



How to implement Battery Storage With Fronius PV Systems

White Paper

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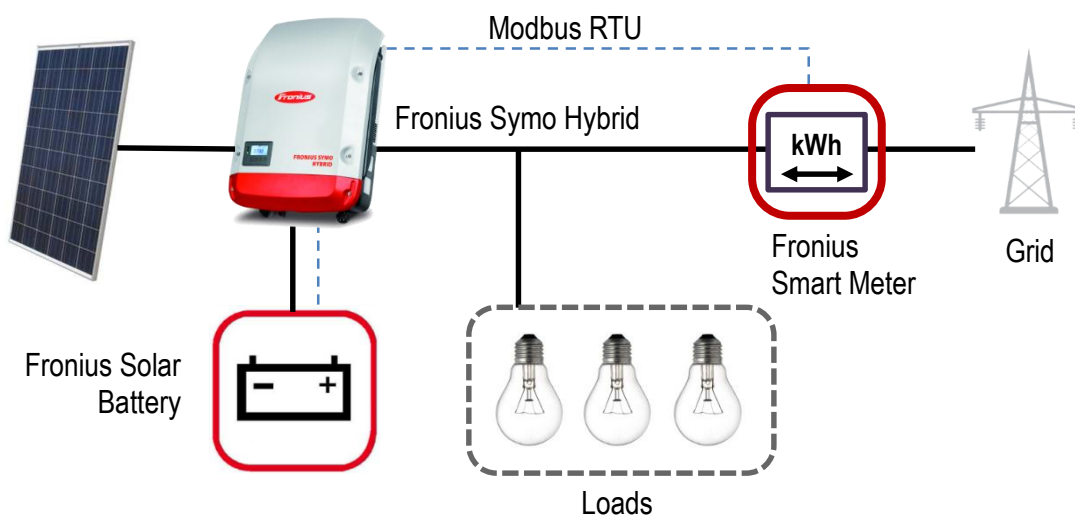
Gender-specific wording refers equally to female and male form.

1 ADDING BATTERY STORAGE IN DC COUPLED MODE

DC coupled system design offers the possibility to charge the battery storage directly with DC power from the PV generator. There are no multiple conversions in the charging process (DC to AC and AC to DC). It can be done with or without emergency power switch in the system.

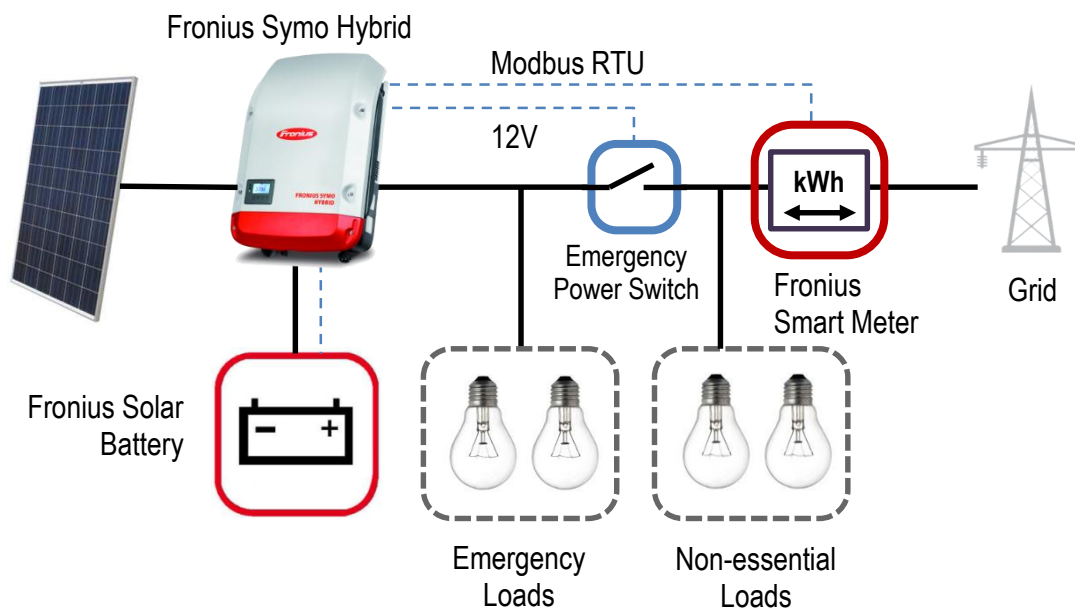
1.1 DC Coupling without emergency power switch

To optimize self-consumption of a PV system the DC coupling method without emergency power switch is an effective way typically for customers who haven't got a PV system initially.



