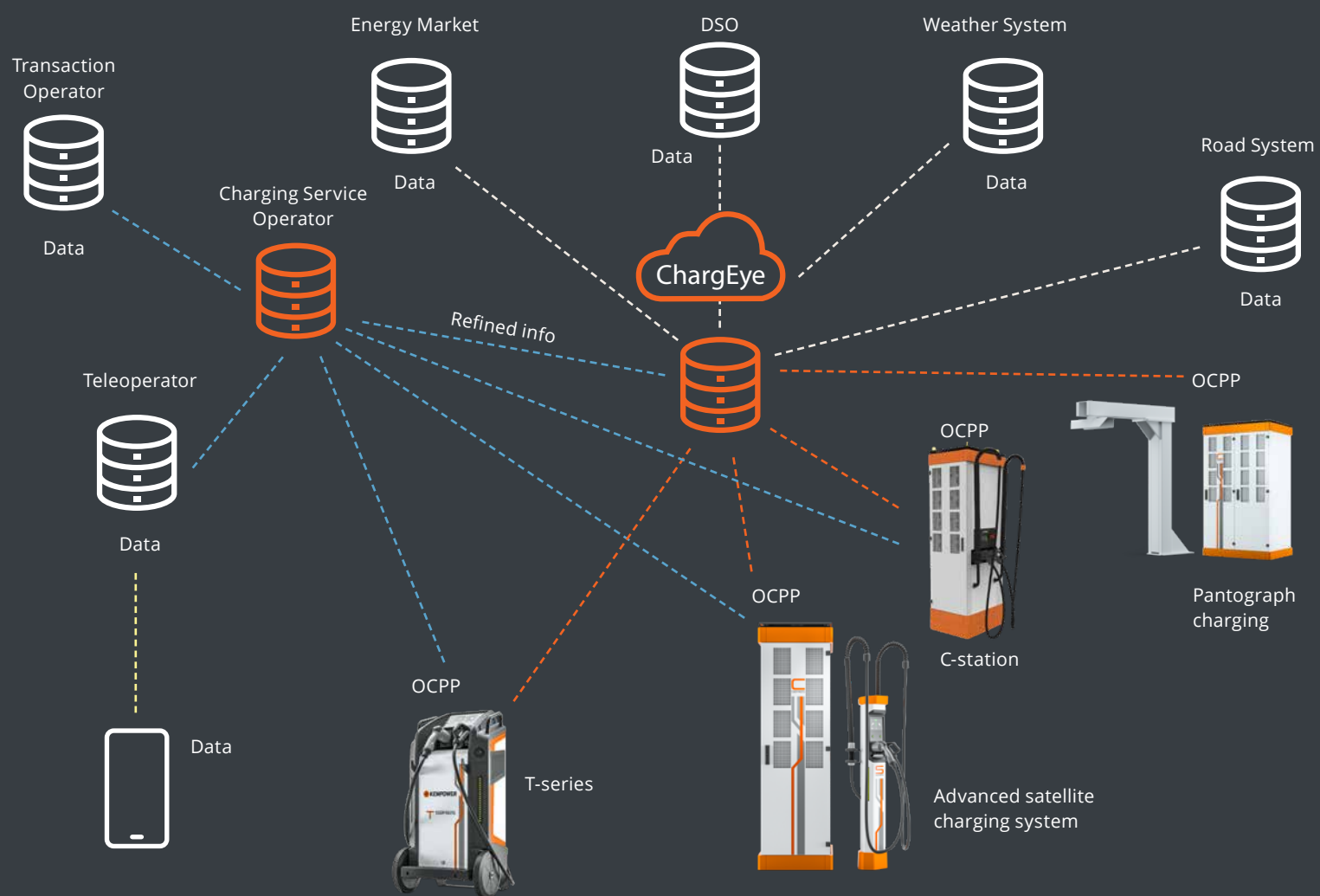
Each charger can be accessed either directly via the charging operator's backend system or using the ChargEye dashboard, which refines and displays the charging data. In both cases, communication between the server and chargers is based on OCPP.



