TECHNICAL INFORMATION MANUAL

TYPE:	Wall-hung condensing boiler
UNIT:	Fan assisted, instantaneous, heating only, outdoor installation
MODELS:	Tahiti Condensing Line Tech Pictor Condensing Line Tech
VERSIONS:	Indoor, Outdoor installation
CODE:	AST 14 C 233/00

1th Edition, September 2011

fondital

BRAND NAME

NOVA FLORIDA

ENGLISH

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NOTES

CONDENSING BOILERS

Condensing boilers are nowadays the most technologically advanced solution available on the market for domestic heating and hot water production. These boilers meet strict environmental protection requirements thanks to very low pollutant emission.

Condensing boilers have higher thermal efficiency compared to traditional boilers, which results in energy savings and a reduction of fuel consumption.

Although at first glance these generators appear as high-end products, and therefore more expensive than traditional boilers, they provide substantial savings and pay back the extra purchasing cost in the short term, provided they are installed in a suitable heating system.

A condensing boiler will generate additional heat from the boiler flue gas by means of condensation (i.e. conversion into liquid form) of water vapour contained in the exhaust pipe, thus recovering its latent heat and obviously allowing energy saving and, as a consequence, better thermal efficiency.

In this way an amount of energy that would otherwise be lost can be recovered (540 kcal for every kg of condensation produced). The condensate produced is however slightly acid and therefore these boilers are manufactured with suitable materials. The formation of condensate is therefore evidence of the correct operation of a condensing boiler.

Useful definitions

Sensible heat: the amount of heat absorbed by an object that causes as its sole effect a change of temperature.

Latent heat: the amount of heat that causes a change of state of an object without a change in temperature.

Gross Calorific Value (GCV): heat released by the combustion of 1 Nm^3 of gas assuming all of the water in a combustion process is in a liquid state after a combustion process, so recovering latent heat. International symbol: Hs

(G20: Hs=37.78 Mj/m^3)

Net Calorific Value (NCV): heat released by the combustion of 1 Nm^3 of gas assuming that the latent heat of vaporization of water in the fuel and the reaction products are not recovered. International symbol Hi (G20: Hi=34.02Mj/ m^3)

Combustion is the process taking place when a mixture of oxygen and fuel is heated to a given temperature. It is an exothermic reaction, which means that heat is released.

The combustion of methane produces water vapour and carbon dioxide, which are released with the combustion by-products. Exhaust gas produced by a boiler is actually a mixture of flue gases and steam.

Why and how condensing boilers produce condensate

It is common knowledge that during the combustion process of methane, along with the production of heat, a certain quantity of carbon dioxide and steam are obtained. This can be expressed by the following reaction:

$$CH_4 + 2O_2 \rightarrow C0_2 + 2H_2O + HEAT$$

(methane + oxygen --> carbon dioxide + water vapour + heat)

In a traditional boiler the flue gases released into the atmosphere inevitably contain a certain amount of energy that otherwise would be wasted. This is due to the high temperature of the flue emissions, which are discharged at a temperature exceeding 100°C.

In general, a 20°C reduction in flue gas temperature will give a 1.5% gross efficiency increase, however traditional appliances cannot recover this amount of energy. The reason lies in the fact that a reduction in temperature of the flue gases in traditional boilers could hinder the natural upward flow of air through the chimney, driven by the difference in temperature between the flue gases and the external air (natural draught). Further cooling of the exhaust flue, (with consequent recovery of latent heat from condensation) would result in acid condensate (pH 3-5), certainly dangerous for the kind of components used in traditional boilers (for example the primary heat exchanger in copper).

The construction features of modern condensing boilers, manufactured using more noble materials (stainless steel), on the contrary, allow the correct operation of these appliances, without altering their properties during their service life.

In order to retain the heat that would otherwise be wasted, as mentioned, flue gases have to be cooled down below the “dew point”, allowing to recover the heat and transfer it back to the heating system. While above the “dew point”, only “sensible heat” can be recovered, bringing the temperature below such temperature (about 55-56°C in normal methane combustion), a part of the steam contained in the flue gases “condense” and release further latent heat.

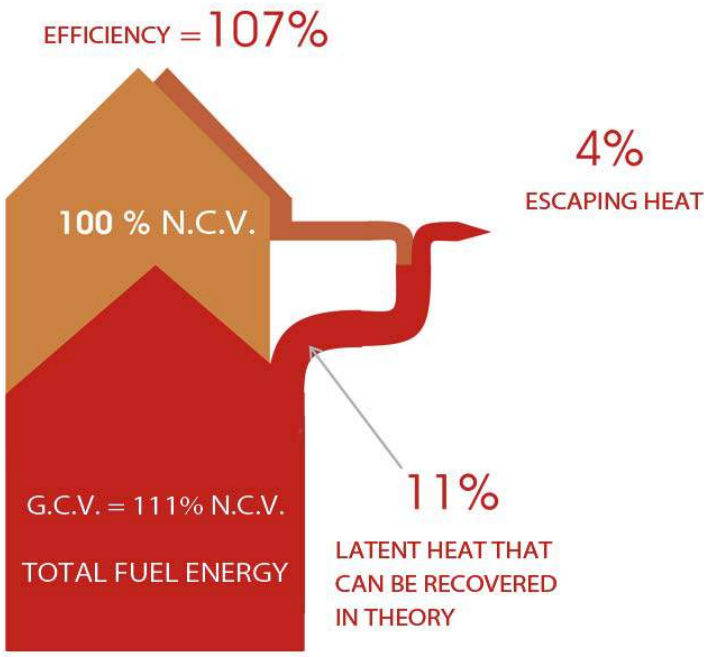
How condensing boilers should not produce condensate

Until a few years ago the calories needed to form water vapour during the combustion process were thought of as impossible to recover, so that they were regarded as a “lower calorific value”.

Nowadays appliances and components are available that allow this operation. The heating system design, however, must be carefully considered, as merely installing a “condensing boiler” (one that, given certain conditions, can form condensate) is not sufficient. The heating system must be designed, implemented and maintained so that the return temperature to the boiler and the power supplied by the boiler itself are kept constant at the lowest possible level, with respect to the heating system requirements.

The use of panels as heating elements is often regarded as the sole key to a “low temperature” heating system, thus providing an ideal application of condensing boilers; this however, is not always true.

It is well possible to construct a panel heating system that does not produce even a drop of condensate, if the design is wrong for the intended needs.



Reference regulations.

The fact that thermal efficiency values can exceed 100% stems from the fact that the European Community Regulations require to calculate the thermal efficiency of all boilers by referring to the net calorific value, which does not consider the condensation heat of steam; this method allows to compare the efficiency of condensing boilers and traditional boilers on the same basis.

European Directive 92/42/CEE on Efficiency Requirements, enforced in Italy by Presidential Decree 660/96

In the case of methane, the amount of latent heat that can be recovered in theory amounts to 11%.

The UNI 11071 (July 2003) Regulation sets out clear and detailed rules for the installation and maintenance of a system comprising a condensing boiler with a nominal heat input not exceeding 35 kW.

At last, the forthcoming publication of the CIG E01.08.929.0 Regulation project will close the gap in the law concerning systems with nominal heat input exceeding 35 kW, thus providing a clear framework for the installation of condensing boilers.

Content of the regulation

Definition of condensing appliance or similar (art. 3.1).

The Regulation defines condensing appliances or similar those appliances for which, during continuous operation, in all or some functioning and/or installation conditions of the heating system, the manufacturer envisages the condensation of combustion by-products not only inside the appliance, but also in the flue gas exhaust system to such an amount that it must be drained away or discharged.

Condensate discharge system (art. 5).

In all cases, condensing appliances or similar, as previously defined, must always be connected to the domestic sewage system. It is important that the connection of the condensate discharge pipe is attached in a way that prevents the leakage or backflow of the unburned solids and combustion by-products or escape of any volatile material into the atmosphere or sewage system. In order to obtain this, a properly designed siphon must be used (inside the appliance and/or connected to the flue gas exhaust system).

As to the condensate discharge system, the Regulation provides that the condensate shall not be exploited by the users; the piping system shall be designed to allow a smooth flow of the condensate, without any bottleneck that could inhibit its regular discharge or cause leakages and shall prevent any freezing of the pipes (condensate).

The Regulation requires the pipes to have a minimum slope of 3%. In all cases, stagnation of the condensation must be prevented, excepted to water inside the discharge siphon

NOTE: The pipe joining the condensation discharge to the domestic sewage system is not part of the heating system (art. 5 paragraph 5.1).

- **How to dispose of the condensate**:

The Regulation considers the noteworthy quantity of wastewater produced in domestic uses (180 litres pro-capite), well-known for its high basicity, which allows to effectively dilute the acid condensate produced by these appliances and therefore, recognises the possibility to **discharge the condensation directly into the sewage system.** The alteration of pH level due to the acidity of the condensate produced by a condensing boiler (heat output up to 35 kW) can be regarded as insignificant.

CHAP. 1
TECHNICAL FEATURES

1.1 MODELS

TAHITI-PICTOR CONDENSING LINETECH **KC 24 – 28 – 32**
TAHITI-PICTOR CONDENSING **KC IN 24 – 32**
TAHITI-PICTOR CONDENSING LINE TECHE **KR 24 – 28 – 32**
TAHITI-PICTOR CONDENSING LINE TECH **KRB 24 – 28 – 32**

KEYS TO ABBREVIATIONS:

LINE TECH: user interface with LCD display
K: condensing
C: combination boiler
R: heating only
RB: with 3-way mixing valve for hot water storage tank installation
IN: encased installation type

MAIN FEATURES:

- TAHITI-PICTOR CONDENSING LINETECH **KC 24 – 28 – 32**:
  Combi, instantaneous condensing boiler, indoor installation, for domestic hot water + heating, room sealed, fan assisted, monothermal finned heat exchanger.
- TAHITI-PICTOR CONDENSING **KC IN 24 – 32**:
  Combi, instantaneous condensing boiler, encased installation, for domestic hot water + heating, room sealed, fan assisted, monothermal finned heat exchanger.
- TAHITI-PICTOR CONDENSING LINE TECHE **KR 24 – 28 – 32**:
  Condensing boiler for indoor installation, **heating only**, room sealed, fan assisted, monothermal.
- TAHITI-PICTOR CONDENSING LINE TECH **KRB 24 – 28 – 32**:
  Condensing boiler for indoor installation, heating only with three-way mixing valve for hot water storage tank installation, room sealed, fan assisted, monothermal.

APPEARANCE:

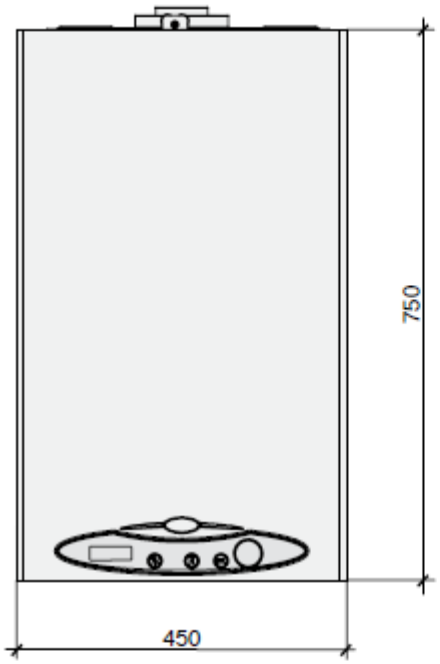
TAHITI CONDENSING LINE TECH

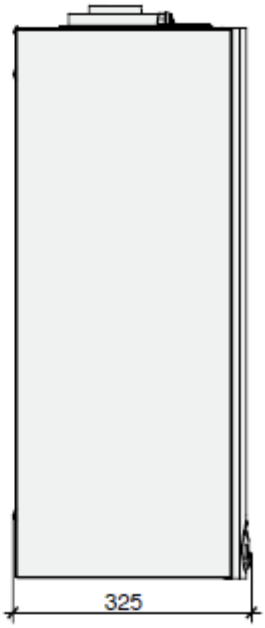
PICTOR CONDENSING LINE TECH

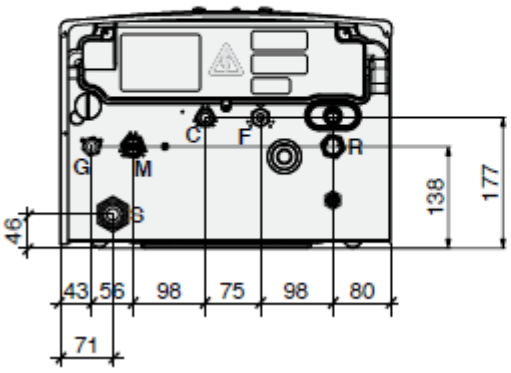
TAHITI-PICTOR CONDENSING IN

1.2 OVERALL DIMENSIONS

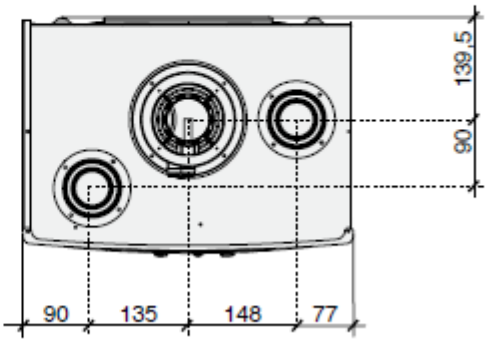
INDOOR INSTALLATION TYPE







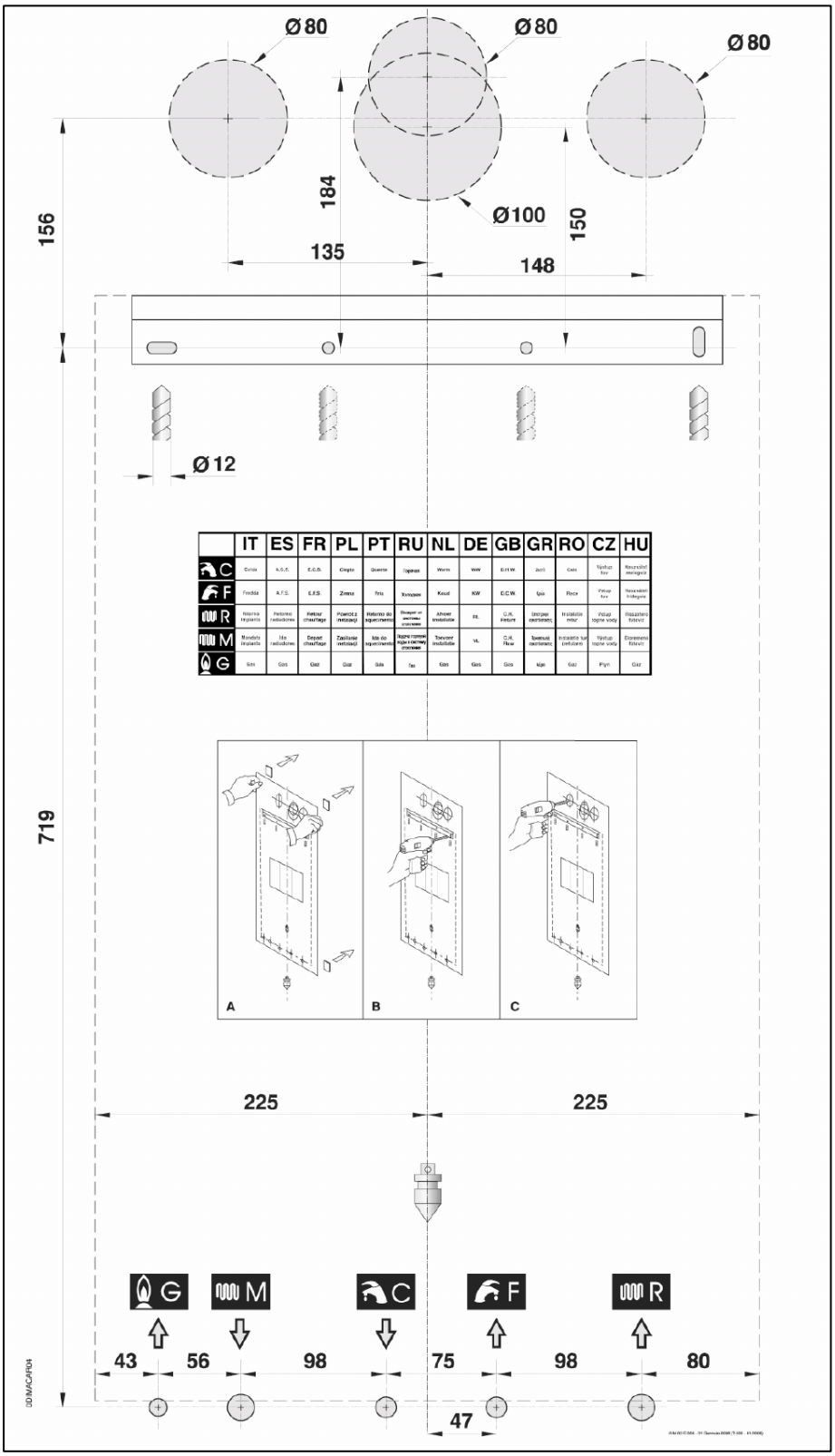
View from the bottom



View from the top

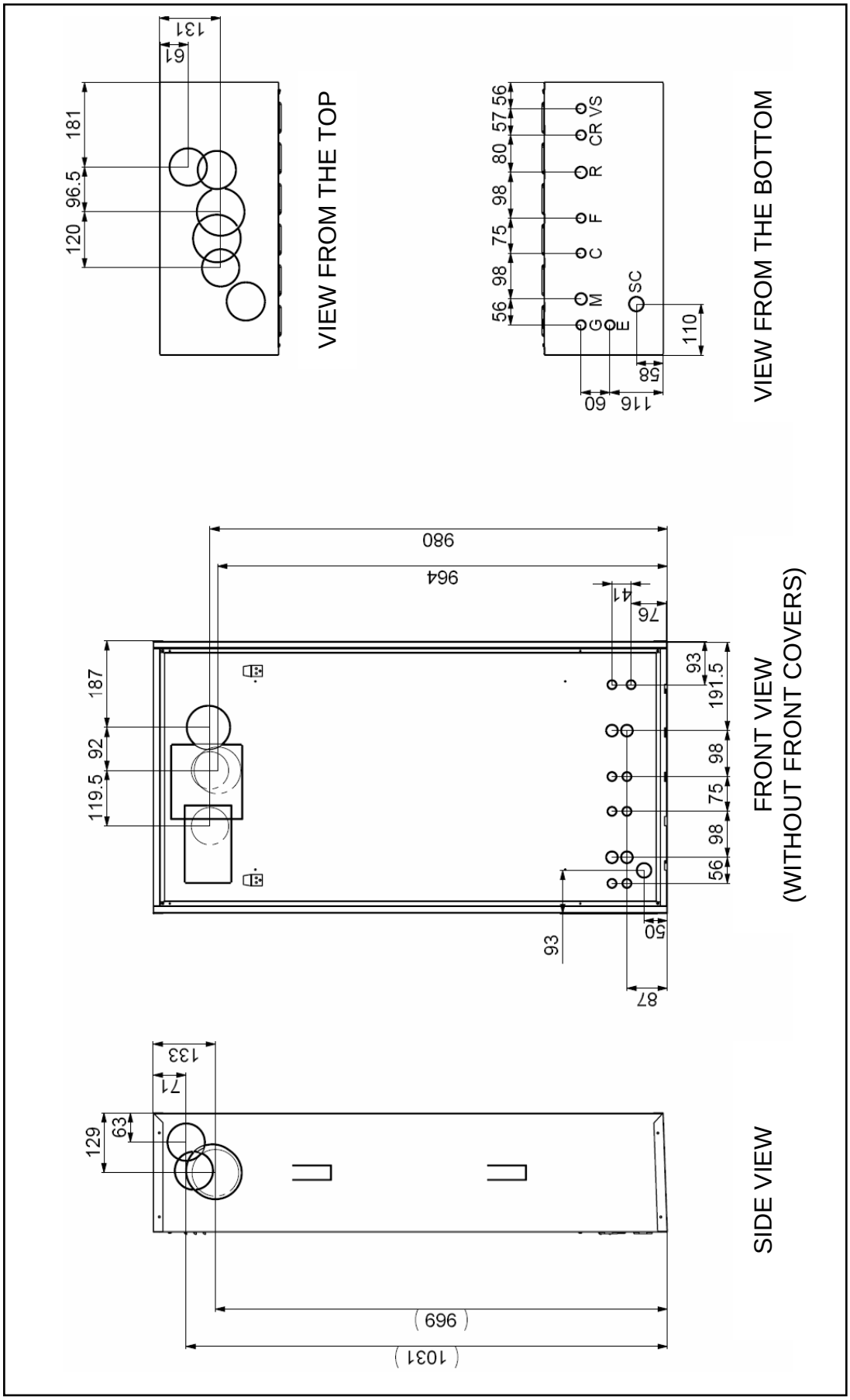
S	Condensate drain
F	Water mains intake (KC and KR)
G	Gas intake
SI	Inspection trap plug
M	CH system flow
C	DHW flow outlet (KC) / storage tank flow (KRB)
SV	3-bar safety valve drain cock
RC	Filling tap
R	CH system return
RS	Drain cock

INSTALLATION TEMPLATE

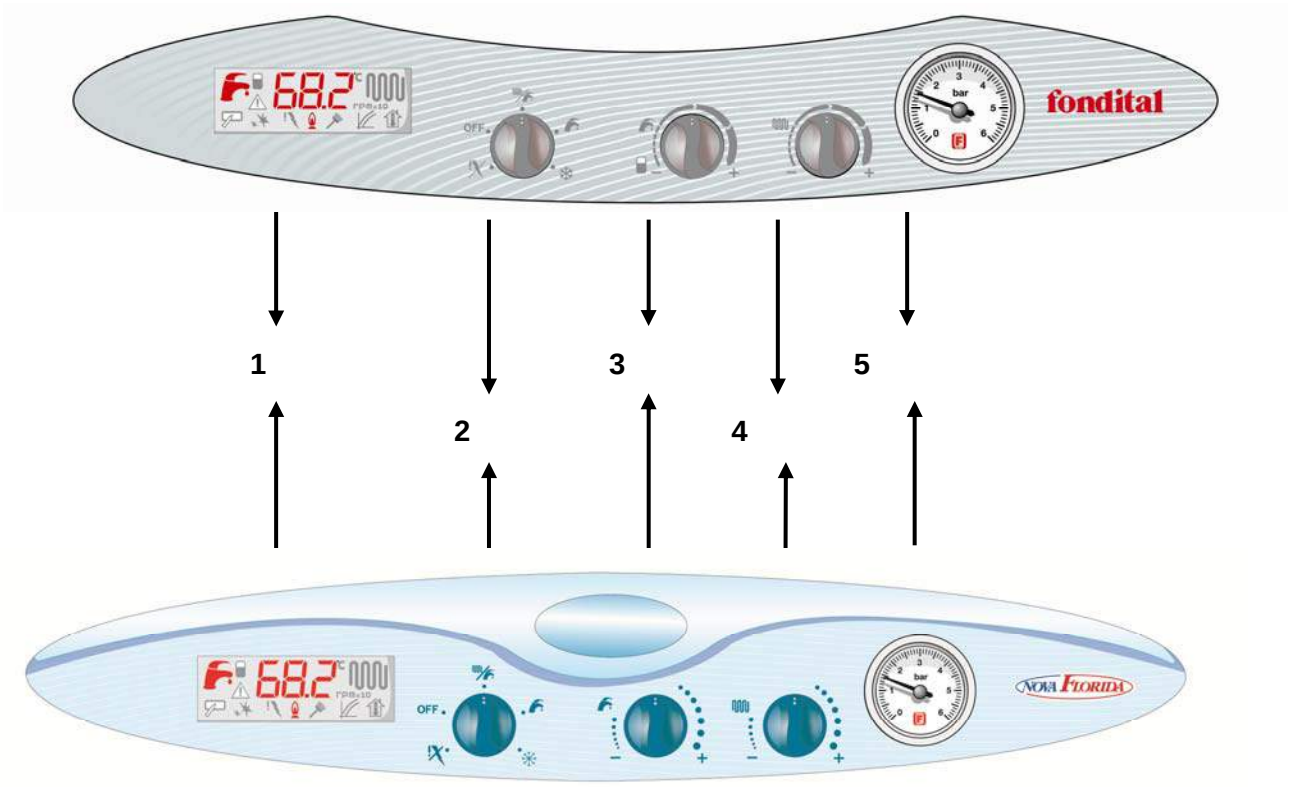


	IT	ES	FR	PL	PT	RU	NL	DE	GB	GR	RO	CZ	HU
C	Calda	A.C.S.	E.C.S.	Ciepła	Quente	Горячая	Warm	WW	E.H.W.	Ζεστό	Caldă	Teplá voda	Használati melegvíz
F	Fredda	A.F.S.	E.F.S.	Zimna	Fria	Холодная	Koud	KW	C.C.W.	Κρύο	Rece	Studená voda	Hidegvíz
R	Ritorno impianto	Retorno instalaciones	Retour chauffage	Powrót z instalacji	Retorno de aquecimento	Возврат от приборов отопления	Afvoer installatie	Rücklauf Heizung	C.H. return	Επιστροφή εγκατάστασης	Întoarcere instalație	Vratná topná voda	Fűtővíz-visszatérő
M	Mandata impianto	Ida radiadores	Départ chauffage	Zasilanie instalacji	Ida do aquecimento	Подача приборов отопления	Toevoer installatie	Vorlauf Heizung	C.H. flow	Τροφοδοσία εγκατάστασης	Tur instalație	Výstup topná voda	Előremenő fűtővíz
G	Gas	Gas	Gaz	Gaz	Gás	Газ	Gas	Gas	Gas	Αερ	Gaz	Plyn	Gáz

ENCASED INSTALLATION TYPE



1.3 CONTROL PANEL



1. Liquid crystal display (LCD)
The LCD displays the boiler status and operating data (see fig. 2)

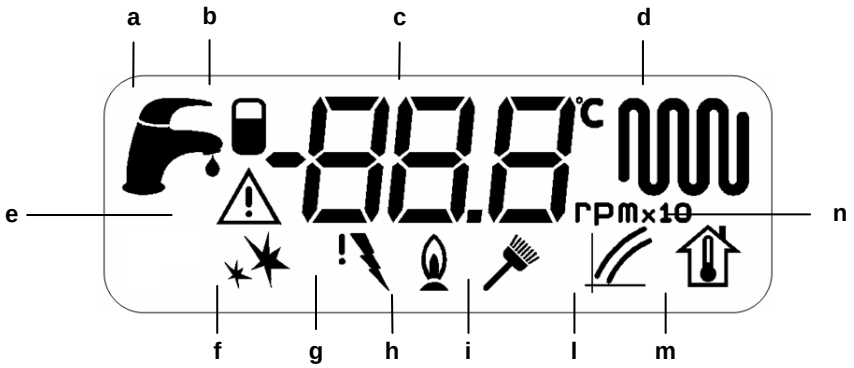
2. Boiler function selector
With the selector on RESET, the boiler restarts after activation of the burner shutdown device.
With the selector on OFF, the boiler is in stand-by mode.
With the selector on SUMMER, the boiler is ready to produce domestic hot water only.
With the selector on WINTER, the boiler is ready to heat and produce hot water.
With the selector on ANTI-FREEZE, only the anti-freeze function is enabled.

