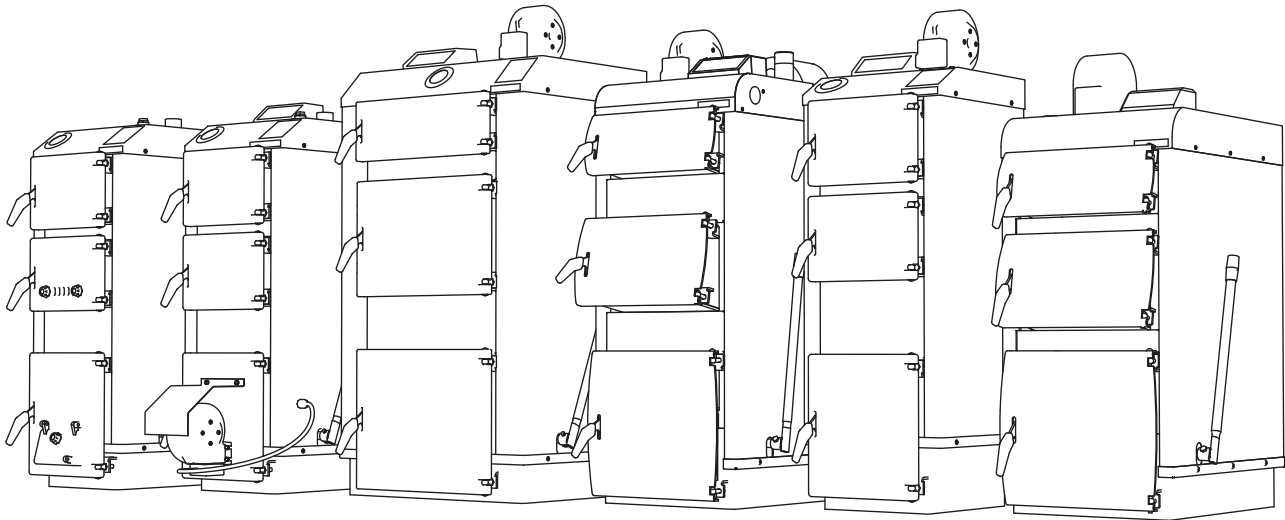


PEREKO®

Technical documentation

for KSW, KSW Plus, KSW Prima, KSW Master, KSX, KSD central heating boilers



We thank you for the choice of PEREKO boilers. This documentation considers KSW, KSW Plus, KSW Prima, KSW Master, KSX, KSD central heating boilers and includes all necessary information and guidelines for its use.

We advise you to read this manual carefully before the use of boiler. Following these instructions will ensure safe operation, prevent from the improper use of device and its faulty work.

This set of documents for the boiler with electronic driver contains also the driver manual that should be read thoroughly. The documentation and manuals should be stored in the place that is available during operation with boiler.

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1. INTRODUCTION

1.1. User's duties and safety precautions

To ensure user's safety and optimum work of device:

- the instruction for a boiler and driver should be read thoroughly and be followed (for the boilers with drivers),
- the instruction should be stored in the secure place at boiler room and available at any time during the use of boiler,
- prevent children, adult people with disabilities impairing the secure work and people not acquainted with this manual from the use of a boiler,
- install the boiler according to the principles in force and according to the rules and guidelines contained in this manual,

- before the setup and fitting the boiler it should be checked, whether all parts are in working condition and if the boiler has a complete set of devices for the service and cleaning,
- the boiler should be cleaned systematically, at least once a week, by complete removal of soot and ash layer that lowers the boiler efficiency,
- provide constant entry to device,
- maximum water temperature in the boiler should not exceed 95°C,
- working pressure cannot exceed 1.5 bar.

CAUTION! Installation of the boiler according to the binding norms and rules and the first start-up should be done by qualified fitter.

1.2. The choice of appropriate boiler power

Nominal power of a boiler (this is the maximum heating productivity available during constant work preserving the efficiency declared by the producer) should be chosen in the way, that reflects the real heating energy consumption, even during very low temperatures.

Purchase of a boiler with the power higher than indicated in the plan is not advised. The choice of a boiler with too high power will cause higher fuel consumption and lower combustion control which will result in higher exploitation costs, however too small boiler will not provide the adequate power to heat the building.

Approximate boiler power may be calculated with the use of boiler power calculator provided at the www.pereko.pl website. What is more, the following factors should also have been taken into account, this is the thickness of walls and insulation, heating penetration through woodwork (i.e. tightness of windows and doors, type of glass applied) and climate zone at which the building is located.

2. DESCRIPTION OF CENTRAL HEATING BOILERS

2.1. Destination

KSW, KSW PLUS, KSW PRIMA, KSW MASTER, KSD and KSX series steel central heating boilers are designed for water central heating of family houses, garages, utility rooms etc.

These boilers are low temperature water boilers and should not be registered at the district Technical Inspection Office. They are designed for work at gravity water central heating systems or

at installations with induced circulation in open system with security devices applied according to PN-91/B-02413 for water heating in open system, including Regulation of Infrastructure Minister, Law Journal 2009, no. 56, pos 461.

2.2. Construction

2.2.1. Water body

KSW and KSW PLUS, KSW PRIMA, KSW MASTER, KSX, KSD central heating boilers are made from steel sheets designed for pressure devices that are working in higher temperatures P265 GH. From the site of combustion chamber the thickness of body sheets is 5 mm and 6 mm and the outside layer (water jacket) is 4 mm. The sheets of exchanger are sewed on both sides and body sheets are strengthened with supports. Convection channels are located in the way that allows for their cleaning through the upper cleaning door.

Design for KSW, KSW PLUS, KSX, MASTER and PRIMA boilers allows for the efficient heat reception thanks to the fumes recurrence and three-way suction design of combustion chamber, however in the KSD boiler the high efficiency is obtained thanks to the bottom combustion process and the application of symmetrical fumes circulation.

2.2.2. Doors

Doors are upper cleaning door, intake door and one common door for the bottom parts of combustion chamber and for the ash tray. All doors are equipped with glow plate with heat-resilient insulation securing the outer layer of doors from overheating.

