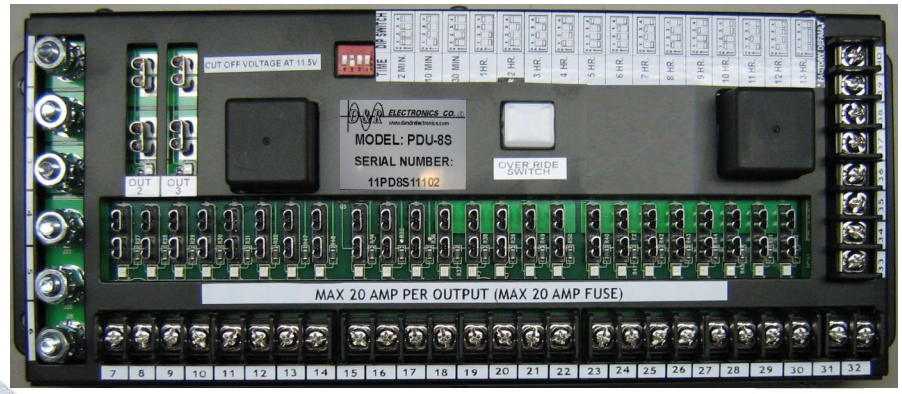
D&R ELECTRONICS CO. LTD.
SOLUTIONS THROUGH CREATIVITY

Power Distribution Unit
PDU-8S

Installation / Operations Manual



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Applicable Models

- PDU-8S

Introduction

The *Power Distribution Unit (PDU)* is a compact and convenient point of load power distribution product for installed electrical devices. By using this device and carefully planning the distribution of mobile equipment power feeds, complex independent wire runs and unreliable fuse panel connections can be avoided.

The *PDU-8S* is directly connected to the vehicle battery and ground, thus providing a direct easily traceable route to the input power source avoiding interfering with the vehicles factory wiring harness. The specifics for safely connecting the *PDU-8S* to a vehicles electrical system are outlined in the detailed instructions to follow.

Each circuit can be individually fused further reducing risk of damage to devices from circuit overload. Each fused output has a red LED to indicate when a circuit fuse is GOOD.

The *PDU-8S* unit provides two 50A high current outputs and up to 24 additional outputs divided into "constant/battery", "ignition controlled" and "timed" outputs to meet the typical in-vehicle equipment installation requirements. These output features have the following characteristics;

1) Constant/Battery Outputs:

   There are 8 output connections each with individual fuses, that are on at all time providing the *PDU* is connected to the battery.

2) Ignition Controlled Outputs:

   The 8 output power connections, also individually fused provide +12V output while the vehicle ignition is ON. Power will be immediately turned OFF at these outputs when the vehicle is shut down and the ignition key removed (some vehicles still maintain and "ignition ON" signal when the key is still in the ignition switch) careful selection of the proper ignition control wire can help avoid this situation..

3) Timed Outputs:

   There are 8 output power connections fit with individual fuses. These outputs are ON while the ignition control signal is applied to the PDU, and will go through a pre-set timed off sequence once the ignition is turned OFF. The time to OFF is user selectable and is selected by the installer based on the system design.

   The timed off sequence is also controlled by an onboard battery voltage monitor. If the battery voltage becomes too low the timing sequence is interrupted and a shut down of the timed outputs will begin. This feature prevents a total discharge of the vehicle battery while the ignition is OFF and the equipment is in use.

General Warning

1. The use of emergency warning devices does not ensure the safety of the operator. The operator is responsible to ensure safe operation of the vehicle regardless of whether the warning device is in operation or not
2. The effectiveness of this or any warning device is highly dependent on proper installation and maintenance. ***Read the manufactures instructions before installing and follow all recommendations.***
3. When in use the operator must ensure that the warning signal is visible and not obstructed by vehicle components (i.e. open trunk lid), people or other obstructions
4. This device is intended for use by authorized personnel only The user is responsibility to ensure that all local, state/provincial and federal laws are being complied with. D&R assumes no liability for any loss resulting from the use of this device.
5. The device must be installed so as not to reduce the output performance of vehicle systems
6. Placement of control switches must be so as to provide convenient reach for the operator without loosing eye contact with the road.
7. Emergency warning devices require high electrical voltages and/or currents. Properly connect and ground all circuits. Shorting or improper grounding of this device may caused personal injuring, vehicle damage or both
8. ***All operators should be properly trained in the operation of this device to ensure both their and public safety***

Unpacking & Pre-Installation Check

D&R Electronics Co. advises that you open and examine all shipments within **48 hours of receipt**. The *Power Distribution Unit PDU* is shipped pre-assembled and factory tested. All necessary hardware for standard installation is included. Remove all components from the shipping carton.

