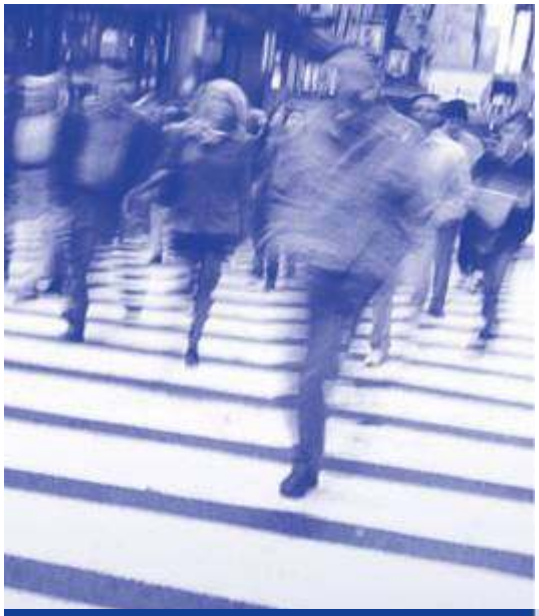


CiViTAS
Cleaner and better transport in cities

ARCHIMEDES
AALBORG • BRIGHTON & HOVE • DONOSTIA - SAN SEBASTIÁN • IAŞI • MONZA • ÚSTÍ NAD LABEM

Brighton & Hove

T2.1 – Electric Vehicle Charging Points

Brighton & Hove

May 2011

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Project no.	TREN/FP7TR/218940 ARCHIMEDES
Project Name	ARCHIMEDES (Achieving Real Change with Innovative Transport Measure Demonstrating Energy Savings)
Start date of the Project	15/09/2008
Duration:	48 months
Measure:	No. 2
Task:	T 2.1
Deliverable:	Electric Vehicle Charging Points
Due date of Deliverable:	15th June 2010
Actual submission date:	15th May 2011
Dissemination Level	Public
Organisation Responsible	Brighton & Hove City Council
Author	David Low
Quality Control	Alan Lewis
Version	1
Date last updated	17th May 2011

Contents

1. Introduction

1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for CIty-VITAlity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme);
CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and
CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

Objectives:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

Horizontal projects support the CIVITAS demonstration projects & cities by :

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

Key elements of CIVITAS

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living ‘Laboratories' for learning and evaluating

1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

1.3 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

1.3.1 Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:

- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the public transport company features as a partner in the proposed project.

2. Brighton & Hove

Brighton & Hove is an historic city, in the south-east of England, known internationally for its abundant Regency and Victorian architecture. It is also a seaside tourist destination, with over 11km of seafront attracting eight million visitors a year.

In addition, it is a leading European Conference destination; home to two leading universities, a major regional shopping centre, and home to some of the area's major employers. All of this,

especially when set against the background of continuing economic growth, major developments across the city and a growing population, has led the city council to adopt a vision for the city as a place with a co-ordinated transport system that balances the needs of all users and minimises damage to the environment.

The sustainable transport strategy that will help deliver this vision has been developed within the framework of a Local Transport Plan, following national UK guidelines. The ARCHIMEDES measures also support the vision, which enables the city to propose innovative tools and approaches to increase the energy-efficiency and reduce the environmental impact of urban transport.

3. Background to the Deliverable

Before the start of the CIVITAS project in September 2008 there were no on-street Electric Vehicle Charging Points located in the Brighton & Hove City Council (BHCC) Area. The CIVITAS project has enabled the installation in Brighton of the first on-street charging points in England, outside of London.

3.1 Summary Description of the Task

The activities described in this deliverable relate to task 1.4 which is the only task within ARCHIMEDES measure 2. The aim was to install ten (subsequently reduced to eight through budget constraints) Green Electric Vehicle Charging Points in the CIVITAS area. They would be powered by sustainably-generated electricity.

The measure was intended to help realise the potential for densely located fuelling stations to encourage the take-up of alternative fuels and to test the belief that scarcity of supply is holding back the wider take up of electrically powered vehicles.

4. Electric Vehicle Charging Points

4.1 Description of the Work Done

This section provides an overview of all work completed within this task.

- September 2008 to September 2009 – identification of sites for the charging points, liaison with the UK Department for Transport (DfT) to arrange authorisation for the signing and lining necessary for the EV charging point bays, and the selection of the supplier of the charging points.

- October 2009 to January 2010 – installation and commissioning of the first four charging points in two separate locations, agreeing the contract for the administration of the scheme, development of the user registration scheme.

- February 2010 to date – on-going running of the scheme using the four existing charging points and working towards the installation of another four charging points at two new locations.

4.2 Summary of Activities Undertaken

Research indicated that there was only one company in the UK, Elektromotive Ltd, with experience of installing on-street charging points at the time. Please see Appendix 2 for specifications and technical details of the charging points. The charging points supplied by Elektromotive are slow charge points and it is exclusively these that have been installed in the Brighton area. Following the city council's written procurement procedure, an official waiver report, allowing the placing of a contract with Elektromotive without seeking competitive tenders, was agreed and signed off by the Director of Environment and the Cabinet Member for Environment.

The decision making process on the possible locations took as a starting point the need for the charging points to be situated within the CIVITAS area of Brighton. Consultation and meetings were arranged with officers from Transport and other divisions within the city council to arrive at a number of possible locations. Following on from this process, a list of recommended sites was compiled and site visits were arranged to assess their suitability.

The criteria adopted for selection of sites was that they should be:

- Located within the CIVITAS corridor of Brighton.
- Highly visible so as to promote to potential users the concept of using electrical vehicles.
- Easily accessible to users who may also be visitors to the city.
- Situated close to an available electrical supply.
- Have sufficient footpath width to be safe for users, and to allow pedestrians to continue to safely pass by after the charging points had been installed.

Following this evaluation process four charging points were installed in Brighton during September / October 2009. Two charging points were installed in Bartholomews in central Brighton which is close to Brighton Town Hall, and two charging points installed in Ditchling Road which is opposite The Level. There was an opening ceremony for the Bartholomews charging point location attended by Councillor Mary Mears, (Leader of the Council), and Councillor Geoffrey Theobald, (Cabinet Member for Environment). The opening ceremony attracted widespread publicity for the charging points, with articles appearing in both the local and national press and also on local television

The installation of four more charging points took place in January 2011. Two have been located in Madeira Drive which is on Brighton seafront by the pier, and two in Withdean Road just outside Withdean athletics stadium which, until summer 2011, was the home of Brighton & Hove Albion Football Club. The connection of power to both the Madeira Drive and Withdean Road charging points is currently in progress, and awaiting completion by BHCC's electricity contractors and suppliers. When this connection process has been completed then the charging points will be made operational and available for use by the public. A map showing all sites is provided in Figure 1.

