Instructions for Use

Instructions for Installation

List of Figures

Definitions

These Instructions indicate Warning, Caution and Comment to emphasise information or instructions we consider important. The indications are used according to the following guidelines:

Warning: Information or instructions that may result in hazardous situations if not followed.

Caution: Information or instructions that may damage the equipment or its parts if not followed.

Comment: Information or instructions that can simplify or facilitate maintenance, or important parts of the text that should be emphasised.

Dear Customer,

You have become an owner of a cast-iron **PROTHERM KLZ** boiler, for natural gas or LPG. We believe it will serve you to your full satisfaction – certain minimum requirements must be fulfilled to that end. That is why we are asking you to study and follow these instructions carefully.

Please, keep the following rules in mind:

1. The boiler and all accessories must be installed and used in compliance with the design, the applicable laws, technical regulations and the manufacturer's instructions.
2. The boiler can only be installed in the type of environment for which it is designed, and which is properly ventilated (cf. Boiler Installation below).
3. Only service centres authorised by the manufacturer are allowed to put the boiler into operation after installation.
4. In case of defects, call a service centre authorised by the manufacturer – incompetent intervention can damage the boiler (and/or the accessories)!
5. The service centre's employee who initiates the boiler operation after installation shall instruct the user about the boiler, its parts and operation.
6. Check to make sure the supplied boiler type complies with the expected manner of use.
7. If you feel uncertain about any activities related to the boiler operation, look up and study all relevant information in these instructions, and follow the recommended procedure.
8. Do not remove or damage any labels or markings on the boiler.
9. The boiler complies with all Czech applicable regulations. If it is to be used in another country, deviations in the regulations have to be identified and resolved.
10. When the life cycle of the boiler, or its parts, has expired, they should be disposed of in an environmentally friendly manner.

TYPE	a	b	∅ d
20	327,5	191	130
30	285	106	130
40	242,5	21	150

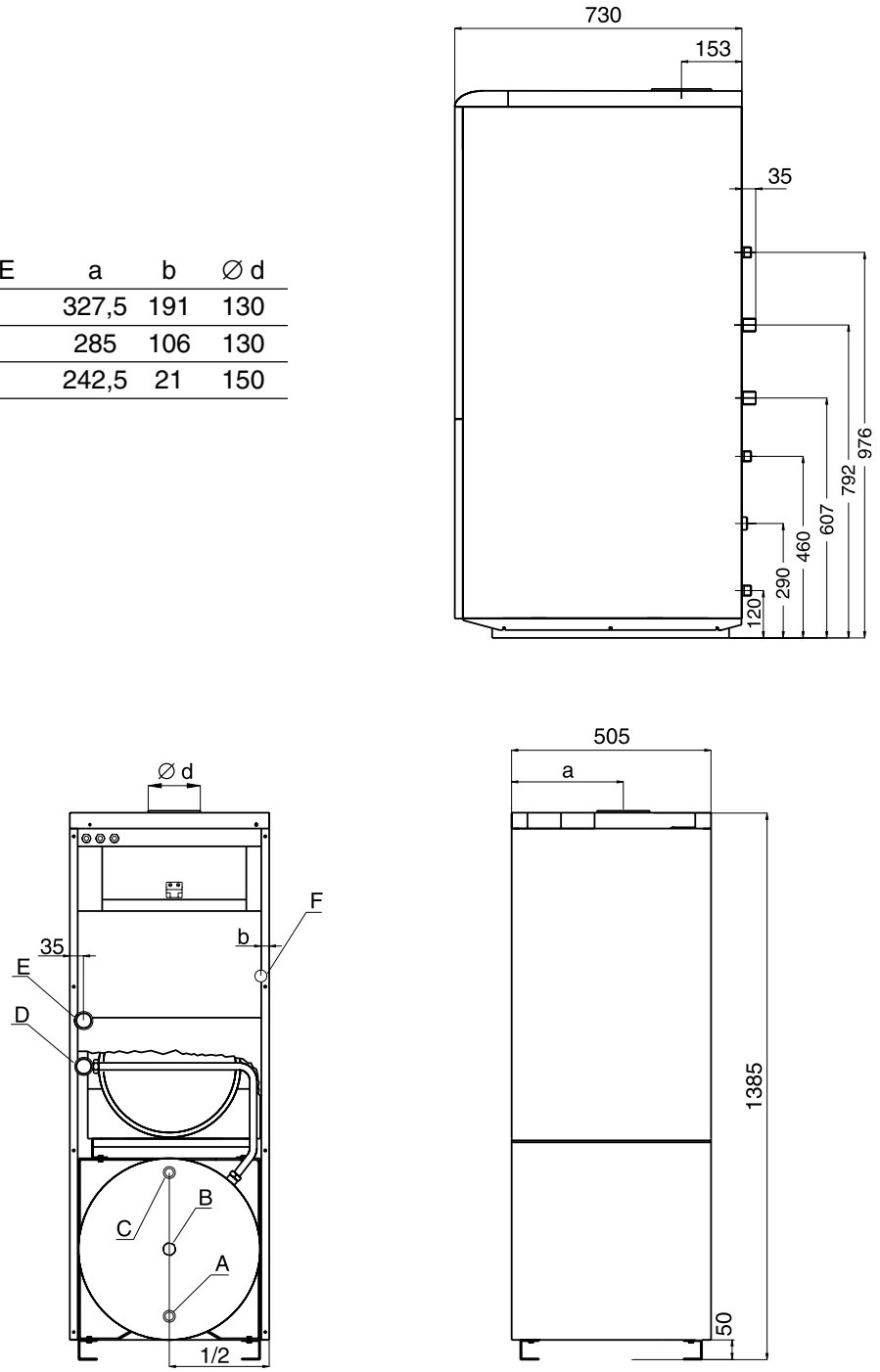


Fig. 1 Basic and Connection Dimensions

A – DHW input 3/4"
B – DHW circulation 3/4"
C – DHW output 3/4"
D – HCW input 1"
E – HCW output 1"
F – Gas input 3/4"

1. Introduction

Cast-iron gas-combusting boilers for installation on the floor (especially in cellars of family houses) are very popular and their popularity is growing. In addition to the “classical” basic features (reliability, stability of operation, simple installation and operation, etc.), boilers PROTHERM 20 (30, 40) KLZ offer the maximum resource utilisation, represented by the ability to prepare domestic hot water (DHW) directly in the boiler, in which a 90-litre reservoir is built; a wide range of operation modes and control by buttons; and more complete accessories, thanks to which the boiler is less dependent on the accessories provided in the heating system.

2. Boiler Accessories and Characteristics

2.1 Characterisation

It is a boiler with a high comfort level in operation and use, for combustion of natural gas or LPG. The fuel is distinguished by letters (ZP for natural gas and P for LPG) in the type code.

The boiler is manufactured in three types, which differ in their power output only. They are used for heating up water for both the heating circuit (HCW – heating circuit water) and domestic hot water (DHW). The DHW reservoir is heated by a separate heating circuit. The HCW is moved through the system by two pumps built into the boiler. The HCW pump is thermostat-controlled – it is activated when the HCW temperature gets to the value set on the thermostat. Thus the heating-up time is reduced after a prolonged break in operation. Heating of the DHW takes preference over the heating circuit – in other words, water in the heating circuits starts to be heated up only after the DHW has reached the pre-set temperature.

Button control on the boiler’s panel provides a wide scale of control modes. The MODE button selects the mode, the DOUBLE ARROW button sets values for the actual mode. Switching between modes and values is cyclic, i.e., they follow each other in a given order each time when the button is pushed, and in the end the order starts anew. The use of the button control is described in Chapter 4.2.

The control modes are as follows:

a) Direct control of temperature in the boiler – the DHW and HCW thermal sensors keep the boiler on until the pre-set temperature is achieved; when the DHW temperature is achieved, the boiler starts heating up the HCW; and when the HCW temperature is achieved, the boiler stands by until temperatures decrease, to heat the water up again.

b) Direct control of temperature in the boiler, in combination with a room thermostat – this arrangement improves the heating mode. DHW preparation is the same as in the preceding instance, but the HCW is controlled by the room thermostat, which keeps the boiler going until the air temperature gets to the pre-set value in the room – then the thermostat switches the boiler off. The air temperature depends on the HCW temperature produced by the boiler. If the HCW temperature value set on the boiler is not sufficient to achieve the air temperature set on the room thermostat, the HCW setting on the boiler must be increased.

c) Continuous regulation depending on the outside temperature, i.e., equithermal regulation – DHW preparation is the same as under a) and the HCW temperature is inversely proportional to the outside temperature; a representation of this dependence characteristic is given by a heating curve – the so-called heating characteristic on the boiler’s panel (Fig. 4). If radiators are equipped with thermostatic valves, this regulation keeps the entire building warm, independently of the time of the day and of atmospheric elements’ effects on outside walls.

d) Equithermal regulation in combination with a room thermostat – DHW preparation is the same as under a) and the HCW is heated up by the boiler that is switched on and off by the equithermal regulation elements and the room thermostat – cf. b) and c) above.

