orlański

natural warmth of the house

Wood gasification boiler

ORLAN

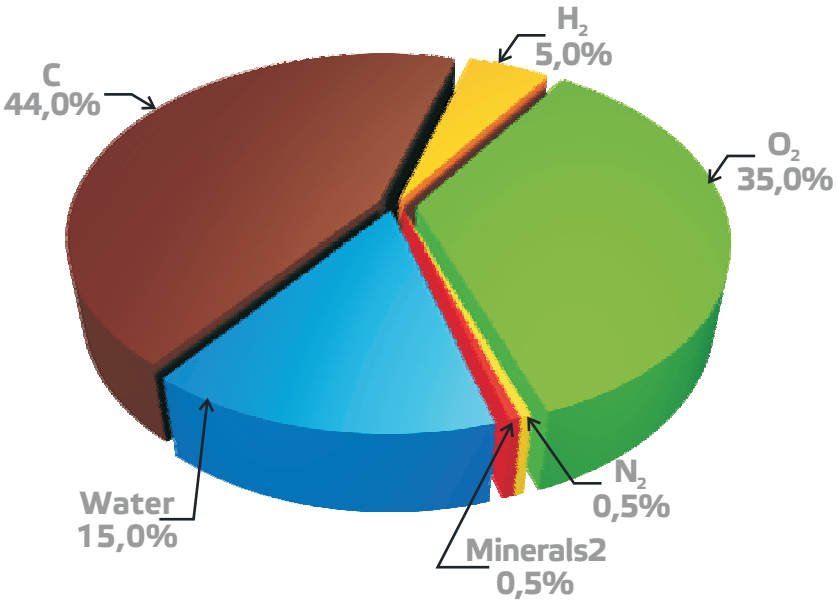
ISO 9001 TÜV CERT CE ISO 14001

Compliant with EN 303 - 5 norm

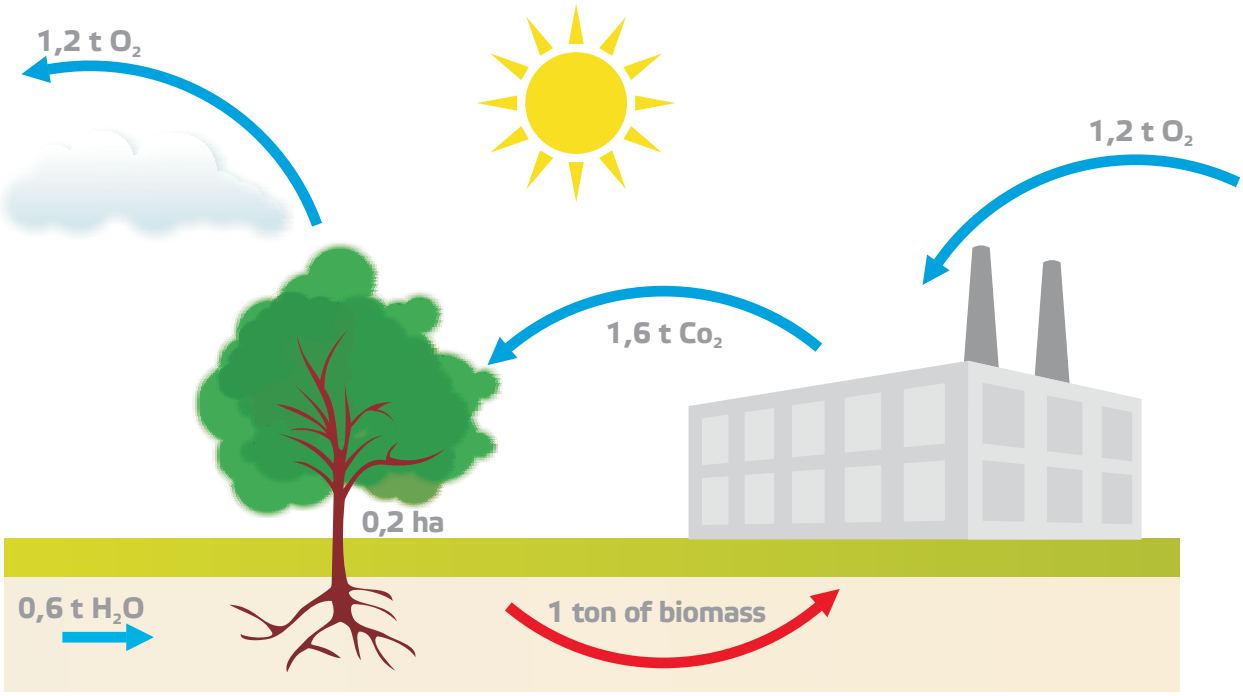
Wood fuel - ORLAN

Wood is a renewable fuel, just like the sun, tidal energy or the wind. These are energy sources which cannot be exhausted. Unlike other energy sources, wood is a fuel which can be accumulated and stored without any energy loss. Storing lowers the humidity of the wood whilst simultaneously raising its fuel value (the amount of energy which can be used during combustion). Wood is also the only fuel whose carbon dioxide (CO_2) balance is zero, meaning that while vegetating through photosynthesis process it absorbs the same amount of carbon dioxide as it emits while combusting.

Chemical contents of wood with 15% humidity



CO_2 circulation graph



3-year warranty for boiler tightness

Wood gasification as an economic source of heating

Wood gasification is a thermal decomposition of wood with a significant air (oxygen) deficit which results in the creation of combustible gases (wood gases) and ash.

