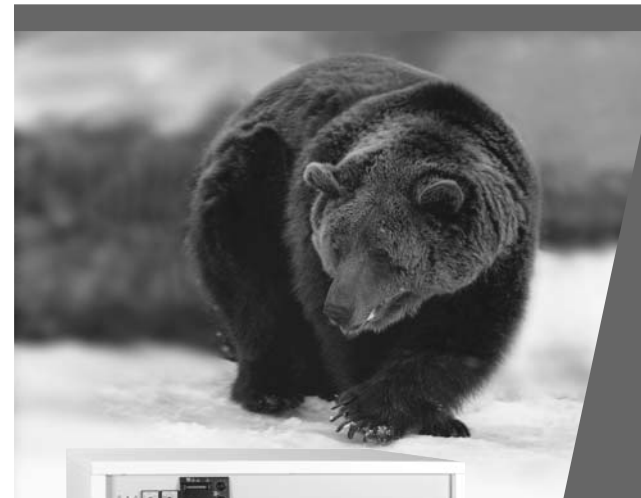




Grizzly

**Manual for instruction
and use of boiler**

65, 85, 100, 130, 150 KLO



- Floorstanding cast iron boiler
- Cascade connection possible
- Output up to 150 kW

www.protherm.sk

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Jurkovičova 45
909 01 Skalica
Tel.: 034 6966 101
Fax: 043 6644 017



XXXX - v.2 4/2005

Dear Client,

You have just become an owner of a KLO / KLO EKO (Grizzly) natural gas or propane gas fired cast iron boiler. We are confident that you will be satisfied with the service this boiler will give you. However, you'll have to comply with at least minimum requirements when running the equipment. Therefore please read these Operating Instructions carefully and comply with their guidelines.

Please pay careful attention to the following important information:

1. The boiler with all its accessories must be installed and used in accordance with an installation design, all applicable legal regulations, technical standards and manufacturer's instructions.
2. The boiler may be installed only in the environment for which it has been designed and only in a correctly ventilated room.
3. After installation, the boiler must be put into operation by a service organisation authorised by the manufacturer.
4. Please also contact authorised service if you are experiencing any problems with the equipment – unauthorised repairs may damage the boiler (as well as the connected equipment!).
5. The service technician when putting the boiler into operation for the first time must demonstrate its controls and show you its various parts and how to control them.
6. Check whether the boiler is complete.
7. Check whether it is the model you have ordered.
8. Whenever you have any doubts how to operate the boiler, find and study the relevant information in these Operating Instructions and proceed in accordance with them.

9. When repairing the boiler, only original parts must be always used. Internal wiring and factory settings must not be changed or interfered with.
10. Do not remove or damage any signs and labels on the boiler.
11. The boiler meets regulations applicable in Slovakia. For use in other countries, any potential differences must be identified and resolved.
12. At the end of life of the boiler's parts and components (or of the entire boiler), their disposal must be carried out ecologically – metal parts must be delivered to a metal scrap yard, plastics, seals, and insulation materials must be sorted out as required, or a special disposal technology used, engaging the services of companies authorised for such operations.
13. Before a protracted shutdown we recommend to turn off the gas supply and disconnect the boiler from power supply. This recommendation is part of general conditions defined in this Operating Instructions.
15. The manufacturer shall not be held liable for any damages caused by the user's failure to:
 - abide by the conditions defined in these Operating Instructions,
 - abide by applicable regulations and standards,
 - abide by installation and operating instructions.
 - abide by the regulations specified in the Warranty Certificate and Service Book.

Such damages are not covered by the product warranty.

In practice, situations might occur when the following essential measures have to be taken:

- prevent the boiler from being (even accidentally) switched on while inspecting the fumes exhaust and gas and water distribution routes, by disconnecting the boiler from power supply by another means than just with the boiler's switch (e.g. by pulling the power cord plug out of the socket),
- shut the boiler down every time when flammable or explosive vapours are present (even temporarily) inside the premises from which combustion air is supplied to the boiler,
- if it is inevitable to drain water from the boiler or the heating system, the water must not be dangerously hot,
- when water leaks from the boiler's heat exchanger or when the exchanger is clogged with ice, do not try to switch the boiler on until normal running conditions have been restored,
- during (even suspected) gas leaks or after gas supply failure, switch the boiler and the gas supply off and call the gas company or authorised service.

Regulations and Directives

The PROTHERM KLO boiler may be put into operation only by an authorised service organisation in accordance with UBP SR Notice No. 74/1996. Installations, putting the boiler into operation, warranty and post-warranty service are performed by a network of the manufacturer's contractual service organisations, which meet the above-specified requirements. Installations must be carried out in accordance with a design prepared in compliance with applicable regulations detailed below.

a) Heating systems:

STN 06 0310 – Central heating, design and installations

STN 06 0830 – Safety equipment for central heating and hot water heating systems.

STN 07 7401 – Water and steam for heat energy equipment of operating pressure up to 8 MPa

b) Gas distribution systems:

STN 38 6420 – Industrial gas pipelines.

STN EN 1775 – Gas supply – Gas pipelines in buildings – Maximum operating pressure below 5 bar

STN 38 6413 – Steel gas pipelines and connections

STN 07 0703 – Gas-fired boilers

STN 38 6405 – Gas equipment. Operating principles.

Act No. 222/94 Coll. on business conditions and public service supervision in the energy industry and on state energy inspection.

c) Electrical installation:

STN 33 2180 – Wiring of electrical instruments and appliances.

STN 33 2000-3 – Electrical installation in buildings. Part 3: Definition of basic characteristics.

STN 33 2000-7-701 – Electrical installation in buildings. Part 7: Requirements on special installations or premises. Section 701. Rooms with a bath-tub...

STN 33 2130 – Electrical engineering regulations. Interior electrical installations.

STN 33 0160 – Electrical engineering regulations. Labelling terminals of electrical objects.

Execution regulations.

STN 33 0165 – Electrical engineering regulations. Colour marking or numbering of wires.

Execution regulations.

STN 33 2350 – Regulations for electrical equipment in difficult climatic conditions.

STN 34 0350 – STN electrical engineering regulations. Regulations for loose cables and cords.

STN 33 1500 – Instructions for electrical equipment.

STN EN 60 335-1 – Safety of household and similar electrical appliances. Part 1 – General requirements.

d) Chimney:

STN 73 4210 – Construction of chimneys and fume exhausts and connecting fuel appliances to them.

STN 73 4201 – Designing chimneys and fume exhaust flues.

STN 06 1610 – Fume exhaust parts of household appliances.

STN EN 297 – Gas-fired central heating boilers. Boilers Type B11 and B11BS with atmospheric burners and nominal thermal output up to 70 KW.

e) Fire protection regulations:

STN 92 0300 – Fire safety of local appliances and sources of heat.

STN 73 0823 – Fire technical properties of materials. Degrees of flammability of building materials.

f) Utility hot water heating systems:

STN 06 0320 – Heating of utility hot water.

STN 06 0830 – Safety devices for central heating and utility hot water heating systems.

STN 73 6660 – Internal water distribution systems.

STN 83 0616 – Utility hot water quality.

Safety of Persons and Equipment

As products, boilers are verified for compliance with the following documents:

STN EN 437, STN EN 50165, STN EN 60335-1+A11, Act No. 513/1991 Commercial Code, Act No. 634/1992 and Ministry of Health Public Notice No. 13/1977.

The boiler (as well as its accessories) complies with the type which has been tested and certified by the Technical Testing Institute in Piešťany, SKTC-104, authorised to verify the compliance with the requirements of the Slovak Bureau for Standardisation, Metrology and Testing, and the compliance with the technical requirements specified by Government Decrees Nos. 392/99, 393/99 and 393/99 as set forth in Act No. 264/1999.

Hence the boilers (and their accessories) meet the requirements of applicable technical and legal standards, a fact confirmed in a "Certificate of Compliance" issued by the manufacturer. Pursuant to applicable legislation, the Certificate is kept for inspection and supervision authorities, and for distribution purposes sufficient is a written confirmation that the Certificate has been issued.

When installing and using the boilers and their accessories, other generally applicable documents must taken into account, which also define requirements in addition to those on the product itself, namely:

- in the areas of design and installation (and maintenance and repairs): STN 06 0310, STN 06 0830, STN 07 0703, STN EN 1775, STN 38 6413 and STN 38 6460, STN 73 4201 and STN 73 4210, and Public Notice No. 48/1982 (in the wording of later regulations) and binding work safety and health at work regulations;
- . during transportation and operation: STN 38 6405, Public Notice No. 718/2002.

In addition to abiding with the requirements of these documents, it is necessary to proceed when using the boiler in accordance with these Operating Instructions and other manufacturer's documentation supplied with the boiler.

Boiler Features

The PROTHERM KLO / KLO EKO stationary, cast iron boiler is designed for heating water for heating purposes and, if combined with an indirectly heated reservoir, also for heating utility hot water. It is available in the following series of size:

- a) 65, 85, 100, 130, 150 KLO
- b) 65, 85, 100, 130, 150 KLO EKO

The boilers use as fuel natural gas and both series have a dual-stage design (low and high output).

Models 65 – 85 KLO/KLO EKO are single-stage and designed to run on propane gas.

Both model series can be fitted with a Siemens Albatros RVA 43.222 equithermal control unit. By combining it with other RVA 43.222 control units, a cascade system can be created with multiple sources of heat.

The central heating system water pump is controlled by a thermostat and turned on only when the heating water temperature reaches a set value. This reduces the time required to heat the water inside the boiler after a protracted break in the boiler's function. The heating water pump is part of the delivery.

The boiler can work in conjunction with an indirectly heated utility water tank. The standard boiler configuration allows the tank to be connected easily to the boiler's terminal box.

To guarantee correct functioning of the system, we recommend using a PROTHERM reservoir heater of 95- to 200-litre volume, equipped with a thermostat and a switching contact. Using the RVA 43.222 control unit will allow water in the reservoir to be topped up by a pump.