3. DHW temperature regulator
This is used to enable/disable water storage and to set the DHW temperature in the range 35-57°C. For boilers model RTN and RTFS connected to an (optional) water heater this regulator also enables/disables the water heater.

4. CH water temperature regulator
This is used to select the temperature of the water in the heating system in the range 20 °C to 45 or 78°C.
When an external probe is fitted, this regulation knob does not work as water temperature selector anymore, while serving the purpose of setting the nominal room temperature.

5. Water pressure gauge
This shows the pressure of the water in the heating system.

LCD display



a. DHW indicator
This comes on when the boiler is in DHW mode.
It flashes when the DHW temperature is being regulated via regulator 3.

b. Water heater on indicator
This indicator comes on when the water heater (optional) is activated via regulator 3.

c. Alphanumeric indicator
This shows the following:
- CH flow water temperature
- CH temperature setting
- DHW temperature setting
- boiler status
- boiler diagnostics

d. Central heating indicator
This comes on when the boiler is in CH mode.
It flashes when the CH temperature is being regulated via regulator 4.

e. Boiler shutdown indicator
This comes on when there is a malfunction that cannot be reset via the boiler function selector 2.
The problem must be solved before the boiler can be restarted.

f. Ignition power indicator (for fitter only)
This indicator flashes when ignition power is set by means of the Pacc trimmer.

g. Burner shutdown indicator
This comes on when the burner shutdown device activates due to a malfunction.
To restart the boiler, turn the boiler selector 2 to the RESET position for a few seconds and then back to the desired position.

h. Flame indicator
This comes on when the burner flame is present.

i. Chimney-sweep function indicator (for fitter only)
This flashes when the chimney-sweep function is activated.

j. Thermoregulation indicator (for fitter only)
This comes on when the thermoregulation curve is set.

k. Nominal room temperature indicator
When an external probe is installed, this indicator flashes when the nomi room temperature is set via regulator 4.

l. Fan speed indicator (for fitter only)
When the chimney sweep function is activated, this symbol flashes indicating the fan speed.

BOILER STATUS – **Normal operation**

Boiler selector on OFF	
Boiler selector on ANTI-FREEZE. During the anti-freeze operation, the display shows alternately the flow temperature and the symbol “AF”.	
Boiler selector on SUMMER or WINTER. No function active. The flow water temperature is displayed.	
Boiler selector on SUMMER or WINTER. DHW system enabled. The flow water temperature is displayed.	
Boiler selector on WINTER. CH function active. The flow water temperature is displayed.	
Boiler selector on SUMMER or WINTER. External (optional) water cylinder enabled. In order to enable the water cylinder, turn the boiler function selector fully counterclockwise and then set it to the desired setpoint. The flow water temperature is displayed.	

Malfunction; lockouts that can be solved turning the boiler function selector to RESET.

Boiler turned OFF	
Boiler shutdown due to flame absence	
Boiler shutdown due to safety thermostat activation	
Boiler shutdown due to flue gas thermostat activation	

Malfunction; lockouts that cannot be solved with the boiler controls.

Shutdown due to a water circulation malfunction in CH system or minimum pressure gauge (pump ON – main flow switch OPEN)	
Shutdown due to a water circulation malfunction in CH system (pump OFF – main flow switch CLOSE)	
CH probe failure	
DHW probe failure KC model only	
Water heater probe fault (Only for KR and KRB models connected to an optional water heater with NTC probe)	
Fan failure	
Remote control (optional) connection failure	
External probe (optional) failure	

PLEASE NOTE
Backlight turns on:

- during regulation with trimmers or boiler selectors;
- flashing (3 seconds on, 2 seconds off), in case of lockout or problems;
- during chimney-sweep function.

1.4 TECHNICAL DATA

NOMINAL DATA				
MODEL		**KC-KR-KRB 24**	**KC-KR-KRB 28**	**KC-KR-KRB 32**
Equipment category		II2H3P		
Installation type		B23; C13; C33; C42; C53; C83		
Nominal heat input (Qn)	kW	23.7	26.2	31.4
Nominal heat output (80 - 60°C) (Pn)	kW	23.1	25.55	30.63
Nominal heat output (50 - 30°C)	kW	24.8	27.4	33.2
Reduced heat input (Qr)	kW	6.8	5.7	9.1
Reduced heat input (80 - 60°C) (Pr)	kW	6.5	5.4	8.7
Reduced heat output (50 - 30°C) (Pr)	kW	7.3	6.1	9.6
Efficiency at 100% (80 - 60°C)	%	97.5	97.53	97.57
Efficiency at 100% (50 - 30°C)	%	104.8	105.4	105.4
Efficiency at 100% 30 %	%	109.1	108.9	108.7
Efficiency at reduced input (80 - 60°C)	%	95.7	95.5	96.3
Efficiency at reduced input (50 - 30°C)	%	106.9	106.7	106.3
Heating temperature adjustment range	°C	20 ÷ 78		
Maximum heating temperature	°C	78 + 5		
Maximum water pressure (heating) (Pms)	Bar	3		
Minimum water pressure (heating) (Pms)	Bar	0.5		
Nominal heat input DHW (Qns)	kW	27.2	30.4	34.5
Nominal heat output DHW (Qns)	kW	28.0	31.0	35.4
Reduced heat input DHW (Qrs)	kW	6.8	5.7	9.1
Tap capacity (D) Δt 30K	l/min	13.5	14.4	16.5
Temperature set for tap capacity	°C	57	57	57
Domestic hot water max. pressure	Bar	8	8	8
Domestic hot water min. pressure	Bar	0.5	0.5	0.5
Domestic hot water adjustment range	°C	35 ÷ 57	35 ÷ 57	35 ÷ 57
Domestic hot water max. temperature	°C	57 + 5	57 + 5	57 + 5
Height	mm	750		
Width	mm	450		
Depth	mm	330		
Nox class (according to en 483)		5		
Domestic hot water qualification en 13203		★★	---	★★

ELECTRICAL DATA				
DESCRIPTION		**KC-KR-KRB 24**	**KC-KR-KRB 28**	**KC-KR-KRB 32**
Power supply voltage	V	230		
Frequency	Hz	50		
Electrical power	W	145		
Degree of protection		IPX4D		

FAN CALIBRATION				
PARAMETER		**KC-KR-KRB 24**	**KC-KR-KRB 28**	**KC-KR-KRB 32**
V max DHW	Hz	181	195	201
V min DHW	Hz	53	45	59
V acc	Hz	67		83
V limit % CH	%	84	83	90

TECHNICAL SPECIFICATIONS							
MODEL		**KC-KR-KRB 24**		**KC-KR-KRB 28**		**KC-KR-KRB 32**	
		Pmax – Heat.	Pmin	Pmax – Heat.	Pmin	Pmax – Heat.	Pmin
Heat loss through external casing Burner ON	%	1.4	2.1	0.9	2.3	0.6	1.6
Heat loss through external casing Burner OFF	%	0.2		0.3		0.2	
Chimney heat loss with burner ON	%	2.6	2.2	2.5	2.2	2.4	2.1
Chimney heat loss with burner OFF	%	-	-	-	-	-	-
Efficiency		★★★★		★★★★		★★★★	

FLUE DATA							
MODEL		**KC-KR-KRB 24**		**KC-KR-KRB 28**		**KC-KR-KRB 32**	
		Pmax – San.	Pmin	Pmax – San.	Pmin	Pmax – San.	Pmin
CO_2	%	{See Gas Table}	{ See Gas Table }	{ See Gas Table }	{ See Gas Table }	{See Gas Table}	{ See Gas Table }
Tfumes – Tair	°C	67	49	51.2	45	54	51
Flue gas system mass flow rate	g/s	12.4	3.1	13.9	2.6	15.7	4.1
Available head	Pa	127	8	170	9	204	15

CONNECTIONS				
DESCRIPTION		KC-KR-KRB 24	KC-KR-KRB 28	KC-KR-KRB 32
Gas connection		G1½		
Heating connections		G1½		
Domestic hot water connections		G1½		

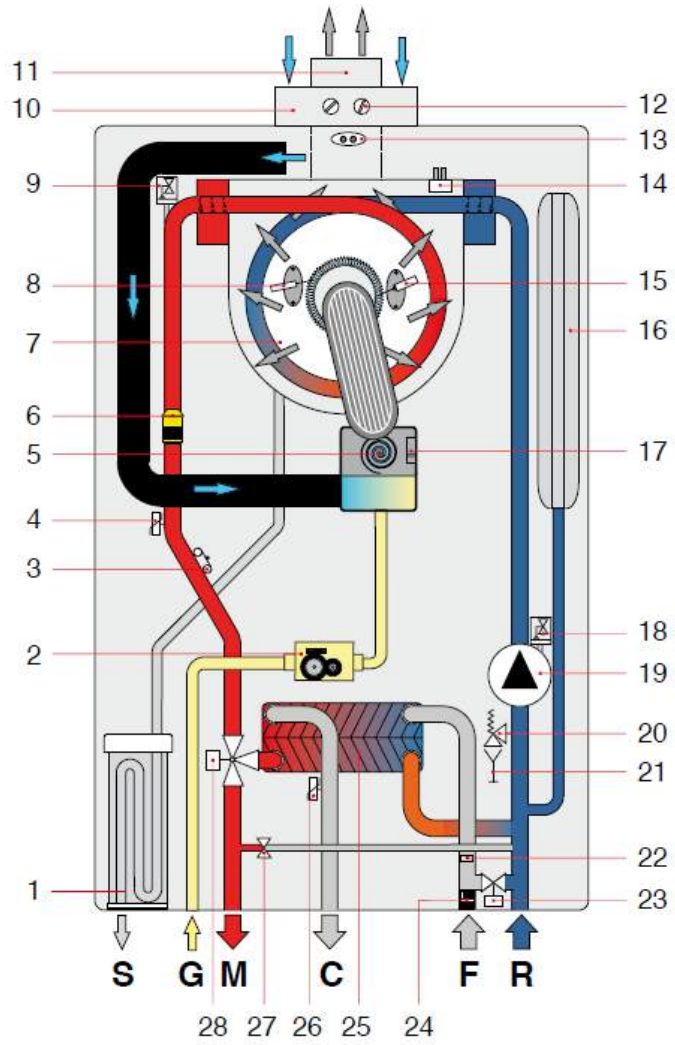
GAS CATEGORY			
COUNTRY OF DESTINATION	CATEGORY	TYPE OF GAS	SUPPLY PRESSURE (mbar)
ITALY	II_{2H3P}	G20 - G31	20 – 37
AT – CH	II_{2H3P}	G20 - G31	20 – 50
DE	$II_{2ELL3/P}$	G20-G25 / G31	20/20 – 50
NL	II_{2L3P}	G25 - G31	25 – 30
FR	II_{2Er3P}	G20/G25 - G31	20/25 – 37
DK – EE – FI – LV – LT – CZ – SK – SI – SE – NO	II_{2H3P}	G20 - G31	20 – 30
BE	$I_{E(R)B}$ - I_{3P}	G20/G25 - G31	20/25 – 37
EE – GB – GR – IE – LV – LT – PT – ES – CH	II_{2H3P}	G20 - G31	20 – 37
LU	I_{2E}	G20	20
PL	$II_{2ELwLs3P}$	G20/GZ41,5/GZ350 – G31	20/20/13 – 36
HU	II_{2HS3P}	G20/G25.1 – G31	25/25 – 30
CY - IS - MT	I_{3P}	G31	37

GAS CIRCUIT									
FAMILY	GAS	NOZZLES		KC-KR-KRB 24		KC-KR-KRB 28		KC-KR-KRB 32	
				DIAPHRAGM	CO_2	DIAPHRAGM	CO_2	DIAPHRAGM	CO_2
		N.	mm.	mm	%	mm	%	mm	%
2Lw	GZ41,5	1	10.8	10.0	8.8	9.3	8.8	12.0	8.8
2Ls	GZ350	1	10.8	---	8.6	---	8.6	---	8.6
2L	G25	1	10.8	9.2	8.8	8.5	8.8	10.7	8.8
2LL	G25	1	10.8	9.2	8.8	8.5	8.8	10.7	8.8
2HS	G25.1	1	10.8	10.0	10.3	9.3	10.3	12.0	10.3
2HS	G20	1	10.8	7.2	9.0	7.2	9.0	8.4	9.0
2H	G20	1	10.8	7.2	9.0	7.2	9.0	8.4	9.0
2Er	G20	1	10.8	9.2	9.0	8.5	9.0	10.7	9.0
2E(R)B	G20	1	10.8	7.2	9.0	7.2	9.0	8.4	9.0
3P	G31	1	10.8	5.3	10.0	5.3	10.0	6.0	10.0

CHAP. 2
HYDRAULIC DIAGRAMS AND MAIN COMPONENTS

2.1 HYDRAULIC LAYOUTS

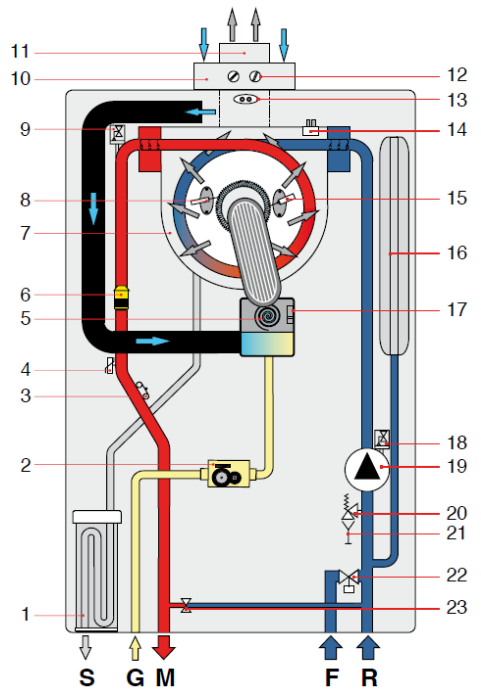
Condensing KC



1. Condensate drain siphon
2. Modulating gas valve
3. Safety thermostat
4. CH temperature probe
5. Modulating fan
6. Primary fluid flow meter
7. Primary condensing exchanger
8. Ignition electrode
9. Air purging device
10. Combustion air intake system
11. Flue gas discharge system
12. Flue gas analysis ports
13. Flue gas thermostat on discharge duct
14. Flue gas thermostat on exchanger
15. Flame sensing electrode
16. Expansion vessel
17. Fan management probe
18. Air purging device
19. Pump
20. 3 bar safety valve
21. Bleeding tap
22. Minimum pressure switch
23. Flow limiting device
24. Filling tap
25. Flow switch with cold water filter
26. Secondary plate exchanger
27. DHW probe
28. Automatic by-pass
29. Motorized 3-way valve

S Condensate drain
G Gas intake
M CH system flow
C DHW flow
F Water mains intake
R CH system return

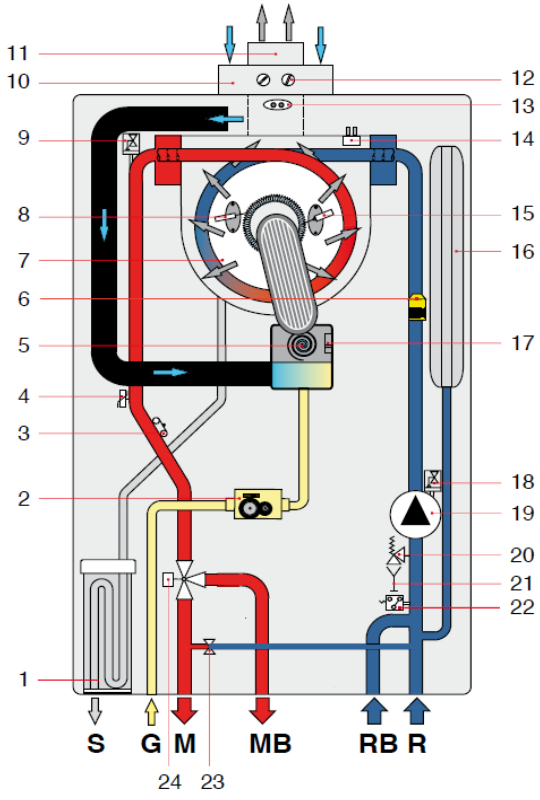
Condensing KR



1. Condensate drain siphon
2. Modulating gas valve
3. Safety thermostat
4. CH temperature probe
5. Modulating fan
6. Primary fluid flow meter
7. Primary condensing exchanger
8. Ignition electrode
9. Air purging device
10. Combustion air intake system
11. Flue gas discharge system
12. Flue gas analysis ports
13. Flue gas thermostat on discharge duct
14. Flue gas thermostat on exchanger
15. Flame sensing electrode
16. Expansion vessel
17. Fan management probe
18. Air purging device
19. Pump
20. 3 bar safety valve
21. Unloading tap
22. Minimum pressure switch
23. Loading tap
24. Automatic by-pass

S Condensate drain
G Gas intake
M CH system flow
F Water mains intake
R CH system return

Condensing KRB



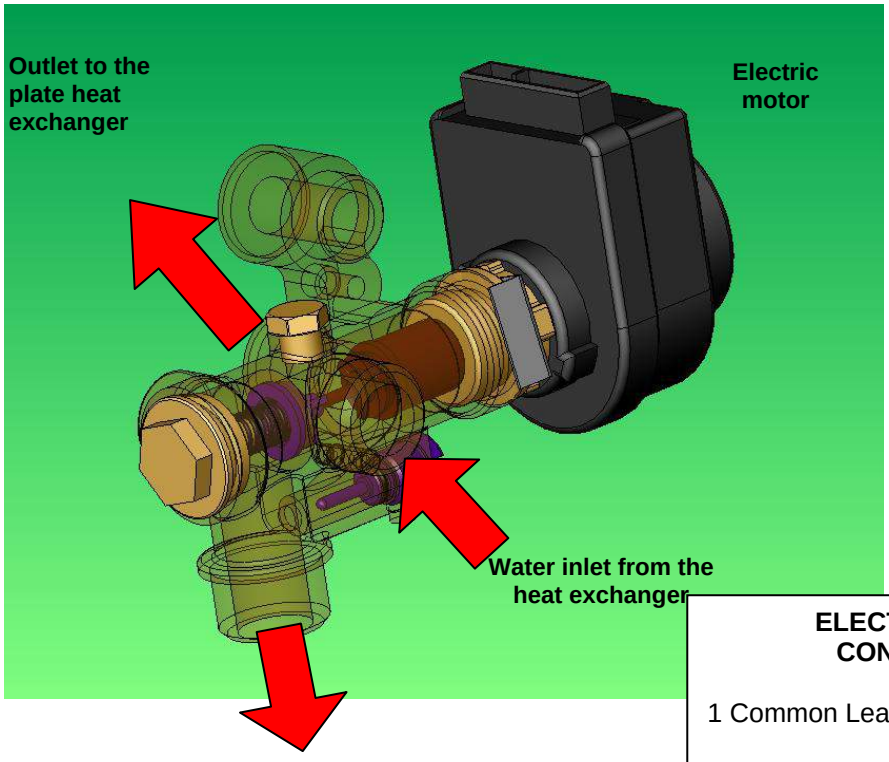
1. Condensate drain siphon
2. Modulating gas valve
3. Safety thermostat
4. CH temperature probe
5. Modulating fan
6. Primary fluid flow meter
7. Primary condensing exchanger
8. Ignition electrode
9. Air purging device
10. Combustion air intake system
11. Flue gas discharge system
12. Flue gas analysis ports
13. Flue gas thermostat on discharge duct
14. Flue gas thermostat on exchanger
15. Flame sensing electrode
16. Expansion vessel
17. Fan management probe
18. Air purging device
19. Pump
20. 3 bar safety valve
21. Unloading tap
22. Minimum pressure switch
23. Automatic by-pass
24. Motorized 3-way valve

S Condensate drain
G Gas intake
M CH system flow
MB Secondary flow to the boiler
RB Secondary return from the boiler
R CH system return

2.2 HYDRAULIC UNIT

MOTORISED THREE-WAY VALVE (only for KC and KRB versions)

The boiler uses a 3-wat valve to switch the distribution of the water between the secondary heat exchanger side (KC model) and the water storage cylinder (KRB), where it will transfer heat to the water. It is made of a valve body and an electric motor (actuator).