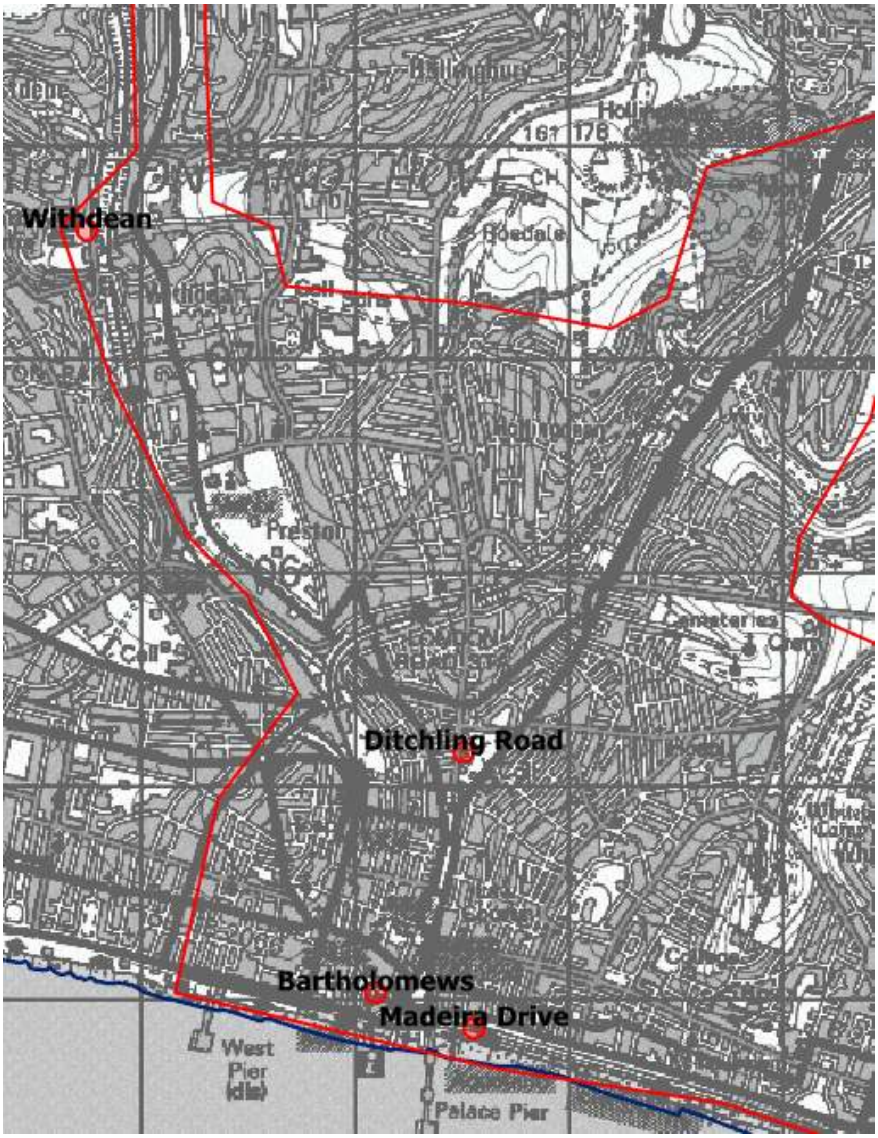


Figure 1: Map of Electric Vehicle Charging Points in Brighton & Hove *Not to scale, source: © Crown Copyright. All rights reserved. Licence: 100020999, Brighton & Hove City Council. 2011.© Cities Revealed*

Elektromotive Ltd, the supplier of charging points to the project, also offered to act as the administrator for the scheme, for a fixed annual fee. Their service would cover the processing of user applications, the issuing of equipment and dealing with routine enquiries from users. It was felt that this would be more efficient than using resources from within the council so this was the approach followed by BHCC.

4.3 Main Outcomes

Following the start of the scheme in February 2010, the number of registered users has steadily grown as shown in Table 1. The scheme is administered on behalf of the city council by a local company, Elektromotive Ltd, who are also the suppliers of the charging point infrastructure. To enrol in the scheme potential users either contact Elektromotive Ltd directly, or make contact through the council, and request an application form which is then emailed or posted to them. They fill in the form and return it to Elektromotive, with a copy of the vehicle's registration (V5) document. This gives their details and confirms that the vehicle is a valid EV or plug-in hybrid vehicle and so eligible to join the scheme. Elektromotive will then post access keys to them, a

set of instructions, and a coiled yellow cable with the appropriate connectors fitted to connect the vehicle to the charging point. When they have received these, the users can then use the charging points in the Brighton area completely free of all charges.

Month/Year	New registrations	Total registered users
February 2010	3	3
March 2010	1	4
April 2010	1	5
May 2010	0	5
June 2010	1	6
July 2010	0	6
August 2010	1	7
September 2010	1	8
October 2010	1	9
November 2010	3	12
December 2010	0	12
January 2011	1	13
February 2011	0	13
March 2011	2	15
April 2011	3	18

Table 1: Users of Electric Vehicle Charging Points in Brighton & Hove

Figure 2: Charging Point in Bartholomews Brighton

Figure 3: Charging Point in Ditchling Road, Brighton

Records of the actual usage of the four charging points currently operating is manually downloaded on a regular basis. The baseline for monitoring purposes commenced on 25/03/2010, with the first set of usage figures produced on 15/08/2010, and the data available at the time of writing covers the period to 14/01/2011 (see Table 2).

Period of operation	**Days of operation**	**Power used (kW)**	**Recharging time (hours)**	**Total Transactions (recharges)**
25/03/2010 to 15/08/2010	140	256.19	210.80	74
15/08/2010 to 14/01/2011	152	213.68	312.13	120

Table 2: Electric Vehicle Charging Point Usage

4.4 Problems Identified

The first four charging points were ready for use at the end of September 2009, but were not immediately available to users, as the details of the membership scheme were still being worked on. At the same time the contract with Elektromotive Ltd was being developed, and the contract went through a number of iterations with a variety of changes being put forward for discussion by both sides. The agreed contract sets out that, in return for an annual payment by the city council, Elektromotive will administer the scheme on our behalf. They also act as the daily point of contact with members and operate a help line to deal with any queries relating to the scheme. The contract with Elektromotive Ltd was finalised, and details of the user's membership scheme completed, in time to start signing up users to the scheme from February 2010.

