

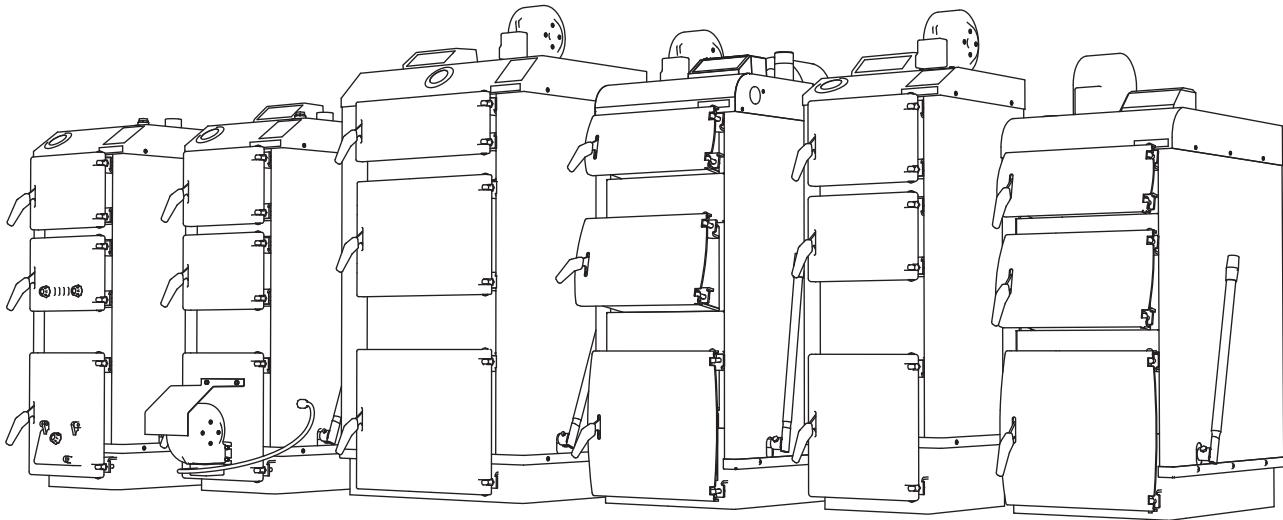
PEREKO®

ciepło jest żółte

Operation and maintenance manual

for charging boilers:

KSW Alfa, KSW Alfa Plus, KSW Master, KSW Prima



Thank you for purchasing PEREKO boiler. This documentation applies to KSW ALFA, KSW ALFA PLUS, KSW MASTER, KSW PRIMA charging boilers and contains all necessary information and recommendations for their operation.

Please carefully read this document before start-up of the boiler. Observance of the guidelines contained in the manual will ensure safety and prevent misuse of the equipment and its faulty operation.

Manual for the controller, which should be read and understood, is enclosed in the set of documents for the boiler supported by electronics. Documentation and manuals should be kept and stored in a way allowing using them also during servicing of the equipment.

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1. INTRODUCTION

1.1. Obligations of the user and guidelines concerning safety

To assure operational safety and maintain optimum operation of the equipment:

- read and observe recommendations contained in the boiler manual and controller manual (applies to boiler equipped with the controller),
- the manual should be kept and stored in a safe place in the boiler room allowing using it during any moment of boiler operation,
- ensure that the drive is never operated by children or persons who have not read the contents of the manual and adults with disabilities preventing them from the safe operation,
- the system should be made in compliance with the applicable regulations and in accordance with the rules and recommendations contained in the manual,

- before setting and connecting the boiler check whether all components are in good working order and whether the boiler has a complete equipment for servicing and cleaning,
- the boiler should be cleaned on regular basis, at least once per week, removing a layer of deposited soot and ash, which reduces the efficiency of the boiler,
- ensure continuous access to the equipment
- water temperature in boiler should not exceed 95°C,
- operating pressure should not exceed 0.15 bar.

NOTE! Boiler installation in accordance with the applicable standards and regulations and first start-up should be carried out by a qualified installer.

1.2. Selection of correct power of the boiler

Nominal power of purchased boiler (that is maximum thermal efficiency, which can be achieved during continuous use and maintaining the efficiency declared by the producer) should be selected in a way corresponding the real demand for thermal energy even in case of occurrence of very low temperatures.

Do not purchase boiler with power higher than this planned in the design. Selecting boiler with too high power will result in higher fuel consumption and lack of full control over the combustion process and therefore higher operation costs, while too small boiler will not ensure sufficient power necessary to heat up the building.

Approximate boiler power can be calculated using a *boiler power calculator* on our website www.pereka.pl Furthermore, you should also consider: thickness of walls and insulation, the thermal permeability of first fix joinery (including: tightness of windows and doors, type of window panels used) and climatic zone, where the heated building is located.

2. DESCRIPTION OF CHARGING BOILERS

2.1. Intended use

Steel heating boilers KSW ALFA, KSW ALFA PLUS, KSW MASTER, KSW PRIMA are intended for water central heating installations in single-family houses, garages, maintenance rooms etc.

These boilers belong to a group of low-temperature boilers and are not subject to registration in the regional Office of Technical Inspection. They are intended for operation in water distribution systems in gravitational central heating installations with or with forced circulation with heating

of warehouses, production floors, drying rooms with hot air and furthermore, in the domestic hot water systems and gravity central heating systems or with forced circulation of the open system, equipped with a protections in accordance with the PN 91/B-02413, applying to protection of open water heating installations, considering the Regulation of the Minister of Infrastructure, Journal of Laws of 2009, no. 56, item 461.

2.2. Design description

2.2.1. Water casing

KSW ALFA, KSW ALFA PLUS, KSW MASTER, KSW PRIMA heating boilers are made of steel sheet intended for pressure devices for operation in elevated temperature P265GH. The thickness of metal sheet of the body from flame side equals to 5 mm and 6 mm. Heat exchanger sheets are welded from both sides and body sheets are reinforced with supports. Convection channels are located in such way that they are cleaned through the upper cleaning doors.

Design solution used in the KSW Alfa, KSW Alfa Plus, KSW Master, KSW Prima boilers allows efficient reception of heat by use return of flue gas and three-draught design of the furnace.

2.2.2. Doors

The boilers are equipped with upper cleaning doors, charging doors and common doors to the bottom part of the furnace and ash-pan chamber. All doors are equipped with heat-resistant glow plate protecting the external surface of doors against excessive heating up.

2.2.3. Upper cleaning doors

Upper cleaning doors are intended for cleaning of an upper part of the boiler and convection ducts (flue gas swirlers are to be removed earlier), through which the hot flue gas from the furnace are flowing. Boilers are equipped also with rear cleaning openings, which are used for cleaning of convection unit.

2.2.4. Charging doors

Charging doors are intended for charging the fuel to boiler furnace chamber and for cleaning of heatable surfaces of the furnace. KSW ALFA boilers are equipped with the doors, which have adjustable secondary air damper.

2.2.5. Ash-pan doors

Ash pan doors are common for the ash-pan and bottom part of the furnace chamber. After opening you gain access to both chambers. This doors allows removing ash formed during the combustion process. Doors in the KSW ALFA series are additionally equipped with a flap intended for control of air supply.

2.2.6. Flue

The boiler is equipped with a welded flue, which is used as a component discharging flue gas from boiler towards the chimney flue. The flue is equipped with a smoke damper intended for control of chimney draught.

2.2.7. Insulation panels

Insulation panels fixed on the surface of water jacket completely eliminates heat losses. Panels are made of aesthetic cartridges made of a zinc-plated metal sheet, painted with powder paint ensuring high anti-corrosion protection. The panels are lined with a mineral wool from the inside, which is used as an insulation material.

