Deye

Optimizer Controller User Manual

SUN-OPTMZ01-STR2-20A

Security Declaration

For detailed information regarding the product's network security vulnerability response procedures and the disclosure of related vulnerabilities, please refer to the Deye Security Center at https://sec.deyecloud.com.

1. About This Manual

Introduction

The Optimizer Controller is designed to maximize the energy harvest of photovoltaic (PV) modules by performing module-level power optimization. It helps improve system efficiency, enhances energy yield under shading or module mismatch conditions, and supports safer and more reliable PV system operation.

This manual provides information on the product, including its installation, operation, maintenance, and safety requirements.

Intended Audience

This manual is intended for qualified installers, service personnel, and users responsible for the installation, operation, and maintenance of the External Photovoltaic Optimizer.

Manual Usage

Read this manual carefully before installing, operating, or servicing the product. Follow all instructions and safety precautions described in this document. Keep this manual for future reference.

Symbols and Conventions

The safety symbols and conventions used throughout this manual are intended to highlight important information and potential hazards. Familiarize yourself with these symbols before proceeding with any installation, operation, or maintenance activities.

Labels	Description
	Caution, risk of electric shock.
	Caution, risk of danger
	Caution, hot surface.
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION.
	Symbol for the marking of electrical and electronics devices according to Directive 2002/96/EC. Indicates that the device, accessories and the packaging must not be disposed as unsorted municipal waste and must be collected separately at the end of the usage. Please follow Local Ordinances or Regulations for disposal or contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.
	CE mark is attached to the solar inverter to verify that the unit follows the provisions of the European RED Directives.
	Refer to the operating instructions.
Qualified personnel	Person adequately advised or supervised by an electrically skilled person to enable him or her to perceive risks and to avoid hazards which electricity can create. For the purpose of the safety information of this manual, a "qualified person" is someone who is familiar with requirements for safety, refrigeration system and EMC and is authorized to energize,ground, and tag equipment, systems, and circuits in accordance with established safety procedures. The inverter and endues system may only be commissioned and operated by qualified personnel.

DANGER:
Indicates an imminently 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.

CAUTION:
Indicates important information that, if not observed, may result in equipment damage, reduced performance, or property loss.

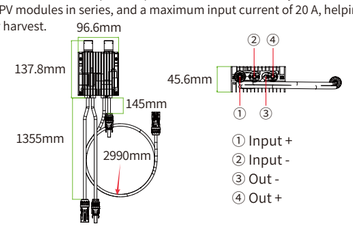
2. Safety Precautions

To ensure the safe installation, operation, and maintenance of the power optimizer, and to reduce the risk of electric shock, personal injury, or equipment damage, all safety instructions in this manual must be strictly observed.

WARNING:
All installation, commissioning, maintenance, and servicing work must be performed by qualified personnel only. Qualified personnel must:
1. Have received appropriate professional training.
2. Read and fully understand this manual before performing any work.
3. Be familiar with applicable electrical safety regulations and standards.
4. Use appropriate personal protective equipment (PPE) when required.
5. Follow all local installation and safety requirements.

3. Product Overview

The Optimizer Controller is a module-level power optimization device for PV systems. It supports one MPPT input, connection of up to two PV modules in series, and a maximum input current of 20 A, helping improve system performance and energy harvest.



4. Installation Guidance

WARNING:
1. Read and understand all instructions, safety information, and warning labels on the optimizer, inverter, and PV modules before installation.
2. Before installation, shut down the inverter and disconnect all PV modules from the system.
3. Before connecting the optimizer, verify that the voltage, current, and power ratings of the PV modules are within the specified operating range of the optimizer.

4.1 Select installation location

DANGER:
Do not install the inverter in areas containing highly flammable materials or gases.
Do not install the inverter in potentially explosive atmospheres.

WARNING:
Do not install in small closed spaces where air can not circulate freely. To avoid overheating, always make sure the flow of air around the inverter is not blocked. Exposure to direct sunlight will increase the operational temperature of the inverter and may cause output power limiting. It is recommended that inverter installed to avoid direct sunlight or raining.
To avoid overheating ambient air temperature must be considered when choosing the inverter installation location. It is recommended that using a sun shade minimizing direct sunlight when the ambient air temperature around the unit exceeds 104°F/40°C.