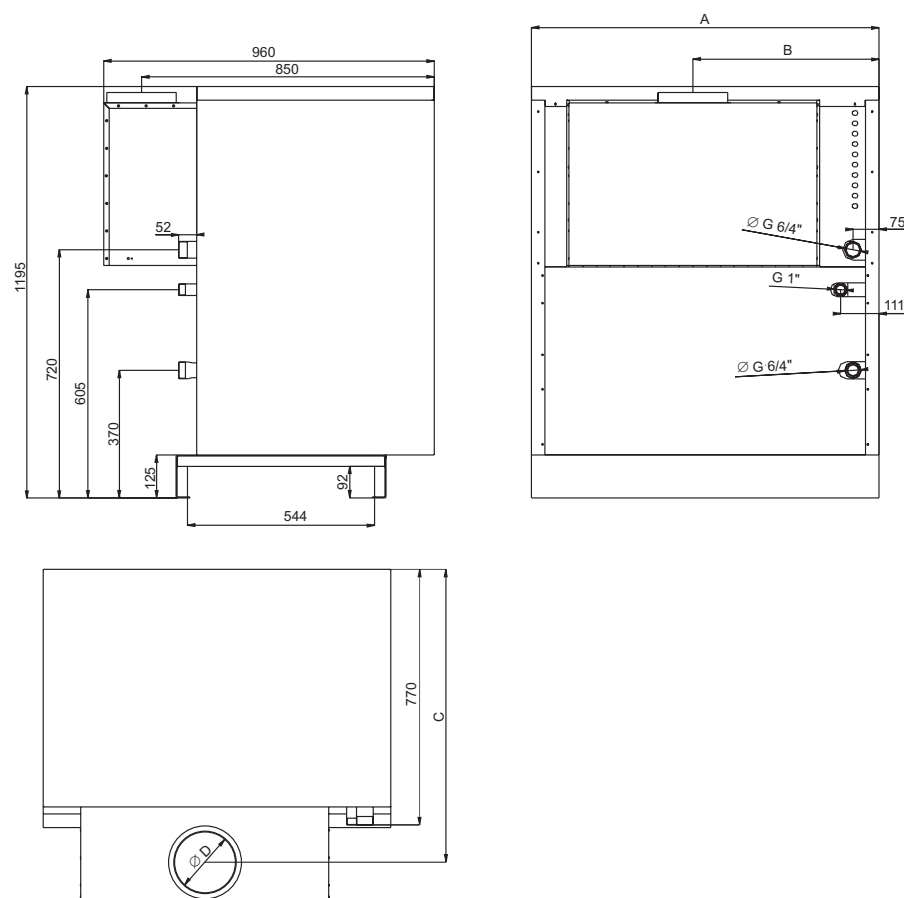
Important: For combined heaters (with water heated also by electricity), it is essential to prevent the supply of alien volt-

age to the boiler – i.e. the thermostat contacts must be separated from the heater's internal electrical wiring!!!

Utility hot water heating has priority before heating water. This means that water in the central heating (CH) system is heated only after the utility hot water (UHW) has been heated to the required temperature. Setting this value above usual temperature (50-60°C) will result in longer heating times and hence longer breaks in heating the building. The heating time will be longer also when the boiler is set to low output, or when the CH water temperature is set too low.

Important: The boiler must not be used for any other purposes than those described in these Operating Instructions.

Basic and Connecting Dimensions



Model	65 KLO / KLO EKO	85 KLO / KLO EKO	100 KLO / KLO EKO	130 KLO / KLO EKO	150 KLO / KLO EKO
A	850	1010	1170	1410	1570
B	460,5	540,5	620,5	740,5	820,5
C	860,3	850,3	840,3	825,3	825,3
D	180	200	220	250	250

Fig. 1

Pressure loss of the boiler's body

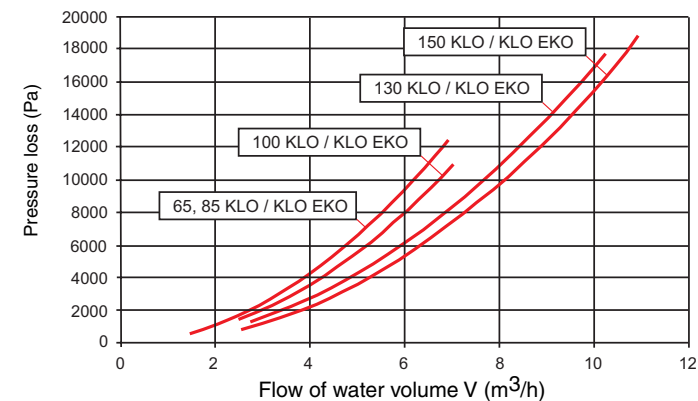


Fig. 2

Accessories

The PROTHERM KLO boiler consists of the following components:

1. cast iron body of the boiler with thermal insulation and water connection pipe section;
2. burner plate with gas connection route and ignition device;
3. collector of combustion fumes with a chimney thrust detector and SKKT thermostat.
4. boiler covers with control panel and boiler terminal box;
5. boiler base.

The cast iron boiler body is made of segments and serves as a combustion chamber (including combustion fumes routes), and also as a water reservoir (including water routes). The segments are lateral (right and left) and central (one kind). The boiler body of the required size (including combustion chamber and water reservoir) is constructed by assembling and joining together the segments. The assembled boiler body is fitted with pipe sections for water connection and is insulated against heat loss and heat radiation. It also has

brackets for fitting thermostat sensors and a thermometer, and lugs on feet for connecting the body to the boiler base. The KLO EKO series boilers use low-emission burner tubes, the KLO series boilers use standard tubes. Depending on the output, the boiler has 7 to 16 burner tubes and a complete gas route.

The burner plate is fitted with a gas distribution section, the actual burner tubes and an ignition device. The gas route consists of a gas supply pipe section terminated with a combined gas valve. The combined gas valve controls the supply of gas into the boiler depending on the required and reached operating states of the whole system (i.e. the boiler combined with the heating system); its outlet is already the gas distribution section of the of the burner plate, terminated with 7 to 15 jets (one for each burner tube).

Igniting the burner and watching that it is running is done by a Polidoro low-emission ignition burner. When a request is sent to ignite the main burner, after waiting time $T_w = 10$ seconds, the ignition burner

is automatically ignited. It is ignited by an ignition spark and its flame is detected by an ionisation electrode. After the ignition burner has steadied up and the ionisation circuit closed, the main gas supply valve to the main burner opens. If the ignition burner does not ignite within a safety time $T_s = 25$ seconds, the gas supply to the main burner and to the ignition burner is automatically shut off. If the flame during normal boiler operation goes out, the automatic ignition system will repeat the ignition cycle of the ignition burner. If the loss of ionisation prevails, the boiler will switch to a fault status (the light of the "Unlock automatic fault signalling system" button on the control panel lights up). After a waiting time of approximately 10 seconds, the fault status can be manually cancelled by pressing the RESET button.

The ignition burner remains on while the main burner is on.

In the event of power supply failure, the gas supply to the burner is automatically shut off. When power supply is restored, the boiler will automatically restart itself.

Boiler Installation Guidelines

The PROTHERM KLO / KLO EKO boilers can be put into operation only by an authorised service organisation in accordance with UBP SR Public Notice No. 74/1996. Installations, putting into operation, warranty and post-warranty service are done by a network of manufacturer's contractual service organisations, which meet the requirements specified above.

Connecting the boiler to gas supply

The PROTHERM Series KLO - ZP / KLO EKO - ZP boilers are designed to run on natural gas with nominal pressure in the distribution network 1.8 kPa (18 mbar) and a calorific value usually claimed between

The combustion fumes collector is connected to a chimney thrust detector and behind it is terminated in a boiler exhaust outlet (on a fumes flue connection). The collector is equipped with a removable cleaning lid, which is accessible after removing the top boiler's cover.

The chimney thrust detector system (SKKT) works on the principle of monitoring the combustion fumes temperature inside the collector. A thermostat situated inside the collector reacts to an increase of the combustion fumes temperature caused by a reduced chimney effect will shut the boiler down (by shutting off gas supply to the burner).

The boiler has covers, which are rigidly fixed to the rear and side-wall, a removable wall and a removable top cover. The boiler's control panel is located in the top section.

The boiler body base is a single steel-base on which the body of the boiler and the covers are mounted.

9 and 10 kWh/cum. The internal gas distribution system as well as the gas meter must be of sufficient size, taking into account also other user's gas appliances. The gas supply pipe must have an internal diameter of at least the same size as the gas connection pipe on the boiler (which depends on the boiler size), but preferably one size bigger.

The PROTHERM Series 65 – 85 KLO - P / 65 - 85 KLO EKO - P boilers are designed to run on propane gas. Propane gas calorific value is given between 12.8 and 13 kWh/kg. Because supplying boilers from pressure cylinders is problematic, particularly from the capacity and handling point

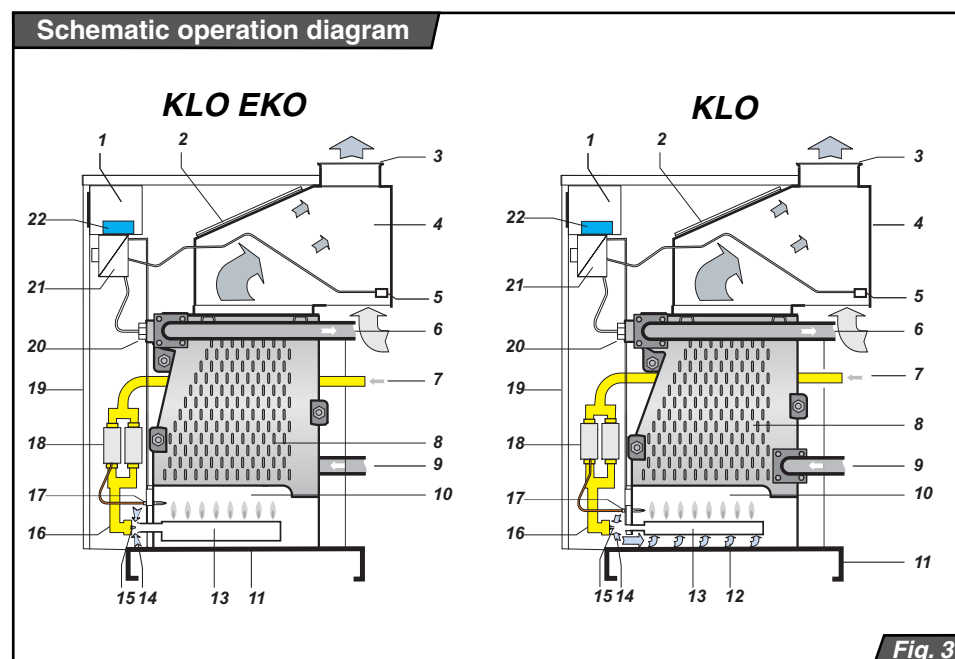


Fig. 3

- | | | |
|---|----------------------------|------------------------------------|
| 1. Main control panel | 9. Heating water inlet | 18. Gas armatures* |
| 2. Chimney thrust detector system cover | 10. Combustion chamber | 19. Boiler covering |
| 3. Fume exhaust | 11. Secondary air supply | 20. Case for sensors |
| 4. Chimney thrust detector | 12. Supply burning air | 21. Main control panel |
| 5. Fume thermostat | 13. Burner | 22. Automotive ignition automatics |
| 6. Heating water outlet | 14. Supply burning air | |
| 7. Gas supply | 15. Jet | |
| 8. Cast iron body segments | 16. Combining pipeline gas | |
| | 17. Operator burner | |

* For models 130-150 KLO / KLO EKO is used only 1 gas armature.

of view, it is recommended that a reservoir is installed near the building to be heated, and refilled by an authorised organisation.

