



KOVARSON

CZECH PRODUCER OF BOILERS



THINK ECOLOGICALLY



ADVANTAGES:

Emission class 5 per ČSN EN 303 – 5



Environmentally-friendly and comfortable heating



Wood pieces up to 55cm long!



High efficiency of up to 92%



Heating savings of up to 40%



Stainless steel blades in the feeding chamber



Exhaust fan



MAKAK

GASIFICATION BOILER

FUEL: WOOD

ECOLOGY AND COMFORT



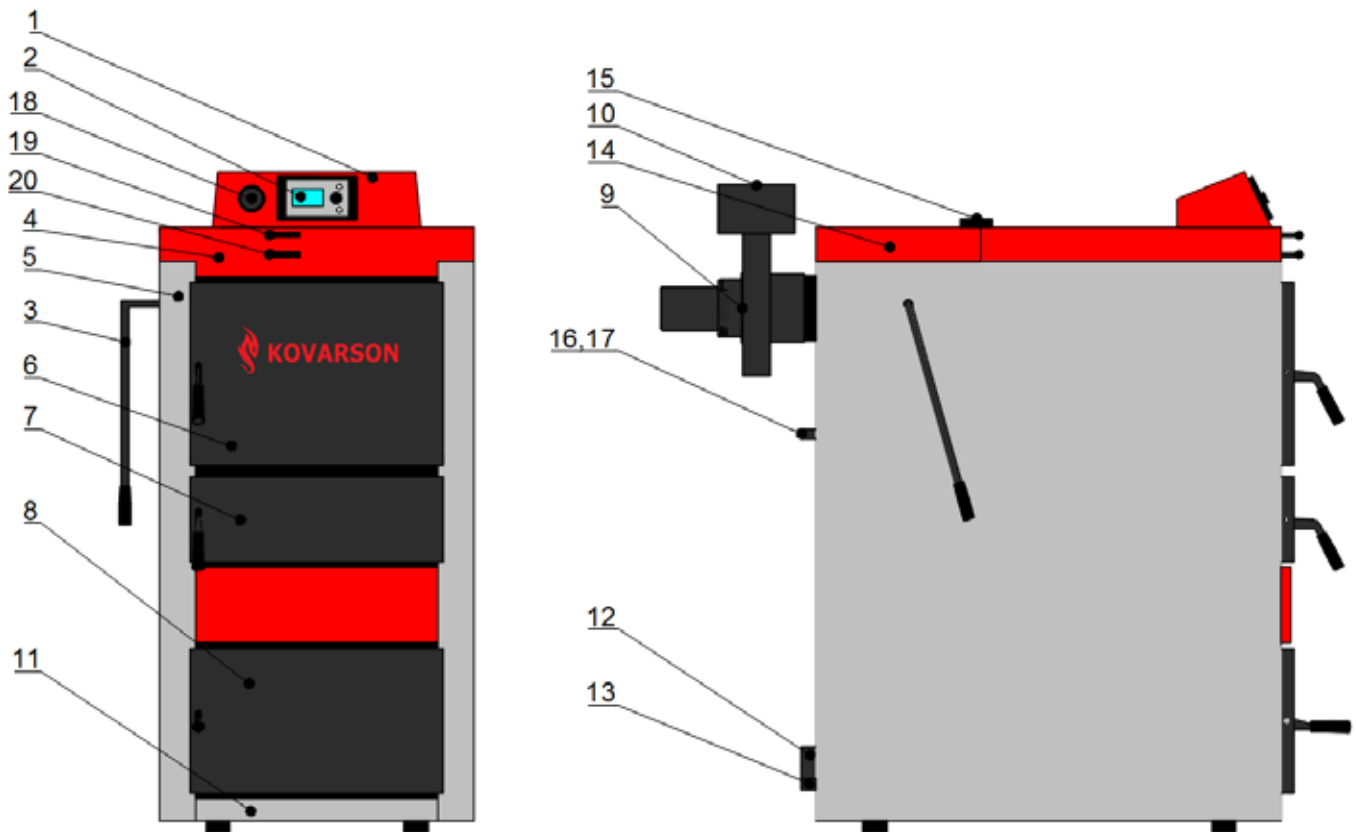
The Czech MAKAK boiler provides economical and environmentally-friendly heating for houses, business premises and medium-large buildings, and is often used for heating water as well. The boiler can gasify wood, chips, briquettes and other wood waste. The combustion chamber takes pieces of wood up to 55 cm long!

