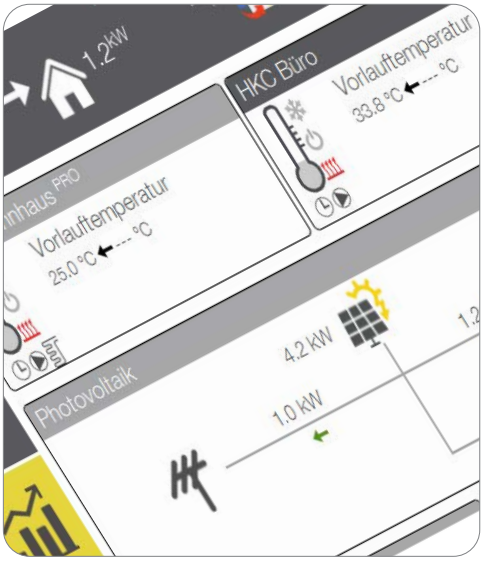
TECHNICAL DOCUMENT

HEAT PUMPS

myiDM+energy

Smart Grid
Photovoltaics power-usage
Hourly energy rates



SG Ready
Smart Heat Pumps

Heat pumps with NAVIGATOR control 2.0

QUALITY SINCE 1977

HEAT PUMPS FROM **AUSTRIA**

www.idm-energie.at

812584_Rev.11 - Translation of the original instructions

1.1. The myiDM service platform

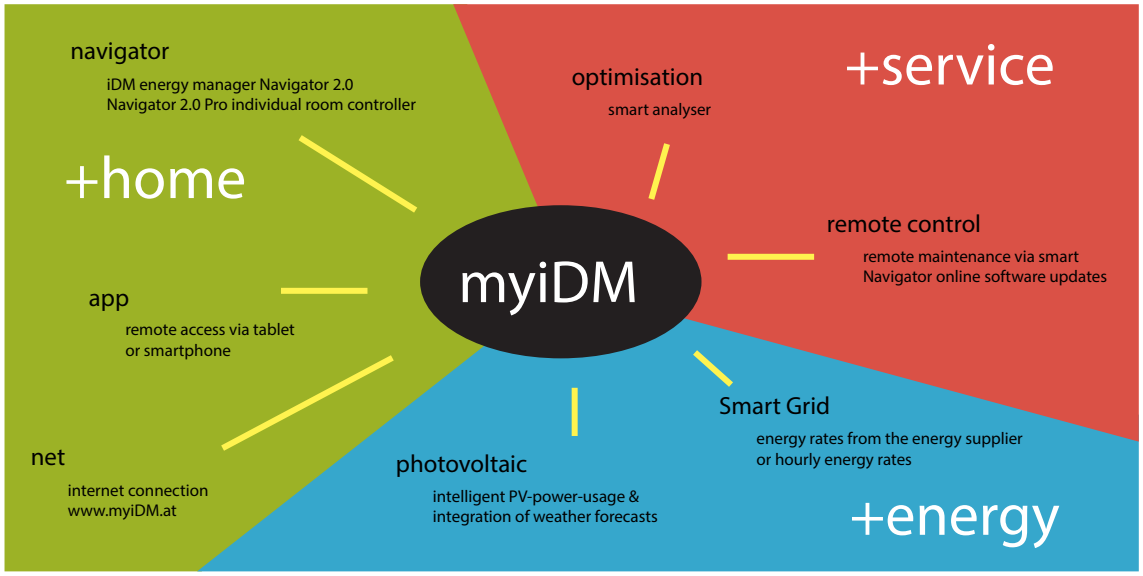
The myiDM service platform is divided into three areas:

- **myiDM+ service**
- **myiDM+ energy**
- **myiDM+ home**

This technical document deals with the „myiDM+ energy" area, which is why this area is explained below. The „myiDM+ energy" service offers intelligent strategies for electricity management in conjunction with the operation of a heat pump. The contribution of the heat pump here is the possibility of load shifting. Load shifting is achieved through thermal storage (raising the temperature for hot water and heating in the AQA/ Hygienik/TERMO or raising the temperature in the building) when electricity tariffs are low or PV yields are high, or by reducing operation (EVU block) when electricity tariffs are high or PV yields are low. With normal electricity tariffs, the heat pump runs in normal mode.
„myiDM+ energy" in combination with the NAVIGATOR control unit 2.0 offers the following functions for thermal load shifting:

- Photovoltaics
  - Intelligent PV power utilization and integration of weather data
- Smart Grid
  - Tariff signals from the energy supplier
  - Hourly variable electricity tariffs (only possible in conjunction with a smart meter)

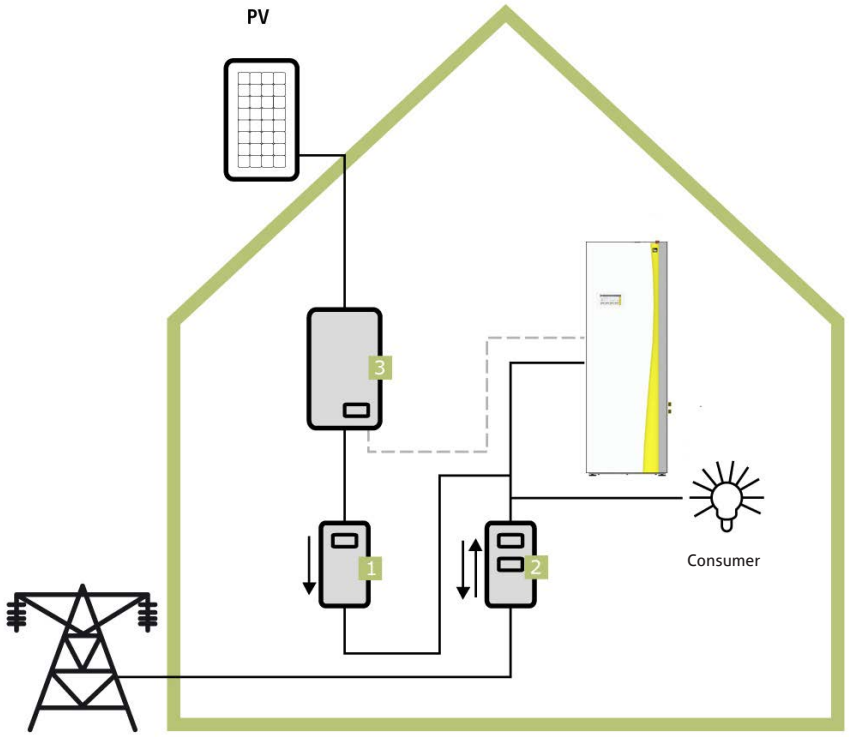
By using the functions listed above, the annual energy costs of the heat pump system are reduced and the electricity grids are also relieved. In cooperation with the company aWATTar (an Austrian energy supplier start-up), iDM Energiesysteme offers the electricity tariff „myiDM+ energy" for the use of „hourly variable electricity tariffs".



2. Photovoltaics - electricity utilization

2.1. Self-consumption of photovoltaic electricity

Due to the grid parity of PV systems and the falling feed-in tariffs, a high level of self-consumption of the PV electricity generated offers economic advantages for the operator. By using the PV electricity for heating, cooling and hot water generation in combination with the NAVIGATOR 2.0 control system of the heat pump, a high proportion of self-consumption is achieved. With the correct dimensioning (heat pump, storage tank and PV system), the annual share of self-consumption can be up to 70 %.



2.1.1. Description

The heat pump, i.e. the NAVIGATOR 2.0, communicates with the inverter or energy consumption controller (3) of the photovoltaic system and therefore knows when solar power is available. The heat pump uses this generated/surplus solar power (possibly in conjunction with a proportion of electricity from the public grid) to heat domestic hot water, to boost the heat storage tank or to cool the cold storage tank and to boost the underfloor heating.

In order to be able to use the PV function, the inverter or energy consumption controller must inform the heat pump of the current power or excess power. Various regulation and control functions have been implemented in the NAVIGATOR 2.0 for this communication between the NAVIGATOR 2.0 and the inverter or energy consumption controller of the PV system.

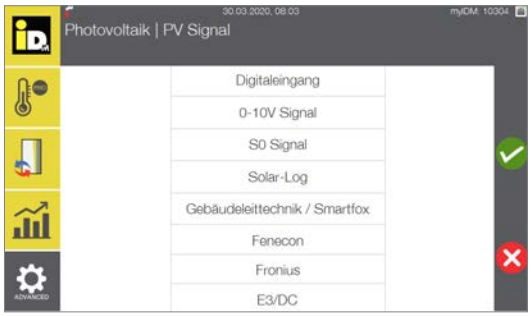
2.1.2. Determination of own consumption

An electricity meter (1) measures the total amount of PV electricity produced, with unused electricity being fed into the public grid. A separate bidirectional meter (2) records this excess energy. The difference between the solar power produced and the surplus is used to calculate self-consumption.

2.2. Communication options PV system - heat pump

For PV power utilization, the following PV signals from the inverter or energy consumption controller can be used to communicate with the NAVIGATOR controller 2.0:

- » Digital input (Floating contact)
- » 0-10V signal
- » S0 signal
- » Solar-Log™
- » Building management system/Smartfox
- » Fenecon
- » Fronius
- » E3/DC
- » SMA with Datamanager
- » Sonnen
- » Huawei
- » Sungrow
- » Goodwe
- » Kostal



The PV signal is set via parameter P008 in the „Settings/Configuration" menu in the heating engineer level of the NAVIGATOR control unit 2.0. With the „0-10 V signal" or „S0 signal" settings, the PV signal type (PV010) must also be configured as surplus or yield. (see chapter „2.5. NAVIGATOR control 2.0 settings").

As soon as the NAVIGATOR 2.0 receives one of the above signals from the inverter or energy consumption controller of the PV system, the set boosting strategies of the heat pump (domestic hot water preparation, heat storage management, floor heating boosting) are executed.

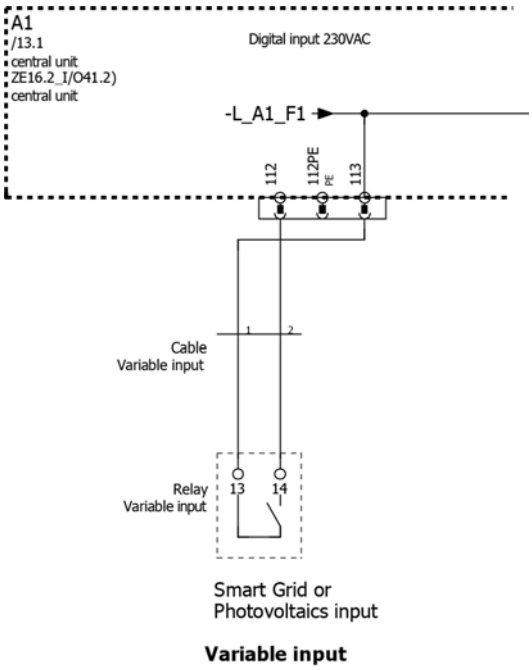
The options/integration variants for PV electricity use with the heat pump, e.g. for systems with a heat pump tariff, must be clarified with the respective energy supply company (EVU)!

All PV signal types are available for cascade systems, except for „Digital input". For 0-10 V signal, S0 signal and building management system/Smartfox, only surplus control is active.

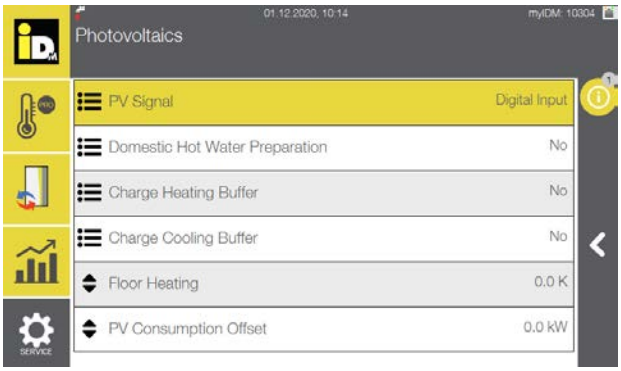
2.2.1. Communication via digital input (potential-free contact)

In order to be able to operate the heat pump with PV power, the inverter must output a potential-free signal as soon as the threshold value set on the inverter by the system operator is reached. The signal from the inverter must be connected to the variable input (terminal 112/113) of the NAVIGATOR control 2.0. The setting of the threshold value always depends on the size of the PV system and the size of the heat pump.

» If a low threshold value is set, the heat pump may run on a mix of PV electricity and electricity from the grid.
» If a high threshold value is set, the heat pump runs largely on PV electricity.
However, the time window for operation is smaller.



Variable input

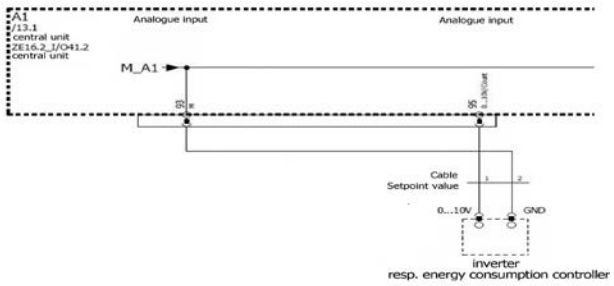


The heat pump does not know the current output of the PV system!