Use this pre-installation check list to verify your unit:

1. Confirm contents with the packing slip
2. Examine unit for damaged in transit (i.e. scratches, broken or bent connectors. etc). Report any damage to the carrier immediately. Keep all shipping material
3. The unit is factory tested and a pre-installation check is not needed.

Installation and Mounting

Warning

1. Any device used inside a vehicle, may cause severe personal injury if not properly mounted and secured. Objects used in the vehicle may become airborne during a collision or other sudden changes in vehicle speed or direction, such as braking, acceleration or turns.
2. Be sure to mount unit through the steel of the vehicle. Avoid mounting through plastic or other non-structural materials.
3. **POINT OF INSTALLATION MUST NOT INTERFERE WITH DEPLOYMENT OF VEHICLE AIR BAGS.**
4. **D&R Electronics recommends this and any of our other products be installed by qualified professionals**.

Mounting the PDU unit

The *PDU-8S* may be mounted anywhere inside the vehicle away from heat, moisture or the elements. **NOTE the PDU is not watertight** do not mount it in the engine compartment, on the exterior of the vehicle or an area where moisture/dirt/ other contaminants can fall into the exposed areas of the PDU.

Ensure that the mounting location is flat and the device is secured to solid vehicle body parts

To mount the *PDU* unit proceed as follows:

1. Determine an appropriate mounting location
2. Confirm there is adequate access and clearance for the wiring and its connections.
3. Secure the *PDU* with 4 self tapping mounting screws (not supplied).

Wiring and Setup Instructions

Warning

1. Good wiring practice and thorough knowledge of vehicle power system is required by the installer of this and any other product.
2. Looms, grommet, cable ties or other installation hardware should be used to anchor and protect wires
3. All wire should conform to the minimum wire size as specified by the manufacturer.
4. Splices should be minimized and made in a fashion so as to protect from corrosion to reduce loss of conductivity.

Note: The exact number of available connections varies by application, refer to the specifications and typical output fusing combinations to ensure that the safety and reliability of this product is not compromised.