ECOLOGICAL - Gasification boilers are very different from traditional solid fuel boilers due to the environmentally-friendly heating. The boilers meet emission class 5 under the EN 303-5 standard - the strictest values for emissions released from a boiler into the atmosphere. This combustion system is above all highly economical. Fuel savings are as high as 40% compared to standard wood boilers that do not work on the basis of gasification. The boilers achieve efficiency levels of up to 92%!

COMFORT - Thanks to the high levels of efficiency and large feeding chamber, the boiler is easy to feed. The feeding chamber is large enough for about 8 to 12 hours of operation at medium output. In energy-saving mode the boiler will keep going for up to 24 hours. The comfort comes from the fact that you will need to feed the boiler only twice a day at medium output. The boilers must be installed with a storage tank. We recommend a tank of about 50 litres for every 1 kW of boiler output. The tank size determines heat energy use for up to several days. The boiler can be regulated by a room thermostat which opens and closes the mixing valve or switches off the central heating circulation pump.

BOILER EFFICIENCY IS **UP TO 92 %**

BOILER DESIGN



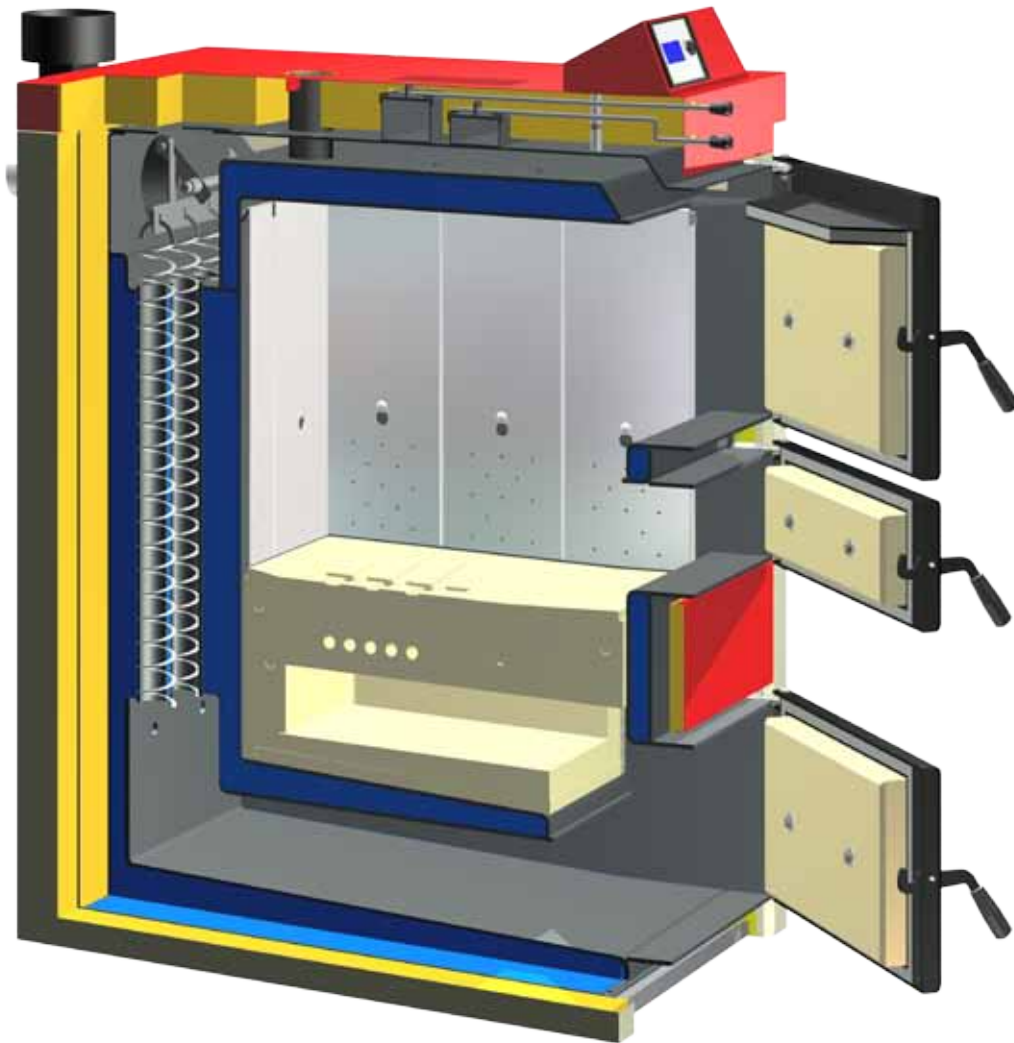
1) control unit panel	5) side boiler plate	9) exhaust fan	13) drain valve	17) cooling loop, connection to drain
2) control unit	6) feeding door	10) output to smoke flue	14) top cover for cleaning heat exchanger	18) thermometer and manometer
3) handle for cleaning	7) cleaning door	11) lower boiler plate	15) heating water drain	19) primary air regulation
4) upper boiler plate	8) ash door	12) heating water inlet	16) cooling loop, connection to water supply	20) secondary air regulation

