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General

DAKON s.r.o., thanks you for your decision to use this product.

Steel land-type boilers for pyrolysis DAKON KP PYRO were developed by Dakon engineers with cooperation only with the Czech companies based on requirements of customer. For DAKON KP PYRO boilers is issued declaration of conformity under the §13 art.2 No.22/1997 Statutes and § 5, art. 1 government decree No. 178/1997 Statutes.

Important Notes

- By proper reading of this handbook you will get important information about construction, safe operation, controlling and service.
- Read properly article about boiler installation before installing KP PYRO boiler.
- **Under the government decree No. 192/199 Statutes and ČSN 303-5:2000 KP PYRO boilers have to equipped with facilities enabling waste heat outlet (see the Fig. 4).**
- Check the delivery if it is complete immediately after you have unwrapped it.
- Please check, if the type of boiler agrees with asked using.
- Installation can do the specialist with valid authorization only.
- The producer is not responsible for faults and/or damages that have been caused by wrong installation.
- Keep all instructions when maintenance and cleaning.
- Connection of the boiler must comply with all valid standards, regulations and this handbook.
- In case of faults set the boiler back and organize removal of fault.
- In case of faulty turn to service technician. Repair made by non-expert user can cause damaging of boiler.
- Use only original spare parts for repairing of the boiler.
- For right function, safety as well as long-term operation the regular checking is recommended to be carried out **once per year** by some of our contact service firm. It is herewith protection of your investment.
- In case of the faults that have been caused by wrong installation and/or breaking of standards, regulations and instructions for operation and maintenance mentioned in this handbook, the producer is not responsible for faults and/or damages and the guarantee is not given for faults like those.
- When the boiler is out of order for a long time (switched off, breakdown) it is necessary to be very careful when switching on. Pump blocking, leak of water from the system or freezing the water in winter can happen in out of order boiler.

Operation

Land type boiler DAKON KP PYRO is gasification hot water boiler for wood determined for heating and preparing hot supply water for flats, family houses, plants and similar objects. Heater system can be with opened or closed pressure expansion tank without pump, using just differences between hot and cold water or with forced heating water circulation.

Description of the boiler

Construction of the boiler

Boilers are constructed for wooden logs maximum length 420 - 570 mm according the type of the boiler it is possible to use also wooden grafts and cubes but only with wooden pieces.

The boiler is welded from steel stampings, gauge 6 mm. In upper part of the boiler, there is a fuel bunker. In lower part, there is a combustion chamber with ceramic fittings. Upper part is from the lower part divided by ceramic jet. In the back side, of boiler there is a combustion collector with suction blower. At the front side there is an upper (stoking) door and lower door. Boiler body is insulated with mineral wadding stock which is under the lining. On the upper panel there is control board with control and regulating elements.

Primary air inflow is assured by regulation segments in side panels. The secondary air is preheated in the back side of combustion collector and led via tubes into the jet.

Water outlet and inlet is made by the tubes with external thread G 6/4" towing neck with external diameter 150 mm is placed at the back side on the combustion collector.

At the back lower boiler part, the boiler is equipped with neck for filling cock, which is a part of accessories.

Placement of parts in boiler

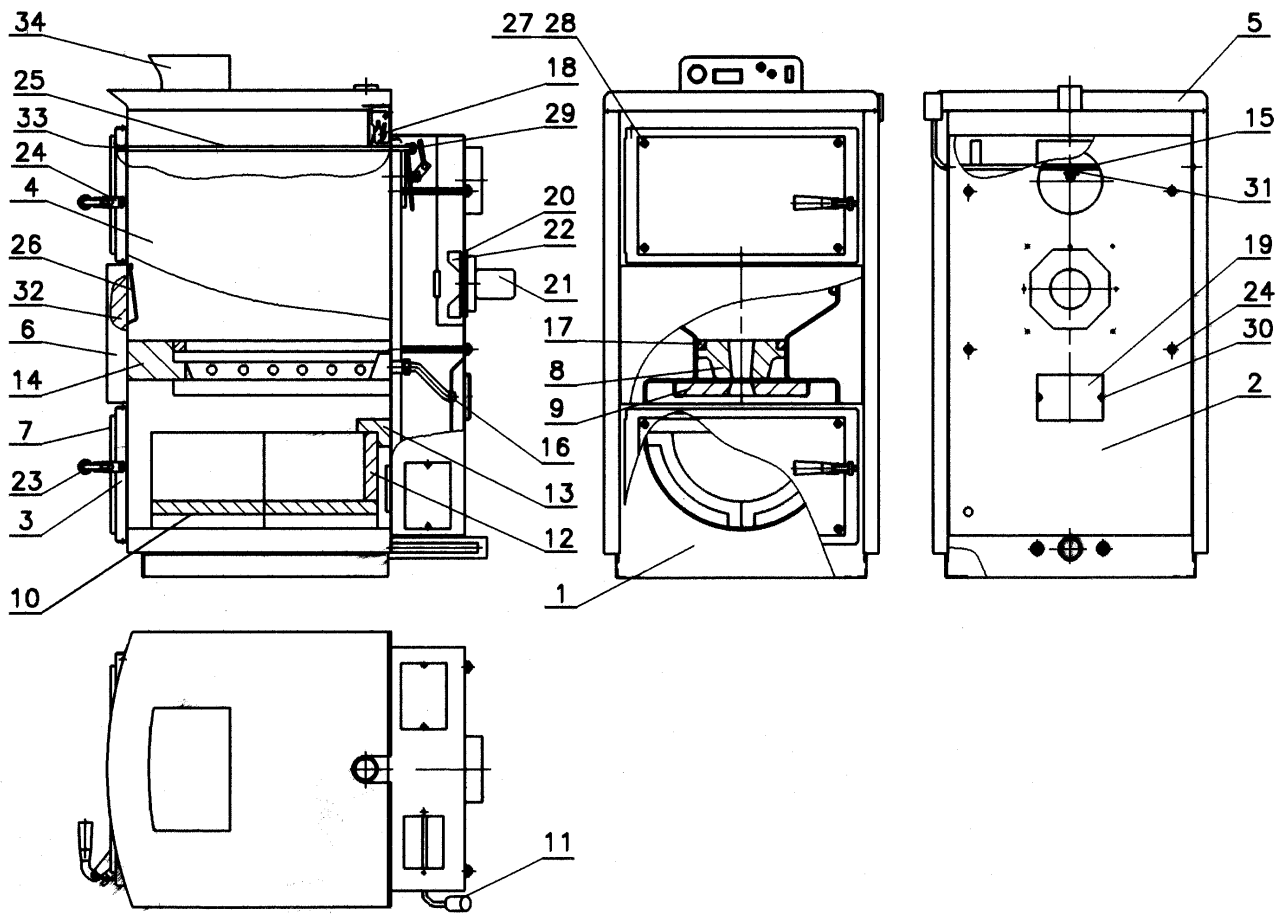


Fig. 1 Placement of parts in boiler

Legend fig. 1

1	Boiler body	13	Cube small	25	Micro switch spring
2	Combustion collector	14	Cube large	26	Protector
3	Door	15	Flap bar	27	Door cover screw
4	Side panel	16	Secondary tube	28	Awl base
5	Upper panel	17	Jet packing cord	29	Nut M10
6	Front panel	18	Micro switch	30	Fly nut M6
7	Door cover	19	Combustion collector cover	31	Pin 4x30
8	Jet	20	Blower flange	32	Front insulation
9	Flat plate	21	Suction blower	33	Pin 2x20
10	Bath	22	Blade wheel	34	Control board
11	Flap weight	23	Handle		
12	Large crescent	24	Handle		

