



# ACRASTYLE LIMITED

Protection & Control for Your Power Systems

**Designed, manufactured & tested solutions**

Over 50 years in business | Experienced design engineers | State-of-the-art technology



## Profile

Acrastyle Limited is an engineering company which designs, manufactures and functionally tests high-voltage substation protection and control equipment.

Our customers include all of the UK electrical Generation, Transmission and Distribution Network Operators. We also deliver protection and control solutions to customers worldwide in the Power, Energy, Industrial, Transport and Renewables sectors.

Since 1962, we have earned a unique reputation for superior product quality, excellence in electrical engineering and exceptional customer service.

The partnership approach we take with all of our customers, aims to go beyond the simple delivery of high quality products and services: we adapt our services, solutions and resources to provide whatever level of support you need in order to complete your project on time, within budget and most importantly, meeting your expectations.

This commitment to excellence has seen our business steadily grow and win multi-year framework contracts with several leading UK network operators.

## Reassuring Quality

We are fully certified to ISO9001, 14001 and 18001 international quality standards, to all the key industry certification organisations, and with those customers who operate their own certification and audit systems.

## Products and Services

- Protection System Design and Engineering Services
- Protection and Control Cubicles
- Mimic Control Panels
- Battery Chargers and Systems
- Outdoor Stainless Steel Enclosures
- Neutral Earthing Resistors (NER's)
- Portable Relay Rooms and Railway Enclosures
- Bespoke Design and Manufacture to suit individual requirements

As a fully independent protection and control specialist Acrastyle Limited can deliver engineered solutions and integrated products using equipment from all the major manufacturers. For further details about any of our products and services, including bespoke solutions, please visit our website at [www.acrastyle.co.uk](http://www.acrastyle.co.uk) or contact us directly.

## Clients and Contractors

Acrastyle Limited is proud to have partnered many of the world's most prestigious 'turn-key' electrical service providers and utility end users. These include:

### UK Transmission Operators

National Grid  
Northern Ireland Electricity  
Scottish Power  
Scottish and Southern Energy

### UK Distribution Network Operators

Electricity North West  
Northern Ireland Electricity  
Northern Powergrid  
Scottish Power  
Scottish and Southern Energy  
UK Power Networks  
Western Power Distribution

### UK Renewables Companies

REG Windpower  
RWE

### Global End-Users

Bermuda Electric Light Company  
China Light and Power  
Electricity Authority of Cyprus  
Guernsey Electricity  
Jersey Electricity Manx Utilities  
Manx Utilities  
Nigeria Electric Power Authority  
Saudi Aramco  
Saudi Electricity Company

### Global Main Contractors

ABB  
ALSTOM  
AMEC  
AMEY  
CG  
Daewoo  
Mitsubishi  
Siemens  
Toshiba

*"...excellence in electrical engineering..."*



## Protection & Control Panels

Acrastyle specialises in providing power system protection and control panels/cubicles for all levels of electrical power transmission, distribution and generation, whether to electrical utilities, renewable installations, industrial sites or the transport sector.

We can design and manufacture protection and control panels for a large range of applications including:

- Generator, transformer, feeder, busbar and mesh corner protection
- Transformer Automatic Voltage Control (AVC) systems
- Digital control systems
- Substation automation equipment
- Substation control panels and mimic control boards
- Metering & fault recording

Acrastyle can provide standard 19" rack type panels or custom-sized panels tailored to suit specific demands. Panels can be rear access or front access swing frame style where substation space is limited. All panels can be provided with or without glazed front doors depending upon the required ingress protection rating (IP rating).

## Replacement Front Sheets

Replacement front sheet protection panels are provided with fully wired inter-device wiring and flying leads wired to a terminal rail enabling easy external connection between old and new systems. Replacement front sheets are custom made to provide a direct replacement to any existing protection and control panel front sheet.

## Automatic Voltage Controllers (AVCs)

### Transformer Tap-change Control Schemes

Acrastyle has several standard designs for single and dual Automatic Voltage Controllers (AVCs), which incorporate the industry standard tap-change controllers such as 'Super-Tapp'.

