DARFON

INSTALLATION MANUAL

CLOUD-BASED MONITORING SYSTEM

TABLE OF CONTENTS

IMPORTANT SAFETY INSTRUCTIONS

PLEASE READ INSTRUCTIONS BEFORE INSTALLING AND KEEP FOR FUTURE REFERENCE.
This manual contains important instructions for the installation and maintenance of Darfon's Monitoring System. Before installing, please read these safety instructions carefully. Take special care to follow the warnings indicated on the unit itself as well as the safety instructions listed below.

Safety Symbols

To reduce the risk of injury and to ensure the continued safe operation of this product, the following safety instructions and warnings are marked in this manual.

WARNING
This indicates the risk of electric shock. The presence of high voltage levels may constitute a risk of injury or death to users and/or installers.

CAUTION
This indicates important information where failure to comply may result in safety hazards or cause damage to this product.

Safety Instructions

- Read all instructions and cautionary marks in the manual carefully before starting the installation. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the device. The manufacturer assumes no liability for the customer's failure to comply with these requirements.
- Do not attempt to repair this product; it does not contain user-serviceable parts. Repairs and internal servicing should only be performed by authorized service personnel.
- Do not tamper with or open this product. Opening this product may result in electric shock.
- Perform all electrical installations in accordance with all applicable local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70.
- Only qualified electrical personnel should perform the electrical installation/wiring of this product.
- Switch off the circuit breakers before installation and wirings.
- For the safety of installation, remove all conductive jewelry or equipment during the installation or service of the device parts, connector and/or wiring.
- Do not stand on a wet location while doing installation and wirings. Enclose the outer covering well before switch on the circuit breakers.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

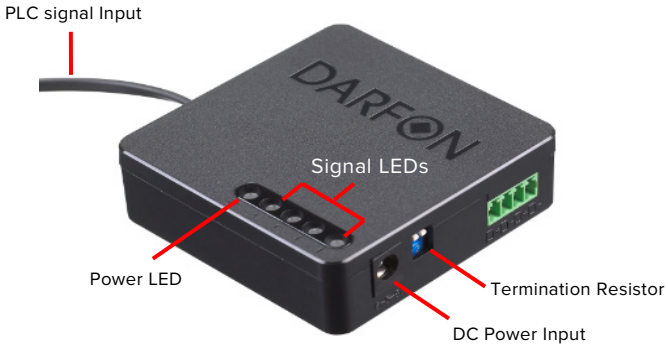
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

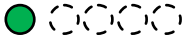
Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

MONITORING SYSTEM

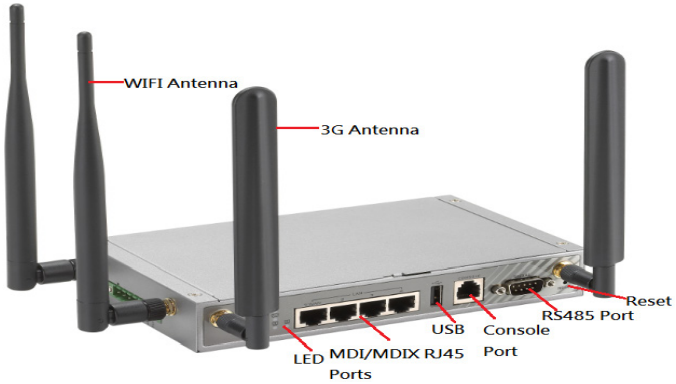
At this stage, the majority of the PV system is already installed: the PV modules and microinverters. The following section list steps on how to install the monitoring system. Before installing, review and follow all important safety instructions listed in the beginning of this manual.

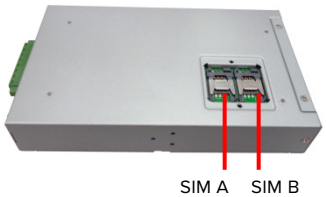
PLC Box Overview

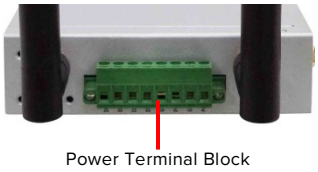


FEATURE	FUNCTION
AC(PLC) Signal Input	Connects to the AC cable in the PV system.
DC Power Input	Plug the Power adapter to the DC Jack on the PLC Box. (Input: AC 100-240V 50-60Hz, Output: DC+12V 1A)
Power LED	The Power LED will be solid when on 
Signal LEDs	The Signal LED will flash three times during normal startup. Represents the strength of the signal. (1 LED - weak signal, 4 LEDs - strong signal.) Weak Signal:  Strong Signal: 
Termination Resistor	If the distance between the Data Logger and PLC Box is greater than 50m, then the termination resistor switch on both the Data Logger and PLC Box should be switched ON. If the distance between the Data Logger and PLC Box is less than 50m, then the termination resistor switch on both the Data Logger and PLC Box should be switched OFF.