Adequately sized propane supply from the reservoir to the boiler and to other gas appliances will then be part of the design and delivery of the reservoir. When installing a propane gas-fired boiler, an accurate nominal pressure of 3.0 kPa (30 mbar) must be secured by installing a reduction valve (station) before the boiler.

Supply of combustion air

Ventilation must guarantee that sufficient quantity of combustion air is supplied to the boiler and that the maximum permissible concentrations of harmful gases in the boiler's vicinity are not exceeded and that an acceptable temperature is maintained there (all in accordance with Ministry of Environment Public Notice No. 706/2002).

The stationary cast iron PROTHERM KLO/KLO EKO boilers draw combustion air from the space in which they are installed. The combustion air supplied to the boiler must be free of dust and corrosive and flammable substances (vapours, solvents, paints, adhesives, etc.). The supply of adequate quantity of combustion air must meet the requirements of STN 070703 "Gas-fired boiler rooms". Gas appliances connected to combustion fumes flue must not be located in places where negative pressure can be created by ventilation fans.

Combustion fumes exhaust

The boiler is designed for combustion fumes to be removed into a chimney (via a chimney connection point) with a stabilised thrust of at least 2 Pa. The boiler is connected to the chimney by a flue of a diameter corresponding to the flue diam-

eter of the flue connection point (depends on the boiler size). The flue is part of the delivery.

It is forbidden to put inside the flue objects obstructing the flow of combustion fumes (e.g. various types of heat exchangers to increase utilisation of the heat).

Construction of the flue and the chimney must comply with STN 06 1610, STN 73 420 and STN 73 4201 standards.

By complying with requirements of these standards, we prevent undesirable phenomena from occurring, such as excessive cooling of the fumes, penetration of dampness into walls, fluctuations in the chimney effect (thrust) and thus undesirable effects on the boiler's functioning.

Requirements on heating water quality

The PROTHERM KLO / KLO EKO boilers are designed for heating water of up to 400 kPa (4 bar) gauge pressure, which is in compliance with STN 07 7401.

The first fill as well as top up water must be clear and colourless, and be free of suspended substances; oil and chemically corrosive additives, under no circumstances may be acidic (i.e. have pH factor greater than 7) and must have minimal carbonate hardness.

For softening the first fill water can be used trisodium phosphate or a one-off dose of chelating agent.

It is recommended to install before the boiler (i.e. to the return heating water pipe) a sludge trap. Its design should allow the device to be emptied in regular intervals without draining a great deal of heating water in the process. The sludge trap can be combined with a filter, but the filter itself would not provide adequate protection. Both the filter and the sludge trap must be checked regularly and cleaned, as re-

quired by the water composition. Depending on the anticipated amount of sludge trapped; is recommended to desludge the boiler approximately a week after it has been put into operation. Functional defects caused by mechanical dirt are not covered by the manufacturer's overall warranty (refer to Warranty Terms and Conditions).

Important: When filling the boiler with water, all air in the boiler as well as in the heating system has to be thoroughly bled.



Using antifreeze liquid

KLO and KLO EKO boilers may be filled with an antifreeze liquid, namely product called ALYCOL TERMO, produced by Slovnaft Moravia. Using other antifreeze products will invalidate the manufacturer's warranty on parts and related costs.

Properties of the heating system and filling the system with water

The boiler must be connected to the heating system distribution pipes (G6/4") and to the gas supply pipe (G 1") in such a way that the connection end pieces are not stressed by forces imposed by the heating system distribution pipes or by the gas supply pipe. The connection end pieces have an external thread.

We recommend equipping the connection

pipes with isolation valves, so that when repairing the boiler it is not necessary to drain water from the heating system.

The heating system should be designed in such a way that a permanent circulation of the heating water is possible at least through some radiators.

The boiler does not have an expansion vessel or a safety valve built in, therefore these devices can be connected only to an external system, designed in accordance with STN 06 0310 and safety features compliant with STN 06 0830.

The boiler can work in systems with both an open and closed (pressurised) expansion vessel. However, when using the boiler in systems with an open expansion vessel, it is necessary to harmonise the temperature setting of the emergency thermostat (98°C) and limit the operation range on the heating controls. This setting must be done by authorised service only.

In open expansion vessels, correct water level must be maintained (between the operating minimum and maximum). Closed expansion vessels when being filled up must be set according to the heating system.

For filling and draining purposes, the boiler is equipped with a filling (draining) valve. After being filled up, the system must be thoroughly bled.

After reconstructions, in unsuitable building disposition, etc., the boiler may be connected to the heating system and to the gas supply by flexible hoses, but only those designed for this purpose. When using flexible connections, these should be as short as possible, protected against mechanical and chemical stress and damage, and be always replaced before the end of their life or before their parameters deteriorate with new ones (as determined by their manufacturer).

Before final installation of the boiler, the heating system distribution pipes must be flushed several times by pressurised water. In old, already used systems, this is done in the opposite direction to the heating water flow.

Boiler's location

If there are special requirement on manipulation with the boiler (e.g. in order to prevent its covers from getting damaged, to reduce its width, etc.), the boiler, delivered assembled, can be partially disassembled.

Enough manipulation space should be left around the boiler and the connected devices, to allow adequate access and works using tools to be performed.

Leaving adequate free space around the boiler will also satisfy the requirements for the so-called safe (fire) distance.

The boiler must be placed on a building base, i.e. floor (or on a pedestal). The floor must have at least normal load-bearing capacity and must not be slippery. The space around the boiler may be only cleaned in a dry way (e.g. by vacuuming). The boiler must be positioned on an inflammable mat. If the floor is constructed of a flammable material, it must be put on an inflammable, thermally insulating mat, exceeding the boiler's footprint by at least 100 mm.

When transporting the boiler with the covers on, doors must be at least 100 cm wide.

Important: Unauthorised persons must not interfere with the boiler's setting (particularly those with an impact on the combustion process), to prevent an increased generation of harmful substances in the combustion fumes, operation noise, reduced heat utilisation or heat generation, etc.).

Table 1: Flammability classes of building materials and products

Flammability classes of building materials and products	Building materials and products classified by flammability class (selection from STN 73 0823)
A – non-flammable	granite, sandstone, bricks, ceramic tiles, mortars, fire protection plasters
B – very low flammability	aluminium, Izumin, Heraklit (hardboard), Lignos, basalt felt boards, fibre glass boards
C1 – low flammability	beech wood, oak wood, Hobrex boards, plywood, Werzalit, Umakart, Sirkolit
C2 - stredne horlavé	pine wood, spruce wood, spruce boards, chipboards and cork boards, rubber
C3 – highly flammable	tar paper, wood fibre boards, cellulose materials, polyurethane, polystyrene, polyethylene, PVC

The boiler must not be installed in an environment in which the burner tubes can get clogged up by dirt or biological agents (small living creatures).

Prevention against freezing

Unless the boiler is protected against freezing by implementing technical and organisational measures around the boiler (controls, operator), it will necessary to shut it down possibly together with some other equipment in the boiler's vicinity (the boiler room), such as for instance a water treatment plant, water top-up equipment, etc., or the entire heating system will have to be shut down, i.e. the water drained, and the supply of water, gas and electricity to the boiler shut off.

Connecting the boiler to power supply

The boiler is designed to be hardwired to power supply. The electric boiler's hardwired connection must have a disconnection device built in – a main switch, with the distance between open contacts at least 3 mm in all poles, with all regulations for switching the boiler being abided by.

The boiler is connected to power supply by means of a terminal box which has terminals for a three-wire connection. The boiler must be wired to power supply in accordance with STN 33 2000-4-46 ^[Slovak Technical Standard Specifications]. Its protective contact (peg) must be always connected to the PE or PEN wire (green and yellow).

It is prohibited to use any type of adapters, extension cables, etc. The boiler is protected against overloading and short circuit by a T 4A / 250 V fuse, located on the control panel. The fuse must be replaced by authorised service only.

Boilers controlled by a room thermostat must use only thermostats which have a potential-free output, i.e. those which do not feed any alien voltage into the boiler. It is recommended that a suitable room thermostat is selected by authorised service.

The boiler has an outlet for connecting a room thermostat, located on a printed circuit board. As an option, the boiler can be supplied with the so called switching kit, used to interconnect with boiler an equithermal control unit. For a specific control unit type must be ordered a specific kit. These switching kits support as standard Siemens Albatros control units RVA43.222, RVA63.242 and RVA63.280,

Important: If a different control unit is used, it must not restrict of disable the boiler's safety functions.

Siemens control units

Albatros RVA43.222 is an equithermal control unit designed for standalone boilers or cascaded boilers.

It is suitable for serial connection to the source of heat with:

- one or two-stage burner
- hot water supply pump or bypass valve
- boiler pump, supply pump, or heating circuit pump

Heating circuit is controlled equithermally, hot utility water heating is controlled by temperature in the tank and a time programme.

By combining more RVA43.222 control units, you can create a stepped up cascades of multiple (maximum 16) sources of heat.

Albatros RVA63.242 is an equithermal control unit designed for serial connection to the source of heat with:

- one or two-stage burner, 1BMU
- hot water supply pump or hot water heating bypass valve
- three-point blender drive with circulation pump
- various multi-function outlet applications

Albatros RVA63.242 is an equithermal control unit designed for serial connection to the source of heat with:

- one or two-stage burner, 1BMU
- hot water supply pump or hot water heating bypass valve
- one or two heating circuits with a three-point blender drive and circulation pump, or with a circulation pump only

All the above equithermal control units can be mutually combined, allowing more complex heating systems to be built. More detailed documentation is supplied with the equithermal control units, or can be viewed on website www.siemens.cz.