Parameters of boilers

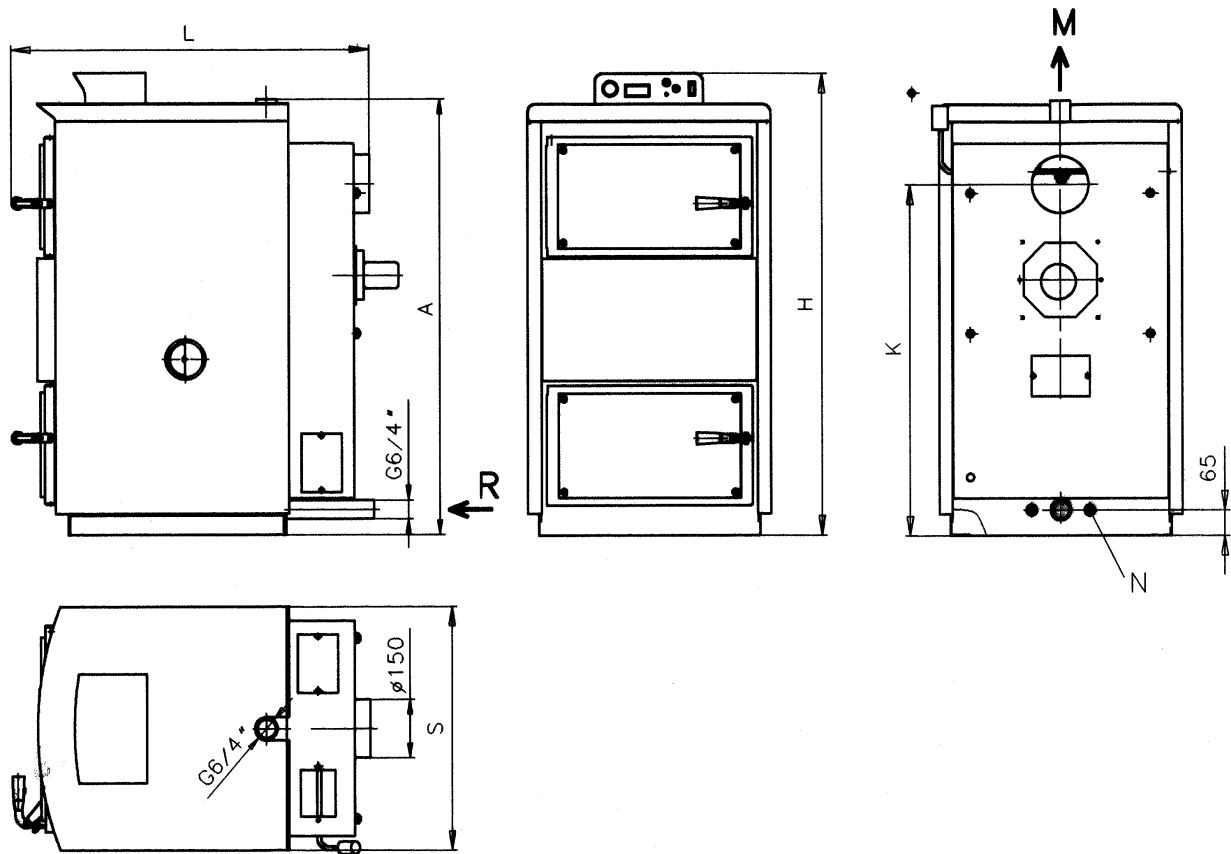


Fig. 2 Parameters of boilers

M - heating eater output
 R - heating water input
 N - filling

Parameter	Diam.	KP 18 PYRO	KP 24 PYRO	KP 32 PYRO	KP 38 PYRO
Total height	H (mm)	1185	1185	1250	1250
Boiler width	S (mm)	626	626	686	686
Boiler depth	L (mm)	935	1035	985	1085
Chimney flue height	K (mm)	900	900	975	975
Heating water outlet	A (mm)	1115	1115	1185	1185
Heating water inlet	B (mm)	65	65	65	65
Heating water connection		G 6/4 " external			
Chimney flue connection	(mm)	150			

Technical parameters

Technical data		KP 18 PYRO	KP 24 PYRO	KP 32 PYRO	KP 38 PYRO
Data specification	MJ				
Nominal Output	kW	21	25	33	36
Output range	kW	8-21	12-25	13-33	15-36
Boiler Claas	-	2			
Efficiency	%	78-85			
Combustion temperature - nominal output - minimum output	°C	200 100			
Combustion discharge - nominal output - minimum output	kg/s	12,31 3,95	15,08 4,66	17,05 5,36	19,78 6,04
The hydraulic lost of boiler	mbar	See the hydraulic lost of boiler			
Burning period when nominal output	hrs	2			
Fuel bunker capacity	l	66	86	114	138
Filling hole dimensions - semicircle width x height	mm	430x240	430x240	520x280	520x280
Maximum logs length	mm	430	540	480	580
Water capacity of the boiler	l	76	90	107	124
Maximum operating overpressure	bar	2			
Maximum operating temperature	°C	95			
Heating water connection	Js	G 6/4 external thread			
Coolant loop connection	Js	G 1/2 external thread			
Asked chimney effect	mbar	0,20	0,23	0,25	0,28
Boiler weight	kg	310	350	375	410
Towing neck diameter	mm	150	150	150	150
Electric covering	IP	21			
Electric input power	W	50			
Consumption when nominal output, wood, damp 20%	kg/hour	5,7	7	8,5	10

Boiler accessories

Basic accessories

Hand book	1 pc	Fire hook	1 pc
Guarantee card	1 pc	Scraper	1 pc
Service companies list	1 pc	Ladle board	1 pc
Filling cock	1 pc	Air blower	1 pc
Control board	1 pc		

Special accessories

Thermostatic valve TS 130-3/4 “ ZD DAKON (Honeywell) or thermostatic valve STS 20 (WATTS).
The parts are delivered only if there is a purchase order.

Thermostats

Honeywell CM 67 (24 V/230V, adapting mode, week period)
Honeywell CM 27 (24V/230V, week period)
Honeywell CM 17b(24V/230V, week period)
Kovopol REGO 97201 (230V. ON/OFF)

Recommended accessories

Blender DUOMIX and MIX Komexterm Praha
Blender cock ESBE REMARK Trade Rožnov pod Radhoštěm
Thermostatic valve REMARK Trade Rožnov pod Radhoštěm

Diagram of hydraulic losses of KP PYRO boilers

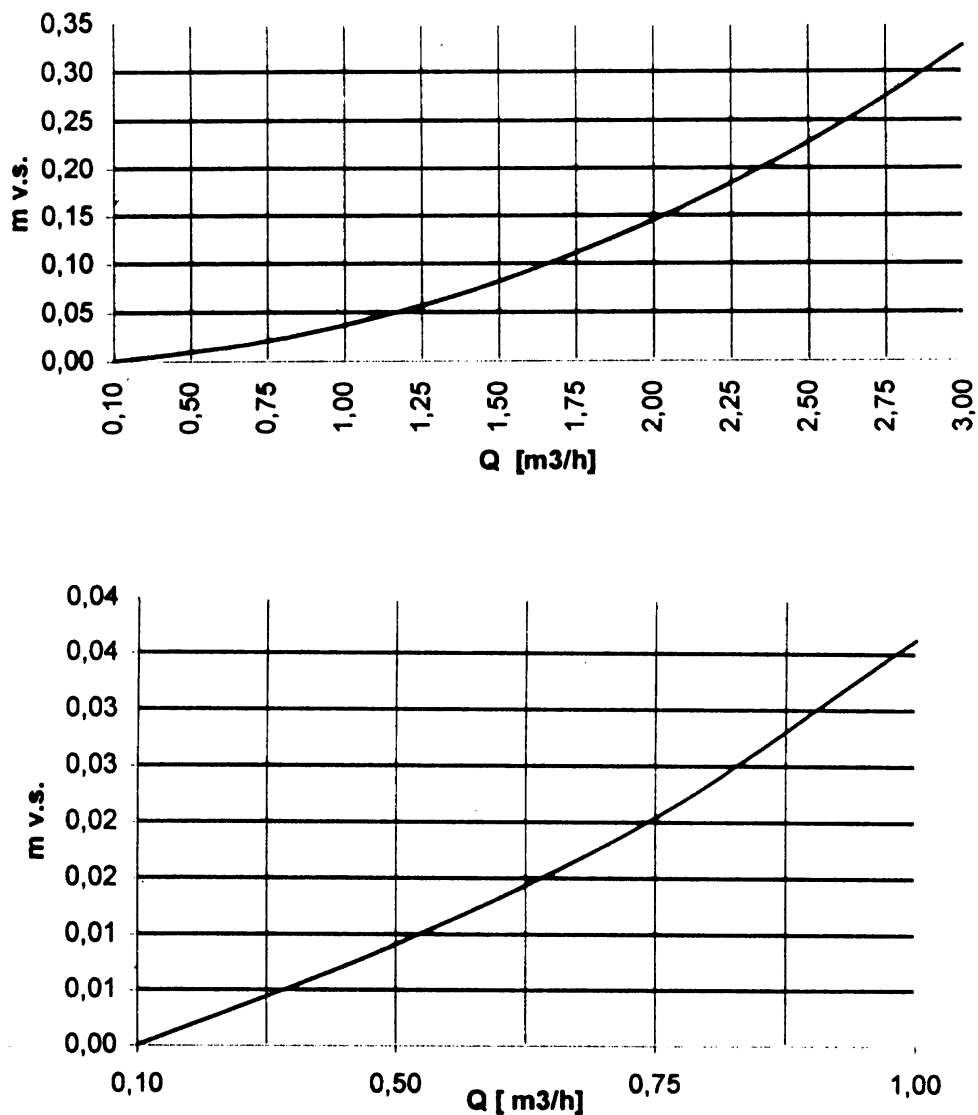


Fig. 3 Diagram of hydraulic losses of boilers KP PYRO

Spare parts

Position	Name	KP 18	KP 24	KP 32	KP 38
1	Boiler body	2672 0001	2674 0001	2676 0001	2678 0001
2	Combustion collector	2672 0002	2674 0002	2676 0002	2676 0002
3	Door	2670 0003	2670 0003	2676 0003	2676 0003
	Door isolation	2670 0050	2670 0050	2670 0051	2670 0051
	Door packing cord	2672 0004	2672 0004	2676 0004	2676 0004
	Door hinge	2670 0005	2670 0005	2670 0005	2670 0005
	Door pin	2672 0006	2672 0006	2676 0006	2676 0006
4	Right side panel	2672 0007	2674 0007	2676 0007	2678 0007
	Left side panel	2672 0008	2674 0008	2676 0008	2678 0008
5	Upper panel	2672 0009	2674 0009	2676 0009	2678 0009
6	Front panel	2672 0010	2672 0010	2676 0010	2676 0010
7	Door cover	2672 0011	2672 0011	2676 0011	2676 0011
8	Jet body	2672 0012	2674 0012	2676 0012	2678 0012
9	Flat plate - long	2672 0013	2672 0013	2674 0013	2674 0013
	Flat plate - short	2672 0014	2674 0014	2674 0014	2678 0014
10	Furnace side-long	2672 0015	2672 0015	2676 0015	2676 0015
	Furnace side- short	2672 0016	-	2676 0016	-