2.2.3. Upper cleaning doors

Upper cleaning doors are used for cleaning of the boiler upper chamber and of convection channels (after the prior removal of fume swirlers) through which hot fumes go out from the hearth. Boilers are also equipped with the rear cleaning doors that are used for cleaning the convection module.

2.2.4. Intake doors

Intake doors are used for filling the combustion chamber with fuel and for cleaning the hearth heating plates. In the KSW series boilers these doors are equipped with regulated throttle for return air.

2.2.5. Ash tray doors

Ash tray doors are common doors to ash tray and bottom parts of combustion chamber. By opening them the simultaneous access to both chambers is obtained. These doors are used for removing ashes stored during the combustion process. At the KSW series the doors have additional flap for the regulation of taken air.

2.2.6. Flue

The boiler has sewed flue that leads off the fumes from the boiler into the chimney channel. The flue is equipped with smoke throttle used for the regulation of chimney draught.

2.2.7. Insulation panels

Insulation panels fitted at the surface of water jacket completely eliminate heat losses. The panels are made from aesthetic powder coated tinplate cassettes with high resilience to corrosion. Panels are filled with mineral wool from the inside and this is the insulation.

2.2.8. Electronic driver

All central heating boilers are equipped with a driver (excluding KSW boiler). Thanks to that, the temperature and the working parameters at any time may be programmed. The driver is located at the top of boiler front and it provides an easy access. Additionally, it is equipped with the operational sensor and the emergency boiler cut-off after reaching the temperature of 90°C. If the boiler operating temperature exceeds the admissible value, automatic cut-off, switching off the device and also central heating pump cut-off will happen. The boiler is then switched on again, when the temperature reached the value defined by the producer (see - driver manual).

2.2.9. Blower

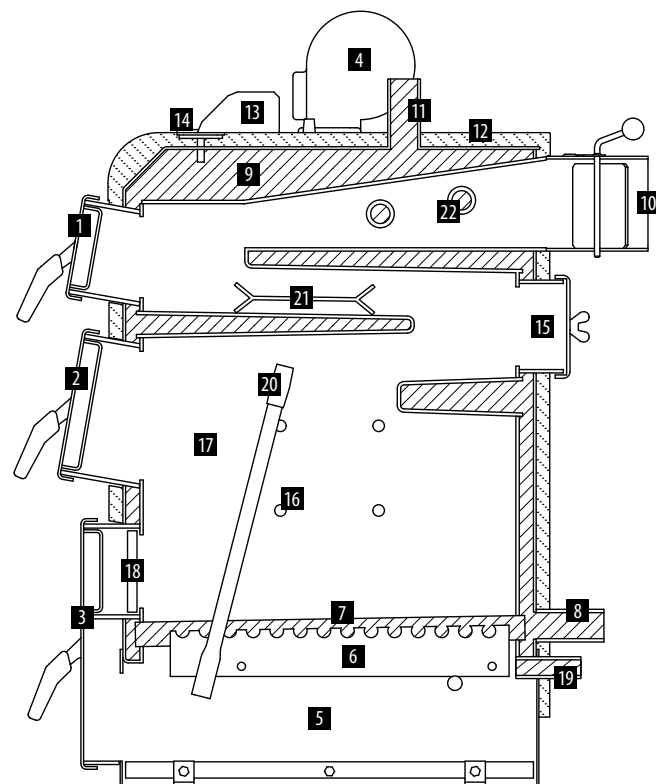
Blower (is fitted at every boiler with a driver) is designed for constant or cyclic delivery of adequate amount of air to the hearth. The amount of air varies in time thanks to the microprocessor. The work of a blower is controlled by driver that automatically prescribes the speed of blower according to the heating consumption of a building. It provides constant and effective boiler operation and prolongs the time of slow-burning (work after one filling).

2.2.10. Movable grate

Movable grate (fitted at each series, despite the KSX) consists of steel combs and is used for removing ash and for crushing the sinter settled at water grate with the use of grate handle.

2.3. Diagram for the boiler

	KSW	KSW Plus	KSW Prima	KSW Master	KSX	KSD
1. Cleaning doors	✓	✓	✓	✓	✓	✓
2. Intake doors	✓	✓	✓	✓	✓	✓
3. Ash tray doors	✓	✓	✓	✓	✓	✓
4. Blower	—	✓	✓	✓	✓	✓
5. Ash tray	✓	✓	✓	✓	✓	✓
6. Movable grate	✓	✓	✓	✓	—	✓
7. Water-cooled grate	✓	✓	✓	✓	—	✓
8. Return water stub pipe	✓	✓	✓	✓	✓	✓
9. Water body	✓	✓	✓	✓	✓	✓
10. Flue	✓	✓	✓	✓	✓	✓
11. Outlet hot water stub pipe	✓	✓	✓	✓	✓	✓
12. Insulation panels	✓	✓	✓	✓	✓	✓
13. Driver	—	✓	✓	✓	✓	✓
14. Bimetallic thermometer	✓	✓	✓	✓	✓	✓
15. Cleaning Opening	≥ 18 kW	≥ 18 kW	✓	≥ 20 kW	✓	✓
16. Air injection system	—	—	✓	✓	✓	—
17. Combustion chamber	✓	✓	✓	✓	✓	✓
18. Glow doors	✓	✓	✓	✓	✓	✓
19. Drain cock	✓	✓	✓	✓	✓	✓
20. Grate lever	✓	✓	✓	✓	—	✓
21. Flue gas swirl vanes	✓	✓	✓	✓	✓	✓
22. Water tubes	only 30 kW model	only 30, 50, 80, 100 kW models	✓	only 12 kW model	only 21, 26 kW models	✓



