

# Unical<sup>®</sup>

## *DUA plus* *BTN 28 - BTFS 28*



**INSTALLATION AND USER  
INSTRUCTION MANUAL**

## General info

While thanking you for buying an UNICAL product we invite you to carefully read the following forewarnings:

### IMPORTANT

This **INSTRUCTION MANUAL**, which is an integral and indispensable part of the product, must be handed over to the user by the plumber.

Read carefully the forewarnings contained in this manual because they supply important indications concerning the safety when using and maintaining the boiler. Keep the manual in a safe place for any future reference.

The boiler must be installed by qualified personnel, in compliance with all applicable laws and standards, according to the manufacturer's instructions given in this manual.

**Incorrect installation may cause injury to persons and/or animals and damage to property. The manufacturer shall not be held liable for any such injury and/or damage.**

After removal of the packaging, which has to be sent to specific waste management sites for recycling, check that the boiler is intact and that it has not been damaged during transport and handling. Keep the packaging out of the reach of children as it may represent a choking and suffocation hazard. Do not install equipment which is patently damaged and/or faulty.

Before installing the boiler, check that the technical data supplied by Unical, correspond to requirements for its correct use in the system.

Before making any service on to the boiler switch off the power supply.

In the event of failure and/or faulty functioning, switch off the boiler. Do not attempt to make repairs: contact qualified technicians.

Original parts must be used for all repairs to the boiler.

Non-observance of the above requirement may jeopardize the safety of the boiler and expose people, animals and property to danger.

To grant the efficiency of the appliance and for its proper operation **it is necessary to do a periodical service according to the UNICAL's indications and local laws in force.**

The manual must be handed over with the boiler should it be sold or transferred, in order that the new owner and/or installer can consult it.

**Only original accessories** must be used for all boilers supplied with optional kits (including electrical ones).

This boiler must be used for the purposes for which it has been designed. Any other use shall be considered incorrect and therefore dangerous.

Damage and/or injury caused by incorrect installation or use and/or damage and/or injury due to non-observance of the manufacturer's instructions shall relieve **UNICAL** from any and all contractual and extracontractual liability.

To guarantee efficiency and correct functioning of the equipment it is legally binding to service the boiler once a year according to the schedule indicated in the relative section of this manual.

In the event of long periods of inactivity of the boiler, disconnect it from the power mains and close the gas tap (Warning! In this case the boiler's electronic anti-freeze function will not be operative).

Should there be a risk of freezing, add anti-freeze: it is not advisable to empty the system as this may result in damage; use specific anti-freeze products suitable for multi-metal heating systems.

N.B.: IF YOU SMELL GAS:

- do not turn on or off electrical switches and do not turn on electrical appliances;
- do not ignite flames and do not smoke;
- close the main gas tap;
- open doors and windows;
- contact a Service Centre, qualified installer or the gas supply company.

Never use flames to detect gas leaks.

**WARNING**

This boiler has been built for installation in the country indicated on the technical data plate, which shows, in addition to the technical features, also the gas type for which it is prepared to work. In case these indications do not correspond to your requirements, please contact your nearest Unical supplier. Thanks for that.

### "WATER TREATMENT IN C.H. SYSTEM FOR CIVIL USE" NOTE FOR INSTALLER AND USER

- 1) The frequency of the cleaning of the D.H.W. heat exchanger is related to the hardness of the feeding water.
- 2) With a water hardness higher than 14<sup>o</sup>f the use of antiscaling devices, whose choice will be made on the base of water characteristics, is suggested.
- 3) To increase the resistance to the scaling, a D.H.W. temperature adjustment very close to that one of the actual use, is suggested.
- 4) The adoption of a modulating room thermostat reduces the scaling danger.
- 5) We advise you to verify the state of cleanness of the D.H.W. heat exchanger at the end of the first year and subsequently every two years.

### PED Declaration

The appliance **DUA plus BTN 28 e DUA plus BTFS 28**

is not under the scope of the PED Directive 97/23/CE, because it belongs to a category lower than the 1st, on the base of the comparison of their features with the limits shown on the table 4 of the directive. Furthermore the appliance is already covered by the Directives 90/396/CE (GAD - Gas Appliances Directive) and 73/23/CEE (LVD - Low Tension Directive)

## DATA PLATE DESCRIPTION

### CE Marking

- The CE marking documents that the boilers satisfy:
- The essential requirements of the Directive regarding gas appliances (Directive 90/396/CEE)
- The essential requirements of the Directive regarding electromagnetic compatibility (Directive 89/336/CEE)
- The essential requirements of the Efficiency Directive (Directive 92/42/CEE)
- The essential requirements of the low voltage Directive (Directive 73/23/CEE)

**Unical** CE 1

Model  (3) CEE 92/42 ★  (4)

S.N°  (5) PIN  (6)

Types  (7) NOx  (8)

**A Central Heating**

Pn  (9) kW Pcond  (10) kW

Qmax  (11) kW Adjusted Qn  (12) kW

PMS  (13) bar T max  (14) °C

**B Domestic hot water**

Qnw  (15) kW D  (16) l/min

R factor  (17) F factor  (18)

PMW  (19) bar T max  (20) °C

**C Electrical Power supply**

(21) V  (22) W

IP class:  (23)

**D Countries of destination**

(24)  (25)  (26)

**E Factory setting**

(27) mbar

mbar

mbar

mbar

mbar

mbar

mbar

mbar

(28)

### LEGEND:

- |   |  |
|---|--|
| 1 = CE Surveillance notify body           | 17 = (R factor) N° taps based on the quantity of water declared EN 13203-1 |
| 2 = Boiler type                           | 18 = (F factor) N°stars based on the quality of water declared EN 13203-1  |
| 3 = Boiler model                          | 19 = (PMW) Max. pressure D.H.W. system                                     |
| 4 = Number of stars (Directive 92/42/CEE) | 20 = (T max) Max. temperature D.H.W. system                                |
| 5 = (S.N°) Serial number                  |  |
| 6 = P.I.N. code                           |  |
| 7 = Approved fluing configurations        |  |
| 8 = (NOx) NOx class                       |  |

### A Central Heating circuit features

- 9 = (Pn) Nominal output
- 10 = (Pcond) Condensing nominal output
- 11 = (Qmax) Nominal heat input
- 12 = (Adjusted Qn) Adjusted for nominal Heat input
- 13 = (PMS) Max. pressure C.H. system
- 14 = (T max) Max. C.H. temperature

### B Domestic Hot Water circuit features

- 15 = (Qnw) Nominal heat input in D.H.W. mode (if different from Qn)
- 16 = (D) Specific D.H.W. flow rate according to EN 625-EN 13203-1

### C Electrical features

- 21 = Electrical power supply
- 22 = Consumption
- 23 = Protection grade

### D Countries of destination

- 24 = Direct and indirect country of destination
- 25 = Gas family
- 26 = Supply pressure

### E Factory setting

- 27 = Adjusted for gas type X
- 28 = Space for national brands

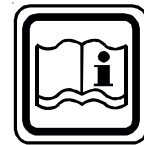
For your own safety, observe these safety instructions.:



**WARNING**  
Identifies potentially dangerous situations.



**WARNING**  
from risk of electric shock.



**PLEASE NOTE:**  
User tip for the optimum utilisation and setting of the control(s) plus useful information.

**1**

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## 1 TECHNICAL FEATURES ET DIMENSIONS

### 1.1 - TECHNICAL FEATURES

**DUA plus** is a wall hung gas boiler with built-in atmospheric gas burner for heating and D.H.W. production; it is available in the following versions:

<b>DUA plus BTN 28</b>	with natural draught open chamber
<b>DUA plus BTFS 28</b>	with forced draught room sealed combustion chamber

All versions have electronic ignition.

**DUA plus B** boilers are supplied with all control and safety features according to the latest laws in force, and comply with the fundamental requirements of the following EEC directives:

The **BEA** boilers comply with the fundamental requirements of the following EEC directives:

- Directive Gas 90/396/EEC dated 29 June 1990;
- Yield Directive 92/42 EEC dated 21 May 1992;

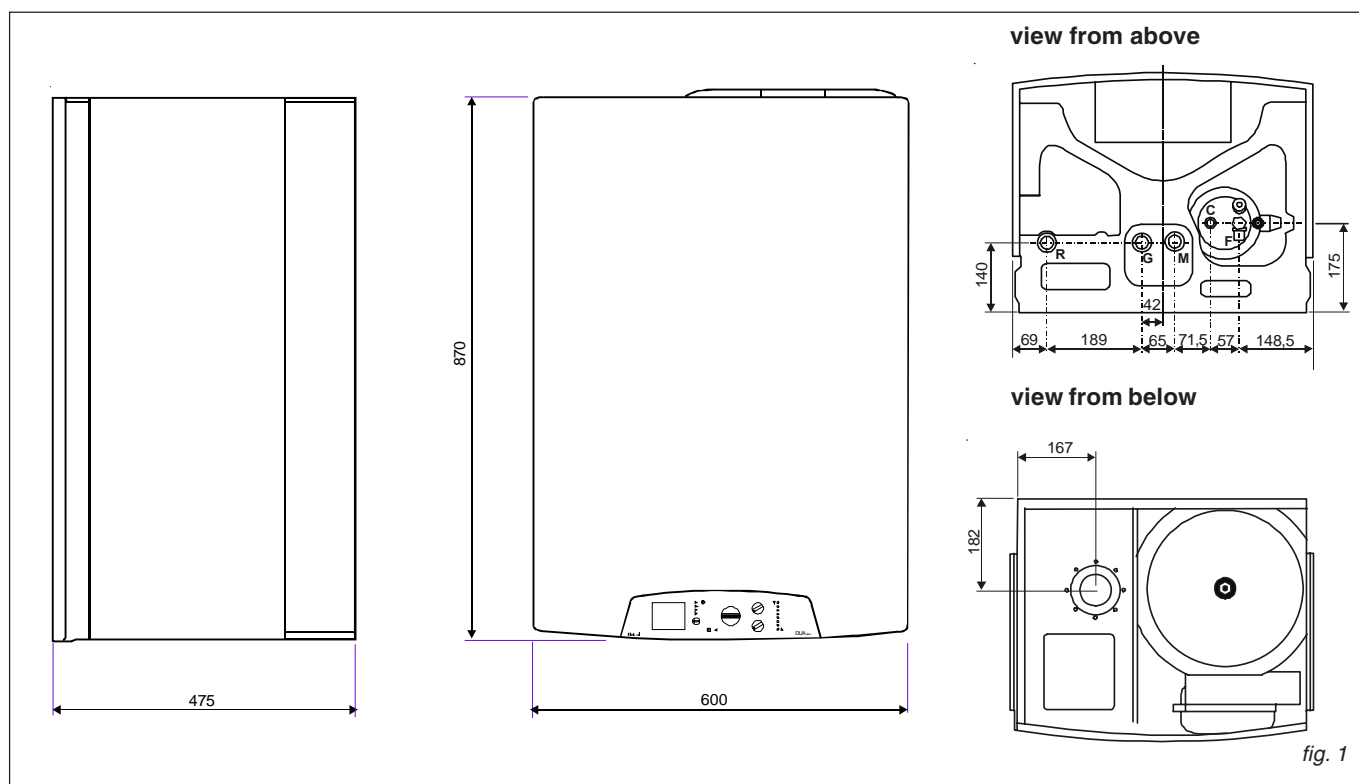
- EMC Directive 89/336/EEC dated 3 May 1989 amended by Directive 92/31/EEC dated 28 April 1992;
- European Community's Low Voltage Directive 73/23/EEC dated 19 February 1973 amended by Directive 93/68/EEC dated 22 July 1993;

The main technical features of the **DUA plus B** boilers are summarised below:

- 60 litre enamelled upright storage tank with a helical steel heat exchanger;
- Monothermal, copper, high performance heat exchanger;
- Adjustment of maximum output in heating mode;
- Adjustment of the flame modulation as a function of the absorbed power;
- NTC sensor for D.H.W. priority;
- Safety pressure switch for low water level;
- System water inlet tap;
- Storage tank exhaust tap;
- Circulation pump with automatic air vent;
- Filling tank pump with automatic air vent;
- High limit thermostat (105°C);
- Anti-freeze protection;
- 7,5 litre expansion vessel;
- 4 litre sanitary expansion vessel (optional);

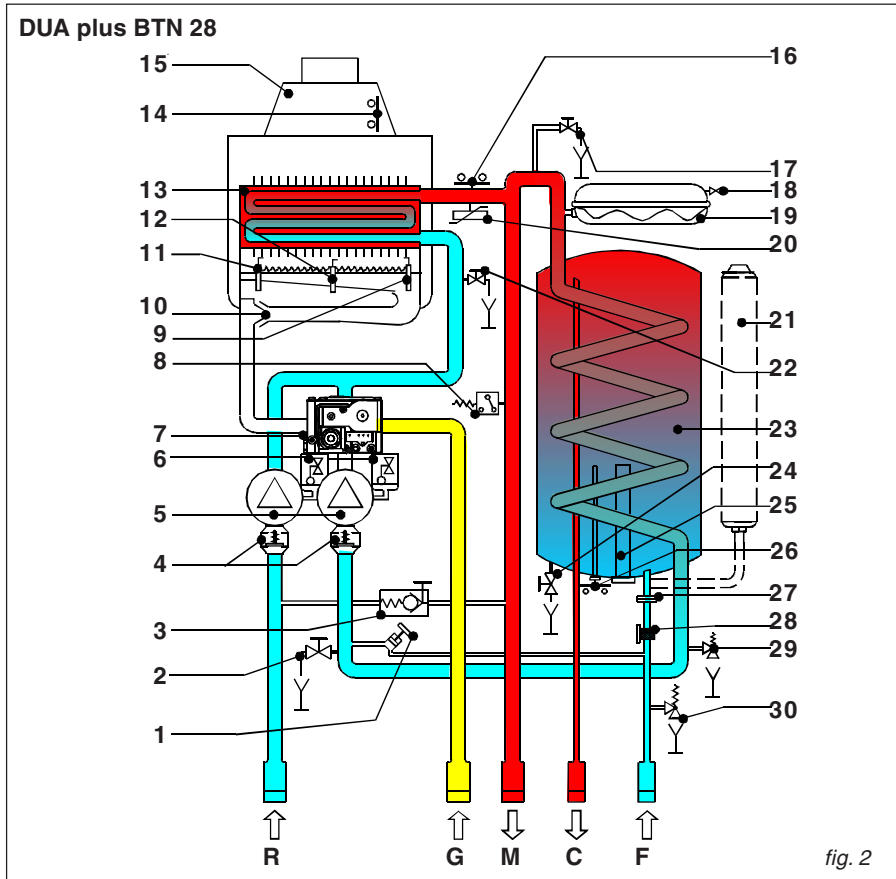
- Automatic differential by-pass;
- Control panel with IP X4D insulation protection;
- Led indication of: D.H.W. demand, C.H. demand, voltage presence, burner in operation, temperature scale, faults, chimney sweeper mode;
- Manometer;
- Tap water flow rate restrictor set at 12 litres/min;
- Unlocking of check valves;
- C.H. temperature selector (35 - 85°C);
- D.H.W. temperature selector (35 - 65°C);
- Main selector Winter / Summer / Antifreeze / Only Heating;
- Minimum outer temperature calibration (if an outer sensor is connected);
- Mounting frame with valves for easy hydraulic connections (optional);
- Electronic ignition with double electrode;
- Casing painted with epoxy polyester powders;
- Flue gas antispillage thermostat (natural draught open chamber version);
- Heating exhaust tap.

