Pump unit to deliver fresh domestic hot (DHW) ModvFresh 4

List of features of main components

Supply from the storage tank 60°C

(B) Check valve
Built-in into the connection of "Supply from storage tank", it avoids undesirable circulations.

(A) Controller
The flow, the temperatures and the instant power produced by the installation are immediately displayed on the controller.

(C) Air vent valve
Automatic air vent: it helps to vent the system from the air microbubbles present in the circuit.

(DS) Heat exchanger
Weld-braised plate heat exchanger made in stainless steel AISI 316. The large heat exchange surface assures a great heat exchange that allows the return of the water to the storage tank at a low temperature down to 15°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 the service and/ or the cleaning by means of the right-hand side opening of the insulation box.

(H) 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 is immediately read by the digital sensor, therefore the controller adjusts the speed of the circulating pump to get the better performance of your nstallation.
The flow appears on the LCD display.
Available measuring ranges: 1-20 l/min and 2-40 l/min.

(E) Recycling
Recycling way *(optional)*. The recycling circuit, provided with a special synchrone high efficiency circulating pump, allows to get an outlet flow already at the required temperature. It works "on demand" or on "time band". The circuit is provided with check valves. A special anti-legionnaire's disease function allows to sterilize all the secondary hydraulic circuit.

(G) High efficiency primary circulating pump
The special electronics modulates the speed of the high efficiency primary circulating pump, from a minimum of 10% up to 100%, to give always a precise user's temperature (f.i.45°C).

Return to the storage tank from 25°C to 15°C (the temperature changes according to the value of the temperature and to the value of the flow)

Domestic hot water 45°C

Recycling 35°C

(F) Connections
Connections with built-in check valve.

Water Supply 10°C

(*) It is present only in the models without recycling

DANGER: SCALDS

During the sterilization the safety level (60°C) is exceeded. Provide antiscald devices at the outlets.
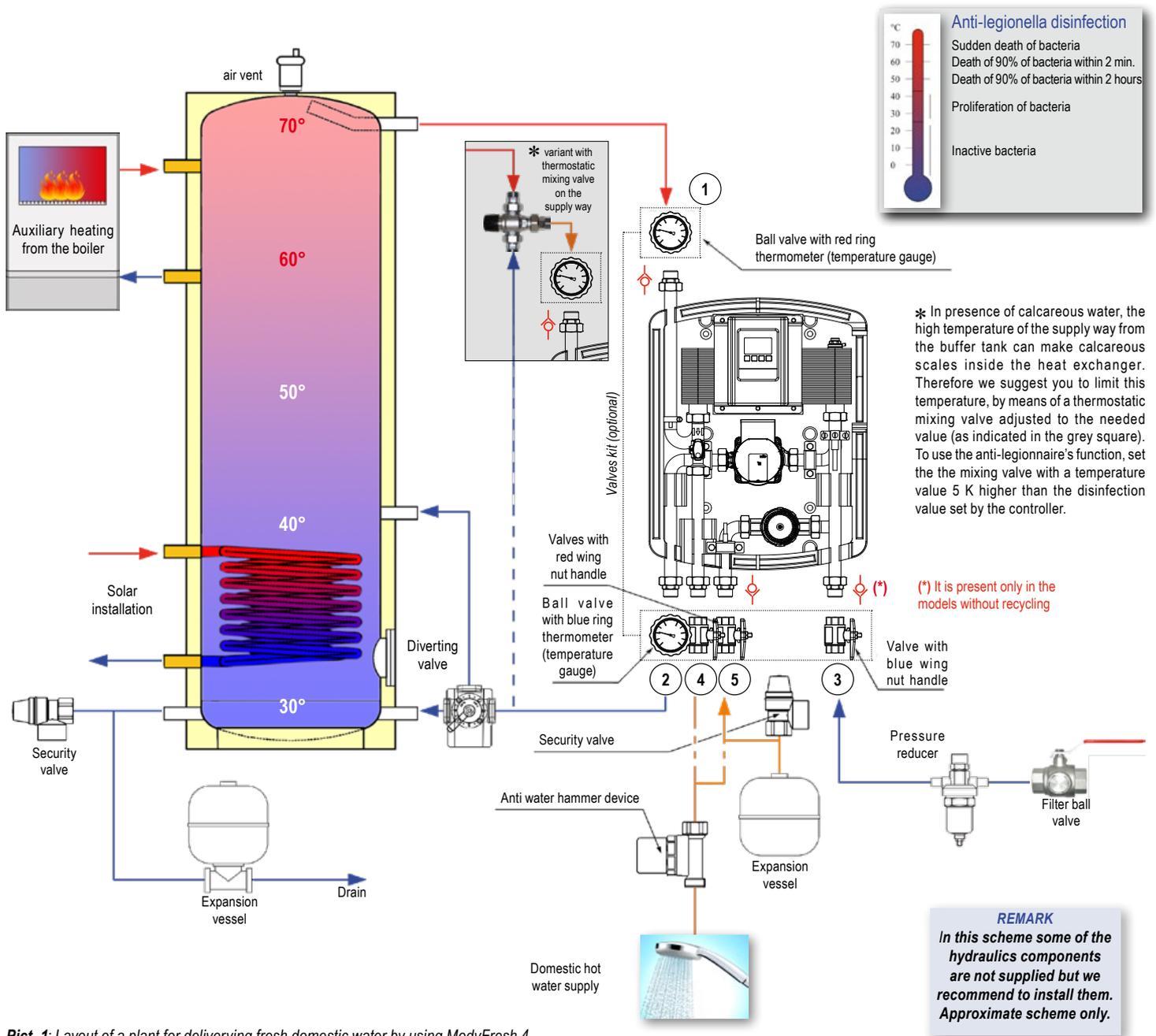
EPP insulation box
Measurements: 398 x 500 x 207 mm.
A special metal back plate fixes the unit to the insulation box and it allows a quick fitting to the wall or to the storage tank.

