



SAFETY: Please read carefully the mounting and the commissioning instructions before starting the unit, in order to avoid accidents and failures caused by an incorrect use of the product. Please keep this manual for future reference. Please also read the technical features and the instructions of the controller.

List of features of main components

(F) Heat exchanger

Weld-braised plate heat exchanger made in stainless steel AISI 316. The large heat exchange surface ensures a great heat exchange that allows the return of the water to the buffer tank at a low temperature down to 25°C. This low temperature allows a perfect performance of the solar or of the heat pump supply.

The heat exchanger can be easily removed for servicing and/or the cleaning by means of the right-hand side opening or the insulation box.



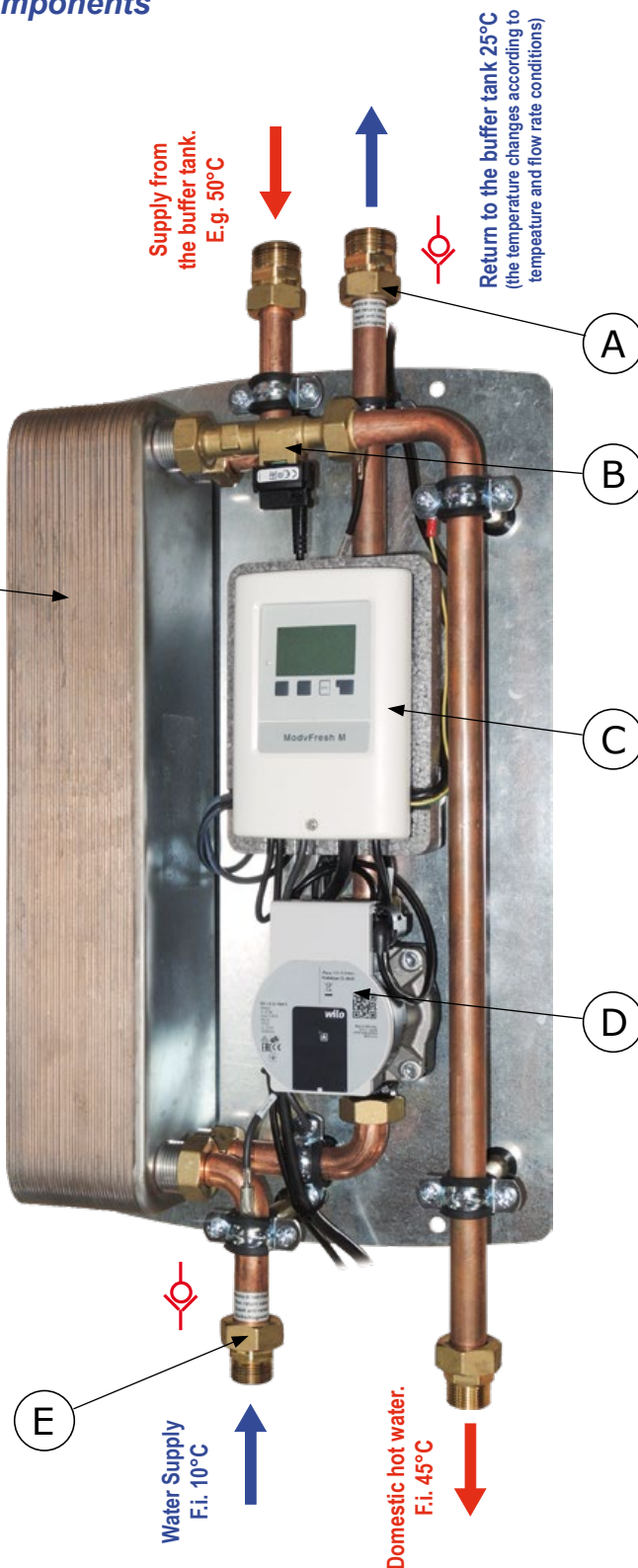
EPP insulation box

Dimensions:
373x610x150 mm.

A special metal back plate allows easy installation both on the wall and on the buffer tank.

(E) Check valve

Built into the water supply connection, it avoids unwanted circulation.



(A) Check valve

Built into the connection of "Return to the buffer tank", it avoids unwanted circulation.

(B) VFS digital flow meter

Thanks to this special device the regulations and the settings of the pump unit are no longer required. The required variation of flow rate is instantly read by the digital sensor, therefore the controller adjusts the speed of the circulating pump to get the better performance of your system. The flow rate appears on the LCD display. Measuring range: 2-40 l/min.

(C) Controller

The flow rate, the temperatures and the instant power produced by the system are instantly displayed on the controller. For an easy and effective connection of the temperature sensors, valves, etc. it is not necessary to act on the control unit, but it is sufficient to plug the cables in the automatic connectors of the sensor box.

