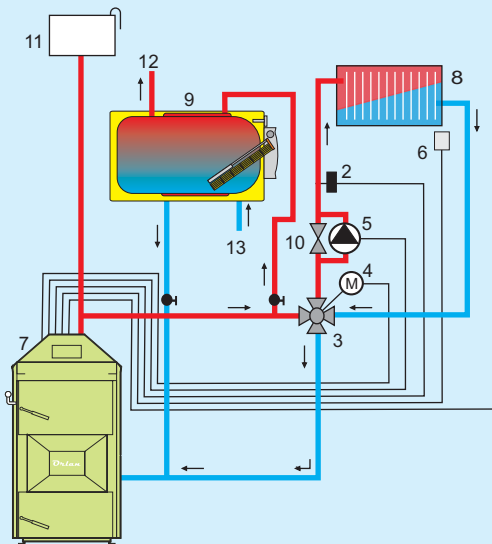


Boiler interaction with four-way mixing valve

1. Outdoors temp. sensor
2. Feeding water temp. sensor
3. Four-way mixer DUOMIX C, DUOMIX AO, DUOMIX P, DUOMIX Z
4. MK.CS assisting drive
5. Circulating pump
6. Room temp. sensor
7. Boiler
8. Heater
9. Operational water heating
10. Differential valve
11. Compensating vessel
12. Exit for warm operational water
13. Cold water entry



Example of boiler's connecting with four-way mixing valve And water heater

If the boiler is connected into the forced (pump) system it has to be protected in case of power deficiency by adding power backup unit. If boiler operates in closed loop system temperature-pressure relief valve has to be installed!

The best way is to connect a water heater into the heating system, which works together with boiler without pump service. This gravitational arrangement enables collecting of boiler minimal output during power deficiency.

Low temperature corrosion occurs if the internal boiler walls are in contact with combustion gases having a lower temperature than the temperature of humidity causing condensation of the combustion gases.

If there is more acetic acid into condensate, the low temperature process is more intensive.

- **Mixing function** is related to necessary temperature changing in central heating system considering outside temperature changes. For proper boiler operation, a suitable high temperature inside of gasification chamber is needed; then the water temperature upon boiler exit will achieve 140-180°F. Using four-way mixing valve enables to mix adequate water quantity, heated directly by the boiler, together with returning water from the system. As the result, the proper water temperature in the boiler is attained.

- **Boiler protection from low temperature corrosion** - is analogous to mixing function but also functions to increase temperature of the water returning from system by mixing of the water directly heated into the boiler.

- **Preheating of warm operational water** is related to necessary disconnecting of system during summer season. Water is heated in universal pre-heater linked with the boiler on gravitation. The central heating system should be closed during summer by mixing valve switching off, and then fast and efficient water heating is achieved.

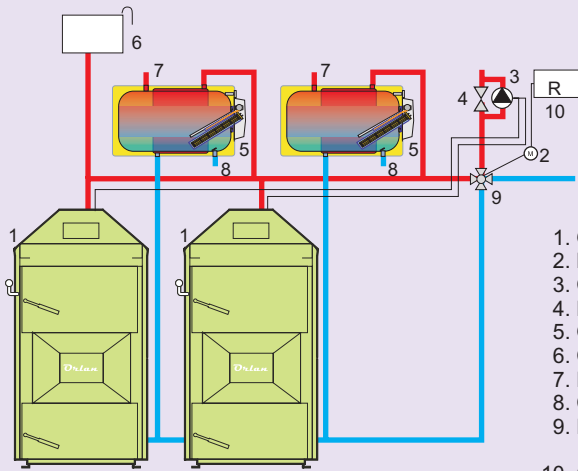
Boiler interaction with operational water heater

To protect the boiler against overheating, the collector is needed to gather minimal theoretical boiler output on gravitation.

| ORLAN boiler output | Heat collector output | Recommended mixing valve diameter | Recommended volume of the operational water pre-heater |
|---------------------|-----------------------|-----------------------------------|--|
| 18 kW | 4 kW | DN 25 | OKCV 125L |
| 25 kW | 5 kW | DN 25, DN 32 | OKCV 160L |
| 40 kW | 8 kW | DN 32, DN 40 | OKCV 180L |
| 60 kW | 15 kW | DN 50 | OKCV 200L |
| 80 kW | 25 kW | DN 50, DN 65 | OKCV 200L |

