



SOLAR STIK®

**OPERATOR AND MAINTENANCE MANUAL
FOR THE
POWER DISTRIBUTION MODULE (PDM)
3000**



Item #: 20-0002510



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Revision: A

Updated:20200428

April 2020 | Solar Stik®, Inc.

Contents

GENERAL INFORMATION, THEORY OF OPERATION, AND EQUIPMENT DESCRIPTION

PDM 3000 Introduction 4

Theory of Operation

Important Product Safety Information and Instructions 5

- Safety Information Labels 5
- Fire Hazard 6
- Recommended Fire Extinguisher 6
- Electric Shock Hazard 7

Environmental and Handling Precautions 8

- Water 8
- Impact 8
- Dust/Foreign Object Intrusion 8
- Heat 8

Equipment Description

- The Inter-Connect System 9
- PDM 3000 Connections 11
 - Power Input 11
 - Power Output 11
 - Regulated Power Output 12
- PDM 3000 Information Plate (I-Plate) 13

OPERATOR INSTRUCTIONS

Integrating the PDM 3000 into a System. 14

MAINTENANCE INSTRUCTIONS

Preventive Care and Maintenance 16

- Foreign Object Debris (FOD) and Water Intrusion. 16

Water Intrusion Remediation 17

PDM 3000 PMCS 18

Transporting Components 19

SUPPORTING INFORMATION

PDM 3000 Technical Specifications 20

Warranty and Returns

Return Material Authorization 21

Warranty 21

ABOUT SOLAR STIK, INC.

Contact 23

List of Figures

Figure 1. PDM 3000 circuits	4
Figure 2. PDM 3000.....	5
Figure 3. Inter-Connect plug.....	10
Figure 4. PDM 3000 front	11
Figure 5. PDM 3000 left side	11
Figure 6. PDM 3000 right side.....	12
Figure 7. PDM 3000 bottom	12
Figure 8. PDM 3000 top, Faceplate, specs, and cautions	13
Figure 9. PDM 3000 output breakers	14
Figure 10. Connecting 24 VDC power source to the PDM 3000.....	14
Figure 11. Connecting a voltage-sensitive 28.0 VDC load to the PDM 3000.....	15
Figure 12. Connecting a 24 VDC load to the PDM 3000.....	15
Figure 13. Location of drain plug screws in the PDM 3000	17
Figure 14. PDM 3000 bottom cutouts	18
Figure 15. PDM 3000 transportation	19

List of Tables

Table 1. PDM 3000 PMCS.....	18
-----------------------------	----

Revision History

Section	Page(s)	Description	Date
		First published	March 2020

GENERAL INFORMATION, THEORY OF OPERATION, AND EQUIPMENT DESCRIPTION

PDM 3000 Introduction

The primary function of a Power Distribution Module (PDM) 3000 is to provide 28.0 VDC power in a stable, regulated manner to DC loads that are sensitive to the quality of power.

The PDM 3000 “boosts” the DC bus voltage (typically ≤ 30.0 VDC), up to 36 VDC then “bucks” it down to a stable, regulated 28.0 VDC. Power sources (24 VDC nominal) may be connected to the Inter-Connect port or to the NATO port.

The PDM 3000 is Plug & Play-compatible with the Solar Stik Inter-Connect circuit, and can be used in concert with other Solar Stik components. The modular design allows the operator to use it with other technologies/capabilities that collectively meet the specific mission requirements for an application.

Cables for the PDM 3000 are sold separately; load cables are customized for the application with the proper connector(s), wire gauge, and length.

Theory of Operation

The PDM 3000 provides stable, regulated 28.0 VDC power to support voltage-sensitive loads. The Inter-Connect and NATO input ports are functionally equivalent, allowing the PDM 3000 to be integrated into a Solar Stik Hybrid Power System (HPS) or to obtain power from a source such as a military vehicle or genset with the common 24 VDC NATO connector.