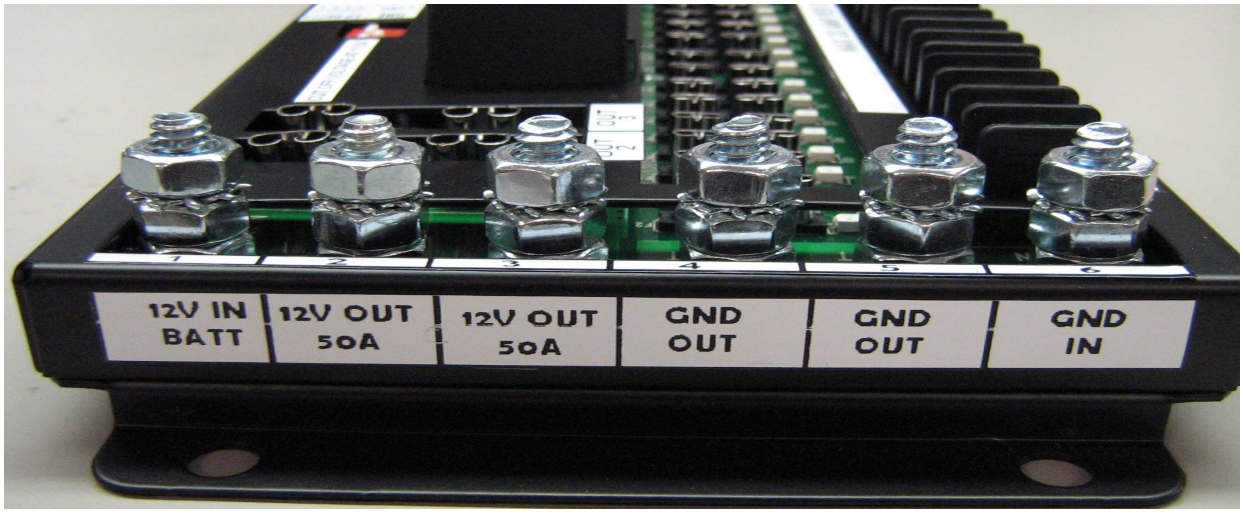


Figure 1
Left side view of the PDU-8S showing the location of the high power Input and Output connectors.

The wiring to the PDU will be determined by the installers design of the power distribution and wire routing for the installed equipment.

Fuses and wire for the screw terminal outputs are selected based on equipment power requirements and their manufacturers recommendations. The maximum fuse sizes and some possible combinations are shown in a table on the following page Figure 2.

The fuses are indicated as 20A maximum, the x is no fuse or no connection and the N/A means that the limit of that area has been reached with the indicated maximum fuse values and that spot is not available. Many combinations can be derived based on the *PDU* specifications and the equipment power requirements. The table in Figure 2 shows eight of these possible combinations, these can be used as a starting point to help plan the power distribution for the intended application.

NOTE: Interconnect Wire, Mounting Hardware, Fuses and any termination or additional hardware mentioned in the installation procedure IS NOT SUPPLIED. These items are industry standard and are provided by the installer at the time of installation.