Although the scheme has been operating from February 2010, the take up by users so far, as measured by registrations and usage, has been relatively slow. The slow take up of the infrastructure by EV users may be due to a lack of availability of up to date electric vehicles in the UK. However, a range of electric vehicles are now increasingly coming to the marketplace from mainstream manufacturers, so this should change.

The latest round of charging point installations was completed by Elektromotive at the end of January 2011, but there have been delays with the connection to electricity or the installation of an electricity meter by the respective electricity suppliers. Previously EDF arranged the electrical connections and then also acted as BHCC's electricity supplier. This simplified the process as the same company (EDF) connected the charging points to a convenient supply, installed an electricity meter and then supplied us with the electricity. The situation has now changed and while the provider of all new electrical connections in the Brighton & Hove area is UK Power Networks (formerly EDF Energy networks), the electricity supplier to the city council, who also has responsibility for meter installation, has changed and this is now Scottish & Southern Energy (SSE). This change of supplier came about when Brighton & Hove City Council recently decided to switch the supplier for their electricity. Changes of this nature should not affect the future of the EV project as Brighton & Hove City Council continues to require that all electricity used is 100% sustainable.

4.5 Mitigating Activities

To make the EV charging point scheme more attractive to potential users, the decision was taken early in the life of the project to make registration and usage of the charging points completely free of charge. The initial registration of the user to the scheme, with the supply of access keys, charging cable and parking permit are all free of charge. In addition, while the user's vehicle is recharging at a charging point, the electricity consumed is also supplied free of charge and there is no charge made for parking in the bay. All of these costs are currently funded through the CIVITAS project and this is expected to continue until the end of the project in September 2012.

From the beginning of the CIVITAS initiative in September 2008, the Electric Vehicle charging point project has been extensively reported by the local press (see examples in Appendix 1). The launch ceremony when the first charging points became operational received wide coverage in both local and national press and on local television.

Since then, there have been many items following the progress of the project by the press. In particular there were three events which received widespread coverage in the local and national press and also on TV along with the use of the charging points in Brighton. The 2010 Madeira Drive annual speed trials in Brighton contained a number of high performance electric vehicles and these were given access to the charging points. The London Future Car Challenge, featuring low-energy impact vehicles, set off from Brighton, as did the Bridgestone Eco Rally, and the charging points were made available to electric vehicle users for both events.

As part of the CIVITAS dissemination a short film promoting the EV charging points to the business community was made which can currently be viewed on YouTube. This emphasised the cost savings to be made, and the environmental advantages of using electrically powered vehicles for use in towns and cities. There are plans to promote this film through other appropriate sites in the near future. The media interest and coverage has even extended across the English Channel, as France 3 TV recently travelled to Brighton to film a news item about the charging points.

4.6 Future Plans

The Third Local Transport Plan (LTP3) for Brighton & Hove contains an allocation of £25,000 for 2011/12, for the ongoing expansion of the EV charging point network. This amount will be sufficient to enable another 2 charging points to be installed at a new location within the city. This allocation is purely capital funding and is therefore not intended to cover running costs, which are currently being funded through the CIVITAS budget. When the CIVITAS project ends in 2012 another source of revenue funding will need to be identified if the project is to continue. The process of identifying possible sites for the charging points will be starting shortly, and this will be followed by consultation with local councillors and other stakeholders to determine the preferred location. Some charging points in Brighton have been installed in locations which were formerly Pay & Display and this has resulted in a potential loss of parking revenue. More recently, locations selected for new charging points have avoided this situation by using sites where there would not be a loss of parking revenue to the city council,

Following on from the Brighton & Hove initiative, a number of other local authorities (West Sussex, Hampshire, and some parts of East Sussex) in the surrounding area have come together in a South Coast network to install EV charging points in both on and off-street locations. BHCC are exploring how it might be possible to allow access to the charging points in Brighton to users registered in the South Coast network scheme, and how in turn Brighton & Hove users could access the charging points installed by the South Coast network.

Appendix 1: Examples of Dissemination

Press release **Friday, 10 September, 2010**

Speed trials go electric

Brighton hosts another first this weekend when an electric vehicle will take part in the annual speed trial event on Madeira Drive.

Before that two Tesla Roadsters, driven by Gian Avignone, Tesla Motors UK Sales and Marketing Manager and Keith Robertson, 2009 Britcar Champion, will be driven down from London to Brighton, proving that commuting to the capital using an electric vehicle is now a real possibility.

The council is providing an electric vehicle charging point, known as an Elektrobay, for one of the Teslas to charge up ready for the speed trial which takes place from 11am tomorrow, Saturday 11 September. Although the Roadster has ample charge for this return journey, it will refuel during the day to demonstrate the convenience and ubiquity of urban charging points.

Organised by the Brighton & Hove Motor Club, the speed trials event first took place in 1905 which makes it the longest running motorsport event in the world.

Brighton's Elektrobays, produced and installed by Brighton-based Elektromotive, the world's leading manufacturer of electric vehicle charging points, are in Bartholomews (next to Brighton Town Hall) and Ditchling Road (opposite The Level open space).

Electric Vehicles produce zero emissions on the road and offer substantial advantages over conventional vehicles in terms of air quality for town and city centres.

Brighton & Hove City Council has recognised these benefits and has installed four on-street Elektrobays, with plans to install another four in two other locations across the city.

guardian.co.uk

Brighton & Hove aims to become UK's most electric car-friendly city

Street chargers installed to motivate drivers to switch to electric

Adam Vaughan
guardian.co.uk, Tuesday 29 September 2009 17.49 BST

A

A G-Wiz electric car charging in London from a Juice produced by Elektromotive which is now installing similar on-street charging points in Brighton. Photograph: David Pearson/ Rex Features

Not content with trying become self-sufficient in food, possibly electing the first Green party MP and weaning itself off oil as a Transition Town, Brighton & Hove is launching a bid to become one of the UK's most friendly cities for electric cars.

This week the city sees a major investment in electric car charging infrastructure, with the installation of four street-side charging stations and a further 16 completed by the end of 2010. The charging stations, which are vital to create a viable charging network for electric cars that mostly have a range of less than 100 miles, will reportedly be the first street-side points outside London.

The capital currently has more than 100 on-street charging stations, and in April mayor Boris Johnson said he wanted London to become the electric car capital of Europe with 25,000 stations and 100,000 electric vehicles. Other cities such as Bristol and Gateshead have existing public charging points but only in car parks.

Brighton-based charging company Elektromotive has already completed installation of the first four Brighton & Hove pilot sites. The first 10 stations will be paid for by £130,000 from clean transport initiative Civitas, which is part-funded by the EU.