2.2.8. Electronic controller

All charging boilers are equipped with the controller (except KSW ALFA boilers). It can be used to set temperature values or change of boiler operation mode. The controller is installed at the top in the front part of the boiler what ensure convenient access. Furthermore, it is equipped with operation control sensor and a sensor for emergency shutdown after exceeding a temperature of 90°C. If the temperature of boiler operation exceeds allowable value then the operation will be automatically stopped and the central heating pump will be activated.

The boiler will restart when the temperature falls to the value specified by the producer (see *Controller user's manual*).

2.2.9. Forced draught fan

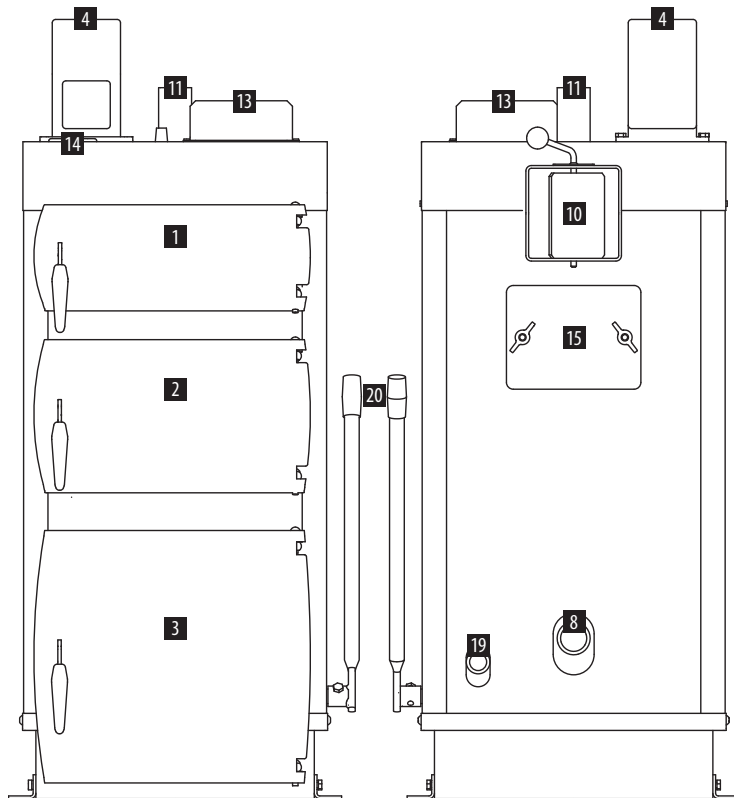
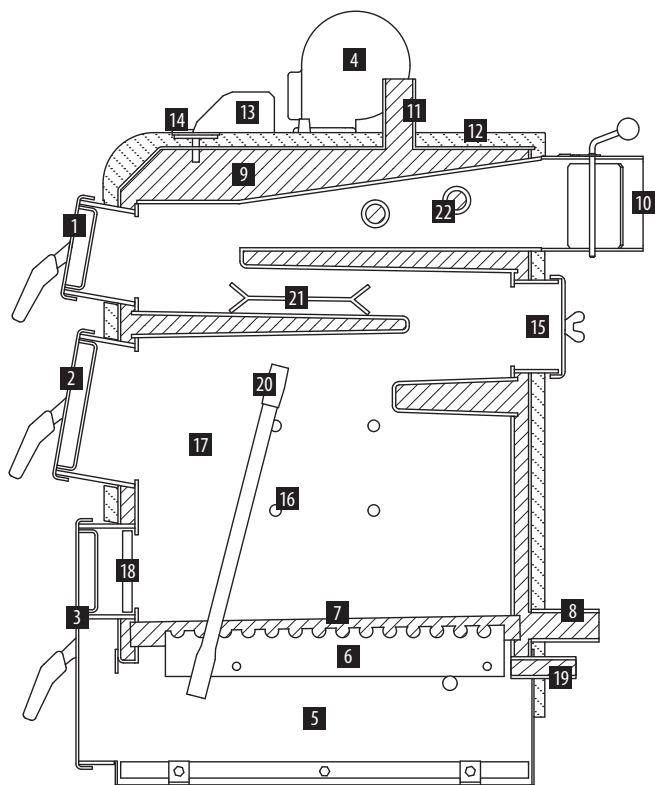
Forced draught fan (available in all version with the controller) is intended for the smooth or cyclic supply of the sufficient amount of air to the furnace. Amount of supplied air varies in time due to microprocessor control. Operation of the fan is controlled by the controller, which automatically selects rotational speed of the fan depending on building heat demand. It ensures permanent and effective operation of the boiler and extends its burn-time (operation on one charge).

2.2.10. Movable grate

Mobile grate consisting of steel combs is used for removal of ash and crushing of sinters formed on the water-cooled grate using lever installed for the grate.

2.3. Charging boiler design diagram

	KSW Alfa	KSW Alfa Plus	KSW Master	KSW Prima
1. Cleaning doors	✓	✓	✓	✓
2. Charging doors	✓	✓	✓	✓
3. Grate and ash-pan doors	✓	✓	✓	✓
4. Forced-draught fan	—	✓	✓	✓
5. Ash-pan	✓	✓	✓	✓
6. Movable grate	✓	✓	✓	✓
7. Water-cooled grate	✓	✓	✓	✓
8. Return water connection	✓	✓	✓	✓
9. Water jacket	✓	✓	✓	✓
10. Flue with a damper	✓	✓	✓	✓
11. Hot water connection	✓	✓	✓	✓
12. Insulation panels	✓	✓	✓	✓
13. Controller	—	✓	✓	✓
14. Bimetal thermometer	✓	✓	✓	✓
15. Cleaning hole	from 20 kW			✓
16. Air injection holes	—	—	✓	✓
17. Furnace chamber	✓	✓	✓	✓
18. Glow doors	✓	✓	✓	✓
19. Drain cock	✓	✓	✓	✓
20. Grate lever	✓	✓	✓	✓
21. Flue gas swirlers	✓	✓	✓	✓
22. Water tubes	only in 12 kW model			✓



2.4. Technical and operation parameters

Parameter	Unit	KSW Alfa and KSW Alfa Plus												
		5	9	12	16	18	20	24	30	35	40	50	80	100
Height	[mm]	860	1080	1115	1200		1205	1265	1335	1435	1635	1685	1800	
Width	[mm]	435		455			505		615	550		660	1000	
Depth ¹ + Flue	[mm]	600+110		645+110	715+110	745+110			850+110	595+100		675+110	900+300	1200+300
Height to axis of the flue	[mm]	695	915	910	990		975	1035	1105	1205	1305	1335	1530	
Flue diameter	[mm]	127		159					178	178		219	200×300	
Area of heated rooms ²	[m²]	≤ 91	≤ 164	≤ 218	≤ 291	≤ 327	≤ 364	≤ 436	≤ 545	≤ 636	≤ 727	≤ 909	≤ 1455	≤ 1818
Heated rooms volume ²	[m³]	≤ 227	≤ 409	≤ 545	≤ 727	≤ 818	≤ 909	≤ 1091	≤ 1364	≤ 1591	≤ 1818	≤ 2273	≤ 3636	≤ 4545
Thermal power	[kW]	5	9	12	16	18	20	24	30	35	40	50	80	100
Efficiency	[%]	~80												
Power control range	[%]	±2												
Capacity of combustion chamber	[dm³]	20		27	33	35.5	45	53	80	110	150	210	360	400
Boiler water capacity	[dm³]	20	28	38	52	55	70		96	102	110	130	180	200
Heat exchanger material	—	Steel P265GH [PN-EN 10028]; 5 and 6 mm											thickness 8 mm	
Maximum operating pressure	[bar]	1,5												
Required min. chimney draught ³	[Pa]	20		23			25			28		35	45	
Min./max. water temperature	[°C]	57/95												
Supply / Power	[V/W]	230/85												
Boiler weight without water	[kg]	129	148	181	202	214	248	253	320	352	382	520	1100	1320
Diameter of water connection	[inch]	G 1 ½												