WARM - WATER BOILER FOR PYROLISYS KP PYRO

11	Flap weight	2600 2223	2600 2223	2600 2223	2600 2223
12	Crescent large	2672 0018	2672 0018	2676 0018	2676 0018
13	Cube small	2672 0019	2672 0019	2676 0019	2672 0019
14	Cube large	2672 0020	2674 0020	2676 0020	2678 0020
15	Flap bar	2672 0021	2672 0021	2676 0021	2676 0021
16	Secondary tube	2672 0022	2672 0022	2672 0022	2672 0022
17	Small jet packing cord	2670 0023	2670 0023	2670 0023	2670 0023
	Large jet packing cord	2672 0024	2672 0024	2676 0024	2678 0028
18	Micro switch	2670 0025	2670 0025	2670 0025	2670 0025
19	Combustion collector cover	2670 0026	2670 0026	2670 0026	2670 0026
	Upper insulation	2670 0053	2670 0053	2670 0054	2670 0054
20	Air blower flange	2670 0027	2670 0027	2670 0027	2670 0027
	Flange packing	2670 0055	2670 0055	2670 0055	2670 0055
21	Suction blower	2670 0028	2670 0028	2670 0028	2670 0028
22	Blade wheel	2670 0029	2670 0029	2670 0029	2670 0029
23	Door gate	2300 3055	2300 3055	2300 3055	2300 3055
24	Handle	2670 0031	2670 0031	2670 0031	2670 0031
25	Flap draw bar	2672 0032	2674 0032	2676 0032	2678 0032
26	Protector	2670 0045	2670 0045	2670 0045	2670 0045
27	Door cover screw	2670 0034	2670 0034	2670 0034	2670 0034
28	Awl base	2670 0035	2670 0035	2670 0035	2670 0035
29	Nut M10	2670 0036	2670 0036	2670 0036	2670 0036
30	Fly nut M6	2670 0037	2670 0037	2670 0037	2670 0037
31	Pin 4x30	2670 0038	2670 0038	2670 0038	2670 0038
32	Front isolation	2672 0039	2672 0039	2674 0039	2674 0039
33	Door spring	2670 0040	2670 0040	2670 0040	2670 0040
34	Control board	2672 0041	2672 0041	2672 0041	2672 0041
	Boiler thermostat TG 200	7109 0369	7109 0369	7109 0369	7109 0369
	Boiler thermostat knob	2670 0056	2670 0056	2670 0056	2670 0056
	Thermostat base	2670 0057	2670 0057	2670 0057	2670 0057
	Blocking thermostat LY 36	7129 0395	7129 0395	7129 0395	7129 0395
	Minimum thermostat TY 32	2672 0057	2672 0057	2672 0057	2672 0057
	Green switch	3100 1093	3100 1093	3100 1093	3100 1093
	Fuse case	2600 2263	2600 2263	2600 2263	2600 2263
	Condenser 1uF/400V	2670 0042	2670 0042	2670 0042	2670 0042
	Panel pin	7161 0453	7161 0453	7161 0453	7161 0453
	Panel spring	7162 0454	7162 0454	7162 0454	7162 0454
	Left inner plate	2672 0058	2674 0058	2676 0058	2678 0058
	Right inner plate	2672 0059	2674 0059	2676 0059	2678 0059
	Filling cock	7177 0631	7177 0631	7177 0631	7177 0631
	Jet body insulation	2672 0060	2672 0060	2672 0060	2672 0060

Address for ordering spare parts and accessories:

DAKON s.r.o.
Spare parts store
Ve Vrbině 588/3
794 01 Krnov-Pod Cvilínem

+420 554 694 150-1 spar parts store
+420 554 694 111 switchboard
+420 554 694 333 fax
e-mail : dakon@dakon.cz
Internet : www.dakon.cz

Into the order enter:

- Boiler type
- Name of spare part
- Position number and code
- Back address

Example: KP 24 PYRO, serial number 0123, Upper panel, 2674 0009

Boiler installation

- It is allowed to install the boiler only by special service firm with valid certificate.
- There has to be project for installation under the directions ČSN EN 303-5.
- When installing keep ČSN 06 1008 directions.
- Installation has to correspond to all directions, valid rules and handbook.
- Boilers can be used in “basic background”, they can be placed in boiler room, where is enough air fro combustion.
- It is not allowed to place the boiler in the corridors, halls and others habitable rooms.

The right size of boiler

Choice of right size of boiler, it means its output is a very important condition for economical operation and right boiler function. It is necessary to chose such boiler, which output corresponds heat losses of heated object.

Nominal boiler output is for out temperatures -12°C, -15°C and -18°C. If you choose the boiler with too big nominal output, it cause the higher tarring. It is not recommended to use boilers with bigger output, than heat losses of heated objects.

Boiler placement

- It is allowed to install boiler in basic background.
- The smallest distance of boiler and flue from hard and mean combustible materials (see the annexes-ignitability of building materials) is 100 mm.
- The smallest distance of boiler and flue from easy combustibile materials is 200 mm.
- The distance of 200 mm has to be kept in case, when the ignitability is not sure.
- It is necessary to place the boiler on incombustible floor or base overlapping the boiler basic. In the front side at least 300 mm, the other sides about 100 mm.
- It is recommended to fix the corner with a water outlet higher by 100 - 155 mm for better cleaning. There has to be constant air flow for combustion in the room where the boiler is.

Caution!

When danger of explosion, fire, combustion gases or vapours (e.g. linoleum or PVC sticking) the boiler has to put out off the operation or stopped.

Boiler assembly

Place the boiler body. Inlet and outlet is shouldered by external thread G 6/4”. Connect the heating water to the pipe in the upper part of the boiler body, circulating water to the pipe at the back side of the boiler. Screw into the hole pipe G 1/2” at the back side of the body the escape valve. Connect the boiler with the chimney with flue pipe inner diameter 150 mm.

On the right side and the left side, there has to be access minimum 0,2 and in front of the boiler minimum 1 m for repairs and assembly. It is recommended to keep these instructions, important for right function and longer operational life.

- When pyrolysis (gasification) arises in stoking chamber tar and condensation (acid), it is necessary to install thermo regulating valve to keep minimal temperature of circulating water up to 60 °C, operational temperature of water in boiler has to be between 80-90 °C.
- Ecological operation is by the nominal output.
- It is not allowed to operate boiler constantly when output lower than 50 %.
- When lower output (heating of supply water) daily making fire is necessary.
- It is recommended to install boiler with retention basins.
- If connection the boiler to the accumulation is not possible, it is recommended to install one of the compensating basins of capacity at least 200 l. (e.g. indirect heating boiler for hot supply water heating). Compensating basin is able to seat redundant heat fro hot supply water heating and reduce the risk of boiler overheating.

When not keeping all mentioned directions and rules is possible notable shortening of operational life of body and ceramic fittings. Operational life of boiler body is very lower and it can be rusted within two years.

Coolant loop connection

The boiler has to be equipped under the government direction No. 182/1999 statutes and direction ČSN EN 303-5 with equipment enabling safe exhaust of the spare heat without any additional energy, to be kept the water temperature maximum 110°C (equipment protection against overheating). For this purpose is boiler equipped with coolant loop put into boiler body. By boiler assembling the coolant loop has to be completed with thermostatic valve type TS 130-3/4ZD (Honeywell) or STS 20 (WATTS) which is possible to order as an independent boiler accessory. Valve connection is necessary to carry out strictly according Fig. 4. Loop is equipped by the external thread type G 1/2" at the outlet and inlet as well.

The maximum overpressure of coolant eater is 2 bar. There has to be put a filter before the coolant water enters into the valve.

