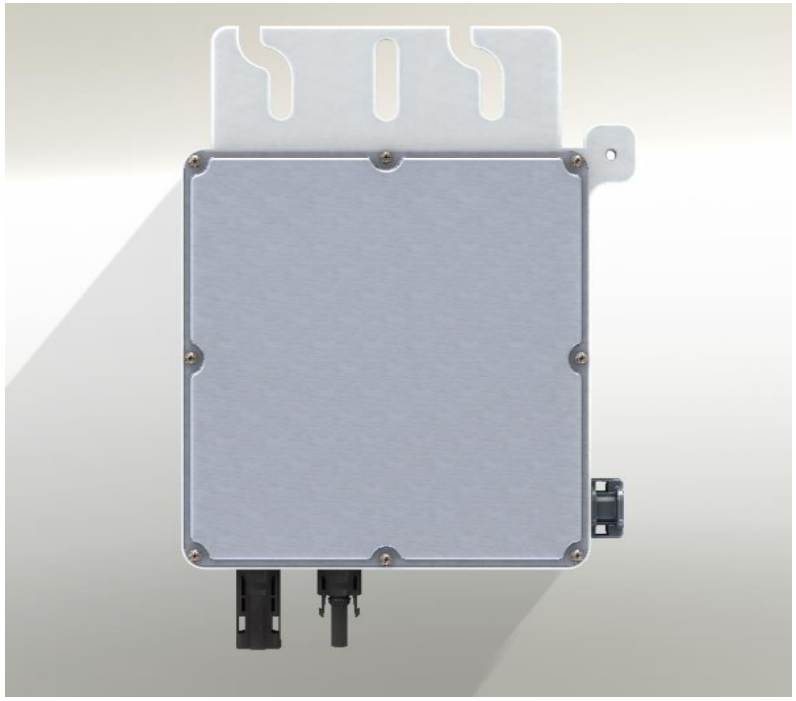
G320 MICRO INVERTER



USER MANUAL

DARFON

TABLE OF CONTENTS

IMPORTANT SAFETY INSTRUCTIONS

Safety Instructions

PLEASE READ THESE INSTRUCTIONS BEFORE INSTALLING ANY PRODUCTS OR DEVICES & KEEP FOR FUTURE REFERENCE.

This manual contains important instructions for the installation and maintenance of G320 micro inverters. 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.
- 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 and wiring of this product.
- Be aware that even without an external voltage source connected, the micro inverter may contain high voltages and there is a risk of electrical shock.
- Connect the micro inverter to the utility grid only after receiving prior approval from the electrical utility company.
- The temperature of the heat sinks outside of the device can reach over 85˚C in normal operation. To reduce risk of burns, use caution when working with micro inverters.
- Do not disconnect the DC power source from the micro inverter without first disconnecting the AC power source. Both AC and DC power sources must be disconnected before servicing. Be aware that DC power/voltage is generated when the photovoltaic array is exposed to light.
- 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.
- The micro inverters should be installed as instructed in this manual. 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.
- When a GFDI fault (Ground fault) occurs, the LED will flash alternating between orange and red. Please refer to the POST-INSTALLATION section for more introductions.

Surge Suppression

Lightning does not actually need to strike the equipment or building where the PV system is installed to cause damage. Often, a strike nearby will induce voltage spikes in the electrical grid that can damage equipment. Artificial spikes such as those induced by electric motors starting up can also cause damages to the equipment.

The micro inverters have integral surge protection built-in; however, if the surge has sufficient energy, the built-in protection in the device would be exceeded and the device could potentially be damaged. Therefore, external surge protection MUST be installed as part of any solar installation.

WARNING When installing a surge protection device (SPD), one MUST follow the original manufacturer's instructions on how to install the SPD properly. Incorrect installation of the SPD may still cause damages to the micro inverters. If the installation site is known for unstable or heavy surges, then it is the responsibility of the installer to make sure the SPD chosen can adequately protect the micro inverters.

The following SPD specification is the minimum protection level that is required

to adequately protect the micro inverter from surges that may be encountered in ordinary 220-240V single phase residential environment.

PARAMETERS	SYM	SPEC
Nominal discharge current (IEC/UL) 15 impulses x 8/20 μs	I_n	30 kA / 20 kA
Maximum discharge current 1 impulse x 8/20 μs	I_{max}	70 kA
Short-circuit current rating	S_{ccr}	100 kA
Protection level at In	U_p-I_n	1.4 kV
Protection level at 10 kA		1.0 kV
Voltage protection rating	V_{pr}	1,000 V
Operating current	I_c	< 1 mA
Follow current	I_f	none
IEC 61643-11: International compliance		Low Voltage SPD - Class II Test
UL 1449 3rd Edition: USA compliance		Type 4, for use in Type 2 Locations

Surge protection devices with protection levels higher than the specification shown above can be used if necessary. Please consult your local electrician or surge protection expert on appropriate surge protection for your property.

For convenience, the following SPDs, which have been tested to ensure that they do not interfere with power line communications, may be used.

Citel DS70R series (DS72RS-120 or DS73RS-120)
http://www.citel.us/datasheets/ac_power/CITEL_DS70R_DataSheet.pdf
(NOTE: use DS72RS-120 when N and G are bound together, or DS73RS-120 where N and G are not bound together).

JDA D1-80/xxx-VG-R series
http://www.jdauspice.com/uploads/2011-01/10/SPD_catalogue.pdf

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.

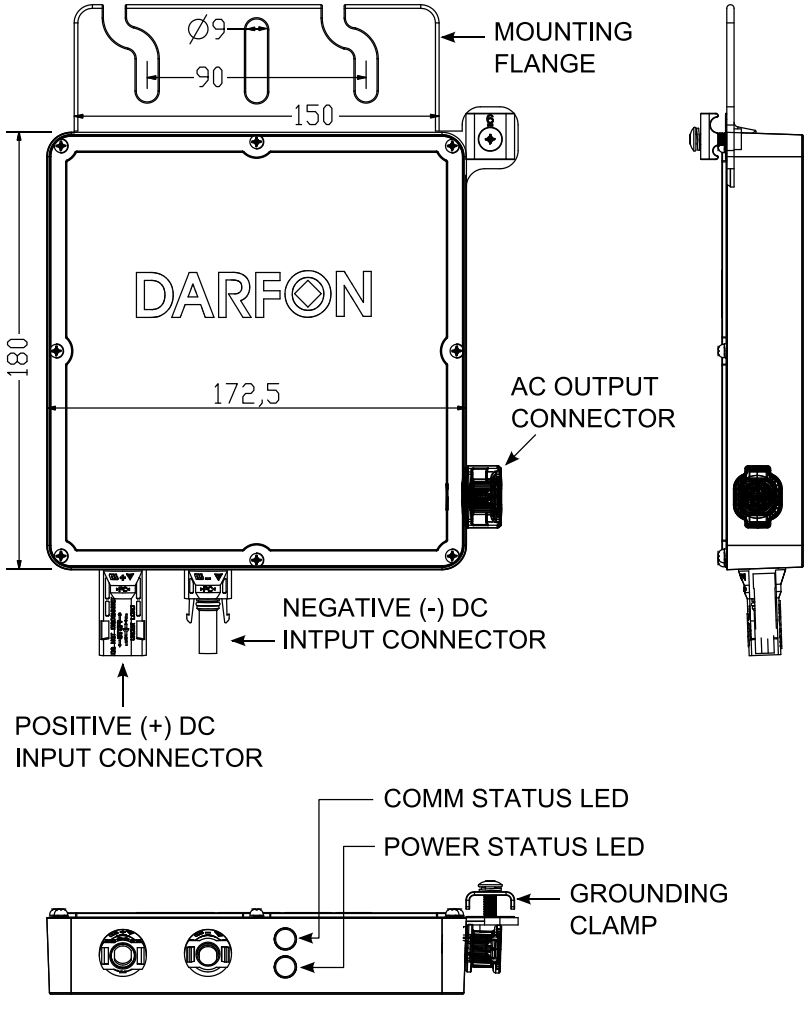
Other Information

Product information is subject to change without notice. All trademarks are recognized as the property of their respective owners.

PRE-INSTALLATION

Thank you for choosing G320 micro inverter as a key component to your solar power system. Review and follow the instructions in this section before installing G320 micro inverters.

The Micro Inverter



PV System Layout

The optimal PV array layout will need to be planned before installation. The layout/plan will affect the wiring and cabling schemes and will need to be adjusted accordingly. The layout will also need to account for the constraints of the distance between each PV module due to the connectors on the trunk cable and the distance between the micro inverters and PLC box.

- The maximum cable distance from the PLC box to the farthest G320 is 50 meters (164 feet).
- It is ideal to tap power from the center of the circuit, so 2 segments of 9 and 10 modules (total 19) for each circuit. This maximizes the communication signal strength to the PLC box.
- The use of a RS485 specific cable is recommended, such as Belden 3105A; however, any twisted pair cable can be used, such as CAT5, with some degradation of signal and distance.

Parts and Tools

This section provides a list of equipment and tools needed for installing and setting up the PV system. Please refer to the Equipment and Parts section for components associated with the micro inverter.