● This solution should be implemented in consultation with the designer of the heating system!

e) Regulation depending on the outside temperature with reduction of air temperature at night, i.e., DHW is prepared in the same way as described under a) and heating during the day in the same way as described under c). But at night (for any time intervals set on the switch clock on the boiler) the temperatures created by the equithermal regulation are reduced by a constant temperature difference, whose value is set by the button control.

If the night reduction of air temperature is selected (called “night reduction” in what follows) - cf. Chapter 4.2 – the HCW temperature is the set temperature minus the set difference, also for direct control of boiler temperature described under a), or direct control of boiler temperature in combination with a room thermostat, as described under b), again in the time intervals set on the switch clock (standard part of the boiler accessories).

Control based on the outside temperature, with the night reduction and thermostatic valves on radiators, is the most economical way of heating.

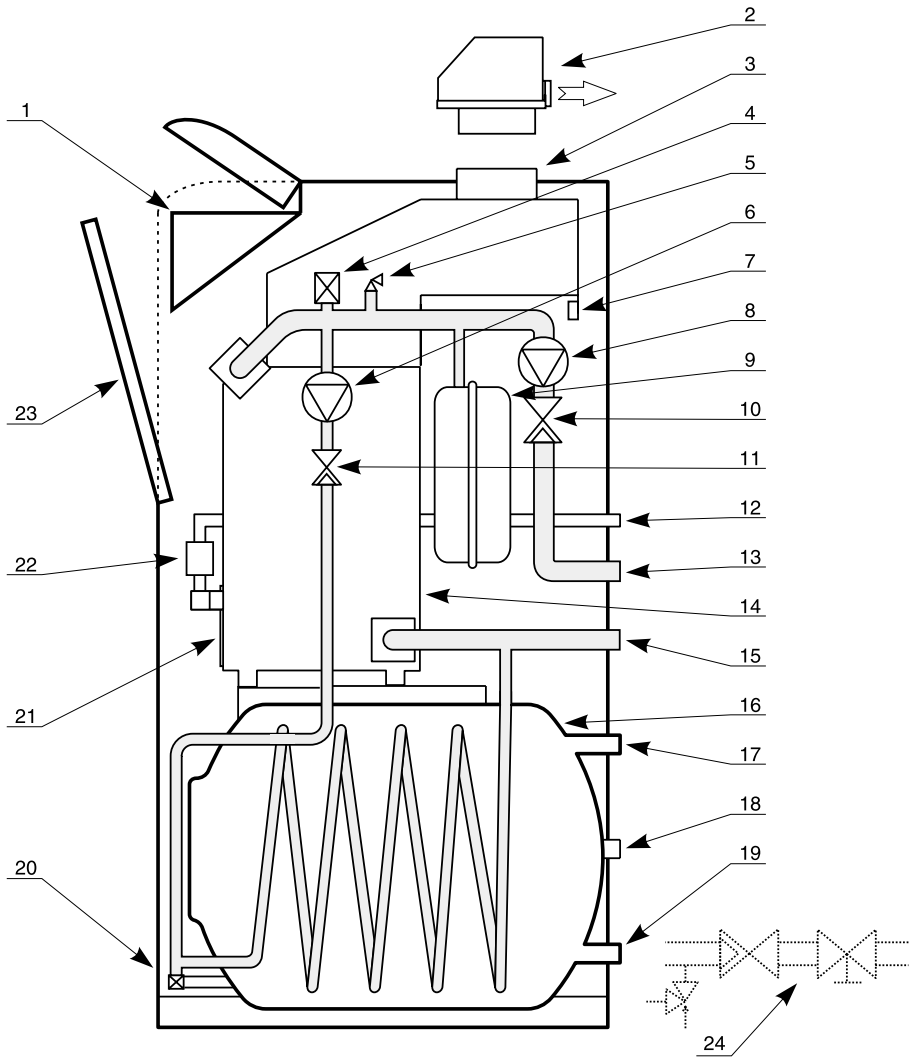


Fig. 2 Boiler Working Diagram

1. – Control panel
2. – POLO-TURBO extension
3. – Chimney flange
4. – Automatic purging valve
5. – Safety valve
6. – Pump for DHW circuit
7. – Flue-gas thermostat
8. – Heating pump
9. – Heating expansion vessel
10. – Backward flap for heating water
11. – Backward flap for domestic hot water
12. – Gas input
13. – HCW output
14. – Boiler body
15. – HCW input
16. – DHW reservoir
17. – DHW output
18. – Outlet for DHW circulation
19. – Input of cold water for DHW
20. – Filling/discharge system
21. – Burner plate
22. – Gas valve and ignition automatic system
23. – Tilt-out front panel
24. – Installation armature for DHW input

Other important features of these boilers are:

- Continuous regulation, based on ongoing comparison between the actual and required values (set by the user); this regulation is proportional, i.e., if the difference is higher, the boiler works with a higher power output, and vice versa.
- Pump run-down time lag – after the boiler is switched off, the pump circulates the HCW in the heating circuit for an additional 3 minutes (only in the heating mode).
- Anti-cycling restriction – after the boiler is switched off in normal operation, it cannot be re-activated for 3 minutes if the HCW temperature is above 8°C (this restriction does not apply if the boiler was switched off by a room thermostat).
- Anti-freeze protection of the system: the pump in the boiler switches on if the HCW temperature is below 10°C.
- Anti-freeze protection of the boiler: the boiler is always started if the HCW temperature is below 8°C.
- Anti-freeze protection of the DHW reservoir if the DHW function is switched off.
- Boiler operation is blocked if water is frozen inside – to prevent damage to the boiler.
- Pump protection: the pump is automatically switched on for a short time if it has not been operated for 24 hours – thus clogging by sludge sedimentation in the pump's bearings is prevented.
- Overheating protection: if the HCW temperature is higher than the pre-set value of 85°C, the pump is always switched on. If the HCW temperature is higher than 95°C, the boiler will be automatically switched off.
- The DHW and HCW temperatures and alarm reports are indicated on the display.
- Integrated hydraulic construction, which includes an expansion vessel (inside of the boiler) for the heating circuit, a pair of backward flap valves, a pair of pumps, a safety valve (for the heating circuit, automatic purging valve, etc. (cf. the boiler accessories below) – hence not so many interconnecting pipes and connections are necessary and repairs are simpler.
- The temperature can be set after switching the HCW pump on.
- The boiler is equipped with an SKKT (chimney-draft control) system – if there is excess flue gas (which indicates insufficient draft) the system is activated and the boiler is switched off (by shutting off the gas supply).

2.2 Boiler Accessories

A **PROTHERM 20 (30,40) KLZ** boiler consists of the following parts:

- Cast-iron boiler body with thermal insulation;
- Burner plate, including gas supply and ignition part;
- Flue-gas duct, with draft dampener;
- Hydraulic construction;
- Boiler casing, control panel, and terminal board;
- Boiler body base.

Cast-iron boiler body consists of elements and serves as a combustion chamber (including the flue-gas outlet) and water chamber (including the water ways). There are side elements ("Left" and "right") and middle (of one type). The elements are put together to create a body of the corresponding size (of both the combustion and water chambers). A completed body is connected to the hydraulic construction, insulated to prevent heat radiation, and provided with fixtures for thermostat sensors and on the legs, fixtures for mounting on the anchoring construction, which contains the DHW reservoir.

Burner plate is equipped with part of gas piping, burner tubes, and ignition equipment. Depending on the boiler (and body) size, it includes between 2 to 4 burner tubes and the gas pipe, which leads to the combined gas armature. This in turn regulates gas supply to the boiler, depending on the required and actual parameters (i.e., the state of the boiler and the heating circuit); the gas pipe leading out of the armature is part of the burner plate, with 2 to 4 nozzles, (one per each burner tube). The boiler is started by an electric spark. Automatic control is used for starting and maintaining the boiler operation, which is directly connected to the combined gas armature (made by the same manufacturer) into one functional system, thus reducing requirements for the interconnection.

Flue-gas outlet: It is a metal-sheet cover, which contains an SKKT thermostat, a draft dampener and a flue-gas flange (to which the flue duct is connected). The SKKT (chimney-draft control) system – if there is excess flue gas (which indicates insufficient draft) the system is activated and the boiler is switched off (by shutting off the gas supply). This part is equipped with a removable cleaning cover, which is accessible after the top casing panel of the boiler is removed.

Hydraulic construction is a system of pipes with two pumps, backward flap valves and safety elements, i.e. an expansion vessel for the heating circuit (10 litres rated volume), a safety valve in the heating circuit (with rated opening pressure of 3 bar) and automatic purging valve. The hydraulic construction also includes the boiler's connection fittings.