2.4. Technical and exploitation parameters

Parametr	Unit	KSW and KSW Plus												
		5	9	12	16	18	20	24	30	35	40	50	80	100
Height	[mm]	850	990	1010	1100	1100	1100	1180	1210	1350	1550	1600	1800	1800
Width	[mm]	360	360	400	400	400	450	450	550	550	550	660	1000	1000
Depth + flue	[mm]	400+150		430+150	500+150	520+150			670+150			750+150	900+300	1200+300
Height to flue axis	[mm]	670	890	890	960	960	980	1050	1050	1150	1350	1400	1530	1530
Flue diameter	[mm]	120×120			140×140							160×200	200×300	
Area of heated rooms ¹	[m²]	50	90	120	150	180	200	240	290	350	400	500	800	1000
Cubature of heated rooms ¹	[m³]	150	225	300	375	450	500	600	725	875	1000	1500	2000	2500
Heating power	[kW]	5	9	12	16	18	20	24	30	35	40	50	80	100
Efficiency	[%]	~80												
Range of power regulation	[%]	±2												
Capacity of combustion chamber	[dm³]	20	20	27	33	35.5	45	53	80	110	150	210	360	400
Water capacity of boiler	[dm³]	20	28	38	52	55	70	70	96	100	105	125	180	200
Heat exchanger material	—	P265GH [PN-EN 10028] steel; thickness 5 mm												
Maximum working pressure	[bar]	1.5												
Requested minimum chimney draught ²	[Pa]	20		23			25			28		35	45	
Water temperature min./max.	[°C]	57/95												
Power supply / Power	[V/W]	230/85												
Boiler weight without water	[kg]	124	137	178	193	206	233	244	299	335	364	495	1100	1320
Water tubular diameter	[inch]	G 1 ½												

¹ with the heating consumption q=100 W/m² for the building insulated with foamed polystyrene 5 cm thick; ² according to PN-EN 12809, PN-EN 303-5:2002 norms;

Parametr	Unit	KSW Master					
		12	16	18	20	24	30
Height	[mm]	1170	1270	1270	1270	1360	1390
Width	[mm]	400	400	400	450	450	550
Depth + flue	[mm]	430	500	520	520	520	670
Height to flue axis	[mm]	1035	1120	1120	1120	1210	1250
Flue diameter	[mm]	148	158	158	158	158	177
Area of heated rooms ¹	[m ²]	120	150	180	200	240	290
Cubature of heated rooms ¹	[m ³]	300	375	450	500	600	725
Heating power	[kW]	12	16	18	20	24	30
Efficiency	[%]	~80-85					
Range of power regulation	[%]	±2					
Capacity of combustion chamber	[dm ³]	32	37	42	50	60	90
Water capacity of boiler	[dm ³]	40	54	57	72	80	105
Heat exchanger material	—	P265GH [PN-EN 10028] Steel; thickness 6 mm					
Maximum working pressure	[bar]	1.5					
Requested minimum chimney draught ²	[Pa]	23	25				
Water temperature min./max.	[°C]	57/95					
Power supply / Power	[V/W]	230/85					
Boiler weight without water	[kg]	210	230	245	275	290	350
Water tubular diameter	[inch]	G 1 ½					

¹ with the heating consumption q=100 W/m² for the building insulated with foamed polystyrene 5 cm thick; ² according to PN-EN 12809, PN-EN 303-5:2002 norms;

Parametr	Unit	KSX			KSD	KSW Prima		
		13	21	26	22/28	15	20	25
Height	[mm]	1300	1400	1500	1350	1100	1150	1150
Width	[mm]	400	450	450	660	450	450	510
Depth + flue	[mm]	450+150	550+150	650+150	600+150	650+150	750+150	770+150
Height to flue axis	[mm]	1000	1100	1200	980	800	850	850
Flue diameter	[mm]	120x120	160x200	160x200	160x200	140x140		
Area of heated rooms ¹	[m²]	110	190	240	220/280	130-170	180-200	230-250
Cubature of heated rooms ¹	[m³]	275	475	600	550/700	325-375	450-500	575-625
Heating power	[kW]	13	21	26	22/28 ²	15	20	25
Efficiency	[%]	~80						
Range of power regulation	[%]	±2				±10		
Capacity of combustion chamber	[dm³]	~35	~60	~75	~70	~50	~60	~70
Water capacity of boiler	[dm³]	40	55	80	80	45	55	65
Heat exchanger material	—	P265GH [PN-EN 10028] Steel; thickness 5 mm				P265GH [PN-EN 10028] Steel; thickness 5 and 6 mm		
Maximum working pressure	[bar]	1.5						
Requested minimum chimney draught ³	[Pa]	20	23	25	25	23	25	
Water temperature min./max.	[°C]	57/95						
Power supply / Power	[V/W]	230/85						
Boiler weight without water	[kg]	190	269	319	352	190	245	280
Water tubular diameter	[inch]	G 1 ½						

¹ with the heating consumption q=100 W/m² for the building insulated with foamed polystyrene 5 cm thick; ² according to fuel used (wood/coal); ³ according to PN-EN 12809, PN-EN 303-5:2002 norms;

2.5. Fuel

The fuel used with central heating boilers should be dry and have adequate and high calorific value.

The use of damp fuel or low caloric fuel or with inadequate physicochemical parameters may cause non-overall incineration and rise its consumption.

BASIC FUEL – its use provides the declared heating power and efficiency		
KSW	hard coal	assortment bean coal OII with bean diameter 20÷40 mm or bean coal OI with bean diameter 40÷60 mm
KSW PLUS	hard coal	assortment bean coal OII with bean diameter 20÷40 mm or bean coal OI with bean diameter 40÷60 mm
KSW MASTER (From bottom)	hard coal	assortment bean coal OI/OII with calorific value $W_d \sim 26$ MJ/kg, type 31-2 according to PN- 82/G-97001-3
KSW PRIMA (Inflammation from bottom)	hard coal	assortment bean coal OI/OII with calorific value $W_d \sim 26$ MJ/kg, type 31-2 according to PN- 82/G-97001-3
	seasoned timber	calorific value min. $W_d \sim 18-19$ MJ/kg
KSX (Inflammation from upper parts)	hard coal	assortment culm class MI/MII, type 31-2 according to PN-82/G-97001-3 (~30% damp)
	mix of coal	assortment bean coal I/II (60-40%) and assortment culm M I/II (40-60%)
KSD	seasoned timber	min. calorific value 15 MJ/kg
	hard coal	assortment bean coal O I/II type 31-2, PN-82/G-97001-3; calorific value 25-28 MJ/kg

SUBSTITUTE FUEL – used as a substitute to basic fuel, may lower the power and efficiency of a boiler