¹ add 100 mm for PLUS version due to the presence of the fan; ² with heat demand q=55 W/m² for the building insulated with a styrofoam, th. 15 cm; ³ in accordance with PN-EN 12809, PN-EN 303-5:2002;

Parameter	Unit	KSW Master						KSW Prima		
		12	16	18	20	24	30	15	20	25
Height	[mm]	1170	1270	1270	1270	1360	1390	1100	1150	1150
Width	[mm]	400	400	400	450	450	550	450	450	510
Depth	[mm]	430	500	520	520	520	670	650+150	750+150	770+150
Height to axis of the flue	[mm]	1035	1120	1120	1120	1210	1250	800	850	850
Flue diameter	[mm]	159					178	159		
Area of heated rooms ¹	[m²]	≤ 218	≤ 291	≤ 327	≤ 364	≤ 436	≤ 545	≤ 273	≤ 364	≤ 455
Heated rooms volume ¹	[m³]	≤ 545	≤ 727	≤ 818	≤ 909	≤ 1091	≤ 1364	≤ 682	≤ 909	≤ 1136
Thermal power	[kW]	12	16	18	20	24	30	15	20	25
Efficiency	[%]	~80-85								
Power control range	[%]	±2						±10		
Capacity of combustion chamber	[dm³]	32	37	42	50	60	90	~50	~60	~70
Boiler water capacity	[dm³]	40	54	57	72	80	105	45	55	65
Heat exchanger material	—	Steel P265GH [PN-EN 10028]; thickness 6 mm						Steel P265GH [PN-EN 10028]; thickness 5 and 6 mm		
Maximum operating pressure	[bar]	1,5								
Required min. chimney draught ²	[Pa]	23	25					23	25	
Min./max. water temperature	[°C]	57/95								
Supply / Power	[V/W]	230/85								
Boiler weight without water	[kg]	210	230	245	275	290	350	190	245	280
Diameter of water connection	[inch]	G 1 ½								

¹ with heat demand q=55 W/m² for the building insulated with a styrofoam, th. 15 cm; ² in accordance with PN-EN 12809, PN-EN 303-5:2002;

2.5. Fuel

Fuel used for combustion in the charging boilers with feeders should have the highest calorific value and be dried. Use of moist fuel or low-quality fuel and with incorrect physical and chemical parameters can result in not complete combustion of the fuel and increase its consumption.

PRIMARY FUEL - its use ensures that the boiler will achieve declared heating power and efficiency		
KSW ALFA	hard coal	nut coal OI with grain size 20÷40 mm or nut coal OI with grain size 40÷60 mm with calorific value Wd ~26 MJ/kg
KSW ALFA PLUS	as above	as above
KSW MASTER	hard coal	pea coal OI/OII with calorific value Wd~26 MJ/kg, type 31-2 acc. to PN- 82/G-97001-3
	fine coal	fine coal grade MI/MII, type 31-2 acc. to PN-82/G-97001-3 (~30% moisture)
KSW PRIMA	hard coal	pea coal OI/OII with calorific value Wd~26 MJ/kg, type 31-2 acc. to PN- 82/G-97001-3
	seasoned wood	calorific value min. Wd~18-19 MJ/kg

SUBSTITUTE FUEL - is used as a substitute for primary fuel, it can decrease power and efficiency of the boiler

KSW ALFA	a mixture of fuel coke and hard coal type 32.1, nut coal OI/II, acc. to PN-82/C-97001-3	with a mass ratio of both fuels 1:1 or 2:1
	mix of pea (hard) coal (70%) and fine coal (30%)	—
	long-flame fuels	(that is hard coal and lignite briquettes, briquettes made of biomass and lignite)
KSW ALFA PLUS	as above	as above
KSW MASTER	a mix of coke and hard coal	type 31-2 of pea coal OI/OII, PN-82/C-97001-3 with a mass ratio of both fuels 1:1 or 2:1
	a mix of hard coal	nut coal OI/OII (60%) and fine coal MI/ MII (40%)
	long-flame fuels	(that is hard coal and lignite briquettes, briquettes made of biomass and lignite)
KSW PRIMA	a mix of coke and hard coal	type 31-2 of pea coal OI/OII, PN-82/C-97001-3 with a mass ratio of both fuels 1:1 or 2:1
	fine coal	fine coal grade MI/II, type 31-2 acc. to PN-82/G-97001-3 (~30% moisture)
	a mix of hard coal	nut coal OI/OII (60%) and fine coal MI/ MII (40%),
	long-flame fuels	(that is hard coal and lignite briquettes, briquettes made of biomass and lignite)

2.6. Boiler equipment

The boiler is delivered in the assembled condition, ready for start-up.

Prior to setting, you should check presence of additional tools and operation of the instrumentation enclosed to the boiler.

	KSW ALFA	KSW ALFA PLUS	KSW MASTER	KSW PRIMA
Controller	—	✓	✓	✓
Fan	—	✓	✓	✓
Bimetal thermometer	✓	✓	✓	✓
Brush	✓	✓	✓	✓
Scraper	—	—	✓	✓
Hook	✓	✓	✓	✓
Ash shovel	✓	✓	✓	✓
Drain cock G½"	✓	✓	✓	✓
Controller User's Manual	—	✓	✓	✓
Fan User's Manual	—	✓	✓	✓
Flue gas swirlers*	✓	✓	✓	✓

* they are factory located in convection ducts. Cleaning doors ensure access. Flue gas swirlers are intended to direct flue gas stream to the water jacket, what significantly improves efficiency and capacity of the boiler and prevents heating up of chimney flues. NOTE! In case of weak chimney draught it can be necessary to remove the swirlers (partially or completely).

3. BEFORE START-UP

3.1. Boiler setting

3.1.1. Boiler room

- It should be a separate room with height not lower than 2.2 m in the new building (in the already existing buildings the allowable height equals to 1.9 m).
- It should have artificial lighting installed and have natural lighting as far as practicable.
- It should have gravity ventilation in good working order, including:
 1. air-supply duct in the external wall with cross-section not lower than 50% of chimney cross-sectional area on height maximum 1 m over the flooring or not lower than 200 cm² for boilers with power up to 25 kW or 400 cm² for boilers over 25 kW,
 2. separate air-exhaust duct on the internal wall with cross-section not smaller than 140~140mm with an outlet located under the boiler-room roof near the chimney.

NOTE! It is forbidden to use mechanical exhaust ventilation in the room where the boiler was installed.

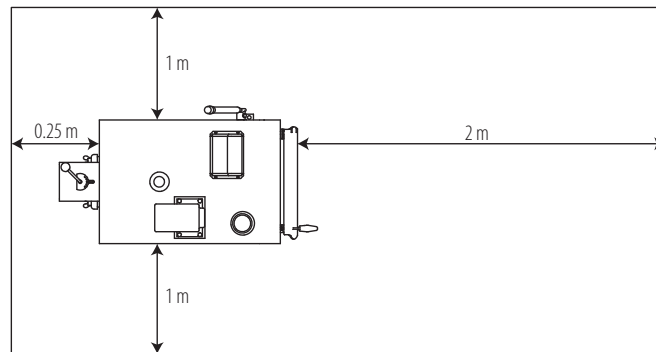
- Floor gully and floor with 1% slope towards the outlet should be planned in the central part of the room.
- Flooring and walls in the whole room should be made of non-combustible materials.
- The doors to the boiler room should open outwards.

NOTE! Do not unscrew angle bars of the base from ash-pan during installation of the boiler.

