

# Ekon

Solid fuel boiler



## User manual Maintenance and installation

## Table of content

Safety provisions	3
1. Introduction	4
1.1. General information	4
1.2. Standards and regulations	4
2. Technical parameters	5
3. Construction	6
3.1. Boiler components	6
3.2. Boiler	7
3.3. Boiler set	7
4. Boiler installation	8
4.1. General information	8
4.2. Boiler location and position	8
4.3. Connecting the boiler to the chimney	9
4.4. Connecting the boiler to the central heating system	9
4.5. Recommended connection diagrams	10
4.6. Changing the door direction	11
4.7. Adjustment of the primary air supply valve	12
4.8. Adjusting the secondary air supply valve	13
5. Using the boiler	14
5.1. General information and safety	14
5.2. Boiler fuel	14
5.3. Ignition	15
5.4. Boiler operation	15
5.5. Maintenance	16
6. Warranty conditions	17
7. Efficiency and emissions	18
8. Disposal of the boiler	18

## Safety provisions



**During the use of the boiler, its individual parts: chimney, door, individual points of the body – can heat up and cause burns if touched.**



**Do not allow children to touch or use the boiler without adult supervision.**



**The boiler can be operated by a capable adult who has carefully familiarized himself with this instruction.**



**Only a qualified specialist can install the boiler and connect it to the heating and electrical systems.**



**If you suspect that the boiler has malfunctioned, please contact the organization that installed the boiler or the manufacturer's representative. Do not under any circumstances use a malfunctioning boiler.**



**Improperly connected and used boiler can cause injury or death.**

## 1. Introduction

### 1.1 General information

The boiler heat exchanger is characterized by exceptional durability and with low requirements for chimney drafts. Service is simple – the control elements consist of a draft valve and a draft regulator, which controls the air supply to the boiler. The enlarged loading opening makes it possible to load larger firewood.

Before connecting the boiler to the heating system, read this manual carefully and check for proper operation of all boiler components and equipment.

Boilers are designed for heating private residential houses, commercial and auxiliary premises. The boilers belong to the so-called low-temperature boilers category, i.e. the average temperature of the heat carrier cannot exceed 90° C, and the maximum operating pressure – 1.5 bar.

The manufacturer reserves the right to make minor changes that do not significantly affect the quality of the combustion process and the operation of the boiler.

### 1.2 Standards and regulations

The boiler must be installed and operated in compliance with the legal requirements of the country to which it is supplied. It must be installed in accordance with the requirements of the maintenance and installation instructions.

Otherwise, the manufacturer assumes no responsibility and does not guarantee repair for any defects.

