

OPC

OUTDOOR PLANT CABINETS



Outdoor cabinets and hardware for secure installation and integration of business networks.

Cable Ways started production of data distribution hardware in 1985 and has been creating outside cabinets solutions since 1997. It has an installed base of thousands of cabinets in the Asia Pacific area.

Our wide customer base has exposed Cable Ways to many development opportunities for the creation of unique cabinet solutions, ranging from oil rigs, arctic circle cell sites and desert surveillance sites.

Based on our wide experience Cable Ways is able to offer a bespoke design service, optimising cabinet design to perfectly match the equipment needs and environmental constraints.

Extrusions: The extrusions, around which our cabinets are built, offer exceptional strength and flexibility, allowing simple customisation without added cost or compromise to cabinet integrity.

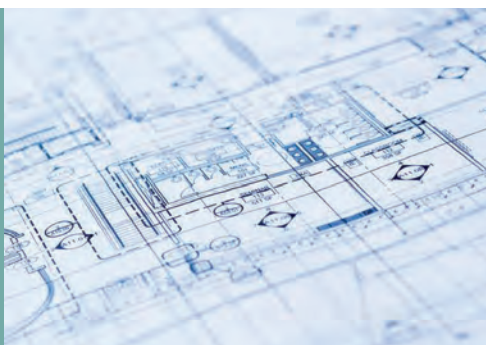
Skin: To meet Cable Ways statement of intent, "fit and forget", we evaluated various options for cladding our outside cabinets and concluded only marine grade aluminum matched all our criteria of a service life exceeding 20 years.

Hardware: For example, our door hinge system uses sealed precision turned captive stainless steel pins rotating in UV resistant custom molded bushes. This simple element has more than 10,000 years of real world usage without failure.

Security: Close to every operational managers heart is the need for peace of mind regarding physical integrity of their network. Our proprietary graffiti resistant, flush front lock has nothing on the outside of the cabinet other than a simple cover plate, it is not possible to understand the locks mode of operation and interest is quickly deflected. Thousands of locks are in service, over 10 years with no failures or reported break-ins.

Thermal Management: Thermal management starts with a clear picture of what is required and the size of the budget. As most engineering disciplines, there is a trade off between performance and cost.

Integration and installation: Cable Ways knowledge base is born out of its own real world experience, the needs of the system integrator and site installer are carried through in all designs. Adequate cable trays allow a variety of equipment dispositions and generous egress glanding speeds installation.





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EcoStar*



Long life Outdoor Cabinets
Configured to suit
Diverse climates



CABINET SCOPE

This external all weather cabinet system has been designed to meet the needs of a service provider with a secure thermally managed enclosure for passive and active equipment. The needs of the system integrator are accommodated with generous cable routs and trays.

The cabinet is designed for remote and unattended operation in hostile environments. Care has been applied to the design of its external characteristics to create a clean and unobtrusive appearance. Special attention has been paid to protecting the electronics from the environment and to securing the enclosure from a public safety and vandal resistance viewpoint.

The cabinet's design is based around an awareness of common needs. These being; ease of integration, public security, speed and ease of installation, simplicity of site operation, flexibility in application, extended service periods and longevity of investment.

GENERAL DESCRIPTION

General

This cabinet is designed to house a variety of active equipment including, wireless and cell hardware, transport subracks and with distribution capacities up to 10000 pairs using 3M and Krone termination systems. All electronic components are housed in a sealed chamber to prevent ingress of water and dust.

The standard colour is "Mossvale sand", optionally "Holly green" and "Ghost grey" are available.

The exterior of the cabinet has a textured finish to the welded and lined aluminum skin. Access to the equipment is via single or double doors on the front of the cabinet. Rear access is available but not fitted as standard.

Modularity

This cabinet system is designed to meet the changing needs of a service provider, where the long term equipment requirements and mix are not fully known.

The cabinet is configurable at the time of manufacture to meet a set of specific requirements or can be constructed to allow additional equipment bays to be added to an existing installation in the field, on line and without loss of service to the installed equipment base.

Changed equipment configurations may require alternative thermal management schemes and the cabinet system allows for the changing out of the thermal management system on site. A basic forced filtered convection cooling system or heat exchanger module can be changed for a higher capacity or an air conditioner.

Cabinet Elements

Cable Ways engineers have created a rationalised approach to the basic elements, which combine to form a cabinet, these being;

- 1 termination options, copper, fiber, water or gas.
- 2 fiber and copper patch management systems
- 3 equipment bays, 19, 21 & 23" EIA, 500mm ETSI
- 4 segmented battery compartments
- 5 thermal management systems

Using this “standardised approach” CWL is simply able to offer solutions, customised to a specific customer need.

Cost sensitivity demands the reduction of flexibility, whereas service utility requires an increase in modularity. The appropriate mix is only found after a detailed analysis of present and future usages and demands. For this process, CWL works closely with your engineering staff to optimise the cabinet solution to meet your needs.

Basic Configurations

Cost optimized manufacturing presents the following options:

| Single or double door | wide | deep | high | RU |
|-----------------------|------|------|------|----|
| Single bay | 650 | 500 | 1430 | 29 |
| Single bay | 650 | 650 | 1430 | 29 |
| Single bay | 650 | 750 | 1430 | 29 |
| Single bay | 650 | 650 | 2000 | 42 |
| Single bay | 650 | 750 | 2000 | 42 |
| Double or quad door | | | | |
| Double bay | 1500 | 650 | 1430 | 58 |
| Double bay | 1500 | 750 | 1430 | 58 |

ENVIRONMENTAL DESIGN

Service Life

The enclosure is designed to have an operational life of not less than 20 years when operated under the conditions specified in 3.2 - 3.5 and 5.14.

Operating Environment

The cabinet has been designed to operate in sub tropical conditions where the ambient temperature may reach 45°C and the average RH exceeds 80%.
 Solar loadings up to 1.35 kW/M² are catered for in the thermal management system.
 Ambient temperatures from -20°C to + 55°C are accommodated in the construction technologies, however where these temperature extremes are common alternative / additional thermal management is required.

Degree of Protection

The enclosure is weather resistant to prevent ingress of rain, snow, sand, dust, insects and other solid foreign objects to a minimum level of IP54. IP55 is common and IP65 is available at an increased cost.

Wind Speed

The cabinet when installed to specification is designed to withstand wind speeds of 150 km/hr.

Vibration

The enclosure is designed to be capable of withstanding severe vibration from roadside locations to minor earth tremors. State of the art material bonding techniques allow movement without destruction. The design is estimated to accommodate 0.54G at resonance in any plane for 5 seconds.