1.2 DC Coupling for optimized emergency power supply

DC coupling with emergency power switch allows supplying loads even in situations when there is an electricity black-out.

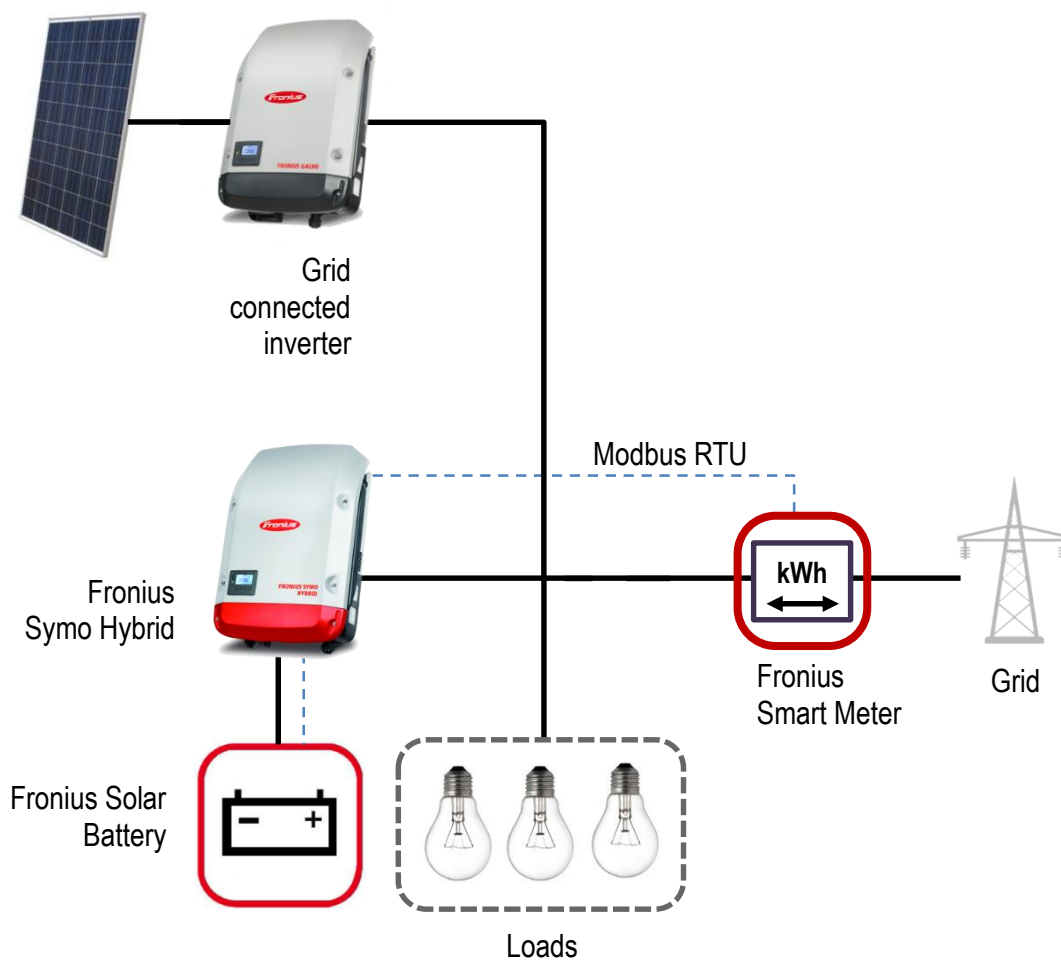


2 ADDING BATTERY STORAGE IN AC COUPLED MODE

If storage needs to be added to an existing PV system, the AC coupled method can be a way to go. The battery will be charged from AC, which means the charging process has then multiple conversions: DC power from the PV array into AC, then AC into DC to charge the battery and finally DC into AC to supply the appliances. Existing PV systems with a PV array that would fit to the Hybrid inverter can also do the DC coupling method.

