

Rainbow Distribution Box



Notes

Rainbow Distribution Box

The Rainbow Distribution Box is a purpose designed DC power distribution box that is flexible to user requirements. It caters for up to 50 mm² battery cable and appropriately sized load cables with sufficient space inside of the box for ease of installation and upgrade.

The Distribution Box has sufficient space on the front panel to mount the Plasmatronics PL Charge Controller. An appropriate charge controller needs to be selected and purchased separately to complete the full functionality of a renewable (solar, wind and/or microhydro) power distribution centre. Because the Plasmatronics range of charge controllers incorporate a display meter there is no need to incorporate meters into the distribution box.

The Plasmatronics range of charge controllers offer a charge input of 20, 40 or 60 amps and also incorporates an LCD display to show battery voltage, charge current as well as battery state of charge or accumulated amp-hours. Refer to our Web site (www.rpc.com.au) for more information.

Features

- Each circuit is protected by a circuit breaker. Three circuits are equipped with multi-hole links. More circuits may be added if required.
- Spacious, attractive housing designed to incorporate an optional charge controller.
- Multiple conduit ports.
- Hinged door.
- Pre-wired and labelled for your convenience.
- Meets new Stand-Alone Power System Standard.

Protection

In order to meet safety standards and the Stand-Alone Power System Standard, either the system designer or the installer will need to calculate the appropriate cable sizes to be used for each circuit. The maximum allowable voltage drop for each circuit is as follows:

- Solar, wind or hydro to distribution box = 10%
- Battery to distribution box = 2%
- Distribution box to load = 5%

Formula used to calculate cable size is as follows:

- Cable Size (mm²) = $3.5 \times L \times I \div V \div (2, 5 \text{ or } 10)$

Where: 2, 5 or 10 refers to allowable voltage drop & L = Route Length (m), I = Current (Amps) and V = Nominal System Volts (eg 12, 24 or 48)

The battery cable needs to be protected with appropriate HRC type fuse and fuse holder(s) on each active terminal of the battery bank. Considering that the danger of short circuits and resulting fires with battery based power systems originates at the battery, the battery fuse holder(s) need to be mounted on the outside of the battery compartment, below vent level, before the positive and negative battery cables come close to one another or a common electrical conductor.

The purpose of any fuse or circuit breaker in a power distribution system is to protect the cable against electrical overload or short circuit. The circuit breakers provided in the standard Distribution Box are: Solar = 2 x 16A, Circuits 1, 2 & 3 = 10A, Regulator = 2A. In order to choose the right cable size and fuse or circuit breaker, you can use the following table 1 to make your choice. The value of the chosen fuse or circuit breaker must not be greater than the maximum ampacity of the cable.

Wiring up the Distribution Box

Connecting the Circuits

The Rainbow Distribution Box has six separate circuits. Two circuits are designated for the charging source (eg solar panels) by connecting the positive cable from the charging source into the circuit breakers. One circuit breaker is used to connect the regulator to the battery positive. Three load circuits are supplied with links. Additional circuit breakers can be added in order to connect additional load circuits above 10 Amps please contact RPC for your customized requirements.

Please Note:

- *Minimum wire sizes need to be considered when setting up these circuits.*
- *These circuits are 12 or 24 volt DC circuits only, any 240V AC appliances will need to have an inverter to supply the appropriate voltage from a battery bank and must not use this distribution box.*

The circuits and the ratings are as follows:

- Solar: Maximum input of 2x16 Amps, requires at least 4.6mm² cable unless the circuit breaker is replaced with one of a lower value.
- Circuits 1, 2 & 3: Designated for loads up to 10 amps. Requires at least 1.84 mm² cable for the cable to be adequately protected by the circuit breaker. Loads may include DC power points, fridge, pump, stereo and 12V TV. Lighting may be connected to these circuits if at least 1.84 mm² cable is used throughout or if appropriately fused sub-circuits are used.

Connecting the Regulator

Rainbow Power Company recommends a Plasmatronics PL20 (20 amps), PL40 (40 amps) or PL60 (60 amps) regulator. For more information on these regulators, refer to our website.

Connect an appropriately sized and colour coded cable between the following points

- Battery + on Regulator to Regulator + Circuit Breaker on Distribution Box (red cable)
- Battery – on Regulator to Battery – on Distrib.Box (black cable)
- Solar – from Solar Array to Solar – on Regulator (black cable)
- Solar + from Solar Array to Solar + Circuit Breaker on Distribution Box (red cable)

Please refer to “ampacity of DC cables” below or “the circuits and the ratings” on the previous page).

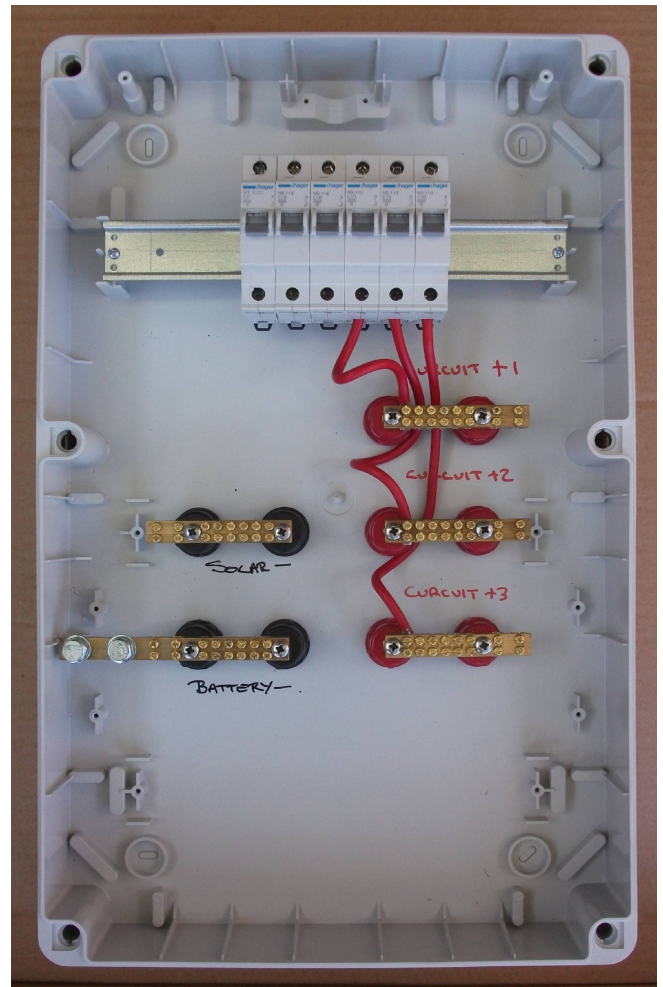
With all the above connected, the regulator will perform its basic function as a regulator.

For more information on regulator functions, consult the regulator user guide supplied with your chosen regulator.

Table 1 - Ampacity of DC Cables

Cross Sectional Area	Current (Amps)
1.84mm ²	15 amps
2.9mm ²	20 amps
4.6mm ²	25 amps
7.9mm ²	45 amps
13.6mm ²	70 amps
32mm ²	110 amps
49mm ²	150 amps

Images of the Rainbow Distribution Box





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