Equipment for Micro Inverter Installation

- Sealing caps (for unused T-branch connectors)
- AC trunk cable (with T-branch connectors)
- AC connector removal tool
- End Caps (used at the end of each AC branch circuit)

Equipment for Monitoring System Installation

- Data Logger (Includes AC Adapter, RS485 Connector, Wall-Mounted Frame and Ethernet Cable)
- PLC Box (Includes RS485 Connector)
- Red/Black Wiring for RS485

Other Tools/Equipment

- Outdoor-rated AC junction box(es)
- Cable clips and/or tie wraps
- Gland/strain relief fittings (on per AC junction box)

- Torque wrench & sockets for mounting hardware
- Adjustable/open-ended wrench (for end caps)

Compatibility and Capacity

G320 micro inverters are electrically compatible with PV modules that have a voltage range of 24V to 60V and a maximum wattage of 350W although 320 watts is considered optimal. Please refer to the 'Compatible PV Module Calculator' on the website at www.darfonsolar.com to verify the PV module is electrically compatible.

Before ordering the PV module, make sure the connector type is compatible with the micro inverter.

Electrical Compatibility

Model	PV MPPT Voltage Range	PV Module Connector Type
G320	24V to 45V	MC4 Locking [Male-Anode (+), Female-Cathode (-)]

Voltage and Capacity

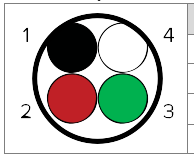
AC Trunk Cable	Overcurrent Protection	240V (Single Phase)
10AWG	30Amp Breaker	19 MI
12AWG	20Amp Breaker	12 MI

WARNING
DO NOT exceed the maximum number of micro inverters in an AC branch circuit as listed above.

CAUTION
Each AC branch circuit must be protected by a dedicated circuit breaker of 30A or less if using 10 AWG trunk cable, or 20A or less if using 12 AWG trunk cable.

AC Trunk Cable

There are different types and options for AC trunk cables. Depending on the orientation of the installation, the AC trunk cable can be in portrait or landscape format. Trunk cables can also consist of three pins (three wires) or four pins (four wires). Currently the four-pin AC trunk cable is used.

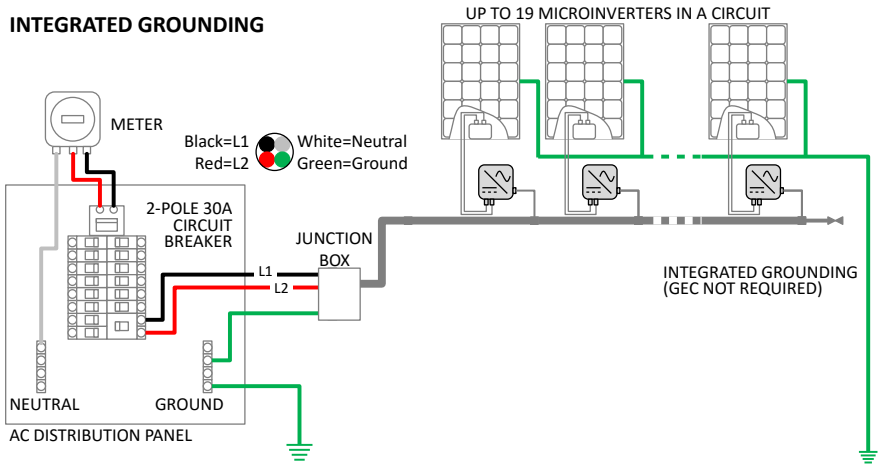


Pin	Wire Color	Wire Usage
1	Black	L1
2	Red	L2
3	Green	Ground
4	White	Neutral

Grounding Options

Option 1: Integrated Grounding

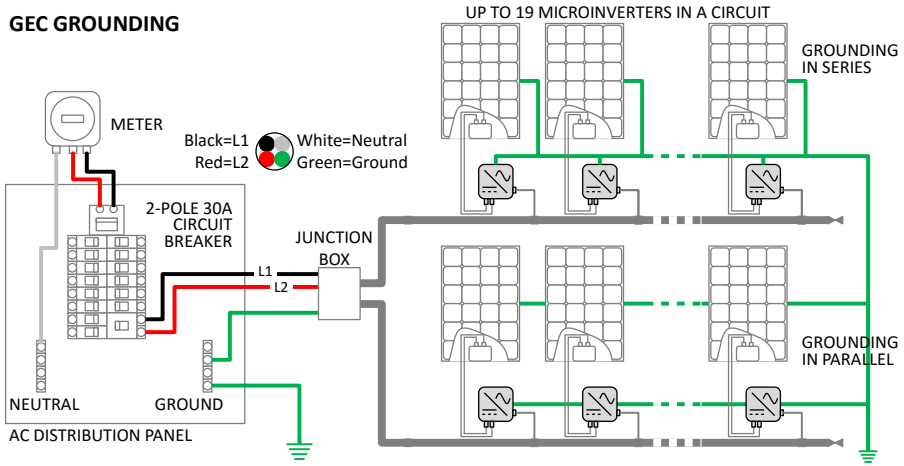
Integrated grounding eliminates the need to install Grounding Electrode Conductor (GEC) to each G320 by completely isolating the internal DC circuit from the AC circuit and ground. DC ground faults are detected on either the positive and/or negative conductors of the DC circuit by a Ground Fault Detection Interrupter Insulation Monitor (GFDI IM). If the GFDI IM detects a ground fault has occurred to the PV input, the micro inverter will automatically disconnect all conductors and cease supplying output power. In accordance with NEC 690.35, installers can build ungrounded arrays where only an Equipment Grounding Conductor (EGC) is required to connect or bond non-current carrying metal equipment together. The EGC grounding process is completed via the grounding connection of G320 4-wire AC cable to the AC trunk cable. The PV module will still need to be grounded according to the module manufacturer's instructions.



Option 2: GEC Grounding

Although the G320 offers integrated grounding (UL 1741 certified), it also comes with a grounding terminal clip for any localities that do not accept integrated grounding. The micro inverter manufacturer will not be held responsible for improper installations that do not have local AHJ and/or Utility operational approval.

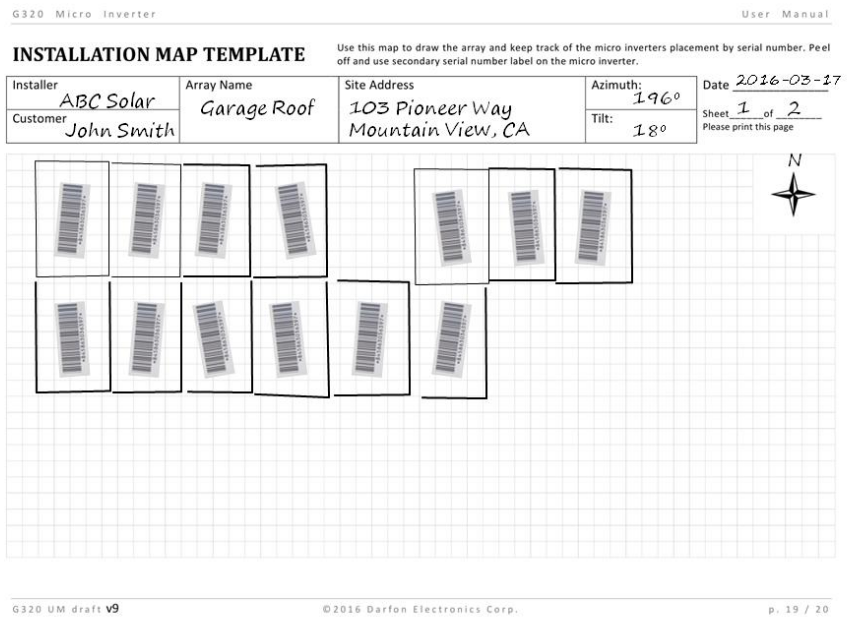
As indicated in the diagram below, the array GEC can be installed either in series or in parallel.



Micro Inverter Layout

Using the installation map template in this manual, draw out the layout of the array and have it readily available during the installation of the micro inverters to record micro inverter location.

Draw the layout of the solar panels in the installation map template like the sample image shown below. When a micro inverter is fastened in its position, then the secondary serial number sticker on the DC side can be peeled off the micro inverter and adhered to the installation map template where the actual position on the roof would correspond to the same panel on the layout drawing.



Note: Tracking micro inverter location by serial number is key for data monitoring and warranty servicing.

Surge Protection

The micro inverters have integral surge protection built-in; however, if the surge has sufficient energy, the built-in protection in the device would be exceeded and the device could potentially be damaged. Therefore, external surge protection MUST be installed as part of any solar installation.

Please refer to the “Surge Suppression” section on pages 2 and 3 on specifications for appropriate surge protection.

INSTALLING THE MICRO INVERTER

The following sections list steps on how to install the G320 micro inverter onto standard PV racking.