Data Logger Overview

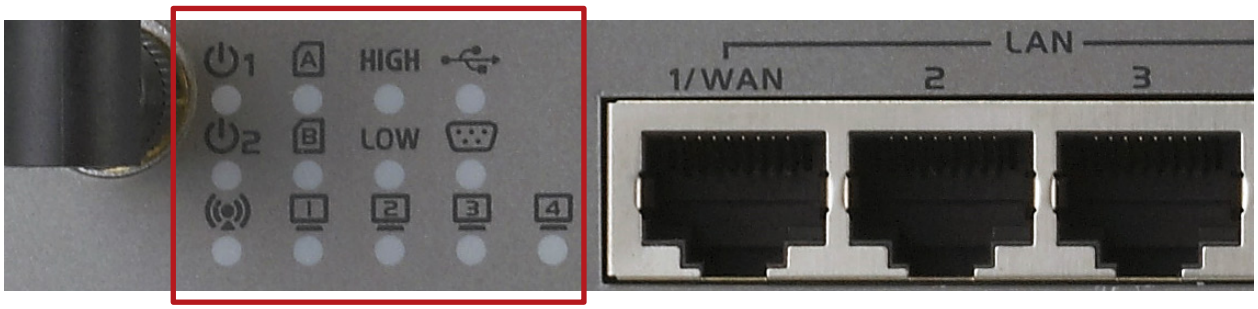






FEATURE	FUNCTION
Power Terminal Block	Plug the power adapter to the power terminal on the Data Logger. (Input: AC 100-240V 50-60Hz, Output: DC+12V 2A)
LED Indicators	Power Source 1, Power Source 2, WLAN (WiFi), SIM A, SIM B, LAN 1, LAN 2, LAN 3,LAN 4, USB, Serial Port, High 3G Signal, Low 3G Signal
WLAN Port	To connect to the internet (router).
LAN Port	To connect to the client device.
USB Port	To connect to a USB storage device.
Reset Button	To reset the data logger, press and hold the button for 10 seconds. The data logger will restart with the default factory settings.
RS485 Port	To connect to the PLC Box.
WiFi Antenna	WiFi antenna is a device for sending or receiving WiFi waves.
3G Antenna	3G antenna is a device for sending or receiving 3G waves.
SIM Card Slot	Insert the SIM card to open 3G function.

LED Indicators



LED ICON	INDICATION	LED COLOR	DESCRIPTION
	Power Source 1	Green	**Steady ON:** Device is powered on by power source 1
	Power Source 2*	Green	**Steady ON:** Device is powered on by power source 2
	WLAN (WiFi)	Green	**Steady ON:** Wireless radio is enabled **Flash:** Data packets are transferred **OFF:** Wireless radio is disabled
	SIM A	Green	**Steady ON:** SIM card A is used
	SIM B	Green	**Steady ON:** SIM card B is used
~	LAN 1 ~ LAN 4	Green	**Steady ON:** Ethernet connection of LAN is established **Flash:** Data packets are transferred
HIGH	High 3G Signal	Green	**Steady ON:** The signal strength of 3G is strong
LOW	Low 3G Signal	Green	**Steady ON:** The signal strength of 3G is weak
	USB	Green	**Steady ON:** If USB device is attached
	Serial Port	Green	**Steady ON:** If serial device is attached

*If both power source 1 and 2 are connected, the device will choose power source 1 first. The LED of power source 2 will remain OFF at this condition.

Installing the PLC Box and Data Logger

Step 1: Install the PLC Box.

Connect DC power to the PLC Box through 12V/1A AC adaptor. Connect the AC wiring (PLC Signal) from the PLC Box to the AC Trunk Cable or the AC Junction Box. The PLC Box will need to be placed in and secured to the AC Junction Box. The wires in the AC trunk cable are identified by color.

CAUTION
Disconnect the PV circuit from any grid power before installing the PLC box to the AC trunk cable or AC junction box.