2.2.2. Communication via 0-10V signal

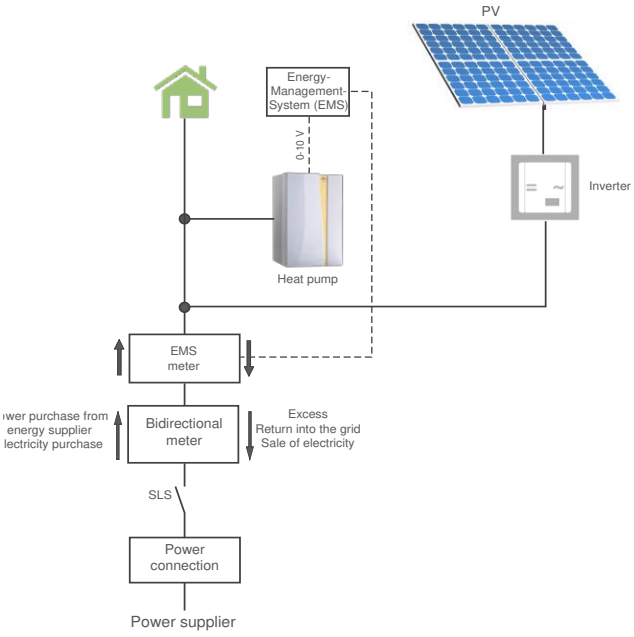
An inverter or energy consumption controller communicates with the NAVIGATOR control unit 2.0 via its 0-10 V signal (analog output). The 0-10 V signal provided is connected to the 0-10 V analog input (terminal 93/95) of the heat pump.

» The heat pump uses the actual PV power or the surplus power from the energy consumption controller.
» A modulating heat pump can be operated with the instantaneous output of the PV system or the surplus electricity.

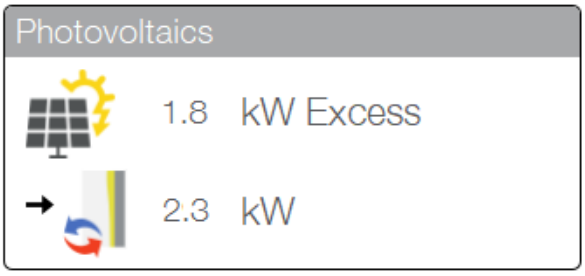


2.2.2.1. 0-10V signal from energy management systems

Energy management systems (EMS) can communicate with the heat pump via a 0-10 V signal.
The heat pump is operated with the **supply current**.

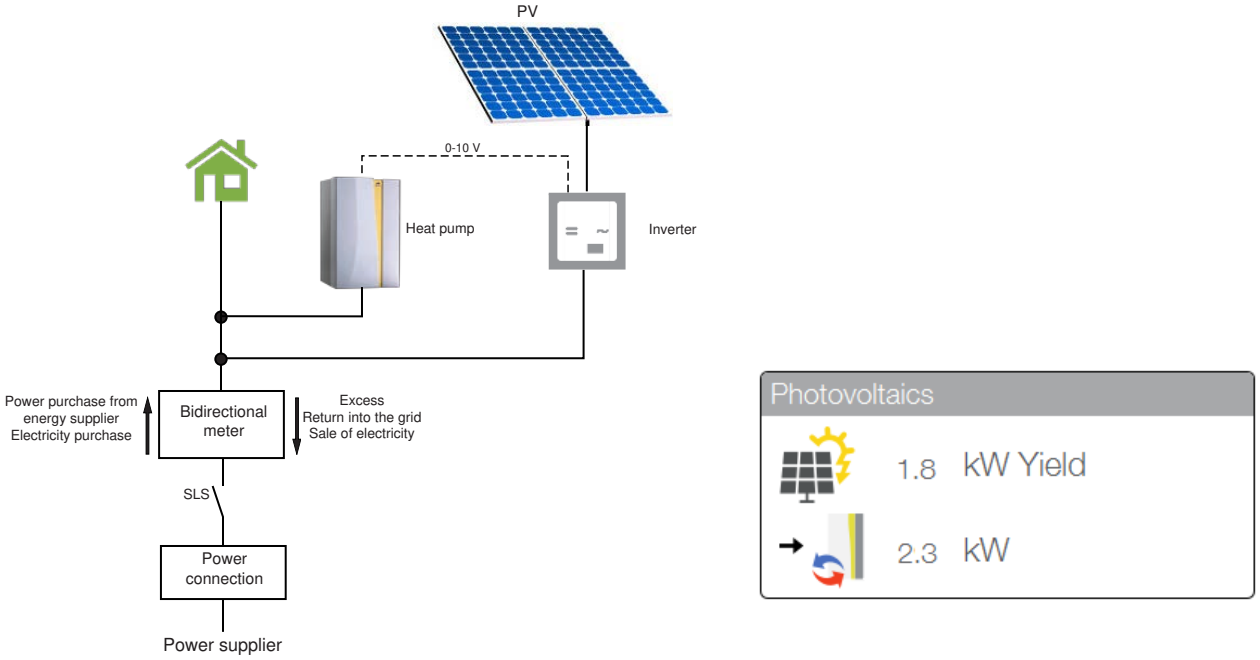


Integration 0-10V signal / Excess



2.2.2.2. 0-10 V signal from inverters

Inverters can communicate with the heat pump via a 0-10 V signal. The heat pump is operated with the **actual PV input**. Other consumers are not taken into account.

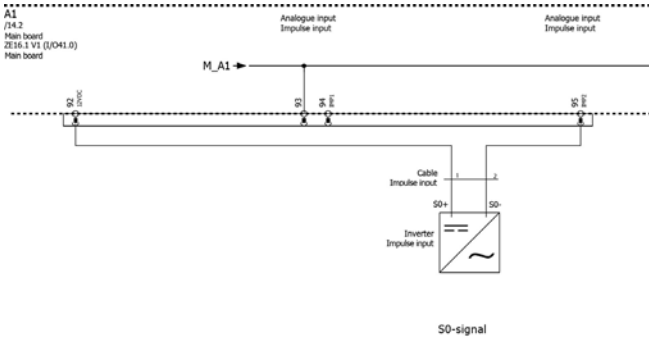


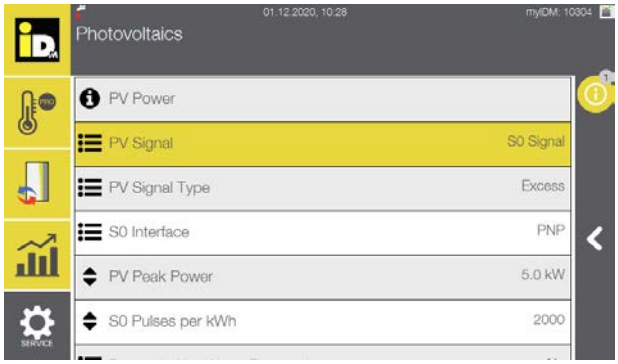
Integration 0-10V signal / Yield

2.2.3. Kommunikation über S0-Signal

An inverter or energy consumption controller communicates with the NAVIGATOR control unit 2.0 via an S0 signal. The S0 signal (meter pulses are potential-free) is connected to the analog/pulse input of the heat pump (terminal 92/95).

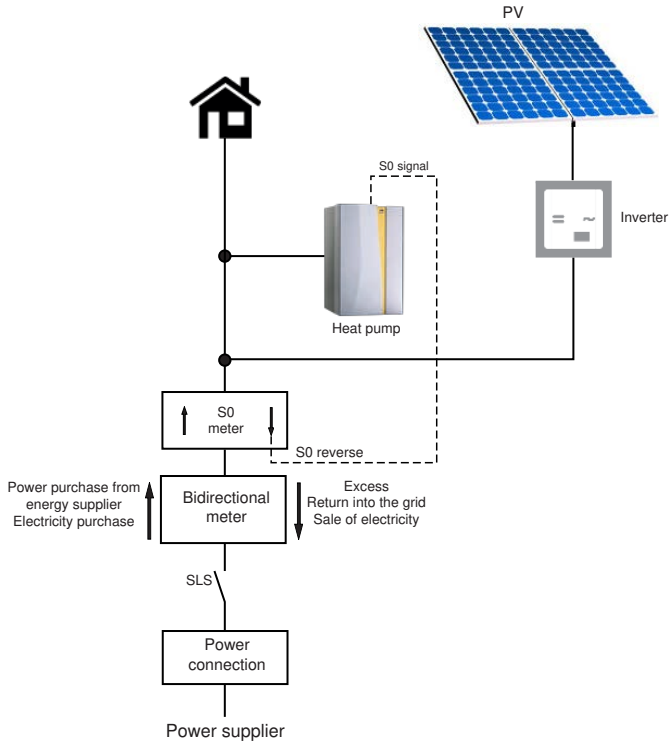
» The heat pump uses the actual PV power or the surplus power from the energy consumption controller.
» A modulating heat pump can be operated with the instantaneous output of the PV system or the surplus electricity.

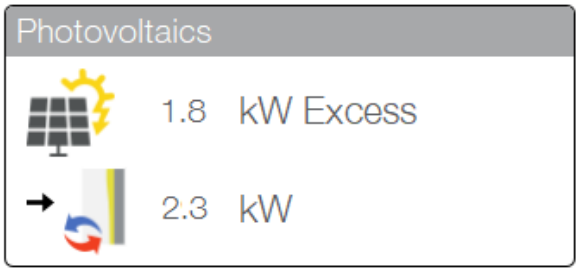




2.2.3.1. S0 signal from energy management systems (S0 meters)

Energy management systems (EMS) can communicate with the heat pump via an S0 signal. The heat pump is then operated with the surplus electricity.

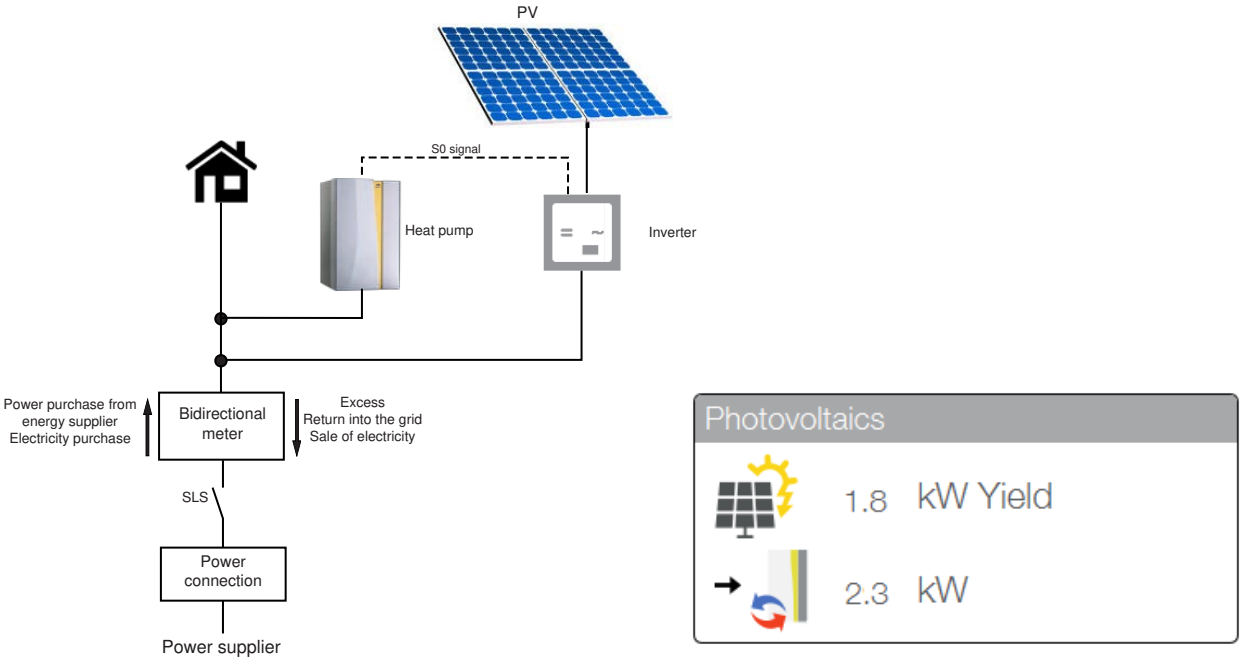




Integration S0 signal / Excess

2.2.3.2. S0 signal from inverters

Inverters (e.g. Kostal Piko) can communicate with the heat pump via an S0 signal. The heat pump is operated with the **actual PV yield**. Other consumers are not taken into account.



Integration S0 signal / Yield

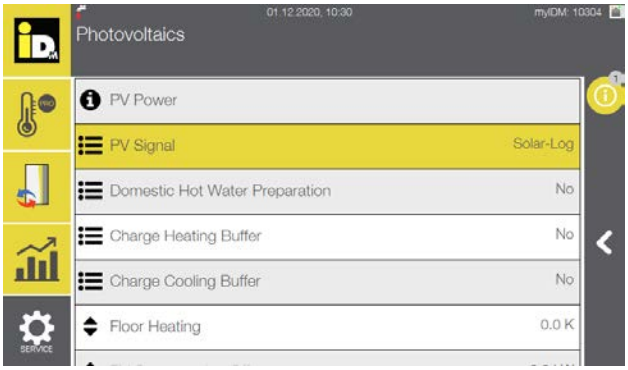
2.2.4. Communication via Solar-Log™

The intelligent communication interface for optimizing self-consumption and monitoring the PV system communicates with the NAVIGATOR controller 2.0 via a network connection. For this purpose, the Solar-LogTM and the heat pump are connected to a switch, hub or router (provided by the customer). Alternatively, the Solar-LogTM and the heat pump can also be connected directly. The network socket is located on the outside of the heat pump casing or inside the heat pump on the electrical system (for AERO ILM heat pumps).

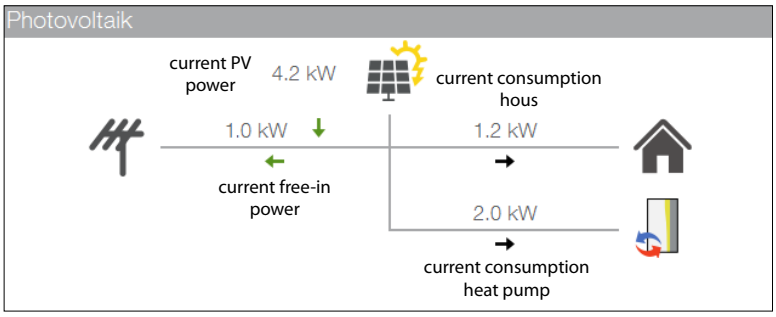
The heat pump is operated with the **surplus electricity**.