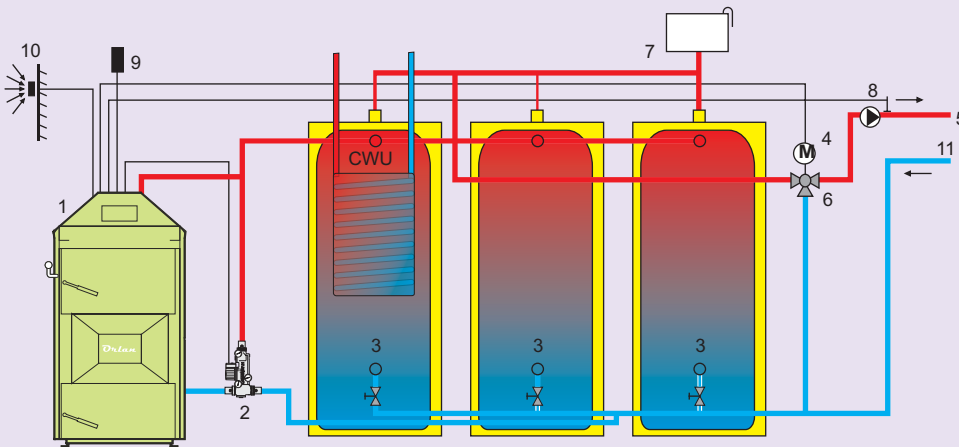
For this purpose, the best way is to use operational water heater together with single function boiler without charging pump. By this gravitational connection, the system takes over the minimal boiler output in case of feeding shortage.

Boiler connection scheme - examples



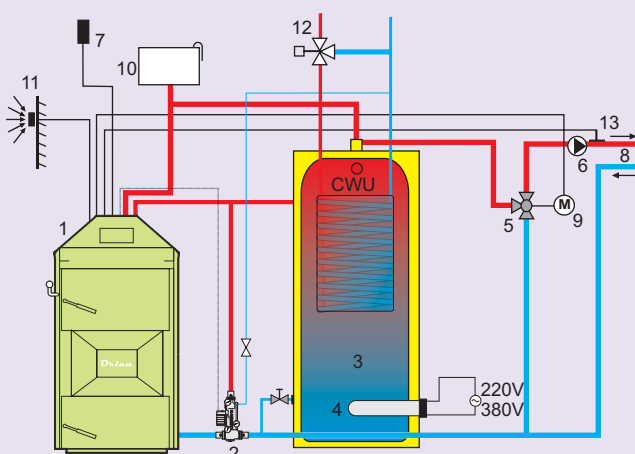
1. ORLAN boiler
2. MK.CS mixing valve drive
3. Circulating pump
4. Differential valve
5. Operational water heater
6. Compensating vessel
7. Exit for warm operational water heater
8. Cold water entry
9. Four-way mixing valve DUOMIX C (DUOMIX AP, DUOMIX A0, DUOMIX Z)
10. Outside temperature sensor

Connection scheme of two boilers working in cascade



1. ORLAN PLUS, SUPER with A 3000 regulator
2. LADDOMAT 21 thermoregulator
3. Accumulation tanks
4. Mixing valve drive
5. Heating system exit
6. Three-way mixing valve
7. Opened compensating vessel
8. Circulating pump
9. CZ04 room temperature sensor
10. CZ03 outer temperature sensor
11. CZ02 feeding water temperature sensor

Connection scheme of heat accumulation system



1. ORLAN PLUS, SUPER with A 3000 EV regulator
2. LADDOMAT 21 thermoregulator
3. NAD, NADO accumulation tank
4. Electrical heater
5. Three-way mixing valve MIX C (MIX BP, MIX AP, MIX P)
6. Circulating pump
7. CZ04 room temperature sensor
8. Heating system exit
9. Mixing valve drive
10. Opened compensating vessel
11. CZ03 outer temperature sensor
12. Mixing valve
13. CZ02 feeding water temperature sensor

Connection scheme of the heat accumulation set with one vessel

Boilers connected in cascade enables the heating of bigger buildings. Boilers should be of the same output. Such a system gives better possibilities of heat source dynamics than a system with only one boiler. Particularly in "transition period" (springtime or autumn) boilers may be serviced alternately. Boilers with such a connection enables for its utilization with the output close to nominal, which warrants boiler longer durability.

Heat accumulation tanks allows for boilers better adjustment according to actual weather conditions. In transition period (the spring, autumn) any boiler without heat accumulation set is switched on and off very often. If the set is connected, the boiler works constantly and the energy is lost into the vessels. Each boiler switching on and off means fuel losses. It may be avoided if the heat accumulation set is used. Simultaneously, in the transition period (the lowest temperature in winter time) the accumulation set helps to reheat the whole central heating system.

Also it should be mentioned that few heat sources such as solar collector, heating pump, or similar may be connected to the heat accumulation set.