KSW	mixture of coke and coal type 32.1 assortment bean coal OI/II class according to PN-82/C-97001-3	in the proportion of both fuels 1:1 or 2:1
	mixture of coal assortment bean coal (70%) and coal assortment culm (30%)	—
	long-flame fuels	(this is coal or lignite coal briquette, biomass briquette also lignite coal)
KSW PLUS	as above	as above
KSW MASTER (inflammation from upper parts)	mixture of coke and coal	type 31-2 assortment bean coal OI/OII, PN-82/C-97001-3 with the proportion in weight of both fuels 1:1 or 2:1
	mixture of coal	assortment bean coal OI/OII (60%) and coal assortment culm MI/MII (40%)
	long-flame fuels	(this is coal or lignite coal briquette, biomass briquette also lignite coal)
KSW PRIMA (inflammation from upper parts)	mixture of coke and coal	type 31-2 assortment bean coal OI/OII, PN-82/C-97001-3 with proportion in weight of both fuels 1:1 or 2:1
	mixture of coal	assortment bean coal OI/OII (60%) and coal assortment culm MI/MII (40%)
	long-flame fuels	(this is coal or lignite coal briquette, biomass briquette also lignite coal)
KSX (inflammation from bottom)	coal assortment bean coal OI/OII with calorific value $W_d \sim 26$ MJ/kg, type 31-2 according to PN- 82/G-97001-3	—
	long-flame fuels	(this is coal or lignite coal briquette, biomass briquette also lignite coal)
KSD	hard coal	assortment culm MI/MII type 31-2, PN-82/G-97001-3 — calorific value 20–24 MJ/kg
	long-flame fuels	(this is coal or lignite coal briquette, biomass briquette also lignite coal)

2.6. Boiler equipment

The boiler is delivered fully assembled, ready to use.

Before the set-up, the availability of supplementary accessories and the working condition of devices attached to the boiler should be verified.

	KSW	KSW PLUS	KSW PRIMA	KSW MASTER	KSD	KSX
Driver	—	✓	✓	✓	✓	✓
Blower	—	✓	✓	✓	✓	✓
Bimetal thermometer	✓	✓	✓	✓	✓	✓
Brush	✓	✓	✓	✓	✓	✓
Scraper	—	—	✓	✓	✓	✓
Hook	✓	✓	✓	✓	✓	✓
Ash shovel	✓	✓	✓	✓	✓	✓
Drain plug G½"	✓	✓	✓	✓	✓	✓
Driver manual	—	✓	✓	✓	✓	✓
Blower manual	—	✓	✓	✓	✓	✓
Fume swirlers*	✓	✓	✓	✓	—	✓

* are fitted in the convection channels during the production process. Access is available through cleaning doors. The duty of swirlers is to direct the fume jet into the water jacket and that significantly increases the productivity and efficiency of boiler and reduces the heat at chimney channels.

3. BEFORE THE START-UP

3.1. Settlement of the boiler

3.1.1. Boiler room

- Should be separate room with the height at least 2.2 m in a new building (at already existing building the 1.9 m height is permitted).
- There should be artificial lighting installed and the natural lighting should be provided if it is available.
- The gravity ventilation in working condition should be provided, this is:
 1. intake air channel at outside wall with the diameter at least 50% of chimney diameter and at the height at least 1 m above the surface and not smaller than 200 cm² for the boilers with heating power up to 25 kW or 400 cm² for the boilers above 25 kW,
 2. separate ventilation channel located at inside wall with the diameter at least 140 ~ 140 mm with the outlet located beneath the ceiling of a boiler room near to the chimney.

CAUTION! In the room, where the boiler is installed the mechanical ventilation support should not be installed.

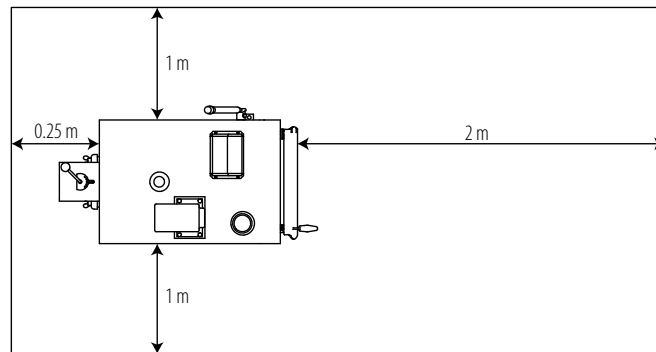
- In the central area of boiler room the sewage grate should be provided and the floor should be 1% inclined to the sewage grate.
- The floor and walls at the whole boiler room should be made from inflammable materials.
- Doors to the boiler room should open at outside.

CAUTION! During the fitting the boiler the bottom angle bars should not be dismantled from the ash tray (for KSW, KSW Plus, KSW Prima, KSW Master, KSD series).

3.1.2. Visual fitting of boiler

The boiler does not require a foundation, but the fitting is accepted at small foundation with the height not greater than 50 mm. The ideal fitting of a boiler should provide the easy access to it that enables its cleaning and maintenance. Therefore, the minimum spaces from particular walls should be maintained:

- The space between boiler front and the opposite wall should be not shorter than 2 m.
- The space between boiler side and boiler room wall should be not shorter than 1 m.
- The space between the back of boiler and boiler room wall should be at least the same as the length of connector, this is 0.25 m.



3.2. Connection to chimney

1. The separate, airtight chimney channel for the outgoing boiler gases should be chosen.
2. Provide chimney channel outlet at least 1.5 m above the crest in order to avoid the reverse draught. Chimney dimension should be chosen accordingly to boiler power and chimney height. Approximate height and dimension of chimney may be chosen with the use of chimney dimension calculator at the www.pereko.pl website.

Despite the results of calculation, the minimum brick chimney diameter should be not smaller than 14 x 14 cm!

3. Before the connection of boiler to the chimney the technical condition of chimney should be verified (it should be done by chimneysweeper for the best results) and to assess whether the chimney is free from other heating devices.