Advantages:

- » Communication with many common inverter types (e.g. Kostal, Solar Edge, SMA,...)
- » Increase and optimization of self-consumption
- » Operation of the heat pump with actual surplus electricity
- » Forecast data (2 days)
- » Network connection



PV signal „Solar-Log" navigator control setting



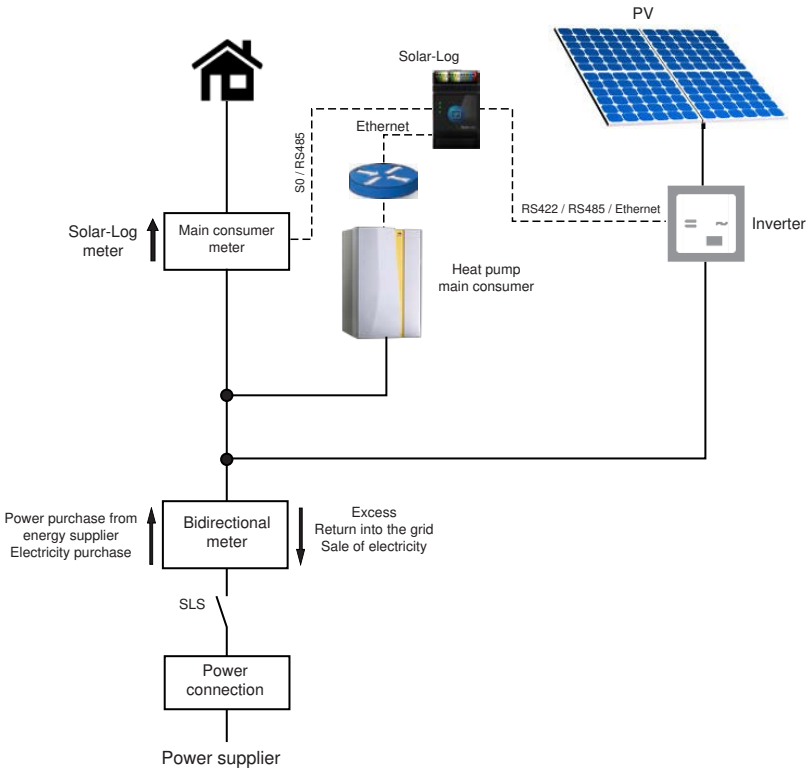
Display on navigator control

Communication with PV systems with battery storage is not possible!

For more information on the supported inverter types and the possible Solar-Log™ models, visit www.solar-log.com

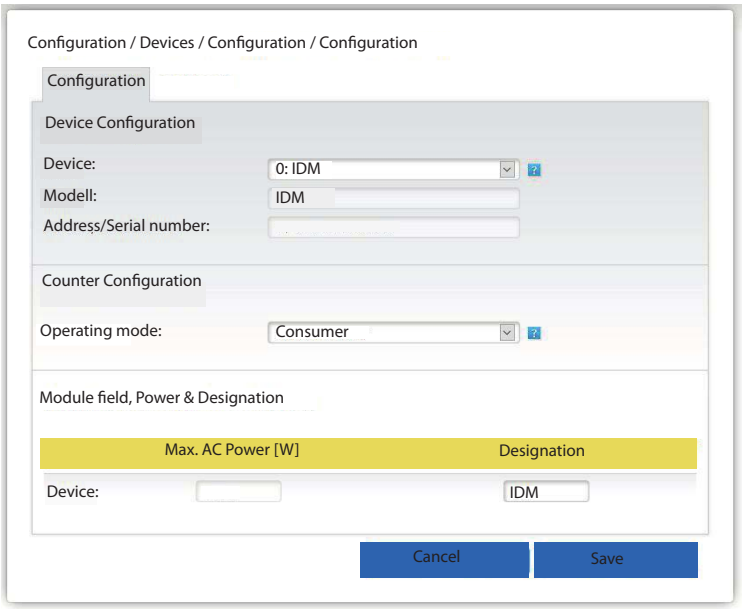
2.2.4.1. Heat pump as the main consumer

If the consumption of the heat pump is not recorded via a consumption meter, the operating mode must be set to „Consumer" in the Solar-LogTM under „Configuration | Devices | Configuration".



Integration Solar-Log / Heat pump as main consumer

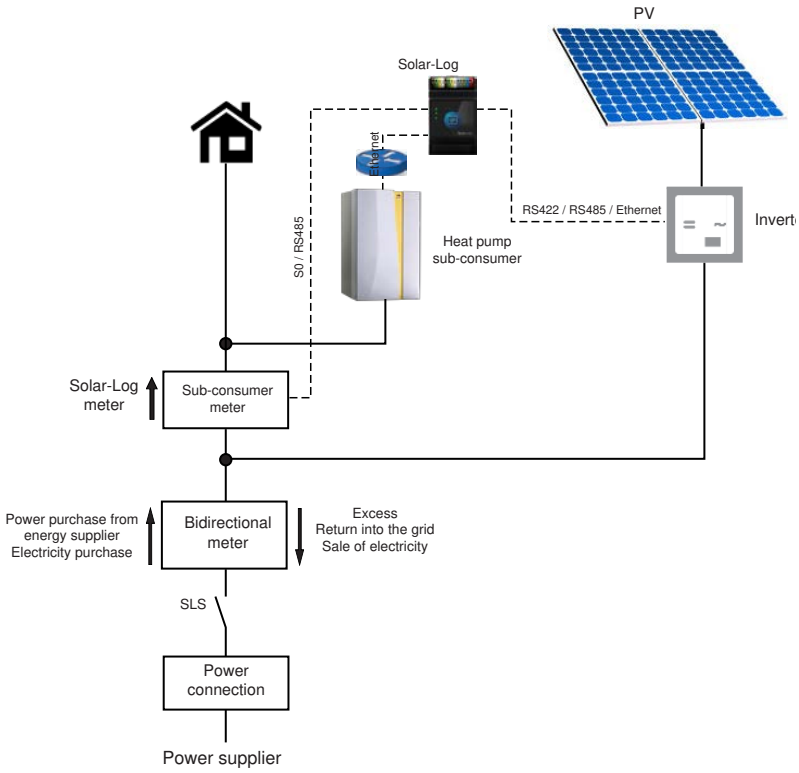
Solar-LogTM" settings:



Source: https://www.solar-log.com/manuals/manuals/de_DE/SolarLog_Handbuch_Smart_Energy_DE_01.pdf

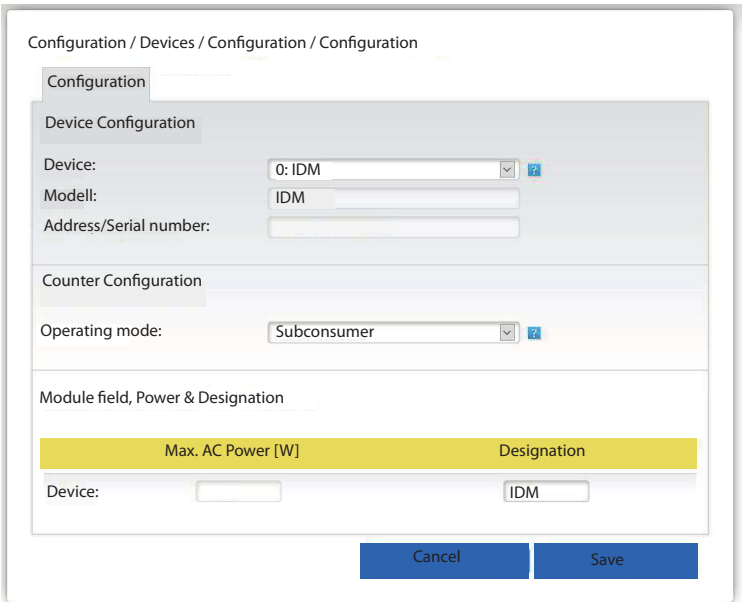
2.2.4.2. Heat pump as under-consumer

If the consumption of the heat pump is recorded via a consumption meter, the operating mode must be set to „Underconsumer" in the Solar-Log™ under „Configuration | Devices | Configuration".



Integration Solar-Log / Heat pump as sub-consumer

Solar-Log™" settings:



Source: https://www.solar-log.com/manuals/manuals/de_DE/SolarLog_Handbuch_Smart_Energy_DE_01.pdf

2.2.5. Communication via building management system/Smartfox

Communication with the NAVIGATOR controller 2.0 can take place via Modbus TCP, via EIB-KNX or via BACnet IP. To do this, the NAVIGATOR control unit 2.0 must be connected to the PV system using a network cable (provided by the customer) with a switch, hub or router (provided by the customer).

The network socket for the network cable is located on the outside of the heat pump casing or inside the heat pump on the electrical system (for AERO ILM heat pumps). The exact position of the respective network socket can be found in the installation instructions for the heat pump.

Network socket on the outside of the cladding on the wall cabinet of a TERRA AL Twin heat pump.

Communication between the NAVIGATOR controller 2.0 and the PV system takes place via the following addresses:

Example: „Modbus TCP"

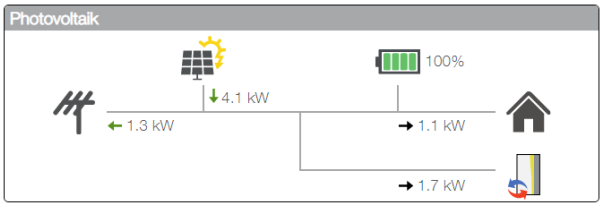
74	FLOAT	RW/RO	Current PV surplus		[kW]
76	FLOAT	RW/RO	Power of electric heating element		[kW]
78	FLOAT	RW/RO	Current PV production		[kW]
82	FLOAT	RW/RO	House consumption	0	[kW]
84	FLOAT	RW/RO	Battery discharge	0	[kW]
86	WORD	RW/RO	Battery level	-1	[%]
4122	FLOAT	RO	Current power consumption heat pump		[kW]

Navigator control display:

1. only the PV surplus is communicated

Current PV surplus and current power consumption of the heat pump

2. all PV values are communicated

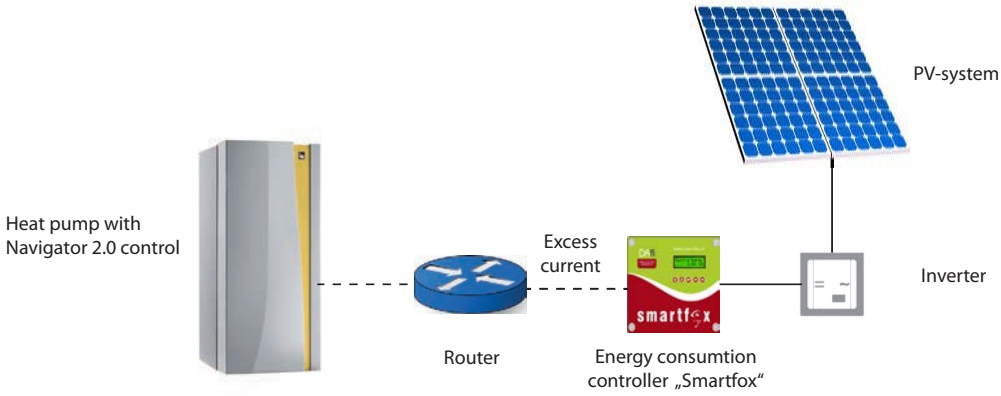


Graphic current flow

Modbus TCP communicates via TCP port 502, BACnet IP via UDP port 47808.
The building management system/Smartfox communication and myIDM function in parallel if all network participants are in the same network!

Example: „Smartfox" solar energy management system

The „Smartfox" energy manager communicates with the heat pump via the network (LAN) using the Modbus TCP protocol (network cable and switch provided by the customer). The heat pump is operated with the surplus power from the PV system.

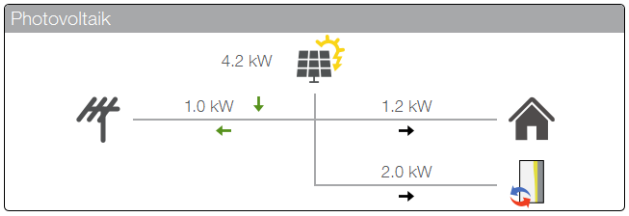


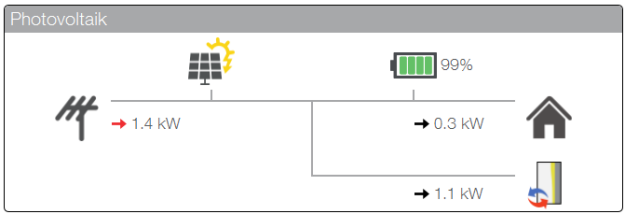
Navigator control settings:

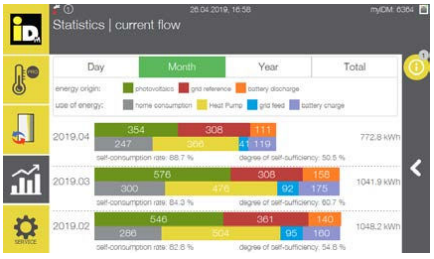
- » PV signal „Building management system/ Smartfox"
- » Network connection
- » Enter IP address manually (DHCP „Off")

Smartfox" settings:

- » Settings/Heat pump" menu
- » Manufacturer „IDM"
- » IP address of the heat pump must be entered







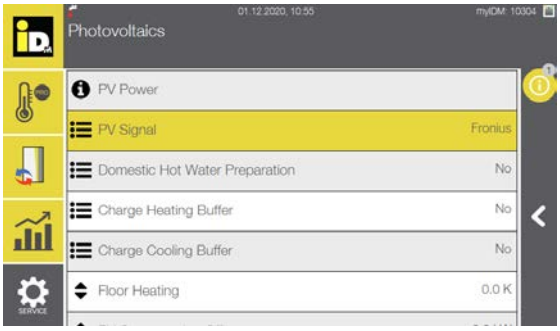
In order for communication with the iDM heat pump to work, a separate license is required for the „Smartfox". This must be requested from „Smartfox"! (http://shop.smartfox.at/index.php)

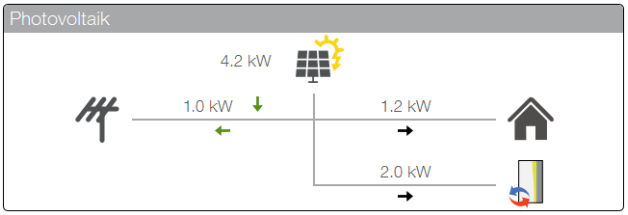
The heat pump and Smartfox must be in the same network.
Network communication with the „Smartfox Light" is not possible!

