

Manual for installation, operation and maintenance of boiler

THERM 24 KDN, KDZN, KDCN

Hanging gas condensing boiler



Thermona®



**Manual for installation,
service and maintenance
of boiler**

THERM 24 KDN, KDZN, KDCN

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1. GENERAL INFORMATION



Please note that it is necessary to follow the notifications given.

1.1 Use

The hanging condensing boilers THERM are gas hot water boilers that burn natural gas. The boilers are constructed as consumer appliances using condensed water steam in the combustion process with excellent efficiency, minimum emissions into the air and the minimum consumption of electricity. Operation is economical and does not strain so the environment. The output can be fluently regulated within the scope of 20 – 100 % and adapted automatically to immediate thermal losses from the object.

Alternatively, in addition to heating, THERM condensing boilers can be used to prepare flowing hot water (hereinafter referred to as TV) and external indirect heating.



The boiler is designed for closed heating systems fitted with an expansion vessel or open expansion vessel a min. height of 8 m above the boiler.

1.2 Equipment details

1.2.1 Equipment description

- the hanging condensing boiler designed for heating building with a thermal loss of up to 20 kW
- option for heating DHW – flow heating or heating in an indirect heating storage tank
- natural gas operation or propan
- fully automated operation
- low consumption of electricity
- automatic fluent output modulation
- simple boiler control
- high comfort level
- built-in equithermal regulation
- built-in automatic by-pass
- ability to control by the superior indoor thermostat or intelligent indoor control unit
- high level of operational safety
- security elements of the boiler prevent overheating of the boiler or the escape of the effects of burnt gases
- built-in energy saving circulation pump with electronic modulation of revolutions
- safety valve 3 bar
- protective functions (anti-freeze protection, pump protection, etc.)
- electric ignition (saving of fuel)

1.2.2 Construction variants

THERM 24 KDN

- closed combustion chamber – TURBO variant
- variant designed only for heating
- air for combustion is sucked in from the open air

THERM 24 KDZN

- closed combustion chamber – TURBO variant
- heating of DHW in indirect heating external storage tank
- air for combustion is sucked in from the open air

THERM 24 KDCN

- closed combustion chamber – TURBO variant
- heating of DHW using a flow method
- air for combustion is sucked in from the open air

1.2.3 General description

The basic element of THERM gas condensing boilers is the load-bearing frame on which the individual boiler units are mounted. In the upper part of the boiler is a condensing body, which associates the combustion chamber with the burner and the stainless exchanger. The removable front wall of the body is fitted with two electrodes (ignition and ionizing), inspection window, a burner and shaped piping for the supply of gas mixed with air.

A suitable ratio of gas mixed with air is ensured by the mixer in cooperation with a gas fitting. It consists of a gas pressure regulator, two solenoid blocking valves and ratio regulation of the output volume of gas with elements for mechanical setting. The whole set for the preparation of the mixture is completed by the ventilator with electronically controlled revolutions.

Condensate is created when operating the condensing boiler. The outflow of condensate from the condensation body and exhaust piping for burnt gases are directed by system of hoses into the odour closure if the condensate flows outside the boiler.

To ensuring the flow of water through the boiler, on the input of the return water is a Wilo energy saving pump with electronically controlled revolutions. The circulating pump is part of the compact hydraulic block that is completed with a bypass, valves for charging the heating system, valves for discharging heating water from the boiler, pressure sensor, safety valve, connection of expansion vessel, etc.

THERM 24 KDZN boilers are fitted with a three-way valve that splits the water for heating and the heating system. The KDCN is completed by the plate exchanger that ensures comfortable heating of DHW.

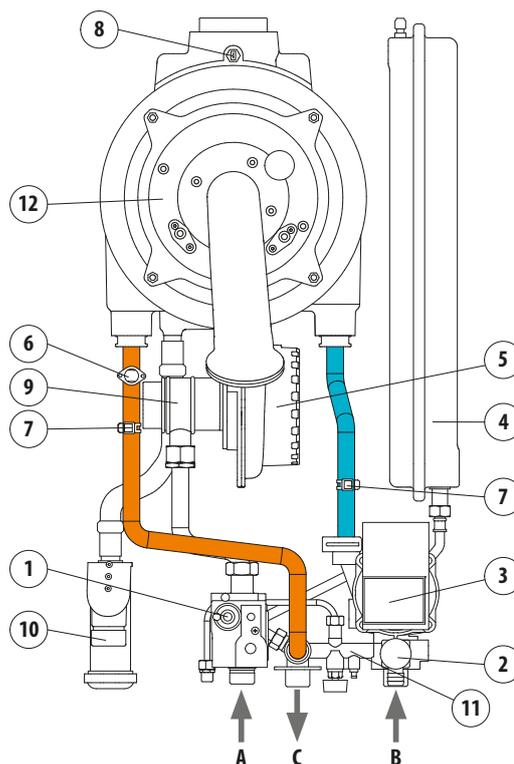
On the front side of the boiler there are control elements and display (see "User Manual" chapter). Inside the control panel there is control micro processor system for controlling the boiler and for controlling protection and regulation of the boiler.

1.2.4 Simplified hydraulic and functional diagrams (are not source materials for assembly)

THERM 24 KDN

- 1 - Gas valve
- 2 - Safety valve
- 3 - Circulation pump
- 4 - Expansion heating vessel
- 5 - Ventilator
- 6 - Emergency thermostat
- 7 - Thermal probe
- 8 - Temperature probe for burnt gases
- 9 - Mixer
- 10 - Trap (siphon)
- 11 - Hydroblock
- 12 - Condensing body

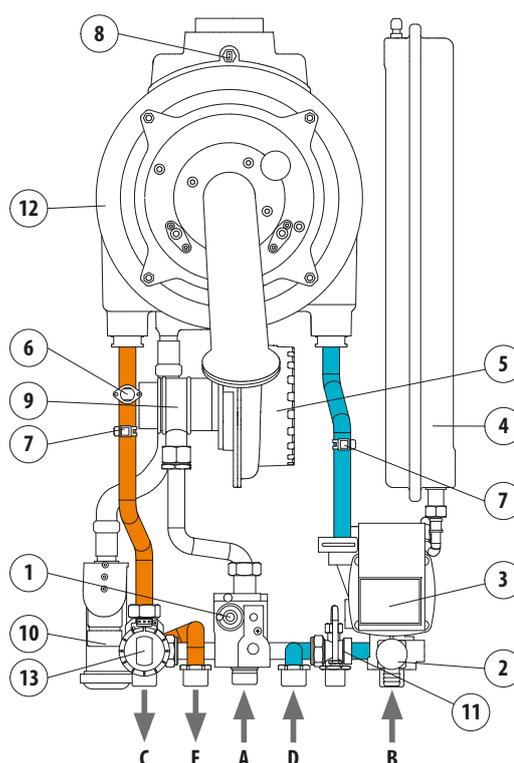
- A - Input for gas
- B - Input for returned water
- C - Output for heating water



THERM 24 KDZN

- 1 - Gas valve
- 2 - Safety valve
- 3 - Circulation pump
- 4 - Expansion heating vessel
- 5 - Ventilator
- 6 - Emergency thermostat
- 7 - Thermal probe
- 8 - Temperature probe for burnt gases
- 9 - Mixer
- 10 - Trap (siphon)
- 11 - Hydroblock
- 12 - Condensing body
- 13 - Three-way valve

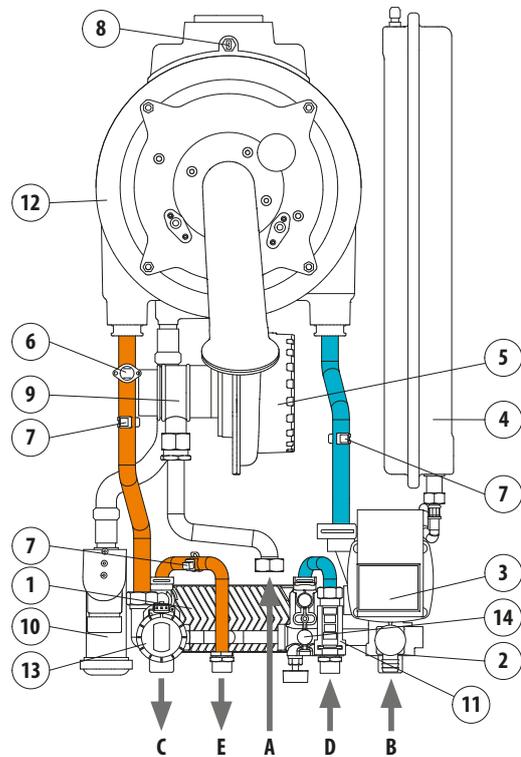
- A - Input for gas
- B - Input for returned water
- C - Output for heating water
- D - Input for returned water from tank
- E - Output for heating water into tank



THERM 24 KDCN

- 1 - Plate exchanger
- 2 - Safety valve
- 3 - Circulation pump
- 4 - Expansion heating vessel
- 5 - Ventilator
- 6 - Emergency thermostat
- 7 - Thermal probe
- 8 - Temperature probe for burnt gases
- 9 - Mixer
- 10 - Trap (siphon)
- 12 - Condensing body
- 13 - Three-way valve
- 11 - Flow switch for heating DHW
- 14 - Hydroblock

- A - Input for gas
- B - Input for returned water
- C - Output for heating water
- D - Input for utility water
- E - Output for utility water



1.3 Operational safety

! THERM boilers are fitted with all safety, emergency and protective elements to ensure completely safe boiler operation. If irrespective of this, e.g. due to unprofessional intervention, irregular inspections and revisions of the boiler, etc., there is a non-standard status then we recommend proceeding as follows:

In the case of gas odour

- close the gas valve under the boiler
- ensure ventilation of the room (windows, door)
- do not manipulate the electric switch
- liquidate any naked flame
- immediately call service (the boiler must not be used until after the service inspection)

In the case of an odour of combustion burnt gases

- disconnect the boiler
- ensure ventilation of the room (windows, door)
- call service (the boiler must not be used until after the service inspection)

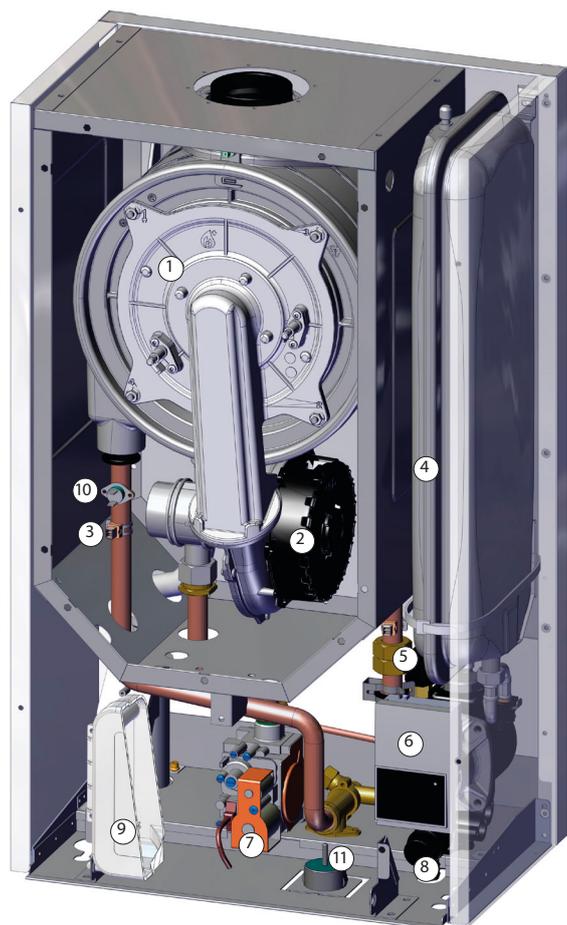
In the case of a consumer appliance fire

- close the gas valve under the consumer appliance
- disconnect the consumer appliance from the electricity network
- liquidate the fire with powder extinguishing equipment or a foam extinguisher