Modern wood gasification boilers use the energy from the wood three times more effectively than appliances with a traditional hearth and their emissions are similar to gas boilers.

Wood gasification process in central heating boilers can be divided into four main phases:

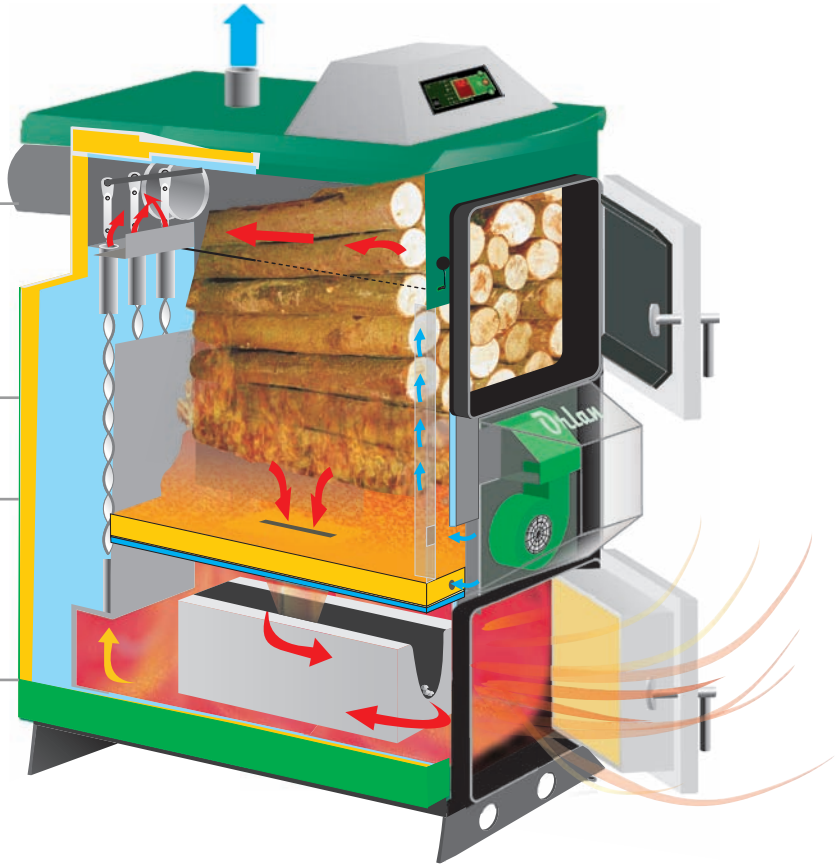
1. Drying and de-gassing wood at a temperature of 450°C.
2. Combustion of the mixture of wood gas and secondary air at a temperature of 560°C.
3. Burning up the flame and heat emission at a temperature of 1200°C.
4. Fumes of a temperature of 160°C are emitted through the chimney flue.

PHASE FOUR
Fumes of a temperature of 160°C are emitted through the chimney flue

PHASE ONE
Drying and de-gassing wood at a temperature of 450°C

PHASE TWO
Combustion of the mixture of wood gas and secondary air at a temperatureof 560°C

PHASE THREE
Burning up the flame and heat emission at a temperature of 1200°C



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Wood as fuel for wood gasification boilers

During the proper wood combustion (gasification process) the exhaust gases and ash created do not contain substances which are harmful to the natural environment, moreover the amount of created ash constitutes 1% of inputted material.