Power transformers are sometimes fitted with adjustable output windings. This can be used to vary the output voltage to keep the supply at a constant voltage level, despite the input voltage varying considerably. The selection of the appropriate winding is performed by a device which monitors the output voltage and the transformer winding currently in use. If a transformer winding change is required to return the output to the required level, this is done in the AVC scheme provided by Acrastyle.

Where transformers are connected in parallel, the control of these winding selection schemes is more complex and Acrastyle can provide several options for a standard 'dual AVC' scheme. Otherwise we can provide a customised design to meet the most demanding of needs.

AVCs can be provided in all styles of enclosure including rear access cubicles, front access swing-frame cubicles, wall mounted boxes and bespoke enclosures.



# Protection & Control

## Substation Wall Boxes

### Indoor & outdoor custom built substation wall boxes

Many substations have extremely limited space. Often the solution for smaller schemes and panels is to use the available wall-space by mounting a 'wall box' that contains the required equipment with indication and control switches mounted on the door of the box for ease of use.



These wall boxes are all custom-designed to meet individual requirements. Acrastyle's mechanical engineers ensure that the equipment can be contained in the box while maintaining the required clearances. They also ensure that the mechanical strength of the box, its structure and the wall fixings meet the correct design criteria.



***“Minimised outage time  
and site-work cost”***

## Key Features

Acrastyle protection/control panels allow the customer to quickly and easily install new or replace existing protection and control equipment with the following benefits:

- 19" rack panels and cubicles
- Solid front panels and cubicles
- Swing frame front access cubicles
- Fully equipped and wired replacement front sheets
- Wall mounted protection/control boxes
- Fully factory tested
- Plug-and-Play commissioning
- Minimised outage time and site-work cost
- Reduced disturbance to adjacent cubicles
- Bespoke solutions available
- Modifications and additions to existing on-site system



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## Protection & Control Design

### Power system protection & control design solutions

Acrastyle has a vast portfolio of LV, HV and EHV protection & control systems in use throughout the world. Its wide experience and in-depth expertise in protection & control design enables it to design the most complex power system schemes as well as providing elegant, simpler schemes for less arduous applications.

The protection & control design process:

- Begins with a detailed understanding of the planned power system configuration
- Understands the power system operating parameters under both normal and fault conditions
- Understands all the mechanical & electrical limitations that may be imposed by the site
- Is carefully controlled with all stages checked and signed off

The process also allows:

- Changes to be carefully logged and documented
- Design version control & overall review before releasing to the customer for approval
- Design freeze for manufacture
- Modifications & change requests post freeze that are carefully reviewed and implemented once approved
- System testing to the scheme drawings to test equipment, manufacture and design

## CAD Design & Drafting

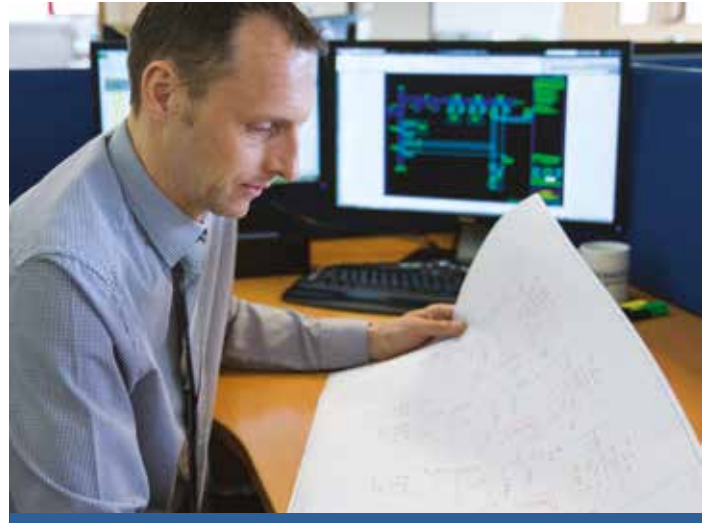
### CAD design for power system protection & control solutions

With our extensive CAD resources, Acrastyle can provide a sub-contract CAD design and drafting service for almost any application.

