

MERLIN

Split Charging Battery Monitors Battery Management Devices



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Merlin - The Power People



Merlin Equipment is the UK's leading supplier of electrical power components and systems to the marine industry. With over 7500 products (generally available from stock), we are a true "one stop shop" for all things electrical. However, unlike many suppliers, we invest heavily in employing qualified electrical engineers and providing our team with regular training - providing you with immediate and accurate technical support and on site warranty repair facilities.

Quality Products

Our philosophy is to provide top quality products which will last. That's why our products are used on Ellen MacArthur's B&Q Trimaran, RNLI lifeboats and even front line ambulances. Much of our equipment is covered by warranties that far exceed those of the competition.

Green Energy

Merlin Equipment is committed to providing top class products, service and support. However, not at any cost. Our Green Policy means that we carefully evaluate all parts of our business - from environmental impact of our products to recycling of packaging. We also recycle our paper, raw production materials and even used batteries.



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Ordering Information

Order directly from Merlin Equipment by telephoning 01202 697979. Alternatively, you can email Merlin Equipment at sales@merlinequipment.com. All sales are subject to our Standard Terms and Conditions (available on request or may be downloaded from our website).

Payment & Carriage

Unless you have a credit account with us, payment is required in full prior to dispatch. Payment can be made by: Credit Card, Cheque, Bankers Draft, Post Office Order, BACS, CHAPS and cash. All pricing quoted by Merlin Equipment excludes carriage at cost and VAT.

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Battery Monitors
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Split Charging Systems

The Merlin Guide To Split Charging

75% of all vessels today are fitted with at least two battery banks. Usually this consists of a dedicated engine start battery and larger batteries (linked in parallel with each other) for deep cycle "Domestic" use. All charging sources should charge all batteries. Therefore some method of split charging (sometimes for each charging device) is required. Split charging is an extremely complex subject and one not usually understood even by many marine electricians. This guide explains our split charging solutions, how they work and their advantages/disadvantages.

Blocking Diodes

A diode is an electronic component that allows current to flow one way down a cable. By building two (or more) of these into a single unit, we are able to split the charge (say from an alternator) between two battery banks without allowing either battery to discharge into the other.

Perhaps the largest drawback of using diodes is "voltage drop". When current flows through a diode, it's internal resistance will lose around 0.5-1VDC of the charging voltage. This means that charging efficiency can be degraded unless you have a battery sensed alternator (usually done by fitting a smart alternator controller such as our Merlin AMS unit) or battery charger.

A fact that many "experts" aren't aware of is overcharging caused by blocking diodes when used with smart charging systems. This problem is caused when the batteries being charged have a large size difference - e.g. 70AH engine and 400AH domestic battery bank. If charging a heavily depleted 2nd battery bank while also charging a full engine start battery, the engine battery will be overcharged. This is due to the charging device raising the voltage to around 14.8V to charge the depleted battery bank. The engine battery only needs a float charge of say 13V so it starts gassing. The problem gets worse the larger the 2nd battery gets.

Subject to boat owners being aware of these facts, we sell LO-LOSS™ blocking diodes for certain applications. In most instances we recommend using Voltage Sensitive Relays or Battery Combiners (see over)

Merlin p/n	Amps	# Of Inputs	# Of Outputs
HRDIO33-1	70	1	2
HRDIO33-3	70	1	3
HRDIO33-18	130	1	2
HRDIO33-23	130	1	3
HRDIO33-33	160	1	2
HRDIO33-41	160	2	3
HRDIO33-43	190	1	2



LO-LOSS™ Technology

Units available from 70-190A

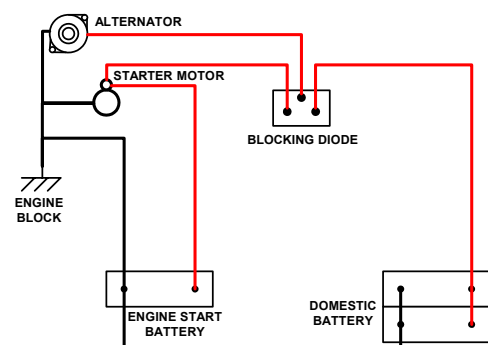
Fully waterproof

Easy to Install

Rugged aluminium construction

Suitable for 12 or 24VDC

Typical Blocking Diode Installation



Voltage Sensitive Relays (VSR's)

Voltage Sensitive Relays are cost effective, compact and have few drawbacks. They are rather like older split charge relays (which close when the ignition is switched on). However, VSR's are activated by their own internal Battery Monitoring System.