1.4 Technical parameters

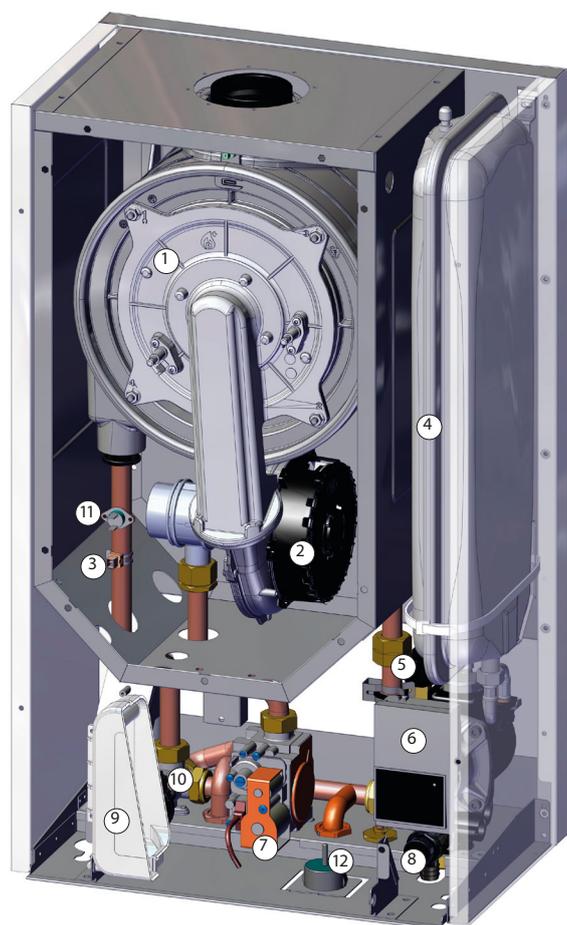
Technical description	Unit	THERM 24 KDN		THERM 24 KDZN		THERM 24 KDCN		
Fuel	-	natural gas	propane	natural gas	propane	natural gas	propane	
Consumer appliance category	-	I _{2H'} , II _{2H3P}	I _{3P'} , II _{2H3P}	I _{2H'} , II _{2H3P}	I _{3P'} , II _{2H3P}	I _{2H'} , II _{2H3P}	I _{3P'} , II _{2H3P}	
Rated thermal input for heating Q _n	kW	20.6	20.3	20.6	20.3	20.6	20.3	
Minimum thermal input for heating Q _n	kW	4.8	5.1	4.8	5.1	4.8	5.1	
Nominal thermal output for heating by P _n	Δt = 80/60 °C	kW	19.8	19.6	19.8	19.6	19.8	19.6
	Δt = 50/30 °C	kW	20.7	20.5	20.7	20.5	20.7	20.5
Rated thermal input power for heating DHW Q _{nw}	kW	-	-	25.5	25.5	25.5	25.5	
Nominal thermal output for heating DHW	kW	-	-	24.0	24.0	24.0	24.0	
Minimal thermal output by P _n	Δt = 50/30 °C	kW	4.9	4.9	4.9	4.9	4.9	4.9
	Δt = 80/60 °C	kW	4.7	4.7	4.7	4.7	4.7	4.7
Drilling gas curtains	mm	5.9	3.9	5.9	3.9	5.9	3.9	
Gas overpressure on the consumer appliance input	mbar	20	37	20	37	20	37	
Consumption of gas	m ³ .h ⁻¹	0,48 – 2,04	0,20 – 0,80	0,48 – 2,04	0,20 – 0,80	0,48 – 2,04	0,20 – 0,80	
Maximum overpressure of heating system PMS	bar	3	3	3	3	3	3	
Minimum overpressure of heating system	bar	0.8	0.8	0.8	0.8	0.8	0.8	
Max. input pressure DHW PMW	bar	-	-	-	-	6	6	
Min. input pressure DHW	bar	-	-	-	-	0.5	0.5	
Maximum input pressure of cold water	°C	80	80	80	80	80	80	
Variations of flues	mm	60/100, 80/125, 2x 80		60/100, 80/125, 2x 80		60/100, 80/125, 2x 80		
Average temperature of burnt gases	°C	64	64	64	64	64	64	
Temperature of burnt gases when overheating	°C	75	75	75	75	75	75	
The lowest temperature of burnt gases at the minimum thermal output	°C	54	54	54	54	54	54	
Weight flow of burnt gases	g.s ⁻¹	2,3 – 9,8	2,3 – 9,2	2,3 – 9,8	2,3 – 9,2	2,3 – 9,8	2,3 – 9,2	
Level of acoustic output	dB (A)	52	52	52	52	52	52	
Boiler efficiency	%	99 – 107	99 – 107	99 – 107	99 – 107	99 – 107	99 – 107	
NOx class of boiler	-	5	5	5	5	5	5	
Type of electricity supply	-	~	~	~	~	~	~	
Nominal supply voltage / frequency	V / Hz	230 / 50	230 / 50	230 / 50	230 / 50	230 / 50	230 / 50	
Auxiliary electricity at	nominal heat input power	W	66.0	66.0	66.0	66.0	66.0	
	partial loading	W	55.0	55.0	55.0	55.0	55.0	
	emergency status	W	4.0	4.0	4.0	4.0	4.0	
Nominal current of the circuit breaker for consumer appliance	A	2	2	2	2	2	2	
Level of coverage of electrical part	-	IP 41 (D)						
Environment according to ČSN 33 20 00 – 3	-	basic AA5 / AB5		basic AA5 / AB5		basic AA5 / AB5		
Volume of expansion unit	l	7	7	7	7	7	7	
Filling overpressure of expansion vessels	bar	1	1	1	1	1	1	
Flow of DHW at Δt = 30 °C	l.min ⁻¹	-	-	-	-	12.5	12.0	
Dimensions of boiler: height / width / depth	mm	725 / 430 / 285		725 / 430 / 285		725 / 430 / 285		
Weight of boiler	kg	32	32	33	33	34	34	

1.5 Set of boilers



THERM 24 KDN

- 1 - Condensing body
- 2 - Ventilator
- 3 - Heating temperature probe
- 4 - Expansion heating vessel
- 5 - Pressure sensor
- 6 - Circulation pump
- 7 - Gas valve
- 8 - Safety valve
- 9 - Control panel
- 10 - Emergency thermostat
- 11 - Manometer

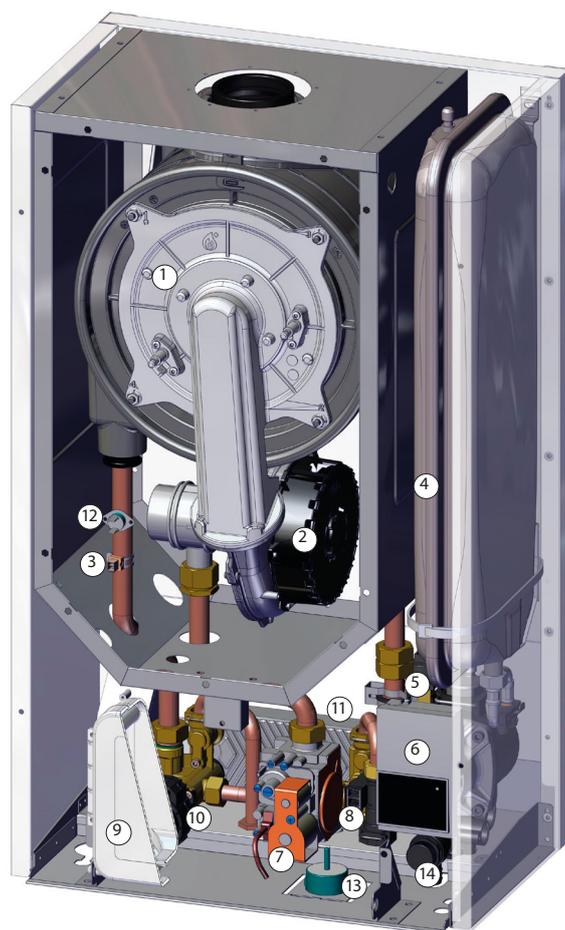


THERM 24 KDZN

- 1 - Condensing body
- 2 - Ventilator
- 3 - Heating temperature probe
- 4 - Expansion heating vessel
- 5 - Pressure sensor
- 6 - Circulation pump
- 7 - Gas valve
- 8 - Safety valve
- 9 - Control panel
- 10 - Three-way valve
- 11 - Emergency thermostat
- 12 - Manometer

THERM 24 KDCN

- 1 - Condensing body
- 2 - Ventilator
- 3 - Heating temperature probe
- 4 - Expansion heating vessel
- 5 - Pressure sensor
- 6 - Circulation pump
- 7 - Gas valve
- 8 - Flow switch
- 9 - Control panel
- 10 - Three-way valve
- 11 - Plate exchanger
- 12 - Emergency thermostat
- 13 - Manometer
- 14 - Safety valve

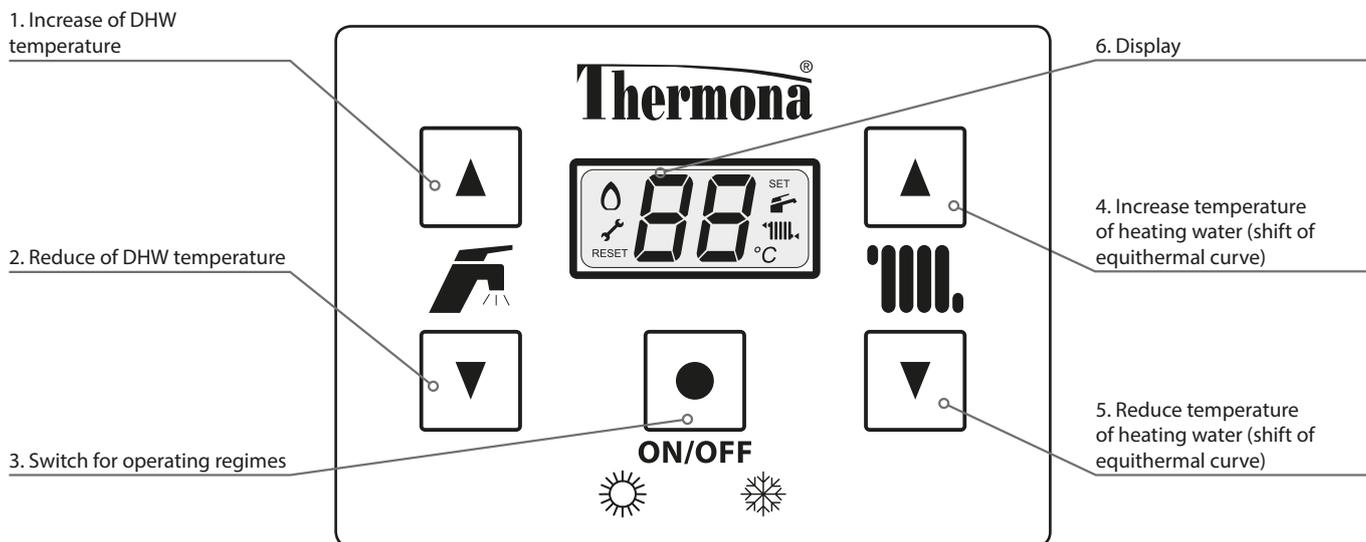


2. USER MANUAL

2.1 Control and signalling

2.1.1 Boiler control panel

The control panel on the boiler is integrated into the front cover of the boiler; individual control elements are fully accessible.



2.1.1 Description of the elements on the control panel of the boiler

Switch for operating regimes - function

Disconnection of the boiler (standby regime) – the protective functions of the boiler remain in operation (when the boiler is connected to the electricity network and the gas supply is opened). Selecting this mode, the boiler display indicates „-“, the heating and heating of DHW is disconnected. The boiler is disconnected by pressing the button  for 5 s



The boiler is activated – by pressing the button  for 2 s. The boiler is activated in the winter regime. In the case of the requirement to switch to the summer regime, press the button  again for 2 s



 **Winter mode** (heating and heating of DHW is active)



 **Summer mode** (only heating of DHW is active, the heating is OFF)



RESET **The error status of the boiler** – is removed by pressing the button  for 5 s



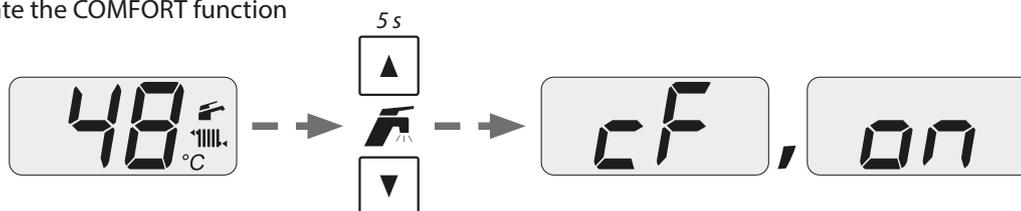
Setting the heating temperature – setting of the output temperature of water in the heating system within the range 30 – 80 °C. In the case of selected equitherm regulation with arrows, the shift in the heating curve is set by the control knob (within the range ± 15 °C from the equithermal curve)



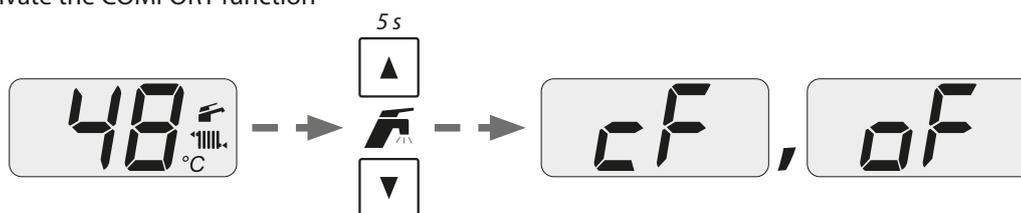
Heating the water – setting of the requested temperature of hot water within the range 35 - 60 °C. Not used in the KDN version. For the KDZN version with reading of the temperature of water in the storage tank, the thermostat (ON/OFF) sets the required temperature of the heating water by which the storage tank is consequently heated

Activation / deactivation of the COMFORT function – for more flexible starting of heating the water for the KDCN version. The function keeps the plate exchanger pre-heated so that the time need to heat the water is shortened to the minimum. This is done by pressing both buttons for 5 seconds at the same time.

Activate the COMFORT function



Deactivate the COMFORT function



The COMFORT function may increase gas consumption in certain cases.

LCD display – displays the operating parameters of the boiler

Indication of set temperature

After pressing the button for setting the temperature of the heating system or DHW the respective symbol of the regime will start to flash along with the numeric display of the temperature on the LCD display. In this case, the value of the last temperature set is indicated. After the termination of the setting, the indication of the set temperature remains for about 5 seconds. The following permanent display of the numeric value and the symbol, the real temperature of the respective regime is indicated again



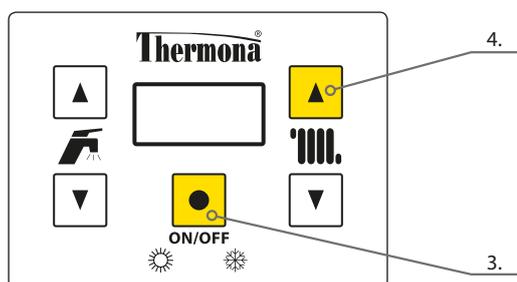
Description of symbols shown on the display

SYMBOL	MEANING
	Field of display of temperatures, failure statuses, service values and other details
	Permanent light – the boiler is in the summer mode - in the display field temperature of the primary circuit Flashes – when setting displays the DHW temperature or the requested DHW temperature
	Permanent lighting – the boiler is in winter mode Flashes – when setting displays the heating temperature or the requested heating temperature
	Permanent light - the burner in operation Flashes - ignition of the burner is in progress
	Flashes - the boiler requires service
	Flashes (in interval of 4 s) - OpenTherm active communication with master regulator
	Alternatively flashes - the boiler is disconnected (standby mode)

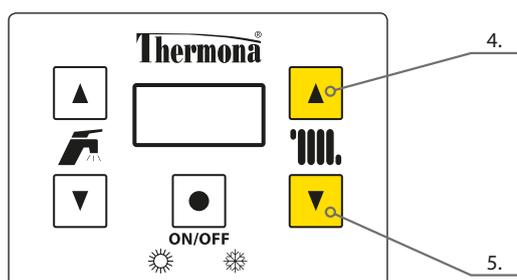
SYMBOL	MEANING
	Active anti-cycling function
	Active pump overrun function
	Active anti-freeze boiler protection function
	Requirement for charging the heating system
	COMFORT active function - pre-heating of water exchanger
	Boiler error boiler – flashes alternatively indicating the error code
	Enforced heating function
RESET	The boiler must be reset

2.1.3 Information menu

Displays the actual parameters of the boiler and other available information.



Enter the menu by pressing buttons 3 and 4 at the same time for 5 s.



Consequent movement in the menu is by pressing buttons 4 and 5.

In the case of uncertainty for 60 s, the information menu is automatically terminated. The menu can be immediately terminated by pressing buttons 3 and 4 at the same time.