The inner boiler body is welded from high quality 6mm boiler plate. We use 8 mm plate for the most stressed and critical parts. The plate for the outer body is 4 mm thick. The feeding chamber is fitted with 3 mm stainless steel inserts. They protect the boiler from condensates and tar, prolonging its working life. The upper part houses the feeding chamber, which has a refractory concrete section at the bottom with a nozzle for the gas to go through. The hot gases pass through the concrete to a burn-out area made of vermiculite and refractory concrete. The main heat exchanger tube with walls 6.1 mm thick lines the rear wall of the boiler, with the upper part opening into a collection tube, after which the cooled gases go out to the chimney. The tubes are fitted with turbulators for easy, problem-free cleaning.

BOILER PROTECTION

Boilers must be connected to a storage vessel in order to allow any excess energy to escape to store heat energy. Protection is also provided at the boiler outlet by a thermostat which shuts off the fan, switches on all pumps and opens all of the mixing valves when the temperature passes the 95°C mark. The cooling loop is an additional feature. If the boiler temperature passes the 95°C mark, the cooling loop's bimetal thermostat opens a valve, releasing cold water into the boiler from the water supply and draining hot water from the other side.

BOILER OPERATION



The principle of two-stage combustion at high temperature is applied.

Burning is encouraged by an exhaust fan which blows primary air into the feeding chamber and secondary air into the nozzle.

The wood is gasified in the feeding chamber, producing wood gas.

The wood gas is sucked into the nozzle by the secondary air and burned in the space below the nozzle.

The hot gases then pass through the main rear heat exchanger tube, where they transfer most of their energy, and the cooled gases go out to the chimney through the collection tube.

The boilers are fitted with an exhaust fan which goes to full speed after the feeding door is opened, and sucks all of the smoke into the chimney through the air chamber located above the feeding chamber so that it does not get into the boiler room.

Cleaning a boiler with turbulators using the handle on the side of the boiler.

Lifting the turbulators causes any deposits to fall down from the tubes into the ashtray area. The cleaning can be performed on both the right and the left side of the boiler.

The ash remaining in the feeding chamber can be collected through the ignition doors.

The rest of the ash can be collected through the lower ashtray openings.



BOILER REGULATION:

New generation controls provide users with an intuitive menu, simple regulation and a range of functions. The units have a good layout and include both user and service interfaces. Combustion is regulated by adjusting the speed of the fan and by using rods to control the primary and secondary air, with settings from 0 to 10.

The desired boiler temperature is maintained automatically, as are the storage tanks in a given place and the temperature of the hot water tank. The option of using room thermostats - working independently for each heating circuit - is helpful for maintaining a comfortable temperature in the heated rooms.

The basic features of a unit include regulation of one mixing valve and up to 4 pumps, and the option of connecting a Sparkster room thermostat or any universal thermostat operating with wires or on a wireless basis. Units can be extended with further modules to regulate up to 5 mixing valves, as long as the external sensors are capable of controlling the mixing valves properly. The unit can also be regulated over the Internet using a module.

