

## Protherm Tiger 24 (12) KTZ / 24 (12) KOZ

The boiler Serial No. is shown on the plate which is attached at the rear of the control panel. The control panel is accessible after removing the front cover.

In the “Operating Guide” section you will find a description of the boiler’s main functions and guidelines how to handle the boiler safely. The “Installation Guide” section is intended for qualified personnel only.

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**protherm** 

**Tiger**

**Boiler Operating and  
Installation Guide**

24 (12) KTZ / v.17  
24 (12) KOZ / v.17



- Wall-hang combined boiler
- Output 9,5 - 23 (3,5 - 11,5) kW
- Hot water heat in tank

[www.protherm.sk](http://www.protherm.sk)

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Your service:

**EN** **CE**  
version

xxxxxxxxx\_01 - v.1 4/2005

# Introduction

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1. The boiler and all associated equipment must be installed and used in accordance with the installation design, all applicable legal regulations, technical standards and with the manufacturer's instructions. The boiler may be used only for the designed purpose.
2. The boiler may be installed only in an environment for which it is designed. If the boiler is delivered by the same person that did the installation, such person must handover to the user all accompanying documentation (namely Operating Guide, Service Book, etc.) All original packaging materials must remain available for transport until the boiler is put into operation.
3. After installation, the boiler may be put into operation by an authorised service organisation only.
4. The boiler complies with regulations applicable in the Slovak Republic. When used in the conditions of other countries, any deviations from local regulations must be identified and rectified.
5. In the event of a defect, call the manufacturer's service organisation – any unauthorised interference may damage the boiler (and possibly also associated equipment!).
6. The service technician putting the boiler into operation for the first time must show the boiler operation, boiler safety components, their function and necessary user reaction, significant boiler components, and how to control the boiler. If the service technician putting the boiler into operation is also the supplier, it must ensure, that original packaging materials remains available for possible transport until the boiler is put into operation
7. Check the delivery for completeness.
8. Check whether the model and type supplied is suitable for the required use, i.e. check whether boiler settings on the manufacturing tag correspond to the local fuel (gas) supply parameters, or let the person who will install or put the boiler into operation perform this check.
9. Whenever you are not certain how to control the boiler, study appropriate instructions in this Operation and Installation Guide carefully and proceed accordingly.
10. Never remove or damage any markings and signs on the boiler. Also keep the original packaging material undamaged for transport purposes, until the boiler is put into operation.
11. When making any repairs, only original parts must always be used. It is forbidden to make any changes to the boiler's internal installation, or to interfere with it in any way.
12. When shutting the boiler down for a longer period of time, we recommend to turn the gas supply off and disconnect the boiler from power supply. This recommendation applies in conjunction with the general conditions stipulated in this Operation and Installation Guide.
13. At the end of its useful life, the boiler or its parts must be disposed of ecologically, to avoid causing any damage to the environment.
14. The manufacturer disclaims any responsibility for damages caused by the failure to observe:
  - the conditions stipulated in this Operation and Installation Guide;
  - applicable regulations and standards;
  - good installation and operation procedures; and
  - conditions stated in the Warranty Certificate and the Service Book.

Situations might occur in practice, when the following essential measures must be adopted:

- prevent the boiler from (even accidentally) being turned on while conducting inspections or working on the combustion gasses flue route or gas and water distribution pipes, by disconnecting the boiler from power supply also by other means than merely turning the main switch off (e.g. by pulling the power cord plug out of power socket);
- shut the boiler down every time when there are any (even temporary) flammable or explosive fumes present on the premises from which combustion air is supplied to the boiler (e.g. from paint when painting, laying and spraying molten substances, from gas leaks, etc.);
- if it is necessary to drain water from the boiler or from the whole system, the water must not be dangerously hot;
- when water is leaking from the boiler's heat exchanger or when the exchanger is clogged up with ice, do not attempt to start up the boiler until normal operating conditions have been restored;
- when a gas leak has been detected or gas supply has been interrupted, or if it is suspected that this has happened, shut the boiler down, turn the gas supply off and call the gas supply company or a service organisation.

## **Safety of equipment and people**

- The boiler (and its additional equipment) complies with the type verified by the Engineering Testing Institute in Brno, heat and ecological equipment testing laboratory, as the testing organization and Certified Body No. 1015, which issued its decision that the boiler has been certified and complies with the requirements of European Directive 90/396/EEC, 92/42/EEC, 73/23 EEC and 89/336 EEC, which set out requirements for gas-fuel-

led appliances, efficiency of hot-water boilers fired by liquefied or gaseous fuels electrical equipment with low voltage and electromagnetical compatibility. Furthermore it complies with Slovak technical specifications STN EN 50 165, STN EN 437, STN EN 483, STN EN 625 and STN EN 60 335 – 1; it also complies with STN 06 1008 and Act No. 513/1991 the Commercial Code, Act No. 634/1992 and Public Notice of the Ministry of Health of CSR No. 13/1997, including all their later amendments.

- In order to run and operate the boiler in accordance with the purpose for which it is designed in actual conditions of use (hereafter referred to only as use), it is necessary to abide also by additional requirements – the most essential ones of which (i.e. those which must not be omitted) are found in the following regulatory documents:
  - in the design area: STN 06 0310 and STN 06 0830 (also STN 73 4201 for type KOZ);
  - in the fire safety area: STN 92 0300;
  - for installation and assembly (and repairs): STN EN 1775 or STN 38 6460 (also STN 73 4201 for type KOZ), Public Notice No. 48/1982 (as amended) and binding occupational safety regulations;
  - during running and operation: STN 38 6405.
- In addition to the above mentioned documents, it is necessary when using the boiler to proceed in accordance with this Operating Guide and the accompanying boiler manufacturer's documentation. Any interference by children, persons under the influence of narcotic drugs, certified persons, etc., when using the boiler, must be prevented.

# Operating Guide

## Controls and signals

### Main switch

The main switch (Fig. 1) is used to switch the boiler on or off. The main switch is situated on the bottom side of the boiler in line with the control panel.

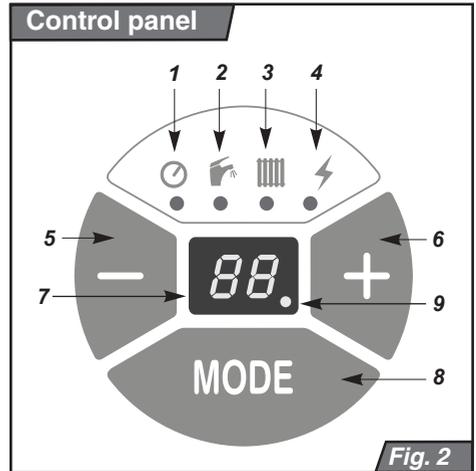
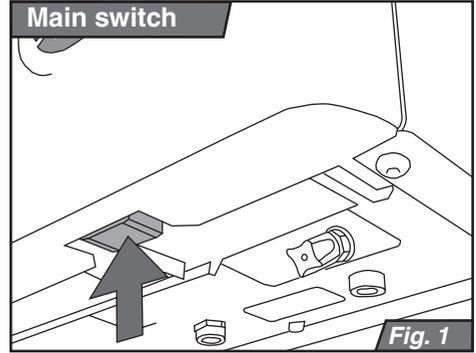
**Please note:** The boiler must be put into operation and switched on for the first time by an authorised service organisation.

### Control panel

On the boiler's control panel you can monitor instantaneous values and set the required parameters.

Description of control elements (Fig.2):

1. Heating water (HeW) LED - indicates display of pressure.
2. Hot water (HoW) LED – indicates display mode or setting of hot water temperature.
3. HeW LED - indicates display mode or setting of heating water temperature.
4. Error LED - indicates boiler defect.
5. (-) button – used to decrease the value of the parameter being set.
6. (+) button – used to increase the value of the parameter being set.
7. Display – display of pressures, temperatures, service parameters and errors.
8. MODE button – switching to different modes of reading or setting of values, confirming set values.
9. HoW heating request LED.



## Selecting Read mode

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### Displaying HeW temperature



After turning the boiler on with the main switch, the current heating water temperature will appear on the display. LED at symbol  lights up.

### Displaying HeW pressure



Pressing and holding depressed the **MODE** button will display HeW pressure (bar) in the system for about 30 s. The LED at symbol  lights up.

### Indicating “HoW temperature”



To display the current HoW temperature in the tank, press the **+** button – the  symbol LED at symbol lights up. The flashing dot behind the number indicates a HoW

heating requirement.

**Note:** For displaying the HeW temperature again, press **+**.

### Warning “HeW pressure too low”



When the HeW pressure drops below 0.8 bar or rises above 2.5 bar, the LED at symbol  flashes. The boiler is still functional, the pressure must be adjusted to the recommended value 1 - 2 bar.

## Selecting Setup mode

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### Setting HoW temperature



Press the **MODE** button repeatedly until the LED at symbol  starts flashing. Using the **- +** buttons set the HoW temperature to the required

value. Setting range --, 38, 39, 40, 41, 42, 45, 50, 55, 60, 65, 70 °C.

Another pressing of the button will save the parameter. To stop the HoW heating, save parameter (--).

### Setting HeW temperature



Press the **MODE** button repeatedly until the LED at the symbol  starts flashing. Using the **- +** buttons set the temperature to the required value.

Setting range --, 38, 40, 42, 45, 50, 55, 60, 65, 70, 75, 80 °C. Another pressing of the **MODE** button will save the parameter.

To select the SUMMER mode (heating of only HoW) select parameter (--).

## HoW tank timer switch

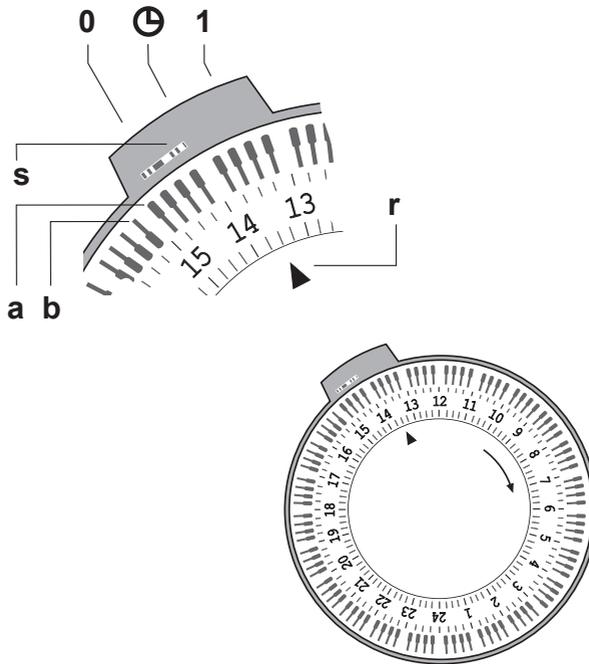


Fig. 3

### Setting time intervals for water tank heating

The Tiger boiler enables setting of HoW heating in the tank in various time intervals.

