
Introduction to GoodWe Grid-tied Inverter Load Control Function



Background

In photovoltaic systems, load control refers to the management of electrical loads to ensure the efficient utilization of solar-generated power. This involves regulating the power consumption of various devices and appliances connected to the system to match the available solar energy output.

Load control is essential for optimizing energy usage. With the increase of new energy sources, users are increasingly emphasizing the rational utilization of energy. Meanwhile, with the popularization of home charging stations and heat pumps, users' demand for controlling these loads is also growing stronger.

Usually the load control function can be achieved by transmitting digital control signals to the main household Load like heat pumps. This may include inverters, energy management systems or other automation technology systems.

For example, by switching on the heat pump when there is excess energy in the photovoltaic system, or by supplying stored electricity to the heat pump or other loads during peak periods, it is possible to reduce energy costs.

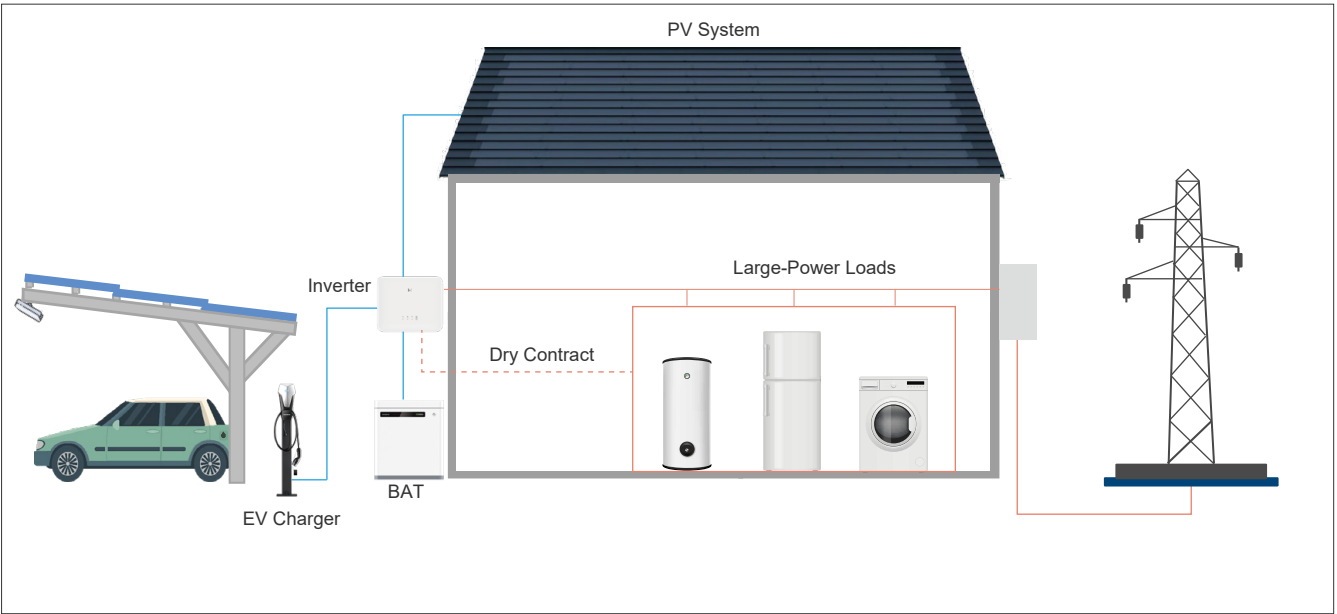


Figure 1: Diagram of typical load control system

GoodWe Solution

The GoodWe load control function aims to promote the external control of main household loads like heat pumps so that they can be operated in response to state of the inverter. In load control application scenarios, heat pumps have been the primary loads in homes. The GoodWe inverter reserves a dry contact control port to support the connection of SG Ready1 certified heat pumps and controllable loads, which is used to turn on or off the loads via SolarGo.