Pump unit to deliver fresh domestic hot water (DHW) ModvFresh 4

Anti-legionella disinfection

°C
- 70 — Sudden death of bacteria
- 60 — Death of 90% of bacteria within 2 min.
- 50 — Death of 90% of bacteria within 2 hours
- 40 — Proliferation of bacteria
- 30
- 20
- 10 — Inactive bacteria
- 0

air vent

70°

Auxiliary heating from the boiler

60°

50°

40°

Solar installation

30°

Security valve

Expansion vessel

Drain

Diverting valve

Security valve

Anti water hammer device

Domestic hot water supply

Expansion vessel

* variant with thermostatic mixing valve on the supply way

1 — Ball valve with red ring thermometer (temperature gauge)

Valves kit (optional)

Valves with red wing nut handle

Ball valve with blue ring thermometer (temperature gauge)

2 4 5   3

Valve with blue wing nut handle

Pressure reducer

Filter ball valve

* In presence of calcareous water, the high temperature of the supply way from the buffer tank can make calcareous scales inside the heat exchanger. Therefore we suggest you to limit this temperature, by means of a thermostatic mixing valve adjusted to the needed value (as indicated in the grey square). To use the anti-legionnaire's function, set the the mixing valve with a temperature value 5 K higher than the disinfection value set by the controller.

(*) It is present only in the models without recycling

REMARK
In this scheme some of the hydraulics components are not supplied but we recommend to install them. Approximate scheme only.

Pict. 1: *Layout of a plant for deliverying fresh domestic water by using ModvFresh 4*

Technical Features

|	
Maximum allowed pressure (without water hammer):	**10 bar**
Working temperature:	**2 ÷ 95°C**
Headloss in the secondary circuit (at the flow of 20 l/min *(50 kW model)*:	**4 mH_2O**
Headloss in the secondary circuit (at the flow of 40 l/min) *(100 kW model)*:	**6 mH_2O**
Headloss in the secondary circuit (at the flow of 40 l/min) *(125 kW model)*:	**5 mH_2O**
Headloss in the recycling circuit (at the flow of di 5 l/min):	**0,3 mH_2O**

Connections and links

PRIMARY CIRCUIT

1 **Supply from the storage tank:** 3/4" ISO 228 male connection. Minimum diameter of the pipe DN20 (Cu 22x1). Maximum length: 3 m.

2 **Return to the storage tank:** 3/4" ISO 228 male connection. 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 (It is present only in the models without recycling). 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).

5 **Recycling (optional):** 3/4" ISO 228 male connection with check valve. Minimum diameter of the pipe DN15.