**Example:** If hot water is not used in the night, HoW heating may be switched off (or vice versa) for a given time interval using the timer switch.

The outer perimeter of the timer switch has switches which are used to set the switching cycle of tank heating. If the switch lever is further from the dial (Fig. 3, pos. a), the tank heating in that time interval is active and vice versa (Fig. 3, pos. b).

The switch (Fig. 3, pos. s) located above

the left side of the dial, is used to select 3 permanent modes. Mode “0” is used for permanent shutdown of HoW tank heating. Position “1” is used for permanent HoW tank heating. When the switch is moved to the position of the clock symbol, the tank heating mode is controlled according to your setting – position of the individual timer switches.

**Note:** Stoppage or activation of HoW tank heating can be done using the boiler control display (see Setting HoW temperature).

Setting of the timer switch in terms of time synchronization is done by turning the outer part of the dial to the right until the correct time is set against the arrow.

## Equithermal mode – curve steepness



Press the **MODE** button repeatedly until the display shows the letter E with parameter 0 to 9. Use buttons **-** **+** to select the equithermal curve.

The curve steepness increases with the set number (E0 < E9), see Fig. 4.

Saving to the memory and simultaneous transfer to parameter “P” is done by pressing the **MODE** button.

**Note:** To activate equithermal control, an outdoor sensor must be connected and the boiler must not be in SUMMER mode.

**Important:** After installing the outdoor sensor the boiler runs at maximum temperature for 1 hour. All settings are ignored during this period except for the room control unit (if connected).

## Equithermal mode – reference temperature shift



If the previous parameter “E” was confirmed by the **MODE** button, the display will show parameter “P” with value 0 to 9. Use buttons **-** **+** to shift the

reference temperature (see graph in Fig. 4, Table 1).

The corresponding values of the reference temperature – parameter “P” are given in Table 1. For the initial setting select parameter P5, which corresponds to an outdoor temperature of 15 °C (see graph in Fig. 4) according to Table 1.

**Note:** When the boiler reaches the reference temperature it continues to heat the heating system at a minimum temperature (38 °C), until the outdoor temperature rises by another 3 °C, then the HeW heating is switched off (see Tab. 1 – switching off temperature).

### Equithermal curves

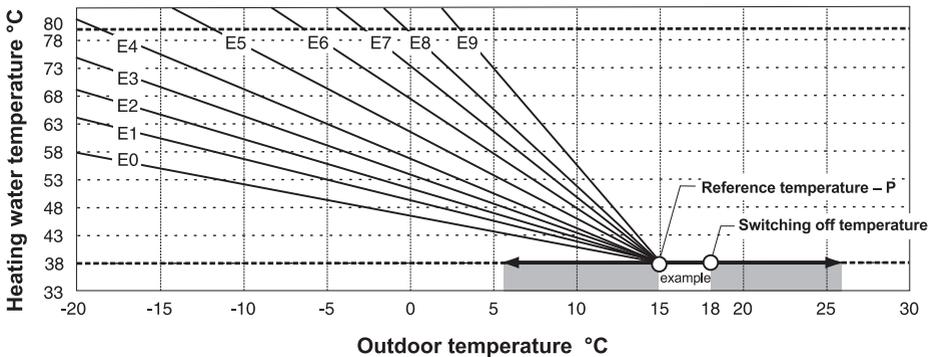


Fig. 4

Table 1

„P“ parameter	0	1	2	3	4	5	6	7	8	9
Reference temperature °C	6	7	9	11	13	15	17	19	21	23
Switching off temperature	9	10	12	14	16	18	20	22	24	26

# Boiler function flowchart

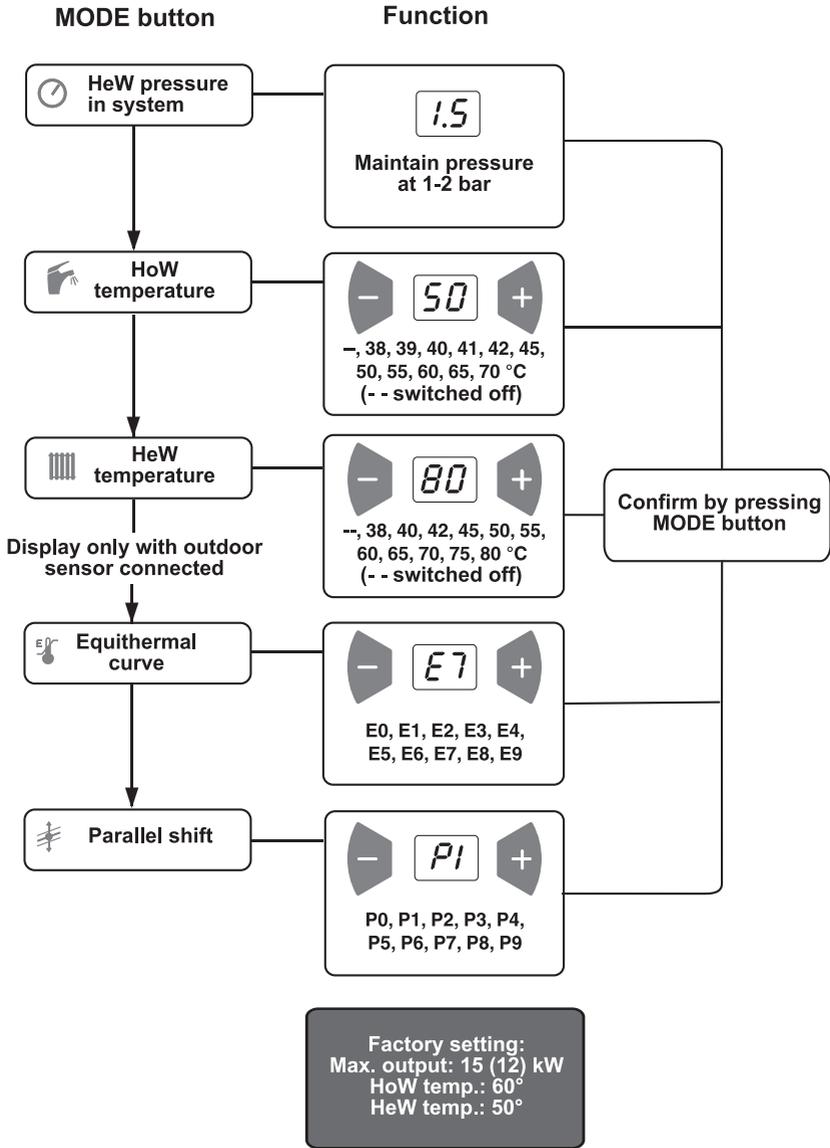


Fig. 5

# Error codes and troubleshooting

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## Loss of HeW pressure - F0



Loss of HeW pressure (under 0.6 bar) in the system. The boiler is automatically shut down – LEDs at symbols ⌚ and ⚡ are flashing. Add

heating water to the system to pressure at 1 - 2 bar. After adding heating water to the system the boiler automatically resumes operation.

If the loss or exceeding of heating water pressure occurs repeatedly, call an authorized service.

## Loss of flame – F1



Flame loss due to interruption of gas supply to boiler – LED flashes at symbol ⚡. Switch the boiler off and after a while switch it back on using the main switch

(RESET). If the error occurs repeatedly call an authorized service.

## Other errors – F2 – F8



If errors F2 – F8 are displayed call an authorized service. The LED at symbol ⚡ flashes. The boiler is shut down, call an authorized service.

## Loss of set parameters – F9



Under certain boiler parameters the customer or service settings may be lost – LED at symbol ☀ lights up. Switching the boiler off (wait about 10 seconds) and back

on should remedy this error.

After remedying the error the set parameters must be checked.

# Starting the boiler up and turning it off

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## Starting the boiler up

**Important:** Putting the boiler into operation and starting it up for the first time must be done by an authorised service only!

If you wish to start the boiler after it has been put into operation, make sure that:

1. the boiler is connected to power supply;
2. the gas valve underneath the boiler is open;
3. the HeW pressure is within the recommended range 1 – 2 bar.

Turn the main switch (Fig. 1) to position (I). The display will light up.

In the event of a safety boiler shutdown during a flame-out, emergency thermostat or flue gas thermostat (applies to KOZ boiler) intervention, the “lightning” LED on the control panel will flash or light up. In case of a flame-out the boiler can be unblocked using the main switch by switching it to position (0) and after a while back to position (I). If the emergency shutdown recurs after a short time again, or if the boiler cannot be RESET, call an authorised service organisation.

If the emergency shutdown was triggered

by the emergency thermostat intervention, the boiler cannot be unblocked by the main switch (RESET). Unblocking the emergency thermostat must be done by an authorised service technician, and this operation cannot be regarded as a warranty repair.

**Important:** The boiler must not be run with the emergency or flue gas thermostat disabled or replaced with a device other than the one specified by the manufacturer.

## Turning the boiler off

Turn the main switch (Fig. 1) to position (0).

If the boiler is to remain shut down for a protracted period of time, turn off the gas valve upstream the boiler. When shutting the boiler down, take into consideration the ambient temperature in the given season. If the boiler and system is not protected by an anti-freeze agent (Alycol Termo), the boiler and system may be damaged. If there is a danger that the boiler may freeze, drain all the HoW pipes.

# Boiler control

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## Using the boiler without room control unit

When run in this mode, the boiler maintains the set HeW temperature. No room control unit is connected, the terminals for its connection must be interconnected with a jumper (standard factory setting).

Setting procedure:

- turn the main switch to position (I);
- set the HeW temperature to the required value on the control panel.

## Using the boiler with room control unit

The boiler maintains the set HeW temperature. The room control unit connection terminal jumper must be removed and the room control unit wired to the terminals. The boiler is turned on and off to maintain the set temperature in the room in which the control unit is installed. Radiators in this room must not be equipped with thermostatic valves.

**Important:** You must set on the boiler control panel a HeW temperature (tempe-

perature of the water in the system) which will be capable of covering thermal losses of the building even in low outdoor temperatures. We recommend selecting a temperature in the 60 – 80 °C range.

## Using the boiler with equithermal control

The boiler changes the HeW temperature as the outdoor temperature changes.

