Operating Instructions

Fronius Ohmpilot

Contents

Safety rules

Explanation of safety notices

<table>
<tr><td>⚠️</td><td>DANGER!</td></tr>
</table>

Indicates immediate danger.
▶ If not avoided, death or serious injury will result.

<table>
<tr><td>⚠️</td><td>WARNING!</td></tr>
</table>

Indicates a potentially hazardous situation.
▶ If not avoided, death or serious injury may result.

<table>
<tr><td>⚠️</td><td>CAUTION!</td></tr>
</table>

Indicates a situation where damage or injury could occur.
▶ If not avoided, minor injury and/or damage to property may result.

<table>
<tr><td>NOTE!</td></tr>
</table>

Indicates a risk of flawed results and possible damage to the equipment.

General

The device has been manufactured in line with the state of the art and according to recognised safety standards. In the event of incorrect operation or misuse, there is a risk of:
- Serious or fatal injury to the operator or third parties
- Damage to the device and other material assets belonging to the operating company

All personnel involved in commissioning, maintenance and servicing of the device must:
- Be suitably qualified
- Have knowledge of and experience in dealing with electrical installations
- Read and follow these Operating Instructions carefully

In addition to the Operating Instructions, all applicable local rules and regulations regarding accident prevention and environmental protection must also be followed.

All safety and danger notices on the device:
- Must be kept in a legible state
- Must not be damaged
- Must not be removed
- Must not be covered, pasted or painted over

Only operate the device when all protection devices are fully functional. If the protection devices are not fully functional, there is a risk of:
- Serious or fatal injury to the operator or third parties
- Damage to the device and other material assets belonging to the operating company

Any safety devices that are not fully functional must be repaired by an authorized specialist before the device is switched on.

Never bypass or disable protection devices.

For the location of the safety and danger notices on the device, refer to the chapter headed "Warning notices on the device" in the Operating Instructions for your device.

Faults that could compromise safety must be remedied before switching on the device.

Environmental conditions

Operation or storage of the device outside the stipulated area will be deemed as not in accordance with the intended purpose. The manufacturer accepts no liability for any damage resulting from improper use.

Qualified personnel

The servicing information contained in these operating instructions is intended only for the use of qualified service engineers. An electric shock can be fatal. Do not carry out any actions other than those described in the documentation. This also applies to qualified personnel.

All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Loose connections, scorched, damaged or inadequately dimensioned cables and leads must be immediately repaired by authorised personnel.

Maintenance and repair work must only be carried out by an authorised specialist.

It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made on them, or that they satisfy safety requirements. Use only original spare parts (also applies to standard parts).

Do not carry out any alterations, installations, or modifications to the device without first obtaining the manufacturer's permission.

Components that are not in perfect condition must be changed immediately.

EMC measures

In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g., when there is equipment that is susceptible to interference at the same location, or if the site where the device is installed is close to either radio or television receivers). If this is the case, then the operator is obliged to take action to rectify the situation.

Data security

With regard to data security, the user is responsible for:
- backing up any changes made to the factory settings
- saving and retaining personal settings

Copyright

Copyright of these operating instructions remains with the manufacturer.

The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the instructions, we will be most grateful for your comments.

General information

General

Intended use

The Fronius Ohmpilot is an addition to the Fronius product portfolio in the field of energy management. The device controls the heating of hot water using surplus energy from a photovoltaic system. Any other use is considered improper.

System components required

- GEN24 inverter
  - Fronius Primo / Symo GEN24
- Fronius SnapINverter
  - Fronius Symo / Galvo / Eco or Primo (from Fronius Datamanager 2.0 software version 3.8.1-x onwards) or Fronius Symo Hybrid (from Fronius Hybridmanager software version V1.8.1.x onwards)
- Fronius Smart Meter
- Fronius Ohmpilot
- Resistive load (e.g. boiler with heating element)

Integrating the Fronius Smart Meter

To operate the Ohmpilot, a Fronius Smart Meter is required to measure the surplus energy. On the user interface of the inverter, it is necessary to set whether the Fronius Smart Meter is installed at the feed-in point or in the consumption branch.

Description of the device

The Ohmpilot uses pulse width modulation to regulate the surplus power from the photovoltaic system for one phase. With one phase, it is possible to control a heating element with a continuously variable output of up to 3 kW for example. The Ohmpilot has two additional outputs for switching further phases. This means that heating elements with an output of 300 W to 9 kW can be controlled.

For a heating element with 9 kW output, the surplus power of 0 - 3 kW is controlled in phase 1. If more power is available, the Ohmpilot switches to phase 2. Phase 1 can therefore be continuously adjusted between 3 and 6 kW. If the available power is > 6 kW, the Ohmpilot adds phase 3. Phase 1 is again continuously adjusted between 6 and 9 kW

Power range	Phase 1	Phase 2	Phase 3
0 - 3 kW	0 - 3 kW continuously variable	-	-
3 - 6 kW	0 - 3 kW continuously variable	3 kW fixed	-
6 - 9 kW	0 - 3 kW continuously variable	3 kW fixed	3 kW fixed

Other resistive loads such as infra-red heaters and towel dryers can also be controlled.

System design

⚠️ **CAUTION!**

Danger from connecting an electronic thermostat.
This would destroy the Ohmpilot or the connected load.
▶ Use mechanical temperature switches.

⚠️ **CAUTION!**

Danger due to connection of an incorrect load (e.g. fan heater).
This may result in destruction of the load.
▶ Connect only purely resistive loads.

NOTE!

Phase control
The sum of all phases forms the basis for Ohmpilot control. The Ohmpilot is not suitable for phase-accurate billing.

NOTE!

Ohmpilot and Fronius Datamanager 2.0 / Fronius Hybridmanager
Only one Ohmpilot can be connected per Fronius Datamanager 2.0 / Fronius Hybridmanager.

NOTE!

Ohmpilot and dynamic power reduction
From software version 3.13.1-x of the Fronius Datamanager or 1.11.1-x of the Fronius Hybridmanager, the Ohmpilot can be used together with dynamic power reduction from 0-100%.

NOTE!

Use of other generation sources
Other generation sources can also be used in conjunction with the Fronius Datamanager Box 2.0, e.g. CHP, third-party inverters, etc. Generated power and consumption data cannot be acquired for other generation sources, so these figures cannot be displayed in Fronius Solar.web.

NOTE!

Backup power
Due to the high heat output, the Ohmpilot cannot be operated in backup power situations.
▶ Install the Ohmpilot outside the backup power circuit.

NOTE!

**Calcification of the connected heating element**
Calcification can occur with hard water, especially if the minimum temperature is set above 60 °C. An annual inspection of the heating element is recommended.
▶ Remove the heating element from the tank and remove the limescale;
▶ do not scratch the surface of the heating element while doing so.

Warning notices on the device	Safety symbols and warnings are located on the left-hand side of the Ohmpilot. These warning notices and safety symbols must not be removed or painted over. They warn against incorrect operation, as this may result in serious injury and damage.

Fronius Ohmpilot 9.0-3
A-4600 Wels
www.fronius.com

Art.Nr.:	4,240,160
Ser.Nr.:	
U	1~230V/3~ 400V/50 Hz
P_{Load(max)}	9000 W
IP 54	16A
I_{In}	1x16A/3x16A
I_{Analog Out}	13A
I_{Relay}	13A

Leistungssteller / Power Controller / Régulateurs de puissance
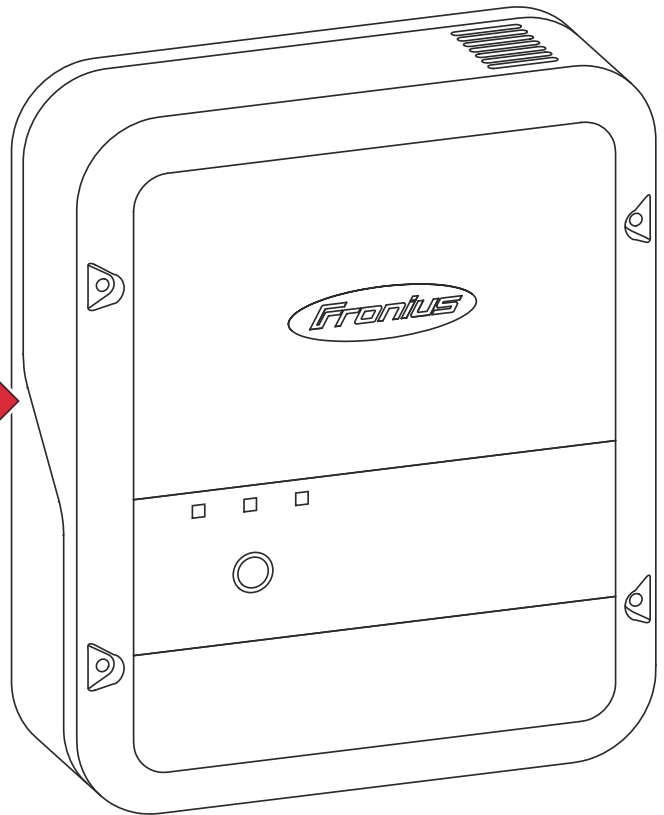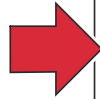
WARNUNG! Ohmpilot darf nur über B16A Überstromschutzeinrichtung angeschlossen werden.
WARNUNG! Ein elektrischer Schlag kann tödlich sein. Vor dem Öffnen des Geräts dafür sorgen, dass Ein- und Ausgangsseite spannungsfrei sind.
EMC emission Class B CE

Safety symbols:

Danger of serious injury and damage due to incorrect operation

Do not use the functions described here until you have fully read and understood the following documents:
- These Operating Instructions
- All the Operating Instructions for the system components, especially the safety rules

Dangerous electrical voltage

Before opening the machine, wait for the capacitors to discharge!

Hot surface

Text of the warning notices:

WARNING!
An electric shock can be fatal. Before opening the device, it must be disconnected at the input and output. Wait for the capacitors to discharge (15 seconds).

WARNING!
The device must not be covered and nothing may be hung over the device or cable.