4. The boiler should be connected to the chimney with the use of connector. The use of connector at square angle is not recommended because it will result in losses of chimney draught. Flue should be connected to the chimney with the use of steel sheet connector 3 mm thick (available at boiler producer). It should be fixed to flue outlet on the outside layer, fixed to the chimney and sealed with high temperature silicone. The connector should rise slightly upwards at the 5°–20° angle. If the boiler flue will be longer than 400 mm, it should be thermally insulated.

CAUTION! Central heating boilers should be mounted according to the Infrastructure Minister Regulations in force (Law Journal 2002, no. 75, pos. 690 and Law Journal 2009 no. 56 pos. 461.) Additionally, chimney liner resilient to corrosion should be used: chemical, pitting, intergranular and surface.

3.3. Fitting the central heating and domestic hot water

3.3.1. Water installations in open system

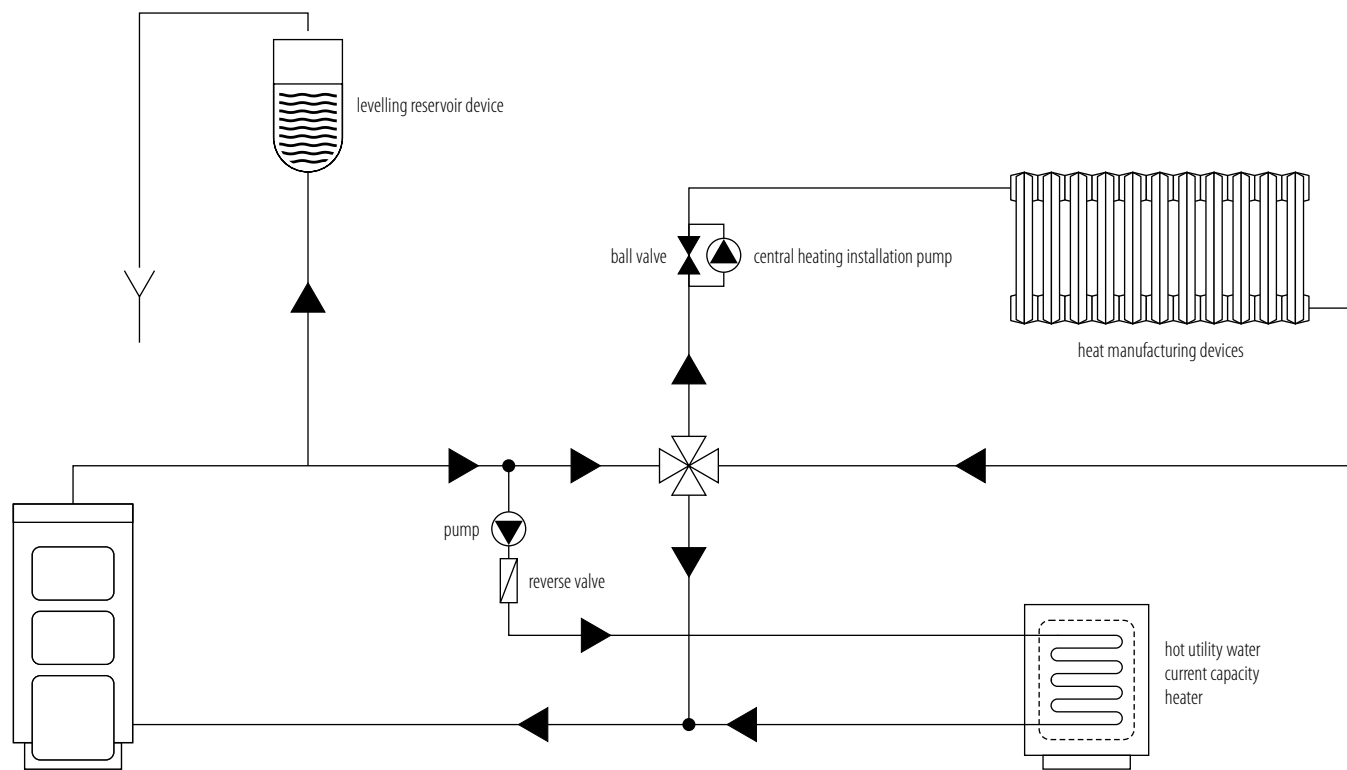
KSW, KSW PLUS, KSW PRIMA, KSW MASTER, KSX and KSD type boilers are designed for water central heating installations in open systems with the gravitational or with forced convection of water. The installation at which the boiler will be operating must comply to the Polish PN-91/B-02413 norm Heating - Protection of water heating installations in open system - Requirements.

PER-EKO brand central heating boilers with nominal power up to 300 kW may be used at water heating installations in closed system under the condition, that 1. the installation has collective

container; 2. the device for reception of exceeding heat is fitted, this is the cooling two-function valve REGULUS DBV -1; 3. the safety valve 1.5 bar is fitted.

CAUTION! The proper security devices and adequate membrane collective container influence the system safety and also the safety of boiler itself. Above mentioned devices should be rigorously controlled at least once at 2 years. The first control should be done during the seasonal control for the boiler and the hydraulic installation should be also verified.

Particular diagram for central heating installation in open system with four-way valve and domestic hot water heater.



3.3.2. Four-way valve

The plan for central heating should include the boiler security devices at the return of too cold water from the system. It is recommended to use four-way mixing valve that enables rising the water temperature at return to the boiler and lowering the water temperature for the building.

Four-way valve mixes hot water from the boiler with cooler water from the central heating return and this:

- protects the boiler against the low temperature corrosion and early wear,
- increases the efficiency of domestic water heating in the domestic hot water container,

3.4. Fitting the boiler to the electric installation

The boiler room should be equipped with electric installation with rated power 230/50 Hz according to the regulations in force. The system must be equipped with the socket with ground bolt and the protective PE clamp in order to prevent from electrocution.

3.5. Filling the installation with water

3.5.1. Filling the boiler before the first use

1. Before filling the boiler with water the central heating installation and the boiler should be rinsed in order to remove impurities.
2. Fill the installation with water through drain plug with the use of elastic hose. The water for central heating boiler should comply to PN-93/C-04607 norms. The quality of water in central heating systems influences its durability, therefore such water should be clean, without impurities, oils and aggressive chemical compounds. The water hardness should not exceed 2°tn

- enables smooth control of heated water temperature according to the needs of heating system,
- rises the productivity of overall system.