PUMP UNIT TO DELIVER FRESH DOMESTIC HOT (DHW) MODVFRESH 4

Peculiar diagram of the recycling circulating pump (if present)
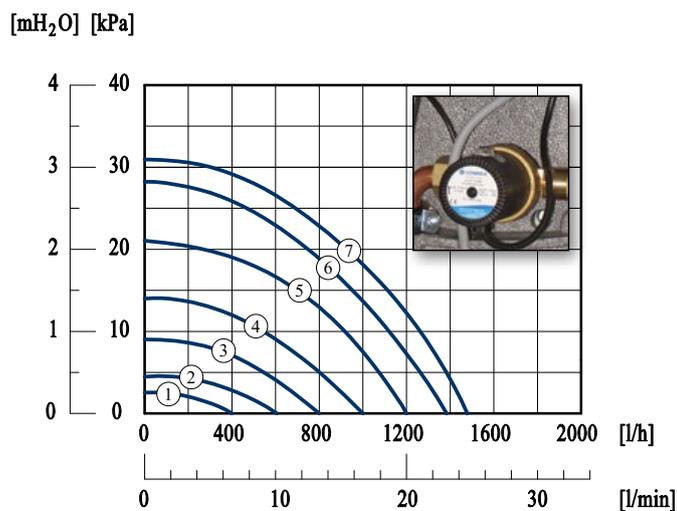
High efficiency synchronous circulating pump
*The speed control is always variable by means of the selector;
you can find the speeds corresponding to the 7 reference marks
along the selector scale.*

Materials

Pipe fittings	Piping	Insulation	Heat exchanger	Gaskets	Circulating pumps
Copper alloy CW617N	Copper	EPP	Stainless steelAISI 316 L Copper	EPDM	*Primary*: body in composite material; *Secondary*: brass body

Installation

The pump unit can be mounted directly on the storage tank, if it is provided with the proper connections (see "Recommendations") or to the wall, near by.
For the wall mounting follow the directions:

✓ Find the position of the 4 holes to be made into the wall according to the scheme *Pict.2*;
✓ Bore and put the proper screw anchors;
✓ Remove the cover and fix the pump unit;
✓ Mount the connection valves set (optional) according to the *Pict.1*;
✓ Connect the pipes in accordance to the connection scheme follwing the directions in *Pict.3*.
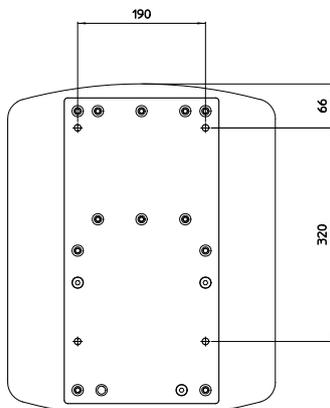
Pict. 2: Back plate for wall mounting
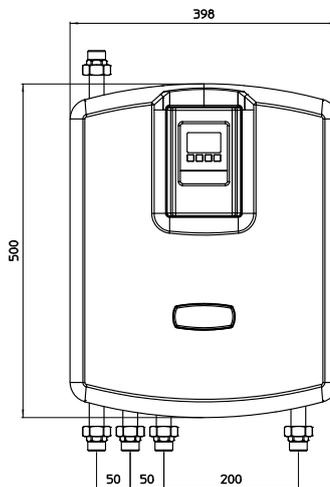
**Pict. 3**: Dimensions and main center-to-center distances of the pump unit

Rev.5 - 03/04/2021
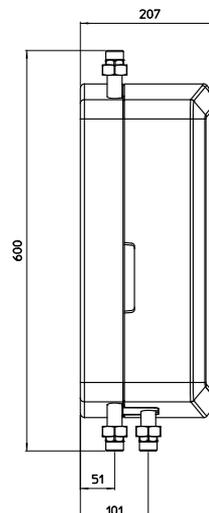
Wiring

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 and the contact for the thermostat additional function (if present). For a quick and easy connection of the temperature sensors and valves/circulating pumps 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 qualify staff.
Please follow the below instructions during the installation:
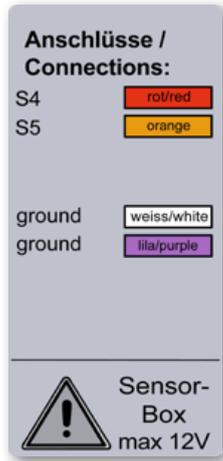
✓ **Connect the sensors (all PT1000) to the pertinent sensor box**

All the connections must be done by the clamps inside the "sensor box", in accordance with the scheme of *picture 2*. The sensor box must be fixed to the wall near the pump unit.