Control elements and connections

**Indications/
controls on the
device**

Function key

1x WPS
2x ACCESS POINT
3x BOOST MODE

Press 1x	WPS (Wi-Fi Protected Setup) opens for 2 minutes or until successful pairing with the router. Pressing the WPS button on the router sends the WLAN password to the Ohmpilot.
Press 2x	WLAN access point is activated for 30 minutes so that settings can be implemented on the Ohmpilot via the Fronius Solar.web app.
Press 3x	Boost mode - dimmer level is activated at 100% for 4 hours, switching takes place through phases 2 and 3. This may result in electricity being sourced from the grid.
Press again	Ohmpilot is returned to the standard operating mode; boost mode, access point or WPS are deactivated.
Press for 7 seconds	Ohmpilot restarts

	Heater indication	Unlit	No power supply to the Ohmpilot.
		Flashing green (permanently)	The faster the flashing frequency, the greater the heat output. The LED flashes slowly at 0 W heat output and quickly at full output.
		Flashing green (twice)	The heating element output is being measured. The Ohmpilot recognises whether a 1-phase or 3-phase heating element is connected.
		Lights up green	Minimum temperature undershot or Legionella prevention system active (full heat output).

	LAN / WLAN connection indicator	Unlit	No connection
		Flashing blue (once)	WPS (Wi-Fi Protected Setup) open
		Flashing blue (twice)	WLAN access point open
		Lights steady blue	Connection with network
	Error indication	Unlit	No error
		Flashing red (once)	No connection to the inverter
		Flashing red (twice)	Temperature measurement faulty
		Flashing red (three times)	Heating element faulty
		Flashing red (four times)	Ohmpilot faulty
		Flashing red (five times)	Minimum temperature not reached
		A detailed description of the error is provided in Fronius Solar.web.	

Connection area
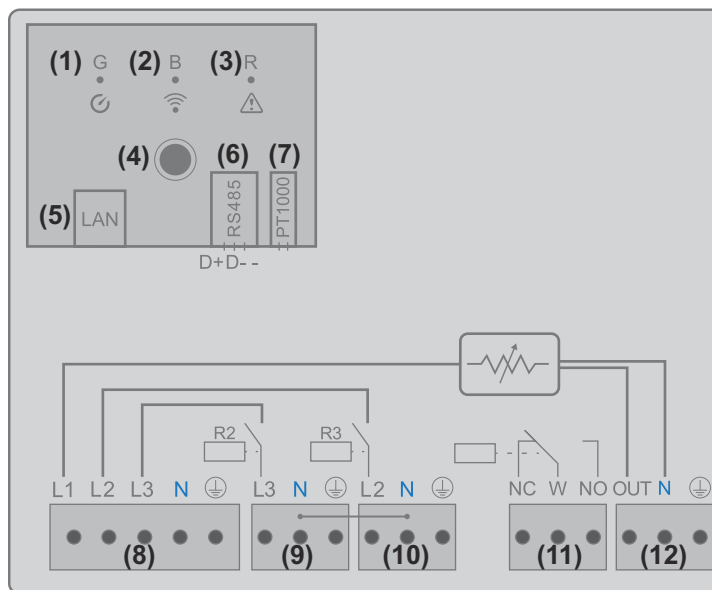
(1)	**Green LED**
(2)	**Blue LED**
(3)	**Red LED**
(4)	**Function key**
(5)	**Ethernet RJ45**
	Cable at least CAT5, shielded

(6)   Modbus RTU (default address 40)

Spring balancer 0.2 - 1.5 mm^2, cable length max. 1000 m, shielded and twisted

(7)   Temperature sensor terminal

Cable sensor PT 1000, spring balancer 0.2 - 1.5 mm^2

(8)   Input - grid supply

1x 230 V or 3x 230 V, spring balancer 1.5 - 2.5 mm^2

(9)   Output - L3 heating element

Spring balancer 1.5 - 2.5 mm^2

(10)   Output - L2 heating element

Spring balancer 1.5 - 2.5 mm^2

(11)   Multifunctional relay output

Variable max. 13 A resistive load, spring balancer 1.5 - 2.5 mm^2

> ⚠ **WARNING!**
>
> **Danger due to wires coming loose**
> Loose wires can come into contact with live parts and cause an electric shock.
> ▶ When connecting signal cables, tie the individual wires together with a cable tie immediately before the terminal.

(12)   Output - heating element / dimming level L1
Continuously variable up to 3 kW

Spring balancer 1.5 - 2.5 mm^2

Selection of heater

1-phase heater Controlled in a continuously variable manner from 0.3 to 3 kW
- Resistive load (no electronic temperature limiters, fans, etc.)

3-phase heater Controlled in a continuously variable manner from 0.3 to 9 kW.
- Equal load distribution on all 3 phases (e.g. 3 x 3 kW).
- If a mechanical temperature switch is being used, it must switch all 3 phases simultaneously.
- Purely resistive load (no electronic temperature limiters, fans, etc.)
- Neutral conductor must be connected
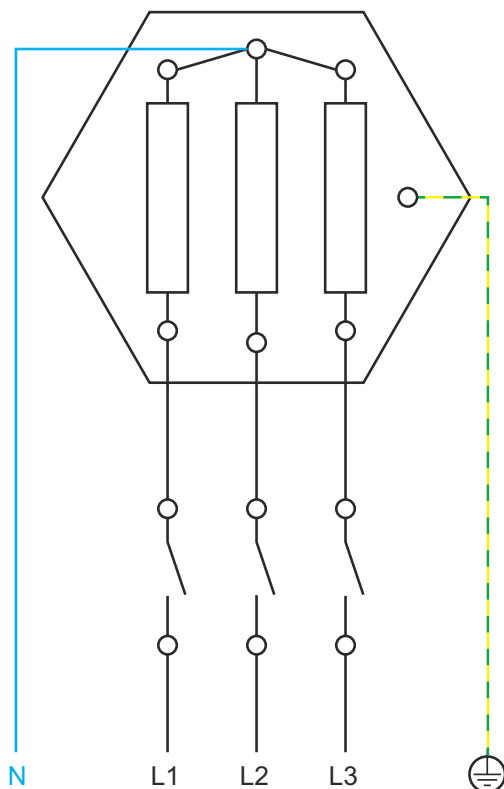
Temperature limitation
A mechanical temperature switch simplifies commissioning and use. If no mechanical temperature switch is available, a temperature sensor can also be connected to the Ohmpilot. This limits the maximum temperature (see chapter "**Temperature limitation**" on page).

Example for calculating the charging time 500 l boiler, heater is fitted at the very bottom of the boiler, temperature spread 45 - 60 °C = 15 °C
4.5 kW heater

Possible stored energy = 500 l (storage tank capacity) x 1.16 Wh (energy requirement per litre) x 15 °C (temperature spread) = 8.7 kWh. If the heater at full power (4.5 kW), heating up takes approximately 2 hours.

For optimum utilisation of the surplus power and rapid reheating of the hot water, adjust the output of the heating system to the output of the photovoltaic system, e.g. 5 kWp system output => 4.5 kW heating
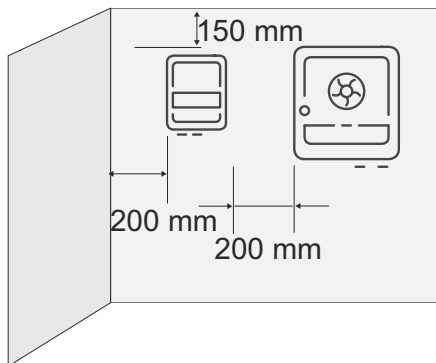
Installation and commissioning

Choice of location and installation position

Choosing location - general remarks

Please note the following criteria when choosing a location for the Ohmpilot:

Install only on a solid surface.

Max. ambient temperatures:
0 °C / +40 °C

Relative humidity:
0 - 99%

The airflow within the Ohmpilot is from the bottom to the top.

If the Ohmpilot is installed in an enclosed space, forced-air ventilation must be provided to ensure adequate heat dissipation.

NOTE!

Cable length
The maximum cable length from the output of the Ohmpilot to the load (heating element) must not exceed 5 m.

Choice of location

The Ohmpilot is suitable for indoor installation. The housing satisfies protection class IP 54 and is protected against splashing water on all sides.

In order to minimise heating up of the Ohmpilot, do not expose it to direct sunlight. Install the Ohmpilot in a protected position. The Ohmpilot must only be installed and operated at an ambient temperature of 0-40 °C.
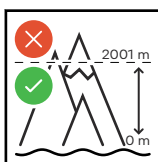
IMPORTANT! The Ohmpilot must not be installed or used at altitudes above 2000 m.

Do not install the Ohmpilot:
- In areas where ammonia, corrosive vapours, acids or salts are present (e.g. fertiliser stores, ventilation openings from cattle sheds, chemical plants, tanneries, etc.)

	Do not install the Ohmpilot in:
	- Places where there is an increased risk of damage from farm animals (horses, cattle, sheep, pigs, etc.)
	- Stables or adjoining areas
	- Storage areas for hay, straw, chaff, animal feed, fertilisers, etc.
	Do not install the Ohmpilot in rooms or environments where there is a lot of dust. All Ohmpilot units are designed to be dust-tight. However, in areas with a heavy build-up of dust, the thermal efficiency may still be impaired by dust forming on the cooling surfaces. Regular cleaning is necessary in such situations.
	Do not install the Ohmpilot in:
	- Greenhouses
	- Storage or processing areas for fruit, vegetables or viticulture products
	- Areas used in the preparation of grain, green fodder or animal feeds

Installation position

The Ohmpilot must be installed level, with the connections facing downwards, on a vertical wall. All inclined and horizontal installation positions are prohibited.

Wall mounting

Safety

> ⚠️ **WARNING!**
>
> **Danger due to residual voltage from capacitors.**
> An electric shock can be fatal!
> ▶ Before opening the device, wait for the capacitors to discharge (15 seconds).

> ⚠️ **WARNING!**
>
> **Risk of burns from the heat sink when open.**
> This can result in personal injury.
> ▶ Wear suitable protective equipment.
> ▶ Allow heat sink to cool.
> ▶ Do not touch the hot heat sink.

IMPORTANT! The IP 54 protection class only applies if the cover is firmly screwed to the back.

Selecting wall plugs and screws

IMPORTANT! Different fixings may be required to fit the Ohmpilot, depending on the type of surface. The fixings are not included in the scope of supply. The installer is responsible for selecting the right type of fixing. The underlying surface must be load-bearing.

To install the Ohmpilot in masonry, Fronius recommends the use of steel screws with a diameter of 4 - 6 mm.

