Technical Interface Specifications

for SG Ready for Electric Space-Heating and Hot Water Heat Pumps and Compatible System Components

Version 1.1

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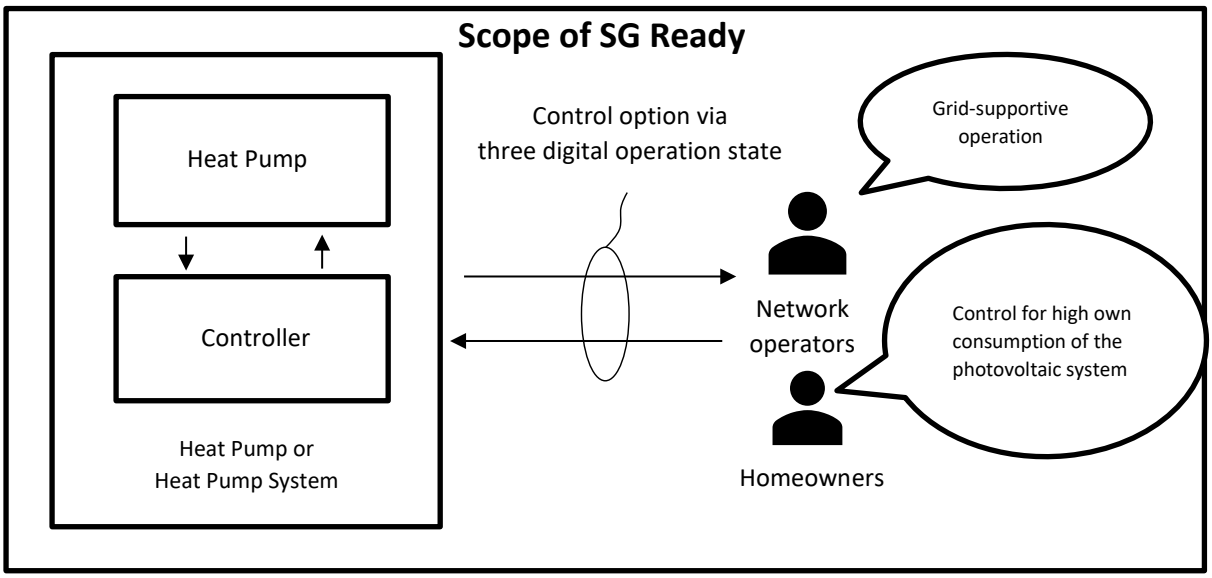
I. General Information on SG Ready for Smart Grid-Compatible Heat Pumps and System Components

The energy sector is increasingly shaped by fluctuating renewable energy input. Heat pumps can act as demand-flexible consumers by actively storing excess electricity as thermal energy when it cannot be fed into the local grid. This stored energy can be used to meet heating demands or to reduce consumption peaks by temporarily shutting down the heat pump. Load management with heat pumps is a proven and energy-efficient method that creates synergies between the electricity and heating sectors, reduces dependency on energy imports, and contributes to climate protection.

The SG Ready label helps identify heat pumps that feature a defined interface for grid-friendly load management. This interface can be used by grid operators to control the device or by homeowners to maximize self-consumption in combination with a photovoltaic system.



I.1 Definitions

- Grid Connection Power: The maximum electrical power provided at the connection point by the distribution network operator. This includes the heat pump and an optionally integrated electric heating element or additional heater.
- Input Signal SG1: The input signal SG1 serves load shedding by limiting the power consumption of the heat pump. This function is primarily intended for distribution network operators. SG1 has priority over SG2.
- Input Signal SG2: The input signal SG2 enables the use of surplus energy provided by the home owner's power generation system or the distribution network operator.
- Controllable Consumption Devices (SteuVE): Consumers with a power consumption of more than 4.2 kW, connected and controllable within the low-voltage network (grid levels 6 and 7). Heat pumps qualify as SteuVE if they have a total grid connection power (as opposed to their heating capacity) exceeding 4.2 kW.[1]

[1] Definition according to the decision BK6-22-300 of the 6th Decision Chamber of the Federal Network Agency from November 27, 2023

2. SG Ready Interface for Heat Pumps

2.I Space-Heating Heat Pumps

- Space-heating heat pumps must have a controller that supports three operating states:

  a) **Operating State 1** (SG1: 1, SG2: 0 OR SG1: 1, SG2: 1):

  This state must be configurable to limit the power consumption of the heat pump.