VSR's initially stay open (off) when the engine is charging the engine start battery (therefore, the engine battery is priority charged). Once the engine battery has reached 13.7V from the alternator charge, the relay will close allowing both engine and domestic battery banks to be charged. When the engine is stopped, the voltage returns to normal levels allowing the relay to open again - separating the engine and domestic batteries. Unlike diodes, VSR's have ZERO voltage drop (so require no battery sensing on alternator or charging device) and won't allow overcharging. Unlike older split charge relays, they will also open if their current carrying capacity is exceeded - preventing them overheating and burning out.

Our larger 300 amp model is fitted with an "Emergency Parallel" feature. By pressing a button on the instrument panel, the VSR will hold both the engine and domestic battery bank in parallel for ten minutes. This will allow starting of the engine from the domestic battery bank. Once this time has passed, and the voltage is up high enough (13.8V), the unit will stay engaged until voltage falls back to normal levels.

The smaller VSR's (100A) are mono-directional - i. e. they sense off one battery only (usually the engine battery and allowing charge to the domestics). Therefore, if you have other charging sources (e.g. solar panels) which are required to charge the engine battery, we recommend using the 300A unit which is Bi-Directional - allowing management of all charge sources on board.

Size the VSR for the largest charging source on board. There is no drawback using a larger than necessary VSR (for example using a 300A unit where bi-directional sensing is required).

VSR's other main benefit is that due to their zero voltage loss, alternator charge controllers simply aren't necessary. Combine VSR's with our AGM batteries and you will have an ultra efficient charging/split charge system - without the complexity of conventional controllers, diodes etc.

As used by: Ellen MacArthur's B&Q Trimaran, Sunseeker Powerboats, Sealine, Moody Yachts, Police Vehicles and Front Line Ambulances



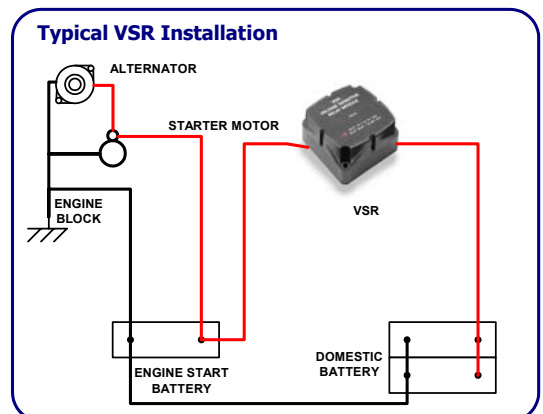
Best method of Split Charging for most vessels

Extremely efficient - ZERO voltage drop

**DIY fit in minutes
Lightweight & Compact**

Indicator LED shows VSR status

Emergency parallel on larger 300A models



Merlin Part Number	Voltage	Max. Cont. Current	Surge Current	Dimensions l x w x h mm	Emergency Parallel
BEP710-100A12V	12VDC	100A	120A	69x69x50	No
BEP710-100A24V	24VDC	100A	120A	69x69x50	No
BEP710-300A12V	12VDC	300A	1250A	102x102x95	Yes
BEP710-300A24V	24VDC	300A	1250A	102x102x95	Yes

Also available - "e-marked" models for automotive use

Split Charging Systems

VSR Switch Clusters

A revolution in marine electrical systems! We figured that most people, when fitting a VSR would almost certainly be fitting new battery switches - so why not combine a unit that does all?

Our battery switch clusters combine high quality BEP battery switches AND a 100A VSR. Each unit is "pre-assembled" with clearly labelled terminals, mounting screws and instruction manual for quick and easy installation.

Each cluster includes a switch for each of your battery banks and a VSR. We've also included an important safety feature - the emergency parallel switch. In the event of a flat engine battery, this switch will allow you to start your engine from the domestic battery bank (useful if being blown onto a lee shore!).

For added security when you leave the boat - each battery switch knob can be removed. Also available are mounting plates allowing the clusters to be panel mounted.