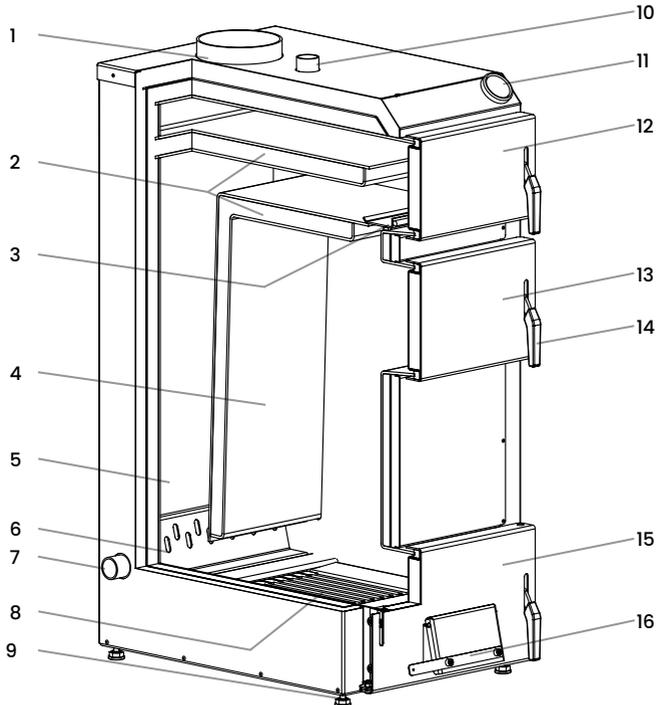
## 2. Technical parameters

Models and power output		10 kW	13 kW	16 kW	20 kW
Heated area	Max m <sup>2</sup>	100	130	160	200
Combustion chamber load	l/dm <sup>3</sup>	65	85	100	115
Combustion chamber depth	mm	400	400	400	400
Combustion chamber opening size	cm	29x20	29x20	34x20	39x23
Heat exchanger area	m <sup>2</sup>	1,9	2,2	2,6	2,8
Number of horizontal heat exchangers	pcs	2	2	2	2
Volume of water in the boiler	l	41	52	56	68
Weight	kg	160	190	210	250
Chimney inner-outer diameter	mm	150/160	150/160	150/160	185/195

Lowest operating temperature	60° C
Highest operating temperature	90° C
Heating efficiency	83%
Hydraulic connections size	G 1 <sup>1</sup> / <sub>4</sub> inch
Highest operating pressure	1,5 bar
Required draft in the chimney	15–20 Pa

## 3. Construction

### 3.1 Boiler components



1. Chimney
2. Heat exchanger
3. Ignition valve
4. Combustion chamber
5. Secondary combustion chamber
6. Catalyst
7. Return branch pipe
8. Cast iron grates
9. Adjustable legs

10. Supply branch pipe
11. Thermometer
12. Cleaning door
13. Fuel loading door
14. Door handle
15. Service door
16. Air supply valve
17. Secondary air supply valve

## 3. Construction

### 3.2 Boiler

The boiler heat exchanger consists of three main zones. Two horizontal heat exchangers (2) are placed in the area of the upper door. The cleaning door (12) is used when it is necessary to clean the surface of the heat exchanger. There is a solid fuel combustion chamber in the area of the service door (13). Through this door, the fuel is loaded into the combustion chamber. An ash box is installed in the area of the lower door (15) for ash removal. A catalytic converter (6) is installed in the area of the lower door, and in the rear part of the boiler there is a secondary air supply opening with a valve (17), supplying additional air to the secondary combustion chamber. A thermometer (11) and a draft regulator are installed in the boiler. The internal heat exchanger body of the boiler is made of bent and welded heat-resistant steel sheets, and the finish is made of powder-coated sheets. Under the boiler finish is an insulating layer of glass wool, which protects against heat loss through the boiler's outer walls. The double doors are sealed with heat-insulating material and painted with heat-resistant paint. Gases generated during combustion are removed through the chimney pipe (1) installed in the upper part of the boiler.

### 3.3 Boiler set

1. Ashtray
2. Instruction
3. Thermometer
4. Transition sleeve
5. Thermoregulator
6. Legs
7. Cleaning tools

## 4. Boiler installation

### 4.1 General information

The **Ekon** boilers are delivered ready for operation. Before connecting the boiler to the heating system, read this manual carefully and check that all boiler components and equipment are working properly. **Ekon** boilers are delivered to the buyer fully assembled, but the thermoregulator, thermometer and chain mounting plate are not installed in order to avoid damage during transportation. They come packed in an ash box.

### 4.2 Boiler location and position

The boiler must stand on a hard, smooth and non-flammable dry surface. It is forbidden to place the boiler near flammable materials. The safe minimum distance (from combustible materials) for **Ekon** boilers is 100 cm.

Provide good access to the boiler for service personnel. Also ensure good access from all sides of the boiler so that nothing interferes with loading fuel and cleaning the boiler, it is convenient to access the ash collector, liner, connections and chimney.

The boiler room must be equipped with adequate air supply and smoke extraction ventilation. Minimal active ventilation channel's cross-sectional dimensions are specified for the country's regulatory acts in which it is operated.

To prevent a reduction in draft and uncontrolled smoke emission, do not install mechanical smoke removal equipment (smoke extractors) in the boiler room.

