



INFORMATION ON USING THE FRONIUS OHMPILOT FOR HEATING WATER IN DOMESTIC HEATING OR WATER HEATING SYSTEMS

Instructions for installers

White Paper
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1. Optimised self-consumption with the Fronius Ohmpilot

Are you planning to increase self-consumption by installing a new PV system or upgrading an existing system?

As well as the ability to connect infrared heaters, towel radiators and heat pumps, the Fronius Ohmpilot allows self-generated solar power to be harnessed in order to heat water. This makes it possible to significantly increase the household's level of self-consumption. Between April and October, up to 100% of the electricity required for heating water can be provided by solar power.

The following examples demonstrate how the Fronius Ohmpilot can be connected to a domestic heating or water heating system.

It is important to note a few points in advance, as it is not possible to connect an electric heating element to every domestic heating or water heating system. Different requirements and circumstances require specially designed heating systems. For this reason, there are a variety of heating systems, not all of which are suitable for the integration of an electric heating element.

We would like to introduce to you, an installer whose core business is not in the area of heating technology, to a number of the most common installations that could come across at your customer's property.

The goal is to make you aware of different solutions that are available to you in special cases, even when there is no connection socket. This means that you can provide your customers with concrete suggestions, which will allow them to heat water using their surplus solar power with just a relatively simple upgrade, for example. Figure 1 shows a common configuration in conjunction with a heating element (also called a heating cartridge).

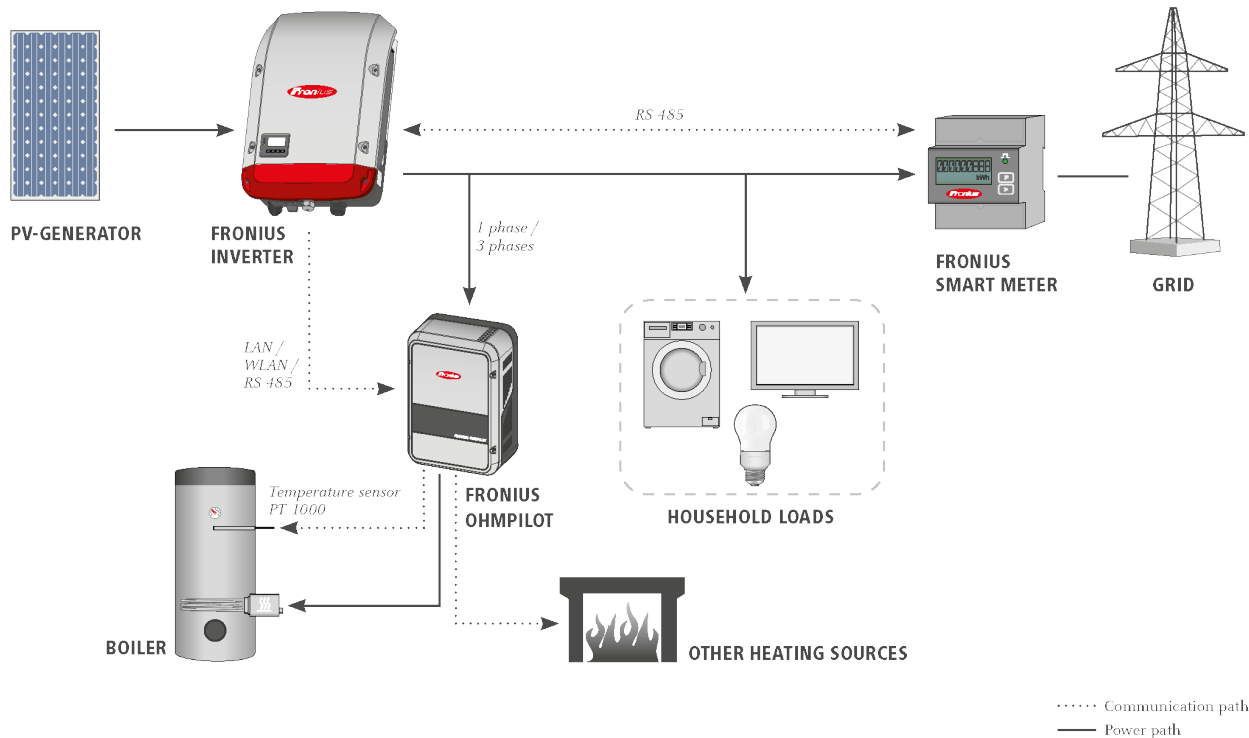


Fig. 1 Configuration diagram of a heating element setup

2. Examples of common domestic heating or water heating installations

The following examples show common installation situations. We then describe the options available for upgrading or converting the system in just a few steps.