List of displayed information parameters

DISPLAY	MEANING
d0	Pressure in heating system (/10)
d1	Outside temperature (1)
d2	Equithermal curve (factor „K“)
d3	Shift of the equithermal curve
d4	Requested temperature of the heating water
d5	Measured temperature of heating water

DISPLAY	MEANING
d6	Temperature of returned water
d7	TUV temperature
d8	Temperature of burnt gases
d9	Revolutions of the ventilator (x100)

(1) - an outdoor temperature display is only available in the case of the correction of the outside sensor and the selection of equithermal regulation

2.1.4 Error messages

A potential failure or another anomaly is signalled by the flashing of the backlight of the LCD display. On the display, the lights and the symbol  alternatively RESET flash with error code E_r and the definition according to the table.

Error code displayed on LCD and the meaning

ERROR CODE	MEANING
Er 01 *	Blocking of the activity when the burner is not ignited
Er 02	Low pressure of heating water
Er 03	Indication of a false flame
Er 04	Defect in thermal heating probe (interruption of short-circuit)
Er 05	Defect to the thermal DHW probe
Er 06 *	Blocking of activity after overheating of the boiler (emergency thermostat)
Er 07	Defect to the outside temperature sensor
Er 08	Failure of the ventilator control

ERROR CODE	MEANING
Er 11 *	Blocking - unspecified failure
Er 13	Defect in the temperature probe for burnt gases
Er 14 *	Fast temperature of heating water (> 2 °C / s), or high temperature of heating water (> 105°C)
Er 16 *	High temperature of burnt gases in the condensing body
Er 21	Defect in temperature probe for return water
Er 69	Error in the connection of the pressure sensor for heating water
Er 99	Error in the configuration of the control system
Li 01	High temperature of heating when heating the water

* The boiler is blocked. For re-commissioning, a manual reset must be made by pressing the button  .

The error code is saved into the memory of the processor where it is also saved in the case of a supply failure. The service technician can check the memory and ascertain the history of failure statuses.

2.2 Commissioning of the boiler

! The boiler must only be commissioned by a service employee authorised by the producer! The list of service technicians is attached to the product.

Action to be taken before and during the activation of the boiler.

Before the first activation of the boiler it is necessary to take the following measures

- check that the heating system is filled with water and the boiler is correctly de-aerated
- ensure that all valves under the boiler and in the heating system are open
- open the gas valve and, using the gas escape detector or foam-making solution, test the tightness of the gas distribution in the boiler

The procedure for the first ignition of the boiler is as follows

- insert the network supply into the socket and switch on the boiler with the switch for operating regimes
- inspect the correct activity of all thermostats and control elements
- inspect all functions of the boiler
- adjust the combustion boiler using the burnt gases analyser or modify the setting according to demands of the area to be heated
- train the user

! The setting of output range of the boiler and other parameters must be in accordance with the technical data. Any overloading and incorrect use of the boiler may cause the devaluation of its components. The warranty cannot be applied for such damaged components!

The boiler must not be operated with the emergency or flue thermostat or manostat excluded from operation or replaced by other equipment than that stated by the producer! Otherwise, an accident or other hazardous statuses may occur!

A service technician authorised by the producer must familiarize the user during activation with the operation of the boiler, the individual parts, the safety elements and the manner of control, complete the Warranty Certificate and give this user manual to the user.

The user is obliged to ensure of the correct use of the boiler in accordance with this manual which is a conditions of acceptance of the warranty. In addition, it is strictly forbidden to intervene in any manner into the secured parts in the boiler!

2.3 Disconnection of the boiler from operation

The boiler can be disconnected for short periods by the operating modes switch or by the master regulation.

For longer disconnection of the boiler outside the heating season (e.g. during summer and holidays) it is recommended to close the gas valve. However, leave the boiler connected to the electricity network. Only in this case will the protective functions of the boiler be active.

Any full disconnection of the boiler (closing of gas supply, disconnection from electricity network) must be done with respect to the ambient temperature of the environment in the respective season! There is a risk of the heating system or DHW circuit freezing due to damage to the boiler or other elements of the heating system.

2.4 Regulation

The boiler is fitted with internal regulating elements at a high level for such basic equipment. The standard is integrated equithermal regulation. The heating in the heating system can be controlled in several ways: regulation of the room temperature in a selected reference room; equithermal regulation of heating water, regulation according to the boiler temperature.

2.4.1 Operation of the boiler without the room thermostat or regulator

In this regime the boiler maintains the selected temperature of the heating water. The room thermostat or the regulator is not connected; the terminals for connection must be mutually interconnected (set in production).

In this mode, set the temperature of the heating water directly on the boiler control panel with the buttons 4 and 5.



The operation of the independent boiler (without selection of equithermal regulation) is recommended to be controlled using at least a simple room thermostat. The room temperature is time stable and keeps the boiler in the operating regimes. It is recommended to use the built-in equitherm regulation either independently or completed by the spatial regulation, as mentioned below.

2.4.2 Operation of the boiler with spatial thermostat

In this manner of regulation, the boiler maintains the selected temperature of heating water. The room thermostat is connected instead of a terminal connection with the indication RT inside the control panel on the boiler. The operation of the boiler is consequently controlled according to the inside temperature in a room where the room thermostat is located (the reference room).



For control according to room temperature, Thermona delivers and recommends the whole series of room thermostats: e.g. PT 22, Honeywell CMR 707, CMT 727 (wireless version) etc.

The mentioned ad-in regulators are not (with the exception of special offers) included in the delivery of the boiler!

Description of the activity of the boiler in the mentioned regime

The working phase of the boiler starts by switching on the room thermostat (the thermostat evaluated low temperature compared with requested) at the moment when the regime control knob is in the winter regime position. The three-way valve relay is disconnected (for boilers with water storage heating); the of circulating pump is activated, as well as the ignition system and ventilator. Ignition of the boiler is for the adjusted starting output. It remains for 2 seconds after activation of the boiler. The output is then decreased to the minimum with a slow linear start to the modulation point stated by service for setting the maximum heating output. The regulation of output of the boiler in this phase is by PID (proportional/integral/derivative) with keeping the temperature set by the buttons on the control panel (within the range 25 – 80 °C). During the whole time of heating, the regulation limit of the output temperature is checked. When heating the system with lower input power than the minimum output of the machine, there is an increase of the output temperature of heating water by 3 °C above the adjusted temperature

(for 30 seconds from ignition, this value is increased to 10 °C). In this phase the boiler interrupts the burning while still running the circulating pump and activates the restriction of reignition (service setting within the range 0 – 10 min.). In this manner the boiler becomes a highly adaptable source of heat due to the high variability of the consequently regulated heating sets (e.g. use of zone regulation, thermostatic valves, etc.).

After disconnecting the thermostat or after the switching the boiler into "SUMMER" mode, the burner stops and the pump is then activated during the adjusted time for the run-out of the pump. This function is used for taking the heat from the condensing body and for improving the allocation of temperatures of bodies when using thermostats with PI linkage with short working cycles.



In the case of the installation of the room thermostat or regulator in the reference room, a minimum of one radiator must be left without a thermostat head. To increase thermal comfort, we recommend not to mount thermostatic heads on radiators in the reference room at all.

2.3.4 Operation of the boiler using built-in equithermal regulation

This regime is accessible in the boiler in the standard variant but is not activated. The activation and the primary setting of the regulation is performed at the request of the client by an authorized service technician.

During equithermal regulation the boiler changes the temperature of the heating water automatically according to the changes in the outside temperature.

This manner of regulation can only be used with the connected outside temperature sensor. The outside sensor is located on the coldest wall of the object (north or north-west) approximately 3 m above the ground. The sensor must not be influenced by any other thermal influence such as open windows, sunlight, ventilation shafts, etc.

Description of the activity of the boiler in this regime

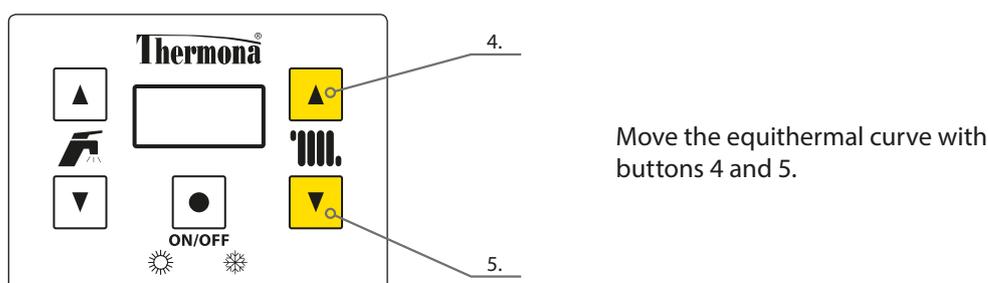
The working phases of the boiler are identical with the previous regime with the difference that the temperature for the heating system is automatically set according to the outside temperature (ascertained by the sensor). The calculation of the requested temperature of the heating system is the function of the ambient temperature and the function of the "K" factor (declination of equithermal curve), which is set by the service technician with respect to the locality and nature of building and the heating system. Using the buttons for setting the temperature of heating water on the control panel, the user sets the requested thermal comfort (correction of the shift of equithermal curve within the range $\pm 15\text{ }^{\circ}\text{C}$ of the heating water). In the case of failure of the ambient temperature sensor, this status is signalled by Er 07 a failure and the boiler continues in operation with the temperature of the heating system according to the setting in the previous regime (without equithermal regulation).

Adjustment procedure

When setting the equithermal regulation, it is necessary to distinguish the declination and the shift of the equithermal curve. By setting of **the declination** the following rule applies : in the case of poor thermal-insulating properties of the object, change the parameters of the declination of the curve in the direction of the higher values (the curve is moved upward); in the case of good thermal insulation, the parameter can be decreased (the curve is moved downward).

The declination of the curve is set by the authorized technician in the service menu of the automatic control system of the boiler!

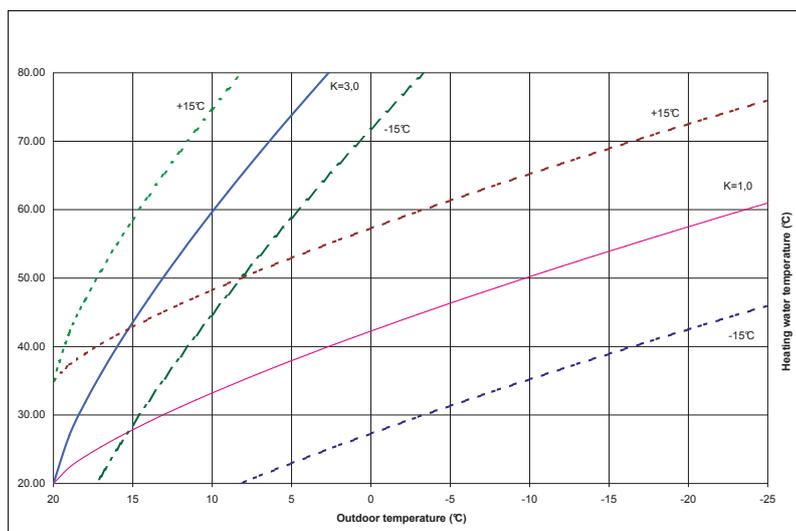
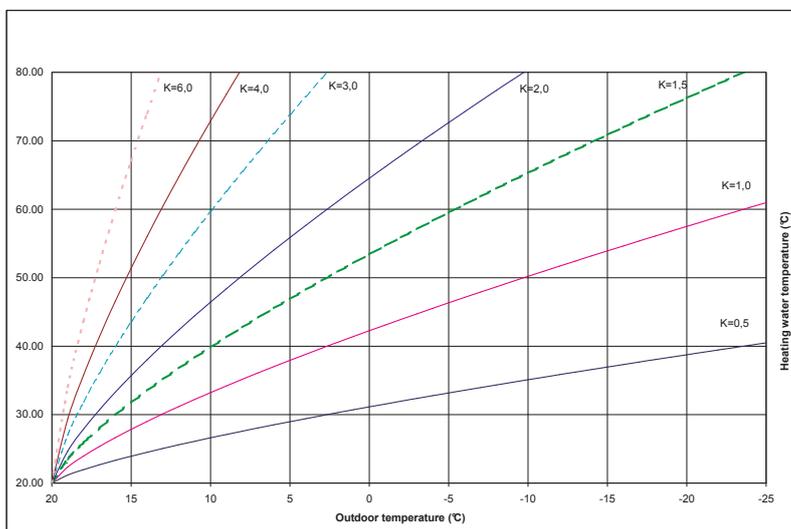
! During the activated equithermal regulation the meaning of the function of the button 4 and 5 on the control panel of the boiler is changed. In this case, the mentioned button is used to set the shift of the heating curve (within the range $\pm 15\text{ }^{\circ}\text{C}$ from the equithermal curve set by the service technician).



It results from the mentioned facts that using the button to set the temperature of the heating on the control panel, in this regime, the requested temperature of the heating space is indirectly set. At the beginning (in the production) the equithermal curve is set for „K“ = 1,6. After inspection of the temperature of the heated space (after approximately 24 hours), it is possible to perform additional setting according to all requirements for thermal comfort. Due to the influence of the equithermal regulation the change of ambient temperatures will be compensated and the level of temperature of the heated space will be automatically kept at a constant level.

Using this regime of regulation, a further decrease of operating costs can be achieved while improving thermal comfort (continuous heating of heating bodies). Finally, this option can be appreciated as pre-regulation of the primary heating circuit when using zone regulation (by mixing valves), etc.

Graph of the course of equithermal curves (zero shift)



Example of the course of selected curves during correction of the shift

2.4.4 Operation of the boiler using built-in equithermal regulation

After ensuring "full value" equithermal regulation (including setting the time programmes, etc.) it is recommended to use intelligent programmable regulator CR 04, resp. PT 59, which regularly communicates with the microprocessor of the automatic boiler system. There is the transfer of information not only about the required temperature of the heating system depending on the spatial and outside temperature, but also the display of operating information about the boiler (work regime, performance, temperatures, possible failures, etc.). This system is characterized by many adjustable and displayed parameters for optimal control of the heating equipment with modulation of the boiler output.



The mentioned ad-in regulators are not (with the exception of short-term special offers) included in the delivery of the boiler!

2.4.5 Heating of utility water (DHW)

Boilers THERM 24 KDCN and KDZN are adapted to heat water using the flow method or for heating by an external or built-in indirect storage tank.