Connecting room control unit

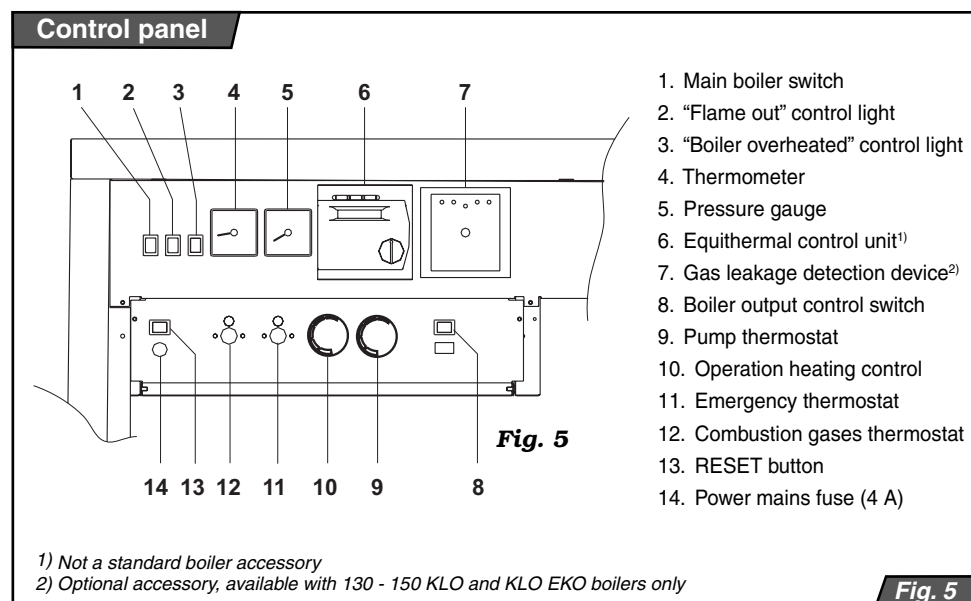
The boiler has a special terminal box for connecting a room control unit, located underneath the control panel. The zero-potential contact control unit is connected by an electrical wire. If a unit requiring 230 V power supply is used (bimetal, with heating resistor), it has to be connected to the terminal box by a three-core cable. The boiler's manufacturer supplies suitable room control units as an option.

Control panel and signalling

Locations of the boiler's control and signalling elements are illustrated in the picture of the boiler's control panel (Fig. X).

The boiler has two control panels:

- Main control panel, with basic control elements for the user
- Service control panel (located under the front cover), used for service settings.



Description of control elements

Main switch – used to cut off power supply to the boiler.

"Flame out" control light – a red light signalling a fault caused by the flame going out. The fault may be caused by gas supply interruption during start up or while the boiler is running.

"Boiler overheated" control light – and orange light signalling a fault triggered by:

- the combustion fumes thermostat after drop or loss of chimney effect,
- the emergency thermostat when the heating water temperature exceeds 105°C (98°C in open systems).

Thermometer, pressure gauge – show temperature and pressure, respectively, of the heating water in the boiler.

Boiler output switch (two flames – one flame) – used to switch between two operation stages (LOW/HIGH).

Pump thermostat – used to protect the cast iron body of the boiler against condensation. After igniting the burner, the boiler pump runs until the temperature exceeds 60°C (factory setting). This temperature setting may be changed by authorised service only.

Heating operation controls – used to set the heating water temperature.

Important: The selected temperature must be always higher than the temperature set on the pump thermostat. If not, the pump will stay permanently switched off.

Emergency thermostat – used to protect the boiler against overheating. If overheated, the thermostat will shut the boiler down. The boiler can be restarted after the heating water in the boiler has cooled off by pressing an unlocking button (11), which is sometimes located under a plastic plug.

Combustion fumes thermostat – used to shut the boiler down when the chimney effect has been reduced or lost. The boiler can be unlocked only after the combustion fumes thermostat has cooled off, by pressing an unlocking button (12).

Important: The boiler must never be run with the above described safety elements (combustion fumes and emergency thermostat) disabled or replaced by devices other than those specified by the manufacturer! Under no circumstances may the user manipulate with these elements.

RESET button – by pressing this button, the fault signalled by the "Flame out" red control light can be fixed. If the fault is signalled repeatedly, call authorised service.

For fault statuses triggered by the combustion fumes of emergency thermostat, using the RESET button is ineffective. In such cases it is necessary to call authorised service, which will diagnose the problem and after repairing the fault put the boiler back into operation.

Power mains fuse – protects the boiler's electrical wiring against overloading and short circuit.

Model KLO / KLO EKO	Max. power / Low power (kW) NATURAL GAS	Max. power (kW) PROPAN
65	65 / 49	55 / -
85	85 / 59	
100	99 / 70	-
130	130 / 91	-
150	150 / 105	-

Table 2 : Maximum and Low power of the boiler.

Running the Boiler

Operator's duties

In addition to setting the control elements (including control unit), the operator must:

- 1) comply with the Local Operating Mode – LOM (or, if one has not been devised yet, proceed in accordance with operating instructions for each device and its components (for the boiler, control unit, pumps, expansion vessel...) – refer to the section General Requirements,
- 2) maintain the area around the clean and neat,
- 3) make sure that no works unrelated to running and maintaining the boiler are performed in its vicinity,
- 4) enforce and secure (e.g. by warning signs or locking the entrance door, etc.) that no unauthorised persons are present near the boiler (i.e. persons without necessary knowledge, younger than 18, certified, etc.); the presence of such persons in the boiler's vicinity is permissible only when accompanied by authorised persons,
- 5) keep passages around the boiler and entrance door free,
- 6) keep important operation records (the so called Operation Diary – OD) as laid down in LOM.

In addition to the measures taken in practical situations – see section General Requirements – the operator must always shut the boiler down whenever it becomes impossible to control the boiler reliably, even manually. Supplies must always be shut off in the event of leaks of any media (in particular gas, but also heating water and electricity) and an authorised service called.

The operator must also shut the boiler down and close all supplies (if necessary not only in the boiler's vicinity but also sup-

plies to the building or at least its relevant part) even if undesirable situations have not occurred yet, but there is a danger that they might occur (e.g. when fire breaks in the building).

Preparing and starting the boiler

Preparing and starting the boiler up is part of the process of putting the boiler into operation, which must be performed by authorised service.

First live test run

The first live test run is a short live run of the boiler to make the last check whether the boiler has been installed correctly and the heating system functions properly. It is part of the process of putting the boiler into operation, which must be performed by authorised service.

The actual operation

The boiler runs automatically according to the setting of control elements, the user performs only the following operations, which have to be demonstrated to the user by the authorised service technician who put the boiler into operation:

1. Switching the boiler on or off using the power mains switch on the boiler's control panel.
2. Controlling the boiler's operation using selected control unit, which are always supplied with separate operating instructions.
3. Setting and checking the required heating water temperature within a 0 to 85°C range on the boiler's thermostat.
4. Switching between nominal or reduced output (HIGH/LOW).
5. When a fault is detected, a fault control light will switch on. In the event of power

failure, the burner will be shut down, and when power supply is restored, the burner will be automatically re-ignited. The fault state can be unlocked by pressing the RESET button in the service section of the control panel. If the fault reoccurs, call authorised service.

6. Unlocking the emergency thermostat. If the emergency thermostat shuts down the boiler, the orange light on the boiler's control panel will light up, signalling, "Boiler overheated". The thermostat is unlocked by pressing button 11, situated in the service section of the control panel. If the fault reoccurs, call authorised service.

Important guidelines

1. The boiler room must have a permanent supply of air.
2. The boiler operator must be at least 18 years old.
3. The boiler must be connected to 230 V/50 Hz power supply mains with appropriate circuit breaker.
4. When putting the boiler out of operation for a longer period of time, disconnect it from power mains.
5. If a defect occurs in the combustion fumes exhaust system and is triggered by the chimney thrust detector (reverse thrust, blocked chimney), the reverse fumes flow cutout device will shut off the supply of fuel into the boiler.
6. The boiler room must be kept clean and free of dust. All sources of dirt must be removed from the boiler room and during works, which generate dust (insulation works, cleaning), the boiler must be shut down. Even partially blocked burner by dirt degrades the combustion process and endangers economic and reliable running of the boiler. We do not recommend keeping in the boiler room any pets (dogs, cats, etc.).

7. Unlocking combustion fumes thermostat (reverse fumes flow safety cut-out). When this detector shuts down the boiler, the orange control light on the main control panel will light up, signalling, "Boiler overheated". The cutout device (TS) is unlocked by pressing button 12, situated in the service section of the control panel.

Important: If the fault reoccurs, disconnect the boiler from power supply and call authorised service.

7. Before commencing any works, which generate flammable vapours or gases that might penetrate the boiler room, or works with temporary fire or explosion hazard (gluing on floor covering material, painting with flammable paints), the boiler must be shut down beforehand.

8. No objects made of flammable material may be placed on the boiler or within a distance less than a safe distance from it.

9. Getting close to or touching the flame checking-window may cause burns.

10. The user must have the installation, putting into operation, regular maintenance and repairs done by a PROTHERM authorised service. Failing to abide by this condition will result in invalidating the warranty provided by the boiler's manufacturer. The Certificate of Quality and Completeness of the PROTHERM KLO Boiler, after being filled in and signed by an authorised service organisation, serves as a Warranty Certificate.

11. The boilers must once year undergo regular maintenance as laid down in Chapter X.

12. The boiler must be run in accordance with these Operating Instructions and oth-

er applicable regulations. Incorrect use of the boiler might result in reducing its life, but also in damages to health and property.

Starting the boiler up

The boiler the functioning of which has already been verified by the first live test is started up as follows:

- Set the heating water operating temperature control to approximately 2/3 of its full range. You will set it to the required temperature later. The heating water temperature has an impact on the heating speed of the UHW reservoir.
- . If the boiler works in conjunction with an indirectly heated UHW reservoir, set the reservoir temperature to approximately ½ or its full range.
- . Check the water pressure on the boiler's pressure gauge. When the water is cold, the pressure must not be lower than indicated (by the pressure gauge red hand – set by authorised service during the first live test run).
- If the boiler is controlled by either an equithermal or room heating control unit, set it in accordance with the device's operating instructions.
- Set the power mains switch to the ON position (I). The boiler will ignite itself and start heating the water in the UHW reservoir (if one is installed). When it has been heated up, the boiler starts heating the heating system water. If your boiler is equipped with an RVA 43.222 equithermal control unit, this function is achieved by selecting the WINTER mode.