We use the latest AutoCAD software & can provide drawings & designs in all releases of AutoCAD DWG file in addition to DXF, DWF and Adobe PDF files. Drawings can also be provided for compatibility with other CAD packages on request.

We are also able to scan and modify old legacy hand-drawn drawings using modern Raster software such that drawings for older equipment can be easily modified to incorporate any necessary changes.

Our sister design office in Chennai, India has the same capabilities and is also able to produce and modify drawings with Elecdes, ELCAD and Microstation on our behalf. Don't hesitate to contact us if you have such a requirement.



## Design & Build

### Utilise our design and build capabilities to reduce your overall project time and cost.

Acrastyle fully understands the benefits of having the system design undertaken by the equipment manufacturer as significant time and money can be lost when coordinating such things as technical queries, design changes and requests for information. Our design team are located within the manufacturing facility, thus providing:

- Faster project delivery
- Lower project cost
- Less administration
- Fewer design errors
- Reduced site costs



# Engineering Design Services

## Interface Engineering

### Power system protection & control integration

Acrastyle has several dedicated Interface Engineers who can provide clear diagrams and schedules that enable customers to combine sub-system elements into a completely integrated system.

'Interface Engineering' is the term given to this detailed design work which shows how to connect the switchgear, transformers and relays via the various multi-core control cables and marshalling kiosks. These then connect all of the different parts of the system.

The usual deliverables of Interface Engineering are:

- Cable Block Diagrams which show what type of cable, how many cores, and where these start and finish
- Termination Schedules which show all the terminals at that location and which cores are connected to these
- Core-sheets which show the usage of each core for each multicore cable

In addition, the Interface Engineer provides cable length data, termination gland requirements and checks the core sizes are all correct for the application. This ensures that when the installation and commissioning engineers come to connect the substation system, all the separately designed and supplied elements join up as an integrated whole.

Without good Interface Engineering you don't have a system, you have a collection of separate and isolated components which will not work together properly.

With good Interface Engineering the overall system forms a complete, interconnected and coordinated solution.

## Site Surveys & Drawing Audits

### Verifying & updating substation scheme drawings

Acrastyle has a team of experienced engineers who conduct detailed site surveys to check the status and veracity of the existing site and scheme drawings. These will be the basis of any new schemes being proposed.

We can scan existing substation drawings whilst on site without the need to remove drawings by using a modern A0 colour drawing scanner. This is particularly desirable when the site drawings are the only copies in existence.

Unfortunately, it is common to find that many of the old drawings are either missing, obsolete, or do not accurately reflect the currently installed condition. This is due to various



modifications which have been made in the past but not accurately reflected in the drawings.

Any new design is dependent on a complete and clear understanding of the existing plant and parameters, so site audits to check the drawings are often an essential first step towards providing a perfect new design.

Where the old drawings are either missing, difficult to read or out of date, Acrastyle can provide a drawing replacement service.

## Scanning & Printing

Our protection & control design services are supported by our large format scanning capabilities, both on and off site. Also, we have large format plotting / printing services up to A0 in colour or black & white.

## Key Features

- Protection & control design
- Design & build capability
- Interface engineering
- Site surveys
- Drawing audits
- CAD design and drafting
- Latest AutoCAD software
- DWG, DXF, DWF and Adobe PDF file formats
- Scanning and printing facilities

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Since the acquisition by S&S Power Switchgear Limited (S&S) in 1997, Acrastyle has been involved in the design, installation and commissioning of medium voltage switchgear and medium/high voltage disconnectors manufactured at the S&S facilities in Chennai and Pondicherry in India.

The original designs for the disconnectors were acquired from Hawker Siddeley with whom S&S had an initial joint venture, following which a number of innovative and cost effective improvements were made. Today more than 25,000 disconnectors have been successfully commissioned world-wide.