Please note: An outdoor temperature sensor must be connected! The outdoor sensor is to be located on the building's coldest wall (north or north-west) about 2.5 – 3 m above the ground. No false heat sources from open windows or ventilation shafts, or sunshine may affect the sensor. When selecting a heating curve it applies that curves with a lower number are suitable for buildings with good thermal insulation and a higher thermal gradient and vice versa.

The heating curves diagram is used as initial information. More precise setting must be done by monitoring outdoor and indoor temperature over several days.

Select E5 for the initial system setting.

During setting all the radiator valves must be open, thermostatic valves must be set to maximum temperature, doors and windows must be closed.

Setting the curve steepness or reference temperature shift is done in small increments and prior to evaluating the change made a period of about 2 hours must elapse. For setting purposes a greater fluctuation of outdoor temperature is better, and the final setting is done when the outdoor temperature drops below 0 °C.

Setting procedure:

1. Select "HeW temperature" mode and check that the SUMMER function is not on (symbol --).

A certain temperature must be set (the temperature value does not affect the equithermal mode).

2. Select "equithermal mode – curve steepness" and set symbol E5 – see pg. 7.

3. Select "equithermal mode – reference temperature shift" and set symbol (P5).

4. Set the boiler to the initial status.

After several days of operation (when the building is heated) make changes to the curve steepness, as necessary:

5. If the room temperature does not change substantially in reaction to changes of outdoor temperature, the curve selection is correct. The temperature can be set to a higher or lower value by shifting the reference temperature – see "Controls and signals – equithermal mode – reference temperature shift".

**Note:** If the room temperature changes substantially in reaction to changes of outdoor temperature, i.e. the indoor temperature rises when the outdoor temperature drops, select a heating curve with a lower number, and vice versa.

## Operation with equithermal control and a room control unit

Equithermal control is supplemented with the room control unit by time control and reduction (e.g. night) of heating.

Setting procedure:

- set the equithermal control according to the preceding point;
- Connect the room control unit to the boiler (remove the jumper from the connection terminal) and set it so that during the comfortable temperature period the required temperature is set about 5 °C higher than is achieved by equithermal control. During the heating reduction period (during the night or absence) the actually required temperature is set on the control unit – must always be at least ca. 3 °C lower than the actual comfortable temperature.

**Important:** The room control unit must be installed by an authorized service.

**Example:** Select curve E5. At an outdoor temperature of -10 °C the boiler provides the heating system with a temperature of 70 °C. If the reference temperature shift parameter P5 is selected at the same time, then at an outdoor temperature of 15 °C the boiler will supply a temperature of 38 °C. When the outdoor temperature rises above 18 °C the HeW heating is switched off.

## Setting boiler output

The factory setting of the boiler output is 15 kW to the heating system. During heating the HeW the boiler uses its maximum nominal output of 24 (12) kW.

**Important:** Changes in the boiler output settings must be performed only by an authorized service.

## Protective functions

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### Protection against freezing

The boiler has an antifreeze protection system which protects the boiler (but not the heating and the hot water distribution systems) against freezing.

When the HeW temperature in the boiler drops below 4 °C, the boiler is automatically switched on regardless of the room control unit's command, or regardless of the HeW heating being switched off – parameter (--). When the HeW temperature reaches 8 °C, the boiler is automatically turned off.

### Pump protection

When the pump has been continuously idle for 24 hours, it is automatically switched on for about 30 seconds, to prevent it from ceasing.

### Anti-cycling

A function which prevents the boiler from restarting the HeW heating cycle after the boiler has been turned off sooner than the time determined by the control board by evaluating the required and actual HeW temperature. This time is within the range of 1 min 30 s and 5 minutes. The function is most useful in heating systems where the maximum thermal loss of the premises corresponds to the lowest level of the boiler's output range.

### Disconnecting the boiler from power supply

If the boiler is disconnected from power supply for a protracted period of time (continuously for a month or longer), we recommend to start up the boiler in regular time intervals (at least once a month). If the pump ceases, call an authorised service. Repairing a pump ceased because of dirt in the heating system is not covered by the boiler warranty.

**Important:** When the boiler is disconnected from the power supply, all protective functions are disabled.

### Power failure

Power failure will turn the boiler off. When power supply is restored, the boiler will automatically restart itself without losing any of the set operating parameters.

If after power supply restoration the LED on the control panel (lightning symbol) lights up, proceed in accordance with the instructions in section Control and signals / Main switch.

The boiler may get blocked because of overheating caused by the pump being switched off as a result of the power failure.

## Pump run-down

Pump run-down is factory set to 45 seconds after termination of the command from the room control unit. If the boiler is run without a room control unit, the pump runs continuously.

If this mode is not acceptable, a second setting is available which enables pump run-down after 45 seconds from burner flame out. This run-down mode is recommended when the boiler is controlled without a room control unit.

**Important:** Changes in the pump run-down settings must be performed only by an authorized service technician.

## HeW safety valve

The boiler is equipped with a safety valve on the HeW side. The valve opens when the pressure in the heating system reaches 3 bar. **DO NOT TOUCH THE SAFETY VALVE!** If the safety valve starts releasing heating water, always turn the boiler off, disconnect it from power supply and

call an authorised service organisation. If the heating system repeatedly loses pressure, consult your service organisation.

**Important:** All the above-mentioned electronic protection functions are enabled only when the boiler is connected to power supply (the power cord plug is inserted into a power socket and the main switch is in position (I)).

## HoW tank safety valve

To prevent over pressure of water in the tank due to heating, the boiler is fitted with a safety valve (6 bar).

## Tank protection

The inside of the tank is protected against oxygen corrosion by a magnesium anode that must be checked at least once a year. The anode reduction depends also on the water composition.

**Note:** The magnesium anode is to be checked only by an authorized service.

## Service and maintenance

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### Topping up water in the heating system

Water in the heating system (in small quantities) can be topped up through the boiler's top-up valve (Fig. 6).

When topping up water in the system, the following conditions must be met:

1. Pressure of the water supplied to the boiler must always be higher than the water pressure inside the heating system.
2. The boiler must be cold when being topped up (HeW temperature must not exceed 30 °C).
3. Recommended water pressure inside the cold boiler (not more than 30 °C) is 1 to 2 bar.

**Important:** If the water mains pressure is lower or equal to the water pressure inside the heating system, the heating water may run into the water mains, which is forbidden. This danger is reduced by a built-in reverse valve installed downstream the top-up valve.

This notwithstanding, the manufacturer disclaims responsibility for any damages caused by incorrect manipulation with the top-up valve and a failure to abide by the conditions specified above. Such damages and defects are not covered by the boiler's warranty.

Procedure of topping up heating water in the boiler:

- make sure that the boiler is connected to power supply and the main switch is in “I” position;
- if the display on the boiler’s control panel indicates that the HeW pressure is below 0.5 bar, the LED on the control panel (lightning symbol) will start flashing;
- partially open the top-up valve (blue, Fig. 6). Watch the pressure grow on the boiler’s display panel (to display the pressure press the MODE button);
- fill the system up until the pressure reaches the value between 1 and 2 bar;
- when the required pressure has been reached, tighten the top-up valves with your hand;
- thoroughly bleed all radiators (the water must be running out in a continuous stream, free of air bubbles);
- check whether the pressure shown on the display is within 1 and 2 bar. If necessary, add more water into the system.
- leave the cap on the automatic bleeding valve loose at all times (even during boiler operation)

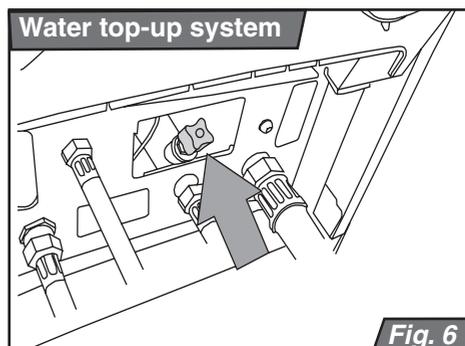
## Cleaning

The boiler cover can be cleaned with a moist cloth and afterwards dried and polished with a dry cloth. Never use abrasive detergents or solvents.

Important: before cleaning the boiler, turn it off with the main switch.

## Regular service

To assure trouble-free and safe running of your boiler, we recommend that you have the boiler checked and serviced in regular yearly intervals. These inspections are not covered by the boiler’s warranty. The operations to be done are specified in the Service Book and must be carried out by an authorised service.



## Warranty and warranty conditions

PROTHERM Tiger 24 (12) KTZ and 24 (12) KOZ gas boilers are covered by warranty defined in the Warranty Certificate, the Service Book and other conditions specified in the Operation Guide and Installation Guide (chapters Introduction and Boiler installation).