Perfect for most sailing and power boats

Considerably reduces complexity of electrical system and installation time

Removeable knobs for added security

Includes emergency parallel switch

MODELS AVAILABLE:



Two Battery
(Engine & Domestic)
p/n 716SQ100 - 12V
p/n 716SQ10024V - 24V
Dimensions: 136x136x75

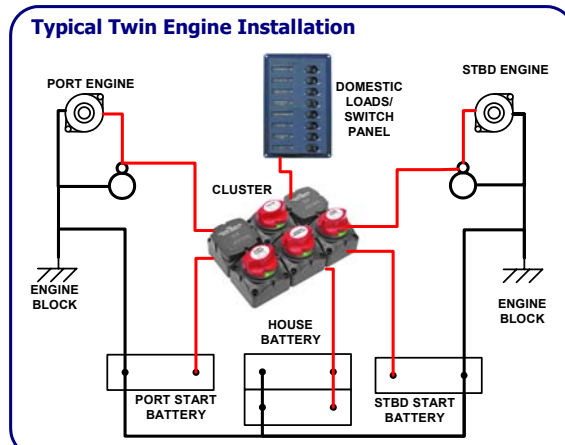
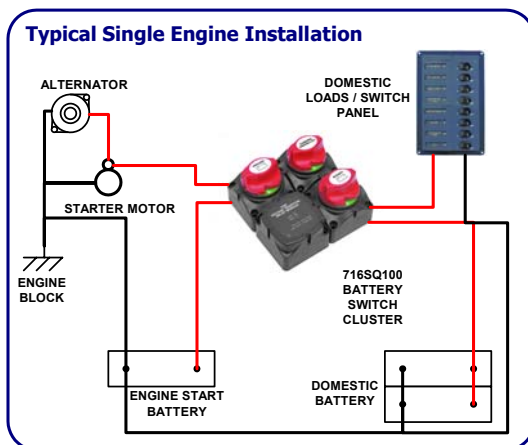


Triple Battery
(2 x Engine & Domestic)
p/n 717-100A - 12V
p/n 717-10024V - 24V
Dimensions: 136x205x75



Mounting plates available:
716SQ series = p/n BSP5VSR
717 Series = p/n BSP6

(Also available in horizontal or vertical format)



Battery Combiners

Pathmaker is our premium split charge management system. Operating in a similar manner to the VSR's, Pathmakers are Bi-Directional. This means they sense voltage on all battery banks - allowing it to manage ALL charging sources on board making your electrics more efficient and cost effective. In fact you'll never need to buy a split charging device ever again!

Pathmaker works by monitoring both battery banks. When it senses that either battery (i.e. engine from alternator or domestics from wind charger) is being charged, it will allow power to flow through to the other battery. Under no circumstances will batteries be overcharged or allowed to discharge into each other. The high efficiency electronics used within the unit introduce ZERO voltage drop. Unlike other split charge devices, Pathmaker's sense voltages are adjustable - this means that you can delay allowing power to other batteries. For instance, you could ensure that the engine battery is charged almost fully before allowing power through to domestics.

A further function of the Pathmaker is a High Voltage Disconnect. In the event of an alternator's regulator failing (a fairly common occurrence), voltage in excess of 15V will be seen at the batteries. The Pathmaker is fitted with a high voltage disconnect that won't allow power to the domestic battery bank - useful if you have spent hundreds or even thousands of pounds on domestic deep cycle batteries!

Pathmaker is also fitted with an emergency parallel function, indicator LEDs and an optional remote panel. It is available for 2 or 3 battery banks (3 bank is useful for motorboats). NOTE: Not approved for petrol engine rooms.