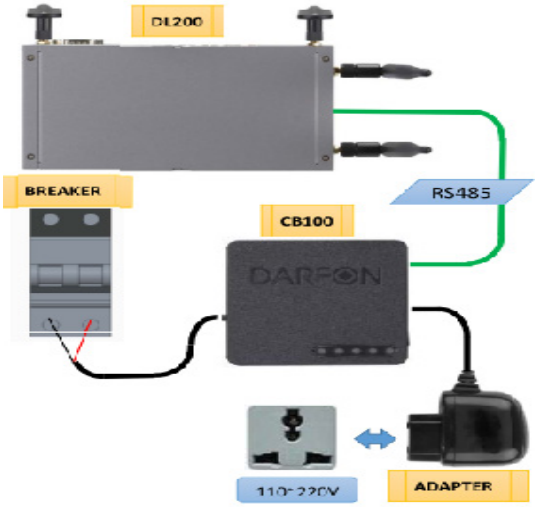
Step 2: Connect the Data Logger to the Router

Place the data logger near the router, then make a direct Ethernet connection. If the data logger cannot be placed near the router, then the installer can add either a wireless access port or a power line communication port (not supplied with the micro inverter).
Note: To mount the data logger, use the included wall-mount frame.

Step 3: Connect the Data Logger to the PLC Box

Insert the red/black wiring into the RS485 connectors, and then insert the connectors into the Data Logger and PLC Box. (Ensure there is length of the red/black wiring is sufficient for installation)

Note: Ensure the RS485 connectors are wired properly.
Data Logger RS485 D + → PLC Box RS485 D +
Data Logger RS485 D – → PLC Box RS485 D –



Note: If installing more than one PLC Box in the system, daisy-chain the PLC Boxes together using RS485 cables. Then connect the last PLC Box in the series to the Data Logger using the RS485 cable.

Step 4: Connect Power

Plug in the Data Logger into the AC outlet. (Be sure the adapter is connected to the Data Logger before it is plugged into to the outlet.)

Registering the PV System

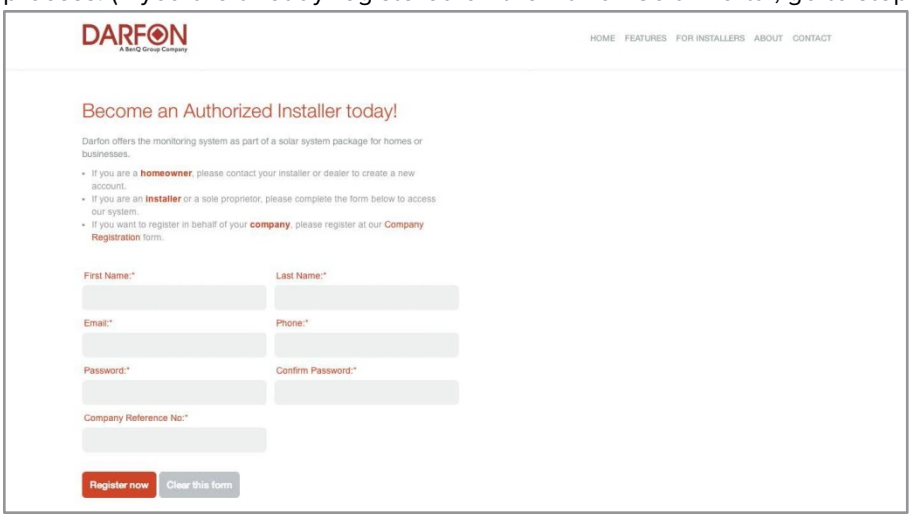
Step 1: Before Registering

Before registering the PV system, you will need the following information:

- Data logger serial number
- Installation map with microinverter location and serial numbers

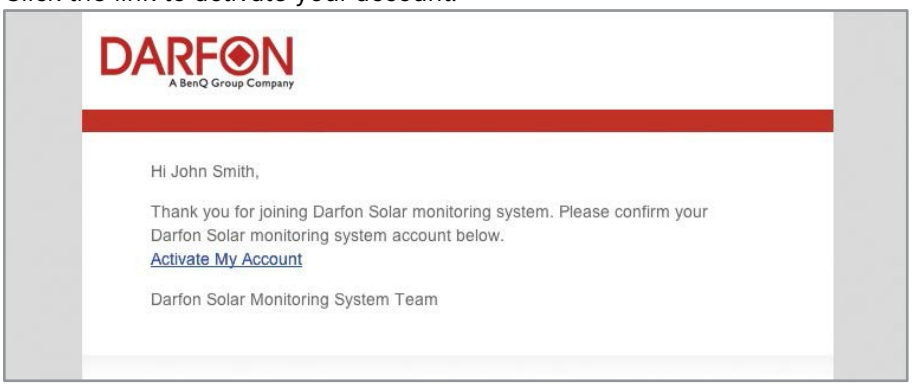
Step 2: Installer Registration

In your web browser, go to http://portal.darfonsolar.com/register/ and complete the registration process. (If you are already registered on the Darfon Solar Portal, go to step 4.)



