Regulation of storage heaters

As is already described in the chapter The principle of heating, the basic function of storage systems is to produce heat in the period when energy is usually cheaper *(usually at night)* and store such an amount of it that can satisfy room heating requirements throughout the whole following day. This system is the more effective the more accurately the release of the accumulated heat can be controlled and, simultaneously, its uncontrolled transfer *(cooling)* prevented.

From the point of view of the regulation of storage systems, there is storage floor heating on one hand, which is very hard to regulate, and storage heaters on the other hand, which are fitted with insulation, regulation flaps or even a fan in order to provide the best controllability possible. Despite this, it is impossible to achieve the same accuracy of regulation with storage systems as one can attain with direct-heating systems.

The amount of heat needed for heating varies depending on the season, and therefore the **first level of regulation** of storage systems is the limitation of the amount of accumulated thermal energy in the system. Storage heaters *(dynamic as well as static)* are therefore equipped with what is known as a charge control thermostat. Using this, the temperature to which the core temperature is heated when charging can be limited, thus allowing the amount of stored thermal energy to be regulated. It is a standard electromechanical thermostat, the setting of which is carried out manually by the user, with the help of a control wheel. Determining the correct setting is dependent primarily on the experience of the user with the heating system in operation, and the predictability of climatic conditions over the next few days.

The second level of regulation is the discharge of the heater with a dependence on the required room temperature. Because of their different constructions, discharge takes place in a different way in the case of dynamic heaters than with static ones.

ECODYNAMIC VFMi dynamic heaters

As dynamic heaters contain a fan, i.e. an active element with which the release of heat can be begun in a planned way, the system of room temperature regulation is similar to that used in regulation for direct-heating convectors. However, in the case of storage heaters, the thermostat doesn’t switch the power contact on or off (electric current into the heating elements) but only the contact of the ventilator. Therefore, a thermostat with a potential free contact (e.g. INSTAT 2) has to be used, similarly as in the case of gas boilers. A digital room thermostat is installed in the heated room on a wall, where it measures the air temperature and switches the fan of the storage heater on and off on the basis of the set programme. The required temperature is thus maintained in the room.

If auxiliary electric heating is installed in the storage heater, its operation is controlled directly by the storage heater, independently of the room thermostat. Auxiliary heating is connected from non-blocked electricity distribution circuits and so is permanently under voltage. Contacts for the connection of auxiliary heating are allocated in the terminal of the storage heaters, and they lead through the inside thermostat – this device will switch the current into the auxiliary heating only if the temperature of the storage core drops

below 30°C. As soon as the heating bar starts heating, the bimetallic strip which touches it switches the flap inside the heater and so the air will stop flowing via the storage core and will flow in a bypass via the heating bar directly to the air outlets.

ECOSTATIC WMX static heaters

Apart from a charge control thermostat, static heaters are also fitted with another, settable electromechanical thermostat. It operates according to the temperature, controlling the mechanical flaps which regulate the air flow through the storage core and maintain the room temperature at a set amount. The higher the air temperature in the room, the more the flaps close and decrease the amount of heated air flowing out of the heater. The heater thus maintains a stable temperature in the room. As it is electromagnetic regulation, where the intervention of the user is needed in order to change the required temperature *(turning the control wheel of the thermostat)*, a digital thermostat, which would automatically change the temperature in the heated room according to a preset programme, cannot be used.

A second option is the use of **static storage heaters in direct-heating mode**. The heater then behaves as a standard direct-heating convector, but on switching to the so-called high tariff it continues heating from the storage core. This feature can be used in older buildings which have inferior thermal insulation and where temperatures otherwise drop undesirably in the period when electric heating is disconnected. In the case of such a connection, the heater can be superordinated to a room thermostat and have its operation programmed in this way. However, the ability to heat from the storage core, used when switched to the high tariff, has a negative effect when the regulation is required to lower the temperature to a target level – when the thermostat switches off the heating element in the heater according to the programme, the heater will continue heating from the storage core thus causing the temperature drop to be very slow. Excessive heating can be partially limited by setting the electromechanical thermostat which controls the flaps of the heater. However, a real danger exists that the function of these two thermostats will interfere with each other. Notably problematic regulation is characteristic of all storage heaters operated in the direct-heating mode. Therefore, this way of heating is suitable mainly for buildings of a non-residential character with regular operation *(offices, shops, workplaces and similar)* and without requirements for operative changes in temperature.

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