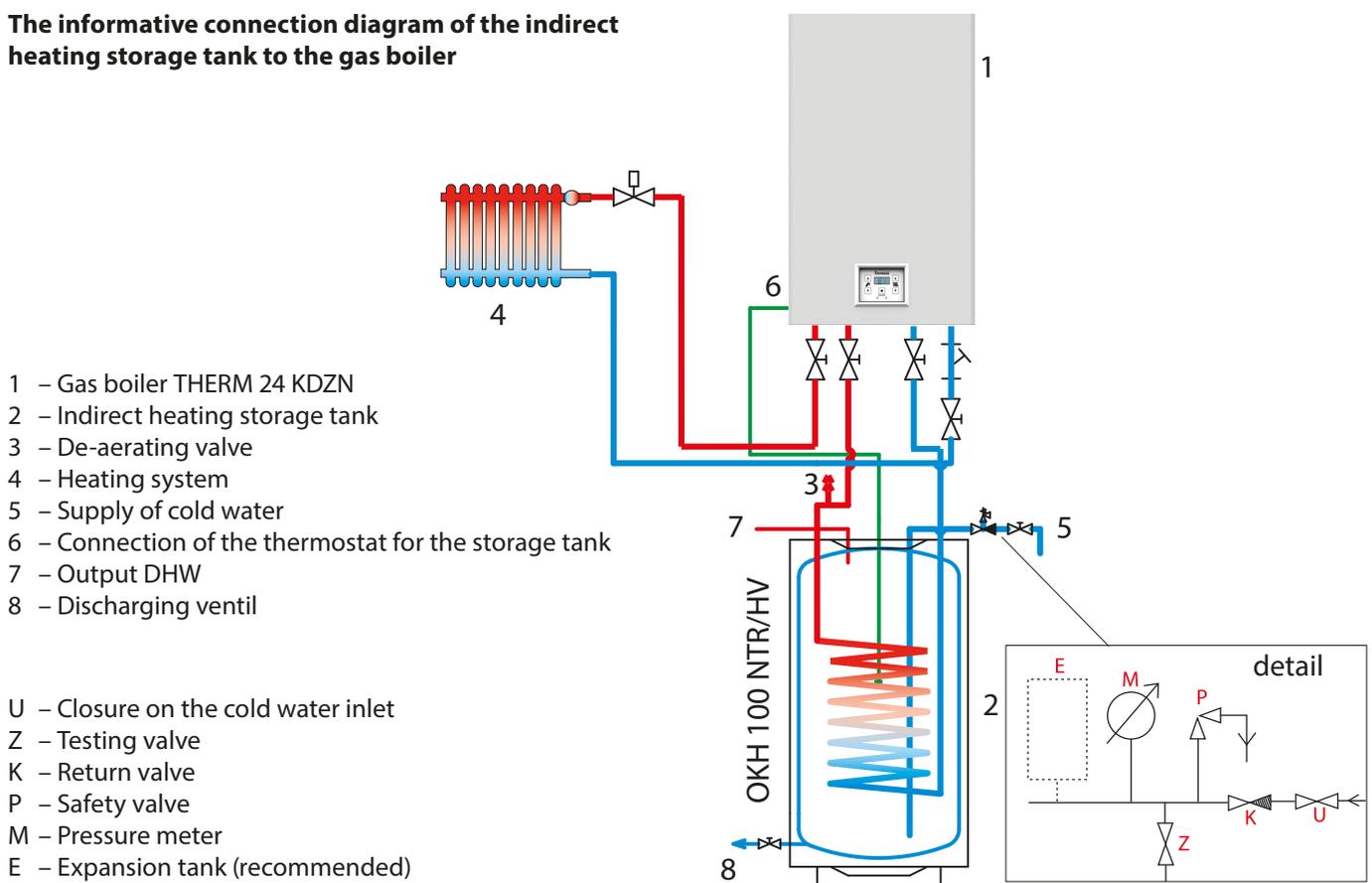
2.4.5.1 Reservoir heating of DHW – DESCRIPTION OF ACTIVITY (KDZN boiler)

In the case that the reservoir sensor or thermostat ascertains the decreased temperature of water, the working phase for heating the reservoir starts. Re-setting of three-way valve (within the time interval of 8 seconds), the pump is activated. After the sequence for the inspection of security elements, the ignition of the burner is enabled.

From detecting the presence of the flame, the starting output of the boiler is kept for 2 seconds and then there is the phase of fluent modulation of the output with PID regulation with the stated value of the temperature of heating of 80 °C. During the whole time of heating, the limits of the regulation of the output temperature are checked. In the case of any increase above 85 °C the burning is stopped and circulating pump remains active. The re-ignition occurs when the temperature drops. The working phase in the water heating regime is terminated by reaching the required water temperature.

This is followed by stopping the burning and then there is the additional cooling of the exchanger with the time function for the running of the circulating pump. After termination and stopping of the pump, there is switching of the three-way valve and resetting is activated. The time for resetting the three-way valve is treated by the time function for blocking the activity of the boiler for 8 seconds. Only then, can the requested heating of the heating system be run.

The informative connection diagram of the indirect heating storage tank to the gas boiler



2.4.5.2 Flow heating DHW – DESCRIPTION OF ACTIVITY (KDCN boiler)

The working phase of this boiler regime starts upon switching on the flow switch for hot water DHW. Consequently, the technician changes the position of the three-way valve; the ventilator is activated; the running of the circulation pump is activated; the ignition process is activated. The boiler is ignited for starting the output and consequently the output of the boiler is increased to the maximum in order to achieve as quickly as possible the required output temperature of the water. This temperature is kept by PID regulation of the output. Ten seconds after termination of taking DHW, the pump will stop.



In the case of parallel requests, the water heating regime takes priority over the heating of the heating system.

2.5 Selected protective and additional functions of the boiler

! Notification: All the above-mentioned security and registered functions, includes anti-freeze for protection of the boiler, are in activity only if the boiler is connected to the electricity!

Anti-blocking functions

After 24 hours of inactivity, the pump runs for 30 seconds to prevent any blocking. In the case of a request for heating (heating or hot water) during the execution of this function, the anti-blocking function is automatically terminated and the request runs. The anti-blocking function is also active when blocking the activity of the boiler in the position of the driver in the mode "OFF" (if the boiler is still connected to the electricity network).

Anti-freeze protection of boiler

The boiler is fitted with an anti-freeze protection system which protects the boiler against freezing. Anti-freeze protection is activated in the case of a decrease of the temperature in the boiler under 6 °C. The pump is activated, the boiler is ignited and heats the heating circuit with a minimum output of 15 °C. The burning is stopped at this temperature and the pump continues running during the function for running the pump. If the boiler is in the status for blocking burning (failure), only the pump is activated. The anti-freeze function is also active in the position "OFF" or in "SUMMER MODE".

Anti-freeze for the reservoir (only the KDZN version when reading the temperature of the water by sensor)

Anti-freeze protection of the reservoir protects water reservoir (no distribution of hot water) against freezing. The anti-freeze protection of the reservoir is activated in the case of a decrease in the temperature of water in the reservoir below 8°C. The pump is activated so the boiler heats the reservoir after reaching the temperature of 10°C.

Anti-Cyclic

The function that prevents the cycling of the boiler in the heating regime when in the case of operating disconnection of the boiler, re-ignition of the boiler is not permitted before expiration of the adjusted, anti-cycling time (5 minutes are set in the production). This function is mostly used in such heating systems where the maximum thermal loss of the stated object corresponds to the lowest limit of the power range of the boiler.

! The anti-cycling time within the range 010 minutes can be only be changed by an authorized service technician!

Run-out of the ventilator

After termination of the requirement for heating the water, the pump continues in operation during the adjusted run-out of the pump. The run-out of the pump is set for 1 minute after the termination of heating; 30 s after the termination of heating of water for the KDCN version and 1 min. after termination of heating of water for the KDZN version. In the case that in the winter regime the boiler is operated without the room thermostat, the pump continues to be ON.

! Change to the run-out of the pump within the range 0 - 10 minutes may only be made by an authorized service technician.

Run-out of the ventilator

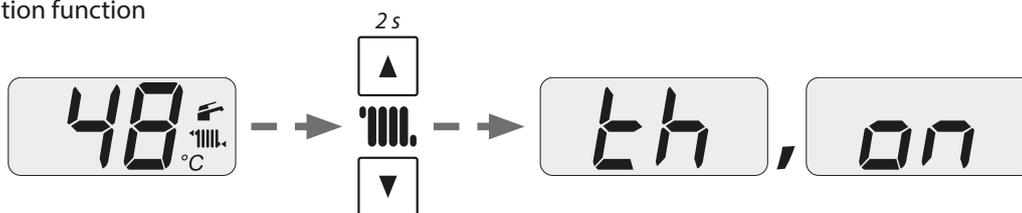
After termination of burning, the ventilator is in operation for 30 seconds while keeping the revolutions corresponding to the starting output (taking the remaining of burnt gases from the combustion chamber).

Antilegionella function (only for the KDZN version for reading the temperature of the water by the sensor)

The function is activated once the measured water temperature in the reservoir falls below the adjusted limit value and does not exceed it during the measured time section (two or three days). In the case of activation, the reservoir is automatically heated to 60 °C; the function is deactivated. The function is deactivated from production; activation can be done in the boiler service menu.

Forced heating function – enables to manually activate or deactivate the heating regime for 24 hours.

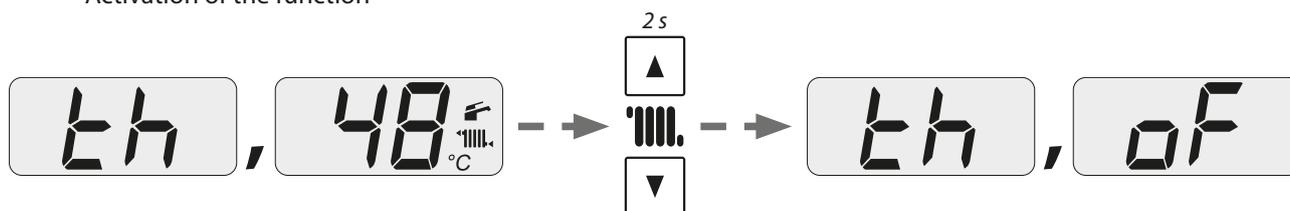
Activation function



When activating the function, the symbol for the “th” function and the actual temperature of the heating water are alternatively shown on the display. The function is automatically deactivated after 24 h.

Immediate disconnection is as follows:

Activation of the function

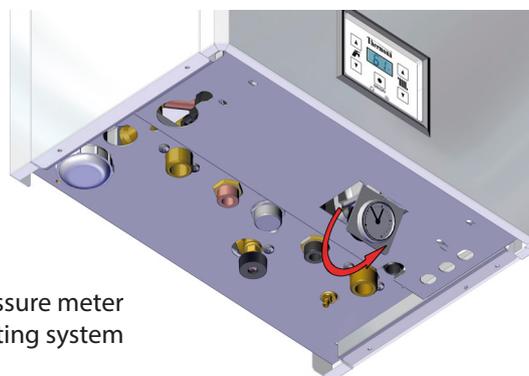


With respect to the request for increased checking of the microprocessor once every 24 hours of operation, the forced reset of electronic system is performed with the consequent initialization (it is reflected by short-term interruption of the boiler and deactivation of data on the display similarly as during the activation of the network inlet of the boiler into the socket).

2.6 Maintenance and service

Regular maintenance is very important for reliable operation, to achieve a long service life, and efficient combustion. The owner or the operator of the gas boiler must according to the Regulation of the ČÚBP and ČBU No. 21/1979 Coll., and ČSN 386405 ensure annual inspection by a service organization. The service organization will for example, inspect the control and security elements of the boiler, inspect the tightness of the gas and water distribution or the cleaning of the burner and the exchanger of burnt dust particles, etc.

For error-free operation of the heating system, it is also necessary to regularly inspect the initial water pressure in a cold condition. In the case of a decrease of pressure below 0.8 bar, it is necessary to additionally fill the heating system. The actual pressure of the heating system can be read from the pressure meter located on the lower side of the boiler.



Location of the pressure meter of the heating system

The external cladding of the boiler can be cleaned with a wet cloth with mild domestic detergent. Do not use detergents on the basis of sand and solvents as these could cause irreversible damage to the paintwork.



The pressure meter can be swivelled out for better reading by pulling the retaining plate.

2.6.1 Additionally filling the heating system

Additional filling into the heating system (additional pressurizing of the system) can be done through the filling valve which is directly integrated on the boiler. Water for filling must fulfil certain parameters, see chapter 3.8.

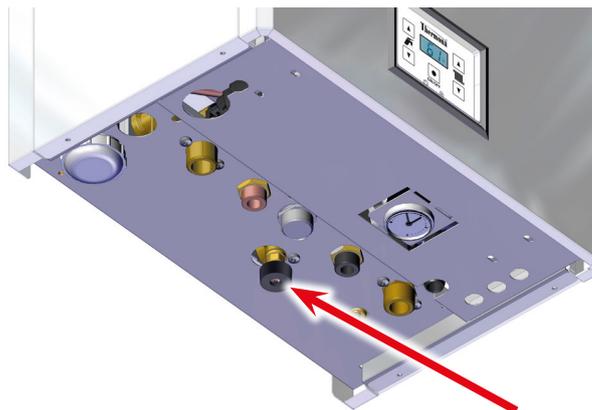
Manometer – displays the measured water pressure in the heating system

During additional filling it is necessary to take the following conditions into consideration

- a) the pressure of utility water supplied into the boiler must be higher than the water pressure in the heating system (otherwise the heating water can flow back to the water mains!)
- b) the additional filling of water is necessary to be done exclusively under a cold status (the temperature of the heating water in the boiler is a maximum of up to 35 °C)

Procedure for additionally filling the heating system with water

1. Disconnect the boiler from electrical voltage
2. Slowly open the valve for additional filling and monitor manometer in the bottom part of the boiler.
3. Set the system pressure to the necessary value (according to the heating system, recommended 1.0 – 1.5 bar)
4. Close the valve for additional filling
5. Connect the boiler to the electricity network and connect the boiler again



2.7 Warranty and warranty terms

The producer is not liable for any mechanical damage to individual components by rough handling, for damage caused by unprofessional intervention into the electronic system during the adjustment and connection of the add-in regulation, for damages caused by the use of other parts and components than the original components used by the producer.

The warranty is also not applicable to defects caused by non compliance with the binding notifications and terms stated in individual parts of this manual.

The warranty is not applicable to non-standardized relations in distribution networks (variation of electrical voltage – in particular voltage peaks, pressure and cleanliness of gas, etc.), defects to equipment outside the boiler that influence activity, improper collection of burnt gases, dirt in the combustion air, damage from outside influences, mechanical damage, storage, transport and defects originated by natural disasters.

In such cases the service organisation may require that the client pays for the repair.

THERMONA Ltd provides a warranty according to the stated in the Warranty Certificate delivered with the product.

Terms for application of the warranty

1. Regular, 1x per year, inspection of the gas boiler. Inspections must only be performed by an authorized organisation, i.e. contractual service. The list of service centres is attached to each boiler. The actual list of service centres is available from www.thermona.cz
2. Documentation for all records of warranty repairs and annual inspections of boilers is in the appendix to this manual.
3. Submitting completed and confirmed warranty certificate and protocol on commissioning into the operation of THERM products

3. INSTALLATION MANUAL

3.1 Basic instructions for assembly of the boiler

Hanging condensing boilers THERM series are designed for operation in standard hot-water heating systems.