Calvey Taylor-Haw, managing director of Elektromotive, said: "By encouraging drivers to switch to electric, Brighton will benefit hugely. There will be less air pollution and local residents will appreciate the quiet of electric vehicles. The installation of the bays will take place over a short period of time, providing electric vehicle users with rapid access to charging facilities."

The bays work with a standard mains plug and wireless key fobs that open the charging stations, which recharge cars within four to eight hours. Electric car owners will pay an annual fee to Brighton & Hove council for a registration scheme to access the network, pricing for which is unconfirmed but is expected to be in the region of £75-100 to join and £30-50 annually.

The scheme has come in for some criticism on The Argus local newspaper website, with users commenting on the fact that there are only three electric cars in the city. A fact confirmed by Taylor-Haw. Electric car owners, who already enjoy a 50% discount on


2 City News November 2009 www.brighton-hove.gov.uk

We're streets ahead on electric cars

Calvey Taylor-Haw, managing director of elektromotive, and council leader Mary Mears launch the new on-street charging points in Bartholomews in the city centre.

The council is leading the way with plans for a network of electric car charging points on the city's streets.

The first is up and running in Bartholomews, near Brighton town hall.

It's hoped to have 10 in operation by the end of the year, including two on Ditchling Road near The Level.

The charging points are being installed by local company elektromotive.

The council is the first outside London to install public on-street charging points for electric cars.

The move is aimed at encouraging more people to drive environmentally-friendly electric cars and is part of the council's commitment to sustainable transport.

Council leader Mary Mears said: "These new charging points will benefit residents, visitors and local businesses.

"Electric vehicles produce zero emissions and so are much better for air quality in town and city centres than traditional petrol and diesel vehicles.

"As well as the environmental benefits, fluctuations in oil prices have also increased interest in electric cars."

The council already uses two electric-powered vehicles to collect recycling in narrow streets in the city centre.

And the mayor's official car is a hybrid, switching between an electric motor and petrol engine depending on driving conditions.

It's the business!

Want to do business here? If so, come to the Brighton & Hove Business Show at Hove Town Hall on 4 November.

It's a day when you can meet hundreds of other city businesses all under one roof – more than 90% of our exhibitors are local businesses.

A free advice and business support zone is being provided by the council, the local Chamber of Commerce and other leading local organisations.

There are also zones dedicated to business start-ups and to Christmas Business Zone – the latter sponsored by the council's tourism arm VisitBrighton.com.

Full details at www.brightonandhovebusinessshow.co.uk.

- **The 2009/10 Brighton & Hove Business Directory – detailing over 5,000 businesses in the city – is now out. Hard copies are available from Brighton and Hove town halls, or visit www.burrows.co.uk/brighton to download it.**
- **Tickets are still available for the Sussex Business Awards at the Grand hotel on 6 November. Details at www.sbawards.org.uk or call 0870 084 4144.**

Kathleen Leonard is one of the first local residents to benefit from seven new care beds that have opened at the council's Craven Vale resource centre in Brighton. Her problems started when she fell over on a bus, breaking bones in her back and arm. After three weeks in hospital Kathleen moved on to Craven Vale where she received intensive support from care staff to help her regain her confidence and strength and get back to living independently. "I couldn't even make a cup of tea when I arrived here," says Kathleen. "But the staff have been marvellous and I'm getting there slowly but surely."

For more news stories please visit: www.brighton-hove.gov.uk/news

Clockwise from top left: BHCC speed trials press release; BHCC Journey On website; City News; Guardian.co.uk

Appendix 2: Electromotive Technical Information

INTRODUCTION

Elektromotive has developed the world's first truly generic electric and plug-in hybrid refuelling network. The Elektromotive Elektrobay™ has been designed as a stylish and durable piece of street furniture, with its contemporary lines it blends in naturally to the surroundings, whether installed at the road side or multi-storey car park.

The Elektromotive transport system is secure and extremely user friendly, offering a safe dedicated power output. New and existing battery technology can be integrated into the network with ease. Whether it is an electric scooter, van or plug-in hybrid car the Elektromotive Elektrobay offers a stylish, rugged and ergonomic design with innovative and simple access for the user, offering easy integration into any parking bay.

Air quality is not a new issue for major capital cities around the world. The team at Elektromotive are passionate about creating the technology to allow the next generation of alternative energy transport systems to operate. It is the vision of Elektromotive to provide the means to recharge electric and plug-in hybrid vehicles whilst utilising real incentives to switch from high carbon fuels. Our goal is to integrate the Elektrobay system into parking bays world wide.

To access the Elektrobay a commuter uses an electronic key that communicates wirelessly to the unit. When a valid key is read the Elektrobay automatically opens the weather-proof access panel where the recharging lead from their vehicle can be inserted. Upon closing the access panel, it locks securely and power is turned on.

The Elektrobay is a very safe design and as a security feature, once the access panel is closed and the unit is charging, it can only be re-opened by the same key or by one of our service engineers. When the access panel is re-opened the power is automatically cut to allow safe removal of the charging lead.

Each Elektrobay is fitted with an active display that shows the status of the charging post and is programmed to notify the user when their Elektrobay access is about to expire. During charging the display can show the registration number and be programmed to function as a parking meter. The system has been designed with a very intelligent electronic architecture with many innovative features to make it easy to use, monitor and maintain.

The Elektrobay can be specified for use in virtually any country around the world subject to conforming to local electrical codes. The system exceeds all current European safety standards, almost 100% recyclable and is available in any colour. The Elektrobay is patent pending, protected by registered design and the terms "Elektrobay™" and "Electrobay™" are trade marks of Elektromotive Limited.

ELEKTROBAY OPERATION

To operate the Elektrobay a user would present their electronic key to the yellow touch point on the right-hand side of the unit. The key is interrogated by the Elektrobay to verify that it is valid. With a successful validation the unit will release the door to reveal the plug socket. The user then plugs their charging cable into the socket and closes the door to start the recharging session. Upon closing, the door locks preventing unauthorised persons from removing the cable.

To end a charging session the user presents their electronic key to the Elektrobay. As a security feature the only key that can stop a charging session and open the Elektrobay is the key that started the session. There are maintenance over-ride keys to stop, disable and reset all Elektrobays, these maintenance keys can be used at anytime.

The use of electronic keys enables all of the usage data to be stored. This includes who, when and how much power has been supplied. This information can then be used for billing, statistical analysis, efficiency and maintenance calculations. The keys can be programmed to have a finite life e.g. 6 or 12 months, or can be programmed to meter the usage in a "pay-as-you-go" credits method. The payment methods have been designed to be "cash-less" for efficiency.