### 1.2 - DIMENSIONS



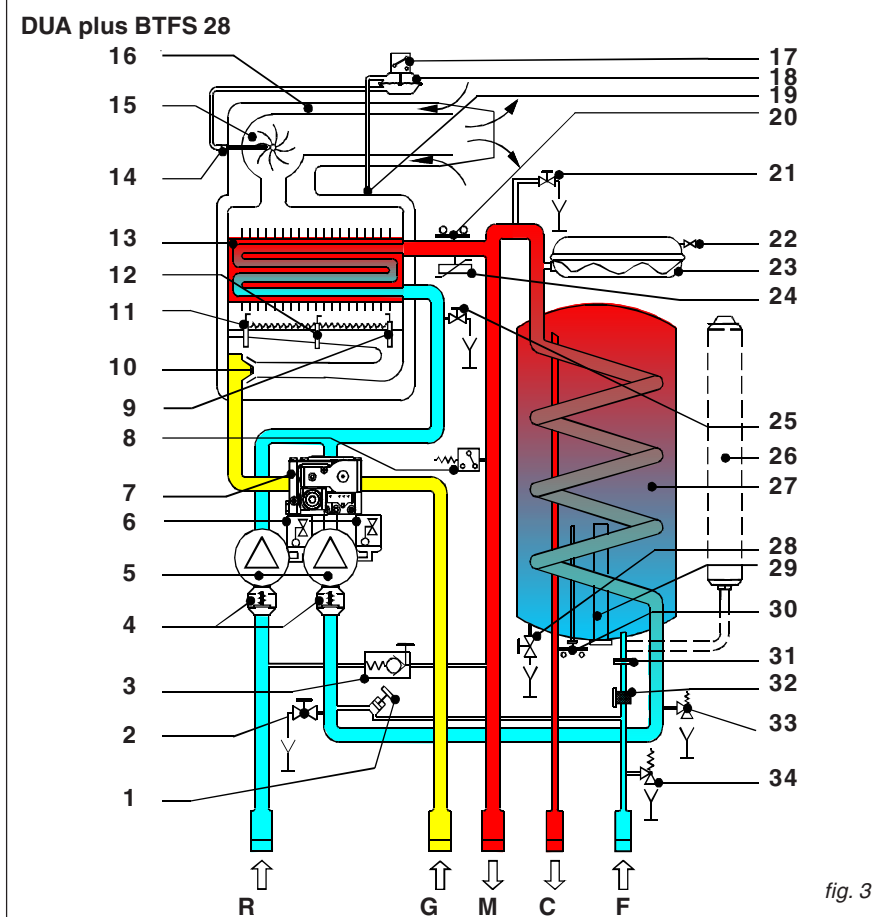
# Technical features and dimensions

## 1.3 - HYDRAULIC CIRCUITS



- 1 Filling system cock
- 2 Boiler draining valve
- 3 By-pass
- 4 No-return valve
- 5 Pump
- 6 Air vent
- 7 Modulating gas valve
- 8 Low water pressure switch
- 9 Ignition electrode
- 10 Burner injectors
- 11 Ignition electrode
- 12 Ionisation electrode
- 13 Main heat exchanger
- 14 Smoke safety thermostat
- 15 Draught diverter
- 16 Safety thermostat
- 17 Manual air vent
- 18 Boiler expansion tank valve inflation
- 19 Expansion vessel
- 20 Flow temperature sensor
- 21 Expansion vessel I. 4 (optional)
- 22 Heat exchanger draining valve
- 23 Tank
- 24 Tank draining valve
- 25 Magnesium anode
- 26 Tank temperature sensor
- 27 Domestic Hot Water flow restrictor
- 28 Filter
- 29 C.H. safety valve
- 30 Boiler safety valve

<b>M</b>	C.H. flow	3/4"
<b>C</b>	D.H.W. outlet	1/2"
<b>G</b>	Gas inlet	3/4"
<b>F</b>	D.C.W. inlet	1/2"
<b>R</b>	C.H. return	3/4"



- 1 Filling system cock
- 2 Boiler draining valve
- 3 By-pass
- 4 No-return valve
- 5 Pump
- 6 Air vent
- 7 Modulating gas valve
- 8 Low water pressure switch
- 9 Ignition electrode
- 10 Burner injectors
- 11 Ignition electrode
- 12 Ionisation electrode
- 13 Main heat exchanger
- 14 Smoke pressure nipple
- 15 Extraction fan
- 16 Air intake and smoke evacuation duct
- 17 Microswitch of the smoke pressure
- 18 Safety pressureswitch of smoke circuit
- 19 Smoke pressure nipple
- 20 Safety thermostat
- 21 Manual air vent
- 22 Boiler expansion tank valve inflation
- 23 Expansion vessel
- 24 Flow temperature sensor
- 25 Heat exchanger draining valve
- 26 Expansion vessel I. 4 (optional)
- 27 Tank
- 28 Tank draining valve
- 29 Magnesium anode
- 30 Tank temperature sensor
- 31 Domestic Hot Water flow restrictor
- 32 Filter
- 33 C.H. safety valve
- 34 Boiler safety valve

<b>M</b>	C.H. flow	3/4"
<b>C</b>	D.H.W. outlet	1/2"
<b>G</b>	Gas inlet	3/4"
<b>F</b>	D.C.W. inlet	1/2"
<b>R</b>	C.H. return	3/4"

## Technical features and dimensions

### 1.4 - OPERATIONAL DATA

For some data (NOZZLES - BURNER GAS PRESSURE - DIAPHRAGMS - INPUTS - GAS CONSUMPTIONS) refer to paragraph ADAPTATION TO THE USE OF OTHER GAS on page 26.

		DUA plus BTN 28	DUA plus BTFS 28
Nominal output	kW	27,9	28,8
Minimum output	kW	12,5	12,9
Actual water efficiency at 100 % of nominal load	%	89,95	92,94
Minimum water efficiency required at 100 % of nominal load	%	89,89	92,92
Actual water efficiency at 30 % of nominal load	%	89,68	92,04
Minimum water efficiency required at 30 % of nominal load	%	87,34	90,38
Star number (according to Efficiency Directive 92/42/CE)	n.	2	3
Combustion efficiency at 100 % of nominal load	%	92,87	94,96
Combustion efficiency at minimum load	%	88,88	90,74
Heat losses through the casing (min. / max.)	%	2,62 - 2,92	2,04 - 2,02
Maximum net smoke temperature (Ts- Ta)	°C	64,6 - 83,4	60,4 - 69,6
Massive smoke flow rate (min. / max.)	g/s	22,05 - 24,3	19,51 - 20,55
Air exces (lambda)	%	126,46	89,4
CO <sub>2</sub>	%	2,3 - 4,6	2,6 - 5,9
NOx (ponderal value according to EN 297/A3+EN 483)	mg/kwh	186	-
NOx class (ponderal value according to EN 297/A3 + EN 483)		2	-
Chimney heat losses with burner in operation (min./max.)	%	11,12 - 7,13	130
Chimney heat losses with burner shut-off	%	0,449	3
			11,03 - 6,61
			0,489

### 1.5 - GENERAL SPECIFICATIONS

		DUA plus BTN 28	DUA plus BTFS 28
Boiler category		I12H3+	I12H3+
Minimum water low rate in heating circuit ( $\Delta T$ 20°C)	l/min	8,9	8,8
Minimum pressure in heating circuit	bar	0,5	0,5
Maximum pressure in heating circuit	bar	3	3
Water content of the primary circuit	l	3,25	3,25
Maximum operation temperature in heating mode	°C	85	85
Minimum operation temperature in heating mode (*)	°C	35	35
Expansion vessel total content	l	7,5	7,5
Maximum water content of the heating circuit (max. temp. 90°C)	l	139,9	139,3
Minimum pressure in the D.H.W. circuit	bar	0,5	0,5
Maximum pressure in the D.H.W. circuit	bar	6	6
Tank capacity	l	60	60
Specific D.H.W. flow rate ( $\Delta t$ 30°C according to EN 625)	l/min.	16	16
Flow rate of the D.H.W. flow restrictor	l/min.	12	12
Contiunuous D.H.W. production with $\Delta t$ 45 K	l/min.	8,98	9,1
Contiunuous D.H.W. production with $\Delta t$ 40 K	l/min.	9,98	10,2
Contiunuous D.H.W. production with $\Delta t$ 35 K	l/min.	11,43	11,7
Contiunuous D.H.W. production with $\Delta t$ 30 K	l/min.	13,33	13,6
Contiunuous D.H.W. production with $\Delta t$ 25 K	l/min.	15,99	16,4
DHW available at a temp. of 45°C in the first 10 mins of draw-off with storage tank water at 60°C and cold water at 10°C (*)	l	187	187
D.H.W. temperature adjustable between	°C	35 - 65	35 - 65
Electrical power supply Tension/Frequency	V-Hz	230/50	230/50
Supply fuse	A (F)	4	4
Maximum absorbed output	W	89	148,5
Insulation degree	IP	X4D	X4D
Net weight (dry)	kg	82	89

(\*) **Warning: The utilisation of this type of boilers in the "floor heating systems" needs the use of specific equipments (e.g.: UNICAL Thermic Module) to avoid all risks of smoke condensation within the boiler.**

# 2

## INSTRUCTIONS FOR THE INSTALLER

### 2.1 - INSTALLATION CONDITIONS

**DUA plus** is a gas boiler which must be installed in accordance with the latest regulations or rules in force.

For the boiler category, which changes according to the destination country, see page 3.

#### NOTE:

Observe the corresponding technical rules and the building supervisory and statutory regulations of the country of final use when installing and operating the system. Always ensure that an appropriately specialised company is entrusted with installation, gas supply and flue gas connection, commissioning and power supply, as well as all servicing and repair works.

Work on gas conduits and fittings must only be carried out by a registered service provider.

The system must be cleaned and serviced once a year. This includes an inspection of the entire system to see if it is in full working order.

Defects and faults must be eliminated immediately.

Please note that we can accept no liability whatsoever for loss or injury resulting from unauthorised adjustment or manipulation of the system's control or regulating devices.

### 2.2 - INSTALLATION

#### 2.2.1 - PACKING

**Dua plus B** is packed and delivered in a strong cardboard box. Once the boiler has been unpacked check that it is intact. The packaging material can be recycled and it must be disposed of accordingly.

Keep the packaging out of the reach of children as it represents a choking and suffocation hazard.

**UNICAL waives all liability for injury to persons and animals or damage to property resulting from non-observance of the above.**

The packaging contains:

- the copper pipe kit for hydraulic connection of the boiler to the heating and water system and to the gas mains;
- a bag with:
  - a) installation, use and maintenance handbook,
  - b) template for fixing the boiler to the wall,
  - c) 4 screws with dowels to fix the boiler to the wall,
  - d) for models **TFS**, a diaphragm for flue gas exhaust.

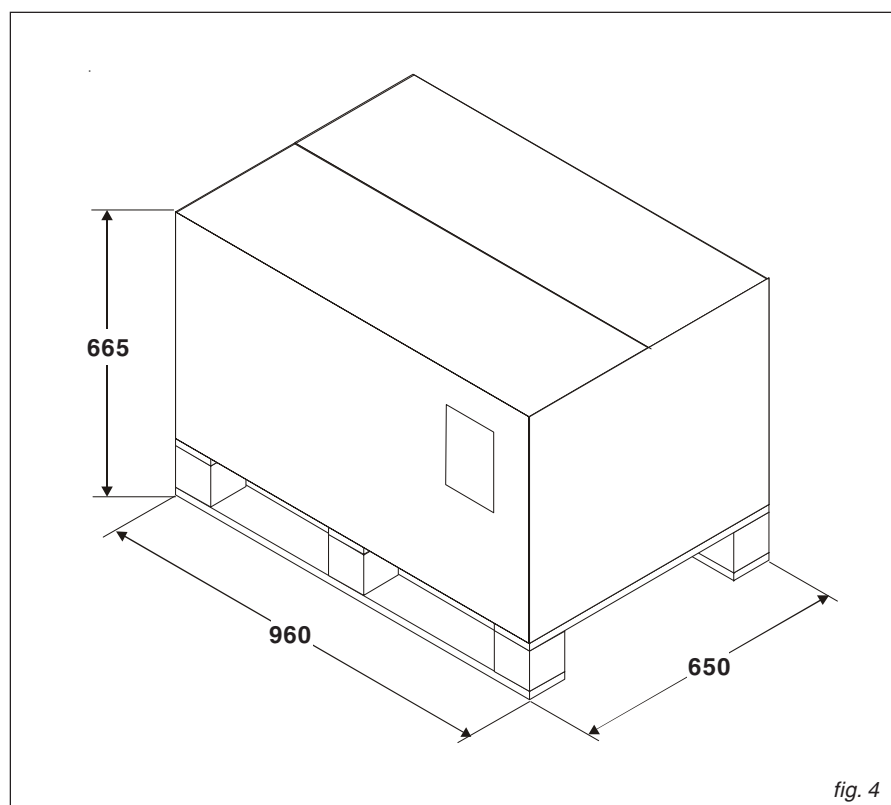


fig. 4



## 2.2.2 - POSITIONING OF THE BOILER

Every boiler is supplied with a dedicated "Metallic mounting jig" to allow the correct positioning of the gas, water and C.H. system connections when the hydraulic system is being laid out and before the boiler is installed.

This mounting jig must be fixed to the wall chosen for the installation of the boiler using two screws with expanding dowels.

The lower part of the mounting jig allows the correct marking on the wall where the fittings for the gas, C.H. flow and return, D.H.W. and D.C.W. have to arrive.

Determine the position of the boiler taking care:

- of leaving a minimum clearance of 50 mm on both sides of the boiler to allow accessibility for service.
- of a good resistance of the screws supporting the boiler on the wall.
- of avoiding to position the boiler above an equipment whose use could be prejudicial for the boiler (stove with emission of greasy vapours, washing machines, etc...).

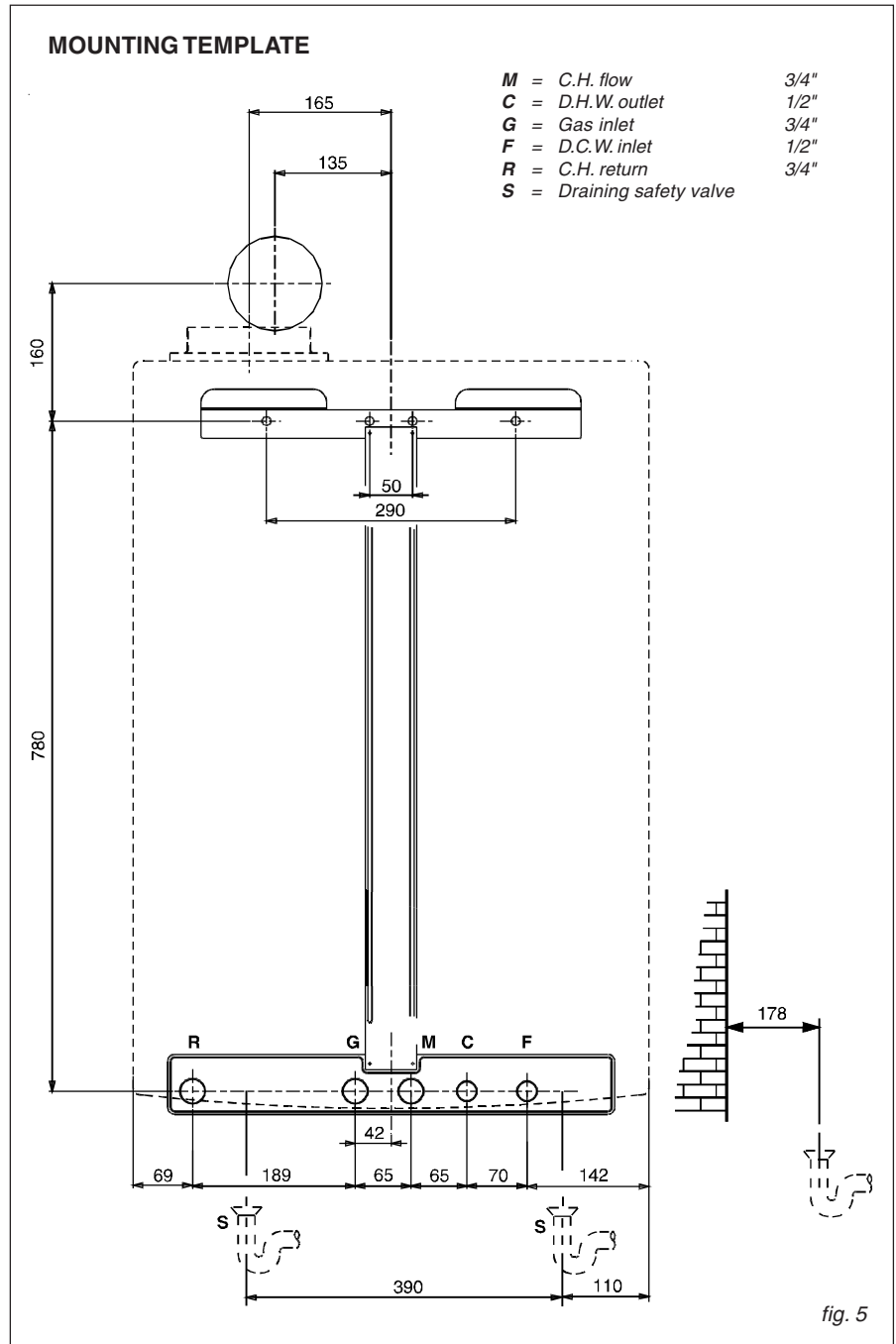
### IMPORTANT:

**350 mm free space must be left between the top of the boiler and the ceiling to allow replacement of the magnesium anode. This condition is met when there is a space of 436 mm between the axis of the holes in the boiler bracket and the ceiling.**

The mounting jig allows the completion of all the connections and the making of the soundness test of the full installation without the boiler in place.

If the boiler is not put in place immediately, protect the different connections in order to avoid that the mortar and the paint cannot compromise the soundness of the subsequent connections.

Because the temperature of the wall, on which the boiler is fitted, does not rise more than 60 K when the boiler is in operation, there are no special requirements to comply with.



## 2.2.3 - ASSEMBLING THE BOILER

Before connecting the boiler to the D.H.W. and heating system pipes, carefully clean the pipes to remove all traces of metal resulting from processing and welding operations as well as any oil and grease which could damage the boiler or jeopardize its operation.

### NOTE:

- Do not use solvents which could damage the components.

Unical refuses all liability for injury to persons and animals or damage to property resulting from non-observance of the above. To install the boiler:

- Fix with tape the paper template to the wall
- make two  $\varnothing$  12 holes in the wall and insert the hooks;

- position the junction points for the connection of the gas supply pipe, cold water supply pipe, D.H.W. outlet, CH flow and return in the positions shown by the template.
- fit the boiler onto the support hooks;
- connect the boiler to the gas pipe, domestic cold and hot water pipes, CH flow and return pipes.
- connect to electrical supply.

## Installation info

### 2.2.4 - VENTILATION

The boiler must be installed in a suitable room according to the rules in force and particularly:

#### NATURAL DRAUGHT OPEN FLUE BOILERS

(TYPE B11bs and VMC INSTALLATIONS)  
The boilers **DUA PLUS TN**, are open flue boilers and are foreseen for chimney connection: the air for combustion is taken directly from the room in which the boiler is installed.