The boiler switches off:

- when heating the UHW, always when the UHW temperature reaches the value set on the UHW reservoir thermostat,

- when the heating system water temperature in the boiler reaches the values set on the operating heating water thermostat,
- when the required temperature set on the room or equithermal control unit has been reached.

If the boiler fails to start up and the emergency state control light is not on, it is an operating shutdown described above. After the heating water and UHW have cooled down and the temperature in the room dropped, the boiler will automatically start up.

If the boiler does not start up even after a longer period of time and does not react to increasing the set values on the operating controls or other control elements (room and equithermal control unit), the problem is in the boiler, and it is necessary to call authorised service.

If the boiler has not started up and the emergency state control light is on, proceed in accordance with the instructions in Description and Functions of Control Elements.

Boiler shutdown

If you wish to shut the boiler down for a short while, use the power mains switch. If you want to shut the boiler for longer, pull out the power cord plug out of the socket and shut off gas supply to the boiler. If there is no danger of the boiler freezing, leave the water in, otherwise drain the water from the boiler, from the UHW reservoir and from the system.

Provided the heating system configuration allows it, when dismantling the boiler drain the water from the boiler only and leave it in the heating system to prevent it from corroding.

Maintenance

We recommend that once a year, preferably before the start of a new heating season, you have the boiler inspected by an authorised service. This inspection is not part of warranty. Things to be inspected are specified in the Service Book.

Mostly it is checking the functions and condition of the burner, checking and adjusting the output, checking for leaks in the flue joints (and if necessary sealing them) and then – if necessary – also cleaning the burner jets (caution – their interior must not be damaged!) and cleaning the boiler's heat exchanger.

Particularly important is to check the functioning of the emergency and combustion fumes thermostat. This inspection is also carried out whenever these components are serviced.

Maintenance performed by the user

a) Clean the boiler covers as needed, without removing the top cover. Before you start cleaning the boiler, disconnect it from power mains and pull the power cord plug from the socket. If the boiler surface

is wet, wait until it dries before reconnecting it.

b) Once a week check water pressure in the heating system and if necessary top up the water. Water in the heating system can be topped up only after the temperature of the water in the boiler has dropped below 40°C (measured on the boiler's thermometer). Failing to abide by this requirement may result in damaging the boiler's block.

c) Check the combustion fumes ducting for leaks.

d) When discovering any gas leak, shut the boiler down, shut the gas valve off and call authorised service.

e) Check and clean the filter and the sludge trap:

- straight after the first live test run,
- after the first week of operation,
- regularly once a week or at least once a quarter, depending on the degree of clogging.

Compliance with the requirements on boilers

Compliance of the boiler's properties are guaranteed and checked during the manufacturing process by a Quality Control System which, as confirmed by Certificate BVQI No. 69097 dated 17 May 2000, meet the BSN EN ISO 9001:1994 quality standard.

Services of a sustained standard for installations and putting the boilers into operation, warranty and post-warranty service, are provided through authorised contracted service organisations of necessary technical qualification and know-how (see point X).

The boiler must be used exclusively in accordance with these Operating Instructions and the accompanying documentation. Whenever you have any doubts or insufficient information, or if you feel you didn't fully understand the instructions, or if you suspect any unauthorised interference with the configuration and functioning of the boiler, always contact authorised service.

Warranty and Warranty Terms and Conditions

The PROTHERM KLO/KLO EKO gas-fired boilers are covered by a warranty specified in the Warranty Certificate, Service

Book and the conditions defined in these Operating Instructions.

Completeness of the Delivery

Delivery of the actual boiler

The PROTHERM KLO/KLO EKO boilers are delivered completely assembled and with their functions tested.

Part of the delivery is the following documentation:

- Operating Instructions,
- Product Quality and Completeness Certificate,
- Warranty Certificate,
- Service Book,
- Directory of Service Centres.

Customised delivery

The following optional accessories can be supplied with the boiler:

- room control unit,
- RVA 43.222 equithermal control unit,
- gas leak detection system,
- UHW heating reservoir,
- three-way distribution valve.

Transportation and Storage

The manufacturer supplies the boiler standing on a palette, to which it is secured against moving (by screws). When manipulating and storing the boiler, do not apply force on the boiler's covers! Boilers without a palette are manipulated on the boiler's body base (see Chapter X).

Boilers must be stored in a room, which meets at least the basic environmental conditions (non-corrosive, maximum humidity 75%, temperature between 5°C and 55°C, low dust, no biological agents).

Technical specifications of KLO Series boilers

Boiler type	65 KLO	85 KLO	100 KLO	130 KLO	150 KLO
Number of elements	8	10	12	15	17
Version	B11BS				
Appliance category	II2H3P	I2H	I2H	I2H	I2H
Ignition	by electric spark				
Fuel/ inlet gauge pressure	natural gas / 2 kPa, propane / 3.7 kPa				
Output stage I / II - ZP (kW)	49 / 65	59 / 85	70 / 99	91 / 130	105 / 150
Output stage I / II - P(kW)	- / 55	-	-	-	-
Input stage I / II - ZP (kW)	53,5 / 70,6	64,7 / 92,4	76,8 / 107,6	98,4 / 141,3	115,3 / 163
Input stage I / II – P (kW)	- / 60,1	-	-	-	-
Efficiency ZP / P (%)	91 / 91				
Consumption					
Natural gas (cu.m / h)	5,7 / 9,5	6,8 / 9,8	8,1 / 11,3	10,4 / 14,9	12,2 / 17,2
Propane (kg/h)	6,1	-	-	-	-
Burner jet diameter (mm)	2,7 / 1,55				
Natural gas / Propane	7 / 9				
Number of burner tubes (pieces)	7	9	11	14	16
Volume of water in the heating body (l)	27,7	34,3	40,9	50,8	57,4
Max. operating temperature (°C)	85 (80°C for open systems)				
Max. operating gauge pressure VV (bar)	4				
Min. operating gauge pressure (bar)	0,3				
Test water gauge pressure (bar)	8				
Power supply	1/N/PE AC 230 V, 50 Hz/TN-S				
Electric input (W)	100				
Electric protection	IP 41				
Noise level (dB)	do 55				
Removal of combustion gases					
Method	through chimney				
Flue diameter (mm)	180	200	220	220	250
Minimum chimney thrust (mbar)	0,025 / 2,5 Pa				
Temperature of combustion fumes at max. output ZP / P(°C)	129 / 115				
NO _x class	Class III				
Combustion fumes flow in weight terms at min./max. output					
Natural gas (g/s)	44 / 46,3	53 / 60,5	63 / 70,5	81 / 92,6	95 / 107
Propane (g/s)	- / 45,7	-	-	-	-
Connection dimensions					
Gas / heating water connection	G1" / G6/4"				
Boiler width (mm)	850	1010	1170	1410	1570
Boiler height / depth (mm)	1195 / 960				
Boiler weight (kg)	258	332	395	482	546

Technical specifications of KLO EKO Series boilers

Boiler type	65 KLO EKO	85 KLO EKO	100 KLO EKO	130 KLO EKO	150 KLO EKO
Number of elements	8	10	12	15	17
Version	B11BS				
Appliance category	II2H3P	I2H	I2H	I2H	I2H
Ignition	by electric spark				
Fuel/ inlet gauge pressure	natural gas / 2 kPa, propane / 3.7 kPa				
Output stage I / II - ZP (kW)	49 / 65	59 / 85	70 / 99	91 / 130	105 / 150
Output stage I / II - P(kW)	- / 55	-	-	-	-
Input stage I / II - ZP (kW)	53,5 / 70,6	64 / 92,4	75,5 / 107,6	98,4 / 141	113,5 / 163
Input stage I / II - P (kW)	- / 59,8	-	-	-	-
Efficiency ZP / P (%)	92 / 92				

Consumption

Natural gas (cu.m / h)	5,6 / 7,5	6,8 / 9,8	8,1 / 11,3	10,4 / 15	12,2 / 17,2
Propane (kg/h)	6,1	-	-	-	-
Burner jet diameter (mm)					
Natural gas / Propane	2,6 / 1,6				
Number of burner tubes (pieces)	7	9	11	14	16
Volume of water in the heating body (l)	27,7	34,3	40,9	50,8	57,4
Max. operating temperature (°C)	85 (80°C for open systems)				
Max. operating gauge pressure VV (bar)	4				
Min. operating gauge pressure (bar)	0,3				
Test water gauge pressure (bar)	8				
Power supply	1/N/PE AC 230 V, 50 Hz/TN-S				
Electric input (W)	100				
Electric protection	IP 41				
Noise level (dB)	do 55				

Removal of combustion gases

Method	through chimney				
Flue diameter (mm)	180	200	220	250	250
Minimum chimney thrust (mbar)	0,025 / 2,5 Pa				
Temperature of combustion fumes at max. output ZP / P (°C)	125 / 100				
NO _x class	Class V				
Combustion fumes flow in weight terms at min./max. output					
Natural gas (g/s)	44 / 46,3	53 / 60,5	63 / 70,5	81 / 92,6	95 / 107
Propane (g/s)	- / 45,7	-	-	-	-
Connection dimensions					
Gas / heating water connection	G1" / G6/4"				
Boiler width (mm)	850	1010	1170	1410	1570
Boiler height / depth (mm)	1195 / 960				
Boiler weight (kg)	317	369	421	499	550

These instructions are intended for specialised service only, and together with Operating Instructions and Service Book provide technical guidelines for installing, setting up and maintaining the boiler.

Installing the Boiler

Assembling the boiler after delivery

The boilers Series KLO / KLO EKO are for transportation reasons delivered with the thrust breaker installed in a horizontal position. After the boiler has been delivered to the point of installation, the thrust breaker must be installed in the operating position. The installation procedure is as follows:

1. Remove the top boiler cover which is fastened with two self-cutting screws.
2. After having removed the top cover, dismantle the thrust breaker. The thrust breaker is attached with three self-cutting screws to the internal boiler bulkhead (Fig. 6).
3. Pull out part of the thrust breaker and rotate it so that the combustion fumes neck is pointing vertically upwards. Insert this part into the counter-part and secure it with ten self-cutting screws. The line in Fig. 7 indicates the joining of the two thrust breaker parts.
4. After assembling the thrust breaker, you must install a sensor (capillary) of the combustion fumes thermostat, which is located inside the boiler, next to the thrust breaker. Insert the sensor in the hole at the back of the thrust breaker and fasten it with the clip and the self-cutting screw provided for this purpose (Fig. 8).

Boiler covers

The front cover is removable. It is held by spring clips which are attached in the top corners. When removing the cover, the pressure of the spring clips gripping the holding pins must be overcome. After dropping it down first, the cover can be completely removed.