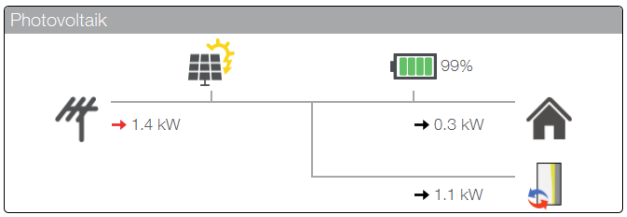
2.2.6. Communication with Fronius PV systems (Symo/Symo Hybrid/GEN24)

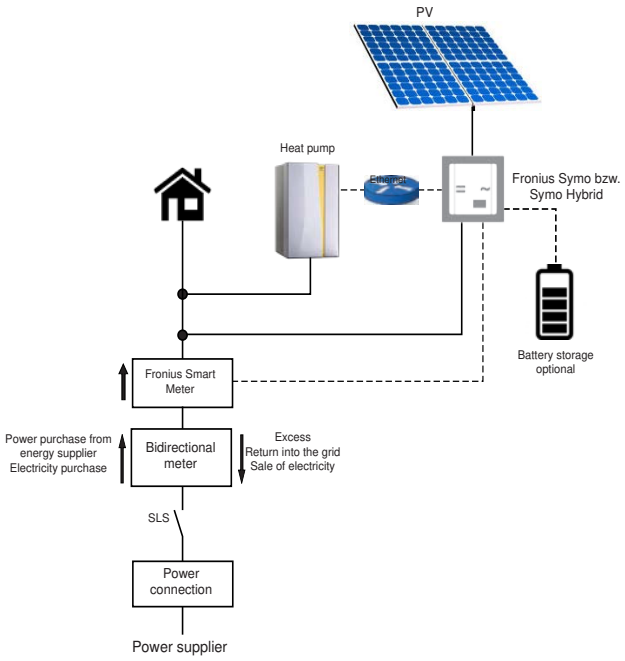
When communicating with Fronius systems, it is important that the heat pump and the Fronius system (Symo / Symo Hybrid / GEN24) are in the same network. Communication between the heat pump and the inverter takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, it is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation.

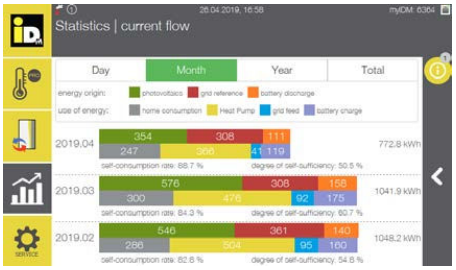








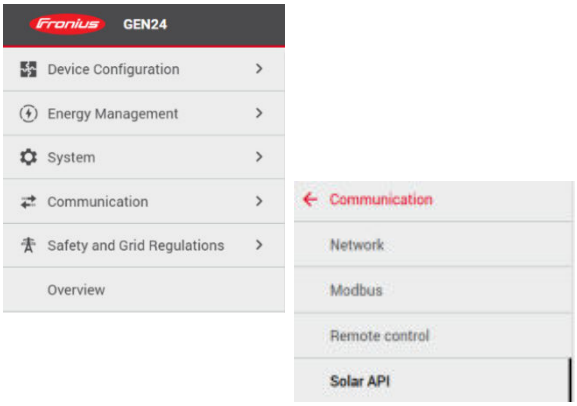
Integration Fronius Inverter

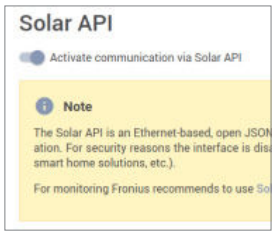


The Fronius Smart Meter is absolutely essential for communication between the iDM heat pump and the Fronius system (Symo / Symo Hybrid / GEN24)! The „Solar API" interface must be activated on the Fronius system!

Communication with several inverters is also possible (PV values are added together). The Fronius Smart Meter is only required as an electricity meter for one inverter.

2.2.6.1. Activate „Solar API" interface





The „Solar API" interface can be activated in the local network by entering the IP address of the inverter in a web browser.

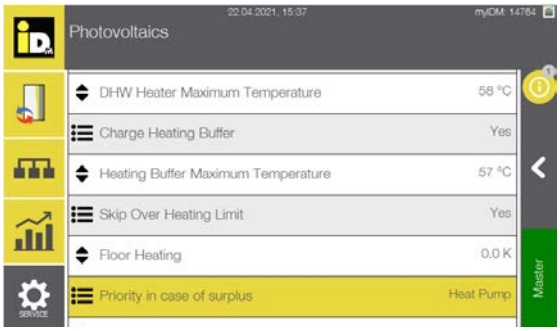
You must log in as a „Technician" (password entry required, usually the same password as for „Customer" login).

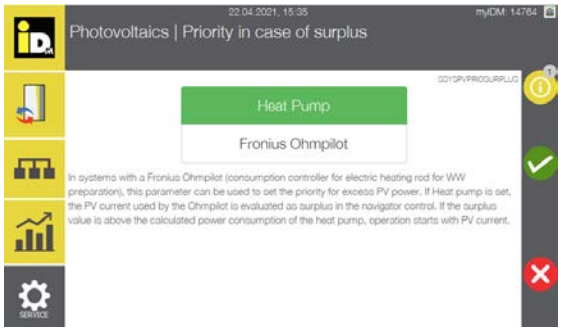
Then select „Communication" in the menu and then „Solar API" (possibly also in the „Remote control" subfolder).

Communication via Solar API can then be activated there.

2.2.6.2. Systems with Fronius Ohmpilot

The Fronius Ohmpilot is a consumption controller that uses surplus PV power to heat water. The Ohmpilot is taken into account in our software, i.e. for systems with Fronius inverters and Fronius Ohmpilot, the „Priority in case of surplus" parameter appears in the PV menu when configuring the „Fronius" PV signal. The surplus PV current that the Ohmpilot uses for the electric heating elements is then evaluated as „surplus" in the control system and as soon as this value is higher than the value that the Navigator control system calculates for operation with PV current, the heat pump starts.

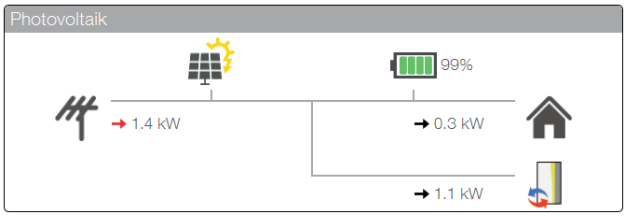


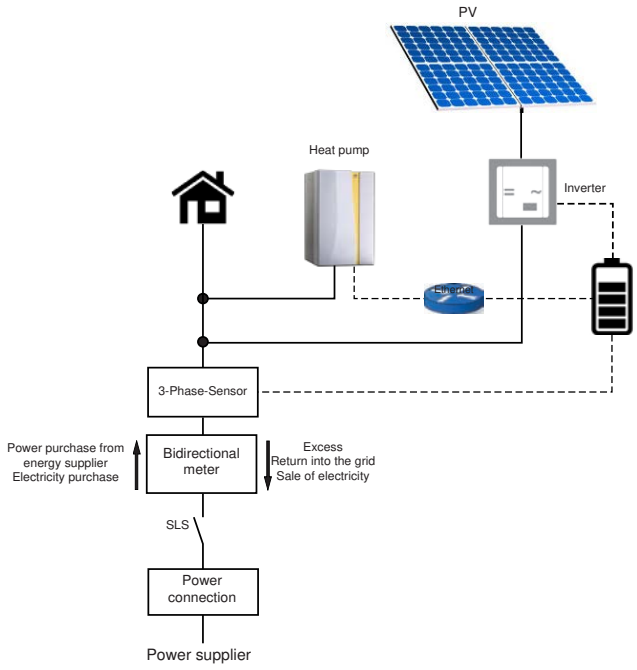


2.2.7. Communication with Fenecon Energy Management System (FEMS)

When communicating with the Fenecon energy management system, it is important that the heat pump and the Fenecon energy management system are in the same network. Communication between the heat pump and FEMS takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, it is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation.



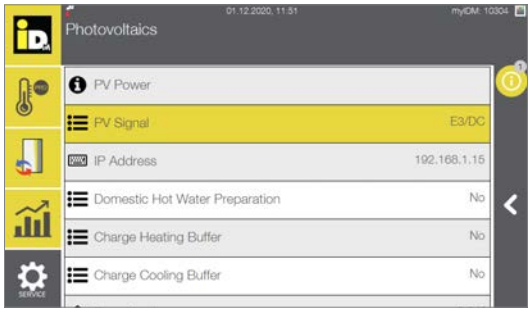


Integration Fenecon Energy-Management-System (FEMS)

When using Fenecon energy management systems, a battery is required as the energy is taken directly from the battery.

2.2.8. Communication with E3DC

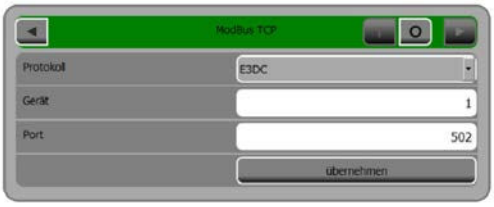
When communicating with the E3DC energy management system, it is important that the heat pump and the energy management system are in the same network. Communication between the heat pump and E3DC takes place automatically via the network (E3DC protocol / port 502). The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

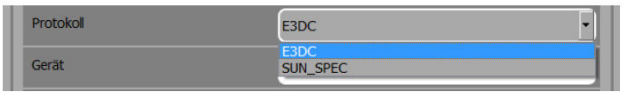


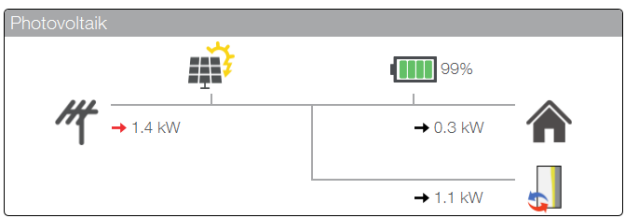
For communication between the iDM heat pump and the E3DC energy management system, the IP address of the E3DC must be set in the navigator control!

The „E3DC" (Simple Mode) Modbus TCP protocol must be configured on the E3DC!

„Modbus function" settings on the E3DC

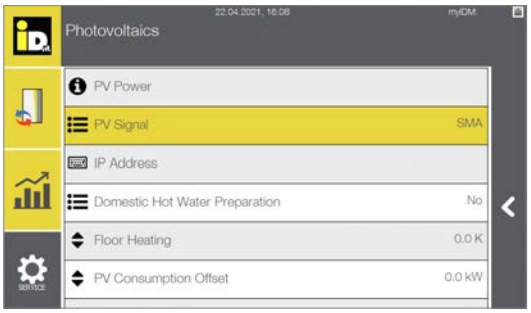


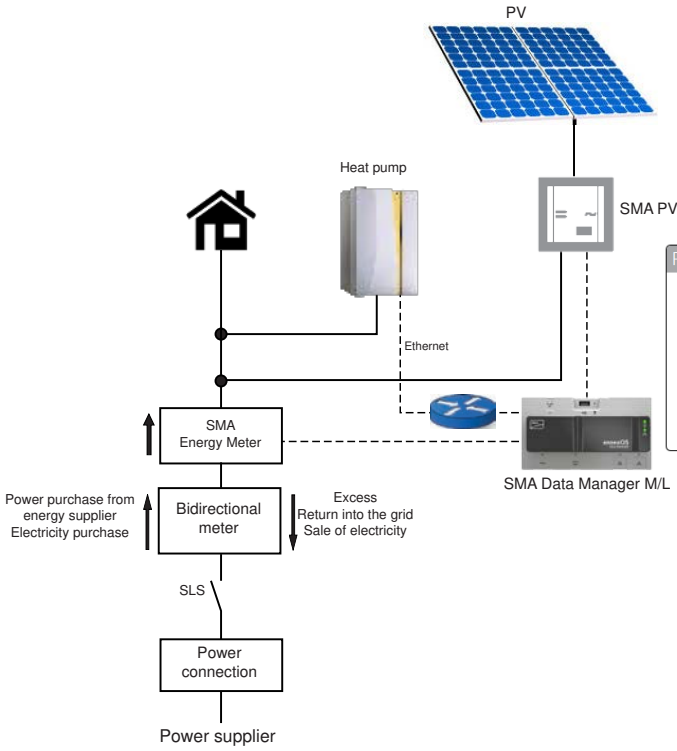


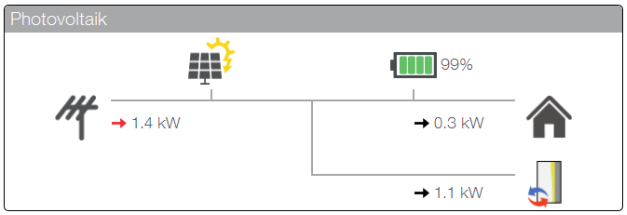


2.2.9. Communication with SMA Datamanager

When communicating with the SMA Datamanager, it is important that the heat pump and the Datamanager are in the same network. Communication between the heat pump and Datamanager takes place automatically via the network (Datamanager protocol / port 502). The surplus electricity is used for domestic hot water preparation, heat storage and heating management.







„Enable Modbus Server" must be checked in the Data Manager.