(D) High efficiency circulating pump

High efficiency circulating pump compliant with European Directive 2009/125/CE. The special electronics adjusts the speed of the primary circulating pump, from a minimum speed of 10% up to the maximum selected speed, in order to ensure always the chosen temperature (e.g. 45°C).



DANGER: SCALDS

To prevent scalds to the user, never exceed 60°C of water temperature. This temperature limit is preset in the controller, but it can be reduced, if necessary.

PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) ModvFRESH 2 PDC

Hydraulic and connection scheme

To use the anti-legionella function, the buffer supply temperature must be 5 K higher than the disinfection temperature set in the control unit. In case it is not possible to reach it (for example in case of use with a heat pump) it will be necessary to integrate by means of an external source.

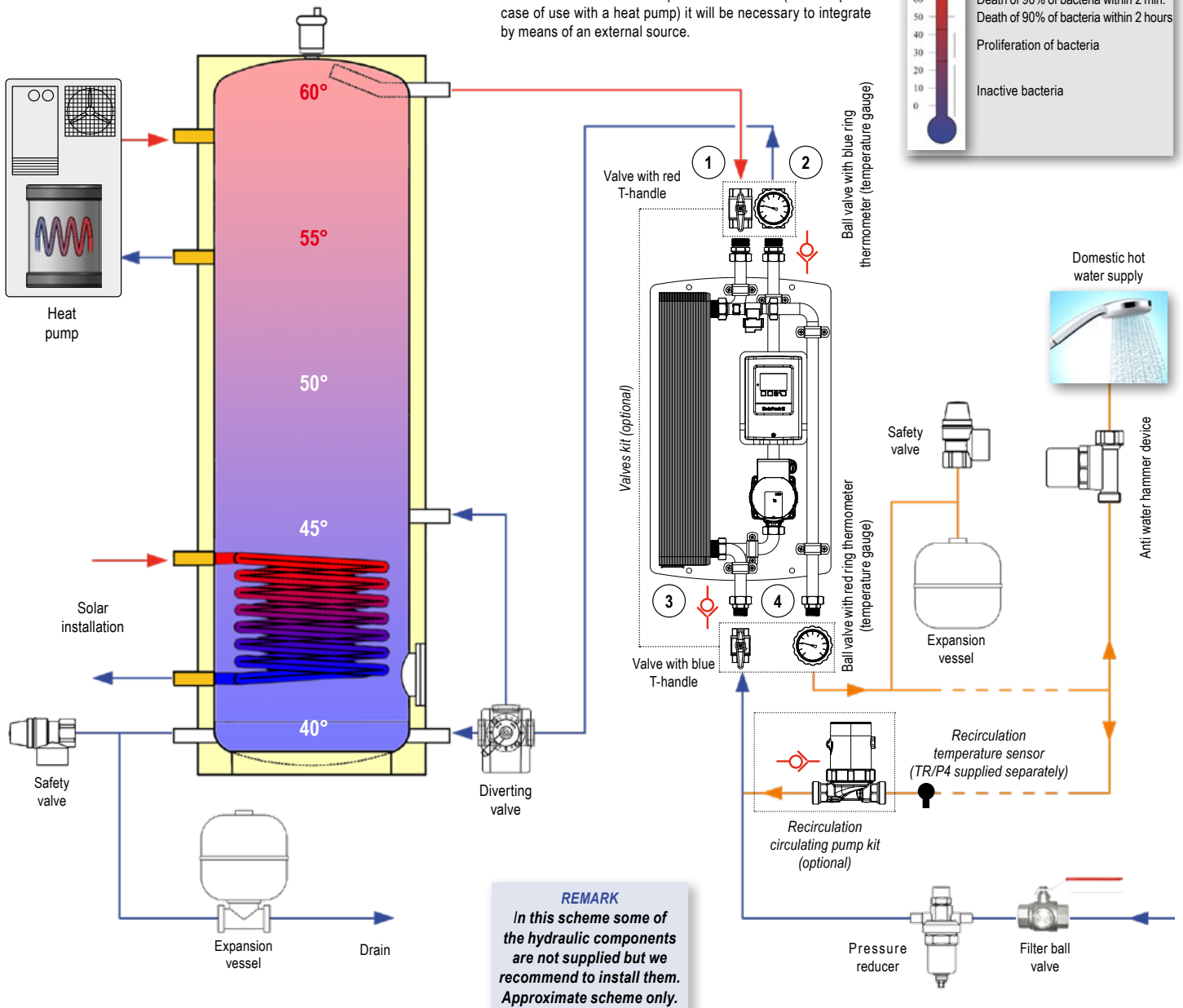
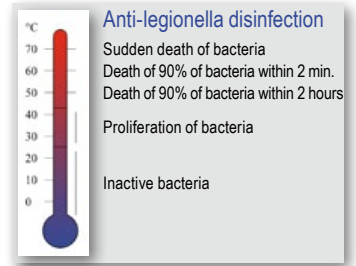


Fig. 1: Layout of a plant for delivering fresh domestic water by using ModvFRESH 2 PDC

Connections and piping

PRIMARY CIRCUIT

- ① **Supply from the buffer tank:** 1" ISO 228 male connection. Minimum diameter of the pipe DN20 (Cu 22x1). Maximum length: 3 m.
- ② **Return to the buffer tank:** 1" ISO 228 male connection with check valve. Minimum diameter of the pipe DN20 (Cu 22x1). Maximum length: 3 m.