Mounting the Ohmpilot on the wall

> ℹ️ **NOTE!**
>
> **Risk of dirt and moisture on the connections or electronic components**
> This may result in damage to the Ohmpilot.
> ▶ When drilling, ensure that terminals and electronic components in the connection area do not become dirty or wet.
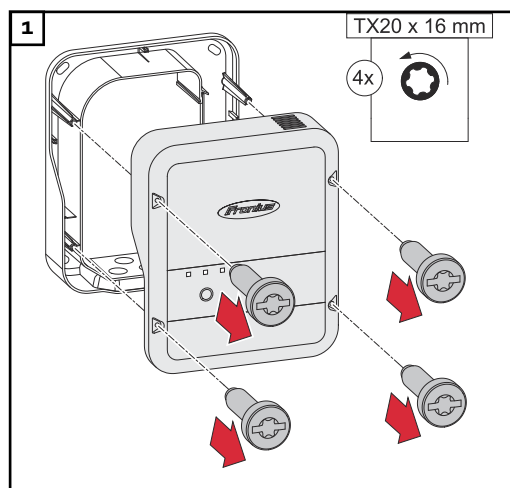
Undo the 4 screws and remove the housing cover.

2 Mark drill holes, drill and insert wall plugs

4x 3 Nm

4 - 6 mm

3 Attach the Ohmpilot to the wall with 4 screws

Installation

Stripping lengths

Stripping lengths of terminals for power stage set (L1, L2, etc.) and terminals for data communication area (D+, D-, PT1000)

Electrical connection

IMPORTANT! Electrical connection work must be carried out by a specialist.

> ⚠ **WARNING!**
>
> **Danger from inadequate ground conductor connection.**
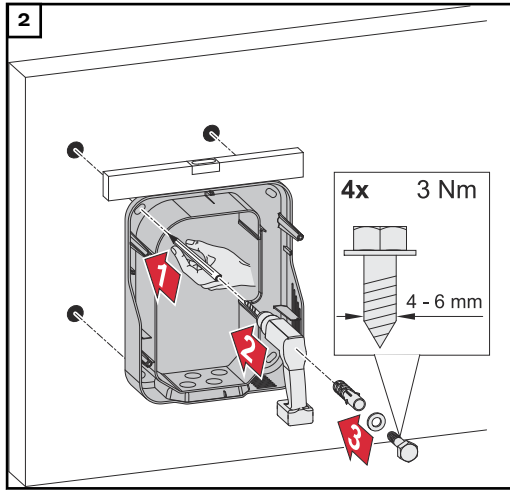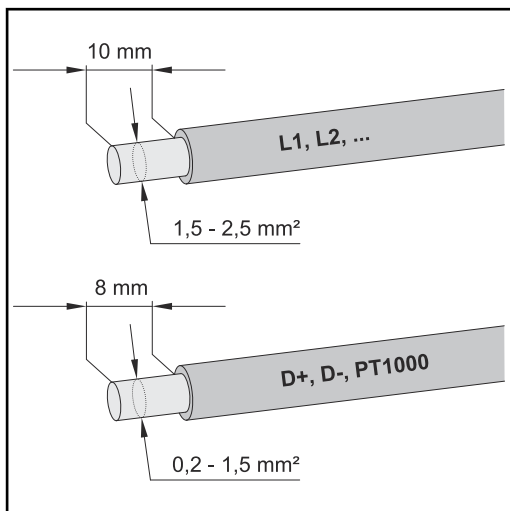> This can result in severe personal injury or damage to property.
> ▶ Install and connect the ground conductor connection in accordance with the national specifications

> *NOTE!*
>
> **Overvoltage from the grid**
> Overvoltage can damage the device
> ▶ Equip the Ohmpilot with a type B16 A automatic circuit breaker and a residual current circuit breaker.

> *NOTE!*
>
> **Cable length**
> The maximum cable length from the output of the Ohmpilot to the load (heating element) must not exceed 5 metres due to electromagnetic compatibility.
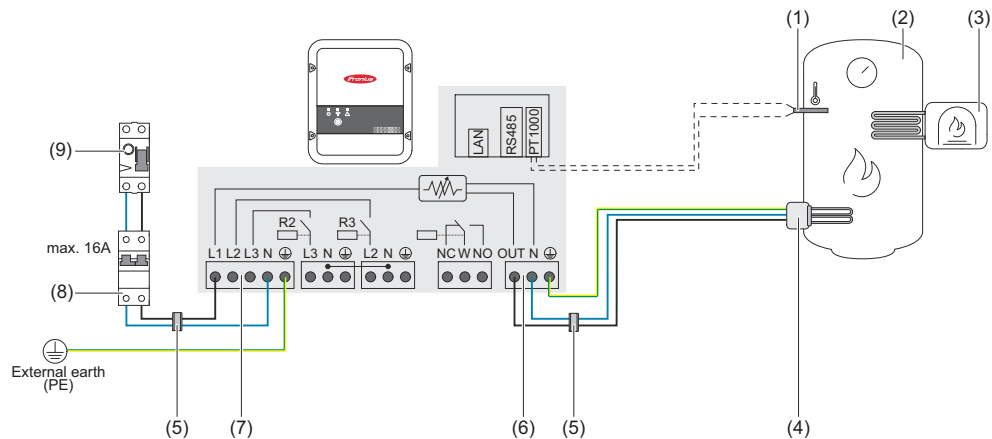
> *NOTE!*
>
> **Load connection**
> ▶ Only connect purely resistive loads.
> ▶ When connecting a heating element, check the earthing of the boiler/buffer and the heating system.
> ▶ Observe the maximum permissible flow and hot water temperature when setting the temperature on the heating element.

1-phase heating element up to 3 kW

Application example 1

(1)	**Temperature sensor** PT1000
(2)	**Hot water boiler**
(3)	**External source** (e.g. gas-fired heating)
(4)	**Heating element** (max. 3 kW)
(5)	**Ferrite rings** (included in scope of delivery)
(6)	**Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded terminal 1.5 - 2.5 mm²
(7)	**Input - grid supply** 1x 230V network, spring-loaded terminal 1.5 - 2.5 mm²
(8)	**Residual-current circuit breaker**
(9)	**Automatic circuit breaker** max. B16A

IMPORTANT! Plug & Play - no further settings are required for this application after successful connection to the inverter.

The Fronius Smart Meter records the current power at the feed-in point and transfers the data to the inverter. By controlling the Ohmpilot, the inverter adjusts any surplus energy that is available to zero. Specifically, this takes place by continuously adjusting the heating element connected to the Ohmpilot. Surplus energy is consumed using the heating element in a continuously variable manner.

If no temperature sensor is fitted, an external source (e.g. gas-fired heating) must be used to ensure the minimum temperature is met.

As an alternative, the Ohmpilot can ensure the minimum temperature. To do this, a temperature sensor must be connected so that the Ohmpilot can measure the temperature. This may result in electricity being sourced from the grid.

The maximum temperature must be set on the heating element thermostat. If the heating element does not have a thermostat, the Ohmpilot can also carry out this task as an alternative (see "Optional settings" section **Optional settings** on page **45**).

3-phase heating element 900 W up to 9 kW

**Application ex-
ample 2**
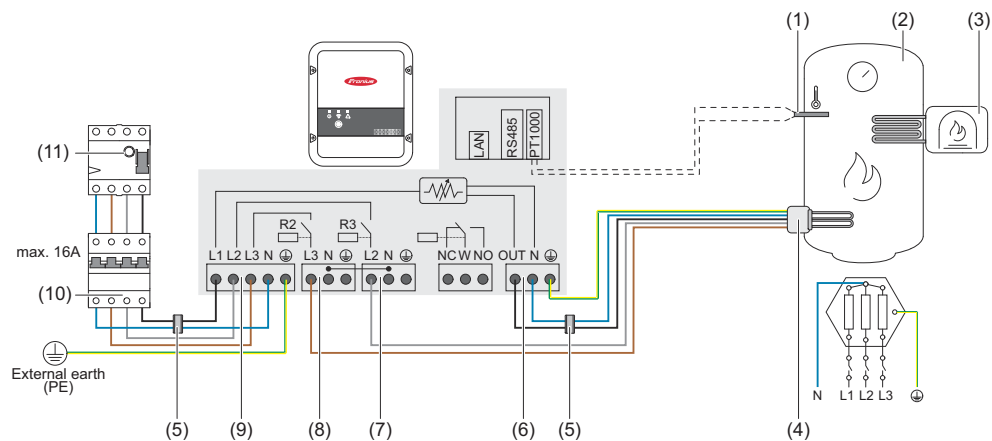
(1)	**Temperature sensor** PT1000
(2)	**Hot water boiler**
(3)	**External source** (e.g. gas-fired heating)
(4)	**Heating element** (max. 9 kW)
(5)	**Ferrite rings** (included in scope of delivery)
(6)	**Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded terminal 1.5 - 2.5 mm²
(7)	**Output - L2 heating element**
(8)	**Output - L3 heating element**
(9)	**Input - grid supply** 3x 230V network, spring-loaded terminal 1.5 - 2.5 mm²
(10)	**Residual-current circuit breaker**
(11)	**Automatic circuit breaker** max. B16A

IMPORTANT! Plug & Play - no further settings are required for this application after successful connection to the inverter.

The Fronius Smart Meter records the current power at the feed-in point and transfers the data to the inverter. By controlling the Ohmpilot, the inverter adjusts any surplus energy that is available to zero. Specifically, this takes place by continuously adjusting the heating element connected to the Ohmpilot. This means that the surplus energy is consumed in a continuously variable manner by the heating element.
Depending on the surplus power, the individual phases are switched on or off and the remaining power is consumed at L1. As a result, the heating element output is divided by three.

If no temperature sensor is fitted, an external source (e.g. gas-fired heating) must be used to ensure the minimum temperature is met.

As an alternative, the Ohmpilot can ensure the minimum temperature. To do this, a temperature sensor must be connected so that the Ohmpilot can measure the temperature. This may result in electricity being sourced from the grid.

The maximum temperature must be set on the heating element thermostat. If the heating element does not have a thermostat, the Ohmpilot can also carry out this task as an alternative (see "Optional settings" section **Optional settings** on page **45**).

IMPORTANT! A neutral conductor must be connected to the heating element!