Installing onto a PV Racking System

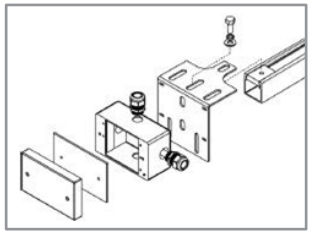
Step 1: Measure the AC Service at the Site

Measure service entrance conductors to confirm AC service at the site. Verify the AC voltages at the electrical utility connection and at the junction box for each AC branch circuit are within the ranges.

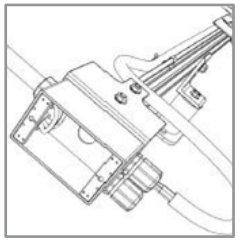
Wire Connection	240V (Single Phase)
L1 to L2	211 to 264VAC
L1 to neutral	106 to 132VAC
L2 to neutral	106 to 132VAC

Step 2: Install the AC Branch Circuit Junction Box

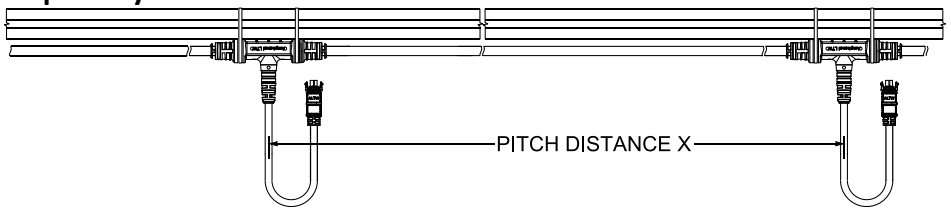
2.1. Mount the adapter plate to a suitable location on the PV racking system (typically at the end of a row of modules). The adapter plate must be installed with an appropriate junction box.



2.2. Connect the open wire end of the AC interconnect cable into the junction box using an appropriate gland or strain relief fitting. The AC interconnect cable requires a strain relief connector with an opening of 3/8 inches in diameter.



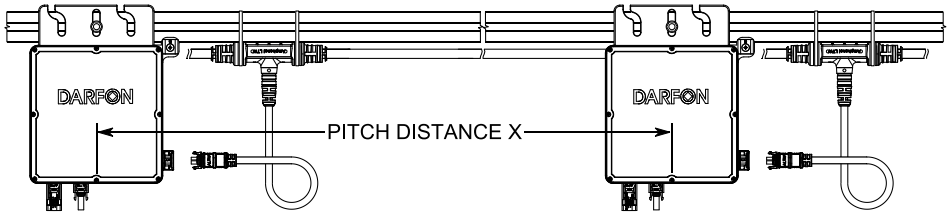
Step 3: Lay Out the AC Trunk Cable



Place the AC trunk cable at the required location. Align the T-branch connector to the position where the micro inverter will be installed. Then secure the cable on either side of the rack using cable clips or tie wraps.
Note the maximum pitch distance is 1050mm when modules are in portrait mode and 1700mm when in landscape mode.

Step 4: Attach the Micro Inverter to the PV Racking

4.1. Note the approximate centers of each PV module on the PV racking.
4.2. Evaluate the location of the micro inverter against potential collection of moisture or water.
4.3. Evaluate the location of the micro inverter with respect to the DC junction box and the PV module frame.
4.4. Align the G320 so that the holes on the mounting bracket are above the slot opening on the PV racking and secure the micro inverter to the PV racking with screws.

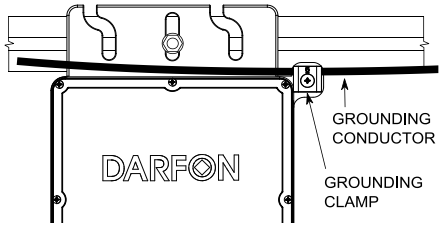


CAUTION Ensure that the inverter does not obstruct the PV module frame or stiffening braces. Ensure the micro inverter's AC connector can easily reach the T-branch connector.

Step 5: Ground the Micro Inverters

[Option 1]: Integrated Grounding. Go to step 6. No additional grounding is needed.

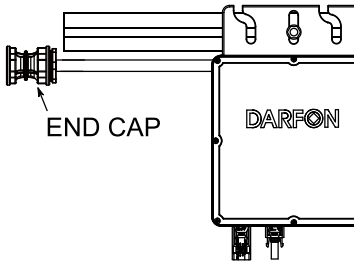
[Option 2]: GEC Grounding. Unscrew the top of grounding clips on the micro inverters. Run the grounding electrode conductor to each grounding clip on the micro inverter and then to the junction box. After laying out the grounding conductor, secure the top of the grounding clips back onto the micro inverters.

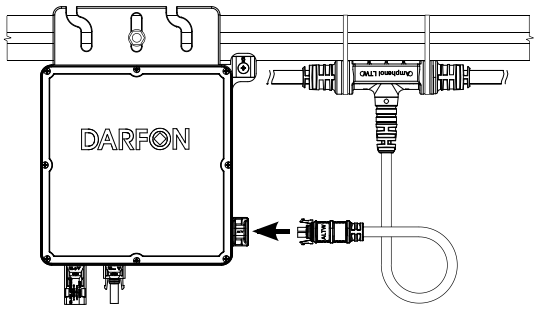


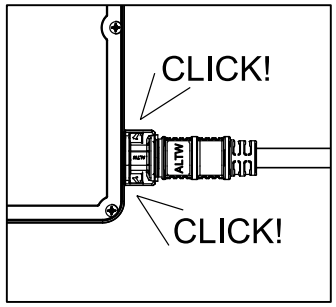
WARNING
Correct AC grounding and short circuit protection must be provided to ensure operational safety.

Step 6: Connect the Micro Inverters

6.1. Remove the temporary shipping cap from the t-branch on the AC trunk cable and connect the micro inverter. Ensure the connection is secure and locked into place by listening to "click" sounds when both lock pins are fully inserted.



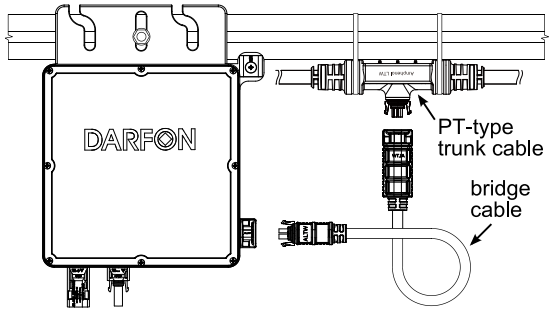




WARNING
Correct AC grounding and short circuit protection must be provided to ensure operational safety.

6.2. Repeat for all micro inverters in the AC branch circuit.

6.3. For any unused connectors on the AC trunk cable, replace the temporary shipping cap with a Sealing Cap. Listen for a click as the Sealing Cap is connected to ensure that it is securely locked into place.



Note : For an existing PV system where PT-type trunk cables are already in place, then a bridge cable needs to be used to connect the micro inverter to the trunk cable. Please check which type of the trunk cable you have before ordering micro inverters.

Step 7: Terminate the Unused End of the AC Trunk Cable

7.1. Strip 10mm (about 0.5in) of the outer sheath from the end of the AC trunk cable.

7.2. Each end cap has four parts: the sealing nut, clamp ring, seal and cap. Slide the sealing nut, clamp ring and then the seal onto the AC trunk cable.

7.3. Insert the individual wires into the slots inside the cap of the end cap.

7.4. Screw the hex nut onto the cap. Use a wrench to ensure the hex nut is screwed in all the way to the base of the cap.

WARNING Ensure the AC trunk cable and end cap do not touch the roof by using cable clips or tie wraps to attach the trunk cable to the PV racking. Ensure that all cabling is located underneath the PV module.

Step 8: Connect the AC Junction Box

Connect the AC trunk cable to the AC junction box using the appropriate gland or strain relief fitting. The AC trunk cable requires a strain relief connector with an opening of 1.6 cm (0.6 in) in diameter.

The wires in the AC trunk cable are identified by color: L1 is sheathed in Black, L2 is sheathed in Red, Neutral is sheathed in White and Ground is sheathed in Green. Note the Neutral/White wire is unused.

WARNING
Although the AC trunk cable includes a grounding wire, the continuous grounding conductor or grounding washers is still required.

Step 9: Connect the PV Modules

Mount the PV modules above the micro inverters, and then connect each micro inverter to a PV module. (The micro inverter and PV module's DC cables have two connectors. Connect the micro inverter positive connector to the PV module negative connector, and vice versa.)

CAUTION
Micro inverters and PV modules are installed using a one to one ratio.

POST-INSTALLATION

WARNING Service/changes to your electrical system should be carried out only by qualified electricians. 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.

Commissioning and Operating

Step1. Turn on the AC disconnect or the circuit breaker for each micro inverter AC branch circuit.
Step2. Turn on the main utility-grid AC circuit breaker. Your system will start producing power after five minutes.
Step3. Register PV system on Darfon Solar Portal. (Monitoring System - Optional). Depending on the strength of the signal, it can take up to 2 hours before the monitoring system detects all the micro inverters in the PV system.