PDU-8S outputs showing some possible fuse combinations

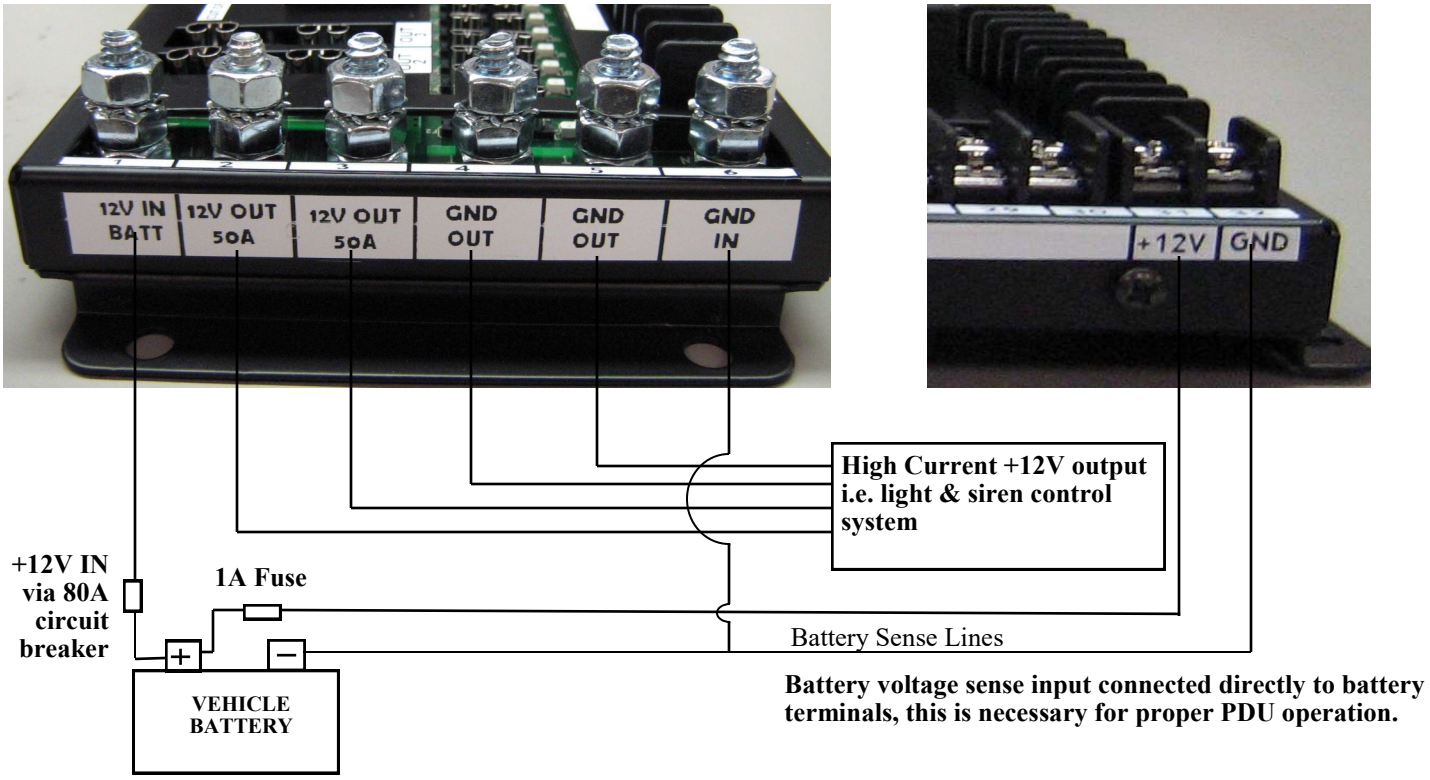
Output Fuse Combinations

IGNITION	**1**	**20A**	**20A**	**20A**	**20A**	**20A**
	2	**20A**	**20A**	**20A**	**20A**	**20A**
	3	**20A**	**20A**	**20A**	x	**15A**
	4	**20A**	**20A**	x	x	**15A**
	5	**N/A**	x	x	x	**15A**
	6	**N/A**	x	x	x	**N/A**
	7	**N/A**	x	x	x	**N/A**
	8	**N/A**	x	x	x	**N/A**
AND						
12V BATTERY	**1**	**20A**	**20A**	**20A**	**20A**	**15A**
	2	**20A**	**20A**	**20A**	**20A**	**15A**
	3	**20A**	**20A**	**20A**	**20A**	**15A**
	4	**20A**	**20A**	x	**15A**	**15A**
	5	**N/A**	**N/A**	x	**10A**	**15A**
	6	**N/A**	**N/A**	x	**N/A**	**15A**
	7	**N/A**	**N/A**	x	**N/A**	**N/A**
	8	**N/A**	**N/A**	x	**N/A**	**N/A**
AND						
TIMER	**1**	x	**20A**	**20A**	**20A**	**20A**
	2	x	x	**20A**	**20A**	**20A**
	3	x	x	x	**20A**	**20A**
	4	x	x	x	x	**20A**
	5	x	x	x	x	**N/A**
	6	x	x	x	x	**N/A**
	7	x	x	x	x	**N/A**
	8	x	x	x	x	**N/A**

Figure 2

Typical fuse and output combination showing maximum fuse ratings for 10A continuous loads, the chart is read vertically the six possible combinations shown add to a total draw of 60A (the maximum PDU Input rating) .

Figure 3 - Input and High current output wiring diagram



Connecting the Battery Input (+12V IN) to the PDU

Figure 3 shows a typical wiring connection to the battery, both the +12V IN (input) and GROUND IN (input) are wired directly to the battery terminals. This is the **"best"** method of supplying reliable power to the installed equipment. If a good "solid" chassis Ground is available then the GROUND IN terminal may be connected to the vehicle chassis close to the installed *PDU*. The interconnect wires must be 6 AWG if the installation power distribution will be at or close to the maximum rating of the *PDU* (see specifications).

1. Run a 6 AWG wire lead from the Battery via a fusible link or circuit breaker rated at 80A to the *PDU-8S*.
2. Cut the wire to length and strip 1/2" length of insulation from the end of the wire, insert the bare wire into a suitable ring terminal (these are not provided the ring hole must clear a 1/4" bolt), crimp or solder..
3. Connect as shown in Figure 3.

Connecting ground input to the PDU

1. Run a 6 AWG wire lead to the chassis of the vehicle, if necessary run this wire directly to the battery negative terminal if a good low resistance chassis connection is not available
2. Prepare the 6 AWG Ground wire for connection to the PDU using the same procedure as the battery input wire.
3. Connect as shown in Figure 3.