Humidity of the wood is a very important factor in the process of combusting it. The less water the wood contains, the higher its fuel value. In case of wood with 20% humidity, about 30-40% of the general amount of wood needed for one heating season can be saved.

It is recommended to cut the trees down during winter period when the sap no longer circulates within them. After felling, the wood needs to be cut into logs about 35-45 cm long and divided into halves or quarters as soon as possible. The suitably prepared wood should be stored for the period of 18-24 months in a ventilated room and fairly sheltered place. Oak is an exception as due to its high density and the content of tannin it requires storing outside and exposure to rain for 12 months, and then needs drying under cover for 2-3 years. After 2 years tannin, volatile ingredients of resin, turpentine, etc will be removed from the wood and the humidity will reach 15-20%. It ias the correct level of wood drying.

It is recommended to use wood that has a 20% maximum moisture content. Hardwoods are used to promote longer burns in the Winter months whilst softwoods can be used for batch burning or creating an ember layer when starting a fire. The softwoods can also be used on its own or as a mix with hardwoods when the boiler is running constantly but it is important that temperatures of 80°C to 90°C are set on the control panel.

Wood humidity

The state of the wood	Humidity	Fuel value
After felling	50-60%	2,0 kWh/kg = 7,2 MJ/kg
After a year of seasoning	25-35%	3,4 kWh/kg = 12,2 MJ/kg
Stored for a few years	15-25%	4,0 kWh/kg = 14,4 MJ/kg

Comparison of fuels regarding their fuel value

Fuel	Fuel value (MJ/kg)
Light fuel oil	42,0
Earth gas GZ-50	37,0
Coal	31,0
Coke	28,5
Brown coal	15,0
Dry wood	15,0

Comparison of some types of trees regarding their density

Type of tree	Humidity	Fuel value
Coniferous		
Pine	700	480
Larch	760	600
Spruce	740	430
Fir	1000	450
Deciduous		
Oak	1080	710
Elm	950	680
Ash	920	750
Beech	990	730
Hornbeam	1080	830
Alder	690	530
Birch	650	650

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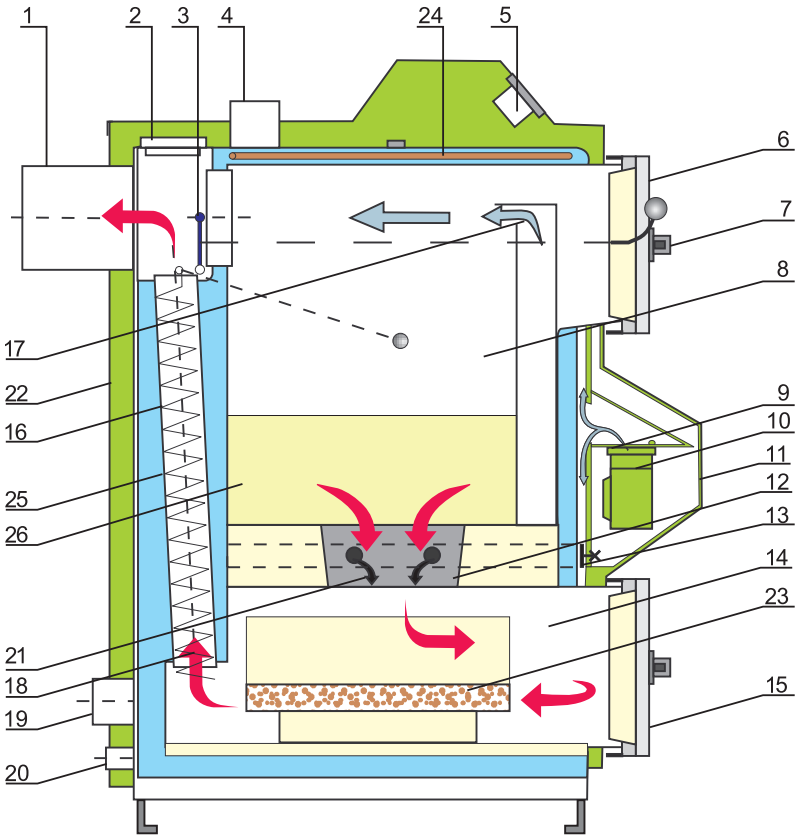
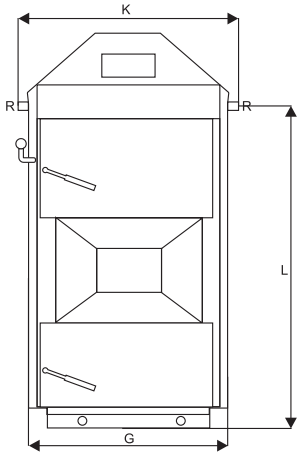
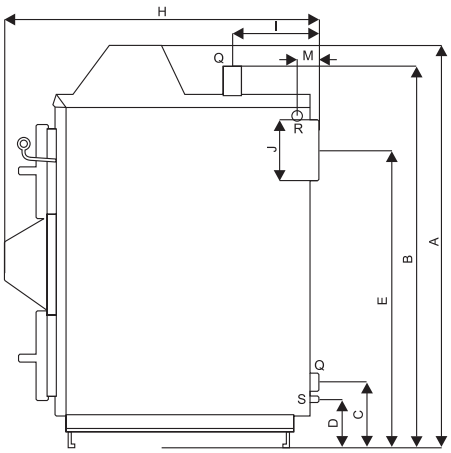
Clean solution - ORLAN