2.1 Case study 1 – Conventional upright hot water tank

Conventional upright hot water tanks with a capacity of around 120-200 litres can be monovalent or multivalent. With mono- or multivalent tanks, one or more heating systems or energy sources are used to meet the heating requirements. Screw-in or flange heaters are used for electric heating. Having a thermowell available is advantageous for placing the temperature sensor. Figure 2 shows the schematic representation of an upright hot water tank.

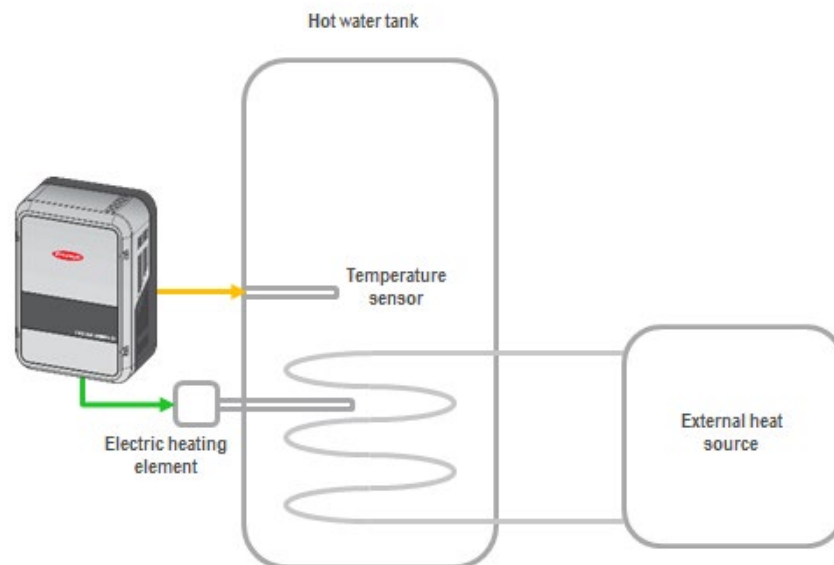


Fig. 2 Schematic representation of an upright hot water tank

Hot water tanks with a capacity of > 200 litres usually have connection sockets for one or more electric heating elements.

Additional note: If there is no connection socket available for the temperature sensor, a temperature sensor can often be used as a contact temperature sensor (from outside). More detailed information about minimum temperature monitoring can be found in the Operating Instructions of the Fronius Ohmpilot.

2.2 Case study 2 - Combination tanks

The combination tank combines both domestic heating and hot water. Combination devices save space and are very convenient for providing both heating and hot water. The hot water area in the combination tank usually has a capacity of 80-200 litres. There are also combination tank systems in which the hot water is heated continuously as it flows through a heat exchanger spiral in the buffer area. The buffer area usually has a capacity of 300-1000 litres. Combination tanks can also be operated in a monovalent or multivalent manner. There are also versions that do not have heat exchangers. Screw-in heating elements and flange heating elements can also be used with combination tanks. In most cases, there is a connection socket for minimum temperature monitoring. Electric heating elements can be connected in the warm water and/or in the buffer area on combination tanks.

