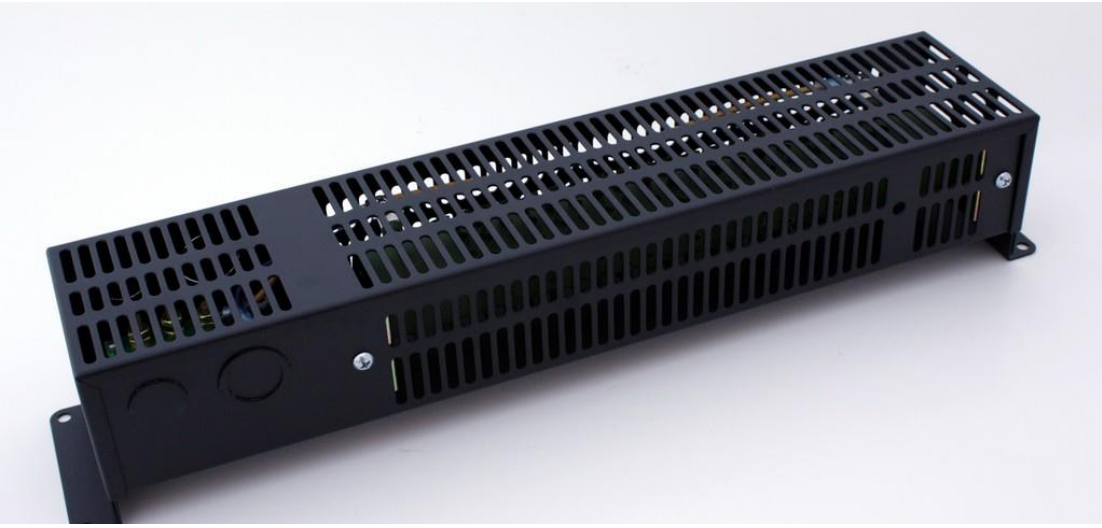
DL-300 Charge Controller User Manual



Introduction

Please read this manual thoroughly before attempting to assemble, install or operate your DL-300 Charge Controller. This will assure optimum performance and safety.

The DL-300 Series Dump Controller and Load is an integrated solution designed to prevent 12 or 24 Volt batteries from overcharging. Compact and easy to install, the DL-300 was developed especially for the LE-v150 and *LE-300* turbines. It incorporates a 300 Watt resistor / heater and controller board in a stout powder coated steel enclosure.

Operation & Specification

The DL-300 dump load controller operates like an electrical overflow for your batteries. As the turbine charges the batteries, the State of Charge (SOC) and battery voltage will rise. As the batteries become fully charged and are no longer able to accept any further electrical energy, the battery voltage will rise. At this point, the dump load controller begins to bleed power into the dump load. This energy is then dissipated as heat into the surrounding environment. More or less power is diverted to the dump load according to how much is being supplied to the battery from the turbine.

The DL-300 Features:
PWM (Pulse Width Modulation) for highest charging performance without flicker
Selectable three stage charging or over-voltage protection mode
Selectable for sealed or flooded batteries using jumpers

Power, 12 Volt version, DL-300:
Recommend fuse or circuit breaker: 30 Amps
Integrated load resistor: 300 Watt, wire wound
Quiescent current when not load dumping: 2.6mA @ 12 Volts

Power, 24 Volt version, DL-300:
Recommend fuse or circuit breaker: 15 Amps
Integrated load resistor: 300 Watt, wire wound
Quiescent current when not load dumping: 3.0mA @ 24 Volts

Connections:
#10-32 brass screws for V+ and V-
Two 1/2” / 3/4” concentric NPT knockouts and two 1/2” NPT knockouts

Mounting:
Mounts to vertical concrete, metal, drywall, or other non-flammable surface
Uses four #10 screws
Body sits 19 mm out from wall
Enclosure suitable for indoor mounting

Weight and Dimensions:
Dimensions: 88 mm wide, 95 mm tall, 470 mm long (3.375 x 3.75 x 18.5 in)
Weight: 1.94 Kg (4.28 pounds)
Shipping Dimensions: 102 mm wide, 108 mm high, 508 mm long (4.0 x 4.25 x 20 in)
Shipping Weight: 2.15 Kg (4.75 pounds)

Materials:
Enclosure: 18 gauge mild steel, powder coated black
Circuit board: FR-4, 1.6 mm (0.062 in), double sided, plated through holes, solder mask, silk screen, gold plating.

Safety Precautions

Safety must always be your primary concern during the assembly, installation and operation of your turbine and DL-300 charge controller. Always be aware of the risks involved with mechanical and electrical installation work. If in doubt about any issue regarding your turbine system, please seek further assistance before proceeding.

Mechanical Safety Hazards:
Whilst installing the DL-300 charge controller or when performing routine inspection or maintenance, always stop the turbine by activating the stop switch.

Electrical Safety Hazards:
The turbine generates rectified DC voltage and the DL-300 controller also operates at these voltages. Even at these low voltages there are inherent risks. Caution should always be used when connecting the turbine or DL-300 controller to the electrical system.

Ensure that you have followed the cable-sizing guidelines to ensure that the correct size of cable has been selected. If a cable of insufficient cross-sectional area is used at any point in the electrical system, heat will build up in the cables causing a potential fire hazard. A properly-sized fuse or circuit breaker should be used in the cables connected to the battery. This will stop the risk of short circuit currents.