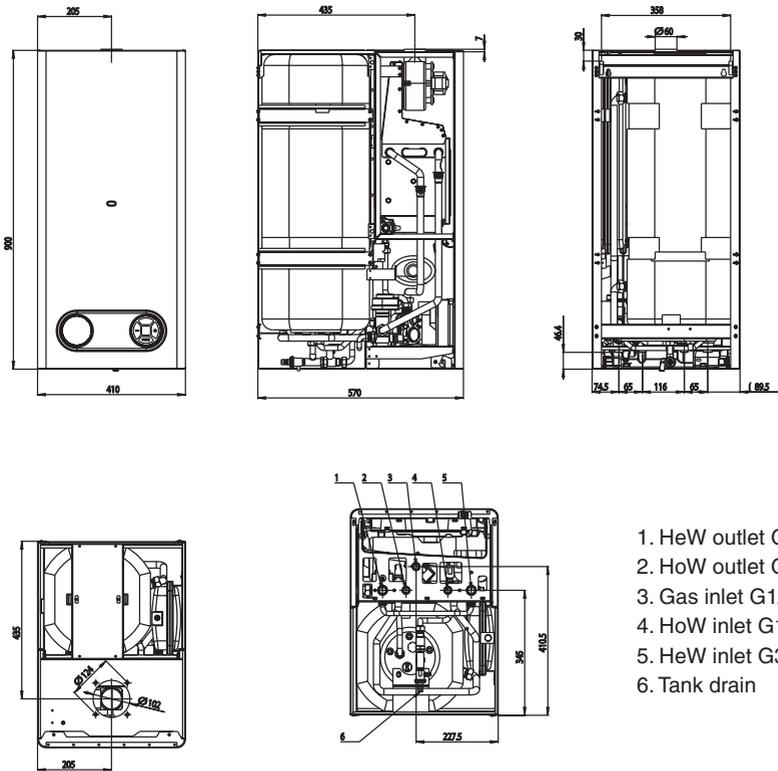
## Technical parameters 24 (12) KOZ

	Tiger 24 KOZ	Tiger 12 KOZ
Category	II	
Version	B <sub>2H3P</sub> B <sub>11BS</sub>	
Ignition	electronic	
Fuel	G20 / G31	G20 / G31
Max. thermal input	[kW] 25,5 / 25	12,5 / 11,4
Min. thermal input	[kW] 11 / 10,5	4,3 / 4,7
Max. thermal output	[kW] 23,5 / 22,5	11,25 / 10
Min. thermal output	[kW] 9,5 / 9	3,5 / 3,8
Efficiency	[%] 90,7 / 90	90 / 88
<b>Gas pressure</b>		
Supply pressure	[mbar] 20 / 37	
Min. pressure at jets	[mbar] 2,2 / 7	1,7 / 6,5
Max. pressure at jets	[mbar] 12,2 / 35,7	14,0 / 35,6
Jet diameter	[mm] 1,2 / 0,7	1,2 / 0,73
<b>Gas consumption</b>		
(Q max.)	2,7[m <sup>3</sup> /h] / 2,1[m <sup>3</sup> /h]	1,32[m <sup>3</sup> /h] / 0,92 [kg/h]
(Q min.)	1,1 [m <sup>3</sup> /h] / 0,9 [m <sup>3</sup> /h]	0,45[m <sup>3</sup> /h] / 0,38 [kg/h]
<b>Heating</b>		
Max. operating pressure	[bar] 3	
Min. operating pressure	[bar] 0,8	
Recommended operating pressure	[bar] 1,2 – 2	
Thermal range	[°C] 45 – 85	
Expansion vessel	[l] 8	
Max. quantity of heating water in system	[l] 70	
Max. pressure in expansion vessel	[bar] 3	
<b>Domestic hot water</b>		
Tank volume	[l] 45	
Max. supply pressure	[bar] 6	
Min. supply pressure	[bar] 1	
Min. flow	[l/min] 2,7	
Adjustable thermal range (depending on flow)	[°C] 38 – 70	
HoW tap (Di per EN 625)	[l/min] 12,6	8
Expansion vessel	[l] 2	
<b>Electrical data</b>		
Voltage	[V/Hz] 230/50	
Input	[W] 95	70
Protection cover	IP 45	
Current	[A] 0,5	
<b>Extraction of combustion gases</b>		
Flue diameter	[mm] 130	chimney 110
Combustion gases temperature	[°C] 95 – 120	
Combustion gases flow by weight	[g/s] 20	16
Min. required constant chimney draught	[Pa] 2	
Noise level (1 m from boiler at height 1,5 m)	[dB] up to 55	
Dimensions – height / width / depth	[mm] 900/410/570	
Weight excluding water	[kg] 70	69

## Technical parameters 24 (12) KTZ

	Tiger 24 KTZ	Tiger 12 KTZ
Category		II <sub>2H3P</sub>
Version	C <sub>12'</sub> C <sub>32'</sub> C <sub>42'</sub> C <sub>52'</sub> C <sub>62'</sub> C <sub>82'</sub>	
Ignition		electronic
Palivo	G20 / G31	G20 / G31
Max. thermal input	[kW] 26 / 25	12,3 / 11,2
Min. thermal input	[kW] 11 / 10,5	4,2 / 4,4
Max. thermal output	[kW] 24 / 22,5	11,2 / 10
Min. thermal output	[kW] 9,5 / 9	3,5 / 3,6
Efficiency	[%] 91,7 / 90,5	91 / 89,9
<b>Gas pressure</b>		
Supply pressure	[mbar] 20 / 37	
Min. pressure at jets	[mbar] 2,2 / 7	1,6 / 5,8
Max. pressure at jets	[mbar] 12,2 / 35,7	14 / 35,8
Jet diameter	[mm] 1,2 / 0,7	1,2 / 0,73
<b>Gas consumption</b>		
(Q max.)	2,7 [m <sup>3</sup> /h] / 2,1 [kg/h]	1,30[m <sup>3</sup> /h] / 0,93 [kg/h]
(Q min.)	1,1[m <sup>3</sup> /h] / 0,9 [kg/h]	0,44[m <sup>3</sup> /h] / 0,37 [kg/h]
<b>Heating</b>		
Max. operating pressure	[bar] 3	
Min. operating pressure	[bar] 0,8	
Recommended operating pressure	[bar] 1,2 – 2	
Thermal range	[°C] 45 – 85	
Expansion vessel	[l] 8	
Max. quantity of heating water in system	[l] 70	
Max. pressure in expansion vessel	[bar] 3	
<b>Domestic hot water</b>		
Tank volume	[l] 45	
Max. supply pressure	[bar] 6	
Min. supply pressure	[bar] 1	
Adjustable thermal range (depending on flow)	[°C] 38 – 70	
HoW tap		
(Di per EN 625)	[l/min] 12,6	8
Expansion vessel	[l] 2	
<b>Electrical data</b>		
Voltage	[V/Hz] 230/50	
Input	[W] 120	95
Protection cover	IP X4D	
Current	[A] 0,6	
<b>Extraction of combustion gases</b>		
Flue diameter	[mm] 100 / 60 (80 / 80)	
Max. length of concentric flue 60 / 100	[Em] 7	
Max. length of separate flue 80 + 80	[Em] 14	
Combustion gases temperature	[°C] 115 – 145	
Combustion gases flow by weight	[g/s] 18	15
Noise level (1 m from boiler at height 1,5 m)	[dB] do 55	
Dimensions – height / width / depth	[mm] 900 / 410 / 570	
Weight excluding water	[kg] 71	70

## Boiler connection dimensions



1. HeW outlet G3/4"
2. HoW outlet G1/2"
3. Gas inlet G1/2"
4. HoW inlet G1/2"
5. HeW inlet G3/4"
6. Tank drain

Fig. 7

## Usable gauge pressure to the system

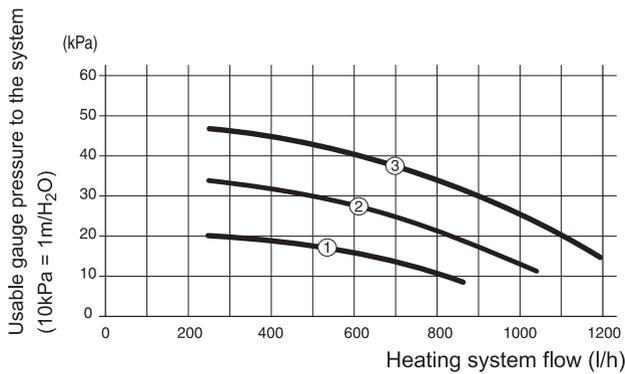
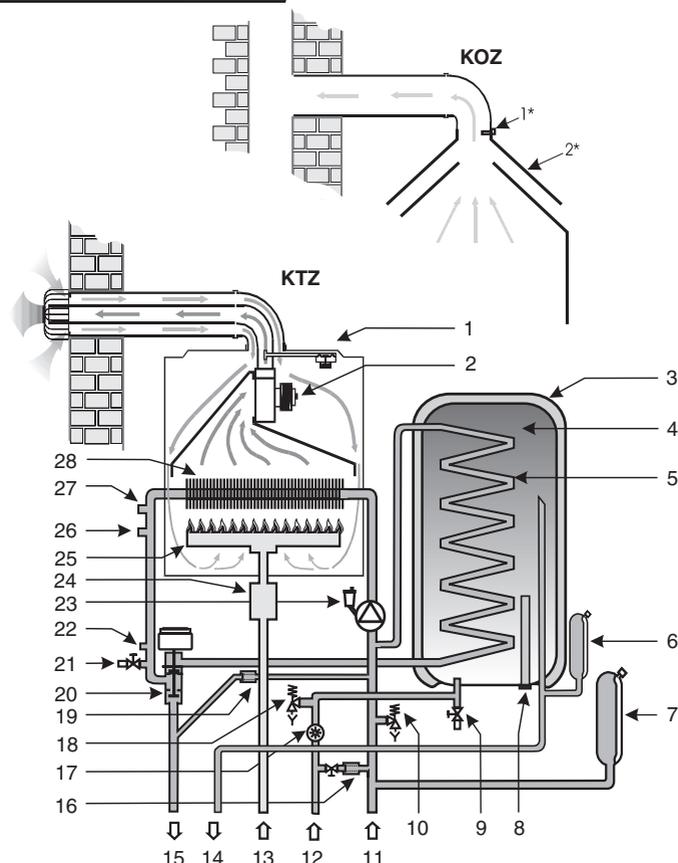


Fig. 8

## Function schematic diagram



- |                               |                       |                            |
|-------------------------------|-----------------------|----------------------------|
| 1*. Combustion gas thermostat | 9. HoW draining valve | 19. Bypass                 |
| 1. Air manostat               | 10. HeW safety valve  | 20. 3-way motor valve      |
| 2*. Draught valve             | 11. HeW inlet         | 21. Draining valve         |
| 2. Fan                        | 12. HoW inlet         | 22. Pressure sensor        |
| 3. HoW tank insulation        | 13. Gas inlet         | 23. Pump                   |
| 4. HoW tank                   | 14. HoW outlet        | 24. Gas valve              |
| 5. HoW heat exchanger         | 15. HeW outlet        | 25. Burner                 |
| 6. HoW expansion vessel       | 16. HeW top-up valve  | 26. HeW temperature sensor |
| 7. HeW expansion vessel       | 17. HoW flow meter    | 27. Emergency thermostat   |
| 8. Anode                      | 18. HoW safety valve  | 28. HeW heat exchanger     |

**Fig. 9**

# Installation Guide

## Introduction

The PROTHERM Tiger 24 (12) KTZ a 24 (12) KOZ boilers are compatible with common types of HoW heating systems and heating radiators.

**Important:** PROTHERM boilers must be put into operation by an authorised organisation only, according to Czech Bureau of Occupational Safety and Czech Safety Inspectorate Notice No. 21/1979 (in the wording of Public Notice No. 554/1990).

The boiler must be put into operation and warranty and post-warranty service performed by the manufacturer's contracted service organisation which meets the above specified requirements.

The boiler is designed to work in a normal AA5/AB5 environment according to STN 33 2000-3 and STN 33 2000-5-51 (i.e. within temperature range +5 to +40 °C, humidity depending on temperature, not exceeding 85%).

The 24 (12) KTZ a 24 (12) KOZ boilers are suitable for the conditions of zones 2 and 3 (Fig. 10), in rooms with a bath tub or shower and washing rooms according to STN 33 2000-7-701; they may not be installed in zone 0. When installed in one of the above rooms, the boiler must have a protection against electric shock in accordance with the same standard.

