

Manual for installation, operation and maintenance of boiler

THERM DUO 50.A
THERM DUO 50 T.A
THERM DUO 50 FT.A

Hanging gas boiler



Thermona[®]

Thermona[®]

everything we do warms

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

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1. GENERAL INFORMATION

1.1 Use

Hanging boilers THERM DUO 50.A, DUO 50 T.A, DUO 50 FT.A are gas hot-water boilers combusting natural gas or propane. When separately used they are designed for objects with thermal losses of up to 45 kW. For heating buildings with the higher heat loss is possible DUO series boilers to align in the cascades. The boilers are constructed as consumer appliances with maximum efficiency with the emphasis on minimum emissions into the air. Operation is economical and does not strain the environment. The output of the boiler can be fluently regulated within the scope of 40 – 100 % and adapted to immediate thermal losses from the object.

DUO series boilers can be used except for heating as well for heating of domestic hot water (hereinafter as DHW) in an indirect heating tank.



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

1.2 Equipment details

1.2.1 Equipment description

- this concerns the hanging boiler designed for heating civil and industrial constructions
- option of DHW heating – heating in the indirect heating tank
- opportunity to align in cascades
- natural gas operation or propan (variant)
- fully automated operation
- automatic fluent output modulation
- simple boiler control
- high comfort level
- high ecological operation
- built-in equithermal regulation
- ability to control by the superior indoor thermostat or intelligent indoor control unit
- high level of operational safety
- security elements in the boiler prevent overheating of the boiler or escape of the effects of burnt gases
- built-in three-stage circulation pump
- safety valve 3 bar
- protective functions (anti-freeze protection, pump protection, etc.)
- electric ignition (saving of fuel)

1.2.2 Construction variants

THERM DUO 50.A

- open combustion chamber
- a version designed for heating of service hot water in the indirect heating tank *
- exhaustion into the chimney (natural draught)

THERM DUO 50 T.A

- open combustion chamber
- a version designed for heating of service hot water in the indirect heating tank *
- a forced flue exhaust

THERM DUO 50 FT.A

- closed combustion chamber – TURBO variant
- variant designed for heating and DHW heating in an indirect heating tank*
- air for combustion is sucked in from the open air

* Required external three-way valve

1.2.3 General description

The basis of THERM gas boilers is the load-bearing frame in which individual boiler elements are mounted. In the upper part there are two copper exchangers with the surface protected by a mixture of aluminium and silicon. Special turbulators are built into the inside tubes of the exchanger, to increase the thermal delivery properties of the exchangers as well as the efficiency. To keep the minimum losses of the heat transfer, it is necessary to keep the outside surface of the lamellas and the inside part of the exchanger clean! The combustion exchangers are mounted on the input by automatic de-aerating valves; on the output by emergency constant thermostats.

The combustion chamber is produced from aluminium-coated sheet and lined with thermal insulation. The front wall is removable. Above the combustion exchangers of the version DUO 50.A is a rectifier for the draught of combustion gases on which there is a combustion gas thermostat for monitoring the back flow of combustion gases. For boilers of series DUO 50T. A, there is, onto the rectifier, the exhaust fan, and its proper function is checked by the thermostat. Version DUO 50 FT.A is in addition to the version of DUO 50 T.A equipped with the shut-off chamber, thereby the boiler becomes a full appliance of Type C - the so-called TURBO.

At the bottom of the combustion chamber there is a special water-cooled burner. It is fitted with ignition electrodes and detection ionising electrode for combustion inspection. The gas fitting is connected to the burner which includes the gas pressure regulator and two solenoid valves controlled by the automation system. The gas fitting contains a modulation electromagnet. The magnetic core of the modulator coil has an adjustable lift which enables to regulate the gas pressure into the burner within the adjustable range.

The return water inlet is equipped with the integrated circulation pump ensuring the water flow through the boiler. A sufficient heating water flow is monitored by a flow switch. Before the pump is placed pressure relief valve for heating water to protect the boiler.

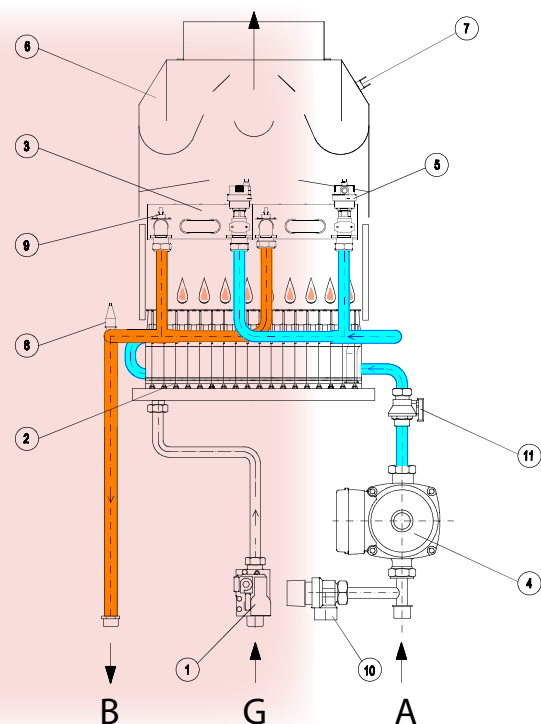
The control panel is completely plastic. On the front side of the control panel are control elements (see "User Manual" chapter). Inside the unit is a new generation micro processor automated system for controlling boiler activity, controlling boiler protection and regulation. THERM gas boilers work without an ignition burner (a timeless flame) and are ignited by an electric spark. This enables to achieve significant gas savings.

! A wide range of DUO boilers is equipped as standard with a circulation pump. From the curve of the applicable connecting excess pressures, at the maximum boiler output and temperature gradient of 20 °C, comes out a relatively low pressure for the downstream heating system. It is to be reckoned with auxiliary pump system, particularly in the case of installation of a separate boiler to the heating system.

1.2.4 Simplified hydraulic and function diagrams

THERM DUO 50.A

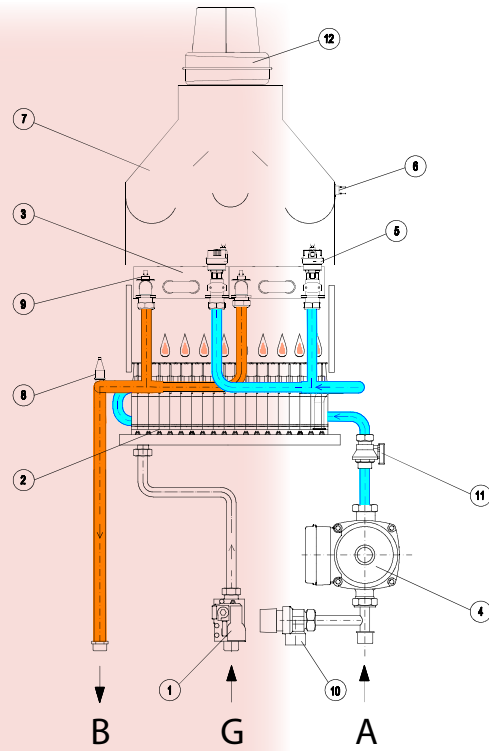
- | Position | Part |
|--------------------------------------|---------------------------|
| 1 - | Gas valve SIT Sigma 845 |
| 2 - | Lownox burners |
| 3 - | Exchanger 2x |
| 4 - | Circulation pump |
| 5 - | De-aerating valve 2x |
| 6 - | Draught interrupting unit |
| 7 - | Burn gases thermostat |
| 8 - | Heating temperature probe |
| 9 - | Emergency thermostat |
| 10 - | Safety valve |
| 11 - | Flow switch |
| A - Input for the return water G 1" | |
| B - Output of the heating water G 1" | |
| G - Gas input G 3/4" | |



THERM DUO 50 T.A

Position Part

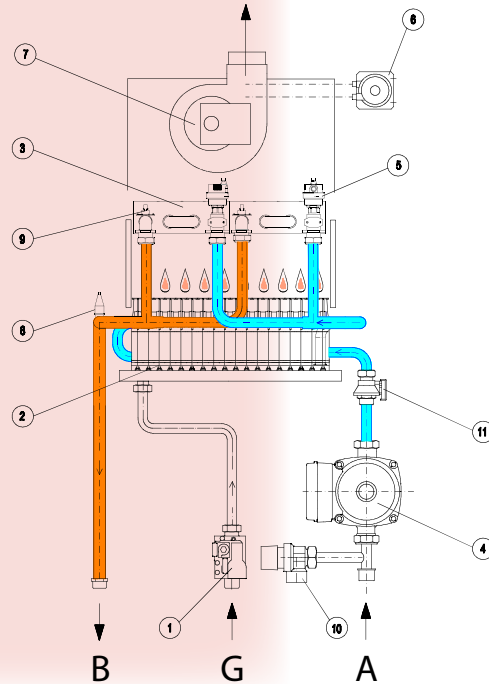
- 1 - Gas valve SIT Sigma 845
 - 2 - Lownox burners
 - 3 - Exchanger 2x
 - 4 - Circulation pump
 - 5 - De-aerating valve 2x
 - 6 - Burn gases thermostat
 - 7 - Draught interrupting unit
 - 8 - Heating temperature probe
 - 9 - Emergency thermostat
 - 10 - Safety valve
 - 11 - Flow switch
 - 12 - Burn gases thermostat
- A - Input for the return water G 1"
 B - Output of the heating water G 1"
 G - Gas input G 3/4"



THERM DUO 50 FT.A

Position Part

- 1 - Gas valve SIT Sigma 845
 - 2 - Lownox burners
 - 3 - Exchanger 2x
 - 4 - Circulation pump
 - 5 - De-aerating valve 2x
 - 6 - Manostat
 - 7 - Burn gases ventilator
 - 8 - Heating temperature probe
 - 9 - Emergency thermostat
 - 10 - Safety valve
 - 11 - Flow switch
- A - Input for the return water G 1"
 B - Output of the heating water G 1"
 G - Gas input G 3/4"



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

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 operated until the service staff arrive)

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
- call service (the boiler must not be operated until the service staff arrive)

1.4 Technical parameters

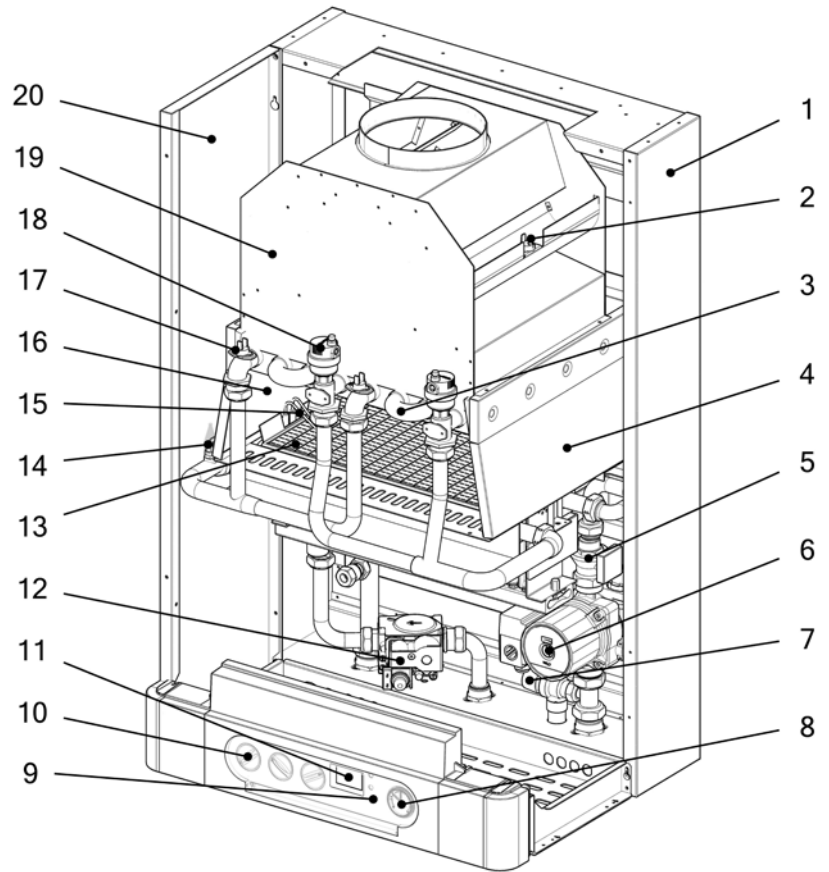
Technical description		Unit	THERM DUO 50.A		THERM DUO 50 T.A		THERM DUO 50 FT.A
Fuel		-	natural gas	propane	natural gas	propane	natural gas
Maximum thermal input power		kW	49,0	46,7	49,0	46,7	49,0
Minimum thermal input power		kW	19,6	27,2	19,6	27,2	27,5
Maximum thermal output for heating		kW	45	43	45	43	45
Minimum thermal output for heating		kW	18	25	18	25	25
Number of burner nozzles		pcs	36	36	36	36	36
Nozzle bores		mm	1,0	0,6	1,0	0,6	1,0
Gas overpressure on the consumer appliance input		mbar	20	37	20	37	20
Gas pressure on the burner nozzles		mbar	1,9 – 12,0	11,0 – 31,0	1,9 – 12,0	11,0 – 31,0	4,0 – 12,0
Consumption of gas		m ³ /h	2,10 – 5,20	0,95 – 1,80	2,10 – 5,20	0,95 – 1,80	2,20 – 5,20
Maximum overpressure of heating system		bar	3	3	3	3	3
Minimum overpressure of heating system		bar	0,8	0,8	0,8	0,8	0,8
Maximum output temperature of heating water		°C	80	80	80	80	80
Average temperature of burnt gases		°C	100	100	100	100	100
Weight flow of burnt gases		g.s ⁻¹	32,3 – 44,7	32,3 – 44,7	32,3 – 44,7	32,3 – 44,7	33,8 – 44,7
Max. noisiness according to ČSN 01 16 03		dB	52	52	53	53	53
Boiler efficiency		%	92	92	92	92	92
Combustion values:	CO	mg.kWh ⁻¹	32 – 60	17 – 40	32 – 60	17 – 40	29 – 90
	NOx	mg.kWh ⁻¹	20 – 49	14 – 20	20 – 49	14 – 20	38 – 62
NOx class of boiler according to ČSN EN 297/A		-	5	5	5	5	5
Nominal supply voltage/frequency		V / Hz	230 / 50 ~	230 / 50 ~	230 / 50 ~	230 / 50 ~	230 / 50 ~
Nominal electricity input		W	120	120	150	150	150
Nominal current of the circuit breaker for consumer appliance		A	1,6	1,6	1,6	1,6	1,6
Level of coverage of electrical part		-	IP 44	IP 44	IP 44	IP 44	IP 44
Environment according to ČSN 33 20 00 – 3		-	normal AA5 / AB5	normal AA5 / AB5	normal AA5 / AB5	normal AA5 / AB5	normal AA5 / AB5
Diameter of chimney flue / draught of burnt gases		mm	160	160	80	80	80/125
Dimensions: height / width / depth		mm	900 / 570 / 430	900 / 570 / 430	900 / 570 / 430	900 / 570 / 430	900 / 600 / 475
Weight of boiler		kg	46	46	48	48	52