The installation plan for a particular building and its execution should be charged to qualified person. Central heating systems may differ from each other, therefore the principles enclosed at central heating plan are binding. There is described exemplary pattern for fitting the boiler to central heating and domestic hot water installation in open system with four-way valve and domestic hot water heater.

(1°tn = 0.71 mval/l). Too hard water will effect in sediments in boiler and central heating system and that reduces its efficiency and may result in boiler malfunction.

3. Filling with water should be stopped, when the installation was already filled up, this is when water pours over from the control tube of collective container located at the highest point of the system or if the barometer indicated approximately 0.8-1.2 bar. Additional filling up should be done within several seconds, just to ensure that water pours over the container.
4. After filling up the installation the boiler drain plug should be closed and the elastic hose should be disconnected from the boiler.

3.5.2. Additional filling the system

Central heating installation in open system enables direct contact of hot water with air, its evaporation and that results in the necessity of additional filling up the system.

CAUTION! It is forbidden to fill the hot system with cold water. Filling the heated boiler elements with water results in its damage and the loss of warranty.

The system may be filled up with water only if the boiler is cold. If prompt filling up with water is required, the fuel from combustion chamber should be removed and the boiler should be cooled to the temperature 30°C, thereafter the missing water may be filled up. After filling the system the kindling should be done again.

3.5.3. Draining the system from water

It is not recommended to drain water from the system after the heating season because it effects in corrosion and concentration of scale. The exemption is the situation, when the drainage is done for required repairs and at long-term boiler standstill during very low temperatures. In the last case, it is recommended to drain water from the installation in order to prevent from freezing up and damages and, thereafter, to fill up the installation after low temperatures.

4. USER'S MANUAL

4.1. Installation check-up

Before the first use of boiler:

1. Check the correctness of mounting and plugging to the electric network: a) four-way valve actuator (if exists), b) central heating pump, domestic water heating pump and floor heating (if exists), c) sensor at boiler, d) blower (if exists) and e) driver (if exists).
2. Verify the hydraulic system: a) its tightness, check the leaks at boiler and system, b) if water is not frozen in pipes and at collective container, c) if water level and its pressure is correct and

adequate (pressure gauge should indicate 0.8 to 1.2 bar depending on the building height).

When the pressure is too low, the water should be filled only to the cold boiler.

3. Verify the tightness of cleaning door at the rear side of boiler.
4. Verify the correctness of plugging the boiler to chimney.
5. Measure the chimney draught.

4.2. First kindling at boiler

4.2.1. Kindling from bottom at water grill

CAUTION! It is forbidden to use highly flammable liquids for kindling (petrol). Kindling should be done in steps, first with the use of timber, then with thin layer of coal.

Kindling from bottom at water grill in the boiler without driver (KSW series)

1. Throttle at boiler flue and at bottom doors should be set in the open position and the handle for movable grill at the end position towards boiler rear.
2. Open bottom doors and then glow doors next to them.
3. Place evenly the paper and thin slates of timber at water grill and kindle it. After kindling the chimney draught should suck the fumes into the convection channels of a boiler.
4. During the kindling intake door should be a bit closed and the return air throttle closed.
5. When the glow will rise the bottom door should be closed and intake door should be opened, then fill the boiler with thin layer of coal or timber in the way, that would not stop the fire and fill the hearth with coal or timber up to the bottom edge of intake doors. Wait for kindling. According to the needs, the chimney draught may be regulated by flue throttle and bottom doors throttle and this influences the temperature at boiler. The rate of bottom doors throttle opening depends on the type of fuel. The worse the fuel is, the more the return air throttle should be opened.

Kindling from bottom at water grill in the boiler with driver (KSW PLUS, KSD, KSX, KSW PRIMA i KSW MASTER series)

1. Repeat steps 1-3 from the previous chapter with paying special attention to the sufficient glow at hearth, that would not die after filling with additional fuel.
2. After filling the boiler with fuel and initial kindling with the use of START button at the driver, the mechanism sets up into the kindling mode. Driver activates the blower and increases the speed step by step, up to the level of settled working parameters (according to driver manual). The temperature at boiler is set to 57°C by manufacturer.
3. When the boiler reaches the parameters, the driver stops the blower or decreases its speed (in the event of a driver with LOGIC system).
4. Then, the blower speed should be adjusted and operator should follow the driver manual.
5. In order to stop driver the STOP button should be pressed.

In the event of low chimney draught the fume swirlers should be removed in order to increase the burning (KSW PRIMA).

4.2.2. Kindling from up

For the KSX series boilers kindling from up is basic, but for KSW Master and KSW PRIMA boilers kindling from up is optional.

1. For the KSX series boilers kindling from up is basic, but for KSW Master and KSW PRIMA boilers kindling from up is optional.
2. Open the intake door and fill the hearth with the mixture of culm assortment MI/MII ~30% damp or with coal assortment bean coal OI/OII. The fuel should be filled up to 2-3 cm beneath the upper intake holes that are located symmetrically on the inside parts of hearth.
3. Place the paper, dry wood chops and kindle it.
4. Close the door and start the driver. Air from automatically started blower will get into the ash tray and fill the upper combustion chamber where glow is located.

4.3. Combustion at boiler

Exploitation above 57°C

During the boiler exploitation at the temperature lower than 57°C the fume gases condensate at boiler walls and at boiler convection channels. After longer exploitation it leads to tarring, lower efficiency of a device and increases the scoring and surface corrosion leading to shorter life cycle of a product. According to this, it is recommended to use the boiler at temperatures above 57°C. It may be achieved by: 1. the proper choice of boiler for the area of rooms heated, 2. the use of 3 or four-way valves between the supply and return lines to the boiler.

5. Close the door and check after couple of seconds, if the glow was ignited and if it was evenly placed at the fuel. If not, spread the glow at the whole area of hearth with rake and that will evenly kindle the whole fuel.
6. The chimney draught may be regulated with the use of flue throttle according to the needs.

CAUTION! During kindling from up at KSW PRIMA and KSW MASTER boilers not complete incineration of fuel may happen.

CAUTION! In the event of long term energy break or driver malfunction the circulation of water in the system should be provided (important in the event of the pump in use).