Boiler casing consists of covers, fixed back wall and side panels, removable front panel and removable top casing panel. The control panel is situated at the upper part of the boiler.

Boiler body base consists of two brackets connected to the bottom of the body, supporting the casing weight. It is also provided with holes for bars (approx. 1/2"), which make handling of the boiler possible without a pallet, if a sufficient number of people are available.

The base also includes a reflexive sheet, which substantially reduces heating of the floor under the boiler. The reflexive sheet is inserted from the side into the base brackets, exactly under the cast-iron body; its bent edges must be directed downwards along the brackets.

3. Boiler Assembly

3.1. General Rule

A **PROTHERM 20 (30, 40) KLZ** boiler can be put into operation only by an authorised installer. A network of the manufacturer's contractual service centres provides installation, maintenance and repairs.

PROTHERM 20 (30, 40) KLZ – ZP types are designed for natural gas, with 1.8 kPa (18 mbar) pressure in the distribution network; the calorific value of natural gas is about 9 to 10 kWh/m^3. The user's gas piping and gas meter must be sufficient for all gas appliances used on the premises. The pipe branch supplying the boiler must have diameter of at least Js 3/4", but a diameter one degree higher is recommended.

PROTHERM 20 (30, 40) KLZ – P types are designed for LPG; the calorific value of natural gas is about 12.8 to 13 kWh/kg. Operation using portable cylinders would be problematic, due to both sufficient volume and handling of the cylinders; hence a prerequisite for the operation is an installation of an LPG tank near the heated premises and filling of the tank by an organisation authorised for such activities.

Sufficient supply of LPG from the tank to the boiler (and other gas appliances, if any) is part of the design and delivery of the LPG tank . For LPG boilers, a pressure-control valve should provide the pressure of exactly 3.0 kPa (30 mbar).

Gas appliances with flue gas removal to chimneys must not be in rooms in which negative air pressure is created by ventilation fans.

The boiler's flue gases are led to a chimney with continuous draft, at least 2 Pa. Connection to the chimney is via a flue-gas duct, with diameter 130 mm for PROTHERM 20, 30 KLZ and 150 mm for PROTHERM 40 KLZ.

Elements reducing the draft (such as various exchangers for using the residual heat) are prohibited from being inserted in the flue-gas duct. The flue-gas duct is not included in the boiler delivery.

Installation of both the boiler and the flue-gas duct must comply with applicable standards. The standards' requirements prevent appearance of adversary effects, such as excessive cooling of the flue gases, penetration of the chimney wall by humidity, and variability of chimney draft, which would affect the boiler operation in an undesirable manner.

The boiler takes combustion air from the space around it. There must be the possibility of direct space ventilation, at a minimum volume of 0.8 m^3 per each kW of the boiler's power output. If direct ventilation is impossible, the required volume is 2 m^3 per each kW of power output.

An extension, **PROTHERM PT 20 (30, 40) POLO-TURBO,** can be used for forced removal of flue gases from PROTHERM 20, 30, 40 KLZ boilers. This makes it possible for the boilers (with the exception of the **PROTHERM 50 20 (30, 40) KLZ** type) to be used on premises where a chimney cannot be used. The extension is directly connected to the boiler's flue-gas outlet. The extension fully replaces a chimney, for maximum length of the flue-gas duct up to 10 equivalent metres (1 equivalent metre: 1 m of straight duct or one 90° elbow).

Only authorised service providers may install the extension on a boiler and start its operation. Safety regulations and precautions must be adhered to when servicing the extension connected to the electrical supply, even if switched off!

The boiler is designed for water pressure up to 400 kPa (4 bar). Water for filling and replenishment must comply with the relevant standards (it mustn't be acidic, i.e., its pH must be above 7, and the carbonate hardness must be as low as possible).

Use of anti-freeze mixtures is not recommended, since they have properties unsuitable for the boiler operation. These specifically include: reduction of the heat to the heating circuit, the system (i.e., the circuit plus the boiler) is thus equipped with the following elements:

A closed expansion vessel with a membrane and the rated volume of 10 litres, whose balance is equipped with a valve similar to a tyre valve, hence a car-tyre pump and pressure meter can be used for setting pressure in the system. The tyre pressure meter should be calibrated by an exact pressure gauge.

A safety valve, with the opening pressure of 300 kPa (3 bar).

The boiler can also be used in systems with an open expansion vessel. If this is the case, the temperature setting of the emergency thermostat should be checked and, if necessary, adjusted – cf. 3.4.

The expansion vessel must be adjusted to the system – thus the system is protected from abrupt changes of pressure (for total water volume up to 180 litres) and from adverse effects on all parts of the system during its operation. If the total water volume is higher than 180 litres, it is necessary to use another expansion vessel, which must be of the same type (closed, with a membrane).

The final pressure of cold water in the system is fixed by the red (adjustable) hand on the pressure gauge. If the actual pressure gets below the value so indicated, leaks must be found, or the system purged (or both). If the system is properly sealed and purged and the pressure drop repeats, the most likely cause is a defect of the expansion vessel – call for professional assistance.

When filling the DHW reservoir, open both inlet and outlet valves and let the water flow until it runs out clean and without air bubbles.

- Prior to the final assembly, the heating-circuit pipes should be flushed by pressure water, several times. For older circuits (that have already been in use) the flushing stream direction must be opposite to that of the heating water.

Installation of a sludge separator is recommended in the incoming branch of heating water. The design of the separator should enable regular removal of sludge without necessity to discharge large quantities of heating water. The sludge separator can be combined with a filter; however, a filter itself is not a sufficient protection. The warranty does not cover mechanical defects caused by foreign bodies and impurities. Both the filter and the separator should be regularly checked and cleaned.

The relevant standards provide requirements for the water quality: if the sum of calcium and magnesium concentrations is above 1.8 mmol/litre, other „non-chemical“ measures should be taken against scaling (such as protection by magnetic or electrostatic field).

The DHW reservoir should not be subjected to:
– Pressures higher than the maximum operation pressure;
– Direct effects of fire or temperatures higher than normal working and climatic conditions;
– Impacts and forces acting on the reservoir's body, vibrations (except for the effects of the operation itself, i.e., filling and circulation of water).

If the DHW outlets (taps) are far from the boiler, another branch (to create a DHW circuit) can be connected to the boiler – the DHW circulates all the time and when it is taken from the tap, no waiting time (letting cold water run “idly”) is necessary – the DHW circuit increases the volume of DHW “in reserve” – on the other hand - in particular if the insulation of the DHW circuit is not sufficient - the DHW heat-up time may considerably increase. The DHW circulation pump is not controlled from the boiler; and the pump must comply with hygienic regulations.

If there are any special requirements concerning transportation of the boiler (such as preventing the covers from damage when the boiler must be carried through narrow spaces), the boiler may be partially disassembled.

Sufficient clearance space must be provided around the boiler to enable manipulation of the boiler and its accessories, both when being installed and during operation.

The boiler is put on the floor (or a special base plate). The floor must have at least usual load capacity and must not be slippery. The area at the boiler must be cleaned without moisture (such as vacuum cleaning). If the floor is flammable, a special flameproof, thermally insulating base plate must be used; its dimensions must be, in all directions, at least 100 mm larger than the floor projection of the boiler.

The boiler with the casing needs a doorframe clearance width of at least 65 cm.

The following clearance distances are prescribed:

– 100 mm from flameproof to moderately flammable materials;
– 200 mm from flammable materials (such as chipboard, polyurethane, polystyrene, polyethylene, expanded PVC, synthetic fibre, cellulose, asphalt board, rubber, etc.).

The boiler is designed for operation in a normal environment (temperatures between +5 and +40°C, humidity up to 85%, depending on the temperature).

The boiler must not be installed in rooms with a bathtub, or in bathrooms, washing areas and shower rooms in zone 0, 1 or 2. It cannot be installed in zones 3 in which water streams are used for cleaning (such as bathhouses, shower and washing rooms in schools, factories, sporting fa;cilities, public facilities, etc.)

If the boiler is installed in allowed zones, the relevant standard also requires adequate protection from electrical shock.

In practice, situations may occur in which the users must apply necessary precautions:

a) Preventing the boiler from switching on (also accidental) when inspecting the chimney, flue-gas duct, water and gas piping – i.e., electricity supply to the boiler must be stopped in addition to using the boiler switch (e.g., by unplugging);
b) Stopping the boiler whenever flammable or explosive vapours appear (even if temporarily) – such as vapours of flooring glue, paints when surface finishing, gas leaks, etc.);
c) If it is necessary to discharge water from the heating system, it must not be dangerously hot;
d) If there is a stoppage of the heating system (boiler or circuit) which might lead to water leak from the boiler exchanger, or if the exchanger is filled with ice, no attempts to start the boiler should be made until normal operating conditions prevail.

3.2 Boiler Installation

The connections for water and gas are on the rear panel of the boiler – cf. Fig. 1.