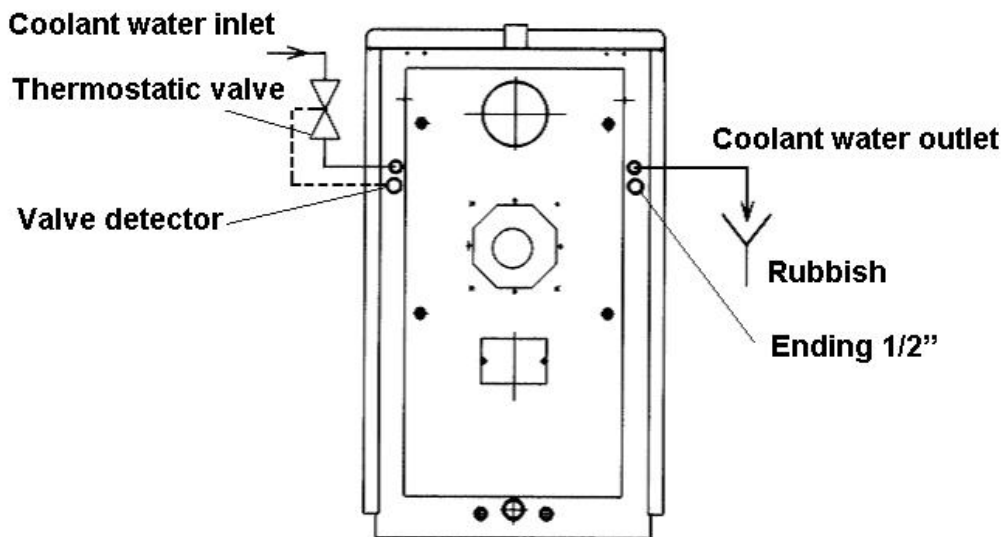


Fig. 4 Coolant loop connection

Chimney attachment

The boilers in central heating system have to be attached to independent chimney flue. The chimney with proper flue is necessary for a good boiler function. It influences output and efficiency.

Recommendation

There should be multiplayer chimney from material resistant to acetic acid for wood combusting to avoid permanent combustion condensation in the chimney.

Attachment of chimney to the flue pipe

Rivet on the flue pipes on the chimney branch with a rivet of diameter 5 mm. The flue pipe is recommended to be as short as possible with upper pitch of the boiler. Flue pipe fixed only in flue and put on the chimney branch neck has to be assembled very well not to detach spontaneously. The pipe is not recommended to be longer than 1,5 m. All parts of flue pipe has to be from incombustible materials.

The chimney attaching has to be carry out under ČSN 73 4201:02 with agreement of Chimneysweep Company. Considering the boiler flue blower it is necessary to ensure proper leak of flue pipe.

You can see the proper chimney sizing in this diagram

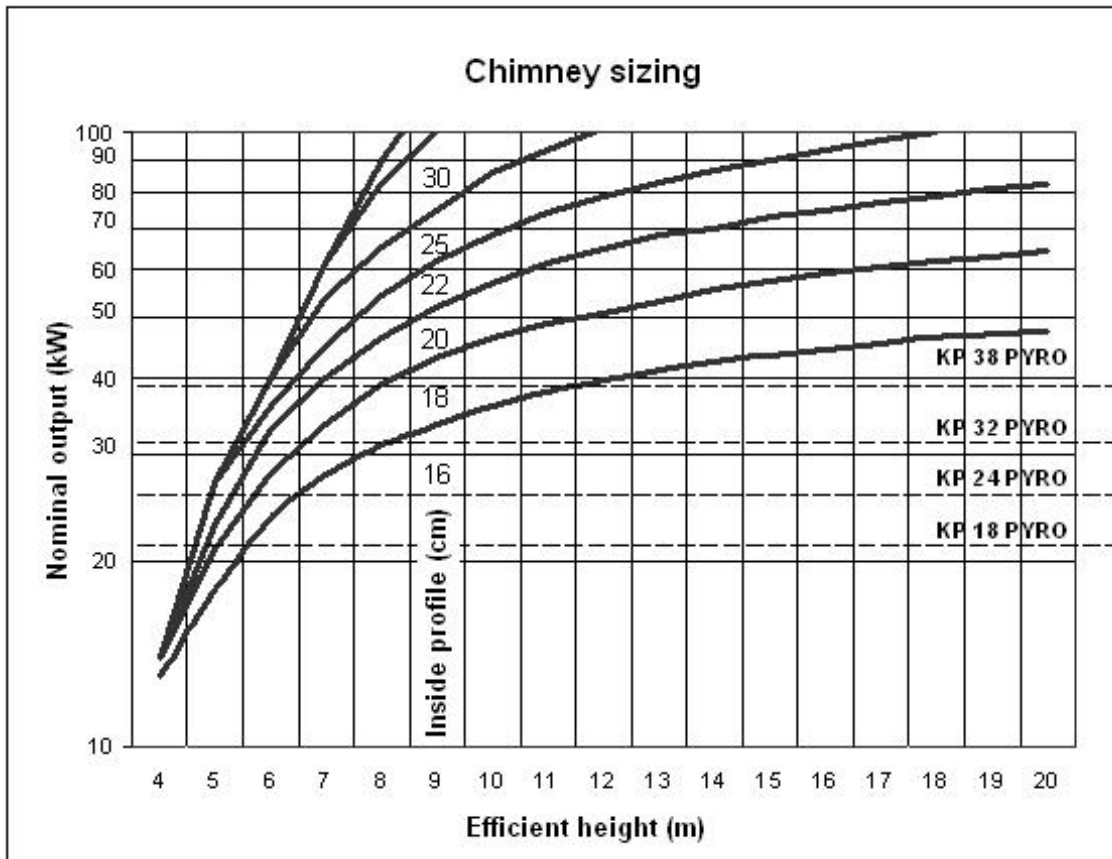


Fig. 5 Chimney sizing

Electrical net attachment

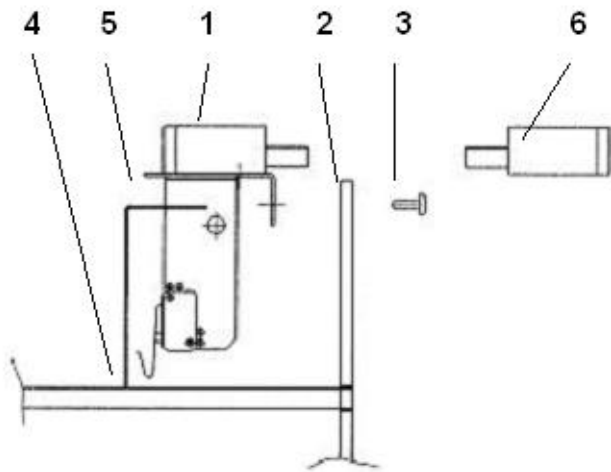
Plug the boiler in the socket with the net plug. Appliance has to be placed the plug is available to service (under ČSN EN 60335-1:1997).

Control elements installation

Control board is in separate box. After boiler assembling is necessary to fix it on the boiler casing and install the thermostats into the catchments.

- Take the control board out of the boxes.
- Separate the upper panel from the boiler the way up.
- Put the thermostat detectors and handle with seven-pole base through hole in upper panel and fix the control board with the fly nuts on the upper panel.
- Put the thermostat detectors into the catchments at the back upper part of the boiler and fix them with the spring.
- Screw in the back side of the boiler handle with seven-pole base.
- If there is a micro switch on the handle, screw the handle on the draw bar side. The handle with base is possible to use as a conduction of moving slider (yoke) on the draw bar.
- If there is not a micro switch on the handle with base, screw the micro switch to the handle at the upper part of the boiler.
- Put the upper panel with control board on the boiler.

For any interference in control board cabling (attachment of pump or space heater) is necessary to slacken fly nuts fixing control board and screw out the screws fixing upper part of control board to lower part.

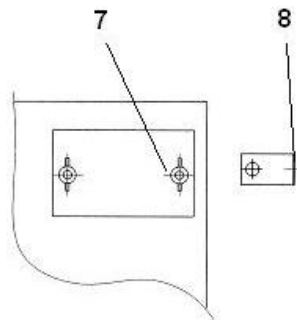


- 1 - Handle with base
- 2 - Basic boiler plate
- 3 - Screw
- 4 - Lap drawing bar
- 5 - Draw bar yoke
- 6 - Air blower base

Fig. 6 Installation of seven-pole base with handle

Suction blower installation

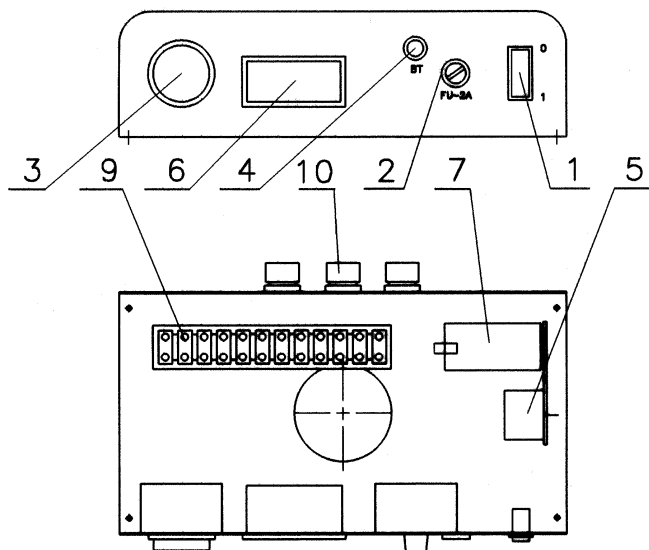
The suction blower is screw in the blower flange and packed in box, which is a part of boiler accessories. Take the blower with the flange and flange packing out of the box. Put the packing on the combustion collector and screw the flange with the blower with the fly nuts to have the net input from the blower on the right or the left side of the plumb. Fix the handle with the cables on the combustion collector cover screw (Fig. 7). The air blower seven - pole base put in the control board base.