## Double Break Type Disconnector – RD Range

- Rated Voltage up to 420kV
- Short time current up to 63kA
- Current rating up to 4000A

The RD range open terminal disconnector is a three column disconnector with rotating centre post drive.

The RD range of disconnectors is available for horizontal, upright and parallel arrangements. The RD range employs a special turn and twist arrangement for opening and closing of contacts. This rotation ensures adequate contact pressure is built to hold the contacts in closed position even under severe terminal loads or short circuit conditions. The turn and twist arrangement also enhances the self cleaning ability of the contacts.

## Operating Mechanism

Disconnectors can be supplied with either manual or motor operated mechanisms. Operating mechanisms, either manual or motor operated have provision for auxiliary switches, interlock and padlock.

Motor operated mechanism have additional features e-g overload protection, control switches and limit switches.

## Contacts

The main contacts are made of copper and are silver plated. Contact fingers utilise springs to ensure adequate contact pressure is maintained throughout the life of the equipment.

## Disconnector Base

The base is manufactured from welded channel section or a welded square tubular assembly and hot dip galvanised. Low friction, sealed-for-life bearings are incorporated in the base to provide a smooth rotating operation. The base is supplied with suitable mounting pads for installation onto a steel or reinforced concrete structure and is suitable for a retro-fit to all existing bases and structures.

## Earthing Switches

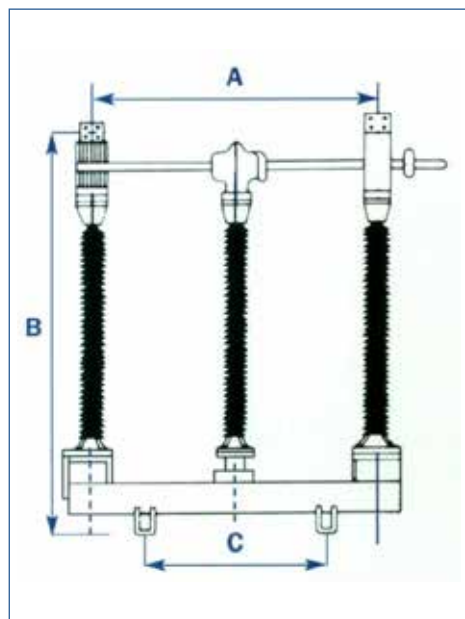
Manual or motor operated earthing switches can be mounted on either or both ends of the disconnectors, as an integral part of the disconnector or as an independent unit.

# Disconnectors

## Key Features

- Low maintenance
- Minimal installation time
- Simplified commissioning
- Suitable for use in harsh environments
- Compatible with existing structure configurations
- Supplied with porcelain insulators where required
- Optional hydrophobic & vandal-proof composite insulators also available
- Rated Voltage up to 420kV
- Short time current up to 63kA
- Current rating up to 4000A

*“...more than 25,000 disconnectors have been successfully commissioned...”*



Main dimensions			Rated voltage	Rated current	Rated short time current	Rated impulse withstand voltage	
A	B	C				To earth	Across isolating distance
			kV	A	kA	kVp	kVp
950	795	500	36	1250	25	170	195
1500	1326	1000	72.5	2000	31.5	325	375
1800	1744	1150	123	1600	40	550	630
2130	1835	1430	145	3150	40	650	750
				2000*			
2450	2417	1800	170	1600	40	750	860
3200	2980	2500	245	2000	40	1050	1200
3200	2980	2500	300	2000	40	1050	1200
							(+170)
5280	4595	3500	420	4000	63	1425	1425
							(+240)

\*NGC EA approved

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## Portable Relay Rooms & Control Rooms

### Rapid on site integration of power system protection

Acrastyle's expertise in power system protection design and manufacturing enables us to provide portable relay rooms and control rooms. These allow the customer to quickly integrate the protection system on site with Plug-and-Play connectivity.

The portable relay rooms are self-contained, fully integrated portable buildings containing several interconnected sub-systems. Manufactured from GRP or stainless steel, these enclosures can be positioned at the substation or wind-farm site, often near the project completion date and simply cabled up to a single marshalling kiosk.

