



Heat pump control via

Fronius energy management of Datamanager 2.0

White Paper

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



1 BASIC INFORMATION

By integrating a Smart Grid Ready heat pump into the energy management of a Fronius PV inverter, the PV consumption of a household can be increased in a simple way. For this purpose, the inverter of the Smart Grid Ready heat pump provides a PV power or feed-in power-related switch-on recommendation. The heat pump controller is thereby informed to run the heat pump at the time, when PV energy is available to consume as much PV power as possible. The heat pump has switched from the PV inverter to an *increasing temperature mode*, which results in an increase in the desired temperatures of the hot water tank. The increase varies from manufacturer to manufacturer and can be found in the operating manual of the respective heat pump.

Compared to a direct control of the heat pump, the switchover to *increasing temperature mode* will give the advantage that parameters of the heat pump control (minimum running times, target running times, temperatures, etc.) remain untouched and thus the user comfort is not impaired.

Note: This will only work, if the heat pump is connected to the same meter as the PV inverter.

1.1 Smart Grid Ready heat pumps – operating modes

The Smart Grid Ready input of a heat pump can actively influence the operating mode of the heat pump. All Smart Grid Ready heat pumps have four controllable operating modes. Fronius recommends switching between operating modes 2 and 3. The switchover is realized by an external relay, which is controlled by the Fronius PV inverter.

Operating mode 1: stop operation

The heat pump is prevented from operating during this operating mode. In this operation, the network operator assigns a daily fixed blocking time of two max hours per day.

Operating mode 2: standard operation

In this operating mode, the heat pump runs in standard operation. To activate this operating state, the external relay for controlling the heat pump remains open.

Operating mode 3: increasing temperature mode

In this operating mode, the heat pump operates within the regulator in the intensified operation for hot water generation and / or room heating. This is not a direct start-up command, but an activation recommendation corresponding to the available PV power. In order to activate this operating state, the external relay is closed.

Operating mode 4: forced start operation

This is a definite start-up command, as long as this is possible, within the scope of the control settings. The controller must be adjustable for several control models:

Variant 1: The heat pump (compressor) is activated

Variant 2: The heat pump (compressor + electric heating rod) is actively switched on

1.2. Required components:

- Fronius inverter (IG, IG+, IG TL, SnapINverter) incl. Datamanager Card 2.0 or Box
- Fronius Smart Meter (63A-3, 63A-1, 50k-3)
- 12V Relay (max. 3,2W coil power, switching voltage max. 230V AC)



1.3. Operation:

The control of the Smart Grid Ready input of the heat pump is controlled by the digital energy management output of the inverter (on Fronius Datamanager 2.0). For this, operating mode 2 (relay open) and operating mode 3 (relay closed) of the heat pump are used. The change between the operating modes is automated, depending on the pre-set temperature target. For control, either the power at the feed-in point or the inverter output can be used. We recommend the regulation of the power at the feed-in point, since the household consumption is taken into account and measured by the Fronius Smart Meter.