- 7 - Combustion collector cover fly nut
- 8 - Air blower cabling holder

Fig. 7 Air blower cabling holder

Control board



- 1 - Switch
- 2 - Fuse case
- 3 - Boiler thermostat
- 4 - Blocking thermostat
- 5 - Minimum thermostat
- 6 - Thermometer
- 7 - Condenser 1uF/400V
- 8 - Terminal plate
- 9 - Bushing

Fig. 8 Control board

Electro diagrammatic plan

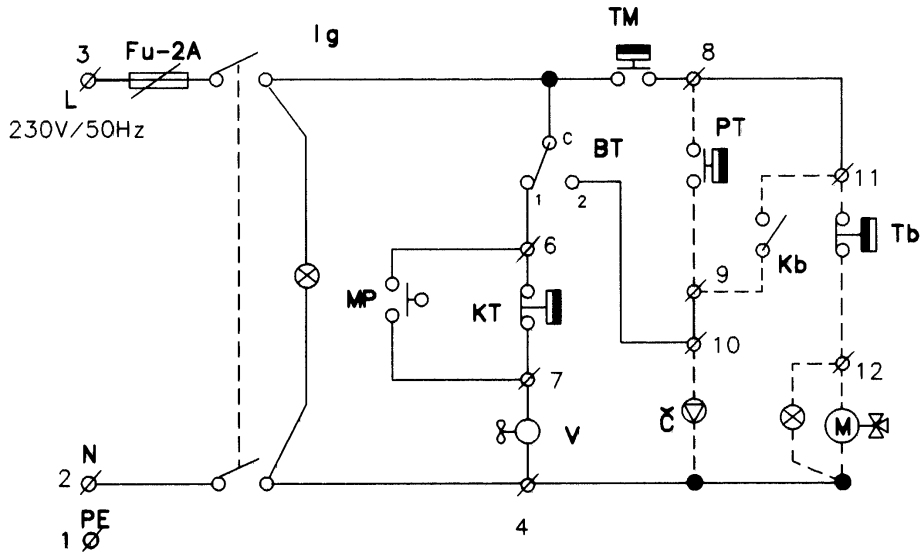


Fig. 9 Electro diagrammatic plan

Legend :

- | | | | | | |
|-------|-----------------------|----|----------------------|----|------------------------|
| Ig | - main switch | TM | - minimum thermostat | Kb | - boiler valve contact |
| BT | - blocking thermostat | MP | - door micro switch | KT | - boiler thermostat |
| Č | - pump | PT | - space heater | V | - blower |
| Tb | - boiler thermostat | Fu | - fuse 2A | M | - three-way valve |
| ----- | not basic accessory | | | | |

Cable attachment

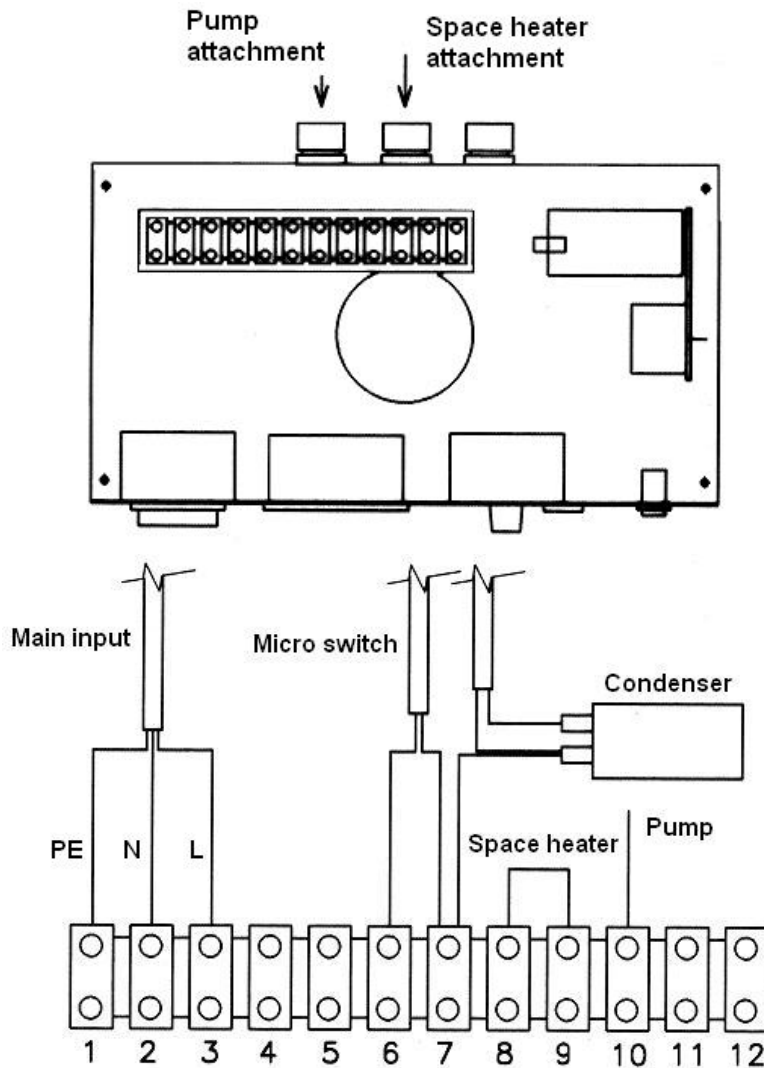


Fig. 10 Cable attachment

Boiler function, service and operation

Putting into operation

Putting into operation, service and possible repairs is allowed to do such service technician only, which has valid certificate from producer. When making fire for the first time check whether the heating system is filled by heating medium and vented.

Obligations while putting into operation :

- Check and compare the installation with project and revision.
- Check whether the heating system is filled by heating medium and vented.
- Carry out the leakiness test of heating circle.
- Check the flue gas installation.
- Check the heating regulation.
- Familiarize the user with boiler operation and service.
- Write down the putting into operation into the guarantee card.

Boiler operation

Making fire with determined fuel

Making fire

Open the upper stoking door. Put the paper and enough wood on the jet, open the lower door. **Open the chimney flap** (draw the flap weight in the way to you). Burn prepared set. Turn down upper door (do not close) switch on the main switch on the control board. If the boiler is attached to an electrical network, the main switch will light up. Opened upper door will put into operation suction blower, which reduces the furnigation from the feeding hopper. After flaring fill up the chamber with the fuel, close lower door and then upper door. **When closing the door, chimney flap closes as well** (make a control - flap weight slides to the back side). The boiler starts to operate in pyrolysis regime. Since that time is boiler controlled by regulation elements setting thermostat) on the control board.

Combustion air regulation

Air feed by the DAKON KP PYRO boiler is divided into two separate circulations, primary and secondary. Primary air directly consists with boiler output. Carry out the primary air regulation by hand setting the regulation segment position in side panel. The secondary air is pre warmed in combustion collector and led through the pipes directly into jet. When boiler is running to reach nominal output, leave the regulation segments opened. When reaching minimal output turn down regulation segments in side panels after flaring.

Stoking

If there is proper temperature in the boiler, the does not work. **Open the chimney flap** (draw the flap weight in the way to you). Open the upper door and wait for the moment to reduce the furnigation from the feeding hopper. When opening upper door the blower starts working. Open the door after that. Match and poke the charge with the fire hook (which is a part of basic accessory) and fill the fuel. To protect from useless smoke stoke the fuel when the original is burnt from about 1/3. To protect immediate burning and combustion evolving cover the flaming coal with wide log.

Close the door after stoking. **The chimney flap closes when closing the door** (make a control - flap weight slides to the back side).

You can reduce the furnigation from the feeding hopper by shortening stoking period.

Heat Constant Operation (keeping fire overnight)

Heat constant operation is such operation, which enables to keep the fire overnight, without need of output into heating system.

To keep the fire overnight do following :

- Fill the fuel bunker with logs (put them on the flaming fuel).
- Turn down the blending valve. Temperature of the water in the boiler increases up to 80 - 90 °C.
- By regulation segments in side panels turn down the primary air input.
- Switch of the main switch on the control board.

The boiler prepared this way can burn more than 12 hours. After stoking the new fuel, opening primary air input and activating the blower by switching the main switch on, the boiler will run in a short time.

Notice:

Water temperature in the boiler has to be about 80 - 90 °C when keeping the fire overnight. When the temperature is lower, tarring is higher and when the temperature is less than 60 °C there arises condensate in stoking chamber. When keeping the fire overnight with temperature lower than 60 °C often, operational life of the boiler is lower.

Ash removing from the boiler

By the pyrolysis arises less ash than in heating in usual boilers. Clean the boiler once per 1-3 days. Ash lodges on the ceramic fittings in combustion space. **When there is a bigger mass of ash in the combustion space, there is not enough space for burning and boiler can overheat and damage.**

Notice:

Remove the ash only case when there is not flame in stoking chamber. It means at the beginning of the stoking. **Pressure conditions in boiler change when opening lower door and boiler starts to furnigate surrounding space from the regulation segments and side panels.**

Carry out the cleaning of the boiler following way:

- Open the stoking door and sweep the rest of combustion in the jet into the lower space.
- Open the lower door and take out the front combustion space crescent.
- Take out the ash from the fitting interior with paddle.