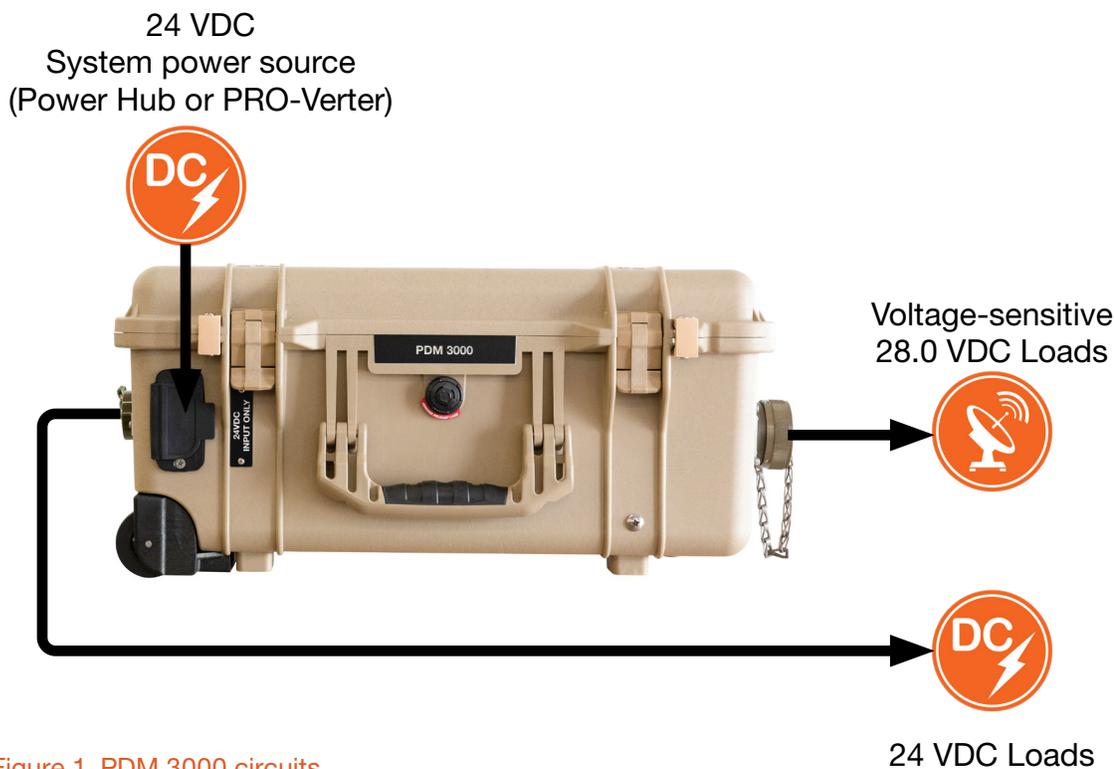


Figure 1. PDM 3000 circuits

Important Product Safety Information and Instructions

This manual contains important safety instructions that must be followed during the installation and operation of the PDM 3000. Read all instructions and safety information contained in this manual.

While the PDM 3000 is designed for indoor/outdoor operation, the cutouts on the bottom must remain clean with access the environment for proper cooling.

The PDM 3000 is not field serviceable. If repair is needed, contact Solar Stik Technical Support for assistance in diagnosis and identification of the proper repair and parts.

Exercise caution when handling or operating equipment. Live power may be present.



Figure 2. PDM 3000

Safety Information Labels

Your safety and the safety of others is very important.

Always read and obey all safety messages.



This is the safety alert symbol. This symbol alerts you to potential hazards that can kill you or hurt you and others. All safety messages will follow the safety alert symbol and the word “DANGER”, “WARNING”, or “CAUTION”. These words are defined as:

⚠ DANGER Indicates a hazardous situation which, if not avoided, **will result in death or serious injury.**

⚠ WARNING Indicates a hazardous situation which, if not avoided, **could result in death or serious injury.**

⚠ CAUTION Indicates a hazardous situation which, if not avoided, **could result in minor or moderate injury.**

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what can happen if the instructions are not followed.

Fire Hazard

Fire Types

Class A fire - Fires in ordinary combustibles such as wood, paper, cloth, trash, and plastics.

Class B fire - Fires in flammable liquids such as gasoline, petroleum, oil, and paint.

Class C fire - Fires involving energized electrical equipment such as motors, transformers, and appliances. Remove the power source and the class C fire becomes a class A or B fire.

Recommended Fire Extinguisher

NSN 4210-00-288-7219 Fire Extinguisher, Carbon Dioxide, 10 lb
Carbon dioxide is a liquefied gas, which is highly effective fighting class B and C fires. These extinguishers are ideal for areas where contamination and/or cleanup are a concern, such as data processing centers, labs, and telecommunication rooms.

⚠ WARNING

Only CO₂ (carbon dioxide) fire extinguishers should be used with this equipment.