Noise Emissions

A variety of fan control systems are available to meet local body requirements. These cater for changed requirements over the night time hours. The cabinet insulation is arranged to reduce any emitted noise from installed equipment fans by < 88% @ 2kHz.



UniStar*



EcoStar*

Integration and Installation Services

A complete solution

Our knowledge base is born out of real world experience, the needs of the system integrator and site installer are carried through in all designs. Adequate cable trays allow a variety of equipment dispositions and generous egress glanding speeds installation.



CABLEWAYS
INNOVATIVE INDUSTRY SOLUTIONS

THERMAL MANAGEMENT

General EcoStar* cabinets will support a variety of equipment with diverse thermal load patterns and are available with cooling systems tailored to the application and budget. The nature of cooling system chosen usually ends up being budget driven, either the power budget or a cash one. Listed below are the more common options highlighting their advantages and disadvantages. They are listed in increasing sophistication and cost.

Cabinet Colour EcoStar* cabinets are supplied in “Mossvale sand” coloring as standard, but are also available in a variety of colors to suit local environmental conditions and council constraints. The effect of solar loading varies with skin color, the darker the color the higher the skin temperature leading to higher thermal ingress.

Quoted ratings are based on the Mossvale color option and variations may cause up to a 200W / bay variation in thermal loading.

Factors for consideration are; location, equipment dissipation, solar loading, cabinet color and heat management choice.

Insulation By default EcoStar* cabinets are insulated against thermal ingress. The use of insulation offers significant thermal isolation advantages over a twin skin regime, where a heated outer skin radiates directly to the inner skin, where energy is added into the cabinet.

CWL has pioneered a new cabinet insulation process which uses skinned long chain inorganic fibers to provide a long lasting non degradable thermal barrier. All insulation materials are self-extinguishing and compliant to AS1530.3;

| | |
|------------------------------|---|
| Ignitability Index (0-20) | 0 |
| Heat Evolved Index (0-10) | 0 |
| Spread of Flame Index (0-10) | 0 |
| Smoke Developed Index (0-10) | 2 |

Natural Convection This process relies on air heated either by solar ingress or from energy dissipated within the cabinet. The rate of cooling is dependant on the temperature differential between the ambient and the heated air and the ease with which air may pass into and out of the cabinet.

Even when a simple filter is used, any contamination will substantially reduce air flow and increase the equipment temperature.

Care must be taken to avoid recirculation and ensure the fresh air flow is managed to the equipment with cooling fans.

Forced Filtered Convection The addition of fans to force ambient air through equipment allows a higher energy dissipation in the cabinet. Fresh air must be managed so that it dose not short circuit active equipment or allow hot puddles of air to accumulate. Fan types and sizes are chosen based on the energy to be removed and any back pressures that will be encountered. Cable Ways green fan controllers reduce power consumption whilst extending fan life and increasing the service interval.

Air to Air Heat Exchangers To avoid equipment contamination and early failure, cooling without mixing outside and inside air is required where the cabinet is within 5km of the sea or adjacent to heavily used roads.

The lowest operating cost option to achieve separation is the air to air heat exchanger.

Equipment warmed air is passed over a conductive surface which has a flow of cooler ambient air on the other side. Thermal energy passes through the plane from hot to cold, removing heat from the cabinet. The rating of a heat exchanger defines the increase in internal temperature above ambient for a given thermal energy transfer. Thus the temperature inside the cabinet is always hotter than the environment, typically by up to 100C. Typically the fan system will accommodate redundancy and be under program control. The program design accommodates a variety of automatic functions to both reduce noise emission and extend the service interval.

Door Mounted Heat Exchangers Standard width cabinets (650mm+) may be fitted with single or twin fan HE's with capacities from 50 to 95W/0C. They may be added to each door in a bayed configuration allowing flexibility and capacity increase. The cabinet is usually increased in depth to 750mm allowing room for batteries up to 155AH capacity.

Interchangeable End Mounted Heat Exchanger For use with cabinets using the full UniStar* extrusion system, four options are offered to allow flexibility in thermal management. All options are based around a removable left end mounted, air management module. The module houses either a heat exchanger or an aircon unit. This added module increases the cabinet width by 450mm.

| | |
|---------|--------------------------------------------|
| US:AE10 | 48V HE consumes 336W and removes ~ 100W/0C |
| US:AE23 | 48V HE consumes 525W and removes ~ 230W/0C |
| US:AC16 | 230V 1.6 kW aircon and controller |
| US:AC30 | 230V 3.0 kW aircon and controller |

Tele-Cooler, Integrated TEC Systems Tele-coolers comprise arrays of TEC modules, processor controlled to reduce internal temperatures below ambient. In essence they are solid state air conditioners which offer service intervals up to 100,000 hours (10+ years). They are complex, power hungry and expensive, but are reliable and quiet.

Air Conditioners Precision air conditioners are available where the internal load exceeds the economic viability of Tele-cooler systems. Their ability to maintain a consistent sub ambient temperature offsets their running expense and comparatively short life (5+ years). Appropriately budgeted and maintained, they form the backbone of legacy cabinet cooling systems.

Thermal Batteries Compounded salts undergo a phase change from solid to liquid after absorbing a predetermined amount of energy. The latent heat fusion allows a cabinet temperature to be pegged at a defined ceiling temperature. The batteries are packaged to meet the specific application need. Most useful to absorb the peak mid day solar gain, they are recharged by their temperature falling to the point of the salts crystallisation. They are passive requiring no power other than the circulation of air within the cabinet. They have a capacity, varying on type of ~60W/hrs/Ltr and have a long maintenance free life of 20+ years, over which they slowly degrade @ ~2% pa.