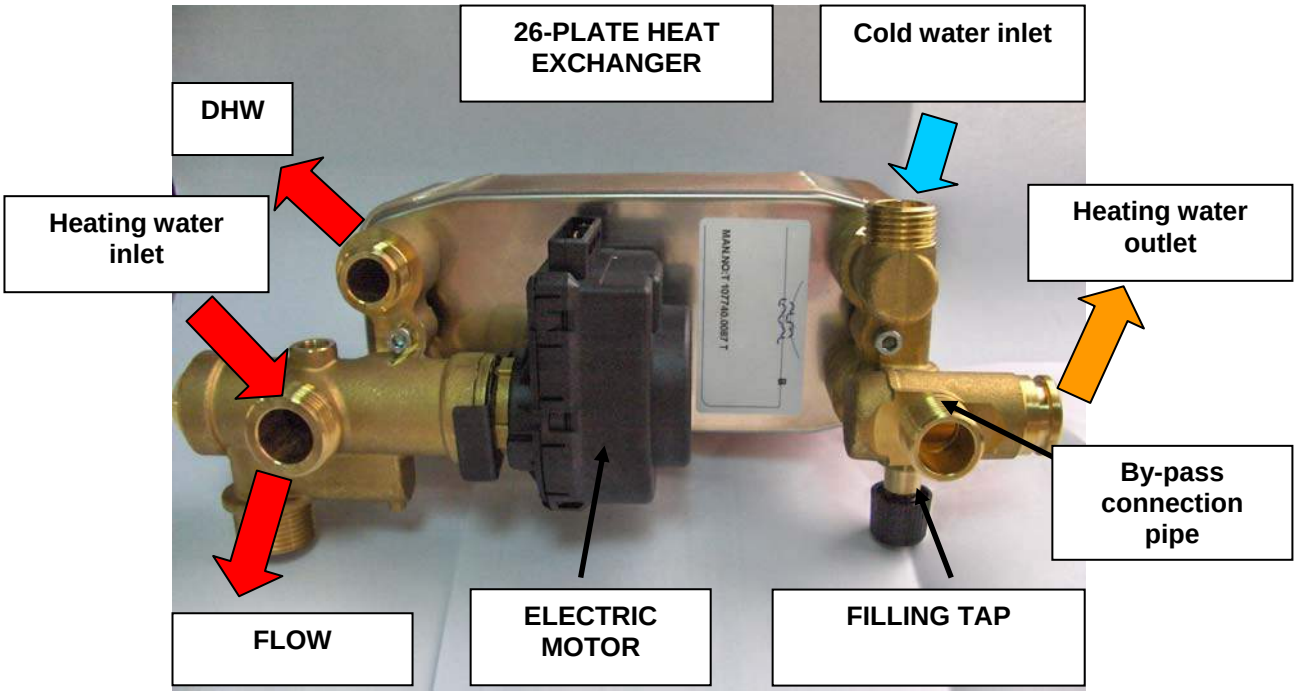


ELECTRIC MOTOR CONNECTIONS

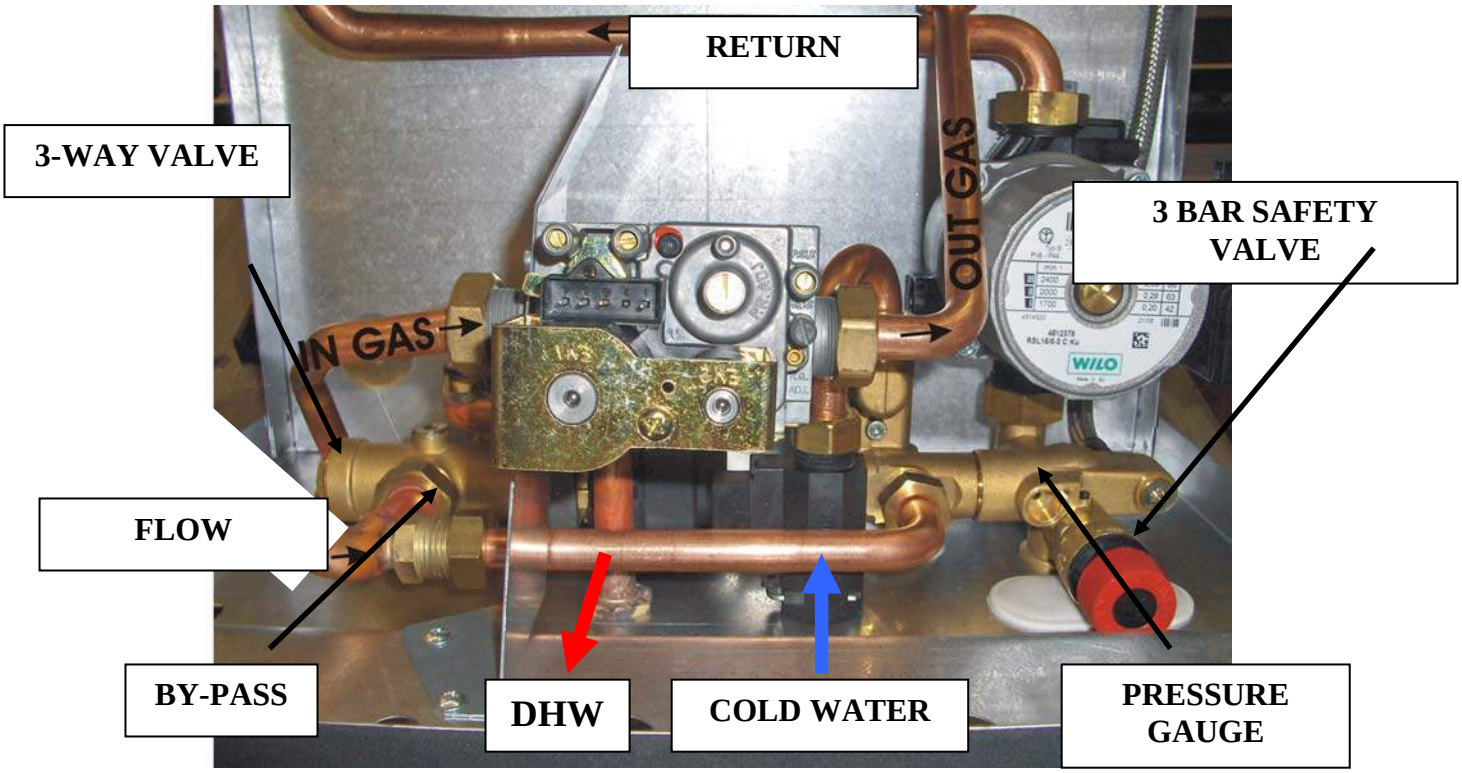
1 Common Lead	Heating
2 Line	Domestic
3 Common Lead	

The secondary heat exchanger is connected to the rest of the hydraulic unit through the 3-way valve and a one more brass hydraulic fitting joined to the cold water inlet pipe. All models are fitted with the same heat exchanger with 26 stainless steel plates, which is oversized in order to allow for condensation even during DHW production.
Upon request for domestic hot water, the cold water coming from the domestic hot water distribution system flows through the flow switch making the boiler start to operate in “domestic” mode. The 3-way valve then diverts the hot water flow coming from the primary heat exchanger to the secondary heat exchanger in order to heat the water.

Please Note: default position for the three-way valve is in “domestic” mode.

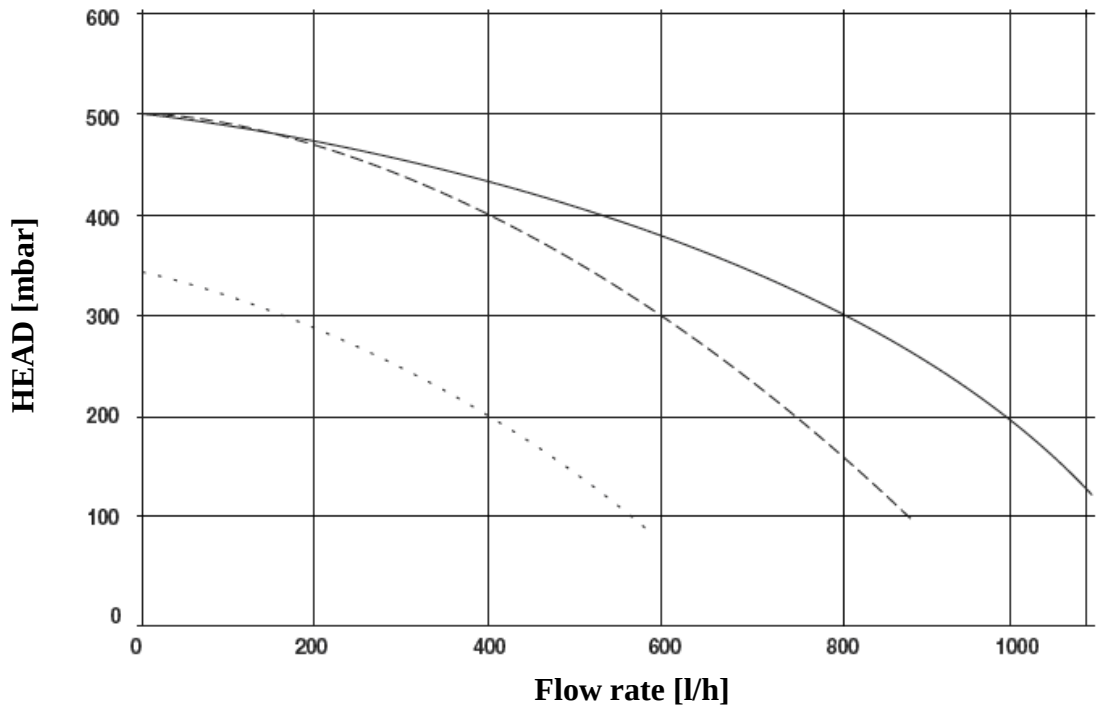


The boiler has an automatic internal by-pass. In case of a pressure drop due to the closure of the thermostatic valves, the by-pass can grant a minimum flow rate to the primary heat exchanger.
The by-pass therefore protects the condensing primary heat exchanger from over-heating due to poor circulation or lack of circulation of the water.



The terminal block of the circulation pump has a 3-position selector switch governing the rotation speed of the the motor and consequently acting on the hydraulic head of the system.
The circulation pump is the same on all models. Different pressure head curves are set according to different power levels.

AVAILABLE HEAD OF THE KC-KR-KRB 24 BOILER

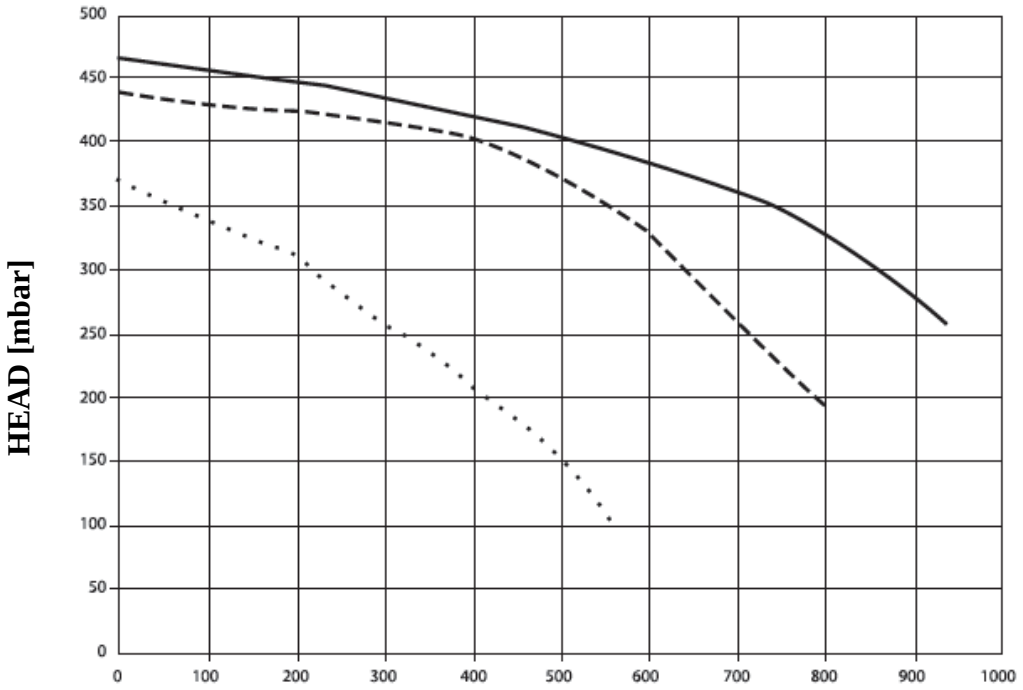


KEY TO TABLE

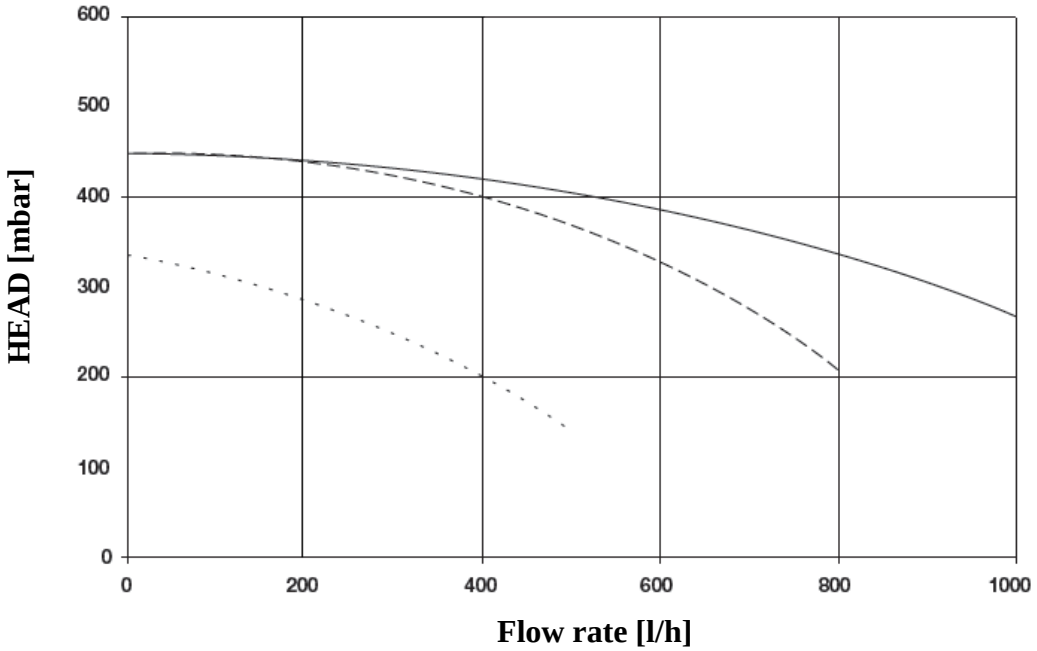
V1 Pompa I speed (min)
V2 Pompa II speed
V3 Pompa III speed (max)

Max head	6 m
Max. operating pressure	6 bar
Max. circulation temperature	95 °C

AVAILABLE HEAD OF THE KC-KR-KRB 28 BOILER



AVAILABLE HEAD OF THE KC-KR-KRB 32 BOILER



KEY TO TABLE

V1 Pompa I speed (min)
V2 Pompa II speed
V3 Pompa III speed (max)

Max head	6 m
Max. operating pressure	6 bar
Max. circulation temperature	95 °C

PRIMARY FLOW SWITCH

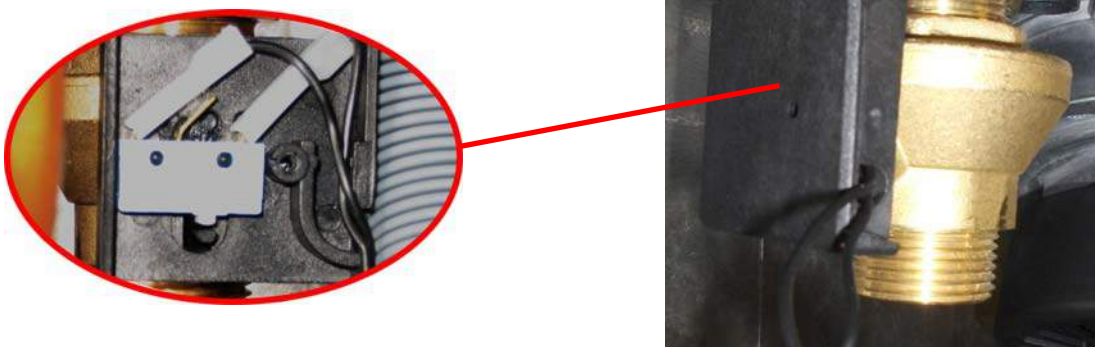
This boiler has two flow switches: as well as the one for domestic hot water, there is another one positioned on the delivery pipe of the heating circuit

PREVIOUS VERSION

When the flow of fluid inside the heat exchanger is lower than 500 l/h for 24 kw versions, 650 litres/h for 28 and 32 kw versions, the flow switch sends a signal that prevents the burner ignition until adequate circulation inside the heat exchanger is restored.

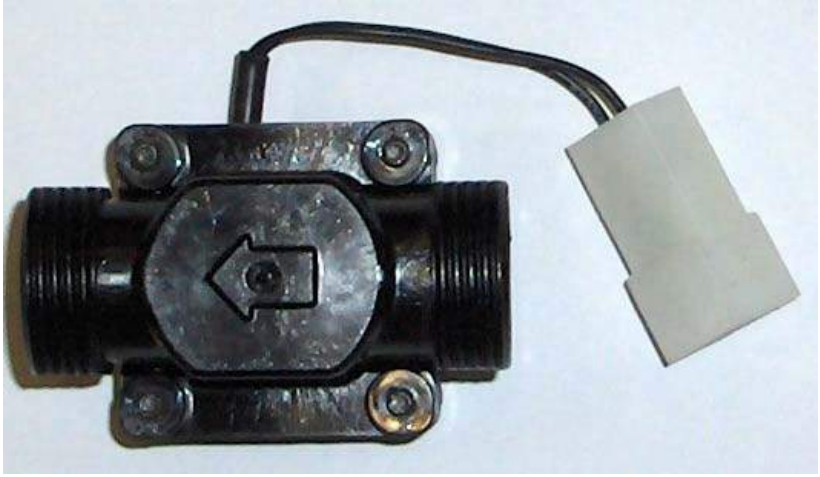
Portata d'intervento:

- Portata minima di 500 l/h (versione 24 kW) codice: 0FLUSSOS04
- Portata minima di 650 l/h (versione 28-32 kW) codice: 0FLUSSOS05



NEW VERSION

When the flow of water within the heat exchanger drops below 200 l/h on, all versions, this flow switch closes the contact preventing the burner to ignite until adequate circulation is restored.
The primary flow switch is an electrical contact that is normally open and closes the circuit only when the right flow rate is reached. When the demand for water ceases the contact opens again.



The new flow switch is electrically connected in series to a **low water pressure switch.**
The low pressure switch is a device that can detect a low pressure inside the heating circuit, thus allowing the boiler correct operation and avoid overheating. The minimum pressure for correct operation is 0.5 bar. When the contact is open, during any request, the pressure switch cuts the supply to the gas valve and the boiler will shut down.

The operation of the heating system (primary) flow switch could indicate problems of clogging in the heat exchanger (primary or domestic hot water), or a pump failure. Less likely is the activation of this flow switch in case of problems in the system (closed valves) because the boiler is equipped with an internal bypass that opens whenever the available head in the system is higher than 4 meters, ensuring minimum flow in the heating circuit.

DOMESTIC HOT WATER FLOW SWITCH (only for version KC)

The hot water flow switch (manufactured by Bitron) has an internal magnetic switch, whose position determines the minimum amount of hot water required to start the boiler. If the hot water requested does not exceed that value, the microswitch does not make contact, preventing the boiler from starting, and avoiding the risk of overheating. What distinguishes different flow switches is their flow limiter (or flow restrictor), which determines the amount of water per minute that can be drained from the system at Δt 30K:

Domestic hot water flow switch

Flow adjuster:

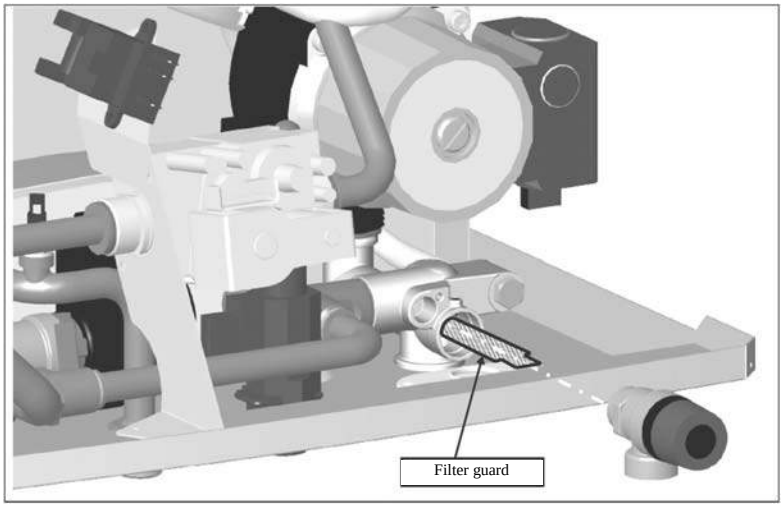
-flow limiter 13 l/min
(mod. 24kW)
code: 0REGFLU04

-flow limiter 14 l/min
(mod. 28kW)
code: 0REGFLU07

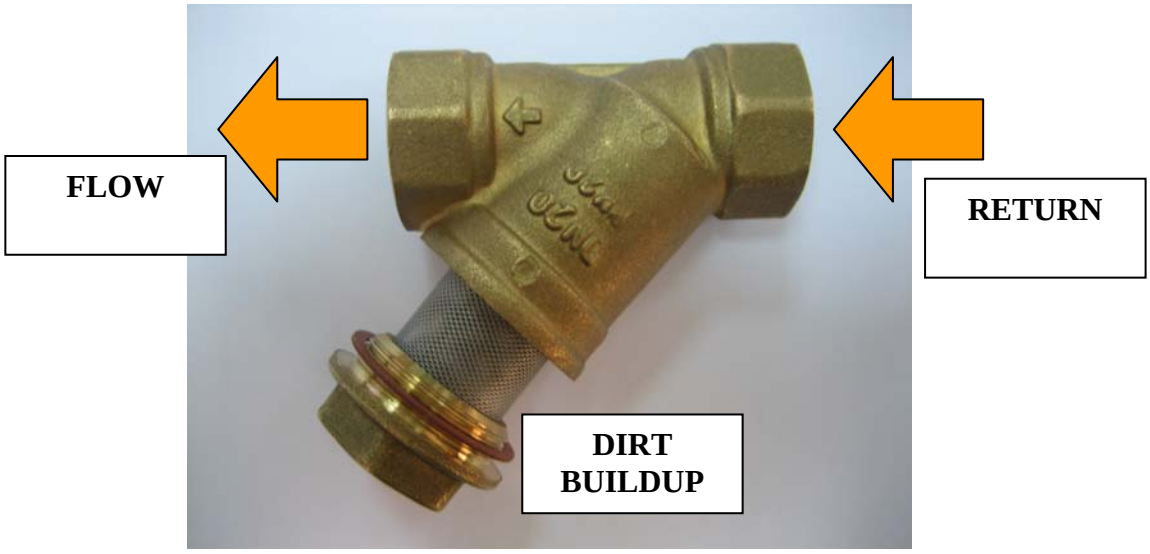
- flow limiter 16 l/min
(mod. 32kW)
code: 0REGFLU06

FILTER GUARD

In order to prevent the build up of dirt inside the primary heat exchanger, which may result in damages to the exchanger, it is advisable to carry out proper cleaning of the system before commissioning.
Preserving the primary exchanger is essential for good operation of the boiler. For this reason a filter guard is standard on all models, to prevent clogging of the piping of the condensing heat exchanger. This filter, in the shape of a tongue, is located on the return pipe of the boiler, inside the brass fitting. In order to clean this filter, it is necessary to remove the 3 bar safety valve.



Excessive buildup of dirt may lead to a pressure drop in the heating circuit, with consequent reduction of the flow rate. If the flow rate is lower than that required by the flow switch, the boiler will shut down for "lack of circulating fluid".
Therefore, the filter tab is not sufficient to stop dirt from depositing inside the boiler. For this reason it is necessary to install a filter that can be inspected (Y-type) with a light mesh of 0.4 mm on the return pipe.



EXPANSION VESSEL

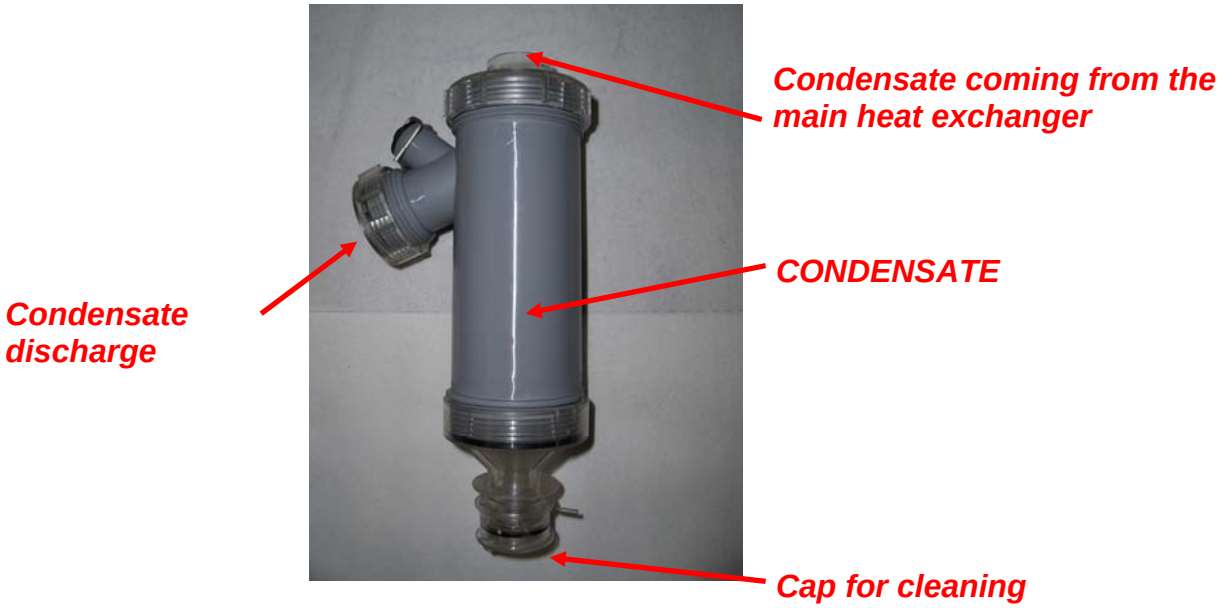
The expansion vessel has the task of compensating excess pressure of the heating circuit during the operation of the boiler.