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

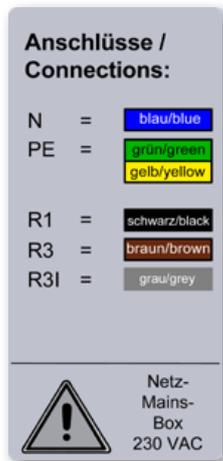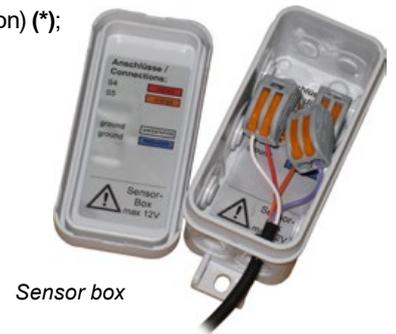**S5:** Deep temperature sensor TT/S2 for the storage tank (in a medium position) **(*)**;

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

Picture 2: *Connection of the sensors to the sensor box*

Sensor box

✓ **Connect the relays to the pertinent relay box**

All the connections must be done by the clamps inside inside the "relay box", in accordance with the scheme of *picture 3*. The relay box must be fixed to the wall near the pump unit.

N: Neutral wire;

PE: Ground;

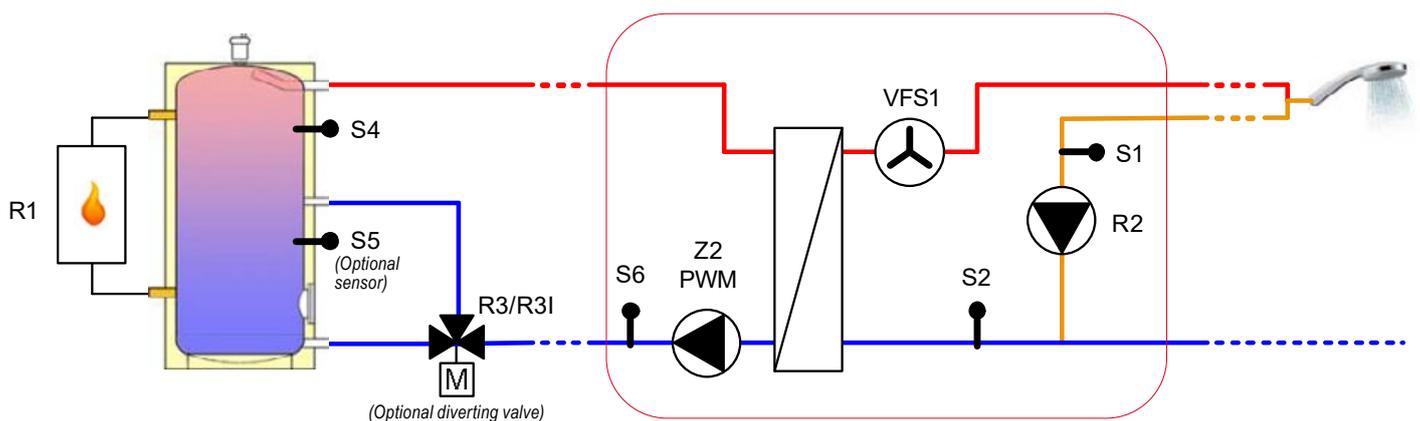**R1:** Thermostat function (output 230V) to start the energy source;

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

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

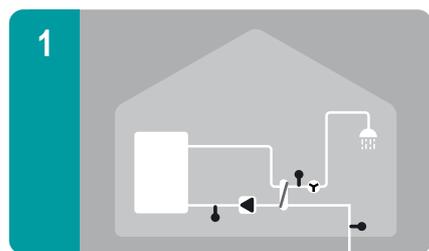**Picture 3:** *Connection of the relays to the relay box*
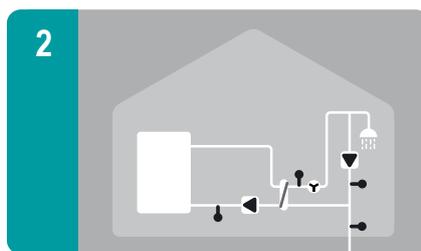
Relay box

Overall scheme

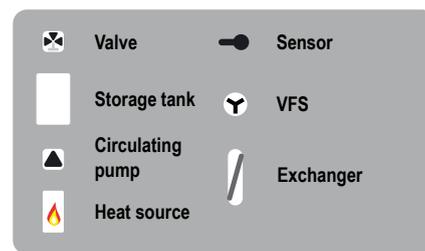# PUMP UNIT TO DELIVER FRESH DOMESTIC HOT (DHW) MODVFRESH 4
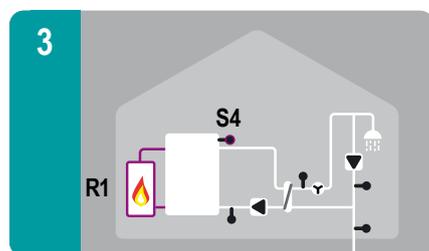
Hydraulic schemes

