



*for a better life*

***Irizar i2e***

**100% electric bus**



A low-angle, upward-looking photograph of modern skyscrapers. The buildings feature glass facades and prominent white structural elements. In the foreground, a dark horizontal band contains the text 'Tecnología Grupo' in a white, italicized serif font. The sky is a pale, overcast blue.

*Tecnología Grupo*

# Irizar Group

The Irizar Group is a leading manufacturer of buses and coaches and sets the global benchmark for electromobility for cities, for electronics, in communications (ITS solutions) and rotating machinery.

With over 2,600 employees, the Irizar Group has bus and coach factories in five plants located in Spain, Morocco, Brazil, Mexico and South Africa. As a result of its diversification policy, the Group also owns six other companies, involved in complementary sectors, with an international presence.

The Group's headquarters are located in the town of Ormaiztegui in Gipuzkoa, Spain, where Creatio, the Irizar Group's Research and Development Centre, is also located.

With more than 127 years of history, the Irizar Group includes Irizar, Hispacold, Masats, Jema Energy, Datik, Alconza and Irizar e-mobility, with a presence on five continents. The Group is constantly growing and is firmly committed to own-brand products, technology and sustainability.



# Irizar e-mobility: the future is now

Created in 2016, Irizar e-mobility's business aims to provide comprehensive electromobility solutions for cities; both manufacturing 100% electric buses, and manufacturing and installing the major infrastructure systems necessary for charging, traction and energy storage, all with the application of the Group's 100% European technology and with Irizar's warranty and service quality.

The vehicle range includes 10.8m and 12m city buses- already operating since 2014 in various European cities - articulated or bi-articulated buses, and other electric vehicles to serve cities.

The Irizar Group aims to promote the use of clean and accessible transport and is committed to the environment and the well-being and health of people which, in turn, enables the creation of better urban environments. Particular emphasis is placed on reducing noise pollution, obtaining low energy consumption to reduce cost, and developing zero-emission vehicles. All these objectives serve to highlight the meaning of our motto, "for a better life".