The GoodWe solution is as following:

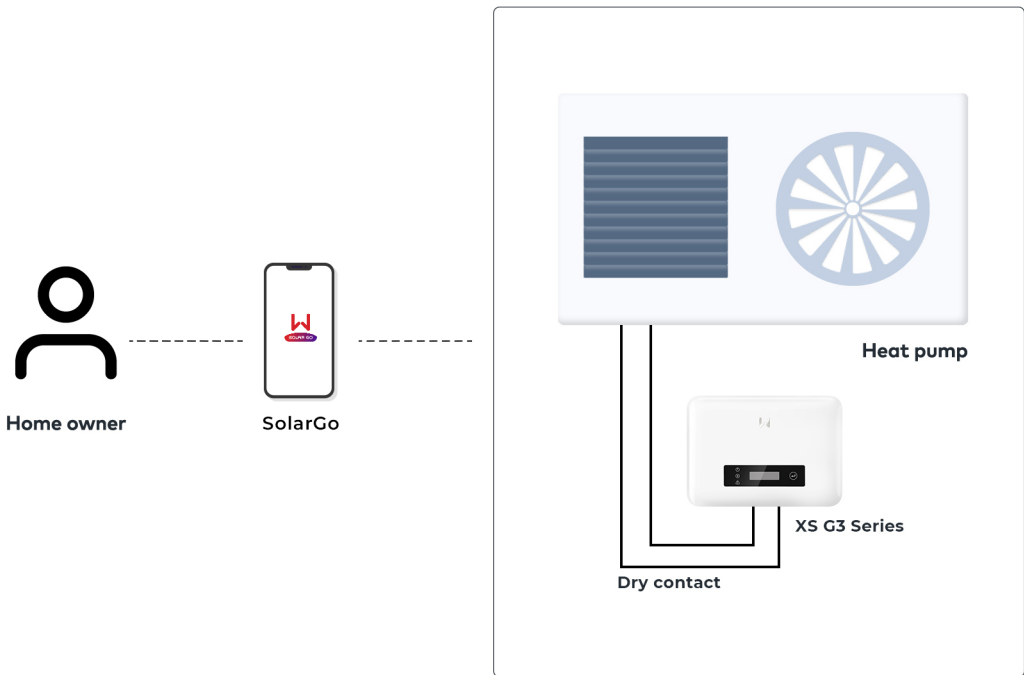


Figure 2: Diagram of Dry contact system by XS G3 series

[1] SG Ready (short for smart grid ready) is a label certifying that a heat pump or a complimentary management technology can respond to defined external control signals.

Firstly, for the utilization of the load control feature, both the GoodWe inverter and the load need to have dry contact interfaces. Taking the GoodWe XS G3 series as an example, the communication port has many different interfaces but only 9 and 10 are for dry contact as shown in the figure below:

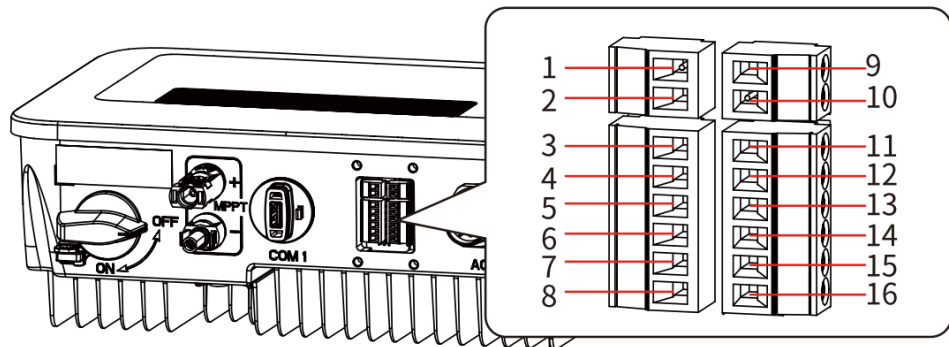


Figure 3: Port definition of XS G3 series: 9: Relay-OUT+ 10: Relay-OUT-

Then connecting the inverter dry contact interface 9&10 to the load dry contact interface K3&K4 to enable or disable the load showing as the following diagram:

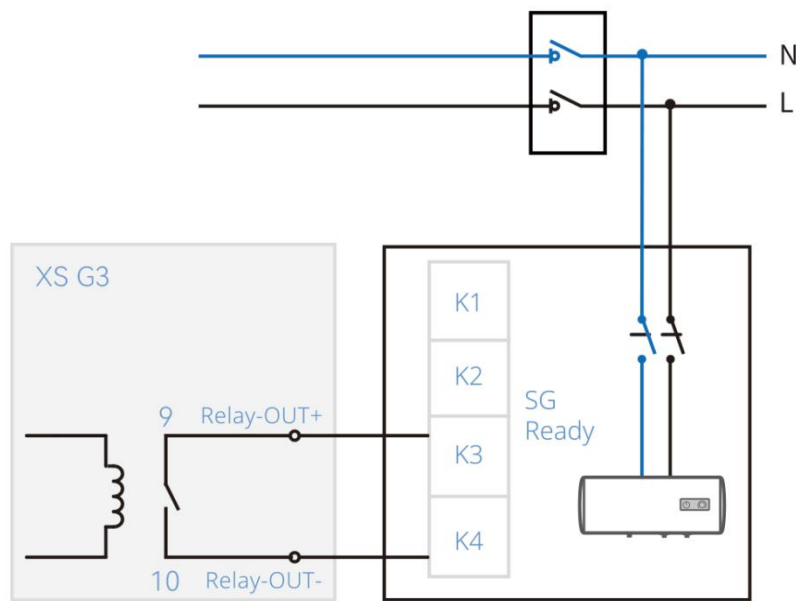


Figure 4: Dry contact connection diagram

Maintaining the open state of K1/K2 is sufficient, no wiring is required. Only connecting or disconnecting K3/K4 is needed to achieve basic control of the heat pump.

Disconnect K1/K2 and K3/K4 when there is no excess power in the PV system (signal: 0:0). The heat pump operates in energy-efficient normal mode.

When the PV system has surplus solar energy, disconnect K1/K2 and connect K3/K4 (signal: 0:1). In addition to maintaining basic operation, the heat pump will heat water to store thermal energy.

Actually, SG Ready supports four different operating modes for heat pumps. But GoodWe inverters currently support only two (Mode 2&Mode 3) of the four modes. These modes are communicated via two binary switches (indicated in brackets below):

Mode 1 – Blocked operation (1:0): The operation for the heat pump is blocked for a maximum of two hours per day.

Mode 2 – Normal operation (0:0): The heat pump runs in energy-efficient normal mode.

Mode 3 – Encouraged operation (0:1): The operation of the heat pump is encouraged to increase electricity consumption for heating and warm water.

Mode 4 – Ordered operation (1:1): The heat pump is ordered to run. This state supports two variants which must be adjustable on the controller for different tariff and utilization models:

- i) the heat pump is switched on
- ii) the heat pump is switched on AND the warm water temperature is raised

Finally, enable and set the "Load Control" function through the "More" interface on the SolarGo App of GoodWe. Tap Home > More > Load Control to set the load control mode.