All condensing boilers are equipped with a rectangular 10-litre expansion vessel,

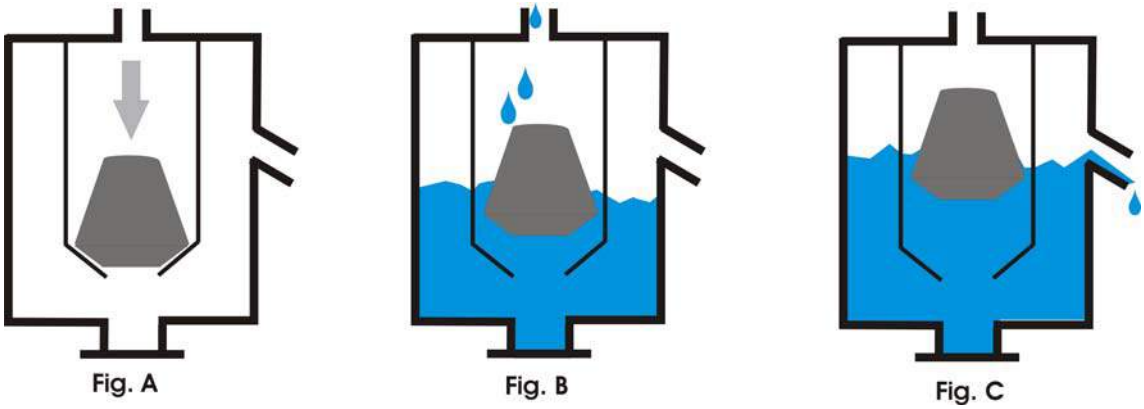
- maximum operating pressure of 3 bar;
- maximum operating temperature of 90°C.

CONDENSATION SYPHON

The siphon, built into the boiler, is devised to prevent combustion by-products from flowing into the condensate drain and consequently into the sewage system. It must not be filled because it contains a float. It can also be cleaned without having to open the boiler by using a plug from the outside.



Operation of the condensate recovery device:



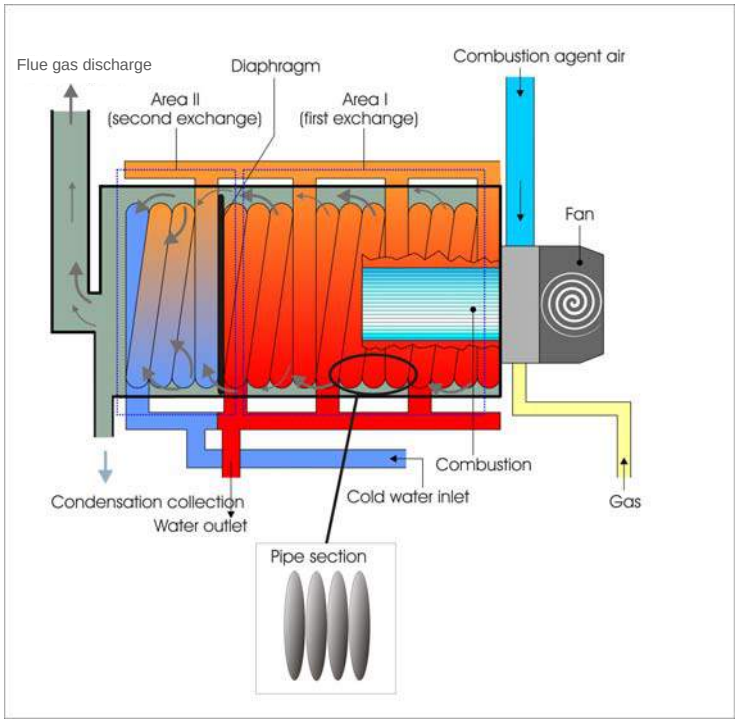
The float closes the condensate outlet (fig. A). The float frees the outlet as soon as the device is full with condensate (fig. B). The condensate then fills the second chamber up to the level of the discharge pipe and is drained out of the boiler (fig. C).
The drain system its connections to the sewage system must be made with suitable materials that can resist thermal and chemical stress. Rustproof and plastic materials are considered suitable.

NOTE: The choice and positioning of the siphon determine the correct functioning of the boiler in total safety. It is not possible to extract and re-locate the siphon in a different position, as the appliance is type-approved in its complexity.
Any modifications to the system would make the boiler no longer type-approved, with liability of the operator that tampered with the device.

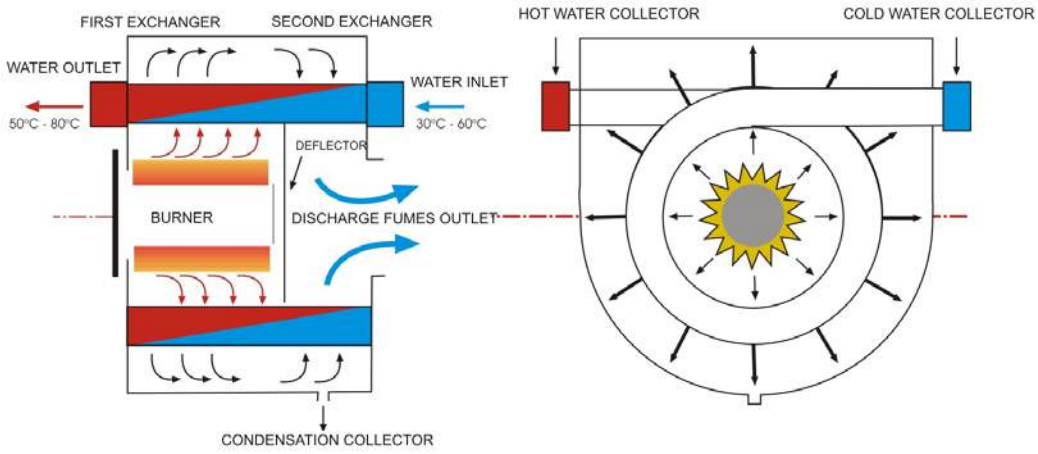
2.4. PRIMARY CONDENSATION HEAT EXCHANGER (GIANNONI)

The heat exchanger is essentially consists of a spiral of stainless steel pipes with an oval section that during the production process are winded into coil shape.
There is no welding joints in hot areas. Another advantage is the low thermal inertia and high resistance to corrosion of the stainless steel.
The heat exchanger has a thermo-polymer coating.

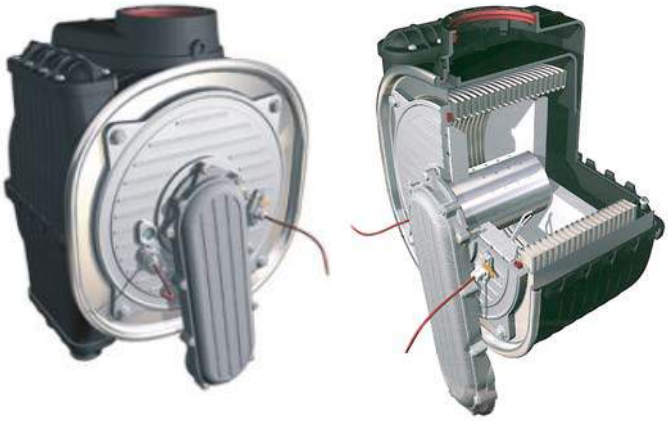
The heat exchanger is made up of several sections, depending on the heat input of the boiler (e.g. “5+1” sections for the 32 kW model, “4+1” sections for the 28 kW model and “3+1” sections for the 24 kW model), which are housed in a casing, also is in stainless steel. The combustion and condensation areas are separated by means of a diaphragm positioned between different elements.



The heat exchanger operation occurs in two different stages. The first stage (zone I, combustion) takes place in the first 3 (for 24-kW model) 4 (28-kW model) or 5 (32-kW model) sections. Each section is made up of 4 coils in direct contact with the flame.
The second stage (zone II, condensation) takes place in an additional section placed behind a deflector and heated by the flue gas before their discharge. This is when condensation takes place.
A ceramic fibre insulation element serves, together with the deflector placed between the combustion and the condensation area, the purpose to divide the two chambers and to divert the flow of flue gases into the gap between the pipes, with the aim of improving heat exchange.

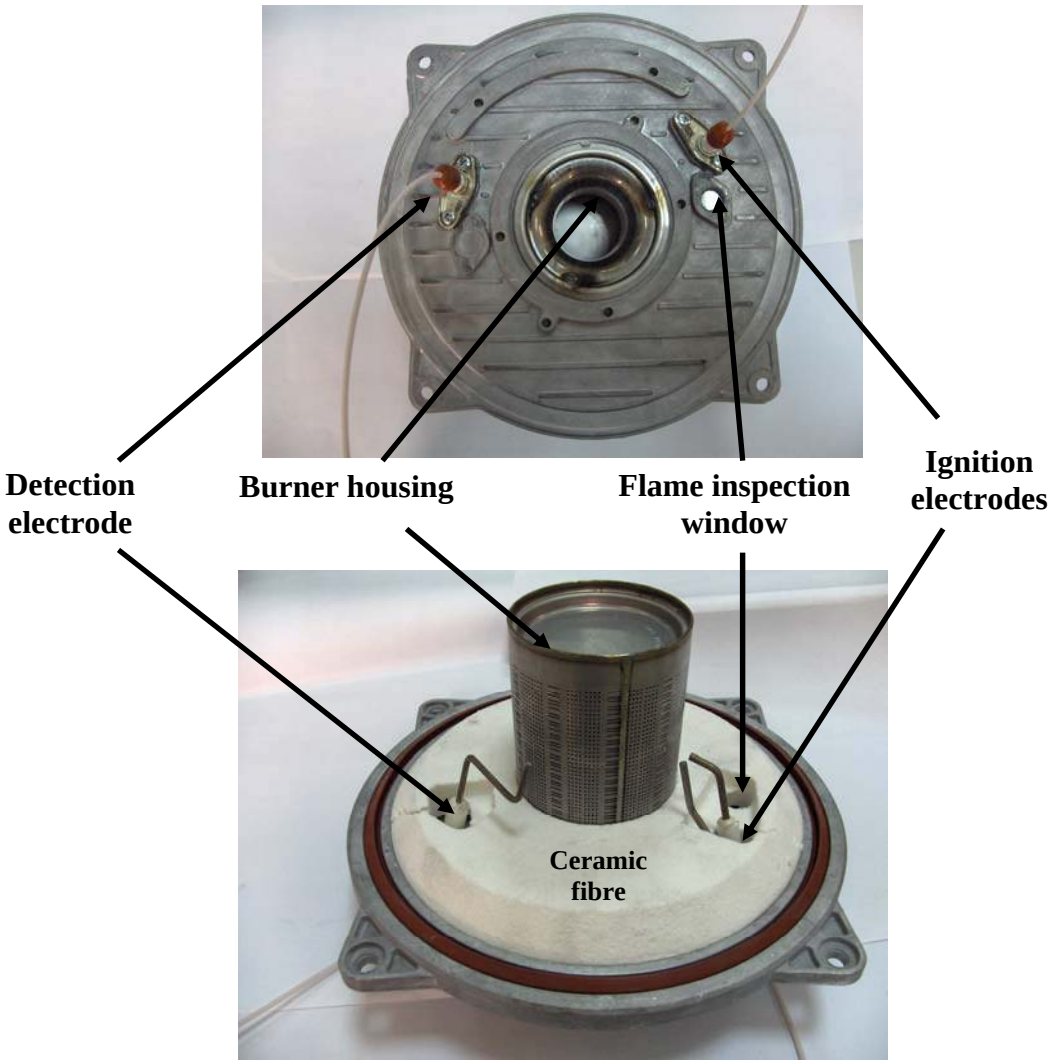


The return pipes of the heating system are placed in the colder part of the unit (the condensation chamber) in order to guarantee condensation of the fumes and to pre-heat water, so that its temperature is higher when it gets back into the heat exchanger. In this way significant energy savings can be achieved. Moreover this allows to prevent condensation in the burner section, thus avoiding potentially dangerous droplets of condensate from dripping onto the burner and damaging it.
The flue gas, after having flowed over the elements positioned in the combustion chamber, flow into the condensation chamber where, return temperature allowing, a part of it starts to condensate, while the remaining combustion by-products are discharged.



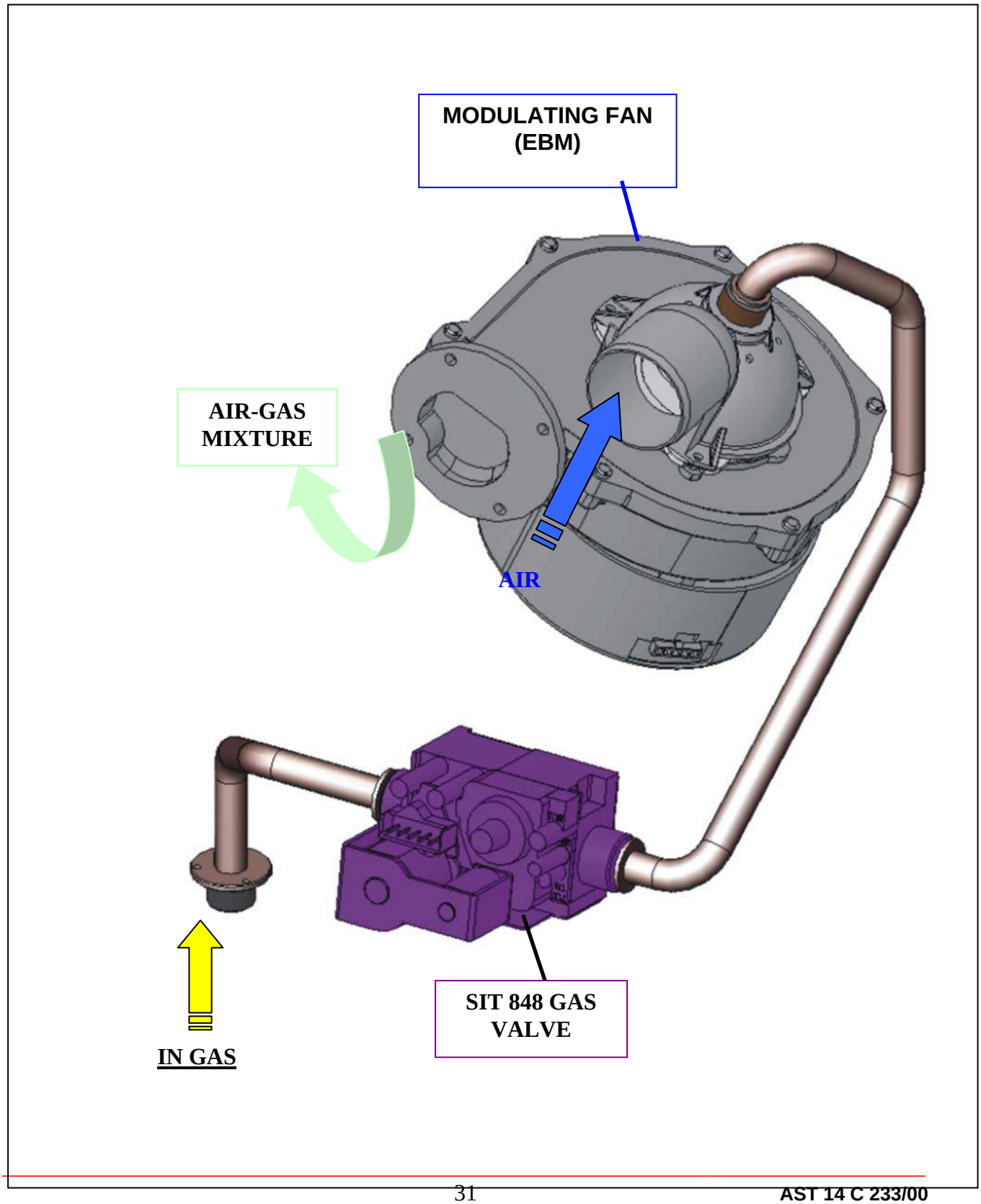
2.5. PREMIXING BURNER

The burner is made of a stainless steel cylindrical housing fixed to the heat exchanger with an aluminium plate.
A seal for exhaust gas and condensation and a ceramic fibre insulating element are placed on the plate.
The external housing of the burner has circular and oblong holes with very small diameters in order to prevent back-fire. The internal part guarantees a homogeneous allocation of the air-gas mixture over the entire surface of the burner.
The ignition electrode and the flame detection electrode are also fixed to the aluminium flange.



2.6 GAS UNIT

When the fan is powered on, ***it creates a depression*** along the pipe connecting the **gas valve fan** dependent on the air flow through it.
When there is a supply to the gas valve, there will be a negative pressure at its outlet and the valve will ***regulate the gas flow*** according to this depression and thus to the fan speed.
This will ensure a constant stoichiometric ratio throughout the operating range of the boiler



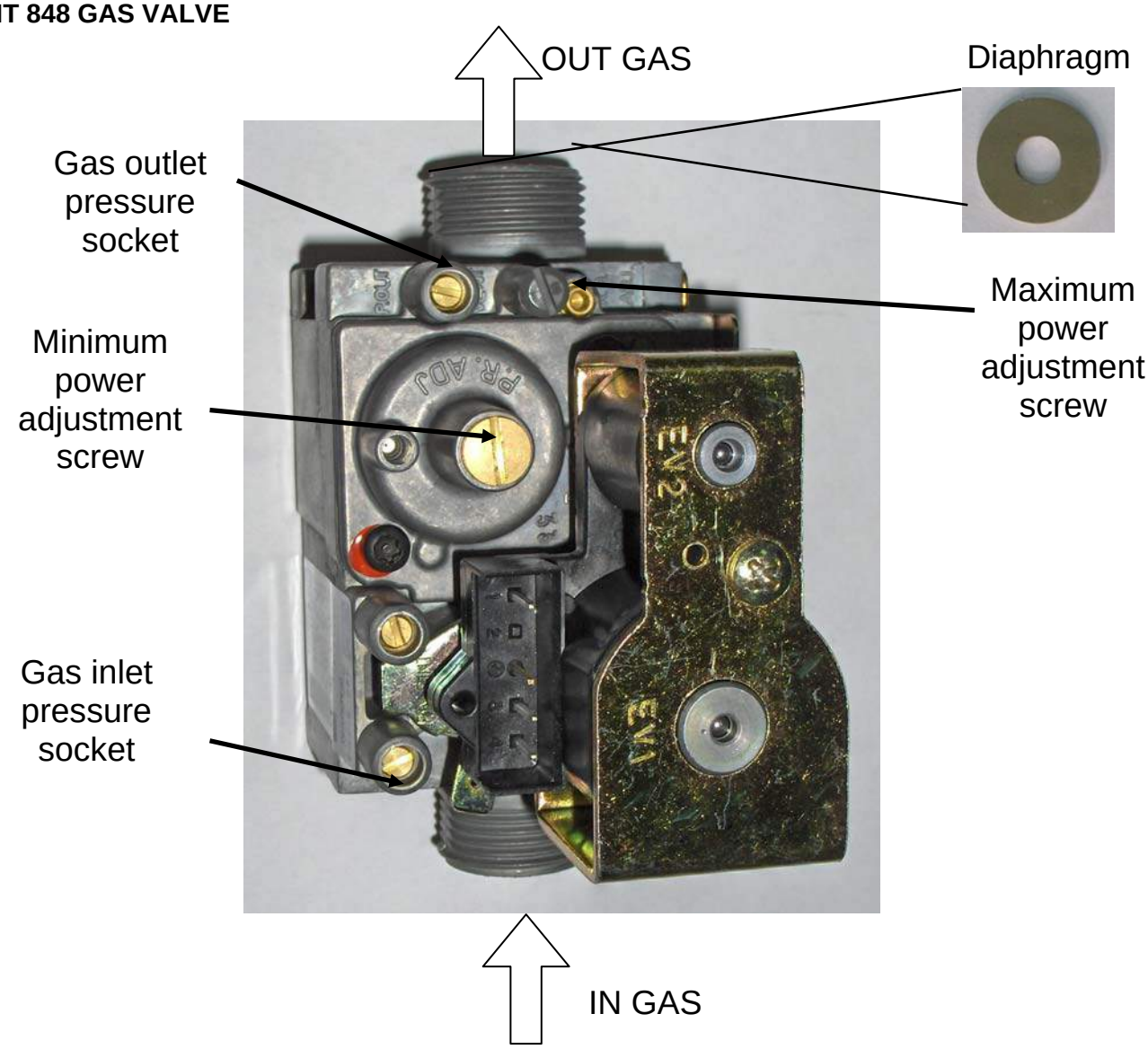
MODULATING FAN (EBM)

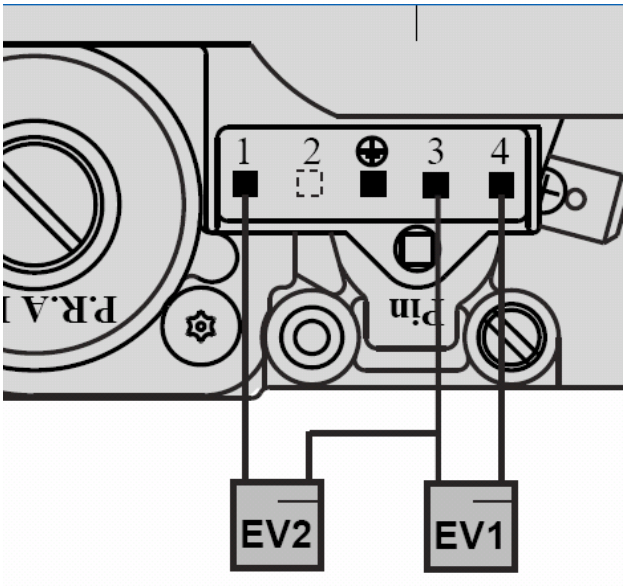
The fan ensures a constant flow of air on all of the modulation range: from maximum to minimum heat input.
The fan speed varies depending on the power modulation supplied by the control board and, as shown in the table below, the type of boiler.
This speed variation is due to the request for heat and the temperature detected by the heating and domestic hot water NTC probes.
After setting the power values of the switch and the maximum and minimum power, modulation occurs with values ranging between those of minimum and maximum.

FAN SETTINGS			
PARAMETERS	**KC-KR-KRB 24**	**KC-KR-KRB 28**	**KC-KR-KRB 32**
Fan speed at maximum burner power (domestic hot water)	181 Hz 5430 rpm	195 Hz 5880 rpm	201 Hz 6061 rpm
Fan speed at minimum burner power (domestic hot water and heating)	53 Hz 1590 rpm	45 Hz 1350 rpm	59 Hz 2163 rpm
Fan speed at burner ignition power	67 Hz 2010rpm	83 Hz 2490rpm	
Heating maximum power upper limit	160,5 Hz 84%	169,5 Hz 83%	184 Hz 90%

The fan is powered with a voltage of 230 Vac. To vary the speed, the board sends a further voltage signal (PWM). For a comparison between the speed requested by the card and the effective fan speed a control is used with a HALL sensor integrated into the fan.
The Hall sensor is a magnetostrictive sensor that returns a PWM signal. The circuit board compares the control signal sent to the fan and the control signal returned from the Hall sensor. If there is no correspondence between the two the boiler will shut off.