SPECIAL NOTES:

1. Making a good solid ground connection to the chassis requires the removal of the paint right down to the shiny bare metal at the point of securing the ground wire to the chassis.
2. All ground returns for equipment connected to the *PDU* should terminate at the *PDU* using the GROUND terminal block. To minimize wire bunching and exceeding the current capacity of each screw terminal on the output block (15A max per screw connection) distribute these return wires evenly across the whole GROUND block.

Connecting the Battery Voltage Monitor from the PDU

We recommend using 18 AWG stranded wire for this connection. The color for the wires should be RED and BLACK, however if this is not available then two distinct colors should be used. It is very important to maintain the correct polarity from the battery to the PDU sense inputs.

WARNING: Any wire connected directly to the battery should be fused, and located as close as possible to the POSITIVE battery terminal. We recommend a 1A fuse inside an inline weather resistant fuse-holder be used.

Connecting high Current (AMP) power outputs from the PDU

The *PDU* supplies two high current (+12V OUT) outputs which may be used to power high current devices such as a lightbar or siren and light control system; this output uses the same style of power connector as the input wire from the battery (Figure 1). Connection to these outputs are via 8 AWG power wires terminated with a ring terminal. These outputs are rated at 50A VDC continuous current and fused by a 70A MAXI fuse (MAX70 or AMT70 are the part numbers for this fuse).

1. Leave the fuse out until the attached equipment is properly wired and secured.
2. If a single connection (one power and one ground) is to carry the full current then the wires must be 8AWG in size. Otherwise the wire supplied by the manufacturer for the equipment will be used to connect to these output power clips.
3. Run the wire from device (i.e. light and siren controller) to the *PDU* mounting location. Using the same process for the Battery input wire (steps 2 and 3).

Connecting the ground outputs (GND) from the PDU

These outputs for ground connection is the return path for the device/equipment connected to the two +12V OUT from the *PDU*.

1. Run the ground wire from device (i.e. light and siren controller) to the *PDU* mounting location.
2. Prepare the wire in the same manner as the "+12V OUT" and insert the wire.

Connecting the Ignition Control to the PDU

To activate the ignition control and timed outputs feature, the *PDU* must receive a control signal from the vehicle.

1. The installer must locate the ignition output from the vehicles wiring harness and run an 18 AWG wire from this point to the ignition input (IGN IN) on the *PDU*.

Care must be taken to connect the correct ignition control wire from the vehicle wiring harness, some of the newer vehicles have more than one type of ignition control wires. **The installer must consult the factory specifications and wiring diagrams for the vehicle that is being retrofitted with the equipment and this PDU.**

Connecting the power output from the PDU

Determine the type of power required by the connecting equipment (i.e. ignition controlled, constant/battery or timed) and start connecting the vehicle equipment according to the system design requirements.

1. All power connections will terminate at the *PDU*, bring the POWER and GROUND (return) wires for the equipment to be connected directly to the *PDU*.
2. Connect the power wire from the equipment to the appropriate output on the *PDU* (i.e. ignition controlled, constant/battery or timed).
3. Connect the return wire from the equipment to one of the terminals screws on the GROUND terminal block or any chassis GROUND.
    - As you install the equipment distribute the many ground return wires to be connected to terminal block evenly over the entire group of 7 terminal screws.
    - It is highly recommended that connecting wires to the screw terminals on the GROUND terminal block be terminated with spade/fork terminals to make neat reliable connections.
1. Once all the wire connections to and from the *PDU* are completed the output fuses can be installed according to the required rating of the connected equipment.

The *PDU* accepts a standard Automotive Blade ATO/ATC Type fuses, each fuse location has an LED indicator to show that the fuse is in place and working. The LED indicator will glow RED if the fuse is “GOOD” otherwise it will be off.

Setting The Time Delay on Timed Outputs

The time delay for the timed outputs is user selectable and is set by a 4 position miniature switch that is accessible through the cover at the back of the *PDU*. The delay time can range from 2 minutes to 13 hours, this function is triggered by turning the vehicle ignition “OFF” and only if the battery voltage is lower than 14V.