Bi-Directional

User Settable

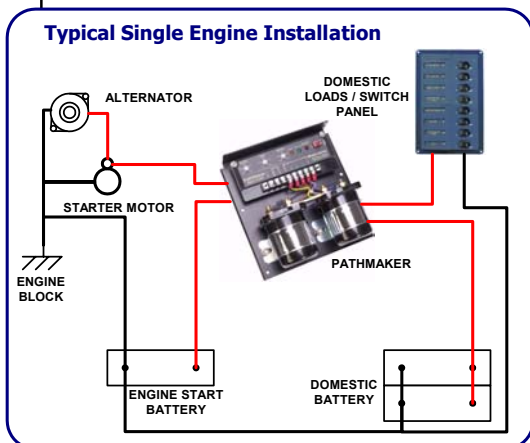
**Emergency Parallel Feature
Indicator LEDs**

**Units available for 2/3 Battery
Banks**

Universal 12/24VDC



Left - Closeup of Pathmaker's front panel
Right - Optional Remote Panel



Merlin Part Number	Voltage	Max. Cont. Current	Surge Current	Dimensions l x w x h mm	Number Of Batteries
XPM100/2	12 or 24VDC	100A	500A	134x188x92	2
XPM100/3	12 or 24VDC	100A	500A	134x188x92	3
XPM250/2	12 or 24VDC	250A	2000A	134x188x92	2
XPM250/3	12 or 24VDC	250A	2000A	134x188x92	3

XPMREM - Pathmaker remote panel - suitable for all Pathmakers

Battery Monitors

Merlin Equipment's Battery Monitors provide detailed and accurate information about your batteries. With a Battery Monitor, you can answer:

Are my batteries fully charged yet?
 Is my charger keeping up with the fridge?
 Should I replace my batteries?
 How much is left in the battery bank?
 What voltage am I charging at?

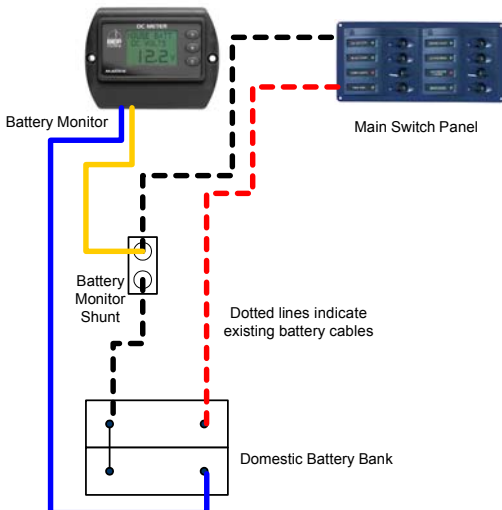
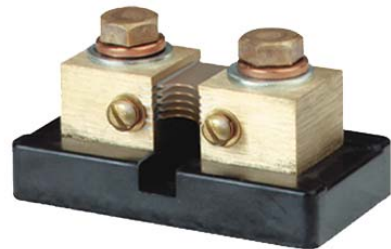
How efficient is my battery system?
 When should I start charging?
 How long until my batteries run flat?
 Is the charging system working?
 Do I need an extra battery?

Simple volt and ammeters simply cannot provide enough information for you to make sensible decisions about managing your batteries.

Since navigation aids, instruments, nav lights and communications depend entirely on battery power, A quality monitor should be standard fit equipment on all boats.

Not to be confused with standard voltage based units, our battery monitors sample voltage, current in and out of the batteries, battery efficiency and battery capacity to provide you with accurate information about battery status.

All our battery monitors use a calibrated shunt for current measurement. Being remote from the actual unit means that it easily slots into existing wiring keeping installation quick and easy. Note that all negative current runs through the battery monitor shunt.



Key to Symbols



Leisure Series Battery Monitor



Professional Series Monitor



Monitors Voltage (Single Battery)



Monitors Current (Twin Battery)



Monitors AH (Single Battery)



Optional PC Connectable



Displays % Remaining (Single Battery)



Displays Time Remaining (Single Battery)



Built in audible alarm



Built in alarm contact



Shunt with monitor supplied Free Of Charge

DCM 600 Battery Monitor

The DCM is our best selling battery monitor. Providing valuable battery information such as voltage, net current (in/out), Amp Hours remaining and % remaining. The unit will also monitor the voltage of up to two other battery banks. Built in High/Low voltage and Amp hour alarms. If not using the 3rd battery voltage, you can connect in your automatic bilge pump to display running time of the pump and number of on/off cycles. Easily allows you to answer questions like "Is my battery charged?", "How much longer will my battery last?", "Is the wind turbine keeping up with my power usage?" etc.