SECONDARY CIRCUIT

- ③ **Cold water supply:** 3/4" ISO 228 male connection with check valve. Minimum diameter of the pipe DN20 (Cu 22x1).
- ④ **Domestic hot water outlet:** 3/4" ISO 228 male connection. Minimum diameter of the pipe DN20 (Cu 22x1).

Technical Features

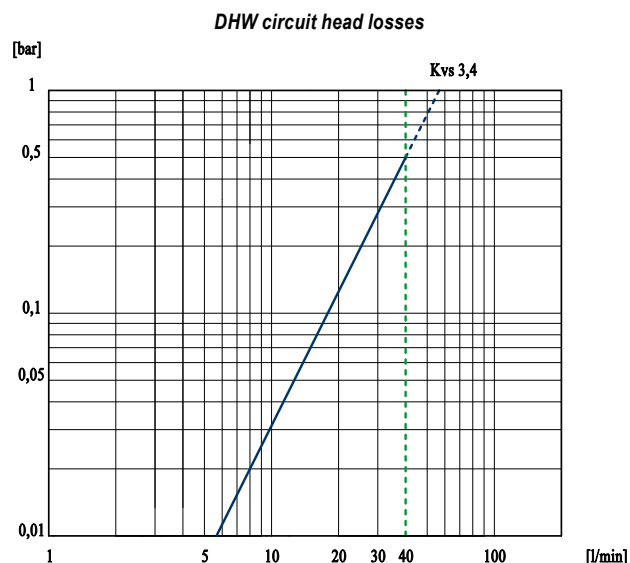
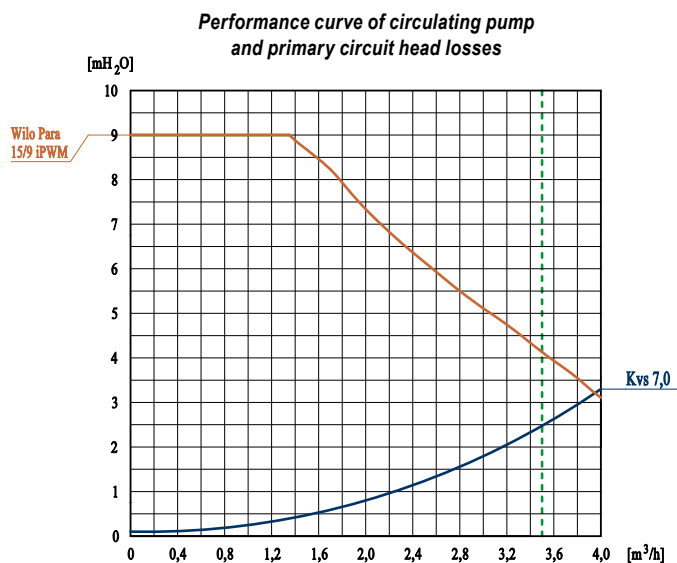
Maximum allowed pressure (without water hammer): **10 bar**
Working temperature: **2 ÷ 95°C**

Field of use

Flow rate up to 40 L/min.
Nominal supply temperature of the buffer tank: 50°C.
Nominal temperature of the water supply: 10°C.
Nominal temperature of DHW production: 45°C, adjustable from 30°C up to 70°C.

PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) MODvFRESH 2 PDC

Diagrams



Materials

Pipe fittings	Piping	Insulation	Heat exchanger	Gaskets	Circulating pump
Copper alloy CW617N	Copper	EPP	Stainless steel AISI 316 L Copper	EPDM	Cast iron

Installation

The pump unit can be mounted directly on the buffer tank, if it is provided with the proper connections (see "Recommendations") or on the wall in its immediate proximity. For the wall mounting follow the instructions:

- ✓ Find the position of the 4 holes to be made into the wall according to the scheme in Fig. 2;
- ✓ Bore and put the proper screw anchors;
- ✓ Remove the cover and fix the pump unit;
- ✓ Mount the connection valve set (optional) according to the Fig.1;
- ✓ If the recirculation kit (optional) is present, install the circulating pump and position the recirculation temperature sensor (TR / P4 supplied separately) as shown in Fig. 1;
- ✓ Connect the pipes in accordance to the scheme in Fig.3.

