

39 One heat pump 54-80 kW, electrical boiler, no DHW from heat pump

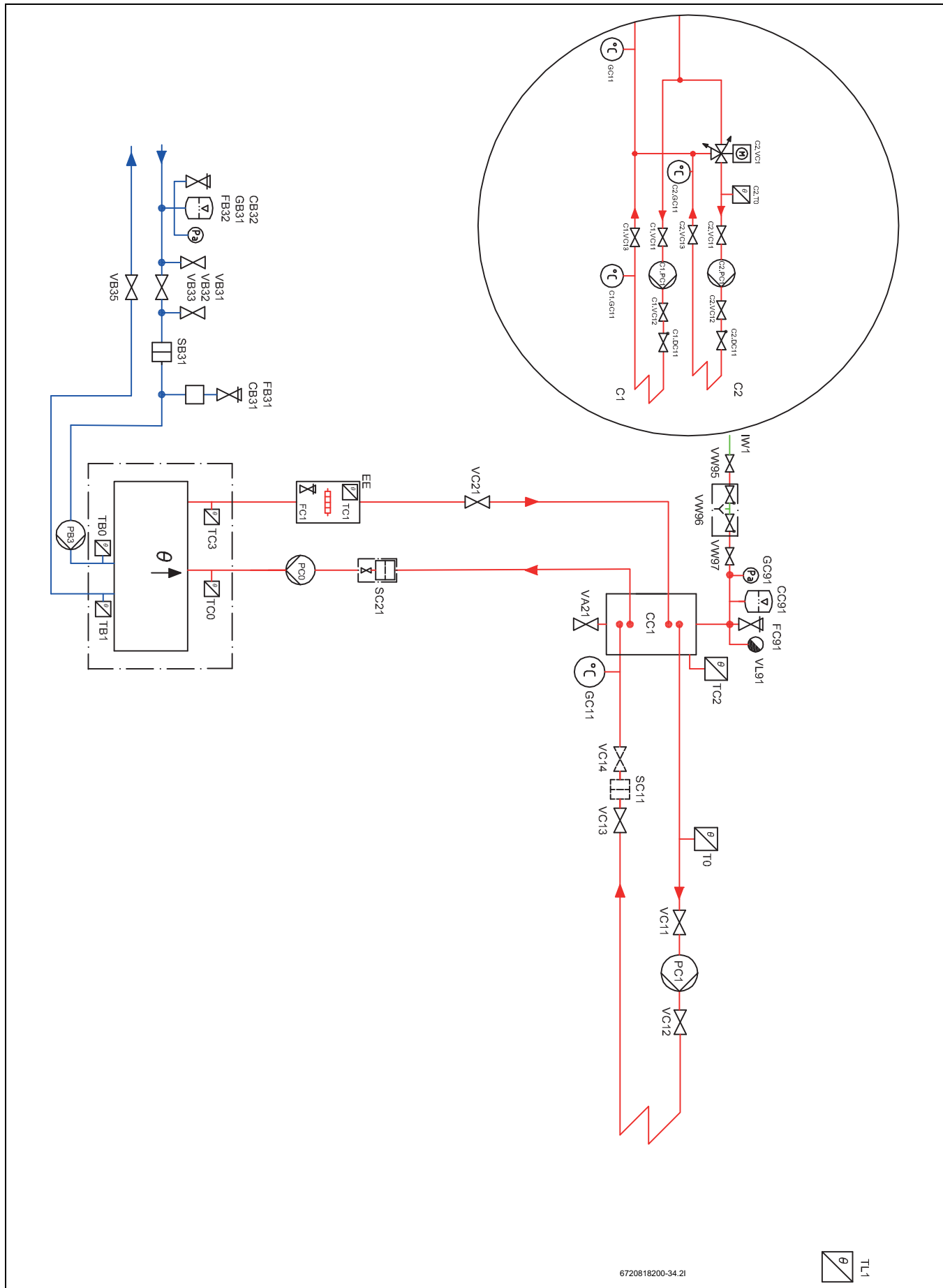


Fig. 33

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, but optimal function is obtained when the heating system nominal flow equals that of the heat pump. With the heat pump in continuous operation, the temperature difference TC3 – TC0 becomes the same as T0 – GC11. 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 sensors T0 and C2.T0

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

Mixed circuit

Overview

Two heating circuits, one of which requires more heat, e.g. radiators and the 2:nd e.g. floor heating.

Function

The (optional) heating circuit with lower temperature demand is controlled through an accessory (Multi-regulator) to which an external sensor, a mixing valve and a circulation pump are connected.

Mixed heating circuit C2

When using C2, accessories are required, including Multi-regulator, sensor C2.T0 and circulation pump C2.PC1. The flow set point value is calculated from the outdoor temperature TL1 and the heat curve for C2 Adjustments are made against flow temperature C2.T0 by controlling C2.VC1 to open against the buffer CC1 during a temperature drop. C2.PC1 can be set to be active in winter mode only or permanently.

54 – 80 kW heat pump

Overview

In winter mode the respective Compressor in the heat pump (ER1, ER2) starts when T0 falls below the preset temperature by the current heat pump hysteresis, and stops when T0 rises above the preset temperature by the current compressor hysteresis. 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.

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.

PB3 brine pump

The brine pump does not have to be a low energy pump according to ErP directive, but using a high energy pump for this high efficiency, twin compressor heat pump will significantly reduce system performance. In order to reach best performance and full operation range, PB3 must be a low energy, speed controlled pump, controlled by the heat pump controller via 0-10V.

PC0 heating pump

All pumps on the heating system must be low energy according to the ErP directive, in order to reach best performance, and full operation range. PC0 must be speed controlled by the heat pump controller via 0-10V.

Cleaning of brine filter SB31

As SB 31 is not a filter ball, but just a filter, cleaning it requires a filling bin, as the filter, and also piping at the same level needs to be drained. Follow instruction in heat pump installation manual.

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 FB31. When glycol is used as antifreeze, automatic vents with microbubble separators are required instead of CB31, and FB31 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), thermically 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 $T_0 - 3K$. Step-down of the electric additional heat is performed with a degree minute calculator from the difference between actual value and set point value T_0 . The number of steps allowed for the electric additional heat can be set separately for heating and hot water.