Using the Fire Extinguisher

When using the extinguisher on a fire, remember PASS:

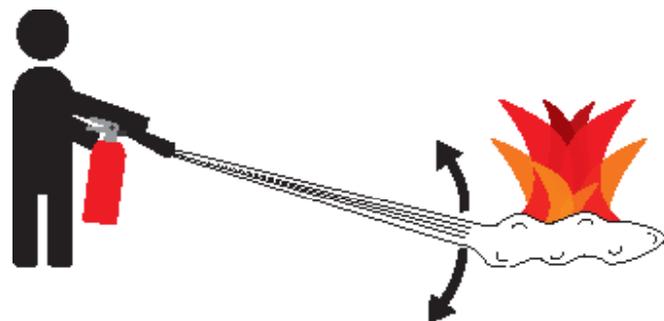
Pull the pin.

Aim the nozzle or hose at the base of the fire from a safe distance.

Squeeze the operating lever to discharge the fire extinguishing agent.

Sweep the nozzle or hose from side to side until the fire is out. Move forward or around the fire as the fire diminishes.

Watch the area for reignition until the cause has been fixed.



Use Sweeping Motion

These additional cautionary steps will ensure your safety:

- System components should not be operated in standing water.
- Close and latch the component lids if it is precipitating.
- System cables should not be routed through standing water.
- Cable connections should remain dry.
- Unused ports on System components should be covered when not in use to reduce the possibility of water intrusion.

Electric Shock Hazard

⚠️ WARNING

Standing water around the electrical equipment and/or intrusion of water into the System components can increase the risk of electrical shock.

DON'T LET THIS BE YOU!



HIGH VOLTAGE: System components, photovoltaic (PV) arrays, and generators may have lethal line voltages. Extreme care should be taken to protect against electrocution.

Always:

- Work with another person in case an emergency occurs.
- Disconnect power before performing maintenance.
- Wear safety glasses whenever working on any part of a System that requires exposure to mechanical or direct electrical contacts.

⚠️ WARNING

The PDM 3000 is NOT GFCI protected.

Environmental and Handling Precautions

All Solar Stik components are ruggedized, yet there are a few things the operator can do to prevent failures and prolong the operational life of the product.

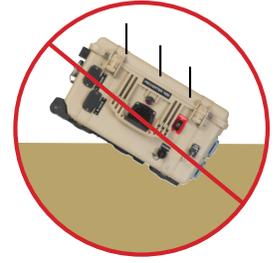
Water

If outdoor operation is necessary, cases should be placed upright, especially during inclement weather.



Impact

Equipment should not be dropped onto hard surfaces at a height greater than one foot when transporting or during operation.



Dust/Foreign Object Intrusion

As a general rule, minimize exposure to high levels of particulates and foreign object debris by exercising common-sense placement and protection during both operation **and** storage.



Heat

Heat and solar loading reduces efficiency and life expectancy. Shade components (except PV panels) to prevent the negative effects of heat.



Equipment Description

The Inter-Connect System

The System is comprised of three (3) distinct types of technologies:

- Energy storage
- Power management
- Power generation

All of the individual components that operate in these categories utilize a unique connection architecture known as the Inter-Connect Circuit.

The Inter-Connect Circuit is the connection framework of the System's DC power network. It uses a simple, polarized, locking connection that is common throughout the architecture. All power management, energy storage, and power generation components are compatible with the Inter-Connect Circuit.

Using a common, polarized connector allows rapid "Plug & Play" scaling of components, adaptation of capabilities within the architecture, technology refreshment, and swapping of components when conditions warrant. It also ensures that there is no unsafe way to make connections.

Circuit Breaker Protections

The Inter-Connect network is protected from overloads and short circuits through a network of circuit breakers strategically placed throughout the circuit. It ensures the potential for a reverse polarity connection within the circuit is minimized. If a problem occurs in a leg of the Inter-Connect Circuit, the affected leg will disconnect from the primary network, leaving the other circuits functioning. If a major failure occurs in the circuit, then the entire network will shut down for System and Operator protection.

Operate with Voltage

The Inter-Connect Circuit communicates simple battery voltage to all components on the network, allowing them to independently coordinate their respective functions. Battery voltage is used to trigger actions such as Automatic Generator Start/Stop (AGS) function, power distribution timing, and more. Therefore, the proper setup of the Inter-Connect Circuit is critical to properly communicate voltage to all points in the System and to ensure all of the components operate together to provide seamless power to the load.

Optimize with Data

Data collection for a System occurs through the Inter-Connect network. Power management devices such as Power Hubs and PRO-Verters meter voltage, current and time through the circuit, providing critical real-time data the operator can use to troubleshoot and verify System performance. Data collection enables programming/architectural changes to optimize performance based on evolving conditions.