MECHANICAL CONSIDERATIONS

| | | | | | | | | | | | | | |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|-----------|--------|---|-------|-------|--------|--------|--------|--------|--------|
| General Cabinet Construction | <p>The EcoStar* cabinet system uses marine grade aluminum sheet and extrusions, ensuring long life and durability in the harshest environments. The outer skin is formed into a monocoque shell, with the mounting rail components adding strength and stiffness.</p> <p>The cabinet may be directly bolted to a concrete base or attached to an aluminium or galvanised steel plinth.</p> <p>The 2.5 mm thick outer skin fitted with a layer of inert insulation applied to the inner surface. The insulation is skinned to prevent damage and extend life. The outer cabinet surface is powder coated in an environmentally neutral colour or as defined according to local body requirements.</p> <p>The external surfaces of the cabinet are flush finished without fixings or openings, to eliminate possibility of access from bar leverage.</p> <p>Special attention has been paid to the DF mounting frames ensuring exceptional stiffness and preventing faults during IDC termination.</p> <p>The heat exchanger inlet and outlet points are confined to door mounted louvers. All inlets and outlets are either covered with stainless steel mesh to prevent the ingress of large insects and reptiles or fitted with a zero cost site serviceable filter.</p> | | | | | | | | | | | | |
| External Finish | <p>The external cabinet is finished as standard in “Mossvale sand” textured PE powder coat but may also be finished with a variety of preparations to customer specifications. Long life high-density textured polyester based powder coat Crodalux PT621/8329, is the recommended finish. ICI Durotec or Duroplast AG anti graffiti powder coatings are optionally available in a wide variety of colours.</p> <p>Specification and 7 year finish performance guarantees are passed through from the powder manufacturers.</p> | | | | | | | | | | | | |
| Cabinet Weights | <div><p>The specific equipment installed determines the final system weights.</p><p>Some common configuration weights are given for reference.</p><table><tr><td>ES**6565</td><td>86 kg</td></tr><tr><td>ES**65150</td><td>155 kg</td></tr><tr><td>T</td><td>52 Kg</td></tr><tr><td>TEA10</td><td>165 Kg</td></tr><tr><td>TEBA10</td><td>190 Kg</td></tr><tr><td>TEEA10</td><td>220 Kg</td></tr></table></div> | ES**6565 | 86 kg | ES**65150 | 155 kg | T | 52 Kg | TEA10 | 165 Kg | TEBA10 | 190 Kg | TEEA10 | 220 Kg |
| ES**6565 | 86 kg | | | | | | | | | | | | |
| ES**65150 | 155 kg | | | | | | | | | | | | |
| T | 52 Kg | | | | | | | | | | | | |
| TEA10 | 165 Kg | | | | | | | | | | | | |
| TEBA10 | 190 Kg | | | | | | | | | | | | |
| TEEA10 | 220 Kg | | | | | | | | | | | | |
| Cabinet Signage (External) | <p>No Provision has been made for service provider identification and this is open for customer determination. The manufacturer's logo is attached onto a corner of a front door.</p> | | | | | | | | | | | | |
| Cabinet Lifting | <p>The cabinet may be slung on its transport plinth, or without plinth using the integrated lifting bar cavities. Refer to the site installation manual for the approved procedure.</p> | | | | | | | | | | | | |
| Heat Exchanger Access | <p>UniStar* cabinets with discreet air management modules. The heat exchanger and mains power management modules are easily accessed at the left end of the cabinet by opening the outer cabinet door. A bitted access key and triangle actuating key are required.</p> | | | | | | | | | | | | |
| Equipment Mounting and Access | <p>Equipment mounting bays will be of adequate mechanical strength to hold TX, mux, F/O and power sources, not exceeding 85 kg per bay.</p> <p>The standard solution accommodates ETSI racks or 19” EIA racks and where bayed they are separated by a central wiring duct and joined by a horizontal cable tray. The wiring duct is specially designed to accommodate the side entry and management of multi pair cables from the subracks.</p> | | | | | | | | | | | | |

The main equipment area is accessed from the front, by opening the equipment module doors. A bitted access key and triangle actuating key are required.

DF Access

The DF is accessed at the right side of the cabinet through a dedicated door, which may use an alternative locking system. A triangle actuating key is required.

Door Stays

The cabinet doors are fitted with heavy-duty stays. The door stays do not hinder access to the equipment or DF chambers. The stays are securely stowed with the doors closed.

External Security

Special attention has been paid on securing the cabinet from vandalism.

Using 2.50mm 3/4 temper marine grade aluminum backed by 94VO insulation, the seam-welded panels provide strength and rigidity. Folded corners and flush faces give no purchase to levers or bars.

An enhanced lock actuating system developed by CWL provides improved security; fully flush key locks operate SS cams that fully secure the triangular lock-actuating key.

A range of alternative locking systems may be fitted to match existing standards; "European" style polyamide or cast aluminum cabinet locks, etc.

Most locking systems may be keyed individually, alike or to a national pattern.

There are no externally visible fixings and precision turned sealed flanged stainless steel hinge pins are used in all applications.

Glanding is provided adjacent to the outside wall beneath the side mounted cable trays. Typically the supply will enter on the left side passing into a management and termination module. These modules may be fitted with a remote displaying power meter and act as the demarcation point for the supply authority.

Outgoing cables are fed to the right side where a wide cable tray allows careful management to the lower glanding.

An additional gland area is provided under the central wiring duct in multi bay cabinets.

External Cable Entry "EcoStar* Cabinets"

Cabinets with a discreet T module.

All bearer and distribution cables enter the cabinet through a large rectangular hole in the precast concrete plinth. A customer specific polystyrene duct plug fits into the precast hole, positioning the PE/PVC underground ducting for proper alignment with the fitted fiber/copper termination systems. UG cables rise to termination frames or pass through conduits to the T/E module interface cable gland.

"D" side cables are presented in underground ducts directly below the termination block-mounting channels.

"E" side cabling passes through the bulkhead cable gland and feeds through the top rear of the termination block-mounting channel.

Cabinets with discreet air management modules.

The electrical supply enters the cabinet on the left-hand side into the air management module, into a switch box. This having a main isolating fused switch, surge diverter, rectifier circuit breaker and supply socket, a utility socket with its own circuit breaker and an auxiliary power inlet socket.

The auxiliary circuitry includes an automatic line power disconnect and fall back. If fitted the power usage meter is viewable through a polycarbonate window in the left facing AMM door.



MAINTENANCE

It is possible to carry out routine maintenance, where required whilst the enclosure is deployed in the field and in service, without loss of service.

In the event of damage, cabinet doors may be replaced in the field. A range of service spares parts are available and are detailed according to the final cabinet design.

Body Maintenance for long life

An annual inspection and wash with detergent is the only recommended surface maintenance; this prevents the build up of corrosive air borne chemicals.

The standard powder coating used has been specifically selected for the EcoStar* cabinet range and whilst not fully graffiti proof, is loaded with PTFE as a first level of protection against intentional or inadvertent marking.

Heat Exchangers

The heat exchanger is an active mechanical device and as such has a finite life. The MTBF of the fan system exceeds 80,000 hrs and the periodic fan replacement will ensure continuous trouble free operation.

All fans should be replaced after the fifth service anniversary and before the sixth. Service exchange units are available under contract for all products.

Air Filters

Incoming air passes through a filter that prevents the ingress of water spray and insects. This filter should be inspected on an annual basis and may washed on site with water and detergent. Our experience shows that any dust or small insects sucked into the heat exchanger are de-hydrated and blown clear. The mechanical components of the heat exchanger use stainless steel and treated marine resistant aluminum components, which require no maintenance.