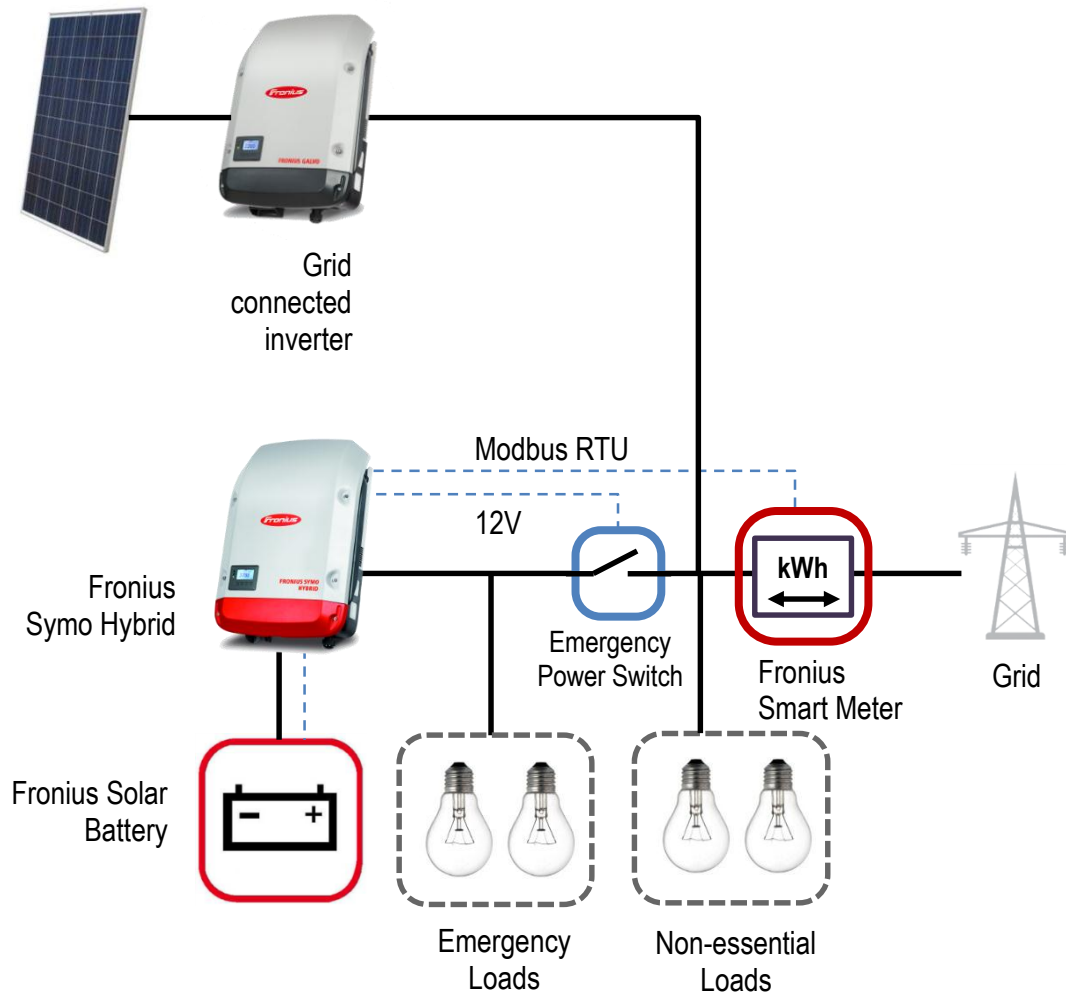
2.1 Basic AC coupling with grid connected inverter

The most cost effective and common method of AC coupling is to add battery storage on the AC bus but without a contactor for emergency grid power supply.



