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APARTMENT HEAT POINTS AS SOLUTION FOR ENERGY EFFICIENT USE OF COOLANT

Existing heating networks do not fully meet the current requirements for regulating heat consumption in buildings. However, they contain significant potential that has to be realized in an energy-efficient manner in the near future yet [1].

The distribution and regulation of heat energy both outside and inside buildings according to demand is one of the main approaches to energy saving [1]. One of the most advanced technical solutions in this area is the use of apartment heat substations (AHS). AHS is a set of fittings and devices designed to produce hot water using heat exchanger and heat from the heating system.

The main advantages of apartment heating systems (HS) are the ability of the consumer to individually regulate the operation of the heating and hot water systems and provide convenient energy metering. Also, hot water consumption will be significantly reduced because hot water will start flowing from the tap in a few seconds and, thanks to its compact design, the hot water systems (HWS) can be installed in any convenient place (for example, instead of a classic boiler). There is also the possibility of flush mounting. The assessment shows that the costs associated with the AHS device will be recouped in up to 5 years at the current level of tariffs. After the payback period, the system with AHS will bring users net savings in operating costs with a significant increase in comfort. The heat energy savings in the operation of apartment buildings with AHS is about 20% respectively [2].

One of the possible reliable options is the use of the EvoFlat FSS apartment heat source by Danfoss, schematic diagram Fig. 1 [3]. This AHS is designed for HWS preparation and connection of a radiator heating system, designed for a maximum operating temperature of 95°C, with nominal pressure of 10 bar.

The module is supplied with such built-in components: differential pressure controller integrated into the main temperature controller (TRS-M), coarse filter, sensor couplings and mounting inserts for heat meters. Simple operation is ensured by combining the hydraulic and temperature control functions of the TRS-M controller. The TRS-M controller with integrated differential pressure controller compensates temperature fluctuations and inlet pressure drops and it always ensures the constant hot water temperature in the system.

If the apartment is designed with underfloor heating, then you can consider the EvoFlat 4.0 M by Danfoss, schematic diagram fig. 2 [4]. This apartment heat point is designed to produce domestic hot water using a flow-through heat exchanger, as well as to connect the underfloor heating circuit in a dependent manner using a mixing unit. It is also designed for a maximum operating temperature of 95°C and a nominal pressure of 10 bar.

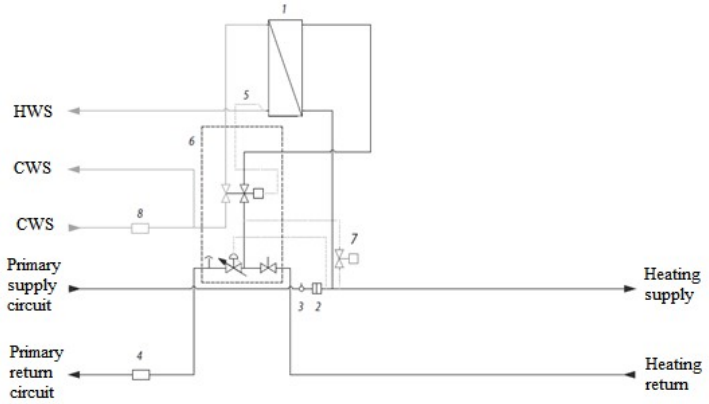

Figure 1. Schematic diagram of the EvoFlat FSS.

1 – Danfoss HB06H-1 plate heat exchanger; 2 - 3/4″ coarse filter N/Nmv=0.6 mm; 3 – sleeve for 1/2″ sensor; 4 – mounting insert for heat meter; 5 – HWS temperature sensor; 6 – hot water temperature regulator TRS-M; 7 – Danfoss FJVR bypass/circulation circuit (optional); 8 – mounting insert for 3/4″ water meter×110 mm.