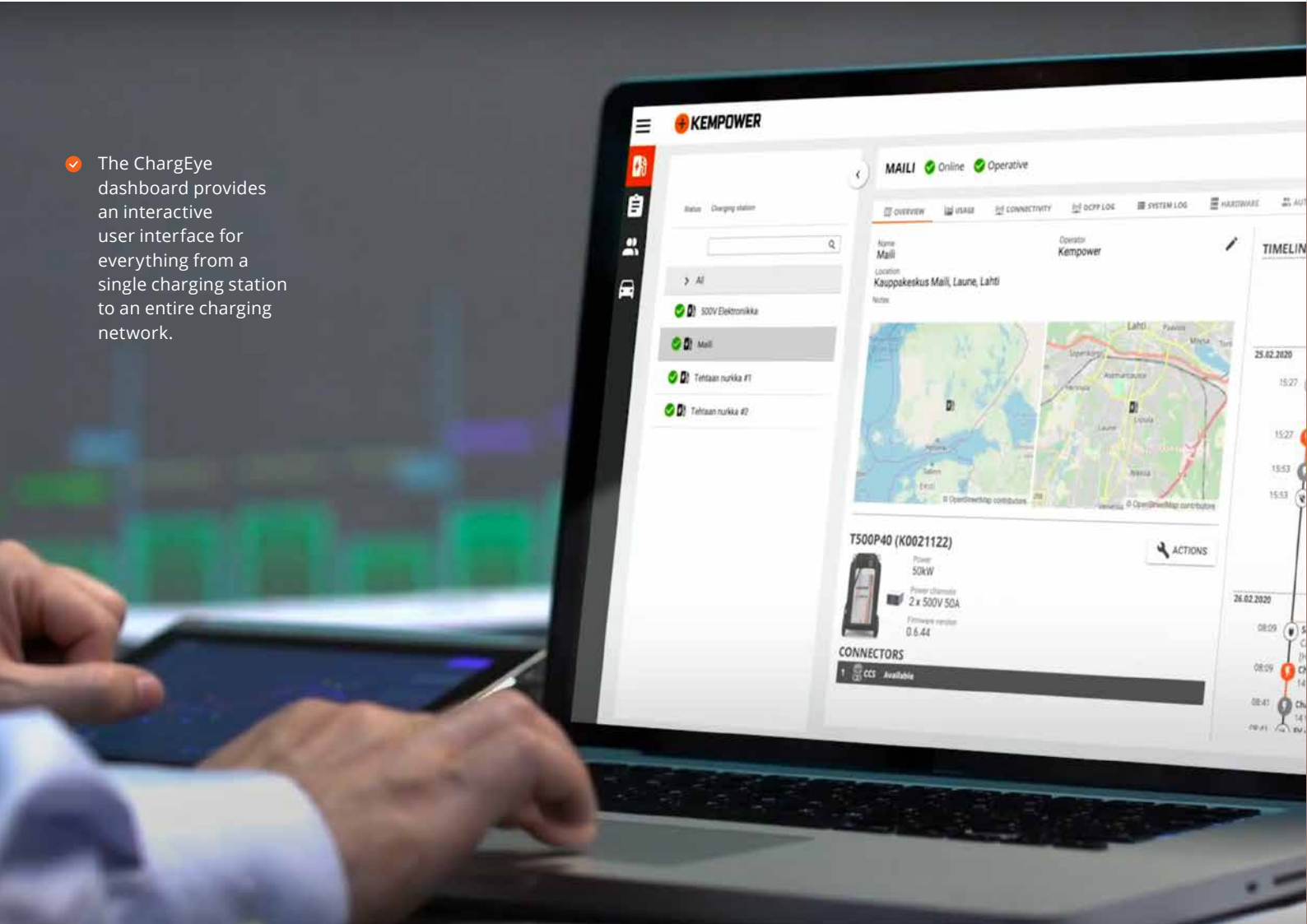
#### HIGHEST AVAILABILITY

Preventive maintenance and remote diagnostics are key elements that ensure 24/7 operation. ChargEye has remote access to each individual charger.





- ✓ The ChargeEye dashboard provides an interactive user interface for everything from a single charging station to an entire charging network.



## ChargeEye connected services

The Basic level of ChargeEye includes basic OCPP communication and dashboard access for remote charger management.

The Advanced level includes the Basic level and adds Application Program Interface (API) capability to connect the ChargeEye system to your back-end and provide refined charging information.

With the Master level you can optimize large depots or charging networks by utilizing an additional set of tools through the dashboard.

## Why is remote monitoring needed?

In most cases when a charging point has an issue, an on-site visit is not possible as the field service person is elsewhere and it would take too long for them to travel to the site.

With remote monitoring tools you can resolve over 80% of cases by either soft-booting the system or administrating the hardware. In other words, remote monitoring is faster and more cost-efficient, and it improves diagnostic accuracy and problem solving using the cumulating logs from each individual charging session.

## Key features

### Remote management and analysis

- to diagnose everything from a single charging station to large charging networks
- preventive maintenance through charger-level service records
- the dashboard scales to smartphones, tablets & laptops through a web-browser interface for authorized groups

### Authentication and connectivity

- authentication via membership RFID, Smartphone web app or Vehicle ID
- direct OCPP access or OCPP integrations via API to the charging service operator's backend systems

### Connectivity platform

- long experience of program development
- multi-server architecture for AWS service
- cyber secure for global data communication
- highest uptime >98%, including stand-alone mode during communication breaks

ChargeEye is a proven platform that is based on the Kemppi WeldEye system, which has operated since 2008 with over 3000 connected units and a high number of intensive events.

- ✓ ChargeEye has three levels, with multiple add-on features available.





Kempower Oy designs and manufactures DC fast charging solutions for electric vehicles operating in the most demanding conditions. We are a large-scale charging system supplier and our aim is a smoothly running and practical electric mobility infrastructure. With our 70 years of experience in demanding electric power supplies and our vast partner network, we always set the bar high in engineering and user-experience design. Our charging solutions are designed and manufactured in Lahti, Finland and available globally.

**[www.kempower.com](http://www.kempower.com)**