Voltage Monitoring for up to 3 battery banks
Charge & Discharge Amps (Domestic Only)

Battery % Remaining

Hi/Lo Voltage Alarms on 3 battery banks

Low Amp Hour Alarm

Internal alarm buzzer - alarm contact allows remote buzzer/lights

Operates on 12 & 24V Battery Banks

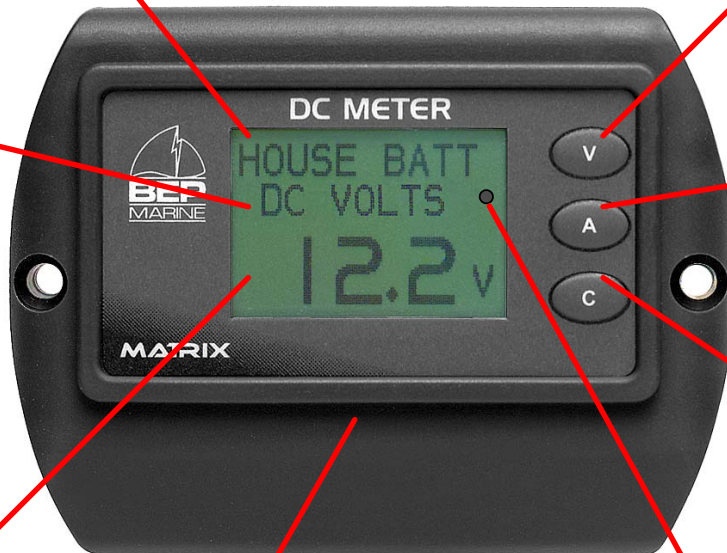
Bilge Pump Monitoring Feature

Battery names are selectable between "House Batt", "House 1", "House 2", "Start Batt", "Stbd Start", "Port Start", "Aux Batt", "Radio Batt" & "Genset Batt"

Volts button - selects Voltage on battery 1, 2 or 3

Easy to read legend explains exactly what you are looking at.

Amps button - shows net current running in and out of domestic battery bank



Capacity button - selects either AH or % remaining in the domestic battery bank.

Easy to read Dot Matrix Display - Backlit with Green LED lighting

Tough plastic enclosure and conformally coated circuit board to resist harsh marine environment

Alarm Active Indicator - for battery voltage (on any battery) and low AH on domestic battery

Model	DCM600
Voltage	10-32V DC (For 12 & 24V Systems)
Max Current	450 Amps Continuous
Battery Capacity	50-3000AH
Internal Alarm Buzzer	Yes
Alarm Free Contact	Yes
Typical Battery System	Monitors single domestic with voltage input for two additional batteries
Display	Backlit LCD Dot Matrix
Cut Out Size	30x8mm (For cable entry)
Dimensions (HxWxD)	83x45x44
Weight (Excluding Shunt)	66g
PC Connectable	No

- L** Leisure SHUNT INCLUDED
- V** Volts x 3 Audible Alarm
- A** Amps x 1 Alarm Contact
- AH** Amp Hours x 1 2 Year Warranty
- %** % Remain x 1

