

19 Two heat pumps 22-48 kW, electrical boiler, DHW from two coil cylinders

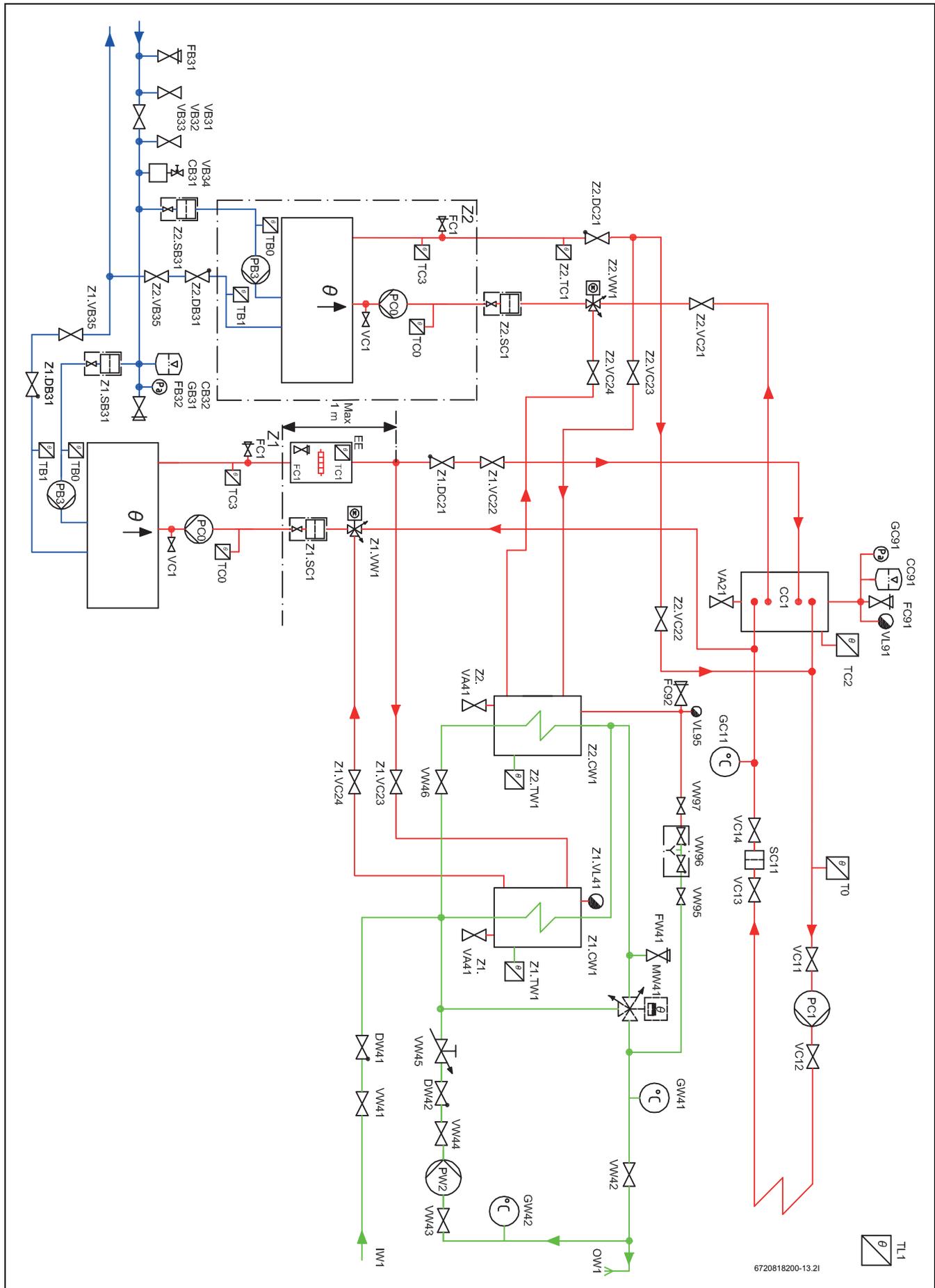


Fig. 13

General specifications

Overview

This system solution is intended for properties with one heating circuit. Maximum system temperature requirement is 80/60 (80° flow, 60° return) at the DOT (Dimensioning Outdoor Temperature) for the region where the properties is.

Function

The heat pump supplies the majority of the required heating.

Heat production from heat pump

The set point value for the flow is calculated from the outdoor temperature TL1 and the heat curve. Adjustments are made against the flow temperature T0. The curve is calculated automatically from the basic settings. The customer has the option of adapting the heat curve at different outdoor temperatures. In case of low heating system flow, start and stop of compressors are done against buffer temperature TC2 in case it shows a higher temperature than T0

Exercise operation

All circulation pumps, and the 3-way valves, runs for one minute if they have not been used for 7 days.

Summer/Winter mode

Winter mode is activated either immediately when TL1 drops below set temperature (7°C), or after 6 hours below 15°C (both settings adjustable) Summer mode is activated when TL1 has been above 17°C for more than 3 hours (both settings adjustable)

Filling of the heating system

Filling of heating water is performed via VW96 which must comply with EN 1717. Filling in this fashion, minimizes the amount of gas introduced into the heating system since it is vented largely through VL95 during filling or immediately after. Filling more than twice a year is indicative of a too small expansion vessel or leakage. Refilling of water may be required more frequently for a certain time after commissioning.