2. STEPS TO CONNECT A SMART GRID READY HEAT PUMP

Step 1: Installation and connection of the external relay

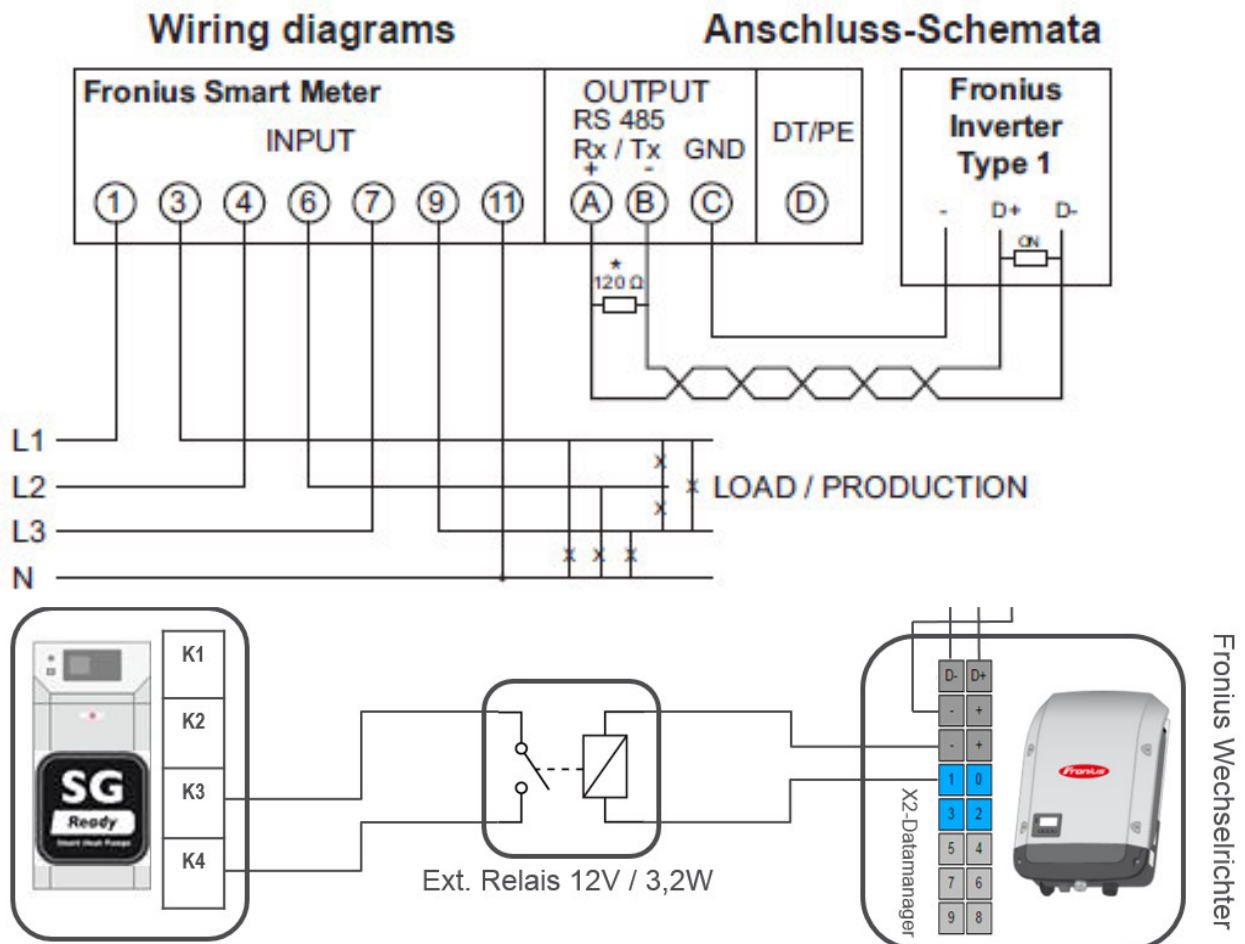


Figure 1: Connection diagram of the external relay for the Smart Grid Ready control of a heat pump.

Operating mode

terminals

Operating mode 2 – standard operation	Relay open contact
Operating mode 3 – increasing temperature mode	Relay closed contact



Step 2: configuration of inverter settings

2.1 Datamanager Interface

The settings can be adjusted via the Datamanager website (webserver is built-in) by following these steps:

/ Activate the Wi-Fi hotspot* on the Datamanager card (inverter) or Datamanager Box V2

/ Connect your computer/tablet/smartphone to the Datamanager's WLAN hotspot*. Or connect a LAN cable to the computer.

/ Open a web browser and go to <http://192.168.250.181> or <http://datamanager/>

Alternatively you can use Fronius SolarWeb App for tablet or smart phone and go to 'Settings' and click 'PV Inverter Homepage'

/ Go to "Settings"

/ Select the "ENERGY MANAGER" tab (see Figure 2)

2.2 Energy Manager Settings

Before setting the thresholds to switch ON/OFF, following points should be considered

/ Approx. base load of the site should be measured (→ energy meter) or calculated.

/ PV system size known

/ Power requirement of the device to be controlled with the energy management function

1. Activate Energy Management function by selecting "**Controlling: by power production**".
If a *Fronius Smart Meter* is included in the system, the setting "**by power surplus (in case of feed-in limits)**" can be chosen.
2. Set "**Thresholds on:**" to level of which the relay should be switched on
3. Set "**Thresholds off:**" to level of which the relay should be switched off
4. Set "**Minimum duration per on signal**" (if required)
5. Set "**Maximum duration per day**" (if required)
6. Click "**Save**" for the settings to be activated