Battery Monitors

Xantrex Battery Monitor

Professional Battery Monitoring

Plug & Play Computer Connection

Built in alarm contact

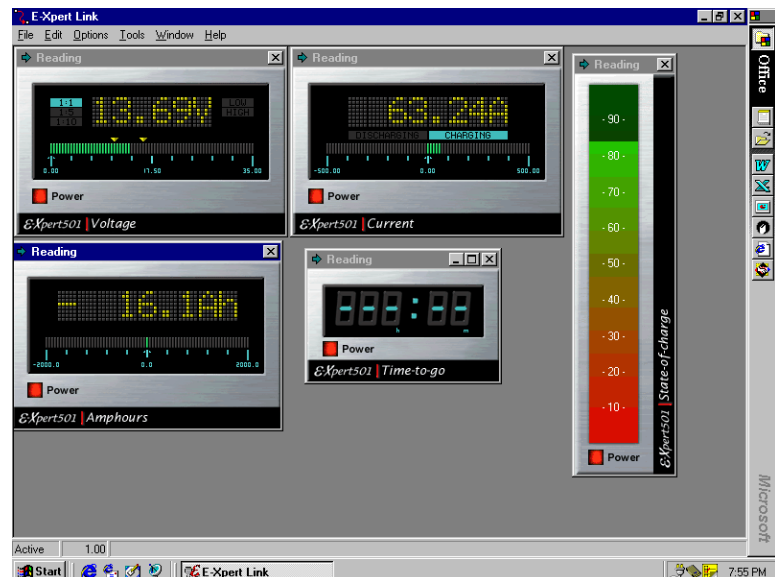
Optional Temperature Compensation

The Xantrex Battery Monitor is a fully featured battery professional unit. It will display Voltage, Amps, AH Consumed, % Remaining and **Time Remaining** at the touch of a button. The unit also features optional temperature compensation for even more accurate battery information. The Xantrex Battery Monitor also logs historical battery data.



Xantrex Datalink Kit

This package allows you to connect your Xantrex Battery Monitor to a PC. Includes software (MS windows only) which allows remote control, building of battery use graphs, programming and test functions. Note - your PC must have a serial port to use the Xantrex Datalink Kit.

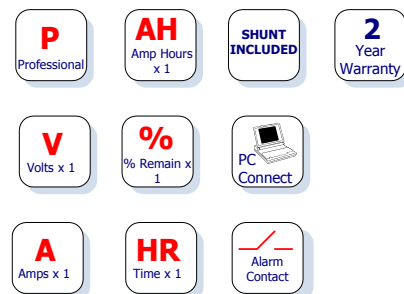


Screenshot for DataLink Software

Temperature Sensor

Battery chemistry varies considerably with temperature. The EXPERT 501 Temperature Sensor allows the unit to incorporate temperature values into it's calculations for even better accuracy.

Model	XBATMON
Voltage	10-50V DC (For 12, 24, 36V Systems)
Max Current	500 Amps Continuous
Battery Capacity	20-2000AH x 2
Internal Alarm Buzzer	No
Alarm Free Contact	Yes
Typical Battery System	Single Battery Bank System
Display	LCD
Cut Out Size	52mm
Dimensions (HxWxD)	(Inc front face) 65x65x72 mm
Weight (excluding Shunt)	227g
PC Connectable	Yes with optional kit



LINK 20 Battery Monitor

As per LINK 20 but for twin independent battery banks

Perfect for vessels with 1, 2, Both & Off type battery switch systems

Separate "At A Glance" Bargraphs for each battery bank

Separate Historical Data for each battery bank

Proven in use in applications as varied as front line ambulances to offshore racing boats, this unit provides accurate battery information - both in a graphical and numeric format.

This unit is particularly useful for vessels that employ 1, 2, Both & Off type battery switches. This unit is shipped with a double current measurement shunt.



By pressing the SEL button, you can cycle between Battery Volts, Current (Net in/out), AH, Time Remaining until battery is flat. The display features an auto dimmer to prevent glare during at night. From right to left - V = Shows voltage of your battery bank; A = This is the net amount of current flowing in/out of your battery bank (useful to see if battery charger is coping with load); AH - This is amount of amp hours consumed from your battery bank - Display can be set to show % remaining if preferred; T = Time remaining at current rate of consumption until battery bank is flat (can be averaged over 2, 5 or 30 minutes for accurate readings when using intermittent loads). Simply press the Bat 2 button and the same will be displayed for battery 2.

"At A Glance" Multi Coloured Bar Graph



P
Professional

V
Volts x 2

A
Amps x 2

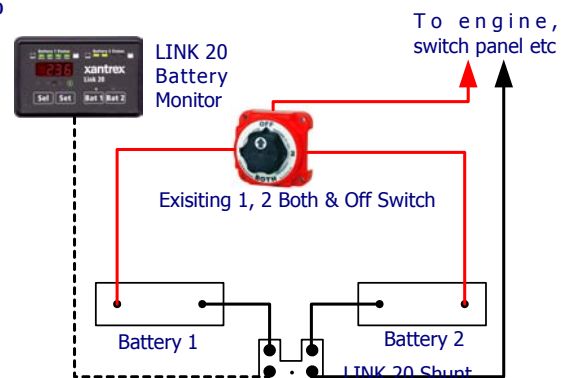
18
Month

AH
Amp Hours x 2

HR
Time x 2

SHUNT INCLUDED

Model	XLINK20
Voltage	10-50V DC (For 12, 24, 36V Systems)
Max Current	500 Amps Continuous x 2
Battery Capacity	2-1999AH x 2
Internal Alarm Buzzer	No
Alarm Free Contact	No
Typical Battery System	Twin Battery Bank System
Display	LED
Cut Out Size	Surface Mount
Dimensions (HxWxD)	74x119x27
Weight (excluding Shunt)	142g
PC Connectable	No