SAFETY

Earth Bonding for Lightning Protection

DF frame earths are taken directly to the lightning earth rod located centrally below the DF frames, via 16mm² cable.

Equipment Earthing

The equipment mounting frame may have fitted an additional isolated earthing bar. This may be connected to the cabinet earth stud bar via 6mm cable. The central cabinet earth stud bar is mounted on the base extrusion at the front of the cabinet.

Customer specification is sought to adapt the standard product to specific local work practices.

Fire Retardant Materials

Fire retardant construction and materials are used throughout the cabinet and enclosure design. All materials are rated 94V1 or better. Additional protection may be applied by the application of an intumissant coating to the cabinet surface. This option is a separate coating regime and not compatible with the standard powder coat offered. The coating, a powered rock formulation, expands during a fire forming a barrier and protects the cabinet against short term exposure.

OPTIONAL CABINET EQUIPMENT

Stackable Battery Plinth

This plinth allows batteries to be mounted under the main cabinet in a secure lockable slide out draw. The unit increases the height of the cabinet stack by 320mm.

Underground Battery Housing

A subterranean battery vault is available in which the batteries are either direct buried or accessed via a pavement rated cast aluminum locking cover. This unit is a separate module and when mounted in line with the cabinet, does not increase installation depth.

ENGINEERING SPECIFICATION

| | |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Thermal Batteries | Where peak solar or service loading may cause temperatures to temporally exceed the operating window, a thermal battery may be incorporated into the rack behind the equipment or integrated into an extended air management module. This device accumulates energy over a predetermined temperature span for release at a time of lower ambient temperature, typically during the night. They are electrically passive phase change devices and as such, there is no increase to the power budget. |
| Thermoelectric Coolers | Where the addition of thermal batteries is inadequate to meet load requirements an array of thermoelectric coolers may be integrated into the heat exchanger. These devices consume high levels of energy and special cabling and power management is required. |
| Air Conditioning (Air Management Modules only) | A long life air conditioning module (16,000 hrs MTBF) may be added where ambient temperatures cause equipment operating ranges to be exceeded or where the equipment must be maintained below ambient. These units typically provide heat transfers rates of 1.6 and 3.0 kW and replace the heat exchanger. |
| Water Level Alarm | A water level alarm may be fitted. |
| Humidity Alarm | A level adjustable humidity alarm may be fitted. |
| Door Security Switches | Cabinet door switches with change over contacts may be fitted. |
| Internal Light | Separately switched DC incandescent strip lights may be fitted in the equipment bays and above the DF. |
| Noise Chokes UniStar* T Modules | Up to four 20-choke mounting trays may be retro fitted as required. The chokes substantially reduce interference from electric fences and protect the line cards. These mount in the T module, on the side walls, accessible in front of the E and D termination modules. They are terminated using the supplied Quante SID-C or Krone NT blocks. Cabling is run to the choke as an interrupted jumper from the D termination to the E source. |
| High Temperature Alarm | A level settable or fixed temperature alarm may be fitted. A smoke detector may be fitted. |
| Gas Detector and Extinguisher System | A 2RU rack mounted gas sniffing fire-extinguishing system is available. The system monitors air flow and on sensing smoke or gas will isolate the DC supply and discharge a non-damaging compliant suffocant. The unit is mains powered and includes a backup battery. |
| Alarm Monitor Panel | A 1RU alarm panel receives up to 16 inputs and produces an SMNP or set of isolated outputs. Inputs are shown on the panel and remain visible until reset. The panel is designed to be in the airflow and can house the smoke detector, humidity and over temperature sensors. |
| Mains Metering and Management | For sites where metering is required, a 2RU panel provides termination P N G, isolation switch with surge diverter, consumption metering, an ELCB protected service socket and 4 load breakers. The display is door mounted and protected under a graffiti barrier. |
| Various | The cabinet is weather resistant to prevent ingress of rain, snow, sand, dust, insects and other solid foreign objects to a minimum level of IP54. Options exist to extend the IP rating and may be specified at order time. Special earthing regimes, RFI shielding, power distribution and management; door access control, battery monitoring and remote discharge testing are some of the many elements, which may be specified. CWL's engineering department will assist in creating your optimum cabinet solution. Basically if you need something to configure your cabinet, we will find a way to meet your need. |

EQUIPMENT BUILD UP

| | |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E Terminations | "E" side equipment tails are led out with a horizontal cable tray, from the central wiring duct, exiting from of the top right of the equipment bay through the bulkhead into the "E" termination channel. |
| Site Expandability | The modularity of the UniStar* system allows low capacity "T" installations to be later upgraded with active equipment and converted into "TEEA" cabinets. |

INSTALLATION PROCEDURES

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Fixings and Ducting | <p>Appropriate M10 anchor bolts, clamp plates, isolating and spring washers are supplied with each cabinet. Where a Cable Ways "TEEA" precast base is used, mains entry ducting is integrated into the plinth. "T" module UG ducting is not supplied and the necessary preformed bends for battery, bearer and distribution cabling will be required. A duct guide plug is supplied to ensure the correct positioning of the UG ducts.</p> <p>For site poured installations, the customer shall supply all piping and groundwork for the site. An aluminum base-mounting frame is available for concrete bases poured in-situ. Product recommendations, sizes and quantities are included with the installation instructions.</p> |
| Installation | <p>All procedures conform to New Zealand work and safety practices.</p> <p>The site installation manual when followed will ensure compliance and is the recommended step-by-step method for site preparation and installation.</p> |

WARRANTY

CABLE WAYS LTD (CWL) warrants to the Buyer that the products or Services are free from any defect in material and workmanship under normal use given proper installation and maintenance for the period stated in CWL's published specifications. Minor defects can be accepted at the sole discretion of the Contractor. Acceptance is not to be unreasonably withheld.

The Buyer will promptly notify CWL of any defect in the Product or Service. CWL or its agent will have the right to inspect the Product or workmanship on the Buyer's premises. CWL has the option to:

- (a) repair, replace or service at its factory or on the Buyers premises the Product or workmanship found to be defective; or
- (b) credit the Buyer for the Product or Service. Refurbished material may be used to repair or replace the Product. Products returned to CWL for repair, replacement or credit would be shipped prepaid by Buyer.

LIMITATION OF WARRANTY

CORRECTION OF DEFECTS BY REPAIR, REPLACEMENT, SERVICE OR CREDIT WILL BE AT CWL's OPTION AND CONSTITUTE FULFILMENT OF ALL OBLIGATIONS TO THE BUYER FOR BREACH OF WARRANTY.

CWL assumes no warranty liability with respect to defects in the Product caused by:

- (a) modification, repair, installation, operation or maintenance of the Product by anyone other than CWL or its agent, except as described in CWL's documentation; or
- (b) the negligent or other improper use of the Product.