3.1.2. Demonstrative method for boiler setting

The boiler does not require a foundation and it is allowed to set it on wall base with height not lower than 50 mm. Model method of boiler setting should ensure free access to the equipment allowing its cleaning and maintenance. Therefore, while setting the boiler it is recommended to maintain minimum distances from the individual walls:

- Distance from front of the boiler to opposite boiler room wall should not be smaller than 2 m.
- The distance of boiler side from the wall of the boiler room should be lower than 1 m.
- The distance of rear part of the boiler from the wall of the boiler room should be equal to at least length of the connection, that is 0.25 m.



3.2. Connection to chimney

1. It is necessary to prepare stand-alone, tight chimney flue, which will be used for flue gas flowing from the boiler.
2. The flue should be placed at least 1.5 m over the roof ridge to avoid the occurrence of back-draught. The intersection of the flue should be appropriately selected for the boiler power and height of the chimney. Provision calculations of chimney height and intersection can be carried out using a chimney intersection calculator available on the website www.pereko.pl.

Regardless of the results of the calculations the minimum intersection of masonry chimney should not be lower than 14 x 14 cm!

3. Check condition of the chimney (preferably by a chimney sweep) before connecting the boiler to the chimney and check whether the chimney is free from connections of the heating elements.

4. The boiler should be connected with chimney using a connector. It is not recommended to use the connection at a straight angle because it will cause a loss in the chimney draught. Flue with chimney should be connected using a connector made of 3-mm thick steel sheet (available from the boiler producer). We put it on the outlet from the flue, fix on the chimney and seal with high-temperature silicone. The connector should be directed slightly upwards from 5° to 20°. If boiler flue will have a length over 400 mm then it is recommended to insulate it with a thermal insulation.

NOTE! Charging boilers should be installed in compliance with the applicable Regulation of the Minister of Infrastructure (Journal of Laws of 2002 no. 75 item 690 and Journal of Laws of 2009 no. 56 item 461.) In addition, it is recommended to use chimney liner resistant to corrosion: chemical, pitting, intercrystalline and surface.

3.3. Connection of central heating and domestic hot water system

3.3.1. Open water installations

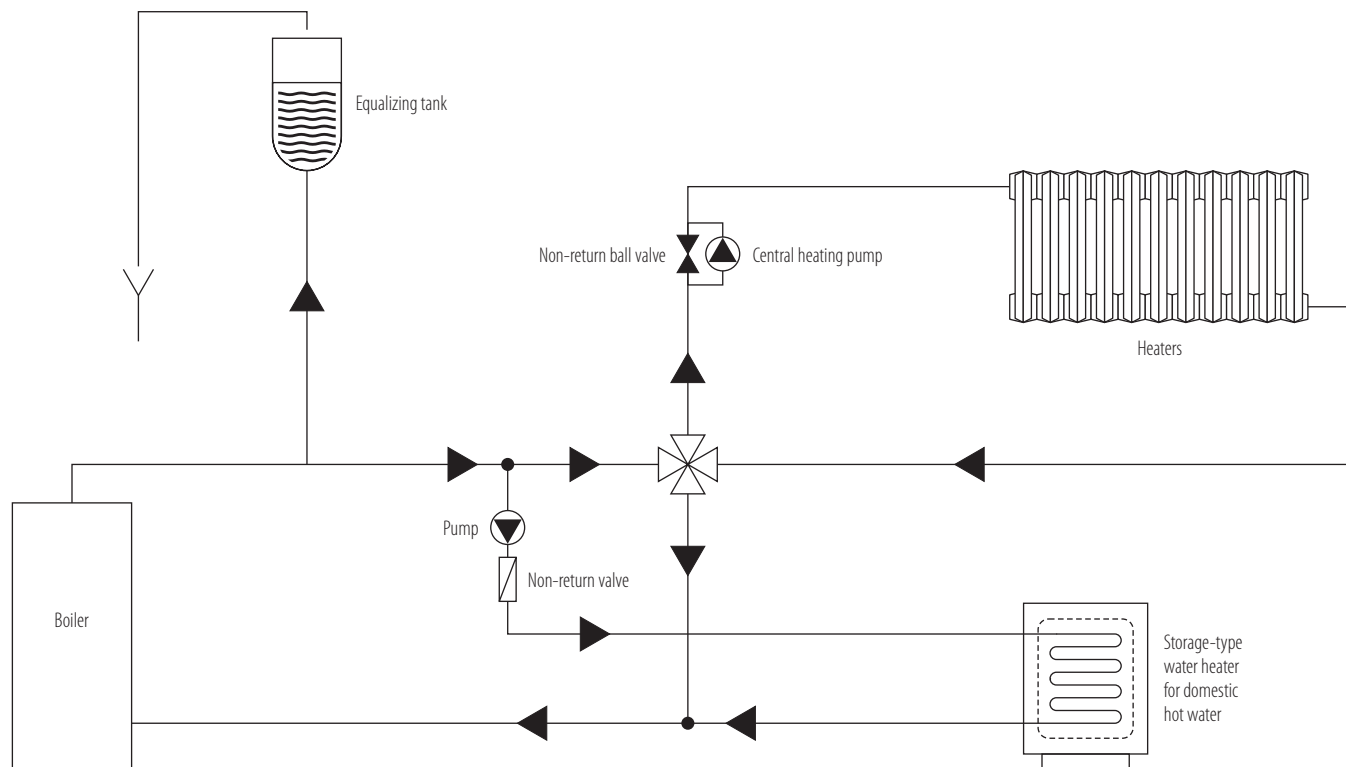
KSW Alfa, KSW Alfa Plus, KSW Master, KSW Prima boilers are intended for feeding water distribution piping in the open central heating systems with gravity or forced circulation of water. The boiler will be operated, should meet the requirements of the Polish Standard PN-91/B-02414 Heating and district heating - Protection of open water heating installations - Requirements.

PEREKO charging boilers fired with solid fuels with nominal power up to 150 kW can be used in closed water heating systems provided that: 1. the installation has been equipped with membrane

expansion vessel; 2. device intended for removal of heat excess, that is two-function cooling valve REGULUS DBV-1; 3. the safety valve 1.5 bar was installed.

NOTE! Correct selection of protections and suitable expansion vessel influences safety level of the system and the boiler. The above equipment should be inspected minimum twice per year. First inspection should be carried out during seasonal start-up of the boiler with the water distribution system.

Exemplary diagram of the open central heating system with four-way valve and hot water heater



3.3.2. Four-way valve

Design of the heating system should take into account protection of the boiler against the return of too cold water from the system. It is recommended to use four-way mixing valve what allows the increasing temperature of water returning to the boiler and decrease of water temperature for the building.

Four-way valve mixes hot water from the supply with cooler water returning from the heating cycle and therefore:

- protects the boiler against low-temperature corrosion and premature wear,
- improves the efficiency of heating of tap water in the DHW storage tank,

3.4. Connection of the boiler to electrical system

Boiler room should be equipped with electrical system with rated voltage 230/50Hz in compliance with the applicable regulations. The system should be terminated with plug-in socket equipped

- allows smooth adjustment of the temperature of the heating water with respect to the needs of the heating system,
- improves the efficiency of operation of the whole system.

Designing of the correct diagram of the system for the house and its execution should be entrusted to a person with appropriate qualifications. Central heating systems may differ and therefore it is necessary to stick to the guidelines included in the central heating design. Below you will find an exemplary connection diagram of the boiler to the central heating and domestic hot water system in the open system with four-way valve and hot water heater.