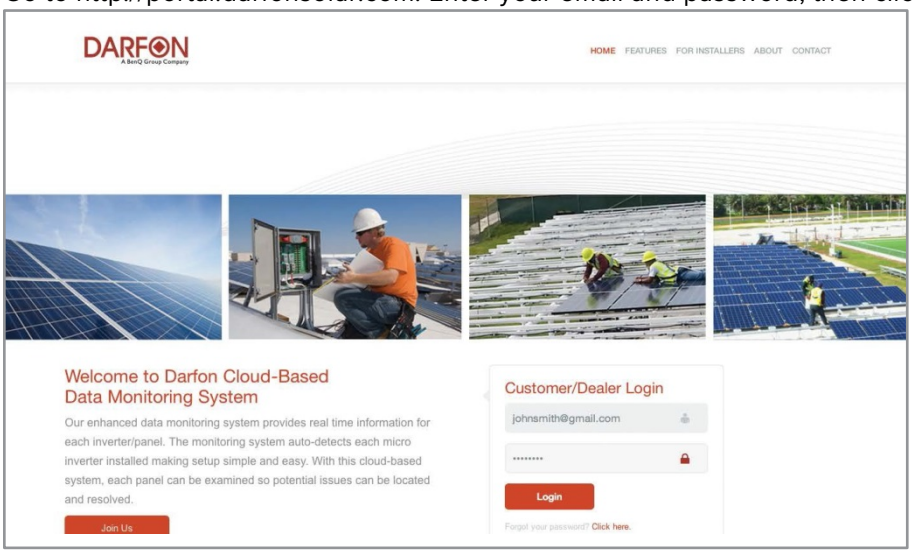
Step 3: Account Activation

After completing registration, a confirmation email with an activation link will be emailed to you. Click the link to activate your account.



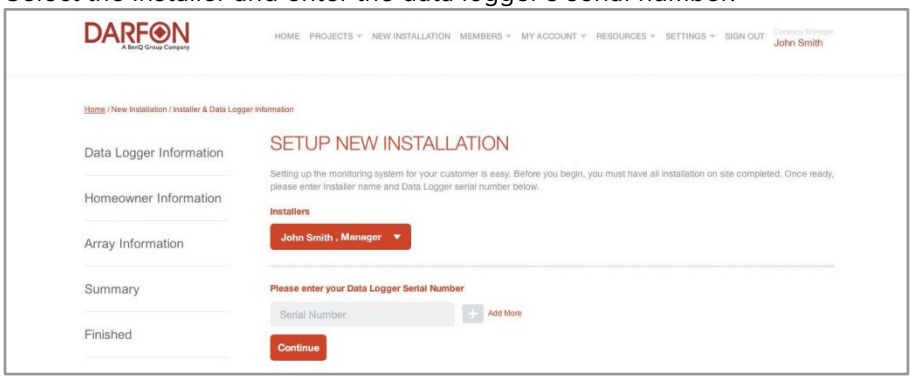
Step 4: Log into the Darfon Solar Portal

Go to http://portal.darfonsolar.com. Enter your email and password, then click “Login”.



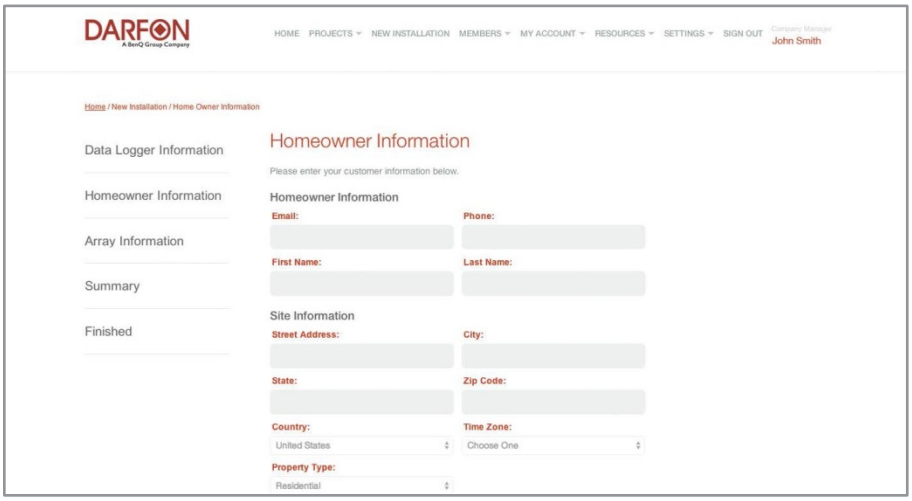
Step 5: Click “New Installation”

Select the installer and enter the data logger’s serial number.