  At least one of the following settings must be implemented:

  1) 0 kW power consumption
  2) Manufacturer-defined positive power consumption (> 0 kW)

     It is recommended to implement the provisions of §14a EnWG: The power consumption is limited to 4.2 kW for a grid connection power of up to 11 kW or to 40% of the grid connection power for values exceeding 11 kW. If the technical implementation of this power limitation is not feasible, a lower positive value for power consumption may be fixed.
  3) Installer-defined positive power consumption (> 0 kW)

     It is recommended to implement the provisions of §14a EnWG: The power consumption can be limited to 4.2 kW for a grid connection power of up to 11 kW or to 40% of the grid connection power for values exceeding 11 kW. If the technical implementation of this power limitation is not feasible, a lower positive value for power consumption may be set. This setting must be accessible exclusively to qualified personnel.

  A reduction in power consumption may be omitted to avoid interrupting operating cycles and defrosting processes. When the signal is present at the end of the operation-relevant process, the system should switch to Operating State 1.

  When controlled via an energy management system, the power consumption may be adjustable down to the minimum supply level in accordance with §14a EnWG.

  b) **Operating State 2** (SG1: 0, SG2: 0):

  The heat pump operates in normal mode.

  c) **Operating State 3** (SG1: 0, SG2: 1)

  The heat pump operates in boost mode for space heating and/or domestic water heating. Surplus electricity is stored thermally, e.g., by increasing target temperatures in buffer or hot water storage.

- Entering a requested Operating State may be skipped to ensure safe operation of the unit.
- Planning documents must be available for each model or model range, describing how heat pump systems with SG Ready space-heating heat pumps should be designed for load management. These documents must be included in the application and be available in the respective sales region’s language.
- Alternative signal names are allowed, as long as the SG1 and SG2 labels are referenced in the device documentation. The naming must not be misleading.

- In multi-unit setups, one device (controller or heat pump) must be assigned to ensure grid-supportive operation of the combined heat pump setup.
- The control voltage can be freely defined by the manufacturer between 3V and 250V and must be specified in the manufacturer's documentation.
- Room temperature may optionally be used as a control parameter for regulating system temperatures (supply/return temperature). A room thermostat cannot be used to block the heat pump based on room temperature alone.
- State changes may optionally be logged.

2.2 Domestic Hot Water Heat Pumps

- Domestic hot water heat pumps must have a controller that supports three operating states:

  a) **Operating State 1** (SG1: 1, SG2: 0 OR SG1: 1, SG2: 1):

  The optional electric booster heater is disabled in this state. Implementation is optional unless the unit qualifies as a SteuVE.

  b) **Operating State 2** (SG1: 0, SG2: 0):

  The heat pump operates in normal mode.

  c) **Operating State 3** (SG1: 0, SG2: 1)

  The heat pump operates in boost mode for domestic hot water heating. Surplus electricity is stored thermally by raising the target temperature of the hot water tank.

- Entering a requested Operating State may be skipped to ensure safe operation of the unit.
- Planning documents must be available for each model or model range, describing how heat pump systems with SG Ready domestic hot water heat pumps should be designed for load management. These documents must be included in the application and be available in the respective sales region's language.
- In multi-unit setups, one device (controller or heat pump) must be assigned to ensure grid-supportive operation of the combined heat pump setup.
- The control voltage can be freely defined by the manufacturer between 3V and 250V and must be specified in the manufacturer's documentation.
- State changes may optionally be logged.

3. Interface-Compatible System Components

3.1 Interface-Compatible System Components

- System components that are compatible with the SG Ready interface must include logic to control heat pumps using all three operating states as defined in sections 2.1 and 2.2.
- Configuration documents must be available to explain how to set up system components for controlling SG Ready-compatible heat pumps. These must be included in the application.
- Control functions need to be configurable in a way to at least meet the following criteria:

a) When the load shedding signal (Operating State 1) is activated via the digital input, it must remain active for at least 10 minutes. After deactivation, it must not be reactivated for another 10 minutes.

b) When the boost operation signal (Operating State 3) is activated via the digital input, it must remain active for at least 10 minutes. After deactivation, it must not be reactivated for another 10 minutes.