Battery Management Devices

Merlin Equipment supplies a range of "Battery Management Devices" that offer solutions to problems encountered on board - for example, devices that independently charge bow thruster/windlass batteries, DC/DC converters and a unique Battery Equaliser range that gives you a 12 AND 24V supply from a single battery bank. Merlin can also custom build and source other items for your particular need - call us on 01202 697979.

Slave Charging Units

Independently charges auxilliary batteries from Domestic Battery Bank

Perfect for Windlass/Bow Thruster Battery Banks

Reduces wiring complexity, wire size and cost

Providing power for windlasses and thrusters is a complex subject. Two options exist - running cable to the bow from the main domestic battery (with huge cable costing around £15-£20 per metre) or installing a small battery bank in the bow (with all the associated problems of charging a battery 30'+ from all the other electrics).

Installing a battery in the bow is the best method - not only do you have battery capacity reserved exclusively for windlass/thruster but the stresses placed on the rest of the electrical system is significantly less. Until now, charging a bow battery was a nightmare. However, Merlin's Slave Charger units solve this problem.

Slave chargers work by monitoring the domestic battery bank. When being charged (by alternator or battery charger), the Slave unit will switch on and deliver a proper 3 stage smart charge to the battery up in the bow - it's like a DC in/DC out battery charger. Benefits:

- Significantly reduced cable size running to the bow battery (5 sq mm instead of 100+ sq mm)
- Bow battery receives a proper charge giving you longer running times and extended battery lifetime.
- Almost zero affect on your existng electrical system
- More cost effective than other methods
- Slave Chargers can also be used to charge other batteries - for example a dedicated fridge battery, winch batteries or even to keep larger tender batteries topped up.

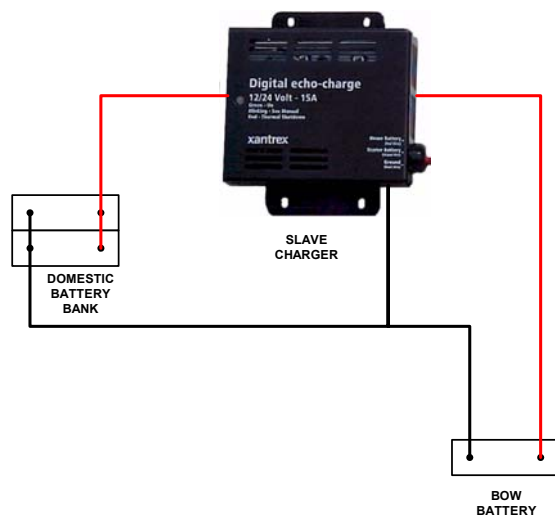


Models Available:

Echo Charge
DuoCharge

Basic Model, fully automatic
Advanced model with battery type selection, 4 stage charging & adjustable switch on/off voltages. Optional temperature compensation.

Typical Slave Charger Installation



DC/DC Convertors

Step Down (24 to 12V) and Step Up (12 to 24V) Convertors

Fully Automatic Operation

High Efficiency

Merlin Equipment's range of Convertors are ideal for running 12V powered equipment from a 24V DC electrical system or vice-versa. With units ranging from 4 to 100A, our range covers most applications. Note that multiple units can be used in parallel to increase power.