3.5. Filling the system with water

3.5.1. Filling the boiler with water before first start-up

1. Flush heating system and boiler before filling it with water to remove all contaminations.
2. Fill the system with water through the drain cock using the flexible hose. Water intended for feeding the heating boiler should meet the requirements of the PN-93/C-04607 standard. Quality of water filling the central heating system influences its durability therefore this water should be clean, free from the contaminations, oil and aggressive chemical substances. Water hardness

- should not exceed 2°tn (1°tn = 0.71 mval/l). Too hard water causes deposition of sediment in the boiler and heating system what decreases efficiency and may damage the boiler.
3. Stop feeding of water when the system is full that is water will start flowing out from the signaling pipe of the expansion vessel located in the highest point of the system or when the pressure gauge indicates approx. 0.8-1.2 bar. Refilling should take several seconds to make sure that the water flows down from the vessel.
 4. Close boiler drain cock and disconnect flexible hose from the boiler when the system is filled.

3.5.2. Refilling the system with water

Heating system with open container allows direct contact of heating water with the air what results in evaporation and necessity to refill it.

NOTE! It is forbidden to add cold water to the heated up system. Adding water to heated boiler components may damage it and is synonymous with loss of the warranty.

The system can be refilled with water only when the boiler is cold. If it is necessary to refill the water in the system quickly then the user should remove fuel from furnace chamber, cool down the boiler to 30°C and then add required amount of water. Firing up should be restarted after filling the system.

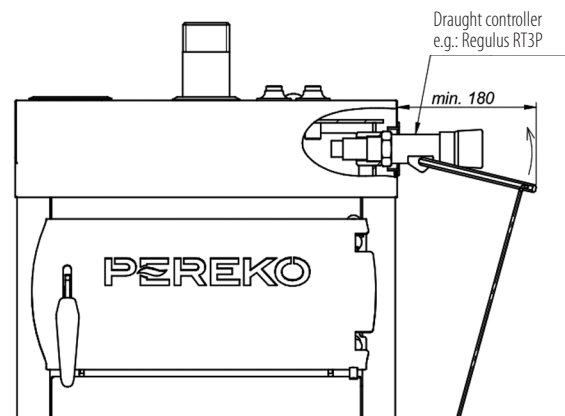
3.6. Draught regulator installation

G 3/4" connector is located on the right wall of the boiler. It can be used for connection of a draught regulator. Remove plastic stopper and then unscrew a plug from muff (see figure) to install it.

NOTE! Draught regulator should be able to operate in a horizontal position.

3.5.3. Draining water from the system

It is not recommended to drain the water from the system after the heating season because it increases the risk of occurrence of the corrosion and formation of boiler scale. The exception is a case, when it is necessary to carry out necessary repair and long-term standstills of the boiler during strong frosts. In the latter case it is recommended to drain the water from the system to avoid freezing and therefore damages and refilling it when the frost is over.



4. USER'S MANUAL

4.1. Checking the system

Prior to first start-up of the boiler:

1. Check correctness of installation and connection to electrical system: a) actuator of the four-way valve (if any), b) central heating pump, domestic hot water pump, floor pump (if any), c) sensor in boiler, d) fan (if any) and e) controller (if available).
2. Check heating system: a) its tightness, whether there are no leaks of water from the boiler or system, b) whether the water is not frozen in the conductors and expansion vessel, c) whether

water level and its pressure are correct and sufficient (pressure gauge depending on height of the building should indicate from 0.8 to 1.2 bar). If the pressure is too low, you should add water by pouring it only to the cold boiler.

3. Check cleaning hole's tightness in the rear wall of the boiler.
4. Check correctness of boiler connection to the chimney.
5. Carry out measurements of chimney draught.

4.2. First boiler firing up

4.2.1. Firing up from bottom on water-cooled grate

NOTE! It is forbidden to use flammable liquids, e.g. petrol, for firing up of the boiler. Firing up should be placed successively. First with wood and then with a thin layer of coal.

Firing up from bottom on water-cooled grate without controller (KSW ALFA series)

1. Damper on chimney flue and damper on bottom doors should be adjusted to ensure that they are in open position and lever of the mobile grate is set in limit position towards the end of the boiler.
2. Open bottom doors and then glow doors located directly behind them.

3. Place uniformly paper, pieces of dry wood and set on fire on the water-cooled grate. After firing up the chimney draught should suck flue gas to the convection ducts of the boiler.
4. Close charging doors and close secondary air damper during firing up.
5. When the heat is formed you should close bottom doors and open charging doors and then pour a thin layer of coal or wood, taking care not to damp the flame, and fill the combustion chamber with coal or wood to the maximum extent to the height of the bottom edge of charging doors. Wait until it ignites. Adjust chimney draughts with a damper in the flue and damper in bottom doors depending on the required temperature in the boiler - if necessary. The degree of damper opening in bottom doors depends on the type of the fuel. The worse fuel the bigger opening of secondary air damper.

Firing up from bottom on water-cooled grate with controller (KSW ALFA PLUS, KSW MASTER and KSW PRIMA)

1. Repeat steps 1-3 from the above section paying attention whether there is sufficient amount of heat in the furnace, which will not burn out after adding the additional amount of fuel
2. When the boiler is filled with fuel and preliminary fired up by pressing the START button on controller the automation system switches to firing up mode. The controller activates the fan, which successively increases revolutions, until set parameters of operation are reached (in accordance with the user's manual for the controller). Set temperature in the boiler is factory set to 57°C.
3. When boiler reaches set parameters the controller will switch off the fan or decrease its speed (in case of the controller with the LOGIC system).
4. Then, adjust fan power and proceed according to the user's manual for the controller.
5. Press STOP button to stop operation of the controller.

Swirlers should be removed in case of weak chimney draught to improve combustion conditions (KSW PRIMA).

4.2.2. Firing from top

Firing from the top is a primary method for the KSX boilers. While KSW Master and KSW Prima boilers are fired from the top only as an option.

1. Damper on chimney flue should be adjusted to ensure that it is in open position (knob in boiler axis).

2. Open charging doors and charge mixture of fine coal MI/MIl with moisture content ~30% or nut coal OI/OIl to the furnace chamber. Fuel should be added to the level 2-3 cm below the upper air injection openings, which are located symmetrically on both sides inside the furnace.
3. Insert paper, pieces of dry wood and set on fire.
4. Close the doors and start the controller. Air from automatically started fan reaches to the ash-pan and will aerate upper combustion chamber where the heat is located.
5. Close the doors and after a dozen or so minutes check whether the heat is burning and whether it is uniformly located in the fuel. If not – spread heat with a poker on the whole surface of charge to ensure uniform combustion of the fuel.
6. Adjust chimney draughts with a damper in the flue – if necessary.

NOTE! Incomplete combustion of fuel can occur during firing from top in the KSW PRIMA and KSW MASTER boilers.

NOTE! In case of long-term power stoppage or controller failure you should ensure water circulation in the system (particularly important when the pump is used).

If the fuel burns out completely then you should clean the furnace and start firing up from the beginning or re-charge the fuel (top combustion from bottom). In the latter case combustion time will be prolonged to 48 h. Firing from top results in better post-combustion of gases, higher efficiency, lower chimney losses and therefore – better fuel economy.

4.3. Combustion in boiler

Operation over 57°C

During operation of the boiler with temperature lower than 57°C the gases contained in the flue gases condenses on boiler walls and in convection ducts of the boiler. After a longer period of operation it leads to the formation of tar deposits, lower efficiency of the equipment and accelerated pitting and surface corrosion, what significantly lowers boiler lifetime. Therefore it is recommended to use boiler over 57°C. It can be achieved by: 1. correct selection of boiler to the size of heated rooms, 2. use of three-way or four-way valves between water supply to the boiler.

Boiler “sweating”

“Sweating” phenomenon, which gives impression that the system leaks, can occur during the first combustion in the boiler or during start-up of the cold boiler. In such case you should fire up the boiler to temperature approx. 80°C to dry it and convection channels. You should proceed in the same way once a week in the case when low temperatures are maintained in the boiler for a longer time.