Assembly must only be performed by a qualified professional company and it is necessary to pay attention to all advice and notifications contained in this manual. Assembly must be in accordance with valid standards and regulations – see ČSN EN 1775, ČSN 38 6462, ČSN 33 2000 – 7 – 701 ed.2, ČSN 06 1008, ČSN 73 4201, TPG 704 01, TPG 800 02, TPG 908 02, Regulation No. 48/1982 Coll.

Before installing the boiler the assembly company is obliged to check

- the type of the boiler corresponds to the ordered boiler
- the selection of the boiler is correct for the stated use (type of gas, heating system, collection of smoke, air suction)
- the delivery is complete

3.2 Complete character of the delivery

THERM hanging boilers are delivered fully assembled. All parts of the boiler are checked and set by the producer before assembly. Each boiler is tested for leakage of the water circuit, leakage of the gas circuit and the regulating and protection parts are set and tested.

The standard delivery of the boiler includes

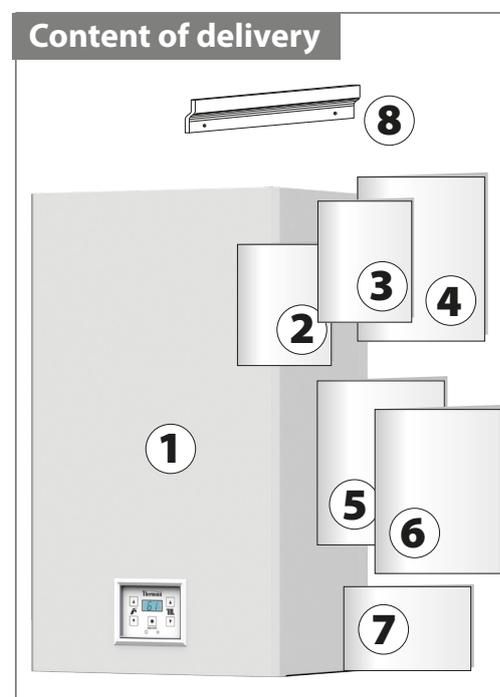
1. Boiler
2. Manual for installation, service and maintenance of boiler
3. Service network
4. Warranty certificate (3 copies)
5. Protocol on the commissioning of THERM products into operation
6. Application for registration into the prolonged warranty programme
7. Confirmation of completing 1. and 2. service inspection
8. Hanging bar, including fixation elements

Accessories

Necessary accessories (collection of gases, regulation, outside sensor, etc.) can be ordered on request. Detailed information can be found in the catalogue of products and accessories or at www.thermona.cz.

To collect smoke in the turbo variant, it is necessary to exclusively use equipment to collect gases delivered by the producer of the boiler. Only by doing this will the boiler report the stated parameters for burning, output, efficiency, etc.

In the case of any doubt or inquiries, contact the producer or supplier before assembly.

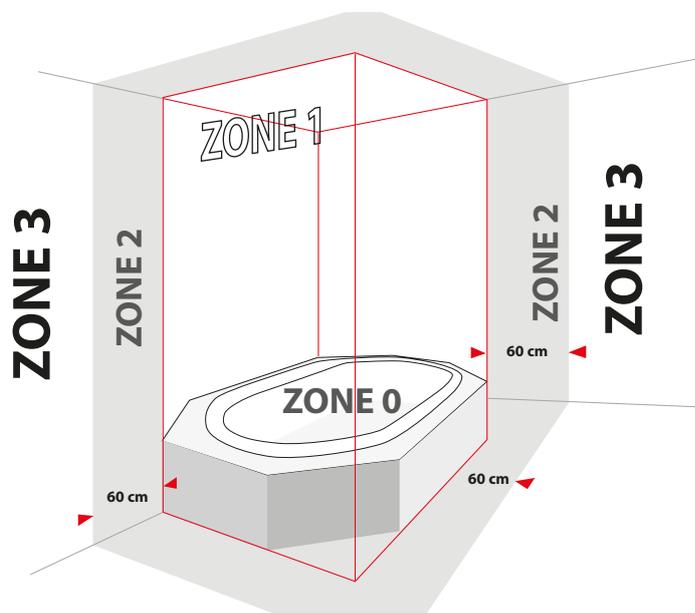
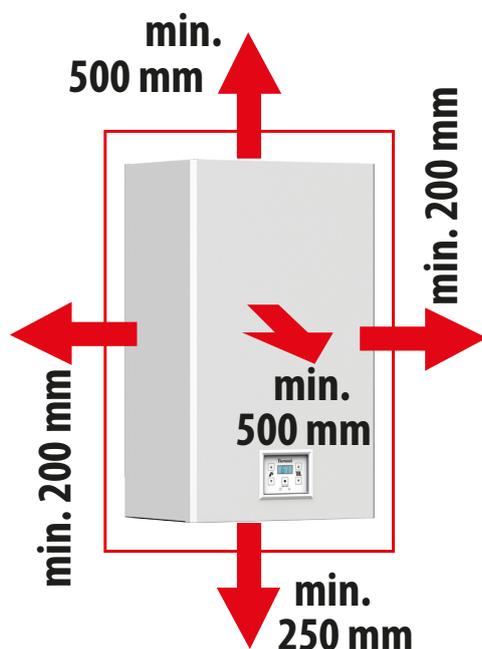


3.3 Location of the boiler

The condensing boilers THERM can be installed in the basic AA5/AB5 environment according to ČSN 33 2000-3 and ČSN 33-2000-5-51 ed. 3 (range of temperature +5 to 40°C, moisture depending on the temperature up to a maximum of 85 %, without harmful chemical influences). The combustion air must not contain halogen-hydrocarbons and vapours from aggressive substances, and must not have high moisture and dust levels.

Boilers can be installed in residential and non-residential premises (the noise fulfils Ministry of Health Regulation No.13/1977 Coll.).

The hanging condensing boilers THERM **must not be** installed in premises with bath-tubs, bathrooms, washing areas and special zones 0, 1 and 2 according to ČSN 33 2000-7-701 ed. 2: 2007 and in washing area according to ČSN 33 2130 ed.2: 2009. The coverage of electrical parts is IP 41 (D) and fulfils the conditions for resistance against vertically dropping water – possible location also in premises with wash-tubs or shower in zone 3 again according to ČSN 33 2000-7-701 ed.2: 2007. If the boiler is installed in the respective zones, additional protection must be implemented – additional protective connection of all conductive parts according to Article 701.415.2 ČSN 33 2000-7-701 ed.2: 2007 and Article 415.2 ČSN 33 2000-4-41 ed.2: 2007. The place of installation must be selected to be able to have access in the case of operation and service inspection. The recommended distances are shown in the following diagrams.



Notice

Items pursuant to ČSN 06 1008 must not be located near the contour of the boiler (classified according to ČSN EN 13501-1+A1:2010) to the smaller distance as: **100 mm** from materials B – easily flammable, C1 – heavy flammable or C2 – medium flammable **200 mm** from materials C3 – light flammable (e.g. wood-fibre boards, cellulose substances, polyurethane, polystyrene, polyethylene, PVC, etc.)

The safe distance between flammable items and the boiler is 50 mm; from the chimney flue and the control hole 200 mm. Flammable items must not be located at lower distances. The wall on which the boiler will be suspended must be constructed from fire-proof material.

Before starting work that may cause a change of the environment in the area of the installed boiler (e.g. work with painting substances, glues, etc.), it is necessary to disconnect the boiler using the regime switch (position with the pointer on "0") and to disconnect it from the electricity network (remove the network fork from the socket).

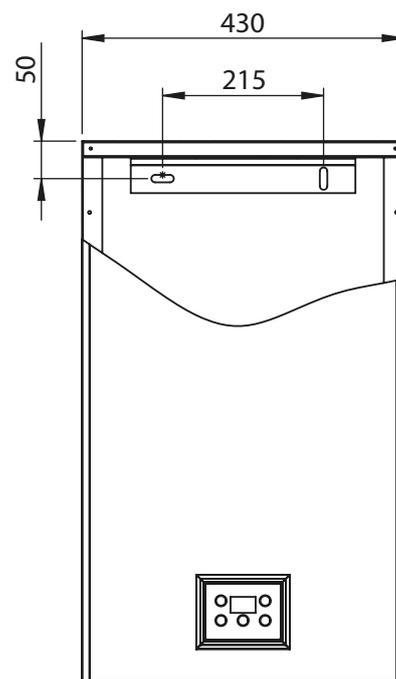
3.4 Suspending the boiler

THERM hanging boilers in the 24 KDN, KDZN and KDCN series are suspended on the wall by the suspension bar delivered with the boiler according to the diagram.

Procedure for suspending the boiler

1. Consistently measure the position of the suspension of the boiler (according to the diagram with the dimensions)
2. Position the suspension bar on the required place and using a spirit level, balance the bar
3. Mark with a pencil the points where holes will be drilled
4. Remove the bar and using a $\varnothing 10$ mm drill, drill the necessary holes
5. Insert dowels into the hole and consequently secure it using the attached bolts
6. Suspend the boiler on the bar
7. Install piping for the exhaustion of burnt gases and the air supply. Fill the space between the piping and the hole in the wall with fireproof material (remember to keep it dismountable for smoke collection).

In the case of installation on a wall with lower load-bearing capacity, it is recommended to consult the installation with a service technician. Around the boiler, due to service inspection or potential service intervention, leave a manipulation area so to be able to easily work with your hands around the boiler using standard hand held tools.

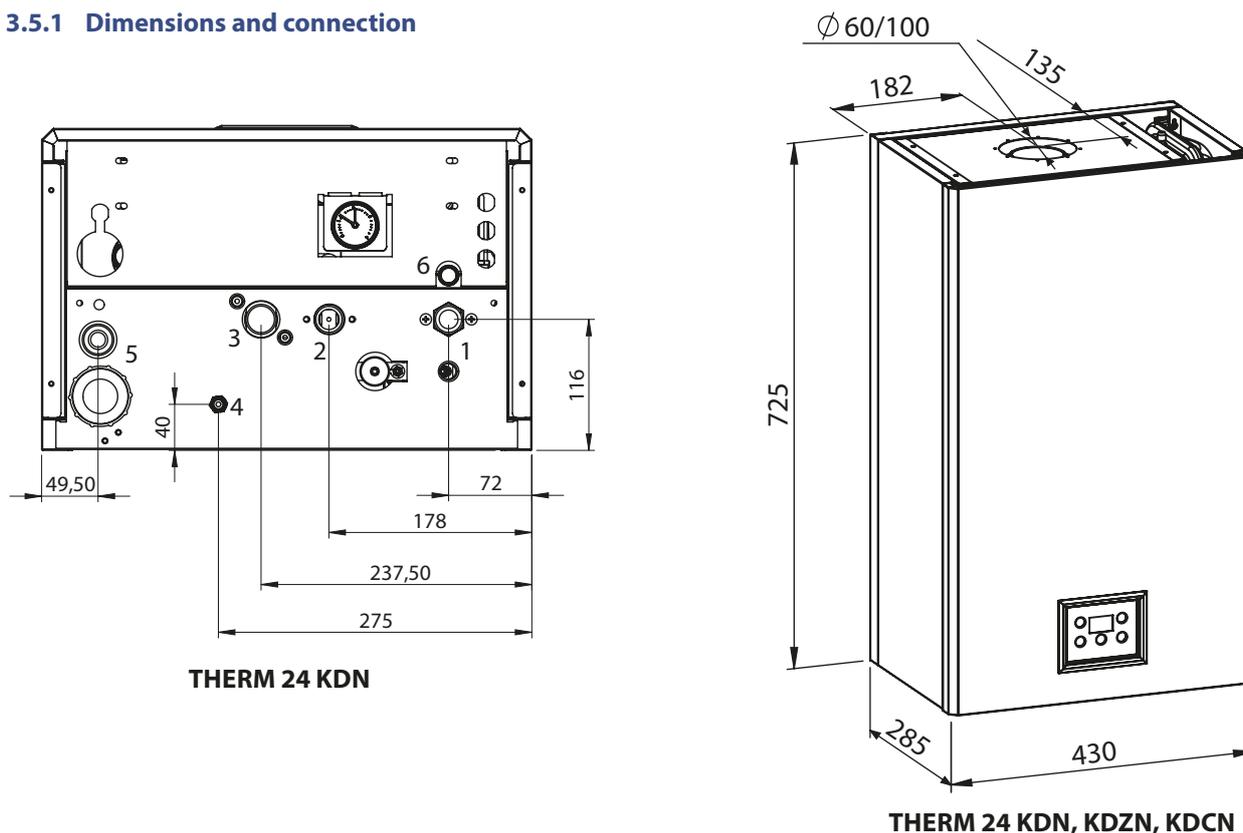


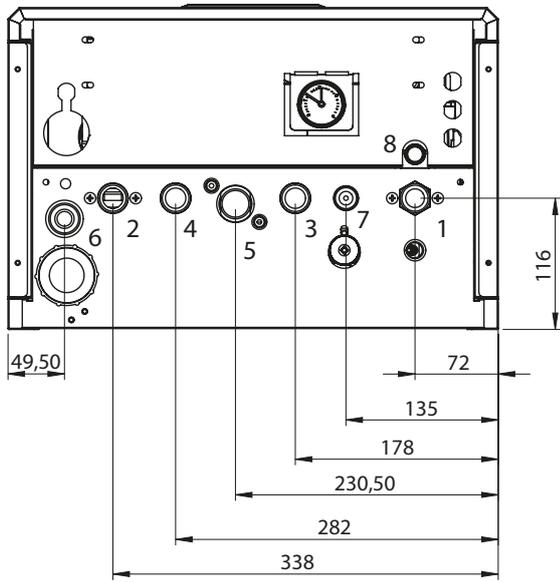
3.5 Connecting the boiler to the hot-water system

The boilers must be connected to the heating system in such a manner that the power fittings do not stress the connecting outlets of the boiler and there is no aeration.