1-phase heating element up to 3 kW with heat pump control

**Application ex-
ample 3**
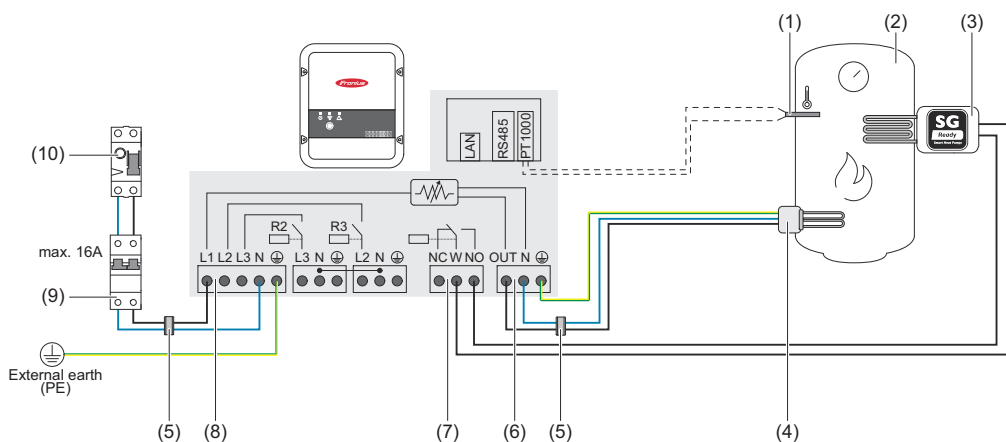
(1) **Temperature sensor** PT1000

(2) **Hot water boiler**

(3) **Heat pump** with SG Ready control input

(4) **Heating element** (max. 3 kW)

(5) **Ferrite rings** (included in scope of delivery)

(6) **Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded ter-
minal 1.5 - 2.5 mm²

(7) **Multifunctional relay output**

NOTE!

Relay contacts can oxidise.
The voltage must be at least 15 V and the current at least 2 mA, so that the relay
contacts do not oxidise.

---

(8) **Input - grid supply** 1x 230V network, spring-loaded terminal 1.5 - 2.5 mm²

⚠ CAUTION!

Danger due to contact with live, stripped wires
A short circuit can be triggered and damage the device.

▶ Carry out all connection work in accordance with the applicable electrotech-
nical guidelines and regulations.

▶ Observe the maximum stripping length of 10 mm.

▶ When connecting the phases, tie the individual wires together with a cable tie
immediately before the terminal.

---

(9) **Residual-current circuit breaker**

(10) **Automatic circuit breaker** max. B16A

The Fronius Smart Meter records the current power at the feed-in point and
transfers the data to the inverter. By controlling the Ohmpilot, the inverter ad-
justs any surplus energy that is available to zero. Specifically, this takes place by
continuously adjusting the heating element connected to the Ohmpilot and by
targeted switching on of the heat pump.

For activation, the heat pump must have a control input (SG Ready or approval
from grid operator). The heat pump can be switched from normal operation to

boost mode by activating input 2 of the heat pump with the relay. The heat pump can also be switched from grid operator-blocked operation to normal operation by activating input 1 of the heat pump with the relay. Information on the compatibility of the heat pump with this control unit can be found in the operating instructions for the respective device.

Relatively small surpluses are consumed by the heating element in a continuously variable manner. The heat pump should be activated above a certain surplus output due to the higher efficiency. The average COP (coefficient of performance) for water heating up to 53 °C is 2.5. This means that 1 kW of electrical energy is converted into 2.5 kW of thermal energy.

The optimum switching times depend on the following factors:
- Heat pump COP. The higher the temperature to which the hot water is heated, the lower the COP.
- The electrical heat pump output.
- Feed-in tariff and the costs for purchasing energy.
- Reduction of the heat pump's start-up cycles = increase in service life of the heat pump.
- Thermal losses from the heat pump and the pipes.

If no temperature sensor is fitted, the heat pump must ensure the minimum temperature is met. As an alternative, the Ohmpilot can also ensure the minimum temperature by activating the heat pump. This may result in electricity being sourced from the grid. The maximum temperature must be set on the heating element thermostat and on the heat pump. If the heating element does not have a thermostat, the Ohmpilot can also carry out this task as an alternative (see "Optional settings" section **Optional settings** on page **45**).

This function can **also be combined with a 3-phase heating element**.

Settings in the menu area

General settings, symbolic representation

1 Open the Ohmpilot user interface (see section **Establishing the data connection**).

2 Under **HEATER 2**, select "**SG Ready heat pump**" for **Consumer**.

3 Select "**Feed-in**" under **Starting threshold** and enter the desired output in watts at which the heat pump is to be switched on.

4 Under **Switch-off threshold**, select "**Consume**" or "**Feed-in**" and enter the desired output in watts at which the heat pump is to be switched off.

Example 1: If you have selected "Consume" under the switch-off threshold and a power of 500 W has been entered, the heat pump will be switched off as soon as the power being drawn from the grid exceeds 500 W.

Example 2: If you have selected "Feed-in" under the switch-off threshold and entered a power of 500 W, the heat pump will be switched off as soon as the power being fed in is less than 500 W.

NOTE!

The heat pump must be connected to the same utility meter.
Between the switch-on and switch-off thresholds, the self-consumption of the heat pump must also be taken into consideration. For example, if the heat pump consumes 3000 Watts of electricity and a hysteresis of 500 Watts must be taken into account, the switch-on threshold can be set to a feed-in of 3000 Watts and the switch-off threshold to a consumption of 500 Watts.

1-phase heating element up to 3 kW and external source

Application example 4
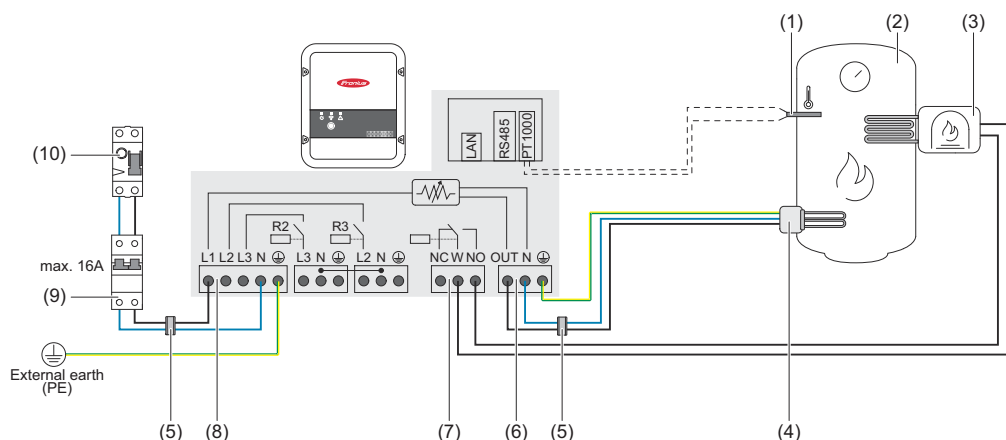
(1)   **Temperature sensor** PT1000

(2)   **Hot water boiler**

(3)   **External source** (e.g. gas-fired heating)

NOTE!

Relay contacts can oxidise.
The voltage must be at least 15 V and the current at least 2 mA, so that the relay contacts do not oxidise.

---

(4)   **Heating element** (max. 3 kW)

(5)   **Ferrite rings** (included in scope of delivery)

(6)   **Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded terminal 1.5 - 2.5 mm^2

(7)   **Multifunctional relay output**

(8)   **Input - grid supply** 1x 230V network, spring-loaded terminal 1.5 - 2.5 mm^2

⚠ **WARNING!**

Short circuit
If live, stripped wires touch each other, a short circuit will occur.

▶ Carry out all connection work in accordance with the applicable electrotechnical guidelines and regulations.

▶ Observe the maximum stripping length of 10 mm.

▶ When connecting the phases, tie the individual wires together with a cable tie immediately before the terminal.

---

(9)   **Residual-current circuit breaker**

(10)   **Automatic circuit breaker** max. B16A

The Fronius Smart Meter records the current power at the feed-in point and transfers the data to the inverter. By controlling the Ohmpilot, the inverter adjusts any surplus energy that is available to zero. Specifically, this takes place by continuously adjusting the heating element connected to the Ohmpilot. Surplus energy is consumed using the heating element in a continuously variable manner.

The temperature is measured by the Ohmpilot. If the temperature falls below the minimum, then an external source (e.g. gas-fired heating) will be activated until the minimum temperature is reached again, so that the Ohmpilot only uses surplus energy and does not draw any energy from the grid.

The maximum temperature must be set on the heating element thermostat. If the heating element does not have a thermostat, the Ohmpilot can also carry out this task as an alternative (see "Optional settings" section **Optional settings** on page **45**).

The heating element is used for the Legionella prevention program.

This function can **also be combined with a 3-phase heating element**.

Settings in the menu area

GENERAL SETTINGS

| Designation | Ohmpilot |

HEATER 1

- Automatic
- ● Manual
- Measure heating element

| Consumer | Single-phase | Power (W) | 3000 |

☑ Temperature sensor present   ☐ Legionella prevention (h)

☑ Adapt day curve   ☐ Maximum temperature

Time from:	Time to:	Minimum temperature:
☑ 06:00	11:00	45 °C
☑ 11:00	13:00	50 °C
☑ 13:00	21:00	45 °C
☑ 21:00	06:00	40 °C

HEATER 2

| Consumer | Activate external source |

Save

General settings, symbolic representation

1 Open the Ohmpilot user interface (see section **Establishing the data connection**).

2 Enable the "**Temperature sensor present**" field

3 Enable the "**Adapt day curve**" field

4 Set the settings under "**Time from**", "**Time to**" and "**Minimum temperature**" as required
For more information, see section **Adapting the day curve**

5 Under **HEATER 2**, select "**Activate external source**" for **Consumer**

Two heating elements - 3-phase and 1-phase

**Application ex-
ample 5**
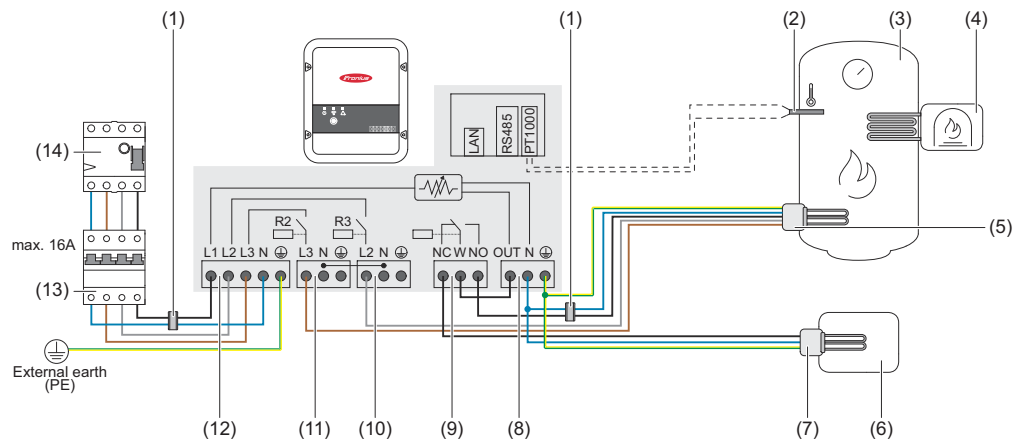
(1)   **Ferrite rings** (included in scope of delivery)
(2)   **Temperature sensor** PT1000
(3)   **Hot water boiler**
(4)   **External source** (e.g. gas-fired heating)
(5)   **Heating element 1** (max. 3 kW)
(6)   **Buffer**
(7)   **Heating element 2** (max. 9 kW)
(8)   **Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded ter-
        minal 1.5 - 2.5 mm^2
(9)   **Multifunctional relay output**
(10)   **Output - L2 heating element**
(11)   **Output - L3 heating element**
(12)   **Input - grid supply** 3x 230V network, spring-loaded terminal 1.5 - 2.5 mm^2
(13)   **Residual-current circuit breaker**
(14)   **Automatic circuit breaker** max. B16A

Many heating systems consist of a boiler and a buffer, whereby the central heat-
ing supplies the buffer, and a control system feeds the hot water boiler via a
pump. As with thermal photovoltaic systems, the Ohmpilot is also capable of
heating the hot water boiler first and then the buffer, so that the maximum
amount of photovoltaic surplus energy can be stored.