Refuelling

NOTE: Switch off the controller/fan and wait 5-10 seconds prior to filling the furnace chamber. Keep a safe distance from charging doors, to avoid burns during filling.

Ash removal and cleaning

Weak illumination of ash-pan by furnace's heat means that the furnace grate is covered with ash, what is connected with a decrease of temperature in the boiler. Ash removal from grate is made during operation of the boiler by pressing several times the mechanical grate to front and back of the boiler, leaving the lever in the rear extreme position. By-products are formed during combustion of the hard coal: slag, sinter, ash, which should be removed using tools prior to next firing up of the boiler.

Boiler burn time

Burn time (that is operation time of the equipment at single fuel charge) and power are variable values depending on the method of boiler firing up. Given times apply only to the operation of the boiler with fuel of required quality. Boiler burn time depends on many factors: calorific value and type of fuel, thermal insulation of the building, equipment receiving the heat (heaters, boiler, floor heating). Burn time period is longer by several hours during boiler operation with lower thermal power.

4.3.1. KSW Alfa and KSW Alfa Plus

Fuel should be added periodically filling the whole chamber. Fuel in the boiler is sufficient for approx. 4-12 hours (depending on the quality of fuel used) during operation with rated power. Burn time period is correspondingly longer when boiler operates with lower thermal power.

Combustion in the KSW ALFA boiler can be adjusted manually changing position of the damper in bottom doors by turning adjustment screw or automatically using automatic draught controller. The opening of the damper in the ash-pan doors causes an increase of thermal efficiency of the boiler. When the combustion controller is used: screw the adjusting screw in the damper ensuring that the damper is able to close the opening by its own weight. Combustion in the KSW ALFA boiler is controlled by the temperature controller.

4.4. Stop of boiler operation

1. Switch off the fan and controller (if any) by pressing the STOP button.
2. Close tightly all doors, flaps, damper on flue to damp the system.

4.5. Emergency stop of boiler operation

The boiler should be stopped always in case of: 1. water leak from the boiler, 2. temperature increase over 90°C or 3. necessity to refill evaporated water in the system and heaters. To stop operation of the boiler you should carry out operations listed in point Stop of boiler operation. If it is necessary to stop the boiler more quickly you should take out heat from igniter using a metal shovel to a metal container, remove heat to the outside and extinguish it with water there.

4.3.2. KSW Master and KSW Prima

Combustion in the boiler is controlled by a controller and fan. Depending on the method of firing up the burn time and power are variable values. Single fuel charging is sufficient for approx. 6-10 hours of operation in conventional firing up on the water-cooled grate (so-called from bottom). Single fuel charging is sufficient for approx. 8-14 hours during combustion from the top (option). The given times apply only to operation with the highly calorific fuel (that is hard coal). Using fuels with lower calorific value (seasoned wood, biomass briquettes etc.) the combustion time (operation after single charge) is proportionally smaller. It is possible to add fuel to combustion chamber while taking special care during the combustion process.

3. After dozen or so minutes check whether the fuel has not reignited.
4. Remove residues of coal and ash from the boiler if the heat is completely extinguished.

NOTE! Do not extinguish glowing fuel with water in the boiler room!

4.6. Boiler shutdown when the heating season is finished

To shutdown the boiler after the heating season you should repeat operations listed in the *Stop of boiler operation* and then: 1. clean whole boiler from inside, flue gas ducts and chimney, 2. leave open doors during boiler standstill to dry the interior and ensure continuous flow of air and 3. perform inspection of boiler condition.

NOTE! Do not drain the water from boiler and heating system after the heating season and during break in heating (except time necessary for a possible repairs). It protects boiler against accelerated corrosion. However, it is necessary to drain the water from the system if the break in boiler heating occurs during frosts. It will prevent freezing of water and damage of the system.

4.7. Cleaning and maintenance

Maintaining cleanness of the boiler is a necessary condition for its effective, trouble-free operation. An Even small layer of deposit will cause a decrease in heat transfer from flue gas and reduces boiler efficiency as a result. It can be also a reason for boiler damage.

Therefore, the boiler should be regularly and precisely cleaned at least once a week. After shutdown and cooling down of the boiler you should: 1. remove ash from combustion chamber and ash-pan, 2. remove soot from combustion chamber and ash-pan using wire brush, 3. clean smoke tubes and flue gas ducts with a brush, then remove soot from flue gas ducts, 4. remove deposited dust, ash, soot and fuel residues from external casing of the boiler.

Periodically check the tightness of the water system and tightness of doors of the boiler, flue and chimney. Tighten hinges or replace the gasket on the doors if necessary. Periodical inspections

should be performed once per year during standstill of the boiler. To execute inspection of the boiler and establish a scope of possible repairs the boiler should be precisely cleaned from the residues after combustion from the fire side.

Serious repairs of the boiler resulting from the incorrect operation, occurred failures or mechanical damages shall be carried out immediately when they are stated by the service.

Pay attention to tidiness in the boiler room. Any other objects, except these necessary for the operation of the boiler should not be stored there.

4.8. Safe operating conditions

- Execute heating system correctly in compliance with the requirements of the applicable standards.
- Fill the system with water correctly. Do not refill the system with cold water during operation of the heated up boiler.
- It is forbidden to operate the boiler if the water level in the system is below the level indicated in the central heating system user manual.
- Never use flammable liquids, e.g. petrol, for firing up.
- Do not extinguish the fire in the furnace by pouring it with water.
- Use suitable equipment and protective clothing (gloves, goggles, head protection, shoes) during work with the boiler and take special care during servicing of non-insulated components (e.g. doors), which may heat up to high temperatures resulting in risk of burn injuries.
- Do not stay on the side of the boiler during the opening of the doors and pay attention to flames.
- Take care of cleanness in the boiler room, ensure proper ventilation and remove corrosive and flammable materials located nearby.
- The boiler should be cleaned only when it does not work.
- Use mobile lamps supplied with a voltage lower than 24V during works connected with servicing of the boiler.
- Take care of the good condition of the boiler and hydraulic system.
- Take care of boiler cleanness.

5. BOILER OPERATION DISTURBANCES – BEFORE CALLING THE SERVICE

The customer will bear the costs of travel and work of the service technician in case of the unjustified calling of service. Therefore, before you call the producer's service please read the section concerning the most often occurring disturbances in boiler operation and methods of dealing with them.

Symptom	Cause	Repair
Smoke emitted to outside	insufficient chimney draught	remove leaks in chimney, flue or boiler doors
	insufficient chimney height	lift chimney to height min. 1.5 m over roof ridge
	too small chimney's intersection	adjust damper of the flue, decrease blowing force
	very low atmospheric pressure	use fan supporting chimney draught
	contamination of chimney flue	clean ducts
Low thermal efficiency of the boiler	combustion of low heat fuel	replace fuel with high heat fuel
	no supply of air to the boiler-room	facilitate correct air supply through the window or air supply duct
	failure of forced draught fan or controller	re-set parameters in compliance with the user's manual or replace with a new one - in good working order
	contamination of gas passes in smoke tubes chamber	clean passes, adjust damper
Moistening and tar deposits inside the boiler (symptoms similar to leak)	use of wood as a primary fuel in the heating process	use fuel recommended by the user's manual
	low temperature maintained in the boiler	użytkować kocioł w temp. min. 57°C
Leak	for assessment by the producer	repair by PEREKO service
Too high chimney's draught	—	adjust chimney draught with a damper in boiler flue
Too high fuel consumption	incorrect setting of parameters	service assistance
	Low quality of fuel	replace fuel
Fuel does not burn completely	bad quality of fuel	replace fuel