Merlin p/n Part Number	Input Voltage	Output Voltage	Output Current Continuous	Output Current Surge	Dimensions LxWxH (mm)	Weight Kg	Notes
BEPDCVR4A	20-38VDC	13.2VDC	4A	7A	70x75x32	0.15	
BEPDCRV7A	20-38VDC	13.2VDC	7A	10A	80x75x32	0.19	
BEPDCRV10A	20-38VDC	13.2VDC	10A	14A	90x75x32	0.2	
BEPDCRV20A	20-38VDC	13.2VDC	20A	24A	160x75x32	0.3	
VAN90-20A	22-35VDC	12.8VDC	20A	35A	238x215x90	2.26	Extreme Duty
VAN90-50A	22-35VDC	12.8VDC	50A	65A	340x215x90	2.26	Extreme Duty
VAN91-10A	11-16VDC	24.2VDC	10A	12A	238x215x90	2.26	Extreme Duty

DC Voltage Stabilisers

Stabilise DC power to voltage sensitive equipment on board

Ideal for boats with Halogen lights

Fully automatic & protected against overload, overheat & short circuit

The DC system on board today's boats are fraught with voltage spikes from winches, windlasses, bow thrusters and fluctuations from smart charging systems. Certain DC loads are very sensitive to voltage variations - especially halogen lights and certain electronic equipment.

Our range of voltage stabilisers filter DC power to provide clean, regulated power - preventing damage to lamps and sensitive electronics. Each unit is overload and overheat protected.



Model	Input Voltage	Output Voltage	Output Current	Dimensions	Cooling
XACT12/5	10-15VDC	12.8V	5A	145x95x35	Convective
XACT12/15	10-15VDC	12.8V	15A	170x170x120	Convective
XACT12/50	10-15VDC	12.8V	50A	195x170x120	Thermostatic Fan
XACT12/100	10-15VDC	12.8V	100A	155x240x135	2 x Thermostatic Fan
XACT24/15	20-30VDC	25.6V	15A	170x170x120	Convective
XACT24/25	20-30VDC	25.6V	25A	195x170x120	Thermostatic Fan
XACT24/50	20-30VDC	25.6V	50A	155x240x135	2 x Thermostatic Fan
XACT24/100	20-30VDC	25.6V	100A	155x240x135	2 x Thermostatic Fan

Battery Management Devices

Battery Equalisers

Provides dual 12 & 24V electrics from a single 24V battery bank

Ideal for 24V vessels requiring significant amounts of 12V power

Prevents damage to 24V battery bank and provides "backup power" for 12V systems

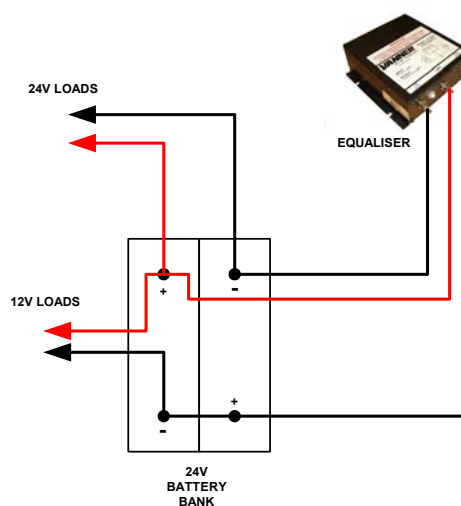
In the past, providing 12V from a 24V battery bank required one or many DC/DC convertors - reducing system efficiency and your bank balance. Alternatively, many boat owners "tap" one of the 12V batteries in the 24V bank which will irreparably damage the batteries (by causing imbalance between each battery within the bank).

Equalisers allow you to "tap" off 12V from a 24V battery bank while keeping each battery balanced and preventing such damage. This has a number of advantages - 1. You can pull a virtually unlimited amount of 12V power (i.e. the power available isn't limited by convertor size); 2. Because you are only using a single convertor, system efficiency is better; 3. In the event of the equaliser failing, you will still be able to pull 12V power for a time (useful if running emergency systems like VHF or GPS).

Equalisers are fully automatic and can be left unattended. Various sizes are available - you should ensure that the Equaliser is slightly larger than the anticipated 12V load (so that it can keep up AND have capacity left to keep batteries equalised) - for example, for a 15A 12V load, choose a 20A equaliser.



Typical Equaliser Installation



Model	Max Output	Recommended Max 12V Load	Effeciency / Current Draw	Dimensions	Weight
VAN60-10B	10A	8A	>91%/17mA @24V	108x218x81	1.04Kg
VAN60-20A	20A	15A	>92%/17mA@24V	238x218x81	2.27Kg
VAN60-60	60A	50A	>97%/17mA@24V	340x218x81	3.18Kg
VAN60-100C	100A	90A	>97%/17mA@24V	342x218x81	3.44Kg

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