4.2 Installation Tools

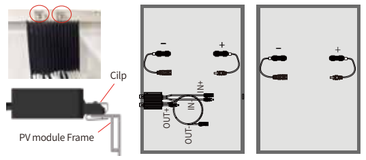
Recommended installation tools: multimeter, unlocking tool.

4.3 Power Off the System

Before installation, ensure that the inverter is powered off and disconnected from the PV string.

4.4 Mount the Optimizer

Attach the optimizer to the PV module frame in the orientation shown in the installation diagram. Ensure that the mounting clip is securely fastened to the frame.

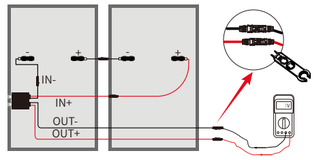


Note:
The optimizers should be installed on the left and right sides of the PV modules respectively.

4.5 Connect the Optimizers

Step1：Connect the input and output terminals of the optimizer to the PV module junction box. Verify that the input and output wiring is correctly connected. Reversing the polarity may result in permanent damage to the device.

Step2：Attach the positive (red) probe of the multimeter to the positive output terminal of the optimizer and the negative (black) probe to the negative output terminal. Subsequently, measure and verify the output voltage of each optimizer individually.



Note: When the terminals are properly connected, the connector will automatically lock. To disconnect, a dedicated unlocking tool must be used to unplug it. Forced disassembly is strictly prohibited.

When the optimizer is connected to the PV module, the output voltage of each individual optimizer is 1 V.

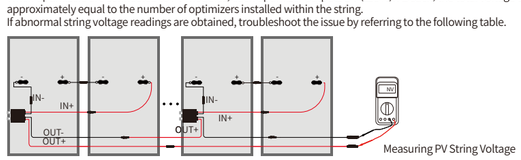
WARNING:
Each optimizer input can be connected to one or two PV modules in series. Ensure that the total open-circuit voltage (Voc) of the connected PV modules is within the optimizer input voltage range of 20 V to 120 V.

CAUTION:
To prevent damage to the optimizer and connectors:
1.When installing the optimizer, connect the input side first, followed by the output side.
2.When removing the optimizer, disconnect the output side first, followed by the input side.

If the multimeter voltage reading is abnormal, refer to the table below to troubleshoot the cause:

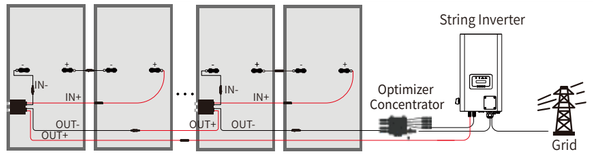
Voltage	Description	Recommended Action
0.95 V ≤ V1 ≤1.05 V	The optimizer is operating normally.	No action required.
V1 > 1.05 V	Optimizer Fault.	The optimizer needs to be replaced.
V1 < 0.95 V	* Optimizer Fault. * Optimizer input connection failed. * Optimizer wiring error * Low solar irradiance	* The optimizer needs to be replaced. * Reconnecting the Optimizer input * Reconnect the optimizer cables, and then connect the optimizer input terminals to the PV module output terminals. * Please measure the voltage value in a location with sufficient sunlight.
V1 ≈ -1 V	The multimeter test leads are reversed.	Swap the positive and negative test leads of the multimeter.

Step 3: After verifying secure connections between optimizers and input cables, connect the output cables of the optimizers. Measure the voltage of the PV string under adequate solar irradiance.
(Diagram Description: Multiple optimizers are connected in series. A multimeter is used at the end of the circuit to measure the string voltage between PV+ and PV-.)
Notes: String voltage = V1 + V2 + … + VN ≈ N × 1 V
When optimizers are connected to PV modules, each optimizer outputs 1 V (±5%). As such, the total voltage of a PV string is approximately equal to the number of optimizers installed within the string.
If abnormal string voltage readings are obtained, troubleshoot the issue by referring to the following table.