The Elektrobay can be optioned with a GPRS modem that enables each Elektrobay to be connected to a data network. There are many other functions that closed-loop can offer however the main addition enables users to pay for charging via their mobile phone.

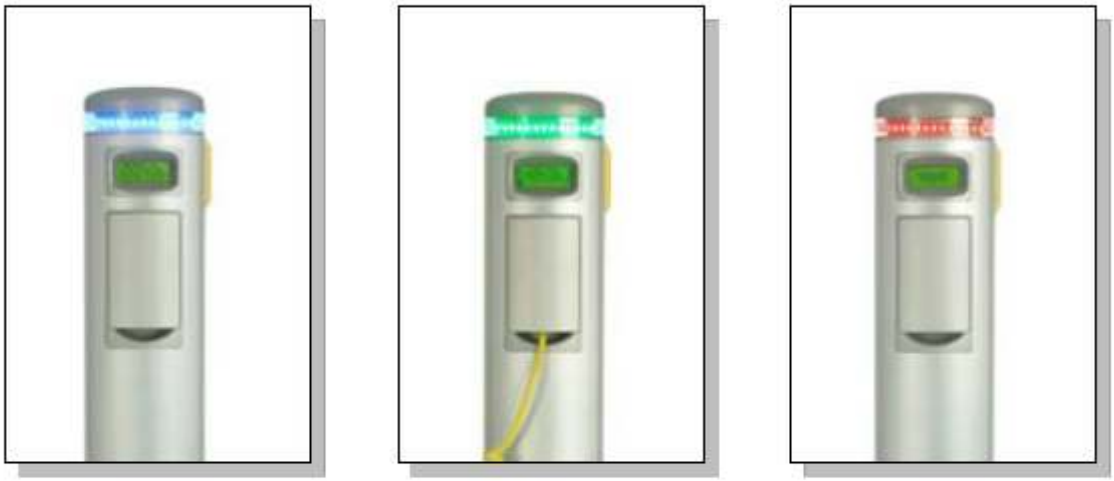
The Elektrobay featured on this page is the UK specification utilising the domestic standard 3 pin square plug and socket (BS 1363). This socket can be replaced for the standard domestic outlet of most regions of the world. This includes the NEMA 5-15R for the USA, the Schuko CEE 7/4 socket in Europe and in Australia the Elektrobay is fitted with the AS 3112 socket.

With this modular socket design and the ability to be powered from 110-240 VAC, the Elektrobay can be instantly customised to any region of the world.

ELEKTROBAY OPERATION - CONTINUED

The main visual feature of the Elektrobay is the indicator lamp at the top of the unit, this indicator enables the state of the Elektrobay to be easily seen at anytime. The indicator lamp shows three main states:

- Blue: Ready for charging
- Green: Charging
- Red: Disabled/ Out of service/ Fault



The Elektrobay also features an Active Display that can show various different pieces of information and can be programmed to display in any language. The following can be shown on the display screen:

- User name
- Vehicle registration
- Elektrobay status
- Access key expiry date
- "Pay-as-you-go" credits
- Charging in progress
- Total power used during charging session
- Charging time
- Parking meter functionality, time overstayed and no-return within specified time

ELEKTROBAY USER GUIDE

Using an Elektrobay is simple, the unit has been designed for ease of use and accessibility. This user guide will walk you through the correct operation and overall functionality that you need to know to recharge your eco-friendly electric vehicle.

Step 1

To begin recharging, find a vacant and active Elektrobay. A **BLUE** light on the top means the Elektrobay is available and ready for recharging.

Step 2

Before accessing the Elektrobay, **PLUG YOUR POWER LEAD INTO YOUR CAR FIRST**. Then present your access tag to the right side of the Elektrobay where you will find the yellow touch point. Touch the centre of the yellow touch point at the same height as the user display panel.

Step 3

The door will click open slightly allowing you to lift the door up to access the socket.

Step 4

Plug your power lead into the socket making sure you have **PLUGGED THE LEAD INTO YOUR CAR FIRST.**

Step 5

Now press the door closed until it **LOCKS IN PLACE** and the power will turn on automatically. The light on top will change to **GREEN** showing that the Elektrobay is recharging.

ELEKTROBAY USER GUIDE – CONTINUED

Once you have finished recharging your EV, simply follow steps 6 to 9 remembering to finish by locking the door back in place.

Step 6

To end the recharging session, present your access tag to the yellow touch point. Only the access tag that started the charging session can unlock and open the Elektrobay.

Step 7

The door will click open allowing you to lift the door up and access your power lead. When the door is opened the light on top will change back to blue. In some instances you may find that the light has already returned to blue before you have ended the transaction. This is normal and dependant on the recharging restrictions of the Elektrobay you are using.

Step 8

Remove your lead from the socket housing. CLOSE THE DOOR FULLY, LOCKING IT BACK IN PLACE ready for the next user. Remember also to remove your power lead from your car before driving off!

The best and safest power lead to use is the yellow coiled type as supplied by Elektromotive. Its use will reduce the risk of the power lead as a trip hazard and aids the sight impaired. The leads have been manufactured from high quality materials to maintain safe operation and durability.

ELEKTROBAY USER GUIDE – CONTINUED

Other important information you need to know when using an Elektrobay:

- The UK specification Elektrobay will supply 240 VAC at 13 amps (Euro 16 amps) to recharge your EV
- Always ensure that your mains recharging lead is in good condition, the best lead to use is the high-visibility yellow, coiled type as supplied by Elektromotive. Never use a cut or damaged lead especially of you can see bare wires. Contact your electric vehicle dealer or Elektromotive for a replacement
- It may be a condition of using a public Elektrobay to use only a yellow coiled lead. Check with your site provider first
- Never leave a power lead trailing on the pavement or roadway. Always be aware of the potential trip hazard to pedestrians and other road users. Think Safety!
- Never unplug your power lead from your vehicle before removing the plug from the Elektrobay
- Never drive off with your power lead still attached to the Elektrobay!
- If the door is forced open during a recharging session the power will be cut immediately.
- All Elektrobays are fitted with a Residual Current Device (RCD) for your protection
- Some Elektrobays are programmed with a recharging time limit, for example 3 hours. The remaining time is shown on the user display panel like a parking meter. After a recharging session these Elektrobays have a "no return" function that stops the last user from starting another recharging session before a certain time has passed. This feature promotes good access to all users by preventing any one user from monopolizing a specific Elektrobay
- After recharging ALWAYS CLOSE THE DOOR OF THE ELEKTROBAY IN THE LOCKED POSITION to reduce the chance of vandalism
- An Elektrobay that has a red light on the top of it indicates that the unit has been disabled or there is a fault with the recharging process.
- For further information visit www.elektromotive.com

FOUNDATION POST, GROUND-WORKS AND POWER SUPPLY DETAILS

There are two distinct types of Elektrobay, they are:

1. Wall mounted, or
2. Anchor mounted onto a foundation

Wall mounted Elektrobay installation

The standard method for affixing a wall mounted Elektrobay is with expansion bolts, this enables the units to be installed onto virtually any type of wall (concrete, breeze block, brick etc). The only significant issue with this type of mounting is with reinforced concrete walls, where it can be problematic to avoid the re-bars in the concrete.