Delivery of DHW

Delivery of DHW with recycling

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 storage tank by a diverting valve (optional). To make it easy, hereafter scheme shows the model with active recycling, however it is also possible to configurate the same scheme without recycling.
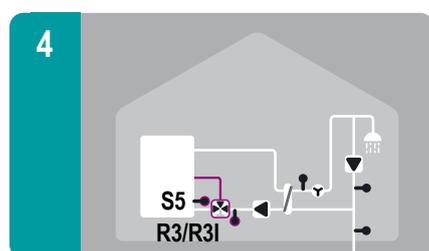

✓ Delivery of DHW with reclycling and *additional thermostat function*

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

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

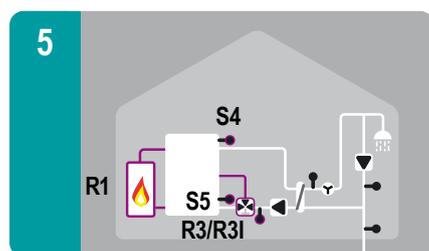**R1:** 230V voltage contact to start the heat source.

✓ Delivery of DHW with reclycling 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 storage tank (in a medium position).

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

✓ Delivery of DHW with recycling, *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 storage 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 storage 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 storage 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.

Pump unit to deliver fresh domestic hot water (DHW) ModvFresh 4

Filling

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

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

✓ Open slowly the valve in the position 1 *(supply from the storage tank)*, if necessary, purge the primary circuit by acting on the air vent valve located on the heat exchanger; open slowly the valve in the position 2 *(return to the storage tank)*;
✓ Open slowly the valve in the position 3 *(cold water supply)* and in case the valve in the position 5 (recycling);
✓ Purge the secondary circuit;
✓ Open slowly the valve in the 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 storage tank and in case restore the pressure.

Suggestions / Remarks on the delivery capacity

The temperature into the storage 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 storage tank) to avoid limescale into the secondary side of the plate exchanger, in case put a thermostatic valve (*Pict.1*).

> ⚠️
>
> **DANGER: SCALDS**
>
> *To avoid scalds to the user the supplied water must never be over 60°C. This temperature limit is preselected into the controller, anyway it can be reduced.*

Recommendations

✓ Try to avoid pressure peaks during the working and the filling of the installation, to avoid to damage of the VFS sensor. Eventually put nearby an anti-water hammer device.
✓ 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 recycling circuit (if included): this function allows to avoid that the recycling pump starts during the standard working of the installation.. Please check the setups of this function on the controller manual.
✓ Be sure that the electric installation is provided with an efficient ground tap.