SIT 848 GAS VALVE





ELECTROVALVE ELECTRIC CONNECTIONS

RESISTANCE VALUES

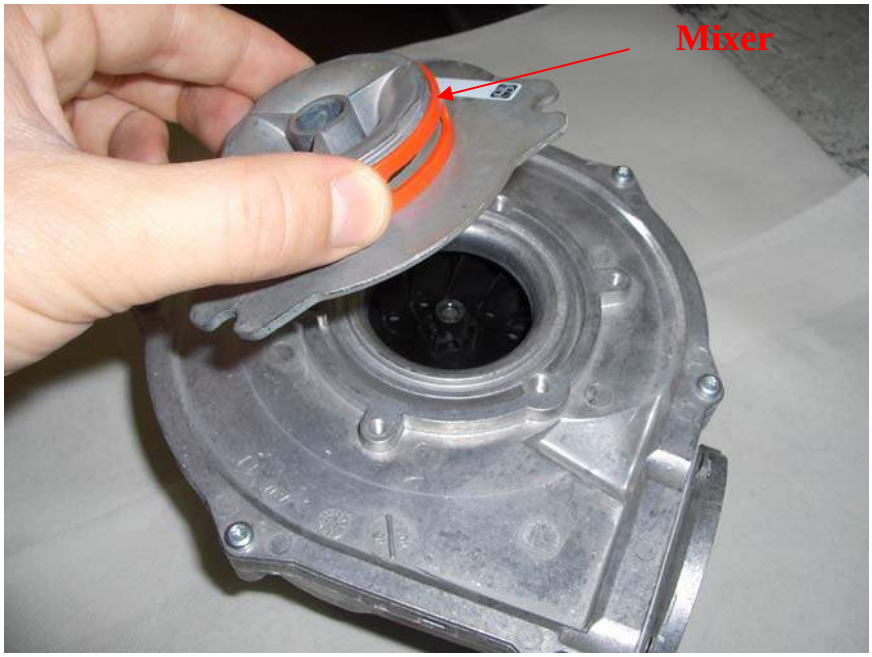
Ev1≈887 Ω
Ev2≈6.64 kΩ

A diaphragm positioned on exit from the gas valve assures a maximum limit in gas flow.
The following table states the diameters of this diaphragm for the different modess and different types of fuel.

Diaphragm diameter (mm)	Methane	LPG
24 kW	7.2	5.3
32 kW	8.4	6

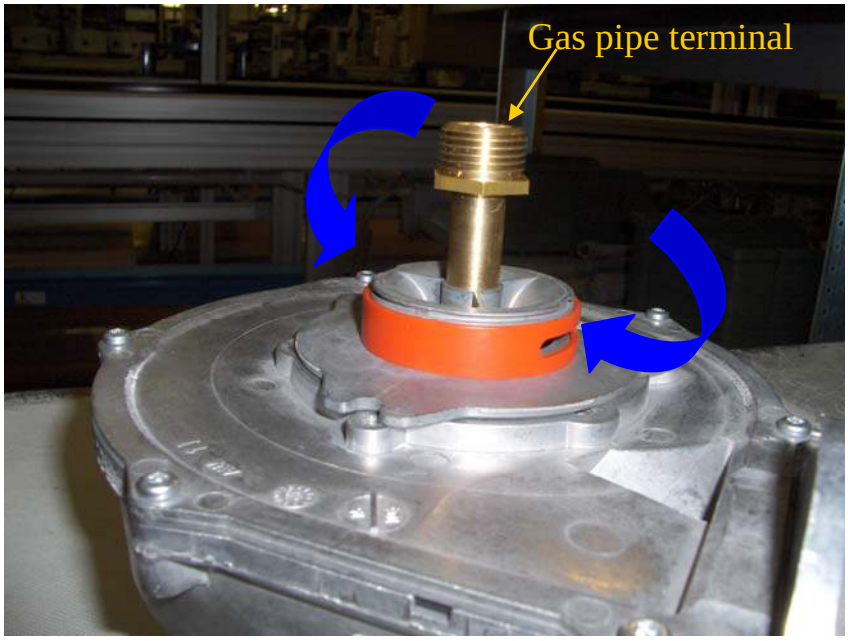
GAS UNIT OPERATION – AIR/GAS ADJUSTMENT SYSTEM

The flow of gas is generated directly from the air flow by means of the depression created by the fan and transmitted to the gas mechanism.
A diaphragm positioned on exit of the gas valve ensures a maximum limit in the gas flow.
By electrically powering the fan a depression is therefore created that is proportional to its speed along the gas valve-fan connection pipe.

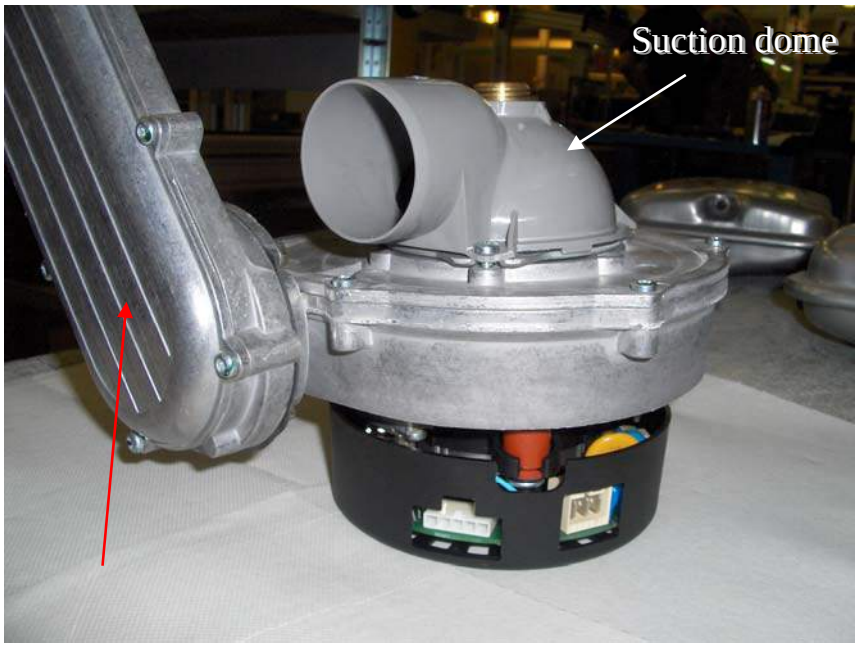


The red ring is only present in the 24 and 28 kW versions, and acts to limit the excessive incoming combustion air.

The suction device mixer (SIT391AGM), connected in correspondence with the fan suction vent, has lateral openings, which are used to measure the correct amount of primary air for combustion.
The gas flow supplied to the burner will depend on the speed assumed by the fan.



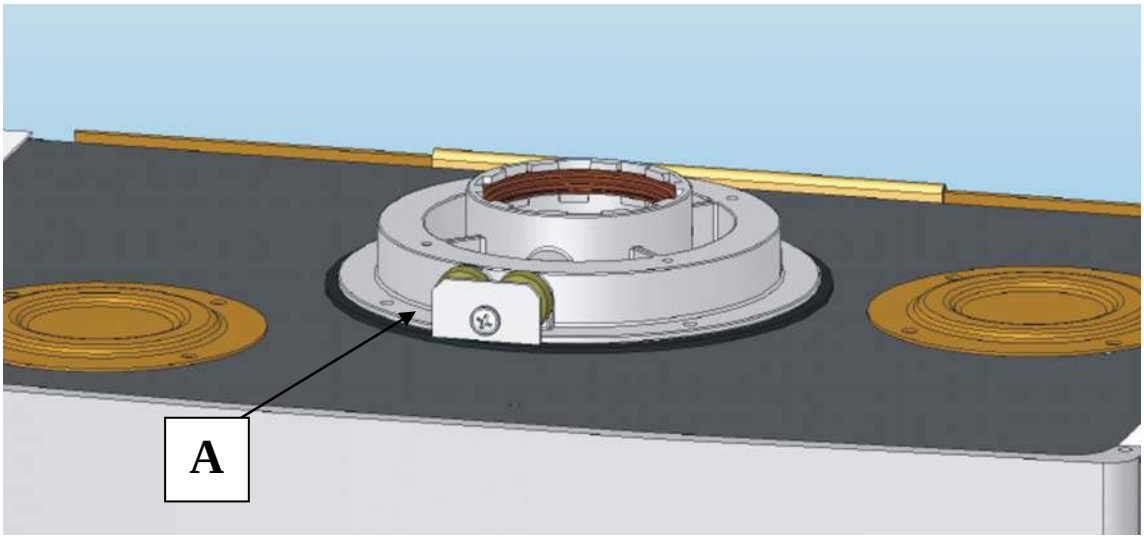
In this case the fan rotor also mixes the amount of air and gas before emission into the burner.



2.7. FUMES EVACUATION PLANT

The boiler has two flue gas sampling points fitted near the flue products exhaust duct (**sampling points for calculation of combustion efficiency**).

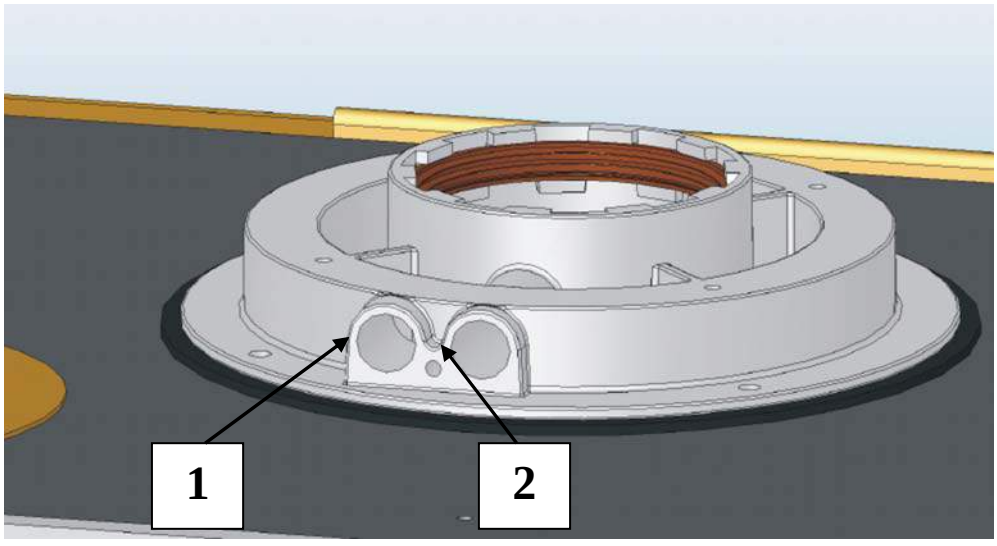
Before carrying out the measurements remove the metal plate and cap A.



To determine combustion efficiency the following measurements must be taken:

-measure combustion air drawn from the relevant hole 1;
-measure the flue gas temperature and of the CO_2 drawn from relevant hole 2.

Take the specific measurements when the boiler is in normal working conditions.



CHAP. 3
ADJUSTMENTS

3.1 TRASFORMATIONS

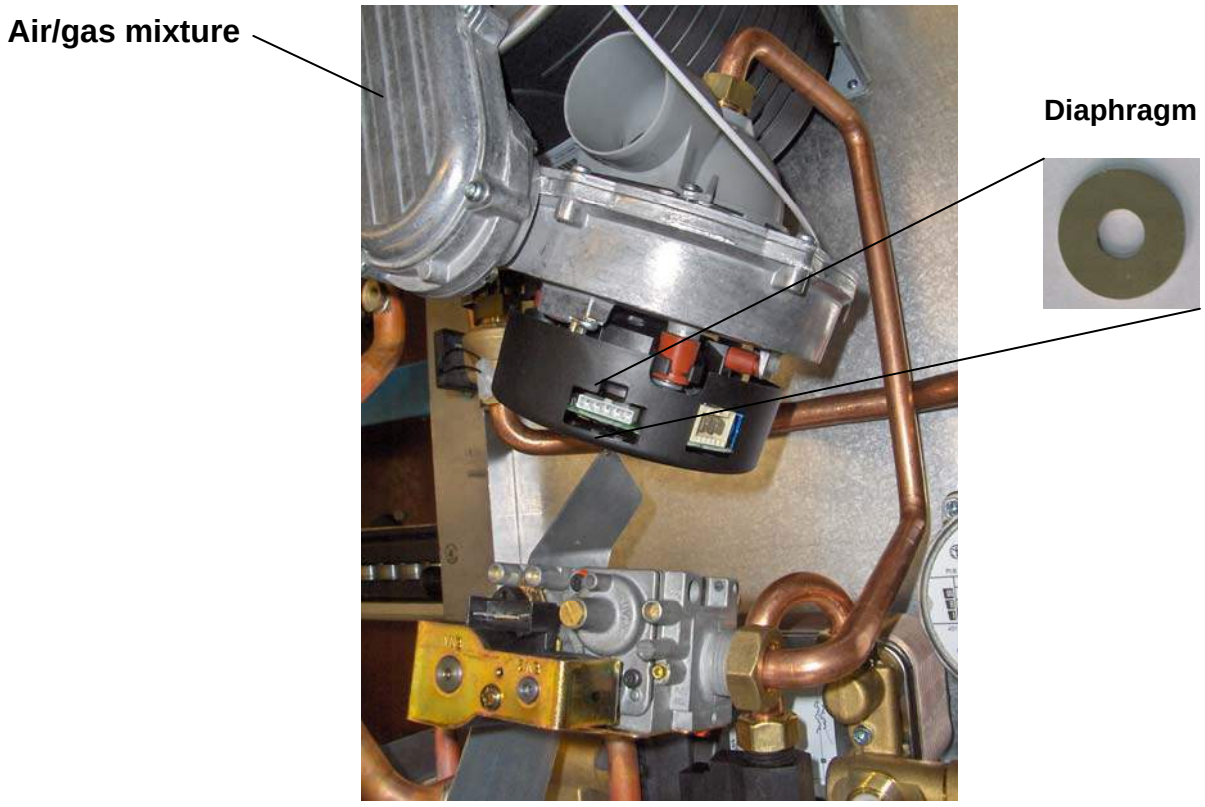
The SIT air/gas adjustment system does not require a nozzle to determine the gas flow.

TRANSFORMATION FROM METHANE TO LPG

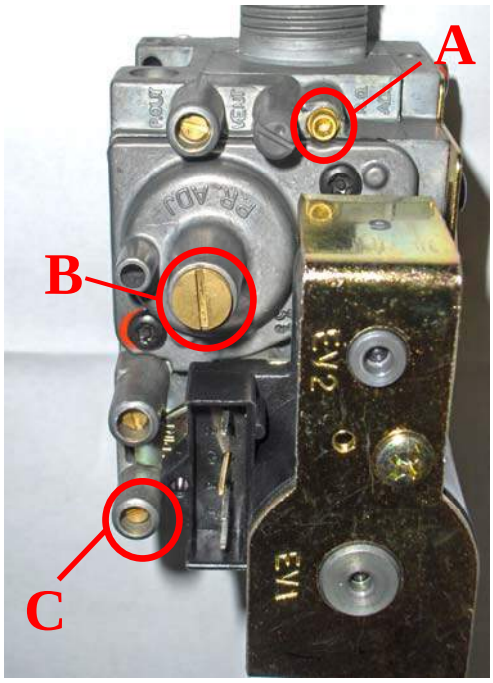
- make sure that the boiler is disconnected from the mains power supply
- remove the diaphragm on exit from the gas valve, replacing it with one having a diaphragm corresponding to the type of gas and the potentiality of the boiler (see the table in CHAP. 2.6. “Diaphragm diameter”)
- re-mount the connection pipe between the gas valve and the fan;
- now set the gas valve (see following page).

TRANSFORMATION FROM LPG TO METHANE

- make sure that the boiler is disconnected from the mains power supply
- remove the diaphragm on exit from the gas valve, replacing it with one having a diaphragm corresponding to the type of gas and the potentiality of the boiler (see the table in CHAP. 2.6 “Diaphragm diameter”)
- re-mount the connection pipe between the gas valve and the fan;
- now adjust the gas valve (Following page).



3.2 CALIBRATION OF THE GAS VALVE



- After having used a screwdriver to loosen the screw that seals the gas inlet pressure socket (C), connect a manometer to check that the network pressure is correct;
- Adjustments of the modulating gas valve are carried out by verifying the value of the CO_2 emissions;
- After having removed the small plate and the protection caps from the flue gas sampling points, connect the combustion analyser;
- start-up the boiler at maximum heat input, in chimney sweep mode ensuring the trimmer maxR set on maximum (see following paragraph).

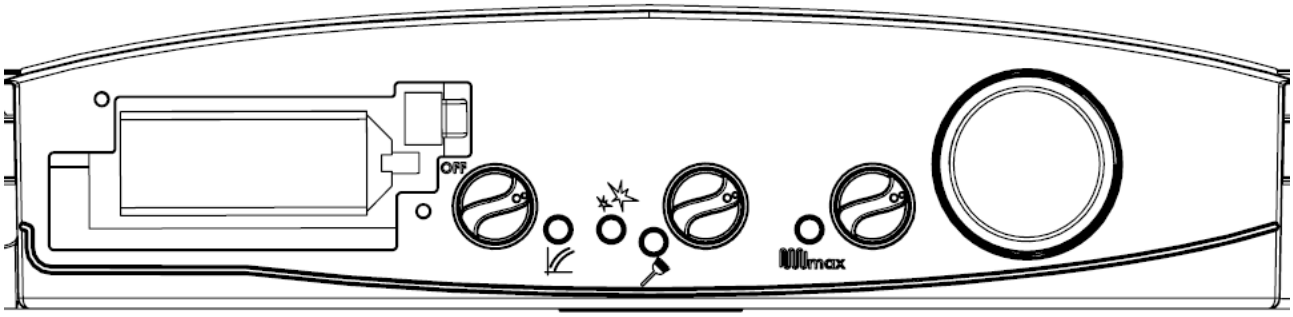
- Calibrate the CO_2 using the R.Q. ADJ ratio adjuster (indicated by A in the figure) with an hex key. Clockwise rotation leads to a decrease in the CO_2 value; check that the value read on the analyser corresponds to that indicated in the following tables after having waited for a functioning time of a few minutes.
- Take the trimmer maxR to minimum and check minimum power;
- Calibrate the CO_2 at minimum heat input, after having removed the protection cap use a screwdriver to act on the Offset adjuster (B). Clockwise rotation leads to an increase in the CO_2 value. Check that the value read on the analyser corresponds to that indicated in the table below after having waited for a functioning period of a few minutes. Re-insert the protection cap.
- Take the trimmer maxR back to maximum and check the CO_2 values;
- Exit the Chimney sweep operation mode by rotating the Boiler mode selector switch back to Domestic function; disconnect the analyser, re-mount the caps and the small protection plate and check sealing.

CO_2 Values	
Methane Gas	8.8 ÷ 9.1 % vol
Propane Gas	9.8 ÷ 10.1 %vol

Content of CO in the fumes < 1000 ppm

3.3 CHIMNEY SWEEP FUNCTION

The boiler has a chimney sweep function that must be used for the measurement when running of the combustion efficiency and adjustment of the burner.



With the burner selector switch in the WINTER position and with the room thermostat (if present) ON, with the boiler operating, use a small screwdriver to press the SPA button (A) for 10 seconds. The boiler will turn off and then on again carrying out the start-up sequence functioning at power set via maxR trimmer (B).
The duration of the chimney sweep function is 15 minutes.
To exit from the chimney sweep function, take the boiler selector switch to a different position than WINTER.

CHAP. 4
KEY TECHNICAL PRINCIPLES

4.1. MAIN GENERAL FEATURES

- Prioritization of functions;
- Configuration switches of the boiler type;
- Priority of hot water;
- Start-up phase with pre-set power
- Timed flame propagation phase at pre-set power
- Modulation of heating with ramp up power;
- Room thermostat timer;
- Maximum adjustable boiler power;
- Modulation of hot water;
- Control of flow temperature during domestic hot water operation;
- Automatic flame control;
- Timed chimney sweep function with adjustable power
- Temperature control with outside temperature probe;
- Open Therm optional remote control;
- Optional multi-zone control board;
- Integrity check of temperature sensors;
- Brushless fans integrity control
- Flow antifreeze function;
- Hot water antifreeze function;
- Pump and diverter valve anti-seize function;
- Pump post-circulation function
- Post-ventilation function;
- Safety devices;
- Miscellaneous;

OPERATION MODE PRIORITY

The following table states the priorities of activation of the main functions in case of be a contemporary request for two or more functions.

Priority	State
1	Shutdown (that could carry out the “anti-freeze function”, “only pump”, “pump anti-block and switch”)
2	Chimney sweep function (only in winter position)
3	Sanitary hot water demand
4	Flow pipes frost protection
5	Flow pipes frost protection (only pump)
6	Heating Demand
7	Return pipes frost protection
8	Return pipes frost protection (only pump)
9	Post circulation
10	Pump and diverter valve anti-seize function
11	Waiting for demands

BOILER TYPE CONFIGURATION SWITCH

This electronic board can manage 5 different types of boiler (F2 = Mono-thermal stratification; F3 = heating only; F4 = boiler with serpentine; F5 = type not used; F6 = stratification with antifreeze) and by using the special configuration jumpers, it is possible to select the type corresponding to the boiler in use. The relative positions of the jumpers can be seen on the top of the board.

DOMESTIC HOT WATER PRIORITY

With the boiler selected in the SUMMER and WINTER functioning modes, the closure of the electric contact of the domestic hot water priority flow switch (following a withdrawal of domestic hot water) generates a functioning request in the domestic hot water plate phase, so starting domestic hot water plate modulation. The functioning request in the domestic hot water phase has greater priority with respect to all other requests. The request ends with the re-opening of the previously-mentioned electric contact.

IGNITION PHASE AT PRE-SET POWER

At every functioning request that leads to ignition of the burner, this is carried out by issuing a burner power that is pre-set by means of the TSP3 parameter (fan speed at burner ignition power). When the presence of the flame is detected, the successive flame propagation phase starts.

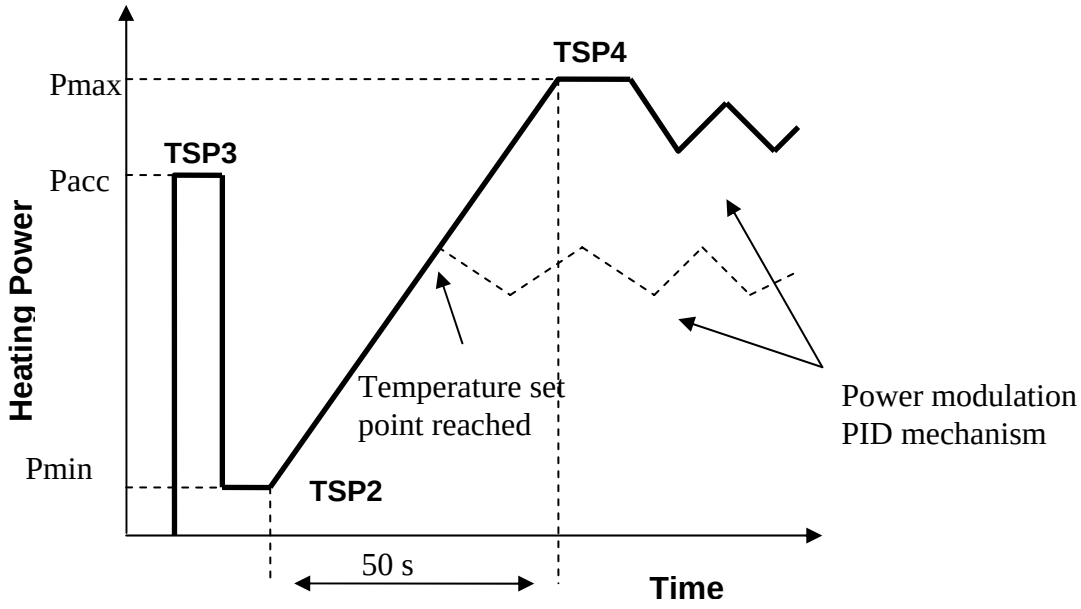
TIMED FLAME PROPAGATION PHASE AT PRE-SET POWER

During the timed flame propagation phase, for a time of 4 seconds, the power supplied to the burner is maintained at the ignition power value in order to allow flame propagation. At the end of the timing it proceeds with the power set by the modulating PID.