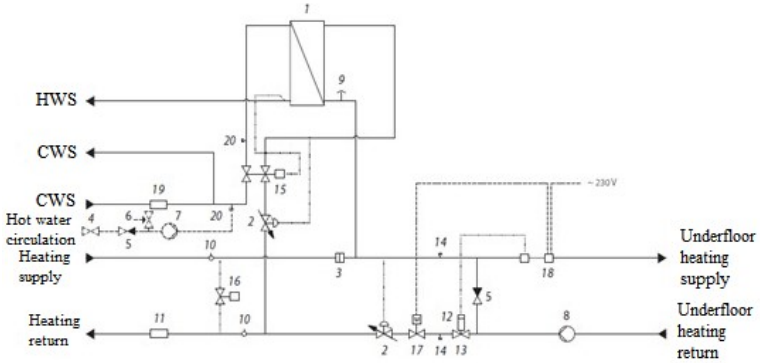

Fig. 2. Schematic diagram of the EvoFlat 4.0 M.

1 – plate type heat exchanger; 2 – differential pressure regulator; 3 – filter; 4 – ball valve; 5 – check valve; 6 – safety valve; 7 – HWS recirculation kit; 8 – pump of the underfloor heating circulation circuit; 9 – air outlet; 10 – sleeve for temperature sensor; 11 – mounting insert for heat meter 3/4″×110 mm; 12 – temperature sensor; 13 – valve of the temperature controller of the underfloor heating; 14 – pipes of the heating circuit; 15 – HWS temperature controller; 16 – summer bypass; 17 – zone valve; 18 – safety thermostat complete with TWA; 19 – mounting insert for water meter 3/4″×110 mm; 20 – HWS recirculation connection point.

The AHS is equipped with an intelligent HWS regulator that adjusts the flow volume depending on the hot water temperature and the volume of water intake. The operation of the HWS controller in combination with the differential pressure regulator ensures uninterrupted operation of the

apartment heat substation under any changes in temperature or HWS flow, as well as pressure in both the primary and secondary circuits in all operating modes. The combined regulator is designed to keep the heat exchanger cold when there is no water drawdown. This significantly reduces the heat loss from the AHS, as the heat exchanger is the largest source of heat loss.

The mixing unit ensures that the temperature of the heating medium is precisely maintained at the required level for underfloor heating between 30 °C and 50 °C.

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FASHIONABLE WORLDWIDE CONSTRUCTION: TRENDS AND INSIGHTS

The construction industry is constantly evolving, adopting new technologies and trends to meet the demands of the modern world. Here are some insights into the fashionable worldwide construction trends:

3D Printing: 3D printing technology is revolutionizing the construction industry. It allows for the creation of complex structures with greater precision and efficiency. This technology has the potential to reduce construction time and costs while enabling more sustainable practices [1].

Connected Construction Sites: The use of connected technologies, such as Internet of Things (IoT) devices and sensors, is becoming increasingly prevalent in construction sites. These technologies enable real-time monitoring of construction processes, improve safety, and enhance project management [1].

Virtual Design and Construction (VDC): Virtual design and construction technologies, including Building Information Modeling (BIM), are gaining popularity in the construction industry. These tools allow for the creation of virtual environments to visualize and plan construction projects before they are built in the physical world. VDC helps improve collaboration, reduce errors, and optimize construction processes [2].

Sustainability: Sustainability is a key focus in the construction industry. Companies are adopting greener practices, such as using eco-friendly materials, implementing energy-efficient designs, and incorporating renewable energy sources. The goal is to reduce the environmental impact of construction projects and create more sustainable buildings [3].

Smart Cities: The rise of smart cities is influencing construction trends. Smart cities leverage technology and data to improve the quality of life for residents, enhance sustainability, and optimize resource management. Construction projects in smart cities often involve the integration of smart infrastructure, including smart buildings, transportation systems, and energy grids [4].

Automation and Robotics: Automation and robotics are transforming construction processes. Construction robots are being used for tasks such as bricklaying, concrete pouring, and demolition, increasing efficiency and reducing the need for manual labor. This trend is expected to continue as technology advances.