The room can have both a direct ventilation (i.e. with ventilation openings facing outwards) or an indirect ventilation (i.e. with ventilation openings facing an adjacent room) provided that the following requirements are complied with:

##### Direct ventilation:

- The room has to have a ventilation opening of, at least, 6 cm<sup>2</sup> /kW of installed input (see input table on par. 2.7) and, in no case, lower than 100 cm<sup>2</sup> and made directly onto an external wall.
- The opening has to be as close as possible to the floor.
- It should not be possible to close it and it should be protected with a grate not reducing its useful ventilation section.

- A correct ventilation can be obtained also through the addition of more openings, provided the addition of the different sections is not less than that really needed.
- In case it is not possible to make a ventilation opening close to the floor, it will be necessary to increase its useful section of at least 50%.
- If an open fire is present in the same room it needs an independent air supply, otherwise the installation of a type B appliance is not permitted.
- If in the room there are other devices which need air for their operation (e.g. a wall exhauster) the section of the ventilation opening has to be the properly sized.

##### Indirect ventilation

In case it is not possible to make a room ventilation opening on an external wall, it is possible to have an indirect ventilation, sucking the air from an adjacent room, making an

opening in the lowest part of a door.

This solution is possible only if:

- The adjacent room is not a bed room
- The adjacent room is not a common part of the building and is not a room with fire danger (e.g. a fuel deposit, a garage, etc..)

#### FORCED DRAUGHT ROOM SEALED BOILER

(TYPE C12 - C32 - C42 - C52 - C62 - C82)  
The **DUA PLUS TFS** are forced draught, room seal-ed boilers; so they do not need particular ventilation openings for the combustion air, in the room in which they are installed.

#### FORCED DRAUGHT, OPEN FLUE BOILER

##### (TYPE B22)

If the **DUA PLUS TFS** are installed in a room according to the chimney configuration on type **B22**, the same ventilation requirements established in paragraphs **Direct ventilation** and **Indirect ventilation** apply.

### 2.2.5 - FLUE GAS DISCHARGE SYSTEM

#### NATURAL DRAUGHT OPEN FLUE BOILERS

##### Connection to the chimney

A good chimney is very important for the correct functioning of the boiler; it must therefore conform with the following requirements:

- it must be made from waterproof material and be resistant at the temperature of the flue gas and relative condensate;
- it must have sufficient mechanical strength and low thermal conductivity;
- it must be perfectly sealed to prevent cooling due to parasite air inlets;
- it must be as vertical as possible and the end section must have a chimney cap which guarantees efficient and constant evacuation of the combustion products;
- the chimney must have a diameter not smaller than that of the boiler's draught diverter; for chimneys with a square or

rectangular section, the internal section must be 10% larger than the section of the connection duct to the draught diverter.

- starting from the draught diverter, the duct must have a vertical section with a length more than twice the diameter, before getting into the chimney.

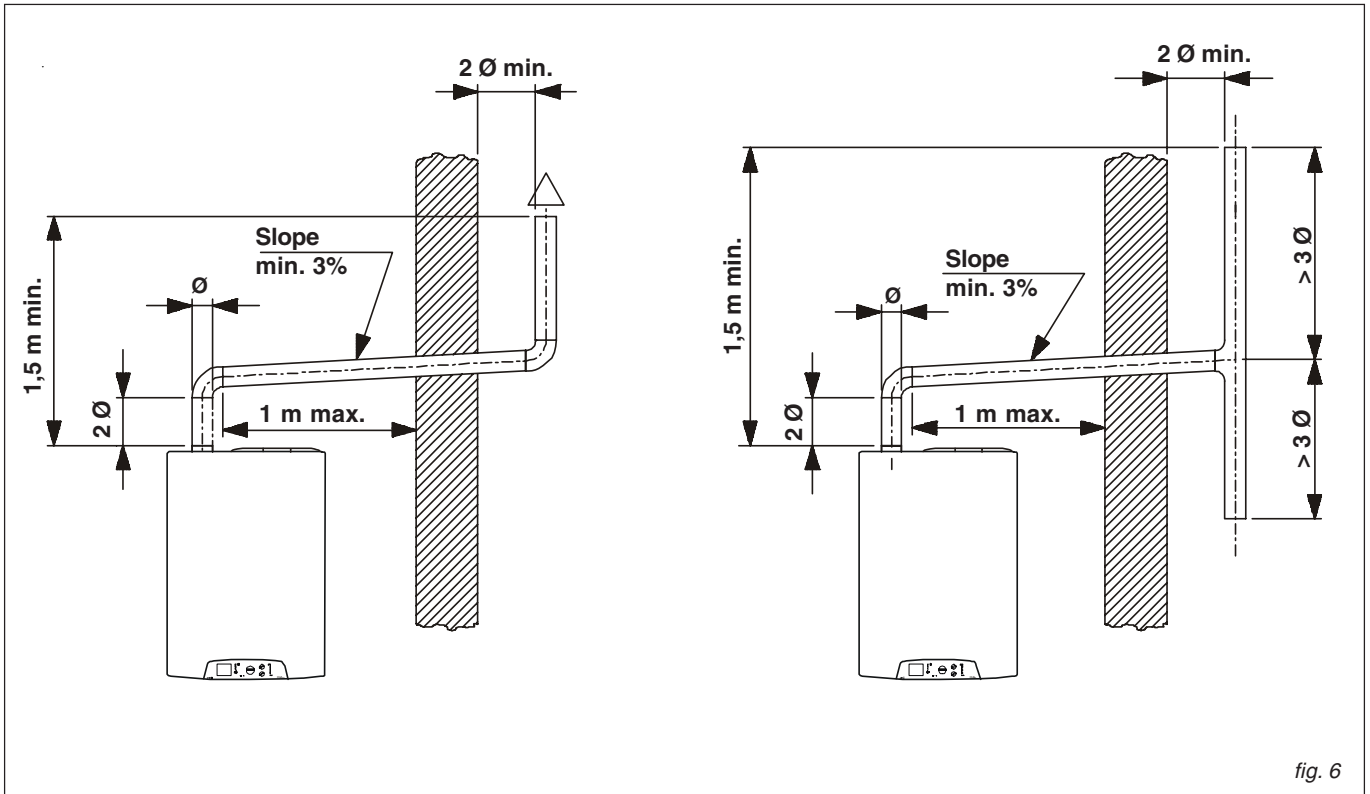
##### Direct emission into the atmosphere

Natural draught boilers can discharge combustion products directly into the atmosphere using a duct, which goes through the outside walls of the building, connected to a flue exhaust terminal.

The exhaust duct must also comply with the following requirements:

- the sub-horizontal part inside the building must be as short as possible (no more than 1 m);
- for boilers with vertical discharge, such as boilers **Dua plus B**, there must be no more than 2 direction changes;
- it must receive the discharge from a single boiler;

- the part going through the wall must be protected by a sheath duct; the part of the sheath duct facing the inside of the building must be sealed and the part facing outwards must be open;
- the final section, on which the draught terminal will be fixed, must protrude from the wall of the building for a length of at least twice the diameter of the duct;
- the draught terminal must overlap the connection to the boiler by at least 1.5 m (see fig. 8).



**DIMENSIONS FOR CONNECTING FLUE GAS DUCT**

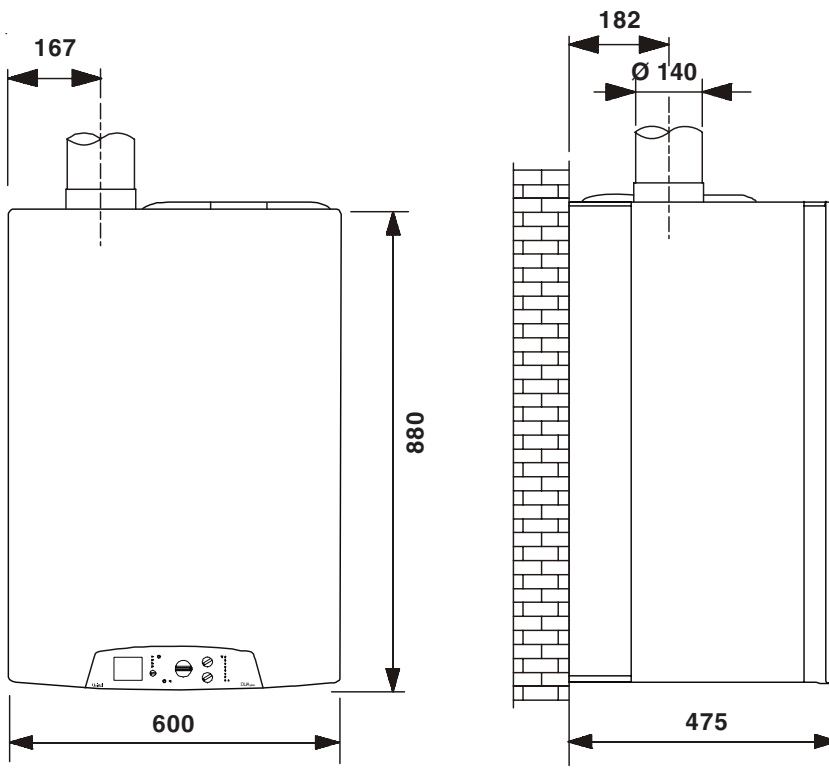


fig. 7

**WARNING:**

The boiler is fitted with an automatic safety reset device as protection against spillage of combustion products inside the building. In case of the device operation, the boiler will remain in lock-out position indicating the anomaly on the display. After 15 minutes the boiler will be reset automatically.



**It is absolutely forbidden to by-pass the smoke thermostat.**

If the boiler cuts off regularly, it is necessary to ask a technician for a check of the flue gas exhaust duct. This duct may be obstructed or may be unsuitable for the discharge of flue gas into the atmosphere.



**UNICAL** refuses all liability for damage caused as a result of incorrect installation, use, modification of the boilers or for non-observance of the instructions provided by the manufacturer or applicable installation regulations

## Installation info

The **DUA plus B** is a forced draught, room sealed boiler; so it does not need particular ventilation openings for the combustion air, in the room in which it is installed.

The forced draught, room sealed boilers, normally should evacuate the smokes on the roof of the building.

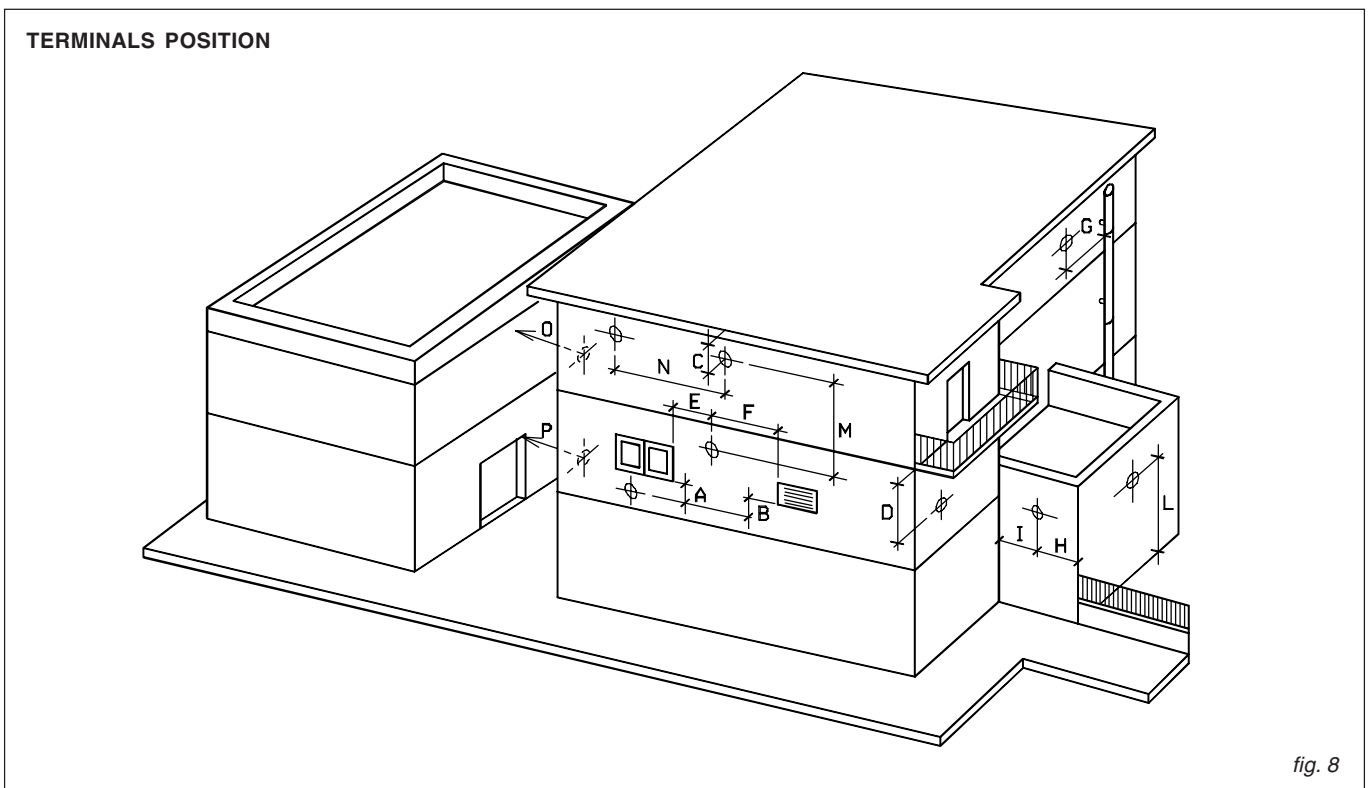
When, in some country, it is allowed to evacuate on the front of the building, the following distances of the terminals, have to be complied with:

POSITIONING OF TERMINALS FOR TYPE "C" BOILERS		
Position of the terminal		Min. Distances mm
- Under a window	A	600
- Under a ventilation opening	B	600
- Under a gutter	C	300
- Under a balcony (1)	D	300
- From an adjacent window	E	400
- From an adjacent ventilation opening	F	600
- From vertical or horizontal air pipes or drains (2)	G	600
- From an external corner of the building	H	300
- From an internal corner of the building	I	1000
- From the ground or from another floor	L	1800
- Between two vertical terminals	M	1500
- Between two horizontal terminals	N	1000

### NOTES

(1) Terminals below a practicable balcony shall be arranged in such a way as to assure that the total run of smokes, from their outlet from terminal up to outlet from balcony external perimeter, including the height of protection baluster, if any, is not less than 2 m.

(2) Distances of not less than 500 mm shall be adopted in placing the terminals, due to the proximity to materials subject to the action of products of combustion such as plastic gutters or waterspouts, wooden jetties, etc.) unless adequate screening measures are taken for the said materials.

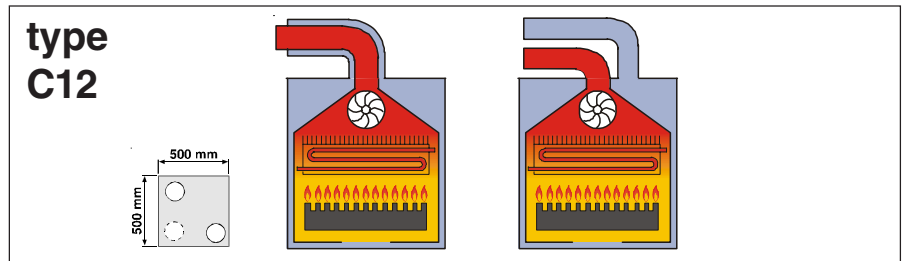


**2.2.5 - SMOKE DISCHARGE AND AIR SUCTION DUCTS CONFIGURATION  
TYPES C12, C32, C42, C52, C82**

The DUA plus boiler has been approved for the following air suction and smoke evacuation types:

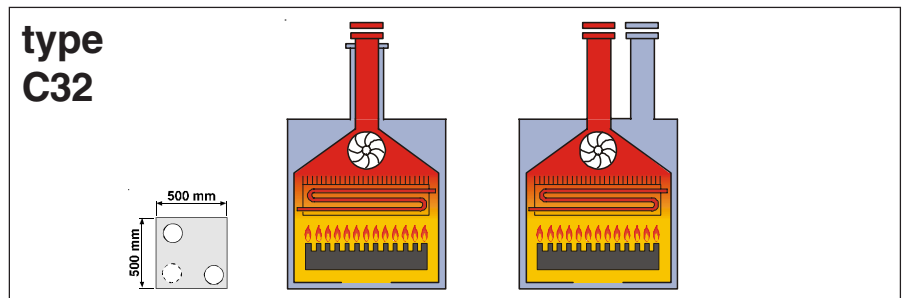
**C12**

Boiler designed for connection to horizontal exhaust and suction terminals directly into the atmosphere using coaxial or dual ducts. The distance between the air intake duct and the flue gas outlet duct must be at least 250 mm and both end sections must be located within a 500 mm square.