emission free



100% Electric

efficient

safe

reliable

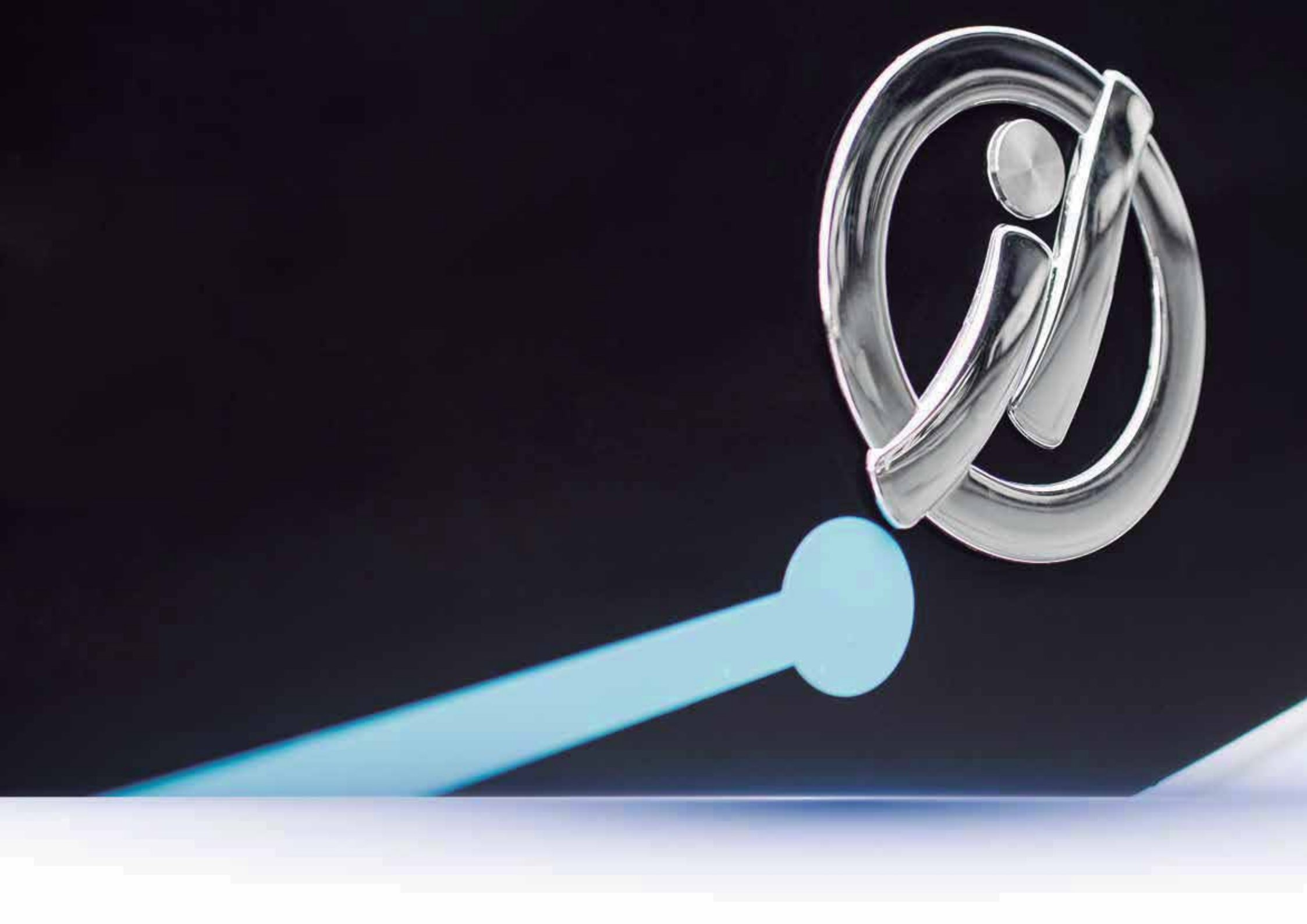
low noise

Irizar technology

for a better life

MARCEL







## Own-brand technology and design, European know-how

Irizar Group companies provide a comprehensive and independent own-brand technology to solve all those aspects involved in the design and development of products and systems which meet all European regulations, and are participating in European projects to bring it to the forefront.

**These projects bring together Irizar**, coach and bus manufacturer; **Hispacold**, producer of climate control equipment; **Jema Energy**, specialised in high-end power electronics; **Datik**, technology company developing intelligent transport solutions; **Masats**, dedicated to climate control and accessibility systems; and **Alconza**, dedicated to electrical motors and generators for the off-shore marine, hydraulic and special purpose industrial generation sectors; and the **Creatio R+D Centre**. Jointly, Irizar Group's companies promote the development of city buses and are responsible for the design, development and supply of the major components and systems of the vehicles.

As such, Irizar e-mobility's product range offers first-class technology, developed in Europe, with cutting-edge design that incorporates pioneering technical features in the sector and which have been tested by European city operators since 2014, with satisfactory results.

# Turnkey solutions

Irizar e-mobility offers turn-key projects that meet 100% of customer requirements.

In addition to conducting energy studies of the operator's routes to determine how much energy the bus will need to ensure optimal range, and planning infrastructure necessary, the company also develops charging stations, co-ordinates the works and even offers cloud-based fleet management systems and financing packages. The Irizar Group accompanies the customer throughout the project's life cycle, offering comprehensive vehicle and infrastructure maintenance.

Irizar e-mobility is currently actively involved in a European project to ensure the interoperability of electric buses by means of standardised charging infrastructures in cities.















## Irizar i2e

The Irizar i2e offers a sustainable and eco-efficient urban mobility solution and responds to the current and future needs of city transport. From the design and planning phase, the emphasis is on achieving the greatest possible energy efficiency, increasing the vehicle's range and optimising its end-of-life management.

The bus has a very low carbon footprint of 8.45g CO<sub>2</sub> eq./km.p (per passenger kilometre). Compared to a conventional combustion-engined bus, it prevents the emission of approximately 800 tonnes of CO<sub>2</sub> during its entire service life. This figure is the difference between the emissions associated with the electricity consumption of batteries and those produced by combustion engines.

The i2e's electric technology also removes the noise of the engine, enabling exterior noise emission when stopped and when starting to be virtually eliminated (0dBA), while the average noise emission of a bus with a conventional combustion engine is 68 dBA. When driving, the Irizar i2e reduces noise emission by 20%.

It uses batteries with Sodium Nickel technology which have a maximum capacity of 376kWh. In addition, the batteries have 10 years' working life as a power supply system and are 99% recyclable.



# The driver is our focus

The driver's workspace has been designed with a special emphasis on ergonomics, comfort, functionality and safety. In compliance with VDV standards, it has a large, modern dashboard with easy access to the controls of all the bus functions. In addition, a wide range of customisation options are offered.

The bus is equipped with a Zero Emissions climate control unit, with cooling (3.5 kW) and heating (8 kW) functions.

It includes pioneering technologies such as EcoAssist by Datik, a system that assists the driver in real time with the aim of reducing the vehicle's energy consumption and increasing its operating range.