To the boiler DUO 50 FT.A is absolutely necessary to use a coaxial flue exhaust 80/125 mm. Average combustion throat at the outlet from the boiler is 56 mm. To continue flue exhaust 80/125, an adapter from the system 60/100 to 80/125 must be mounted directly on the outlet nozzle of the fan. The system 80/125 is of course in the company offer.

1.5 Set of boilers

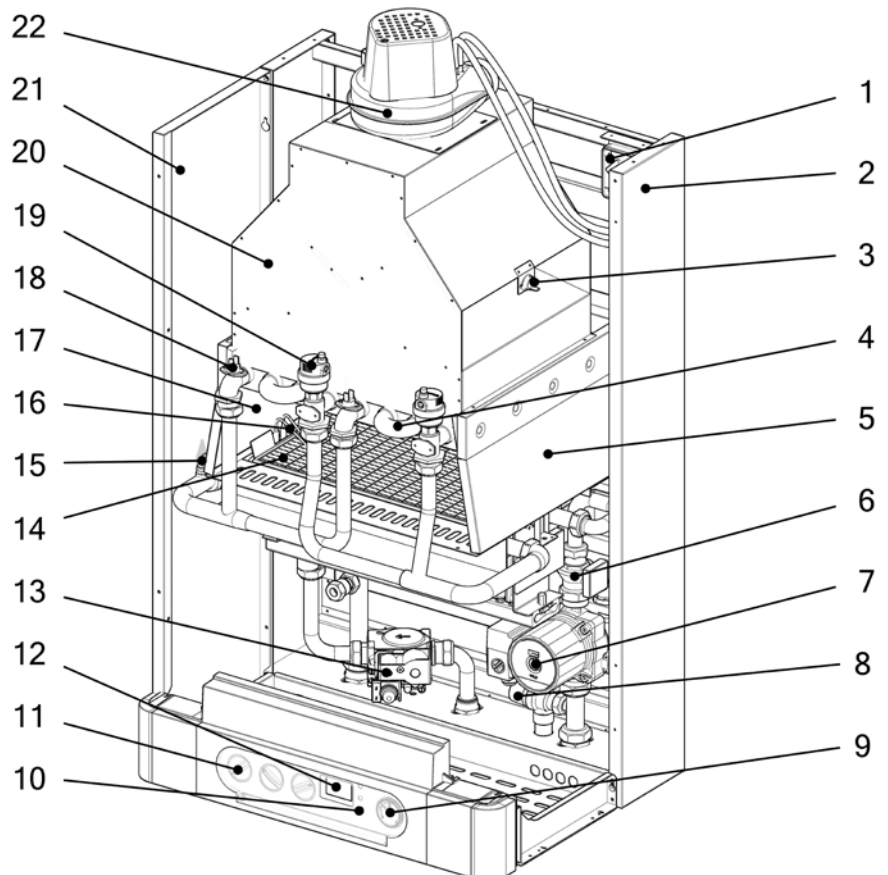
THERM DUO 50.A

1. Boiler frame
2. Burnt gas thermostat
3. Exchangers (burnt gases - water)
4. Combustion chamber
5. Flow switch
6. Pump
7. Safety valve
8. Manometer
9. Multifunctional buttons
10. Rotary knob
11. Display
12. Gas valve
13. Lownox burner
14. Temperature heating probe
15. Ignition electrodes
16. Isolation of combustion chamber
17. Emergency thermostat
18. De-aerating valve
19. Burnt gases draught interrupting unit
20. The boiler casing



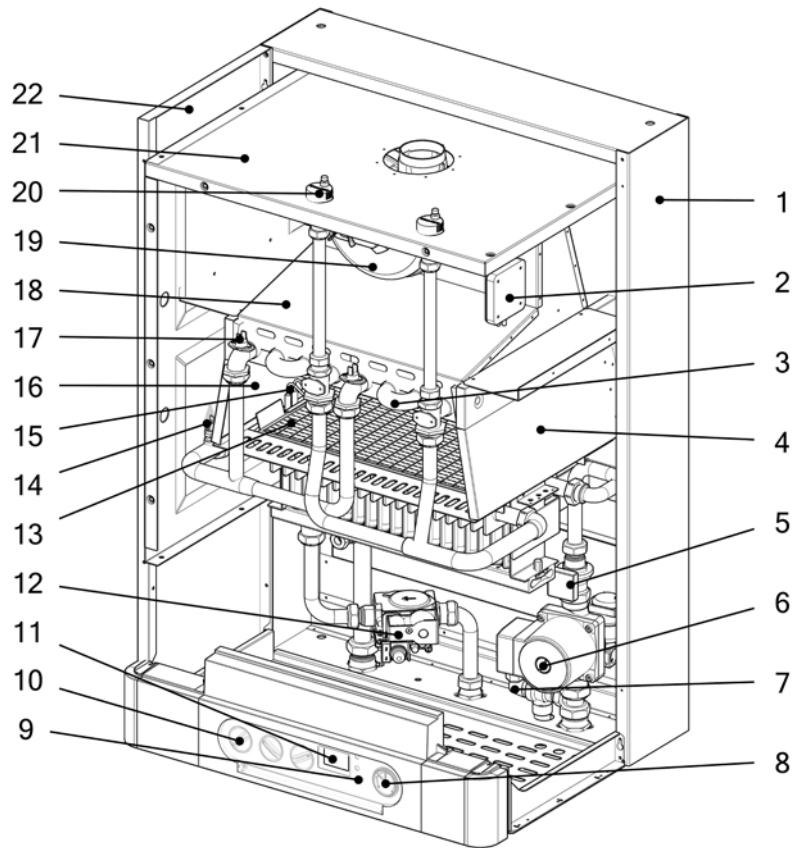
THERM DUO 50 T.A

1. Manostat
2. Boiler frame
3. Burnt gas thermostat
4. Exchangers (burnt gases - water)
5. Combustion chamber
6. Flow switch
7. Pump
8. Safety valve
9. Manometer
10. Multifunctional buttons
11. Rotary knob
12. Display
13. Gas valve
14. Lownox burner
15. Temperature heating probe
16. Ignition electrodes
17. Isolation of combustion chamber
18. Emergency thermostat
19. De-aerating valve
20. Burnt gases draught interrupting unit
21. The boiler casing
22. Burnt gas ventilator



THERM DUO 50 FT.A

1. Boiler frame
2. Manostat
3. Exchangers (burnt gases - water)
4. Combustion chamber
5. Flow switch
6. Pump
7. Safety valve
8. Manometer
9. Multifunctional buttons
10. Rotary knob
11. Display
12. Gas valve
13. Lownox burner
14. Temperature heating probe
15. Ignition electrodes
16. Isolation of combustion chamber
17. Emergency thermostat
18. Burnt gases collector
19. Burnt gas ventilator
20. De-aerating valve
21. Closing chamber
22. The boiler casing

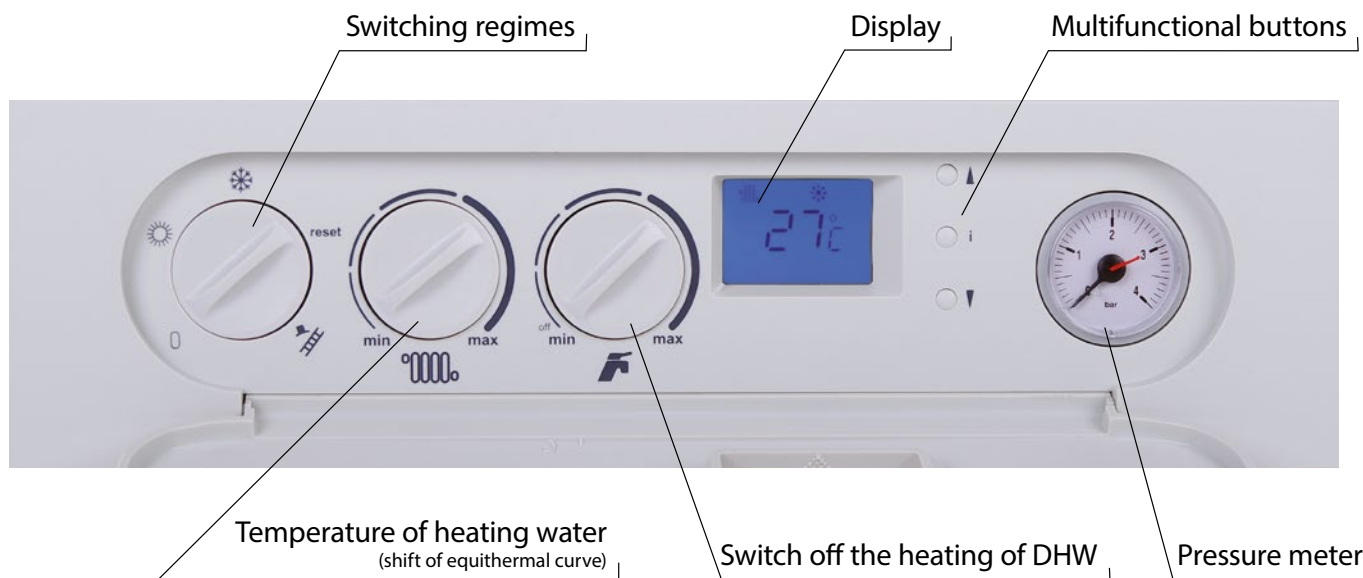


2. USER MANUAL







2.1 Control and signalling

2.1.1 Boiler control panel

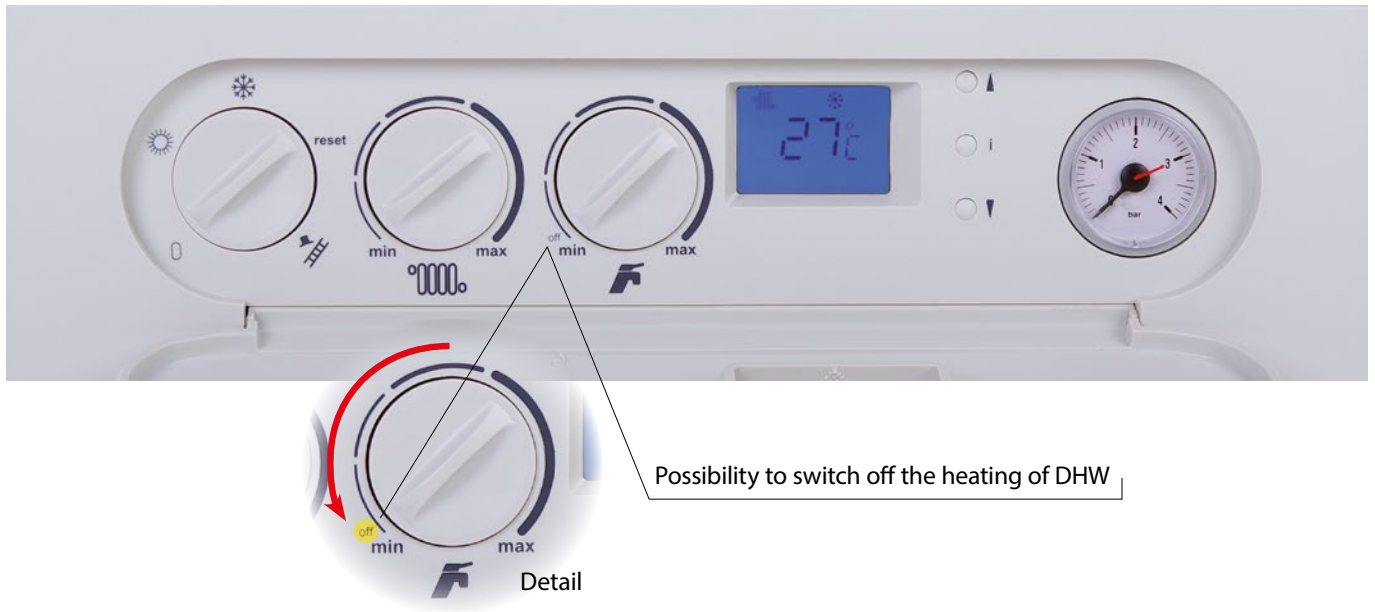
Control elements of the boiler are hidden under the plastic cover. The cover is opened by lightly gripping the handle in the upper part or by pressure on the lower part of the hole for the display.



