

SOLAR OFF-GRID CUSTOMER MANUAL



Customer Care Line
(after sales service)

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Part number: 3846570100 AB

Solar
Instruction manual



Defy Solar Off-Grid: Customer Manual

1. Product Contents

Product contents:

- Refrigerator/Chest freezer unit
- PCB control Box

Additional components for off-grid setup (purchased separately):

- Solar panel
- Battery

NB: additional component to be purchased according to specifications stipulated in this manual. Refer to Appendix A for solar panel and battery specs.

2. Solar Phase 2 Sources

The product offers an off grid, as well as a hybrid solution. The user interfaces show indicators for all three sources:

- Solar Panel (DC)
- Battery (DC)
- Grid (AC)

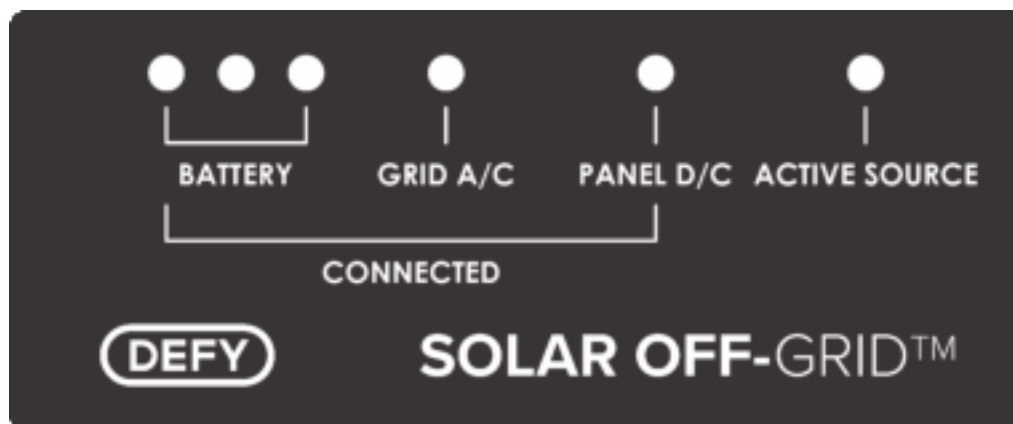


Figure 1: LED Source Indicator

N.B. Product can run as hybrid or completely off-grid. It is not mandatory to have an A/C grid connection if the product is running off-grid.

The mode of operation and priority of sources is as follows:

- During the day when solar power is available, solar panels will run the product and simultaneously charge the battery.
- At night, when solar source is unavailable, the product will run using the battery.
- Grid/AC will only be used if the customer wants to run the product as a hybrid.
- Product will run for up to 3 days using a fully charged 200ah LiFePO4 battery and panel connection during inclement weather (duration may differ according to the quality of the battery through its lifecycle). Product will only switch over to grid/AC connection thereafter.
- In ideal conditions, product will last approximately 3 days with full battery charge. (NB: According to specified panel and battery specifications).
- The Solar PCB control box allows for an automatic transition between sources – no manual input or user intervention is required.

LED information:

- The “BATTERY” LED’s, as in figure 2 above, indicated the charge level of the battery

No. of B LED’S ON	Battery Charge level
3	85 - 100%
2	25 - 85%
1	0 - 25%
0	Battery depleted / not connected

- “Grid AC” and :Panel DC” LED’s:

LED ON/OFF	Connection
ON	Source connected
OFF	Source not connected

- The Active source LED will change colour depending on which source is being used to run the product. The colour indicates the following source usage:

Active Source Colour	Source Used to Run Product
GREEN	Panel Only
DARK BLUE	Battery Only
LIGHT BLUE / TURQUOISE	Both Panel and Battery
PARTIAL GREEN AND RED	Grid / AC

3. Solar Control Box

The solar PCB control box comes packaged with the primary refrigerator/chest freezer unit. The box comes assembled as per the below:

Upon unboxing the control box, the unit should consist of the following pre-assembled components.



Figure 2: External Components (Pre-assembled)

NUMBER	COMPONENT
1	LED SOURCE INDICATOR
2	CIRCUIT BREAKER AND COVER
3	CONTROL BOX HOUSING - COVER
4	CONTROL BOX HOUSING - BODY
5	CABLE GLANDS

4. Circuit breaker

The circuit breaker, as shown in the below image, is in the “**OFF**” position. To turn the product on, push the circuit breaker switch up. The one-pole circuit breaker will be used to turn on/off all sources at once. When the circuit breaker is switched on, any sources which are connected to the product, will light up on the LED source indicator. The active source colour will change based on which source is being used to run the product.