2.2 AC Coupling with grid connected inverter on grid side

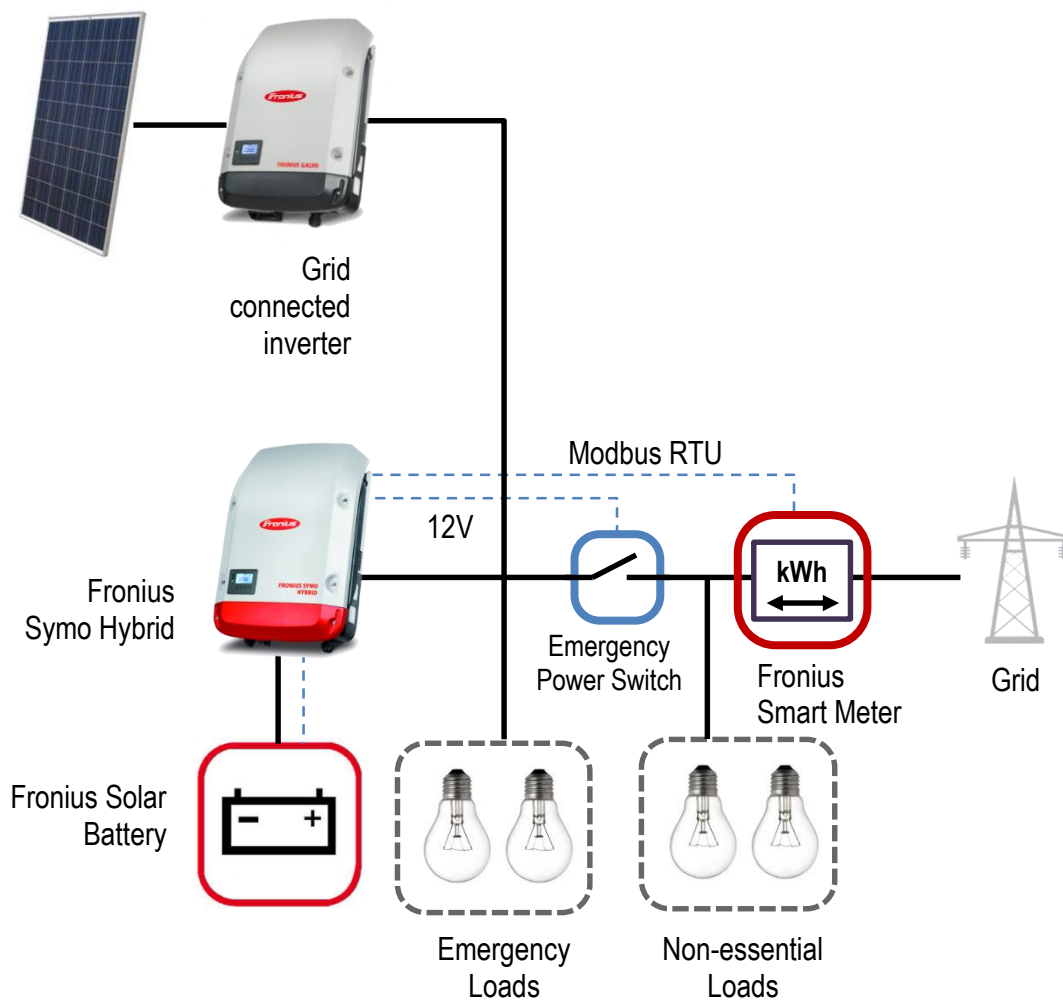
It is recommended to do the AC coupling method with the AC coupled inverter connected on the grid side, because of system stability. In off-grid situations the grid-connected inverter will switch off and the Hybrid inverter will supply the loads from the battery only.



2.3 AC Coupling with grid connected inverter on load side

To be able to use the energy from the AC coupled inverter in off-grid situations the grid connected inverter needs to be connected on the load side of the emergency power switch. In off-grid situations the loads can be supplied from the Hybrid inverter and the grid-connected inverter.

Please note: This will be possible in 2016 with a software update on Symo Hybrid that will then control the AC coupled inverter. Until the software is available we recommend to go with what's described in chapter 2.2 AC Coupling with grid connected inverter on grid side

