17 One heat pump 22-48 kW, oil or gas boiler, no DHW from heat pump

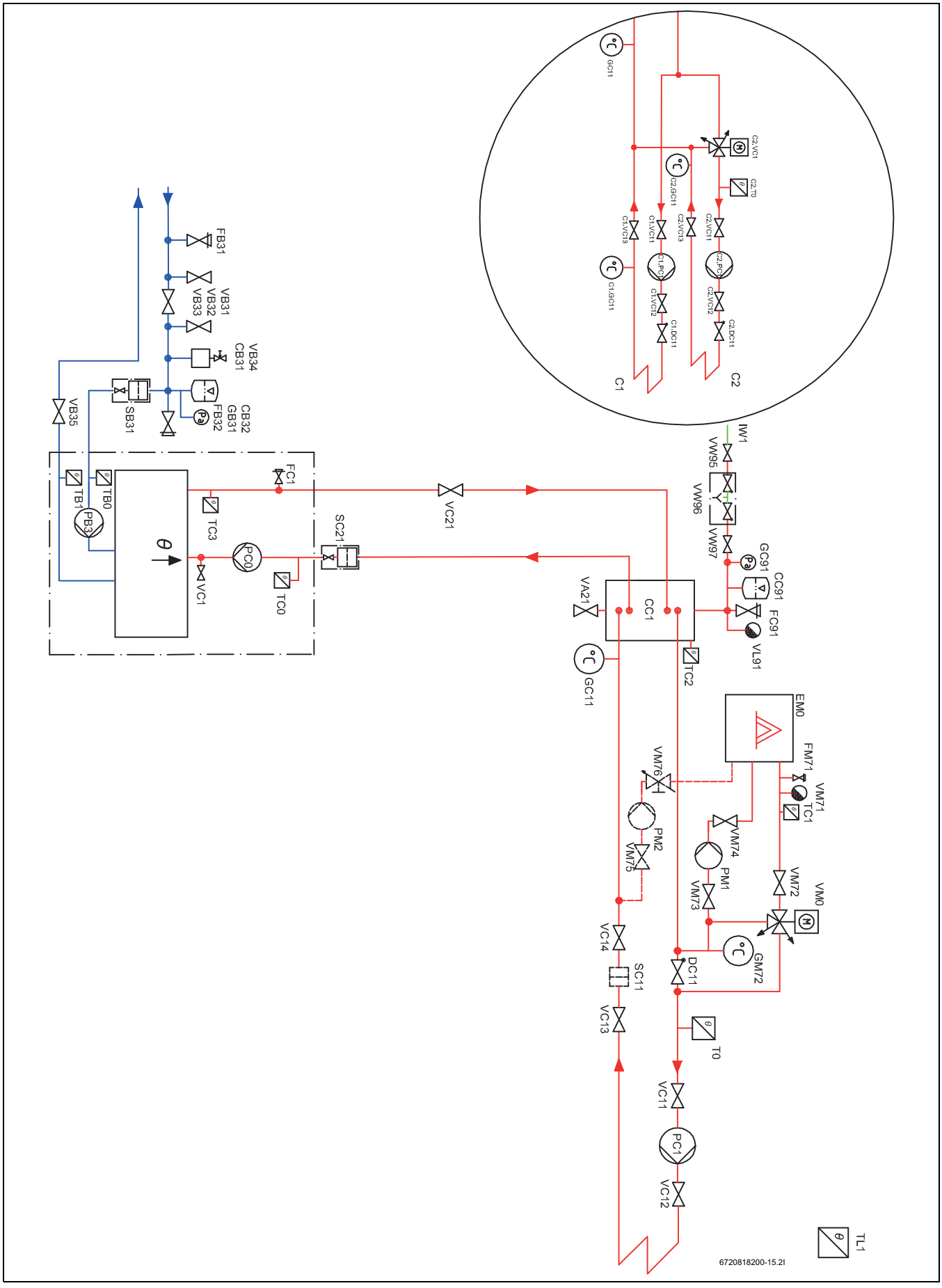

Fig. 15

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, TC1 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.

22 – 48 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 long-est 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.

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

Mixed additional heat

Overview

Mixed additional heat (oil or gas boiler) that can be started and stopped by a signal from the heat pump and is used as additional heat for both heating and potable hot water production.

Function

The additional heat EM0 assists when the heat pump alone is unable to satisfy the heating demand or when the additional heat is cheaper than heat produced by the heat pump (Hybrid function)

Control of mixed additional heat EM0

Engaging of the mixed additional heat EM0 is performed with a degree minute calculator from the difference between actual value and set point value T0 - 3K. When the number of degree minutes is fulfilled, the system receives starting permission and the boiler circulation begins. When the temperature sensor TC1 confirms that the working temperature has been reached, the mixing valve control of VM0 begins which then regulates T0 to setpoint. Disconnection occurs when the mixing valve has closed and the degree minute calculation of the difference between the T0 actual value and set point value reaches the preset number of degree minutes.

PM1 (& PM2) boiler pump control

The boiler pump(s) is started at the same time as the start signal to the boiler EM0, and keeps running until 2 minutes after the start signal to EM0 has been removed.

Heating buffer CW1 (potable hot water production)

CW1 can also be heated by the boiler, via the thermal valve VM1, that start to open toward CW1 at 60°C

Adjusting of mixed additional heat EM0

The internal temperature regulation of the additional heat should be set about 10K above the maximal heating system temperature (the highest flow temperature of the heat curve). The start signal from the heat pump is connected in such a way that the additional heat cannot be started in the absence of this signal, but without the security function, requiring manual acknowledgement for restart. The boiler alarm should not be connected to the heat pump; if the additional heat is not hot within a reasonable amount of time an alarm is received through the temperature sensor TC1.

Condensing boiler with low temp return

If a condensing boiler with a 2:nd return is used, PM2 should be installed together with VM75, VM76 and DM71. It will supply the boiler with lower return temperature for the condensing part of the boiler. VM76 to be adjusted according to boiler requirement for minimum flow to this return (normally around 10% of nominal total flow).