6. WARRANTY TERMS AND CONDITIONS

1. Envo sp. z o.o. with registered office in Starachowice ul. Radomska 76 is a producer of PEREKO boilers.
2. The warranty card is void without a date, stamp and signatures of the producer, retail outlet and the seller.
3. Copies shall not be issued if the warranty card is lost.
4. The warranty card or purchase invoice is the only documents authorising the purchaser for free warranty repair.
5. The beginning of the warranty period for the PEREKO boiler is the date of purchase confirmed by a proof of purchase.
6. The producer provides a warranty for tightness of heat exchanger in the central heating boiler for 60 months for the KSW Prima and KSW Master boilers, 72 months for KSW ALFA and KSW ALFA PLUS and 24 months for the components.
7. The producer provides a warranty for tightness of welding connections for 10 years.
8. Warranty for tightness of welding joints is not synonymous with warranty for tightness of the whole boiler and is applicable in case of leaks only on welding joints.
9. The producer reserves the right to make improvements or modifications without prior notice.
10. The warranty is prolonged by a period from the date of the notice of boiler repair to the date of its execution. Execution of the repair is confirmed in the warranty card and report from visit intended for removal of fault.
11. The producer will consider the claim within 14 days from the date of the notice.
12. During the warranty period the boiler can be replaced with a new one if the Producer (based on the decision of the authorized expert) decides it cannot be repaired.
13. Quality claims concerning the boiler should be made in sales location or directly to the producer at the address given in the warranty card.
14. The warranty does not cover boiler connection, clamping grips, heat doors, sealing cord located in the external doors and tools for servicing and cleaning.
15. Warranty for electronic temperature controller, fan and automatic coal feeding system is provided by their producer and it is enclosed to set of boiler documents.
16. The user shall bear the costs of travel and work of the service technicians in case of unjustified claim and groundless calling the service.
17. The above manual for the charging boilers is the property of ENVO sp. z o.o. It should not be copied and use by the other economic entity or natural person without written consent from the owner. All rights reserved.

NOTE! The producer does not accept any liability for effects of incorrect installation, incorrect operation of the boiler, non-observance of the recommendations included in the user's manual or incorrect maintenance of the equipment.

The warranty becomes void in case of:

1. Use of protections incompatible with PN-91/B-02413.
2. Incorrect connection in closed system acc. to the Journal of Laws of 2009, no. 56 item 461.
3. Incorrect transport and storage of the boiler.
4. Starting the boiler without sufficient amount of water.
5. Damages resulting from overheating of the boiler.
6. Repairs during the warranty carried out period by person and companies without authorization from the producer.
7. Damages resulting from non-observance of assumptions contained in the manual.
8. Exceeding allowable working pressure 1.5 bar.
9. Mechanical damages or intervention in the boiler structure by non-authorized persons.
10. Corrosion of steel components resulting from maintaining too low temperature of water - below 57°C with simultaneous use of incorrect, moist fuel.

SERVICE ASSISTANCE

Date	Comments	Signature

WARRANTY CARD

for hot water heating boiler used in the central heating system

Serial number

Type

Production date

QC mark

Warranty for tightness of welding connections of water casing in the boiler is provided for 10 years, 60 months for tightness of the heat exchanger for KSW Prima and KSW Master boilers and 72 months for KSW Alfa and KSW Alfa Plus boilers, and 24 months for the other components.

The beginning of the warranty period for the PEREKO boiler is the date of purchase confirmed by a proof of purchase.

.....
Sign and stamp of the producer

.....
Date of retail sale

.....
Sign and stamp of commercial unit

Producer:

Envo sp. z o.o.,

27-200 Starachowice, ul. Radomska 76, POLAND

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Technical support

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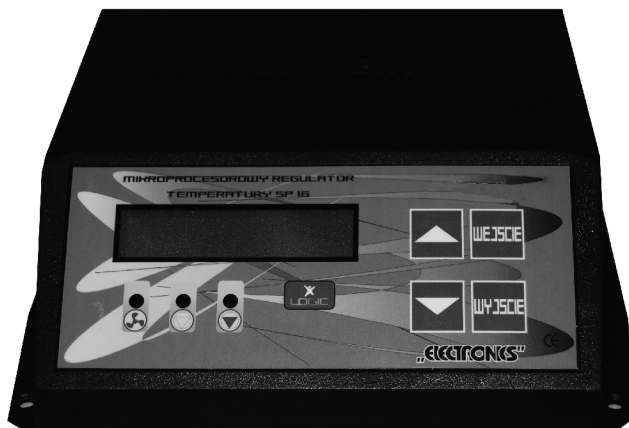
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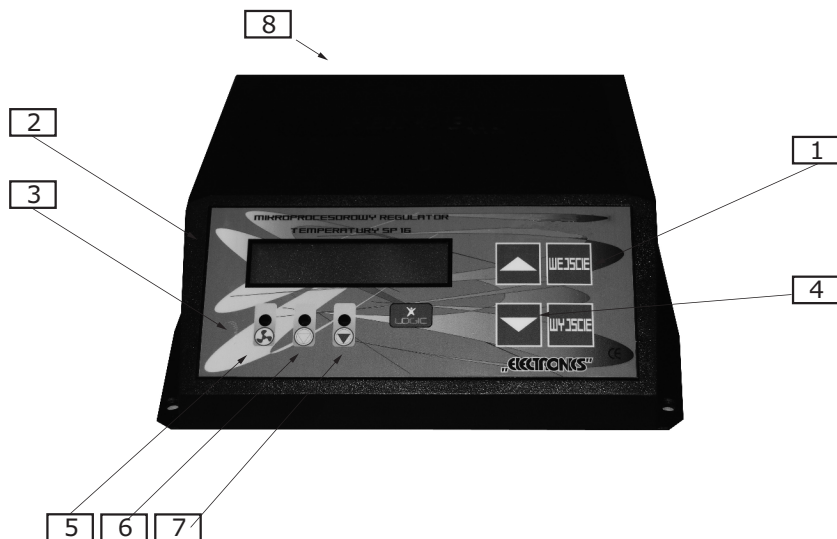
„ELECTRONICS“

**MICROPROCESSOR TEMPERATURE
CONTROLLER
FOR CENTRAL HEATING BOILERS
AND HOT SERVICE WATER BOILERS**

SP-16



1. Front panel description



Controller view with marked functions

1. Turning on (hold ENTER button for 2 sec.).
2. LCD display.
3. Indicator lights.
4. Device control buttons.
5. Blower start up indicator.
6. Central heating pump start up indicator.
7. Hot service water pump start up indicator.
8. 3,15 A fuse.

2. Application

Controller is equipped with innovative, intelligent Logic control system. This system consists in automatic adjustment of boiler power to current operating conditions. All regulation process is based on measurement of central heating temperature. Due to innovative solution enabling optimal fuel combustion in the boiler, it has the effect of reduction of harmful oxides emission into the atmosphere. With proper oxides aftercombustion and no overshoots, boiler equipped with our device can use up to 30% less fuel than standard solutions.

3. Controller operation

To start up the controller hold ENTER button. After controller start up, main page with following information is displayed on LCD:

Central heating (CH) temperatures

- current and set up

Hot service water (HSW) temperatures

- current and set

CH	22°C	Z	55°C
HSW	22°C	Z	45°C

From the main page you have the access to several functions, pressing (▲) enters into central heating temperature adjusting mode, you set up desired temperature with (▼) and (▲). When temperature decreases below 35°C (--) and ENTER button is pressed, central heating pump turns off. Controller enters SUMMER MODE, with only hot service water function.

However, if (▼) is pressed as first, you enter into setting up hot service water temperature. By pressing (▲) and (▼) you set up desired temperature. When temperature decreases below 35°C (--) and ENTER button is pressed, hot service water pump turns off.

