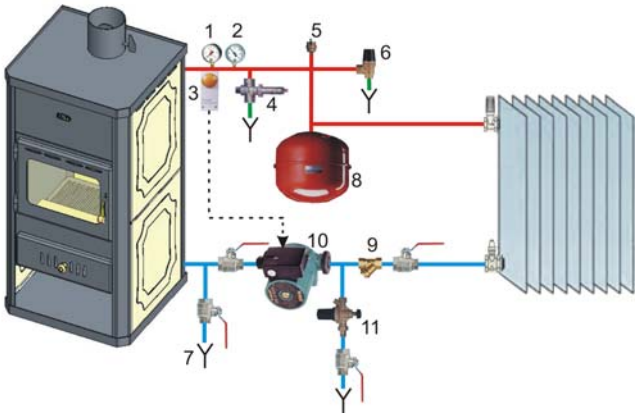
1. When you build an open heating system, ensure direct connection between the fireplace and the expansion vessel. On this connecting pipe no shut-off element must be there, which could interrupt the connection.

All elements of the installation must be provided against freezing, especially if the expansion vessel or other parts of it are located in non-heated premises.

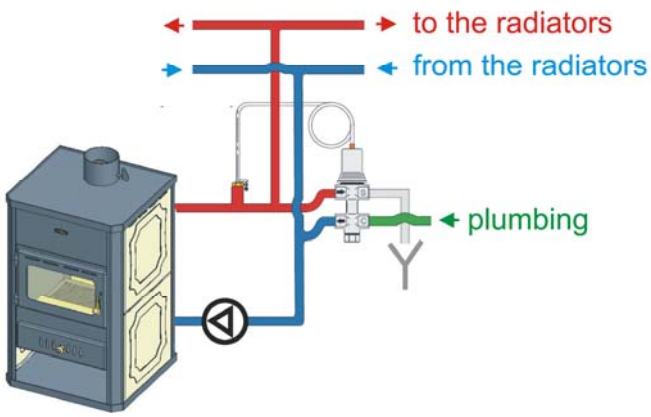
2. To guarantee the safe operation of the closed heating system it is necessary to be provided with:

- Safety valve for pressure – it is set on 1.5 bar. If for some cause the pressure exceeds this value, a part of the liquid is drained.
- Safety valve for temperature. If for some cause the temperature of the liquid exceeds 90-100°C, a part of it is drained.
- Automatic supplementing group. When some of the safety valves activates, the liquid drained from the system is restored.



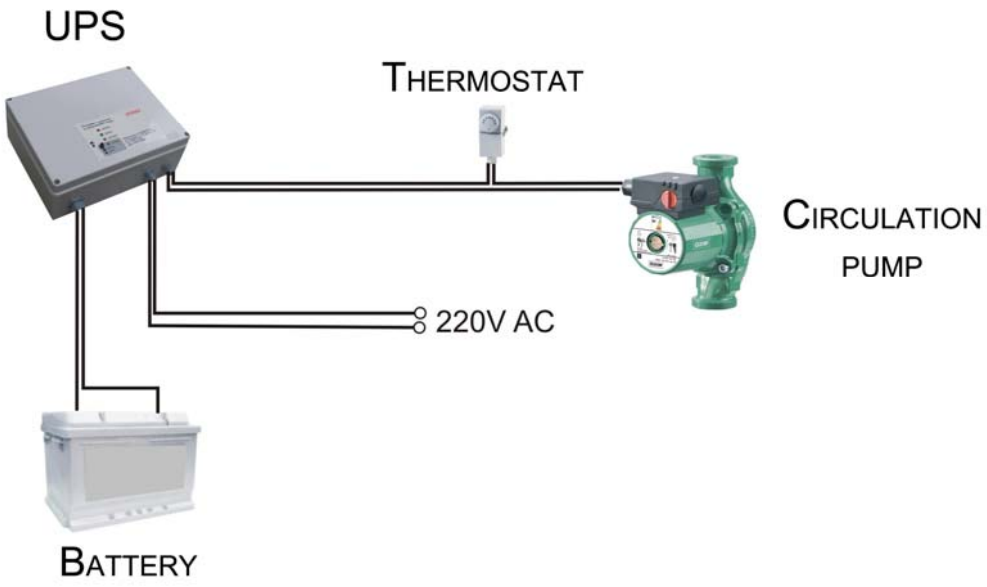

1. Manometer.
2. Thermometer 120º C.
3. Electrical thermostat.
4. Thermal safety valve.
5. Automatic air vent.
6. Safety hydraulic valve
7. Drainage.
8. Closed expansion vessel.
9. Filter.
10. Circulation pump.
11. Automatic supplementing group

Another possibility to prevent the system from unacceptable temperature rise is the use of combined thermal safety valve.




In emergency (for example power cut of the pump) when the temperature of the liquid reaches the set value (90 ÷100 $^{o}$C) the valve activates and then cold water from the plumbing enters the system and part of the hot water is drained in the sewerage.

3. In order to maintain the normal operation of the heating system and to avert emergencies when the central power cuts, it is necessary for the pump to be provided with UPS from a battery.




When there is a voltage in the network, the pump is fed directly from it and the battery is charged when necessary.

When the power cuts, the UPS supplies voltage to the pump from the battery, converting 12 V direct current into 220 V alternating current. The duration of operation in such mode depends on the power of the pump and the capacity of the storage battery. E.g. a battery in good working order with capacity 155Ah can feed a pump with a power 50 W within about 24 hours.