The Fronius Smart Meter records the current power at the feed-in point and
transfers the data to the inverter. By controlling the Ohmpilot, the inverter ad-
justs any surplus energy that is available to zero. This takes place by continuously
adjusting the heating element connected to the Ohmpilot.

For this application, two heating elements are installed, with preference being
given to activation of the first heating element (5). Only once the maximum tem-
perature in the boiler (3) has been reached is the second heating element activ-
ated in a continuously variable manner, so that the remaining energy can, for ex-
ample, be stored in a buffer.

If no temperature sensor is connected to the Ohmpilot, after 30 minutes the
Ohmpilot attempts to output energy via the first heating element once again. If a
temperature sensor is present, the system switches back to the first heating ele-
ment from a temperature difference of 8 °C (to the temperature measured be-
fore switching over).

This switching can also be used for layering in a boiler/buffer, so that the maximum temperature is reached in the top part of the boiler using minimal energy and the remaining energy is stored in the lower part of the boiler. By using layering in a storage tank, it is also possible to store significantly more energy, as a minimum temperature is normally maintained in the top part of the boiler. This means that the temperature difference and thus the amount of energy is rather small. In the lower part of the boiler, a high temperature difference of 50 °C, for example, can be used.

Both the first and the second heating element can be 1-phase or 3-phase. For two 3-phase heating elements, see **Application example 6**. If no temperature sensor is fitted, an external source (e.g. gas-fired heating) must be used to ensure the minimum temperature is met.

As an alternative, the Ohmpilot can also ensure the minimum temperature. This may result in electricity being sourced from the grid. The maximum temperature must be set on the heating element thermostat. If heating element 1 (5) does not have a thermostat, the Ohmpilot can also carry out this task as an alternative (see chapter **Optional settings** on page **45**). However, heating element 2 (7) must have a thermostat.

> **NOTE!**
> Both heating elements can never be heated at the same time!
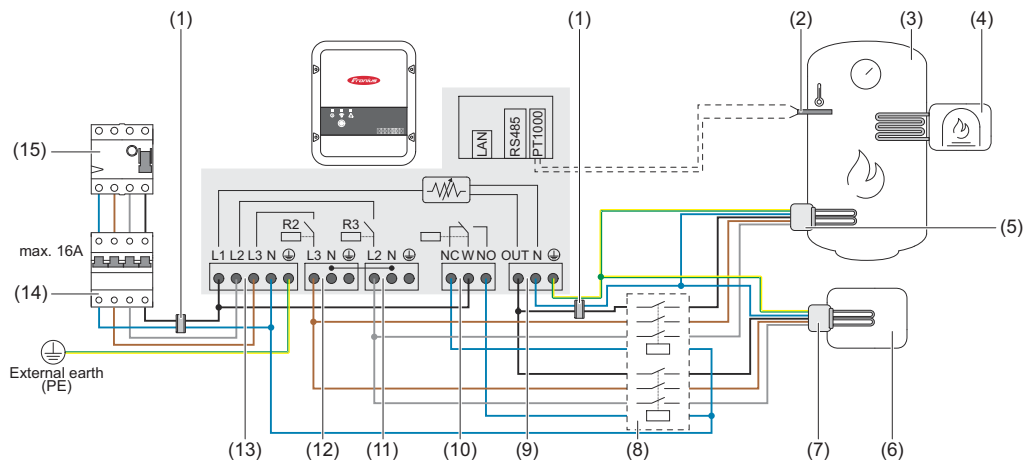
Settings in the menu area

General settings, symbolic representation

[1] Open the Ohmpilot user interface (see section **Establishing the data connection**).

[2] Under **HEATER 1**, select "**Manual**" and "**Single-phase or Three-phase**".

[3] Under **HEATER 2**, select "**Single-phase or Three-phase**" and enter the output of the load.

Two 3-phase heating elements up to 9 kW

Application example 6

(1) **Ferrite rings** (included in scope of delivery)
(2) **Temperature sensor** PT1000
(3) **Hot water boiler**
(4) **External source** (e.g. gas-fired heating)
(5) **Heating element 1** (max. 9 kW)
(6) **Buffer**
(7) **Heating element 2** (max. 9 kW)
(8) **Contactor switching**
(9) **Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded terminal 1.5 - 2.5 mm^2
(10) **Multifunctional relay output**
(11) **Output - L2 heating element**
(12) **Output - L3 heating element**
(13) **Input - grid supply** 3x 230V network, spring-loaded terminal 1.5 - 2.5 mm^2.
(14) **Residual-current circuit breaker**
(15) **Automatic circuit breaker** max. B16A

Many heating systems consist of a boiler and a buffer, whereby the central heating supplies the buffer, and a control system feeds the hot water boiler via a pump. As with thermal photovoltaic systems, the Ohmpilot is also capable of heating the hot water boiler first and then the buffer, so that the maximum amount of photovoltaic surplus energy can be stored.

The Fronius Smart Meter records the current power at the feed-in point and transfers the data to the inverter. By controlling the Ohmpilot, the inverter adjusts any surplus energy that is available to zero. Specifically, this takes place by continuously adjusting the heating element connected to the Ohmpilot.

For this application, two heating elements are installed, with preference being given to activation of the first heating element (5). Only once the maximum temperature in the boiler (3) has been reached is the second heating element (7) activated in a continuously variable manner, so that the remaining energy can, for example, be stored in a buffer.

If no temperature sensor is connected to the Ohmpilot, after 30 minutes the Ohmpilot attempts to output energy via the first heating element once again. If a temperature sensor is present, the system switches back to the first heating ele-

ment from a temperature difference of 8 °C (to the temperature measured before switching over).

This switching can also be used for layering in a boiler/buffer, so that the maximum temperature is reached in the top part of the boiler using minimal energy and the remaining energy is stored in the lower part of the boiler. By using layering in a storage tank, it is also possible to store significantly more energy, as a minimum temperature is normally maintained in the top part of the boiler. This means that the temperature difference and therefore the amount of energy is rather small. In the lower part of the boiler, a high temperature difference of 50 °C, for example, can be used.

Switching must be realised by an external contactor. If no temperature sensor is fitted, an external source (e.g. gas-fired heating) must be used to ensure the minimum temperature is met.

As an alternative, the Ohmpilot can also ensure the minimum temperature. This may result in electricity being sourced from the grid.

The maximum temperature must be set on the heating element thermostat. If heating element 1 (5) does not have a thermostat, the Ohmpilot can also carry out this task as an alternative (see chapter **Optional settings** on page **45**). However, heating element 2 (7) must have a thermostat.

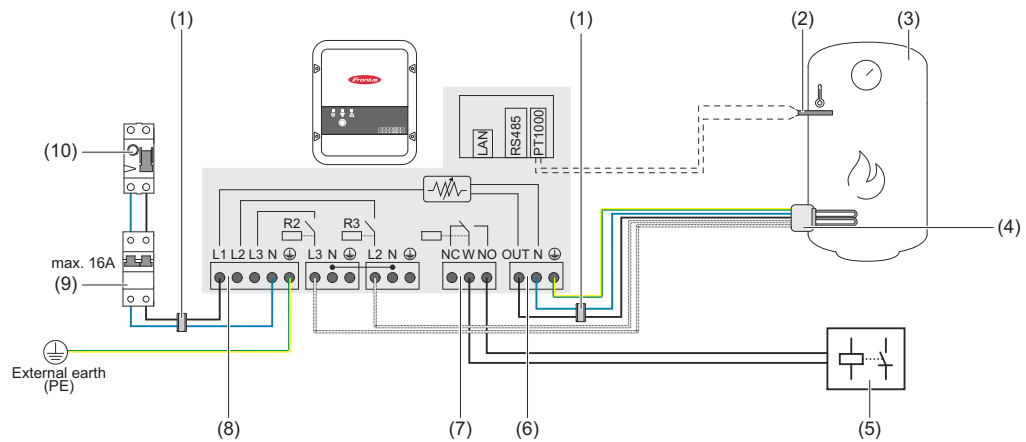| NOTE! |
|---|
| Both heating elements can never be heated at the same time! |

Settings in the menu area

General settings, symbolic representation

1 Open the Ohmpilot user interface (see section **Establishing the data connection**).

2 Under **HEATER 2**, select "**Three-phase**" and enter the output of the load.

1-phase heating element up to 3 KW / 3-phase heating element and circulation pump

Application example 7

(1)	**Ferrite rings** (included in scope of delivery)
(2)	**Temperature sensor** PT1000
(3)	**Hot water boiler**
(4)	**Heating element**

> **NOTE!**
>
> **1-phase and 3-phase heating element**
> This function can be implemented with a 1-phase and 3-phase heating element.

| (5) | **Circulating pump auxiliary relay** |

> **NOTE!**
>
> **Circulating pump run-on time**
> At the end of the heating operation, the circulating pump is active for 60 seconds.

| (6) | **Output up to 3 kW** variable, max. 13 A resistive load, spring-loaded terminal 1.5 - 2.5 mm^2 |
| (7) | **Multifunctional relay output** |

> **NOTE!**
>
> **Relay contacts can oxidise.**
> The voltage must be at least 15 V and the current at least 2 mA, so that the relay contacts do not oxidise.