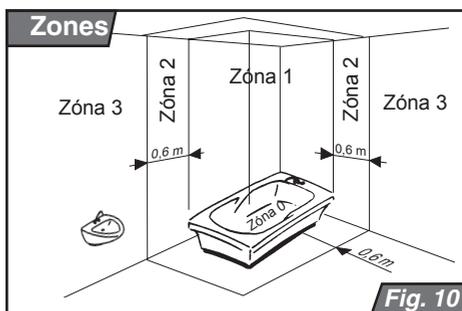
The boiler may be (according to Ministry of Health Notice No. 13/1977, i.e. by their noise level) installed in residential and communal rooms.

The boilers are designed to run with heating water compliant with STN 07 7401 (which under no circumstances can be acidic, i.e. its pH factor must be greater than 7 and must have a minimal carbonate hardness).

Requirements on utility water properties are defined by STN 83 0616 (on drinking water by STN 75 7111). If the water has a sum of cal-

cium and magnesium concentration greater than 1.8 mmol/l, it is useful to implement other "non-chemical" measures against incrustation (e.g. magnetic water treatment combined with a desludging device).

Problems caused by clogging of the system with dirt from the heating system or incrustation sediments or clogging-induced problems (e.g. clogging of the heat exchanger, pump defects) are not covered by the boiler's warranty.



Distance from flammable materials (e.g. PVC, chipboard, polyurethane, synthetic fibres, rubber and other) must be sufficient so that the surface temperature of these materials does not exceed 80 °C. The safe distance for reaching this highest temperature must be observed regardless of the flammability grade of a specific material according to STN 73 0823. No flammable materials may be placed on the boiler (permanently or temporarily) or in this safe distance.

**Important:** Surface temperature of the boiler upper parts (particularly the side walls and the cover) of a working boiler might exceed the ambient temperature by up to 50 °C.

The manipulation (free) space left around the boiler must be sufficient for a person to work on it safely with bare hands and with common hand tools. Recommended distances are min. 300 mm from each side and min 600 mm in front of the boiler).

Boilers are delivered independently, their accessories are delivered separately (see next section “Content of delivery”). Boilers must be installed with the essential accessories (e.g. combustion gas flues, air supply ducts) to ensure their functionality and proper operation.

In the case of 24 (12) KTZ combustion gases must be removed and fresh air supplied through a special for this purpose designed dual tubing. Practically any required dual-tube route can be constructed from standard components supplied by the manufacturer. The flue route must be constructed in such a way that condensed water vapour contained in the combustion gases can be removed from the tubing. This is achieved by using special components which can be built into the flue route. Problems caused by condensate penetration are not covered by the boiler's warranty. Due to the considerable variety of particular solutions, the dual tubing is not part of the boiler delivery and is not included in the price. Principles for route design and construction are described in chapter Air supply and flue gases removal.

Type 24 (12) KOZ is designed for flue removal via a chimney (through a chimney duct) with a minimal constant draught of 2 Pa. The boiler is connected to the chimney using a flue duct of dimensions correspon-

ding to the boiler throat. It is forbidden to place into the flue duct an objects obstructing the flow of combustion gasses (e.g. various heat exchangers for utilization of residual heat). The flue duct is not part of the boiler delivery.

The flue duct and chimney must be constructed in accordance with STN 06 1610 and STN 73 4201. By complying with principles set out in respective standards you will prevent undesirable effects like excessive combustion gas cooling, penetration of moisture into walls, variable chimney draught, including undesirable influence on boiler operation. The boiler consumes combustion air from the area in which it is located. This area must comply with all requirements on combustion air. The supply and sufficient quantity of combustion air must be solved in compliance with valid regulations.

## Content of delivery

### Boiler delivery

PROTHERM Tiger 24 (12) KTZ and 24 (12) KOZ boilers are delivered completely assembled and functionally tested.

The delivery contains (Fig. 11):

1. Boiler
2. Operations and Installation Guide
3. Service Book
4. List of Service Centres
5. Warranty Certificate
6. Mounting bar including fixing material

### Special delivery

Based on requirements the following accessories can be ordered:

1. Flue components  $\varnothing$  60/100 for model KTZ, e.g.:
  - *S5D-1000* Horizontal set (elbow with flange 90°, 1 m termination), ord. No. 7194
  - *K1D* Elbow 90°, ord. No. 2842
  - *T1D-1000* Extension, ord. No. 2825
  - *S3* Chimney set (roof termination), ord. No. 2805
  - *Z1* Condensate trap, ord. No. 2857
2. Flue components  $\varnothing$  80 for model KTZ, e.g.:
  - *S2* Separate set (distributor, 2 × elbow 90°, 2 × pipe 1 m termination), ord. No. 2803
  - *K2A* Elbow 90°, ord. No. 2830
  - *T2* Separate pipe (1 m extension), ord. No. 2819
  - *S4* Chimney set (roof termination), ord. No. 2809
  - *Z2* Condensate trap, ord. No. 2858

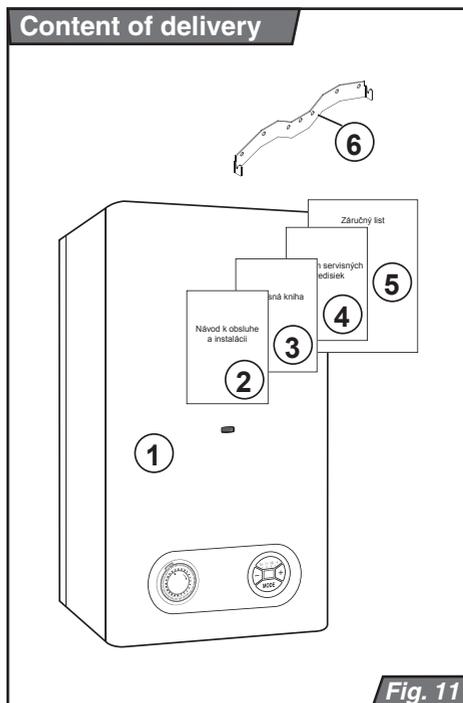


Fig. 11

## Preparing for installation

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### Distribution pipes

Nominal pipe inside diameter is chosen in the usual way based on the pump characteristic. Distribution pipes are designed according to the requirements on system performance, not according to the boiler's maximum output. The system must allow sufficient flow so that the temperature difference between the supply and the return pipe is smaller than or equal to 20 °C. Minimum flow must be 500 l/h.

The piping system must be constructed to prevent air bubbles from developing, making permanent bleeding of the system easier. Vents should be situated on all high points of the system and on all radiators.

It is recommended to install a system of heating water, domestic hot water and gas shutting valves.

We recommend that you install on the lowest point of the heating system a drainage valve which will also dub as a heating system top-up valve.

**Important:** If the boiler is connected to a floor heating system, a fitting must be installed downstream of the boiler outlet to prevent heating water of an unacceptable temperature from entering the system. The setting of the safety fitting depends on the properties of the used piping.

Before final installation of the boiler, the heating distribution system pipes must be flushed a few times with pressurised water. In old, already used systems, the flushing must be done in opposite direction to the heating water flow.

**Important:** Prior to connecting the boiler to the heating system remove all plastic plugs from outlet necks.

### Heating system cleanliness

Before installing a new boiler, it is es-

sential to clean the system thoroughly. In old systems it is necessary to remove all sludge settled at the bottom of the heating radiators (particularly in gravity systems).

In new systems it is necessary to remove all conservation material which the majority of radiator manufacturers use.

It is recommended to install upstream the boiler (i.e. to the HeW return pipe) a sludge trap. The sludge trap should be designed in such a way that it is easy to empty in regular time intervals without having to drain a lot of water from the heating system. The trap can be combined with a filter, but a filter with a sieve on its own will not provide sufficient protection. The filter and the sludge trap must be checked and cleaned regularly.

### HeW circulation in the system

Although the boiler is equipped with a bypass, we recommend to design the heating system so that the heating water can flow through at least some of the radiators all the time.

### Using antifreeze

We do not recommend to use antifreeze, because of their unsuitable properties for the boiler. It is mainly their reduced heat transfer, large volume expansion, aging and damage of rubber parts.

In necessary cases it is permitted to use antifreeze Alical Termo (produced by Slovnaft Bratislava) – according to the producer's experience use of this antifreeze cannot lead to reduced safety and influence on boiler operation. If even this method of preventing heating system freezing cannot be used, non-performance by the boiler and potential boiler damage due to use of other antifreeze agents cannot be covered by the warranty.

## Thermostatic radiator valves

If a room control unit is installed, at least one of the radiators in the reference room must be without a thermostatic valve. For better temperature comfort, we recommend to leave all radiators in the reference room without a thermostatic valve.

## Domestic HoW system

The HoW pressure must be 1 to 6 bars. If the pressure exceeds 6 bars, a reduction valve combined with a safety valve must be installed at the inlet.

In areas with very hard water we recommend to implement suitable measures to reduce the water hardness.

## Installing the boiler

---

### Mounting the boiler

When mounting the boiler, proceed in accordance with design documentation conditions (e.g. wall load-bearing properties, chimney inlet, pipe inlet and outlet connections).

Mounting procedure (Fig. 12):

1. To fix the boiler mounting bar (part of the boiler delivery) on the supporting wall mark a line along the top edge of the boiler (Fig. 12, pos. 4). Use a level.
2. Place the mounting bar on the marked line (Fig. 12, pos. 3) and mark the holes in the bar onto the wall. Then drill the marked holes to the required diameter. Insert the brackets into the drilled holes, position the bar and secure it using appropriate screws.
3. If the boiler model with forced combustion gas extraction (KTZ) is being mounted, and the flue duct is terminated in a façade wall (Fig. 12, pos. 2), measure the opening for the concentric duct (see the boiler connection dimensions).
4. Mount the boiler on the mounting bar.
5. In the case of model KTZ, install a combustion gas extraction pipe. The space between the pipe and opening in the wall is to be filled using non-flammable material.

### Connecting the boiler to HeW, HoW and gas pipes

The boiler connection end pieces must not be subjected to any forces from the heating water, domestic hot water or gas piping system. This requires accurate positioning of all connection pipes, vertically (height) as well as the distance from the wall and mutual distance between inlets and outlets.

We recommend to design the heating system in such a way that when making repairs, it will be possibly to drain the whole heating system from the boiler.

After reconstructions, in unfavourable building dispositions, etc., it is possible to connect the boiler to the heating system, the domestic HoW system as well as the gas supply by flexible hoses, but only those designed for that purpose. Flexible components should be as short as possible, must be protected against mechanical and chemical loads and damage, and must be replaced with new ones before the end of their useful life cycle or reliability to meet their nominal specifications (as stated by their manufacturers).