Diagrams of the pump unit performances

The following diagrams relate the user's flow rate and the supply temperature to the buffer storage tank, according to the requested temperature of DHW. This allows to identify the minimum supply temperature needed to supply DHW at a required temperature and flow. Vice versa it is also possible to fix which is the maximum usable flow at the selected DHW temperature, at the available supply temperature. Performances are also due to the inlet temperature of the cold water from the water supply system; diagrams show three possibilities with inlet water at 5°C, 10°C and 15°C.
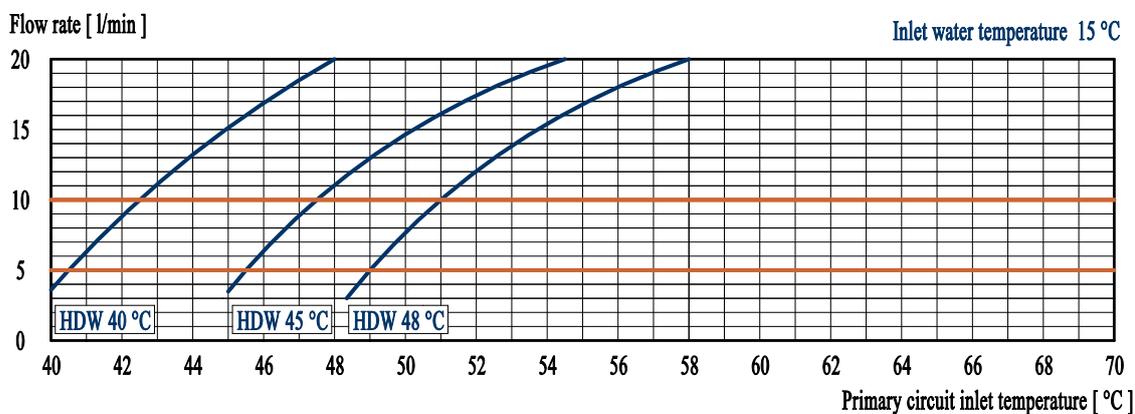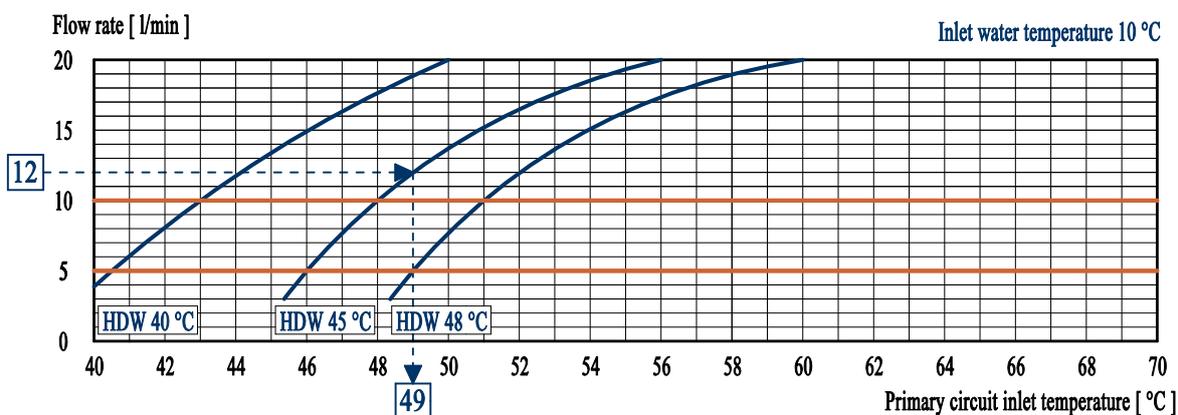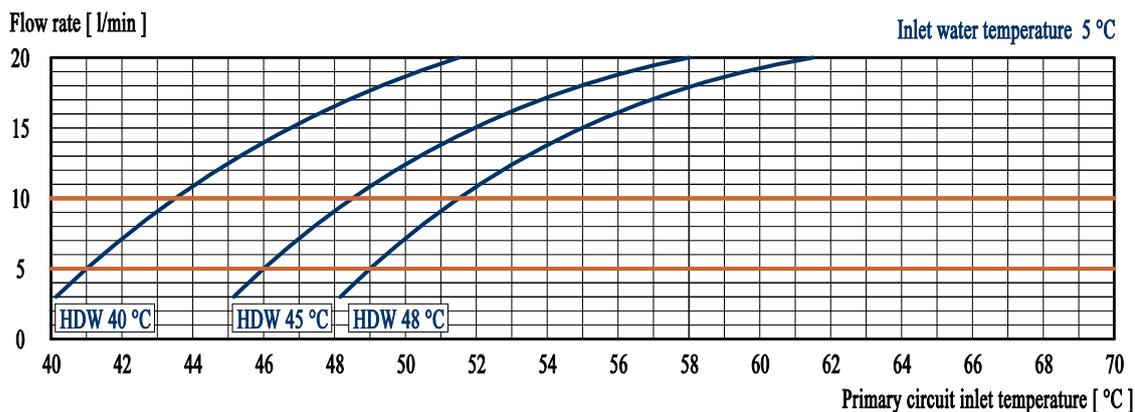
How to read the diagrams

Example 1: **ModvFresh 4 50 kW, inlet at 10°C**. In this case a DHW flow of 12 l/min at a temperature of 45°C is required. Crossing the desired DHW temperature curve, it follows that the supply from the buffer storage tank must be almost 49°C.

Example 2: **ModvFresh 4 100 kW, inlet at 10°C**. This is the case in which the supply from the buffer storage tank cannot go over 56°C and we want to see what can be the maximum suppliable temperature at the DHW of 45°C. Crossing the desired DHW temperature curve, it follows that the flow cannot be over 26,2 l/min.

Example 3: **ModvFresh 4 125 kW, inlet at 10°C.** The 125 kW model allows to operate with lower temperatures in the buffer tank, or to deliver the same flow rate at a higher temperature. Comparing this example with that of the 100 kW model, with the same DHW temperature, it can be seen that a similar flow rate is obtained with a significantly lower supply temperature (53°C versus 56°C).