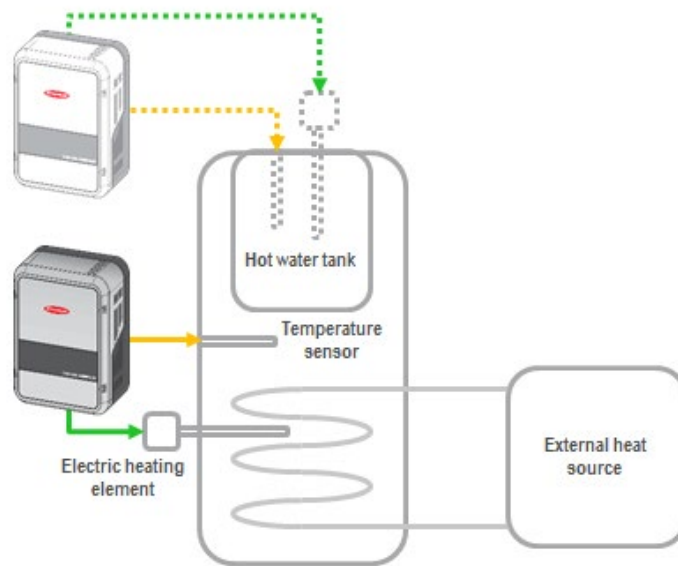


Fig. 3 Schematic representation of a combination tank

2.3 Case study 3 – External heat exchanger

External heat exchangers can be used with almost all types of tanks, such as hot water tanks, combination tanks and buffer storage tanks. Electric heating elements are connected directly to the external heat exchanger. Minimum temperature monitoring usually takes place in the tank.

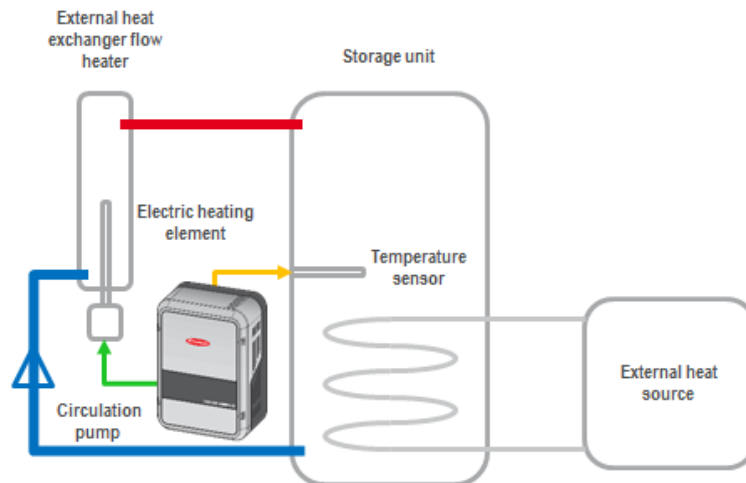


Fig. 4 Schematic representation with an external heat exchanger

Note: External heat exchangers can be used with almost all systems, even if there are no free connection sockets. The control of the charging pump must be considered separately when using a bespoke solution. This can be achieved in the following ways:

- a. Using a simple differential temperature controller between the tank and the heat exchanger. This means that the charging pump only starts once the temperature difference reaches the set value (e.g. tekmar type 1780, ST-AD DT-3.1, H-Tronic TDR 2004).

- b. Using a temperature control with measurement on/in the heat exchanger. This means that the charging pump starts as soon as the set temperature is reached.
- c. Using a relay, which is controlled using the Datamanager when there is surplus power. It may be necessary to adjust the setting multiple times until the optimum setting is found.

Temperature stratification in the tank can only be achieved when the hydraulics have been designed, adjusted and coordinated accordingly.

2.4 Case study 4 – Hydraulics for external loading

The electrothermal station tubra® – eTherm T from Tuxhorn can be used in conjunction with the Fronius Ohmpilot. It can be used with all drinking water and buffer storage tanks and can also be retrofitted to existing heating systems. An exact measurement of the surplus energy is carried out at the feed-in point. This means that surplus electrical energy can be used continuously and stored in the hot water tank in the form of heat.