When the selected time has elapsed power to all timed outputs will be shut “OFF”. If during the timing cycle the ignition is turned back on the timer will reset and the time cycle will restart when the ignition is turned off again.

The *PDU* has a built in Voltage Monitoring circuit, this will automatically shut down any timed outputs if the battery voltage is reaching a “CRITICAL LOW” point (11.5 VDC). Similarly this Voltage monitor circuit will cut off power to the timed outputs if the battery voltage exceeds 18V DC.

To set the time delay follow these steps:

1. Locate the dip switch on the PDU.
2. Refer to the attached label or Table 1 to determine the switch settings.
3. Use a pen tip or other suitably small tool to set the switches. This will select the time increments to the output off time delay

.

TIME	SW-1	SW-2	SW-3	SW-4
2 MIN.	ON	ON	ON	ON
10 MIN.	OFF	ON	ON	ON
30 MIN.	ON	OFF	ON	ON
1 HR.	OFF	OFF	ON	ON
2 HR.	ON	ON	OFF	ON
3 HR.	OFF	ON	OFF	ON
4 HR.	ON	OFF	OFF	ON
5 HR.	OFF	OFF	OFF	ON
6 HR.	ON	ON	ON	OFF
7 HR.	OFF	ON	ON	OFF
8 HR.	ON	OFF	ON	OFF
9 HR.	OFF	OFF	ON	OFF
10 HR.	ON	ON	OFF	OFF
11 HR.	OFF	ON	OFF	OFF
12 HR.	ON	OFF	OFF	OFF
13 HR.	OFF	OFF	OFF	OFF

Table 1 Time Delay Switch Settings
Factory Default = 2 Hours

Timed Modes of Operation

Battery Voltage:

A) **Between 14.0 to 18V** the output of the "PDU Timer" will be **ON unconditionally**.
B) If the battery voltage drops **below 14.0V** and the **ignition is OFF**, the "PDU Timer" will commence a predetermined countdown delay at the end of which the unit will shut-off and go into "STANDBY" mode. This delay is set by the 4 DIP switches on the "PDU Timer" , **THE FACTORY DEFAULT IS TYPICALLY SET TO 2 hours (DIP switch 3 =OFF all others on). Check and set this accordingly.**
C) If the battery voltage recovers and is raised above 14.0V (i.e.. the battery is being charged) the countdown process will cease and the "PDU Timer" will go into "ON" mode

Ignition:

A) If the ignition switch is OFF and the unit is in countdown mode, cycling the ignition switch ON/OFF will reset the countdown. Always at the end of the countdown the "PDU Timer" will be in "STANDBY" mode.
B) The ignition switch "ON" will always reset the countdown and prevent it from timing down (override countdown mode and keep the "PDU Timer" ON).

Override:

The override circuit can be triggered by the PB (push button) momentary on switch on the "PDU Timer" . Triggering the override will send the unit into "ON" mode for "2" minutes regardless of the operating mode, or battery voltage (providing battery is not completely dead and the ignition is off).

Standby:

Once the "PDU Timer" is in STANDBY mode, the only way for the system to come out of STANDBY is;
A) Override Switch is pressed
B) Battery is charging and the battery voltage is over 14V.
C) Ignition switch is switched ON.

LED Indicator:

The LED indicator shows the mode or status by the following indications;
A) **STANDBY** – LED blinking at the rate of **10% ON 90% OFF**.
B) **ON** - LED **ON solid**
C) **COUNTDOWN** - LED blinking at the rate of **90% ON 10% OFF**

LED Fuse Indicators

Each fuse has an LED indicator, the LED will be lit if the fuse is good and there is a DC voltage present on the appropriate terminal. To save power and prevent unnecessary drain of the battery these LED indicators will only be lit if the ignition input is present at the *PDU*. The only exception are the LED indicators on the Timed outputs, these will indicate "ON" if the timer is active and the fuse is good.

Maintenance

The *PDU-8S* does not require user maintenance except for the individual fuse replacement.