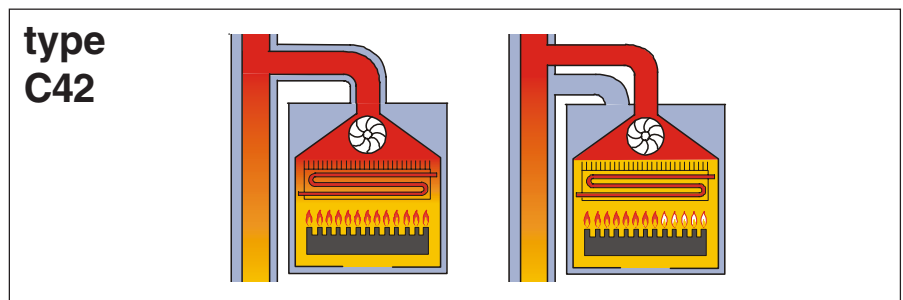
**C32**

Boiler designed for connection to vertical discharge and suction outlets directly into the atmosphere using coaxial or dual ducts. The distance between the air intake duct and the flue gas outlet duct must be at least 250 mm and both end sections must be located within a 500 mm square.



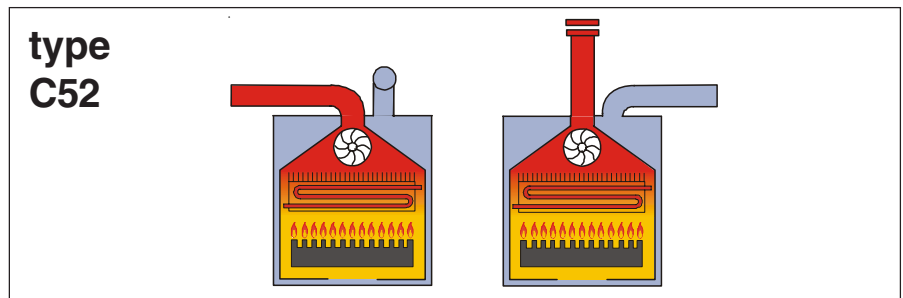
**C42**

Boiler designed for connection to collective chimneys including two ducts, one for the suction of combustion air and the other for the exhaust of the combustion products, through coaxial or dual ducts. **The chimney must comply with relevant applicable law provisions.**



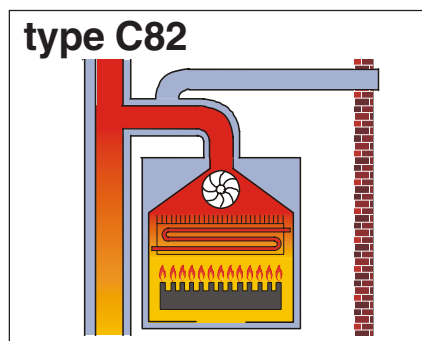
**C52**

Boiler with separate combustion air suction and combustion product exhaust ducts. **These ducts can discharge into areas with different pressure. The dual ducts must not be located on two opposite walls.**



**C82**

Boiler designed for connection to an air supply terminal and fitted to an individual or shared chimney. **The chimney must comply with relevant applicable law provisions.**



## Installation info

### 2.2.7 - SMOKE DISCHARGE SYSTEM FORCED DRAUGHT BOILERS

#### Type C12

The maximum autorised length for the horizontal coaxial pipes is **3 meters**; for each supplementary bend the maximum length will be reduced by 1 meter; furthermore the pipe shall have a downward inclination of 1% on the outlet direction in order to avoid the rain enter the pipe.

For installations with horizontal coaxial pipe with length between 1 m, it is necessary to place, inside the fan outlet, the diaphragm supplied with the boiler (see fig. 9).

#### Type C32

The maximum allowed length of the coaxial vertical pipes is 5 meters, included the roof terminal; for each supplementary bend the maximum allowed length will be reduced by 1 meter.

For installations with coaxial ducts having a length between 1.5 m, it is necessary to place, inside the fan outlet, the diaphragm supplied with the boiler (see fig. 9).

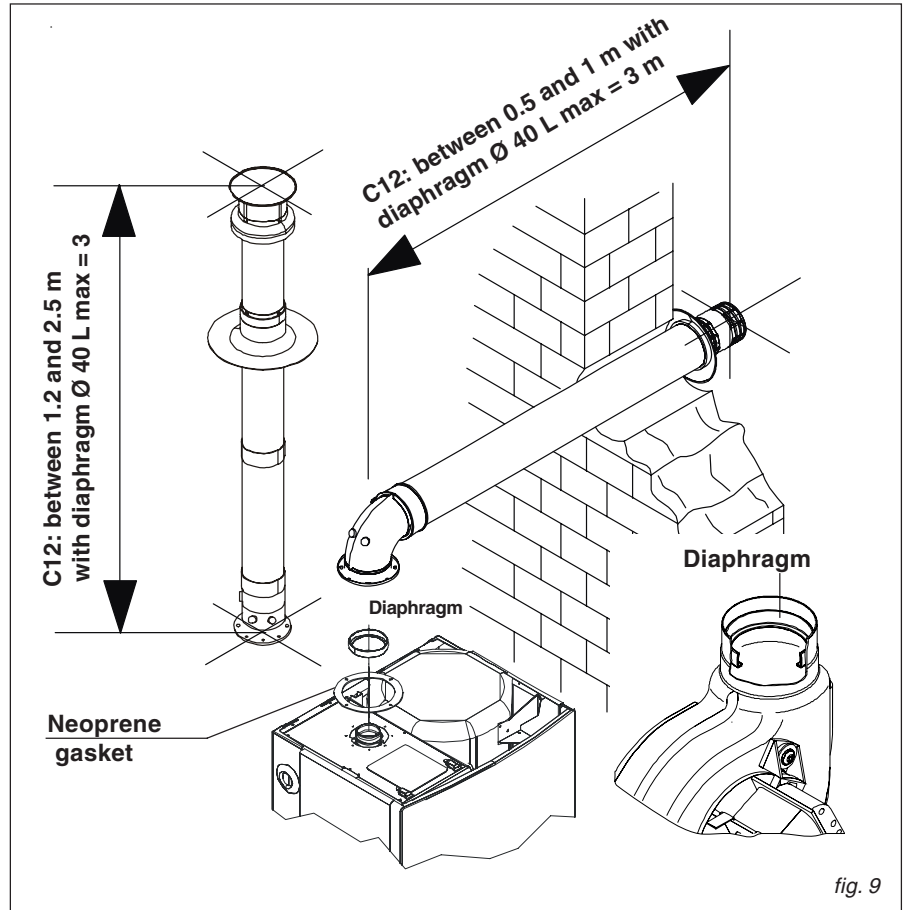


fig. 9

### DIMENSIONS FOR CONNECTION OF THE COAXIAL DUCTS

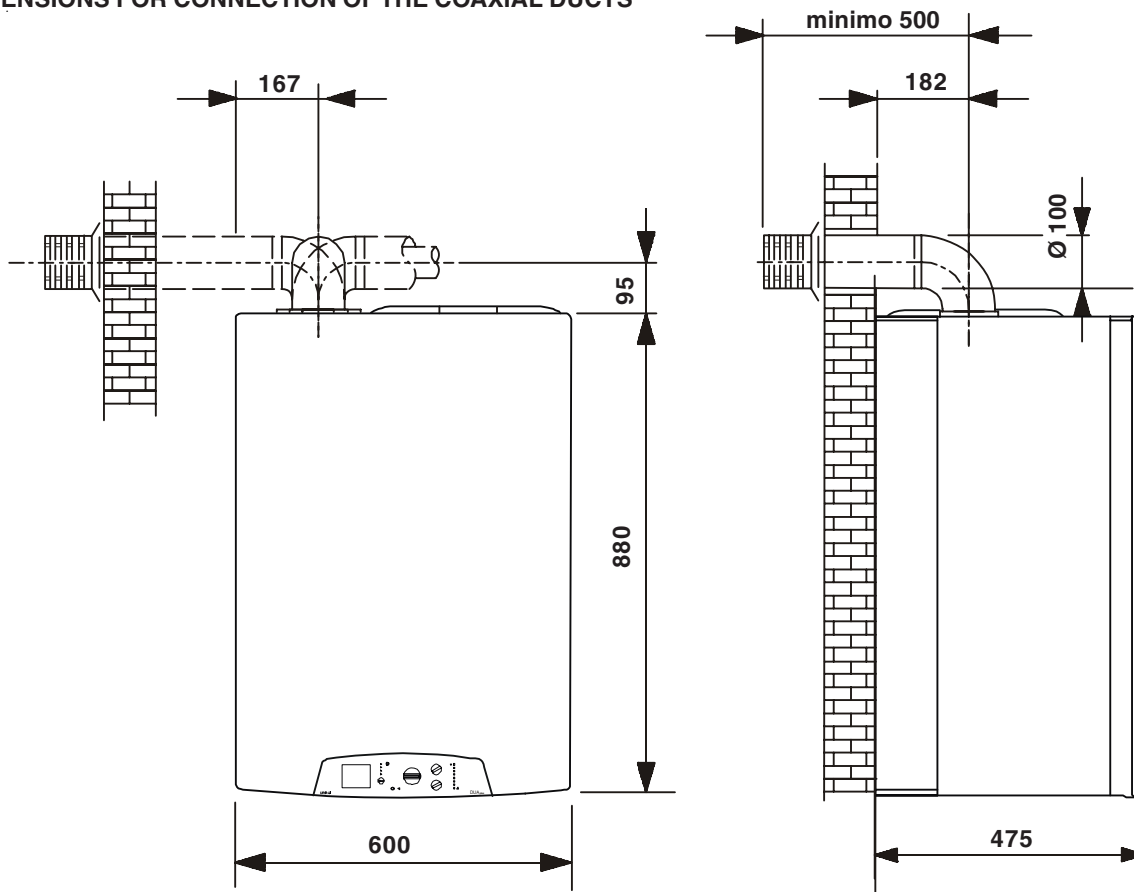
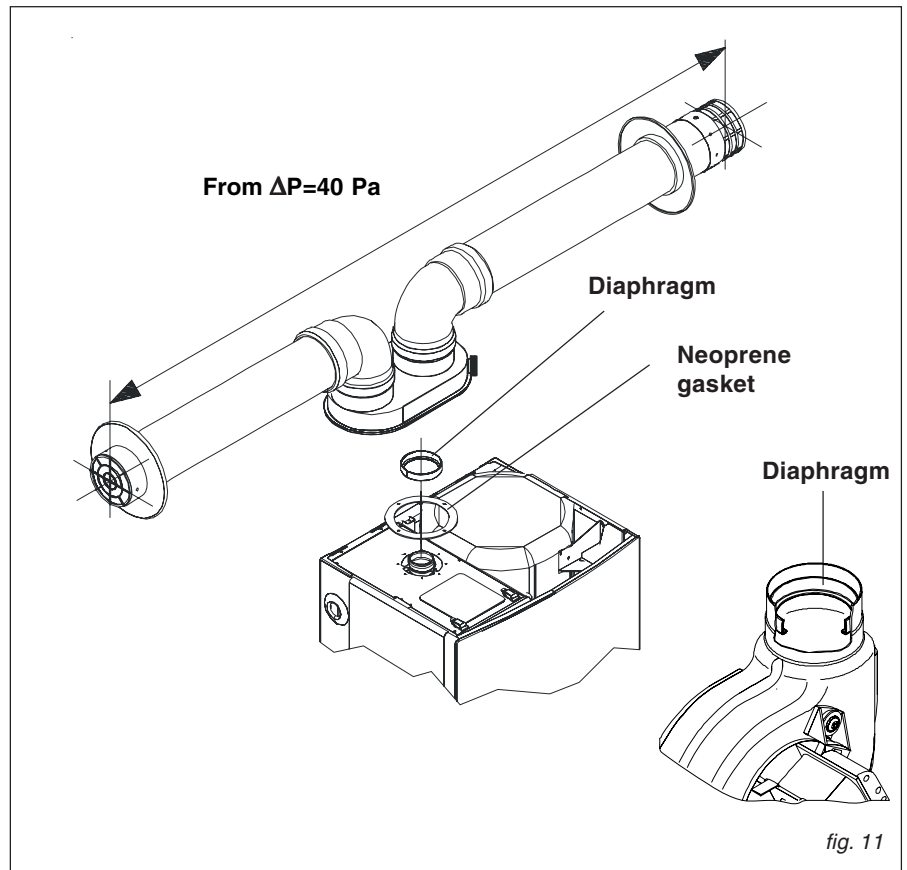


fig. 10

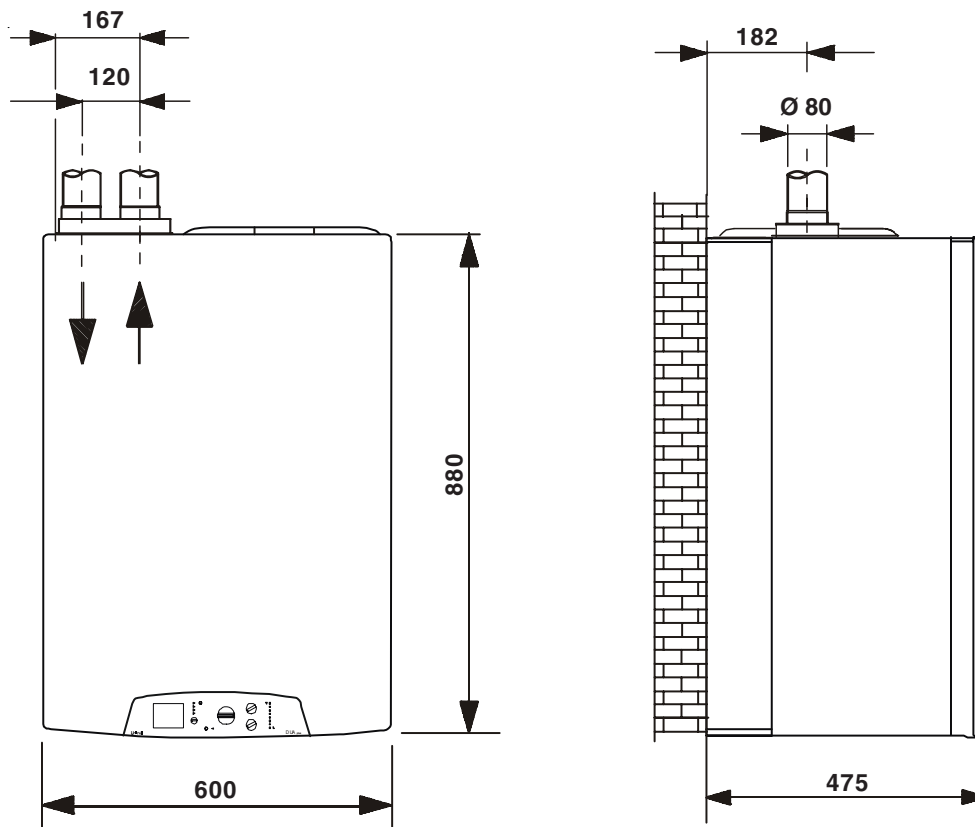
**2.2.8- SMOKE EVACUATION THROUGH TWO SEPARATE DUCTS Ø 80 (Type B accessories)**

**NB:** The maximum allowed pressure drop, according to the installation type, must be equal to the value indicated in the installation examples given on page 17.

For installations with smoke evacuation through separate ducts, whose pressure drop value is between 15 Pa and 30 Pa, it is necessary to fit a diaphragm, supplied with the boiler, inside the smoke outlet (see fig. 11).



**DIMENSIONS FOR CONNECTION THE AIR INTAKE AND THE FLUE GAS DISCHARGE WITH DUAL DUCTS**



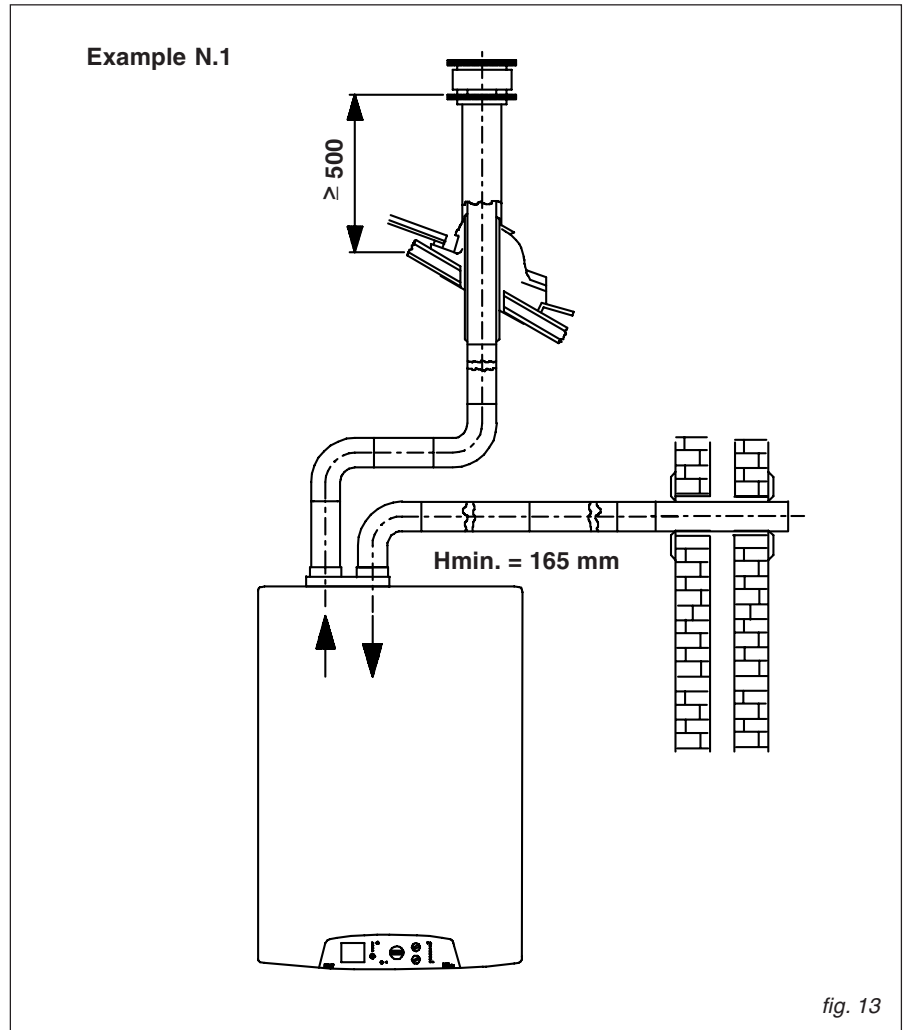
## Installation info

### CONFIGURATIONS FOR SEPARATE PIPES (SUCTION AND OUTLET) Ø 80

#### Example N.1

Primary air suction from perimeter wall and flue gas discharge on roof.