## Mounting the boiler

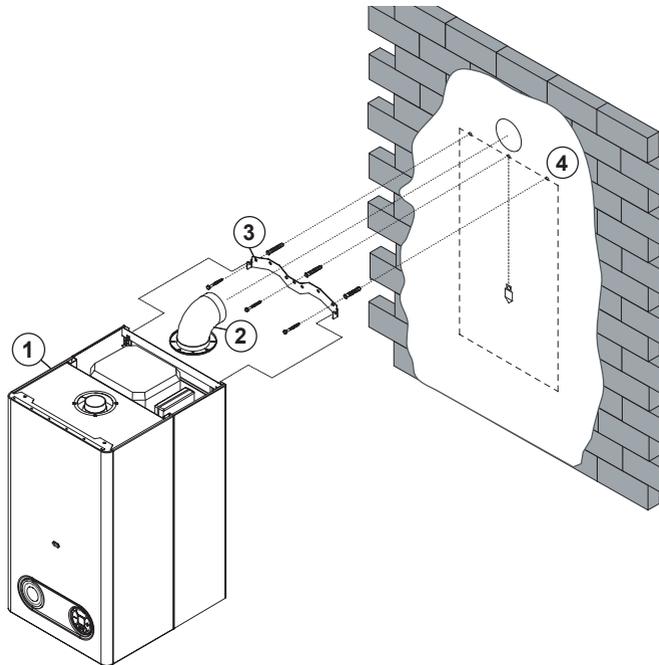


Fig. 12

### Operating pressure in the heating system

The heating system (measured on the boiler) must be filled at least to the hydraulic pressure of 1 bar (corresponds to a 10 m hydrostatic water column). We recommend that you maintain the pressure within the range 1 – 2 bar. The expansion vessel capacity is sufficient for up to 70 l of heating water in the heating system (at temperature 85 °C).

### HeW expansion vessel

Before filling the heating system up, check pressure in the expansion vessel. The initial pressure inside the expansion vessel should be 0.2 – 0.3 bar lower than the assumed pressure in the heating system.

If the heating system is already filled, shut the HeW valves located underneath the boiler and, using the drainage valve, relieve the boiler from pressure. Then you can check the expansion vessel pressure and if necessary increase the pressure.

**Important:** Make sure that the expansion vessel capacity is sufficient for the volume of water in the heating system (see installation design documentation).

### Domestic HoW expansion vessel

The expansion vessel is used to balance the water pressure in the tank. The pressure in the expansion vessel for hot water should be 0.2 – 0.3 bar higher than the real HoW pressure in the mains. When checking the pressure proceed just as for the HeW expansion vessel.

## HeW safety valve

The system safety valve is situated at the bottom of the boiler on the left side of the hydraulic group (Fig. 13). When the maximum pressure in the system is exceeded, water or steam can be discharged through the safety valve, therefore we recommend the discharging the water into the building's waste water system.

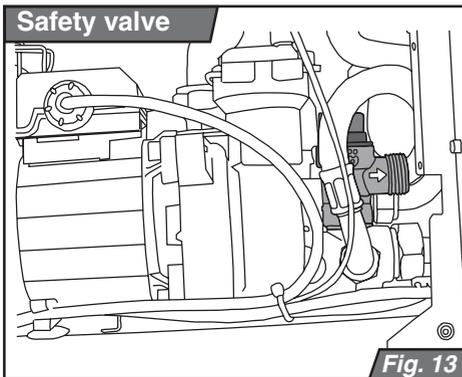
**Important:** Under no circumstances may anyone manipulate with the safety valve while the boiler is in operation.

## HoW safety valve

Under the HoW tank near the draining valve is located the HoW safety valve (Fig. 15). Due to possible exceeding of the max. permitted pressure in the tank, we recommend at you attach a hose to the safety valve neck, (see HeW safety valve).

## Connecting gas supply

The Tiger 24 (12) KTZ a 24 (12) KOZ – natural gas boilers are designed to be fuelled by natural gas of nominal pressure in the gas mains 2 kPa, for which the calorific value is most commonly stated to be within the range of 9 and 10 kWh/m<sup>3</sup>. Indoor gas distribution pipes and a gas meter must be rated adequately, taking into account also the user's other gas appliances.



All gas distribution pipes in the building must be installed in accordance with STN EN 1775.

If the propane supply pipe to the boiler is located underground, the area of the supply must be sufficiently ventilated or equipped with a valve that will close the underground section whenever the boiler is not burning. The valve must also close the supply when the ventilation fails, i.e. defect of forced ventilation or when natural ventilation is monitored by a detector (warning signal from the detector).

**Important:** The boiler end-piece for connection of gas is a direct piece of the gas valve with a 1/2" thread and a technological flat surface. This technological flat surface does not allow classical sealing of the thread using threading and sealant, e.g. hemp, teflon, paste, etc. The joint must be sealed only by tightening a nut over the pipe face with a corresponding seal (size 18 x 10 x 2).

After completing the gas supply connection to the boiler, the coupling must be thoroughly checked for potential gas leaks.

## Topping the boiler water up

The procedure of topping up water in the boiler is described in section "Operating Guide – Service/Maintenance" on page 13.

## Filling the heating system with water

- check that the gas supply to the boiler is closed
- loosen the cap on the automatic bleeding valve located on the pump
- check and set the pressure in the expansion valve according to the prescribed static pressure in the system
- connect the boiler to the power supply
- switch the main switch to position "I" (Fig. 1), within about 20 seconds

from switching on the main switch the boiler will be shut down, the boiler display will show F0, flashing LED at symbols  and .

- Press once the MODE button to display the approximate value of the heating water in the system (see the pressure display mode on pg. 5)
- open the system supply valve and watch the pressure increase on the boiler display
- fill the system with water, the pressure should be 1–2 bars
- bleed thoroughly all radiators (thoroughly bleed all radiators (the water must be running out in a continuous stream, free of air bubbles)
- leave the cap on the automatic bleeding valve loose at all times (even during boiler operation)
- check whether the pressure shown on the display is within 1 and 2 bars. If necessary, add more water into the system.
- open the HoW valves to bleed the HoW circuit

**Important:** If the pressure in the boiler is not 0.7 bars or higher, it will not start. If during operation the pressure drops below 0.7 bars, the boiler will shut down for safety reasons - F0. If the LED at the pressure display flashes, the water pressure in the boiler is over or under the operating optimum value and the HeW pressure in system must be adjusted.

## Draining water from the boiler

The drainage valve's main function is to relieve water pressure in the boiler during repairs (Fig. 14). Water from the boiler can be drained through this valve only partially.

Complete draining of water either from the boiler only or from the whole heating system and refilling it again must be done through fill-up (discharge) valves installed in suitable locations in the heating system.

Draining water from the heating system and refilling it again and the follow-up operations (bleeding, adjusting expansion vessel) are not covered by the boiler's warranty.

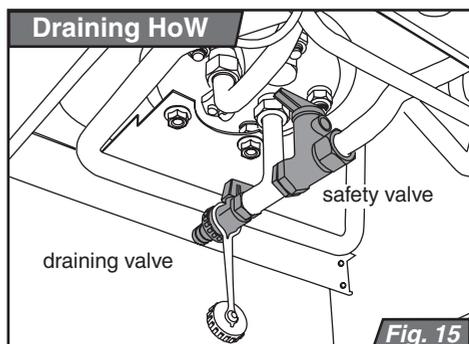
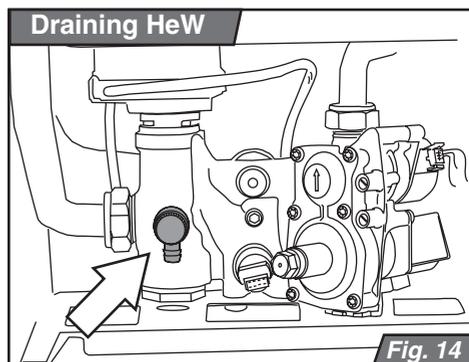
If there is a danger that domestic hot water inside the boiler or the distribution pipes may freeze, measures must be implemented to dispose the water off completely.

After completion installation of the gas supply line to the boiler it is necessary to thoroughly check the tightness of the coupling.

## Draining water from the HoW tank

The draining valve at the bottom of the tank is used during inspections of the tank.

**Important:** Always open the draining valve carefully. Prior to draining let the tank cool down and close the HoW inlet and outlet valves under the boiler.



## Air supply and combustion gas removal for KTZ boilers

In the case of model KTZ combustion gases must be removed and fresh air supplied through special dual tubing.

Horizontal tubing sections must have a gradient allowing water condensate to run towards the boiler or to special condensate removal components. This is achieved by combining elbows with straight components, which will result in a gentle slope of the straight section. Condensate removal components should be whenever possible installed as close to the combustion gases outlet neck as possible. Defects caused by condensate penetration are not covered by the boiler's warranty.

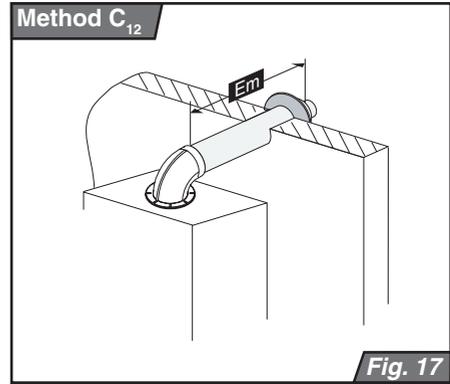
### Air supply/combustion gases removal methods (according to EN 483) and permitted tube lengths

Unless stated for the following dual tube route design methods and their termination outlets otherwise, the tube lengths (from the boiler connection point to the termination outlet) must be as specified - see Table 1:

**Note:** 1 Em is regarded to be either 1 m of straight section or one 90° elbow.

**Important:** When exceeding lengths prescribed in Table 2, a combustion gas diffuser (screen) must be located at the fan outlet (Fig. 16).