LED	LED Status	Mode	Possible Reason
Power Status LED	Solid Green	Generate	Operating normally
	Flashing Green	Prepare	Initialization, restart
	Flashing Red	Protect	OVP, UVP, OFP, UFP, ISL, OPP
	Solid Red	Danger	GFDI activated
	Off (at daytime)	Fail	Dead or no PV input
COMM Status LED	Solid Blue	Ready	Operating normally
	Flashing Blue	Data	Communicating data
	Off (at daytime)	Fail	Dead or no PV input

GFDI Fault

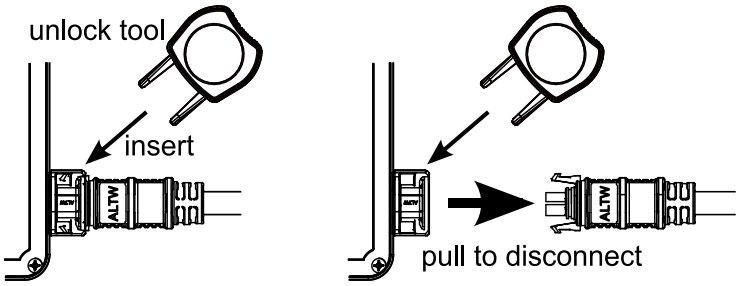
GFDI fault is defined as an unintentional, electrically conducting connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment or earth. When a Ground fault occurs, the GFDI will trigger the LED light to show continuous Red, and the micro inverter will automatically disconnect all conductors as a safety precaution.

If the GFDI has detected a ground fault, please contact with the installer and follow the Operation Manual to clear this condition. Or you can contact Darfon customer support at support@darfon.com.

Disconnecting a Micro Inverter

Disconnect all PV circuits from Distribution Panel before any work is done. **Never** disconnect the micro inverters from PV modules while under load.

Step1. Disconnect the micro inverter from the AC trunk cable. Use an appropriate unlock tool to disconnect the mated connector pair. Do not force open the connector pair in any way without the appropriate unlock tool. Damages to the connectors may occur if wrong tools are used.



Step2. Completely cover the PV module with an opaque cover.

WARNING
Be aware that DC power/voltage is generated when the PV module is exposed to light.

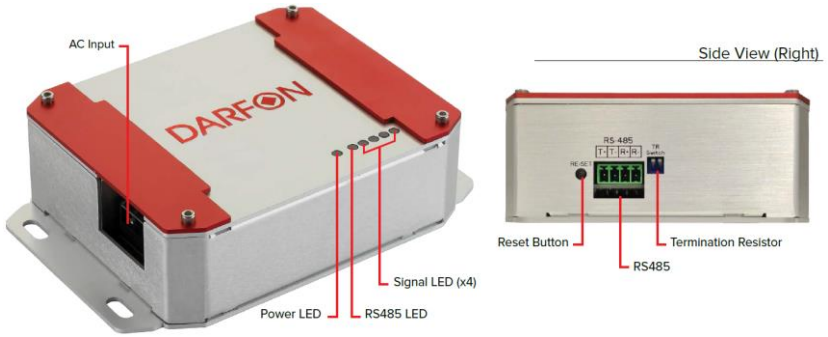
Step3. Using a multi-meter, verify that the DC conductors between the PV module and the micro inverter carries no current.
Step4. Disconnect the PV module from the micro inverter. To disconnect the micro inverter's DC connectors, please use a DC unlock tool.
Step5. If GEC grounding was installed, disconnect the grounding wire or washer from the micro inverter.
Step6. Remove the micro inverter from the PV racking.

WARNING Do not leave the T-branch connector on the AC trunk cable exposed for an extended period of time. If the removed micro inverter will not be replaced with another micro inverter immediately, connect a sealing cap to the T-branch connector.

MONITORING SYSTEM

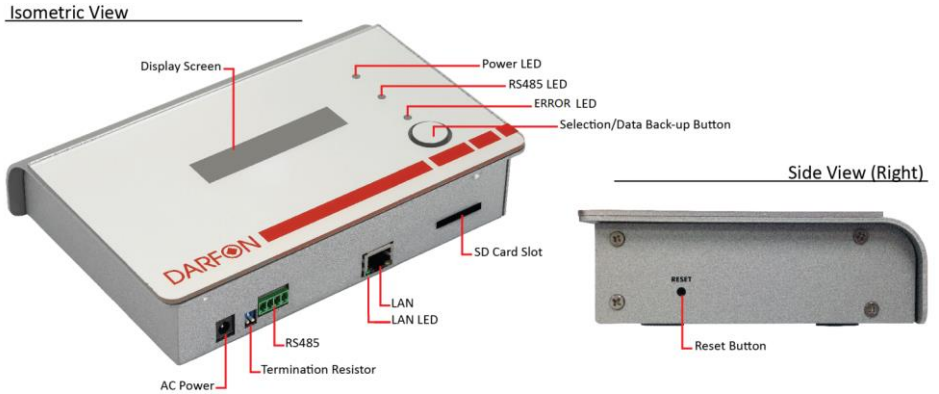
At this stage, the majority of the PV system is already installed: the PV modules and micro inverters. The following section list steps on how to install the monitoring system. Before installing, review and follow all important safety instructions listed in the beginning of this manual.

PLC Box Overview



Feature	Function	LED
AC Input	Connects to the AC cable in the PV system.	
Power LED	The Power LED will be a solid green when on.	● ○○○○○
Reset Button	Press the reset button to restart the PLC Box.	
RS485 Port	Use to connect to the Data Logger.	
RS485 LED	The RS485 LED will continuously flash orange when the Data Logger is connected and communication with the micro inverter is working.	● ● ○○○○
Signal LED	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
AC Power	Plug in the AC adapter to the AC outlet to power the Data Logger. (Input: AC 100-240V 0.48A 47-63Hz, Output: DC+9V 2A or 12V 1A)
Display Screen	Displays messages: Network IP/Subnet Mask/Today Energy/Total Energy/Number of Inverters /Error Message
LAN	Use to connect to the home's router.
LAN LED	Turns a solid orange when connected to the router and flashes green during data transmission.
Error LED	Turns a solid Red, when MI errors happen.
Power LED	Turns a solid green, when power is on.
Reset Button	To reset the data logger, press and hold the button for 5 seconds. The data logger will restart with the default factory settings.
RS485 Port	Use to connect to the PLC Box.
RS485 LED	Flashes orange, when connected to the PLC Box and begin transmitting data from MI.
SD Card Slot	Insert a SD card to store backed up data.
Selection/Data Back-Up Button	Press the button to toggle between messages on the display screen. To back up the data to a SD card, press and hold the button for 5 seconds.
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.

Installing the PLC Box and Data Logger

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

Step 1: Install the PLC Box

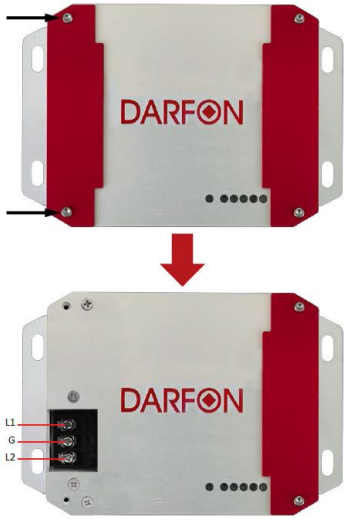
1.1. Remove the left red side cover. (Use a 2.5mm wrench to remove the 2 screws)

1.2. Connect AC power to the PLC Box. Using a screwdriver, connect the L1, L2 and Ground wiring 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:

L1 is sheathed in Black
L2 is sheathed in Red
Ground is sheathed in Green

1.3. Place and secure the left red side cover back onto the PLC 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 powerline 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 T + → PLC Box RS485 T +
Data Logger RS485 T – → PLC Box RS485 T –

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

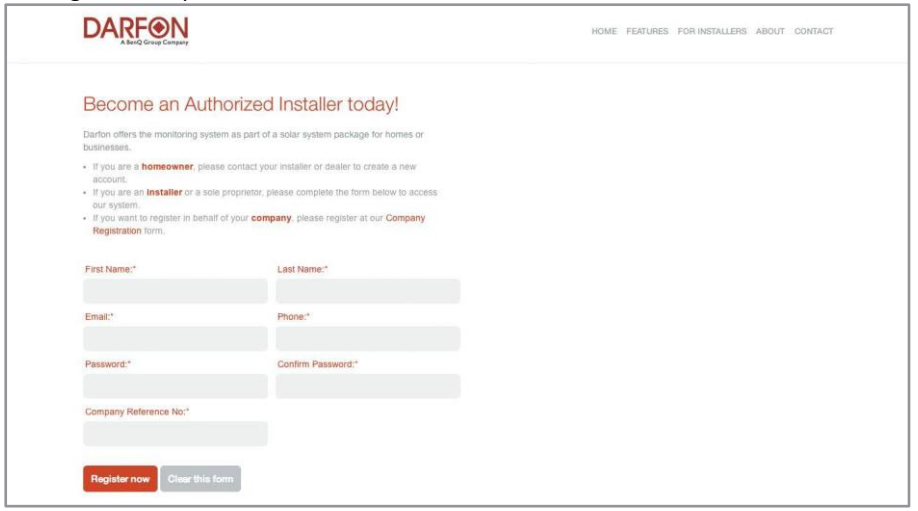
Step 1: Before registering

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

- Data logger serial number
- Installation Map with micro inverter location and serial numbers