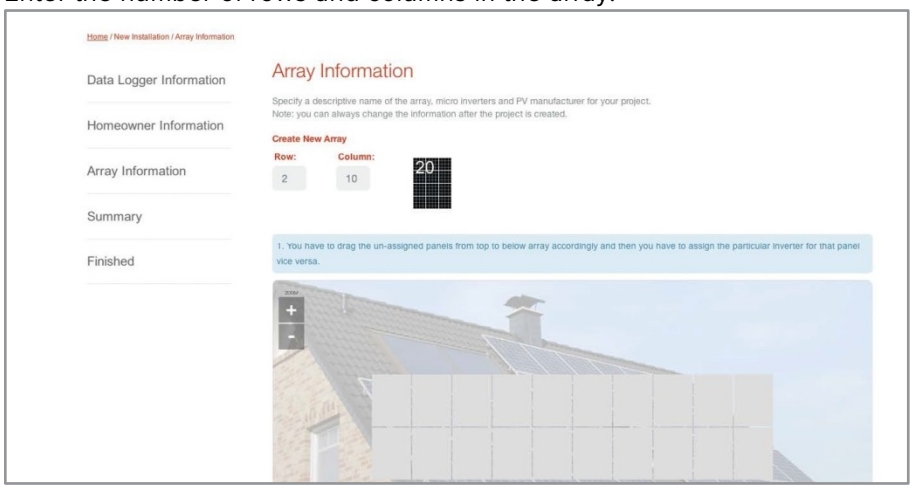
Step 6: Enter the homeowner and site information

Be sure to select the correct time zone for the site and then click “Save & Continue”.

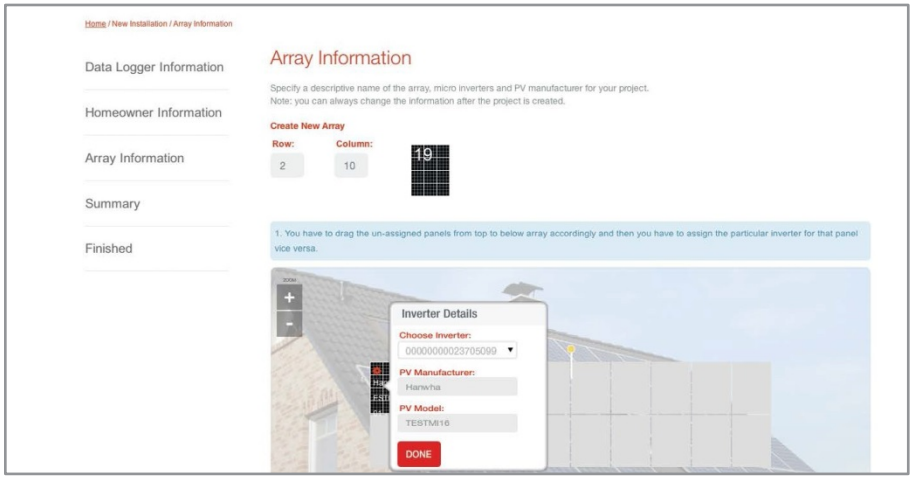


Step 7: Create an Array

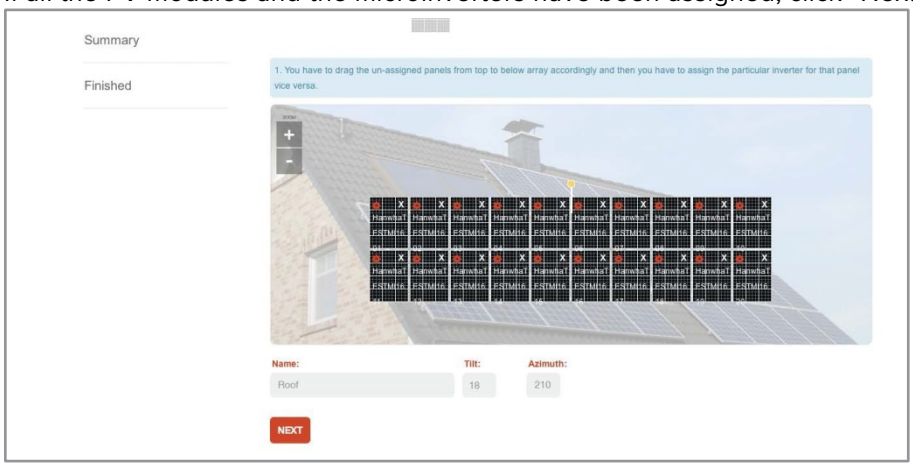
7.1 Enter the number of rows and columns in the array.



7.2 Drag and drop each PV modules onto the array. For each module, select/assign the microinverter serial number, enter the module manufacturer and model, then click “Done”.