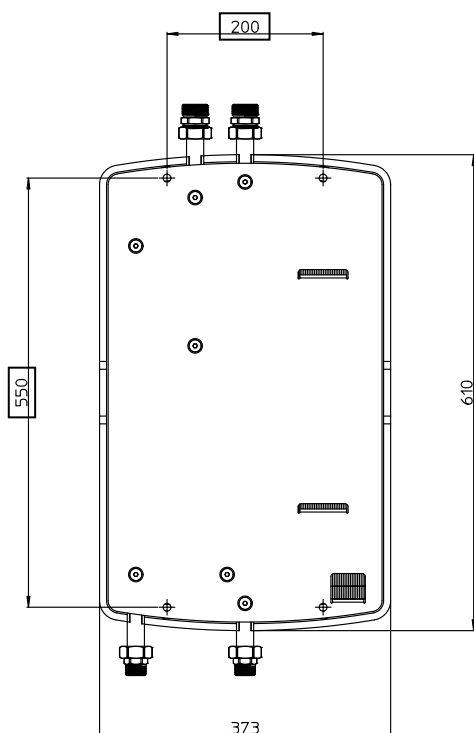


Fig. 2: Back plate for wall mounting

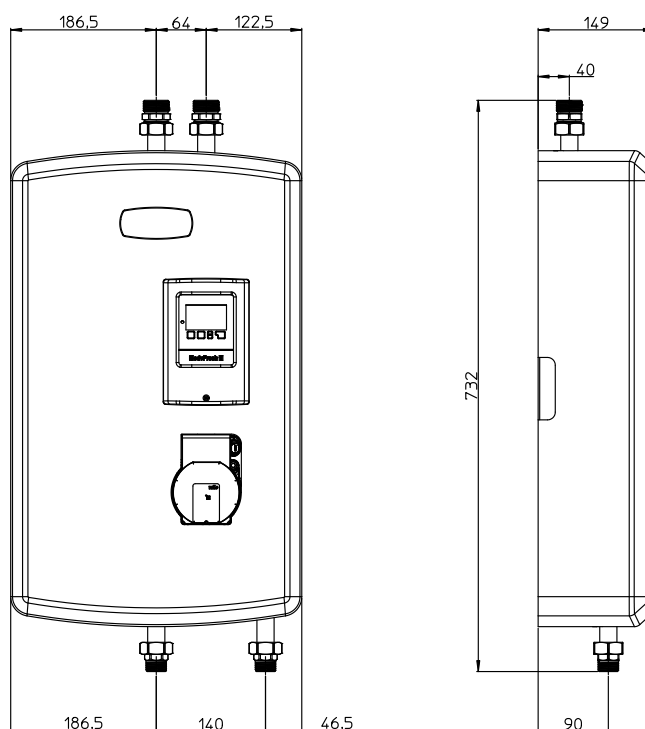


Fig. 3: Dimensions and main center-to-center distances of the pump unit

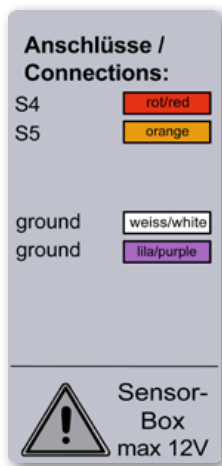
PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) ModvFRESH 2 PDC

Wiring

The controller is supplied prewired. The power cable, also prewired, must be connected to the 230 VAC grid system only after having connected the temperature sensors, the diverting valve, the contact for the thermostat additional function and, if present, the recirculation kit with its sensor. For a quick and easy connection of the temperature sensors and mixing valves it is not necessary to operate on the controller, it is sufficient to put the cables into the automatic connectors of the sensor boxes.

These operations must be done only by qualified staff.

Please follow the below instructions during the installation:



✓ Connect the sensors (all PT1000) to the pertinent sensor box

All the connections must be done by the clamps inside the "sensor box", in accordance with the scheme of Fig. 4. The sensor box must be fixed to the wall near the pump unit.

S4: Deep temperature sensor TT/S2 for the buffer tank (in a medium-high position);

S5: Deep temperature sensor TT/S2 for the buffer tank (in a medium position) (*);

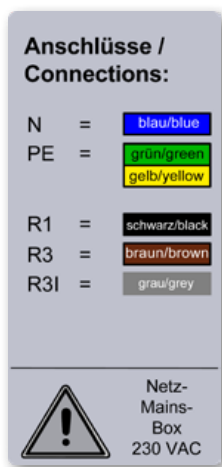
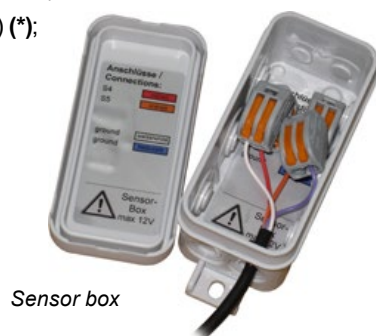
ground: Connect the second cable (white) of the sensor.

ground: Connect the second cable (violet) of the sensor.