Other manufacturer's equipment purchased by CWL and resold to the Buyer will be limited to that manufacturer's warranty. CWL assumes no warranty liability for other manufacturer's equipment furnished by Buyer.

No agent, distributor, or representative is authorised to make any warranties on behalf of CWL or to assume for CWL any other liability in connection with any CWL Product of Service.

DISCLAIMER OF WARRANTY AND LIMITATION OF REMEDIES

Buyer understands and agrees as follows:

THE ABOVE WARRANTY REPLACES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF CWL, INCLUDING ANY WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. ALL OTHER WARRANTIES ARE DISCLAIMED AND EXCLUDED BY CWL.

THE FOREGOING WILL BE THE SOLE AND EXCLUSIVE REMEDY WHETHER IN CONTRACT, TORT OR OTHERWISE, AND CWL WILL NOT BE LIABLE FOR INJURIES OR DAMAGES TO PERSONS OR PROPERTY RESULTING FROM

ANY CAUSE WHATSOEVER, WITH THE EXCEPTION OF INJURIES OR DAMAGES CAUSED BY THE GROSS NEGLIGENCE OF CWL. THIS LIMITATION APPLIES TO ALL SERVICES AND PRODUCTS DURING AND AFTER THE WARRANTY PERIOD. IN NO EVENT WILL CWL BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR COMMERCIAL LOSSES EVEN IF CWL HAS BEEN ADVISED THEREOF.

IN-WARRANTY REPAIR

Product repaired while under warranty shall be warranted for the remainder of the original Product Warranty or a period of six months from the date of repair or date of return shipment to Buyer whichever is longer.

OUT-OF-WARRANTY REPAIR

Product repairs while out of warranty shall be warranted for a period of six months from the date of repair or date of return shipment to buyer whichever is applicable.

WARRANTY CLASSIFICATION

Products referred to within published material are classified by a code, which designates the specific product warranty period as follows:

| | | |
|-----|-----|-----------------------------------------|
| A - | 90 | Days |
| B - | 120 | Days |
| C - | 1 | Year |
| D - | 2 | Years |
| E - | 3 | Years |
| F - | 5 | Years |
| X - | - | Pass through from original manufacturer |

OUTSIDE PLANT CABINETS

Warranty classification for outside plant cabinets are split over the various components;

| | | | |
|-----|-------|-------|--------------------------------------|
| F - | | | Cabinet body, locks, hinges, handles |
| F - | | | Heat exchanger hardware |
| E - | | | Electrical and control systems |
| X - | 2 | Years | Heat exchanger fans |
| X - | 2 | Years | Air conditioners |
| X - | 7 | Years | External finish powder coat 7 years |
| X - | 3 | Years | DC power systems |
| X - | 4 / 5 | Years | Batteries |



Thermal Testing The first of every production design is tested for compliance to the standard to which the cabinet has been rated. The testing will be carried out at the Cable Ways facility according to CWL test procedures and be open to inspection by the purchasing body.

That the module under test, whilst passing a managed airflow through the equipment bay, shall remove not be less than the specified power in Watts / °K rise in operating temperature.

IP Testing **GR-487-CORE R3-193, O3-194 (or as specified)**
The first of every production design is tested for compliance to the standard to which the cabinet has been rated. The testing will be carried out at the Cable Ways facility according to CWL test procedures and be open to inspection by the purchasing body.

That whilst under falling water inclined at 45° from the horizontal, not more than 1cc/0.028 M3 of cabinet volume of water shall enter the equipment compartment in any manner so as to be in contact with the mounted equipment. (IP54)

The cabinet system will be compliant to such standard as is defined by the sales specification.

Seismic Testing **(IF RATED) GR-63-CORE 5.4.1.4 ETS 300 019-2-4/A1**
The first of every production design is tested for compliance to the standard to which the cabinet has been rated. The testing will be carried out at the Cable Ways facility according to CWL test procedures and be open to inspection by the purchasing body.

That when loaded with equipment not exceeding the rated mass, the cabinet system shall withstand two consecutive thirty second cycles of planar excitation without damage. Swept excitation from 2-10 Hz, ranged acceleration from 0.5 – 2.5 m/s² may be used.

Periodic Inspection Item

Periodic Inspection Time P eriod

| Cabinet Exterior | Annually | 2 years | 4 years | 6 years |
|---------------------------------------|----------|---------|---------|---------|
| Air filter | C | | | |
| Exterior hinges | Δ | | | |
| Exterior surfaces (general condition) | C | | | |
| Lock operation & condition | Δ | CL | | |
| Cabinet Interior | Annually | 2 years | 4 years | 6 years |
| Light operation (if fitted) | Δ | | | R |
| HE Fan operation | Δ | | | |
| HE Fans – external air circuit | Δ | | | R |
| HE Fans – internal air circuit | | Δ | | |
| HE element tray | | | | C |

Δ - Check

C - Clean

L - Lubricate

R - Replace



Common features

2.5 mm marine grade skin for 15+ year life with UV resistant AG polyester powder coat finish

Captive sealed SS hinge pins & dedicated interlocking hinges

Adjustable 19, 21" or ETSI equipment mounting rails or customised gear tray or both.

Optional skin insulation for the reduction of solar ingress & thermal management.