A backward flap valve and a safety valve must be installed in the DHW inlet into the boiler. The valve, which is integrated with a flap, is part of the boiler delivery. The valve compensates for the volumetric expansion of DHW when it is heated up, hence it is in continuous operation – water leaking from the valve should be drained to a washbasin – the drainage pipe/tube should be slanted to the washbasin, so that water is not accumulated in it. If the water main's pressure is above 600 kPA (6 bar), a reduction valve is necessary on the boiler input.

It is also recommended to install a shut-down cock before the armature (with respect to the water stream) – such valve is not included in the delivery.

The armature must always be installed – however, the water leak from the safety valve can be prevented if an expansion vessel is installed in the DHW branch – a "high-pressure" (not "heating") expansion vessel is necessary, with minimum rated volume minimum 3 litres and the rated pressure 600 kPa (6 bar). The vessel must be installed in the branch after the armature (with respect to the water stream), either before the reservoir or after it, at a suitable point of the DHW distribution pipes.

No valves, cocks or other obstacles to water stream may be installed: between the reservoir and the safety valve (the armature); or between the reservoir and the DHW expansion vessel!

In order to really prevent water leaks from the safety valve, the “high-pressure” expansion vessel’s pressure setting should be 10 to 30 kPa (0.1 to 0.3 bar) lower than the safety valve’s opening pressure!

The connection fittings on the boiler (in particular the gas fitting) must not be affected by any pressures or forces from the piping – in other words, all dimensions and distances of the connected pipes must be accurate, both mutually and from the wall and floor.

The boiler may be connected to the heating circuit by flexible elements (hoses) during reconstructions, if necessary because of the layout, etc. Such hoses must have parameters suitable for the purpose, should be as short as possible, protected from damages caused by mechanical load and chemical agents, and replacement must always be arranged prior to the end of the life-cycle and/or deterioration of their parameters (according to their manufacturer’s instructions).

3.3 Electrical Connections of Boiler

Electrical connection of the boiler to the power grid is by three-wire cord and plug. The socket for the plug must comply with the relevant standard and have the grounding pin (connected to a PE or PEN cable (yellow-green).

The boiler must be connected to the protective grounding wire; the plug in the socket must always be accessible without obstacles.

Use of adaptor plugs, extension cords, etc. is prohibited. The boiler is protected by a tube fuse (T 1.6A / 250V), installed under the front cover panel.

Only a person with adequate electrical-engineering qualifications can be allowed to install the socket and the thermostat (thermostat installation requires utilization of the boiler’s internal electric cabling); the same requirements apply to servicing the electric part.

Before any work commences on the electrical part, the boiler’s cord must be unplugged.

Only no-voltage thermostats or regulators can be used for regulating the boiler, i.e., they must not bring in any foreign voltage. A specialised service centre should assess suitability of a particular regulator.
The terminal board for connections is in the boiler’s connection box.

3.4 Heating System – Properties and Filling

The heating circuit must be designed so that the heating water is allowed to circulate through at least one radiator all the time.

If an open expansion vessel is used as part of the heating system, the temperature settings of the emergency thermostat must be adjusted to 95°C – only authorised service centres are authorised to adjust these settings!

The boiler is equipped with a filling/discharge valve, During filling, the cap of the automatic purging valve must be loosened, to let the purged air escape. The cap of the automatic purging valve should be left loose all the time – this enables automatic purging of the system during operation.

4. Description of Controls

4.1 Description and Functions of Controls

The controls and indicators are shown in diagrams of the control panels in the Figure.

On the horizontal control panel, there are: pressure gauge, main switch, RESETbutton, button control, - i.e., buttons MODE and DOUBLE ARROW, display and clock. The horizontal control panel is under the plastic cover in the front part of the top panel.

When the front panel is tilted forward, the vertical control panel with the emergency thermostat is uncovered.

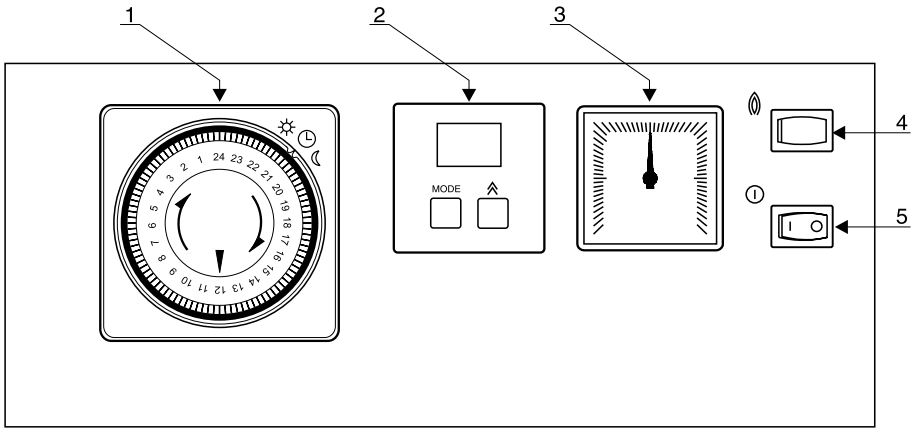


Fig. 3 Control Panel

1. – Switch clock
2. – Button control module
3. – Pressure gauge
4. – RESET button
5. – Main switch

Pressure gauge –pressure of the heating water;

Main switch – switches on/off electric power supply to the boiler;

Button control – MODE and DOUBLE ARROW buttons – sets the mode and values for the operation; the settings are indicated on the display. Procedures and examples of the setting are described below.

Display- situated above the button control and indicates the DHW and HCW temperature values, codes of the equithermal control, codes of additional modes and codes of defect states. The meaning of icons on the display is described below, together with the setting procedures.

Defect Codes:

F1 – Indication of ignition blocking and shutting the gas valve – NO FLAME. This status is automatically activated whenever there is no signal of flame presence. The boiler is shut down and cannot be restarted. The same status can be activated by safety elements – emergency or flue-gas thermostat.

F2 – A defect of the HCW sensor, or the HCW temperature below 3°C. The boiler is shut down and cannot be restarted.

F3 – The HCW temperature is above 95°C. The boiler is shut down, it will be re-activated automatically when it has cooled down.

F4 – A defect of the DHW sensor. The DHW reservoir is not heated up, the heating circuit is not affected.

F5 – A defect of the external senor (short circuit or broken connection). This defect is only possible if the equithermal control is used – it will not appear in other operational modes.

Emergency thermostat – if the HCW is over-heated, the emergency thermostat will shut down the boiler and it must be reset before restarting. Cf. F1 if the RESETbutton does not restart the boiler.

Electric fuse – protects the boiler's electric installation from overload and short circuits

RESET button ("flame" icon) – to be pressed when there is an "F1 defect" as defined above (if the boiler was switched off by the flue-gas thermostat, the button will reset the state only after the boiler has cooled down, in about 10 minutes).

If the defect persists, it is necessary to identify and remedy the chimney draft defect – if the cause is not clear (suspected clogging of chimney, etc.) a specialised service centre should be called!!!

For defects caused by the emergency temperature thermostat, RESET button will not reset the state and a specialised service centre must be called to check the boiler and put it back into operation.

The boiler must not be operated with the safety elements /flue gas and emergency temperature thermostats) disabled or replaced with elements different from those specified by the manufacturer! Users are not allowed to tamper with the safety elements.

4.2 Display and Button Control

The display has two fields, in which numbers, letters, dashes, dots and their combinations may appear.

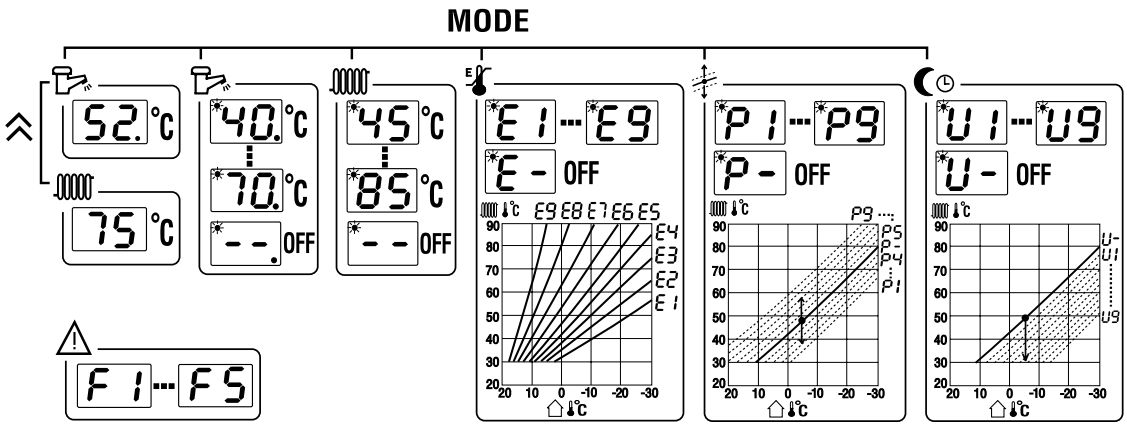


Fig. 4 Button Control Diagram

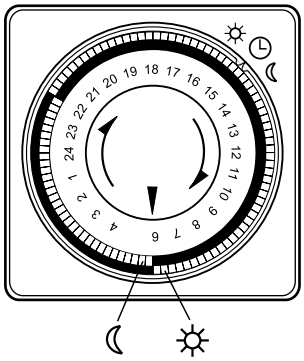


Fig. 5 Switch Clock

☼ – komfortní teplota OV
☾ – úsporná teplota OV (útlum podle parametru „U")

Numbers indicate temperature values – with a dot in the lower right-hand-side corner it is a DHW value; without a dot, the HCW value.