(* **If S6 < S5 → R3I = 230 V**

If S6 > S5 → R3 = 230 V

Fig. 4: Connection of the sensors to the sensor box



✓ Connect the relays to the pertinent relay box

All the connections must be done by the clamps inside the "relay box", in accordance with the scheme of Fig. 5. The relay box must be fixed to the wall near the pump unit.

N: Neutral wire;

PE: Ground;

R1: Thermostat function (output 230V) to start the energy source;

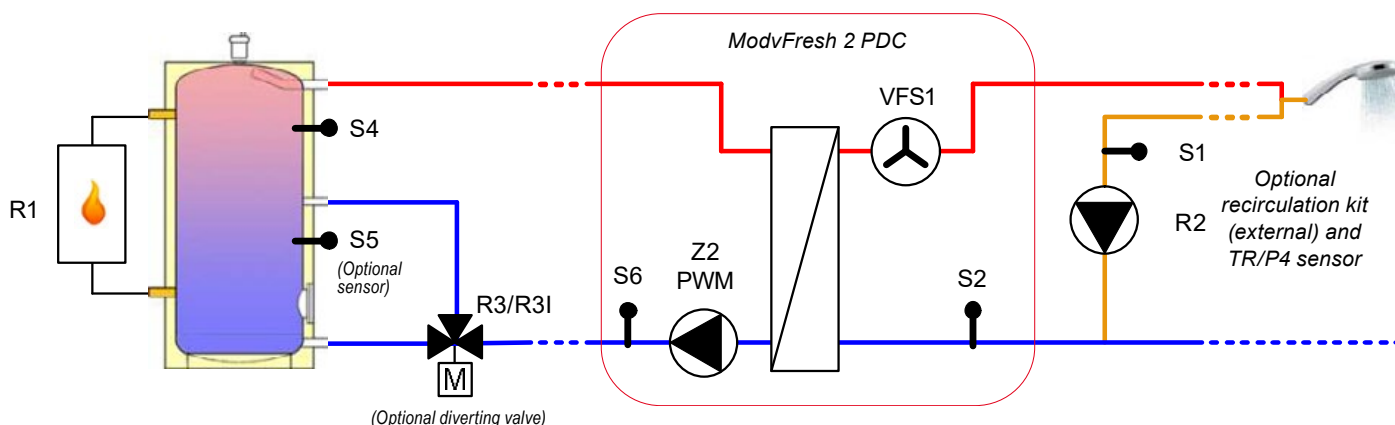
R3: 230 V output (NO) for diverting valve, exchange contact with R3I

R3I: 230 V output (NC) for diverting valve, exchange contact with R3

Fig. 5: Connection of the relays to the relay box



Overall scheme



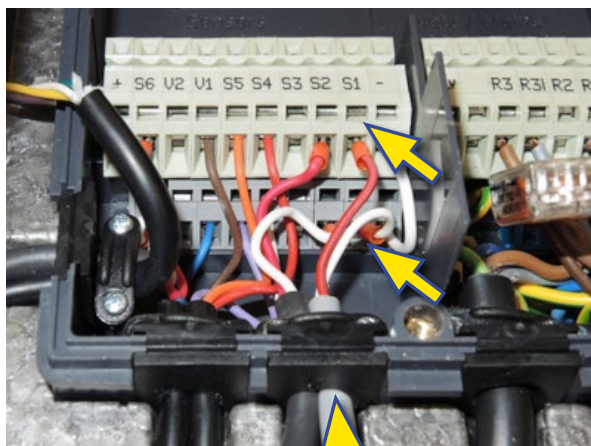
PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) MODvFRESH 2 PDC

Wiring of the optional recirculation kit

The wiring of the optional recirculation kit foresees the connection inside the control unit of the circulating pump and the temperature sensor. **To carry out these operations, rely only on qualified staff.**

✓ **Open the front panel of the control unit by unscrewing the fixing screw.** Pay attention to the cable connected to the front panel electronics.