Step 2: Installer Registration

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



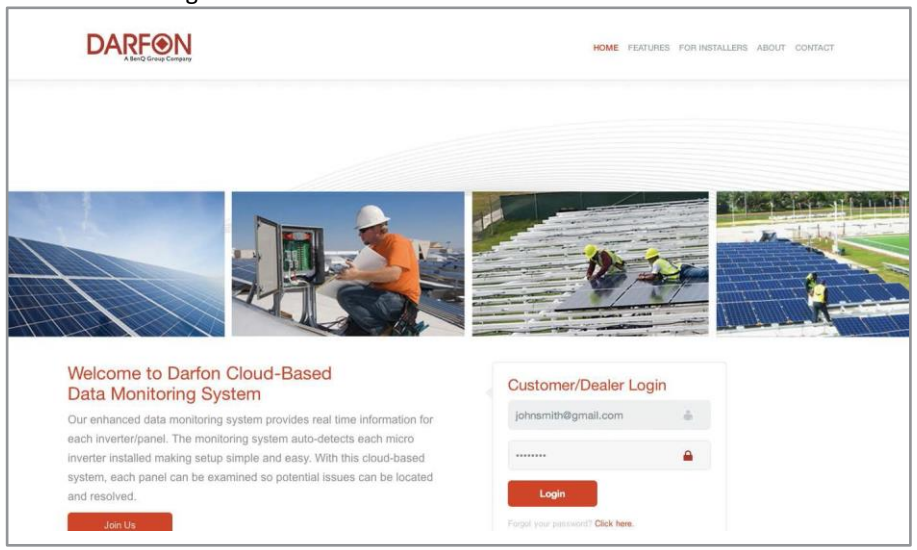
Step 3: Account Activation

After finishing the registration, a confirmation email will be sent to your email with an activation link.

Click the link to activate your account.

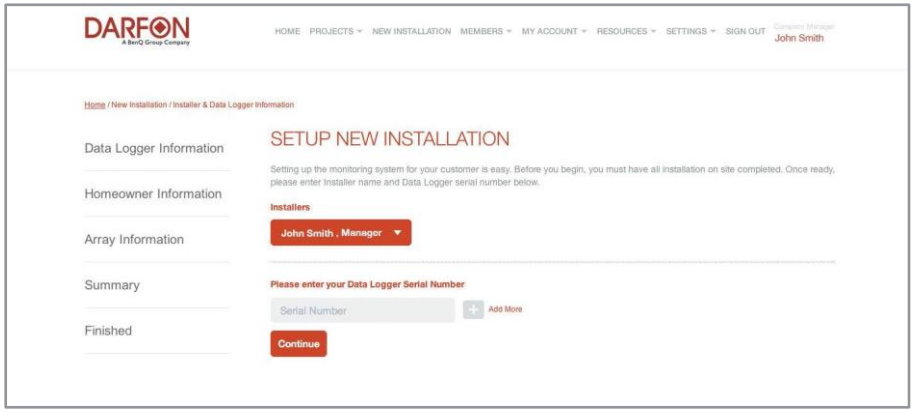
Step 4: Log into the Darfon Solar Portal

Go to http://portal.darfonsolar.com. Enter your email address and password, then click the Login button.



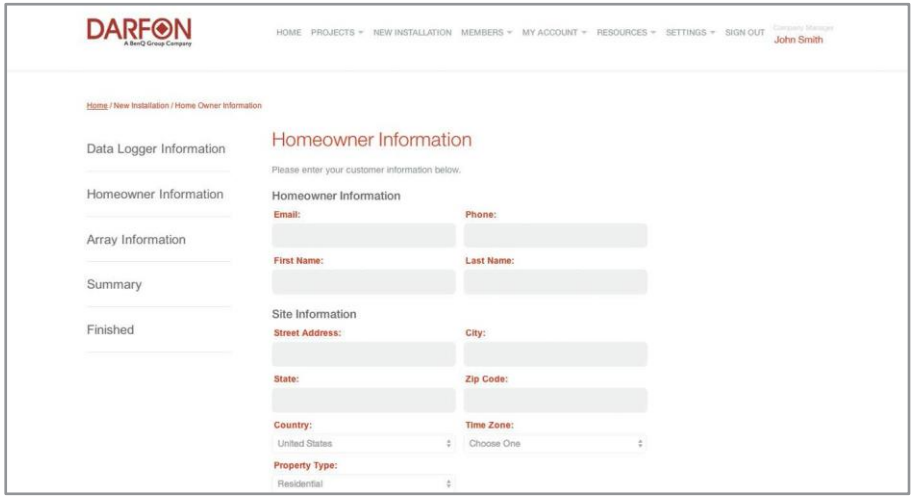
Step 5: Click “New Installation”

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



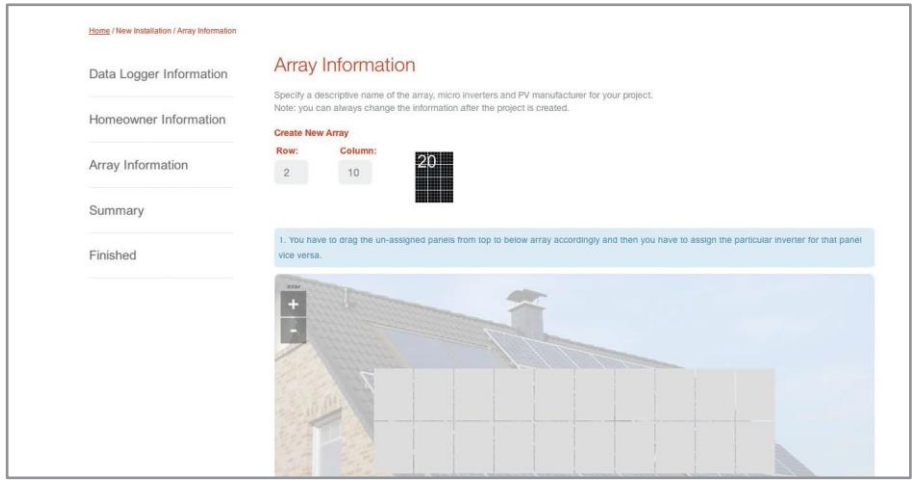
Step 6: Enter the homeowner and site information

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

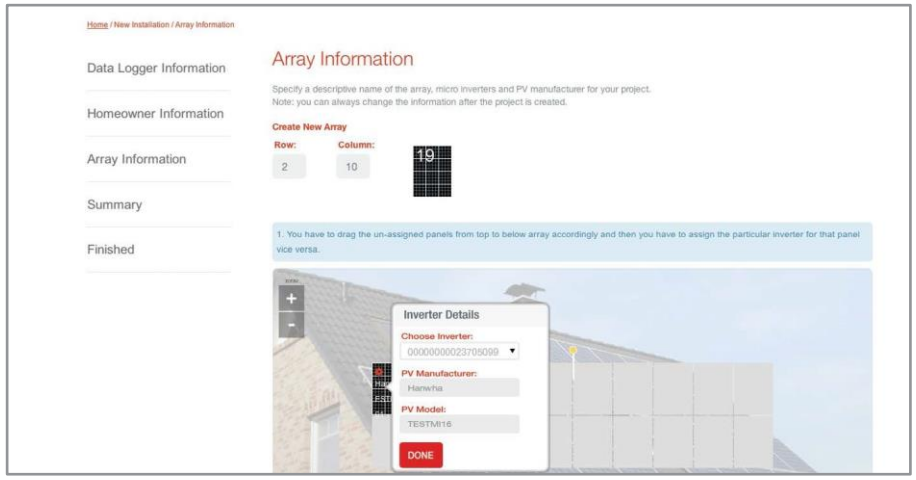


Step 7: Create an Array

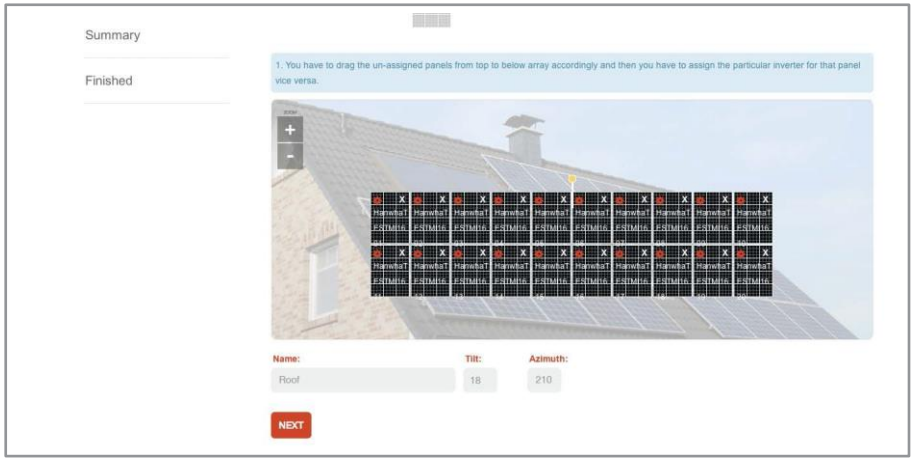
7.1 Enter the number of rows and columns in the array.