A flashing dot in the upper left-hand-side corner indicates that the value corresponds to a mode, as set by the MODE button – that is, not measured values but the values being set are displayed.

The order of DHW temperature values to be set is: 40, 44, 48, 52, 56, 60, 64, 68, 72°C and the "DHW off" mode (indicated by two dashes and a dot in the lower right-hand corner: "- -.").

The order of HCW temperature values to be set is: 40, 50, 60, 65, 70, 75, 80, 85°C and the "HCW off" mode (indicated by two dashes without a dot in the lower right-hand corner: "- -").

The "off" modes: "DHW off" means that the DHW priority is blocked and the boiler heats the CHW immediately; while "HCW off" means the so-called summer operation, only DHW preparation and no heating.

All parameters of the boiler are set with the MODE and DOUBLE ARROW buttons and the display. When the boiler is switched on, the boiler displays the actual HCW temperature (such as 62); pushing the DOUBLE ARROW button we display the actual DHW temperature (such as 53). or a defect code (F1 through F5).

By pushing and releasing the MODE button we activate setting mode (with a flashing dot in the upper left-hand-side corner) of the DHW-temperature (indicated by a steady dot in the lower right-hand corner). The displayed value is the temperature value being set – it is changed by pushing the DOUBLE ARROW button. By pushing the MODE button we confirm the value, which is thus recorded in the memory, and the following mode is activated.

This following mode is the HCW-temperature setting – again, the DOUBLE ARROW button changes the value to be set, MODE confirms the value and records it in the memory.

Then the “E” mode is displayed – the equithermal curve setting, E1 through E9. The requested output temperature pf the HCW when leaving the boiler depends on the outside temperature and the curve selected. If “E-” is displayed, the equithermal mode is to be switched off. DOUBLE ARROW changes the E value, MODE records it in the memory.

The next is the “P” mode – a parallel shift of the selected E-curve – the HCW temperature determined by the respective E-curve is decreased (P1 through P4) or increased (P5 through P9) constant temperature difference. “P-” means no shift.

P1 shift by -15°C
P2 shift by -9°C
P3 shift by -6°C
P4 shift by -3°C
P5 shift by +3°C
P6 shift by +6°C
P7 shift by +9°C
P8 shift by +15°C
P9 shift by +21°C
P- the original equithermal curve, without a shift

By DOUBLE ARROW the required shift is selected. MODE confirms the selection and activates the following setting mode.
The U mode is activated, meaning the value of the night reduction. When the switch clock switches the boiler to the night operation “NOC” (the “MOON” icon on the clock), the HCW temperature selected in any of the above methods is decreased by:

U1 reduction by 3°C
U2 reduction by 6°C
U3 reduction by 9°C
U4 reduction by 12°C
U5 reduction by 15°C
U6 reduction by 18°C
U7 reduction by 21°C
U8 reduction by 24°C
U9 reduction by 27°C
U- without a reduction

The DOUBLE ARROW button selects the required value of the night reduction, the MODE button confirms and records the value and activates the first mode mentioned above (the DHW-temperature setting).

The night operation intervals are set by the tabs on the circumference of the clock – cf. Fig. 5 – the tabs turned towards the centre mean the night operation – there can be several intervals with the reduction during the day.

5. Boiler Operation

5.1 Boiler Preparation and Start

The preparation for and commencing of the boiler operation are carried out by a specialised service centre.

5.2 First Heating

The First Heating is a short-term operation of the boiler in order to verify the correct installation and functions of the heating system and boiler. It is included in the commencing of boiler operation by specialised service centre.

5.3 Boiler Operation

Users are allowed to handle only the boiler controls that are on the control panel.

Boilers whose functionality has already been verified by the First Heating are started as follows:

– The power cord must be plugged into the socket.
– Check the pressure of the heating water on the boiler's pressure gauge. If the water is cold, the pressure must not be lower than set by the red hand (set by the authorised service centre during the First Heating).
– If the room thermostat regulator is used for regulating the boiler, set the regulator following its instructions for use. If the equithermal regulation is used, follow the instructions for the equithermal regulation in the final chapter of this booklet.
– Put the main switch to the "ON" position ("I"). Flame will be ignited and the DHW reservoir contents are heated up. When the DHW is heated up, the heating water is warmed up and the heating is started, controlled by the heating regulator, if the HCW temperature is set.

The HCW (heating-circuit water) heating process is stopped when its temperature has achieved the set level, or if the room temperature has achieved the level pre-set on the room thermostat (i.e. temperature of air in the room in which the thermostat is installed).

The DHW (domestic hot water) heating up is stopped when the pre-set DHW temperature is achieved, or the HCW temperature has achieved its maximum level. If the latter is true, the pump keeps running and the DHW is heated up again when the HCW temperature gets below the maximum level.

If the boiler will not start, the HCW setting should be checked in the "basic mode," and the HCW temperature level at which the pump starts working, in the "first service mode" – the HCW temperature must always be higher than the pump-activation one! If the equithermal regulation is used, the HCW temperature activating the pump must be set (the "t-" service mode).

If the boiler does not ignite and no defect code is indicated on the display, the operation is stopped due to one of the operational reasons we have just described; the heating will automatically start again as soon as the DHW or HCW cools down, or when air temperature decreases in the room in which the room thermostat is installed.

If the boiler does not start even after a long time and does not respond to increasing of the temperature value by the button control, there is a defect and a specialised service centre should be called.

● We recommend that the DHW temperature level in the reservoir is kept at 65°C all the time, or it is increased to 75°C at regular intervals, in order to prevent multiplication of Legionella pneumophila bacteria (or other kinds).

What to do if there is a defect code displayed?

F1 – wait until the boiler cools down (about 10 minutes) – this does not refer to the DHW reservoir;
– check whether the "HCW off" mode is not set ("two dashes");
– set heating demand on the room thermostat (such as setting a higher temperature on it);
– set the maximum HCW level on the boiler.
If the defect persists (occurs again within 30 seconds from pushing the RESET button, switch off the boiler and call professional assistance.
If the boiler will start and the defect occurs after a longer period of time, insufficient chimney draft may be the cause (such as partly or fully clogged). If the cause is not obvious, switch off the boiler and call professional assistance.

F2 – Switch off the boiler and call professional assistance.
F3 – Inform a service centre if it occurs more frequently.
F4 – Call professional assistance.
F5 – Switch the boiler to direct control of temperature (which enables the operation) and call professional assistance to check the outside sensor of the equithermal regulation.

5.4 Breaks in Boiler Operation

If the operation of the boiler is to be stopped for a shorter period of time, simply set the main switch to the ‚off' position. Before a longer break between operations, unplug the electrical cord and shut off the gas supply. You can leave water in the boiler if there is no risk of freezing, otherwise you should discharge water from the boiler and the heating circuit.

- If at all possible, discharge water only from the boiler when disassembling the system – the heating circuit is protected from corrosion if the HCW is left in.

6. Boiler Maintenance

6.1. Professional Maintenance

The boiler should be checked and adjusted by a professional organisation at least once a year, preferably before the beginning of the heating season. Such service inspection cost is not included in the warranty. A list of recommended steps is specified in the Service Booklet.

Most of the steps are concerned with checking the condition and functions of the burner, adjustment of power output, checking the tightness of flue-gas duct connections (with repairs if necessary), cleaning of burner nozzles (if necessary – the cleaning must be done carefully, as the inner diameter of the nozzles must not be changed by the cleaning), and cleaning the heat exchanger in the boiler, checking the DHW reservoir and the magnesium electrode.

Checking the functionality of the emergency and flue-gas thermostats is very important – these elements must also be checked after each servicing on them.

The magnesium electrode should be checked within half a year from commencing the boiler operation. The loss rate of the electrode depends on the hardness and. more generally, composition of water. The company checking the electrode will tell you how often the electrode should be checked afterwards, on the basis of the loss until the first check. If 60% or more of the electrode has been lost and the time interval for the checks should remain preserved, the electrode should be replaced with a new one. The reservoir must not be operated when the electrode has been all used up. Any defects caused by corrosion due to a missing magnesium electrode are excluded from the warranty.