# Maximum profitability

Although the initial outlay in buying an electric vehicle is higher than that for hybrid or diesel vehicles, Irizar i2e buses are cost-effective if you take into account their entire service life, as the total operating cost is similar for all three types traction. On top of this, in many cases there are tax breaks that reward the reduction in pollution and further improve the return on investment.

The key is in the sharp decrease in the fuel and maintenance costs, which are 70% lower than for conventional vehicles. When compared to these conventional vehicles, electric motors have fewer moving parts, leading to fewer breakdowns and less frequent services which results in significantly lower costs.

Furthermore, in this search for maximum profitability, the Irizar i2e also places an emphasis on reducing electricity consumption by incorporating the most innovative energy technologies, such as the EcoAssist system by Datik and the energy storage management system developed by Jema Energy.

All of this comes with Irizar's warranty coverage.







MARSEILLE  
PROVENCE  
METROPOLE

**Irizar i2e** *Le bus de l'avenir*

**100%  
ÉLECTRIQUE**  
*technologie Groupe Irizar*

i2e

**RTM**

**RTM**  
**PARTENAI**  
**DE**  
**L'INNOVATI**





# A leader when it comes to range

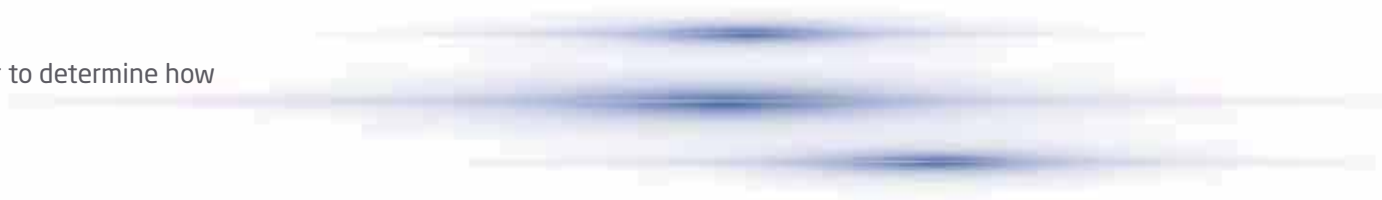
With a single charge of six or seven hours, the Irizar i2e offers a range of between 200 and 220 km at an average speed of 15-17 km/h, ensuring between 14 and 16 hours of driving in heavy city or intercity traffic conditions.

With a nominal power of 180kW, the total onboard energy in the vehicle is 376 kWh, which enables this range of over 200 kilometres to be achieved, depending on the driving cycle and weather conditions.

The bus also has a storage system capable of identifying and efficiently managing energy flows and peaks.

The buses that are currently operating commercially, along with the different tests being conducted by operators and urban transport authorities in various European cities, support our claims for these operating ranges.

Energy studies are also conducted on the operator's routes in order to determine how much energy to load in order to ensure this range.









# Safe and reliable

The Irizar i2e is the first electric city bus on the market that complies with the R.66.01 rollover safety regulations. Its rigid and robust structure is designed to withstand side-on and head-on collisions as well as to prevent lateral tipping. It includes hill hold and anti-skid control systems.

Before entering into service, the Irizar i2e has undergone stringent fatigue and durability testing to prove its reliability. Firstly, the manufacturing process of the bus is thoroughly monitored through inspections; in addition, the vehicle undergoes reliability tests equivalent

to the life of the vehicle (600,000 km and 12 years). These tests are supervised by organisations external to Irizar and take place at the Idiada track.

We have more than 127 years' of experience in manufacturing buses and coaches which have, for over 20 years, operated on the five continents in diverse weather and road conditions, along with the knowledge and experience of the Group's companies and technological centres.





## Comfort and entertainment

The Irizar i2e has been designed so that passengers enjoy a sense of comfort, calm and quiet. It offers the same interior climate control as the rest of the Irizar range, as well as a noise-free atmosphere.

It has electric doors and different opening options, automatic safety sensors, internal emergency devices, etc., which are combined with access ramps for persons with reduced mobility (PMR). The “kneeling” function, to give step heights of between 250-270 mm, enables comfortable and effortless access to the bus.

For your entertainment, Irizar enables the installation of a wide range of solutions, such as USB charging points, WiFi, Braille buttons, luggage racks, passenger information, interior vinyls, and more.

# Connected vehicle

## iPanel. Fleet management by Datik

The iPanel fleet manager from Datik offers the most advanced technology to provide customisable solutions according to the needs of the business model. iPanel services are tailored to be integrated into the client's processes, helping them with decision-making in order to optimise the fleet's performance and profitability.