(8)   **Input - grid supply** 1x 230V network, spring-loaded terminal 1.5 - 2.5 mm^2

⚠ **CAUTION!**

Danger due to contact with live, stripped wires
A short circuit can be triggered and damage the device.
▶ Carry out all connection work in accordance with the applicable electrotechnical guidelines and regulations.
▶ Observe the maximum stripping length of 10 mm.
▶ When connecting the phases, tie the individual wires together with a cable tie immediately before the terminal.

(9)   **Residual-current circuit breaker**
(10)   **Automatic circuit breaker** max. B16A

The Ohmpilot can also control a circulating pump in a heating system in parallel to a heating element via the floating contact of the device control. This is possible with all circulating pumps that have an auxiliary relay.

The designation of the floating contact on the Ohmpilot is **NC W NO.** When the contact is activated, the switching rocker (W) switches from the "normally open" (NO) position to "normally closed" (NC).

In heating mode, this contact is activated and the circulating pump runs as **"HEATER 2"** in parallel to the heating element, which is operated via the **"HEATER 1"** output.

To prevent the auxiliary relay of the circulating pump from switching on and off continuously in case of low or fluctuating PV power, the Ohmpilot is equipped with a delay. This has a positive effect on the wear and service life of the relay and the pump.

Settings in the menu area

General settings, symbolic representation

1 Open the Ohmpilot user interface (see section **Establishing the data connection**).

2 Under **HEATER 1**, select **"Automatic"**.

**3** Under **HEATER 2**, select **"Circulating pump"**

IMPORTANT!

If the "Circulating pump" option is selected, no other heater can be controlled by the Ohmpilot. The **HEATER 1** output controls the heating element which, in combination with the circulating pump, heats a hot water tank.

Establishing the data connection

Possible communication channels

The data connection is required for communication between the inverter and the Ohmpilot. The inverter mainly sends default values to the Ohmpilot. For some applications, it is necessary to make settings via the Ohmpilot user interface.
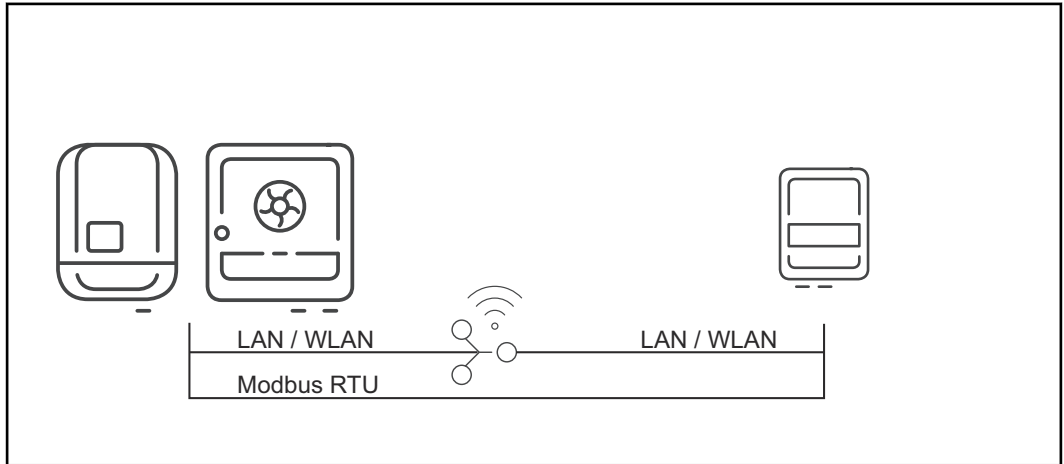
There are 3 possible communication channels:
- Modbus RTU (via RS 485)
- LAN (Ethernet)
- WLAN

> **NOTE!**
>
> **Fronius Datamanager 2.0 software version**
> In order to communicate with the Ohmpilot, software version 3.8.1-x onwards must be installed on the SnapINverter series inverter (Fronius Datamanager 2.0).

Pairing the inverter to the Ohmpilot

Each inverter with a Fronius Smart Meter automatically connects to the Ohmpilot. If there are several inverters with Fronius Smart Meter in the network, the Ohmpilot must be paired manually on the user interface of the inverter to be paired under "Device Configuration".

Information on how to access the user interface of the inverter can be found in the operating instructions for the respective device.

―――― Components ――――

Inverter			
No	**Device type**	**PMC**	**Serial number**
1	Fronius Symo 4.5-3-S	25451000700930316|4,071,334|0.8D_D|RECERBO|R|	

Meter			
No	**Device type**	**Location of the meter**	**Serial number**
1	Smart Meter 63A	Feed-in point (Primary meter)	15160132

Ohmpilot					
No	**Serial number**	**Software version**	**Hardware version**	**Paired with**	**Pairing**
1	28136344	1.0.26-1	3	FRO:31161708	Pairing

Establishing a connection via Modbus RTU
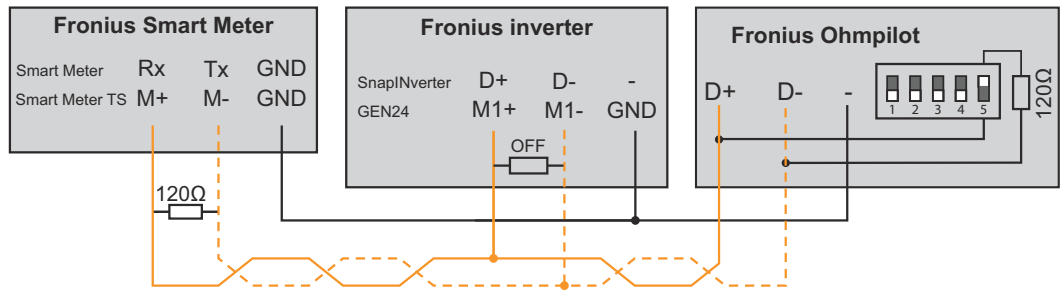
Ohmpilot connections	Fronius Smart Meter connections	Fronius SnapINverter / GEN24 connections
D+	Rx / M+	D+ / M1+
D-	Tx / M-	D- / M1-
-	GND	GND

⚠ **WARNING!**

Danger if cables are mixed up
If data cables and live mains cables are mixed up, this can result in personal injury and damage to property.
▶ Use data cables that are clearly distinguishable from the mains cables.
▶ Mark cables (e.g. by labelling)

NOTE!

Defective cabling is signalled by the red LED indicator flashing once.

---

1 Connect the data communication cable in parallel to the Ohmpilot and system components.

2 Activate the terminating resistor on the first and last device of the Modbus cable. Activate the resistor on the Ohmpilot with DIP switch number 5.

3 Set the Modbus address using DIP switches 1-3.
Default address: 40 (for future applications, the Modbus address can be changed using the DIP switches on the Ohmpilot.)

DIP switch settings

Switch	Setting
DIP 1-3	Modbus address BCD
DIP 4	Reserve
DIP 5	Terminating resistor (120 Ohm)

Establish a WLAN connection to implement further settings:

1 Press the button on the Ohmpilot 2x.
The blue LED flashes twice. The WLAN access point is activated for 30 minutes.

2 Activate the "Ohmpilot" WLAN network on the mobile device or PC.
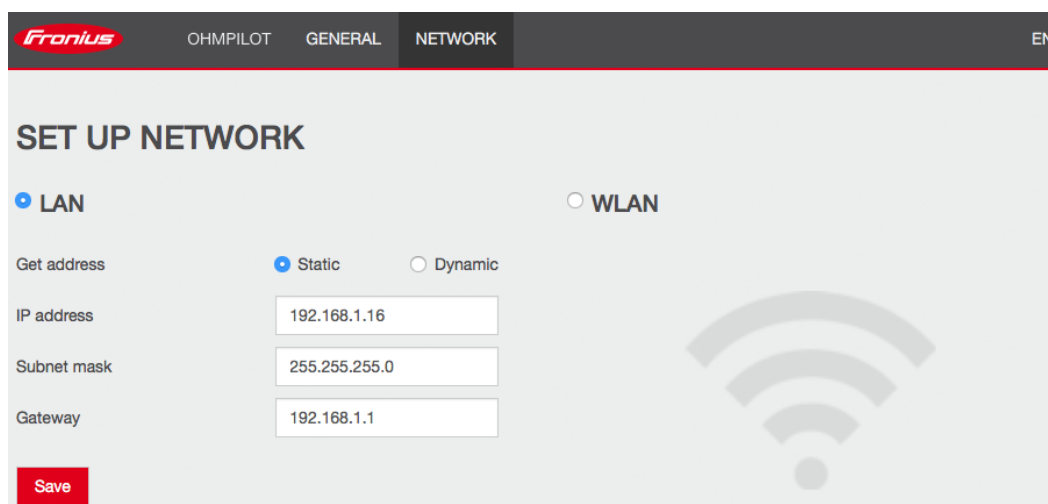
3 In the browser, enter the address http://192.168.250.181 or http://ohmpilotW.local.

4 Continue configuration on the user interface.

Establishing a connection via LAN

As standard, the Ohmpilot obtains its IP address automatically from the DHCP server, meaning that no settings are generally necessary.

The inverter automatically searches for the Ohmpilot, and the search process may take up to 5 minutes. If the red LED is not lit and the green LED is flashing, the Ohmpilot is working correctly.

A static IP address can be assigned to the Ohmpilot via the user interface.

Set Up Network, symbolic representation

1 In the web browser, open the address http://ohmpilotL.local.

Alternatively, the IP address assigned by the DHCP server can also be read out. Almost every router displays its connected devices (clients) on its user interface. Apps such as Fing can help you find the automatically assigned IP address. Alternatively, the Ohmpilot can also be searched on the network using the Fronius Solar.start App.

> **NOTE!**
>
> **Accessing the Ohmpilot via the network.**
> In networks with a DNS suffix, the Ohmpilot can be accessed at http://ohmpilotL.<DNS-Suffix>, e.g. http://ohmpilotL.fronius.com

To set the IP address manually, the "Static" option must be selected. Then enter the desired IP address.

The Ohmpilot can then be reached at http://ohmpilotL.local or at the fixed IP address assigned.