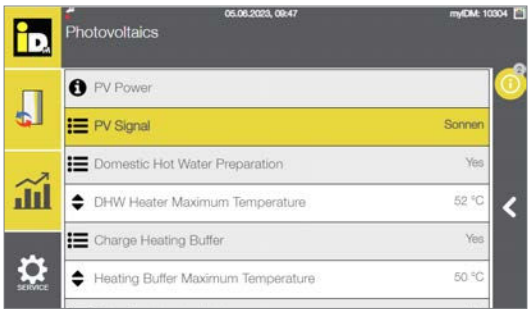
The SMA Energy Meter is absolutely necessary for communication between the iDM heat pump and the SMA Datamanager M or L!
The IP address of the SMA Datamanager must be set in the navigator control!

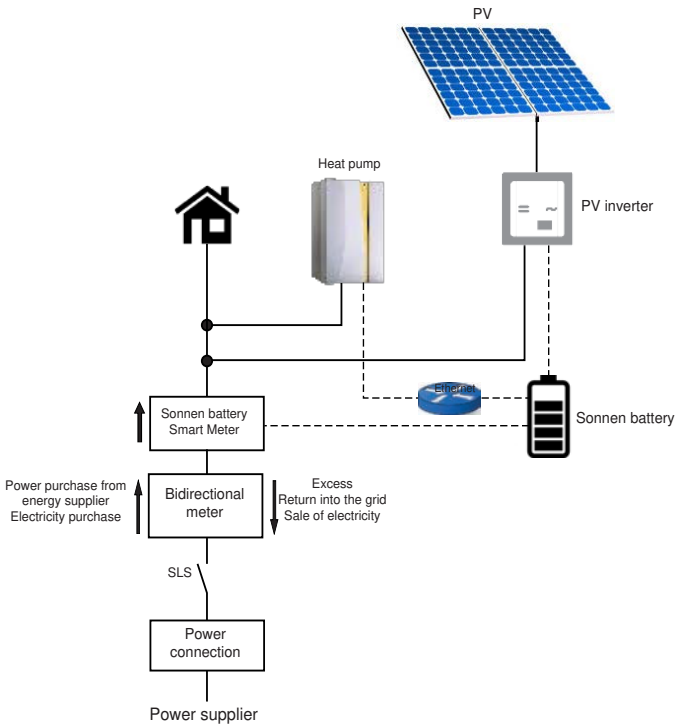
Communication with the „SMA Sunny Home Manager" is not possible!
The SMA Datamanager M Lite does not work in conjunction with systems with battery storage!

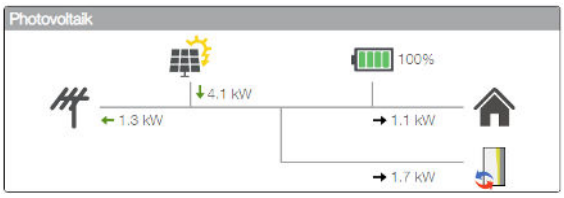
2.2.10. Communication with Solar battery

When communicating with the solar battery from Sonnen, it is important that the heat pump and the solar battery are in the same network. Communication between the heat pump and the solar battery takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, it is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation.





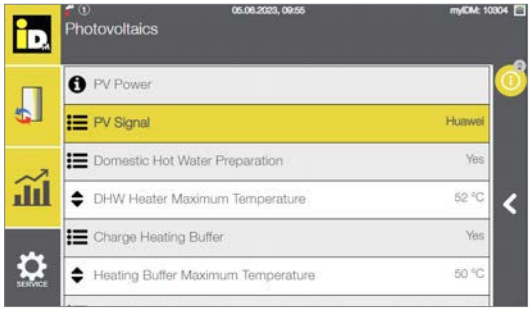


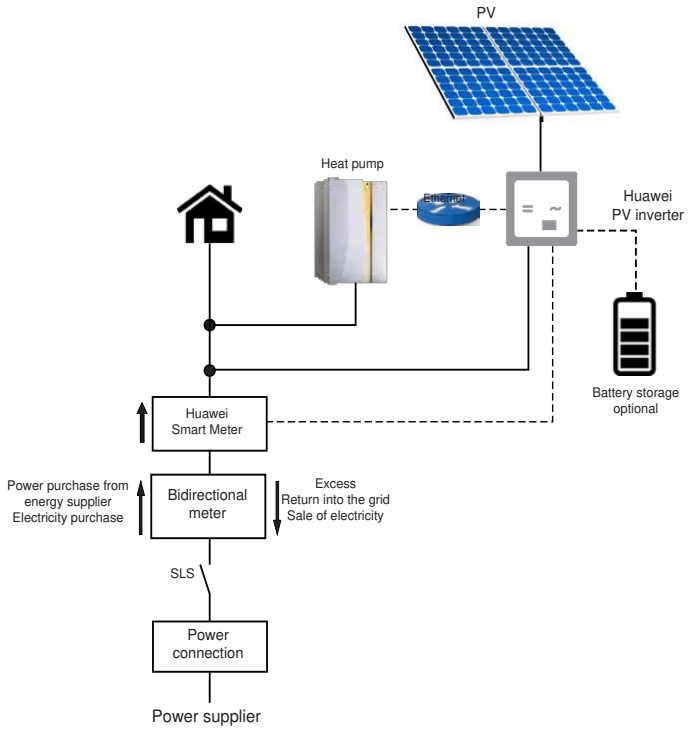
A Sonnen smart meter is absolutely essential for communication between the iDM heat pump and the Sonnen battery!

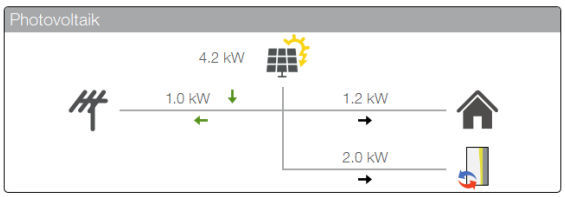
2.2.11. Communication with Huawei PV systems

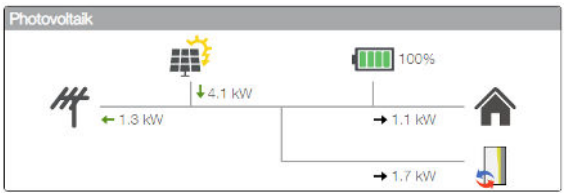
When communicating with Huawei PV systems, it is important that the heat pump and the Huawei system are in the same network. Communication between the heat pump and the inverter takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

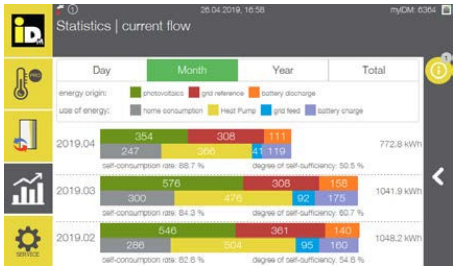
The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, the battery is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation.









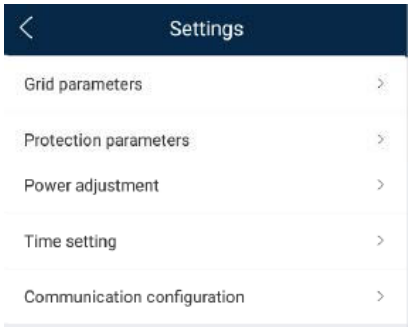


In order for the communication between the iDM heat pump and the Huawei PV system to function properly and the corresponding data to be recorded, a suitable Smart Energy Meter from Huawei must be installed. In addition, a dongle from Huawei and activation of the „Modbus TCP" interface (mobile app from Huawei) is required!
Communication with several inverters is currently not possible!

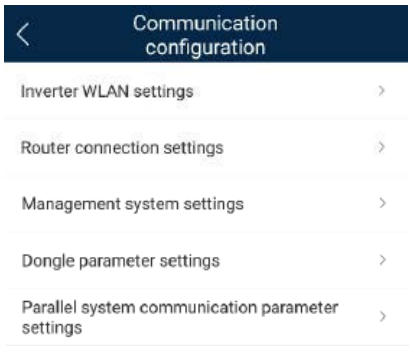
2.2.11.1. Activate „Modbus TCP" communication/interface

Modbus TCP communication must be set/activated via the mobile app.

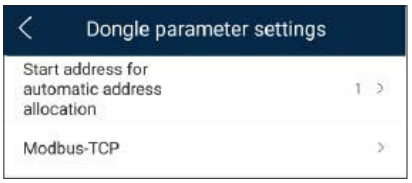
To do this, select the „Settings" menu.



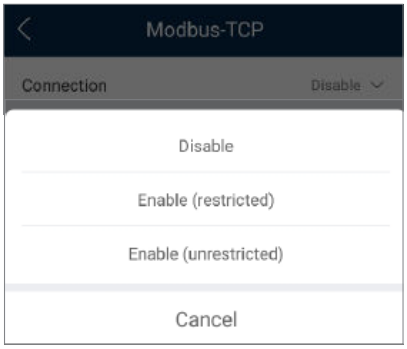
Select the „Communication configuration" menu.



Select the „Dongle parameter settings" menu.



Select „Modbus TCP".

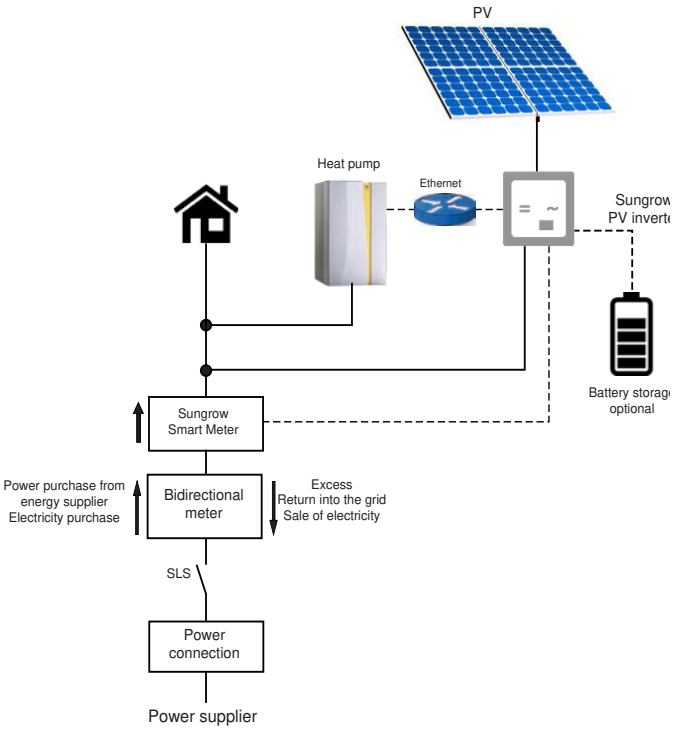


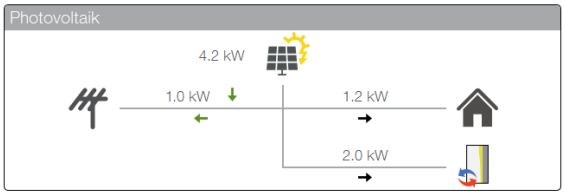
Select „Enable (unrestricted)".

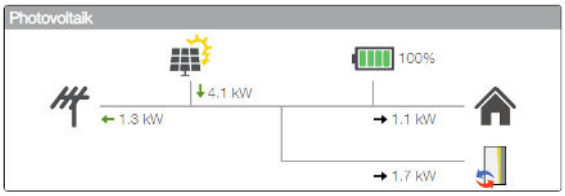
2.2.12. Communication with Sungrow PV systems

When communicating with Sungrow PV systems, it is important that the heat pump and the Sungrow system are in the same network. Communication between the heat pump and the inverter takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, it is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation..





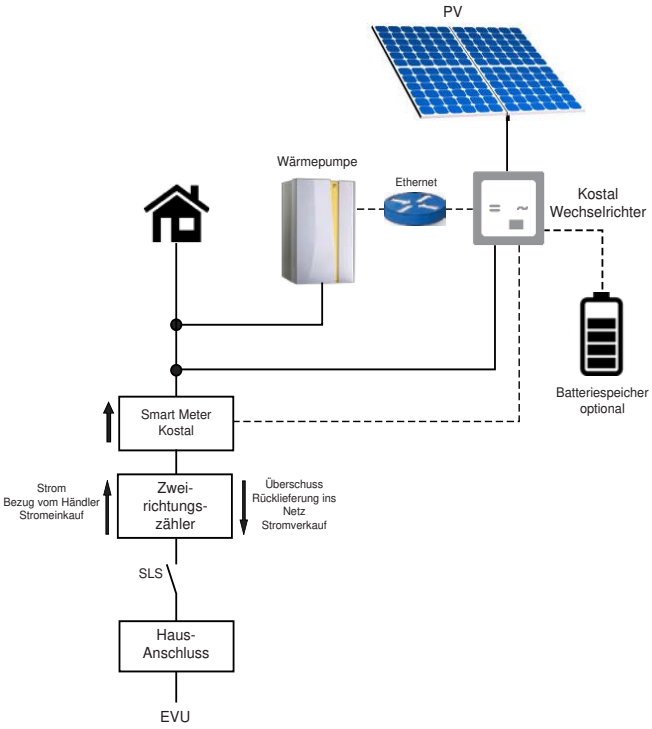


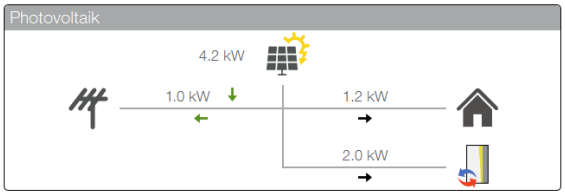
A suitable Smart Energy Meter from Sungrow must be installed so that communication between the iDM heat pump and the PV system from Sungrow functions properly and the corresponding data can be recorded. The inverter must be connected directly to the router via LAN cable and the Modbus ID on the inverter must be set to „1" (= default setting).
When using the WinNet-S Cloud app, the dongle must also be connected to the inverter in addition to the LAN cable.
Communication with several inverters is currently not possible!