Fig. 6



Fig. 7

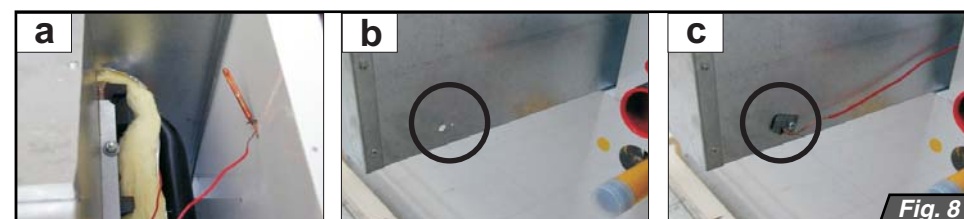


Fig. 8

The top cover can be removed after the two self-cutting screws located at the back of the boiler have been removed. When the screws have been removed, lift the cover upwards.

The boiler's control panel front can be dismantled after removing the two self-cutting screws in the panel's top corners. The remaining covers (side and rear) are attached by three lugs and self-cutting screws to the boiler's chassis. The covers are connected by protective wires to the boiler's electrical wiring.

Heating system pump

Select the heating system pump according to the design. Problems (e.g. insufficient heating water circulation) caused by using a different than prescribed pump are not covered by the manufacturer's warranty. In addition to other aspects, the pump delivery pressure rating must be designed taking into account overall losses in the heating system and in the boiler.

Properties of the heating system and filling it with water

The emergency thermostat temperature must be set depending on the expansion vessel type (closed or open). The emergency thermostat is located under the boiler's front cover (see Fig. X). For open systems, set the emergency temperature to 98°C, for closed systems to 105°C.

In open systems it is also necessary to limit the range of the operating heating water control unit to not more than 85°C, to prevent overlapping of their ranges due to tolerances, and undesirable reactions of the emergency thermostat.

The operating control unit limiting is done with an arresting wire clip situated inside the control button. The clip can be accessed after pulling the button off the thermostat shaft. The setting must be checked in an operation test.

After filling the heating system with water, bleeding it and adjusting the expansion pressure vessel (if one is installed), mark the resultant pressure of the heating water in cold state by pointing the red (adjustable) hand of the boiler's pressure gauge at it.

Instructions for installing closed expansion pressure vessels

Expansion vessels and safety pipes (connecting the boiler with the pressure vessel) must be protected against freezing. The maximum operating pressure in closed expansion vessels must not be lower than the opening pressure of the safety valve, and this must not be higher than the permissible operating pressure of the boiler's body; hence it is not recommended that the operating pressure of the expansion vessel exceed the operating pressure of the boiler's body. Closed heating systems (with a closed expansion vessel) must be equipped with a low water level detector; if the water drops below the minimum level, the boiler must be shut down in such a way that it can be restarted only after operator intervention.

The heating water system pipes, its joints and embedded elements (shutting valves, meter connectors and meters, etc.) must not be causes of leaks, i.e. they must be able to withstand the maximum operating pressure and temperature with a sufficient reserve.

Electrical wiring

The boiler's electrical compartment as well as the service section of the control panel is accessible after folding the top boiler cover. After dropping the cover forward, the terminal box becomes accessible for connecting accessories. The panel remains connected with the electrical compartment by wires and capillaries of meters and thermostats.

Important: the boiler must be earthed.

If the boiler is run with a room control unit, before it can be connected, the jumper in the terminal box must be removed. Otherwise the jumper is left in.

The room control unit's power supply wires are connected to terminals Pr1 and Pr2, positions 4 and 5. Recommended wire cross-section is 0.5 to 1.5 sq. mm.

The principle of the room control unit outlet's zero-potential must be respected.

If a bimetal control unit, which requires 230 V power supply is used, then the phase (L) and neutral (N) unit's terminals are connected to terminals Pr1 (position 4) and N of the boiler side, respectively. The control unit's outlet terminal is connected to terminal Pr2 (position 5) on the boiler side. Minimum rating of the control unit outlet terminals should be 230 VAC/2 A (induction load).

Pump wiring – if the pump's input exceeds the boiler's power supply circuit breaker rating, an additional switching element (contactor) must be installed.

Interconnecting the boiler with an indirectly heated reservoir

The boiler's internal wiring allows several ways how to interconnect the boiler with an indirectly heated reservoir.

- a) Topping-up pump.
- b) A three-way, actuator-controlled valve

and the boiler thermostat using an RVA 43.222 equithermal regulator.

Connecting equithermal control unit

The boiler's standard wiring allows the boiler control to be extended. The so called switching kit can be ordered, by means of which the boilers can be connected to one of Siemens Albatross equithermal control units, RVA 43.222, 63.242 or 63.280. Basic properties or these equithermal control units are detailed on page 13.

For connecting an equithermal control unit, the printed circuit board (behind the control panel) is equipped with a connector, "J1", which is as standard fitted with jumpers. The installation is performed as follows:

1. Take out of the switching kit box the connector which is already fitted with wires. Connect loose ends of the wires to relevant terminal boxes which are also part of the switching kit, depending on the control unit type. Schematic wiring diagrams are shown on pages 37 - 39.
2. Part of the RVA 63.242 and RVA 63.280 switching kit is an auxiliary printed circuit board which can be used for instance for connecting pumps and valves for blending circuits. If you are using one of these, connect the "J1" wire as indicated in the wiring diagram.

Important: each of these control units requires specific wiring, and hence it is not possible to use the ready made wiring for a different type of equithermal control unit.

3. Disconnect the boiler from power supply.
4. Pull the jumper off the boiler printed circuit board connector and replace it with the connector supplied with the switch-

ching kit of the equithermal control unit. Check the connector and make sure that it has not interconnected for instance also an additional opposite pin.

5. Insert the remaining terminal boxes into the equithermal control unit as shown in the relevant schematic diagram (pages 37 – 39).
6. Insert the equithermal control unit into the cut-out in the boiler's control panel and secure it against falling out with the lugs provided. The fixing lugs are located in the equithermal control unit's corners.
7. If you have used the auxiliary printed circuit board for the RVA 63.242 and 63.280 control units, connect the auxiliary device leads to corresponding terminals (see the wiring diagram on pages 37 - 39).
8. Depending on the application, connect temperature sensors to the control unit.
9. Remove from the boiler sump (Fig. 9) the pump thermostat capillary and replace it with the heating water temperature sensor from the equithermal control unit.

Description of Safety Elements

The emergency thermostat sensor, the operating controls sensor and the heating water temperature pump sensor are located in an indent in the boiler's body next to the heating water outlet. The combustion fumes thermostat sensor is located in the chimney thrust detector device. The emergency thermostat, the combustion fumes thermostat and the heating water pump thermostat are located in the service section of the control panel (see Fig. X). The emergency and fumes thermostat are provided with an unlocking button and a temperature setting scale (see Fig. X). Unlocking can be done after unscrewing the cover by pressing the unlocking button. The emergency thermostat can

Important: The pump thermostat will remain unused. The heating system protection function must be provided by the equithermal control unit. With the equithermal control unit set to an appropriate mode, set the heating water system protection temperature to 60°C.

10. Connect the boiler to power supply.
11. Set the equithermal control unit as detailed in this Instruction Guide, in the enclosed equithermal control unit documentation and in the design documentation for the given application

With an approval by an authorised measurements and control technician, it is possible to use the switching kit also for other types of control units.

Important: When using any control unit, the boiler's operating and safety functions must not be disabled or by-passed.

be unlocked only after the heating water temperature has dropped. The same applies to the combustion fumes thermostat, which can be unlocked only after its sensor has cooled off.

Important:

- After reactions of safety devices (emergency and combustion fumes thermostat), the boiler may be put back into operation only after the cause, which lead to the shutdown has been identified.
- The boiler must never be run with the emergency devices disabled or replaced by other devices that the ones specified by the manufacturer. After every servicing of these devices, their correct functioning has to be checked.

- The boiler may be restarted only after the sensor of the reverse fumes flow safety device has cooled off, i.e. after 10 minutes.

The heating water pump thermostat is factory-set to 60°C (recommended temperature) and secured against changes by a wire clip.

The power mains switch serves as a protection of the boiler's internal wiring against overloading and short-circuiting. The boiler's power mains fuse labelled T1.6A can be replaced after unscrewing the fuse box cover, located on the left-hand side of the service panel.

Important: The fuse may not be repaired or substituted by a different object.

“Flame out” control light – lighting up of the red control light signals a fault caused by unwanted outage of the flame. It can be unlocked by pressing the RESET button. If the light comes on repeatedly, the fault might be caused, besides other, by the following problems:

1. gas mains supply failure,
2. blocked or damaged house gas pressure regulator,
3. insufficient supply of combustion air,



Fig. 9



Fig. 10

4. insufficient gas jet pressure,
5. defective gas valve,
6. defective automatic ignition system,
7. broken ignition or ionisation cable,
8. defective pre-ignition burner,
9. defective ionisation electrode,
10. clogged up burner tubes.

“Boiler overheated” – lighting up of the orange control light, signalling one of the following faults:

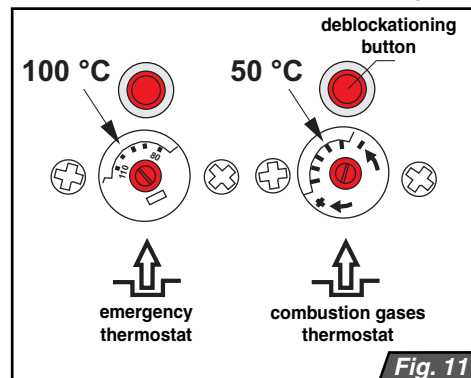
1. shutdown by the fumes thermostat after loss or drop of the chimney thrust, the fault might be caused, among other, by the following problems:
 - a) incorrect temperature setting of the fumes thermostat,
 - b) obstacle in the chimney route,
 - c) chimney thrust dropping below 2 Pa,
 - d) faulty fumes thermostat.
2. shutdown by the emergency thermostat due to overheating which might be caused, among other, by the following problems:
 - a) shut heating water outlet and boiler outlet valves,
 - b) incorrect temperature setting of the emergency thermostat,
 - c) heating water pump of incorrect rating,
 - d) clogged up heating water filter,
 - e) clogged up desludging device,
 - f) obstacle in the heating system,
 - g) clogged up fumes/water heat exchanger.