Caution!!!

If installation is not equipped with hot service water pump you should turn off water heating function.

Pressing ENTER button confirms selected parameter and pressing EXIT button exits without saving previously made changes.

CH Temperature

Blower power

59°C
BLOWER POW. 30%

FUNCTIONS

- **MANUAL OPERATION** function is to fire up the boiler, it enables independent start up of controller and blower outputs.

MANUAL OPERATION

BLOWER

Pressing ENTER button turns on one of the outputs. With (▲) and (▼) you change output to be turned on or off. Pressing EXIT returns to set up menu.

- **HSW hysteresis** that function is to set up service water hysteresis, it consists in delaying HSW pump start up by set up number of degrees, i.e. hysteresis 2°, set up temperature 50°C - pump shall start up when service water temperature decreases to 48°C. This function works in HSW priority and summer mode.

HSW HYSTERESIS

HYSTERESIS TEMP.
HSW 2°C

- **PUMP START UP TEMPERATURE**

temperature at which circulation pump starts up is PLYNNIE adjustable within the range 30° - 5° C below temperature set up for the boiler, i.e. CH temperature is set up for 60°C, then range of pump regulation may be set between 30°C and 55°C.

PUMP START TEMP.

PUMP START TEMP.
35°C

- **CH/HSW PRIORITY**

CH/HSW PRIORITY

- **HSW PRIORITY** HSW pump starts up and works until achieves set up temperature. When services water reaches set up temperature HSW pump turns off and CH pump turns on.

HSW PRIORITY

- **CH PRIORITY** in this mode pumps start working when boiler temperature reaches temperature set up in pump start up function. (CH pump works permanently and HSW pump turns on after reaching desired temperature.) In this mode HSW temperature cannot be higher than CH temperature.

CH PRIORITY

- **MANUFACTURER SETTINGS** controller is equipped with programmed settings, you may return to them at any time. However, you should remember that all personal settings will be lost.

MANUF. SETTINGS

MANUF. SETTINGS
YES

- **END OF WORK** turns the controller off. To turn it on again press and hold ENTER button.

END OF WORK

END OF WORK
YES

Controller has got hidden installation menu, to get there press and hold (▲) and (▼) buttons for 3 seconds. Changes of parameters in that menu should be made by qualified person. Your changes of those parameters may cause controller misoperation.

INSTALLATION MENU

- **TURN OFF TIME** function is to set time which is measured when CH temperature does not increase and maintains 5°C below set temperature.

TURN OFF TIME

TURN OFF TIME
60 MIN

- **BLOWER START-UP** this function consists in setting 100% power of blower with time parameter (1sec. - 15 sec.) which, due to temporary loss of efficiency, has to be regulated. When you notice that the blower does not work correctly during start.

BLOWER START UP

BLOWER START UP
1.0 SEK.

- **ROOM REGULATOR** room regulator may be connected to the controller. It controls CH circulation pump. Two-core cable is led out from room regulator that should be connected to jack input. No external power sources should be connected to the device during installation of room regulator. When function is turned on, an arrow should appear on the display (upper right area). If room regulator is not connected to the device this function should not be turned on.

ROOM REGULATOR

ROOM REGULATOR
ON

CH 50°C Z 55°C ←
HSV 45°C Z 45°C

- **MAX. BLOWER POWER** this function is to limit maximum blower power. Maximum power should be limited when used fuel (pellet, oat) is too light and is blown around in combustion chamber due to huge fan power.

MAX. BLOWER POW.

MAX. BLOWER POW.
99 %

- **MIN. BLOWER POWER** function is to set up minimum fan power. Fan should be set up to work at minimum power. However, you should remember that fans lose their factory parameters as a result of use and soil. In that situation you should increase.

MIN. BLOWER POW.

MIN. BLOWER POW.
31%

4. Technical data

1. CH temperature adjustment range 35°C - 80°C.
2. HSW temperature adjustment range 35°C - 65°C.
3. Automatic blower adjustment.
4. Operation in ambient temperature 0°C - 40°C.
5. Automatic saving of settings during supply voltage decay.
6. Relative air humidity 95%.
7. I insulation class.
8. 3.15 A fuse.
9. Controller has got function preventing from premature freezing of installation, in case of temperature decrease below 6°C circulation pump starts up automatically.
10. Controller is equipped with secondary protection (emergency thermostat) which protects the boiler against overheating.

5. Use

1. Connect feeder of CH and HSW pump.
 - a) yellow-green conductor to earth terminal,
 - b) blue conductor to "N" terminal,
 - c) brown conductor to "L" terminal.
2. After connecting the blower, pumps and after installing all sensors turn the controller on.
3. Controller technical condition should be checked periodically.
After performing above actions the controller ensures:
 - a) Maintaining constant temperature of CH boiler set up by user.
 - b) Automatic start of pumps and blower.
 - c) Automatic shutdown of the blower and pumps after fuel use up.
 - d) Continuous readout of temperatures.

6. Error messages

Error 0 - Device failure.

Error 1 - EEPROM memory failure.

Error 2 - CH temperature sensor failure.

Error 3 - HSW temperature sensor failure.

Error 6 - Too high CH temperature.

Error 8 - Too high HSW temperature.

Error 9 - No fuel.

7. Fuse replacement

To replace the fuse disconnect the feeder from the socket.

8. Installation recommendations

1. Controller installation should be entrusted to authorized person.
2. Controller should be placed in location disabling it becoming heated above 40°C.
3. Perform installation in accordance with par. 5 (Use)
4. Device should be installed and operated in accordance with rules of operating electrical devices. Controller must not be exposed to water or to conditions causing steam condensation i.e. rapid changes of ambient temperature.
5. In cases of controller misoperation first check:
 - a) the fuse
 - b) connections stability and technical condition of cooperating devices, that means the blower, pumps.
 - c) Set the controller to manufacturer settings.
6. Boiler should have check valves installed in cycles of CH and HSW pumps.

CAUTION!!!

Perform connecting blower and circulation pumps motors only after disconnection of the controller from 230V supply network.

9. Electric parameters

- | | |
|-----------------------------------|-----------------|
| 1. Supply voltage | ~ 230 V / 50 Hz |
| 2. Power consumption (no ratings) | 2 W |
| 3. Output ratings: | |
| blower | 100 W |
| pumps: | |
| CH | 100 W |
| HSW | 100 W |

10. Warranty card

1. Manufacturer guarantees good quality of equipment, guarantee and post-guarantee services.
2. Manufacturer grants the guarantee of failure-free controller operation for the period of 24 month from purchase date.
3. Failures and damages revealed during warranty period shall be eliminated immediately, free of charge within not longer than 14 days from the day of delivering the device for repair at manufacturer location.
4. Shipment costs are incurred by the customer.
5. When making a complaint failure description should be attached.
6. Warranty does not include damages arose due to improper operation by the user or modifications and repairs performed not by service centre.
7. Seller is obliged to fill in the warranty card on the day of giving out the equipment. Warranty card which is not filled in or having any corrections or cross outs precludes exercising warranty rights.

Information on utilization of electric and electronic devices



This symbol placed on products or documentation attached to them informs that unserviceable electric or electronic devices must not be thrown away together with garbage. Proper behaviour in case of necessity of utilization, reuse or components recovery consists in handing over the device to specialized collection point where you shall not be charged. Proper utilization of the device enables preservation of valuable resources and avoidance of negative effect to the health and environment. Detailed information about the nearest collection point may be obtained from your local authorities.

date	The range of complaints	Signature and stamped

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Data	Zakres reklamacji	Podpis i pieczęć

..... Data sprzedaży	
..... Podpis Pieczęć punktu sprzedaży

Producent:
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Tadeusz Wilgocki

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