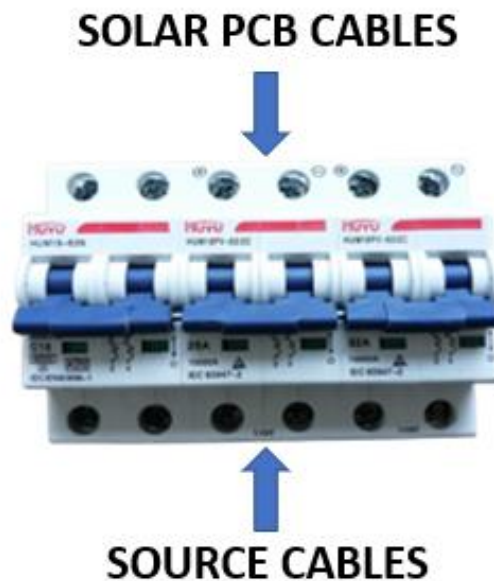


Figure 3: Circuit Breaker in "OFF" position.

NB:

It is mandatory for the circuit breaker to be in the off position during installation and at any point when electrical circuitry is being handled. Customer should use an accredited installer for the installation process. If the product is connected as a hybrid unit i.e., AC and DC sources connected, when the circuit breaker on the PCB control box is turned off, ensure that the circuit breaker at the distribution board is also turned off before touching any electronics.

5. Outputs Connections: Solar PCB to Fridge/Chest Freezer – TTR Cable

If there is a loose connection from the PCB control box to the product, please follow the below instructions to check and reconnect the product. Connections differ for refrigerator and chest

freezer units. Refer to the relevant section below for details on how to connect/reconnect the cables going from the PCB control box to the refrigerator/chest freezer.

NB: The circuit breaker must be turned off prior to checking and connecting product. If the product is connected as a hybrid unit i.e., AC and DC sources connected, when the circuit breaker on the PCB control box is turned off, ensure that the circuit breaker at the distribution board is also turned off before touching any electronics.

Refrigerator - 50cm Double Door Fridge and 60cm Combi Fridge:

The following connectors can be found at the back of the refrigerator units, above the compressor.



Figure 4: Refrigerator Power Cables and Sensor Cable Connector



Figure 5: Refrigerator Power and Sensor cables connected.

1. Connect the upright TTR power cable to connector D.
2. Connect the upright TTR sensor cable to connector E.

Chest freezers - CF210 and CF300:

The following connection points can be found on the thermostat. The thermostat is located on the compressor air grill, on the side of the unit. Remove the 4 screws fixing the air grill to the unit and detach the air grill. The thermostat and housing will be attached to the inside of the air grill, as in the image below:

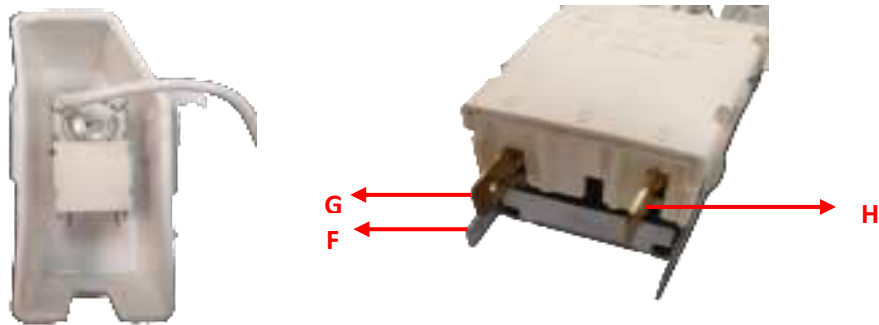


Figure 6: Chest Freezer Thermostat and Terminals



Figure 7: Chest Freezer Cables Connected

1. Connect the chest freezer TTR ground cable to terminal F.
2. Connect the chest freezer live TTR cables to the brass terminals G and H. Both cables are live and can both connect to terminal G or H, there is no convention.

6. Trouble Shooting

NB: If the product is connected as a hybrid unit i.e., AC and DC sources connected, when the circuit breaker on the PCB control box is turned off, ensure that the circuit breaker at the distribution board is also turned off before touching any electronics.