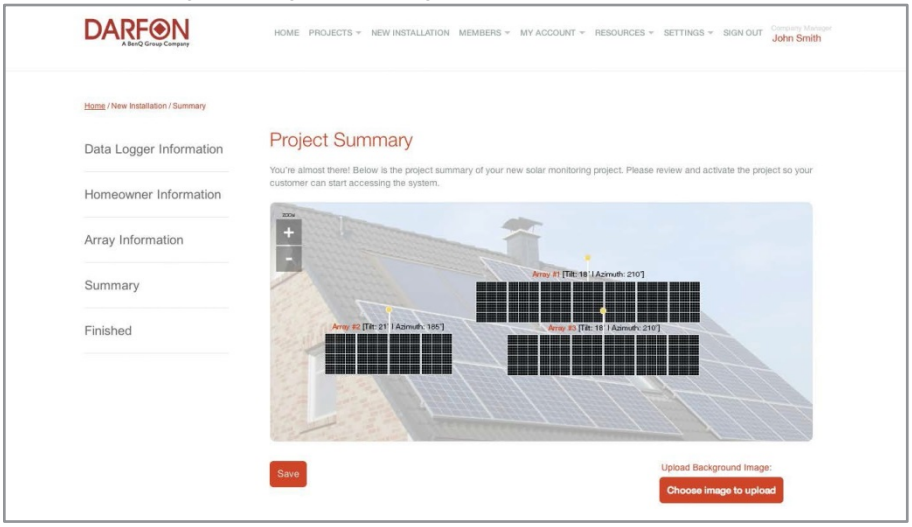


7.3 Enter in a name for the array, the tilt and the azimuth.
If you have more than one array, click “+Add More Arrays” and repeat the process.
If all the PV modules and the microinverters have been assigned, click “Next”.



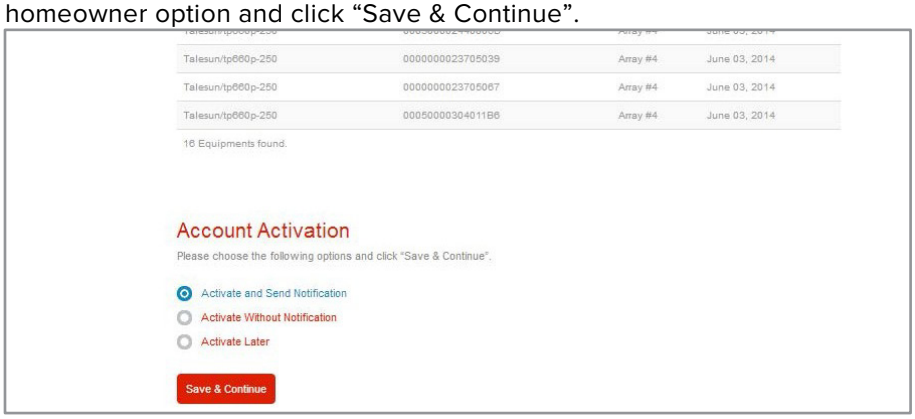
Step 8: Arrange the Arrays

Arrange the arrays to match the layout of the PV system and click the “Save” button.
Note: Uploading a background image is not required.



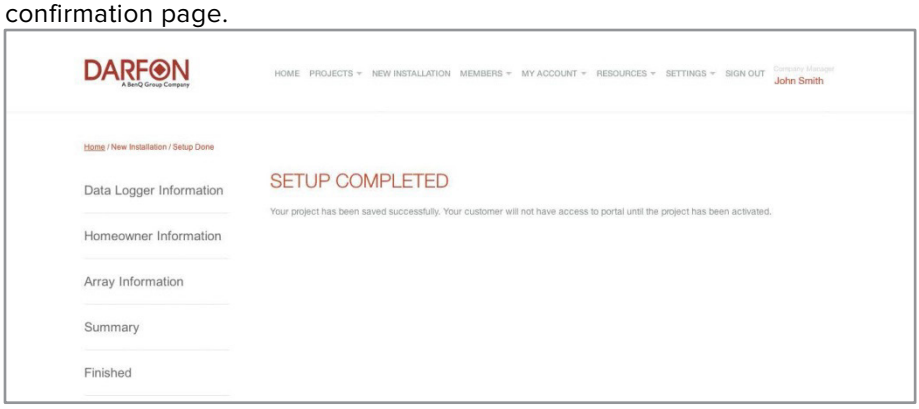
Step 9: Account Activation

Scroll down to the Account Activation section. Select the Send Activation Notification to homeowner option and click “Save & Continue”.