The switch for operating regimes has the following positions:

- 0 Disconnection of the boiler** – the protective functions of the boiler remain in operation (when the boiler is connected to the electricity network and the gas supply is opened). If selecting this mode, the boiler display only indicates OFF, the heating is disconnected, there is heating of DHW and, at the same time, the backlit display is OFF.
-  **Summer regime** (only heating of DHW is ON, the heating is OFF)
-  **Winter regime** (heating of DHW is ON)
-  **Unblocking the failure status of the boiler**
-  **Service mode** (the function “sweeper” – the output of the boiler can be fluently regulated by the wheel – left position = minimum output and temperature, right position = maximum output and temperature). This regime serves only for service activity and measurement (emissions, temperatures of burnt gases, etc.)
-  **Setting the heating temperature** – rotary control knob for user setting of the output temperature of water in the heating system within the range 35 – 80 °C (recommended range is 55 – 80 °C). In the case of selected equitherm regulation, the shift in the heating curve is set by the control knob (within the range ± 15 °C from the equithermal curve)
-  **Setting the DHW temperature** – not used, only active when using the boiler for reheating of the solar storage tank (special function in the case of the boilers cascade with the communication interface (so called interface) IU04.10 at the control boiler: setting a night setback - viz. Guide to the cascade boil rooms). DHW temperature for DUO boilers series connected to a standard tank is set directly on the tank thermostat.

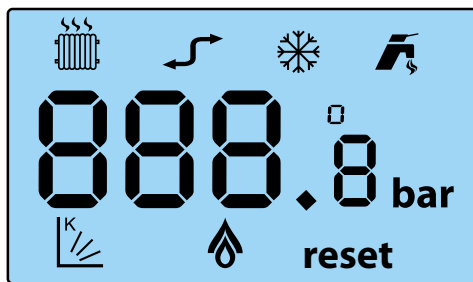
Disconnection of water heating – setting the rotary control knob for user setting of the output temperature of the hot water to the left side position (less than 10° of the route); the heating of water can be permanently disconnected from operation.



Multi-functional buttons – designated for the diagnostics and setting of the parameters of the boiler exclusively by a service technician or for switching off information data (see below)

Pressure meter – displays the measured water pressure in the heating system.

2.1.2 LCD display





Description of symbols shown on the display:

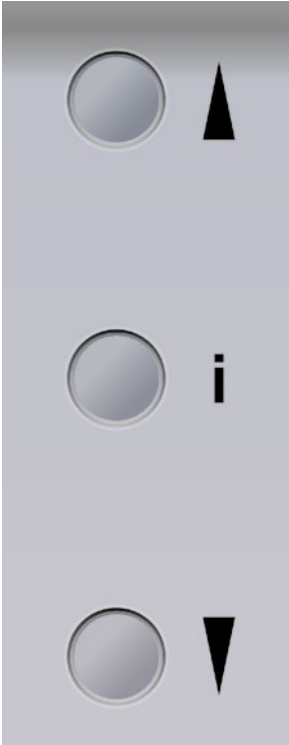






SYMBOL	NAME	MEANING
88.8	display field	Display of temperatures, pressure, failure statuses and service values
	valve	Permanent lighting – the boiler is in the water heating mode
	radiator	Permanent lighting – the boiler is in heating mode Flashes – displays the hot water temperature or the requested water temperature
	flame	Permanent light - the burner burns Flashes - the burner burns during the service mode
	curve („K“ factor)	Permanent lighting – the equithermal heating regime is selected Flashes – displays the “K” factor, not usual with °C outside temperature
	frost flake	The boiler is in in „WINTER“ regime
	communication	Steady light - Opentherm+ communication is active Flashes – communication with the interface of the cascade is active





Indication of set temperature

After turning the control knob for setting the temperature of the heating system or DHW (boilers with flow heating of 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.

2.1.3 Information menu

Buttons  and  are used for entrance and bi-directional browsing in the information menu in the following sequence order:

	PARAMETER	SHOWS ON THE DISPLAY
	The required heating temperature	 35 °C
	The temperature of heating	 35 °C
	The required DHW temperature (2)	 35 °C
	DHW temperature (2)	 35 °C
	Outside temperature (1)	 16 °C
Equithermal curve (factor „K“)	 1.6	
Return to normal display		

If button  or  is not pressed for 10 seconds, or if pressing buttons  and  at the same time, the information menu is terminated.

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

(2) - when selecting heating water in the storage tank, the display is “- -”, (in the case of additional heating of the built-in storage tank or solar accumulator, the numeric value is displayed – see below)

2.1.4 Error messages

Any error or other anomaly is indicated by flashing, a backlit LCD display, display of the error code and key symbol. On the first position of the display is symbol “E”; on the other positions is an error code with the meaning according to the table.

Error code displayed on LCD and the meaning:

ERROR CODE	MEANING
E01	Blocking of the activity when the burner is not ignited
E02	Insufficient flow of heating value
E04	Defect in thermal heating probe (interruption of short-circuit)
E05	Failure of the system temperature probe in a cascade arrangement
E06	Blocking the activity after the boiler overheating (emergency thermostat) at version DUO 50 T.A , possibly responses of the flue thermostat
E07	Defect to the outside temperature sensor
E08	Reaction of the air thermostat (version turbo) or the combustion thermostat (“chimney” version)*
E12	Failure of insufficient pressure of heating water after 4 pump cycles

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.



*** In the case of the occurrence of error E 08, the supply of fuel into the boiler is closed and re-burning of the boiler is blocked. After 20 min. there is automatic unblocking of the failure. In the case of a repeated occurrence, it is necessary to call a professional employee and to take measures to remove the defect. After any intervention into the equipment, it is necessary to perform the operating test.**

2.2 Activation and deactivation of the boiler

2.2.1 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:

- set the rotary button of the input temperature of the heating water of the boiler to the maximum
- insert the network supply into the socket and switch on the boiler with the switch for operating regimes
- by briefly turning of the operating regime switch to the right, the boiler is automatically activated (when the gas supply is de-aerated)
- inspect the correct activity of all thermostats and control elements
- inspect all functions of the boiler
- inspect the setting of the output range of the boiler or modify the setting according to the demands of the heated object
- 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! For example, when excluding the flue thermostat from operation, there can be, in the case of the non-functionality of the chimney, the back flow of burnt gases into the room! There is a risk of poisoning from burnt gases! For mounting the protection unit for the back flow of burnt gases (flue thermostat) and replacing its defective parts, only the original parts delivered by the producer must be used.

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!

2.2.2 Disconnection of the boiler from operation

It is possible to disconnect the boiler for a shorter period by the operating regime switch or by the switch on the room thermostat.

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.

2.3 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.

2.3.1 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 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 middle button.



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. The boiler thermostat is recommended to be set in a transient period (autumn, spring) at 60 °C, in the winter period up to 75 °C. It is recommended to use built-in equithermal regulations, either alone or accompanied by a space thermostat, as shown below.



2.3.2 Operation of the boiler with spatial thermostat

In this manner of regulation, the boiler maintains the selected temperature of heating water. Indoor thermostat is connected with the jumper of the terminal X9 on the boiler control automatics. 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). It is not recommended to mount thermostatic valves on radiators in the reference room!



For the control according to room temperature, Thermona delivers and recommends the whole series of room thermostats: e.g. PT 22, PT 32, BPT 22 (wireless version), Honeywell CM 707, CM 907, and others.

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 for turbo version. After the check sequence of the safety feature of the flue flow, i.e. the flue thermostat or the manostat for turbo version, the burner ignition is permitted. Ignition of the boiler is for the adjusted starting output. It remains for 2 seconds after activation of the boiler. Then the output is decreased to the minimum with slow linear starting (about 50 s.) to the point of modulation stated by the service setting for the max. 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 wheel on the control panel (within the range 30 – 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 5 °C above the adjusted temperature. In this phase, the boiler is stopped while maintaining the operation of the circulating pump, and at the boiler "turbo", the fan goes to run-time function of the fan stop (30 seconds). The re-ignition occurs when the temperature drops by 3 °C below the desired temperature after an anticycling time (this term is explained in the following description!).

Thus, the boiler is a highly adaptable source of heat due to the large amount of the subsequently regulated heating systems (e.g., zone control, thermostatic valves, etc.).

After turning off of the space thermostat or switching the mode selector to "Summer", the burners are stopped and the pump is further turned on for a set time of the pump run-out function.



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.

2.3.3 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 sensor THERM Q01. 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:

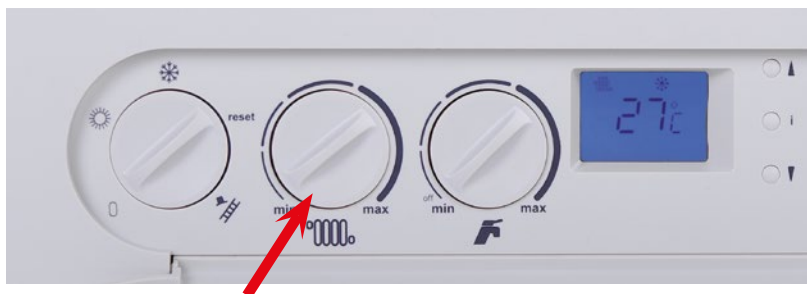
The working phases of the boiler are identical with the previous regime with the difference that the temperature for the heating system is automatically set according to the outside temperature (ascertained by the sensor). The calculation of the requested temperature of the heating system is the function 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 the heating system. Using the heating water knob 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). The equithermal curve is modified for standard heating systems with radiators.

In the case of failure of the ambient temperature sensor, this status is signalled by E7 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!