## Railway Substation & Trackside Enclosures

### Railway substations protection

Acrastyle's capabilities includes the unique design challenges presented by the nation's rail network. It has manufactured over a hundred protection schemes for railway substations and also has the ability to manufacture fully integrated portable railway control/protection rooms and trackside enclosures, manufactured from GRP or stainless steel.

These relay rooms and trackside protection enclosures are self-contained, fully integrated portable buildings which can be quickly positioned and cabled up to external protection equipment. Included in the enclosure are:

- A protection and local control scheme custom-designed for the power system or rail application
- A SCADA RTU which is fully integrated with the protection scheme, as well as all the other control and monitoring devices in the enclosure
- Heating, lighting, power supply and air-conditioning to ensure the plant and personnel operating the equipment experience optimal conditions
- A central marshalling box and cable gland plate for ease of external connections
- Battery charger and batteries

## Fully Tested Enclosure

### All systems tested as a fully integrated package

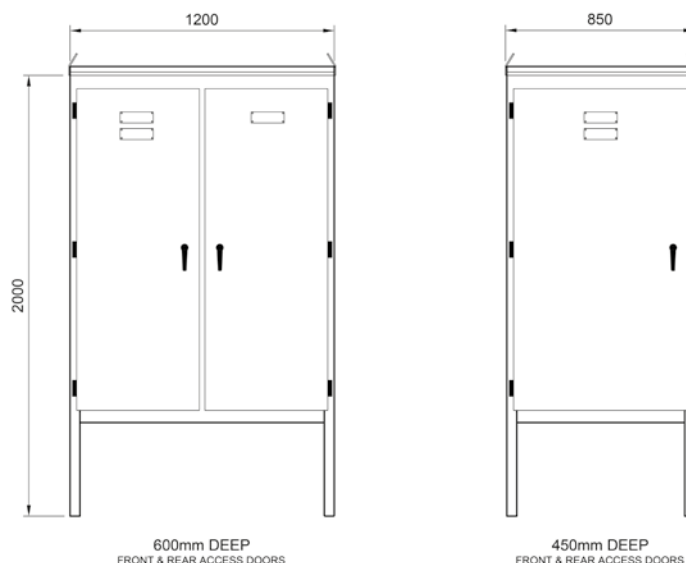
Once completed at our factory, the individual systems in the enclosure are first extensively tested as self-contained sub-systems, for example the protection scheme itself, then its interaction with the remote ends are simulated before the control elements.



All the systems are finally tested as a fully integrated package by injecting signals at the marshalling kiosk terminals, ensuring all the correct operations are performed and then detecting the outgoing signals at the marshalling point. This rigorous system testing makes sure that the entire system will perform seamlessly as a Plug-and-Play solution when finally positioned on site.



# Enclosures & Kiosks (Outdoor & Indoor)



Standard double-bay & single bay kiosk sizes. All custom sizes available.

## Substation Marshalling Kiosks & Supplies Pillars

### Indoor & outdoor custom built marshalling kiosks

Acrastyle is a leading manufacturer and provider of marshalling kiosks and supplies pillars for electrical substations. They are used to provide convenient connection points for the various control, protection and instrumentation wires which go to, and come from, all the different substation plant. This includes power and instrument transformers, switchgear and SCADA equipment.

Marshalling kiosks can be supplied in either of two standard enclosure sizes or any custom size you require.

Electrically they are designed for each application, ensuring the correct amount of equipment is included for both the currently envisaged requirement and for future expansion. They can be supplied with a polished steel finish or painted in any industry standard colour.

## Key Features

- Cable terminals and expansion terminal rails
- Fuse and test link arrays
- Cable management facilities and cable gland plates
- Miniature circuit breaker arrays
- Switches
- Isolation points
- Safety insulation barriers
- Substation auxiliary power supply sockets
- Pilot isolation transformers
- Lamps and indicators
- Thermostatically controlled anti-condensation heater and supplied pillars

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Acrastyle has been the leading manufacturer of Liquid Neutral Earthing Resistors (LNER) for more than 40 years. It has supplied Neutral Earthing Resistors all over the world to power system utilities including Hong Kong, Singapore and Australia. The design is fully EA tested and approved with thousands in service worldwide.