HEATING MODULATION WITH RAMPED INCREASE IN POWER

The heating temperature pre-selection potentiometer or the opentherm remote control set the delivery water temperature value. Following a functioning request in the heating phase, if the temperature of the water read by the NTC probe is less than the heating ON thermostat intervention temperature (set-point + 0 °C), the burner ignition sequence starts (TSP3). At the end of the burner ignition sequence, the gas flow goes to minimum value (TSP2); successively the gas flow passes form the minimum value to the maximum value set via the maximum heating power selection trimmer (TSP4) increasing power to set point every 50 seconds.
The temperature of the delivery water is read constantly and the increase stops as soon as the flame modulation point is reached, using a PID mechanism, until the pre-selected heating temperature is reached and maintained.

During the heating phase the pump is on and the electric diverter valve is in the heating position.
During functioning in the heating phase, a demand for hot water has priority and therefore it overrides the heating operation under way.



HEATING MODULATION TEMPERATURES:

- Heating temperature adjustment range: 20°C – 78°C
- Heating thermostat intervention temperature: OFF = **set point** + 5° C
- Heating thermostat intervention temperature: ON = **set point** + 0° C
- Heating thermostat timing: 240 seconds

(it is the time that the burner remains inactive after switch-off)

- Power increase ramp timing: 50 seconds.

The **set point** depends on the position of the heating temperature selection knob or the temperature set using remote control.

LOW TEMPERATURE HEATING MODULATION TEMPERATURES:

- Heating temperature adjustment range: 20°C – 45°C
- Heating thermostat intervention temperature: OFF = **set point** + 2° C
- Heating thermostat intervention temperature: ON = **set point** - 2 ° C
- Heating thermostat timing: 120 seconds

(it is the time that the burner remains inactive after switch-off)

- Power increase ramp timing: 50 seconds.

The **set point** depends on the position of the heating temperature selection knob or the temperature set using remote control.

ROOM THERMOSTAT TIMER (ANTIFAST)

This is the time that the burner remains off between one start up and the next.

During heating modulation, on reaching the minimum value of the power supplied to the burner, and maintaining the power condition supplied above that requested, when the delivery reaches the “set-point + 5°C” temperature, the burner is switched off. After the burner has been switched-off, wait for 240 seconds (thermostat timing), at the end of which, if the delivery is lower than the “set-point” temperature, the burner is switched-on again. The pump is powered during timing.
The heating thermostat timing is zeroed:
- with set-point > 55 °C if the delivery temperature value falls below 40 °C;
- with set-point ≤ 55 °C if $T_{set\text{-}point} - T_{flow} > 15$ °C;
- on arrival of a domestic hot water request;
- taking the boiler state selector switch to OFF-RE-ARM-ANTI-FREEZE.

If the reduced heating range is selected (low temperature) the respective intervention temperatures of the thermostat change as previously seen. Following switch-off of the burner wait for 120 seconds (thermostat timing), at the end of which, if the delivery is lower than the “set-point” temperature, the burner is switched-on again. The pump is powered during timing.
The heating thermostat timing is zeroed:
- if the delivery temperature value falls below 20°C;
- on arrival of a domestic hot water request;
- taking the boiler state selector switch to OFF-RE-ARM-ANTI-FREEZE.

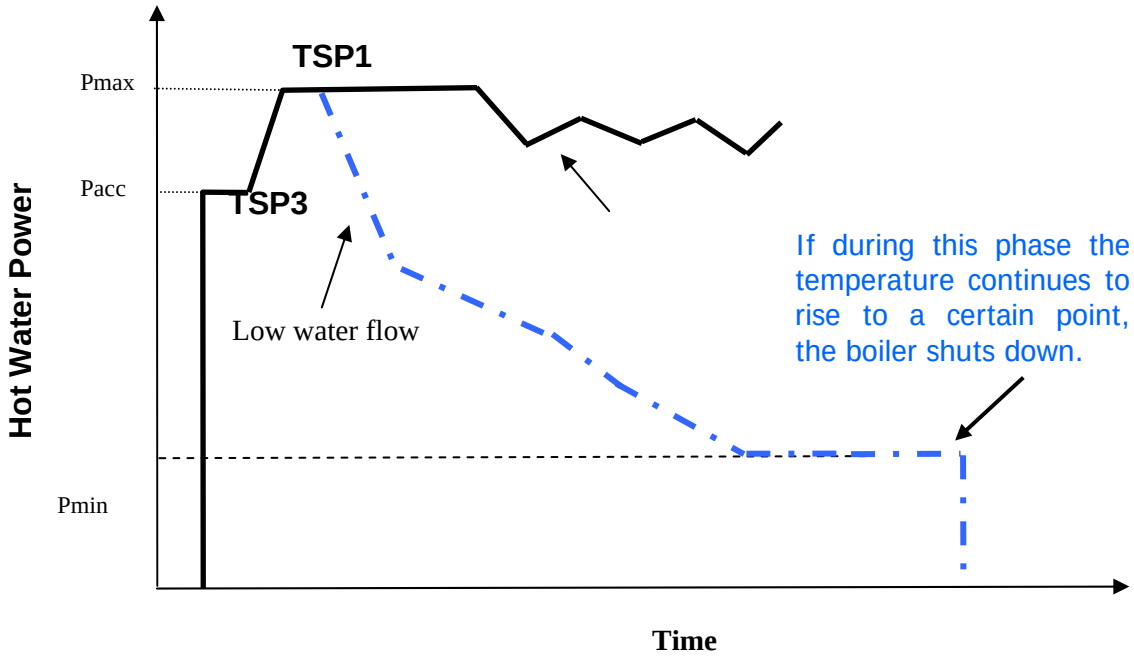
BOILER ADJUSTABLE MAXIMUM POWER

During functioning in the heating phase, the maximum power supplied to the burner results as being that set on the P4 trimmer heating maximum power pre-selection. If the remote control is present, the maximum power limit that can be set from the P4 trimmer is a percentage varying from 10% to 100% of the maximum power, which can be set with parameter TSP4.

DOMESTIC HOT WATER MODULATION

During the domestic hot water phase the electric switch valve is in the domestic hot water position and the pump is powered.
During domestic hot water modulation, on reaching the minimum value of the power supplied to the burner and maintaining the power condition supplied higher than that requested, when the delivery reaches the “set-point + 5°C” temperature, the burner is switched off. After the burner has been switched-off, with the functioning request still present, if the domestic hot water temperature reaches a value lower than the “set-point +3°C” temperature, the burner is re-ignited.

When domestic hot water starts to be withdrawn and for a period of 20 seconds the respective intervention temperatures of the thermostat are start withdrawal ON, domestic hot water plate thermostat intervention temperature (set-point +8°C) and start withdrawal OFF, domestic hot water plate thermostat intervention temperature (set-point +15°C).



DOMESTIC HOT WATER FUNCTIONING MODULATION TEMPERATURES:

- Domestic hot water temperature adjustment range: 35° C-57° C
- Domestic hot water thermostat intervention temperature: OFF = set point + 5° C
- Domestic hot water thermostat intervention temperature: ON = set point +3° C
- Start domestic hot water withdrawal thermostat intervention temperature (first 20-second interval): OFF = set point + 15° C
- Start domestic hot water withdrawal thermostat intervention temperature (first 20-second interval): ON = set point + 8° C
- Delivery thermostat intervention temperature in domestic hot water phase: OFF 85° C

CONTROL OF THE DELIVERY TEMPERATURE IN DOMESTIC HOT WATER PHASE

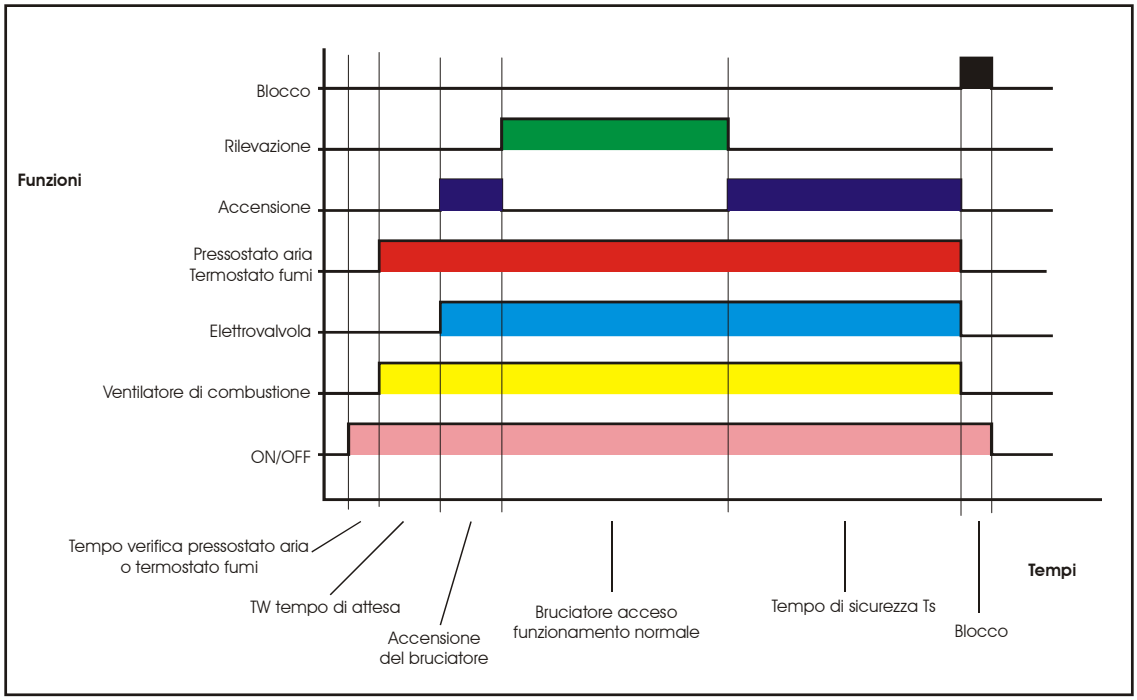
During the production of domestic hot water, the delivery temperature is always monitored and when it reaches 85°C, the burner is switched off. The burner is switched back on as soon as the delivery temperature reaches 75°C.

AUTOMATIC FLAME CONTROL

The device is always active and automatically carries out self-verification functions. The fan is started on functioning request. The device starts to count the TW chamber pre-washing stand-by time equal to 1.5 seconds. When this has expired the gas valve and the igniter are powered; when the flame is detected it is possible to keep the gas valve open. The igniter is excluded in the presence of the flame or at the end of the TS safety time (10 seconds.). If the flame does not appear during an attempt at from cold, the automatic flame control repeats the ignition sequence 5 times with ventilation intervals for washing the chamber of 5 seconds. If the flame disappears during normal functioning, the automatic flame control

repeats the start-up sequence and only one attempt at ignition after a pre-wash of the chamber of 5 seconds.
If the flame is not detected in the last attempt at ignition within the TS safety time the flame control goes into the block condition, post-circulation is carried out depending on the functioning request (30 seconds. Domestic hot water; 180 seconds. Heating) and post-ventilation for chamber washing with duration of 6 minutes. Post-ventilation cannot be zeroed releasing the boiler. Post-ventilation is carried out at ignition speed (TSP3 parameter) + 990 rpm.
In order to re-arm the block condition, after having waited 5 seconds, act on the relevant selector switch taking it to the re-arm position, or from the remote control by means of the appropriate sequence of keys; in the last case a maximum of 3 attempts for restoration can be made from remote control. If they are all used the alarms must be reset directly from the boiler.

Below is the diagram of the boiler operation:



CHIMNEY SWEEP FUNCTION TIMER AND ADJUSTABLE POWER

With the boiler in winter position, by moving the proper switch (SPA), which is reserved for qualified personnel, holding it down for at least 10 sec., it is possible to start a timed sweep function: the boiler performs the start-up sequence and then goes on at a predetermined power set by the maximum heating power adjustment trimmer (MAXR); the temperature limit is forced to 90° C; during the sweep function, the pump is powered and the diverter is located in heating position. The chimney sweep function ends after 15' or by moving the selector on the boiler to a position other than winter.

TEMPERATURE ADJUSTMENT WITH EXTERNAL PROBE:

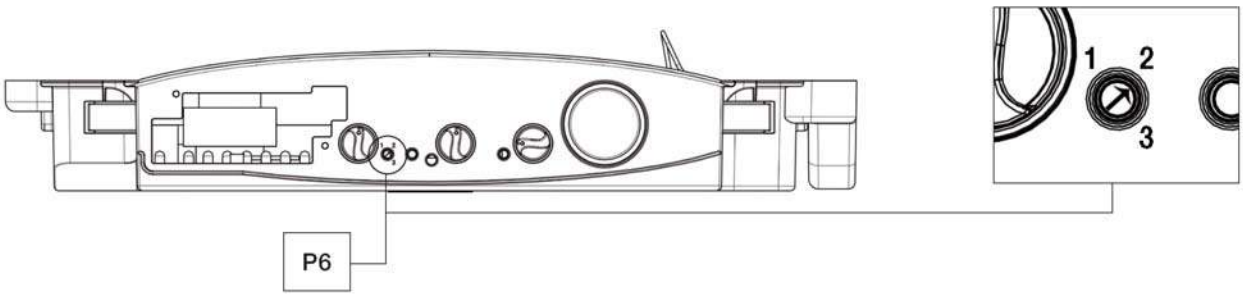
The connection of an external temperature probe is envisioned, which acts by automatically modifying the heating delivery temperature depending on the external temperature measured, the selected heat adjustment curve and the nominal room temperature set.
The heat adjustment curve is selected by means of P6 trimmer, whose value can be read from the TSP5 parameter visualised in the "TECHNICAL" section of the remote control. The nominal room temperature is set by means of P1 trimmer, which with external temperature probe looses the function of setting heating temperatures and whose value can be read from the TSP6 parameter visualised in the "TECHNICAL" section of the remote control. The card autonomously recognises the presence of the external temperature probe and activates the heat adjustment function. Also in this case and independently from the set heat adjustment curve, the delivery temperature is limited within the heating temperature pre-selection range (20 °C ÷ 78 °C o 20 °C ÷ 45 °C). A range that is determined by P6 trimmer. In the case of the contemporary presence of the external probe and the remote control, assuming that the remote control is able to set and carry out the heat adjustment, the modulation card sends the external temperature value to the remote control and if the heating request is determined from the remote control it will be the latter that determines the value of the delivery temperature, on the basis of its heat adjustment curve and the environmental temperature it sets. If however the heating request arrives at the same from remote and the closure of the T. Env. contact, present on the card, both the remote control and the modulation card independently calculate the delivery temperature on the basis of the reciprocal heat adjustment curves and environmental temperatures set and the highest delivery temperature will be used.

Setting the temperature control curve

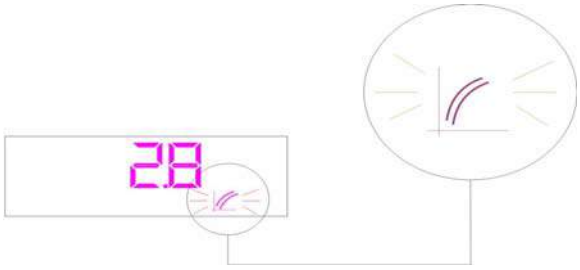
- **High-temperature curve**: for high-temperature systems (radiators) the choice of the curve must be made with the P6 potentiometer on the boiler control panel; it is recommended to set the values between 1 and 2.

- **Low-temperature curve**: for low temperature systems (floor) the choice of the curve must be made with the P6 potentiometer on the boiler control panel, it is recommended to set values between 0.2 and 0.8.

P6 potentiometer set on the boiler control panel:



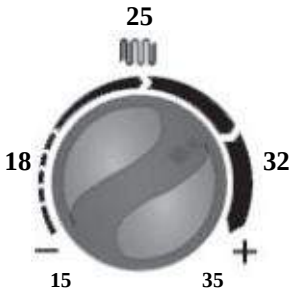
In the TECH LINE version, the curve setting is always done with the potentiometer P6 on the board in the boiler.
By moving the trimmer, the corresponding symbol flashes and displays the value of the curve:



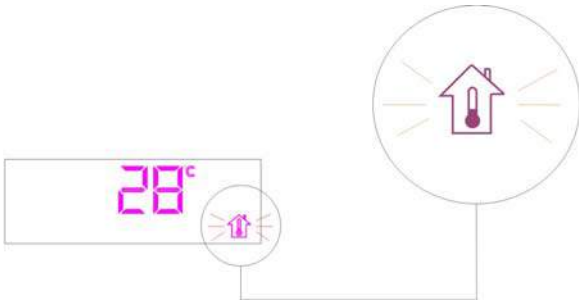
The control of the correct choice of the curve takes time, during which a few precautions may be necessary:

- If the external temperature drops and the room temperature increases, it is necessary to set a less steep curve, i.e., lower;
- If the external temperature drops and the room temperature decreases, it is necessary to set a steeper curve, i.e., higher;
- Finally, if the room temperature remains constant as the outside temperature changes, the curve is correct.

If the room temperature remains constant, but different from the desired value, it is necessary to shift the curve up or down. This happens automatically by turning the knob on the heater **RISC** set on the boiler control panel. In fact, with the external sensor installed, this knob no longer adjusts the temperature of the flow, but the nominal room temperature from a minimum of 15° C to a maximum of 35° C.
It is recommended to set a value between 20° C and 25° C, or at least similar to what is set on the thermostat. Turn the knob clockwise to increase the temperature or counterclockwise to decrease it:



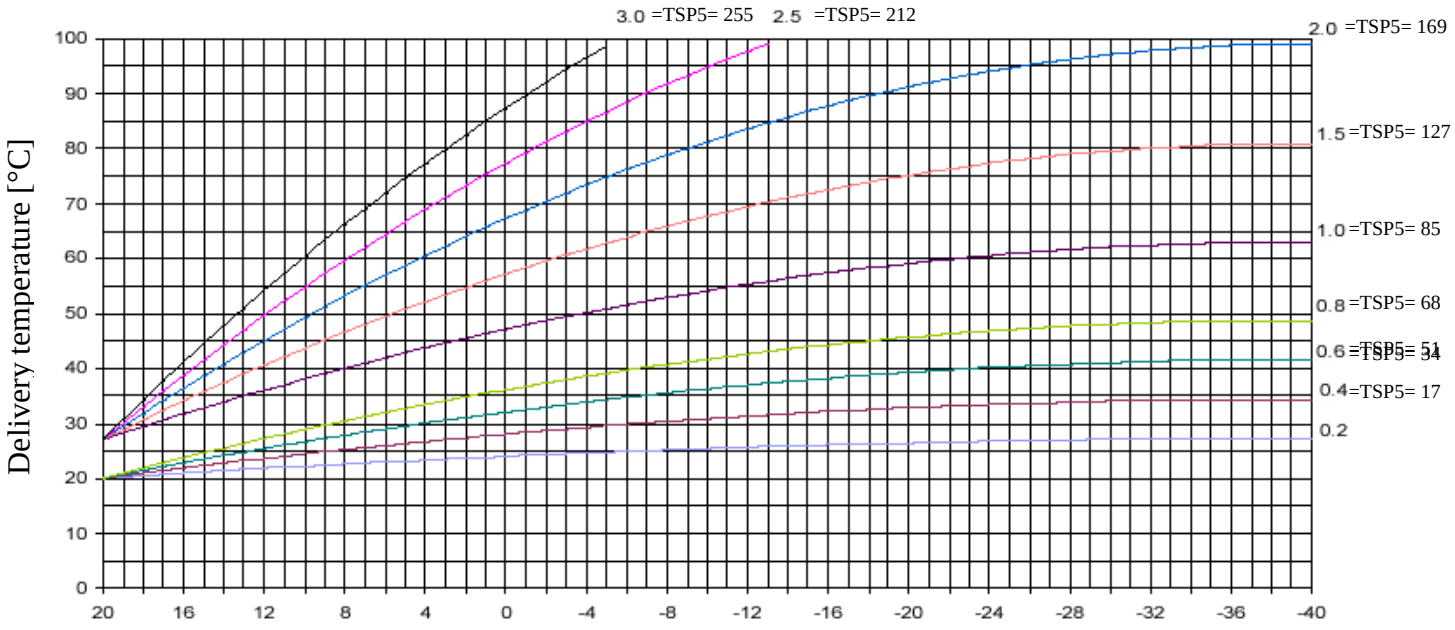
In the TECH LINE version, the nominal room temperature is set with the RISC potentiometer on the boiler board.
By moving the trimmer, the corresponding symbol flashes and the value of the curve is displayed:



Choice of curves:
Basically the choice of the curves is a procedure that can be done by "eye" or with an easy formula; the fact is that you should always double check the temperature changes in order to correct the curve and choose the most accurate one.

Below is a graph with curves and their parameters:

Heating curve diagram



In the first case, it is enough to take the real external temperature value as reference and associate it to value of flow desired. Then choose the nearest curve.

Example:

at external temp -4° C I want a delivery of 62° C; **curve: 1.5**

In the second case the following formula can be used:

$$\textbf{CURVE} = \frac{\text{Tmax} - 20}{20 - \text{Testmin}}$$

Where Tmax is the maximum flow temperature and Testmin the minimum outdoor temperature.

Example:

Low temperature:
Tmax = 44° C
Test = -10° C

$$\textbf{CURVE} = \frac{44 - 20}{20 - (-10)}$$

Curve = 0.8
Position of potentiometer **R4 = 4.2**

High temperature:
Tmax = 70 ° C
Test = -10 ° C

$$\textbf{CURVE} = \frac{70 - 20}{20 - (-10)}$$

Curve = 1.7
Position of potentiometer **P6 = 1.7**

Temperature adjustment with external probe:

- Heat adjustment curve co-efficient KDOTC pre-selection value range 0.0 ÷ 3.0
- TSP5 parameter range (shows the KDTOC heat adjustment curve set on the boiler by means of the P6 trimmer) 0 ÷ 254
- Heat adjustment curve coefficients that select low temperature heating 0.0 ÷ 0.8
- TSP5 parameter values that select the low temperature heating range 0 ÷ 75
- Heat adjustment curve coefficients that select high temperature heating 1.0 ÷ 3.0
- TSP5 parameter values that select the high temperature range 76 ÷ 254
- Fixed difference between the high/low temperature curves 7°C
- Relationship between the values of the TSP5 parameter read and the co-efficients of the heat adjustment curves: $coefficient\_curve = \frac{TSP5}{84.67}$;
- TSP6 parameter range (shows the nominal room temperature set by means of the P1 trimmer only with external probe present) 15 °C ÷ 35 °C;
- KDOTC heat adjustment curve coefficient resolution <0.02

PREPARATION FOR THE OPENTHERM REMORE CONTROL

The card is prepared for the connection of an external interface that allows connection of a remote control based on OpenTherm protocol; these, as well as acting a san environmental thermostat for its area of competence, allows to set some of the boiler's global parameters. The remote control is attached to the interface board by two non-polarised wires protected agianst short-circuit.

When the remote control is not connected and/or does not communicate, all of the settings are made on the boiler. The communication between the card and the remote control ONLY takes place with the boiler selector switch in the WINTER, SUMMER, ANTI-FREEZE position; in the RE-ARM and OFF position the communication is interrupted and all functions are disabled. An eventual fall of the communication leads to continuous attempts to establish it, but after 1 minute the card starts to function in local mode again, observing the position of the selector switch, until the connection is re-established; in this case the heating request that could be generated by an eventual contact connected on opentherm is temporarily ignored. When the connection is active, the remote control has greater priority that the boiler selector switch and globally enables/disables the domestic hot water and heating functions (DHWENA and CHENA). The temperature requested in the domestic hot water phase (DHWSET) is set by the remote control and is however limited within the domestic hot water temperature pre-selection range (35 °C ÷ 57 °C). In the same way, the maximum delivery temperature in the heating phase (CHMAX) is set by the remote control and this is limited within the standard or reduced heating temperature pre-selection range depending on the value of P6 trimmer (TSP5 parameter).
The remote control may request of the boiler and display the temperatures of the delivery probes, domestic hot water, external, the set domestic hot water and heating temperatures, the current modulation level and error codes.
The remote control can display the different domestic hot water, heating, flame presence, fault or block presence functioning states and can re-arm the boiler from a block condition, for a limited number of times. The remote control also allows to set TSP parameters from the boiler card. The technical features of the remote control vary from model to model and are stated in the relative technical specifications (3).

TSP parameters that can be set from remote
The possibility to set some parameters, reserved for qualified staff, in the non-volatile memory of the boiler card is envisioned, using the TSP parameters function envisioned by opentherm protocol. Setting the TSP0 parameter with different data from those accepted does not produce any effect and the value is automatically restored by removing it. The method of setting TSP parameters is strictly relative to the remote control model used.