When cleaning switch on the main switch on the control board. Put into operation suction blower, which sucks the ash dust.

Once per 14 days carry out the proper boiler cleaning. Take out the front part of lower fitting and sweep out the ash from the combustion space. Suction blower causes removing the ash by combustion flow and ash subsides in the back part of collector. It is suitable to open one cover in lower side part of combustion collector and sweep the ash out.

Regular and proper cleaning is important for operational life of the boiler. When you do not clean the boiler properly, it can cause serious damage and **guarantee passes**.

Wood combustion

Determined fuel is dry cleft timber and log wood diameter 100 mm and maximum dampness 20 %. Length of logs and clefts is from 430 mm to 580 mm (according the boiler type – see the technical dates) and heat value from 15 to 17 MJ/kg.

The wood has to be dry! Bigger dampness causes lower output, increase tarring and causes lower operational life of the boiler. The output and function of the boiler is guaranteed when dampness is maximum 20%.

Energetic capacity of usual wood types

Wood	Heating capacity for 1 kg		
	kcal	MJ	kWh
Spruce	3900	16,25	4,5
Pine	3800	15,8	4,4
Birch	3750	15,5	4,3
Oak	3600	15,1	4,2
Beech	3450	14,4	4,0

Regulation segment position in side panel during operation:

(Wooden logs fro fuel of determined length maximum dampness 20% according the boiler type)

Position of regulation segment in side panel	Output	Burning period of setting (hours)
Fully opened	Nominal	2,0
Half opened	70% of nominal output	3,0
Closed	Minimum output	5,0

Boiler setting back

To make the shutdown leave burn the rest of the fuel in the fuel bunker. It is not recommended to speed up the process.

Long time boiler shutdown

For long time shutdown (e.g. the end of heating period) clean the boiler properly to avoid corrosion cause by dump in black and flue ash. If the boiler is out of operation in the winter, it is possible that water in heating system can freeze. Release the water or infuse the system with antifreeze.

Operation

The boiler can operate only the adult persons which are made familiar with instructions and operation the boiler. It is allowed to put the boiler into operation, set the determined temperature of the heating water, put the boiler out of the operation and check the operation by service technician only. Acquainting with function and servicing the boiler is obliged to do service technician after putting into operation. Leaving children alone near working boiler is prohibited. Operate the boiler with maximum temperature 90 °C and check the boiler occasionally.

When danger of explosion, fire, combustion gases or vapours (e.g. linoleum or PVC sticking) the boiler has to put out off the operation or stopped.

Condensation and tarring

Before the soot settles down on the inside walls of the boiler, some condensate appears on the walls. The condensate runs down. The boiler stops condensing after the fire was made two up to four times after setting the ash on the boiler walls. Also at low output heating usually less than 60 °C and damp fuel the condensate in combustion is formed and condensate runs down on the cold boiler walls. Low temperature heating is not good for operational life of chimney body either.

Tarring appears at similar conditions (low output, low temperature) and in addition at not right adjusted burning - little combustion air. It is possible to scrape off the tar only while it is warm i.e. at temperature of the water min. 85 °C.

To avoid condensation and tarring it is necessary to run the boiler at outlet temperature of heating water from 80 to 90°C and secure the temperature of circulating water to be more than 60°C.

The safety of boiler operation

Keep all safety rules and directions while boiler installation and operation, especially ČSN 06 1008.

- It is necessary to place the boiler on incombustible floor or base overlapping the boiler basic. In the front side at least 300mm, the other sides about 100 mm.
- The boiler can operate only the adult persons which are made familiar with instructions and operation the boiler. Leaving children alone near working boiler is prohibited.
- It is prohibited to use combustible liquids for making the fire and increase nominal output during operation (overheat) do not storage or leave any combustible materials and objects near the ash hole. Leave the ash in incombustible containers with cover.
- The boiler can operate with open expansion vessel for maximum 95 °C working boiler has to be checked occasionally.
- Keep instruction in handbook. Interferences jeopardizing health are not allowed.
- Examples of ignitability are named in schedule in annexes of handbook.
- Do not put any combustible objects on the boiler and do not leave any combustible objects near the boiler (less than safety distance).

Main conditions for a good function and operational life of boilers for pyrolysis

- Install the boiler in the wet and well ventilated place.
- Operate the boiler, when the outlet temperature of circulating water is 80 - 90 °C.
- Use equipment (mixing valve, e.g. Laddomat 21- company ATMOS) ensuring minimum temperature of circulating water 65 °C (when the water temperature increases, condensing tar and acids are lower, it means longer operational life).
- When the boiler operates and the output is lower than 50% of nominal or only for heating supply water in summer, daily making fire is necessary (because of operational life)
- It is necessary to clean fuel bunker from the tar regularly.
- The chimney has to have determined draught. (according the type-see the Handbook). It has to be well calked and insulated not to condensate water vapor and tar in chimney when low output.
- As a **passive protection**, we recommended to use a liquid with a low freezing point and anticorrosive effect – FRITERM.

When not keeping these instructions, the guarantee passes and operational life shortens.

Faults and remedy

The user is allowed to carry out only those repairs consisting in simple exchange of panels, lining bricks, packing cord. The other possible fault can remove service firm named in list only, which is delivered as an annex of handbook. Use only original spare parts.

Fault	Cause	Remedy
The output is insufficient	Insufficient fuel heating value, dampness higher than 20%	Use determined fuel with proper dampness
	Fouled or damaged blade wheel	Clean or change blade wheel
	Not enough primary air	Check the position of regulation segments in side panels
	Clinked jet	Clean the hole in jet by the fire hook
High temperature of water in the boiler and at the same time low temperature in radiators	Too big hydraulic resistance	Increase pump rotation speed
	Wrong setting of mix-valve behind the boiler.	Change the setting of mix valve by changing position of regulation lever
High temperature of water in the boiler, water is boiling	Too high draught	Reduce requirement fro heating water temperature to 80°C, decrease primary air flow by change of regulation segments in side panels.
Too much condensations in stoking chamber, black liquid flows from the stoking door	Over designed output	Put less fuel into the stoking chamber
	Low temperature of heating water in boiler	Increase determined temperature of heating water on the boiler thermostat, secure minimum temperature of circulating water to 60 °C by setting the mix valve.
Air blower doesn't work or is too noisy	Determined boiler temperature is reached	Right boiler function
	Broken air blower	Change
	Fouled blade wheel	Clean from the tar and sediments. Change in case of damage
	Broken condenser	Change

Service

As a part of a handbook, delivered with boiler, there is a list of service firms, which have under the agreement authorization to do service of gas boilers DAKON.

Guarantee

Putting into operation and service of all DAKON boiler can do only service company named in independent attachment of this handbook. In opposite case the complain will not conceded.

Each complain has to be make as soon as the fault has been discovered.

Producer stipulates right for all changes made within technician improving of product.

Guarantee period and conditions are in guarantee card, which is a basic accessory of the boiler.

Producer's address for possible making complaints:

DAKON s.r.o.

Ve Vrbině 588/3

794 01 Krnov-Pod Cvilínem

554 694 122 complaints, 554 694 111 switchboard operator, 554 694 333 fax

e-mail : dakon@dakon.cz

General guarantee conditions

These guarantee conditions concern all products, sold by Dakon company and are meant as general conditions for guarantee for these goods. The guarantee period is given in guarantee card delivered together with products. DAKON guarantees that all features and properties named in handbook and certificate will be the same for all the guarantee period, assuming that the product will be used the way, settled by producer in handbook.

Assembly of product has to be made according all valid rules and standards and producer's directions. While operation keep the conditions given in handbook.

In case, when putting into operation is asked to do by service firm or annual inspection and repair asked to do by service firm, it is possible to do such activity only by service technician from any of service firm named in list delivered together with product.

Service technician is obliged to show his certificate for certain type of product issued by producer before making such repair or boiler inspection. While putting into operation and making maintenance is technician obliged to do all activities according valid standards and rules concerning such product and all activities given in handbook such as proving the product, especially control its operating and security elements. He is also obliged to acquaint user with maintenance the product.

The customer makes a complain at seller, at the nearest service firm named in list delivered together with boiler or at DAKON company. Each complain has to be make immediately after finding the fault.

When complaining the product, which is asked to put into operate by some of service firms, the customer is asked to show confirmation about putting into operation by service firm of Dakon company. In case when annual service is asked to do by some of service firm, the customer is obliged to show paper about such service, including service of coolant loop ant thermostatic valve as long as 12 months including date of putting into operation and as long as 12 moths including last service date.

By transportation and storage of product keep instructions on packaging. Use only original spare parts for repairs.

Dakon company stipulates the decision, whether will be the broken part repaired or changed, within free repair. Parts changed during guarantee period become a means of Dakon company.