The Inter-Connect Plug

- Polarized
- 200 A maximum current
- 24 VDC connection only
- Mechanically “locks” into place
- Rotate knob clockwise to lock, counterclockwise to release
- Can be repaired or modified in the field



Figure 3. Inter-Connect plug

PDM 3000 Connections

Power Input

The 24VDC Input Only Inter-Connect port allows the PDM 3000 to use the Solar Stik HPS Inter-Connect circuit as a power source.



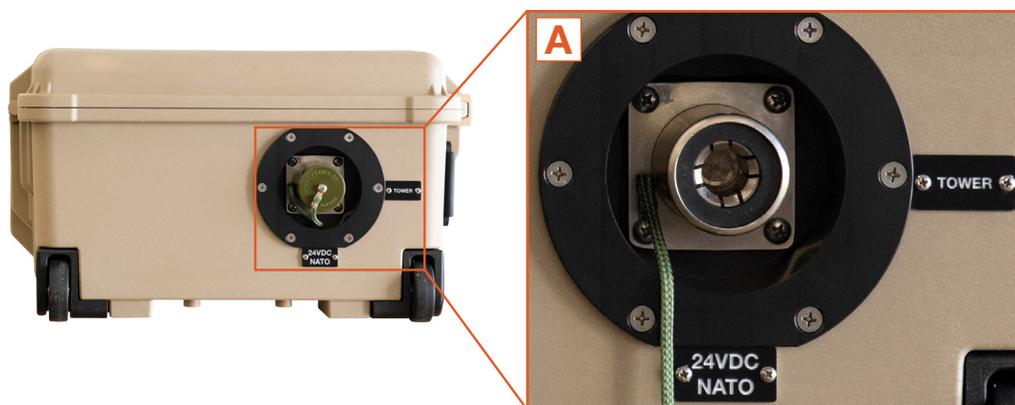
	Description	Connector	Voltage	Amps
A	Battery Connection	Inter-Connect Port	24 VDC	100

Figure 4. PDM 3000 front

Power Output

The 24VDC NATO port provides unregulated 24 VDC power to a load.

Note: This port may also be used for 24 VDC power input if required.



	Description	Connector	Voltage	Amps
A	24 VDC NATO Slave (unmetered)	NATO Slave	24 VDC	100

Figure 5. PDM 3000 left side

Regulated Power Output

The 2-pin connector in the right side of the PDM 3000 provides regulated 28.0 VDC power to a load. The 100 A breakers on the right side also serve as power switches for engaging and disengaging power circuits to the 24 VDC NATO and 28.0 VDC Amphenol ports.

Note: Both output connectors are customizable per application/customer requirements.

⚠ CAUTION

Do NOT connect a battery directly to the regulated 28 VDC output port because this will damage the PDM 3000.



	Description	Connector	Voltage	Amps
A	28.0 VDC regulated output	Amphenol	28.0 VDC	75
B	Regulated 28 VDC output to PDU	N/A	N/A	100
C	24 VDC output to Tower	N/A	N/A	100

Figure 6. PDM 3000 right side

The bottom of the PDM 3000 case is cut away to facilitate heat dissipation. The internal components are sealed from exposure to the environment by a gasket.

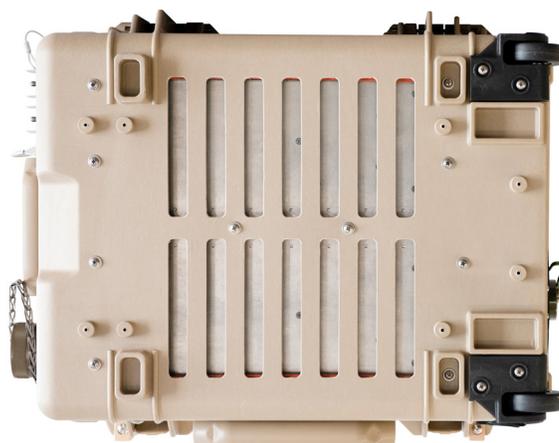


Figure 7. PDM 3000 bottom

PDM 3000 Information Plate (I-Plate)