Boiler construction

1. Chimney flue
2. Heat exchanger cleaning cover
3. Chimney flap
4. Hot water outlet
5. Boiler controller
6. Upper door
7. Closing/opening door handle
8. Loading chamber (gasification)
9. Fan flap
10. Fan
11. Fan casing
12. Nozzle made of refractory concrete
13. Secondary air adjustment
14. Combustion chamber
15. Bottom door
16. Smoke tube heat exchanger
17. Primary air flow
18. Flue gas outlet
19. Heating water inlet
20. Drain valve
21. Secondary air flow
22. Insulation
23. Ash pit
24. Thermal safety device (cooling coil)
25. Mechanical cleaning system of the smoke tube heat exchanger
26. Set of moulders





Technical data

Boiler type	m.u.	ORLAN 18	ORLAN 25	ORLAN 40	ORLAN 60	ORLAN 80
Power range	kW	4÷18	5÷31	8÷40	15÷50	25÷80
Effciency	%	91	91	91	91	91
Weight - STANDARD *	kg	395	510	580	910	1115
Weight - SUPER *	kg	425	525	595	975	1165
Total height	A - mm	1220	1325	1570	1535	1575
Hot water outlet height	B - mm	1210	1325	1560	1575	1625
Hot water inlet height	C - mm	215	235	220	210	245
Hot water inlet height	D - mm	145	145	130	145	175
Chimney conduit height	E - mm	870	960	1220	1170	1210
Casing width	G - mm	545	600	600	740	740
Total depth	H - mm	960	1040	1020	1340	1700
Hot water outlet	I - mm	340	320	330	575	600
Chimney conduit diameter	J - mm	180	200	200	210	210
Total width	K - mm	660	720	720	860	860
Height of coil connection	L - mm	990	1100	1330	1310	1300
Coil outlet	M - mm	260	150	260	365	315
Diameter of feeding and return ferrule	Q - inch	2"	2"	2"	2 ½"	2 1/2"
Diameter of coil ferrules	R - inch	3/4"	3/4"	3/4"	3/4"	3/4"
Diameter of blowdown connection	S - inch	1/2"	1/2"	1/2"	1/2"	1/2"
Water capacity	dm^3	55	75	93	180	205
Loading chamber capacity (gasification)	dm^3	85	120	185	310	465
Power taking	W	50	50	50	100	100
Billet length	cm	50	50	50	75	100
Wood humidity: - recommended	%	15÷25				

* The parameters above are net values, transport with packing come additionally.

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Clean solution

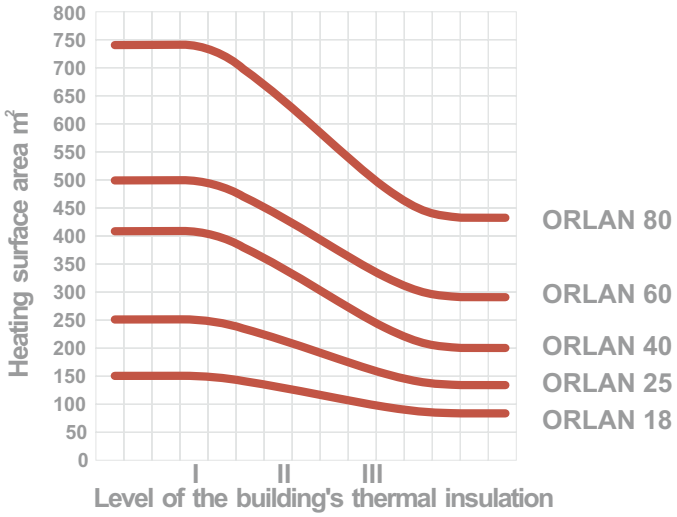
There are two types of Orlan boiler available:

- **SUPER** with a cooling coil, mechanical cleaning system of the smoke tube heat exchanger and set of moulders.
- **STANDARD** without any cooling coil nor mechanical cleaning device.

Boilers' advantages

- **Efficiency up to 91%**
- **Low exploitation costs**
- **Easy service**
- **Little quantity of ash**
- **Time between loadings up to 12 hours**
- **Range from 18 up to 80 kW**
- **Fan power modulation from 30 up to 100%**
- **Adapted for work in closed system**
- **Electronic regulator with possibility to remote control panel**
- **Nature friendly**
- **Made of the best quality steel**

Choosing the right boiler for the surface:



What kind of boiler?

We choose boiler according the below:

- Building heat needs established by an installation developer.The amount should be enlarged by 20% (boiler over sizing).
- Heat rate in relation to using cubic measure.
- Rate's value should be established at 30-50 W/m^3 – it depends.
- We can use the diagram enclosed.

NOTICE!

The diagram is only a clue and Eko-Vimar Orlański Sp. z o.o. doesn't take responsibility for wrong choice of boiler parameters.

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The best material - the best quality

Boiler's body - it is made of 6 mm welded metal sheets, the thickness of remaining walls is 4 mm. All boiler nozzles are made of steel tubes.

Heat exchanger - these are smoke tubes which are made of 57x4 cm boiler tubes.

Insulation, exterior casing - boiler is insulated with 20 mm insulation material covered with 0,8 mm varnished sheet steel.

Nozzle - ceramic element made of refractory concrete (working temperature 1800ºC).

Chimney flap - made of high quality steel. Tight fl ap adhesion to the combustion duct assures the burning chamber tightness.

Fan - with an electrical motor, the fan is placed at the front of the boiler. Fan casing is made of 0,8mm steel plate.

Control panel - placed at the top boiler cover. It's fastened to the boiler cover with sliding clips.

Chimney flue - is made of 4 mm steel pipe.

Ash pit - steel chamber bottom comes together with ceramic ash pit (working temperature 1800ºC) and additionally there is the layer of reinforced concrete which protect against high temperature.

Boiler's door - made of high quality steel, insulated and protected with refractory concrete. Ovenproof glass fi bre assures door tightness.

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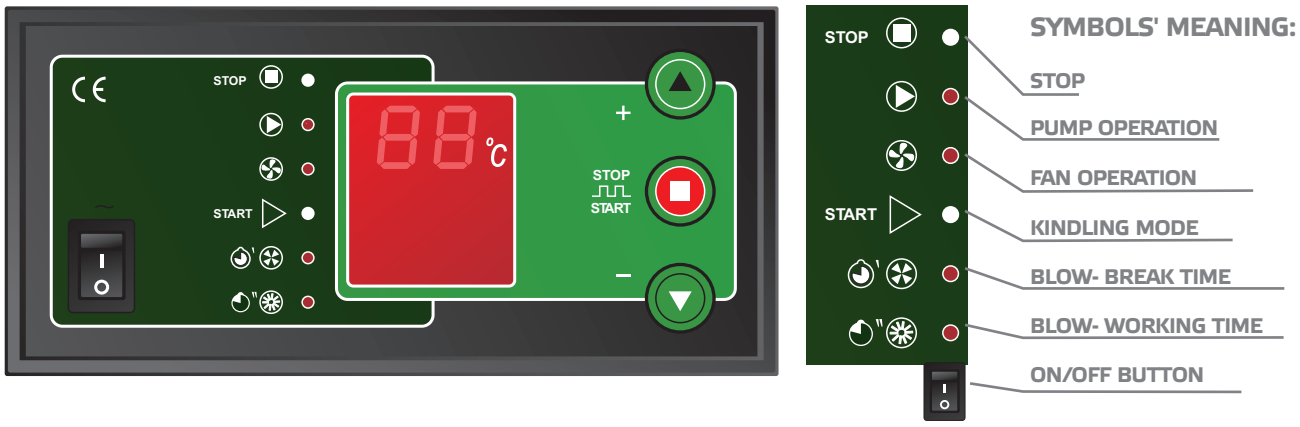
Total control - ORLAN

Temperature regulator which controls with a fl ow and starts circulating pump in heating installation.