7.2 Drag and drop each PV modules onto the array. For each PV module, select/assign the micro inverter serial number, enter the PV Module Manufacturer and Model, and then click Done.

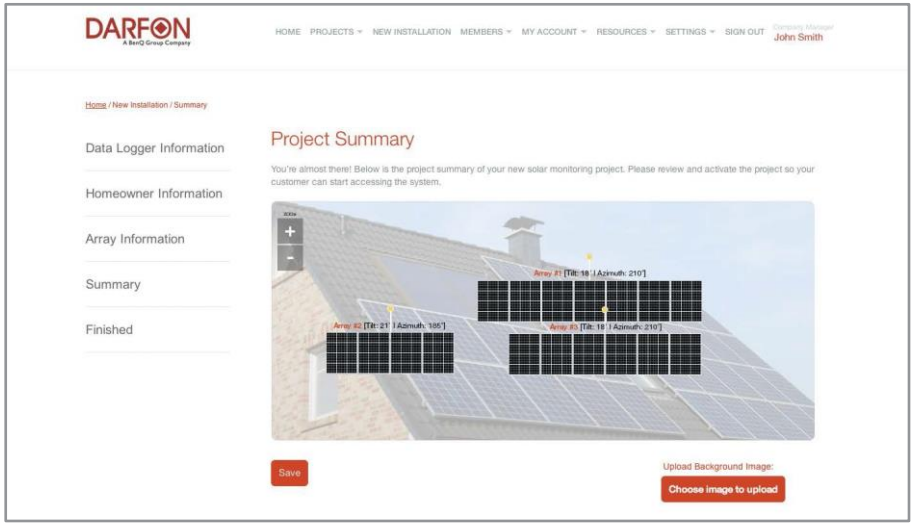


7.3 Enter in a name for the array, the tilt and the azimuth.
If you have more than one array, click the "+Add More Arrays" button and repeat the process.
If all the PV modules and the micro inverters have been assigned, click "Next" button.



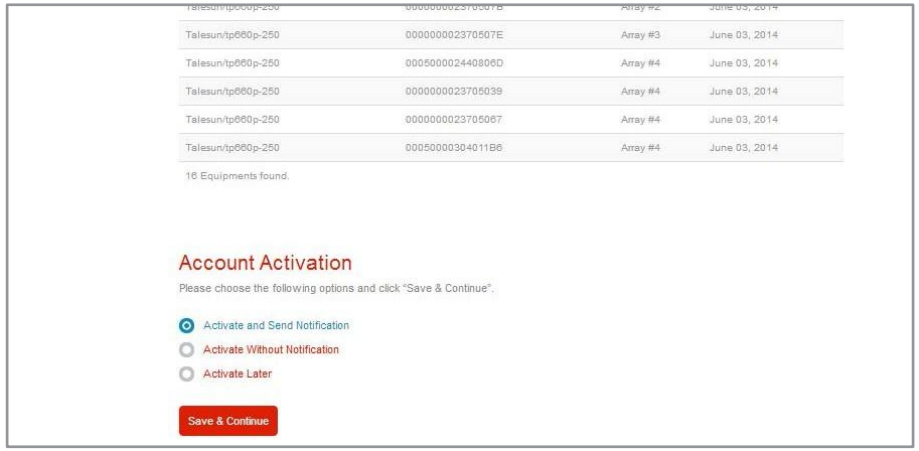
Step 8: Arrange the Arrays

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



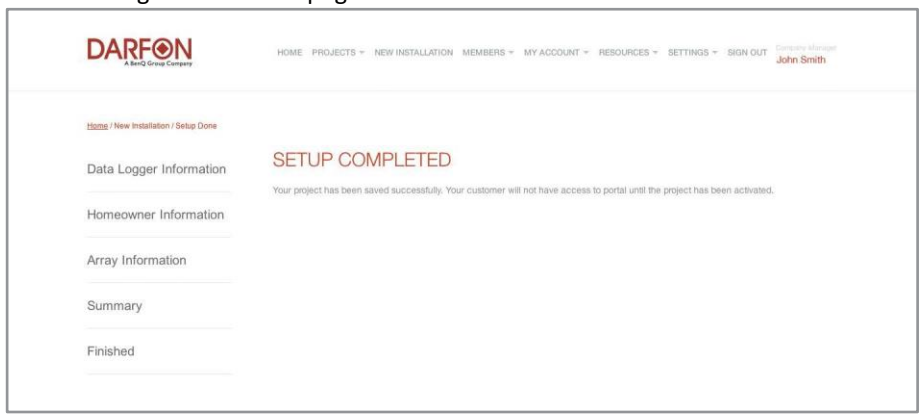
Step 9: Account Activation

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



Step 10: Completion Confirmation

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



TROUBLESHOOTING

Troubleshooting the Micro Inverter

If the PV system is not operating correctly, use the steps in this section to troubleshoot the problem. If the issue cannot be corrected using the steps in this section, please contact an authorized service representative.

Power Status LED Indications

	LED Status	Mode	Possible Reason	Action
●	Solid Green	Generate	Operating normally	No action
≻●≺	Flashing Green	Prepare	Initialization, restart	Wait 5 min after the grid power returns to normal
≻●≺	Flashing Red	Protect	OVP, UVP, OFP, UFP, ISL, OPP, reading memory	Wait 5 min after the grid power returns to normal
●	Solid Red	Danger	GFDI activated	DO NOT touch! Check PV system for current leakage
○	Off (at daytime)	Fail	Dead or no PV input	Check module connection; if connection is ok, then replace MI

COMM Status LED Indications

	LED Status	Mode	Possible Reason	Action
●	Solid Blue	Ready	Operating normally	No action
≻●≺	Flashing Blue	Data	Communicating data	No action
○	Off (at daytime)	Fail	Dead or no PV input	Check module connection; if connection is ok, then replace MI

Depending on the position/location of the installed micro inverter, the use of hand-held mirrors may be needed. If the micro inverter's Power Status LED is off or red, then follow these steps:

Step1. Verify that any upstream AC disconnects, as well as the dedicated circuit breakers for each AC branch circuit, are functioning properly and are closed.

Step2. Verify that the AC voltages at the electrical utility connection and at the junction box for each circuit are within the appropriate range.

Wire Connection	240V (Single Phase)
L1 to L2	211 to 264VAC
L1 to neutral	106 to 132VAC
L2 to neutral	106 to 132VAC

Step3. Verify the PV module DC voltage is within the allowable voltage and wattage range shown in the Technical Specifications section.

Step4. Verify the DC leads are connected correctly between the micro inverter and the PV module.

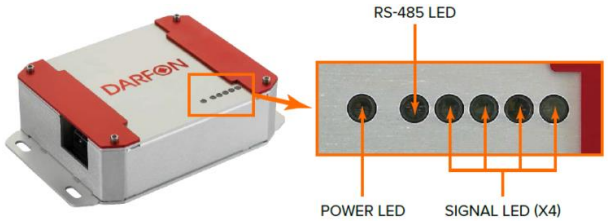
If the micro inverter's COMM Status LED is off, then follow these steps:

Step1. Verify that the Power Status of the micro inverter is functioning properly.
Step2. Verify that the data logger is uploading data to the monitoring software.

If the problem persists, contact the Technical Support at support@darfon.com.

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
RS485 LED	No Light	No Communication with Data Logger
	Flashing Orange	Communication with Data Logger
Signal Strength LED	No Light	No Signal from Micro Inverters
	One Solid Green	Weak Signal from Micro Inverters
	Four Solid Green	Strong Signal from Micro Inverters

If the Power LED status shows no light:
- Verify the AC conductors are securely connected to the PLC Box
- Verify the AC source connected to PLC box 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 and the RS485 LED status is flashing orange, but there is no communication:
- Turn the PLC Box and Data Logger's termination resistor on

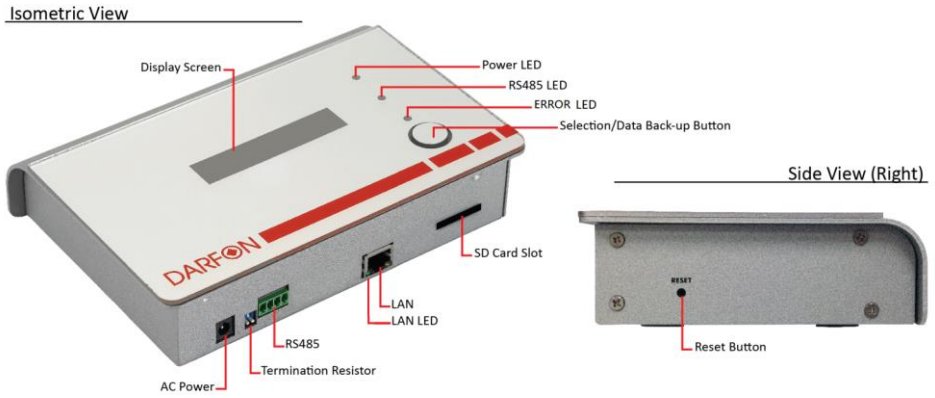
Troubleshooting the Data Logger

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

RS485 LED did not turn on:
- Check the RS485 connection between the Data Logger and the PLC Box.
- Verify the PLC Box has power.