Operation

Preparing and starting up the boiler

Before actually starting up the boiler, the following basic tasks have to be carried out:

- Fill up the heating system with water. Check the water pressure on the boiler's pressure gauge.
- Check the boiler's connection to the fumes exhaust system,
- Open the gas isolation valve and let gas into the boiler. Measure the supply pressure. Bleed the gas connection pipe.
- Set the thermostats:
 - emergency thermostat (open systems to 97°C – factory setting, closed systems with expansion vessel may have the temperature set to 105°C),
 - fumes thermostat to 70°C (can be set within the range 70-110°C. Setting change must be approved by the manufacturer),
 - operating heating water and UHW thermostat (when auxiliary reservoir is used) is set to approximately $\frac{3}{4}$ of their respective full ranges. The operating heating water thermostat can be set within the range 0-85°C.
- Press the power mains switch. When using an RVA 43.222 control unit, set the mode to WINTER. The boiler ignites



and starts heating the UHW. After reaching the set temperature, it starts heating the heating system water. With the boiler running, check the entire gas route joints for leaks, e.g. using a foam-forming solution. Any leaks (caused by the boiler's transportation) must be repaired and the inspection repeated.

- At the end before starting the boiler up, check and if necessary adjust the gas supply pressure at the outlet from the gas shutting-valve.

The adjustment is done using the regulation elements on the gas shutting-valve.

Putting the boiler into operation

- Open the gas supply valve and the heating system water supply valve.

Set the I/II switch to the II position – manual operation. Set the boiler thermostat to the maximum temperature.

- Turn on the main switch on the boiler's control panel. Connection to power supply is indicated by the green light.

3. If everything is OK, the ignition burner is ignited. The burner's ignition electrode sparks for 25 seconds by default. The ignition burner starts up the boiler in reduced output. If the burner does not ignite within the ignition cycle, a control light on the power mains modules will light up, signalling a fault (see Fig. 29). If repeated attempts to ignite the burner fail, the main switch must be turned off and the fault diagnosed and repaired (refer to Chapter 11), and then the whole process repeated.

- The boiler's thermal output can be set and adjusted as described in Chapter 7.3.

- Perform a heating test:

- set the I/II switch to the I position,
- on the Albatros control unit enable function "Chimneysweep",
- carry out the heating test.

First live heating test

The first live heating test is performed by running the boiler for a short while after its final connection to the heating system.

Set the boiler's controls (operating controls, room control unit) so that you reach as high heating water temperature as possible with as few boiler shutdowns (switch offs) as possible. Keep the entire system (the boiler as well as the heating system) in these conditions until it stabilises itself (i.e. until the temperature even in the point

furthest away from the boiler stabilises), and then let it run for at least an hour.

Shut the boiler down. Write down the boiler pressure. Once more carefully bleed the system and then pressurise it to the value you have written down.

Let the boiler cool off. Monitor whether with the dropping temperature the pressure does not drop down significantly. If the pressure does drop, look for leaks, repair them and repeat the live heating test.

Specialist Maintenance

Part of maintenance (servicing) are also repairs. These are one-off specialised works performed immediately whenever a reason for them occurs (defect, error). Errors are repaired by replacement, using correct, exclusively manufacturer's original or by the manufacturer recommended parts and components.

Whenever a defect occurs, it is forbidden to continue running the boiler on a permanent basis for the purpose for which it is designed!!!

When maintaining and repairing the boiler (or its parts), measures must be taken to prevent injuries, particularly by electricity,

by fall (movement) of objects and by burning.

If mechanical maintenance is performed by people without electrician qualification, it is absolutely essential before works on the equipment are commenced to disconnect it from all power supplies, and this not only with a switch (main, power mains), but also by disconnecting the supplies (e.g. with circuit breakers, etc.)!!!

Apart from Operating Instructions, the tasks performed as part of specialist preventative maintenance are detailed in the Boiler Service Book.

Converting to Different Fuel Type

Converting to a different type of fuel (natural gas, propane gas) is possible only in models 65 and 85 KLO / KLO EKO. The conversion to a different fuel can be done by the following procedure.

Important: This conversion must be done exclusively by an authorised service.

The procedure converting to a different type of fuel:

- Shut the power supply before the boiler.
- Disconnect the boiler from power supply.

3. Fold the boiler's front panel.

4. Remove the jets from the burner console and replace them with jets of appropriate diameter depending on the boiler type and kind of fuel (refer to the table provided).

5. Replace the pre-ignition burner jet. Use jets for the given type of fuel (see Table X).

6. Honeywell gas valves have in the bottom right corner a black plug. Underneath the plug is an adjusting valve for the start up gas supply. Insert into the indented ar-

row in the adjusting valve a flat screwdriver and turn it by 180°. When running the boiler on propane gas, the arrow must be pointing in the direction of gas flow. When running the boiler on natural gas, the arrow must be pointing in the opposite direction to gas flow.

7. When converting the boiler from natural gas to propane gas, disconnect the modulator connector.

8. Connect the boiler to power supply

9. Open the gas supply valve before the boiler.

10. Set the boiler output as described on page X.

11. Check all gas route joints for leaks and implement the following safety measures:

- stick a label in a suitable way right on the boiler, showing on what type of fuel the boiler now runs,
- record the change, and the name of the person who made it in the boiler's accompanying technical documentation.

When converting the boiler, use only original manufacturer-supplied or authorised parts. When converting to a different type of fuel, the requirements on the design of threaded joints for the gas pipes inside the boiler must be respected, i.e. they must be sealed only with suitable material for the installation, and resistant against the used type of fuel. Safeguard the settings of all elements for instance by applying a drop of paint.

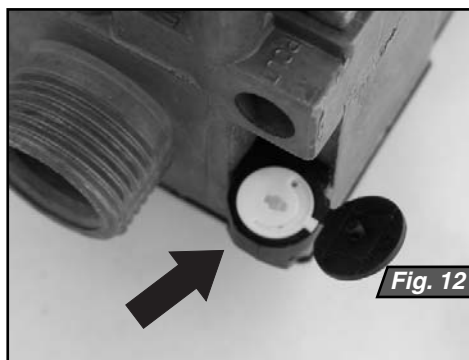


Table 3: Gas valves used by the model

Model	Type of gas valve	Producer / number of valves
65 KLO / KLO EKO - PROPAN	sigma 843, sigma 840	Sit / 2
65 - 100 KLO / KLO EKO - ZP	sigma 843, sigma 840	Sit / 2
130 - 150 KLO / KLO EKO - ZP	VR 400 B+B high - low	Honeywell / 1
130 - 150 KLO / KLO EKO - ZP + proof of gas-tightness	VR 400 B+B high - low + valve VE 408 AA 1007 for operator burner	Honeywell / 1 + 1 (operator burner)
For all models is used the automatic ignition system 4560 B 1055 (TS 50 sec.)		

Gas pressure settings

65 - 100 KLO / KLO EKO Standard – Natural Gas (65 KLO/KLO EKO propane)

1. Remove the gas inlet pressure measuring point screw on the gas valve and attach a pressure gauge (U-tube) to it. The natural gas supply pressure should not be lower than 2 kPa.
2. To reduce the supply pressure, tighten the measuring point screw.
3. Attach a pressure gauge (U-tube) to the outlet gas measuring point on the gas valve.
4. Start up the boiler.
5. Let the operating pressure on the burner stabilise for a while before starting the adjustment.
6. Fold the HIGH/LOW modulator plastic cover.
7. Check the appropriate high and low output against the table provided.
8. Using the HIGH/LOW switch set the boiler to nominal output (two flames).
9. Insert an 8 mm spanner on the gas valve modulator nut and by turning it clockwise or anticlockwise adjust the boiler's nominal output.

10. Check the pressure gauge (U-tube) reading.

11. Set the HIGH/LOW switch to the position LOW (one flame).

12. Adjust the output using the screw on the modulator, using a 3.5 mm wide flat screwdriver.

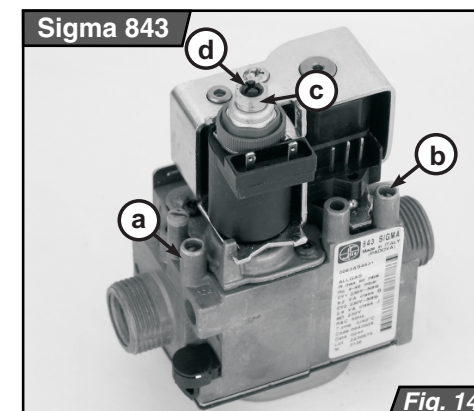
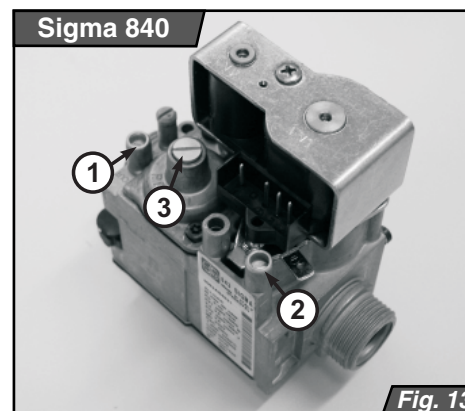
13. Check the output setting

14. Make sure that all measuring points are properly secured and no gas leaks from them.

130 – 150 KLO / KLO EKO Standard – Natural Gas

These models are equipped with a pair of Honeywell or SIT electromagnetic gas valves.

1. Remove the gas inlet pressure measuring point screw on the gas valve.
2. Using a pressure gauge (U-tube), measure the gas pressure supplied to the boiler. The value should not be lower than 2 kPa.
3. Replace the measuring point screw.
4. Remove the gas outlet to the burner pressure measuring point and attach a pressure gauge (U-tube) to it. The meas-



uring point is situated on the burner plate console.

5. Start up the boiler.

6. Let the operating pressure on the burner stabilise for a while before starting the adjustment.

7. Take orientation reading of the gas pressure (the values must correspond to the values specified in Table X).

8. Remove the aluminium plug on gas valve 1 and lightly turn the plastic output adjusting screw found inside.

9. Fold the protective plastic HIGH/LOW modulator cover on gas valve 2.

10. Using the HIGH/LOW switch, set the boiler to nominal output (two flames).

11. Insert an 8 mm spanner on the gas valve modulator 2 nut and by turning it clockwise or anticlockwise adjust the boiler's nominal output. Adjust the low output by turning the modulator screw clockwise or anticlockwise using a 3.5 mm wide flat screwdriver.