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
No power at any of the outputs	No power to "***12V INPUT***"	Check 12V INPUT connection for loose or missing wires.
No relay "click"		Check Battery fusible link or circuit breaker, if this is faulty replace it if it is tripped reset it.
	Faulty ground	Check Vehicle Chassis "Ground" connection
	Faulty Unit	Return Unit for repair
No power to "Ignition" circuits	Ignition trigger wire not connected to PDU "ignition" terminal	Verify "ignition" input connection
No relay "click"	Incorrect connection to vehicle wiring harness	Consult the factory specifications and wiring diagrams for the vehicle
		Verify that the ignition wire receives +12V when vehicle ignition is set to "ON" and vehicle is running.
	Faulty Unit	Return unit for repair
Timed outputs not on while ignition is "ON"	Linked to ignition control.	Follow above process
Timing cycle incorrect	Timing switch settings incorrect	Set switches for desired timing
Timing cycle does not end/ start and all ignition control function "OK"	Faulty unit	Return unit for repair
No power to Individual Circuits	Fuse Blown	Replace fuse
	Faulty Circuit	Return Unit for repair

Specifications

General

Description	No. of Available Connections
Power Inputs:	
6 AWG +12V @ 60A max input current	1
6 AWG Ground	1
18 AWG Ignition Control Input	1
Power Output (High Current Connection)	
8 AWG @ 50A Max +12V (fused at 75A)	2
8 AWG Ground	2
Battery Voltage Monitor	
18 AWG sense wire @ +12V BATT terminal	1
18 AWG sense wire @ GND BATT terminal	1
Terminal Block Power Outputs	
Ignition Controlled Power - the total current not to exceed 60A	8
Continuous Power - the total current not to exceed 60A	8
Timed Power - the total current not to exceed 60A	8
Ground return path for the Output terminal blocks the total return current not exceed 60A	7
NOTE: All combined output power (using any combination of outputs) not to exceed 60A	

Timed Outputs With Voltage Protection	Specification
Operating Voltage (monitored/allowed by protection feature)	11.5V—18V
Stand-by Current	30mA
Operating Current	600mA
Selectable Time Delay	2 min. - 13 hrs.
Input Voltage Low Sensing Threshold	>14.0V
Input Voltage Low Disconnect	<11.5V
Input Voltage High Disconnect	>18.0V

WARRANTY

D & R Electronics warrants its new products to be free from defects in material and workmanship, under normal use and service for a period of one year on parts replacement.
This warranty applies only to original purchasers acquiring the product directly from D&R Electronics, or its authorized dealers. Warranty will not be recognized without proof of purchase or bill of sale.
This warranty is not transferable.
The warranty begins on the date of delivery to the first user/purchaser.
This warranty shall not apply to products which must be repaired due to normal wear and tear, negligence, improper installation, abuse, misuse, or which have been altered or modified at a facility other than D & R Electronics, or its authorized depot centers.
Units proved to be defective within the warranty period, based on an examination by D&R Electronics, will be replaced or repaired at D & R Electronics' option. This warranty does not cover travel expenses or labor charges for removal or installation.
Lamps, flash tubes, batteries or other items considered consumables are not covered under warranty.
This warranty is in lieu of all other express warranties. D&R Electronics makes no warranties, expressed or implied, other than the express warranties contained herein.

PRODUCT RETURN POLICY

In order to provide you with faster service, product returns for repair or replacement, must have a **Return Goods Authorization Number (RGA number)**. Please contact our company to obtain a RGA number before you return the product to D & R ELECTRONICS. Write the RGA number clearly on the package. Be sure you use sufficient packing materials to avoid damage to the product being returned while in transit.
D & R ELECTRONICS assumes no responsibility or liability for expenses incurred for the removal and/or the installation of products requiring service and/or repair. Repairing or replacing product is at the discretion of D & R ELECTRONICS.

D&R ELECTRONICS Co. LTD.

CANADA
8820 George Bolton Pkwy.
Bolton, Ontario L7E 2Y4
Tel: (905) 951-9997
Fax: (905) 951-0019

2299 Kenmore Avenue
Building 3, Doors 11-14
Buffalo, New York 14207
Toll Free: 1-800-538-7338

www.dandrelectronics.com