The control panel functions are:

- **keeping established boiler's temperature by defogger controlling,**
- **liquid, gas detonation avoiding, blower starting,**
- **blower power setting (service mode),**
- **boiler blow programmable,**
- **control automatic stopping right after boiler going off,**
- **blower blockade while boiler loading,**
- **controlling with central heating pump,**
- **„COMFORT SYSTEM" - system of pump blocking protection while boiler's down time,**
- **protection against boiler overheating and freezing,**
- **light controlling in case of temperature sensor damage,**
- **display intense toned increased in time of regulating.**



Ekoster Control control panel

EKOSTER Control panel is to be used for cooperation with EKOSTER 2 microprocessor temperature regulator. EKOSTER Control thanks to continuous cooperation with EKOSTER 2 regulator enables for boiler temperature readout, temperature setting changes as well as turning ON and OFF of the control. Build-in alarm system is highly innovative as it alarms of acceptable temperature- 95ºC excess, the temperature decreasing below 0ºC and damage of a sensor.

TECHNICAL DATA	
Range of temperature displayed	-9ºC - + 99ºC
Range of temperature setting	+60ºC - + 97ºC

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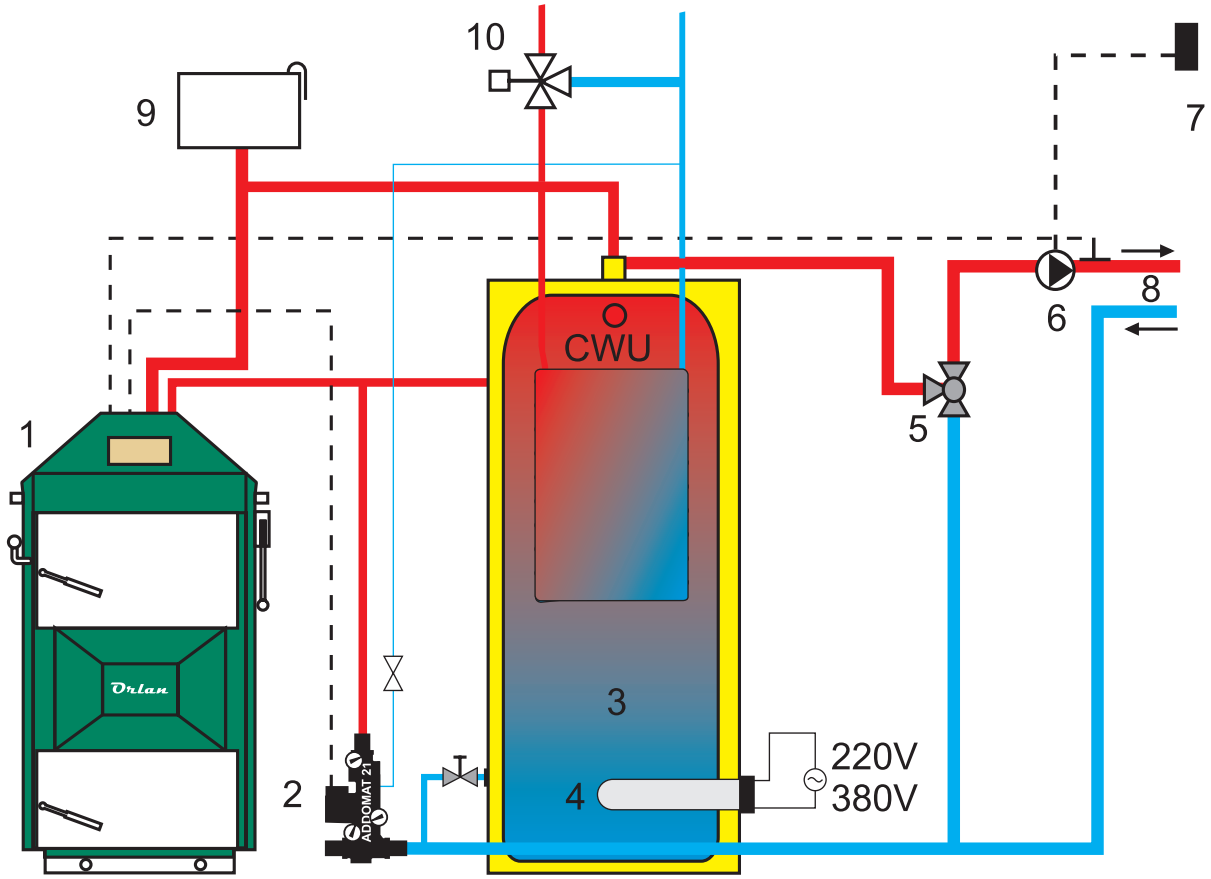
Installation diagram - ORLAN