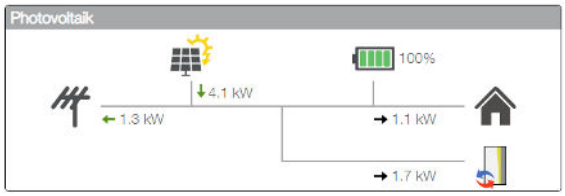
2.2.13. Communication with Kostal PV systems

When communicating with Kostal PV systems (Piko IQ / Plenticore / Plenticore Plus), it is important that the heat pump and the Kostal system are in the same network. Communication between the heat pump and the inverter takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, it is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation.

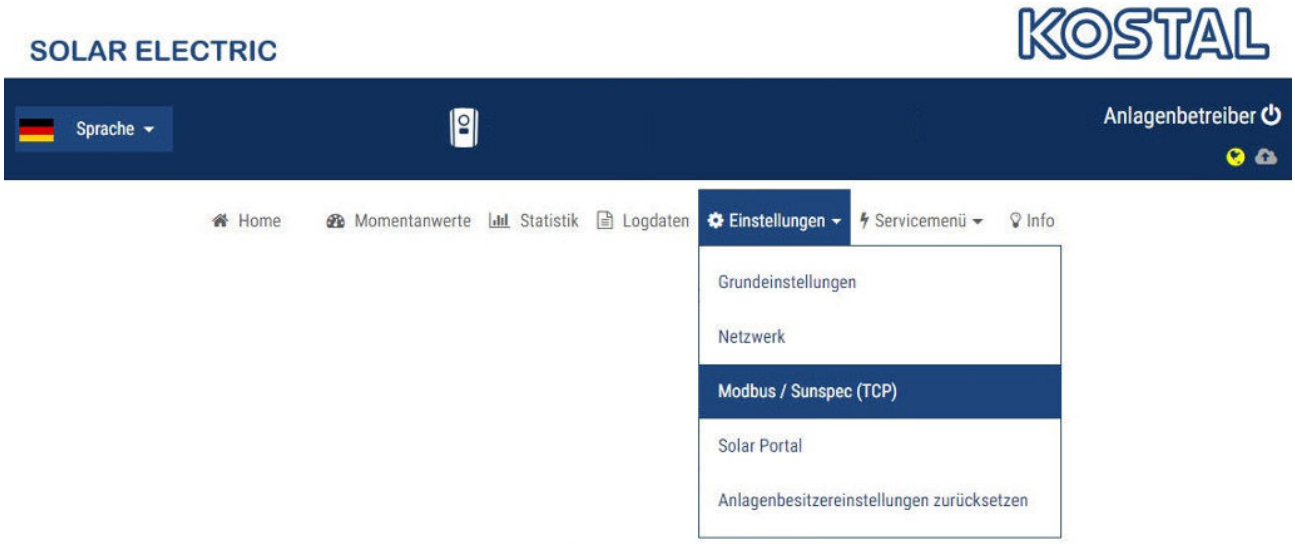




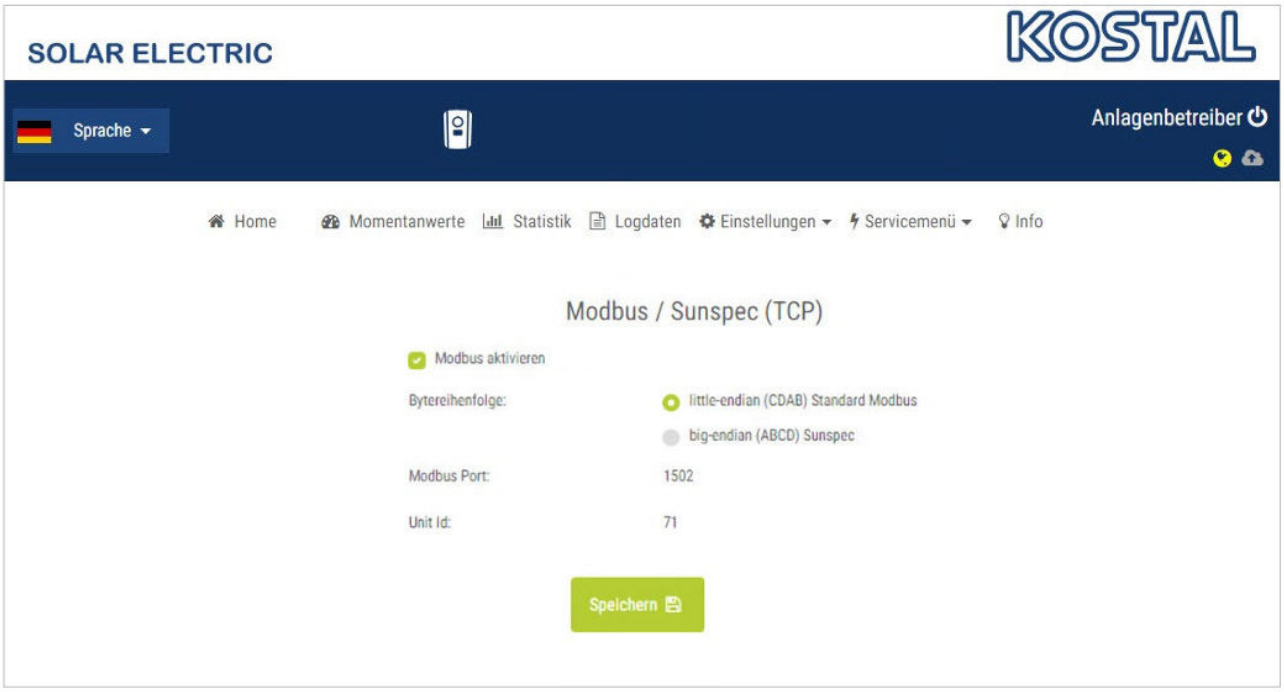


A suitable Smart Energy Meter from Kostal must be installed so that the communication between the iDM heat pump and the PV system from Kostal functions properly and the corresponding data can be recorded.
Communication with several inverters is currently not possible!

2.2.13.1. Activate „Modbus TCP" communication/interface



Select **„Modbus/Sunspec (TCP)"** in the Settings menu.



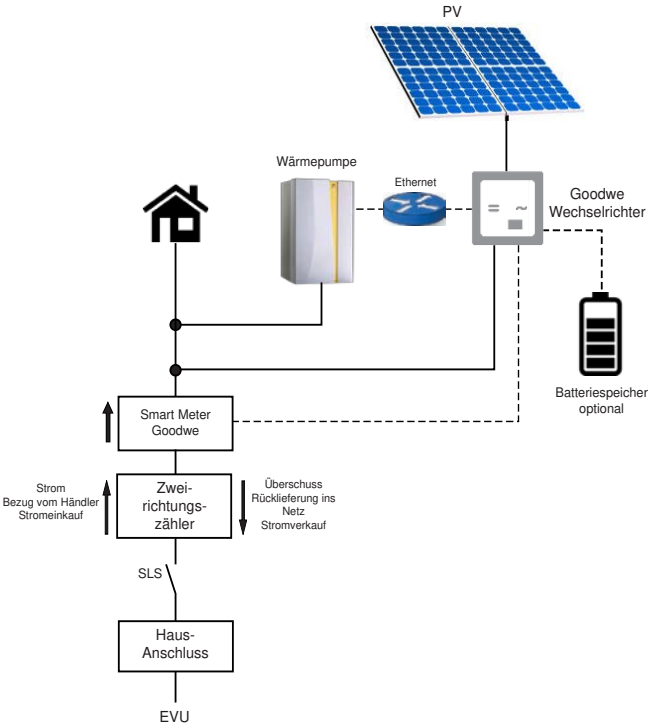
» Activate „Modbus TCP"
» Byte sequence: „little-endian" (if selectable)
» Set Modbus port: „1502"
» Set unit ID: „71
» Confirm with „Save"

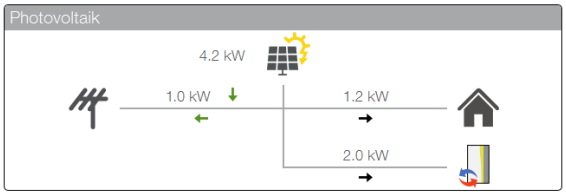
The Modbus TCP protocol can only be used via an Ethernet cable connection!
The inverter must be connected directly to the router!
The inverter must be in the same network as the heat pump!

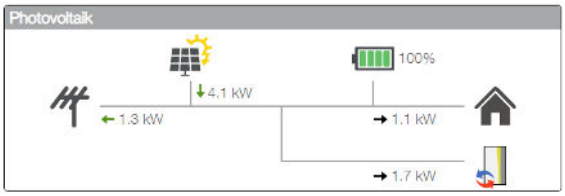
2.2.14. Communication with Goodwe PV systems

When communicating with Goodwe PV systems, it is important that the heat pump and the Goodwe system are in the same network. Communication between the heat pump and the inverter takes place automatically via the network. The surplus electricity is used for domestic hot water preparation, heat storage and heating management.

The excess current for the heat pump depends on the charge level of the battery. If the battery charge level is low, the battery is charged first. If the battery charge level is high, the energy from the battery is also used for heat pump operation.







A suitable Smart Energy Meter from Goodwe must be installed so that the communication between the iDM heat pump and the Goodwe PV system functions properly and the corresponding data can be recorded.
Communication with several inverters is currently not possible!

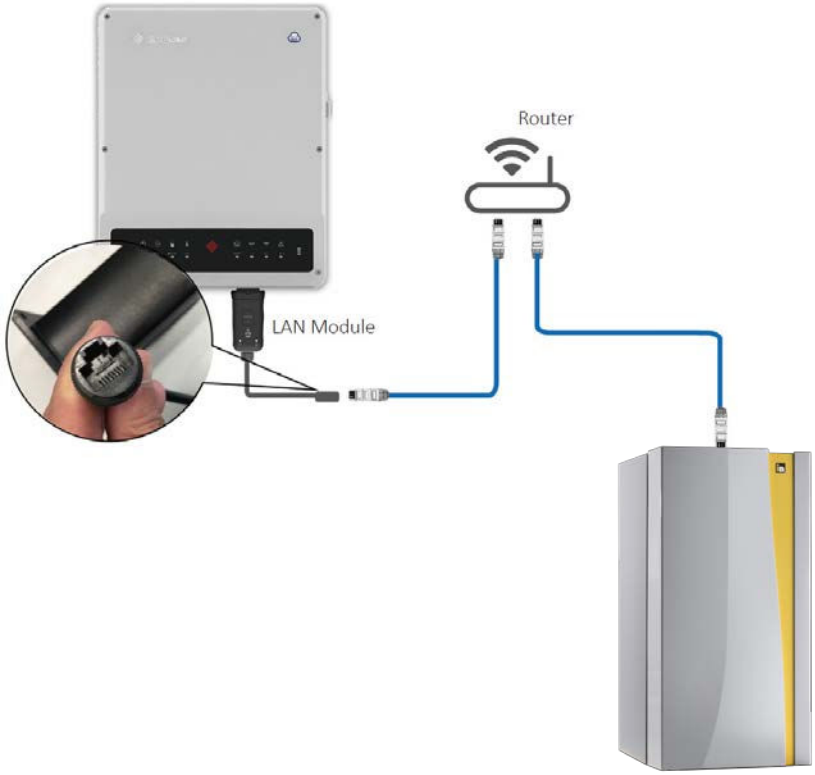
2.2.14.1. Activate „Modbus TCP" communication/interface

Modbus TCP communication is only supported by the following inverter models with the corresponding software version.

Product Series	Model Name	MODBUS TCP/IP		
		Compatibility	Firmware	SolarGo Version
ET	GW5K-ET/GW6.5K-ET/GW8K-ET/GW10K-ET/GW5KN-ET/GW6.5KN-ET/GW8KN-ET/GW10KN-ET	√	ARM 25 or higher	5.1.0 or higher
BT	GW5K-BT/GW6K-BT/GW8K-BT/GW10K-BT	√	ARM 25 or higher	5.1.0 or higher
EH	GW3600-EH/GW5000-EH/GW6000-EH/GW3600N-EH/GW5000N-EH/GW6000N-EH	√	ARM 25 or higher	5.1.0 or higher
EHB	GW5000-EHB/GW6500-EHB/GW8600-EHB/GW0010-EHB	√	ARM 25 or higher	5.1.0 or higher
BH	GW3k-BH/GW3600-BH/GW5000-BH/GW6000-BH	√	ARM 25 or higher	5.1.0 or higher

The Modbus TCP protocol can only be used via a wired Ethernet connection and the official Goodwe dongle. With a WLAN connection, Modbus TCP is deactivated by default; Goodwee must be contacted to activate Modbus TCP on the dongle.

» Activate „Modbus TCP/IP" in the SolarGO application
» Set the Modbus ID to „1"
» Set port to „502
» Network connection according to the following diagram



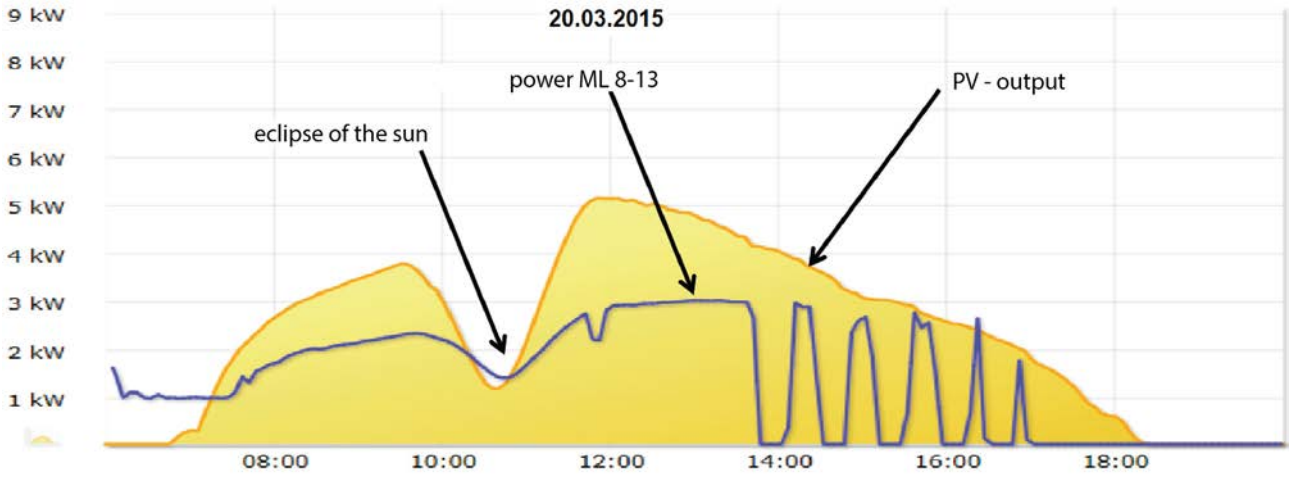
2.3. Priorities for PV electricity use

Depending on the PV signal type set, different priorities are applied for PV power utilization:

» Digital input (potential-free contact):
Once the threshold value set by the operator has been exceeded, the heat pump uses the uses the PV electricity to heat the water first. After completion of hot water preparation and when heating is required, the heat pump switches to heating mode.