Other options include the use of sparkLAMBDA modules. The lambda probe monitors acid levels in the flue gases and reduces atmospheric emissions of carbon monoxide. The lambda module provides an output for to the primary and secondary air actuator, ensuring excellent combustion, boiler performance adjustment and fuel savings.



MODERN TECHNOLOGY - retrofitting



FUME SENSOR

informs about the fume temperature, When the temperature overstep the allowed level it is necessary to perform the cleaning of boiler.



MIXING VALVE SERVO

output for controlling the mixing valve with a servomotor.



ROOM THERMOSTAT

output for a room thermostat to regulate the boiler and the central heating pump.



INTERNET MODULE

regulating and setting the boiler via a web browser.



EXTERNAL SENSOR

sensor providing information about the external temperature. his helps in the evaluation of the algorithms controlling the mixers.



MODULE B 4c-MX

the possibility of controlling 2 mixing valves (two modules can be attached) and the storage tank.



MODUL C 4c-MX

controls 2 mixing valves (two modules can be attached).

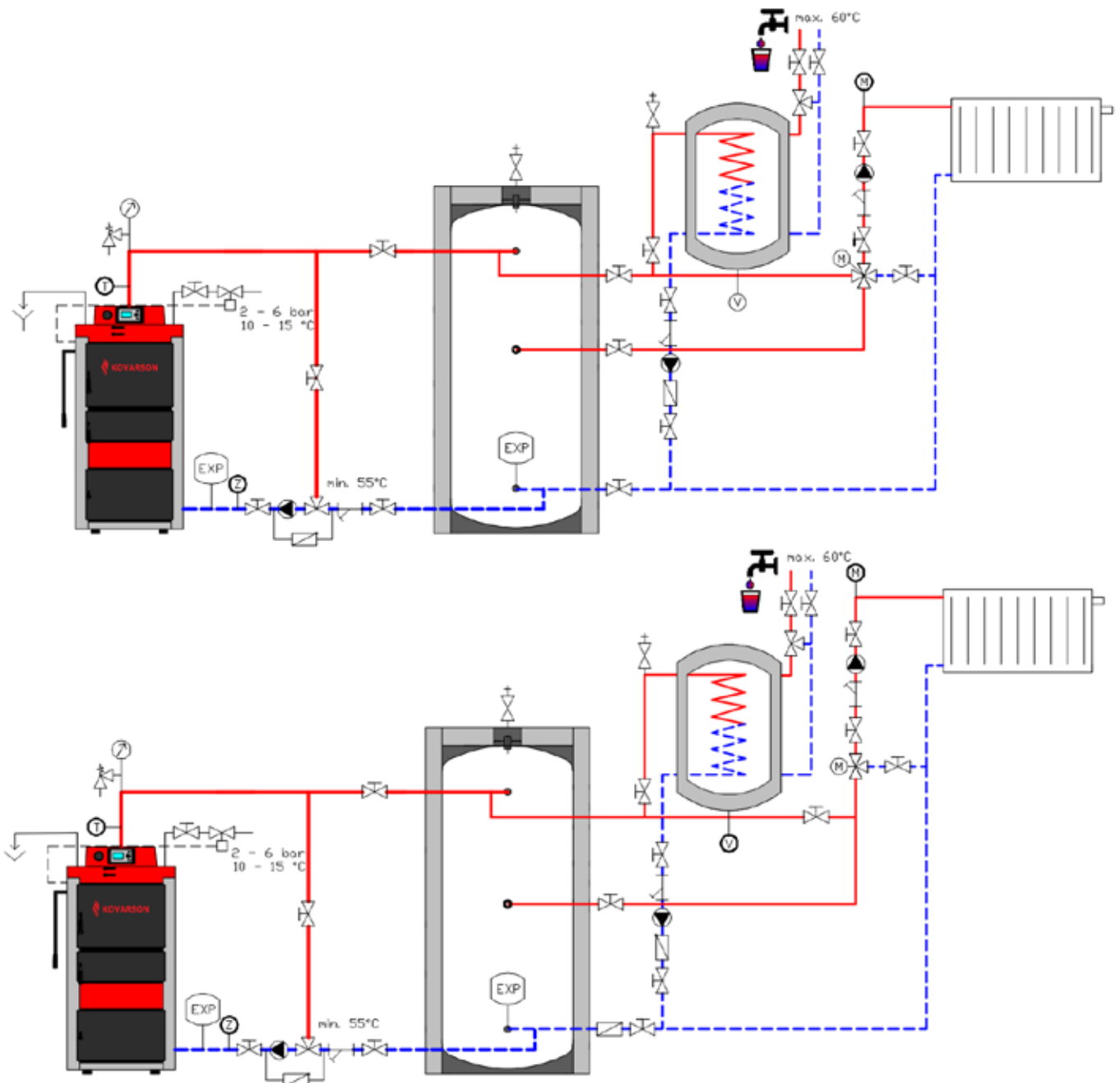


SPARKLAMBDA MODULE

modern electronical device, which serves for measurement of oxygen on the flue outlet. Device works for reduction of the carbon monoxide which are exhausted to the atmosphere, lower the consumption of the fuel and increase the boiler durability.