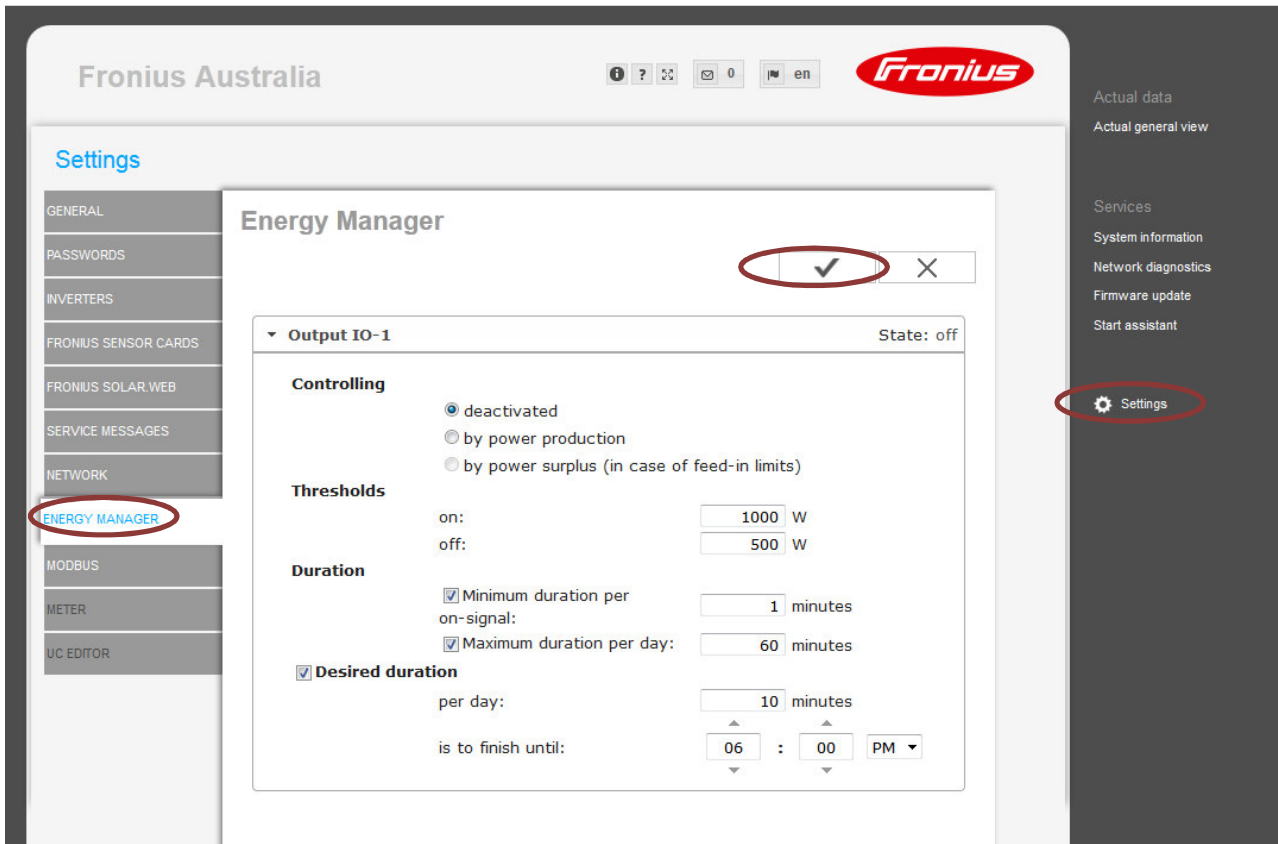


Figure 2: Web-interface settings

Example:

A heat pump with an electrical power consumption of 2,730 W has to be controlled by a Fronius inverter using the Smart Grid Ready input. For this purpose, the Fronius Datamanager 2.0 digital energy management output is connected to the Smart Grid Ready connection of the heat pump via a relay (for potential separation). The connection configuration of the heat pump can be found in the respective installation instructions for the heat pump model.

The control parameters for the Smart Grid Ready control are entered via the WEB interface of the Fronius Data Manager under Settings \ Energy management. Figure 2 shows the settings for the example described above.

In this example, the digital power management output of the Datamanager 2.0 is activated until a 500W reference is measured at the feed-in point if the feed-in power of 3,000W (heat pump output + 10% = 2,730 x 1,1 ~ 3,000W) is exceeded. The minimum running time of the heat pump is ensured with this setting via the heat pump control, since this operating mode is only a switching-on recommendation. The threshold values also depend on the PV power installed, so the value of the switch-on threshold should not be more than 70% of the installed PV power.



3. Appendix:

3.1 Datamanger Software Version 3.2.2 (or older)

Note that older Fronius Datamanger software versions may have fewer functions. In order to receive all current functions a software update has to be carried out. You can find more on our homepage or at the following link.

https://www.fronius.com/cps/rde/xchg/SID-CC75BC00-F2C5992B/fronius_international/hs.xsl/83_20347_ENG_HTML.htm#.V8VSlenyIUY

3.2 Remote control

It is also possible to change the settings remotely from a PC, which is located in the same LAN network. To do so, the static IP address has to be used in the Fronius Datamanger network settings. This IP address can be stored in the browser and thus easily accessible. New WLAN routers also allow you to use the URL <http://datamanager>. In order to access the system from outside, you need an external IP address, which you will get from the responsible IT administrator.

3.3 Examples for relay types

The technical specifications has to be observed when selecting the relay. (Coil power max. 3.2W, coil voltage, switching voltage and switching current)

As an example, following type is suitable:

Weidmüller Relay 6A -MRS 12 VDC 1CO 1



Troubleshooting: Please find more in the operating manual or call:

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