**Establishing a connection via WLAN**

There are two options for connecting the Ohmpilot to an existing WLAN network:

Connecting via WPS (WiFi Protected Setup)

1 Press the button on the Ohmpilot 1x.
The blue LED flashes (once) as long as WPS is active.

2 Press the WPS button on the router within 2 minutes.
The blue LED on the Ohmpilot lights up permanently, the connection to the network was successful.
The inverter automatically searches for the Ohmpilot, and the search process can take up to 5 minutes. If the red LED is not lit and the green LED is flashing, the Ohmpilot is working correctly.
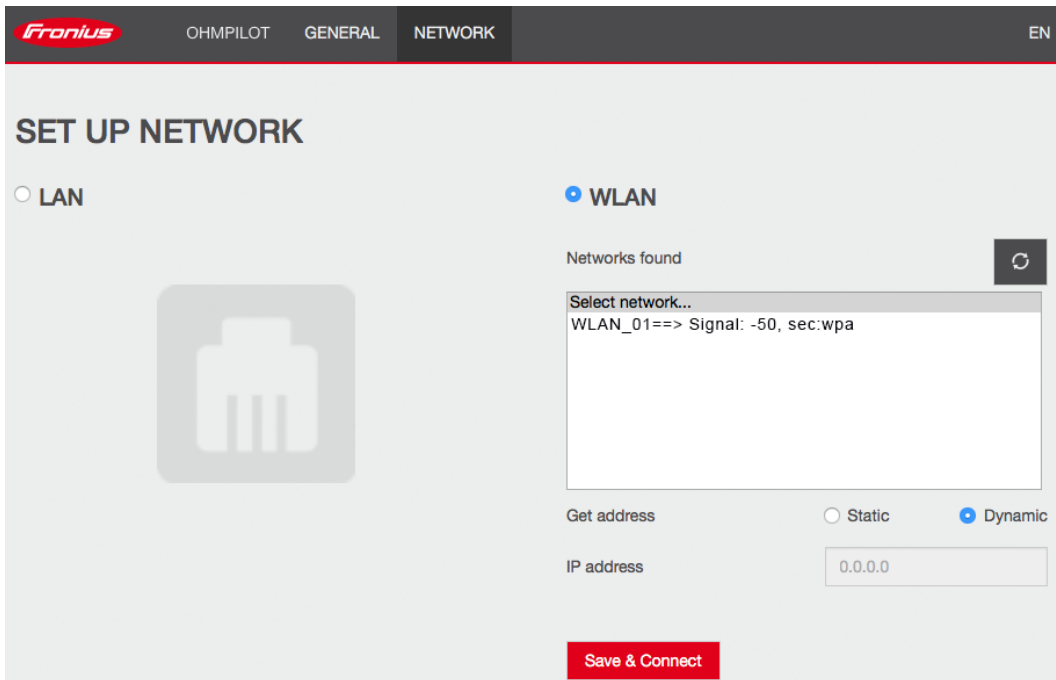
Set Up Navigation, symbolic representation

Connecting via access point and manual configuration of the WLAN settings

1 Press the button on the Ohmpilot 2x.
The blue LED flashes (twice) as long as the WLAN access point is active (30 minutes). Before the access point is opened, it searches for available WLAN networks.

2 Activate the "Ohmpilot" WLAN network on your smart device or PC.

3 In the browser, enter the address http://192.168.250.181 or http://ohmpilotW.local. Alternatively, the Ohmpilot can also be searched on the network using the Fronius Solar.start App.

4 Select the desired network in the WLAN network tab.

> **NOTE!**
>
> **Desired network not listed.**
> If the desired WLAN network is not listed, end access point mode by pressing the button again and repeat the process.

5 Click on "Save & Connect", enter WLAN password.
If the blue LED on the Ohmpilot lights up permanently, the connection to the network was successful.
The inverter automatically searches for the Ohmpilot, and the search process can take up to 5 minutes. If the red LED is not lit and the green LED is flashing, the Ohmpilot is working correctly.

> **NOTE!**
>
> **WLAN network scan not possible.**
> When the access point is opened, it is not possible to scan the WLAN networks.

A static IP address can be assigned to the Ohmpilot via the user interface.

The Ohmpilot can then be reached at http://ohmpilotW.local or at the fixed IP address assigned. Alternatively, the Ohmpilot can also be searched on the network using the Fronius Solar.web App.

NOTE!

Device connections.
Only one device can connect to the Ohmpilot.

NOTE!

Accessing the Ohmpilot via the network.
In networks with a DNS suffix, the Ohmpilot can be accessed at http:// ohmpilotW.<DNS-Suffix>, e.g. http://ohmpilotW.fronius.com

Boost Mode

Boost Mode

Boost Mode is used to supply the load at the "Heater 1" output with 100% of the available power for a short time. The dimming level is set to 100% over a maximum period of 4 hours; switching through phases L2 and L3 takes place. This may result in electricity being sourced from the grid.

Boost Mode can be activated and deactivated by pressing the function key on the Ohmpilot (see **Indications/controls on the device**) or via the user interface.

Settings in the menu area
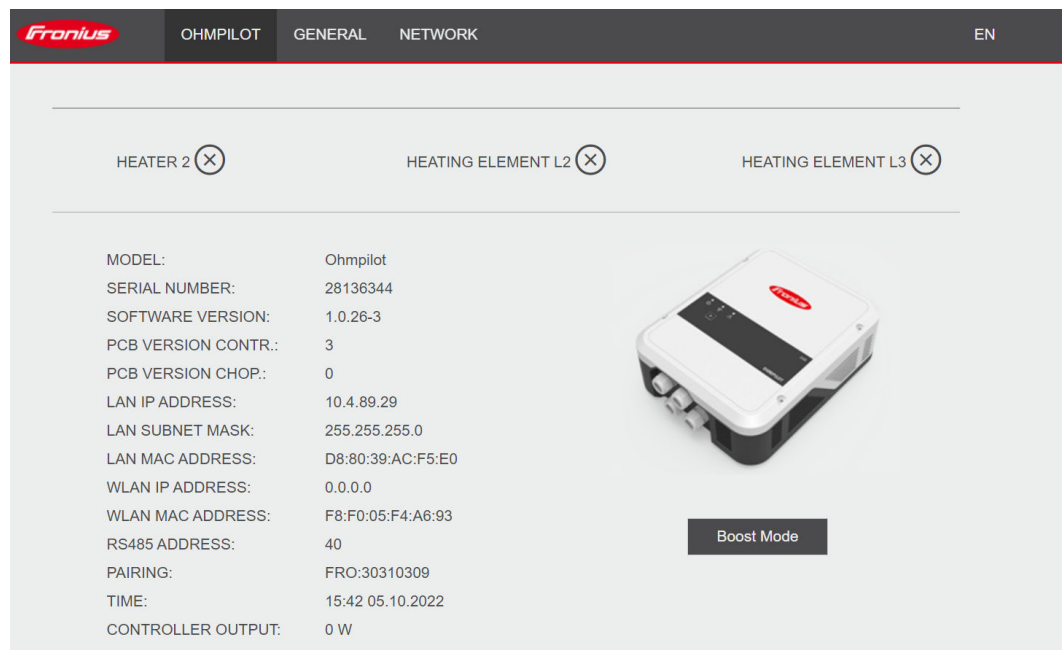
Boost Mode, symbolic representation

1 Open the Ohmpilot user interface (see section **Establishing the data connection**).

2 Click on the **Boost Mode** button to activate the function.

3 Click again to deactivate Boost Mode.

User interface

Status display

Status display, symbolic representation

Status	
OK	Ohmpilot is operating in normal mode.
Minimum temperature	The minimum temperature has been undershot. Heater 1 heats up to 100%.
Legionella prevention	Legionella prevention program is active. Heater 1 heats up to 100%.
Boost	The Ohmpilot was manually set to Boost Mode. Heater 1 heats up to 100%.
Error	An error has been detected. Further information is displayed in Fronius Solar.web.
Temperature	Current measured temperature. A valid value is only displayed when a temperature sensor is connected.
Heat output	Current power being used by the Ohmpilot.
Heater 2	Heater 2 is active. Heater 2 may be a second heating element, a heat pump or an external source (e.g. gas-fired heating).
L2 heating element	Phase 2 of 3-phase heating element is active.
L3 heating element	Phase 3 of 3-phase heating element is active.

Optional settings

Manual settings for HEATER 1

Application
The settings described here can be implemented for all the application examples shown above.

General settings, symbolic representation

Setting the output of HEATER 1 manually:

1	Under **HEATER 1**, select "**Manual**"
2	Select "**Single-phase**" or "**Three-phase**" for **Consumer**
3	Enter the output of the load

Automatic measurement of heating element 1
In the case of applications with a 1-phase and a 3-phase heating element, it is not possible for the Ohmpilot to measure heating element 1 automatically due to the cabling. In this case, the configuration must be carried out manually.

Activating Legionella prevention

> ⚠️ **CAUTION!**

Danger due to Legionella
Legionella bacteria can cause serious illnesses. Despite setting the "Legionella prevention" function, contamination of the water with Legionella bacteria cannot be fully ruled out.
▶ Perform the Legionella prevention function regularly.
▶ Ensure continuous circulation and extraction of hot water.
▶ Check the hot water temperature regularly

> **NOTE!**

If the boiler is operated at a temperature < 60 °C for a longer period of time and a hygienic storage tank is not used, measures must be taken to kill Legionella.
▶ For private use, it is recommended to run the Legionella prevention function at least once a week (168 hours). The actual interval depends on the size of the storage tank and the set temperature.
▶ A PT1000 temperature sensor is required for this function and can be sourced from Fronius under item number 43,0001,1188.

When the Legionella prevention system is activated, the hot water is heated to 60 °C at a set interval.

1 Enable the "**Temperature sensor present**" field

2 Enable the "**Legionella prevention (h)**" field

3 Enter the desired Legionella prevention cycle

Adapting the day curve

This function ensures that the user-specified temperature is not undershot. If there is insufficient surplus current, the external source (if activated) is controlled or power is drawn from the grid to ensure a minimum temperature.

Up to four time periods and minimum temperatures can be defined. For example, higher hot water temperatures are available in the evening. During the day, more potential for the surplus is then possible by selecting a lower minimum temperature.

Adapting the day curve:

1 Enable the "**Temperature sensor present**" field

2 Enable the "**Adapt day curve**" field

3 Under "**Time from**", enter the time from which the Ohmpilot should start to heat to the new minimum temperature.

4 Under "**Time to**" enter the time until which the Ohmpilot should heat to the minimum temperature.

5 Under "**Minimum temperature**", select the desired end temperature.

> **NOTE!**

Undefined time ranges.
If no time ranges are defined, heating is not provided via the grid or external source during this time. Only surplus PV energy is used.

If time ranges overlap, the higher temperature is used, so that, for example, a basic temperature of 40 °C can be set for the whole day and is increased to 50 °C at certain times.

Primary heat source.
If heater 1 is the primary heat source, the day curve must be adapted to guarantee the desired minimum temperature. A PT1000 temperature sensor is required for this function and can be sourced from Fronius under item number 43,0001,1188. The temperature sensor must be installed above the heating element / external source to ensure a continuous supply of hot water.