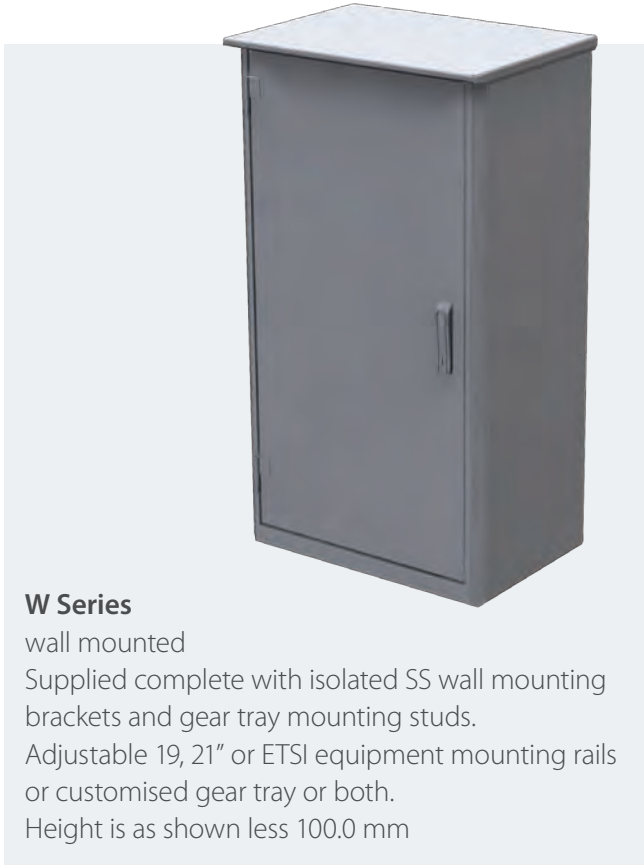
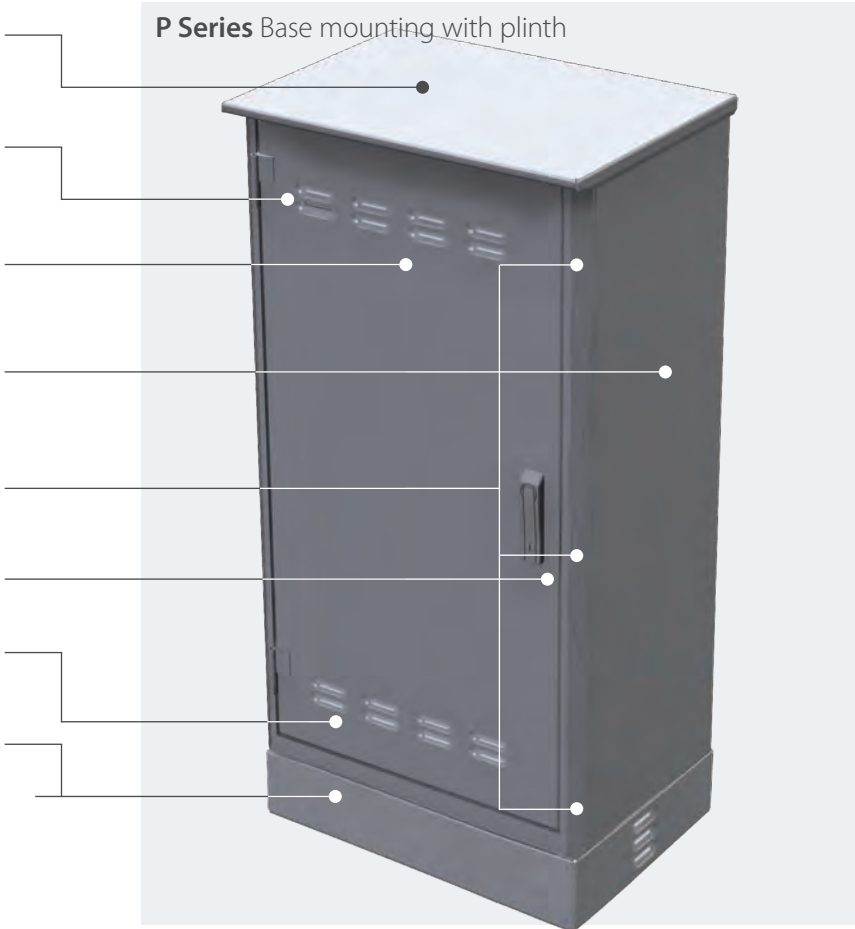
Standard, super secure and pad lock options available

Standard 3 point locking

Wide range of cooling systems available

Optionally ventilated plinth with internal gland plate

Cabinet colour, to suit local body requirements or to corporate standard



W Series

wall mounted
Supplied complete with isolated SS wall mounting brackets and gear tray mounting studs.
Adjustable 19, 21" or ETSI equipment mounting rails or customised gear tray or both.
Height is as shown less 100.0 mm

| Width (cm) | | Depth (cm) | | Height (cm) | | RU |
|------------|---|------------|---|-------------|--|----|
| 45 | X | 30 | X | 75 | | 12 |
| 45 | X | 30 | X | 101 | | 18 |
| Width (cm) | | Depth (cm) | | Height (cm) | | RU |
| 65 | X | 30 | X | 75 | | 12 |
| 65 | X | 40 | X | 75 | | 12 |
| 65 | X | 30 | X | 101 | | 18 |
| 65 | X | 40 | X | 101 | | 18 |
| 65 | X | 30 | X | 120 | | 22 |
| 65 | X | 40 | X | 120 | | 22 |
| Width (cm) | | Depth (cm) | | Height (cm) | | RU |
| 80 | X | 30 | X | 101 | | 18 |
| 80 | X | 40 | X | 101 | | 18 |
| 80 | X | 40 | X | 120 | | 22 |

Common features

2.5 mm marine grade skin for +15 year life with UV resistant AG polyester powder coat finish.

Cabinet colour, to suit local body requirements or to corporate standard

Captive sealed SS hinge pins & dedicated interlocking hinges

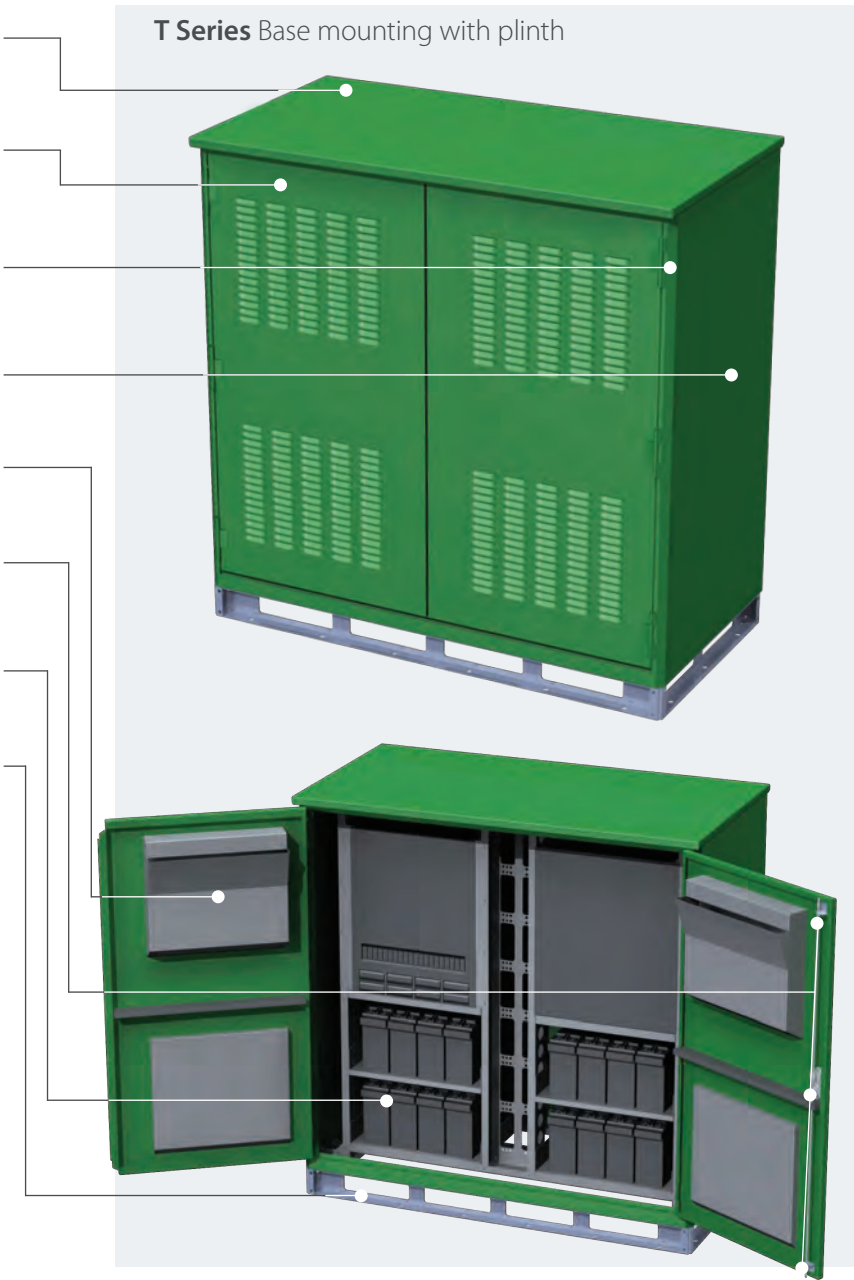
Optional skin insulation for the reduction of solar ingress & thermal management.