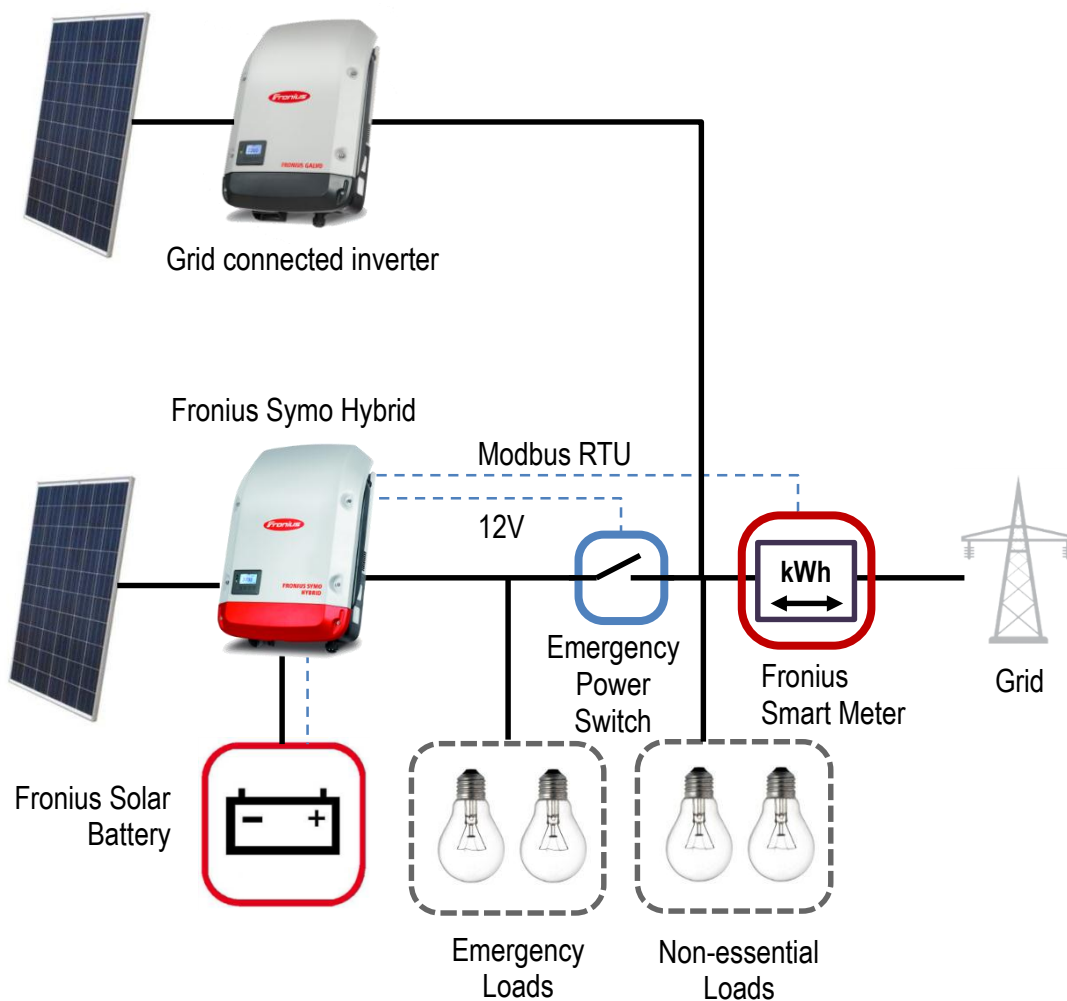


3 AC AND DC COUPLING OF STORAGE

A combination of AC and DC coupled storage is a possibility in particular if the PV generator should be increased at a later stage if more PV production is required. The battery can be charged from DC and from the AC coupled inverter.