Figure 8. PDM 3000 top, Faceplate, specs, and cautions

OPERATOR INSTRUCTIONS

Integrating the PDM 3000 into a System

1. Turn off both breakers during System setup.

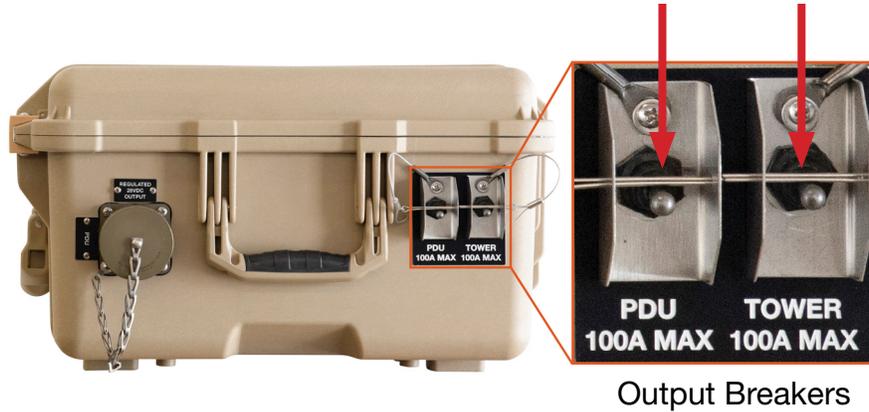


Figure 9. PDM 3000 output breakers

2. Use an Inter-Connect cable to connect the PDM 3000 to a 24 VDC power source (e.g., Solar Stik HPS PRO-Verter or Power Hub DC bus). The choice of HPS Inter-Connect port will depend on the HPS configuration. Contact Solar Stik Technical Support.

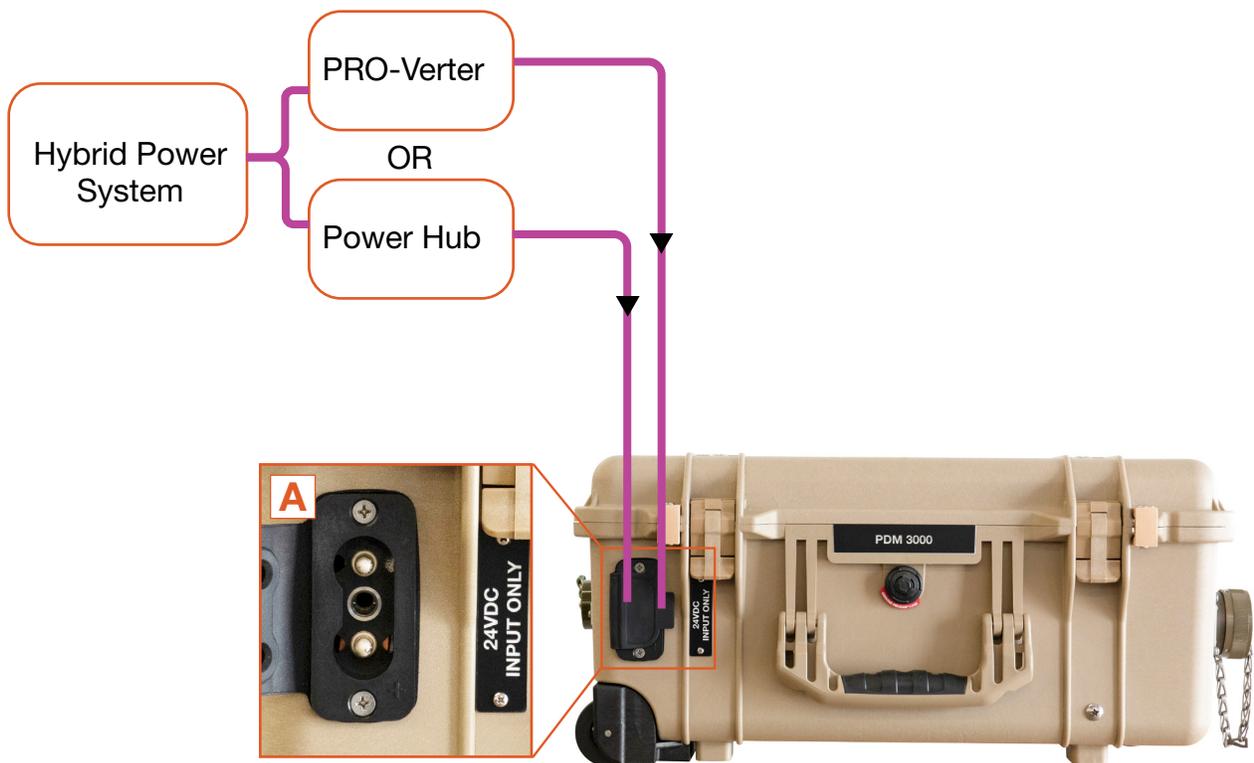


Figure 10. Connecting 24 VDC power source to the PDM 3000

3. Connect load (PDU) to Regulated 28 VDC Output port.

Note: This connector is custom. Contact Solar Stik for information about connector/cable options.

