

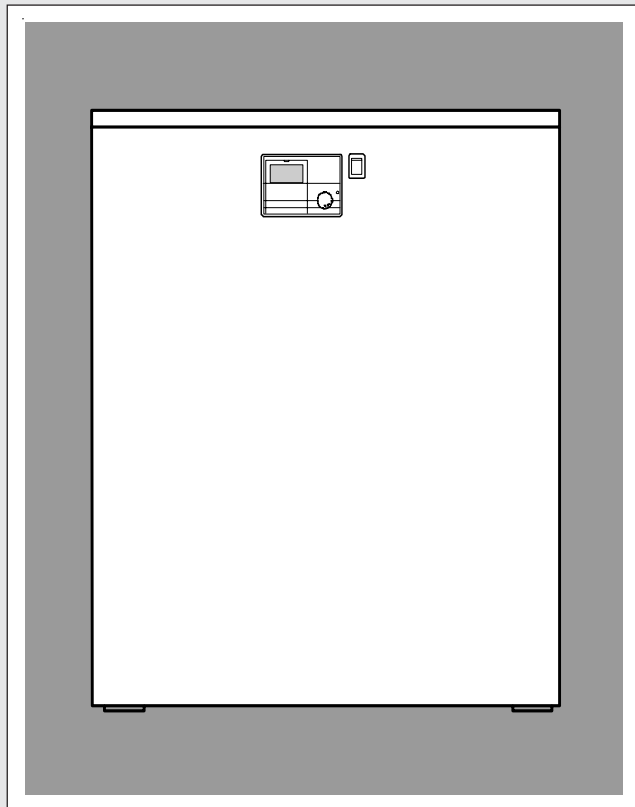
# Unical<sup>®</sup>

## ***MODULEX***

***100 - 145 - 190***

***240 - 290 - 340***

***MODULAR CONDENSING  
BOILER***



## **INSTALLATION AND SERVICING INSTRUCTIONS**

**Warning: this manual contains instructions to be used exclusively by the installer and/or a competent person in accordance with the current laws in force.**

**The end user MUST not make any alterations to the boiler.**

**Failure to follow the instructions indicated in this manual, which is supplied with the boiler, could cause injury to persons, animals or damage to property.**

**UNICAL shall not be held liable for any injury and/or damage.**

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## 1

## GENERAL INFORMATION

## 1.1 - SYMBOLS USED IN THIS GUIDE

When reading this guide particular care has to be given to the parts marked with the followings symbols:



**DANGER!**  
Indicates serious danger  
for your personal safety  
and for your life



**WARNING!**  
Indicates a potentially dangerous  
situation for the product and the  
environment



**NOTE!**  
Suggestions for the  
user

## 1.2 - CORRECT USE OF THE APPLIANCE



The ALKON appliance has been designed utilizing today's heating technology and in compliance with the current safety regulations. However, following an improper use, dangers could arise for the safety and life of the user or of other people, or damage could be caused to the appliance or other objects. The appliance is designed to be used in pumped hot water central heating systems. Any other use of this appliance will be considered improper. UNICAL declines any responsibility for any damages or injuries caused by an improper use; in this case the risk is completely at the user's responsibility. In order to use the appliance according to the scopes it was designed for it is essential to carefully follow the instructions indicated in this guide.

## 1.3 - WATER TREATMENT



- The hardness of the mains water supply conditions the frequency with which the heat exchanger is cleaned.
- In hard water areas where the main water can exceed 15°f total hardness, a scale reducing device is recommended. The choice of this device has to be made taking into consideration the characteristics of the water.
- In order to improve the resistance to lime scale it is recommended to adjust the domestic hot water temperature as near as possible to the one you really require.
- We recommend you to check the state of cleanliness of the domestic hot water heat exchanger at the end of the first year and subsequently, on the basis of the lime scale found, this period can be extended to two years.

