User Guide
Controlling the Smart Heater via RS485 using Modbus

History

Version	Date	Changes
1	07/31/2014	Initial Draft

1. Introduction

This guide will give a short introduction about how to communicate with the "Smart Heater" and will give a short overview about further functionality such as firmware updates.

2. Requirements

The Smart Heater is a standard Modbus slave device with a fixed address. The address as well as the communication parameters are listed in the Modbus specification. Further a Modbus master is required. This can be either an additional hardware device or e.g. an RS485 to USB converter for connecting the Smart Heater directly to a PC. On Windows PCs one can use for example the free available tool "modpoll" (http://www.modbusdriver.com/modpoll.html) to test the communication.

3. Testing the connection

Once the Smart Heater is connected to the master, the connection can be tested. This can be done be reading the holding register with the address 8192, 1 register long. The result should be "0x14ef" in hex.

If the result is something other or a timeout, be sure to check some things:
- RS485 Termination is on the master side.
- Modbus address and parameters (baud-rate, data bits, etc..) are correct.
- Check proper connection of wires - try to change line A and B.

If there is still no connection, please contact your vendor.

4. Controlling the Smart Heater

The Smart Heater has two modes of operation. One mode is the automatic mode and the other is the manual mode.

4.1. Automatic mode

In this mode, the Smart Heater expects metering values from a two-way meter. The values should contain the sum of the generated power by an PV installation and the used power by the household.

Example: PV is generating 2KW, the household is using only 1 KW, the result in the register would be a negative value of -1000W.

This value is then transmitted to the Smart Heater in the register 4865 "HomeTotalPower". The register 4864 "PowerNominalValue" has to be "-1" to stay in automatic mode.

The Smart Heater will then switch on its heating elements, according to the power value. The Smart Heater has to be connected to the two way meter as well, so that it can so the result of the switching operation. If e.g. the "HomeTotalPower" is -600W, the Smart Heater will turn on the 500W heating element, and the measured value at the two way meter should decrease to -100W. This is absolute necessary for the proper functionality of the Smart Heater.

For the proper repetition of the message refer to chapter 5 "Timeout".

4.2. Manual-Mode

In this mode the user can choose, which power the Smart Heater should be used. To do this, in register "PowerNominalValue" the desired power has to be transmitted e.g. 1250W. The Smart Heater then switches the next smaller heating element, here 1 KW. The content of the register "HomeTotalPower" is in this mode irrelevant.

For the proper repetition of the message refer to chapter 5 "Timeout".

5. Timeout

For security reasons the transmitted messages for both operating modes have to be repeated at least every 60 seconds (prior to version 1.2.0 the timeout is only 10 seconds). Otherwise the Smart Heater will switch off all heating elements and will go to unconnected state. This feature prevents the Smart Heater from uncontrolled heating, while the master is out of order.

6. Firmware Updates

The Smart Heater is updateable through its RS485 Modbus interface. Updates files are only supplied by the manufacturer. There are two possibilities of updating the Smart Heater.

6.1. Update via update tool – not yet released

To update the Smart Heater through the Update-Tool, the Heater has to be connected to a PC via an RS485-to-USB converter. In the Tool, select the new Firmware and proceed. After the firmware has been transmitted, the Heater checks the integrity of the file, and reboots itself to flash the new firmware. After another reboot, the Smart Heater is updated and ready to use.

6.2. Update via Modbus master

If the Smart Heater should be updateable through the Modbus master, the master has to be capable of delivering the update file. For further information, please contact your vendor / manufacturer.