## LNER Design

Our Liquid Neutral Earthing Resistor design has passed rigorous tests, making them suitable for seismically active regions.

The LNERs range from 6.6kV up to and including 33kV with a maximum fault current rating of 2500A.

Acrastyle's LNERs are manufactured to our traditional low maintenance design and comprise a large tank containing an electrolyte solution (distilled water with a small amount of electrolytic powder). The outer case of the LNER is connected solidly to the earth point. An inner electrode which is insulated from the LNER, is the HV connection to the transformer or generator star point. At commissioning, small amounts of electrolyte are added to the water to increase the conductivity of the solution until it reaches the calibrated resistance level.

The final result is a high current carrying capacity fluid with a high resistance, in a very robust and low maintenance product.

Our LNERs can be completely custom designed to fit into any site location or replace any existing legacy LNER with the minimum of site disturbance.

Acrastyle's Neutral Earthing Resistors are made from stainless steel and can be supplied in a natural stainless steel finish or painted. Many have achieved 30 and 40 years plus of continuous service.

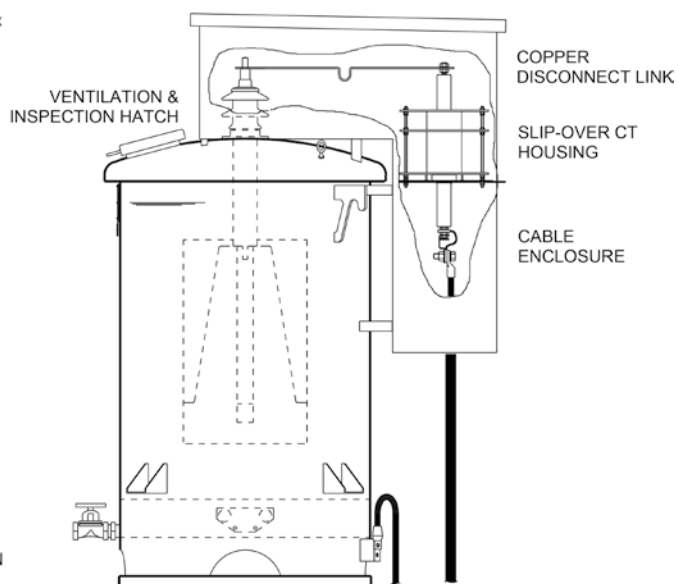
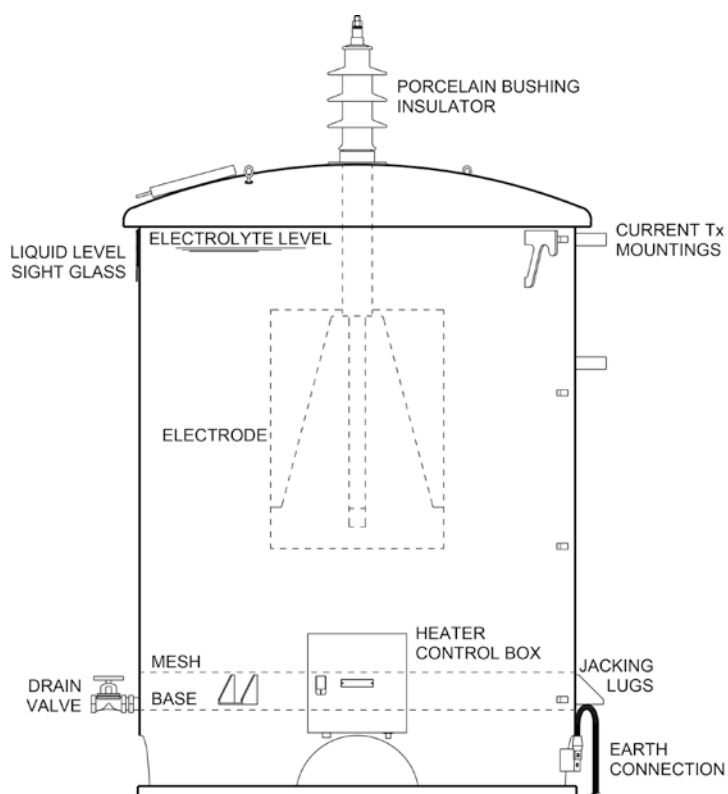
*“...a very robust and  
low maintenance product.”*