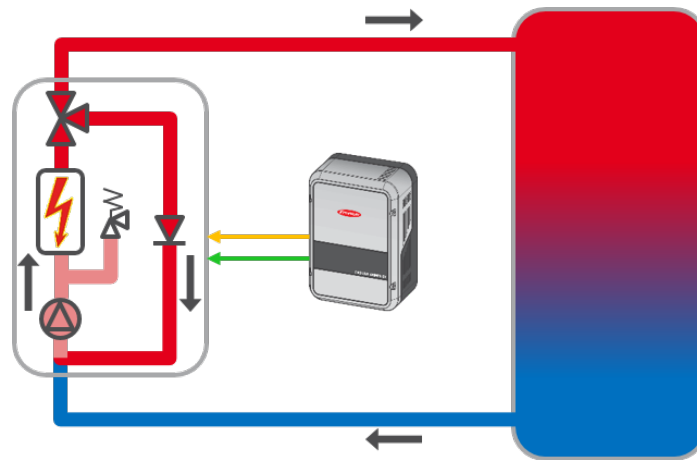


Fig. 5 Schematic representation of the Tuxhorn tubra®-eTherm T

This solution consists of a ready-to-install complete station that also contains the necessary charging pump controller. The water is warmed by circulating it through a pipe system until it reaches the target temperature. The heated water flows into the tank, thus allowing smooth stratification in the tank. Water of a useable temperature can still be produced using this method even when there is little energy available. Self-consumption can thus be increased by over 40%.

2.5 Case study 5 – Horizontal tanks

Only a few horizontal tanks offer the ability to retrofit electric heating elements, as they lack the connection sleeve or the connection for the flange. In some cases, the cleaning flange can be used to connect the electric heating element.

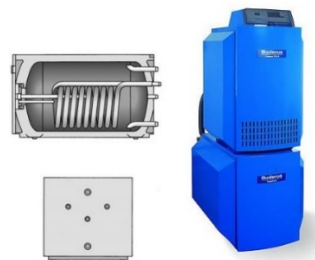
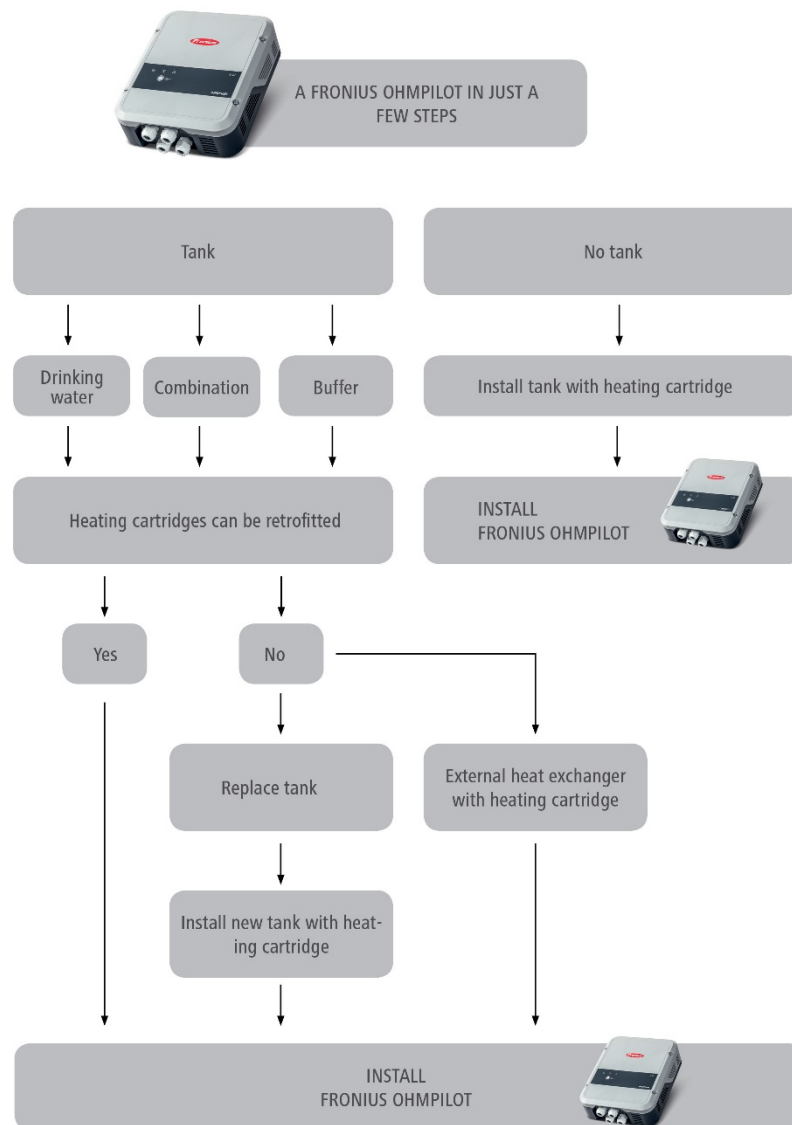


Fig. 6 Example of a horizontal tank

3. What should be taken into consideration if the existing domestic heating or water heating system lacks the connection socket required for installing the Fronius Ohmpilot?