Range of parameters TSP (1 digit):

- **TSP0,** sets the default data table and restores the original data: 1 ÷ 3 (1 = 24kW; 2 = 28kW; 3 = 32kW);
- **TSP1,** sets the fan speed at maximum burner power in hot water operation: 120 ÷ 250 Hz;
- **TSP2,** sets the fan speed at minimum burner power in hot water and heating mode 30 ÷ 120 Hz;
- **TSP3,** sets the fan speed at burner ignition power: 30 ÷ 160 Hz
- **TSP4,** sets the upper limit to the trimmer P4 of the preset maximum heating power 10 ÷ 100% of MAX
- **TSP5,** shows the curve of the temperature adjustment set by the potentiometer P6: from 0 ÷ 254;
- **TSP6** Shows the nominal room temperature set by the heating switch from + 15° C ÷ + 35 C;
- **TSP7,** timing thermostat (ANTIFAST): from 0 ÷ 240 seconds;
- **TSP8,** hot water flow switch delay: from 0 ÷ 3 seconds;
- **TSP9,** setting of hot water thermostats: 0 traditional, 1 solar

Note: When the management board is provided as a spare part it is set by default on TSP0 = 1 (24KW). To adapt it to a 32 KW boiler, set the TSP0 =3 parameter using the remote control.

PREPARATION FOR THE AREA CONTROL UNIT

The card envisions the connection with a remote/0SCHEREM00 area interface card to which the 0CIRCSTA06 area control unit is connected. The adoption of the area control unit allows to use the environmental thermostat function and hourly programmer of the remote control for the management of the main area and to install specific environmental thermostats and hourly programmers in the secondary areas. This allows to use the remote control with the relative boiler control functions also in the presence of plants divided into areas. The area control unit consent output to the boiler is connected directly to the TA environmental thermostat input in the boiler. The AREA serial communication output of the remote/0SCHEREM00 area interface card must be connected to the area serial input of the 0CIRCSTA06 area control unit respecting the specified polarity. The area control unit can be attached to boilers with multiple configurations.

CHECK INTEGRITY OF TEMPERATURE PROBE

The system checks the fault condition of the NTC probes attached to the integrated modulation card and necessary for functions. The fault condition is verified when the probe indicates a temperature foreign to the correct probe functioning range.

TABLE OF VALUES OF RESISTANCE (Ω) COMPARED TO THE TEMPERATURE OF THE SENSOR NTC OF HEATING AND DOMESTIC HOT WATER:

T° C	0	2	4	6	8
0	27203	24979	22959	21122	19451
10	17928	16539	15271	14113	13054
20	12084	11196	10382	9634	8948
30	8317	7736	7202	6709	6254
40	5835	5448	5090	4758	4452
50	4168	3904	3660	3433	3222
60	3026	2844	2674	2516	2369
70	2232	2104	1984	1872	1767
80	1670	1578	1492	1412	1336
90	1266	1199	1137	1079	1023

6SONDNTC01

If there is a fault in the delivery probe, the burner, if ignited, is immediately switched off, the pump and the fan are powered while the fault is present. The switch valve is in the heating position if there is no request present or if there is a heating request, while it is in the domestic hot water position if there is a request present in domestic hot water mode.

Any functioning request is ignored. If the probe fault is solved without any request, the fan stops immediately, the pump carries out post-circulation for 30 seconds and the switch valve goes to domestic hot water; if it is solved and there is a functioning request, this is managed normally.
If there is a fault in the domestic hot water probe, with no functioning request there is post-circulation of 3 minutes with electrical switch valve in domestic hot water mode; with a functioning request in domestic hot water mode the burner is not activated (it is switched-off if already switched-on) and the pump is activated while the request is present, at the end of which, without further requests, it carries out post-circulation for 30 seconds. If the fault is solved normal functioning is undertaken.
If there is a fault in the external temperature probe every functioning request that leads to ignition of the burner is performed ignoring the calculation algorithm.
Range of correct functioning of flow temperature probes, domestic hot water, cylinder: -20° C; + 120° C;

SECURITY CHECK OF THE BRUSHLESS FAN

Fan speed is constantly monitored in order to detect any anomalous conditions. In stand by conditions, a speed exceeding 500 rpm for a period of time longer than 20 seconds determines a fan alarm signal with consequent block.
At the start of the rotation request the speed detected must be within the maximum fan speed tolerance set (set-point ± 300 rpm) within a time period less than 10 seconds, to prevent the fan alarm signal with consequent block.
During functioning, if the speed detected results lower than the setpoint – 300 rpm window, and however lower than the minimum rotation speed for working fan (700 rpm) or higher than the setpoint + 300 rpm window for a time of 5 seconds the power supply is removed from the gas valve and the igniter, if switched-on, and if the anomaly remains for more than 10 seconds the fan alarm signal is shown with consequent block. At the end of the rotation request the speed detected must be less than 500 rpm within a time less than 50 seconds, to prevent the fan alarm signal with consequent block. The broken fan signal is suspended when the speed parameters acquired by the Hall sensor return within the pre-set limits.

FAN INTEGRITY CONTROL FUNCTION PARAMETERS

- Fan rotation speed at standstill: <500 rpm
- Fan rotation speed when functioning: >700 rpm
- Window for positive speed error: *setpoint*+300 rpm
- Window for negative speed error: *setpoint*-300 rpm
- Timing of validation of correct standstill or rotation state: 1 second
- Timing of fan start-up stand-by before alarm: 10 seconds
- Timing of fan stop stand-by after rotation before alarm: 50 seconds
- Timing of rotation speed alarm out of window: 10 seconds
- Timing of fan alarm not at standstill: 20 seconds
- Timing of ignition consent fall for speed out of window or at standstill:5 seconds

FLOW ANTI-FREEZE FUNCTION

The temperature of the water in the boiler is measured by means of the NTC probe and when this falls below the temperature of 5 °C a functioning request in delivery anti-freeze phase is generated with consequent ignition of the burner.
After the switch-on sequence, the power supplied to the burner is forced to the minimum value. The functioning request in delivery anti-freeze phase ends when the delivery temperature exceeds 30°C or when a functioning time of 15 minutes has been reached. Any functioning request in the heating or domestic hot water phase has greater priority and therefore forcibly ends the function in progress. During a boiler anti-freeze function the pump is powered and the electric switch valve is in the heating position.
If the flame control should block and in case of impossibility of igniting the burner, the domestic hot water anti-freeze function however carries out circulation of the pump. The domestic hot water anti-freeze function is enabled with the boiler selector switch in the SUMMER, WINTER or ANTI-FREEZE position.

Caution, the antifreeze function does not protect the heating system, only the boiler.

DESCRIPTION	ON	OFF
Flow antifreeze function	5 ° C	30° C (or after 15' of operation)
General temperature tolerance	± 3° C	

DOMESTIC HOT WATER ANTIFREEZE FUNCTION

The temperature of the domestic hot water is measured using the NTC probe and when this falls below the temperature of 5 °C a functioning request in the domestic hot water functioning phase is generated, the pump is put into circulation and after a wait of about 30 seconds the burner is ignited. After the switch-on sequence, the power supplied to the burner is forced to the minimum value. Moreover, during a domestic hot water anti-freeze phase, the temperature detected by the delivery probe is controlled continuously and if this reaches the temperature of 60 °C, the burner is switched off. The burner is re-ignited if the functioning request in the anti-freeze phase is still present and the delivery temperature is lower than 60 °C.
The functioning request in the domestic hot water anti-freeze phase ends when the domestic hot water temperature exceeds 10 °C when a functioning time of 15 minutes has been reached. Any functioning request in the domestic hot water phase has greater priority and therefore forcibly ends the function in progress. During domestic hot water anti-freeze function the pump is powered and the electric switch valve is in the domestic hot water position. If the flame control should block and in case of impossibility of igniting the burner, the domestic hot water anti-freeze function however carries out circulation of the pump. The domestic hot water anti-freeze function is enabled with the boiler selector switch in the SUMMER, WINTER or ANTI-FREEZE position.

DESCRIPTION	ON	OFF
Flow antifreeze function	5 ° C	10° C (or after 15' operating temperature or flow temp > 60° C)
General temperature tolerance	± 3 ° C	

PUMP ANTI-SEIZE AND ELECTRIC SWITCH VALVE FUNCTION

The circuit board counts the time passed from when the pump has been deactivated: if this period of time is equal to 24 hours the pump, together with the switch, is activated for a period of time equal to 180 seconds. During the pump anti-block function the burner is not ignited. Any functioning request in heating, domestic hot water or anti-freeze mode has greater priority and therefore overrides any other operation mode in order to carry out that request. The first intervention of the pump anti-block function is envisioned after 3 hours from the first power supply of the card. The function works successively as previously described.

POST-CIRCULATION PUMP FUNCTION

At the end of a heating, anti-freeze or chimney sweep request, the burner is switched-off immediately while the pump continues to be powered for 180 seconds; the same takes place at the end of a functioning request in the domestic hot water phase, however varying the post-circulation timing, which will be 30 seconds.
Without any functioning request the pump is powered while the temperature of the water read by the delivery NTC probe is higher than 78 °C; as soon as the delivery value falls below this value the pump post-circulates for 30 seconds and then switches-off. Any functioning request in the heating, domestic hot water, anti-freeze or chimney sweep phase has greater priority and therefore forcibly ends the post-circulation function in progress in order to carry out that requested.

(function)	Time (sec)
Heating, antifreeze, chimney sweep	180
Finned hot water exchanger, cylinder.	30
For heating temperature> 85° C	30

POST-VENTILATION FUNCTION

At the end of a functioning request, the burner, if ignited, is switched-off immediately while the fan continues to be powered for 10 seconds (timed post-ventilation).
Any functioning request in the heating, domestic hot water, anti-freeze or chimney sweep phase has greater priority and therefore forcibly ends the ventilation function in progress in order to carry out that requested.

The post-ventilation function is also activated when the temperature of the water read by the delivery NTC probe is higher than 95°C and ends when the delivery temperature is lower than 90 °C.
The post-ventilation function is carried out at ignition speed (TSP3 parameter).

SAFETY DEVICES

Primary or heating flow switch

During operation the heating flow switch is continuously checked. If contact occurs in a position not compatible with the current state of the circulator, and there is no request for operation, there is no error reported about fluid circulation.
With a request for operation (heating, hot water or antifreeze), if the contact of the primary flow switch is closed with the pump OFF, an error in the fluid movement is reported after 30 s.
With a request for operation with the circulator ON and no consent from the heater flow switch, an error is reported after 30 seconds, initiating the "pump cycle". This enables power to the pump for one minute and then off for the next 5. This cycle ends if the request for operation is removed, or if, with the pump ON, the primary flow switch is closed, in which case the error message is terminated and normal operation resumed. If in the interval of 5 minutes when the pump is not powered on a further request arrives, the pump is activated immediately and resumes the "pump cycle."
If during the operation of a request the contact of the heating flow switch opens, the consent to the gas valve is stopped immediately, reporting the error after 30 s and starting the "pump cycle". At this stage, the closure of the flow switch with the pump ON will terminate the error message and normal operation is resumed. Upon the possible closure of the contact with the circulator off, the error remains on and the pump is not started.
At the end of a request for operation, during the post-circulation phase, the control on the heat flow switch is disabled, to avoid unwanted error messages.

Safety thermostat

The safety thermostat is a contact normally closed and operates at a temperature of 105° C. This device is connected logically in series with the gas valve operator and is managed by the automatic flame control. When it is opened it immediately stops the supply to the gas valve and if it remains open for a time > TW + TS, a permanent lockout is obtained with the execution of a post-ventilation for 6 minutes at a starting rate of (TSP3) + 990 rpm and a post-circulation is performed for 180 seconds or 30 seconds depending on the type of request (heating or hot water).
If the thermostat remains open for less time than TW + TS, it temporarily turns off the burner, if it was on, but NOT the permanent lockout and upon closure of the safety thermostat, it returns to normal operation.
The safety thermostat is acquired and maintained only in the presence of a request for burner ignition.

SAFETY THERMOSTAT

The safety thermostat thermostat have normally closed contacts. It is connected logically in series with the gas valve operator and managed directly from the automatic flame control. When open, the gas valve power supply is interrupted immediately and if it remains open for a time > TW+TS the block is obtained with the execution of post-ventilation of 6 minutes and post-circulation (180 seconds in Heating and 30 seconds in Domestic hot water).

Safety valve

Installed on the heating water pipe, it makes sure that the pressure does not exceed three bars. Otherwise, the boiler safety could be impaired.
If the valve measures pressure greater than that tolerable, the same will open by discharging water to the outside.

VARIOUS

VARIOUS TEMPERATURES	ON	OFF
Delivery probe boiler anti-freeze function	<5°C	>30 °C
Domestic hot water probe boiler anti-freeze function	<5°C	>10 °C
Fan function for delivery temperature	95°C	90°C
Chimney sweep function	70°C	90°C
Domestic hot water anti-freeze delivery thermostat	OFF 60°C	
Delivery, domestic hot water, boiler temperature probe correct functioning range	-20°C/+120°C	
External temperature probe correct functioning range	-40°C/+50°C	
Post-circulation function for delivery temperature	78°C	
General temperature tolerance	± 3°C	

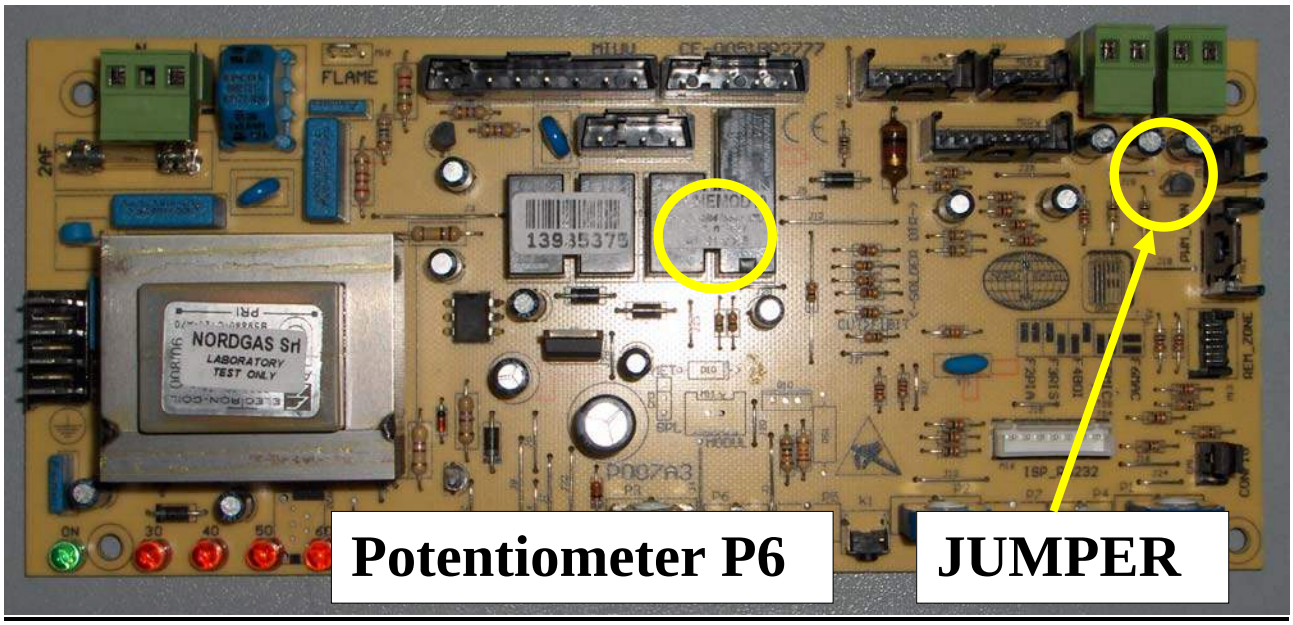
VARIOUS TIMINGS	TIME
Pump anti-block and switch	24 hours
Circulation pump and switch for anti-block	180 seconds
Post-circulation for delivery thermostat	30 seconds
Post-ventilation	10 seconds
Post-ventilation after block	6 min
Start of chimney sweep phase	10 seconds
Duration of chimney sweep phase	15 min
Expiry of opentherm remote data	1 min
Opentherm contact validation OFF	1 second
Opentherm contact validation ON	10 seconds
Ignition power	4 seconds
Delivery anti-freeze phase duration	15 min
General timing tolerance	±5%

NOTE: The power supplied in the anti-freeze phase is minimum

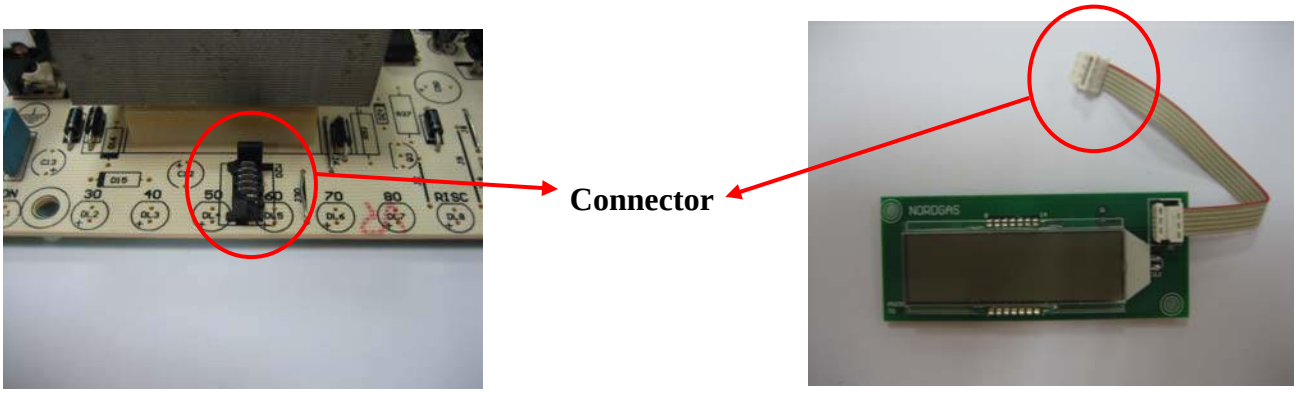
CHAP. 5
ELECTRICAL PARTS

5.1 ELECTRONIC DIAGRAMS AND THEIR WIRING DIAGRAMS

6SCHEMOD19 (spare part code for Condensing Tech Line)



The board for the Line Tech version has a bus connector on the bottom left side for the connection of the LCD display (0SCHELCD00).

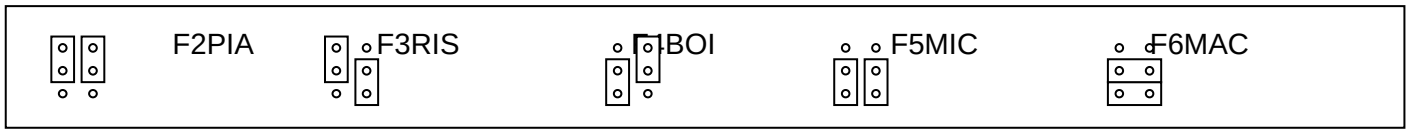


Configuration jumpers

This board can manage 5 different types of boilers. Different settings can be specified by adjusting **2 jumpers** according to the type of boiler in use.
Different positions are shown on the board:

- F2PIA: combi with secondary with plate heat exchanger (default on KC);
- F3RIS: only heating (default on KR);
- F4BOI: combi with hot water cylinder (default on KRB);
- F5MIC: no setting – jumper setting for future developments;
- F6MAC: as F2 + layered boiler tube anti-freeze

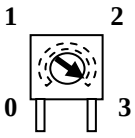
Configuration examples:



***CAUTION:** all boards provided as replacement are set in F2PIA*

Potentiometer P6: This potentiometer has two functions.

o If the external probe is fitted, it allows to select desired climatic curves.

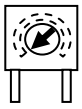


- Parameter values that select the range of low temperature heating: 0 ÷ 0.8

- Parameter values that select the range of high temperature heating: 1 ÷ 3

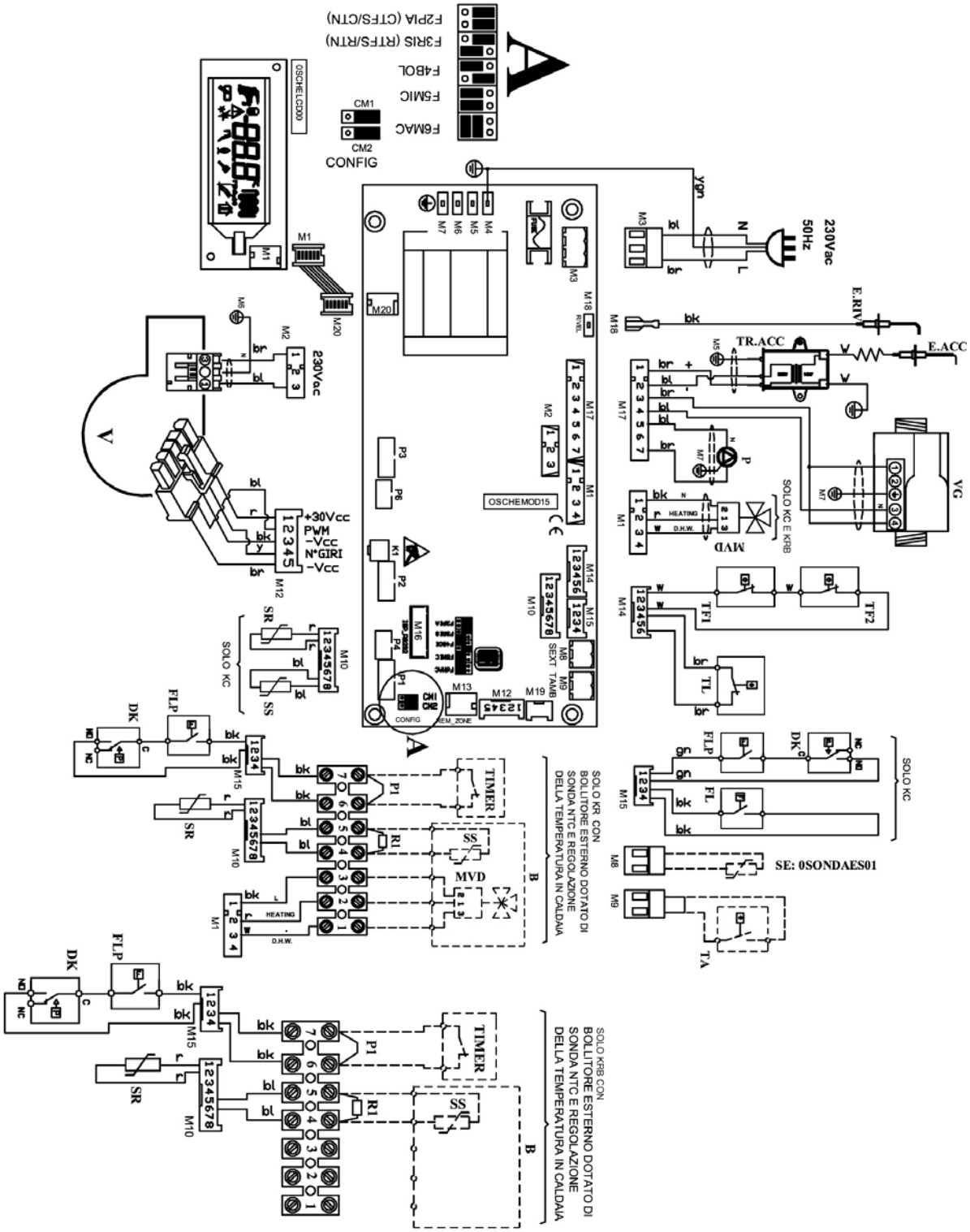
With the Line Tech version, by moving the potentiometer, the corresponding symbol flashes and the value of the selected curve is shown on the display.

o When no external probe is fitte, it allows to select the heating temperature range of the boiler.

 the range is from 20°C to 45°C  the range is from 35°C to 78°C

CONDENSING TECH LINE, production code 0SCHEMOD19

Spare part code: 6SCHEMOD19



5.2 BOILER CONNECTION AND REMOTE CONTROL

Connecting to the boiler:

The boilers versions KRB and KR can be connected to external water cylinder.
The model KRB already has an internal diverter valve, while the model KR has an optional external mounting.
Inside the control panel there is a terminal block for the electrical connection to the boiler, where are connected a jumper (P1) and a resistor (R1). In addition, for the model KR, electrical connections are available via an external divertor (see diagram).