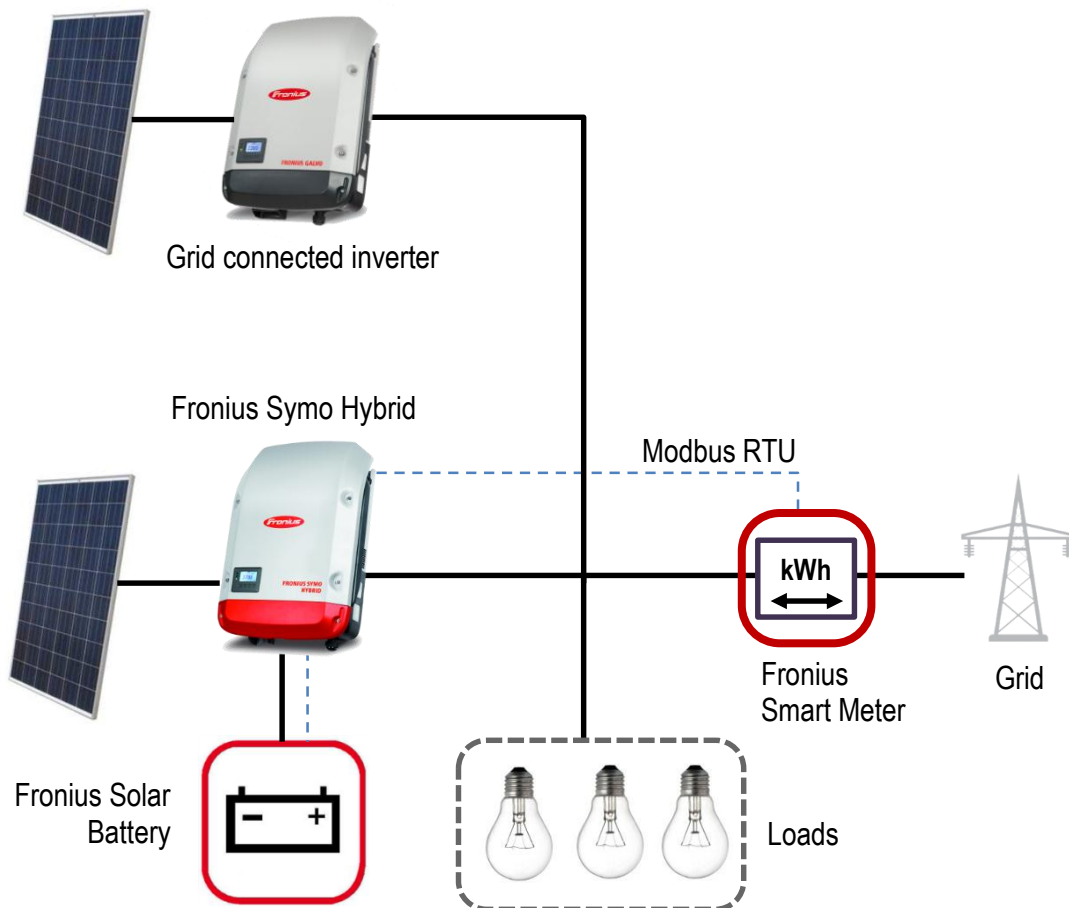
3.1 DC coupling and AC Coupling with grid connected inverter on grid side

It is recommended to do the AC coupling method with the AC coupled inverter connected on the grid side, because of system stability. In off-grid situations the grid-connected inverter will switch off and the Hybrid inverter will supply the loads from the battery and the DC connected PV array.



3.2 DC and AC Coupling without emergency power switch

This architecture is a common result if an AC coupled system that gets an additional PV array connected to the Hybrid inverter. AC and DC coupling is a cost effective and common method to add battery storage but without a contactor for emergency grid power supply.





4 FAQs ABOUT STORAGE

Can I connect multiple Solar Batteries on to a Fronius Hybrid inverter?

At the moment, only 1 Solar Battery can be connected to a Fronius Hybrid inverter which means a maximum of 12kWh nominal storage capacity.

Can I use multiple Hybrid inverters with batteries in parallel?

No, the system at this stage can only have 1 Hybrid inverter with battery.

What batteries can I use on the Fronius Hybrid inverter?

Either the Fronius Solar Battery or the Tesla Powerwall can be used to connect to the Fronius Hybrid inverter.

Can I AC-couple a single phase grid-connected inverter to a Symo Hybrid inverter?

Basically yes, but this depends whether your mains connection is 3-phase. The Symo Hybrid can only be used for houses with 3-phase mains connection. For single phase houses a single phase Hybrid inverter is needed.

Can the system do 0-export?

0-export is possible only when using the pure DC-coupled option shown in 1.1 and 1.2, if the Fronius Solar Battery is connected and the battery is not fully charged. If the system has additional AC-coupled inverters the system can limited export or will require an additional controller. These scenarios aren't shown in this paper.

Can I use the Fronius Symo Hybrid in a single phase installation?

The Symo Hybrid can only be used if there is 3-phase connection available at the mains. It is possible to AC couple a single phase inverter to a Symo Hybrid as long as there is 3-phase connection available on site. The single phase Fronius Hybrid inverter will be launched in 2016.