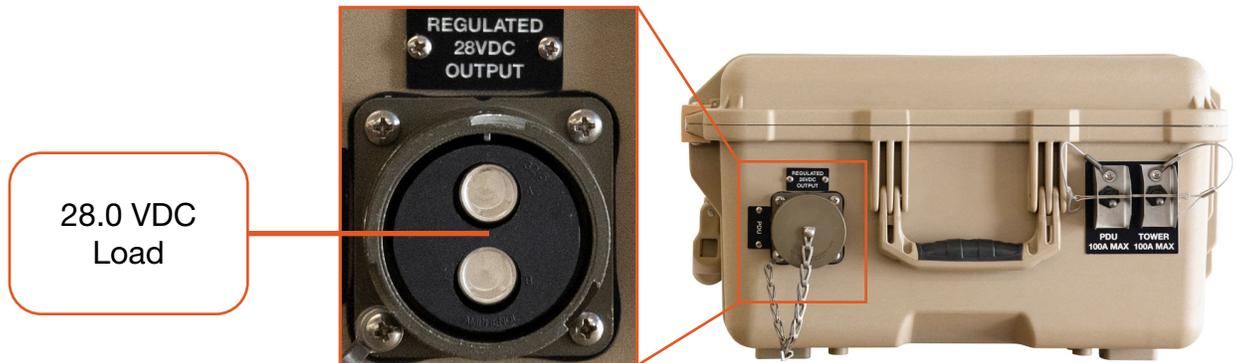


Figure 11. Connecting a voltage-sensitive 28.0 VDC load to the PDM 3000

⚠ CAUTION

Do NOT connect a battery directly to the regulated 28 VDC output port. Connecting a battery directly to the regulated 28 VDC output port will damage the PDM 3000.

4. Use a NATO slave cable to connect load to 24 NATO port to a load (tower).

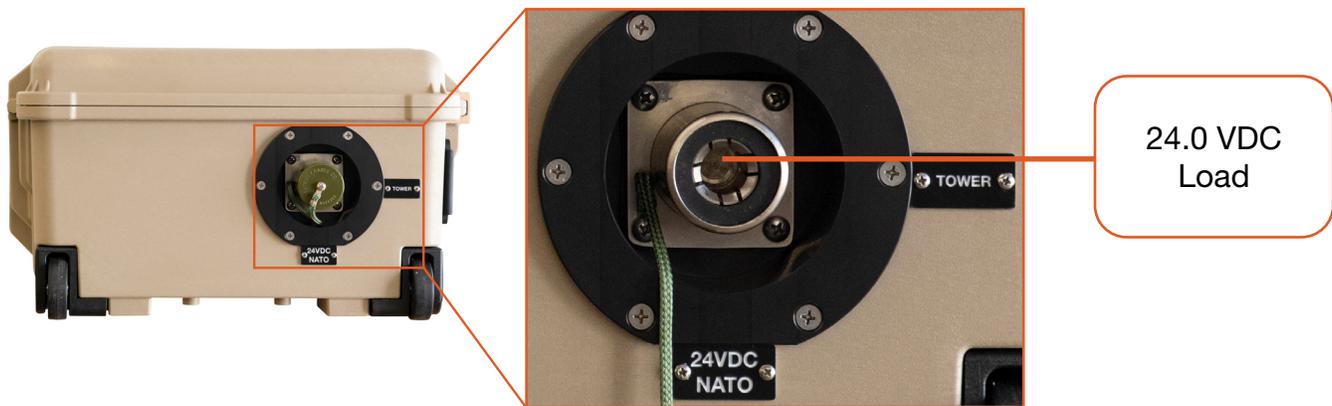


Figure 12. Connecting a 24 VDC load to the PDM 3000

5. Turn on the breakers required to support the load(s).



MAINTENANCE INSTRUCTIONS

Preventive Care and Maintenance

The PDM 3000 case is sealed. No maintenance to internal parts is required or advised.

The function and efficiency of all electronic equipment is related to and dependent upon the temperature at which it is operating. It performs optimally within a narrow temperature range and less so as the temperature falls outside of that range. **Heat will cause the PDM 3000 to derate.** Please use the following measures to mitigate against heat and other environmental effects:

- Shade the PDM 3000 from direct sun exposure and shelter it from the elements as much as possible.
- Keep unused connector covers closed to prevent water/dust intrusion.
- Check the integrity of electrical connectors on a monthly basis.
- Turn off loads when they are not in use. This will save power and allow more power to be available when it is needed.