» 0-10 V signal / S0 signal / Solar Log™ / Smartfox building management system / Fronius / Fenecon / E3DC / SMA with Datamanager / Sonnen / Huawei / Sungrow / Kostal / Goodwe
The heat pump starts in heating mode and switches to DHW heating when the PV yield or surplus electricity exceeds the current/forecast power consumption for DHW heating. Once DHW heating is complete and heating is required, the heat pump switches back to heating mode

Progression of the daily output of a photovoltaic system

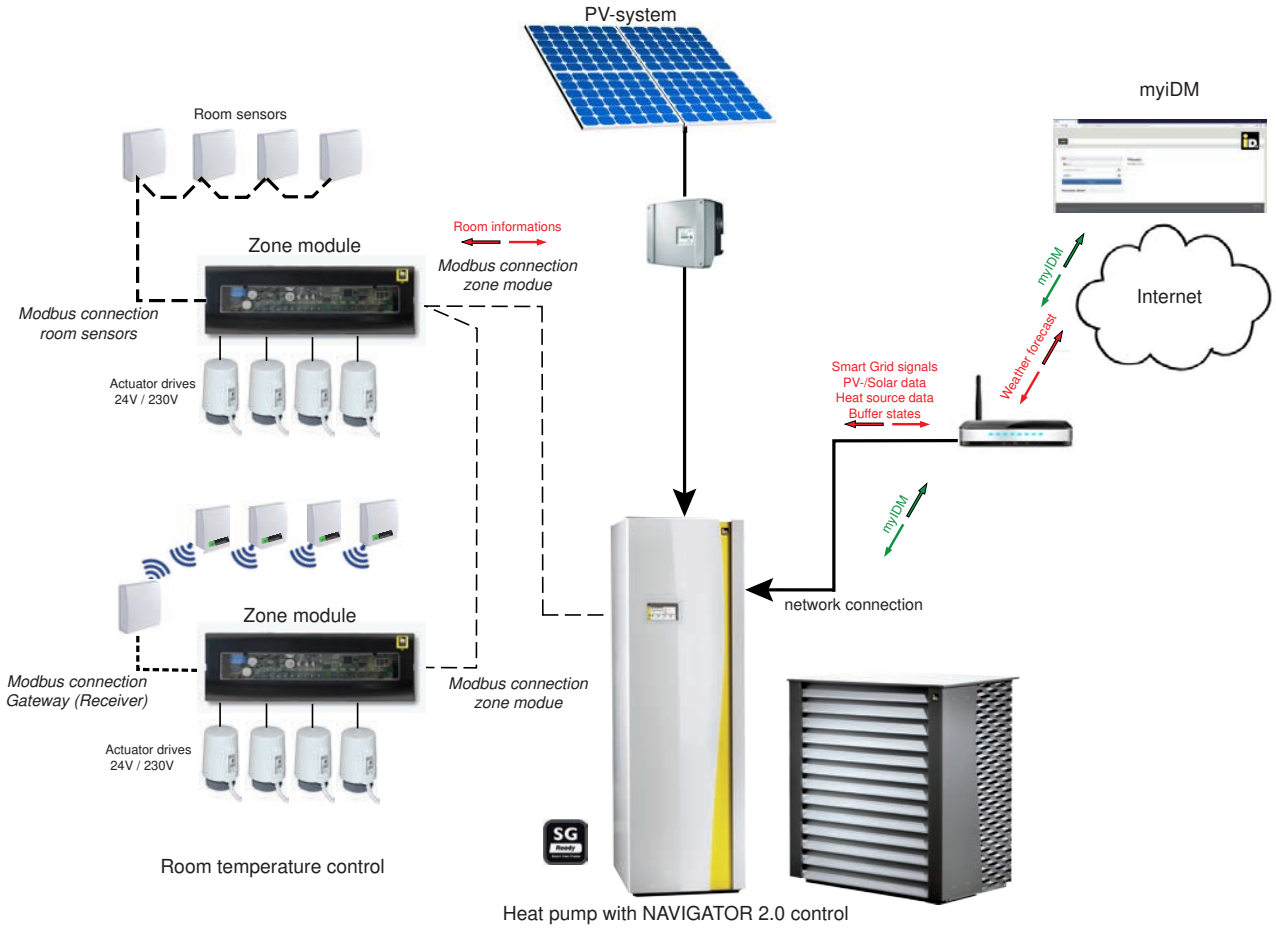


Current output of the PV system / power consumption TERRA ML 8-13

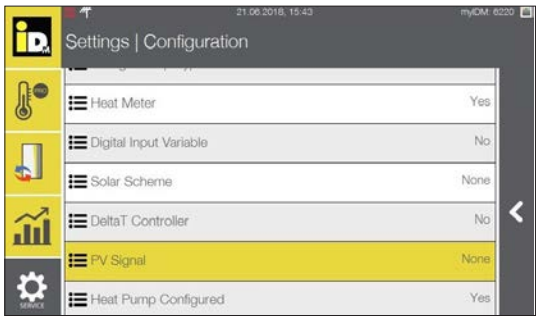
The heat pump must be operated at least at nominal speed so that it can provide hot water. The corresponding power consumption of the heat pump at nominal speed can be found in the performance data.

2.4. Communication with NAVIGATOR 2.0 Pro

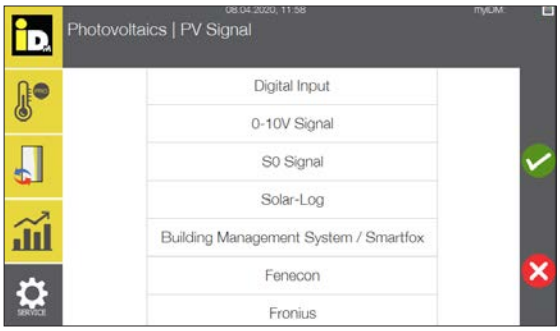
In systems with NAVIGATOR 2.0 Pro (individual room control), the individual rooms are also used for thermal storage. All rooms with the room type „Living" and the operating mode „Automatic" are operated at the comfort temperature stored for the respective room in the event of a PV surplus. This optimizes/increases self-consumption.



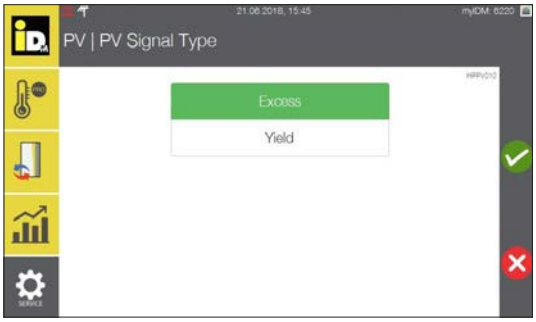
2.5. Settings NAVIGATOR control 2.0



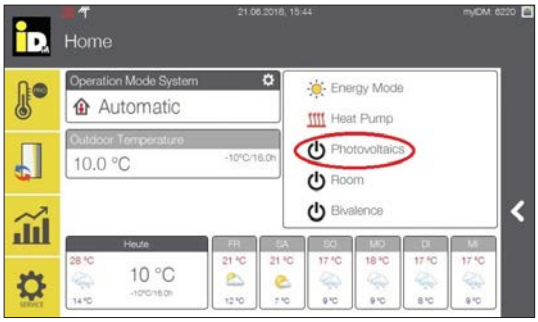
The communication type between the PV system and the heat pump must be set in the configuration menu (heating engineer level) of the NAVIGATOR control unit 2.0.



If 0-10 V signal or S0 signal is set, the „PV signal type" must also be set. This parameter determines whether the power consumption of the heat pump is included in the transmitted PV value or not.



» **Surplus:** The power consumption is included in the calculation. The transmitted PV value is reduced by the current power consumption as soon as the heat pump starts.
» **Yield:** The power consumption is not included in the calculation. The transmitted PV value is not reduced as soon as the heat pump starts.



As soon as this setting has been saved, the Photovoltaic display appears in the NAVIGATOR 2.0 main menu.

The „Photovoltaics" menu also appears in the main „Settings" menu.

In the „Photovoltaics" menu item, the corresponding parameters are displayed depending on the PV input signal type selected.

In the „PV power" submenu, the following values are displayed for the input signals 0-10 V signal, S0 signal or building management system/Smartfox:

- » Current PV surplus
- » Current or forecast power consumption (of the heat pump)

If Solar-Log™ has been configured as an input signal, the following values are displayed:

- » Current PV production
- » Current house consumption
- » Current PV surplus
- » Current consumption target value
- » Current consumption
- » Forecasted heating consumption
- » Forecasted cooling consumption
- » Forecasted consumption Priority

In addition to the compressor characteristic curve, the evaporation and condensation temperature, as well as the speed and fan output (for air heat pumps) are also taken into account when calculating the instantaneous input power.

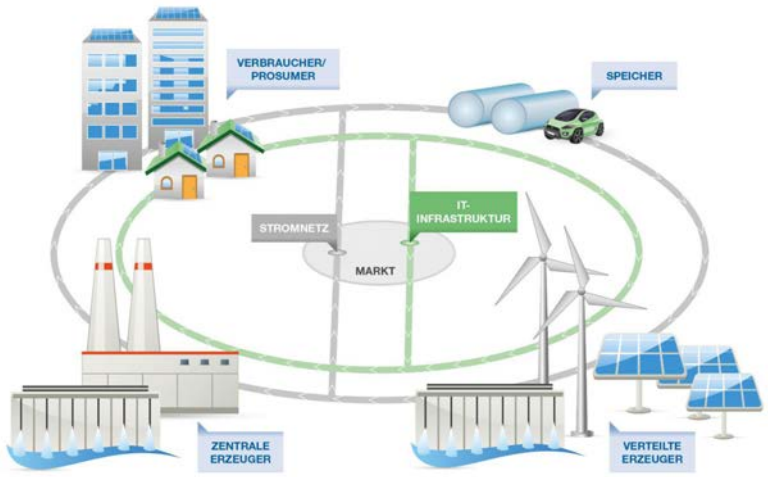
The outdoor temperature, the heat storage temperature / heat pump return temperature, the minimum speed and the maximum DHW heater temperature are included in the calculation of the predicted input power (when the heat pump is at a Downtime).

Photovoltaics parameters (Settings/Photovoltaics)		
Par. No.	Name	Description
	PV power	The „PV power" parameter displays the previously specified PV and heat pump power. After the signal from the inverter or energy consumption controller is transmitted to the NAVIGATOR control unit 2.0, the heat pump starts. In heating or cooling mode, in contrast to hot water mode, the heat pump is switched off after the minimum running time of the compressor has elapsed if the available PV power falls below the requested PV power.
PV008	PV signal	This parameter is used to set the type of PV signal. Digital input, 0-10 V signal, S0 signal, Solar-Log, building management system/Smartfox, Fenecon, Fronius, E3DC, SMA with Datamanager, Sonnen, Huawei, Sungrow, Kostal or Goodwe can be set as the PV signal.
PV010	PV signal type	For signal types 0-10V and S0, this parameter defines whether this signal is a surplus or yield signal. If „Surplus" is set, the signal value is reduced by the electrical power of the heat pump when the heat pump is switched on. If „Yield" is set, the heat pump does not influence the value transmitted via the S0 or 0-10V signal.
PV016	S0 interface	This setting indicates which type of transistor is installed in the S0 interface from which the signal is sent. A test signal can be output on most devices, which can be used to test the correct setting for this parameter. If the parameter is set incorrectly, no power is generated from the S0 signal.
PV007	PV Peak Power [0 - 500 kW]	The maximum output (size) of the PV system in kWp must be set for the „PV Peak Power" parameter.
PV004	S0 pulses per kWh [0 - 10.000]	For the S0 signal, this parameter is used to set the number of pulses per kWh. This value is taken from the manufacturer of the inverter or S0 meter.
PV002	Domestic hot water preparation [Yes/No]	If this parameter is set to „Yes", the domestic hot water cylinder is charged with PV electricity. This happens regardless of the setting of the hot water time program. Hot water charging is terminated if the PV power falls below the required (necessary) PV power during hot water charging and the minimum runtime is exceeded.
PV025	Domestic hot water with electric heating element [Yes/No]	With iPump T, iPump A and AERO SLM heat pumps, if set to „Yes", the electric heating element (in stages with 1 to 6 kW) can boost the DHW heater to up to 70°C if there is sufficient excess PV power. However, the heat pump always boosts the temperature beforehand.
PV005	DHW heater Maximum temperature [50°C]	This parameter specifies the maximum temperature of the domestic hot water heater. The adjustable range depends on the maximum heat pump temperature.
PV001	Charging the thermal store [Ja/Nein]	If this parameter is set to „Yes", the PV electricity is also used for heat storage management.
PV006	Heat storage Maximum temperature [50°C]	This parameter specifies the maximum temperature of the thermal accumulator. The thermal store is charged to the maximum thermal store temperature regardless of the set heating limit. The adjustable range depends on the maximum heat pump temperature.
PV013	Skip heating limit [No/Automatic/Always]	The parameter specifies whether heat storage management is also carried out above the heating limit (in summer mode). If „Automatic" is set, the lower storage tank area is also loaded in systems with hygiene with STP. If „Always" is set, the thermal store is always charged (e.g. to supply a pool) or for systems without a heating circuit (external demand/GLT). The „Charge cold storage tank" parameter must not be configured to „Yes".
PV012	Load cold accumulator [Yes/No]	This parameter can be used to enable management/subcooling of the cold storage tank for systems with a PV system. This function is only possible for non-modulating heat pumps!
PV009	Cold storage Minimum temperature [18°C]	This parameter defines the minimum temperature of the cold storage tank (12 - 25 °C) with sufficient PV power. The standard set/calculated switch-off temperature for cold store management is therefore not taken into account when the heat pump is operating with sufficient PV power.
PV014	Skip cooling limit [Yes/No]	This parameter specifies whether cold storage management is also carried out below the cooling limit. The „Charge thermal store" parameter must not be configured to „Yes".