# Liquid Neutral Earthing Resistors

## Key Features

- Thermostatically controlled anti-frost heating systems
- Condensation traps to return evaporate to the LNER
- Fluid level detection and low level alarm devices
- Inspection hatches for ease of maintenance
- CT housings and Current Transformers for earth fault protection devices
- Direct overhead line or underground cable connection options
- Lifting hooks and jacking lugs.
- Drain valve

Two typical LNERs – A 1750mm  $\phi$  LNER suited to an overhead connection, rated at 33kV 750A & a 1016mm  $\phi$  LNER with underground cable connection, rated at 11kV 600A



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Acrastyle's range of battery charging solutions are designed to meet various applications from small compact systems to large bespoke complex installations and to meet the most demanding requirements.

## Cabinets

Heavy duty front access cabinets are provided with:

- IP44 rating as standard. Cabinets with an IP54 rating are available on request.
- Vents allowing for fan-less cooling.
- Optional glazed doors
- Top or bottom cable entry



*Bespoke options, sizes & colours available upon request*



## User Interface

This is provided via a multi-function digital alarm unit with built in LCD text based descriptions and separate coloured LED alarm indications allowing for effective monitoring.

## Chargers

The chargers are fully rated to supply both the standing load & future load, whilst float charging the battery. They have a short term overload capability of 110%. Various configurations are available including:

- Single charger
- Two chargers working in parallel and rated at 50% full load
- Two chargers in parallel each rated at full load in duty / standby mode
- Two chargers in parallel each rated at full load but sharing the load and providing redundancy.

All chargers are current limited and are factory set to customer requirements. Current outputs are available from 6 amps to 400 amps and a choice of a single output voltage of 24, 30, 48, 110 or 220 volts DC.

# Battery Charging Solutions

## Distribution

The distribution section comprises sets of either fuse and link output circuits or alternatively MCBs. The fuses are of the HRC cartridge type and are in accordance with BS 88, rated from 2 amps up to 200 amps. Dedicated DC rated MCBs are available with a rating from 1 amp up to 700 amps for each circuit.

Outputs are supplied in modular blocks to allow for customer configuration and future expansion. In addition to the above, the following can also be included:

- Temporary input connections
- Load ammeters and voltmeters
- Link isolators allowing different distribution boards to be linked together
- Mechanical and / or electrical interlocks allowing isolation and linking in only pre-determined conditions and sequences

## Batteries

These can be provided as:

- Plante acid cells with a 25 year design life
- Heavy duty valve regulated lead acid cells with a 10 year design life at an ambient operating temperature range between 5°C and 25°C.
- Nickel cadmium batteries

Batteries are supplied with inter-cell links and supplied charged ready for use. Battery capacity up to 400Ah are supplied as standard, higher capacities are also available.

## Battery & Charger Isolation Units

These units are available to provide isolation during servicing and maintenance. They can be either wall mounted or floor standing and usually contain BS88 fuses or NH fuses. DC rated MCBs are available as an option.

## Battery Support Stands

Battery support stands are of a modular steel construction with levelling feet. Acid resistant paint can be supplied. The stands are available in various configurations depending on cell size and available space.