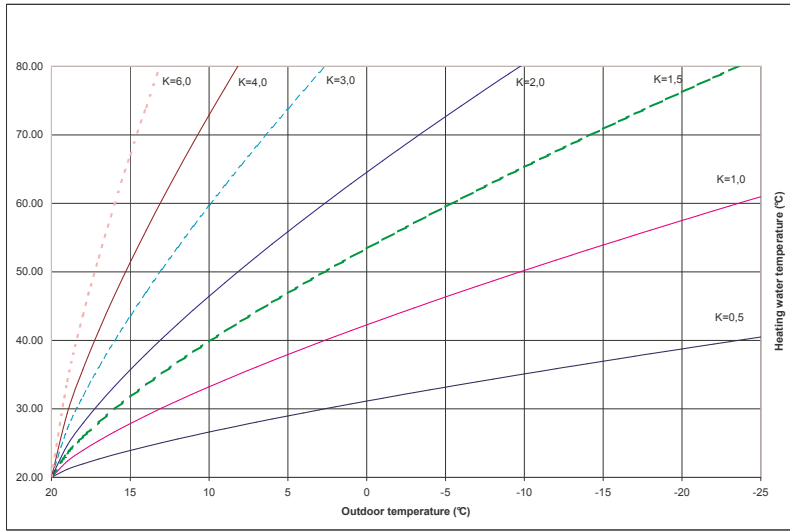


! During the activated equithermal regulation the meaning of the function of the middle button on the control panel of the boiler is changed. In this case, the mentioned knob is used to set the shift of the heating curve (within the range $\pm 15\text{ }^{\circ}\text{C}$ from the equithermal curve set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

It results from the mentioned facts that using the knob 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. The initial user setting of the rotary control knob is in the middle of the setting route (the indicator is up which corresponds to the shift of the curve $0\text{ }^{\circ}\text{C}$). 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):



The calculated temperature of the heating water is restricted to max. 80 °C. If the calculated temperature varies within the range 20 ÷ 35 °C the requested temperature is restricted to the minimum temperature of the boiler, i.e. 35 °C and the function of periodical running of the boiler is activated within the fixed interval of 15 minutes and the variable time of running for 35 °C according to the formula:

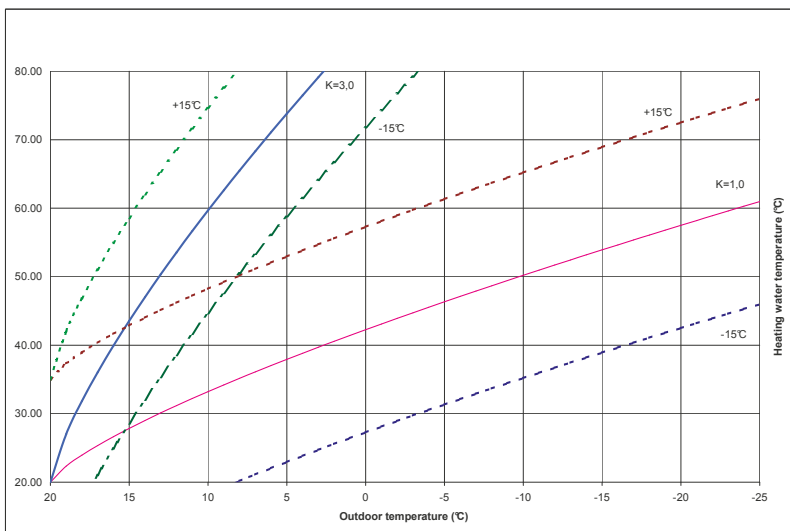
$$T_{on} \text{ (min)} = 15 - T_{off} \text{ (min)} \\ = 35 - \text{calculated equitherm temperature}$$

If the calculated equitherm temperature ≤ 20 °C, the boiler remains disconnected.

Note:


- T_{on} = interval of activation of the boiler
- T_{off} = remaining interval for the disconnection of the boiler into fixed 15 minutes

Example of the course of selected curves during correction of the shift (middle button):




2.3.4 Operation of the boiler with master equitherm regulator

After ensuring “full value” equithermal regulation (including setting the time programmes, etc.) it is recommended to use intelligent programmable regulator CR 04 or 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 has many adjustable and displayed parameters for optimal control of heating equipment with the boiler power modulation.

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

2.3.5 Control of cascade boiler rooms

Hanging DUO series boilers can be arranged in the cascade. It is already well known and time-tested principle of boilers, both from the hydraulic and the control point of view. The boiler cascade can be conveniently controlled by our unique communication system that ensures the continuous communication between the individual boilers. For this purpose the Thermona company supplies the interface IU 04.10 that ensures the transfer of information between the boilers and the calculations of the boiler room power needs (number of working boilers and their power modulation). For further improvements, the interface IU 05 for the control boiler of the cascade can be used, which has the similar properties as the interface IU 04.10 (communication between the boilers) and also provides communication with the programmable controller (PT 59, CR 04). This system has more programmable options for the display of the operating status of the boiler room (operating modes, power, temperature, possible failure of individual boilers, communication disorders, the possibility of deactivating the heating DHW tank with regulators PT 59 and CR 04).

 **For more information about the principle, design, type of cascade boiler rooms control etc. are available, for example on the website www.thermona.cz.**

The mentioned ad-in regulators are not included in the delivery of the boiler!

2.3.6 Heating of domestic hot water (DHW)

DUO series boilers are standard prepared for heating of hot service water in the indirect heating tank. To ensure heating of the DHW is necessary to install the three-way valve on the boiler as shown on the figure below.

Tank heating of DHW - DESCRIPTION OF WORK

If the thermostat of the hot water storage tank is ON, the working phase of heating of the storage tank starts. The three-way valve relay is switched on and if the boiler was running in the phase for heating the heating system, the burner and pumps are stopped.

After re-setting of three-way valve (within the time interval of 8 seconds), the pump is running and at the turbo boiler also the flue exhaust fan. After the check sequence of the safety feature of the flue flow, i.e. the manostat or the flue thermostat, the burner ignition is permitted.

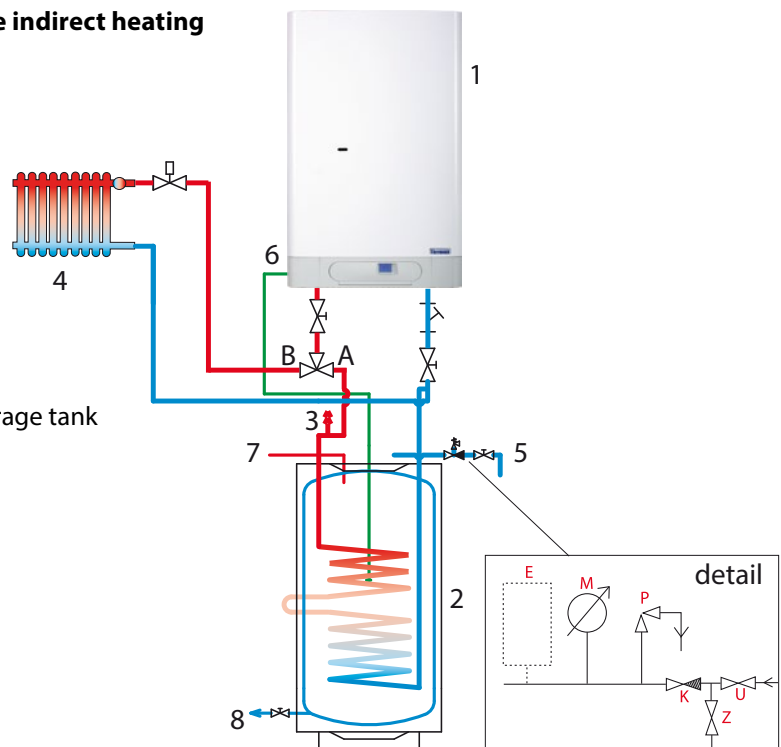
From detecting the presence of the flame, the starting output of the boiler is kept for 2 seconds and then there is the phase of fluent modulation of the output with PID regulation with the stated value of the temperature of heating of 80 °C. During the whole time of heating, the limits of the regulation of the output temperature are checked. In the case of any increase above 86 °C the burning is stopped and circulating pump remains active and at the boiler "turbo" the fan goes to run-time functions of the fan run-out (30 seconds). The reignition is in the case of a decrease of the temperature under 80 °C. The working phase of the water heating terminates with the disconnection of the thermostat of the hot water storage tank.

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 (25 seconds). 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. In the case of parallel requests, the water heating regime takes priority over the heating of the heating system.

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

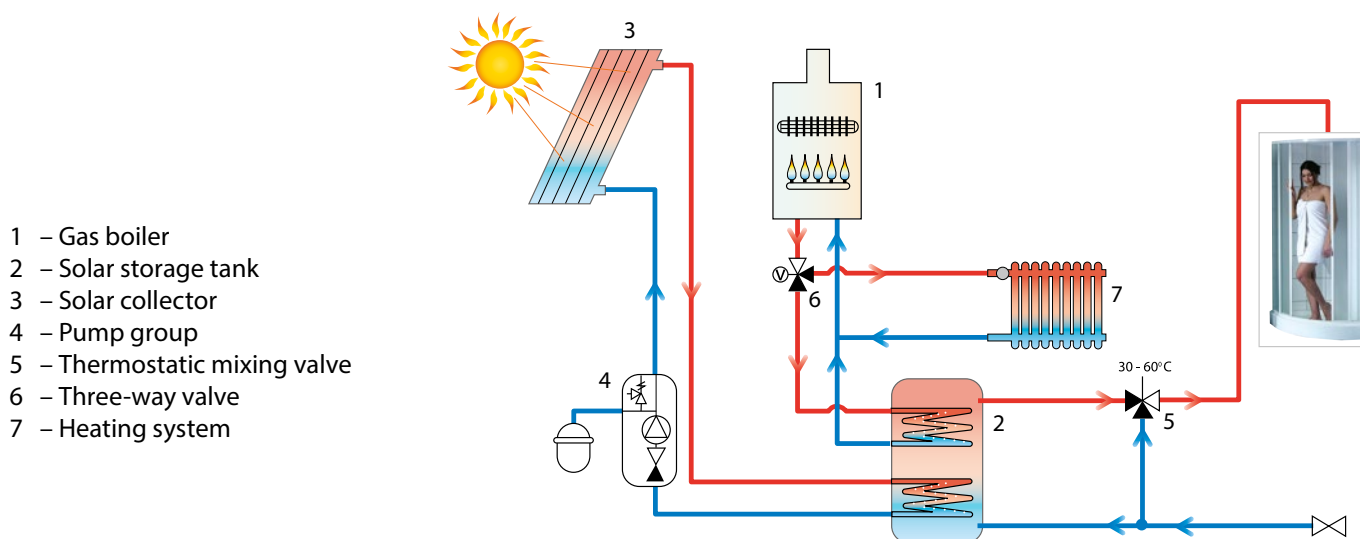
- 1 – Gas boiler
- 2 – Indirect heating storage tank
- 3 – De-aerating valve
- 4 – Heating system
- 5 – Supply of cold water
- 6 – Connection of the thermostat for the storage tank
- 7 – Output DHW
- 8 – Discharging valve

- U – Closure on the cold water inlet
- Z – Testing valve
- K – Return valve
- P – Safety valve
- M – Pressure meter
- E – Expansion tank (recommended)



2.3.7 The heating of water in the accumulator storage tank is in the connection with solar panels

Gas condensing boilers DUO can be used for heating the solar system with the accumulation storage tank. Our geographical conditions do not enable to operate a solar system without the additional (backup) heat source which in this case is the gas boiler. The boiler independently takes care of heating and when requested, it is able to additionally heat the solar accumulator.



Description of the activity of the boiler in this regime:

This working mode has the same behaviour as “Storage water heating” described in one of previous chapters with the difference that the temperature in the accumulator water storage tank is read by a thermal probe instead of the thermostat for the storage tank. The setting of the requested water temperature is enabled either from the communication line or by the rotary control button for hot water on the boiler panel. The hot water temperature probe must be connected and functional, otherwise the heating of the water is stopped. With the connection of the contact on the terminals of the storage tank (not used in this case) the forced temperature of heating is 60°C (independently of setting the temperature of water TV). This function protects against any origination of harmful bacteria such as Legionella.

2.4 Selected protective functions of the boiler

Anti-blocking functions

After 24 hours of inactivity, the pump runs for 30 seconds to prevent any blocking. After 24 hours of inactivity, the three-way valve relay is activated for 10 seconds (if the boiler is fitted with it) due to the same reason. 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

The boiler is fitted with an anti-freeze protection system which protects the boiler (not the heating system, storage tank and hot water distribution lines) 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 35 °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 with the selector in the position of the control knob in the position “OFF” or “SUMMER REGIME”.

Checking the flow (checking the operation of the pump)

Before each ignition of the boiler there is a check of the flow switch, which evaluates the correct function of the boiler pump. Rechecking the flow switch is activated if within 15 seconds of running the pump, the flow sensors is not activated. The pump is stopped and after 15 seconds there is the next attempt to activate the boiler. This phenomenon is repeated 4x with consequent signalling of the failure E12. It is necessary to de-block the failure by the regime switch. If the time of inactivity of the pump before rerunning the boiler exceeds 30 minutes, the first interval for running the pump is prolonged to 180 seconds. For restoration of the activity of the boiler it is necessary to disconnect and connect using the rotary control knob for selection of regimes or by disconnecting and connecting the network supply. When selecting the boiler with bithermic heat exchanger (DHW flow heating), the pressure in the heating system is checked by the primary pressure switch only.

Anti-Cyclic

A feature that prevents cycling of the boiler in heating mode when, during the boiler is switched off, it is not permitted to re-ignite the boiler before the set anticyclic time run out (factory default is 5 minutes). This function is most used in the heating systems where maximum heat loss of the object corresponds to the lowest limit of the boiler output range.



The change of the anticyclic time in the range of 0-10 minutes can only be performed by an authorized service technician!

Run-out of the pump

The run out of the pump is set in production for 5 minutes. After the extinction of the burner caused by the disconnection of the room thermostat, the pump continues to operate during the adjusted run out of the pump. In the case that in the winter regime the boiler is operated without the room thermostat, the pump continues to be ON.



The change of the run out of the pump during the operation with the room thermostat within the range 0 - 10 minutes may only be performed by an authorized service technician.



Notice: All the above-mentioned security and registered functions are in activity only if the boiler is connected to the electricity!



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).