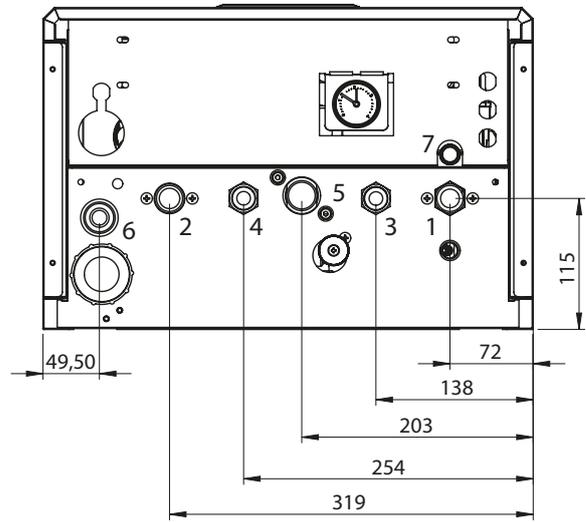
As it concerns a heat-water flow boiler fitted with its own pump, it is necessary to resolve the connection to the heating system in relation to the calculations of the hydraulic relations of the whole system. Due to the optimal use of the condensing regime of the boiler, it is recommended to design heating systems for low temperatures ($\Delta t = 50/30$ °C). The minimum overpressure of the system is 0.8 bar. We recommend using the pressure of the heating water in the system within the range 1.0 – 1.5 bar.

3.5.1 Dimensions and connection





THERM 24 KDZN

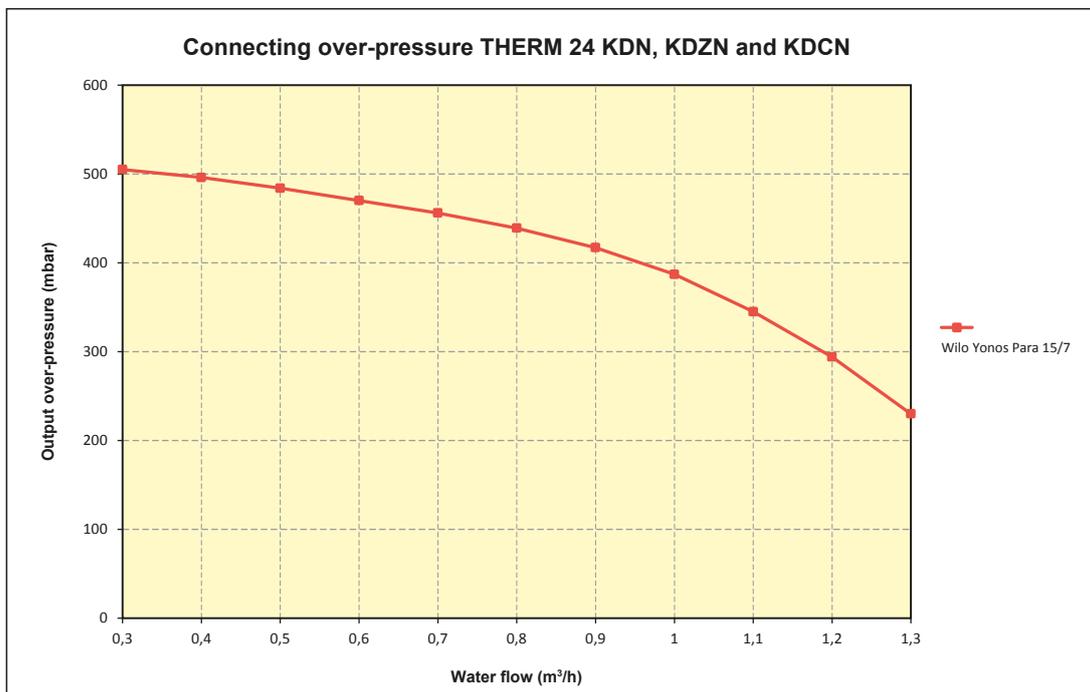


THERM 24 KDCN

BOILER CONNECTION	BOILER MODEL				
	UNIT	TYPE OF THREAD	THERM 24 KDN	THERM 24 KDZN	THERM 24 KDCN
Input for returned water	G 3/4"	outside	1	1	1
Output for heating water	G 3/4"	outside	2	2	2
Input for gas	G 3/4"	outside	3	5	5
Output safety valve			6	8	7
Condensate outlet			5	6	6
Input for returned water from tank	G 3/4"	outside	-	3	-
Output for heating water into tank	G 3/4"	outside	-	4	-
Input for utility water	G 1/2"	outside	-	-	3
Output for utility water	G 1/2"	outside	-	-	4
Input for additional filling	G 1/2"	outside	4	7	-

3.5.2 Graphs of the connecting overpressures of heating water (on the output for heating water)

Notice The curves of the connecting over-pressures of heating water are designed for **Wilо Yonos PARA 15/7** pumps for the outside regulation stage.





The piping system must be located to prevent the origination of air bubbles with the aim to make de-aeration easy. The de-aerating elements should be mounted on all the highest located parts of the heating system and also on all heating bodies.

Before testing and commissioning, according to ČSN 06 0310, the assembly must include perfect flushing of the heating system up to fully clean status. To prevent the penetration of dirt into the boiler system, the entrance of the return water from the heating system into the boiler must be fitted with a suitable filter and sludge separator. It is necessary to clean and inspect the filter and sludge separator in regular intervals.

The heating system must be implemented in accordance with ČSN 06 0830 – Heating systems in buildings – Security equipment and with ČSN 06 0310 – Heating systems in buildings – Design and assembly.



The producer requires

- **mount into the slides of the pump filter and de-sludge equipment**
- **mount a bypass valve in heating systems with thermostatic valves**
- **install the valve in the lowest point of the system near the boiler for filling and discharging the heat-carrying medium from the heating system and for sludge separation**
- **mount de-aerating equipment on the output of the boiler and on the top point of the heating system**



The producer recommends

- **to fill the system with soft water according to ČSN 07 7401**
- **to separate the boiler on the input and output with a stop valve (see ČSN 06 0830), so in the case of inspection, repair of the boiler or cleaning of the filter, it is not necessary to discharge the whole system**

3.5.3 Expansion tank

THERM condensing boilers are fitted as standard with the integrated expansion vessel for the heating system with the volume of 7l. The volume of the expansion tank is in most CASE, sufficient to cover the expansion of heating water in standard heating systems with plate heating bodies. In some older heating systems with a large volume of heating water, it is necessary to mount an additional expansion vessel.

3.5.4 Using anti-freeze mixtures

It is not recommended to fill heating systems with anti-freeze mixtures due to their properties. This generally concerns the decrease of the delivery of heat, large volume expansion, ageing and damage to the rubber parts of the boiler.

3.5.5 Safety valve

In the lower part of the boiler is a safety valve. When operating the boiler, under certain circumstances, there can be penetration of water or escape of steam from the safety valve. Due to this reason it is recommended to install on the output of the safety valve suitable leakage which will terminate into the waste system.



Under no circumstances is it permitted to manipulate with the safety valve during operation of the boiler!

3.6 Connection of boiler THERM 24 KDCN boiler to the distribution of service water

The quality of the water in the hot water circuit has a significant influence on the possibility of blocking the plate exchanger of boiler. Therefore, it must fulfil the quality parameters according to the Regulation Ministry of Health 376/2000 Coll. (drinking water), in particular concerning indexes of the hardness (sum of substance concentrations of calcium and magnesium < 2.5 mmol/l). In the case of any doubt or unverified parameters (own wells), it is recommended to use automatic dosing equipment for water treatment.

3.7 Connection of the boiler to the gas distribution

! Before connection of gas, it is necessary to perform inspection whether connecting conditions (connecting gas pressure, type of gas, etc.) correspond to terms approved for this type of the boiler.

The boiler must only be connected to gas by an authorized firm according to ČUBP Regulation and ČBU 21/1979 Coll. (as amended by Regulation 554/1990 Coll.) by employees with the qualification according to FMPE Regulation 175/1975 Coll. (as amended by FMPE Regulation 18/1986 Coll.) and according to the approved documentation for gas installation. It is not necessary to install the gas regulator before the boiler. It is contained in the compounded gas fitting which is part of the boiler. In the boiler input there must be a ball valve with the respective attestation for gas. The gas closure must be freely accessible. The boiler is designed for operation with natural gas with the heating capacity 9 – 10,5 kWh/m³ and the nominal pressure in the 20 mbar distribution network and also (after necessary modifications) with propane with nominal pressure in the 37 mbar distribution network.

3.7.1 Conversion to other fuels

When changing the gas during the reconstruction of the boiler, the gas curtain, which is located in the threading between the gas output from the gas fitting and the mixer must be changed. In addition, it is necessary to inspect or change the setting the respective parallel mixing parameters on the gas fitting. The volume of CO₂ in burnt gases is set within the minimum and maximum range of the output of the boiler according to the burnt gas analysers. These activities must only be carried out by a trained service employee authorised by the manufacturer. After the adjustment of the boiler, the units for the default setting must be secured against unauthorized intervention. The manufacturer is not liable for any damage caused by unqualified setting.

! After the termination of the assembly of the gas lines to the boiler, it is necessary to consistently check the tightness of all joints!

3.8 Filling and discharging of the heating system

When filling the heating system the boiler must be disconnected from the electricity network by disconnecting the fork from the socket. Filling must be done slowly so that the air can flow through the respective de-aerating valves. The water for the first filling and for additional filling must be according to ČSN 07 7401 clear, without colour, without suspended substances, oil and chemically aggressive ingredients, must not be acid (pH must not be lower than 7), with minimum carbonate hardness (max. 3.5 mval/l). For modification of the hardness, it is necessary to use preparations approved by producer.

3.8.1 Procedure for filling the heating system

1. check and adjust the pressure in the expansion vessel according to the stated static pressure in the system.
2. open the charging valve of the heating system and on the manometr monitor the increasing pressure in the heating system
3. After filling the heating system, the pressure should be within the range 1.0 – 1.5 bar
4. carefully de-aerate all radiators (during the circulation of water no air bubbles should be heard)
5. check the water pressure in the system again – after de-aeration it will probably be to pressurize the heating system
6. check that the de-aerating valves on the heating bodies are closed, automatic de-aerating valves in the boiler will remain slightly opened!

If these requirements are not fulfilled, the warranty for damaged components will no be applicable.

3.8.2 Additional filling of water into the heating system

The additional filling of water into the system is described in the Chapter "Maintenance and Service" and in the „User Manual“part.

3.8.3 Discharging of water from the heating system

The full discharging of water from the whole heating system must be resolved by the system discharging valve located in the lowest point of the heating system.

3.9 Condensate outlet

The boiler is fitted with an odour closure (siphon), which must be flooded before running the boiler with about 100 ml of water. Firstly, it is necessary to connect neutralizing equipment to the outlet for the condensate and then to discharge the condensate to the sewerage piping. The discharging of the condensate into the sewerage piping is governed by national or regional (local) regulations.

The collection piping must have a minimum declination of 5° from the boiler into the sewerage piping and must not be blocked (in the case of blocking the collection of the condensate, there is resonance of the combustion chamber of the boiler chamber).

Condensate analysis

Ingredient	Unit of measure	Value
NO ₂	mg.l ⁻¹	< 0,01
Copper (Cu)	mg.l ⁻¹	< 0,13
Lead (Pb)	mg.l ⁻¹	< 0,0066
Cadmium (Cd)	mg.l ⁻¹	< 0,0001
Zinc (Zn)	mg.l ⁻¹	0.253

Pointer	Value
pH	4.1

3.10 Design of gas exhaust

The exhaust for burnt gases of these types of boilers must be designed by means of the certificate smoke collection system delivered by the producer. From the viewpoint of checking the route for burnt gases, it is necessary to ensure that the exhaust for burnt gases has a suitable revision hole. The exhaust for burnt gases and any connection to the chimney must be in accordance with ČSN 734201. The actual performance of the exhaust for burnt gases must be designed and prepared in the project for the connection of the boiler while respecting the standard rules for collection of condensate. The horizontal piping must be installed with the slope 2° from the terminal unit in the direction from the boiler to prevent any escape of the condensate (and possible freezing) from the terminal unit of the exhaust into the surroundings.

For THERM condensing boilers, the following methods for the collection of burnt gases are approved

- coaxial smoke collection tube with a diameter of 60/100 mm
- coaxial smoke collection tube with a diameter of 80/125 mm
- separate smoke collection tube with a diameter of 2 x 80 mm

Permitted maximum lengths of smoke collection tube

Diameter of the smoke collection tube	Max. length - horizontally	Max. length - vertically
60/100 mm	6 m	6 m
80/125 mm	11 m	11 m
2 x 80 mm	11 m + 11 m (suction + exhaust)	11 m + 11 m (suction + exhaust)

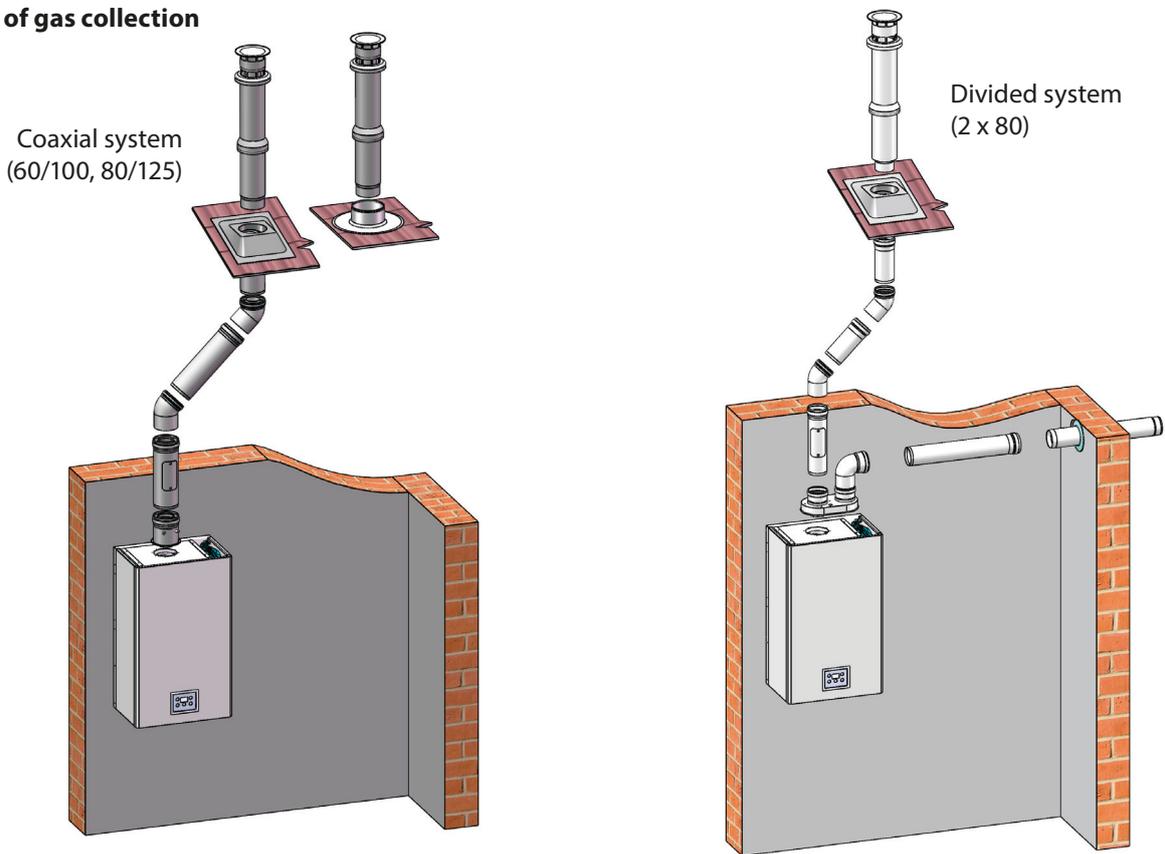
Minimum length of smoke collection is 1 m. The first knee in the case of horizontal smoke collection is included into the maximum length of smoke collection. The second and subsequent further knees shorten the maximum length by:

- 0,5 m - knee 45°
- 0,75 m - knee 90°



The maximum total pressure loss of gas collection is 95 Pa.

