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Wirnet™ iStation

AN – Solar panels installation through USB-C input of Wirnet™ iStation



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1 Introduction

Wirnet™ iStation installation using solar panels require to fully control power efficiency of every part of the chain. Indeed, when a DC input POE injector is used to power the product, both the efficiency of the POE injector and the efficiency of the internal product converter need to be considered to calculate the global power efficiency. As the standard POE voltage is quite high (around 50 VDC), power efficiency is low, at around 80% for both stages which bring to a global power efficiency at about 60%.

Working on a solution based on the USB-C to reduce the voltage input will improve the efficiency from 60% to more than 80%. Solar panels dimensions will also be reduced by the same percentage. This Application Note gives information on the engineering rules when the customer wishes to connect a solar panel charge controller to USB-C of the Wirnet iStation.

2 Wirnet™ iStation: USB-C input specifications

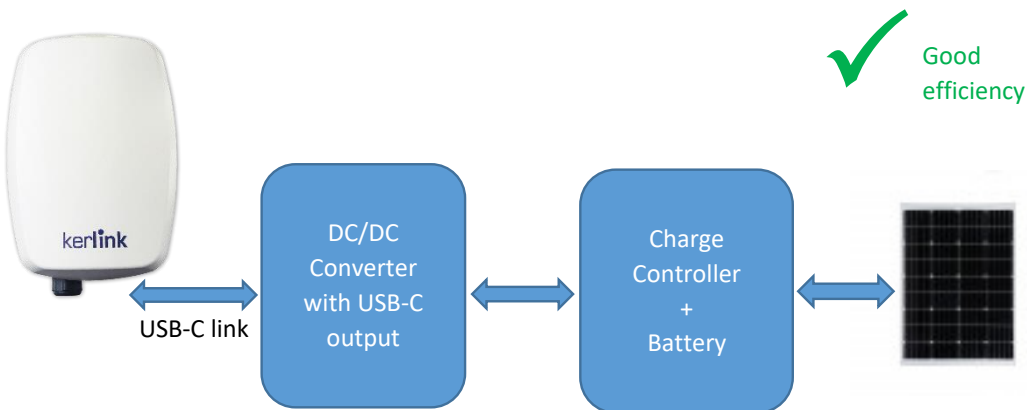
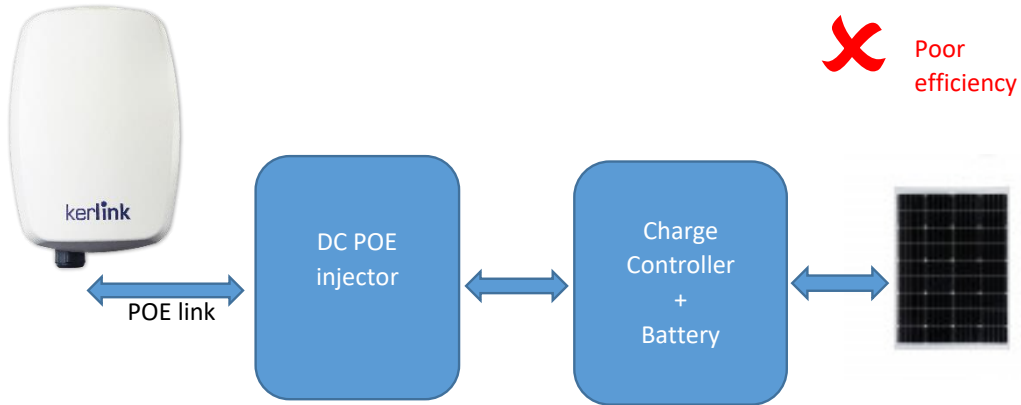
Specifications	
Absolute maximum input voltage rating	5.5V
Operating input voltage range	5.1V to 5.5V



Please strictly respect these recommendations to avoid any malfunction or loss of performance that may not be covered by the manufacturer warranty / extended warranty.



3 Installation architectures



4 Accessory specifications: DC/DC converter with USB-C output

Kerlink provides the following accessory which is a voltage adapter to be positioned between the solar panel charge controller and the USB-C of the Wirnet iStation.

- The reference for this accessory is ACCIOT-POW01 (including DC/DC converter, a notice and a packaging).



Figure 1 : Packaging

Description	Specification
Input voltage range	8-35 VDC
Nominal output voltage	5.4V
Voltage regulation	<1%
Ripple (full load test)	<0.1V
Maximum output current	2A
Efficiency	80%
Cable length (USB-C side)	1m
Cable section (USB-C side)	AWG20 min
Cable external diameter (USB-C side)	6.6mm <math>< \varnothing</math> 8.6mm
Shielded (USB-C side)	yes
Cable UL rating (USB-C side)	UL 2725
Cables UL flammability classification	UL 94 V-0
Waterproof rating	IP67
Temperature range	-25 to +65°C

Figure 2: Specifications

5 Wirnet™ iStation: Power consumption

The average power consumption on the USB-C Input under 5V is detailed below:

Wirnet™ iStation	Power consumption
CPU block	1.25W avg
Ethernet block	0.150W avg
GPS block	0.135W avg
WWAN block (25%Tx,75%Rx)	1.45W avg
Radio block in Rx mode (x8 demodulator on)	1.5W avg
TOTAL	4.485W avg

Figure 3: Power consumption

Also, the maximum input power under 5V is approximately 7W. This includes CPU, ethernet enabled, GPS enabled, WWAN enabled and maximum RF power in Tx LoRa mode.