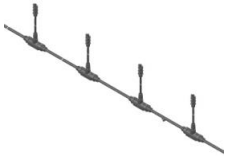
LAN LED did not turn on:
- Check the LAN connection between the Data Logger and the router.
- Verify the router has power.



EQUIPMENT AND PARTS

OPEN-ENDED TRUNK CABLES
- 10 AWG
- 25 or 50 drops
- 1050/1700 mm pitch

PA trunk cable



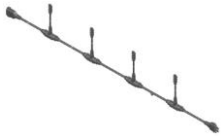
PT trunk cable

BMC TRUNK CABLES
- 12 AWG
- 1050mm pitch
- Only sold with ACRak®

PA 1P trunk cable

PA 2P trunk cable

PA 4P trunk cable



PT 1P trunk cable

PT 2P trunk cable

PT 4P trunk cable

EXTENSION CABLES
- 12 AWG
- 1/2/15m long

BMC F-M ext. cable

BRIDGE CABLES
- 18 AWG
- 50cm long

SMC F-M bridge cable

SEALING CAPS

BMC female

BMC male

SMC female

CABLE PARTS

Cable end cap

Cable joiner

UNLOCKING TOOLS

BMC unlock tool

SMC unlock tool

DC unlock tool

MONITORING DEVICES

Data logger

PLC box

MICRO INVERTERS

G320

TECHNICAL SPECIFICATIONS

Micro Inverter

	G320			
INPUT FROM PV (DC)				
Number of Panels per Inverter	One			
Nominal Power (STC) of Each Panel	320 W			
Recommended STC Panel Power	200~350 W			
Maximum Panel Voltage	60 V			
Operating Voltage Range	22~60 V			
MPPT Voltage Range	24~45 V			
Minimum Start Voltage	24 V			
Maximum Current per Panel	12 A			
OUTPUT DATA (AC)				
Nominal Continuous Power Rating	300 W			
Nominal Frequency (Range)*	50 (47~53) Hz or 60 (57~63) Hz			
Power factor	> 0.99			
Total Harmonic Distortion	< 2%			
Nominal Voltage / Range	208 / 184~228V	220 / 198~242V	240 / 211~264V	277 / 244~304V
Nominal Output Current	1.44 A	1.36 A	1.25 A	1.08 A
Max. Units per 20/30A Circuit	18 / 27 balanced	11 / 17	12 / 19	42 / 66 balanced
EFFICIENCY				
Peak Efficiency	96.5%			
CEC Weighted Efficiency	96.0%			
Nominal Static MPPT Efficiency	>99.5%			
MECHANICAL & ELECTRICAL				
3-Phase Configuration	WYE link			
Night time power consumption	< 20 mW			
Ambient Operating Temp. Range	-40 to 65 °C			
Internal Operating Temp. Range	-40 to 85 °C			
Weather-Proof Rating	NEMA 6 or IP67			
Dimensions LxWxH	268 x 195 x 34 mm			
Weight	1.3 kg			
COMPLIANCE & COMMUNICATION				
UL, FCC, IEEE Compliance	UL 1741, FCC Part 15, Class B, IEEE 1547			
Communication	PLC			

* Range programmable at the factory per customer request or local regulation

PLC Box

COMMUNICATION	
Serial Port Interface	1 x RS485 (For Data Logger)[1]
Maximum Number of Devices	Up to 24 Micro Inverters
Maximum Transmission Distance[2]	Up to 164ft (50m)
MEMORY	
Internal Memory	Flash ROM 16K bits
MECHNICAL DATA	
Ambient Temperature	-10°C to 50°C
Dimensions (D x W x H)	6.9 x 4.5 x 1.7 in (174 x 115 x 44mm)
Weight	0.5 lbs (0.2kg)
Environmental Protection Rating	IP20 (Indoor Use Only)
Compliance	UL60950-1, FCC Part 15 Class B
POWER	
Power Consumption	10W (Maximum)
Power Supply Input	100 - 240VAC, 50-60Hz
Power Supply Input Current	100mA@100VAC (Maximum)

[1]The maximum distance between the Data Logger and PLC Box is 1312ft (400m).
[2]The distance from the PLC Box to the micro inverter at the farthest end of the AC branch.

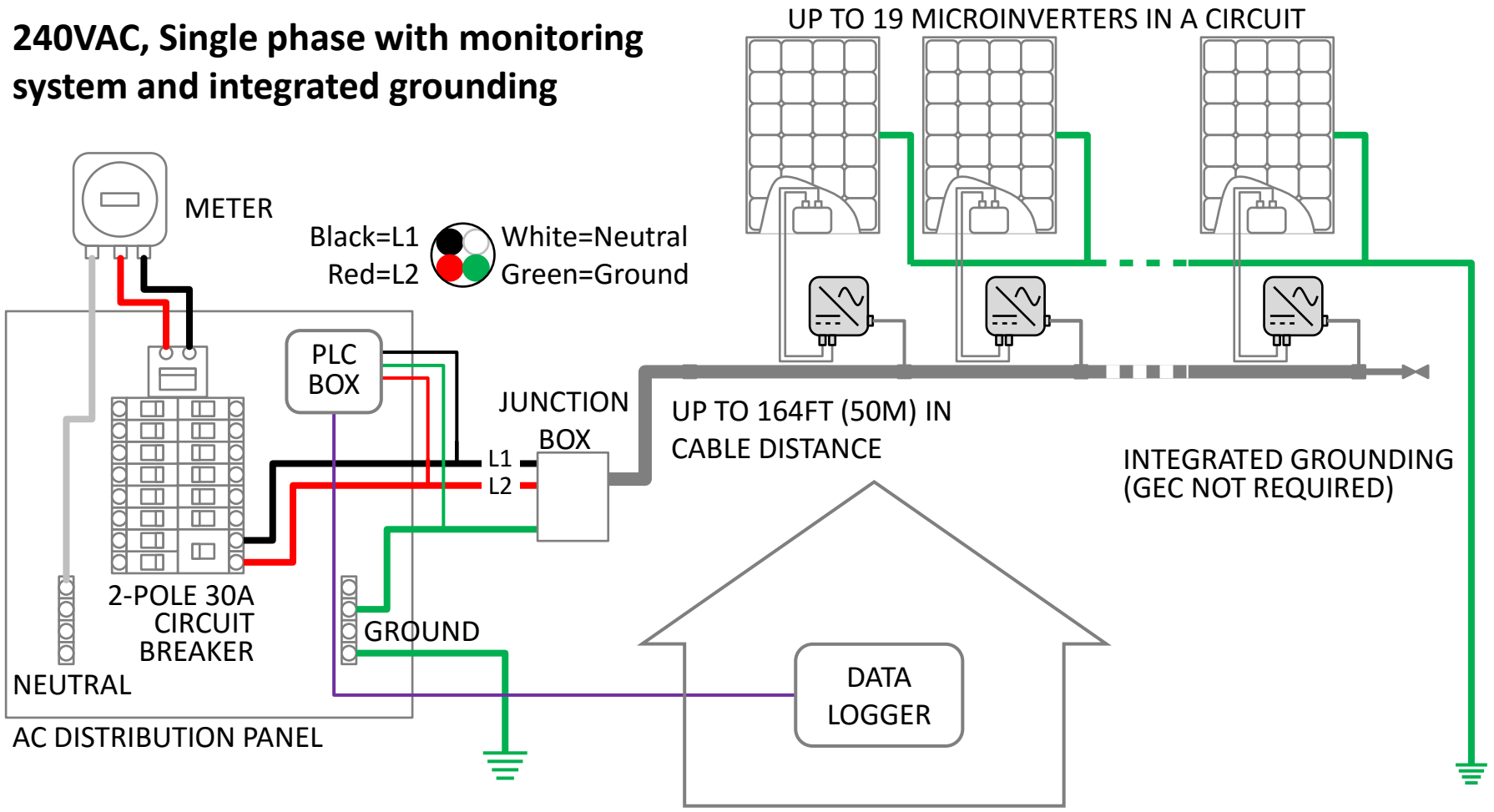
Data Logger

COMMUNICATION	
Serial Port Interface	1 x RS485 (For PLC Box)[1]
Maximum Number of Devices	Up to 3 PLC Boxes
Ethernet Port	1 x RJ45
VISUALIZATION & MEMORY	
Graphics User Interface (GUI)	Web-based
Internal Memory	4 GB
Memory Expansion	SD Card (max. SDHC 32G)
MECHNICAL DATA	
Ambient Temperature	-10°C to 50°C
Dimensions (W x H x D)	7.9 x 5.5 x 1.8 in (200 x 140 x 45mm)
Weight	1.0 lbs (0.5kg)
Environmental Protection Rating	IP20 (Indoor Use Only)
Compliance	UL60950-1, FCC Part 15 Class B
POWER	
Power Consumption	4W
Power Supply Input /Ouput	100 - 240VAC, 50-60Hz