## 4. Boiler installation

### 4.3 Connecting the boiler to the chimney

The chimney must be installed to meet the requirements of the country where it is installed. The recommended chimney draft is 15–20 Pa. The minimum chimney liner recommended by the boiler manufacturer are these dimensions:

- diameter of round insert – 150 mm;
- dimensions of the square insert – 140x140 mm.

The boiler flue pipe must be connected to the flue itself with a rigid steel connection of suitable cross-section, shape and thickness. The connection of the solid fuel boiler to the chimney must be properly insulated to prevent burns.

### 4.4 Connecting the boiler to the central heating system



**Dedicate the work of connecting the boiler to properly qualified specialists.**

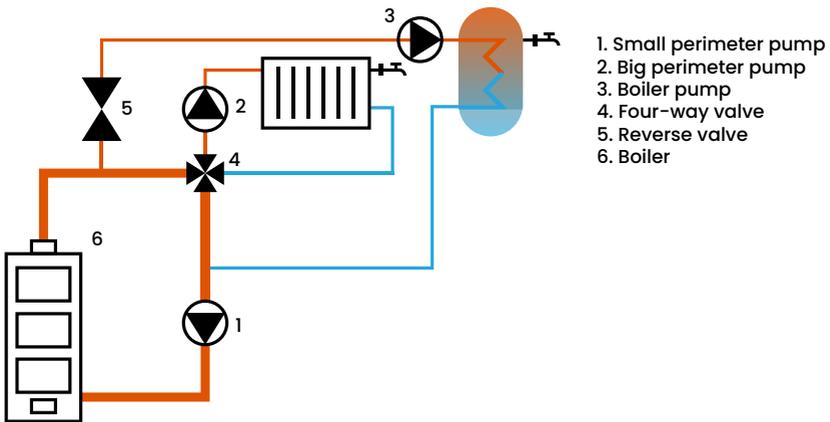
In order to extend the service life of the boiler and to ensure adequate comfort of use, it is necessary to follow such an installation scheme that ensures the maintenance of the working temperature of the boiler not below 60°C.

With the help of a specialist, make sure that the condition of the boiler, the tightness of the plumbing connections and the flue and the components are working properly. In a closed heating system, there must be a thermal expansion compensation vessel of suitable capacity (at least 10% of the total liquid volume in the system). The use of safety valves or valves that limit the flow in a closed heating system is prohibited. Recommended connection schemes are presented in subsection 4.5.