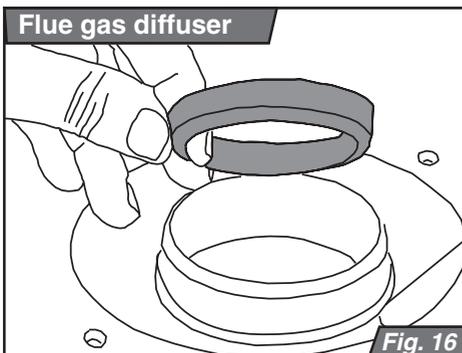
The following methods of air supply and combustion gas removal are approved for the boiler:

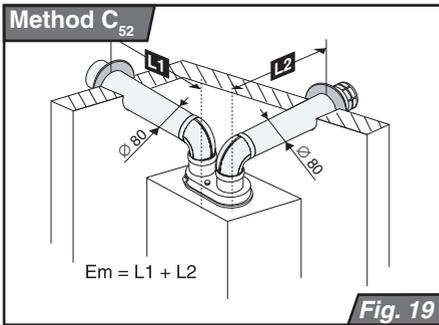
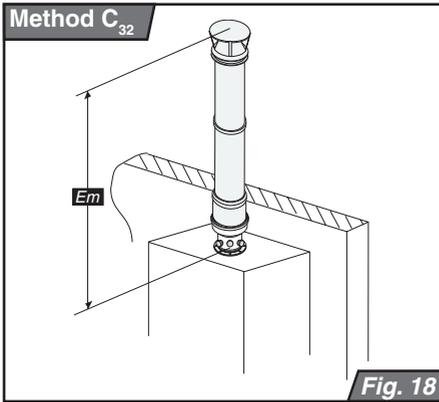


**Method C<sub>12</sub>** – horizontal routes with horizontal termination outlets into free space. When using tubing separated (80 mm) into horizontal routes with horizontal termination outlets, the air and combustion gas terminations for the same boiler must be designed so that they are both located inside a square of 0.5 m side length.

Example of a horizontal route of dual tubing – design C12 (according to EN 483) is illustrated in Fig. 17.

**Method C<sub>32</sub>** – vertical routes with vertical termination outlets into free space. The termination of separated tubing is the same as in Method C12.; further, the distance between the planes of both terminations must be smaller than 0.5 m.





Example of a vertical route of dual tubing – design C32 (according to EN 483) is illustrated in Fig. 18.

**Method C<sub>42</sub>** – connection to common dual chimneys. Dual tubing from each boiler (individual routes) may be terminated in a common chimney; the chimney's transportation sufficiency is assessed from the data stated by the manufacturer of the chimney flue used. If the routes are terminated in the chimney in mutually perpendicular directions, the minimum vertical distance between them must be 0.45 m. If the routes are terminated in the chimney

from opposite directions, the minimum vertical distance between them must be 0.60 m. Outlets of routes terminated in a common dual chimney must never be fitted with end pieces (used in routes discharging to free space)! Both route sections (the outside – air, and the inside – combustion gases) must be safely inserted into the chimney inlet, but not too deep, so that it does not form an obstacle to the flowing combustion gases or air.

In this case the route of the concentric tubing must not exceed the length (elbow 90° +) 3 Em; the separated tubing route must not exceed (elbow 90° +) 9 Em (when adding the length of the air and combustion gas sections together).

**Method C<sub>52</sub>** – dual tubing separated and terminated at two different points (with different specifications, mainly pressures).

Separate tubing can also be used to remove combustion gases and supply combustion air (see Fig. 19). The separate tubing routes must not be terminated at mutually opposite building walls.

**Method C<sub>62</sub>** – connection to independently approved and handed over tubing.

In this case the tubing must have a nominal size according to the boiler's technical parameters and valid for the same permitted lengths as are cited in this part of the Instructions for individual installation examples (Methods CXX) – the lengths were determined by experience and no formula are used to calculate them. Only corresponding components (end pieces) of the approved and supplied tubing are used for connecting the boiler and outlet/inlet termination of tubing into free space

**Table 2**

Flue duct diameter	min. length	max. length with screen	max. length without screen
100 / 60	1,5 Em	3 Em	7 Em
80 / 80	2 x 2 Em	2 x 3 Em	2 x 7 Em

(or special chimney or shaft) - if the tubing does not contain such pieces, it must be supplemented (combined with) components from other tubes (e.g. tubing from the manufacturer).

**Spôsob  $C_{82}$**  – tubing with the air supply part terminated in free space and the combustion gases part in a common chimney.

Air may also be taken from free space (or space with abundant air supply) and combustion gases discharged into a common chimney (or again into a space with common presence of combustion gases).

### Examples of locating flues in accordance with Appendix 7 to Slovak Government Decree No. 92/1996

#### Separate outlet on a straight wall

1. The separate outlet forms a zone from the outlet centreline of width  $a = 0.5$  m, radius  $b = 1.0$  m and height  $c = 5.0$  m.

**Fig. 20 - Schematic diagram of the zone formed when using a separate flue outlet**

2. If the distance of the outlet centreline under the top part of the window structure  $d > 0.3$  m, the zone must not overlap to the area formed by the window. If the distance  $d \leq 0.3$  m, the zone delimited by radius  $b$  may overlap with the top part of the window.

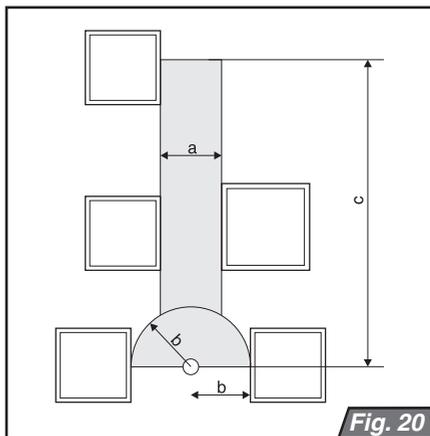
**Fig. 21 - Schematic diagram of the zone formed from the centreline of the flue located in the vicinity of the top part of the window**

#### Dual outlet in horizontal configuration on the same external wall

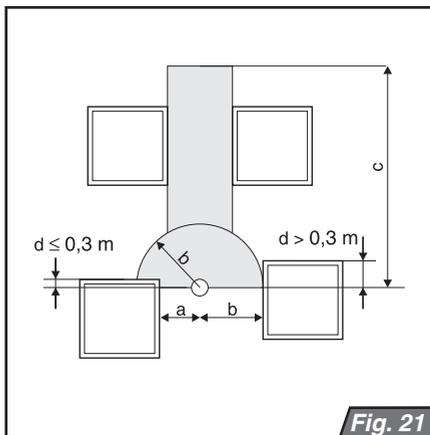
The distances of dual outlet on the straight wall in horizontal configuration should be:

$a = 1.5$  m,  $g = 5.0$  m,  $c = 5.0$  m.

If  $g < 5.0$  m, zones overlap, but the overall zone width of 8 m must be maintained and the value “a” increased on both sides accordingly (e.g. if  $g = 4.0$  m, then  $a = 2.0$  m).



**Fig. 20**



**Fig. 21**

**Fig. 22a - Dual outlet in horizontal configuration on a straight external wall**

**Dual outlet in vertical configuration**

Minimum distances with dual outlet in vertical configuration on a straight external wall should be:

$a = 0.5 \text{ m}$ ;  $b = 1.0 \text{ m}$ ;  $c = 5.0 \text{ m}$ ;  $a_1$  depending on  $x$  as follows:

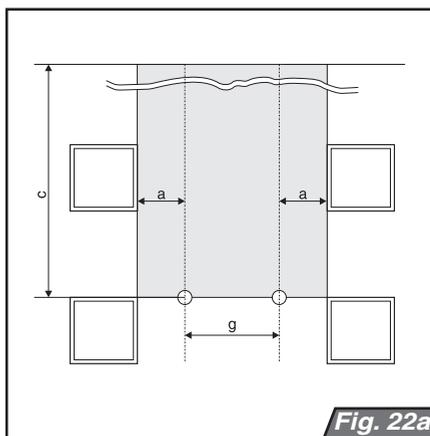
$x \geq 5.0 \text{ m}$ ,  $a_1 = 0.5 \text{ m}$ ;

$x \geq 4.0 \text{ m}$ ,  $a_1 = 0.6 \text{ m}$ ;

$x \geq 3.0 \text{ m}$ ,  $a_1 = 0.75 \text{ m}$ ;

$x \geq 2.0 \text{ m}$ ,  $a_1 = 1.0 \text{ m}$ ;

$x \geq 1.0 \text{ m}$ ,  $a_1 = 1.2 \text{ m}$ ;



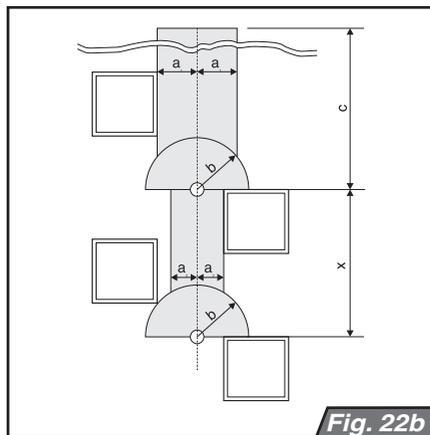
**Fig. 22a**

**Fig. 22b - Dual outlet in vertical configuration on a straight external wall**

**Very important!**

The shown examples of locating flues may be used only when repairing or reconstructing buildings.

In all other cases it is necessary to proceed in accordance with Public Notice No. 410/2003 of the Slovak Ministry of Environment which amends Ministry of Environment Public Notice No. 706/2002 on sources of air pollution, on emission limits, on technical requirements and general operating conditions, on a list of pollutants, on classification of sources of air pollution and on requirements for dispersion of polluting emissions.



**Fig. 22b**

## Safety measures

The distance of flammable materials from the flue section of the separated tubing must be such that the surface temperature of these materials does not exceed 80 °C. Flue tubing termination must not be located in areas:

- with explosion hazard (according to STN 33 2320)
- which are the indoor sections of buildings (foyers, corridors, staircases, etc.)
- which are closable, i.e. thoroughfares, etc.
- extending into terrain (even though they are free of obstacles open to free space),

e.g. tunnels, subways, etc.

With respect to these principles of prohibited location of flues, the inlet termination of air supply must also be evaluated independently.

The opening in the wall for the dual tubing – air supply and flue removal – is made with deficient clearance (ca. 120 to 130 mm) and after completing the installation it is sealed. The sealing must be done using non-flammable materials (flammability grade A according to STN 73 0823), e.g. wall plasters, plaster, etc. Holes in flammable walls or ceilings are made according to the first part of this section.

## Electrical connection of the boiler

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### Electrical connection of the boiler

The boiler is connected to power supply by a three-core flexible cord without a plug. The fixed socket through which the boiler is connected to power mains must comply with the provisions of STN 33 2000-4-46. It must always have a protective contact (peg), reliably connected with a PE or PEN wire (yellow-and-green). The boiler must be always connected to the protection wire (earth) through its power cord and must be always installed in such a way that the socket and the plug are accessible. Using various adapters, extension cords etc., is not permitted.

The boiler is protected by one tube fuse (T 125 mA / 250 V), which is located on the boiler control board – see diagram on pg. 33 and 34.

**Important:** The plug and the socket as well as a room control unit, which is an interference with the boiler's internal wiring, must be under all circumstance connected by a qualified electrician only, as defined by Public Notice No. 50/1978.