Wide range of cooling systems available

Standard 3 point locking, super secure and pad lock options available.

Adjustable 19, 21" or ETSI mounting rails or gear tray or battery shelves

Steel HDG plinth 65.0 mm or 100.0 mm height














| Bay | Width (cm) | | Depth (cm) | | Height (cm) | RU |
|------------|------------|---|------------|---|-------------|----|
| Single Bay | 65 | X | 40 | X | 143 | 29 |
| | 65 | X | 50 | X | 143 | 29 |
| | 65 | X | 65 | X | 143 | 29 |
| | 65 | X | 75 | X | 143 | 29 |
| | 65 | X | 65 | X | 200 | 42 |
| | 65 | X | 75 | X | 200 | 42 |
| Double Bay | 150 | X | 65 | X | 143 | 56 |
| | 150 | X | 75 | X | 143 | 56 |


Outdoor Plant Cabinets protecting infrastructure from weather






ECOSTAR* C & T SERIES - PART NUMBER TABLE





EcoStar* family products part numbering system:

| EcoStar* family | Plinth options | Mounting frame or Gear tray | Battery shelves | Cooling system | Locking system | Insulation | Color | Overall sizes (cm) | | |
|-----------------|----------------|-----------------------------|-----------------|----------------|----------------|------------|-------|--------------------|-------|--------|
| | | | | | | | | Width | Depth | Height |
| EC | P | 1 | N | V | A | I | G | 45 | 30 | 75 |
| ET | S | 1 | L | V | B | I | G | 65 | 65 | 143 |

| | | | | | | | | |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------|--|--|--|--------------------|--|--|--|
|  | EcoStar* family | | | | EcoStar* C | | | |
| | EC EcoStar* C (please choose overall sizes from table) | | | | Overall sizes (cm) | | | |
|  | ET EcoStar* T (please choose overall sizes from table) | | | | | | | |
| | | | | | | | | |
|  | Plinth options | | | | | | | |
| | EcoStar* C P Base mounting with plinth | | | | 45 30 75 12 | | | |
|  | W Wall mounting - no plinth (height is as shown less 100.0 mm) | | | | 45 30 101 18 | | | |
| | EcoStar* T A Aluminum plinth - PC with cabinet | | | | 65 30 75 12 | | | |
|  | S Steel plinth - HDG | | | | 65 40 75 12 | | | |
| | N None | | | | 65 30 101 18 | | | |
|  | Mounting frame or Gear tray | | | | 65 40 101 18 | | | |
| | G Gear tray | | | | 65 40 101 18 | | | |
|  | 1 or 2 or E 1=19", 2= 21" or E= ETSI Mounting frames | | | | 65 30 120 22 | | | |
| | N None | | | | 65 40 120 22 | | | |
|  | Battery shelves | | | | 80 30 101 18 | | | |
| | EcoStar* C N None | | | | 80 40 101 18 | | | |
|  | EcoStar* T A = 1 B = 2 C = 3 Left side battery shelves | | | | 80 40 120 22 | | | |
| | D = 1 E = 2 F = 3 Right side battery shelves | | | | | | | |
|  | G = 1 H = 2 J = 3 Both side battery shelves | | | | | | | |
| | K = 1 L = 2 M = 3 Single bay battery shelves | | | | | | | |
|  | N None | | | | | | | |
| | | | | | | | | |

| | | | | |
|------------------------------------------------------------------------------------|--------------------------------------------------|---|-------------------------------------------------|----------------------|
|  | Cooling systems on front door for ΔT=5 °C | | Fans | Dissipated heat (kW) |
| | Common | B | Forced filtered convection 2 X 120 x 120 AC fan | 0.13 |
| | | C | Forced filtered convection 2 X 120 x 120 DC fan | 0.42 |

| | | | | |
|-------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|-------|--|
|  | N None - plain door | | | |
| | V NC - Natural vented door louvers with filter foam | | | |
|  | EcoStar* T A Air conditioners | | | |
| | D | Forced filtered convection 1 x 220 AC fan | 1.25 | |
|  | E | Forced filtered convection 1 x 220 DC fan | 1.25 | |
| | F | Forced filtered convection 1x220 AC&1 x 120² DC fans | 1.34 | |
|  | H | Air to air heat exchangers Various options | < 4.0 | |
| | P | Forced filtered convection plus PCM FC+PCM | | |
|  | T | Forced filtered convection plus TEC FC+TEC | | |
| | | | | |

| | | | | |
|-------------------------------------------------------------------------------------|------------------------|---------------------|---------------|-----------------------|
|  | Locking systems | | Colors | |
| | A | Swing lock handle | A | Almond |
|  | B | Flush front locking | F | Forest green |
| | C | Pad lock handle | G | Ghost grey texture |
|  | Insulation | | L | LT ADM Grey |
| | N | None | M | Mossvale sand texture |
|  | I | Insulated | | |
| | | | | |

| | | | |
|--------------------|-------|--------|----|
| EcoStar* T | | | |
| Overall sizes (cm) | | | |
| Width | Depth | Height | RU |
| Single bay | | | |
| 65 | 40 | 143 | 29 |
| 65 | 50 | 143 | 29 |
| 65 | 65 | 143 | 29 |
| 65 | 75 | 143 | 29 |
| 65 | 65 | 200 | 42 |
| 65 | 75 | 200 | 42 |
| Double bay | | | |
| 150 | 65 | 143 | 56 |
| 150 | 75 | 143 | 56 |