Maximum allowable pressure loss:  
65 Pa





**Example N.2**

Primary air intake from an outer wall and smoke evacuation through the same wall.

**Maximum allowed pressure drop: 72Pa**

**CALCULATION OF PRESSURE LOSS FOR DISCHARGE & SUCTION DUCTS**

**Bear in mind the following parameters when calculating pressure losses:**

- for each metre of duct with  $\varnothing 80$  (both suction and discharge) the pressure loss is 2 Pa;
- for each  $90^\circ \varnothing 80$  (R=D) bend with long radius, the pressure loss is 4 Pa;
- for the  $\varnothing 80$  L = 0.5 m horizontal air inlet terminal, the pressure loss is 3 Pa;
- $\varnothing 80$  L = 0.6 m horizontal discharge end section, the pressure loss is 5 Pa;

**NB: These values refer to discharges through original UNICAL non-flexible and smooth ducts. In both of the following examples the hypotized compositions of the intake and evacuation ducts are possible because the total pressure loss is lower than 72 Pa, which is the maximum allowed pressure loss.**

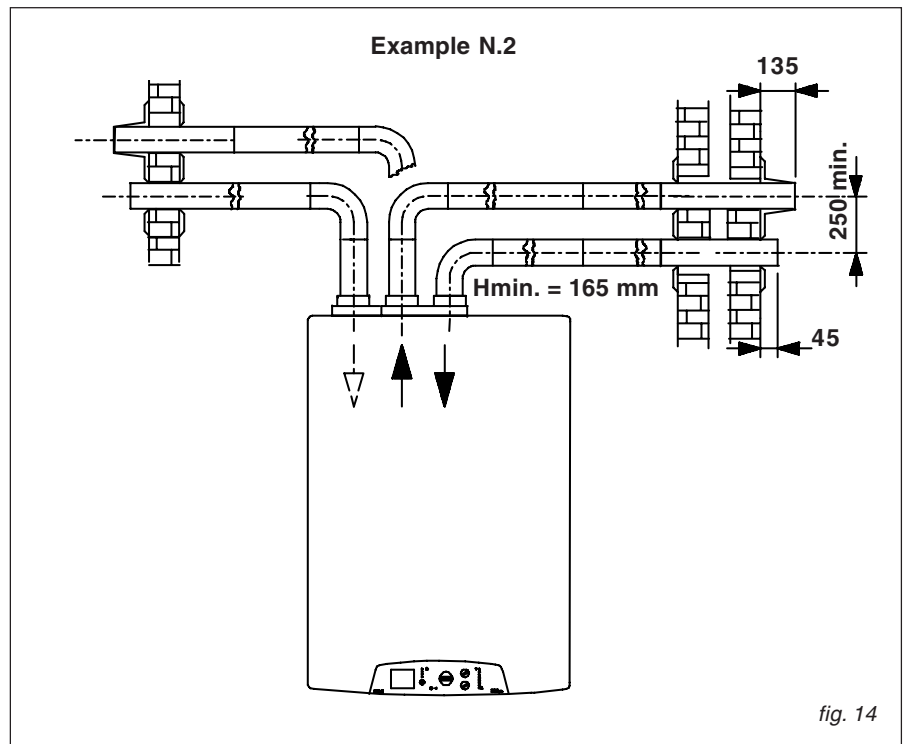


fig. 14

**Example of check using wide radius bends:**

- 15 m duct  $\varnothing 80$  x 2 = **30 Pa**
- 2x $90^\circ \varnothing 80$  long radius bends 2x4= **8 Pa**
- horizontal  $\varnothing 80$  air inlet terminal = **3 Pa**
- horizontal  $\varnothing 80$  terminal = **5 Pa**

**Total pressure loss = 46 Pa**

## Installation info

### 2.2.9 - ON SITE COMBUSTION EFFICIENCY MEASUREMENT

#### Coaxial ducts (Type A accessories)

To determine combustion efficiency the following measurements must be made:

- the combustion air temperature measured in hole 2 (see fig. 15).
- the flue gas temperature and CO<sub>2</sub> % measured in hole 1 (see fig. 15).

**Make these measurements with the boiler running in a steady state condition.**

#### (Type B accessories) Separate ducts

To determine combustion efficiency the following measurements must be made:

- the combustion air temperature measured in hole 2 (see fig. 15).
- the flue gas temperature and CO<sub>2</sub> % measured in hole 1 (see fig. 15).

**Make these measurements with the boiler running in a steady state condition.**

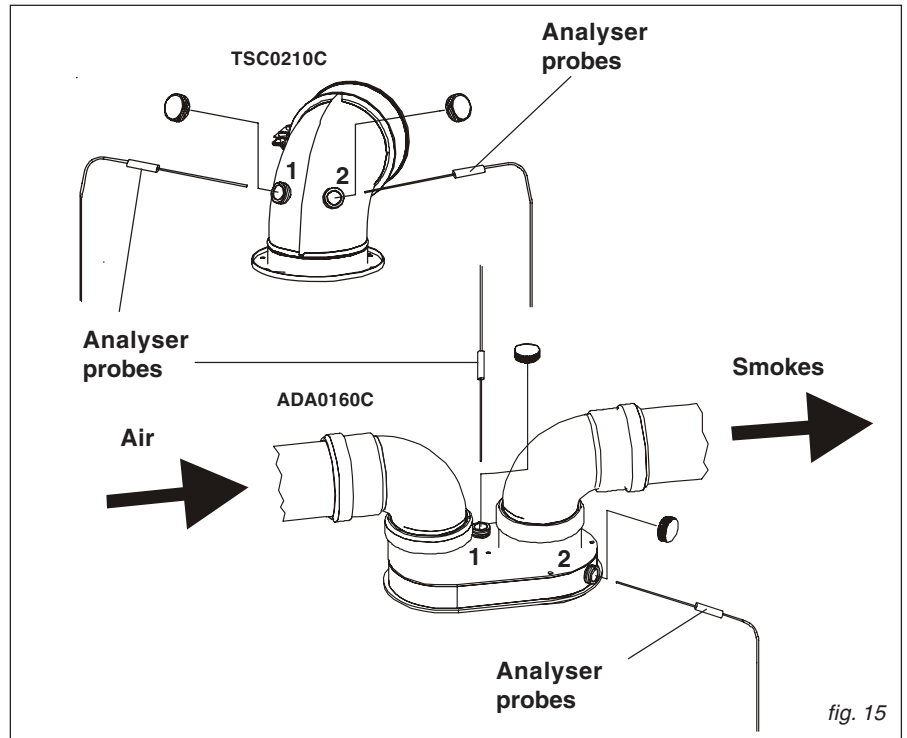


fig. 15

### 2.2.10 - GAS SUPPLY LINE

The gas supply line must have a diameter equal or larger than the one used in the boiler. Comply with the applicable local installation requirements which shall be considered as having been incorporated in full in this manual.

Before opening the internal gas supply system; i.e. before connecting the gas meter, all seals must be checked.

If any part of the system is concealed the seals must be checked before the pipes are covered.

The seal test must be conducted using air or nitrogen at a pressure of at least 100 mbar.

The commissioning of the boiler also includes the following operations and checks:

- Opening of the gas gate valve and venting of the air contained in the piping and boiler, preceding appliance by appliance.
- Check, with the gate valve of all the appliance

Off, that there are no gas leaks.

During the 2<sup>nd</sup> quarter of a hour from the beginning of the test no pressure reduction is to be detected on the gas pressure gauge. If gas leaks have to be found, use only water soap solution or any other specific gas leak detector which can be available on the market. Never look for gas leaks using a naked flame.

### 2.2.11 - HYDRAULIC CONNECTIONS

Before installing the boiler we recommend that the system be cleaned to remove any impurities which could originate from components and which could risk damaging the circulating pump and heat exchanger.

#### HEATING

The heating flow and return must be connected to the relevant 3/4" connections of the boiler **M** and **R** (see fig. 5). When determining the size of the heating circuit pipes it is essential to bear in mind the pressure losses induced by radiators, any thermostatic valves, radiator cut-off valves and the configuration of the system. In the boiler, between the flow and return pipes, an automatic bypass device is fitted (a differential valve with a flow rate of about 150 l/h) which guarantees always minimum flow rate through the heat exchanger, also in the case, for instance, that all the thermostatic valves fitted on the radiators, are closed.

#### DIAGRAM FLOW RATE/MANOMETRIC HEAD AVAILABLE FOR C.H. SYSTEM

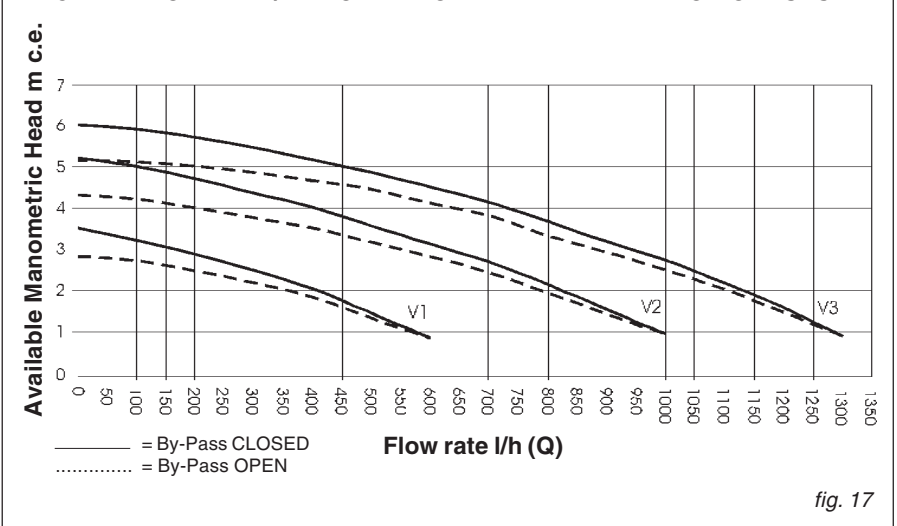


fig. 17

It is possible to adjust the by-pass by acting onto the adjusting screw (see fig. 18).

### D.H.W. (Domestic Hot Water)

Inlet and Outlet and of D.H.W. must be connected to the relevant ½" connections of the boiler **C** and **F** (see fig. 5).

The pressure in the water mains must be between 1 and 3 bar (in case of higher pressure it is necessary to fit a PRV (Pressure Reducing Valve)).

We recommend that the discharge of the safety valve mounted in the boiler be conveyed into the sewer.

If this precaution is not taken, activation of the safety valve may result in flooding of the room where the boiler is installed. UNICAL shall not be held responsible for damage caused by non-observance of this technical precaution.

The hardness of the supply water affects the frequency of the cleaning of the heat exchanger; the opportunity to install a water softening device depends on the characteristics of the water itself.

#### NOTE:

**With a water whose hardness is higher than 20°f the use of a softener is strongly recommended**

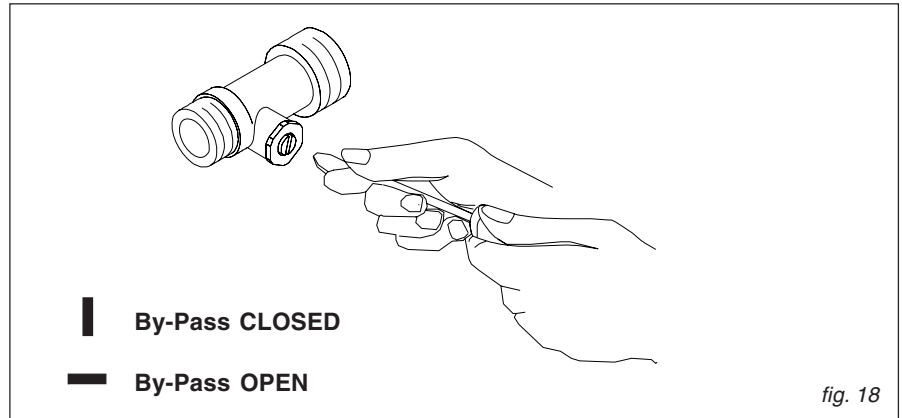
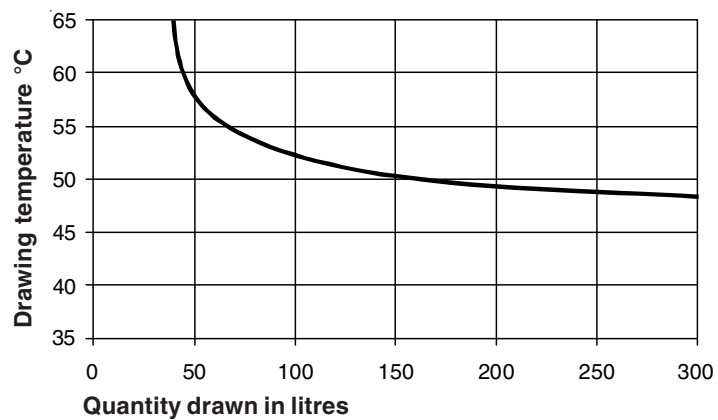


fig. 18

### D.H.W. PRODUCTION



**Cold water temperature = 15 °C**  
**Quantity drawn at 14 litres/min**

fig. 19

### 2.2.12 - ELECTICAL CONNECTIONS

The electrical connections of **DUA plus 30 µtank** are shown in the clause "WIRING DIAGRAMS" (par. 2.3 - pag. 20).

The boiler must be connected to the mains supply at **230 V - 50 Hz**. This connection is to be perfectly done, as foreseen by the IEC and local rules and must be earthed.

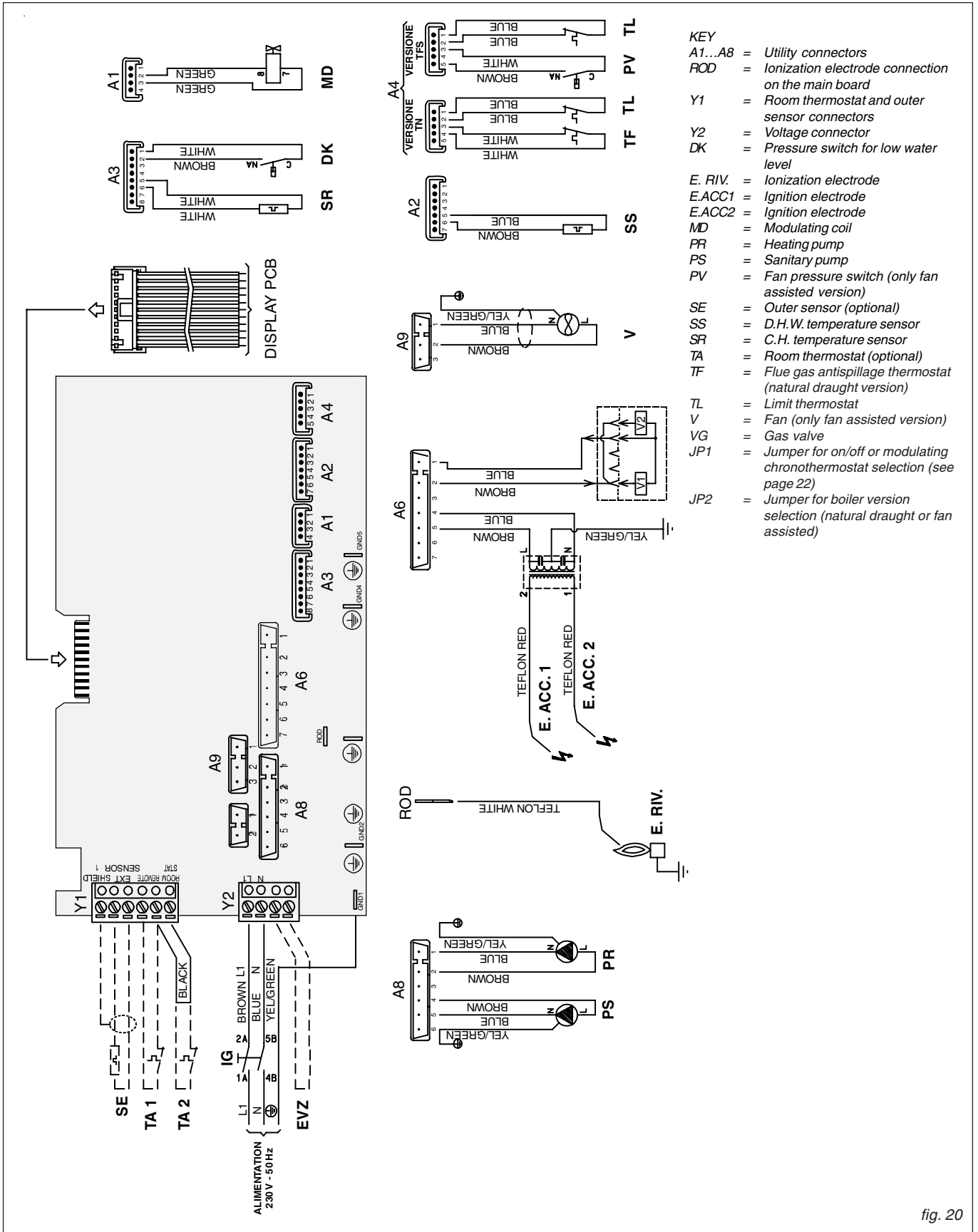
This fundamental requirement for safety purposes must be checked; in case of doubt, ask for a professionally qualified technician to check the electrical system. **UNICAL** disclaims all liability for damage or caused by failure to earth the system. **Gas, domestic water and central heating pipes are not suitable for earthing purposes.**

The boiler is supplied with 1.5 m long 3x0,75mm<sup>2</sup> cord. **Phase** and **Neutral** must compulsory be connected to **Phase** and **Neutral** of the supply socket. A double pole switch with a distance between the contacts higher than 3 mm, must be installed upstream the boiler to enable all maintenance operations to be carried out safely.