Thanks to our fully customisable fleet management system, our customers can optimise the performance and profitability of each fleet, in addition to closely monitoring costs and efficiency and providing safety during operations. Datik products and services are designed for commercial fleets of all sizes.







### **Cost reduction**

Intelligent information enables better planning of driver training, the purchase of vehicles and routes to be operated, thus reducing energy and improving the competitiveness of the service.

EcoAssist reports system data which can enable energy reductions, helping to identify sections of routes where more instructions are provided to the drivers.

Control of energy. Specific data on the exact energy cost per route which enables future calculations to be made, and automatic reports that identify areas of improvement for reducing consumption.



### **Safety while driving**

The manager includes a solution for monitoring driving hours which prevents the risks of fatigue and fines for violations and for monitoring compliance of speed limits along the route.

Furthermore, the iPanel enables speed limits to be configured by zones, controlling excess speed violations during the route.



### **Anti-vandalism**

iPanel has on-board video surveillance cameras in permanent operation to record activity both inside and outside of the coach with intelligent labelling for quicker searching of the most relevant moments of the recording.

The anti-theft device that warns of any attempt to steal the bus.



### **Passenger information**

iPanel provides information on routes, punctuality, incidents and advertising both on the mobile phones of the supervisors themselves, as well as on large anti-vandalism multimedia screens located at stations and multimedia screens located inside the vehicle.



### **Information to the traffic operator**

The traffic operator uses the manager to find out the location of the fleet and the incidents that may affect the planning of services, monitoring punctuality in order to support the configuration of the transport offer and exchanging messages between the control centre and drivers, providing relevant information in order to optimise the service.