Customization:

- ☐ Gear tray
☐ Special cable entry options
☐ Locking system
☐ Custom

Accessories:

- ☐ Door Switch
☐ Light
☐ Float switch
☐ Equipment shelves
☐ Additional cable trays

Power system:

- ☐ Rectifier capacity
☐ 1 & 2 RU < 4kW ☐ 3 RU < 6kW ☐ 5/6 RU < 22kW
☐ Battery capacity
☐ 24V ☐ 48V
☐ 100AH ☐ 150AH ☐ 300AH ☐ 600AH
☐ 2RU AC mains entry & distribution panel < 10 MCB'S
☐ 3RU AC/DC power distribution panel < 22 MCB'S

This we need to know, to properly specify a cabinet:

- ☐ Solar radiation ☐ W/M2
☐ Max working ambient temperature ☐ °C
☐ Max equipment working temperature ☐ °C
☐ Max equipment dissipation ☐ WATTS
☐ Special equipment consideration, e.g. air flow direction



EB REX 500

Uses actively managed passive cooling to extend battery life.



ALCATEL LUCENT

18 block multi disciplined backup cabinet.

THERMALLY MANAGED BATTERY ENCLOSURES

With the increasing demand for higher field storage capacity, Cable Ways engineers have developed a technology to thermal manage enclosures, which can double block life.

This extended life changes the economics for solar power solutions where the high cost of replaceable storage may rule out an application. Not only does this technology reduce the running cost, it halves the necessary block recycling.

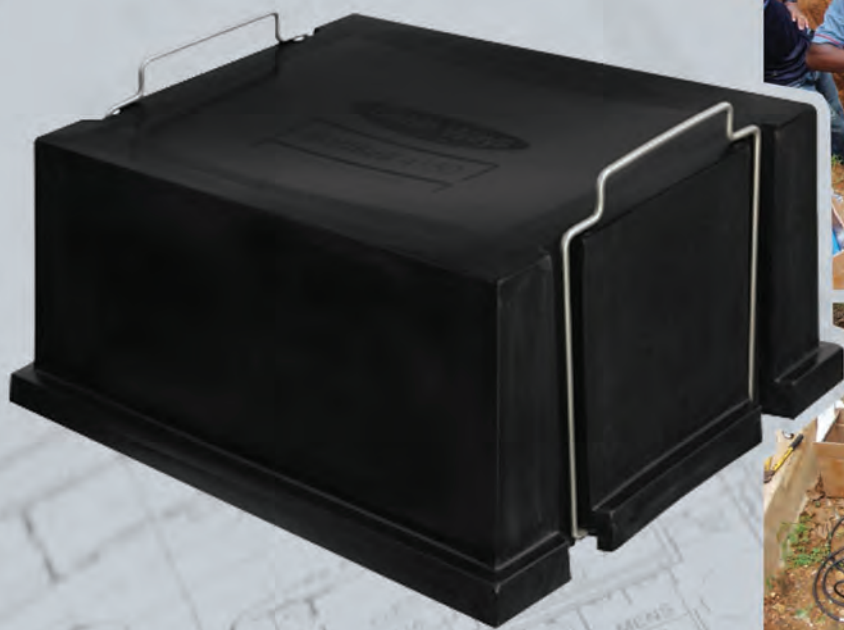
The coast rated enclosure, based on the field proven UniStar* range of extrusions is secure without external fixings and uses a flush surface three point locking system. Full access is through the twin alarmed front doors. The optional alarm system is self arming and is fully securely contained, providing distinctive awareness to the local community.

Housed within, is a 2V block, battery frame capable of seismic cross bracing, having isolation and distribution MCB's. An additional 3RU is available for mounting rectifiers or solar control hardware, along with adequate cable management.

The actively managed passive cooling system has the capacity to maintain a normalized working temperature during day time peaks, concurrent with boost charging.

The reduction of large cyclic temperature variations and the maintenance of a consistently lower working temperature greatly extend's battery life.

The REX range of standby power enclosures is adaptable to suit a range of capacities from 500Ah to 3000Ah.



UBH4150

Designed to suit a string of blocks up to 150Ah. Photos showing an actual step-by-step installation of an underground battery housing unit.



UNDERGROUND BATTERY HOUSINGS

With the unrelenting pressure of increased service expectancy, comes the demand on network designers and engineering departments to squeeze additional equipment into already crowded cabinets and equipment shelters.

The positioning of lead acid batteries inside equipment cabinets has been a traditional solution to field applied technologies, however the mixing of batteries and equipment is now fully recognized as far from ideal as the block life is reduced through increased working temperature.

Cable Ways Ltd, have released a novel solution meeting the needs of both the network planners and the DC power engineers. By removing the batteries from the cabinet additional space is made available for use by system engineers to expand network capabilities and by placing the blocks underground the life expectancy may be greatly extended.

No longer is the back up time dictated by the available dimension constraints of a cabinet, now it may be fully extended to meet the demands of increased throughput network hardware.

The temperature 1 – 2 meters below the ground surface is stable within a few degrees throughout the year and so batteries suitably housed exist in a preferred environment. Cable Ways Ltd has developed a modular format direct bury housing along with the necessary protocols and hardware to ensure simple subsequent access. A comprehensive kit is supplied for both direct bury or pit application.

These battery housings are ideal for use in cast pits where flooding occurs. They have base fixing and conduit access points and latch secured covers, with additional pad lockable security options.

UBH4150 is designed to suit a string of blocks up to 150Ah.





VODAFONE FLEXI POWER AND FLEXI 32



**RETRO POWER AND
FORCED CONVECTION UNIT**



**HOUSINGS FOR RF APPLICATIONS ON
PRODUCTION LINE READY TO BE INSTALLED ON SITE**

RECTIFIER AND BATTERY HOUSING FOR EMERSON POWER



NOKIA 480 LINE SDH with integrated 1100W heat exchanger. Now painted to deter the graffiti artist.

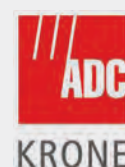
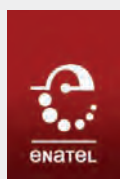
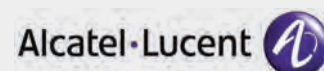


ALCATEL LUCENT REPEATER SITE using forced filter cooling with additional silencers provide < 45 db



WHOOSH WIFI





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