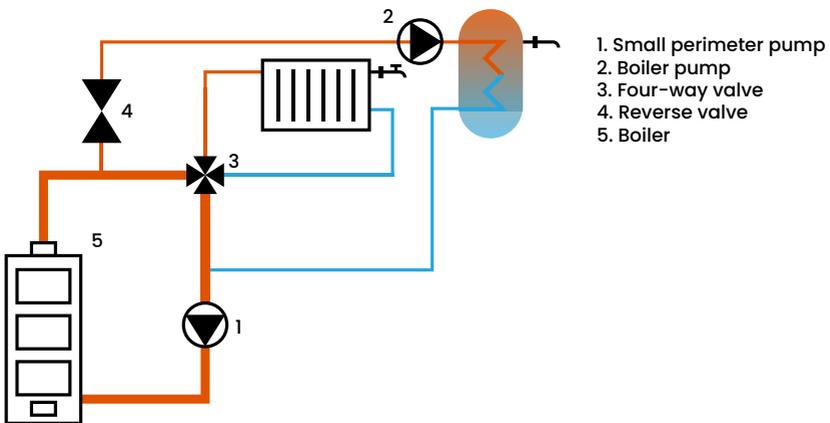
## 4. Boiler installation

### 4.5 Recommended connection diagrams

With four-way valve

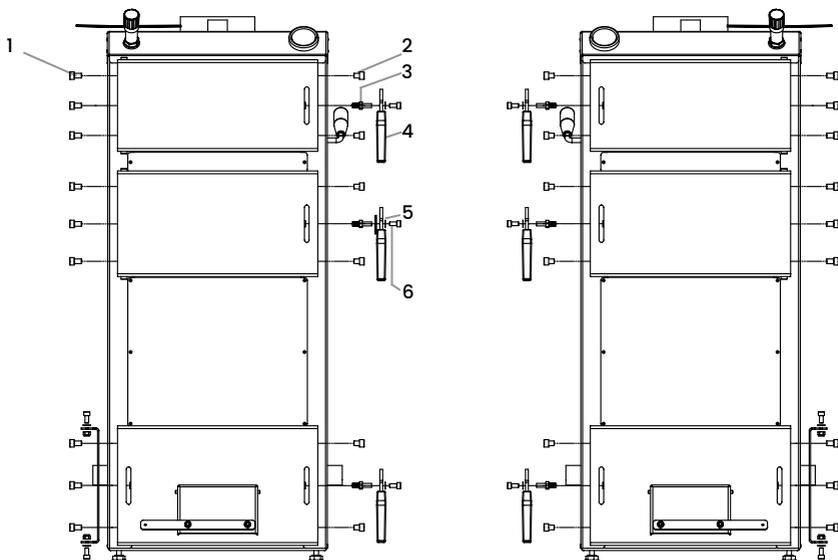


With 4-way valve for older (gravity) systems:



## 4. Boiler installation

### 4.6 Changing the door direction



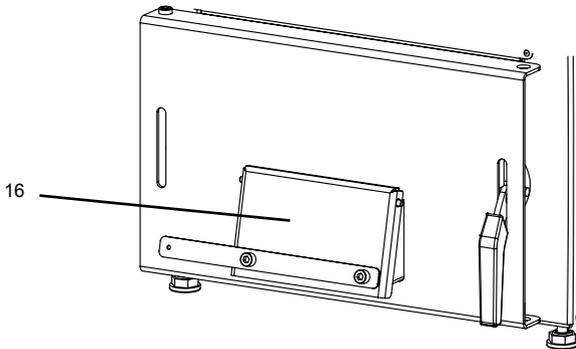
1. Screw DIN 912 M10x16
2. Screw DIN 912 M10x12
3. Eccentric M10

4. Door handle
5. Spring washer
6. Screw DIN 912 M8x14

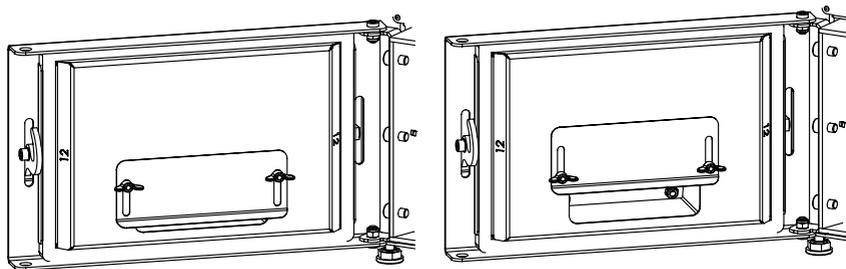
The direction of the upper and middle doors is changed by turning the door together with the hinge (hinges) away from the boiler body and screwing it on the opposite side of the boiler. The door handle is unscrewed, turned over and screwed back. The direction of the lower door is changed by turning the door away from the hinge. The hinge is unscrewed from the boiler body and screwed on the opposite side of the boiler. The door is screwed to the hinge, and the door handle is unscrewed from the door and screwed back to the opposite side of the door. The draft regulator is fixed at the top of the boiler depending on the direction of door opening. The chain mounting plate is mounted on the hinge side.