The protective function of the magnesium electrode is based on its consumption – hence the replacement of the electrode cannot be included in the warranty either.

6.2. Maintenance by User

a) The boiler should be cleaned as necessary, without removing the cover panels. Before cleaning, put the main switch off and unplug the power cord. If the boiler surfaces are wet after the cleaning, the boiler should not be started until it dries.

b) The HCW pressure should be checked once a week, with replenishment of water as necessary – before replenishing, the boiler temperature (the reading shown on the boiler thermometer) must cool down to below 40°C. Failing to met this requirement may lead to leaks or ruptures in the boiler body (caused by thermal shrinkage).

c) Checking tightness of the flue-gas duct.

d) If there is a gas leak, shut the gas supply valve and call a specialised service centre.

e) Checking and cleaning the filter and sludge separator:
   1. Immediately after the First Heating;
   2. After the first week of operation;
   3. Regularly once per month; or once per quarter if the sedimentation rate is lower.

7. Safety of Life and Property

7.1. Technical Requirements for Boilers – Product Compliance and Safety of Use

Product compliance of the boilers is governed by the following Czech standards: ČSN EN 297, ČSN EN 437, ČSN EN 625, EN 50 165, ČSN EN 60 335-1:1997.

In addition to these, the present Instructions and the manufacturer's documentation must be complied with. Children and persons under the influence of drugs or otherwise incapable must be prevented from operating the boiler.

8. Warranty

The warranty on **PROTHERM 20 (30,40) KLZ** boilers is provided as specified in the Guarantee Certificate, Service Booklet and under conditions specified in these Instructions.

9. Complete Delivery

9.1. Boiler Delivery

PROTHERM 20 (30, 40) KLZ boilers are delivered completed and functionally tested.

The documentation consists of:

– Instructions for Use
– Certificate of Quality and Completeness
– Warranty Certificate
– Service Booklet
– List of authorised service centres

9.2. Optional Accessories

On special request, a room regulator or the outside sensor for the equithermal regulation (T 704 3E, made by Honeywell).

10. Transportation and Storage

When leaving the manufacturing plant, the boiler is fixed (bolted) on a palette.

For storage, normal conditions have to be provided (non aggressive environment, air humidity up to 75%, temperatures between 5°C and 55 °C, low dust nuisance, no biological factors).

Do not let any forces act on the casing or panels when handling or when storing the boiler!

The following instructions are for specialised professionals only. Together with the "Instructions for Use" and the "Service Booklet," technical instructions for installation, setting and maintenance are provided.

Numbers and headings of the chapters are the same as in the "Instructions for Use"

3. Boiler Assembly

When servicing the boiler that is plugged into the electrical grid (even if the main switch is off), all safety precautions for work on electrical equipment must be adhered to.

The boiler casing can be dismounted. The front cover panel is fixed by spring clamps in the upper corners of the casing. The front panel is tilted out) by pulling its top edge forward. The top panel's rear edge is tilted upward, after undoing two screws in the rear part. The remaining casing panels are fixed to the body by bolts. All parts of the casing are connected to the boiler electrical installation by protective wires.

Be careful when transporting the boiler, its centre of gravity is rather high!

3.3 Electrical Connections of Boiler

The electrical installation cabinet and the service part of the control panel are accessible when the top panel of the boiler is removed. The front part of the cabinet consists of the control panel, fixed by two screws. When the panel is tilted forward, the terminal board for connection of external equipment becomes accessible. The panel remains connected to the boiler by the wires and tubes of the measurement devices.

If the boiler is to be operated with a room thermostat, the jumper between the contacts on the terminal board is removed; otherwise the jumper must remain on the board.

A room thermostat is connected by a power cable to the XT5 terminal board – the recommended cross-section of the cable wires is between 0.5 and 1.5 mm^2. The no-voltage rule must be fulfilled by the room thermostat regulator!

If the boiler is to be operated with the continuous regulation depending on the outside temperature (equithermal regulation), the outside-temperature sensor must be installed.

The sensor is installed outside on the building, preferably in one half of its height (or one half of the heated part's height). If the regulation should provide comfortable heating in certain rooms, the sensor should be on the wall in which the windows of the rooms are. If this is impossible, the sensor will be installed on the northwest side. If equithermal regulation is used to optimise the heat quantity, the sensor is to be installed on the coldest (i.e. the north) walls of the building.

- The sensor must not be exposed to the morning sun, or directly to the elements, hot air flows above windows, doors, ventilation, or even the installation tube leading to the boiler (the cable should be sealed in the tube); neither should it be in corners etc. with no or low movement of air, such as closely under balconies, roof edges, eaves gutters, or in niches.

The sensor is connected to the boiler with a two-wire cable, with copper wires of cross-section at least 0.5 mm^2 and the cable length up to 30 metres (between the sensor and the boiler, i.e., 60 metres from the boiler to the sensor and back). The cable should not be led parallel to other cables or through premises with high-power electric motors (or electric welding machines., etc.)

3.4 Heating System – Properties and Filling

The emergency thermostat settings must be adjusted according to the type of the expansion vessel used (closed or open): for open to 95°C, for closed to 110°C.

Adjustment of the HCW expansion vessel (i.e., of the pressure in its gas part) begins before the filling – it should always be pressurised to a pressure value slightly higher than the expected pressure of water (e.g., 50 kPa (0.5 bar) higher). Thus the balancing volume will be as high as possible and can better be utilised. Then fill the sys-

tem with cold water, purge it, setting the pressure to the expected final value, as shown by the boiler pressure gauge. Then carefully release pressure from the gas part of the expansion vessel, monitoring its pressure with the tyre-pressure meter, as long as the gas part's pressure is higher than the water pressure as shown by the boiler pressure gauge.

As soon as the pressure values are near to each other, release the pressure from the gas part very carefully, until the values equal each other and both begin to decrease – at this moment the desired highest balancing volume is set for the given working point. At this stage the pressure changes are very small and very careful work is necessary – water is virtually incompressible and its volume remains more or less unchanged even if the pressure decreases. If you "overrun" the pressure limit value, you will have to pressurise the gas part in the expansion vessel and repeat the procedure more carefully.

The expansion vessel's valve is not absolutely tight – if the pressure in the system drops down, it may be caused by a water leak or by pressure decrease in the vessel's gas part. When you replenish water, the gas part "shrinks" and the balancing capacity of the expansion vessel is reduced, lower than the rated amount. Hence just pressurising the gas part after a longer operation period (or a short one, if water has been replenished) is not a universal recipe!

If there is a DHW expansion vessel, it is set by simply pressurising it before filling DHW into the boiler and the piping, up to the working pressure as explained in Section 3.2.

After filling the heating system with water, purging and setting the pressure expansion vessel (if there is one), the final HCW pressure value is set by the red needle on the boiler pressure gauge.

4. Description of Controls

Sensors of the emergency thermostat and **the DHW and HCW temperature sensors** are in the boiler body near the HCW outlet. The emergency thermostat and the HCW pump thermostat are located on the left hand side, on the service part of the control panel. The emergency thermostat is equipped with a reset button and range for temperature setting. The reset button can be pressed when the HCW temperature setting has been reduced.

Electric fuse is on the control panel inside the connection box (the plastic mould with control panels).

Flue-gas thermostat is a button-shaped element on the rear side of the flue gas cover. The thermostat is reversible, i.e., when the flue gases cool down, it will re-activate the boiler.

After the safety elements' response (emergency and flue-gas thermostat), the boiler's operation can only be re-started after identifying the reasons for their activation. The boiler must not be operated if the safety elements are disabled or replaced with elements different from those specified by the manufacturer. These elements must also be checked after each servicing on them.

Service (Additional) Modes

Pushing the MODE button and holding it pushed for about 8 sec the display will be switched to the service mode, indicated by displaying "t" - the HCW temperature necessary for switching on the HCW pump:

"t1" = 40°C
"t2" = 45°C
"t3" = 48°C
"t4" = 50°C
"t5" = 52°C
"t6" = 54°C
"t7" = 56°C
"t8" = 58°C
"t9" = 60°C
"t-" automatic HCW setting according to the actual required temperature.

The setting is changed by pushing the DOUBLE ARROW button, it is confirmed and stored in the memory by the MODE button. Thus the starting power mode is activated, indicated by the "n" icon and numbers from 1 to 9, or a dash, at the second position. The meaning is as follows:

"n–" minimum starting power

to

"n9" maximum starting power

Settings in the manufacturing plant:

– For burners with tubes that guarantee minimum content of pollutants (in particular that of nitrogen oxides, No_x) in flue gases, the so-called LOW NOX design, the starting power is always set to the maximum.
– For burner with standard tubes and combusting natural gas, the minimum starting power is always set.
– For burner with standard tubes and combusting LPG, the starting power is set to level 6.