So, as the efficiency of the DC/DC converter is around 80%, make sure that the output power from the solar panel charge controller is sufficient.

To correctly size the solar panel and battery, here are the values to consider:

- **5.382W** in average on DC/DC converter input
- **8.4W** in max DC/DC converter input

6 Wirnet™ iStation: Connection with DC/DC converter



Figure 4: Swap of cap & gland

In the initial configuration (fig.4 on the left), the cable gland is screwed into the M25 hole on the left and the transparent cap in the right.

In the configuration where the ACCIOT-POW01 accessory is connected, the customer will have to swap the cable gland with the transparent cap as shown in fig.4 on the right.

Be careful to keep the waterproof protection!!!

Here are the specifications of USB-C plug:

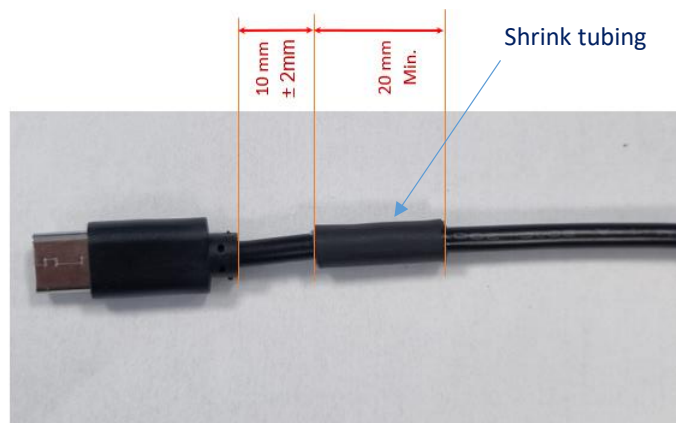


Figure 5: USB-C plug on the cable

To use this cable gland, the first step is to screw the first part tightly to the iStation so as not to twist the cable afterwards. Then, plug the cable.

Therefore, it will be necessary to position the blue gasket of the cable gland on the shrink tubing as shown on the following photo.



Figure 6: View of the blue gasket placed on the shrink tubing

The USB-C plug can then be connected to the USB-C receptacle of iStation, as shown below.



Figure 7: View of the cable plugged

Add the rubber and the cover.



Figure 8: View of the rubber placement

Finally, screw the cover on tightly to ensure a good seal.

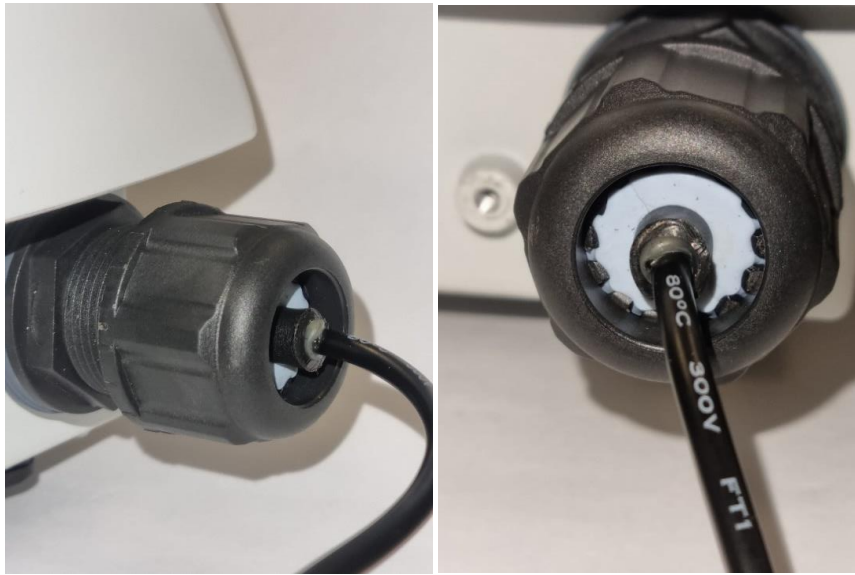


Figure 9: View of the cable gland placed



Special attention on length and section must be taken into consideration regarding the cable used between the converter and the Wirnet™ iStation USB-C input since acceptable drop voltage inside the cable is low.

Please strictly respect these recommendations to avoid any malfunction or loss of performance that may not be covered by the manufacturer warranty / extended warranty.

Any other question related to our product, please contact our distributors or Kerlink:
support@kerlink.fr / + 33 2 99 12 29 00.

We stay at your disposal for any help on your project.

Yours sincerely,

Kerlink