# Installation info

## 2.3 - ELECTRICAL WIRING

### 2.3.1 - ACTUAL CONNECTION DIAGRAM



- KEY**
- A1...A8 = Utility connectors
  - ROD = Ionization electrode connection on the main board
  - Y1 = Room thermostat and outer sensor connectors
  - Y2 = Voltage connector
  - DK = Pressure switch for low water level
  - E. RIV. = Ionization electrode
  - E.ACC1 = Ignition electrode
  - E.ACC2 = Ignition electrode
  - MD = Modulating coil
  - PR = Heating pump
  - PS = Sanitary pump
  - PV = Fan pressure switch (only fan assisted version)
  - SE = Outer sensor (optional)
  - SS = D.H.W. temperature sensor
  - SR = C.H. temperature sensor
  - TA = Room thermostat (optional)
  - TF = Flue gas antisplage thermostat (natural draught version)
  - TL = Limit thermostat
  - V = Fan (only fan assisted version)
  - VG = Gas valve
  - JP1 = Jumper for on/off or modulating chronothermostat selection (see page 22)
  - JP2 = Jumper for boiler version selection (natural draught or fan assisted)

fig. 20

## GENERAL INFORMATION ON THE ELECTRICAL CONNECTIONS

### Access to the supply terminal block

- ⚠ **WARNING!** Disconnect power supply
- Remove the front casing.
- Widen the two plastic flaps (A); pull frontwards the panel board and rotate it downwards.
- To get access directly to the connection zone, unscrew the two screws (B) and remove the cover (C); if this isn't enough, unscrew the five screws (D) to get access completely inside the panel board (**act carefully**).

### Replacement of the supply cable

When replacing the supply cord, the UNICAL original one, Part. code **00610308**, **must be used**.

- Get access to the supply terminal block Y2 (see previous paragraph).
- Insert the new power supply cord through the extractable cable gland E
- Pull out the terminal block Y2 and make the connections respecting the position and the colours. The female faston of the earthing wire must be introduced on the tab **GND 1**.

L1=phase = brown - terminal Y2 - 1  
 N =neutral = bleu - terminal Y2 - 2  
 ⊕ = earth = yellow/green - tab GND1

### Room thermostat connection (ROOM STAT)

- Get access to the terminal block Y1
- Remove the link between terminals 4 - 5.
- Insert the room thermostat cable TA through the extractable gland, supplied with the boiler, and connect it to the terminals 4 and 5.
- **WARNING!** If an ON/OFF room stat is used, the jumper JP1 of the modulating PCB must be positioned between pins 2 and 3 (see fig. 23).

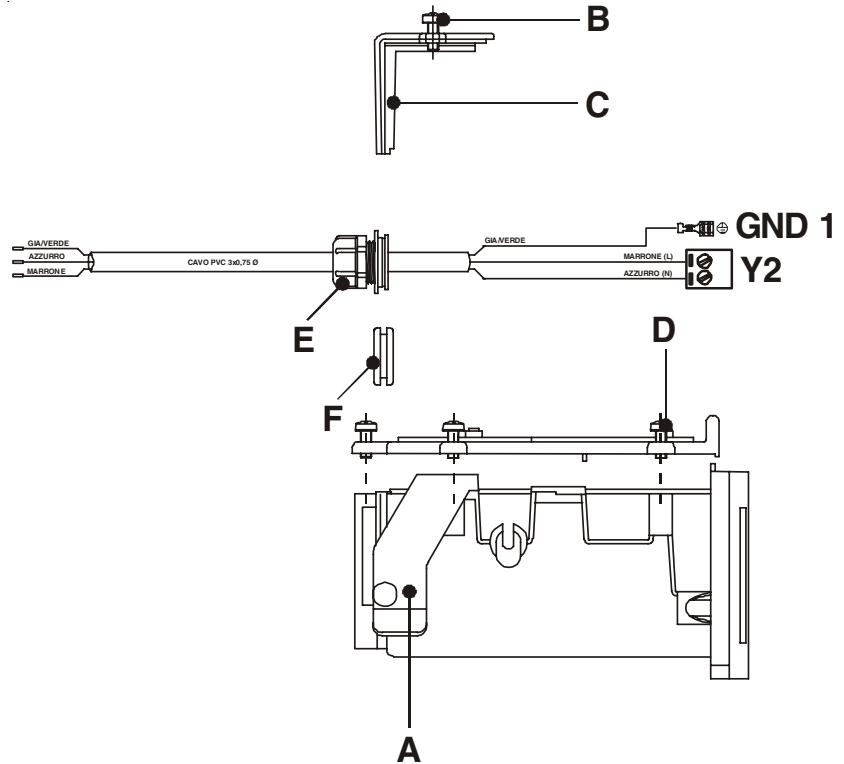
### External sensor connection (EXT SENS)

- Get access to the terminal block Y1
- Insert the external sensor cable through the extractable cable gland, supplied with the boiler, and connect it to the terminals 2 and 3 of the block Y1; if the cable is of shielded type, then connect the shield to the terminal 1 of the block Y1.

For the connection of the ROOM STAT and the EXT SENSOR, replace the plastic plugs F of the panel board with the cable glands supplied with the boiler.

## ACCESS TO THE MODULATING PCB

### Panel board side view



### Front view

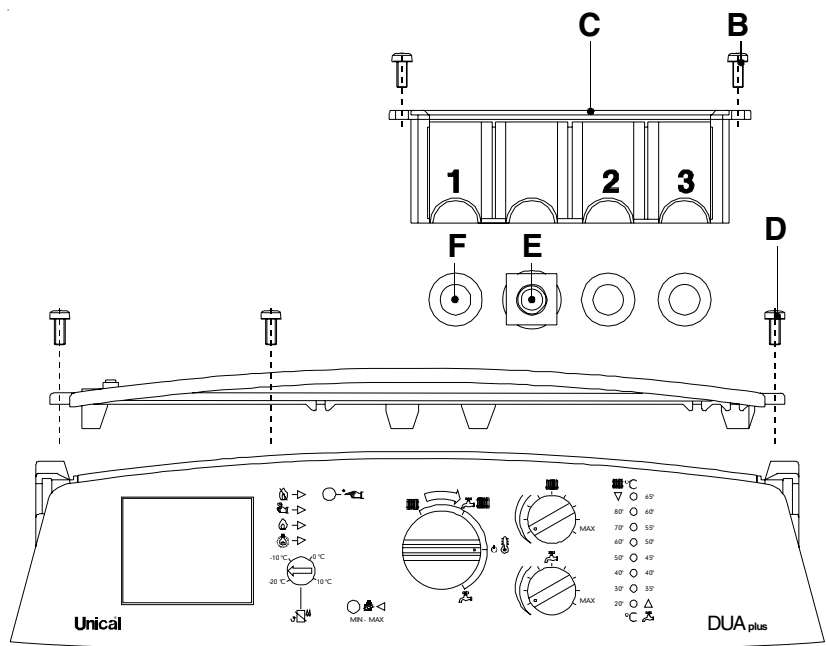
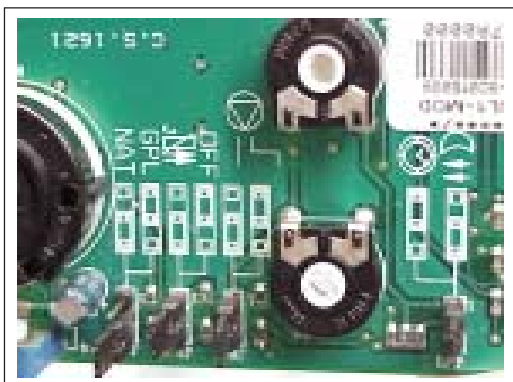


fig. 21

## Installation info

### 2.3.2 - POSITIONING OF THE JUMPERS



#### JUMPERS ON THE DISPLAY PCB

##### JP4 : GAS TYPE SELECTION

**Natural gas:** Jumper on NAT (standard supply position)

**Liquefied Petroleum Gas:** move jumper to LPG position

The standard supply position correspond to the gas type shown on all the labels within the boiler

##### JP3 : EXTRNL TEMPERATURE COMPENSATION FOR OUTER SENSOR

Boiler with outer temperature sensor: jumper on

Boiler without outer temperature sensor: jumper on **OFF**

##### JP2 : SELECTION OF PUMP OPERATION MODE

If pump has to work continuously: jumper on **1**

If pump has to stop after an overrun of 5 min since the stop of the heating demande: jumper on pos. **2** (standard supply position)

##### JP1 : CHRONOSTAT FUNCTION (do not change position of the jumper)

This function is not yet available.

Jumper on (Standard supply position: for a good working keep the jumper in this position).

#### POSITIONING OF THE JUMPER

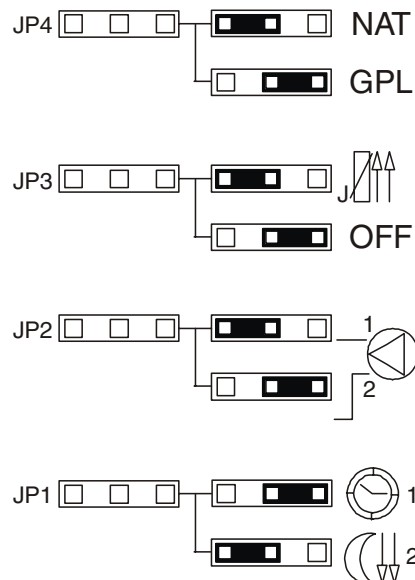


fig. 23

#### TABLE OF THE RESISTANCE VALUES ACCORDING TO THE TEMPERATURE OF THE HEATING SENSOR (SR) AND D.H.W. TEMPERATURE SENSOR (SS)

T°C	0	1	2	3	4	5	6	7	8	9
0	32755	31137	29607	28161	26795	25502	24278	23121	22025	20987
10	20003	19072	18189	17351	16557	15803	15088	14410	13765	13153
20	12571	12019	11493	10994	10519	10067	9636	9227	8837	8466
30	8112	7775	7454	7147	6855	6577	6311	6057	5815	5584
40	5363	5152	4951	4758	4574	4398	4230	4069	3915	3768
50	3627	3491	3362	3238	3119	3006	2897	2792	2692	2596
60	2504	2415	2330	2249	2171	2096	2023	1954	1888	1824
70	1762	1703	1646	1592	1539	1488	1440	1393	1348	1304
80	1263	1222	1183	1146	1110	1075	1042	1010	979	949
90	920	892	865	839	814	790	766	744	722	701

Relation between the temperature (°C) and the resistance (Ohm) of the heating temp. sensor SR and the D.H.W. temp. sensor SR. Example: At 25 °C the nominal resistance is 10067 Ohm - At 90 °C the resistance is 920 Ohm.

## 2.4 - FILLING THE SYSTEM

After completing all the connections of the system the heating circuit can be filled. This filling operation must be performed with care as follows:

- open the air vents of the radiators and check that the automatic air vent in the boiler is works properly;
- gradually open the water tap and check operation of any automatic air vents installed in the system;
- close the air vents on the radiators as soon as water comes out;
- use the pressure gauge on the boiler to check that the pressure has reached the value of 0.8/1bar;
- close the water inlet tap and then release the air again through the radiator air vents;
- after switching on the boiler and after the system has reached the correct temperature, stop the pump and repeat the air relief operations;
- let the system cool down and then adjust the water pressure to 0.8/1 bar.

This must be performed when the system is cold. Use the temperature and pressure gauge on the boiler to read the pressure value of the circuit.

### WARNING

The minimum water pressure switch does not give electrical impulse to the burner to ignite when the pressure is lower than 0.4 bar. The pressure of the water in the C.H. system must not be lower than 0.8/1bar; if this value is lower use the water filling tap on the boiler to adjust the pressure.

This must be performed when the system is cold. Use the temperature and pressure gauge on the boiler to read the pressure value of the circuit.

**NB: After a given period of inactivity and without electrical supply the pump could be blocked.**

**Before switching on the boiler it is important to restart the pump as follows:**

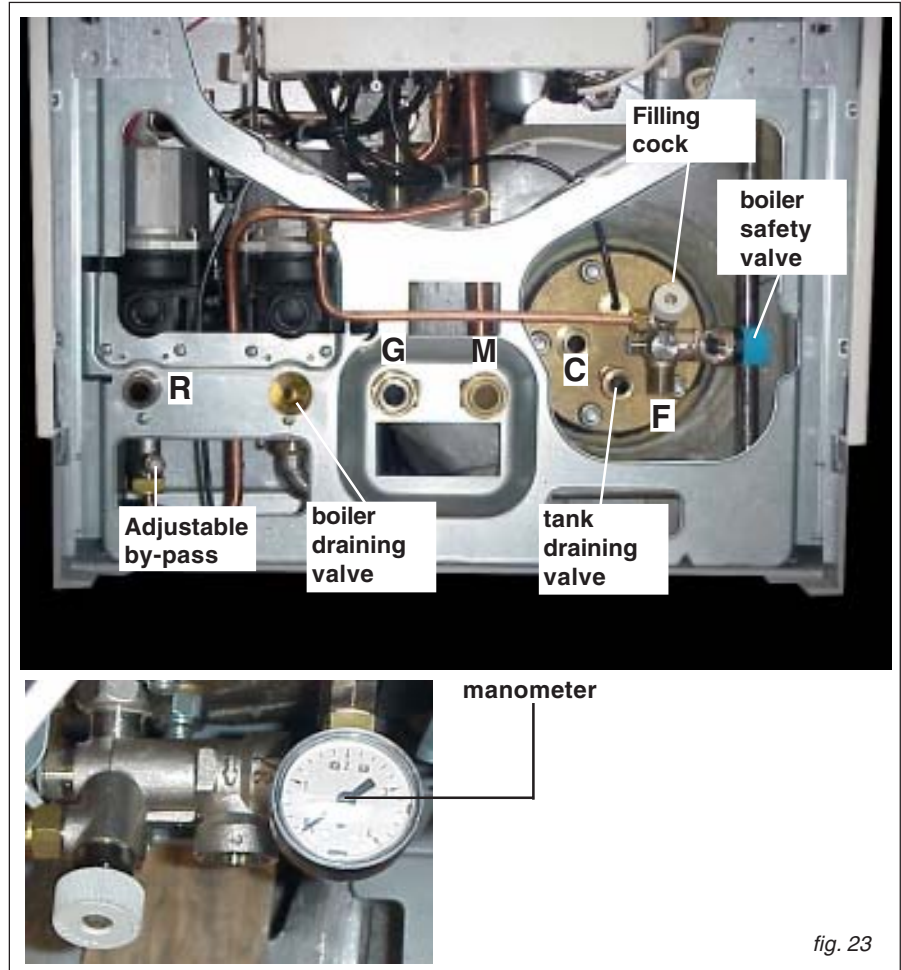


fig. 23

- loosen the protection screw in the centre of the pump motor,
- insert a screwdriver in the hole and then manually rotate the pump shaft clockwise.

Once the pump has been restarted tighten the protection screw and check that there are no water leaks.

### WARNING

Once the protection screw has been removed a little water may leak out. Before replacing the casing of the boiler dry any wet surfaces.

## 2.5 - STARTING THE BOILER

### PRELIMINARY CHECKS

Before starting the boiler check that:

- the boiler installation has been made in accordance with all the applicable regulations concerning water and gas installation, smoke evacuation and electrical installation
- the flue gas exhaust duct and its terminal are installed correctly: **when the boiler is switched on there must be no leakage of any combustion products from any seals;**

- the supply voltage of the boiler is 230 V-50 Hz;
- the system is correctly filled with water (pressure at the gauge 0.8/1 bar);
- any gate valves of the system are open;
- the mains gas corresponds to that with which the boiler has been adjusted; otherwise convert the boiler to use the gas available on site (see: "MODIFICATION FOR OTHER GASES"); **this operation must be performed by qualified technicians;**
- the gas supply taps are open;

- there are no gas leaks;
- the external mains switch is on;
- the boiler's safety valve is not locked;
- there are no water leaks.

### SWITCHING ON AND OFF

To switch on and off the boiler follow the indications in the "Users' Instructions".