2.5 Maintenance and service

Regular maintenance is very important for reliable operation, to achieve a long service life, and efficient combustion. We consistently recommend the user to contact a service organisation in the place of residence and to ensure regular inspections of the boiler after one year of operation (see chapter: Warranty and Warranty Terms). The service technician 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.

2.5.1 Additionally filling the heating system

Additional filling into the heating system (pressurizing the system) must be carried out through the inlet valve in a heating system.

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



- a) the pressure of the water used for refilling 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 on control panel 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

2.6 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 spol. s r. o. 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. Submission of the completed and confirmed warranty certificate.

3. INSTALLATION MANUAL

3.1 Basic instructions for assembly of the boiler

Hanging boilers THERM DUO 50.A, DUO 50 T.A, DUO 50 FT.A 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 38 6462, ČSN 73 4201, TPG 704 01, TPG 800 02, TPG 908 02, Regulation No. 48/1982 Sb.

Before installing the boiler the assembly company is obliged to check:

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

3.2 Complete character of the delivery

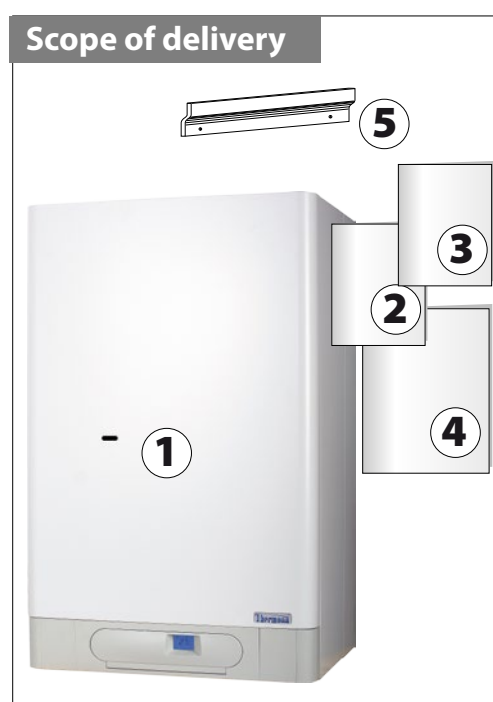
THERM hanging boilers are delivered fully assembled. All parts of the boiler are checked and set by the producer before assembly. Each boiler is tested for leakage of the water circuit, leakage of the gas circuit and the regulating and protection parts are set and tested.

The standard delivery of the boiler includes:

1. Boiler
2. Installation, service and maintenance manual
3. Service network
4. Warranty certificate (3 copies)
5. 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.

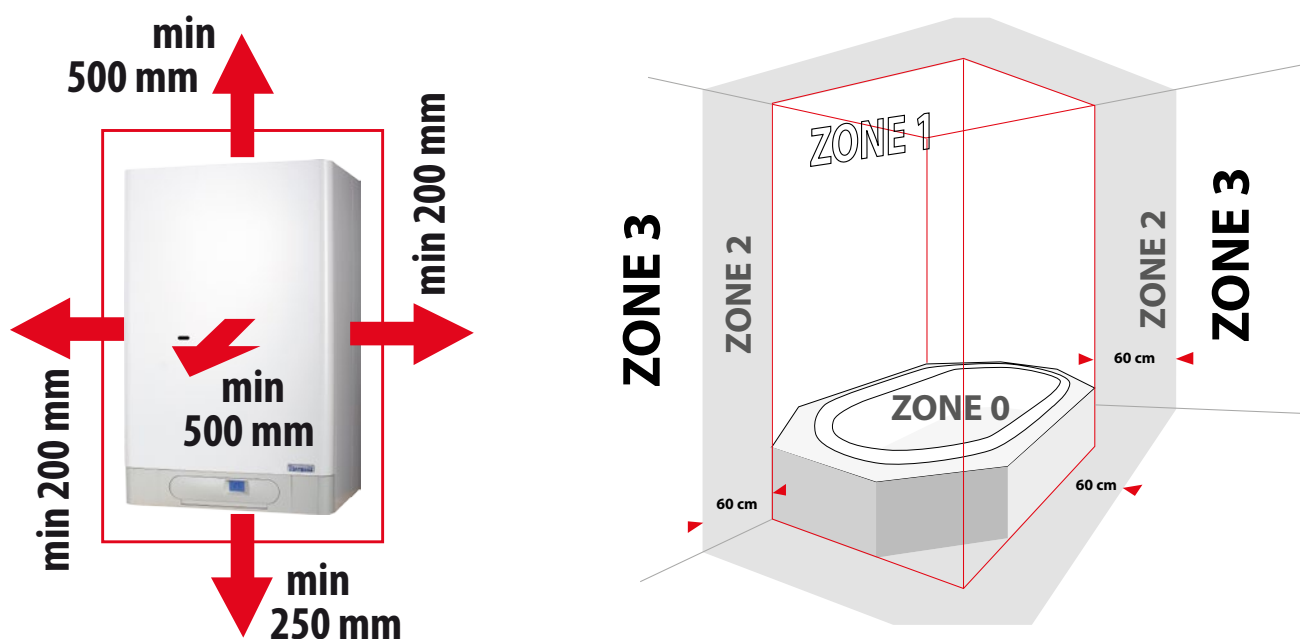
3.3 Location of the boiler

Boilers DUO serie can be installed in the basic AA5/AB5 environment according to ČSN 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.).

THERM HANGING BOILERS **must not be** installed in premises with bath-tubs, bathrooms, washing areas and special zones 0 and 1 according to ČSN 33 2000-7-701 ed.2. The coverage of electrical parts is IP 44 and fulfils the conditions for resistance against sprayed water – possible location also in premises with wash-tubs or shower and washing areas in zone 2 again according to ČSN 33 2000-7-701 ed. 2. If the boiler is installed in acceptable zones, it is necessary to ensure protective linkage of all conductive parts according to the same standard, according ČSN 33 2000 – 4.

The sizes of the areas in which DUO 50.A and DUO 50 T.A boilers are installed and the manner of ventilation must be in accordance with TPG 704 01. In the case of boilers in a cascade, it is necessary to respect e.g. TPG 90 802 (ventilation of boiler rooms with a total rated output of more than 50 kW), CSN 07 0703 and any other relevant regulations and standards. 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 m; 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).

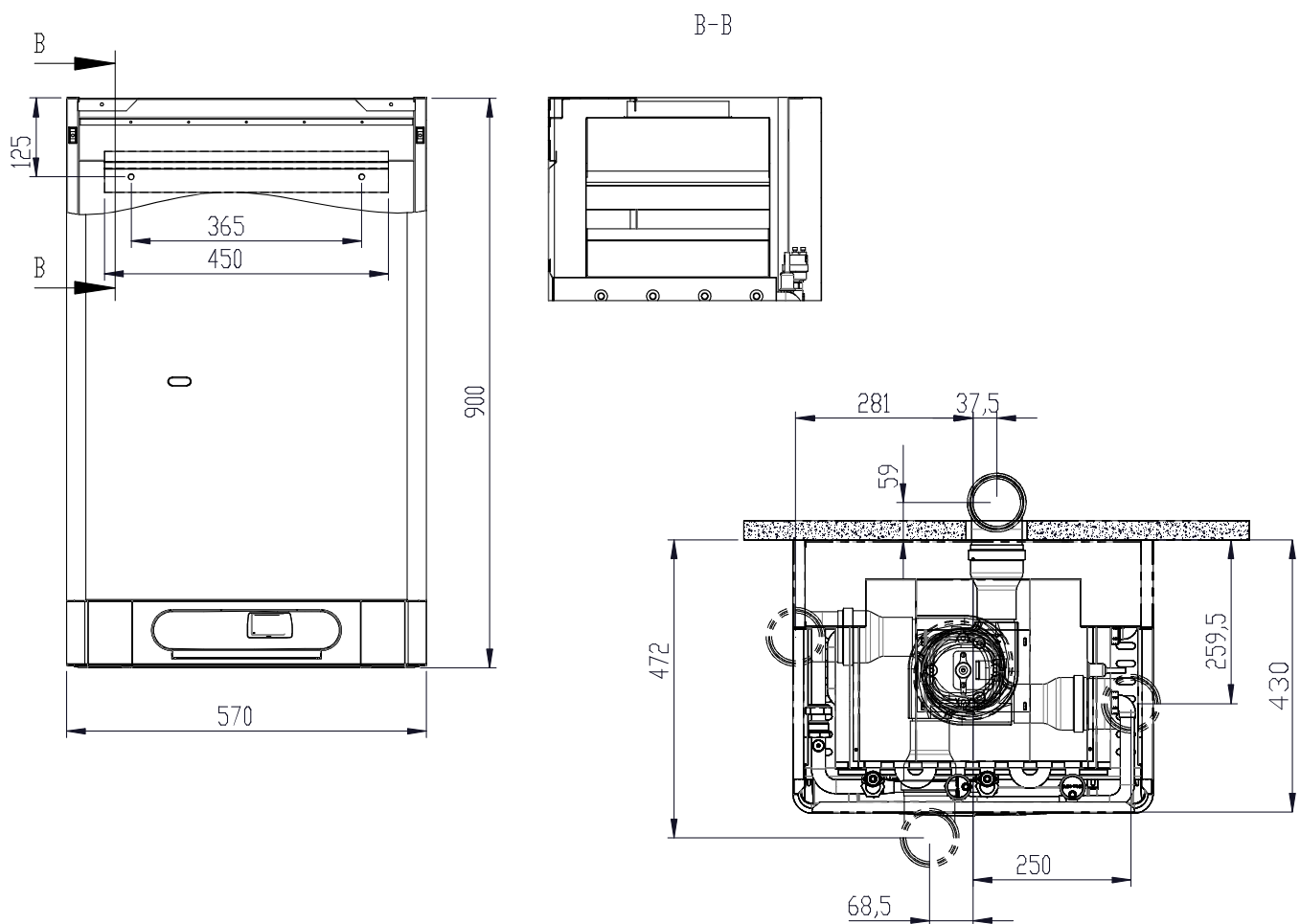
3.4 Suspending the boiler

THERM hanging boilers in the DUO serie 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. In the case of the turbo version, install the piping for exhausting 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 dismantlable 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.



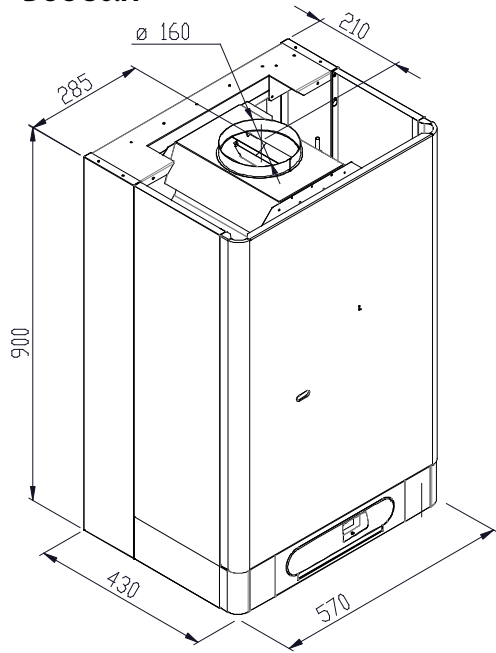
3.5 Connecting the boiler to the hot-water system

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.