Troubleshoot

Situation	Root Causes	Solution
Negative string voltage reading	• Multimeter probes connected with reversed polarity • Incorrect labeling on cables	1. Swap the positive and negative multimeter probes. 2. Remake and correct cable identification labels.
String voltage reads 0	• Open circuit present in the PV string • Cables belong to different PV strings	1. Inspect the PV string to locate open-circuit faults. 2. Reorganize cables to match the designated PV string.
String voltage lower than the number of optimizers	• Missing connections at the input terminals of some optimizers • Missing connections at the output terminals of some optimizers	Thoroughly check all wiring connections of PV modules and PV strings.
String voltage higher than the number of optimizers	• Actual quantity of optimizers in the string exceeds the designed quantity • PV modules are wired directly into the string without optimizers	1. Verify the actual installed quantity of optimizers in the string 2. Fully inspect wiring of PV modules and PV string cables



Note:
When connecting optimizers to the Optimizer Concentrator:
* The communication distance for PLC shall be limited to within 200 m.
* Each Optimizer Concentrator provides 4 independent input channels.
* Each channel supports 6 to 20 optimizers.
* The total string voltage shall not exceed 1100 Vdc. Refer to the Optimizer Concentrator User Manual for detailed installation and configuration requirements.

4.6 Removing the Optimizer

Before removal, ensure that the inverter is powered off and completely disconnected from the PV modules and strings. Then slide the optimizer in the reverse direction of the frame to detach it.

4.7 Start Up the System

After verifying that all connections are correct and secure:
* Power on the Optimizer Concentrator.
* Confirm that the Optimizer Concentrator detects all connected optimizers.
* Power on the inverter.
* Verify normal system operation.

5. Inspection and Replacement

WARNING:
To prevent electric shock and equipment damage, all inspection and replacement procedures must be performed by qualified personnel only.

5.1 Inspection

If the optimizer is suspected to be operating abnormally, perform the following checks:
1. Measure the optimizer input current using a clamp meter.
* If measurable input current is present, the optimizer is operating normally.
* If no input current is detected, proceed with the following checks.

2. Inspect the PV modules connected to the optimizer.
* Check for visible damage to the modules.
* Check whether the modules are heavily shaded or obstructed.
* Replace damaged modules and remove any obstruction if necessary.

3. Inspect the cable connections.
* Shut down the inverter.
* Disconnect the optimizer from the PV string. Always disconnect the output side before disconnecting theinput side.
* Measure the voltage at the PV module output connectors using a multimeter.
* If the measured voltage is within the expected range, the PV module and wiring are operating normally.
* If no voltage is present, inspect the wiring and connectors for open-circuit faults or poor connections.

4. If the PV modules and cable connections are verified to be normal, replace the optimizer.

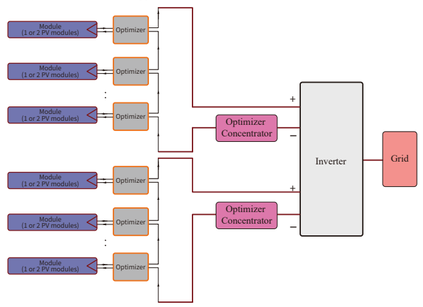
5.2 Optimizer Replacement

To replace the optimizer, perform the following steps:
1. Shut down the inverter and disconnect the corresponding PV string.
2. Disconnect the optimizer output cable.
3. Disconnect the optimizer input cable.
4. Remove the existing optimizer.
5. Install the replacement optimizer.
6. Connect the optimizer input cable.
7. Connect the optimizer output cable.
8. Reconnect the PV string to the inverter.
9. Restart the inverter.
10. Measure the optimizer input current using a clamp meter to verify proper operation of the replacement unit.