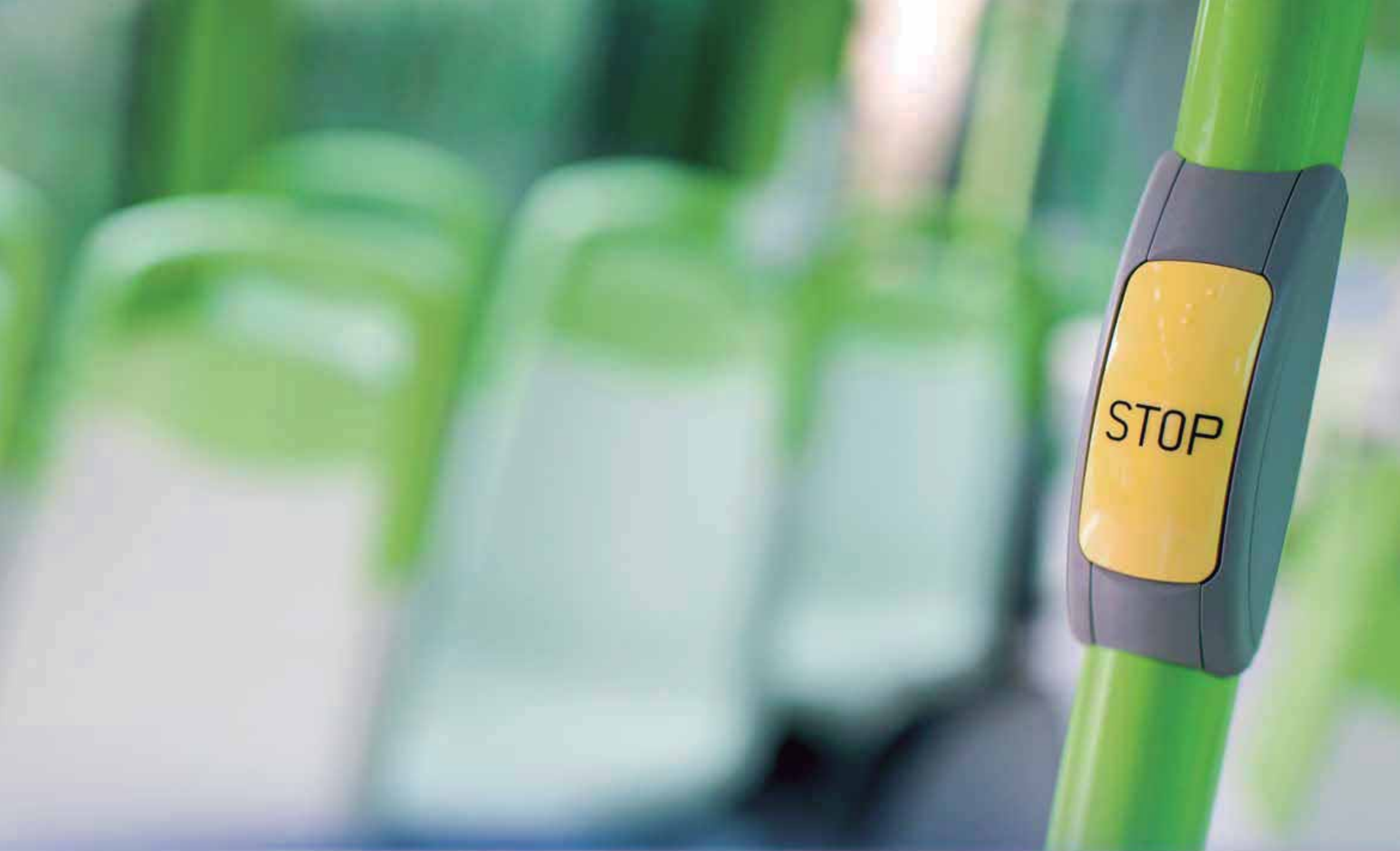
# A bus tailored to your needs

The electric buses feature an innovative modular structure and different solutions that offer optimum flexibility and ability to adapt to the different needs of operators.

As such, the customer is provided with a large variety of alternatives, among which the following are worth highlighting:

- Number of batteries
- Passenger door options
- Charging strategies
- Types of seats
- Rear ends
- Fold-down seats
- Exterior advertising boards
- WiFi
- USB chargers
- Luggage racks
- Xenon lights
- Passenger counter
- External loudspeaker
- Alcolock system
- iPanel







# Visionary energy management

Different charging solutions are available designed by Jema Energy, a Group company with 60 years' experience and knowledge in the field of industrial power electronics offering robust, reliable, safe and high-performance solutions... solutions that provide the best options for the different conditioning factors customers face in terms of power limits, as well as space and operating restrictions.

Irizar e-mobility advises on the different possibilities for designing the charging strategy depending on four key factors: the state of charge of the vehicle when it enters the depot, time available for charging, number of buses requiring charge and power available for charging.



### Smart charging control unit

This is a control centre that efficiently manages all charging conditions/restrictions in the depot. The system identifies the different charge requirements of each bus in order to optimise the total power required.

### In-depot charging

The easiest and most traditional way of charging, in which the operator connects the charger to the bus with a type 2 cable. Available for use outdoors as well as indoors.



100kW DC Charger	Indoor	Outdoor
Output power (Pnom)	100kW	80kW
AC Voltage	400 V AC 3F + N + T	
Max input current	152A	132A
Frecuency	50/60 Hz	
Output voltaje range (Vnom)	410-900 Vdc	
Operating temperature at nominal power	-5°C a +45°C	-20°C - +50°C
Relativ humidity	10% - 95% without condensation	
Dimensions (h x w x d)	1900x800x800 mm	1850x1200x900 mm
Weight	970 Kg	1000 Kg

### Pantograph charging

Recommended when the vehicle does not have sufficient range to complete the journey and it is necessary to charge vehicles during travel as well as in the depot.

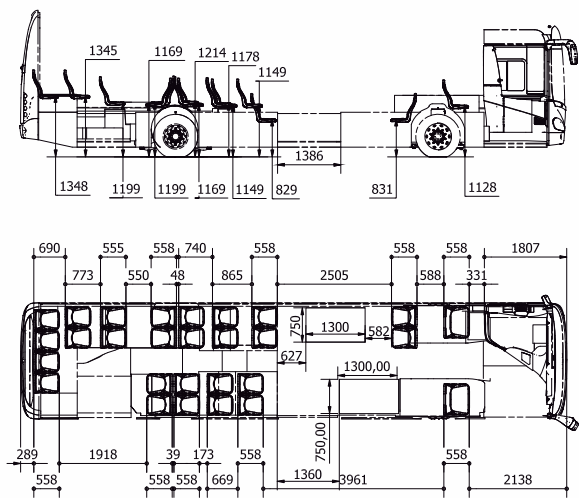
The charging stations are located at strategic points throughout the cities, at the end or start of each line, in order to charge/supply several buses or lines.