De-airing of heating system

The type and positioning in the system of the buffer tank CC1 makes it function, together with the vent VL91, as a heating system vent.

Dirt separator for the heating system

The type and positioning in the system of the buffer tank CC1 makes it function also as a sediment separator. Gathered sediment can be flushed out via VA21. But when a heat pump is installed in an existing heating system, a magnetite filter is needed (SC11)

Adjustment of heating system flow

The connecting mode according to this system solution works for any low-flow or high-flow system. This way of connecting the two heat pumps to the heating system gives an optimal range of system flow between the nominal flow of one heat pump to the total nominal flow of both heat pumps. With the heat pumps in continuous operation, the temperature difference T0 – GC11 should be in the range between TC3-TC0 and two times the difference TC3-TC0. The flow can be adjusted primarily by adjusting the pressure height of the PC1 pumps respectively. However, a correct flow may have the consequence that only part of the heating system becomes hot. This means that the distribution valves of the heating system needs adjusting (radiators/ floor heating).

Flow temperature sensor T0

For steel pipes these sensors must be of immersion type. For copper pipe it can be a contact sensor.

22 – 48 kW heat pump

Overview

In winter mode one of the Compressors in the heat pump (ER1 or ER2) starts when T0 falls below the preset temperature by the current heat pump hysteresis. When one step in each working* heat pump is started, the 2:nd compressor in each heat pump is allowed to start when T0 falls

below the preset temperature by the current heat pump hysteresis. *If at least one compressor in a heat pump is in working order. Once stopped, the respective compressor is blocked from restarting for 3 minutes. The hysteresis is floating and individual for each compressor. This means that the starting order of the heat pumps changes; the one with the longest non operating time will start first and the one with the longest operating time will stop first. But only when only one compressor in each heat pump is running, both compressors is allowed to be stopped in a heat pump

Pump control heat carrier pump PC0

PC0 starts before start of the first compressor and runs for a while after the last compressor stops. PC0 is regulated to keep a constant temperature difference for TC3-TC0.

Pump control collector circuit pump PB3

PB3 starts before the first compressor starts and runs for a while after the last compressor stops. PB3 is regulated against TB1. in order to keep a constant temperature difference TB0 - TB1 within the normal working interval.

Outside normal collector circuit temperatures, the temperature difference is adjusted to achieve optimal operation.

De-airing of collector circuit

When ethanol is used as antifreeze it is important that there are no automatic venting devices in the collector circuit since these will tend to vent the ethanol over time. Instead, there is a 4.5 liter plastic vessel CB31 where air gathers and is vented manually via VB34. When glycol is used as antifreeze, automatic vents with microbubble separators are required instead of CB31, and VB34 must be installed directly on the pipe

3-step electric heater

Overview

An electric heater, controlled in 3 power steps, either integrated in the heat pump or external, is used as additional heat for both heating and potable hot water production.

Function

The internal electric additional heat assists when the heat pump alone is unable to satisfy the heating demand. The electric additional heat can also supply hot potable water, and if necessary (DHW cylinder that stores potable water used) thermally disinfect the hot water heater on a regular basis

Control of 3-step electrical heater

Step-up of the electric additional heat is performed with a degree minute calculator from the difference between actual value and set point value T0-3K. Step-down of the electric additional heat is performed with a degree minute calculator from the difference between actual value and set point value T0. The number of steps allowed for the electric additional heat can be set separately for heating and hot water.

Fresh water tank

Overview

The property also requires a small to medium amount of potable hot water, which is supplied by fresh water cylinder(s).

Function

The fresh water tank is heated by the heat pump, the 3-step electrical heater on the heat pump flow, or integrated electrical heater (backup function).

Fresh water tank (potable hot water production)

The heat pump should be set to use a local hot water sensor. Hot water mode is activated when TW1 drops below the start temperature. Hot water mode ceases when TW1 and TC0 exceed the stop limit. In hot water mode the compressor starts and the 3-way valve VW1 is put in hot water position. The heat pump normally charges the fresh water tank with both compressors, until the end of the charging cycle, when the

compressor with most running hours are stopped. But it is possible to make a setting to limit DHW charging to one compressor only, if the DHW cylinder is small compared to the heat pump power. The speed of PCO is controlled during the charging to ensure high charging temperatures during the start of the charging, and high flow at the end of the charging cycle, to ensure that the buffer is charged all the way to the bottom.

Flow in the hot potable water circulation

In order to maintain the dimensioned capacity of the fresh water tank CW1, it is important that the flow in the hot water circulation is not too high that the maximum return of the heat pump is exceeded. The temperature difference between GW41 and GW42 should be about 5K.

Thermal mixing valve MW41

This valve is only needed on direct customer request; there are no functional or legal requirements for it. Temperature limitation is handled by the stop level on the charging temperature from the heat pump and backup heater.

DHW dimensioning

	2x F500 ¹⁾	2x F750 ²⁾
2x G222 ³⁾	30	40
2x G228 ³⁾	40	50
2x G238 ³⁾	24 ⁴⁾	65
2x G248 ³⁾	30 ⁴⁾	40 ⁴⁾

Table 15 no. of apartments

- 1) Coil cylinder 500 lit.
- 2) Coil cylinder 750 lit.
- 3) Heat pump size
- 4) Only possible to use one compressor in each heat pump