Foreign Object Debris (FOD) and Water Intrusion

All Solar Stik equipment is designed for operation in adverse environmental conditions; however, certain rules apply:

1. If operating in wet environments, use common-sense placement to avoid water intrusion by either flooding or precipitation.
2. If operating in dusty environments, place unit in a location that minimizes exposure to particulates.

Consult the Preventive Maintenance Checks and Services (PMCS) section of this manual for additional details.

Water Intrusion Remediation

! WARNING

Standing water around the electrical equipment or intrusion of water into the System components can increase the risk of electrical shock.

- If water intrusion is suspected and the System is still functional, disconnect power sources entering that component from the most distant location possible, power down the System (turn off the power switches on all of the System components), then disconnect the component from the System. Do not to try to remove what may be a flooded component while it is still powered up.
- Remove the screw from the drain hole at the bottom edge of the component case. If water flows out of the drain hole after removal of the plug, let it flow until it stops. Then slightly and slowly tilt the case toward the drain hole to remove any remaining water. Continue to increase the angle of the component slowly until no more water drains from the hole. After the water has been drained, move the component to a safe, dry location. Place the component in the most dry environment possible for a time long enough that any remaining moisture inside will dry. When it is dry, reintegrate the component to the System and test it to determine if it is still functional.



Figure 13. Location of drain plug screws in the PDM 3000

PDM 3000 PMCS

The PDM 3000 case is sealed. No maintenance of internal parts is required or advised.

Table 1. PDM 3000 PMCS

Item #	Item to be Inspected	Interval	Procedures	Non-mission Capable
1	Visual inspection of PDM 3000	M	<ol style="list-style-type: none">1. Inspect case for visible damage and missing items.2. Clean excessive dust or dirt accumulation from the exterior, interior, and connectors and from the cutouts on the bottom.3. Close all unused port covers.	~If the case is broken or split or if connectors are damaged, do not place into service.

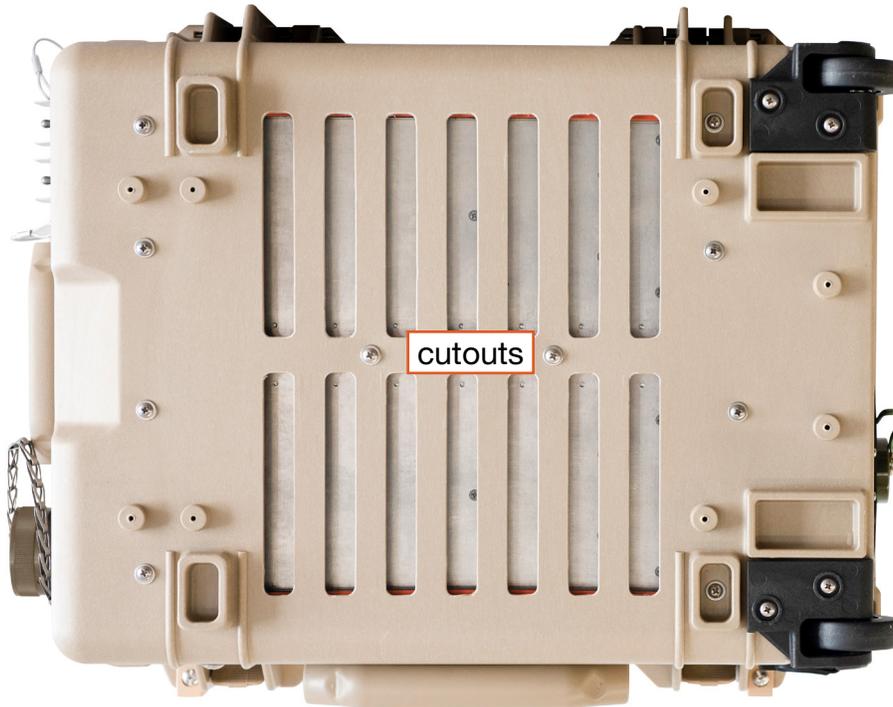


Figure 14. PDM 3000 bottom cutouts

Transporting Components

The PDM 3000 carries like a briefcase using the case handles (arrow). There are no transport restrictions. It is safe for all modes of transportation, including land, sea, and air.