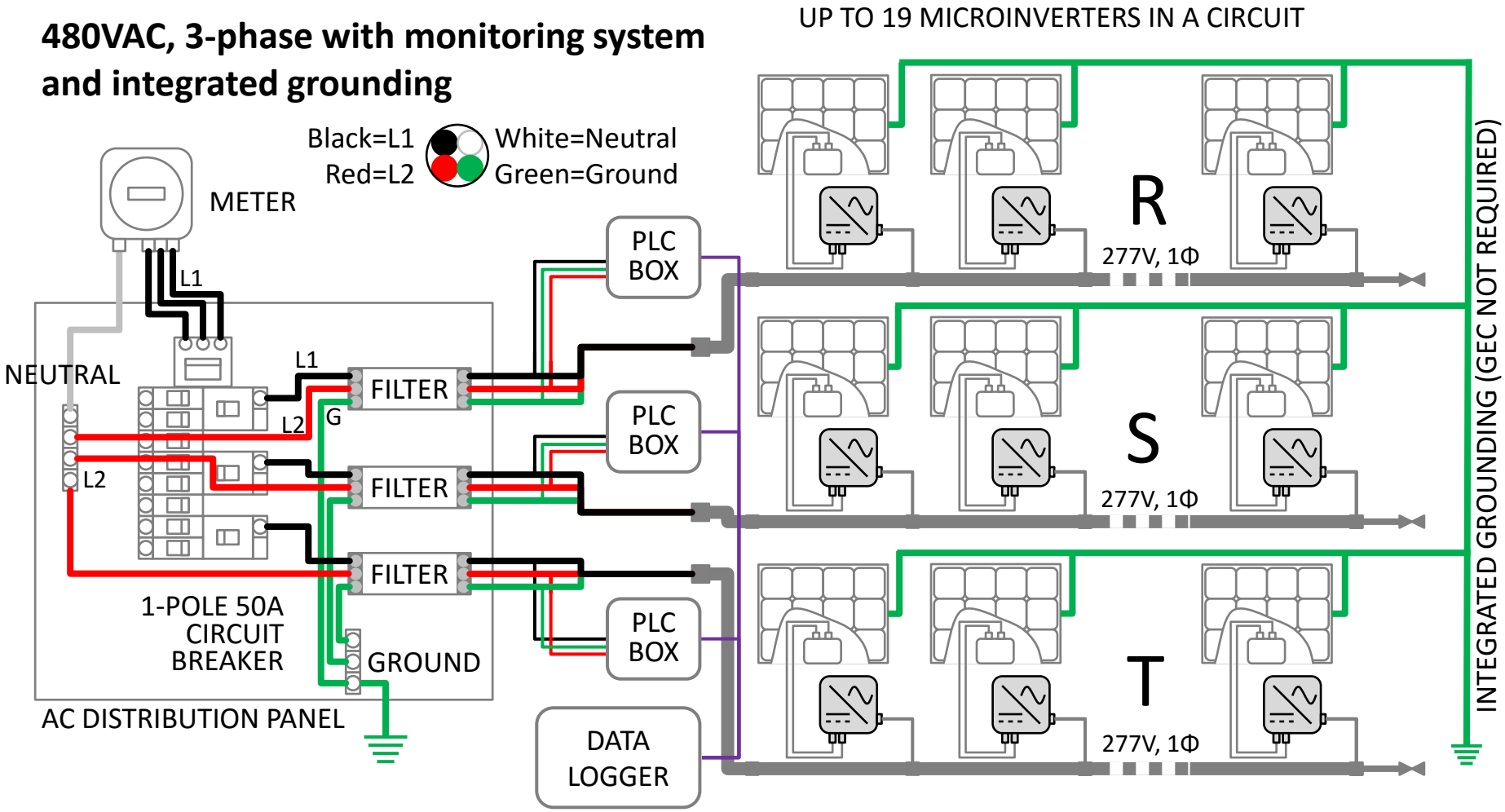
[1]The maximum distance between the Data Logger and PLC Box is 1312ft (400m).

SAMPLE WIRING

240V 1Φ



480V 3Φ WYE

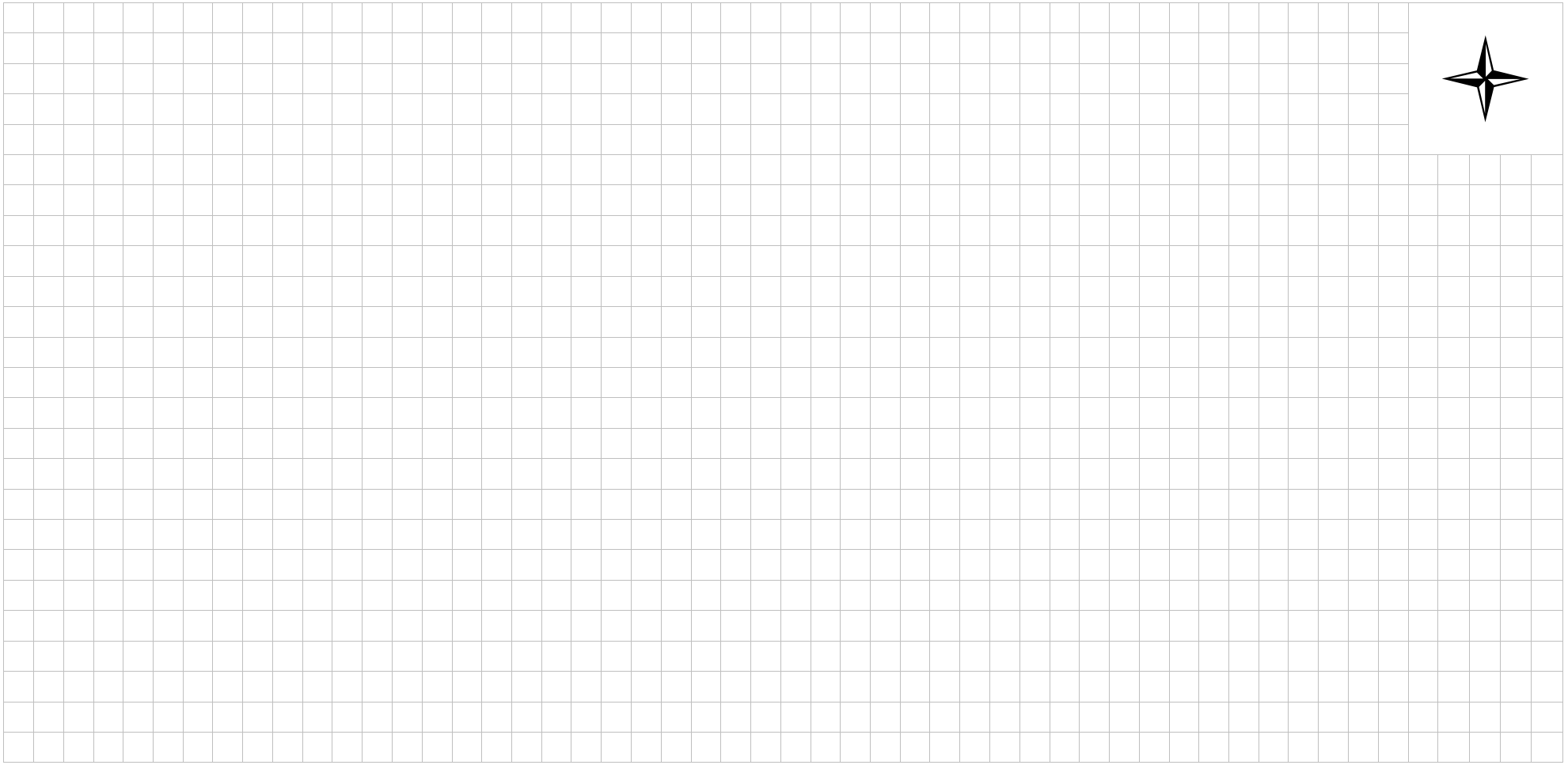


NOTE:
WHEN MULTIPLE PLC BOXES ARE USED, A LOW-PASS FILTER WITH APPROPRIATE CURRENT RATING IS TO BE INSERTED BETWEEN THE GRID AND EACH PLC BOX. A RECOMMENDED FILTER IS SCHAFFNER FN350 SERIES.

INSTALLATION MAP TEMPLATE

Use this map to draw the array and keep track of the micro inverters placement by serial number. Peel off and use secondary serial number label on the micro inverter.

Installer	Array Name	Site Address	Azimuth:	Date _____
Customer			Tilt:	Sheet_____of _____ Please print this page



NOTES

Manufactured by:
Darfon Electronics Corp.
167 Shan-ying Road, Gueishan
Taoyuan 333, Taiwan, (R.O.C.)

For more information:
www.darfonsolar.com