12. Check the output setting.

13. Make sure that all measuring points are properly secured and no gas leaks from them.

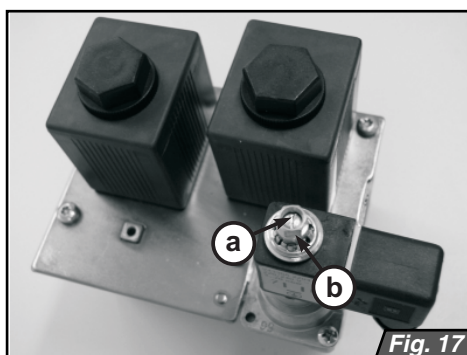
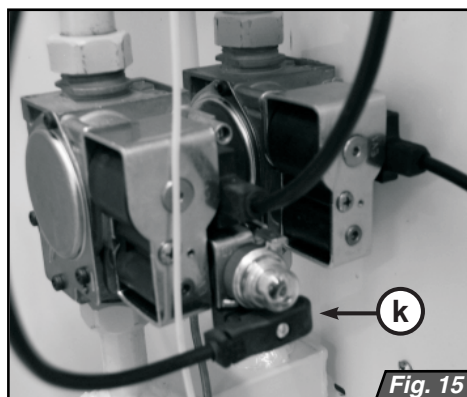
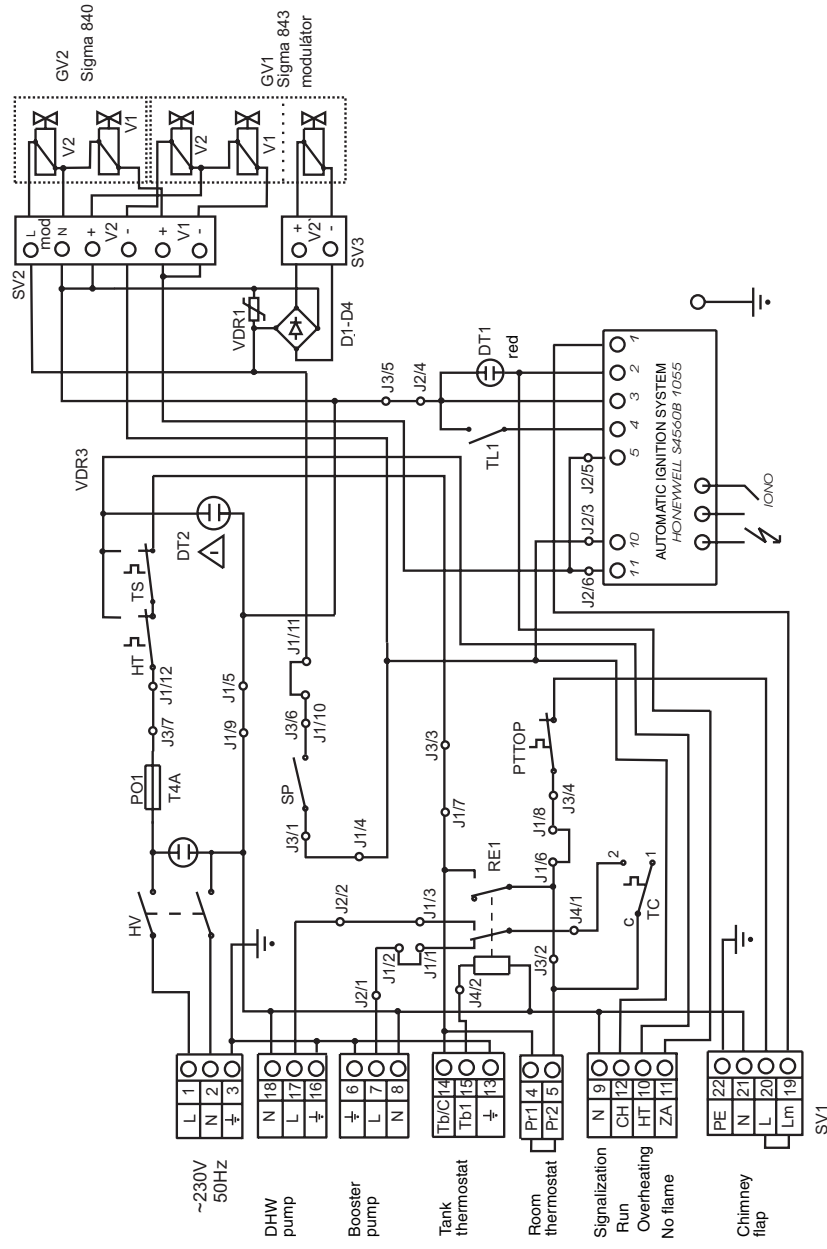


Table 4: Pressure of gas settings for KLO – natural gas / propane.

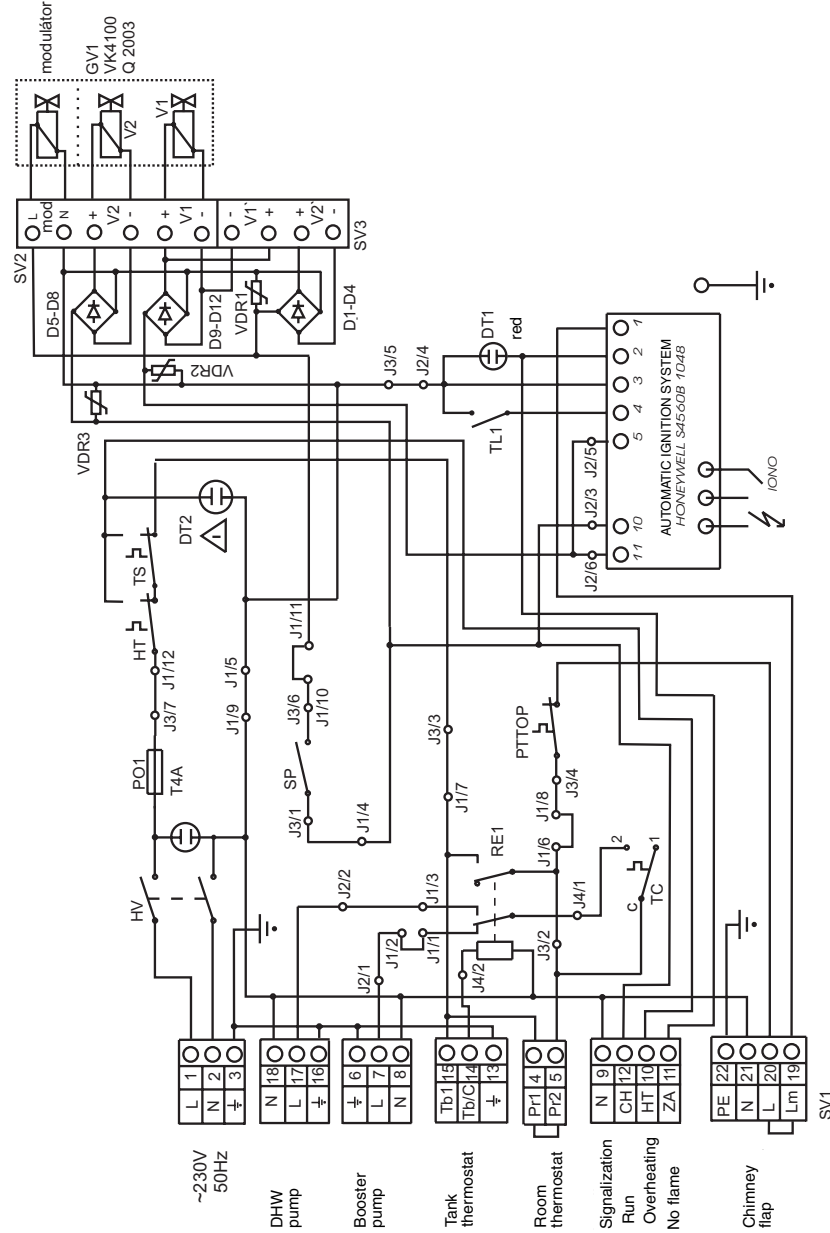
Model	65 KLO	85 KLO	100 KLO	130 KLO	150 KLO
Low power (mbar)	7,3 / -	6,7	6,2	7,2	6,6
Maximum power (mbar)	12,4 / 31,4	12,8	11,3	12,3	12,9
Ø jet of main burner (mm)	2,7 / 1,55	2,7			
Ø jet of operat. burner (mm)	0,45 / 0,24	0,45	0,45	0,45	0,45

Table 5: Pressure of gas settings for KLO EKO – natural gas / propane

Model	65 KLO EKO	85 KLO EKO	100 KLO EKO	130 KLO EKO	150 KLO EKO
Low power (mbar)	7,8 / -	7,4	6,6	7,7	7,1
Maximum power (mbar)	13,8 / 28,4	14,2	13,3	13,7	13,7
Ø jet of main burner (mm)	2,6 / 1,6	2,6			
Ø jet of operat. burner (mm)	0,45 / 0,24	0,45	0,45	0,45	0,45



Legend of schematics see on page 36



Legend to schematic electric diagrams for the 65 - 150 KLO / KLO EKO boilers

HV	- main switch
PO1	- power mains fuse
PT-TOP	- heating operation controls
TL1	- fault reset button, RESET
DT1	- red glow tube - fault indication control
DT2	- orange glow tube - overheating indication control
HT	- emergency thermostat
TS	- combustion fumes thermostat
TC	- pump thermostat
SP	- output switch - low (in the position LOW)
RE1	- Finder 40.52 relay, 230V AC coil
D1-4	- AC to DC converter diodes
D1-12	- AC to DC converter diodes
VDR1	- varistor
VDR1-3	- varistors
GV1	- gas valve (pilot burner and modulator)
GV2	- gas valve on-off
J1/1-12	- Molex 12-termin. connector for connecting an equivalent control unit
J2/1-6	- Molex 6- termin. connector
J3/1-7	- Molex 7- termin. connector
SV1	- main terminal box
SV2	- terminal box for connecting main gas valve GV1
SV3	- terminal box for connecting gas valve GV2

Table 6: Description of connector J1

1	TC	Used only when no equithermal control unit is connected
2	TOP (heating water)	Heating circuit pump
3	TUV (hot utility water)	Reservoir feed pump
4	F5	Burner stage 2 - phase
5	N	Power supply – neutral wire
6	reg.	Used only when no equithermal control unit is connected
7	F4	Burner stage 1 - phase
8	K4	Burner stage 1
9	N	Power supply – neutral wire
10	SP	Used only when no equithermal control unit is connected
11	K5	Burner stage 2
12	L	Power supply - phase 230 V AC