1. If the circuit breaker is in the on position and the LED's come on, but the compressor remains off i.e., product is not cooling (active source LED should be off):
 - Turn the circuit breaker off and wait for 1 minute.
 - Check all connections from the circuit breaker to the refrigerator/chest freezer are in place as indicated in this installation manual in section 5 above.
2. If the AC LED is flashing consistently (every 1-3 seconds):
 - Turn off the circuit breaker. Leave the circuit breaker off for 5 minutes.
 - Put the circuit breaker back on. Normal operation should resume.
 - If the error resumes, please contact your nearest service center.
3. If the connected sources are turning on and off in succession (this may occur every 10 seconds to 1 minute):
 - Turn off the circuit breaker. Leave the circuit breaker off for 5 minutes.
 - Put the circuit breaker back on. Normal operation should resume.
 - If the error resumes, please contact your nearest service center.
4. Points 3 and 4 above may be a result of the solar control box overheating due to poor placement, for example, directly behind the product condenser. Please ensure that the control box is mounted in a well-ventilated area at the side of the unit. An accredited installer should be used to move the box if the initial placement is incorrect.
5. When initializing the unit, if the product is being run off-grid:
 - Battery should be at least 75% charged before turning on the unit. This depends on irradiation level at the time of installation.
 - A higher voltage is recommended if unit is being started during rainy weather conditions.
 - Unit should be turned on during the day to avoid depleting the battery during unit pulldown (this is the time taken for unit to be completely cooled, starting from ambient temperature).
 - If product is running completely off-grid, please ensure product is **unloaded** (empty) during pulldown phase.

7. Warnings

NB: If the product is connected as a hybrid unit i.e., AC and DC sources connected, when the circuit breaker on the PCB control box is turned off, ensure that the circuit breaker at the distribution board is also turned off before touching any electronics.

- The installation should be performed by an accredited installer. Customer should not interfere with the internal components of the PCB control box.
- Do not touch any of the cable connections going to the refrigerator/chest freezer without turning the circuit breaker off first.
- Do not touch any product connections for at least 1 minute after turning the circuit breaker off to allow the components time to discharge.
- For customers that are trouble shooting, connections to the refrigerator/chest freezer may be check and confirmed to be in place (if the product was moved for cleaning etc.). Ensure circuit breaker is turned off prior to checking connections.
- If the product and control box need to be moved, customer should call an authorized installer to do so.
- The surface of the control box is a high-temperature surface and contact should be avoided whilst the product is operational.
- The control box should not be mounted next to a water source or an area prone to leaks or dampness.
- Ensure that the input and output cables from the PCB control box are not pulled.

8. Maintenance

- Solar panels should be checked periodically to ensure optimum efficiency. Solar panels should be clean and clear of dust, ice, water, debris, etc.
- Please ensure that the box is in a well-ventilated area, free of dust.
- Care should be taken when product is moved for cleaning purposes, to be prevent damage to cable connections.

Appendix A – Panel / Battery / Grid specs

Panel Specs:

- 550W: High Irradiance Areas
- 700W: Low irradiance Areas
- Refer to attached irradiance map.
- Open circuit voltage: 40-48V range
- Possible to use 2 x 350W panels connected in parallel for 700W output.



	Region	Panel
	Irradiation level (kWh/m2)	Power (W)
	1200 - 1600	700
	1600 - 2000	700
	2000 - 2400	700
	2400 - 2800	550
	2800 - 3200	550

Battery Specs:

- 12V – no deviations allowed.
- 200AH
- LiFePO4 battery required.
- Possible to use 2 x 100ah battery connected in parallel for 200ah output.
- Product will run for up to 3 days off a fully charged 200ah LiFePO4 battery and panel connection during inclement weather (duration may differ according to the quality of the battery through its lifecycle).
- **Lead-acid / Gel / AGM batteries are not applicable with this system.**

Grid (A/C) Specs:

- Normal 220-240V Grid connection is applicable.
- Direct connection to DB required (cables supplied). No wall plug supplied.
- GRID CONNECTION IS OPTIONAL. Unit can function as an off-grid unit.

Input/Output Specs:

SOURCE	PARAMETER	MAGNITUDE	UNIT
AC INPUT	AC VOLTAGE	230	V
	AC CURRENT	500	mA
BATTERY INPUT	MAX DC CURRENT	12 - 14	V
	MAX DC CURRENT	25	A
PANEL INPUT	*MAX DC VOLTAGE*	48*	V
	MAX DC CURRENT	10*	A
OUTPUT	DC VOLTAGE	310 - 330	V

If two or more panels are used to achieve the specified panel wattage, installer must ensure that the panels are connected in parallel to maintain the specified maximum panel voltage input. The solar PCB will automatically limit the maximum panel current input to 10A.