500kW DC indoor charger	
Output power (Pnom):	500kW
AC Voltage:	260V AC 3F + N + T
Max input current:	1200A
Frecuency:	50/60 Hz
Output voltaje range (Vnom):	400-850 Vdc
Operating temperature:	-10°C +50°C at nominal power
Relative humidity:	5% - 95% without condensation
Dimensions (h x w x d):	2000x2800x750 mm
Weight:	1850 Kg

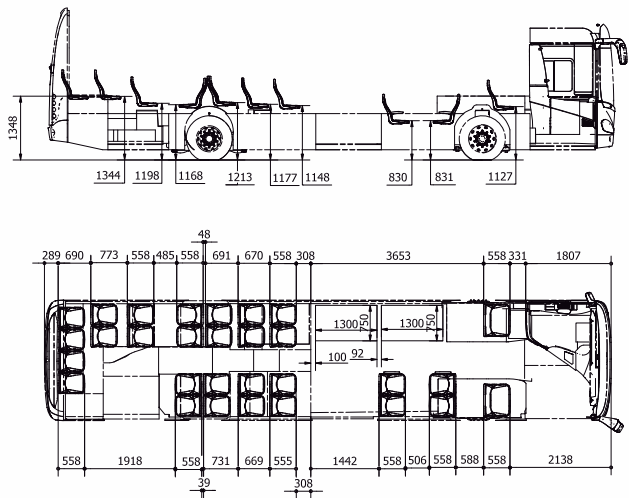


# Seats distribution Irizar i2e 12m

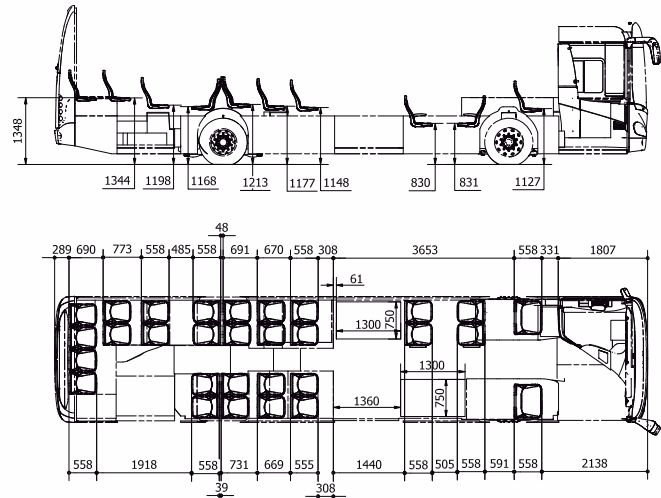
## 3-door access



No. of doors:	3
PRM zone:	2
No. of seats:	28
No. of standees*	
Total no. of passengers:	Maximum 75
	Comfort 56



No. of doors:	3
PRM zone:	2
No. of seats:	30
No. of standees*	
Total no. of passengers:	Maximum 75
	Comfort 57



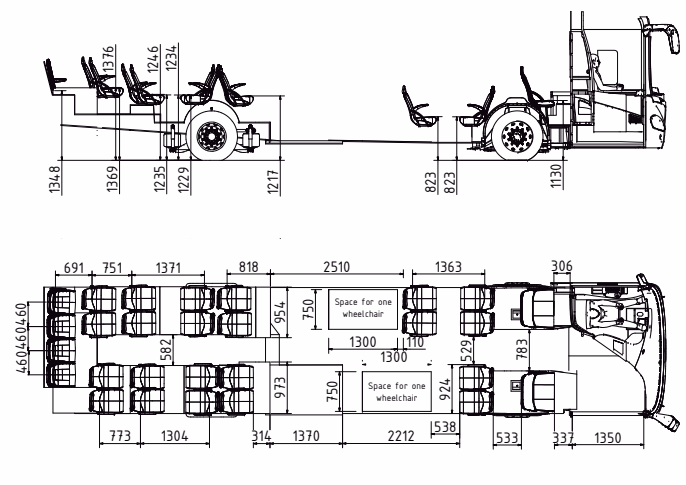
No. of doors:	3
PRM zone:	2
No. of seats:	30
No. of standees*	
Total no. of passengers:	Maximum 75
	Comfort 57

\*No. of standees - Data varies depending on the MAM of each country and the number of batteries installed on the bus (as a guideline):

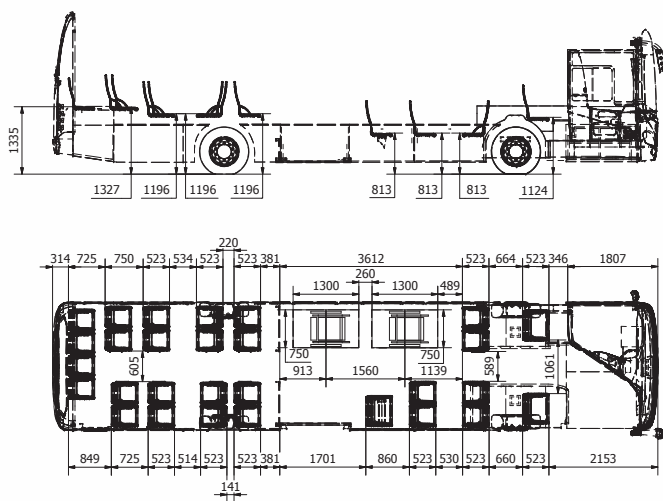
With 12 batteries - 57 standees | With 13 batteries - 51 standees | With 16 batteries - 45 standees