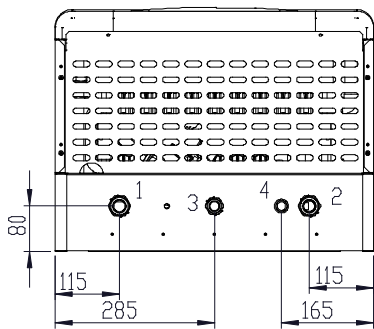
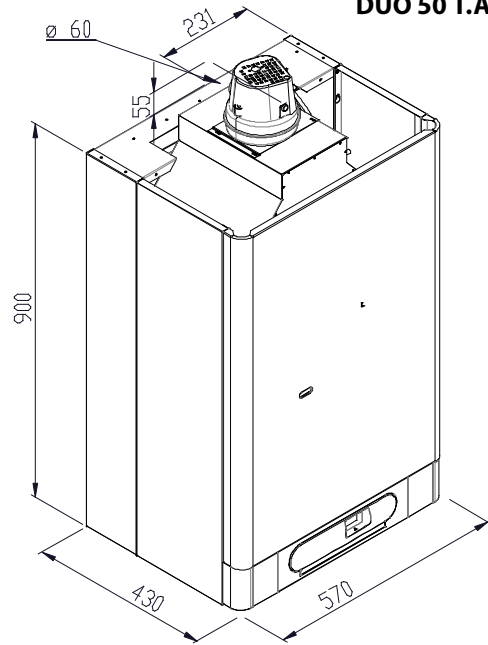
As it concerns a heat-water flow boiler fitted with its own pump, it is necessary to resolve the connection to the heating system in relation to the calculations of the hydraulic relations of the whole system. In a similar manner it is necessary to proceed even when boilers are arranged in the cascade. To use the maximum exchanger outputs, to ensure the correct function and a long service life, it is necessary to ensure a minimum overpressure for the heating system of 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

DUO 50.A



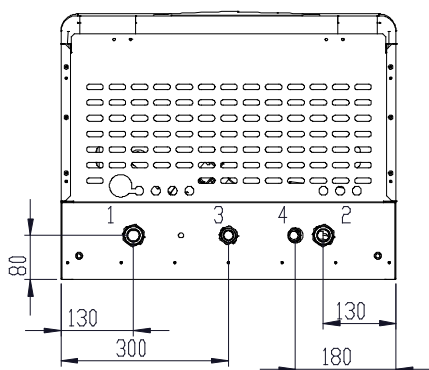
DUO 50 T.A



DUO 50.A, 50 T.A

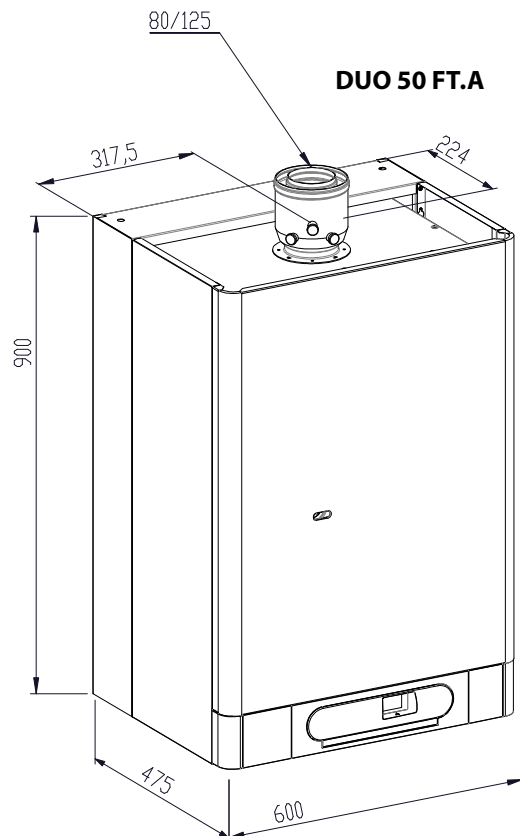
- 1 - Heating water outlet G 1", external
- 2 - Input return water G 1", external
- 3 - Gas inlet G 3/4", external
- 4 - Output of the safety valve G 1/2", internal

DUO 50 FT.A



- 1 - Heating water outlet G 1", external
- 2 - Input return water G 1", external
- 3 - Gas inlet G 3/4", external
- 4 - Output of the safety valve G 1/2", internal

DUO 50 FT.A

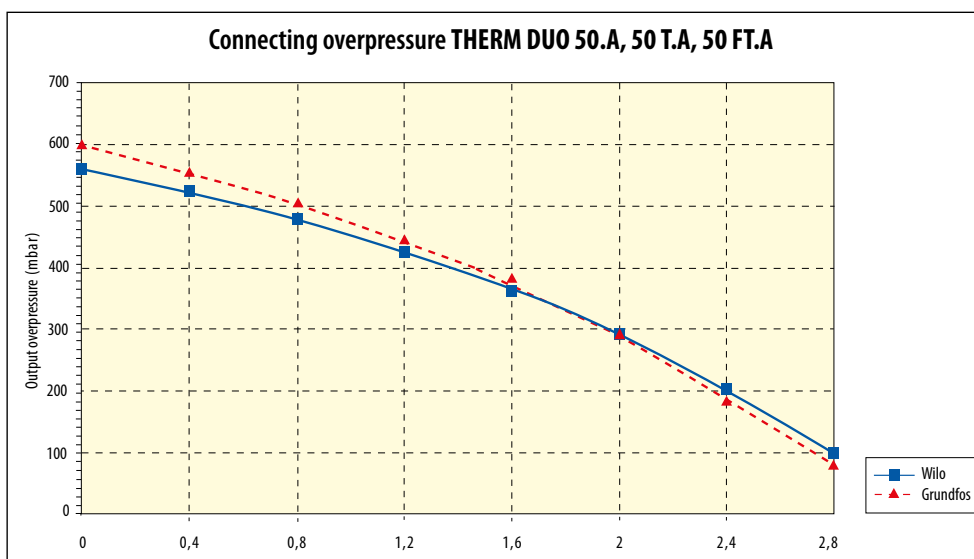


3.5.2 Graphs of the connecting overpressures of heating water (on the output for heating water)

Notice: The curves of the connecting over-pressures of heating water are designed for **Wilo 15/7-3** pumps for the outside regulation stage.



Due to the delivered output of the boiler and the resistance properties of the exchanger, we do not recommend decreasing the output of the pump.



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 in regular intervals.

The heating system must be manufactured in accordance with ČSN 06 0830 – Securing equipment for central heating and heating of utility water and with ČSN 06 0310 – Design and assembly of central heating.



The producer requires:

- mount into the slides of the pump filter or de-sludge equipment (e.g. Spirovent Kal)
- 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

DUO series boilers are not equipped with an expansion tank of the heating system. The heating system is necessary to provide with an external expansion tank with the volume specified in the heating project.

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.



Only in necessary cases, is it permitted to use a certified anti-freeze mixture designed for these purposes and in the recommended concentration according to the producer. (for example FRI TERM[®] - producer Velvana, a.s., Velvary).

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 the boiler to the gas distribution

The connection of the boiler to the gas distribution must always be done professionally by a reputable company holding the valid certificate and by professionally capable employees – holder of valid certificate (issued according to Act **No.174/1968 Coll.** as amended and Regulation of ČUBP and ČBU **No. 21/1979 Coll.** (as amended) and according to the approved documentation for gasification. A gas pressure regulator is not installed in front of the boiler. This regulator is contained in the compound gas armature which is part of the boiler. A ball valve must be installed in front of the boiler with the respective attestation for gas. The gas closure must be freely accessible. The inside gas distribution network and the gas meter must be designed with respect to the other gas consumer appliances of the user. Gas meters in the buildings must be operated according to **ČSN EN 1775**.

DUO series boilers are designed to operate on **natural gas** with a calorific value of 9 to 10,5 kWh/m³ and the nominal pressure of 20 mbar in the distribution network, and boilers DUO 50.A and DUO 50 T.A (after the conversion of nozzles, etc.) and on the **propane** with the nominal pressure in the distribution network of 37 mbar in the distribution network.

3.7 Conversion to other fuels

When converting the boiler due to change of gas, it is necessary to dismantle the burner ramp, to change the nozzles and to change setting of the pressure range on the gas valve. It is also necessary to change the settings in the boiler service menu. These activities may be performed only by a trained service technician!

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 display 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 Connection to the chimney - DUO 50.A version

The mentioned variant of boiler is connected to a special chimney air channel that must have a diameter corresponding to the power of the boiler and must be lined in relation to ČSN. Before connecting the boiler, we recommend to consult with a chimneysweep or to ensure preliminary revision. The boiler is fitted with a built-in draught interrupting unit. The recommended chimney draught above the interrupting unit is within the range 3 – 5 Pa. The part of the chimney flue above the interrupting unit must be vertical with a length of 400 mm. It is not permitted to insert into the chimney flue any bodies restricting the passage of burnt gases (e.g. various types of exchangers for use of the remaining heat). The chimney flue is part of the equipment of the chimney.

The chimney must be operated in accordance with ČSN 73 4201 and must fulfil, e.g. the following requirements:

- 1/ The chimney insert must be from dustproof material and must be resistant to burnt gases and condensate.
- 2/ The chimney must report sufficient strength and low heat penetration. It must be sufficiently tight to prevent cooling.



The chimney variants of boilers must only be located in rooms that comply with the respective requirements for the manner of ventilation! Boilers consume air for combustion directly from the area in which they are installed! The supply and the necessary volume of air for combustion and ventilation of the room must be resolved in accordance with valid regulations. For details, see, e.g. TPG 70401 – Off-take gas equipment and consumer appliances for gas fuel in the buildings.

3.10 Design of exhaustion of burnt gases, version DUO 50 T.A and DUO 50 FT.A

The exhaust for burnt gases of these types of boilers must be designed by means of the smoke collection system delivered by the producer. The route for smoke must be designed so that any originated condensate from burnt gases can always be collected. For this reason, special flanges or inserts are used to collect condensate. The smoke must be collected so as to prevent leakage of the originated condensate into the ventilator and also into the boiler! In terms of inspection of flue gas path, the flue exhaust must be equipped with a suitable manhole.

Defects caused by leakage of the condensate cannot be the subject of the warranty for the boiler!

For the THERM DUO 50 T.A boilers is approved the flue diameter of 80 mm:

For the THERM DUO 50 FT.A variant of the boiler, the following methods for collecting burnt gases are approved:

- a) coaxial smoke collection tube with a diameter of 80/125 mm
- b) 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	DUO 50 T.A		DUO 50 FT.A	
	Maximum length - horizontally	Maximum length - vertically	Maximum length - horizontally	Maximum length - vertically
60/100 mm	impossible	impossible	impossible	impossible
80/125 mm	impossible	impossible	3 m	3 m
2 x 80 mm	impossible	impossible	3 m + 3 m (suction+ exhaust)	3 m + 3 m (suction+ exhaust)
1 x 80 mm	5 m	5 m	impossible	impossible

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:

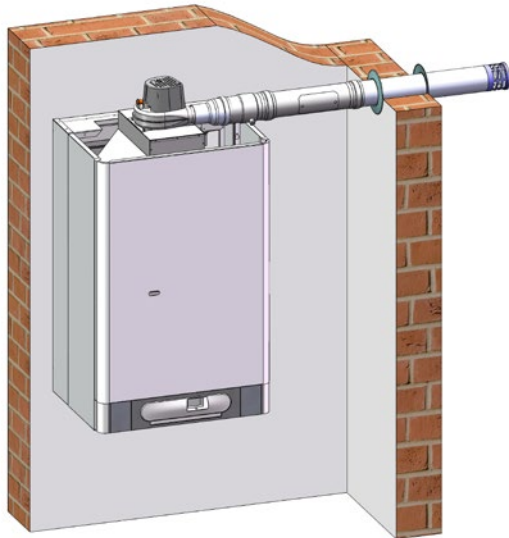
- 0,5 m - knee 45°
- 0,75 m - knee 90°



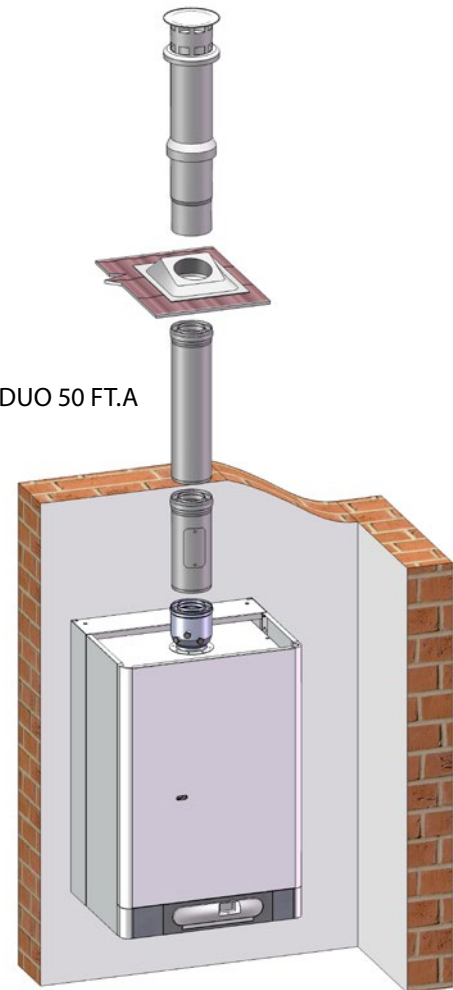
The maximum total pressure loss of gas collection is 80 Pa.

Example of gas collection

THERM DUO 50 T.A



THERM DUO 50 FT.A



3.11 Connection of the boiler to the storage tank

The DUO boiler (after expansion by the three-way valve) may be reliably and efficiently resolved together with the heating for the heating system and heating of water (TV). A detailed description of the water heating is in Chapter 2.3.6.



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 fork. These are connected to the network socket installed near the boiler so that the network fork is also accessible after installation of the boiler pursuant to the requirements of **ČSN EN 60 335-1**. The socket 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 $230\text{ V} \pm 10\%$.