Photovoltaics parameters (Settings/Photovoltaics)		
Par. No.	Name	Description
PV003	Raising underfloor heating [0.0 K]	With this parameter, additional energy can be stored in the underfloor heating with the appropriate temperature setting. The parameter specifies the value (0.0 - 6.0 K) by which the underfloor heating should be increased. The prerequisite is that the system is in heating mode, i.e. the temperature is below the heating limit.
PV011	Time constant Mean value [2 min]	This parameter specifies the time interval (0.1 - 360 min) for averaging the PV power.
PV015	PV consumption offset	This parameter can be used to increase or decrease the value of the „current / predicted power consumption" and thus influence the switching on of the heat pump with PV power use.
PVPRIO	Priority with surplus [Heat pump / Fronius Ohmpilot]	For systems with a Fronius Ohmpilot (consumption controller for electric immersion heaters for DHW heating), this parameter can be used to set the priority for surplus PV power. If „Heat pump" is set, the PV power used by the Ohmpilot is evaluated as surplus in the navigator control. If the surplus value is higher than the calculated power consumption of the heat pump, operation starts with PV power.
PV-ROOMS	Rooms in comfort mode [Off / Heating and cooling / Heating / Cooling]	In systems with a PV system and iDM individual room control, this parameter can be used to enable the overheating of rooms in heating mode and the undercooling of rooms in cooling mode if there is a sufficient PV surplus. Only rooms with the „Automatic" operating mode and the „Residential" room type are operated at the stored comfort temperature (depending on the set heating and cooling limit).

In systems with a solar thermal system and a PV system, both systems run in parallel for domestic hot water preparation.

The term „smart grid" refers to intelligent electricity grids that connect all the players in an energy system, such as grid components, generators, storage systems and consumers, via a bidirectional communication network. This enables energy- and cost-efficient operation*.

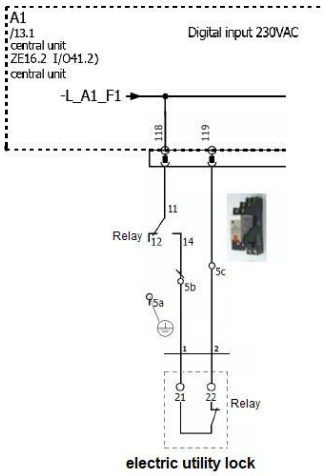


* Quelle: https://www.smartgrids.at/smart-grids.html

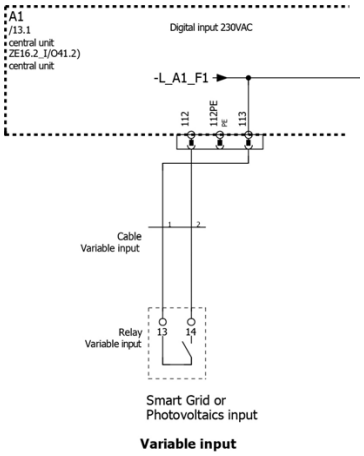
3.1. Tariff signal from the energy supplier

The communication of tariff signals to the NAVIGATOR control unit 2.0 takes place via two digital inputs (variable input and EVU block). An important grid component, a smart meter, is required for communication. Digital data can be received from the electricity generator (e.g. tariff changes) or sent to the electricity generator (e.g. electricity consumption) via a smart meter. Based on the digital data received, the Smart Meter can control the digital inputs (e.g. of a heat pump with NAVIGATOR 2.0). Depending on the switching status (0 or 1) of the digital inputs, the electricity tariff is communicated to the NAVIGATOR control unit 2.0.

The connection is made to terminal 118/119 or 112/113 of the NAVIGATOR control unit 2.0.



electric utility lock



Variable input

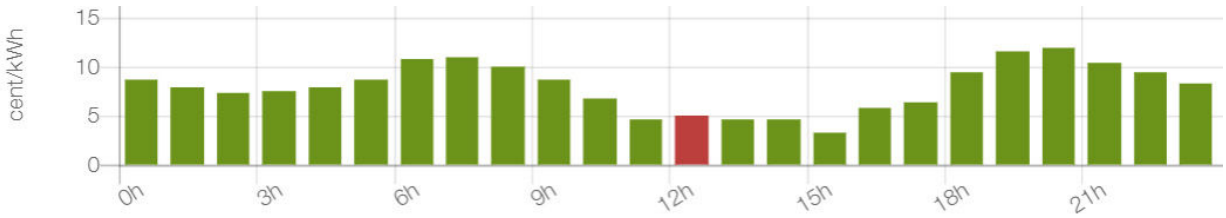
These two digital inputs can be used to specify four switching states for the NAVIGATOR 2.0:

Smart Grid	Traffic light	Variable input	Input EVU block
High electricity tariff	Red	0	1
Normal electricity tariff	Yellow	0	0
Low electricity tariff	Green	1	0
„Free" electricity	Super green	1	1

3.2. Hourly variable electricity tariffs

Due to the liberalization of the electricity market and the associated „unbundling" of electricity suppliers and grid operators, electricity can be traded on the exchange. On the basis of detailed weather forecasts, which provide information on the fluctuating electricity generation of wind and PV systems, the electricity tariffs are announced on the exchange the day before. The sunnier and windier the weather, the cheaper the electricity tariff because there is a surplus of green electricity. This can even lead to negative electricity tariffs.

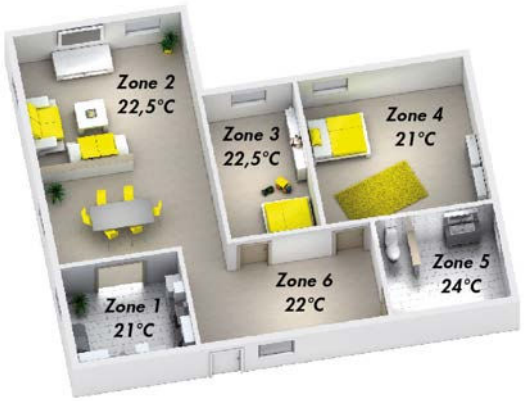
Example of an electricity tariff curve



The NAVIGATOR control unit 2.0 automatically obtains the electricity tariffs provided by the electricity supplier for the next day and optimally adjusts the operation of the heat pump accordingly. This optimization of the heat pump is achieved through the possibility of load shifting by means of thermal storage.

When the electricity price is low, the NAVIGATOR control unit 2.0 increases the temperature in the heat storage tank (thermal storage). Due to the thermal storage, the heat pump can run in reduced mode when electricity tariffs are high, thereby saving energy costs. The hot water charging programs are also optimized based on the electricity tariffs. In the table above, for example, there is a low electricity tariff from 03:00 to 05:00. According to the time program, hot water is not required until 07:00, when a high electricity tariff is charged. By optimizing the NAVIGATOR control 2.0, the hot water preparation is brought forward to the time range in which the low electricity tariff is available.

When using the NAVIGATOR 2.0 Pro individual room control, the thermal storage is also applied to the rooms in addition to the heat storage. The building mass is specifically used as storage.

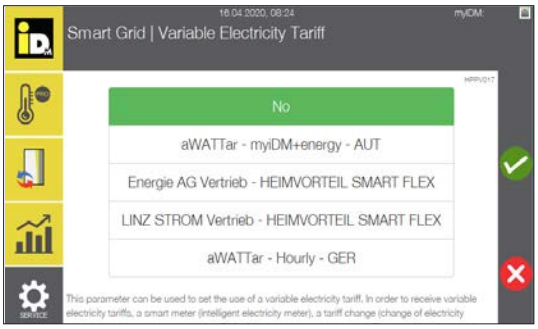


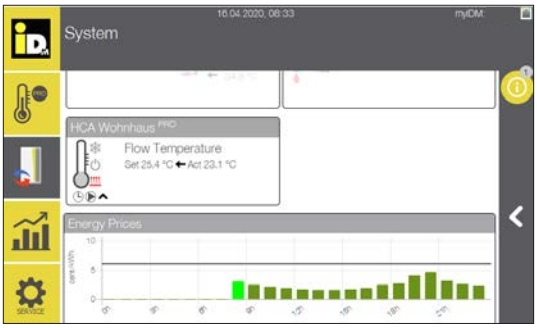
3.2.1. Provider of variable electricity tariffs

3.2.1.1. aWATTar - „myiDM+energy"

The Viennese start-up „aWATTar" was the first energy supplier in Austria to offer an hourly variable electricity tariff. The „myiDM+ energy" tariff is made available daily from 14:00 for the following day. This allows the NAVIGATOR control unit 2.0 to optimally adapt the operation of the heat pump to the electricity tariff.

In the NAVIGATOR control unit 2.0, the electricity provider „aWATTar - myiDM+energy AT" or „aWATTar - Hourly DE" can be set in the „Smart Grid / Variable electricity tariff" menu.

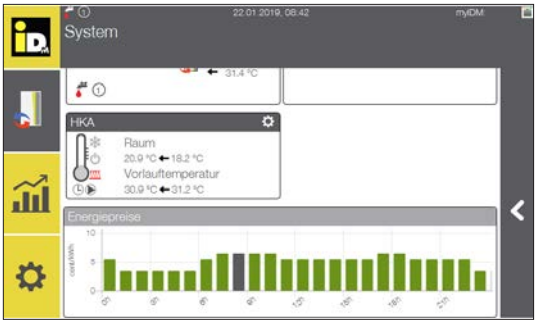




3.2.2. Home advantage SMART FLEX" electricity tariff

The companies „Energie AG Vertrieb" and „Linz Strom Vertrieb" also offer a variable electricity tariff. This tariff is not issued every hour, but in three-hour blocks. The „Heimvorteil Smart Flex" tariff is made available daily for the following day. This allows the NAVIGATOR control unit 2.0 to optimally adapt the operation of the heat pump to the electricity tariff.

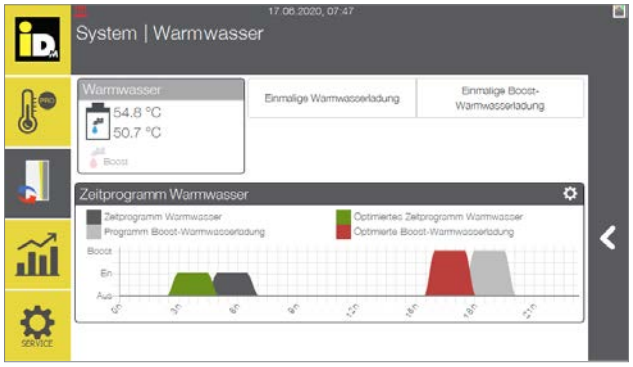
In the NAVIGATOR control system 2.0, the electricity provider „Energie AG Vertrieb - Heimvorteil Smart Flex" or „Linz Strom Vertrieb - Heimvorteil Smart Flex" can be set in the „Smart Grid / Variable electricity tariff" menu.



Communication between the electricity supplier and NAVIGATOR 2.0 takes place via myiDM (Internet).

3.2.3. Navigation gate control settings

This parameter can be used to set the pre-installation time for hot water charging.



The time program is moved forward by the value set here (from the end of the set time program) if the electricity prices are lower than at the time of the set time program.

This parameter can be used to activate the adjustment of the heating temperature.

If the electricity price is below the daily average value, the setpoint temperature is increased by the value set here.

If the electricity price is below the daily average value, the setpoint temperature is reduced by the value set here.

3.2.4. Prerequisites

To use variable hourly electricity tariffs, the following things must be in place:
- a smart meter
- an internet connection and
- an iDM heat pump

If a smart meter is not yet available, it can be requested from the grid operator.
The heat pump is not connected to the smart meter, an internet connection of the heat pump is sufficient.
If an electricity meter is used/inserted, the household electricity is also taken into account.

However, it is also possible to install a separate electricity meter for the heat pump. With two electricity meters, a different electricity supplier can even be selected for the household and the heat pump.
Whether your iDM heat pump can process dynamic electricity tariffs depends on the controller generation and the installed software version. Availability can be checked on the iDM homepage:
https://www.idm-energie.at/service/verfuegbarkeit-pruefen/

3.2.4.1. Applying for a smart meter

The following template can be used to apply for a smart meter from the respective energy supplier:

Ladies and Gentlemen,

I would like to submit my express wish to have an intelligent meter („smart meter") installed on my electricity system (meter point ID [enter 33 digits here, or] customer number [enter customer number here]).

According to paragraph 5, IME-VO Amendment 2017 (https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007808), which has been in force since December 2017, the distribution system operators must make this possible at the customer's request, regardless of the project plan for the nationwide rollout, and within 6 months at the latest, in my case by [enter today's date + 6 months] at the latest.

Please send me a brief written confirmation that you have received this letter.

Yours sincerely,

[Insert name]

ALWAYS THERE FOR YOU:

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www.idm-energie.at | team@idm-energie.at

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