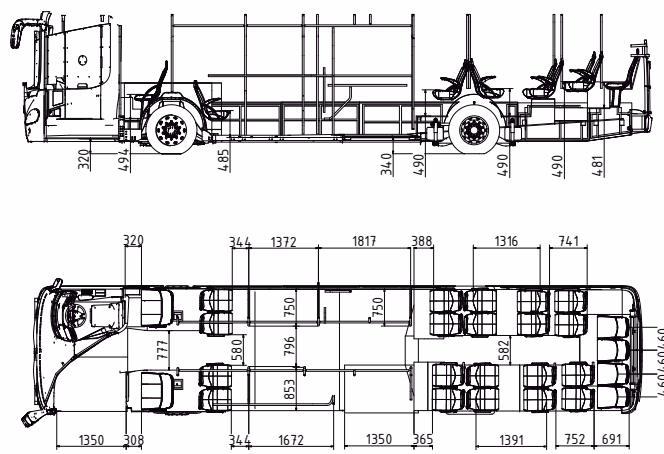
2-door access



No. of doors:	2
PRM zone:	2
No. of seats:	28
No. of standees*	
Total no. of passengers:	Maximum 75
	Comfort 63



No. of doors:	2
PRM zone:	2
No. of seats:	29
No. of standees*	
Total no. of passengers:	Maximum 78
	Comfort 62



RHD

No. of doors:	2
PRM zone:	1
No. of seats:	26
No. of standees*	
Total no. of passengers:	63

Please enquire for other distribution possibilities.

# Technical data

<b>Length (Axles)</b>	11,980 mm (2 axles)
<b>Height</b>	3,209 mm
<b>Width</b>	2,550 mm
<b>Wheelbase</b>	5,770 mm
<b>Front / rear overhang</b>	2,805 mm / 3,405 mm
<b>Standing height in aisle</b>	2,400 mm
<b>Floor height</b>	340 mm
<b>Lead angle</b>	6.5°
<b>Trailing angle</b>	7°
<b>Step height</b>	<b>Door 1:</b> 250 mm (320 mm without kneeling) <b>Door 2&amp;3:</b> 270 mm (340 mm without kneeling)
<b>Low - floor</b>	
<b>Passenger capacity</b>	<b>Maximum capacity: 82</b> (2 doors, 13 batteries, 2 wheelchairs, 30 seats and 50 standees) <b>Minimum capacity: 60</b> (2 doors, 12 batteries, 1 wheelchairs, 26 seats and 33 standees)
<b>One or two wheelchairs areas</b>	
<b>Four seats for reduced mobility people</b>	
<b>Anti-graffiti materials</b>	
<b>Driver's seat according to VDV</b>	
<b>From two to three double doors</b>	
<b>Bolted aluminum structure (roof and sides)</b>	
<b>Floor structure</b>	High quality steel
<b>Wheelchair electric ramp</b>	
<b>Possibility of assembling cantilever seats at the front</b>	
<b>LED Internal and external illumination</b>	
<b>Exterior trimming replacement</b>	
<b>Double glazed windows</b>	
<b>Acoustic isolation (roof and sides)</b>	
<b>Creepage function</b>	Start assist
<b>Hillholder function</b>	Maintains the bus stopped on slopes before going backwards

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**Electromagnetic compatibility regulation R10****EcoAssist**

Efficiency mode indicator

**Eco-mode**

Smart management for the climate once the bus is switched off

**Compliance with fire-resistance regulation 118R****Door width****Door 1:** 1,200 mm**Door 2:** 1,200 mm**Door 3:** 1,050 mm

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**Turning diameter**

20,870 mm

**Maximum weight front axle**

7,500 Kg

**Maximum weight rear axle**

12,600 Kg

**Powertrain****Manufacturer:** Siemens**Type:** Synchronous**Power (nominal):** 180kW**Rated torque (nominal):** 1,400Nm

Traction capacity even on 18% maximum slopes

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**Energy storage system**

## Batteries

Sodium Nickel technology

**Nominal voltage:** 600V/650V**Total capacity:** 282-376 kWh depending on the number of batteries

## Recharging

Standard combo 125A plug

**Recharging time:** 6-7h

Customized energy storage management

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**Climate system****Driver:** Hispacold Zero Emissions climate system

(cooling:3,5kW, heating: 8kW)

**Passenger:** Hispacold Zero Emissions climate control system

(cooling: 35, heating: 28kW)