Retrofitting requires a certain amount of effort in the form of conversion measures or replacing individual components of the heating or water heating system, as well as the customer being prepared to make the investment. By demonstrating the amount of investment required and its advantages, you can propose solutions to your customers and thus offer them mid- to long-term potential savings.

The following test should give you an overview of whether it is feasible to retrofit or convert the system so that surplus energy from the PV system can be used to heat water for the household.



We recommend working through the following steps to check whether the Fronius Ohmpilot can be used:

Step 1: Check whether it is possible to connect a heating element (for combination tanks, this can be in the hot water and/or buffer area).

Is there a connection socket for a screw-in heater (sleeve with \varnothing 5/4" or \varnothing 6/4")?

- ✓ **Yes:** An electric heating element can be used.
You can therefore use the Fronius Ohmpilot.
- × **No:** There is no connection socket for a screw-in heater.
ATTENTION: You cannot use the Fronius Ohmpilot in combination with an electric heating element. → Continue with step 2

Step 2: Check whether it is possible to connect a flange heater (for combination tanks, in the hot water and/or buffer area).

Is there a connection for the cleaning flange?

- ✓ **Yes:** You can swap the flange for a flange with sleeve (\varnothing 6/4", \varnothing 5/4").
You can therefore use the Fronius Ohmpilot.

OR

- ✓ **Yes:** A flange heater can be used.
You can therefore use the Fronius Ohmpilot.
- × **No:** There is no connection for the cleaning flange.
ATTENTION: You cannot use the Fronius Ohmpilot. → Continue with step 3

Step 3: Consult the customer as to whether replacing the tank is a possibility.

- ✓ **If yes:** Convert the existing water heating system and install a tank with a connection sleeve and thermowell for temperature monitoring.
For horizontal tanks: convert the existing heating system by decommissioning the horizontal tank and installing a new upright tank with a connection sleeve and thermowell for temperature monitoring.
You can therefore use the Fronius Ohmpilot.
- × **No:** Replacing the tank is not worthwhile.
ATTENTION: You cannot use the Fronius Ohmpilot. → Continue with step 4

Step 4: Check whether the existing system has an external heat exchanger.

- ✓ **Yes:** You can use any existing electric heating element that is or can be connected to external heat exchanger.
You can therefore use the Fronius Ohmpilot.
- × **No:** There is no external heat exchanger.
ATTENTION: You cannot use the Fronius Ohmpilot. → Continue with step 5

Step 5: Consult the customer as to whether retrofitting an external heat exchanger is a possibility.

- ✓ **If yes**, retrofit an external heat exchanger with connection sleeve to the existing water heating system. Use the thermowell of the tank for temperature monitoring. You can therefore use the Fronius Ohmpilot.
- ✗ **No**, the customer does not want to connect an external heat exchanger. **ATTENTION:** You cannot use the Fronius Ohmpilot.

At the same time, check whether the thermowell can be connected in the appropriate area (hot water/buffer area). If this is not possible, an external source (e.g. gas-fired heating) must ensure the minimum temperature is maintained.

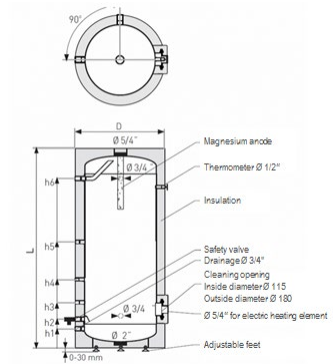
4. Product examples

4.1 Tanks

Water, combination and buffer storage tanks are available in a variety of sizes and versions. In order to give you an overview of the variety available, we have listed a few example products here.