5. Boiler Operation

5.1. Boiler Preparation and Start

Check water pressure on the boiler pressure gauge. Turn the gas supply valve on. Plug the boiler's power cord into the socket. Set the HCW and DHW thermostats to about one half of their ranges. Use the first additional mode to set automatic HCW temperature setting for the pump operation; this setting may be adjusted for standard operation in the future. Put the main switch on. The boiler is ignited and heats up the DHW, then HCW.

Check the boiler for gas leaks when operated (e.g., by a testing foam) – if any leaks are found (caused by transportation), they must be sealed and the check repeated.

At the end of this procedure, the boiler's power output is checked and, if necessary, adjusted by setting the gas pressure on the gas armature. Settings corresponding to the customer's wish are carried out.

Such setting is done by the controls on the combined gas armature (cf. the corresponding Fig.). The pressure us measured by a "U" manometer (against the atmospheric pressure).

Before setting, switch the boiler off and unplug its power cord. Then:

– Remove the plugs (A)
– Unfasten the closing screw (2) of the gas output pressure measurement point and insert the "U" manometer's tube.

Maximum Power

– Start the boiler and let it run at full power, heating up the DHW. The measurement should not be interfered with by switching off when the pre-set temperature of water is achieved.
– Turn the adjustment screw (B) clockwise to set the gas pressure:
– 120 mm water column for natural gas
– 270 mm water column for LPG
– 100 mm water column for mixed gas*.

* "mixed gas" has code GZ 35 in Poland, G 25.1 in Hungary.

Reduced Power

– It is measured at a "soft start" when the boiler is switched on in the heating mode (this condition lasts for max. 1000 sec)
– Turn the screw (C) counter-clockwise to set the left extreme position – for minimum power output.
– Turn the knob (D) on the automatic part:
– 50 mm water column for natural gas
– 130 mm water column for LPG
– 40 mm water column for mixed gas*.

* "mixed gas" has code GZ 35 in Poland, G 25.1 in Hungary.

When the setting process is finished, switch the boiler off, remove the "U" manometer's tube and (without excessive force) fasten the closing screw of the measurement point. Put in the metal plug. Restart the boiler and check whether the ignition is activated properly for both power stages; check tightness of the measurement point to the gas armature.

5.2. First Heating

The First Heating is a short-term operation of the boiler after its installation and final connection to the heating circuit.

The boiler controls (on the boiler and the room thermostat) should be set to achieve the highest possible HCW temperature and the fewest possible (operational) stops. Keep the system (the boiler plus the heating circuit) on until it stabilises (i.e., the temperature at the most distant radiator is stationary) and then for one more hour.

Stop the boiler and write down the reading on the boiler pressure gauge. Carefully purge the entire system and bring the pressure to the recorded value.

Then let the system cool down and watch whether the pressure does not decrease too fast – if yes, you have to find the leaks, seal them and repeat the First Heating procedure..

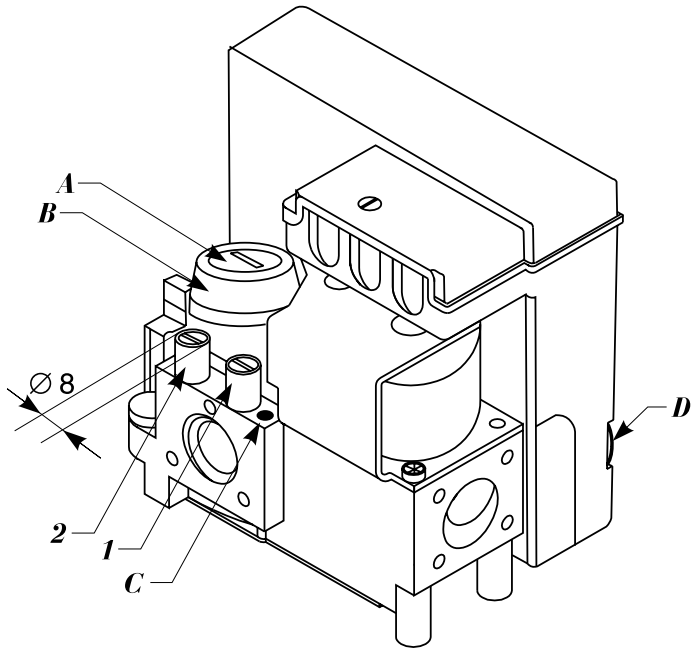


Fig. 6 Regulation elements of "HONEYWELL VK 4105 G" combined gas armature (for boilers 20, 30, 40 KLZ)

1 – Measurement point of gas pressure at input to armature
2 – Measurement point of gas pressure at output from armature
A – Plug
B – Setting screw for maximum
C – Setting screw for minimum
D – Electric setting of minimum

* "mixed gas" has code GZ 35 in Poland, G 25.1 in Hungary.

6. Boiler Maintenance

6.1. Professional Maintenance

The professional preventive maintenance is described in the “Instructions” and in the “Service Booklet”.

If fuel conversion (from natural gas to LPG or vice versa) is necessary, the following procedure must be followed. Only authorised service centres are allowed to carry out the conversion.

The following steps are to be followed:

1. Dismount the burner from the boiler.
2. Replace the nozzles with the type suitable for the required fuel.

	nozzle diameter	Number of nozzles		
	(mm)	20 KLZ	30 KLZ	40 KLZ
Natural gas	2.65	2	3	4
LPG	1.7	2	3	4
Mixed gas*	3.3	2	3	4

* “mixed gas” has code GZ 35 in Poland, G 25.1 in Hungary.

3. Mount the burner back into the boiler.
4. Set the pressure as prescribed for operation – cf. “Boiler Preparation and Start”.
5. Check tightness of the gas piping. Take the following precautions:
   a. Indicate on the boiler, in a suitable manner, the type of fuel for which it has been converted;
   b. Record the conversion, date and identification of the centre that converted the boilers, in the technical documentation.

Only original parts supplied by the manufacturer or a party authorised by the manufacturer may be used for the conversion. When converting, the workers must respect requirements for thread connections, specifically, sealing by materials suitable for the type of work and resistant to the fuel used.

– For natural gas it is plumber's gaskin soaked in linseed or boiled oil, etc.
– For LPG it is plumber's gaskin soaked in alcohol cements made from lampblack (type HERMETIC) or shellac with addition of washed graphite.

Settings of all elements are to be permanently marked by, e.g., a drop of paint.

If the pump is blocked by sediments, it can be rotated by a screwdriver (in the direction of the pump rotation) – the screwdriver slot is accessible after the screw is dismounted from the front end of the stator.

Do not tap the shaft: its is ceramic.
The DHW pump must be run at the highest speed.
If excessive scaling or other pollution is found when inspecting the spiral heating tube in the DHW reservoir, the reservoir must be cleaned.

The loss rate of the magnesium electrode will be determined on the basis of the first check, which is to take place within half a year from commencing the boiler operation. The boiler must not be operated when the electrode has been all used up. If 60% or more of the electrode's original size (300 mm) has been lost and the time interval for the checks should remain preserved, the electrode should be replaced with a new one.

The following principles should be followed when replacing a defective element of the boiler's cast-iron body:

– Always use a new coupling. Grease the coupling moderately with oil or petroleum jelly before inserting it into the openings. Dab them inside with a wooden mallet. The coupling should be inserted uniformly (from all sides). Be careful to only insert clean couplings.
– Apply enough stove cement on the contact surfaces of the elements. Perfect tightness is a prerequisite of proper and economical operation.
– Put the element on the protruding part of the coupling, dab it on with a wooden mallet. Use a puller to press the elements toward each other, with a uniform gap between the elements all the time.
– When mounting the boiler casing, be careful about proper insulation.