Example of gas collection



3.11 Connection of the boiler to the storage tank

The THERM 24 KDZN boiler (after expansion by the three-way valve and in the version only for heating – THERM 24 KDN) may be reliably and efficiently resolved together with the heating for the heating system and heating of water (DHW). The principle for heating water is described in detail in Chapter 2.4.5.1.



The output of the boiler to which the water storage tank is connected, should correspond to the nominal output of the heating insert or heat exchange of the surface in the storage tank. In the case of over-sizing of the boiler related to the heating insert, there is overheating of heating water in the stated circuit and consequent cycling of the boiler. This phenomenon closely relates to the increased consumption of gas.

3.12 Connection of the boiler to the electricity network

Boilers are fitted with a three-conductor supply cord with an unseparated fork according to ČSN 34 0350 ed.2: 2009. The connection to the network is performed pursuant to the requirement of Article 25.1 ČSN EN 60335-1 ed.3: 2012. into the network socket located at the boiler. The socket must fulfil the following requirements: must fulfil protection against the hazardous contact of non-live parts in TN networks TN (formerly called zeroing) or in TT network (formerly called grounding) and the connection must be made according to **ČSN 33 2180** so that the protective pin is on the top and the middle or zero conductor is connected (front view) to the right hollows. The network voltage must be $230\text{ V} \pm 10\%$. Boilers have an M8 bolt where it is necessary to connect the grounding conductor – make the protective connection.



The installation of the socket, connection of the room thermostat and the service of the electrical part of the boiler must only be carried out by person with the respective professional electro-technical qualification according to the Regulation No. 50/1978 Coll..

3.12.1 Connection of the room thermostat

To control the boiler by the room thermostat, only such a thermostat that has voltage-free contact can be used, i.e. no other voltage is supplied into the boiler.

It is necessary to connect the room thermostat to the boiler by a two-core conductor. The recommended cross-section for connection of the room thermostat for a copper conductor (wire) is from 0.5 to 1.0 mm².

The terminal board for connection of the room thermostat is located under the connecting module inside the control panel of the boiler - terminal RT (see electric diagram of the boiler). It is equipped in production with an interconnecting unit. The interconnecting unit is removed only when connecting the room thermostat! The terminal board is accessible after removing the outside cover, tilting and consequent dismantling of the rear part of the control panel.

3.12.2 Connection of a room regulator with OpenTherm+ communication

The intelligent room regulator is connected similarly as the connection of the traditional spatial thermostat- to the connecting module (terminal OT+). The regulator is connected to the same terminal. It is not possible to connect two types of regulators at the same time!

Technical recommendation during the connection of the regulator with OpenTherm+ communication with the boiler

The connecting cable supplies the regulator for the transfer of the signal of the mutual communication by the protocol OpenTherm+ between the automatic system of the boiler and the regulator.

Number of conductors in the line :	2
Maximum length of the line :	50 metres
Maximum resistance of the line :	2 x 5 Ohm
Polarity :	non polarized connection (conductors can be exchanged)



To prevent the resolution of the communication, it is necessary to use a pair or a shielded pair of conductors! The connecting cable must not run in parallel or cross the power lines! The cable shielding must be mutually interconnected and grounded to the fasten grounding to the automatic boiler system (the shielding must not be grounded to the body in several places!). For example, a SYKFY cable is recommended.

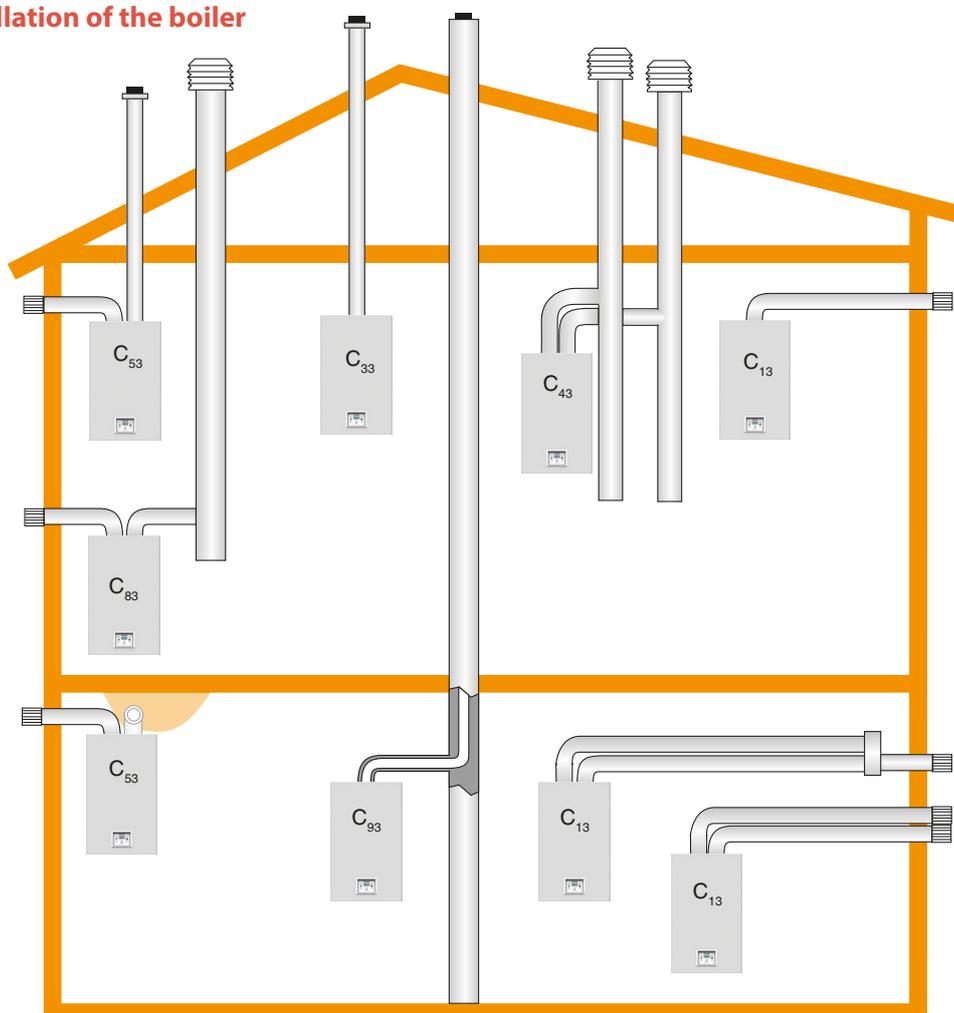
3.13 Variants for the installation of the boiler

Construction:

C₁₃ - axial horizontal variant with termination to the peripheral wall. The piping can be double, the termination is either concentric or closely located (location inside the square with the side 50 cm), so it is affected by the same atmospheric conditions.

C₃₃ - Coaxial vertical variant with termination on the roof. The piping can be double, the termination is either concentric or closely located (location inside the square with the side 50 cm and the distance between the areas of two holes must be less than 50 cm) so it is affected by the same atmospheric conditions.

C₄₃ - Separated connection to two pipes of the common shaft. The termination of shafts is either concentric or closely located (location inside the square with the side 50 cm), so that it is affected by the same atmospheric conditions.



C₅₃ - Separated pipe with termination to the peripheral wall or on the roof, in different pressure zones, but under no circumstances to two opposite peripheral walls.

C₈₃ - Separated connection with the collection of burnt gases from a separate or common chimney. Supply for the combustion gas is from the peripheral wall.

C₉₃ - The piping for the supply of all burnt gas is the existing vertical piping in the building, e.g. reconstructed chimney.

4. ADDITIONAL INFORMATION FOR SERVICE

4.1 Gas fitting SIT 848 SIGMA - setting

SIT 848 SIGMA is gas fitting with the proportional regulation air / gas. It is fitted with two solenoid valves for blocking the passing gas during any inactivity of the boiler. The regulating system works depending on the feedback signal of the gas pressure from the mixer. In addition to closable measuring adapters for the input, output and medium gas pressure, there are elements for setting the correct ratio of air – gas within the whole range of the regulation of the output of the boiler.

1. Setting the start of regulation

It is done using the plastic bolt in the extension of the regulation system by the auxiliary membrane. The bolt can be accessed after unscrewing the protective brass cover. Set here the ratio of the mixture at the minimum output of the boiler (i.e. with setting of minimum revolutions of the ventilator). The volume of gas in the mixture is increased by screwing the bolt.

2. Setting the ratio air / gas

This is done by the regulation bolt for the gas valve on the output of the gas valve. Set here the ratio of the mixture at the maximum output of the boiler (i.e. with setting of maximum revolutions of the ventilator). The volume of gas in the mixture is reduced by screwing the bolt.

Setting and adjustment the parameters of the gas fitting, i.e. regulation starting and setting the ratio of the mixture is performed by a service technician during activation of the boiler and during each annual inspection of the boiler. The boiler must be adjusted by the burnt gases analyser!

Stated setting values

Fuel: Natural gas Group H

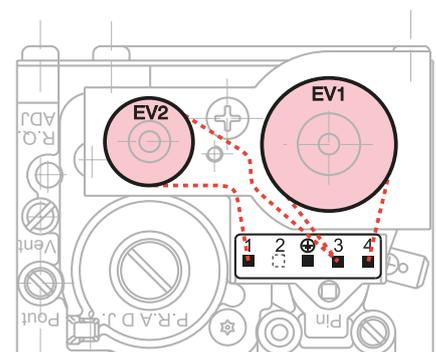
Diameter of the curtain [mm]	Parameter	Value of parameter	Shows on the display	Output [kW]	Revolutions of the ventilator [rpm]	CO ₂ [%]	O ₂ [%]
5.85	9	04	dP	24.0	5200	8,8 - 9,0	5,5 - 5,1
5.85	9	02	hP	4,9 (4,7)	1236	8,6 - 8,8	5,5 - 5,1

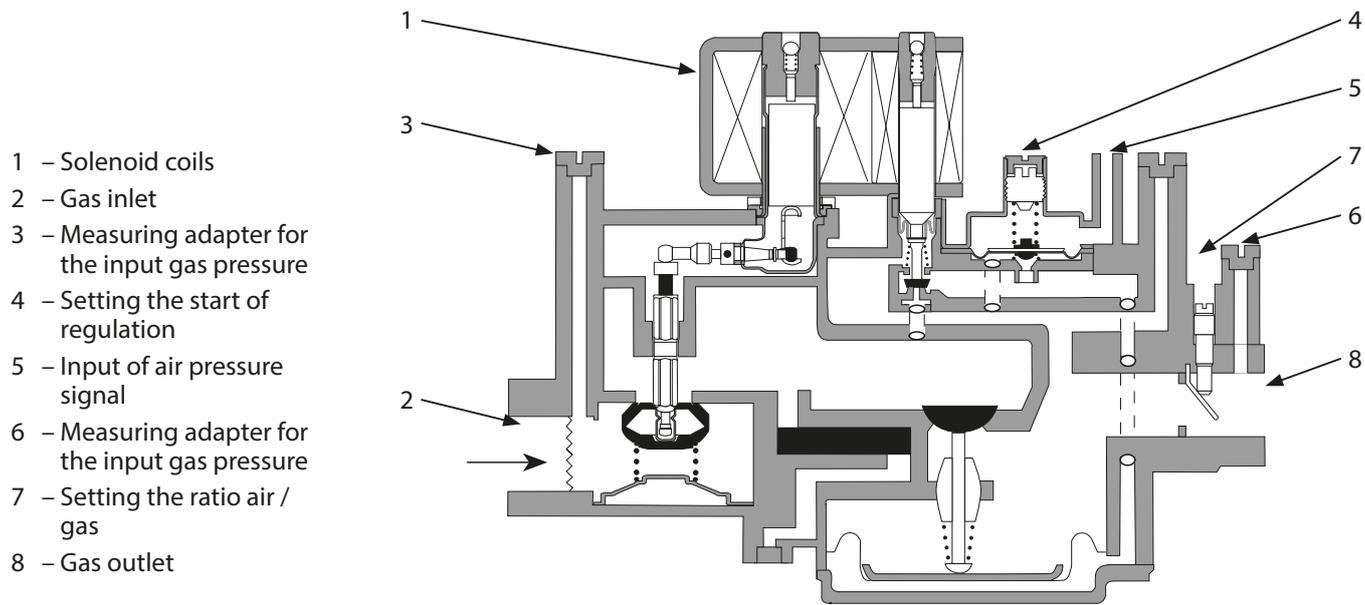
Fuel: Propane Group P

Diameter of the curtain [mm]	Parameter	Value of parameter	Shows on the display	Output [kW]	Revolutions of the ventilator [rpm]	CO ₂ [%]	O ₂ [%]
3.9	9	04	dP	24.0	4900	10,0 - 10,2	5,3 - 4,9
3.9	9	02	hP	5,3 (5,1)	1240	9,5 - 9,7	5,3 - 4,9

Electrical connection of the connector for solenoid coils

Gas fitting contains two EV1 solenoid valves (gas input solenoid) and EV2 (regulation system solenoid). Coils are connected in the connector for the connecting cable in parallel (i.e. they are connected at the same time). The supply voltage of the coils is 230 V AC (alternate).