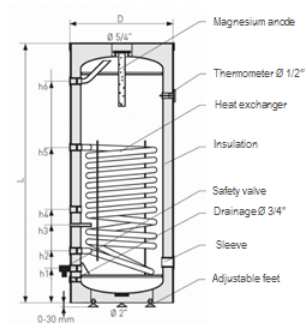
Upright water tank:

- / Capacity: 100 - 140 l
- / No heat exchanger
- / Suitable for electric heating elements (5/4")
- / Standard sizes up to around 500 l available



Upright water tank:

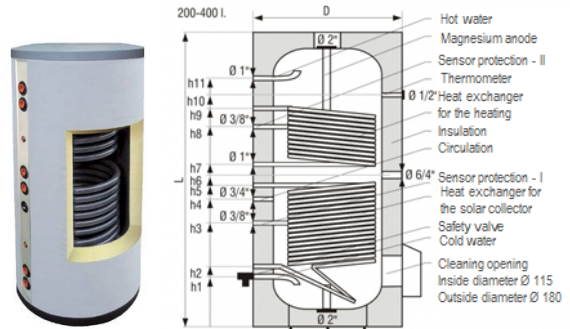
- / Capacity: 100 - 140 l
- / With heat exchanger
- / Suitable for electric heating elements (5/4")
- / Standard sizes up to around 500 l available





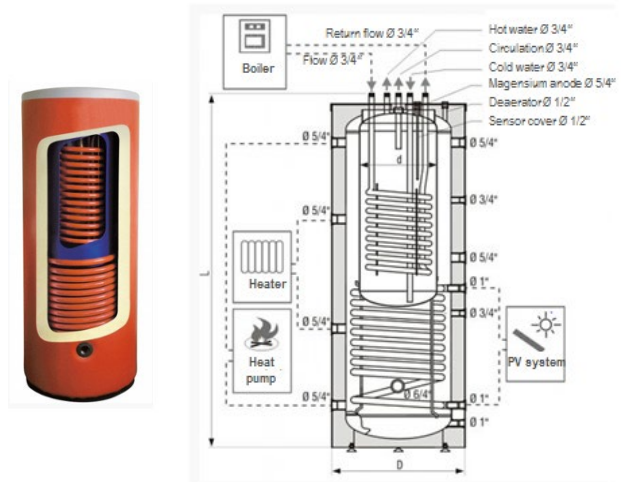
Upright water tank:

- / Capacity: 200 – 400 l
- / With two heat exchangers
- / Suitable for electric heating elements (6/4")



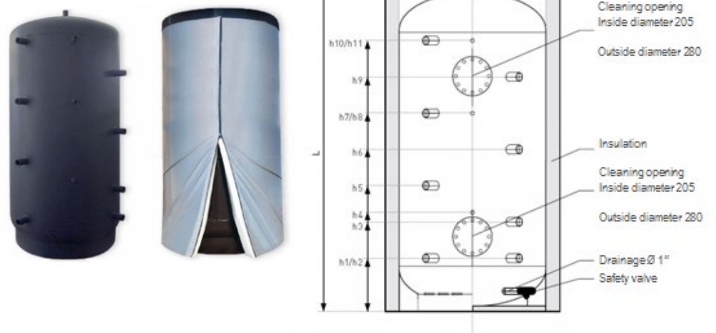
Combination tank (tank in tank):

- / Standard sizes 300/80 to 1,000/200 l
- / Available with zero, one or two heat exchangers
- / Mono-, bi- or multivalent
- / Suitable for electric heating elements (5/4"; 6/4")



Buffer storage tank:

- / Standard sizes 200 to 5,000 l
- / Usually no heat exchanger
- / Suitable for electric heating elements (usually 6/4")
- / With multiple connection sleeves
- / Available with or without insulation
- / Buffer tanks up to 500 l often do not have an access flange



4.2 Electric heating elements

Screw-in heaters 230 V:

- / Temperature regulator
- / Safety temperature limiter (STB)
- / Up to 3 kW (5/4"; 6/4")



Screw-in heaters 400 V:

- / Temperature regulator
- / STB
- / Up to 12 kW (6/4")



Flange heaters

- / Temperature regulator
- / STB
- / Variety of power categories up to approx. 650 kW
- / Variety of different thread/flange sizes
- / Higher power categories usually only available upon request



Electric heating elements, which shall be operated by the Fronius Ohmpilot, need to have a connection for the neutral conductor. Phase and neutral conductor must not be interchanged. With 3-phase heating elements, it should be considered that the neutral conductor connection is available at the neutral point. The neutral conductor has to be executed.