If the fuel has been incinerated completely, the hearth should be cleaned and the kindling should be done again or an operator should fill the boiler with fuel again (upper combustion from bottom). In the second event the time of combustion increases up to 48 h. Kindling from up causes better incineration of gases, higher efficiency, lower losses at chimney and this leads to higher savings of fuel.

Boiler “sweating”

During kindling at boiler for the first time or in the event of kindling at cold boiler there may occur boiler “sweating” that resembles leaks. In such an event an operator should intensively heat the boiler up to the temperature of about 80°C in order to dry the boiler with convection channels. The same should be done once a week, when the boiler runs at low temperature for long periods.

Filling up with fuel

CAUTION: Before filling up the combustion chamber the driver should be switched off and operator should wait for 5 to 10 seconds. During the filling up the safe distance from the intake door should be maintained to avoid burns.

Removing ash and cleaning

Low light at ash tray from glow indicates the ash layer at hearth grill and that leads to decrease of temperature in the boiler. Removing the ash from grill is done during the boiler operation by moving mechanic grill forth and backwards several times, leaving it in backwards position. During the combustion of coal by-products are produced: slag, cinder, ash and it should be removed with tools before the next kindling.

Boiler's slow-burning

According to the kindling method the slow-burning (this is operating time of a device at one filling with fuel) with the power are variables. The times specified below are indicated only for boilers with the fuel of adequate quality. Slow-burning depends on various factors, this is: the calorific value and type of fuel, building insulation, heat receiving devices (radiators, hot water heaters, floor heating). During the boiler work with lower heating output slow-burning increases for several hours.

4.3.1. KSW and KSW Plus

The fuel should be added periodically, by filling up the whole chamber. The fuel at boiler is sufficient for 4-12 hours (according to the type of fuel used) during the work with rated power. During the boiler work with lower power output such period will increase.

Combustion at KSW type boiler may be adjusted manually by changing the position of throttle at bottom door with the use of control screw or automatically with the use of combustion gauge. Opening the ash door throttle will lead to the increase of heating efficiency of a boiler. During the use of combustion gauge the control screw at throttle should be tightened in such a way, that allows for closing the hole with throttle thanks to its own weight. Combustion at KSW PLUS boiler is controlled by the temperature controller.

4.3.2. KSD

KSD boiler is a boiler with the bottom combustion. According to fuel type (timber, coal) slow-burning and the power of boiler is variable. During the burning of timber one filling is sufficient for about 4-6 hours of work. During the combustion of coal the slow-burning increases significantly and for OI/OII coal it is 10-12 hours and for MI/MII coal it is 14 hours of work and longer.

4.3.3. KSX

During the basic kindling from up there is no possibility for additional fuel filling up and one filling is sufficient for about 24 hours. The times indicated response. Combustion at KSX boiler is adjusted with temperature controller.

During the basic kindling from bottom at KSX boiler one filling with fuel is sufficient for about 8 hours of work. At this type of combustion there is a possibility for additional filling up the combustion chamber.

4.4. Stopping the boiler work

1. Turn off the blower and driver (if exist) by pushing the STOP button.
2. Close tight all doors, flaps and flue throttle and that will lead to fire extinction.

4.5. Emergency boiler stopping

Boiler operation should be stopped whenever: 1. the water leaks at boiler; 2. temperature increases above 90°C; or 3. there will be the need for evaporated water filling in the installation and radiators. In order to stop the boiler work the duties from the point "Stopping the boiler" should be executed. When the necessity for prompt boiler stop appeared, the glow and fuel should be removed from the boiler with the use of metal shovel into a metal container, take the glow outside the building and quench it there with water.

4.3.4. KSW Prima and KSW Master

Combustion at boiler is controlled by driver and blower. According to the type of kindling the slow-burning and power is variable. During traditional kindling at water grill (this is from bottom) one time filling with fuel is sufficient for about 6-10 hours of work. During kindling from up (optional) one time filling is sufficient for about 8-14 hours of work. The times given resemble boiler work with high calorific fuel, such as coal. During the use of fuel with lower calorific value (seasoned timber, biomass briquette etc.) the combustion time (for one filling) is proportionally lower. During the combustion process there is possibility for additional filling up the combustion chamber with precautions to the safety procedures maintained.

3. After couple of minutes check, if another kindling did not happen.
4. If the glow ceased, remove the remnants of coal and ash from the boiler.

CAUTION! It is forbidden to quench the fuel at the area of boiler room!

4.6. Quenching the boiler after heating season

In order to prepare the boiler at the end of heating season proceedings from the point "Stopping boiler work" should be repeated and then: 1. clean the whole boiler from the inside, also fume channels and chimney; 2. leave doors opened for the boiler standstill time to dry the boiler and allow the air to move in and out and; 3. verify the technical condition of a boiler.

4.7. Cleaning and maintenance

Maintaining the boiler clean is obligatory for its effective and trouble-free work. Even the small layer of sediments decreases transfer of heat from fumes and this leads to decrease in the boiler efficiency. It may be a cause of its damage.

Therefore, the boiler should be thoroughly cleaned once a week. After the quenching and cooling down the boiler: 1. remove ash from the combustion chamber and ash tray; 2. remove soot from the combustion chamber with the card; 3. clean the flame channels and fume channels with a brush, than remove soot from fume channels; 4. clean the boiler external cover from ash, soot, dust and remnants of fuel.

4.8. Procedures for secure exploitation

- The heating installation should be done properly, according to binding norms.
- Water should be filled properly. Do not fill the installation with cold water, when the boiler is heated.

CAUTION! The water should not be drained from the boiler and central heating system after the heating season (unless for the time of repairs). It protects the boiler against the rapid corrosion.

However, it is necessary to drain the system for the idle time during frosts. It protects against water freeze and system damage.

The water installation, boiler doors, flue and chimney should be periodically verified for tightness. Tighten the hinges or replace the door seal if necessary.

Periodical boiler inspection should be done once a year during boiler standstill. In order to perform boiler inspection and assess the possible repairs, the boiler should be thoroughly cleaned from the heating remnants at insides of combustion.