6. Application Examples

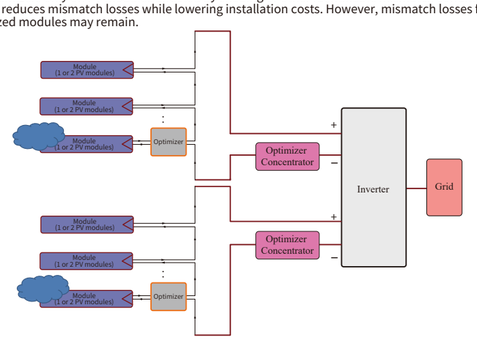
6.1 Example 1: Full Installation

Install an optimizer on every PV module in the string. This configuration provides the highest energy yield and is recommended for systems with multiple mismatch conditions, such as shading, module aging, orientation differences, or mixed module types.



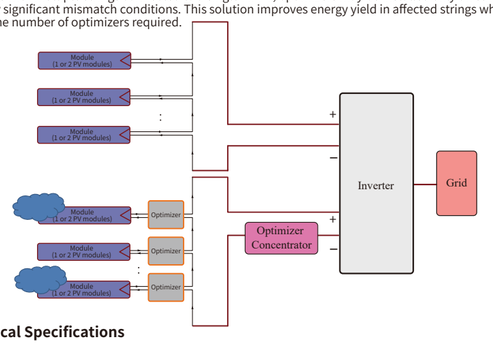
6.2 Example 2: Installation on Shaded Modules

Install optimizers only on PV modules affected by shading or other identifiable mismatch conditions. This approach reduces mismatch losses while lowering installation costs. However, mismatch losses from unoptimized modules may remain.



6.3 Example 3: Installation on Mismatched Strings

For systems with multiple strings connected to a single MPPT, optimizers may be installed only on strings affected by significant mismatch conditions. This solution improves energy yield in affected strings while reducing the number of optimizers required.



7.Technical Specifications

Model	SUN-OPTMZ01-STR2-20A
Input Data	**Parameter**
Max. PV Power (W)	1600
Max. Input Voltage (V)	120
MPPT Voltage Range (V)	20-120
Max. Input Short-Circuit Current (A)	30
Max. Operating Input Current (A)	20
Output Data	
Max. Output Voltage (V)	120
Max. Output Current (A)	20
Output Bypass*1	Yes
Output Voltage During Standby per Optimizer	1V
General Data	
Max. Efficiency	99.60%
Over Voltage Category	II
Operating Temperature Range	-40°C-70°C*2
Permissible Ambient Humidity	0~100%
Permissible Altitude	4000m
Ingress Protection (IP) Rating	IP 68
Input Connector	PV005
Input Wire Length	1.4m*2
Output Connector	PV005
Output Wire Length	3m+0.12m
Cabinet Size (W*H*D) [mm]	96.6*134.5*45.6
Weight [kg]	1kg
Warranty	10 Years
Type of Cooling	Natural Cooling
EMC Standard	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN 55011:2016/A2:2021, EN62920:2017/A1:2021
Safety Standard	IEC62109-1 (Class II Safety)

Notes:
1. In the event of an optimizer failure, the built-in bypass function allows the PV string to continue operating, minimizing the impact on system power generation.
2. When the optimizer temperature reaches approximately 70°C to 85°C, over-temperature protection may be activated. The optimizer will automatically recover and resume operation after the temperature decreases to a normal level.

8. EU Declaration of Conformity

Within the scope of the EU directives:
- Electromagnetic compatibility 2014/30/EU (EMC)
- Low Voltage Directive 2014/35/EU (LVD)
- Restriction of the use of certain hazardous substances 2011/65/EU (RoHS)

NINGBO DEYE INVERTER TECHNOLOGY CO., LTD. confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above mentioned directives. The entire EU Declaration of Conformity and certificate can be found at https://www.deyeinverter.com/download/#pv-optimizer
Please scan the QR code below to access the EU Declaration of Conformity and the relevant certificates.

Maintenance: Deye optimizers do not require any specific regular maintenance.
Troubleshooting: If you have any problems when using Deye products, please contact our after services team for help by email at service@deye.com.cn. For more details, please refer to product warranty policies.
Disposing of the Optimizer: Do not throw the optimizer away with household waste. Follow latest local rules for getting rid of electronic waste. Make sure the old optimizer and any accessories are disposed of properly.

Contact Information

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