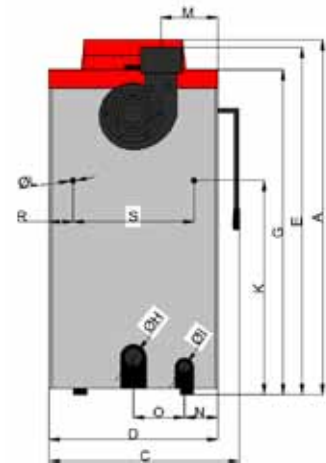
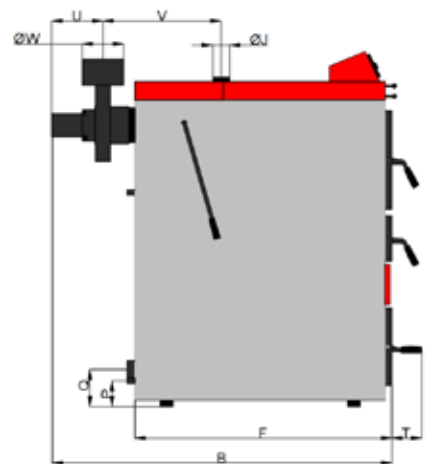
RECOMMENDED INSTALLATION

Boiler model		MAKAK 20	MAKAK 25	MAKAK 30	MAKAK 35	MAKAK 40
Nominal output with wood	kW	20	25	30	35	40
Efficiency	%	88,5	89,1	90,6	91,8	92
Wood consumption	kg.h ⁻¹	5,7	6,7	7,7	8,8	9,8
Flue gas temperature with wood	°C	73,1	87,3	101,5	115,8	130
Chimney draft	Pa		20		25	
Emission class		4		5		
Recommended operating temperature of heating water	°C			70 - 90		
Minimum temperature of return water	°C			55		
Input voltage	V			230		
Power input	W			60		
Heating areas of up to:	m ²	200	250	300	350	400



IT IS POSSIBLE TO USE THE PUMP SYSTEM WITH THE THERMOSTATIC VALVE TO PROTECT THE RETURN WATER FROM CH.


Boiler type		MAKAK 20	MAKAK 25	MAKAK 30	MAKAK 35	MAKAK 40
Efficiency	%	88,53	89,51	90,63	91,75	92,06
Weight	kg	450				
Water volume capacity	l	120				
Combustion chamber volume	dm ³	135,5				
Combustion chamber depth	mm	550				
Dimensions of the storage container filling hole	mm	440x300				
Boiler class per ČSN EN 303-5	-	4	5	5	5	5
Boiler dimensions	A	mm	1 370	M	mm	219
	B	mm	1 310	N	mm	120
	C	mm	716	O	mm	205
	D	mm	650	P	mm	120
	E	mm	1 340	Q	mm	145
	F	mm	989	R	mm	92
	G	mm	1 250	S	mm	466
	H, J		2"	T	mm	116
	I		1"	U	mm	197,5
	K		2"	V	mm	456
	L		½"	øW	mm	159



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