Figure 15. PDM 3000 transportation

SUPPORTING INFORMATION

PDM 3000 Technical Specifications

Safety	
Breaker(s)	<ul style="list-style-type: none"> • (1) 100 A unregulated DC output breaker • (1) 100 A regulated DC output breaker
Fuse(s)	(1) 200 A catastrophic fuse
Reverse Polarity	Polarized connectors
Ground Fault	Grounding lug

General	
Nominal Operating Voltage	24 VDC
Battery Voltage Range	24–30 VDC
Internal cooling	Passive cooling
Case	1560 Pelican case
Warranty	1-year materials and workmanship
Efficiency	95%

Connections	
Input(s)	(1) 24 VDC Inter-Connect*
Output(s)	(1) AIB2-32-5SC (regulated 28 VDC)
Input/Output(s)	(1) NATO port

*Deltran 224-0061-BK

Environmental	
Operating Temperature	-40 °F to 140 °F (-40 °C to 60 °C)

Weights and Dimensions (L x W x H)	
Weight	50 lb (22.6 kg)
Dimensions	23.5 x 18.25 x 10.375 in (59.7 x 46.4 x 26.4 cm)

Warranty and Returns

Return Material Authorization

If Customer believes a Product is defective, a Return Material Authorization (RMA) number must be obtained from Solar Stik prior to shipment of such Product back to Solar Stik. The RMA number must appear on all packages returned to Solar Stik and be referred to in all related correspondence. Return shipment of the Product for which damages are claimed shall be at Customer's expense, and such Products shall not be returned, repaired, or discarded without Solar Stik's written consent. Returned Products will be subject to inspection and final determination as to whether or not any adjustment is due. If the inspection shows the warranty for the Product is breached, the provision of WARRANTY (below) will apply. Solar Stik advises that Customer order recommended spares and maintenance parts, especially for critical OCONUS operations. Otherwise Customer may experience system downtime during the return and inspection of nonworking components.

Warranty

1. Solar Stik warrants, unless otherwise agreed to between buyer and seller (Solar Stik, Inc.), for a period of one (1) year from Solar Stik's delivery of such Products, the Products shall be free from defects in materials and workmanship and shall conform to the contractual specifications or to specification sheet of the Product. This warranty does not cover defects or failure caused by improper handling, storage, maintenance, or repair or by any modification, misconnection, abuse, abnormal use of such Products (inter alia, overloading or overcharging) or use not complying with Solar Stik's user manual provisions if any.
2. Warranty claims must be made to Solar Stik immediately after discovering the defect and within the warranty period or are forever waived.
3. The foregoing warranty is exclusive of any other warranties, express, implied or statutory. In particular, this warranty shall not apply to failure arising from defect in design when the design has been completed in part by the Customer or a third party. Unless otherwise agreed, the warranty shall not apply to the compliance of Products to Customer's needs. Should the Products warranty be breached, Customer's exclusive remedy against Solar Stik, and Solar Stik's sole obligation, shall be limited to, at Solar Stik's option, repairing or replacing the defective Products.
4. The Product shall be considered defective if the failure may be duplicated by Solar Stik, it being understood nonconformity shall be determined by reference to the contractual specifications applicable to the allegedly defective Products.

ABOUT SOLAR STIK, INC.



SOLAR STIK®

Mission Statement

Using American-made components and constant innovation, Solar Stik creates portable power solutions that enable self-sufficiency for the soldier, the sailor, and beyond. In doing so, we save lives, change lives, and help revive American manufacturing.

STIKopedia

[STIKopedia](#) is a compilation of everything you would ever want to know about portable Hybrid Power Systems, including the philosophy and mechanics of high-efficiency circuits, and the individual technologies used to create them.

Solar Stik Training and Education

- **Solar School (St. Augustine, FL)** provides an introduction to the design and support of small-scale, renewable-energy, power generation systems, with detailed explanation of system components. Advanced configuration options with hands-on deployment of actual systems will enhance student understanding.
- **Solar Stik New Equipment Training (on site)** teaches Hybrid System configuration options with hands-on deployment of actual systems to enhance student understanding.

Solar Stik Training Courses are tailored to the specific needs of the students. To schedule Solar Stik Training or to learn more about the curriculum, please contact us.

Contact

Technical Support Line

800-793-4364 Ext. 102

(24 hours a day, 365 days a year)

Address

Solar Stik, Inc.

226 West King Street

Saint Augustine, Florida 32084

Website

www.solarstik.com

Trademarks and Logos are the property of Solar Stik, Inc. unless otherwise noted.

This manual is subject to revisions without prior notice.

© 2020 Solar Stik, Inc.

All Rights Reserved.