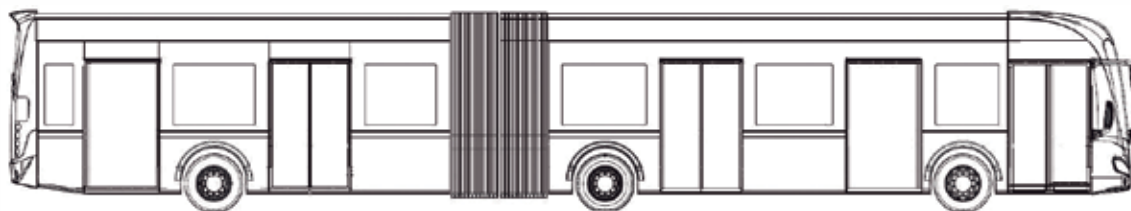
# Irizar i2e

Irizar e-mobility's 18 m articulated bus

100% electric

The Irizar i2e is a new urban mobility solution for transporting a greater number of passengers. An 18m vehicle with a 100% electric engine that integrates the Group's major components and technology systems.

It incorporates the most advanced active safety systems on the market, making it a perfect alternative to the tram as far as flexibility, operating capacity and cost are concerned.



## Irizar i2e - 18 m

### DIMENSIONS

<b>Lenght</b>	18.73 m
<b>Width</b>	2.55 m
<b>Height</b>	3.30 m
<b>Wheelbase 1</b>	5.98 m
<b>Wheelbase 2</b>	6.54 m
<b>Front / rear overhang</b>	2,805/3,405 mm
<b>Standing height in aisle</b>	2.40 m
<b>Doors width</b>	1.2 m
<b>Min free door height</b>	2.1 m
<b>Step height, bus 1</b>	250 mm (320 mm without kneeling)
<b>Step height, bus 2</b>	270 mm (340 mm without kneeling)
<b>Doors</b>	3 to 5 doors
<b>Passenger capacity</b>	156 (35 seats + 120 standees + 1 wheelchair + 1 pram) 5 doors. Class I 153 (49 seats + 103 standees + 1 wheelchair + 1 pram) 3 doors. Class I
<b>Structure</b>	Bolted aluminium

### POWERTRAIN

<b>Motor</b>	Alconza (Irizar Group) Power 235kW (nominal) Rated torque 2,300Nm (nominal) Traction capacity even on 18% maximum slopes
<b>Axle 1</b>	ZF RL 82 EC independent (2 + 2 shock absorbers and air bellows)
<b>Axle 2</b>	ZF AVN 132 (4 + 4 shock absorbers and air bellows)
<b>Axle 3</b>	ZF AV 133 80° (ratio 1:7.36) (4 + 4 shock absorbers and air bellows)
<b>Brakes</b>	Wabco EBS3 brake system Knorr ventilated discs and calipers
<b>Suspension</b>	Wabco ECAS4 suspension system Koni shock absorbers
<b>Steering</b>	ZF Servocom 8098
<b>Rims</b>	Standard: Alcoa Level 1 8.25"x22.5" Optional: Alcoa Durabright Black Tag 8.25"x22.5"
<b>Tyres</b>	Standard: Continental Urban HA3 M+S 275/70-22.5 Optional: Michelin HLZ M+S 275/70-22.5
<b>Articulation and bellows</b>	Hübner Hgmk 19.5
<b>Batteries</b>	90-150 kWh (depending on the configuration)
<b>Recharging</b>	Standard Como 125A Plug Conductive opportunity charging via pantograph Charging time: Fast charge 5-10mins ; slow charge 3h Maximum charge power: 500kW Customized energy storage management

### EQUIPMENT

- Masats electric doors
- Door 1: Double inwards
- Doors 2 and 5: simple sliding
- Doors 3 and 4: Double sliding
- Separate Hispacold climate system. Driver (manual) and passengers (automatic)
- Operation aid system (OAS) pre-installed
- CCTV cameras pre-installed
- Sign and stop buttons
- Closing and ticket machine preparation
- LED internal and external illumination
- Venus simple windows
- LED front, side and rear indicators
- Preheater during the charge
- Wheelchair electric ramp: Masats RT1 1300 automatic with manual inlock and drive
- Reversing camera
- Creepage function (start assist) and Hillholder function (maintains the bus stopped on slopes before going backwards)
- Compliance with magnetic compatibility according to 95/54
- EcoAssist by Datik, efficiency mode indicator
- Eco-Mode: Smart management for the climate system once the bus is switched off
- Seats: Driver seat: Isri 6860/875NTS  
Passenger seats: Different possibilities





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