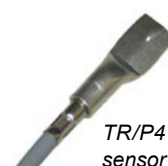
✓ **Connection of the contact sensor (TR/P4) for the temperature of the recirculation line.**



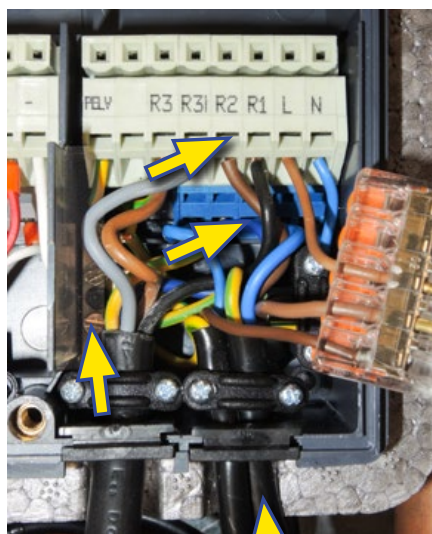
- ✓ Enter the control unit with the sensor cable through the appropriate cable passage, as shown in the photo of fig. 6.
- ✓ Connect the red sensor cable to terminal S1;
- ✓ Connect the white cable to the common terminal block at the bottom.

S1: Contact temperature sensor TR/P4

Fig. 6: connection of the recirculation temperature sensor.



✓ **Connection of the recirculation line circulating pump**



- ✓ Enter the control unit with the sensor cable through the appropriate cable passage, as shown in the photo of fig 7.
- ✓ Connect the phase wire (brown) to terminal R2;
- ✓ Connect the neutral cable (blue) to the common terminal block at the bottom.
- ✓ Connect the earth cable (green/yellow) to the earth terminal block positioned on the left.

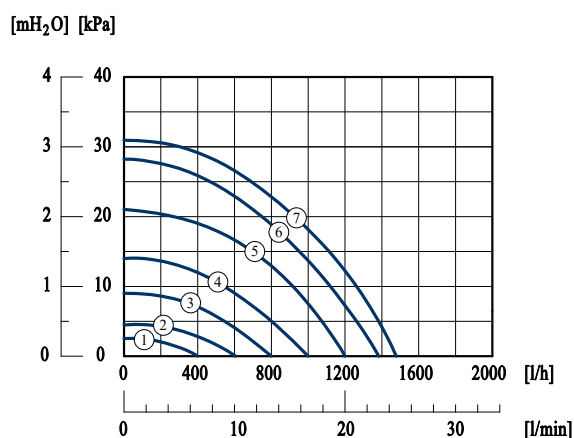
R2: Recirculation line circulating pump

Fig. 7: connection of the recirculation line circulating pump.



Maximum absorbed power: 27 W

The speed control is always variable by means of the selector; you can find the speeds corresponding to the 7 reference marks along the selector scale.

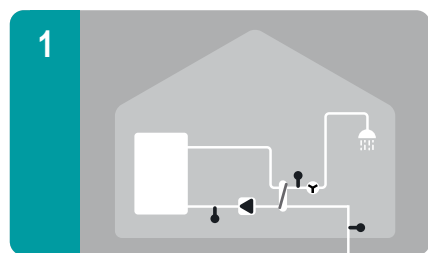


✓ **Close the front panel of the control unit, by fixing it with the appropriate screw.** Pay attention to the cable connected to the front panel electronics and to the terminal block located on the right side of the control unit.

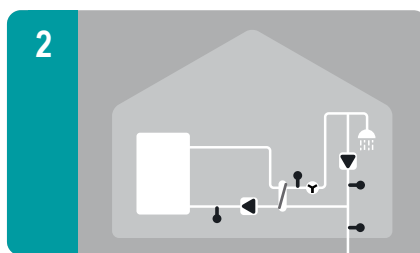
✓ **When the control unit is switched on for the first time, the recirculation functions must be activated, as illustrated in the appropriate section of this instruction manual.**

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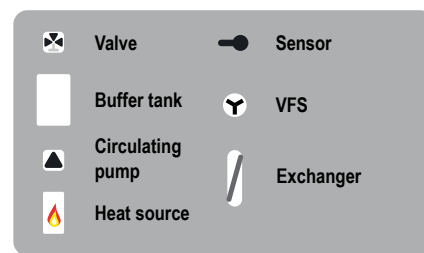
Hydraulic schemes



Delivery of DHW

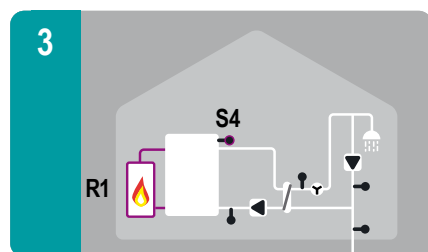


Delivery of DHW with recirculation



Hydraulic schemes with additional functions

Preset schemes of **ModvFresh 4** controller can be enriched in an easy and flexible way by two additional functions: additional heating with thermostat function and/or control of return temperature to buffer tank by a diverting valve (optional). To make it easy, hereafter scheme shows the model with active recirculation, however it is also possible to configure the same scheme without recirculation.