An exemplary scheme of one container with an accumulation tank connection.

1. ORLAN boiler
2. Thermoregulator LADDOMAT 21
3. Accumulation tank NAD, NADO
4. Electric heater
5. Three way mixing valve
6. Circulation pump
7. Room thermostat
8. Heating system outlet
9. Expansion tank
10. Mixing valve



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Installation diagram - ORLAN

An exemplary scheme of an accumulation system connection.

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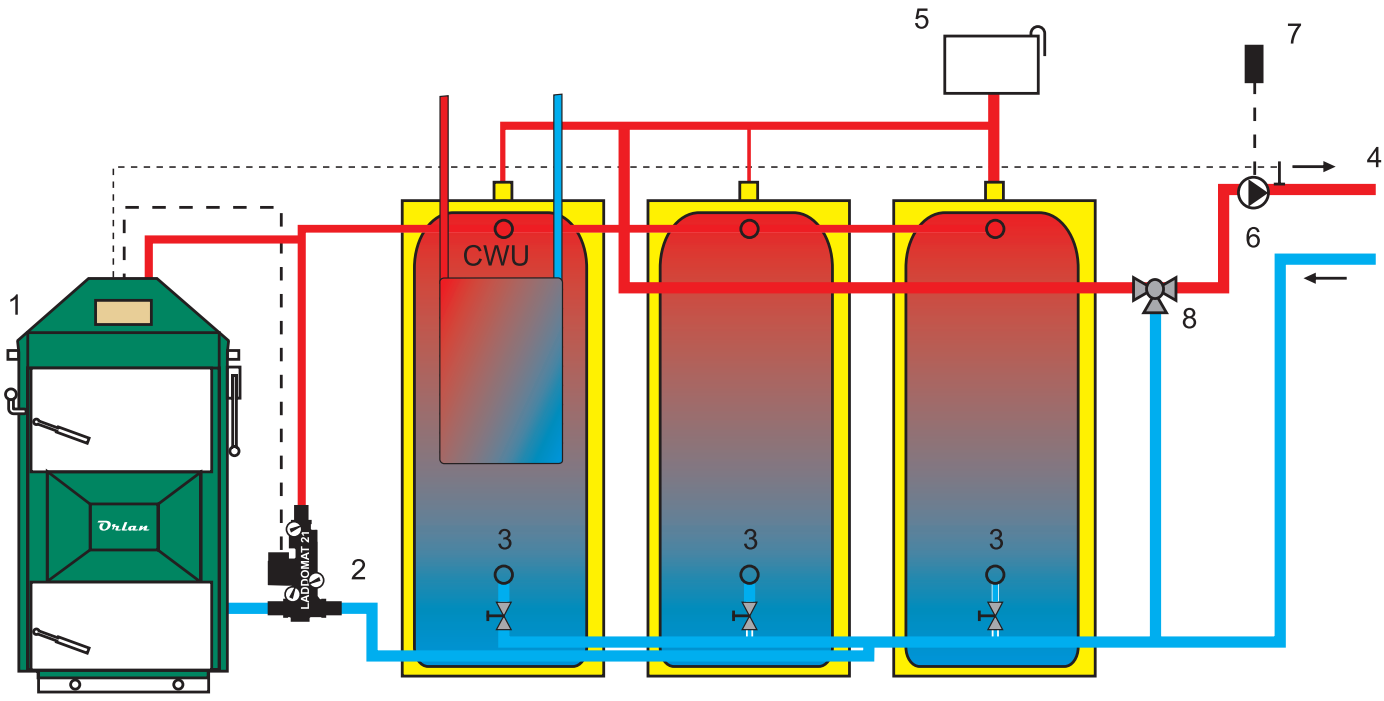

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