4.2.1 Supply sources for heating elements

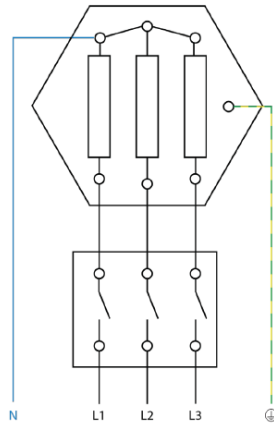
To make sure that 3-phase heating rods are working perfectly with the Ohmpilot there are a few things which have to be considered.

1-phase heating rod

- 0,3 to 3 kW
- Omic load (no electronic temperature limiter, fan...)

3-phase heating rod:

- 0,9 to 9 kW
- star connection
- equal load distribution on all 3 phases (e.g. 3 x 3 kW)
- If a mechanical temperature switch is used, all three phases have to be switched at the same time
- Omic load (no electronic temperature limiter, fan...)
- The neutral conductor must be installed and connected (can be retrofitted in most cases)



Connection diagram for 3-phase heating elements

You can find some suggestions of possible heating rods as well as supply sources below:

Please note that the following list is only an extract of compatible heating rods. This means, the following list is not complete and should just serve as a guideline.

ASKOMA

Askoma
Industriestrasse 1
CH-4922 Bützberg

Supply source:

OEG
www.oeg.net
Industriestrasse 1
DE- 31840 Hessisch Oldendorf

WS Weinmann & Schanz GmbH
www.weinmann-schanz.de
Rote Länder 4
DE-72336 Balingen

Inocal Wärmetechnik
Gesellschaft m.b.H.
www.inocal.com
Industriezeile 47
AT-4020 Linz



Type of equipment

Type of equipment	Order code	Capacity	Volt	Immersion length
AHFOR-BI-OP-2.0	012-5601	2000 W	400 V	260 mm
AHFOR-BI-OP-2.5	012-5602	2500 W	400 V	310 mm
AHFOR-BI-OP-4.0	012-5603	4000 W	400 V	260 mm
AHFOR-BI-OP-5.0	012-5604	5000 W	400 V	300 mm
AHFOR-BI-OP-6.0	012-5605	6000 W	400 V	360 mm
AHFOR-BI-OP-7.5	012-5606	7500 W	400 V	420 mm
AHFOR-BI-OP-8.0	012-5607	8000 W	400 V	450 mm
AHFOR-BI-OP-9.0	012-5608	9000 W	400 V	490 mm

ELEKTRATHERM

Elektratherm GmbH
 Im Argental 2
 88239 Wangen i.A.
 Phone: 07528-9519006
 Fax: 07528-9519008
verkauf@elektratherm.de

Type of equipment:

Type of equipment	Capacity	Immersion length	Non-heated	Surface load
405CC 200/32/12	2000 W	320 mm	120 mm	8 W/cm ²
405CC 300/39/12	3000 W	390 mm	120 mm	8 W/cm ²
405CC 450/50/12	4500 W	500 mm	120 mm	8 W/cm ²
405CC 600/62/12	6000 W	620 mm	120 mm	8 W/cm ²
405CC 750/72/12	7500 W	720 mm	120 mm	8 W/cm ²
405CC 900/85/12	9000 W	850 mm	120 mm	8 W/cm ²

ZOPPAS

Fa. Zoppas Industries,
 Feldbacher Strasse 1b/Top 8
 A-8200 Gleisdorf
 Phone: +43 664 244 74 77
www.zoppasindustries.com
stephan.buchsbaum@zoppas.com