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 inside the control panel of the boiler (see the electric diagram of the connection 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. 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

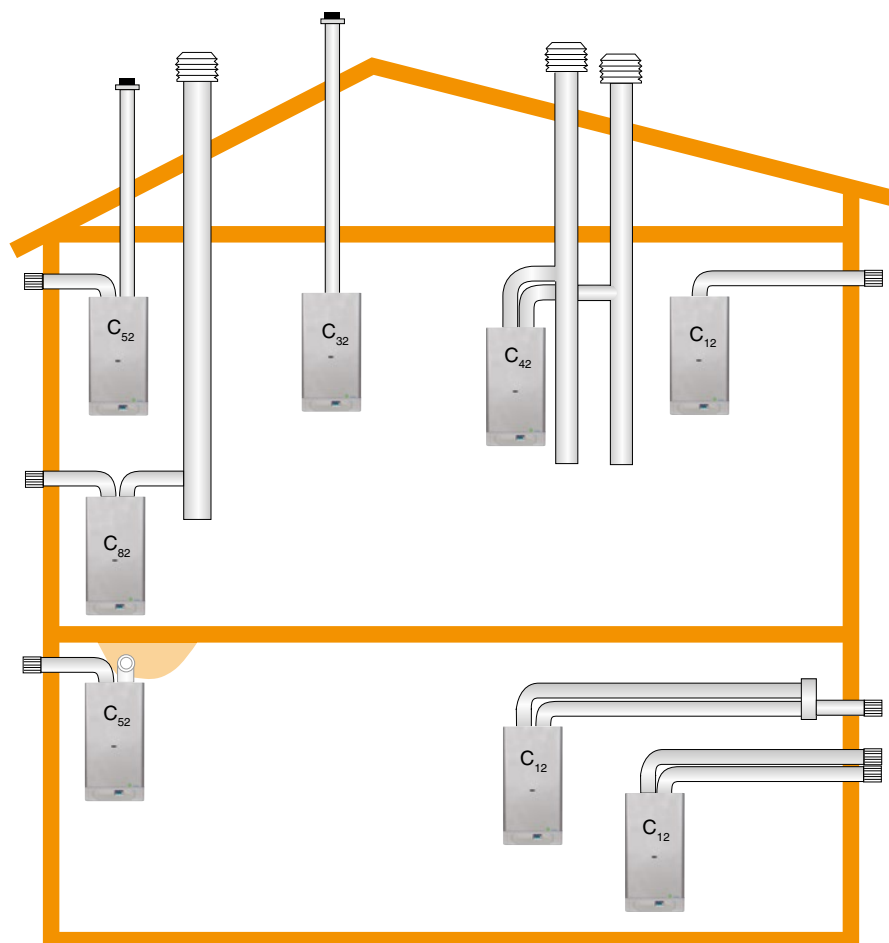
The connecting cable supplies the regulator for the transfer of the signal of the mutual communication by the protocol OpenTherm+ between the automatic system of the boiler and the regulator.

- 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 faston grounding (X2) 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:

C₁₂ - 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.

C₃₂ - 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.

C₄₂ - 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.

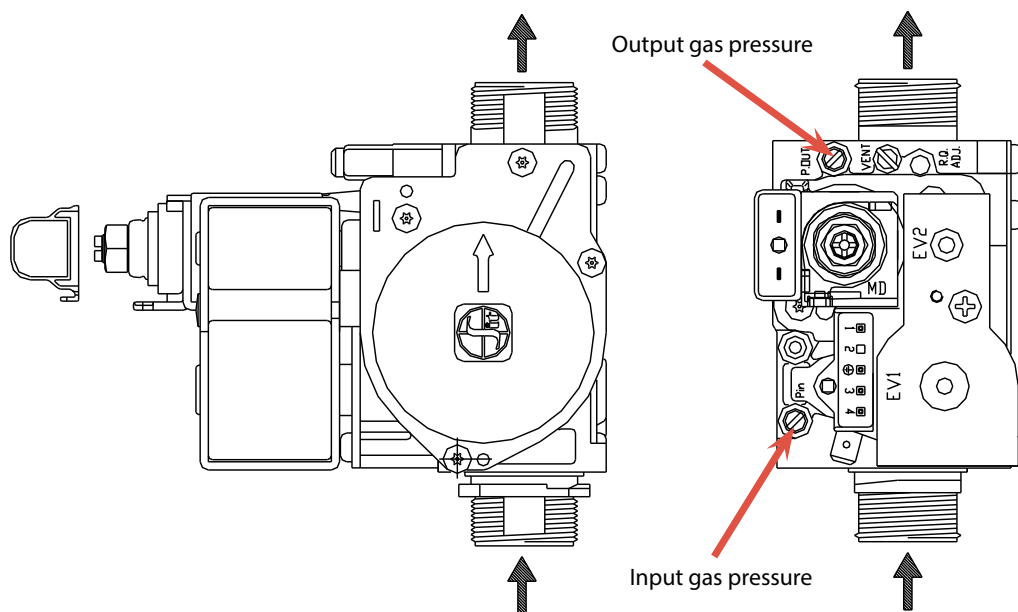
C₅₂ - Separated pipe with termination to the peripheral wall or on the roof, in different pressure zones, but under no circumstances to two opposite peripheral walls.

C₈₂ - Separated connection with the collection of burnt gases from a separate or common chimney. For the combustion gas is from the peripheral wall.

4. ADDITIONAL INFORMATION FOR SERVICE

4.1 Gas fitting SIT 845 SIGMA - setting

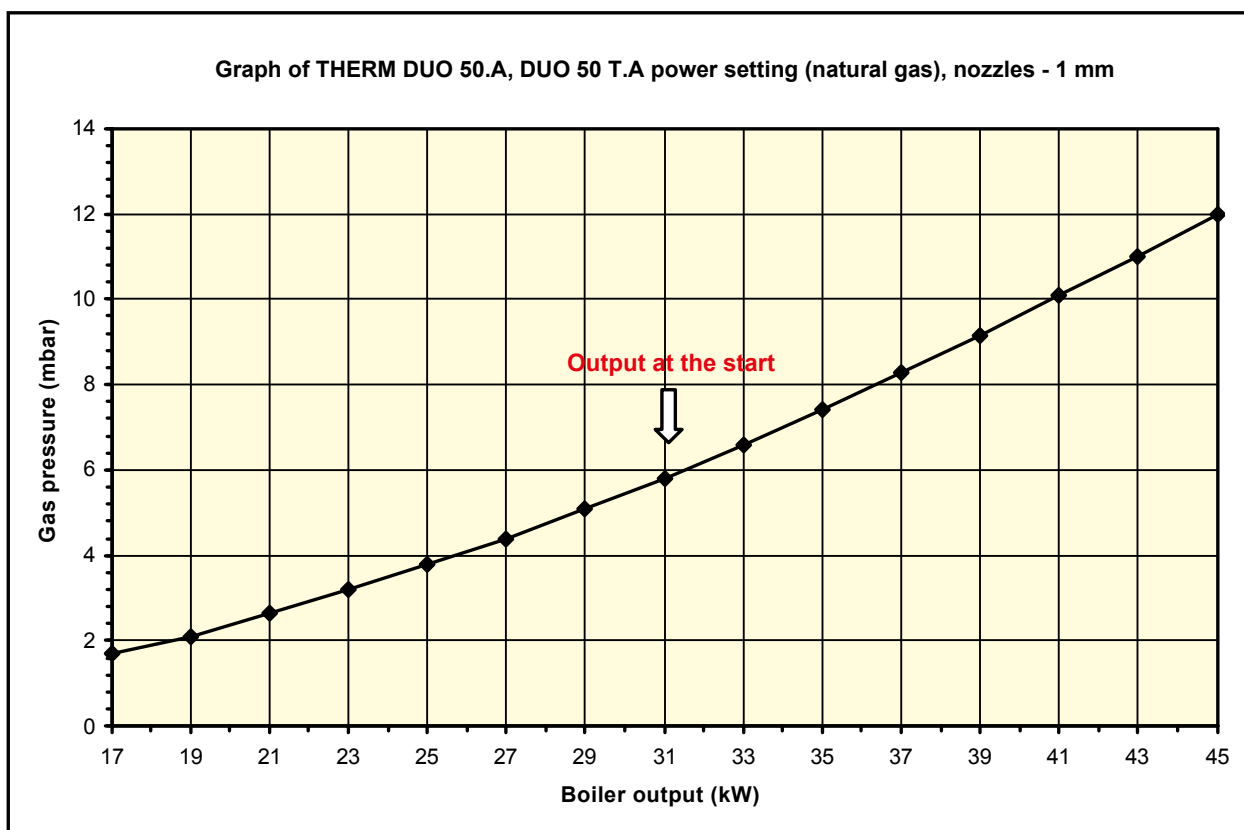
SIT 845 SIGMA gas fitting is fitted with two off-take adapters for measuring gas pressure (see Fig.). The adapters are fitted in a standard manner with a closing screw which is loosened during measurement. After termination of measurement, it is necessary to carefully tighten closing screws (the recommended tightening moment is 1 Nm).



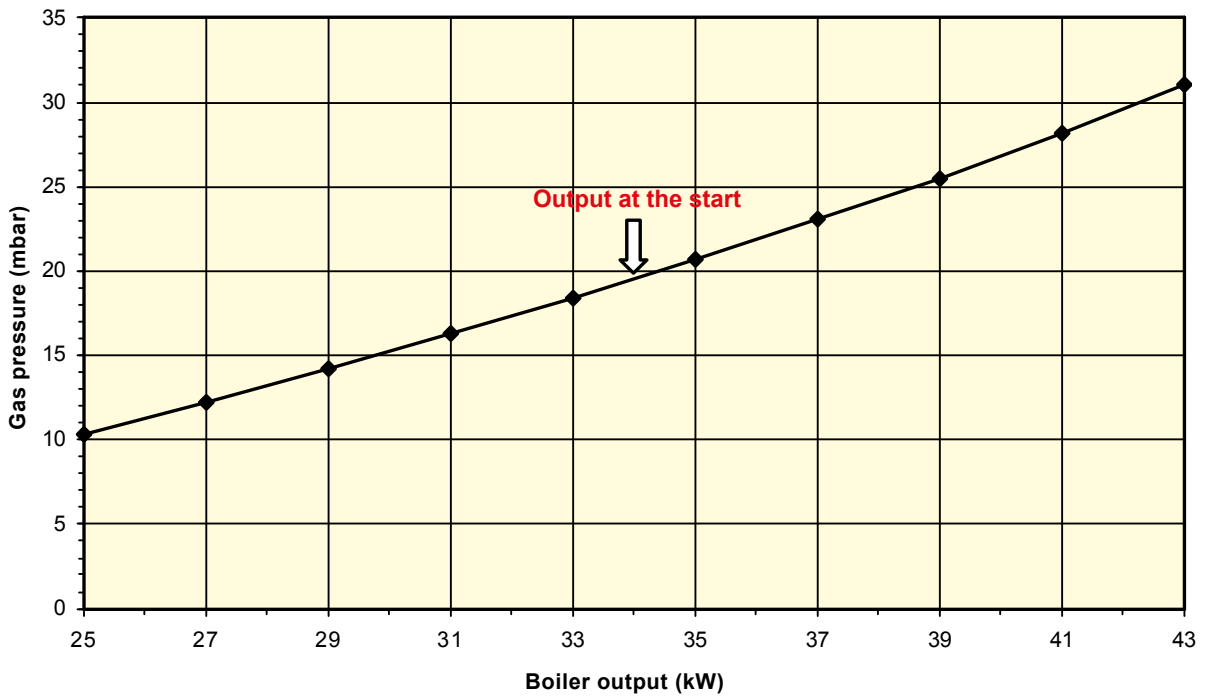
! The maximum, minimum and starting output is set by an employee from the service organisation!

The system for setting the gas pressure range on the modulator is protected by a plastic cover. This cover is removed when setting the gas pressure and after termination of the setting, it is necessary to mount it into the original position necessary for the correct function of the modulating coil.