## Adjustment info

### 2.6 - ADJUSTING THE BURNER

All the instructions below are for the exclusive use of **qualified technicians**. All the boilers leave the factory adjusted and tested.

If it is necessary to change the adjustment due to changes in the gas or adaptation to the supply network conditions, it will be also necessary to re-adjust the gas valve.

**Attention: during this re-adjustment do not draw any Domestic Hot Water.**

For this reason it's necessary to know the boiler operation in **service mode**.

In order to activate this function, push and keep hold the **service** push button, on the control panel, for 3 seconds: the **service mode** green led will be continuously .lighted (🔌◀ continuous) and the boiler will operate at the maximum capacity. Then push once again the same button: the **service mode** green led will start blinking (🔌◀ blinking). The **service mode** function remains active for 15 minutes.

For cleaning this function before this fixed period, push the reset button: the **service mode** led will switched off (🔌◀ off)..

To correctly adjust the gas valve, follow the steps below:

#### A) Maximum output adjustment

- check the value of the supply pressure (see table NOZZLES - PRESSURES);
- Remove the cover (A) protecting the pressure regulator on the top of the modulating coil.
- Connect a manometer at the outlet gas valve pressure nipple.
- Activate the service mode function to the maximum capacity (service mode led continuous lighted).
- When the burner is ON, check that the "MAXIMUM" pressure value corresponds to that indicated on the table "NOZZLES - PRESSURES":
- Adjust, eventually, the value rotating the "C" nut (fig. 25) by clockwise rotation the gas pressure increases, by anticlockwise rotation the gas pressure decreases.

#### B) Minimum output adjustment

- Operate the boiler in **service mode** at minimum output (service mode led blinking).
- When the burner is ON, check that the "MINIMUM" pressure value corresponds to that shown on the table "NOZZLES PRESSURES":
- Adjust, eventually, the value by keeping locked the "C" nut with a 10 mm open wrench and rotating the "B" screw (fig. 25) by clockwise rotation the gas pressure increases, by anticlockwise rotation the gas pressure decreases.

#### C) Ending of basic adjustments

- check the min. and max. pressure values of the gas valve by acting the service mode
- if necessary make any fine adjustments

#### PRESSURE TEST NIPPLE

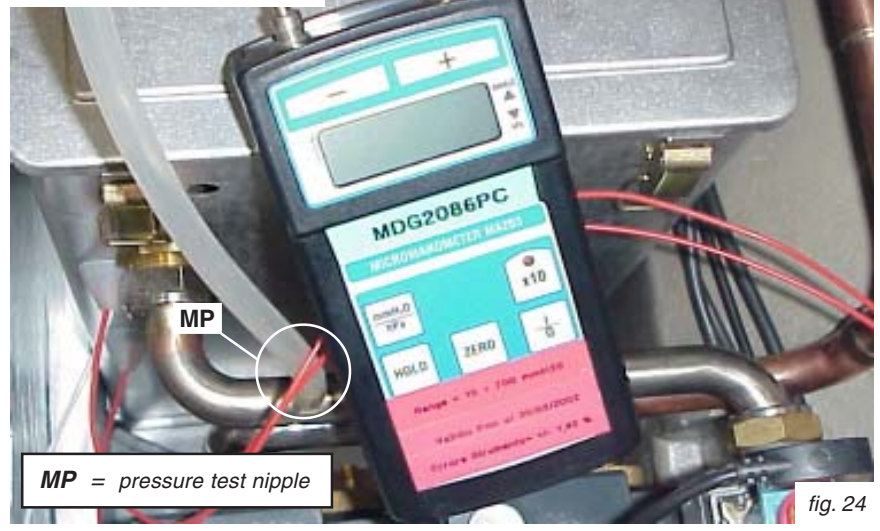


fig. 24

#### SERVICE MODE AT MAX CAPACITY



#### SERVICE MODE AT MIN CAPACITY



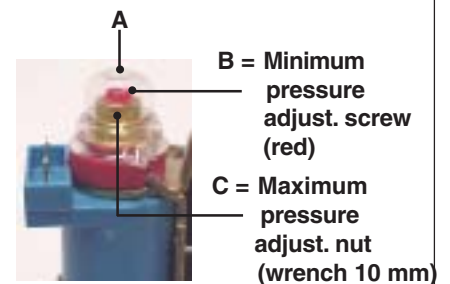
#### SERVICE MODE DISABLED (BEFORE 15 MINUTES)



#### GAS VALVE



#### MODULATING COIL



Adjustment Max. output "C" retaining nut with 10 mm. wrench

Carry out the adjustment Min. output blocking the position of the retaining nut "C" with a 10 mm. spanner to avoid uncalibration and use a screwdriver on the "B screw

fig. 25

- Clear the **service mode** function by pushing the reset button or switching off.
- Remove the plastic pipe from pressure test nipple and close the inner screw;

- Use soap solution to check for gas leaks.



## 2.7 - ADAPTING THERMAL POWER TO THE HEATING SYSTEM

With the heating system cold.

Connect the pressure gauge to the burner as shown in fig. 24, switch on the boiler in heating mode and proceed as follows.

- Wait about two minutes to allow the pressure to reach the operating value.
- Read the pressure measured and check that the thermal power generated by the boiler suits the installation requirements.
- If necessary – **but this is not compulsory** – you can regulate the potentiometer **CH POWER** on the modulation board to adjust the thermal power to the heating system. Turn the potentiometer **clockwise** (seen from the front) to increase the pressure or **anticlockwise** to decrease it.

### Note

Since the boiler is the modulating type, it automatically adapts the thermal power to the features of the heating system. By operating potentiometer **CH POWER** you effectively limit the maximum power of the boiler and hence its pickup capacity.

### Using the pressure/thermal power graph (fig. 26)

Assuming that the heating system has a total absorption of 18 kW, using the graph in figure you can determine the maximum pressure at which the burner can be set.

### Example 1

If the boiler runs on methane gas, adjust the potentiometer **CH POWER** to set the pressure to 7,3 mbar for version TN and to 7,1 mbar for version TFS.

### Example 2

If the boiler runs on butane gas, adjust the potentiometer **CH POWER** to set the pressure to 12,5 mbar for version TN and to TFS.

### Example 3

If the boiler runs on propane gas, adjust the potentiometer **CH POWER** to set the pressure to 15,3 mbar for version TN and to 15,5 mbar for version TFS.

GAS PRESSURE BURNER DIAGRAM CORRESPONDING TO THE SYSTEMS OUTPUT

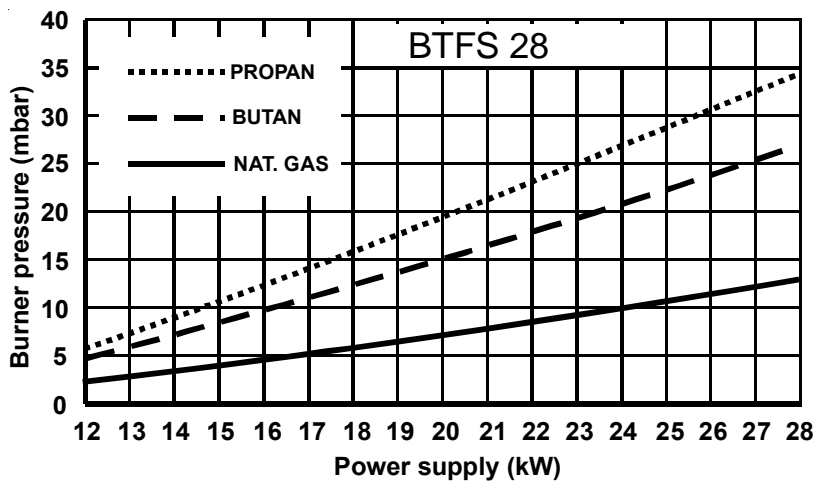
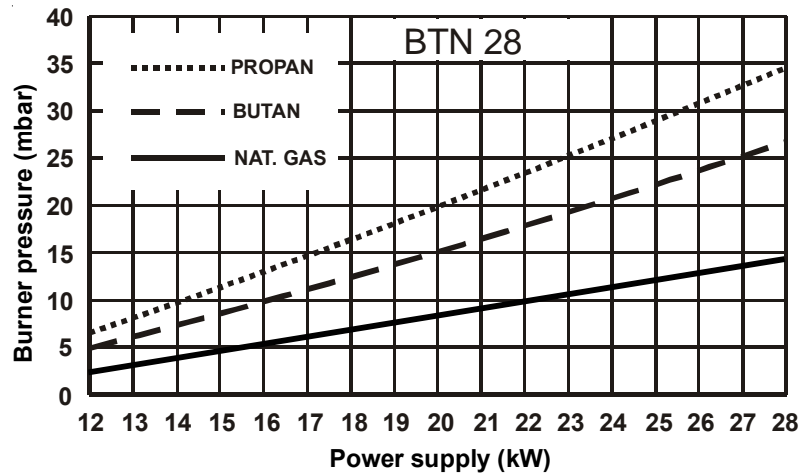


fig. 26

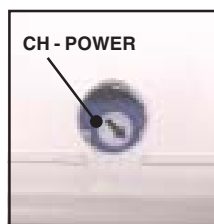
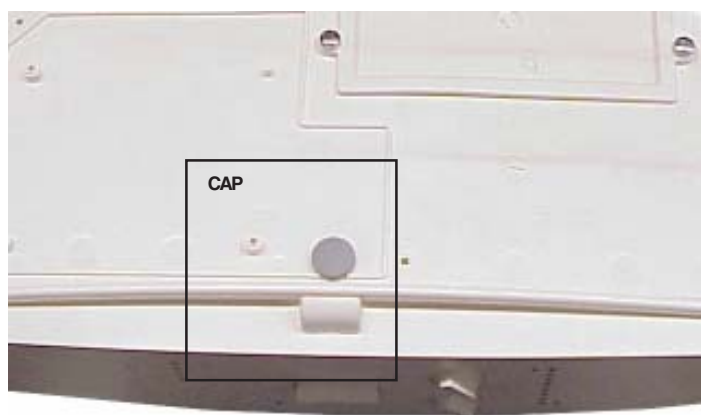


fig. 27

## Adjustment info

### 2.8 - MODIFICATION FOR OTHER GASES

The boilers are manufactured for the type of gas specifically required upon order. Any subsequent conversion must be performed by qualified technicians who will use the kits supplied by **Unical** and perform the conversion and required adjustments for correct preparation of the boiler for use.

To convert the boiler from one type of gas to another proceed as follows:

#### for conversion from natural gas to LPG

- remove the main burner;
- disassemble the 15 injectors "1" of the main burner and replace them with those with a diameter corresponding to the new type of gas (see table "INJECTORS - PRESSURES");
- reassemble the main burner;
- position the jumper on the modulation PCB in the panel board as shown in fig. 23
- remove plug "A" (fig. 25) on the gas valve and fully tighten max pressure adjustment nut "C"
- check the pressure value upstream the gas valve (see table "INJECTORS - PRESSURES") and adjust the min. pressure of the burner as shown in section "ADJUSTING THE BURNER", by screwing the nut "B" to increase or unloosing the nut "B" to decrease the burner pressure.
- check that the burner is functioning properly;
- **check that there are no gas leaks.**
- tighten and seal the plug "A" (fig. 25) of the modulating coil;

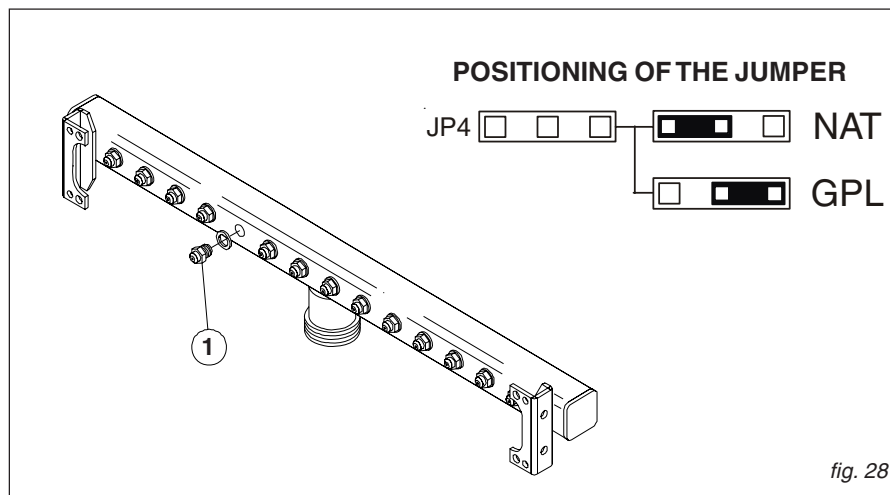


fig. 28

- when the conversion is completed, fill in the label, supplied with the kit, with the information required and stick it onto the boiler alongside the data plate.

#### for conversion from LPG to natural gas

- remove the main burner;
- disassemble the 15 injectors of the main burner and replace them with those with a diameter corresponding to the new type of gas (see "INJECTORS - PRESSURES");
- reassemble the main burner;
- get access to the modulating PCB inside the panel board and position the jumper shown in the fig. 28;
- remove plug "A" (fig. 25) from the gas valve modulating coil and adjust the maximum and minimum output s described in paragraph 2.6;

- check that the burner is functioning properly;
- **check that there are no gas leaks.**
- tighten the screw "A" of the plug of the gas governor (fig. 25);
- when the conversion is completed, fill in label, supplied with the kit, with the information required and stick it onto the boiler alongside the data plate.

### NOZZLES - DIAPHRAGMS - PRESSURES - GAS FLOW RATES

The pressures at the burner indicated in the following table must be checked after the boiler has been operating for 3 minutes.

#### DUA plus BTN 28

Type of gas	Output min. - max (kW)	Input min. - max (kW)	Supply pressure (mbar)	Ø Nozzles (mm)	No. of Nozzles	Ø Diaphragme (mm)	Burner pressure		Gas consumption	
							min. (mbar)	max (mbar)	min.	max.
Metano (G20)	12,5 - 27,9	14,5 - 31	20	1,30	15	NO	2,3	9,7	1,53 m³/h	3,28 m³/h
Propano (G31)	12,5 - 27,9	14,5 - 31	37	0,76	15	NO	7,8	34,3	1,13 kg/h	2,41 kg/h
Butano (G30)	12,5 - 27,9	14,5 - 31	29	0,76	15	NO	5,8	27,3	1,14 kg/h	2,44 kg/h

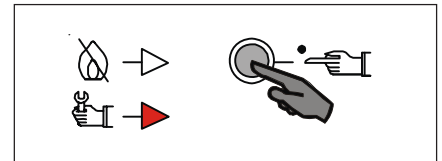
#### DUA plus BTFS 28

Type of gas	Output min. - max (kW)	Input min. - max (kW)	Supply pressure (mbar)	Ø Nozzles (mm)	No. of Nozzles	Ø Diaphragme (mm)	Burner pressure		Gas consumption	
							min. (mbar)	max (mbar)	min.	max.
Metano (G20)	12,9 - 28,8	14,5 - 31	20	1,30	15	NO	1,9	10,6	1,53 m³/h	3,28 m³/h
Propano (G31)	12,9 - 28,8	14,5 - 31	37	0,76	15	NO	7,7	35,3	1,13 kg/h	2,41 kg/h
Butano (G30)	12,9 - 28,8	14,5 - 31	29	0,76	15	NO	6	27,6	1,14 kg/h	2,44 kg/h

## 2.9 – FAULT FINDING CHART AND POSSIBLE SOLUTIONS

In case of fault lamp lighting depress the Reset push button and, while kipping it depressed, look at the error code given by the flashing leds.

Note: The error code is given by the combination of two, three, four of five leds, flashing on the temperature scale.



▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Fault on the outer temperature sensor (if connected)  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *The control of the flow temperature by the outer sensor is non active. Call the After Sale Service*  
 50° ○ 45° **BOILER STATUS**  
 40° ○ 40° This fault does not cause the locking of the boiler.  
 30° ○ 35°  
 20° ● △

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Fault on the smoke evacuation system; after 15 min there is an automatic reset.  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *For TN version: check the chimney draught*  
 50° ○ 45° *For TFS version: ascertain the good operation of the fan and its air pressure switch.*  
 40° ● 40°  
 30° ● 35°  
 20° ● △ **BOILER STATUS**  
 The boiler is in lockout position.