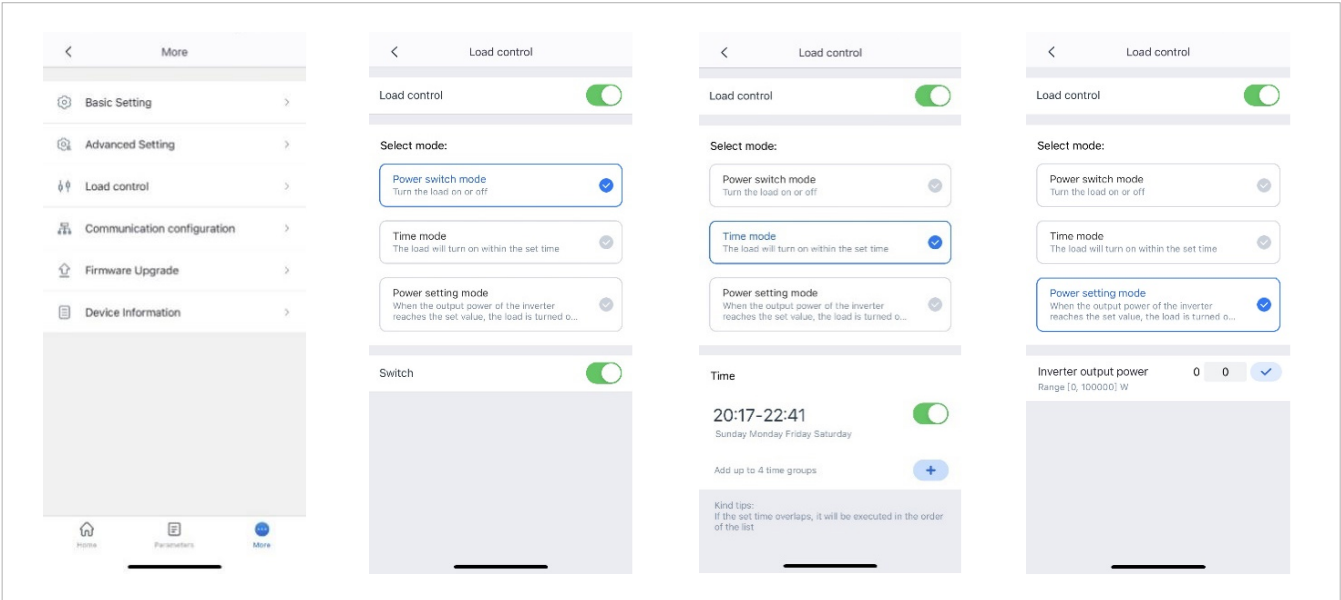


Figure 5: load control function setting Diagram via SolarGo

The load control methods (for on-grid inverters of GoodWe) are as follows:

- Switch mode: Control the opening and closing of the load through the "switch" button.
- Time setting mode: Set the time to turn on or off the loads, and the loads will be turned on or off automatically within the set time period.
- Power setting mode: Set a power value. When the output power of the inverter exceeds the set value, the load will turn on. The load control function is disabled by default.

For hybrid inverters of GoodWe, the system has a special model——BACK-UP load control instead of the power setting model:

BACK-UP load control: the inverter has an integrated relay controlling port, which can control the loads off or on. In off-grid mode, the loads connected to the relay port can be turned off if the overload at BACK-UP is detected or the battery SOC value is lower than the battery off-grid protection setting. Showing as following:



Figure 6: BACK-UP load control showing in SolarGo —UI would be updated depending on version

In addition, the GoodWe inverters with load control function are as following:

Product	Model
On-grid	XS G3 (0.7-3.3kW)
On-grid	MS G3 (5-10kW)
On-grid	MS G3 US (5-11.4kW)
On-grid	DNS G3 (3-6kW)
On-grid	SDT G3 (8-30kW)
Storage	ET (5-10kW)
Storage	ET (15-30kW)
Storage	ES G2 (3-6kW)
Storage	ES Uniq (8-12kW)

Table 1: Inverter model with load control

Conclusion

GoodWe inverters support the load control function. The homeowners can chose this function for main load controlling. In combination with local photovoltaic system, the main load can be operated in response to the availability of locally produced clean energy. As a result, homeowners can increase self-consumption and self-sufficiency, maximize the utilization of photovoltaic energy and achieve economic optimization by controlling household loads through PV systems.

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