The claim for free repair passes:

- By breaching the guarantee conditions.
- By not presenting all papers when making complain.
- When a serial number of product or data code is missing or impossible to read.
- When not keeping all instructions in handbook.
- When wearing caused by ordinary using of product.
- When the faulty caused by not keeping instructions, rules and standards in handbook.
- When the faulty caused by interference with product in conflict with handbook.
- When faults of exchanger, pump, three-way valve and the other parts of hydraulic circuit, gas fitting, burners etc, caused by fouling up from heating system, water pipeline, gas pipeline or combustion in the air.
- When fault of boiler body caused by corrosion as a result of inconvenienced operation mode, when the temperature of back coming water is lower than combustion vapour point.
- In case of boiler body breakdown (deformation, cracking, running) caused by operation without coolant loop. Coolant loop installation and proving has to be confirmed in guarantee card by service technician when putting into operation. Coolant loop has to be installed according the handbook and it has to be functional.
- In case of damage caused by transportation.
- In case of damage caused by natural disaster or unpredictable effect.

All of these general guarantee conditions cancel the other entire establishment concerning guarantee conditions set in handbook, which would be in conflict with these conditions.

Maintenance

At least once per 14 days check water in heating system. If there is not enough water, fill it. After heating period is finished, clean the boiler properly, change damage parts. Average operational life of glass packing cord is about half an year. (depends on opening the door). When the cord stops leak, it is possible to take it out, turn about 90 °C and put back again. This is only temporary solution, it is necessary to change the cord in a short time.

One per 14 days (according to the boiler operation) take off the air blower and clean the blade wheel.

After each heating period finishes, take off the covers in upper part of the combustion collector and clean with scraper (or brush) the back side of the boiler in the combustion collector from ash sediment.

Amount of ash and black depends on fuel quality and operational conditions. If the boiler is over-designed or operates for low temperatures, there are more blacks when burning. For reducing neck and reducing flap cleaning is possible to disassemble the flap (take off the covers in upper part of collector) and remove black sediment from reducing flap and neck walls.

Change of door packing cord

Take off the old packing cord by the mean of screw driver and handle and clean the gap. Take the new one and put the cord beginning to horizontal part of handle. Push the cord into the door circuit gap with hand or gentle hammer tap. By slow door tapping push the cord into the gap to close the door.

Door hinge and door gate setting

There can appear a squeezing packing cord from the door. To secure the door leak is necessary to change the door position. You can carry out this changer by screwing the door hinges in. Stoking and lower door are connected with the boiler body with two hinges, connected with the door with a long pivot. If you want to change hinge setting it is necessary to take the pivot out, free up the nut securing hinge position and screw the hinge in. Hinge setting fix by tightening the hinge nut to the neck. Put on the door and put the pivot into the hinge. By the similar way it is possible to change door gate setting at the opposite door side.

Change of the jet body

Jet body is placed in boiler body on the jet holder. In the lower part there is packed with boiler filler and in upper part and on the circuit with packing cord.

When changing the jet take out the packing cord from the jet gap by the mean of screw driver. Take out the jet body and clean the jet holder properly from the tar and old filler.

Put the jet body insulation on the clean surface (see the spare parts). Take the in your hand and put it on the jet handle way, that a shorter wall is hard by the back part of the boiler. The space on both the side of the jet has to be the same. Take the packing cord and push it into the gap to be at the same level with the jet by the little tapping. Change of the air blower blade wheel.

Carry out when the boiler is extinguished. Switch off the net feeding and disconnect feeding base. Slacken fly nuts fixing blower flange. Take off the flange with the blower from the combustion collector. Slacken the blade wheel nut with the spanner No. 10 the way opposite the clock hands. Install the new blade wheel, screw on the handle with blower on the combustion collector. Attaché seven-pole basin to the boiler inlet and plug in the boiler. Check the right function of blower by switching the main switch and opening the stoking door.

Regular annual inspections of coolant loop.

Proving the function of coolant loop.

The coolant loop ensures safe boiler operation in case of breakdown of heating system, when the system is not able to lead the heat out from the boiler. This breakdown can appear e.g. by freezing heating system, water circulation breakdown and so on. Enough pressure, and coolant water is necessary for good function of boiler. It is necessary to ensure pressure at least 2 bar and water flow 20 l/min.

The coolant loop function examination is the best to do by overheating the boiler at minimum temperature 97 °C degrees. If this examination not possible, the alternative examination is necessary:

- Screw out the sensing head of thermostatic valve from the coffer.
- Dive the sensing head into the water in electric kettle and let the water boil. Thermostatic valve has to open the coolant water outlet flow. Check in the flow at the water outlet.
- After water is chilling out, the valve has to close the coolant water flow.
- After a successful examination, install the sensing head back to the coffer.
- Clean the filter before the coolant water enters the valve.

When the examination is not successful - the valve will not open the coolant water flow or the valve does not calk enough, it is necessary to change the valve.

Caution! Possibility of injuring by hot water !

No changes of setting valve or repairing it !

Disposal of packaging

Wooden and paper parts of packaging are recommended to use by heating. The other parts of packaging put into junk buyout or use refuse storage area, managing by local authority.

Disposal of product after service life finishing

The old boiler put into junk buyout or use refuse storage area, managing by local authority.

Standards and regulations

There are these standards and regulations concerning projecting, assembly and service of boilers:

ČSN EN 303-5	Central heating boilers-Part 5: boilers for solid fuels used for central heating with manual or automatic supply with output up to 300 kW-terminology, examinations, requirements and marking.
ČSN 06 0310	Central heating - designing, mounting.
ČSN 73 0823	Ignitability of building materials.
ČSN 07 7401	Water and steam for heating power equipment with working pressure up to 8 MPa.
ČSN 06 0830	Safety devices for central heating and preparation of DHW.
ČSN 73 4201	Designing of chimneys and flues.
ČSN 06 1610	Parts of flues and house appliances .
ČSN 73 4201:02	Mounting of chimneys and flues, connecting of consumers of fuel.
ČSN 06 1008	Fire safety of local consumers and heat sources.
ČSN 73 0831-50	Fire safety of buildings.

Ignitability

Of building materials

(extract from ČSN 73 0823)

A ... incombustible	asbestos, bricks, blocks, ceramic wall tiles, fireclay, mortar, plaster (without any organic additions)
B ... not easy combustible	cardboard plaster plates, basalt felt plates, fiberglass, plates AKUMIN, IZOMIN, RAJOLIT, LIGNOS , VELOX and HERAKLIT
C ₁ ... hard combustible	beech and oak wood, laminated wood boards, felt, plattes HOBREX, VERZALIT, UMAKART
C ₂ ... mean combustible	pine, larch and spruce wood, laminated wood boards according to ČSN 49 2614
C ₃ ... easy combustible	asphalt cardboard, cellulose materials, tar paper, wood-fiber boards, cork, polyurethane, polystyrene, polypropylene, polyethylene, floor fabric

Installation and operation of pressure expansion vessels for steel boilers up to 50kW

The main advantage of using the pressure expansion vessel there is the possibility to avoid the air to come into the heating system.

Any complaint of guarantee will be recognized only if the principles mentioned below are kept.

- 1) Inlet piping leading towards the expansion vessel must be as short as possible, without any closing elements and with possibility of dilatation. The expansion vessel must not be under heat radiation.
- 2) Each heating system must be equipped at least with one reliable safety valve located on the outlet piping of the boiler and must be equipped by a manometer. Location, assembling and inner diameter of the safety valve must comply with ČSN 06 0830 and ON 13 4309.
- 3) Opening pressure of the safety valve must be checked by overpressure of 180 kPa.
- 4) Only a licensed company is allowed to carry out installation and adjusting of the safety valve, pressure testing, and adaptation of the pressure in the pressure expansion vessel. It is necessary to check the gas pressure in the pressure expansion vessel if it is higher than hydrostatic height in the heating system.
- 5) The boiler must be equipped with safety facility under ČSN 060830 the boilers for solid fuels up to 50 kw also with draught governor. The maximum operating temperature is 95 °C.
- 6) The pressure expansion vessel must be protected against freezing.
- 7) It is possible to adapt the gas pressure in the pressure expansion vessel by reducing to the value of the heating system while the water is cold. Reducing is carried out with a valve and the overpressure is measured with a tire

WARM - WATER BOILER FOR PYROLISYS KP PYRO

gauge. Complete water into the heating system up to pressure maximum higher by 10 kPa than the hydrostatic height of the heating system.

- 8) For filling up the heating system make marks on the manometer for adapted hydrostatic height and for maximum pressure in the system at 90 °C.
- 9) If the pressure difference is changed during operation against the marks (getting over the minimum or maximum pressure), it is necessary to check the system, desecrate, to complete water and if need be to increase the gas pressure in the pressure expansion vessel according to the manufacturer's directions.
- 10) It is allowed the hydrostatic height to be maximum 12 m in the boilers under ČSN 07 0245.
- 11) Every pressure expansion vessel must be checked minimum once per year including filling pressure.
- 12) A project must be worked out for each heating system.
- 13) If the pressure expansion vessel is well chosen, the pressure difference must not change more than 60 kPa at changes of the heating water from 10 up to 90 °C. This pressure difference can be tested at heating test when the temperature of the water is warmed up from the cold state. If the pressure difference changes more than 60 kPa it means the pressure expansion vessel is not chosen well and there is a risk to damage the boiler.