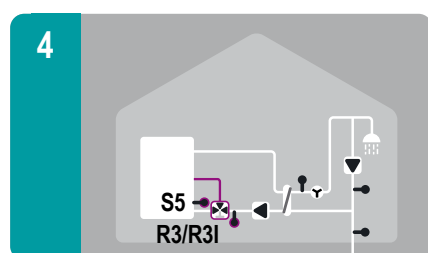


✓ Delivery of DHW with recirculation and *additional thermostat function*

With this hydraulic scheme it is possible to manage an additional heat source.

S4: Deep temperature sensor TT/S2 for the buffer tank (in a medium-high position).

R1: 230V voltage contact to start the heat source.

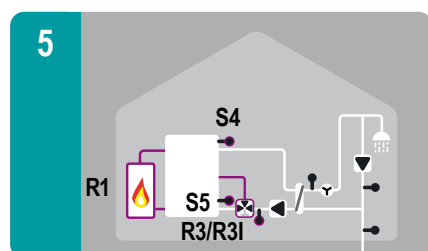


✓ Delivery of DHW with recirculation and *control of return temperature*

With this hydraulic scheme it is possible to manage a motorized diverting valve on the return to control the stratification.

S5: deep temperature sensor TT/S2 for the buffer tank (in a medium position).

R3/R3I: 230V voltage contact to control the diverting valve.



✓ Delivery of DHW with recirculation, *additional thermostat function and control of return temperature*

With this hydraulic scheme it is possible to manage both an additional heat source and a motorized diverting valve on the return to control the stratification.

S4: deep temperature sensor TT/S2 for the buffer tank (in a medium-high position).

R1: 230V voltage contact to start the heat source.

R3/R3I: 230V voltage contact to control the diverting valve.

Please note: in scheme 5, the controller considers 25°C as fixed temperature inside the buffer tank to manage the deviation. In case you would need to read the temperature and to process the value in the controller, it is necessary to order separately a TT/S2 sensor and to wire it to sensor box.

S5: optional deep temperature sensor TT/S2 for the buffer tank (in a medium position).

Setting up

- ✓ Read carefully the instructions of the controller;
- ✓ Plug;
- ✓ Select the desired language, set the hour and the date as described in manual's pages.

Electrical connections



DANGER

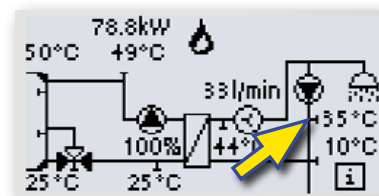
**The pump unit is pre-wired.
A Shuko plug is necessary to connect it to the electric system.
Voltage: 230 VAC ± 10%.
Frequency: 50±60 Hz.
Maximum absorbed power: 100W.
(127W with optional recirculation line circulating pump)**

PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) ModvFRESH 2 PDC

Activation of the recirculation function (only in the presence of the specific kit and contact probe TR/P4)

From the main screen of the control unit:

- ✓ press **[Esc]** to enter the menu
- ✓ use the arrow keys to select the **6. special functions** menu and confirm by pressing the **[OK]** key
- ✓ use the arrow keys to select the **6.6 Relay 2** menu and confirm by pressing the **[OK]** key
- ✓ select item **6.6.1 Circulation** by pressing the **[OK]** key; factory default is “off”
- ✓ press the **[info]** key to change the parameter, with the **[+]** key set “on”
- ✓ confirm with the **[ok]** key and exit by pressing **[esc]**
- ✓ when exiting, confirm the saving of the changes by pressing **[yes]**
- ✓ return to the main screen by pressing the **[esc]** key several times
- ✓ check that the recirculation circuit with the relevant circulating pump and temperature sensor is displayed in the hydraulic diagram.



Filling

The pump unit has been tested under pressure leaking in the factory. However we recommend to check again the connections.

The buffer tank must be put under pressure (about 2 bar).

- ✓ Open slowly the valve in position 1 (supply from the buffer tank);
- ✓ Open slowly the valve in position 2 (return to the buffer tank);
- ✓ Open slowly the valve in position 3 (cold water supply);
- ✓ Open slowly the valve in position 4 (domestic hot water outlet);
- ✓ Open slowly one or more outlets for some minutes to let the air going out from the secondary circuit;
- ✓ Close the outlets;
- ✓ Breathe out the buffer tank and in case restore the pressure.

Suggestions / Remarks on the delivery capacity

The temperature into the buffer tank must be almost 5K higher than the desired temperature of the domestic water. Higher differences of temperature allow to extend the delivery time of the hot water. In presence of calcareous water we recommend not to exceed the temperature of 70°C (supply from the buffer tank) to avoid limescale into the secondary side of the plate exchanger.