Pump unit to deliver fresh domestic hot (DHW) ModvFresh 4
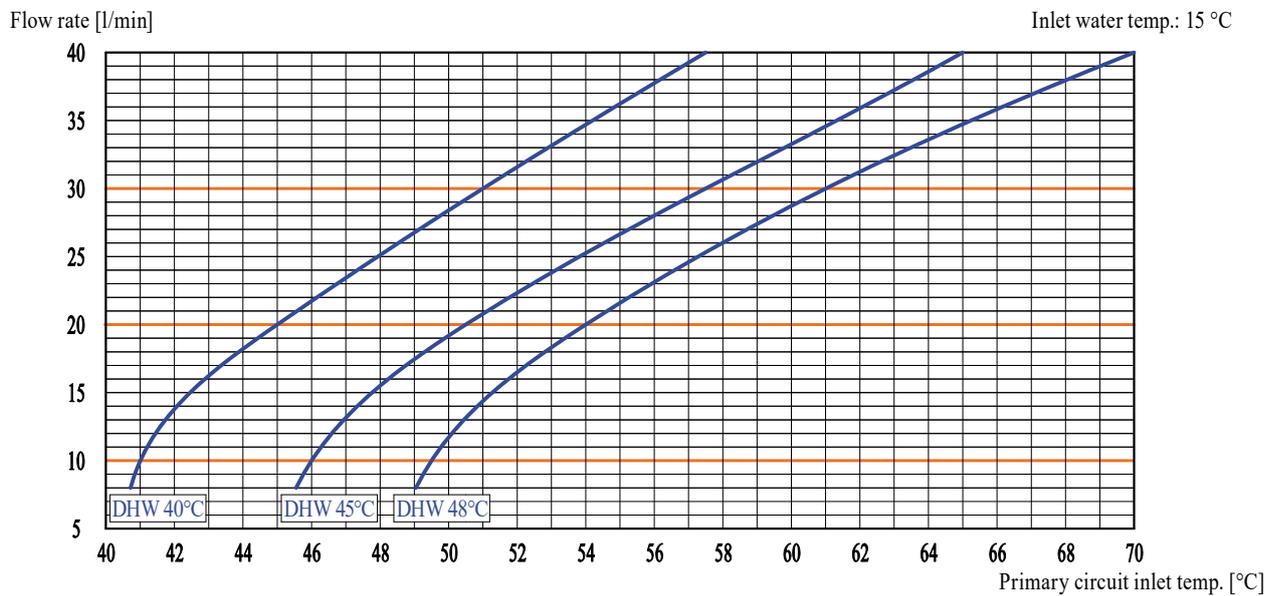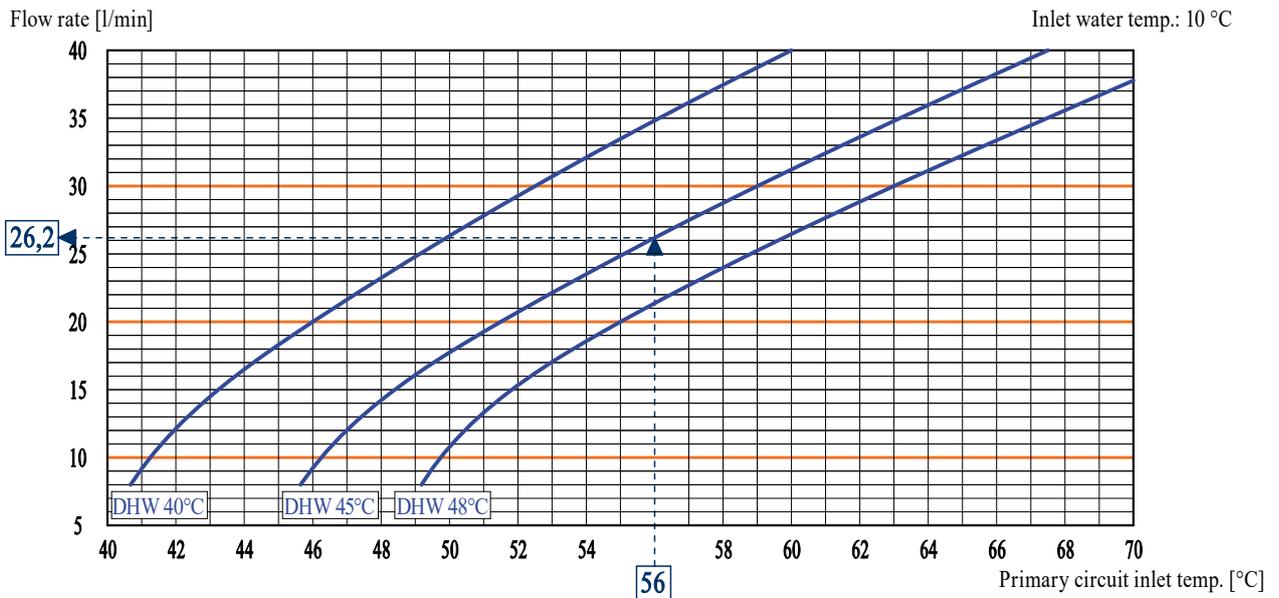
DHW pump unit ModvFresh 4 50 kW