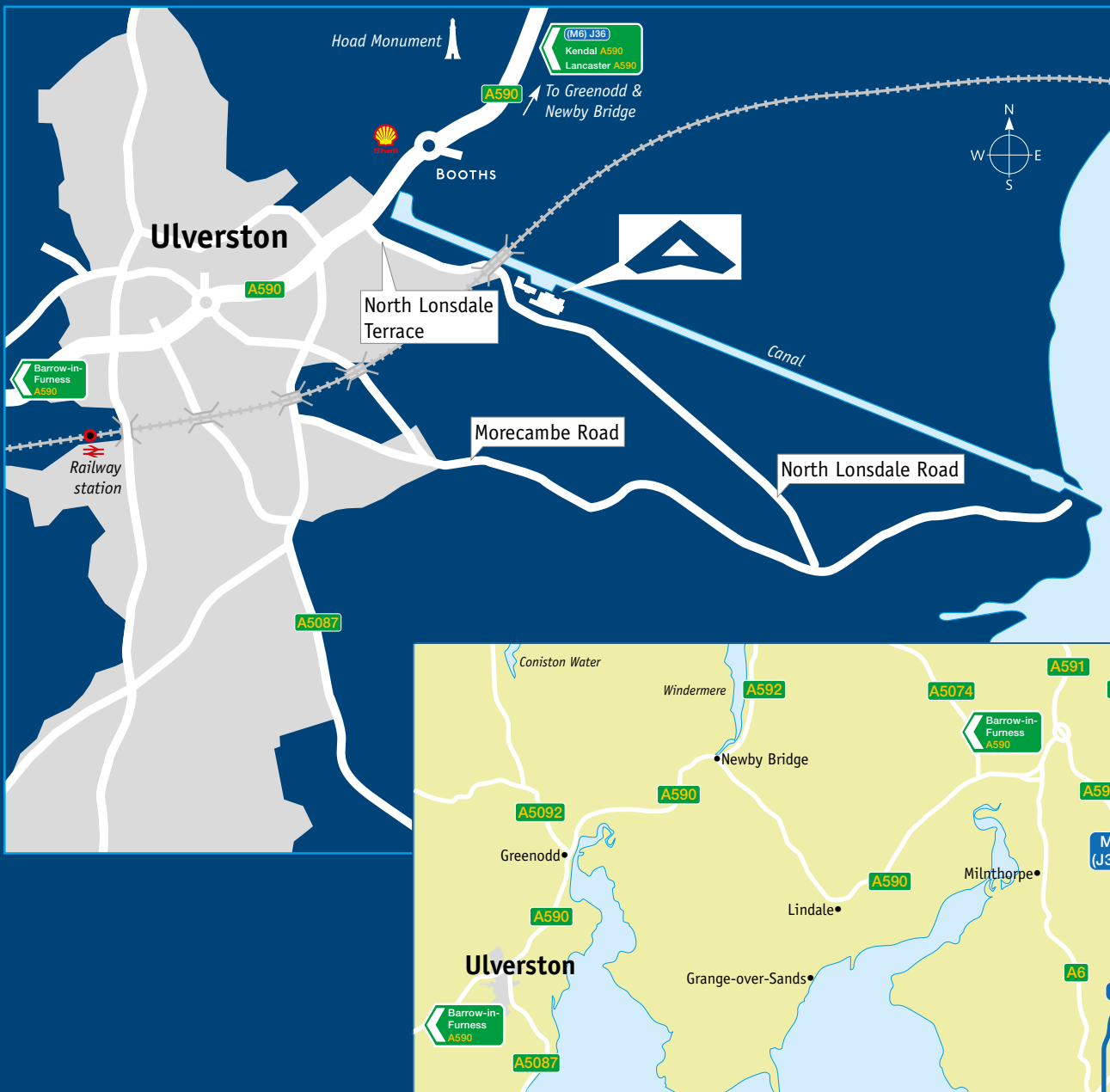
### Key Features:

- Adaptable design
- 19" rack design cubicle
- Modular system
- Charger output ranges from 24V to 220V
- Battery capacity of up to 400Ah as standard
- LCD & LED multifunction digital alarm unit
- Access to all critical components
- Top and bottom cable access available
- Various distribution options
- Easy to maintain and operate

*"...small compact systems to large  
bespoke complex installations..."*



## How to find us



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