Wall mounted Elektrobay with barrier

To protect the wall mounted Elektrobay a barrier is also affixed to the wall. In the majority of wall mounted installations the power supply cable will be clipped to the wall using cable cleats. The image on the left of this page is a wall mount Elektrobay with barrier affixed to a reinforced concrete wall.

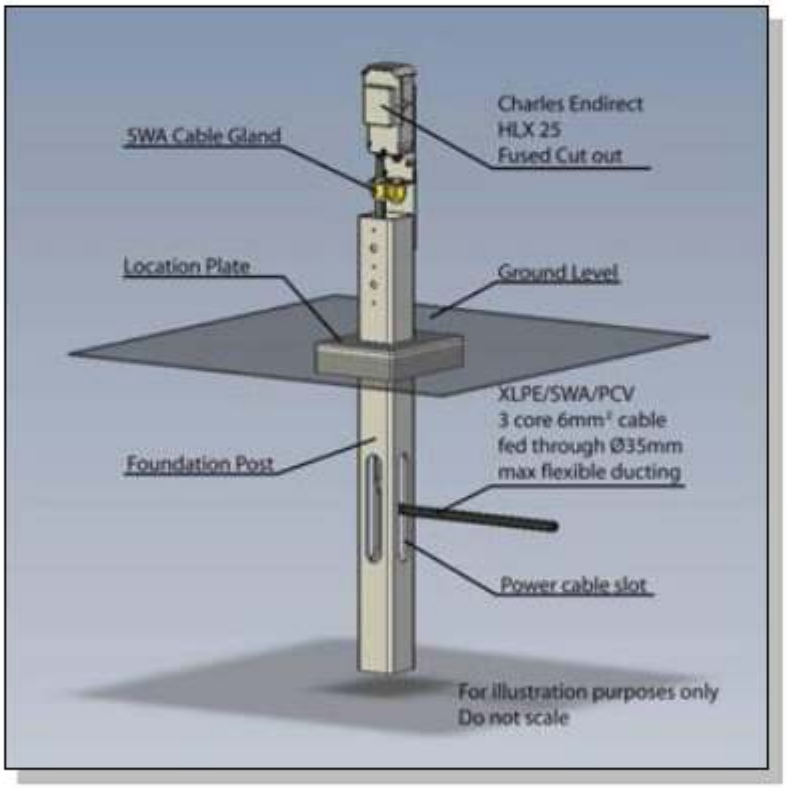
The wall mounted Elektrobay can also be installed using a bespoke bracket as shown in image below. Each bracket is designed specifically for the requirements of the individual site, there is an additional cost for the design and manufacture of the bracket, for further details on this method of mounting please contact Elektromotive.

Wall mounted Elektrobay with custom bracket

ANCHOR MOUNTED ELEKTROBAY INSTALLATION

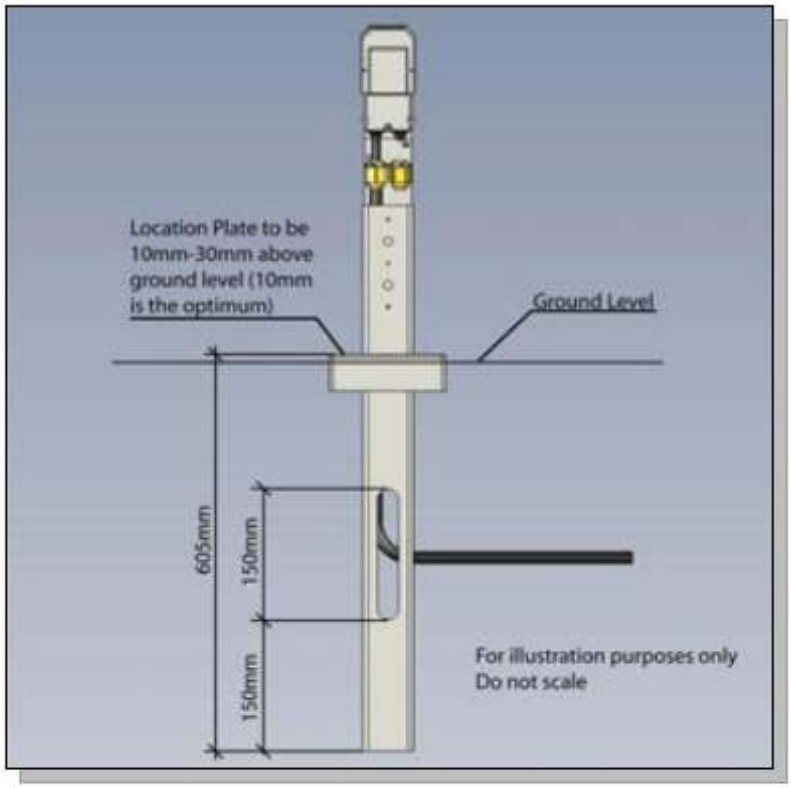
The Elektrobay is fixed to the ground via a "foundation post" that is cast into concrete. Power is supplied to the unit through an armoured supply cable that runs down the centre of the post. The cable can be fed either up the centre of the entire length of the post or through cable cut-outs that enable the cable to be fed perpendicular to the vertical axis of the anchor.

To aid ease of installation the foundation post features a "location plate". The location plate enables the anchor to be positioned vertically with a wide tolerance of 20mm. The location plate is designed to slightly protrude up from the ground level a distance of 10-30mm, it should be noted that the 10mm is the preferred distance. The locating plate must not be below ground level and during installation the horizontal upper surface must not be covered with concrete or asphalt as this face mates with the base of the Elektrobay.



Foundation post and associated parts

Whilst the foundation post is supplied as a standard component to the dimensions in figure below, it is possible to customise the dimensions below ground level. For further information on customising these dimensions of the foundation post please contact Elektromotive.



Foundation post dimensions (not to scale)

The Elektrobay and foundation post has been designed with a shear point to reduce peak impact loads if the unit is struck by a vehicle.