Example	
Time / desired temperature	**Application case**
3.00 - 5.00 am / 45 °C	So that hot water is available for showering at 6.00 am. After showering, the hot water is only heated with surplus energy.
4.00 - 6.00 pm / 45 °C	If there is not enough surplus energy, the hot water is reheated for showering. After showering, the heater is no longer reheated to minimise heat loss.

Temperature limitation

If heater 1 does not have a configurable thermostat, this function can be used to limit the temperature.

1. Enable the "**Temperature sensor present**" field
2. Enable the "**Temperature limitation**" field
3. Enter the maximum temperature (e.g.: 60 °C)

NOTE!

This function is only possible for heater 1.
If a second heating element is being used as heater 2, it must be equipped with a thermostat. A PT1000 temperature sensor is required for this function and can be sourced from Fronius under item number 43,0001,1188. The position of the temperature sensor should be just above the heating element, so that the incoming cold water is immediately heated again and thus the maximum amount of storage is used.

Appendix

Status Codes

Sending errors
- Errors are saved in Fronius Datamanager 2.0 and can be sent via Fronius Solar.web.
- Possible error outputs:

Status codes

HE = Heating element TS = Temperature sensor I = Inverter ES = External source (e.g. gas-fired heating)

Code	Description	Cause	Remedy
906	Heating element 1 faulty - short circuit L1	The load on L1 is higher than 3 kW. Short circuit on L1.	Check heating element 1. Check wiring.
907 908	HE 1 - Overload on L2 HE 1 - Overload on L3	Current on L2 greater than 16 A Current on L3 greater than 16 A	Check HE 1 and replace if necessary.
909 910 911	HE 1 faulty - L1 highly resistive HE 1 faulty - L2 highly resistive HE 1 faulty - L3 highly resistive	No current is flowing through L1/L2/L3. L1/L2/L3 of HE 1 faulty. Phase L1/L2/L3 interrupted.	Check L1/L2/L3. Check L1/L2/L3 connections.
912	HE 2 faulty - short circuit L1	The load on L1 is higher than 3 kW. Short circuit on L1.	Check HE 2. Check wiring.
913 914	HE 2 - Overload on L2 HE 2 - Overload on L3	Current on L2 greater than 16 A Current on L3 greater than 16 A	Check HE2 and replace if necessary.
915 916 917	HE 2 faulty - L1 highly resistive HE 2 faulty - L2 highly resistive HE 2 faulty - L3 highly resistive	No current is flowing through L1/L2/L3. L1/L2/L3 of HE 2 faulty. Phase L1/L2/L3 interrupted.	Check L1/L2/L3. Check L1/L2/L3 connections.
918 919	Relay 2 (phase L2) defective Relay 3 (phase L3) defective	Relay R2/R3 does not switch.	Replace Ohmpilot.
920	TS short circuit	TS input resistance less than 200 Ohm. No PT1000 TS connected. TS defective.	Check cable and connections on TS cable. Replace TS.
921	TS not connected or faulty	No TS connected (input resistance greater than 2000 Ohm). TS is activated (should be deactivated). TS cable defective. TS defective. No PT1000 TS connected.	Connect TS to device. Deactivate TS via the user interface (if sensor not needed). Check TS cable. Replace TS.

922 923	60 °C for Legionella prevention could not be achieved within 24 hours. Minimum temperature could not be achieved within 5 hours	ES is switched off/faulty. (922 only). TS has not been fitted correctly. Heating system has not been dimensioned properly (hot water consumption too high, etc.) HE/TS defective.	Switch on ES (922 only). Fit TS above the HE (in the protective tube). Legionella prevention via the user interface. Replace HE/TS.
924	ES could not achieve minimum temperature within 5 hours.	ES switched off/faulty. ES not connected to Ohmpilot. TS incorrectly mounted. Heating system not dimensioned properly (hot water consumption too high, etc.). TS faulty.	Switch on ES. Connect ES to relay 1. Fit TS above the heater battery of the ES. Check minimum temperature setting. Replace TS.
925	Time not synchronised	Time not synchronised in the last 24 hours. Router has been switched off/reconfigured.	Check connection between Ohmpilot and inverter. Switch on router. Check network settings.
926	No connection to inverter	No connection between inverter and Ohmpilot. Inverter switched off. The Ohmpilot also needs a connection to the inverter at night. Router switched off/faulty/reconfigured. Night switch-off function enabled on the inverter. Poor WLAN connection between inverter or Ohmpilot and router.	Check connection. Switch on the inverter. Update the software. Switch the Ohmpilot and inverter off and on again. Deactivate the night switch-off function of the inverter. On the inverter display, set night mode to ON under "SETUP/ Display Setting/ Night Mode" menu. Switch on router. Reposition the WLAN antenna to a better location. Check network settings.
927	Ohmpilot over-temperature	Ambient temperature too high (> 40 °C). The output of the heating element is too high. Ventilation slots are covered.	Install Ohmpilot in a cooler location. Use a heating element with a permissible output. Uncover the ventilation slots.

Status codes			
928	Ohmpilot under-temperature	Ambient temperature too low (<0 °C).	Install Ohmpilot in a warmer location. Installation outdoors is not permitted.
	Residual current circuit breaker triggered	Neutral conductor (N) and phase (L) reversed.	Connect N and L correctly.
	Ohmpilot is not using any surplus	Thermostat on heating element has switched off. Safety thermostat (STC) on the heating element has triggered.	Wait until thermostat switches on again. Reset safety thermostat.
	Ohmpilot is using only part of the surplus power	Heating element power is lower than surplus power.	Select a larger heating element where necessary
	Power at the feed-in point is not always adjusted to 0	Load and generation fluctuations require a few seconds to settle down.	
	After switch-on, the green LED makes 2 long flashes	Thermostat on heating element has switched off. Heating element is not connected.	Briefly turn up the thermostat for the power measurement. Connect the heating element.
	After a power failure, the Ohmpilot will no longer work	After a power failure, the Ohmpilot automatically assigns itself the following fixed IP address if it does not receive an IP address after 40 seconds: 169.254.0.180 (only valid if the Ohmpilot is connected to the router via WLAN).	Restart Ohmpilot so that the WLAN connection is re-established.

Technical data

Fronius Ohmpilot technical data

General data	
Dimensions (height x width x depth)	350 mm x 280 mm x 110 mm
Weight	3.9 kg
Protection class	IP 54
Installation	Wall
Ambient temperature range	0 to 40 °C
Permissible humidity	0%-99% (non-condensing)
Cooling	Convection
Storage temperature	-40 to 70 °C
EMC emission class	B
Overvoltage category	3
Pollution degree	3

Input data	
Frequency	50 Hz
Nominal voltage	230 V / 400 V
Max. input current	1 X 16 A / 3 x 16 A

Interfaces	
Modbus RTU	RS 485, max. 1000 m, shielded and twisted
LAN	Ethernet at least CAT5, shielded
WLAN	Standard IEEE 802.11 b/g/n
Temperature sensor	PT1000 (max. 30 m)

Output data	
Analogue output 1-phase/3-phase	Continuously variable 0 - 3 / 0 - 9 kW
Analogue nominal current per phase	13 A
Analogue output short-circuit current	16 A (max. 5 seconds)
Relay output max. current	L2 / L3 16 A (max. 5 seconds)
Multifunctional relay output	min. 15 V / 2 mA; max. 16 A (max. 5 seconds)
Efficiency during rated operation	at least 98%
Consumption during standby	typically 1.8 W

Tests/specifications

**Tests/specifica-
tions**

Tests/specifications per EN60730 Section 1 Table 7.2

6a	Construction	Electronic RS 2.5.5, independently mounted RS
19	Screwless terminals	2.10.6.1 type X mounting
24	Classification of the RS according to protection against electric shock, Section 6.8	Safety class I 6.8.3
29	Type of shutdown or open circuit for each circuit	Micro-interruption per 2.4.4.
30	PTI value of the insulation materials used for insulation	PTI 175 in accordance with 6.13.2
31a	Type of ground conductor connection	N in accordance with 7.4.3, grounding terminal in accordance with 9.1.1
39	Operating principle	Operating principle TYPE 1 in accordance with 2.6.1
40	Additional properties for operating principle	C in accordance with 6.4.3.3
51	Glow wire test temperatures (Sections 21.2.1, 21.2.2, 21.2.3 and 21.2.4)	Housing 550 °C, cable gland/strain-relief device 650 °C; category B in accordance with EN 60730-1:2000/A1:2004;
75	Rated surge voltage (Sections 2.1.12, 20.1)	In accordance with EN 61000-6-2:2005, EN 60730-1:2011, EN 301 489-1 (V1.9.2) Wire to wire | Wire(s) to ground, signal and control lines: --- ± | 1 kV DC mains inputs: ± 0.5 kV | ± 0.5 kV AC mains inputs: ± 1 kV |± 2 kV
77	Temperature of the ball pressure test	In accordance with 21.2.1, 21.2.2, 21.2.3 and 21.2.4, case (housing): Ball pressure test 1: 102°C Cable bushing (cable gland): Ball pressure test 2: 125 °C
80	Rated surge voltage for creepage distance or contact-gap	In accordance with EN 61000-6-2:2005, EN 60730-1:2011, EN 301 489-1 (V1.9.2) Wire to wire | Wire(s) to ground Signal and control lines: --- ± | 1 kV DC mains inputs: ± 0.5 kV | ± 0.5 kV AC mains inputs: ± 1 kV |± 2 kV

Warranty terms and conditions, and disposal

Fronius manufacturer's warranty

Detailed, country-specific warranty conditions are available on the internet
www.fronius.com/solar/garantie

Disposal

Waste electrical and electronic equipment must be collected separately and recycled in an environmentally responsible manner in accordance with the EU Directive and national law. Used equipment must be returned to the distributor or through a local, authorised collection and disposal system. Correct disposal of the used device promotes sustainable recycling of resources and prevents negative effects on health and the environment.

Packaging materials
- Collect separately
- Observe locally valid regulations
- Compress the cardboard box to reduce volume

Applicable standards and directives

CE mark
The devices conform to all the requisite and relevant standards and guidelines that form part of the relevant EU directive, and are therefore permitted to display the CE mark.

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ergy/installers-partners/
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toring-digital-tools

**MONITORING &
DIGITAL TOOLS**

Fronius International GmbH
Froniusstraße 1
4643 Pettenbach
Austria
contact@fronius.com
www.fronius.com

At www.fronius.com/contact you will find the contact details
of all Fronius subsidiaries and Sales & Service Partners.