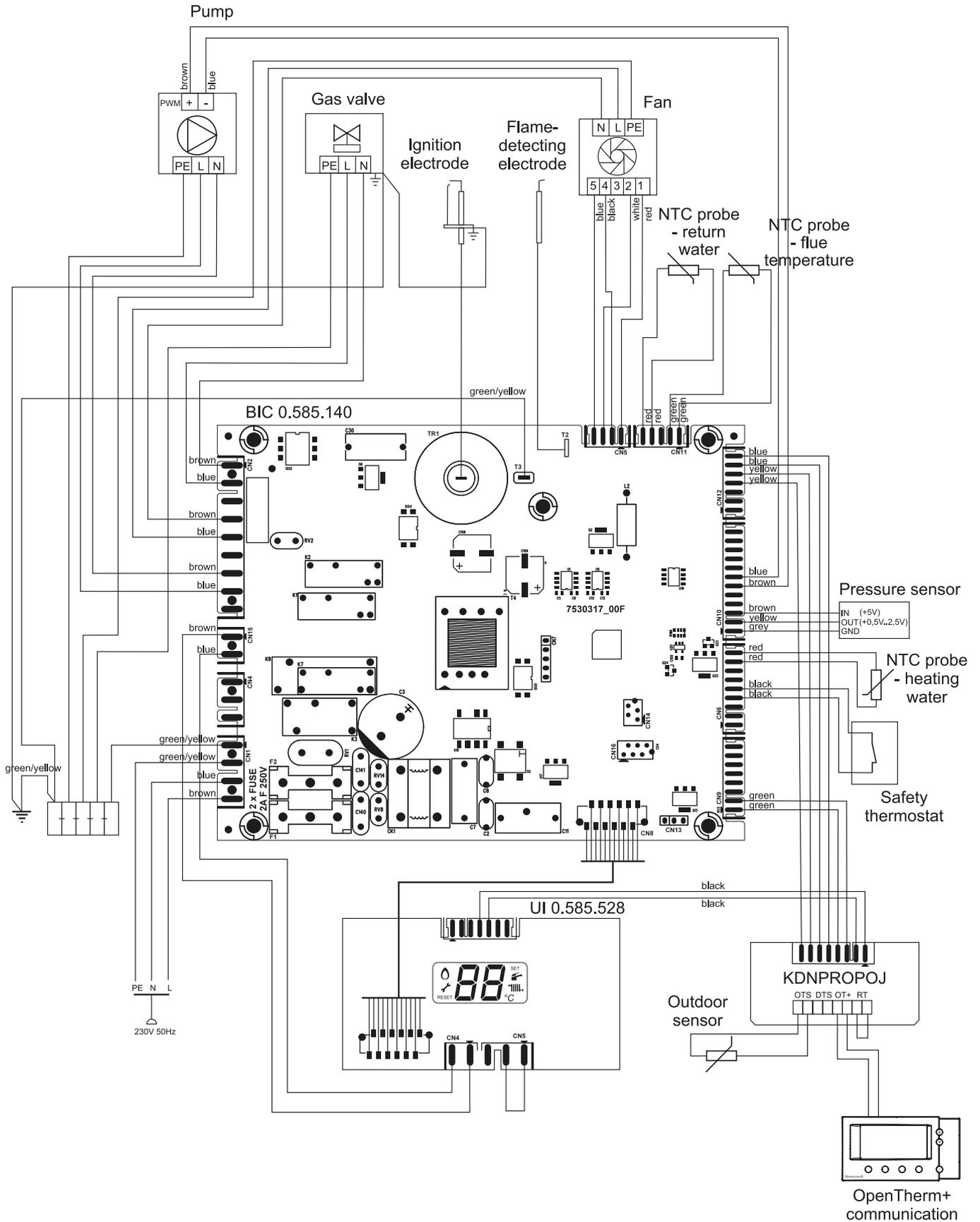


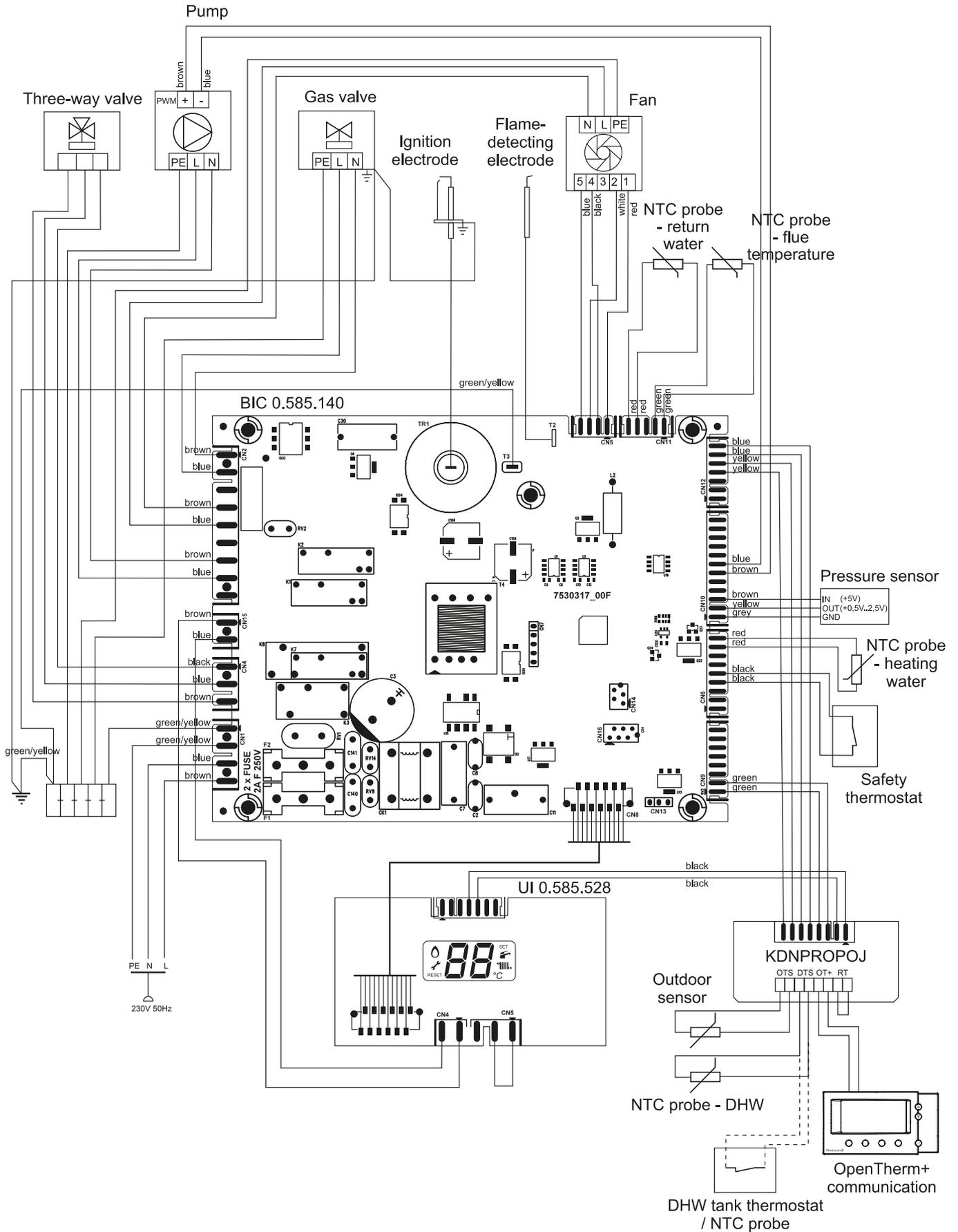


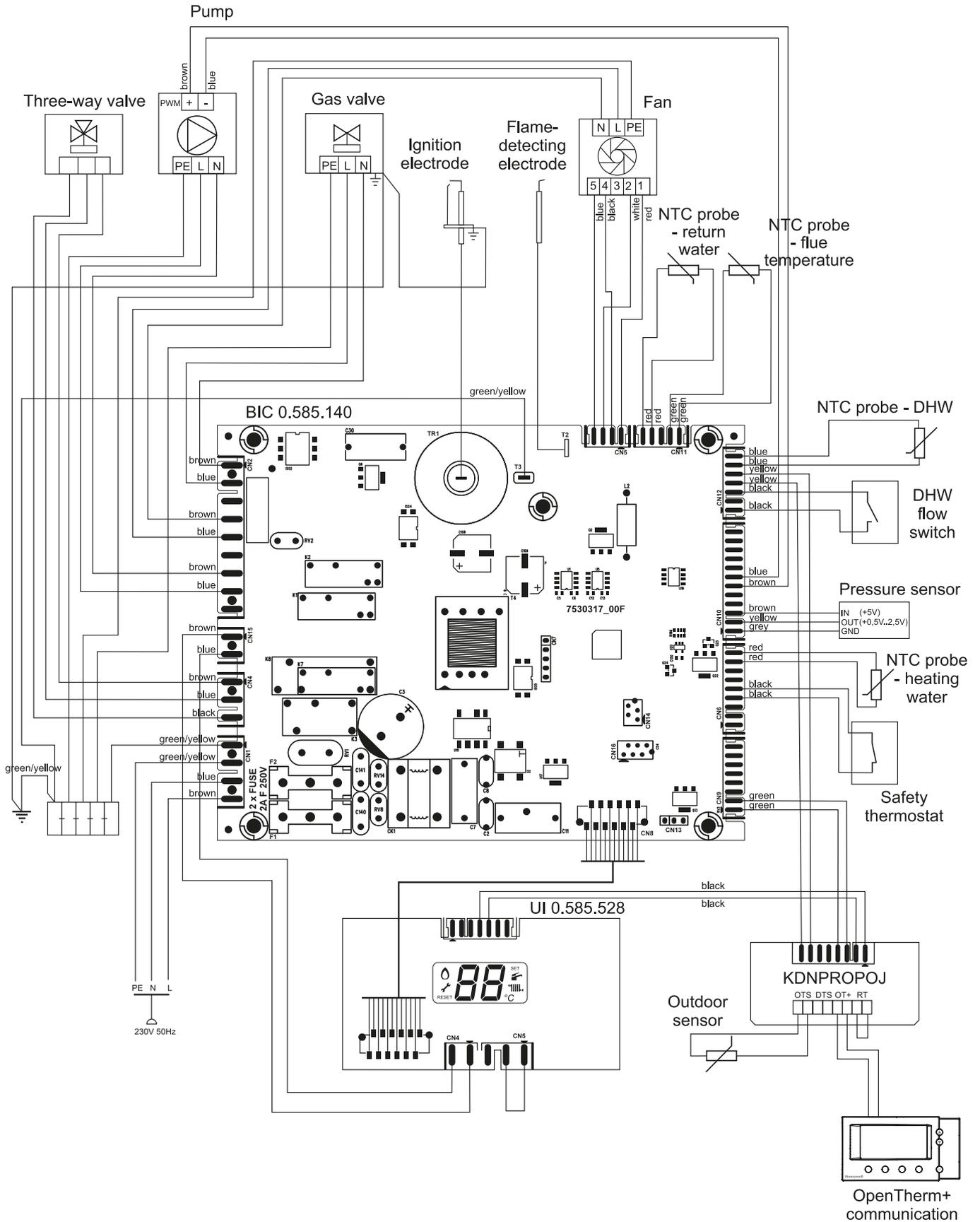
! The gas fitting is set exclusively by an employee of the authorized service organisation!

4.2 Electrical connection diagram

THERM 24 KDN







Product information sheet

as required by the EU Commission Regulation No. 811/2013 and 813/2013

Model/s: **THERM 24 KDN ; THERM 24 KDZN**

Condensing boiler: YES

Low-temperature (**) boiler: NO

B1 boiler: NO

Combination heater: NO

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Seasonal space heating energy efficiency class	A			Seasonal space heating energy efficiency	η_s	92	%
Rated heat output	P_{rated}	20	kW				
For boiler space heaters and boiler combination heaters: Useful heat output				For boiler space heaters and boiler combination heaters: Useful efficiency			
At rated heat output and high-temperature regime (*)	P_4	19,80	kW	At rated heat output and high-temperature regime (*)	η_4	90,00	%
At 30% of rated heat output and low-temperature regime (**)	P_1	4,20	kW	At 30% of rated heat output and low-temperature regime (**)	η_1	98,55	%
Auxiliary electricity consumption				Other items			
At full load	el_{max}	0,066	kW	Standby heat loss	P_{stby}	0,076	kW
At part load	el_{min}	0,055	kW	Ignition burner power consumption	P_{ign}		kW
In standby mode	P_{SB}	0,004	kW	Emissions of nitrogen oxides	NO_x	27	mg/kWh
				Sound power level, indoors	L_{WA}	52	dB
For combination heaters:							
Water heating energy efficiency class				Water heating energy efficiency	η_{wh}		%
Declared load profile							
Daily electricity consumption	Q_{elec}		kWh	Daily fuel consumption	Q_{fuel}		kWh
Annual electricity consumption	AEC		kWh	Annual fuel consumption	AFC		GJ

(*) High-temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.

(**) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

Product information sheet

as required by the EU Commission Regulation No. 811/2013 and 813/2013

Model/s: **THERM 24 KDCN**

Condensing boiler: YES

Low-temperature (**) boiler: NO

B1 boiler: NO

Combination heater: YES

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Seasonal space heating energy efficiency class	A			Seasonal space heating energy efficiency	η_s	92	%
Rated heat output	P_{rated}	20	kW				
For boiler space heaters and boiler combination heaters: Useful heat output				For boiler space heaters and boiler combination heaters: Useful efficiency			
At rated heat output and high-temperature regime (*)	P_4	19,80	kW	At rated heat output and high-temperature regime (*)	η_4	90,00	%
At 30% of rated heat output and low-temperature regime (**)	P_1	4,20	kW	At 30% of rated heat output and low-temperature regime (**)	η_1	98,55	%
Auxiliary electricity consumption				Other items			
At full load	el_{max}	0,066	kW	Standby heat loss	P_{stby}	0,076	kW
At part load	el_{min}	0,055	kW	Ignition burner power consumption	P_{ign}		kW
In standby mode	P_{SB}	0,004	kW	Emissions of nitrogen oxides	NO_x	27	mg/kWh
				Sound power level, indoors	L_{WA}	52	dB

For combination heaters:

Water heating energy efficiency class	A			Water heating energy efficiency	η_{wh}	84	%
Declared load profile	L						
Daily electricity consumption	Q_{elec}	0,117	kWh	Daily fuel consumption	Q_{fuel}	14,165	kWh
Annual electricity consumption	AEC	26	kWh	Annual fuel consumption	AFC	11	GJ

(*) High-temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.

(**) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

7. CERTIFICATE OF QUALITY AND COMPLETENESS OF THE PRODUCT

THERM gas condensing boilers

Indication of model: **THERM 24 KDN**
THERM 24 KDZN
THERM 24 KDCN

Serial number:

The product delivered with this certificate corresponds to valid technical standards and technical conditions. The product was produced according to the respective drawing documentation, within the required quality and is approved by the Technical Testing Institute s.p., EC notified body, identification number 202.

The following certificates were issued for boilers THERM 24 KDN, KDZN and KDCN: E-30-01267-16, E-30-01268-16, E-30-01269-16, E-30-01270-16, B-30-01271-16, B-30-01272-16.

Technical inspection

date:

seal and signature:



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