Step 10: Completion Confirmation

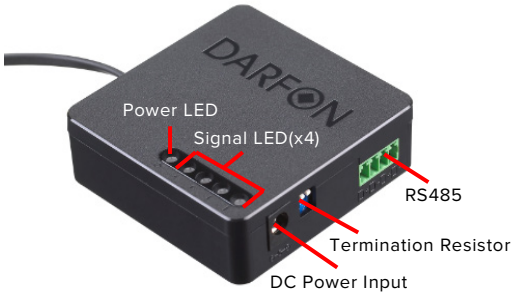
The PV System registration has been completed and your screen should display the following confirmation page.



TROUBLESHOOTING

Troubleshooting the PLC Box

If the monitoring system is not operating correctly, use the steps below to troubleshoot the problem. If the issue cannot be resolved using these steps, please contact inverter maker's technical services.



	LED STATUS		DESCRIPTION
Power LED		No Light	No Input Power
		Solid Green	Operating
Signal LED		No Light	No Signal from Microinverters
		One Solid Green	Weak Signal from Microinverters
		Four Solid Green	Strong Signal from Microinverters

If the Power LED status shows no light:
- Verify the Power Adaptor is securely connected to the PLC Box
- Verify the AC source connected to Power Adaptor is turned on

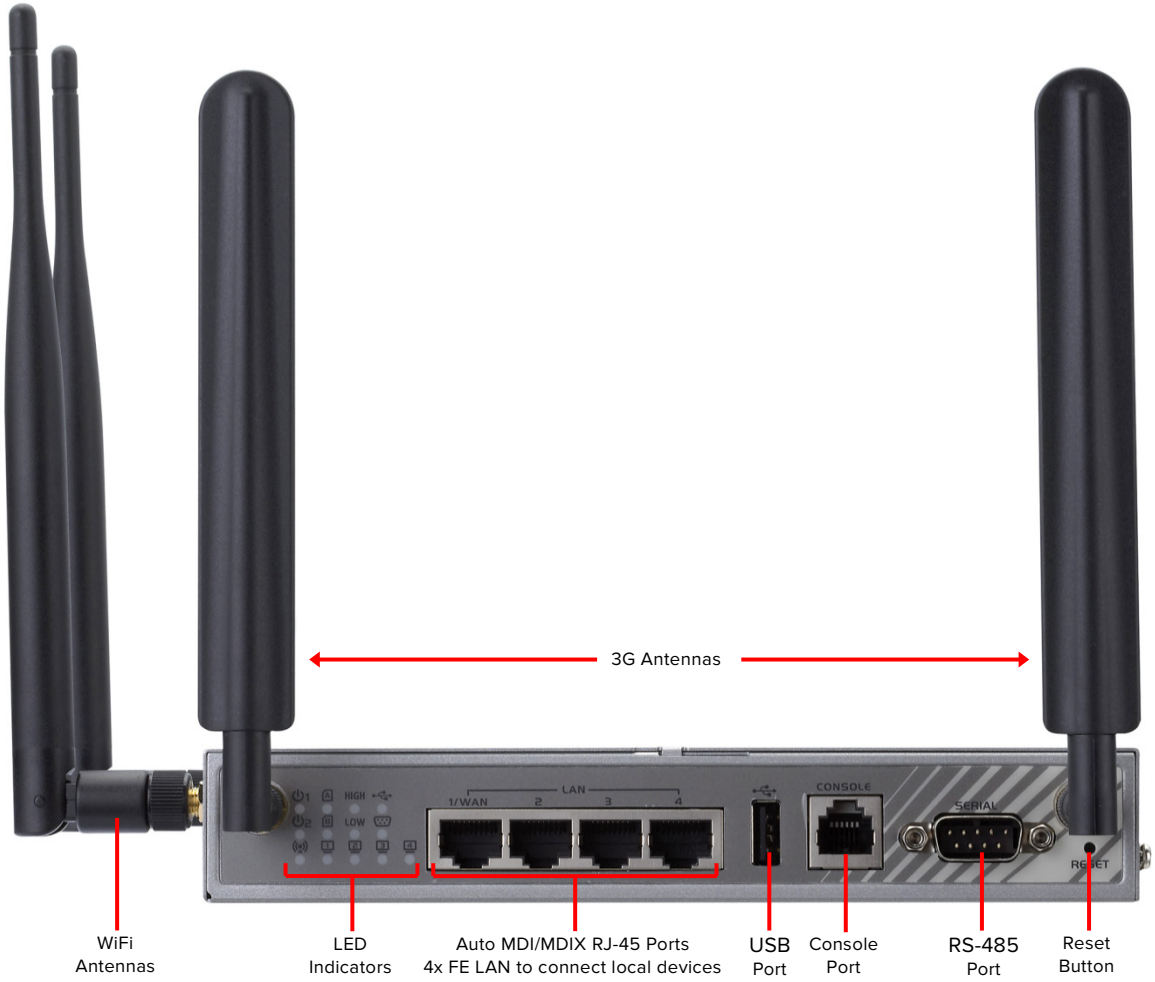
If the RS485 LED status shows no light:
- Check the RS485/CAT5 connection between the PLC Box and Data Logger
- Verify the Data Logger has power
-