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Fault on the DHW temperature sensor (SS)  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Ascertain that the SS sensor has the right resistance values shown on the table of the resistance values and it harness is correct (see table on page 14)*  
 50° ● 45°  
 40° ● 40°  
 30° ○ 35°  
 20° ● △ **BOILER STATUS**  
 The boiler is in lockout position

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Faulty flame control PCB  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ● 50° *Replace the ignition and/or modulating PCB*  
 50° ○ 45° **BOILER STATUS**  
 40° ○ 40° The boiler is in lockout position  
 30° ○ 35°  
 20° ● △

**BOILER STATUS**  
 The boiler is in lockout position

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° The water pressure within the installation is below 0.5 bar  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Reinstate the water pressure through the filling valve (accessible also to the user) and look for possible water leaks. If the problem is not solved call the After Sale Service.*  
 50° ● 45°  
 40° ○ 40°  
 30° ○ 35°  
 20° ○ △ **BOILER STATUS**  
 The boiler is in lockout position

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Fault on the CH temperat. sensor (SR)  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Ascertain that the SR sensor has the right resistance values shown on the table of the resistance values and its harness is correct (see table on page 16).*  
 50° ● 45°  
 40° ● 40°  
 30° ● 35°  
 20° ○ △ **BOILER STATUS**  
 The boiler is in lockout position

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Fault on the gas valve modulation system (coil interrupted)  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Replace the gas valve modulation coil, after checking of the harness, the supply tension and the gas pressure.*  
 50° ○ 45°  
 40° ● 40° **BOILER STATUS**  
 30° ○ 35° *Chaudière fonctionnant à la puissance mini.*  
 20° ○ △

**BOILER STATUS**  
 The boiler is in lockout position

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Probable freezing of the primary heat exchanger; temperature below 2°C detected by the SR or SS sensors.  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Cut the power supply, close the gas valve and call the After Sale Service.*  
 50° ● 45°  
 40° ○ 40° **BOILER STATUS**  
 30° ○ 35° The boiler is in lockout position  
 20° ● △

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Alteration of factory parameters  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *None. Replace the modulating PCB*  
 50° ● 45°  
 40° ○ 40° **BOILER STATUS**  
 30° ● 35° The boiler is in lockout position  
 20° ● △

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° The air pressure switch is faulty or in short circuit (only for TFS version)  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ● 50° *Inspect the air pressure switch operation*  
 50° ○ 45°  
 40° ○ 40° **BOILER STATUS**  
 30° ● 35° The boiler is in lockout position  
 20° ○ △

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Fault on the modulation system of the gas valve.  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Check first the modulating coil or its harness are not earthed or in short circuit: if this is the case replace them. If no result, replace the modulating PCB.*  
 50° ● 45°  
 40° ● 40°  
 30° ● 35°  
 20° ● △ **BOILER STATUS**  
 The boiler is in lockout position

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Intervention of the safety thermostat  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Make sure the water is circulating through the heat exchanger and the safety thermostat TL and its harness are not interrupted. Check as well the CH temperature sensor (SR).*  
 50° ● 45°  
 40° ○ 40°  
 30° ● 35°  
 20° ○ △ **BOILER STATUS**  
 The boiler is in lockout position

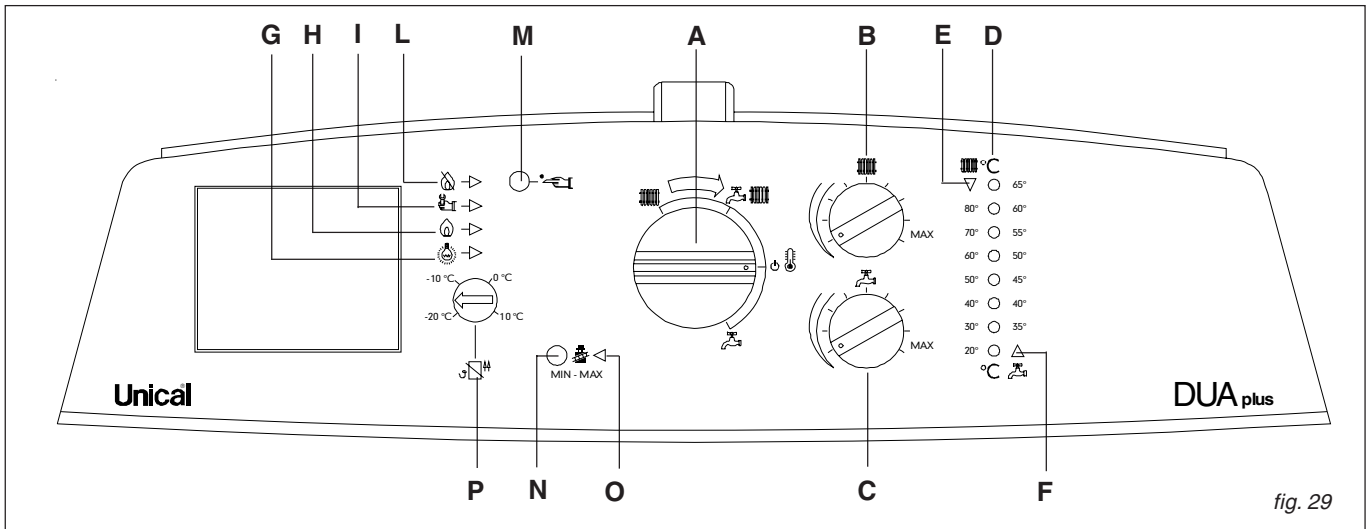
▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Too high boiler temperature  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Make sure the pump is properly operating and the heat exchanger is clean inside*  
 50° ○ 45°  
 40° ● 40° **BOILER STATUS**  
 30° ● 35° The boiler is in lockout position  
 20° ○ △

▽ ● 65° **SIGNIFICATION OF THE ERROR CODE**  
 80° ○ 60° Main PCB (modulation) is damaged.  
 70° ○ 55° **POSSIBLE SOLUTION**  
 60° ○ 50° *Cut and reinstate the power supply to the boiler: if no result, replace the main PCB.*  
 50° ● 45°  
 40° ● 40° **BOILER STATUS**  
 30° ○ 35° The boiler is in lockout position  
 20° ○ △

3

USER'S INSTRUCTIONS

3.1 - PANEL BOARD

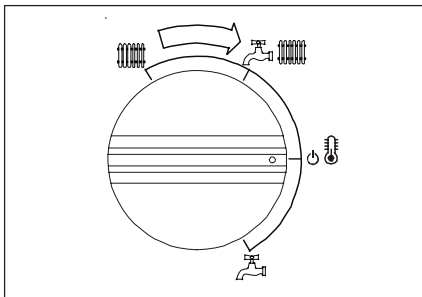


A = Mode selector: Heating only- Heating + D.H.W.  
 - Antifrost - D.H.W. only  
 B = Heating temperature adjusting knob  
 C = D.H.W. temperature adjusting knob  
 D = Thermometer  
 E = Signal lamp of heating temperature scale

F = Signal lamp of D.H.W. temperature scale  
 G = Power ON signal lamp (antifrost)  
 H = Burner in operation signal lamp  
 I = Fault indication lamp  
 L = Burner lockout warning lamp  
 M = Manual reset button

N = Special functions button (for service purposes)  
 O = Special functions signal lamp (for service purposes)  
 P = Outer temperature selector (operational only if outer temperature sensor is fitted).

MODE SELECTOR:  
 CH ONLY - CH & DHW -  
 ANTIFROST - DHW ONLY



By acting on the selector the operation mode is chosen :

CENTRAL HEATING ONLY

With the mode selector in this position the boiler works for Central Heating only.

CH & DHW

With the mode selector in this position the boiler works for Central Heating and Domestic Hot Water production

ANTIFROST

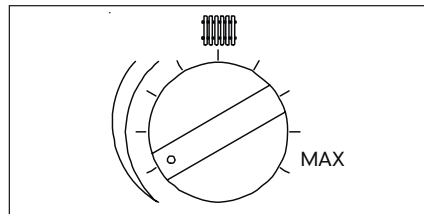
With the mode selector in this position the boiler is not in operation: the antifrost protection on the heating circuit only is operational.

The antifrost protection system is operational only if the boiler is feeded with gas and electrical supply.

D.H.W. only

With the mode selector in this position the boiler works for D.H.W. only.

HEATING TEMPERATURE ADJUSTING KNOB



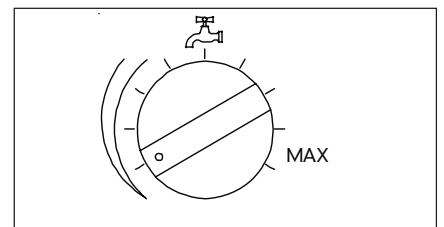
With this knob it is possible to set the maximum desired temperature in the heating circuit.

The setting range of this temperature is between a minimum of 35°C and a maximum of 85°C.

By rotating COUNTER-CLOCKWISE this knob a minimum temperature of 35°C is reached.

By rotating completely CLOCKWISE this knob a maximum temperature of 85°C is reached.

D.H.W. TEMPERATURE ADJUSTING KNOB



With this knob it is possible to set the maximum desired temperature in the boiler. The setting range of this temperature is between a minimum of 35°C and a maximum of 65°C.

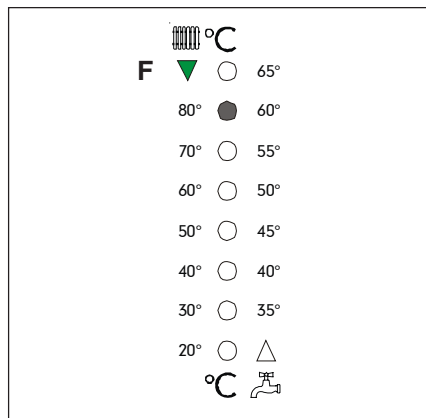
By rotating COUNTER-CLOCKWISE this knob a minimum temperature of 35°C is reached.

By rotating completely CLOCKWISE this knob a maximum temperature of 65°C is reached.

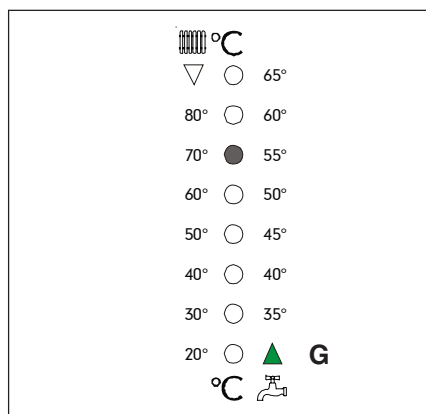
## THERMOMETER

Through the thermometer scale of the panel board it is possible to verify:

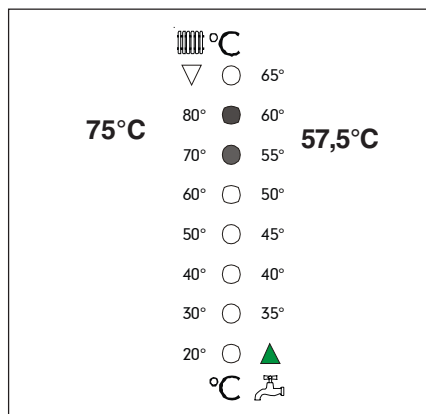
**on the L.H. side scale** the flow temperature of the heating circuit, (**F** green led ON); on the following example the temperature will be 80°C.



**on the R.H. side scale** the outlet temperature of the D.H.W. (**G** green led ON); on the following example the temperature will be 55°C.



On both cases, when two leds are ON the temperature value will correspond to the half of temperature difference between the two ON leds.



## MANOMETER

It shows the water pressure inside the heating circuit, whose value, in cold condition, should not be lower than 0,8/1 bar.

Manometer



Note that if the pressure decreases below 0,4/0,6 bar the boiler goes into lockout, not allowing the ignition of the burner.

In this case reinstate the minimum required filling pressure (0,8/1 bar) following the instructions given on figure 23.

## POWER ON SIGNAL LAMP

The function of this GREEN lamp is to show that the power to the boiler is ON; to get the boiler ON, position the "A" switch on "I" position.

## BURNER IN OPERATION SIGNAL LAMP

The function of this GREEN lamp is to show the proper operation of the burner

## FAULT INDICATION LAMPE

The function of this RED lamp is to show an operation fault.

By depressing on the RESET button (N) it is possible to see the error code given by the combination of the flashing leds. See paragraph 2.9 "FAULT FINDING AND REPARATIONS".

## BURNER LOCKOUT WARNING LAMP

La fonction de ce témoin (ROUGE) est de signaler l'intervention du dispositif de mise en sécurité du brûleur.

## MANUAL RESET BUTTON

This button allows the re-establishment of the boiler operation after a lockout of the burner control and to know the error code given by the combination of the flashing leds (burner lockout warning lamp). (témoin de défaut allumé).

## SPECIAL FUNCTIONS BUTTON (FOR SERVICE PURPOSES)

This button allows the activation of the SERVICE mode. (see paragraphe 2.6 "Burner adjustment"). To reset this mode before the expiring time depress on the manual reset button.

**WARNING! OPERATIONS RESERVED ONLY TO SERVICE TECHNICIANS.**

## SPECIAL FUNCTIONS LAMP (FOR SERVICE PURPOSES)

The function of this GREEN LAMP is to indicate the activation of the SERVICE mode: Continuous ON led = Max output for 15 min. Flashing led = Minimum output for 15 min.

## OUTER TEMPERATURE SELECTOR (OPERATIONAL ONLY IF OUTER SENSOR IS FITTED)

Si the kit outer sensor is fitted, it is possible, through this button, to set an outer temperature value between **-20°C** (completely counterclockwise) and **10°C** (completely clockwise).

If the outer temperature is equal or lower than the one selected by the selector "Q" the boiler temperature will be the one adjusted on the "C" button.

If the outer temperature is higher than the one selected by the selector "Q" the boiler temperature will decrease linearly, independently from the one adjusted on the "C" button.

**WARNING! OPERATIONS RESERVED ONLY TO SERVICE TECHNICIANS.**

## MODULATING ROOM THERMOSTAT

**Warning:** The mounting of a modulating room thermostat imply the modification of the functions of the heating temperature adjuster (C) and D.H.W. temperature adjuster (D).

Refer to the specific instructions supplied with the modulating thermostat.

## Service info

### 3.2 - IGNITION AND EXTINCTION

#### BOILER IGNITION

Position the main switch "A" on "I" position .

#### SUMMER mode

(D.H.W.production only)

Select the SUMMER operation mode acting on the selector "B".

Turn the temperature adjusting knob "D" on the desired value.

By CLOCKWISE rotation the maximum temperature is achieved.

#### WINTER mode

(Heating and D.H.W. production)

Select the WINTER operation mode acting on the selector "B".

Turn both, the heating temperature adjusting knob "C" and the D.H.W. temperature adjusting "D" on the desired values.

By CLOCKWISE rotation the maximum temperature is achieved.

#### HEATING mode

(Heating only is activated)

Select the HEATING only operation mode acting on the selector "B".

Turn the temperature adjusting knob "C" on the desired value.

By CLOCKWISE rotation the maximum temperature is achieved.


The boiler gives always the priority to the D.H.W. mode (see SUMMER operation). Once the D.H.W. demande is satisfied, if the room thermostat asks for heat, the boiler goes to HEATING mode.

During the heating operation mode the boiler switches ON and OFF controlled by the room thermostat and by the electronic P.C.B. of the panel board.

The electronic control built-in the panel board, depending on the detected temperature difference between the one adjusted on the knob and the one mesured,

puts the burner into operation plus or minus frequently in order to satisfy very quickly the heat demande by the room thermostat.

#### ANTIFROST mode

Select, by acting on the selector "B" the position  (Antifrost)

**NB: The signal lamp "H" is ON..**

#### COMPLETE EXTINCTION OF THE BOILER

Cut the elctrical power supply to the boiler acting on the main switch "A" (position O).

### 3.3 - IMPORTANT SUGGESTIONS AND NOTES

According to the national laws the service of the heating appliances is compulsory.

This service consists, as a minimum, of an annual systematic visit, during which the serviceman will control the safety equipment and will make the cleaning of the combustion circuit of the boiler.

**This annual visit must be conducted within the frame of a service contract, whose different variants can include all or part of the interventions concerning the displacement, the manpower and the spare parts.**

**Only persons professionally qualified** can perform interventions on the gas valve adjustment.

Check regularly the filling pressure of the heating system through the manometer, and, if necessary, reinstate the minimum pressure value (0.8/1 bar in cold condition).

When the boiler stays without been used for a long period, before putting the boiler in operation make sure the pump is not jamed. To make it free, if necessary, remove the plug on the motor axis, put a screwdriver in the slot foreseen on the motor shaft end and try to rotate it manually, clockwise.

Once this dejamming operation has been concluded, replace the protecting plug and make sure there are no water leaks.

**This operation has to be made, preferably, by the Unical Service Center charged for maintenance of the boiler.**

The hardness of the domestic water conditions the frequency of the cleaning of the coil heat exchanger.

The convenience of water treatment must be examined on the base of the water characteristics.

N.B. If the water hardness is higher than 20°f (french), the adoption of a water softer is strongly recommended.

#### FROST PROTECTION

If the boiler is connected to the mains and the main switch "A" is in the antifrost position, the heating pump is put into operation, for a few seconds, every day, in order to impede the pump jamming.

The boiler is equipped with an automatic antifrost protection system: this system is operational when the temperature detected by the flow temperature sensor falls below 7°C by switching on the heating pump.

Below 5°C, the burner and the pump are switced on, untill the temperature of 15°C, is reached with a 15 min. maximum time limit.

After that, burner and pump are switched off. This cycle will be repeated, if necessary.

If, for any reason (lack of gas or electricity), the antifrost protection system does not work and the temperature detected by the flow temperature sensor falls below 2°C, the operation of the burner is automatically inhibited until the detected temperature rises above 5°C.

This system protects the boiler and the eventual DHW tank from freezing, but it does not protect the C.H. and sanitary circuits.

Moreover special anti-freeze products suitable for the multimetal installations can effectively protect the heating system from the freeze.

**Do not use the anti-freeze products for car's engines because they can damage the water sealing gaskets.**

#### Note

**The anti-freeze protection device system will start running only if both the electrical and gas supply of the boiler are left connected.**

#### Information for the user

**The user can gain access only to the parts of the boiler which can be reached without the need of tools.**

**It is therefore forbidden to disassemble the outer casing of the boiler and tamper with the internal parts.**



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