Recommendations

- ✓ Absolutely avoid pressure peaks during the working and the filling of the system, to avoid to damage the VFS sensor. Possibly insert a water hammer reducer in its immediate vicinity.
- ✓ The VFS sensor, depending upon models, begins to record the flow rate starting from 2 l/min. For a correct working a minimum flow rate of 3÷4 l/min is recommended.
- ✓ The VFS sensor records also the flow of the recirculation circuit (if present): this function allows to avoid that the recirculation pump starts during the standard working of the pump unit. Please check the setups of this function on the controller manual.
- ✓ Make sure that the electrical system is provided with an efficient earth connection.



DANGER: SCALDS

During the sterilization the safety level (60°C) is exceeded. Provide antiscald devices at the outlets.

Minimum draw-off

To ensure a constant temperature of the delivered DHW, a minimum draw-off flow rate is required. In the following table there is an example of draw-off with a cold water temperature of 10°C on the supply: the minimum draw-offs, necessary to ensure stability at 45°C desired by the user are shown, making various assumptions of water temperatures provided by the tank.

Supply water temperature from the tank	Minimum draw-off
55 °C	2 l/min
60 °C	2,5 l/min
65 °C	3 l/min
70 °C	3 l/min
75 °C	3,5 l/min
80 °C	4 l/min

PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) ModvFRESH 2 PDC

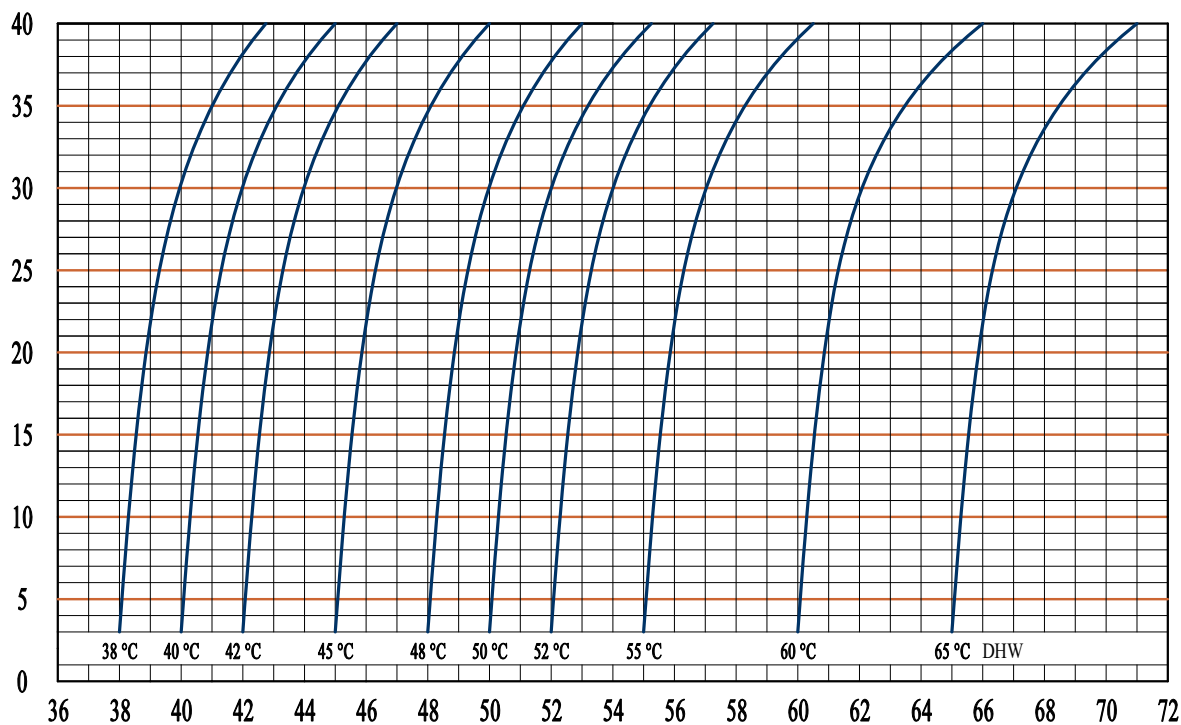
Diagram of the pump unit performances

The following diagram relate the user's flow rate and the supply temperature from the buffer tank, according to the requested temperature of DHW. This allows to identify the minimum supply temperature needed to deliver DHW at a required temperature and flow rate. Vice versa it is also possible to establish the maximum usable flow rate at the temperature chosen for the DHW, against on available flow rate temperature.

The buffer temperature must be almost 5 K higher than the desired temperature of the domestic hot water. Bigger temperature differences allow to extend the draw-off time.

Puffer supply temperature as a function of the DHW flow rate and temperature (Inlet cold water temperature: $10 \pm 5^\circ\text{C}$)

DHW flow rate [l/min]



Puffer supply temperature [°C]

Calculation of performances



It is also possible to download an excel file from the site www.modvlvs.com dedicated to the calculation of the performances of the **ModvFresh** units from where you can get: output power, time of delivery, the overall delivery capacity and recovery time of the temperature in the tank.