If the Signal Strength LEDs status shows no lights or only one solid green LED:
- Check the connections and cable distances between the PLC Box and micro inverters
- Place the PLC Box as close to the micro inverters as possible. Maximum cable distance is 164ft (50m)

If the Signal Strength LEDs status shows 3 or 4 solid green lights, but there is no communication:
- Turn the PLC Box termination resistor on

Troubleshooting the Data Logger

If the monitoring system is not operating correctly, use the steps below to troubleshoot the problem. If the issue cannot be resolved using these steps, please contact inverter maker's technical services.



Power LED did not turn on:

- Verify that the Power adapter is connected to the Data Logger and the AC outlet.
- Verify that there is power in the AC outlet.

Serial Port LED did not turn on:

- Check the RS485 connection between the Data Logger and the PLC Box.
- Verify the PLC Box has power.

WLAN LED did not turn on:

- Check the WLAN connection between the Data Logger and the router (Internet).
- Verify the router has power.

TECHNICAL SPECIFICATIONS

PLC Box

COMMUNICATION	
Serial Port	DB9 RS485 for Data Logger[1]
Number of Devices	Up to 24 Microinverters
Transmission Distance[2]	Up to 164ft (50m)
MEMORY	
Internal Memory	Flash ROM 16kb
MECHNICAL DATA	
Operating Temperature	-10 to 50°C (14 to 122°F)
Dimensions (WxHxD)	70 x 70 x 20mm
Weight	57.1g (2oz), Adaptor 65.3g (2.3oz)
Protection Rating	IP20 (Indoor Use Only)
Compliance	UL60950-1, FCC Part 15 Class B
POWER	
Power Consumption	7.2W (Maximum)
Power Supply Input	12VDC, 600mA

[1] The maximum distance between the Data Logger and PLC Box is 1312ft (400m).
[2] The distance from the PLC Box to the microinverter at the farthest end of the AC branch.
[3] Supported cellular band is dependent upon regional hardware version.
[4] 3G and Wi-Fi performance will be degraded if device's ambient temperature is above 55°C.

Data Logger

DEVICE INTERFACE	
Uplink	Embedded 3G (Dual SIM), RJ45 FE
LAN	4x RJ45 FE, 11n 2T2R (WiFi)
Serial Port	DB9 RS485 (Up to 3 PLC Boxes)
Management Port	RJ12 RS232 (Console)
Storage & Log	USB 2.0 (32G Max.)
Cellular Band[3] (EURO)	UMTS(WCDMA): 2100/1900/900 MHz GSM: 1900/1800/850/900 MHz
Cellular Band (US)	UMTS(WCDMA): 2100/1900/850 MHz GSM: 1900/1800/850/900 MHz
Antenna (Detachable)	2x 5dBi (WiFi), 2x 3dBi (3G)
WAN FUNCTIONS	
WAN	Multiple WANs, Failover/Load Balance, Configurable Ethernet/3G
Cellular	2G/3G IPv4/IPv6, IP Pass-through
Ethernet	Dynamic IP, Static IP, PPPoE, PPTP, L2TP
IPv6	Dual Stack, 6-in-4, 6-to-4
BASIC FUNCTIONS	
Ethernet	LAN IP, Subnet Mask
WiFi System	802.11n 2T2R MIMO 300Mbps (2.4GHz)
WiFi Operation	AP Router
Modes	Multi-SSID, WPS, WMM
WiFi Security	WEP, WPA,WPA2, WPA-PSK, WPA2-PSK, 802.1x
VLAN	Port-based, Tag-based
NAT	ALG, Special AP, DMZ Host, Virtual Server/ Computer, PPTP/L2TP/IPSec Pass-Through
Routing	Static, Dynamic: RIP1/RIP2, OSPF, BGP
MECHNICAL DATA	
Operating Temp.[4]	-10 to 50°C (14 to 122°F)
Dimensions (WxHxD)	7.4 x 4.3 x 1.2 in (187 x 110 x 31mm)
Weight	1.5 lbs (0.67kg)
Protection Rating	IP20 (Indoor Use Only)
Compliance	UL60950-1, FCC Part 15B, Part 15C
POWER	
Power Supply Input	Dual 12VDC, 2A Max.

NOTES

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