The preferred method to install the foundation post is to cast the post into a hole L 0.3m x W 0.3m x D 0.6m using "PAV1" concrete with an "S2" slump. A foundation of this recommended size will result in a mass of approximately 150kg, this will reduce the chance on the foundation being displaced from either vehicle collision or human intervention. Where PAV1 concrete is not available it is possible to substitute this specification with a concrete that is resistant to freeze-thaw damage and road salt corrosion. A standard installation detail for the ground-works can be found on page 14 of this document.

In addition to the foundation post, some installations may require the use of a feeder pillar. There are two options of feeder pillar available:

- Option 1: An integral feeder pillar and sign post for displaying the parking sign.
- Option 2: A conventional low profile feeder pillar without a sign post

The feeder pillar enables the necessary electrical supply connection and ancillaries to be housed safely.

Integral feeder pillar and sign post installed with the Elektrobay

At sites where a sign post is not necessary, a conventional style feeder pillar is available. Full details of this unit can be found on page 16 of this document. Please note that it is also possible to locate the feeder pillar remotely from the recharging bay. It is possible to supply a maximum of 6 Elektrobays from both the integral feeder pillar and the conventional feeder pillar when supplied with a 100amp incoming feed.

In any site that requires a separate electrical connection to the grid a feeder pillar must be used. There are several main reasons for this, these are listed below:

- Grid Isolation – It is a mandatory requirement from the operators of the electrical grid that any private electrical connection of this type must have a point where the grid connection is fused and can be and isolated. If the utility company is called out to isolate a site then access to the grid connection must be separate to the unit.
- Grid Supply Billing – As the sites cannot be connected to the un-metered supply it is mandatory to have a standard energy meter (property of the energy supplier) recording the total consumption of power for billing purposes by the utility company. This meter must be easily accessible and independent from the Elektrobay.
- Unit Isolation in case of Emergency – The emergency services are very familiar with this kind of street furniture making the point of isolation easily identifiable in the event of having to cut power from a site to allow for the safe removal of a vehicle. Upon isolation the Elektrobay will automatically release the door latch to enable the removal of a vehicle in either an emergency or tow-away.

If the supply cable to the Elektrobay is to be buried from either the feeder pillar or other source it can be passed through flexible waterproof ducting with a maximum outside diameter of 35mm. However, as we only recommend SWA armoured cable for all installations it is possible to bury this cable without the need for ducting. When back filling the cable trenches always ensure that buried cable marker tape is placed approximately 150mm from the top surface.

POWER SUPPLY INFORMATION

The figure below is a schematic overview of the recommended power supply / feeder pillar arrangement for all installations. Please note that Elektromotive will commission the final installation of the unit by connecting to the fused cut-out located on the Elektrobay foundation post. In installations where a separate power supply is used an energy meter will be fitted by your energy supplier, to ensure that the energy meter will fit within the feeder pillar the dimensions must be checked by Elektromotive.

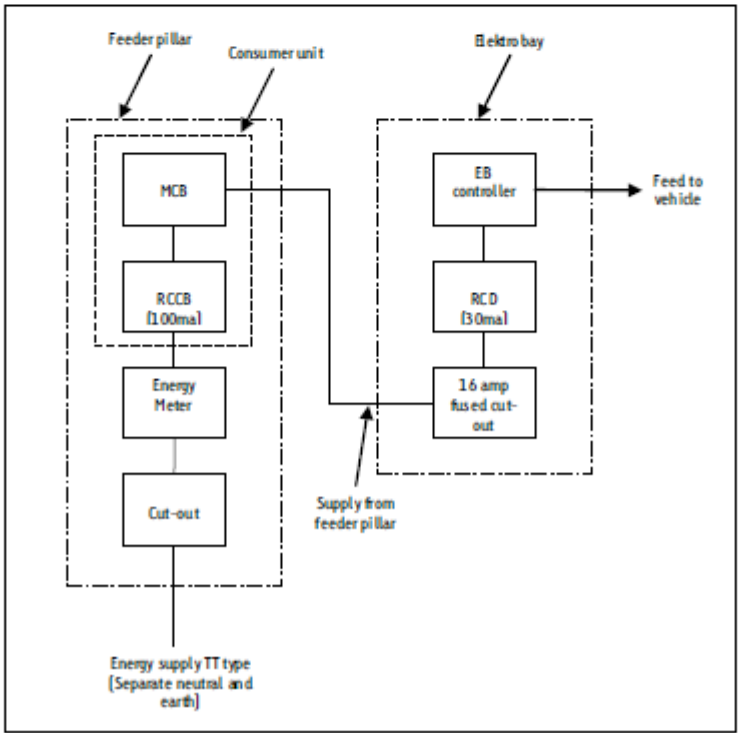
The designated cable required to feed the Elektrobay is XLPE/SWA/PVC 3 core 4mm^2 or 6mm^2 armoured cable. The cable is retained via an SWA type cable gland with the insulated cores terminated inside the Charles-Endirect HLX 25 Fused Cut-out (16 Amp for the UK and 20 Amp for Europe). The SWA cable is fed through flexible ducting with a maximum outside diameter of 35mm. It is a design requirement that the power cable is fed from a supply that can be isolated via MCB.

The incoming electrical supply to the Elektrobay must be a "TT" type with a separate earth (not connected to the Neutral), provided by an earth spike or mat. The preferred method of connecting the earth from the feeder pillar to the Elektrobay is via a separate conductor independent from the earthed metallic armour sheath.

A consumer unit is fitted into the feeder pillar to house the individual MCB's and single RCCB. The required specification MCB is a "Type B" (0.4sec response) with a rating of 16 amps for the UK and 20 amps for Europe. Each individual Elektrobay will require an individual MCB, it is not possible to supply more than one Elektrobay from a single MCB. In addition to the MCB a single 100ma RCCB with a 100amp operating capacity must be fitted, note only one RCCB is required per feeder pillar.

The power requirements to supply Elektrobay are as follows:

- UK Specification 240 VAC @ 16 Amps supply minimum
- Euro Specification 240 VAC @ 20 Amps supply minimum



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Title		
Elektrobay Technical Specifications		
Prepared By G.C.S.	Date 12/01/2008	Rev. 1.2
Approved By N/A	Ref No. EB001-UK	Page No. 1

Notes

This specification relates to the UK version of the Elektrobay. Elektrobays specified for use in other world regions may be different depending on local electrical regulations.