Inlet water temperature 5 °C

Flow rate [l/min]
HDW 40 °C HDW 45 °C HDW 48 °C
Primary circuit inlet temperature [°C]

Inlet water temperature 10 °C

Flow rate [l/min]
HDW 40 °C HDW 45 °C HDW 48 °C
Primary circuit inlet temperature [°C]

Inlet water temperature 15 °C

Flow rate [l/min]
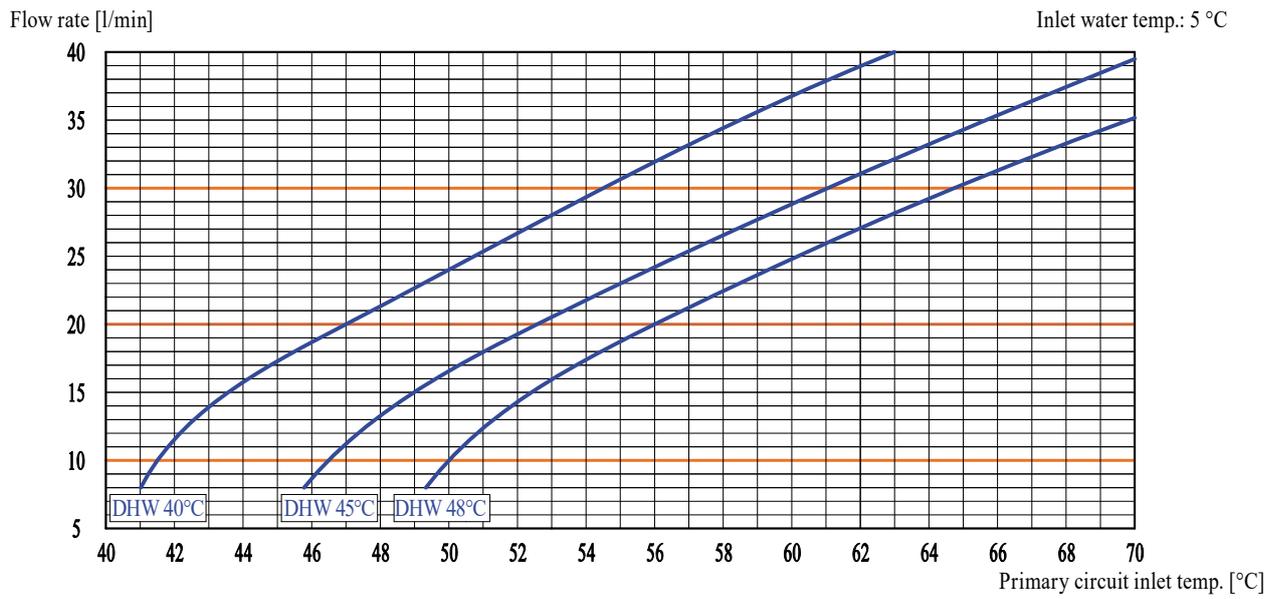HDW 40 °C HDW 45 °C HDW 48 °C
Primary circuit inlet temperature [°C]

Calculation of performances

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

PUMP UNIT TO DELIVER FRESH DOMESTIC HOT WATER (DHW) MODVFRESH 4

DHW pump unit MODVFRESH 4 *100 kW*

Flow rate [l/min]

Inlet water temp.: 5 °C

Primary circuit inlet temp. [°C]

Flow rate [l/min]

Inlet water temp.: 10 °C

Primary circuit inlet temp. [°C]

Flow rate [l/min]

Inlet water temp.: 15 °C

Primary circuit inlet temp. [°C]

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PUMP UNIT TO DELIVER FRESH DOMESTIC HOT (DHW) MODVFRESH 4

DHW pump unit MODVFRESH 4 125 kW

Flow rate [l/min]

Inlet water temp.: 5 °C

DHW 40°C   DHW 45°C   DHW 48°C

Primary circuit inlet temp. [°C]

Flow rate [l/min]

Inlet water temp.: 10 °C

26,9

DHW 40°C   DHW 45°C   DHW 48°C

53

Primary circuit inlet temp. [°C]

Flow rate [l/min]

Inlet water temp.: 15 °C

DHW 40°C   DHW 45°C   DHW 48°C

Primary circuit inlet temp. [°C]