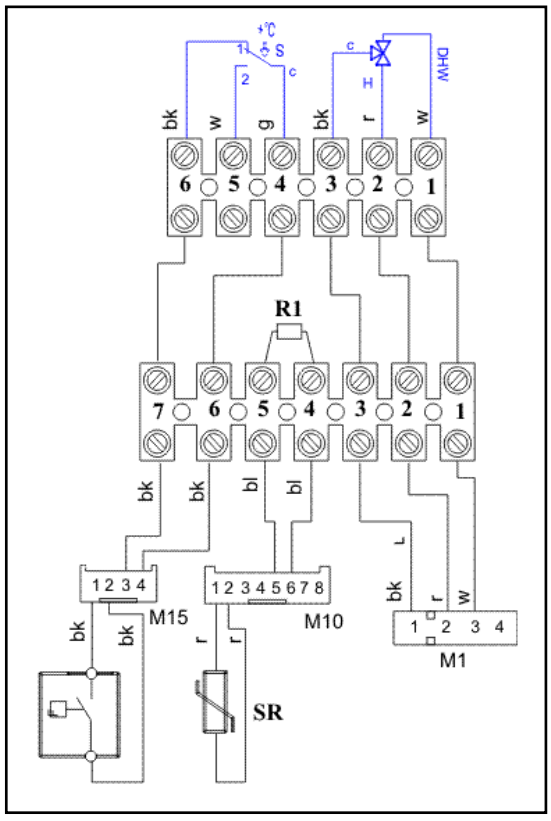
Depending on whether the boiler is controlled by a thermostat or a probe, there are two types of electrical connections:

- ***Bulb thermostat:*** the hot water temperature is set by the same thermostat, which is electrically connected in place of the jumper P1 (resistance R1 is maintained);

- ***Immersion probe:*** in this case the hot water temperature is set by the domestic hot water switch on the boiler, and the probe is electrically connected in place of the resistor R1 (jumper P1 is maintained);

In the first case the hot water request is satisfied at full power with a heat exchange at a fixed point until the bulb thermostat opens the contact upon reaching the temperature, while in the case of an immersion sensor, there is modulation also in hot water operation.

Diagram of a KR bulb thermostat:



CAUTION: with an external hot water system, configure the board in **F4BOL.**

Remote control connecting:

The installation involves connecting the remote control with an interface system to be placed inside the control panel. This is an electronic board contained in the remote control kit that has to be connected to the main boiler board via a bus connection. See instructions and operating manual.

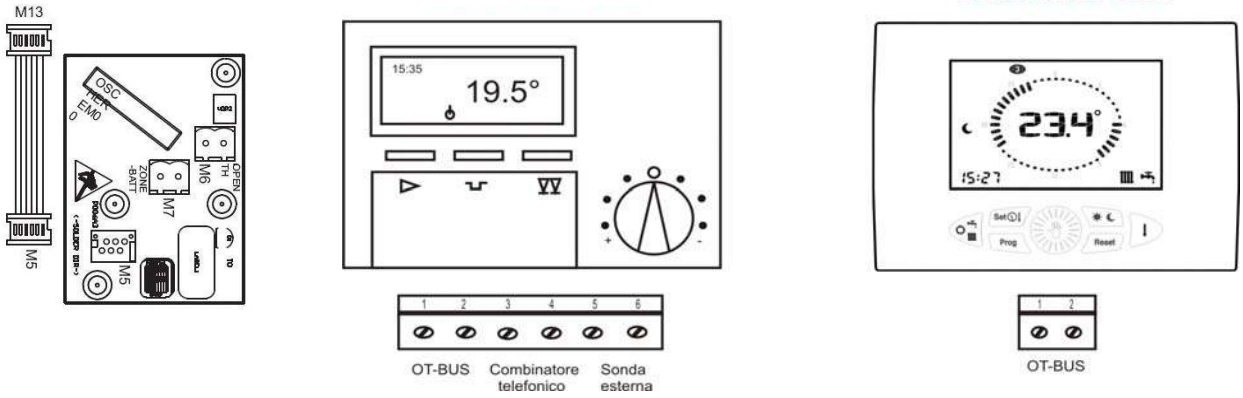
There are two versions of remote controls:

- 0CREMOTO02: with OT-BUS connection, external probe and dialer (it is recommended to connect the probe to the remote control);

- 0CREMOTO05: with OT-BUS connection only.

The interface board is compatible with both types.

Interface board **0CREMOTO02** **0CREMOTO05**



CAUTION: using the remote control as a programmable thermostat, make sure to leave the contact **TAMB** free on the board.
Moreover, in case of multi-zone systems, see the manual on "Temperature adjustment and zoned systems" for the best use of the remote control both as a room thermostat and as a viewer of the boiler status.

5.3 FAN BOARD PARAMETERS CONFIGURATION

!!! CAUTION THE BOARD IS PROGRAMMED ACCORDING TO THE PARAMETERS OF 24 KW MODELS!

To adapt to a different power (28 and 32 KW), you must reprogram using the remote control, setting the parameter TSP0 to 2 or 3.

How to enter the control board power setting with the remote 0CREMOT02

- Connect the remote control to the boiler through the communication board 0SCHEREM00;
- Power up the boiler;
- Open the remote control
- Using the buttons   scroll through the menu until you get to the "**TECHNICAL**" menu and press the confirm button  ;
- Using the buttons   scroll through the menus until you get to the "**TSP 07**" menu;
- Press the confirm button.  You will see the parameter "**20**";
- Press confirm again.  , The symbol  will appear and the first of four 0 will flash;
- Using the buttons   and confirm,  enter your password: (Default **1234** and confirm;
- You will see the menu "**TSP 07**";
- Press the confirm button  .
- At this point you will see the menu "**TSP 00**" and after about 30 seconds the default "**00**".
- Press the confirm button  : the symbol  will appear next to "**TSP 00**"
- With the buttons   + Select:

  01 for 24 kW,
  02 for 28 Kw
  03 for 32 kW.

- Press the confirm button again. 
- After about 30 seconds menu "**TSP 00**" will appear with the stored value;
- Using the buttons   scroll through the parameters until you get to "**TSP 01"** and verify that the new value is correct (see final table);
- If the value is incorrect, press the confirm button  (the symbol  will appear next to "**TSP 01**";
- With the buttons   select the correct value and confirm with  ;
- Wait a few seconds and "**TSP 01**" will appear with the stored value;
- With the buttons   scroll through and double-check the values of the parameters "**TSP 02**", "**TSP 03**" and "**TSP 04**" as described above, with reference to the final table;
- **Once the control sequence is finished, close the window.**

At this point the board is programmed with the parameters related to the power set.

How to enter the control board power setting with the remote 0CREMOT05

- Connect the remote control to the boiler through the communication board 0SCHEREM00;
- Power up the boiler, make sure that the switch is in the 'winter' position and **the remote is OFF**;
- Wait until the remote is on and press the simultaneously  and  keys until the display shows "**TSP"** (10 seconds);
- Press the confirm button  ; at this point "**t 00"** will start flashing**;**
- Press the confirm button  (flashing value 0);
- Turn the knob  to set the desired value:

01 for 24 kW,
02 for 28 Kw;
03 for 32 Kw;

- Hold for a few seconds (3-4) the confirm button  to store the new value;

- Turn the knob  until it shows "**t 01**" and wait a few seconds; the value associated will appear and set as correct (see final table);

- Press the confirm button  (the value associated will flash) and rotate the knob until it reaches the correct value;

- Hold for a few seconds (3-4) the confirmation button  to store the new value;

- Set the parameter values "**t 02**" "**t 03**" and "**t 04**" as described above, in reference to the final table;

- Press  to exit the setup environment and turn off the power.

SUMMARY TABLE: POWER SETTINGS

	0CREMOTO02	0CREMOTO05	*24 KW*	*28 KW*	*32 KW*
Initial setting	**TSP 00**	**t 00**	1	2	3
Fan speed at full burner power	**TSP 01**	**t 01**	181 Hz	195 Hz	201 Hz
Fan speed at minimum burner power	**TSP 02**	**t 02**	53 Hz	45 Hz	59 Hz
fan speed at burner ignition power	**TSP 03**	**t 03**	67 Hz		83 Hz
upper limit of maximum heating power	**TSP 04**	**t 04**	84%	83%	90%

CHAP. 5
FLUE GAS DISCHARGE SYSTEM AND PIPING

Specific pipes and systems must be used for the air suction/flue gas discharge in original condensing boilers as provided by the manufacturer, which are resistant to the attack of condensation acids.
The discharge pipes must be installed with a slope towards the boiler such to guarantee the reflux of the condensate towards the combustion chamber, which is constructed to collect and discharge it.
If this is not possible, it is advisable to install systems able to collect and convey the condensation to the condensation discharge system.

6.1 FLUE GAS DISCHARGE / FRESH AIR INTAKE CONCENTRIC PIPES Ø 100/60

Installation Type C13 – C33

*Maximum pipe lengths**

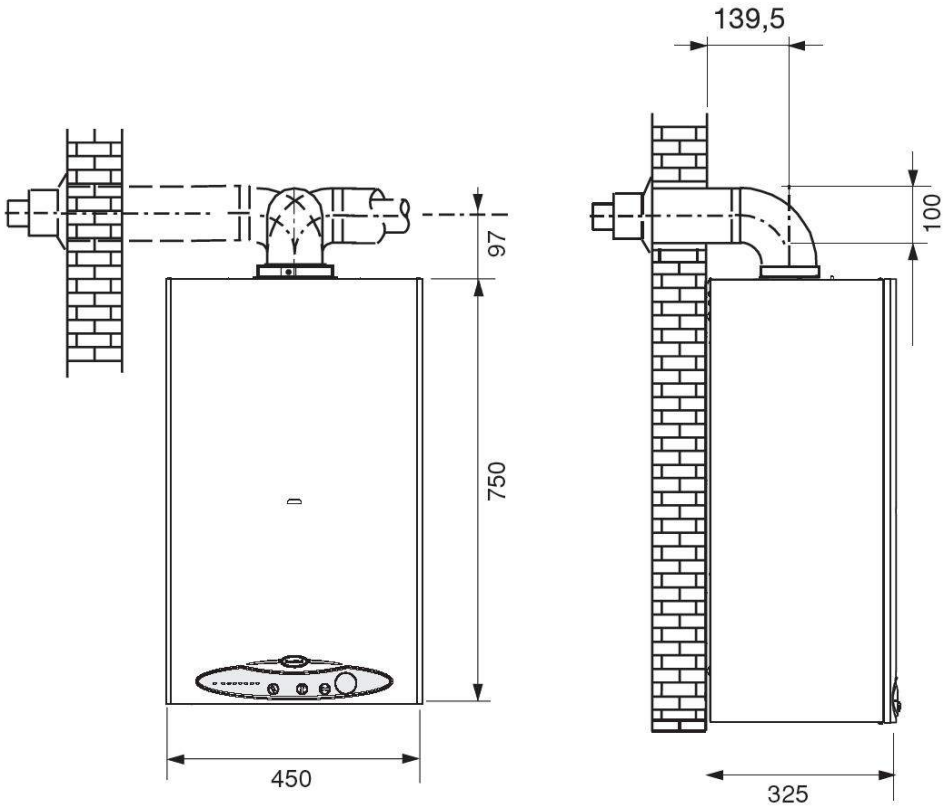
TYPE OF INSTALLATION	PIPE MATERIALS		KC/KR/KRB 24	KC/KR/KRB 28	KC/KR/KRB 32
	Air intake	Flue gas discharge	L max [m]	L max [m]	L max [m]
C13 – C33	aluminium	polypropylene	9,5	7,5	6.5

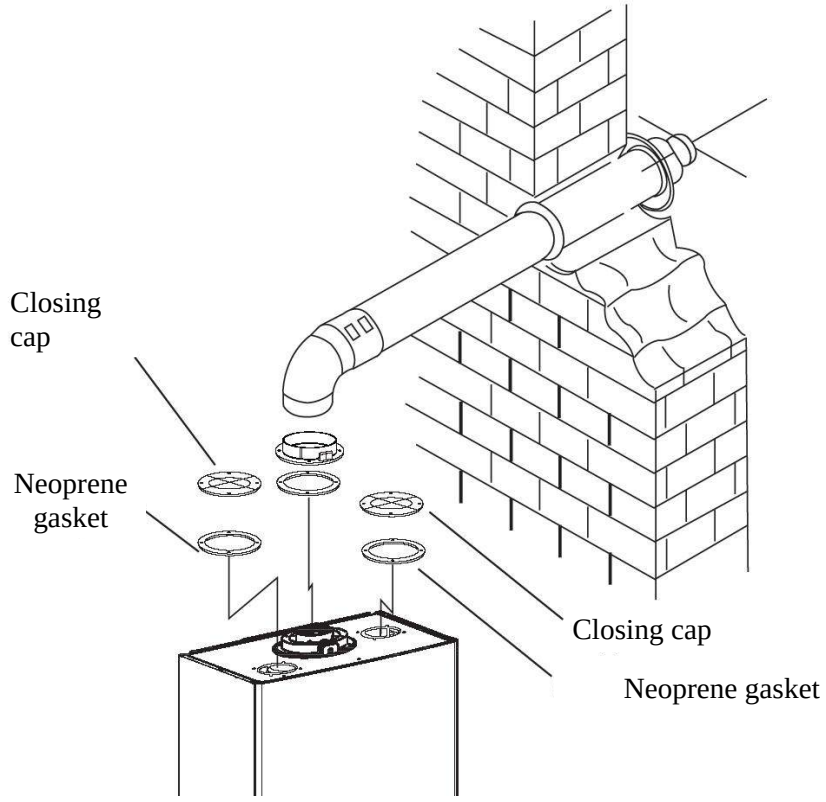
* Initial elbow excluded

Loss of Flue Load

Component	KC/KR/KRB 24 – 28 – 32
	[m]
Extension L = 1000 mm	1.0
Extension L = 500 mm	0.5
Elbow 90 °	1.0
Elbow 45 °	0.5
Vertical Flue Terminal	1.5
Horizontal Flue Terminal	1.5

DIMENSION FOR THE CONNECTION OF FLUE GAS DISCHARGE DUCTS WITH COAXIAL PIPES





6.2 FLUE GAS DISCHARGE / FRESH AIR INTAKE TWIN PIPES Ø 80/80

Maximum pipe length

Installation Type C43 – C53 – C83*

TYPE OF INSTALLATION	PIPE MATERIALS		KC/KR/KRB 24	KC/KR/KRB 28	KC/KR/KRB 32
	Air intake	Flue gas discharge	L max [m]	L max [m]	L max [m]
C43 – C53 – C83	aluminium	polypropylene	120	120	120

* The minimum length of air intake and discharge pipes must be 1 meter

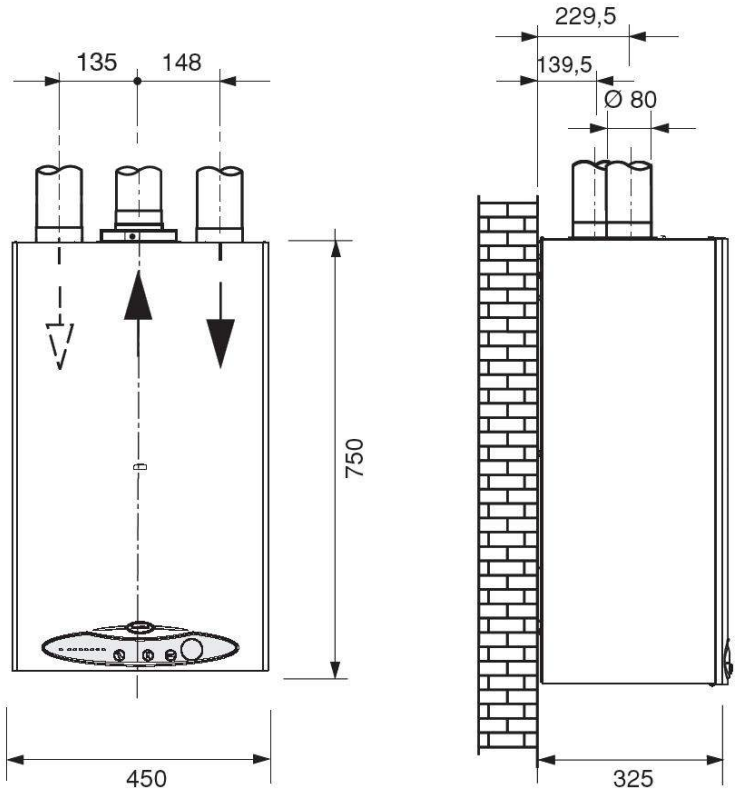
TYPE OF INSTALLATION	PIPE MATERIALS		KC/KR/KRB 24	KC/KR/KRB 28	KC/KR/KRB 32
	Air intake	Flue gas discharge	L max [m]	L max [m]	L max [m]
B23; B53	aluminium	polypropylene	120	120	120

* The minimum length of air intake and discharge pipes must be 1 meter

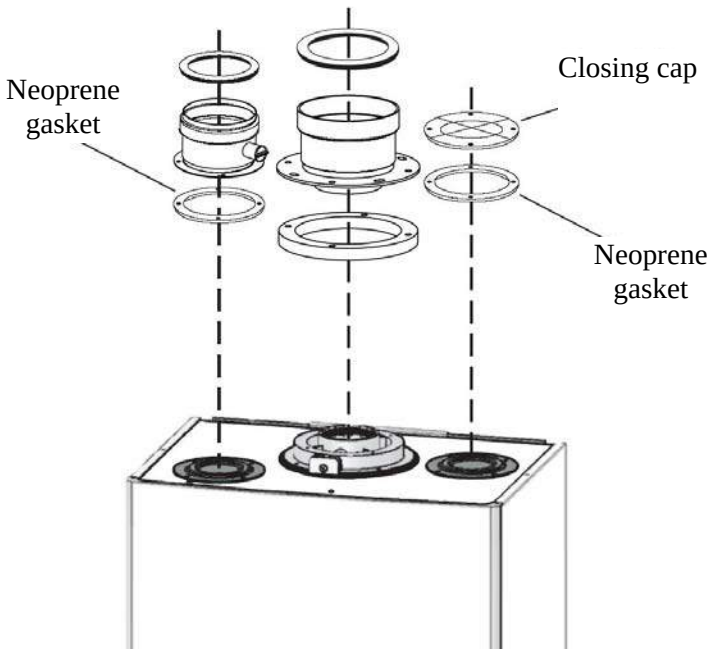
Loss of Flue Load

Component	KC/KR/KRB 24 – 28 – 32
	[m]
Extension L= 1000 mm	1,0
Extension L= 500 mm	0,5
Elbow 90°	1,5
Elbow 45°	1,0
Vertical flue terminal	1,5
Horizontal flue terminal	1
Condensate drain	1,5

DIMENSION FOR THE CONNECTION OF FLUE GAS DISCHARGE DUCTS WITH SPLIT PIPES



SPLIT PIPE KIT:
0KITSDOP00



6.3 COAXIAL AIR / EXHAUST DUCT 125/80

*Maximum pipe length**

Type of installation: C13 - C33

TYPE OF INSTALLATION	MATERIAL PIPES		TYPE OF INSTALLATION	KC/KR/KRB 28	KC/KR/KRB 32
	Air intake	Gas exhaust	L max [m]	L max [m]	L max [m]
C13 - C33	aluminum	**polypropylene**	14.5	11	11.5

* Initial elbow excluded

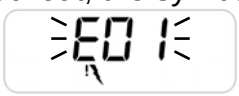
Loss of Flue Load

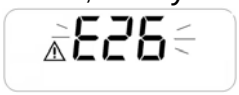
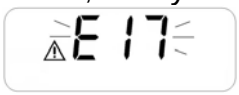
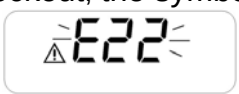
Component	KC / KR / KRB 24 - 28 - 32
	[M]
Extension L = 1000 mm	1.0
Extension L = 500 mm	0.5
Curve 90°	1.0
Curve 45°	0.5
Roof Discharge Terminal	1.5
Wall Terminal	1.5

6.4 FLUE GENERAL SUMMARY

FLUE						
TYPE OF INSTALLATION	PIPING MATERIAL		KC / KR / KRB 24	KC / KR KRB 28	KC / KR KRB 32	DIAMETERS PIPES
	Air Intake	Gas Discharge	L max [m]	L max [m]	L max [m]	[Mm]
B22 - B53		Polypropylene	120	120	120	Ø 80
C13 - C33	Aluminum	Polypropylene	9.5	7.5	6.5	Ø 60/100
C13 - C33	Aluminum	Polypropylene	14.5	11	11.5	Ø 80/125
C43 - C53 - C83	Aluminum	Polypropylene	120	120	120	Ø 80 + Ø 80

FAULT FINDING

Boiler status	*Problem*	*Possible cause*	*Solution*
The boiler is in lockout, the symbol  flashes.	The burner does not ignite	No gas supply	Check gas supply. Check if gas taps are open or if any safety valves installed on the pipes cut in.
		The gas valve is disconnected	Re-connect it
		The gas valve is faulty	Replace it
		The circuit board is faulty	Replace it
	The burner does not ignite: there is no spark.	The ignition electrode is faulty.	Replace the electrode.
		The ignition transformer is faulty.	Replace the ignition transformer.
		The circuit board is faulty.	Replace the circuit board.
	The burner ignites for a few seconds and then goes off	The circuit board does not detect the flame: the live and neutral wires are reversed.	Check the correct live-neutral connection to the mains.
		The detection electrode wire is interrupted.	Re-connect or replace the cable
		The flame detection electrode is faulty.	Replace the electrode.
		The circuit board does not detect the flame: it is faulty.	Replace the circuit board.
		The ignition power level is too low.	Increase it.
		The minimum heat input is not right.	Check the burner setting
The boiler is in lockout, the symbol  flashes.	The flue gas thermostats do not give consent.	There is not enough suction of combustion air or flue gas discharge.	Check the air suction/ flue gas discharge pipes: clean or replace them.
		The flue gas thermostats are faulty.	Check the flue gas thermostats: replace them if faulty
		The fan is not working properly.	Check the fan.
		The circuit board is faulty.	Replace it
The boiler is in lockout, the symbol  flashes.	The boiler thermostat has intervened.	There is no water in the heating system: the pipes are blocked, the thermostatic valves are closed, the taps are closed.	Check the state of the system.
		The pump is blocked or broken	Check the pump.
		The delivery probe sends incorrect values	Check the flow probe

The boiler is in lockout, the symbol  flashes.	Primary flow switch failure: the pump is ON, but the flow switch does not close.	Not enough water in the system	Fill the heating system
		The system is leaking	Check the heating system
		Primary flow switch disconnected	Connect it
		Primary flow switch is faulty	Replace it.
The boiler is in lockout, the symbol  flashes..	Primary flow switch failure: the pump is OFF, but the flow switch remains closed	There is dirt in the primary flow	Remove dirt
		The primary flow switch is faulty.	Replace it.
The boiler is in lockout, the symbol  flashes..	The flow probe does not work	The heating probe is disconnected or faulty	Re-connect it or replace it
The boiler is in lockout, the symbol  flashes..	The domestic hot water probe does not function	The domestic hot water probe is disconnected or faulty	Re-connect it or replace it
The boiler does not work in domestic hot water mode (KC)	The domestic hot water flow switch does not intervene	Insufficient pressure in the system	Check the system
			Check the pressure switch filter
		The flow switch sensor is disconnected or faulty	Connect it or replace it
		The flow switch is blocked	Replace it
The boiler is in lockout, the symbol  flashes..	The fan does not function correctly	The fan is not connected correctly	Check the fan.
		The fan is faulty	Replace it
The boiler is in lockout, the symbol  flashes...	The boiler does not receive data from the Remote Control	The connection with the remote control is interrupted.	Check the connections of the remote control (wiring exceeding 5 metres must be shielded)
		The remote control is broken	Replace the remote control

The boiler is blocked, and flashes the image: 	Water cylinder probe fault (if water cylinder is fitted)	The heating system probe is disconnected or faulty	Reconnect or replace
		Wrong jumpers configuration	Set the board
	Water cylinder probe fault (if water cylinder is not fitted)	Wrong jumpers configuration	Set the board
The boiler works but the picture flashes 	External probe fault	The external sensor is faulty or in short-circuit (thermoregulation no longer performed)	Replace it

IF NONE OF THESE HYPOTHESES ARE VALID THE FAULT IS ON THE MAIN CIRCUIT BOARD WHERE IT IS ONLY POSSIBLE TO CHECK THE CONNECTIONS OR RADICALLY REPLACE THE BOARD ITSELF.

Fondital S.p.A.

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