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ELECTRICAL CHARACTERISTICS

Rated Voltage	240 VAC
Rated Frequency	50-60Hz
Rated Input Current	20 Amps
Over Current Protection	UK Spec: 16 Amp Eaton Fuse Euro Spec: 20 Amp Eaton Fuse
RCD Protection	Type A C 30 mA rated fault current Moeller Part No. F1-25/2/003 fitted in conjunction with Moeller Remote Switching Unit Part No. FAZ/FIP-XFSM
Socket Electrical Compliance	BS 1363: Part 2: 1995
Socket Environmental Compliance	IP56 protected to BS EN 60529: 1992
RFID Access Key Compliance	ISO 15693-2 & 3, ISO 14443 A/B
RFID Reader Compliance	ISO 15693, ISO 14443 Type A & B
RFID Reader Approvals	UL, FCC, CE
RFID Operating Frequencies	13.56 MHz (HF), 134.2 kHz / 123.2 kHz (LF)
Unit Electrical Compliance	Low Voltage Directive 73/23/EEC, Electromagnetic Compatibility EMC Directive 89/336/EEC

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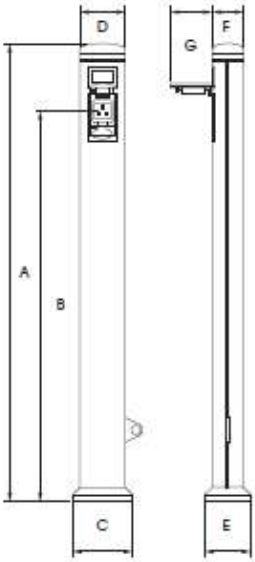
PHYSICAL CHARACTERISTICS

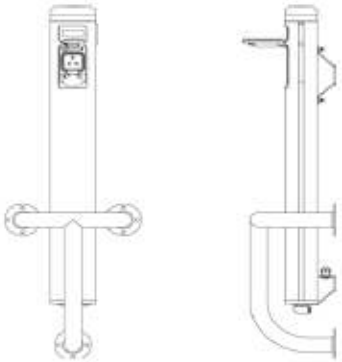


Outer Chassis	Aluminium
Anchor	70mm x 70mm Rectangular Hollow Section Depth below unit 600mm
Anchor Sheer Point	Ground Level
A: Overall Height	1400mm
B: Height To Socket	1200mm
C: Width Of Base	190mm
D: Width Of Post	140mm
E: Depth Of Base	150mm
F: Depth Of Post	100mm
G: Depth Of Open Access Panel	130mm
Operating Temperature	-20°C to +50°C
Overall Weight	20kg (with anchor)

	Title	Elektrobay Technical Specifications UK Version 13 Amp Supply		
	Prepared By	G.C.S	Date 24/09/2009	Rev 1.0
	Approved By	N/A	Ref No. EB001-Wall-UK	Page No. 1

This specification relates to the UK version of the Elektromotive Elektrobay, electric vehicle recharging site.

Electrical Characteristics	
Rated Voltage	240 VAC
Rated Frequency	50-60Hz
Rated Input Current	20 amps
Over Current Protection	UK spec 16 Amp Eaton fuse
RCD Protection	Type AC 30 mA rated fault current Moeller Part No. F1-25/2/003 fitted in conjunction with Moeller Remote switching unit Part No. FAZ/FIP-XFSM
Socket Environmental compliance	BS 1363: Part 2: 1995
Socket Environmental compliance	IP56 protected to BS EN 60529: 1992
RFID Access Key Compliance	ISO 15693-2 &3, ISO 14443 A/B
RFID Reader Compliance	ISO 15693, ISO 14443 Type A & B
RFID Reader Approvals	UL, FCC, CE
RFID operating Frequencies	13.56 MHz (HF), 134.2 kHz / 123.2 kHz (LF)
Unit Electrical Compliance	Low Voltage Directive 73/23/EEC, Electromagnetic Compatibility EMC Directive 89/336/EEC



Physical Characteristics	
Outer Chassis	Aluminium
Protective Barrier	Steel construction powder coated Traffic Yellow RAL 1023 Width 400mm, Height 550mm, Depth 260mm
Fixings	7 (min) x M8 bolts
Overall Height	1007mm
Overall Installed Height	1400mm
Overall Width	140mm
Overall Depth	150mm
Height to socket	1200mm
Operating Temperature	-20 deg C to +deg C
Overall weight	12kg (with barrier)

	Title	Elektrobay user safety, standards compliance and testing		
	Prepared By	G.C.S	Date 13/08/2009	Rev 1.0
	Approved By	N/A	Ref No. N/A	Page No. 1

The Elektrobay has many safety features that can be divided into two groups, mandatory and supplemental.

MANDATORY SAFETY FEATURES

The unit is designed in accordance with British Standard 7671, where the primary method to protect against direct contact to live conductors is to fully enclose the live conductors in an enclosure as documented in sections 412-01-01 and 412-03. Supplementary protection against direct electrical contact will be provided by a Residual Current Device, as per section 412-06 of the standard.

To protect against indirect contact to the live conductors, the primary method employed is in accordance with section 413-02 of the standard, in that the external metal casing of the unit is equipotentially bonded (permanently connected and tested for integrity) to the earth conductor.

The unit will be powered by a TT type electrical supply requiring an Earth electrode to be installed at the site. Once again this is in accordance with BS 7671.

MANDATORY UNIT STANDARDS COMPLIANCE

The Elektrobay complies with the following standards:

- Fulfils the essential requirements of the Low Voltage Directive (LVD) 2006/95/EC and the R&TTE Directive 1999/5/EC
- EMC
- ETSI EN 301 489-1 V1.8.1 (2008)
- Health & Safety EN 60950-1:2006
- Specification of Degrees of Protection Provided by Enclosures EN 60529:1992
- The Electrical Equipment (Safety) Regulations 1994 (SI 1994/3260);
- IEC 60309 (where fitted)
- BS 1363 (where fitted)
- IEC 62196 (where fitted)
- Established recurrent testing regime in accordance with BS 7671

The Elektrobay also complies with the following supplemental safety measures:

- Compliance with the European Standard IEC 61851 "Electric vehicle conductive recharging system";
- Auto shut-off upon disconnect of the connector from the recharging station;
- Auto shut-off on disconnection of the connector from the vehicle;
- Auto shut-off on over current (the demand is too great);
- Remote control shut-off from server;
- Physical site safety features such as anti-collision bars and curbs;
- High visibility lighting for reversing collision avoidance;
- The unit will prevent the cable from being connected or disconnected to the recharging infrastructure with the power on;
- IP44 electrical connection port on the multi phase unit
- IP56 electrical connection port on the single phase unit

It should be noted that Elektromotive is the only UK company to actively participate in TC 69, the European Standard Technical Committee for IEC 61851 "Electric vehicle conductive recharging system".