## 4. Boiler installation

### 4.7 Adjustment of the primary air supply valve

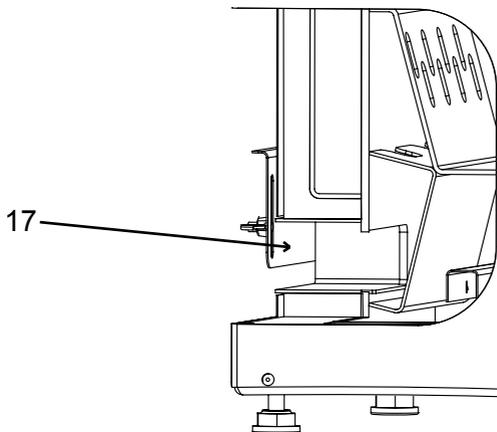


The draft regulator automatically operates the air valve in front of the lower door by chain. During combustion, when the temperature rises, the valve is closed, and when it falls, it is opened. Check the operation of the shutter - it must move freely. On the inner side of the lower door, a valve limiting the maximum power is installed, which is locked in the desired position depending on the desired power, and more accurate air supply settings are made with the help of the draft regulator.



## 4. Boiler installation

### 4.8 Adjusting the secondary air supply valve



At the back of the **Ekon** boiler, there is an opening for additional air flow into the secondary combustion chamber. When starting the boiler for the first time, it is necessary to adjust the position of the damper covering the opening. The secondary air supply valve is adjusted once for each type of fuel. When the quality or type of fuel changes, it is adjusted again. Adjustments are made at the boiler's operating temperature and operating mode. The correct position of the damper can be determined in two ways:

- Observing the color of the smoke coming from the chimney. If the smoke is black, the damper should be pushed in the opening direction. If the position of the damper is correctly set, the smoke coming out of the chimney is white or not visible at all;
- Using the readings of the gas analyzer, the valve should be set so that the oxygen excess in the chimney is within 5%. If the amount of secondary air is too large, the efficiency of the boiler decreases.

## 5. Using the boiler

### 5.1 General information and safety



**Use the boiler safely and follow the basic safety and boiler operation rules.**

- Check the operation of the safety valve (max. 1.5 bar) and open the shut-off valves between the heating boiler and the heating system.
- Check the water pressure in the system.
- The heating system must be filled with water and bled.
- Do not use flammable liquids such as gasoline, paint thinners etc. when starting solid fuel.
- Do not burn plastic, rubber and other air-polluting waste.
- The smoke extraction system must be reliably connected and tight.
- Unmaintained chimney, insufficient draft can cause Carbon monoxide poisoning.
- Carry out maintenance work on the boiler only after it has cooled down.

### 5.2 Boiler fuel

**Wood.** The boiler will reach the power specified in the technical parameter table if you burn wood with a moisture content of no more than 20%. The burning duration depends on the amount of fuel charged, its quality, outdoor and indoor temperature, the building's thermal resistance, the working capacity of the boiler and the quality of compliance with the recommendations of the user manual (connection and adjustment of the boiler, heating water flow and temperature maintenance).

**Coal.** Black coal mixture: medium and fine coal (50/50%).

## 5. Using the boiler

### 5.3 Ignition

- 1) Check the water pressure and tightness of the boiler and system.
  - 2) Check the draft and the condition of the smoke channels.
  - 3) Clean the boiler ashtray, grates, smoke channels and internal side walls of the boiler.
  - 4) Put fuel through the middle door.
  - 5) Fully open the foundation shutter and close the middle door.
  - 6) Fueling is done through the bottom door. After lighting the fuel the door must be closed.
  - 7) After the fuel ignites, the ignition valve is closed.
  - 8) If the boiler works too intensively, the power can be reduced with the power limiting valve (See 4.7.).
  - 9) The recommended working temperature of the boiler is 80–85 °C.
  - 10) If the working temperature of the boiler is exceeded, it must be adjusted with the help of the traction regulator circuit.
- If a specialist installs the boiler for the first time, he must familiarize the user with the instructions for using the boiler.