Likewise servicing of the boiler's electrical part must be done by a person with the above qualification only. Before carrying out any works on its electrical section, the boiler must be disconnected from power supply by pulling the power cord plug from the power socket!

Only room control units with zero-potential output may be used in conjunction with the boiler, i.e. units which feed no foreign voltage to the boiler.

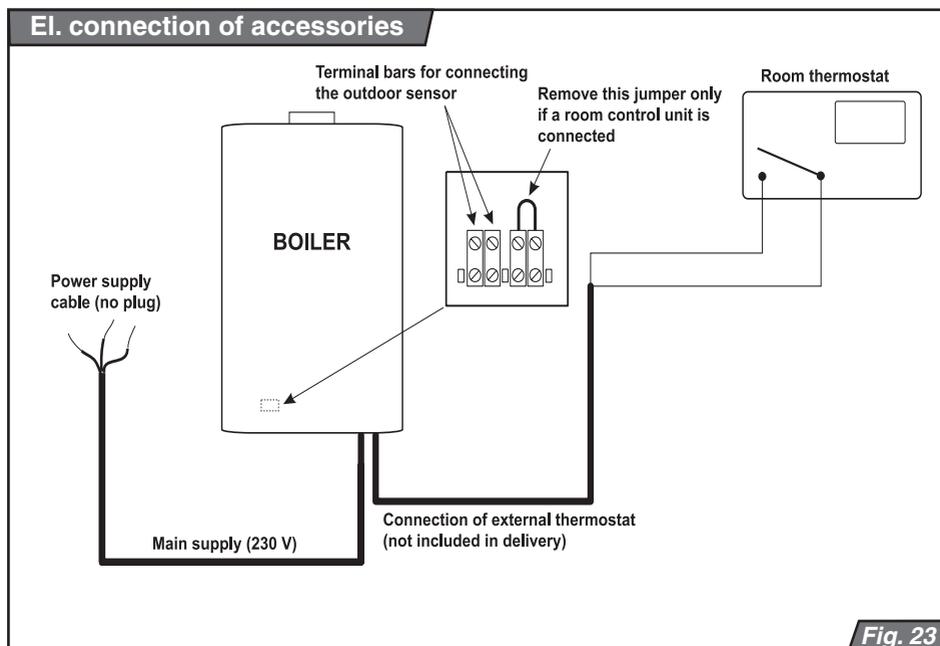
Minimum required current carrying capacity of the control unit's output terminals is ~ 24 V / 0.1 A.

The room control unit must be connected to the boiler by a two-core cable. The recommended copper wire cross-section is between 0.5 and 1.5 sq.mm.

The room control unit connection cable must not run in parallel with power wires or cables.

The terminal box for wiring a room control unit, which is factory-fitted with a jumper, is situated on the back of the boiler control panel. The terminal box is accessible after removing the outside cover and tilting the control panel (Fig. 23).

Connection of the outdoor temperature sensor is done by a dual-core wire, section 0.75 sq.mm. Max. Ohm resistance is 10 Ohms, total length is max. 30 m. The terminal box for connecting the outdoor temperature sensor and room control unit is located next to the room control unit terminal box.



## Rebuilding the boiler for alternative fuel (propane)

The basic design of Protherm Tiger 24 (12) KTZ and 24 (12) KOZ boilers is made to run with natural gas. If it is required to run the boiler on propane, the gas valve must be changed and boiler set to prescribed parameters. Rebuilding the boiler for alternative fuels may be done only by an authorized technician certified by the manufacturer. The gas valve designed

for propane operation is part of the kit for changing the boiler from natural gas to propane. The kit contains all necessary parts and the working procedure.

Technical specifications for changing the boiler to a different fuel are also included in an independent part of the Service Manual.

# Electrical diagram of Protherm Tiger 24 (12) KOZ boiler

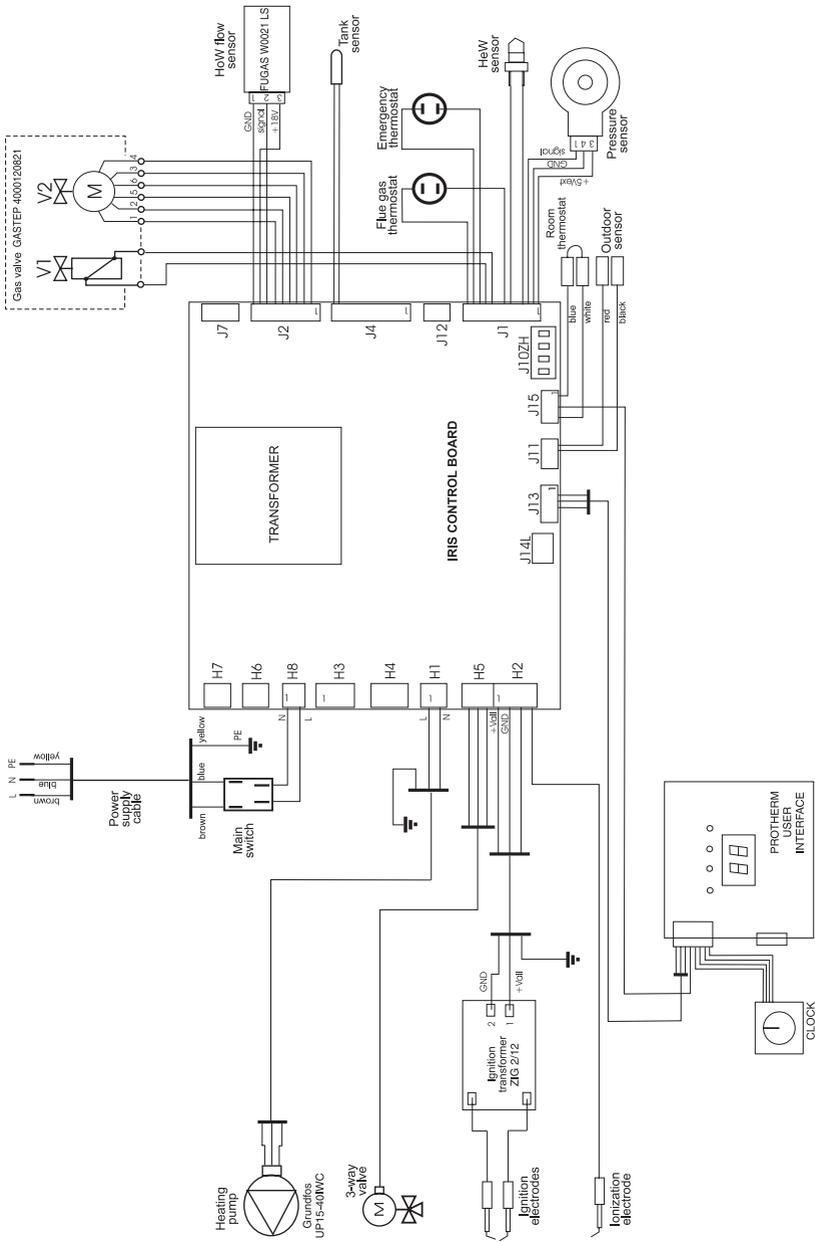


Fig. 24

Electrical diagram of Protherm Tiger 24 (12) KOZ boiler

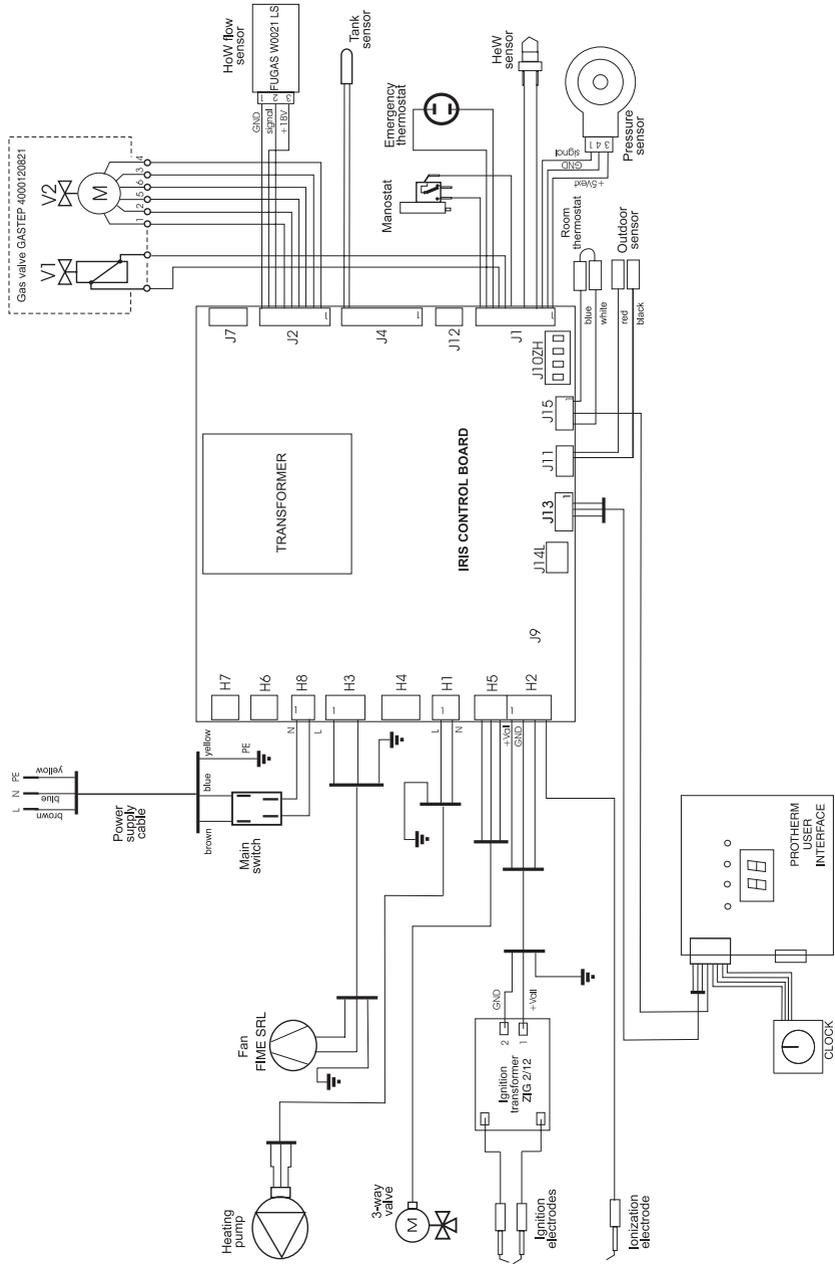


Fig. 25