Proposal of the pressure expansion vessel's capacity calculation

(Under the amendment ČSN 06 0830, art. 122)

Capacity of the Pressure Expansion Vessel

$$C = 1.3 * V * \frac{P1 + B}{B} \quad [dm^3]$$

B ... pressure difference, for steel boilers designated for 50 kPa

P1 ... absolute hydrostatic pressure (kPa)

1.3 ... coefficient of safety

V ... increased volume of water in the heating system:

$$V = G * \Delta v \quad [dm^3]$$

G ... weight of water in the heating system (kg)

Δv ... change of water volume at certain thermal difference:

Δt	°C	60	80	90
Δv	dm ³ /kg	0.0224	0.0355	0.0431

The real pressure difference can be higher against the calculated maximum by 10 kPa in case of limiting values of calculation and due to increasing pressure of gas in the expansion vessel according to item 7.

Sample:

weight of water in the heating system	...	G = 195 kg
hydrostatic height of the heating system	...	10.5 m then P1=205 kPa
thermal difference in the heating system	...	t = 80° C
change of water volume for t = 80° C	...	0,0355 dm ³ /kg
safety valve adjusted for	...	180 kPa
pressure difference	...	D = 50 kPa

increasing of the water in the whole heating systém : $V = G * \Delta v = 195 * 0.0355 = 6.9225 dm^3$

The minimum needy capacity :

$$C = 1.3 * V * \frac{P1 + D}{D} = 1.3 * 6.9225 * \frac{205 + 50}{50} = 45.9 dm^3$$

According to manufactured sizes we can choose the vessel to be : **50 dm³**

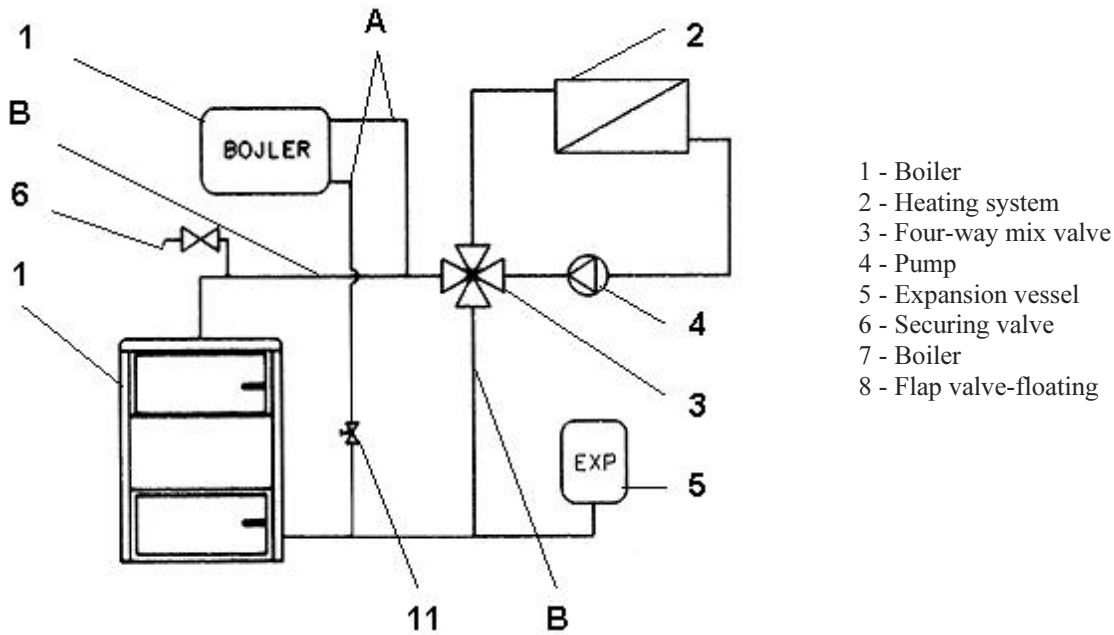
Notice :

If the pressure expansion vessel is to prolong the service life of the boiler, it is necessary to avoid low-temperature corrosion by keeping the temperature in the boiler above dew point (about 65 °C) for example by means of mixing device. If the temperature is under the dew point, the boiler will corrode on its combustion products surfaces and the service life of the boiler will be shorter because of pressure and dynamic stress to the boiler's walls.

Under the Decree No. 18/79 Statutes or No. 23/79 Statutes §4 a licensed company with a valid certification is allowed to mount the pressure expansion vessel only.

Examples of attachment of KP PYRO boilers to the heating system

Recommended attachment of KP PYRO boilers



Above mentioned diagram is a combination of self-circulation system and forced circulation on heater's circle. The boiler (container with hot supply water) is attached to boiler circle and is heated by self-circulation way .

Installation conditions

- Hot supply water container has to be placed at least 400 mm above the heating water outlet to secure self - circulation. The minimal capacity for KP PYRO 18, 24 boilers is 150 l. and 200 l for KP PYRO 32, 38.
- Recommended boiler circle tubes and hot supply water container tubes diameters.

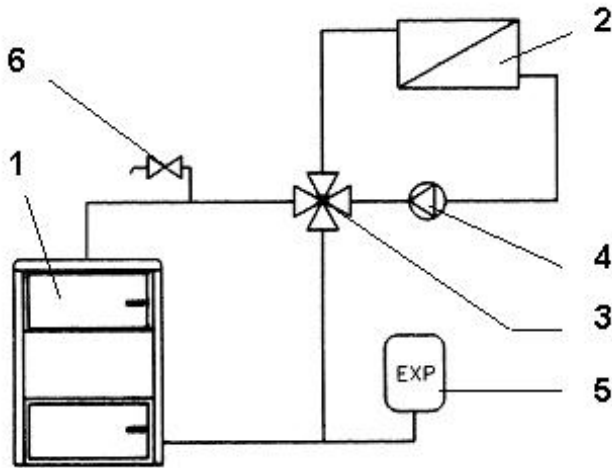
Boiler type	Part A		Part B	
	copper	steel	copper	steel
PYRO 18	35x1,5	25 (1")	42x1,5	32 (5/4")
PYRO 24	35x1,5	25 (1")	42x1,5	32 (5/4")
PYRO 32	35x1,5	25 (1")	42x1,5	32 (5/4")
PYRO 38	35x1,5	25 (1")	42x1,5	32 (5/4")

Advantages for above mentioned installation

Hot supply water container is not only for water heating, but also for partial protection from overheating, which can be caused by big chimney effect after the suction blower is switched off.

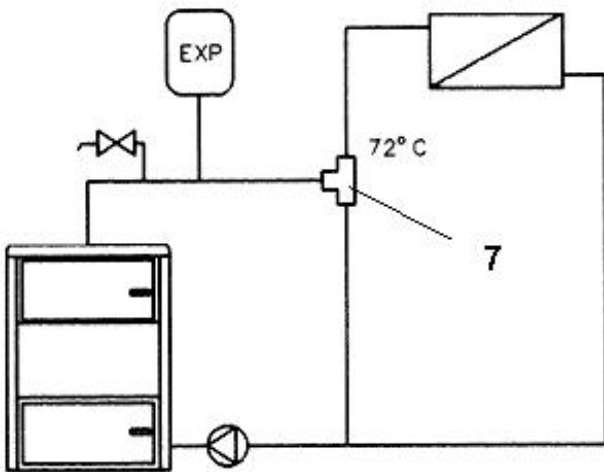
Possible ways of attachment of KP PYRO boiler to the heating system

Attachment with mixing valve

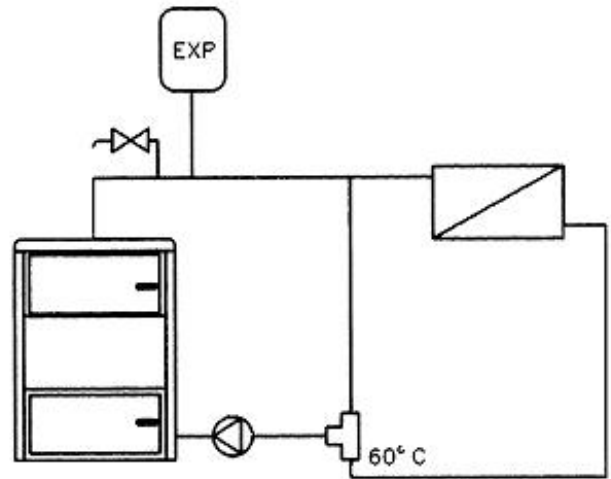


- 1 - Boiler
- 2 - Heating system
- 3 - Four-way mix valve
- 4 - Pump
- 5 - Expansion vessel
- 6 - Securing valve
- 7 - Thermo valve (e.g. ESBE)
- 8 - Flap valve
- 9 - There-way valve

Attachment with thermo valve in the heating water outlet



Attachment with mixing valve and hot supply water container



Attachment with thermo valve in the heating water inlet