Type 1BGL1ED8000X

Type of equipment



Typ	Volt	Capacity	Surface load	Immersion length	Non-heated	Article CODE
INCOLOY-825	~230 V or 3~400 V	2000 W	8 W/cm ²	320 mm	120 mm	1BGL1ED80002
INCOLOY-825	~230 V or 3~400 V	3000 W	8 W/cm ²	390 mm	120 mm	1BGL1ED80004
INCOLOY-825	3~400 V	4500 W	8 W/cm ²	470 mm	120 mm	1BGL1ED80006
INCOLOY-825	3~400 V	6000 W	8 W/cm ²	620 mm	120 mm	1BGL1ED80007
INCOLOY-825	3~400 V	7500 W	8 W/cm ²	720 mm	120 mm	1BGL1ED80008
INCOLOY-825	3~400 V	9000 W	8 W/cm ²	780 mm	120 mm	1BGL1ED80009

VULCANIC-TRIATHERM

Fa Vulcanic-Triatherm GmbH
 Flurstraße 9
 96515 Sonneberg
 Phone: 03675/4083-59
 Fax: 03675/402980
<http://www.triatherm.de>
info@triatherm.de

Attention: These heating rods must not be used for enamelled boilers but are an affordable alternative for buffer tanks!

Unit types:

Article code KNP1	Immersion length	Capacity	Volt	Surface load
025050I32K01	250 mm	2000 W	3 ~ 400 V*	6,1 W/cm ²
025050I32K02	250 mm	3000 W	3 ~ 400 V*	9,1 W/cm ²
035100I32K01	350 mm	4500 W	3 ~ 400 V	11,0 W/cm ²
045100I32K01	450 mm	6000 W	3 ~ 400 V	10,6 W/cm ²
055100I32K01	550 mm	7500 W	3 ~ 400 V	10,3 W/cm ²
065100I32K01	650 mm	9000 W	3 ~ 400 V	10,1 W/cm ²
075100I34K01	750 mm	12000 W	3 ~ 400 V	11,4 W/cm ²

* selectable at ~ 230 V

4.3 External heat exchangers

External heat exchangers

- / Available in a variety of power categories
- / Screw-in thread or flange
- / With or without electric heating element
- / Customization possible
- / Tubra®-eTherm T (Tuxhorn)



Conclusion

Would you like to generate follow-up business? Do you have concrete inquiries from your customers who want to optimise their self-consumption? Or do you have customers who are specifically interested in Fronius heating solutions?

The Fronius Ohmpilot means that you can now cater to customer needs even better and expand your PV offering to becoming a complete solar solution supplier.

If your assessment determines that the existing domestic heating and water heating system does not meet the requirements for connecting a Fronius Ohmpilot, it is in any case worthwhile to take a closer look at the heating installation. Give your customers an overview of the options described above, so that they are aware of the options that are available to them. This will give them a clear basis for making their decision.

If you decide against it, you can also recommend that your customers get in touch with their heating installer directly and ask them to assess the potential for connecting or retrofitting a heating element, for example when maintenance is next carried out on the system.

By outlining the investment framework and explaining the effort required to upgrade the system, you will make it easier for the customer to choose to upgrade or convert their outdated heating or water heating system. Give the reasons for renewing or upgrading the system, even if this is not part of your core business. This means that further steps can be planned in conjunction with your customer and their heating installer.

Sources:

- / Screw-in/flange heaters www.askoma.com
- / Electric heat exchangers www.tuxhorn.de
- / Electric upright tanks www.austria-email.at
- / Heat exchangers + electric heating elements www.te-waermetauscher.de
- / Tanks + electric heating elements www.heizung-solar24.de
- / Heat exchangers + electric heating elements www.meinhausshop.de
- / Electric heat exchangers www.maxdapra.com/de
- / Tanks www.schwarte-shop.de
- / Different electric heater versions www.heatsystems.de
- / Screw-in/flange heaters + room heating, etc. www.elekratherm.de
- / Screw-in heaters + heating cartridges www.elho.at/shop/index.php
- / Screw-in heaters www.eska.de
- / Screw-in heaters www.maier-elektrotechnik.de
- / Screw-in/flange heaters + more www.herbst.eu
- / Heating cartridges + screw-in/flange heaters + more www.tuerk-hillinger.de
- / Infrared heaters + screw-in heaters + more www.mkt-techsolution.com
- / Heating cartridges + screw-in heaters + infrared + more www.elkume.at
- / Electric heating elements + heat exchangers www.killius-technik.de