

TRNSYS Software Model of Solar System with Long-Term Storage

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Abstract. The paper describes a Trnsys model of real solar heat pump system in Slatiňany, Czech Republic. The model was based on output data from the monitoring system for the year 2011 (solar irradiation, ambient temperature, heat consumption). The output data from the computed model were compared to the values recorded by a monitoring system.

Introduction

The article aims to describe a model of long-term heat storage created in the TRNSYS simulation tool [1]. The model simulates a real system installed in Slatiňany (Czech Republic) in 1996. The output data from the computed model were compared to real values recorded by a monitoring system. The model was created to facilitate optimisation of the system.

System description

The system provides space heating and hot water for sheltered workshops of the Social Care Home in Slatiňany. During the summer, heat gain from the solar collector field installed at the roof of the building (absorber area 147.8 m^2) is stored in a long-term heat storage tank. The steel non-pressure water storage tank (usable volume 1083 m^3) is located outside the building and insulated by mineral wool (700 mm). During the winter, when the amount of solar radiation is limited, the energy from the long-term heat storage tank is used for space heating in the building (water floor heating, heat loss of the building is 57 kW at $\theta_c = -15 \text{ }^\circ\text{C}$) [2], see Fig. 1.

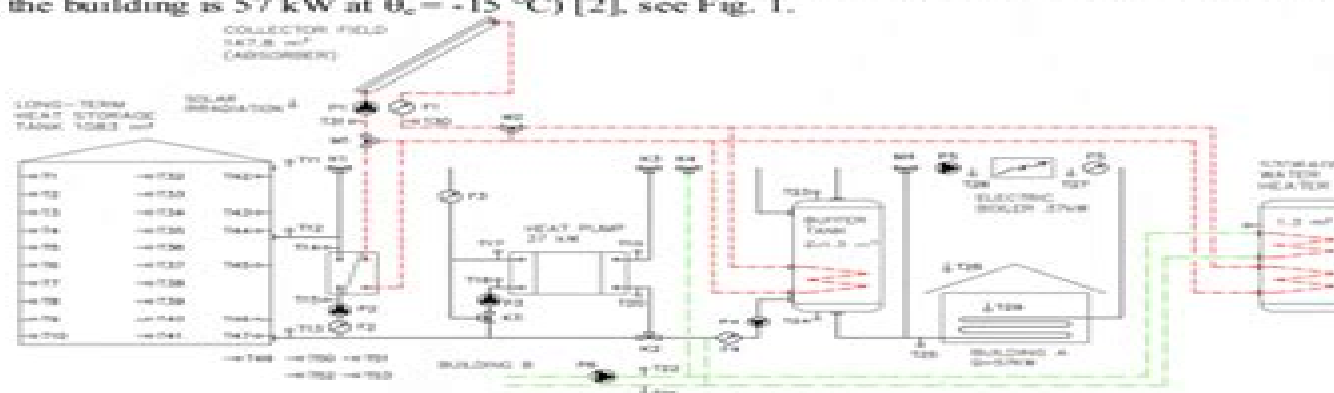


Fig. 1 – System diagram, description of key parts and measurement points of system monitoring.

If the temperature in the long-term heat storage tank is sufficient (over ca $36 \text{ }^\circ\text{C}$ based on heating curve), the building is heated directly using the water from the tank which enters the underfloor heating system over two buffer tanks. The water from the long-term heat storage tank is taken near the surface or from the middle of the tank and return water flows in at the bottom. At lower

Trnsys Manual

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