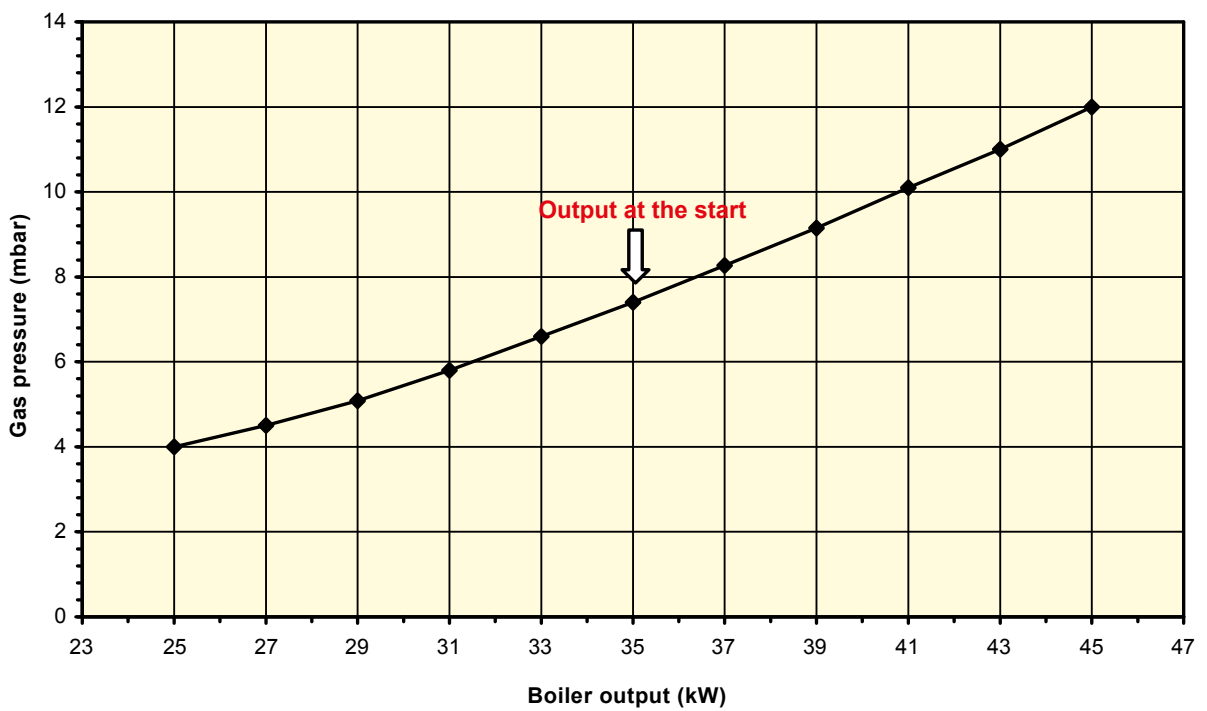
4.2 Graphs for setting the boiler output



Graph of THERM DUO 50.A, DUO 50 T.A power setting (propane), nozzles - 0,6 mm

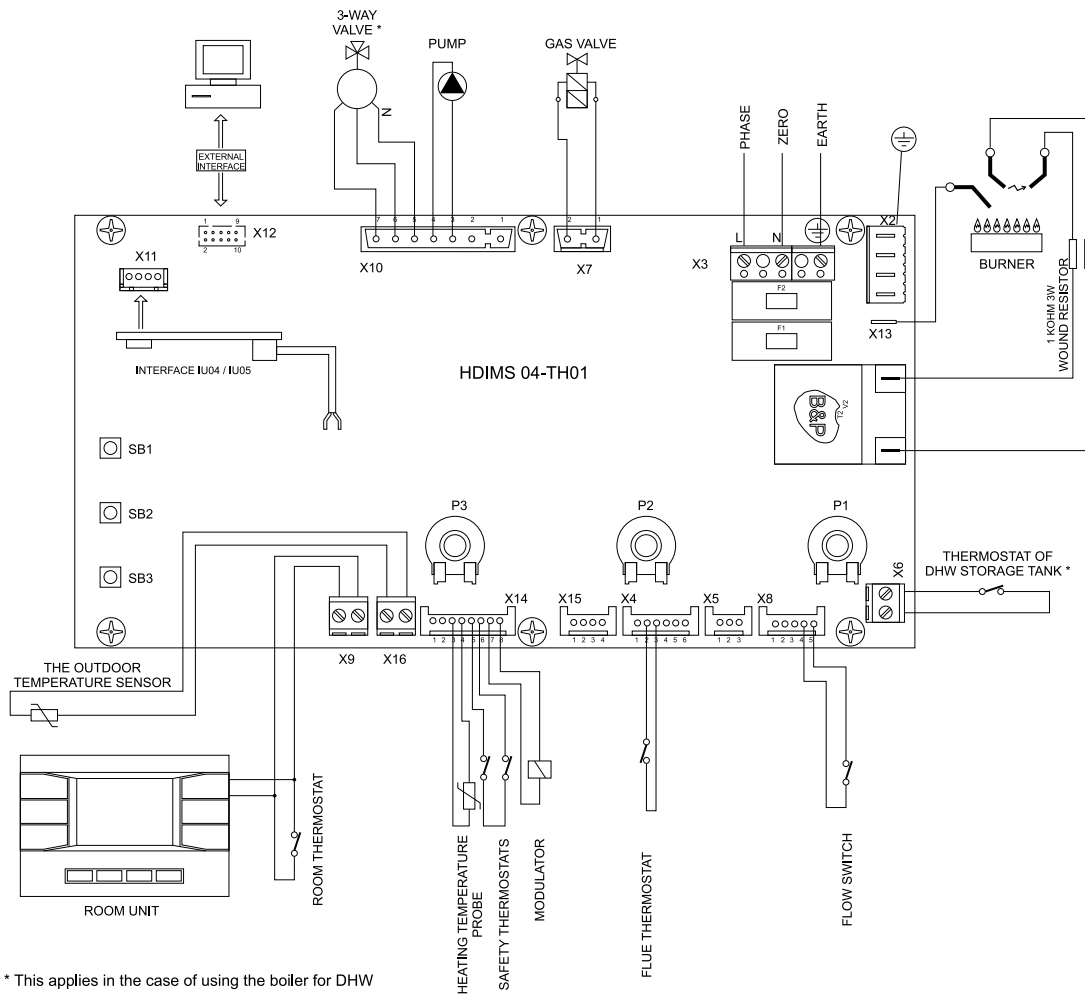


Graph of THERM DUO 50 FT.A power setting (natural gas), nozzles - 1 mm

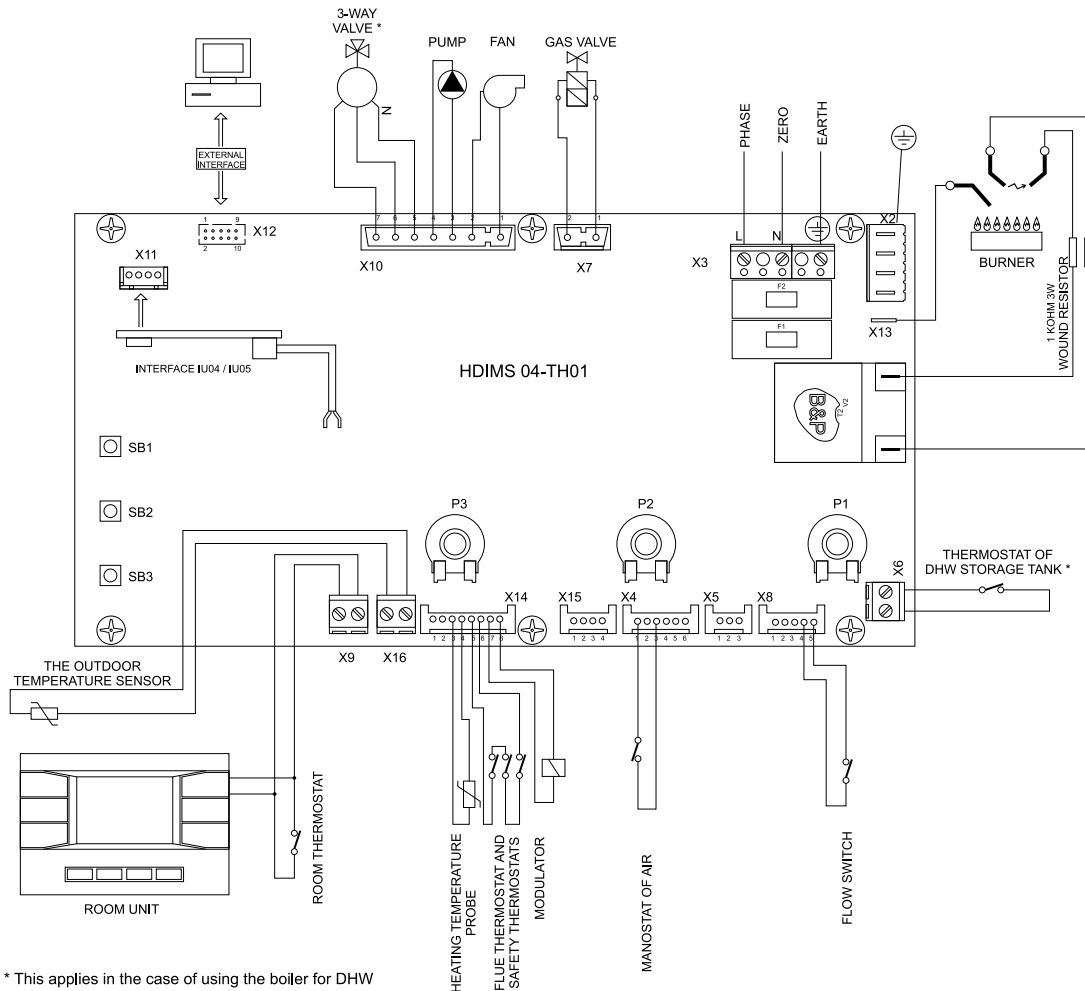


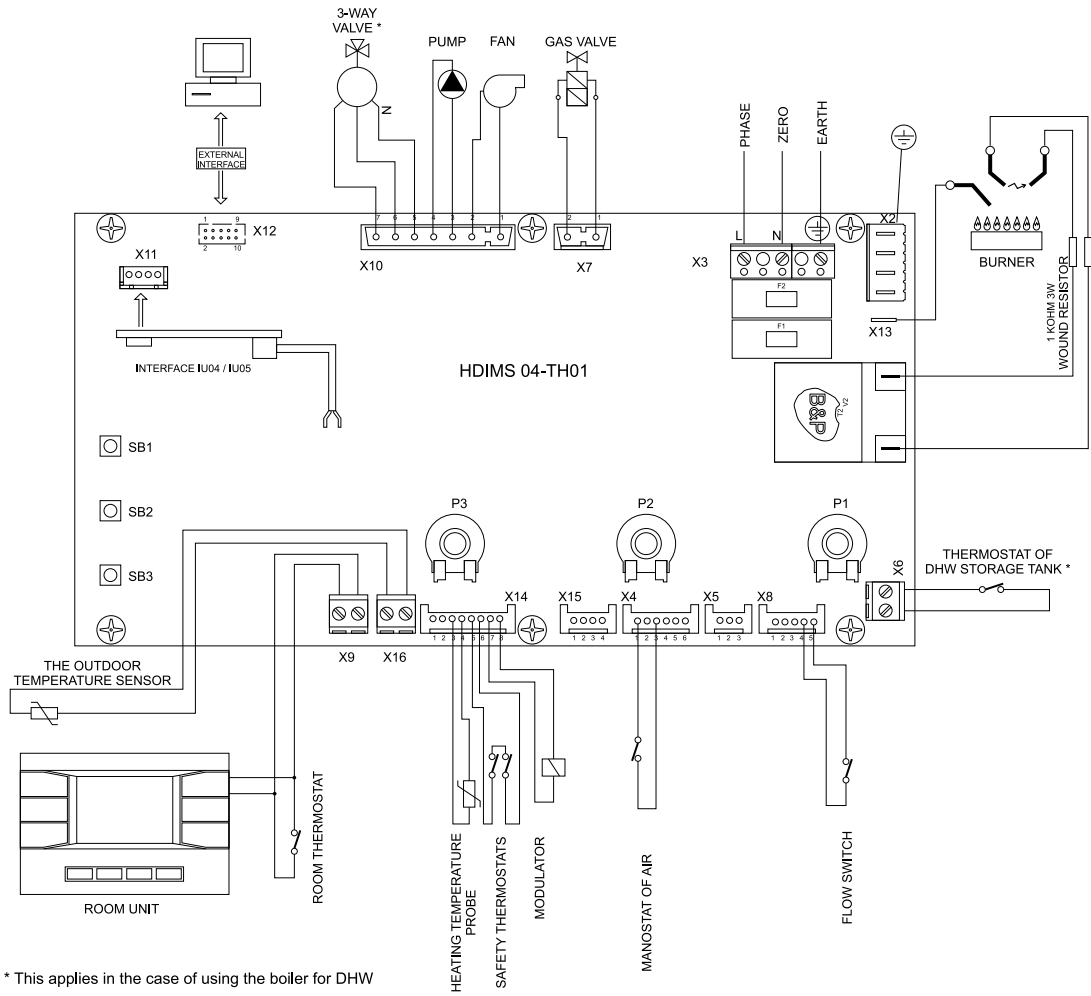
4.3 Electrical connection diagram

DUO 50.A



DUO 50 T.A





* This applies in the case of using the boiler for DHW



everything we do warms

THERM gas boilers:

Indication of model: THERM DUO 50.A
THERM DUO 50 T.A
THERM DUO 50 FT.A

Serial number: [empty box]

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.

THERM DUO 50.A, DUO 50 T.A

- Certificate of testing of the model according to the EC Directive for consumer appliances for gas fuel 90/396/EEC, No. E-30-00709-09
- Certificate of testing for the model according to the EC Directive for efficiency 92/42/EEC No. E-30-00710-09

THERM DUO 50 FT.A

- Certificate of testing of the model according to the EC Directive for consumer appliances for gas fuel 90/396/EEC, No. E-30-00759-09
- Certificate of testing for the model according to the EC Directive for efficiency 92/42/EEC No. E-30-00760-09

Technical inspection

date

stamp and signature:

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