Serious repairs of a boiler arising from faulty exploitation, malfunctions and mechanical damages should be done as quickly, as it is possible after notification by the service.

Maintain the boiler room clean and do not storage other object there, than those connected with boiler maintenance.

- Do not use the boiler, when water level at the system is beneath the level indicated in the manual for central heating system.
- Never use highly flammable liquids (petrol) for kindling.

- Never quench the fire at the hearth with water.
- Use proper tools and protective gear during boiler maintenance work (gloves, spectacles, head cover, boots), with particular caution during the service of not isolated elements (i.e. doors), that may heat up to high temperatures and lead to burns.
- Stand aside the boiler during doors opening and watch out the outgoing flames.
- Maintain the boiler room clean, provide the proper ventilation and remove caustic and flammable materials from the surrounding.
- Clean the boiler only during standstill.
- During boiler servicing use movable lamps with the voltage not higher than 24 V.
- Maintain proper technical condition of boiler and hydraulic system.
- Maintain the boiler clean.

5. BOILER MALFUNCTIONS – BEFORE PHONING THE SERVICE

In the event of groundless service call, the journey costs and service labor will be covered by customer. Therefore, before calling the manufacture service, get in touch with common boiler malfunctions and ways of its solving oneself.

Symptom	Cause	Repair
Fumes at outside	lack of chimney draught	remove the leaks at chimney, flue or boiler doors
	chimney height inadequate	rise the chimney at least 1.5 m above the ridge
	too low chimney dimension	correct the flue throttle, decrease the blow
	very low atmospheric pressure	use the blower to aid the chimney draught
	chimney channels dirty	clean the channels

Symptom	Cause	Repair
Low boiler heating efficiency	heating with low calorific fuel	exchange the fuel with high-calorific fuel
	air in the boiler room lacking	enable the air access through the window or inlet channel
	malfunction of blower or driver	set the parameters again according to the service manual or exchange for the a new one – in working condition
	fume channels at the flame chamber dirty	clean the channels, adjust throttle
Insides of boiler damp and with soot (symptoms similar to leaking)	the use of timber as a primary fuel for heating	use the fuel according to service manual
	low temperature maintained at boiler	use the boiler at temp. min. 57°C
The leak	assessment by the producer	repair done by PEREKO service
Too high chimney draught		adjust the chimney draught with throttle at boiler flue
Too high fuel consumption	incorrect parameters set	service aid
	low fuel quality	change the fuel
Fuel do not burn completely	bad quality of fuel	change the fuel

6. WARRANTY CONDITIONS

- The producer for PEREKO boilers is Envo sp. z o.o. company with its seat at Starachowice; ul. Radomska 76, Poland.
- The warranty card is not valid without the date, stamp and producer signatures, sales point, and the salesmen.
- In the event of warranty card loss the duplicates will be issued.
- Warranty card and invoice are the only documents that empower the buyer to warranty repairs.
- Producer grants the warranty for the central heating boiler exchanger tightness for the period of 60 months from the date of boiler production for boilers series KSX, KSD, KSW Prima i KSW Master and for the period of 72 months from the date of production for boilers series KSW i KSW Plus and for 24 months for other parts.
- Producer grants the warranty for the tightness of welds for the period of 10 years from the date of production.

7. The warranty for welds tightness is not equivalent to the warranty for the tightness of the whole boiler and is used in the event of leaks only at welds.
8. The producer reserves the right for changes in the technical state without previous notification.
9. The warranty is prolonged for the period from the date of repair notification up to the date of its execution. The repair is confirmed at warranty card and at the protocol of inspection and malfunction.
10. The producer will solve the claim within 14 days from the date of notification.
11. At the period of warranty it is possible to exchange the boiler for a new one in the event the Producer confirmed: after the certification of empowered auditor, that the boiler cannot be repaired.
12. Quality claims for boiler should be noticed at the sales point or directly to the producer at the address indicated at warranty card.
13. The warranty does not include boiler installation, clamps, glow doors, sealing knob at the inside doors and tools for servicing and cleaning.
14. The warranty for electronic temperature adjuster, blower and automatic coal mechanism is provided by its producer and is attached to the complete set of documents for a boiler.
15. In the event of faulty claim and groundless service call, the journey costs and service labor will be covered by the user.
16. This service manual for central heating boilers is the property of Envo sp. z o.o. company. It is forbidden to copy or use it by any other entrepreneurs or individuals without the written permission of the owner. All rights restricted.

CAUTION! The producer is not responsible for the results of faulty installation, faulty use of a boiler, not following the provisions indicated at the manual and faulty servicing the device.

The warranty ceases in the event of:

1. The use of security devices not complying the PN-91/B-02413 norm.
2. Faulty fitting in the closed system, according to Law Journal 2009 no. 56 pos. 461.
3. Faulty transport and storage of a boiler.
4. Boiler start-up without the adequate level of water.
5. Damages caused in the event of boiler overheating.
6. Repairs at the time of warranty by persons and companies not certified by the producer.
7. Damages arising from not following the provisions indicated in the manual.
8. Exceeding the permitted working pressure 1.5 bar.
9. Mechanic damages and changes in the boiler construction done by uncertified persons.
10. Steel element corrosion resulting from too low temperature of return water below 57°C with the simultaneous use of inadequate, too damp fuel.

SERVICE AID

Date	Remarks	Signature

WARRANTY CARD

for the central heating water boiler

Serial number

Type

Date of production

KJ sign

We hereby grant the warranty for the tightness of welds at water body of boiler for the period of 10 years from the date of production, for the tightness of exchanger for the period of 60 months from the date of production for boilers series KSX, KSD, KSW Prima and KSW Master, for the period of 72 months from the date of production for the boilers series KSW and KSW Plus and for the period of 24 months for other parts.

.....
Signature and producer's stamp

.....
Date of retail sales

.....
Salesmen signature and stamp of trade company

Producer

Envo sp. z o.o., 27-200 Starachowice, ul. Radomska 76, POLAND

www.grupaenvo.pl

Technical aid

tel. +48 (41) 274 53 53, fax +48 (41) 274 53 26

e-mail: serwis@pereko.pl,

tel. kom. +48 602 315 512, 604 953 459, 660 726 577

www.pereko.pl