**Grates must be placed correctly (“∇∇∇∇∇”). When stacked in reverse, wood fractions and ash fall, clogging the gaps. In this case, the boiler loses its traction and power, the grates fold.**

## 5. Using the boiler

### 5.4 Boiler operation

- 1) Depending on the heat demand and burning intensity, periodically load fuel through the middle door.
- 2) When leaving the boiler to operate during the night, the air supply valve can be set – thereby reducing the boiler power. But after reducing the air supply too much, it starts to accumulate soot on the walls of the boiler and the efficiency of the boiler decreases.
- 3) The boiler door must be closed during operation.

### 5.5 Maintenance

#### **Ashtray.**

Clean the ashtray as needed, depending on the type of fuel used. Overfull ashtray prevents the proper combustion of fuel – improper air distribution occurs, so the fuel burns unevenly along the entire length of the boiler.

#### **Boiler cleaning.**

It is recommended that all combustion waste and slag be cleaned before each new ignition. The heat exchanger is easily cleaned through the upper door. The combustion chamber is cleaned through the middle door. Cleaning of cast iron pans and ashtray is done by pulling out the components through the bottom door.

#### **Recommendations.**

- The tar layer formed inside the boiler can be reduced by burning aspen or black alder wood at maximum temperature.
- Periodically inspect the boiler and heating system.

## 6. Warranty conditions

When selling the boiler, the seller must familiarize the buyer with the terms of the warranty:

1. The manufacturer provides:
  - 4-year warranty for the tightness of the boiler heat exchanger.
  - 2-year warranty for the included parts.
2. The boiler installation scheme must ensure a return water temperature of at least 60°C.
3. Boiler installation must be performed only by a qualified specialist.
4. During the warranty period, the manufacturer undertakes to carry out free of charge elimination of malfunctions, if they occurred due to the fault of the manufacturer.
5. The warranty does not apply to:
  - Failure to submit purchase documents.
  - Violation of installation, operating instructions or warranty conditions requirements.
  - In case of mechanical damage to the boiler.
  - After determining that the boiler has been repaired by an outsider.
  - In case of natural disasters.
6. Defects detected during the warranty period will be eliminated within 21 working days from the date of the complaint.
7. Costs related to service calls and repairs, if it is determined that the warranty conditions have been violated, are covered by the buyer.

## 7. Efficiency and emissions

Ecodesign 2015/1189

<b>Ekon 20</b>							
Manual ignition - the boiler should be used with a hot water tank of at least x* liters							
Condensing boiler [no]			Solid fuel cogeneration boiler [no]		Combined boiler [no]		
Fuel	Most suitable fuel	Other suitable fuel	$\eta_s$ [x%]:	Seasonal space heating emissions			
				SP	GOC	CM	NO <sub>x</sub>
				[x]mg/m <sup>3</sup>			
Log wood, humidity ≤ 25 %	Yes	No	80±3	47±10	16±5	505±10%	258±5%
<b>Characteristics when burning only the most suitable fuel</b>							
Useful heat release				Heat utility			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
At nominal heat output	P <sub>n</sub>	16,8	kW	At nominal heat output	$\eta_n$	83,2	%
At [30%/50%] rated heat output, if applicable	P <sub>p</sub>	Non applicable	kW	At [30%/50%] rated heat output, if applicable	$\eta_p$	Non applicable	%
List of equivalent models				<b>Ekon 10, Ekon 13, Ekon 16</b>			

SP – solid particles, GOC – Gaseous organic compounds, CM – carbon monoxide  
 NO<sub>x</sub> – nitrogen oxides,  $\eta_s$  – Seasonal energy consumption efficiency for space heating  
 (Efficiency factor – 3%)

$\eta_n$  – Seasonal energy consumption efficiency for space heating at maximum power

$\eta_p$  – Seasonal energy consumption efficiency for space heating at 30% capacity

X – Chamber volume =  $45 \times Pr \times (1 - 2.7/Pr)$  or 300 liters, whichever is greater, Pr is expressed in kilowatts (kW)

Y – Chamber volume =  $20 \times Pr$ , Pr is expressed in kilowatts (kW)

## 8. Katilo utilizavimas



**The boiler must be disposed of in accordance with the requirements of the country where it is disposed of.**