Batteries used in renewable energy systems can deliver a serious amount of current. A short circuit in the battery circuit can lead to hundreds of Amps flowing through the battery cables. This will cause a heat build-up and ultimately an electrical fire. Batteries are also susceptible to explode when shorted. Always use insulated electrical tools when working on the battery's electrical connections.

Batteries are very heavy. Do not attempt to move batteries by yourself. Always use manual handling tools and an assistant.

Always keep lead-acid batteries the correct way up. Do not allow the acidic electrolyte to spill or come into contact with your skin. Always follow the manufacturer's safety instructions when handling lead-acid batteries.

Please use common sense when installing and operating your turbine and DL-300 Charge Controller.

Electrical Installation

Please refer to electrical schematic for appropriate generic wiring diagrams. In a battery charging renewable energy system, there may be different ways of wiring small wind turbines, photovoltaic panels, charge controllers and batteries together. This type of system will often expand 'organically', but the following guidelines should be followed:

Location – The DL-300 controller should be mounted in an adequately ventilated area, which is not exposed to direct moisture or spray. The dump load elements become hot during normal operation and should not be covered or blocked. Ideally allow 75mm of free space around the unit.

Gel or Flooded Batteries – An electrical jumper needs to be configured in order to make the controller more suitable for use with 'Flooded' or 'Gel' batteries. A jumper (supplied) should be applied to pins labelled '2.2' when the DL-300 is to be used with flooded batteries. When the DL-300 is to be used with Gel batteries, no jumper should be applied to pins '2.2'. **Never apply a jumper to pins '2.1' – diagram on the next page helps you locate pins 2.2.**
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	Jumper Pins 2.1	Jumper Pins 2.2
Gel type Batteries	No Jumper	No Jumper
Flooded type Batteries	No Jumper	Connect Jumper

Use the correct voltage controller – A 12V DL-300 controller should only be used on a 12V battery system. A 24V DL-300 controller should only be used on a 24V battery system. Do not interchange.

Follow the appropriate electrical code - The electrical wiring of your turbine and associated electrical systems must be done in accordance with national and local electrical codes and regulations.

Do not connect the turbine or batteries during the installation - Ensure that the turbine is not running or connected to the batteries during the installation or wiring process. Connect the output cables of the turbine together to prevent the rotor from starting up.

Galvanic corrosion of electrical joints - Try to avoid connections between dissimilar metals. For example, connecting copper and aluminium together will result in galvanic corrosion of the connection. This will increase the electrical resistance of the connection (wasting energy), and reduce the mechanical integrity of the joint. Where possible, use a fluxed solder to make electrical joints.

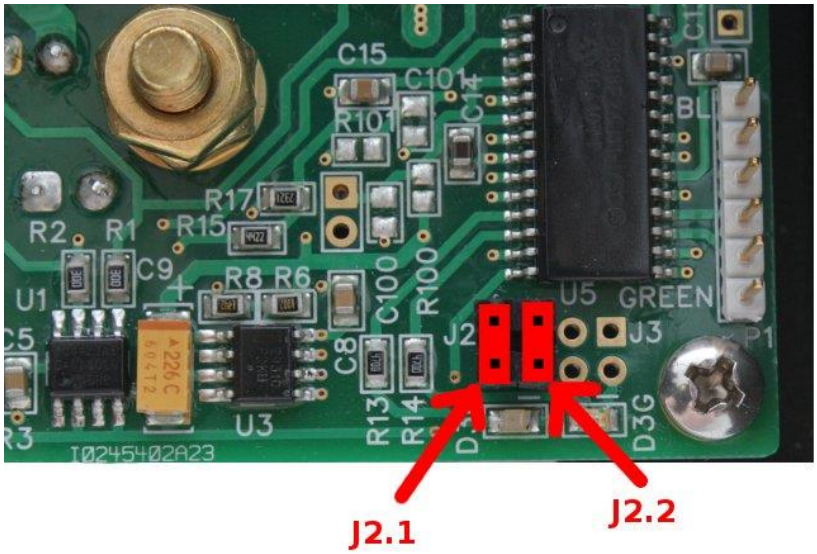
Protect the cables - The power transmission cables must be protected from mechanical damage and fatigue. Run the cables through an approved conduit / trunking.

Cable strain relief - Prevent mechanical strain on all cables. Cable ties or cable glands are a good way to prevent mechanical strain on the cables.

Fuses - The DL-300 controller should be protected with a suitably rated 'slow-blow' DC fuse or DC circuit breaker. Please refer to the table below for the correct rating. The fuse or breaker should be positioned between the DL-300 and batteries (on the positive cable)

Nominal Voltage	DC Fuse / DC Circuit Breaker Rating
12V	30 Amp
24V	15 Amp

Electrical Connections of DL-300 Controller



DL-300 Voltage Set Points

Whilst operating, the DL-300 does a multi-stage charge based on time and the bulk and float voltages:

12V Setpoints		
Mode	Flooded	Sealed
Bulk	14.6	14.3
Float	13.4	13.4
Protect	16.0	15.0

24V Setpoints		
Mode	Flooded	Sealed
Bulk	29.2	28.6
Float	26.8	26.8
Protect	32.0	30.0

LED Indicators

- Standby Mode (when first powered up):
  - both LEDs blink simultaneously every 7 seconds

- Charging Mode:
  - ***bulk***: green blink - long delay - green blink
  - ***absorb***: green blink - short delay - green blink
  - ***float***: green solid
  - ***dumping***: red solid when duty cycle > 0%

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