Technical Parameters

Type		Unit	20 KLZ	30 KLZ	40 KLZ
Category				II_{2H3P}	
Design				B_{11BS}	
Ignition				el. spark	
Fuel / input pressure				natural gas / 1.8 kPa LPG / 3.0 kPa	
Power output	- natural gas	kW	12 – 17	18 – 25	23.5 – 33.5
	- LPG	kW	11 – 15	16 – 22.5	21.5 – 30
Power input	- natural gas	kW	13.5 – 19	20 – 28	26 – 37
	- LPG	kW	12 – 17	18 – 25	24 – 33
Consumption*	- natural gas*	m^3/hour	1.9	3	4
	- LPG*	kg/hour	1.2	2	2.8
Burner nozzle diameter	- natural gas	mm		2.45	
	- LPG	mm		1.55	
Elements of body		pieces	3	4	5
Number of burner tubes		pieces	2	3	4
Flue gas removal	- manner			to chimney	
	- diam. outlet	mm	130	130	150
Min. required draft in chimney		Pa		2	
Flue gas temperature	- natural gas	°C		~ 100	
	- LPG	°C		~ 95	
Weight flowrate – flue gas		g/s	13.3	19.8	26.6
Efficiency	- natural gas	%		90 – 92	
	- LPG	%		89 – 91	
Water volume in boiler body		l	9.1	11.6	14.1
Max. operational temperature		°C		90	
Max. operational pressure		kPa		400	
Gas connection branch				G 3/4"	
Heating water connection branch				G 1"	
DHW safety valve				up to 3 bar	
DHW connection branch				G 3/4"	
El. voltage / frequency		V/Hz		230 / 50	
El. protection class				IP 40	
Noise level		dB		up to 55	
El. power input (without pump and three-way valve)		W		130	
Dimensions	- width	mm		505	
	- height	mm		1390	
	- depth	mm		730	
Weight (without water)		kg	145	160	185
DHW reservoir volume		litre	90		
DHW flowrate (Di according to ČSN EN 625)		litre/min	12.4	14.0	15.3
Max. DHW up to ΔT 30°C and Di flowrate		litre	145**	230**	290**
DHW max. pressure		kPa		600	

* Fuel consumption re-calculated according to the ČSN EN 297 Standard (at 15°C)
** basic temperature in reservoir 70°C
Comment: 100 kPa corresponds to 1 bar

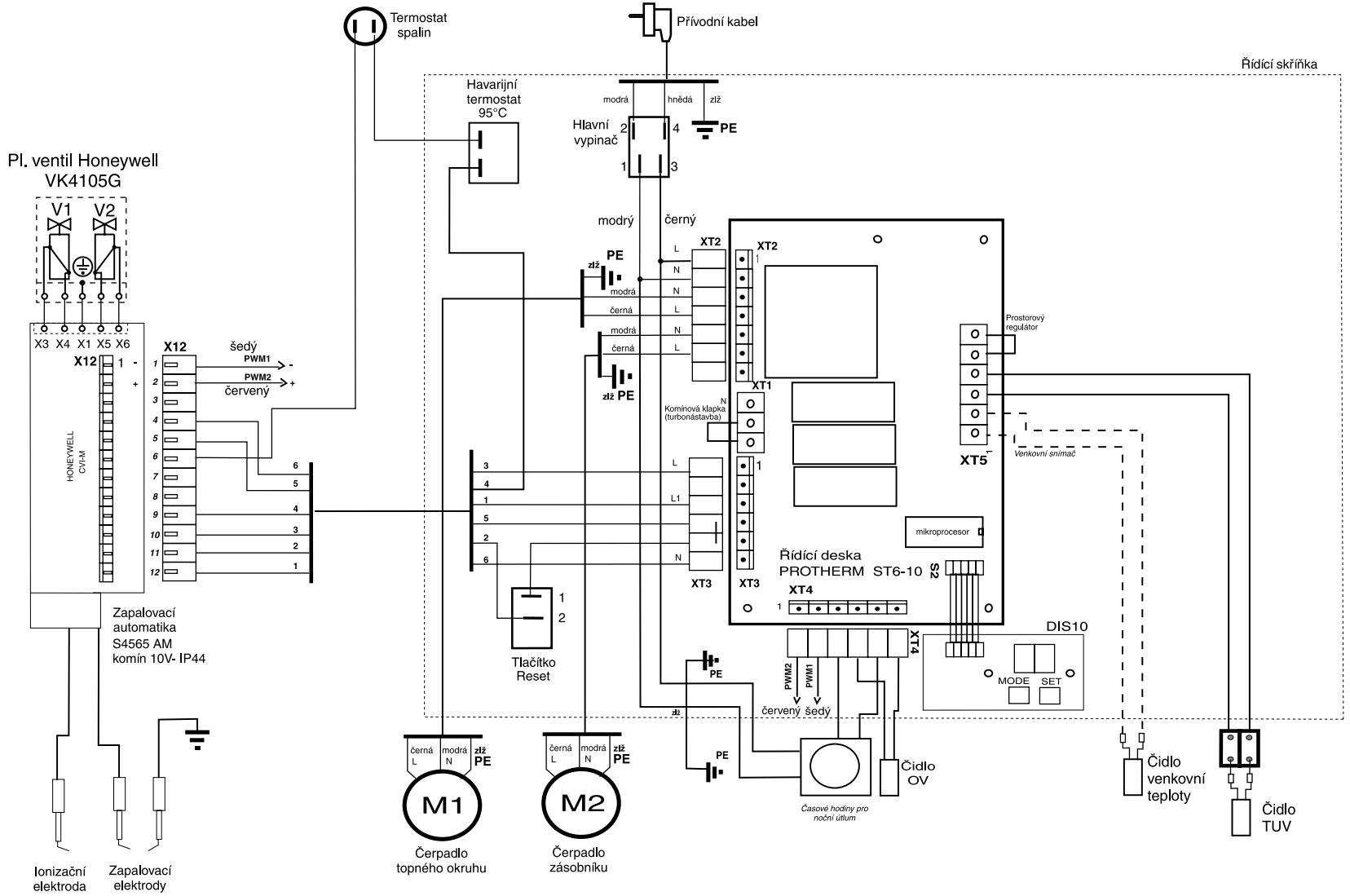


Fig. 7 Electric Wiring Diagram of PROTHERM 20 (30, 40) KLZ

Equithermal Regulation

When starting the boiler and adjusting the heating modes, i.e., the parameters of the regulation (selection of the curve and its shift) the radiators must be fully open (if there are thermostatic valves on the radiators, they must be set to the highest temperature), windows and entrance doors must be closed and the ventilation must be as low as possible for the operation.

The setting starts with selection of a “medium” curve (E4 to E6) – curves with lower numbers are better suited to buildings with good quality thermal insulation / smaller thermal loss) and higher heat exchange (larger areas of heat exchange surfaces). The higher number curves are necessary for buildings with higher thermal losses and systems with a higher temperature gradient.

If the user’s requirements are not met with the initial selection, the regulation parameters are adjusted. Adjust in small steps and leave one-hour time lag after each change (to be able to assess the consequences). The settings can be properly adjusted after several hours of operation, preferably when the outside temperature fluctuates. The final adjustment should be done when the outside temperature is below 0°C.

Adjust the regulation parameters along the lines described below:

– If a temperature drop outside causes a temperature increase inside, decrease the number of the curve (and vice versa);
– If changes of outside temperature do not cause any changes of the temperature inside, the curve selection is correct;
– If the correct curve was found, but the temperature inside is lower than required, adjust by a positive shift (to a higher temperature) and vice versa.

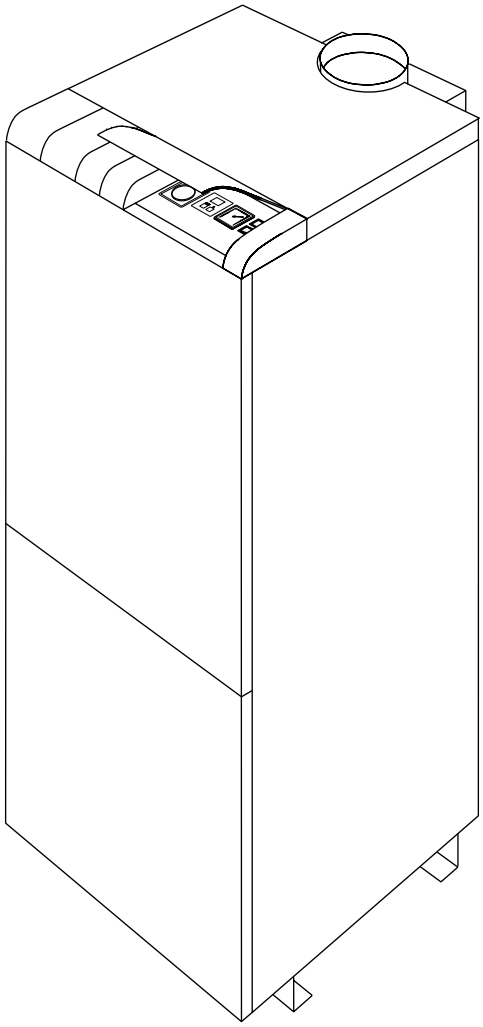
The final adjustment should use the night reduction – or reduction at other times of the day, such as when the users work and the heating temperature can be lower than at times of relaxation. If the HCW temperature is increased*/decreased by 3 to 4°C, the temperature in the room is increased/decreased by 1°C.

● Savings achieved by reductions and shifts are always lower than the costs spent on re-heating up – hence we should start at higher temperatures and go down, rather than the opposite.

The last principle is particularly important for the equithermal regulation in combination with a room thermostat – a higher setting on the room thermostat cannot increase the temperature (which depends on the selected heating curve of the equithermal regulation) – the room thermostat’s action is added to (or making up for) the reductions set on the switch clock.

bear

protherm



Instructions for Use and Installation

of Cast-Iron Boilers PROTHERM 20 (30, 40) KLZ “BEAR” Version

4XXX

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