## 1.4 - INFORMATION TO BE HANDED OVER TO THE USER



The user has to be instructed on the use and operation of his heating system, in particular:

- Hand over these instructions to the end user, together with any other literature regarding this appliance, placed inside the envelope contained in the packaging. **The user has to keep these documents in a safe place in order to always have them at hand for future reference.**
- Inform the user on the importance of air vents and of the flue outlet system, stressing the fact that is absolutely forbidden to make any alterations to the boiler.
- Inform the user how to check the system's water pressure as well as informing him how to restore the correct pressure.
- Explain the function of time and temperature controls, thermostats, heating controls and radiators, to ensure the greatest possible fuel economy.
- Remind the user that it is obligatory to carry out a comprehensive service annually and a combustion analysis every two years (in compliance with the national law).
- If the appliance is sold or transferred to another owner or if the present user moves home and leaves the appliance installed, ensure yourself that the manual always follows the appliance so that it can be consulted by the new owner and/or installer.

**Failure to follow the instructions indicated in this guide, which is supplied with the boiler, could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any such injury and/or damage.**

## General Information

### 5 - SAFETY WARNINGS



#### **WARNING!**

The installation, adjustment, and servicing of this appliance must be carried out by a competent person and installed in accordance with the current standards and regulations. Failure to correctly install this appliance could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any injury and/or damage.



#### **DANGER!**

Servicing or repairs of the appliance must be carried out by UNICAL authorised service technicians; UNICAL recommends drawing up a service contract. Bad or irregular servicing could compromise the safe operation of the appliance, and could cause injury to persons, animals or damage to property for which UNICAL shall not be held liable.



#### **Modifications to parts connected to the appliance**

Do not carry out any modifications to the following parts:

- the boiler
- to the gas, air, water supply pipes and electrical current
- to the flue pipe, safety relief valve and its drainage pipe
- to the constructive components which influence the appliance's safe operation



#### **WARNING!**

When tightening or loosening the screw pipe connections, use only adequate fork spanners. The improper use and/or the use of inadequate equipment can cause damages (for example water or gas leakages).



#### **WARNING!**

Indications for appliances operating with propane gas

Ensure yourself that before installing the appliance the gas tank has been purged.

For a correct purging of the tank contact the liquid gas supplier or a competent person who has been legally authorized.

If the tank has not been correctly purged problems could occur during ignition.

If this occurs contact the liquid gas tank's supplier.



#### **Smell of gas**

If you smell gas follow these safety indications:

- Do not turn on or off electrical switches
- Do no smoke
- Do not use the telephone
- Close the main gas tap
- Open all windows and doors where the gas leakage has occurred
- Inform the gas society or a company specialized in installing and servicing heating systems



#### **Explosive and easily inflammable substances**

Do not use or leave explosive or easily inflammable material (as for example: petrol, paint, paper) in the room where the appliance has been installed.



### **WARNINGS**

The boiler has to be installed in such way to avoid, under the foreseen operation conditions, the congelation of the water and to prevent that the control devices are exposed to a temperature lower than  $-15^{\circ}\text{C}$  and higher than  $40^{\circ}\text{C}$ .

The boiler has to be protected against environmental variations with:

- ALL WETHER protection and covering KIT foreseen by the manufacturer.
- The insulation of the hydraulic pipelines and the condensate evacuation
- The adoption of specific antifreeze products in the C.H. installation.

## 1.6 - DATA PLATE

### 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  Hz  22 W

IP class:  23

**D Countries of destination**

24  25  26

**E Factory setting**

27 mbar

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   |  |
|   | <b>C = Electrical features</b>   |
| <b>A = Central Heating circuit features</b>                         | 21 = Electrical power supply   |
| 9 = (Pn) Nominal output   | 22 = Consumption   |
| 10 = (Pcond) Condensing nominal output                              | 23 = Protection grade  |
| 11 = (Qmax) Nominal heat input                                      |  |
| 12 = (Adjusted Qn) Adjusted for nominal Heat input                  | <b>D = Countries of destination</b>  |
| 13 = (PMS) Max. pressure C.H. system                                | 24 = Direct and indirect country of destination                            |
| 14 = (T max) Max. C.H. temperature                                  | 25 = Gas family  |
|   | 26 = Supply pressure   |
| <b>B = Domestic Hot Water circuit features</b>                      | <b>E = Factory setting</b>   |
| 15 = (Qnw) Nominal heat input in D.H.W. mode (if different from Qn) | 27 = Adjusted for gas type X   |
| 16 = (D) Specific D.H.W. flow rate according to EN 625 - EN 13203-1 | 28 = Space for national brands   |

### 1.7 - GENERAL WARNINGS

This instruction manual is an integral and indispensable part of the product and must be retained by the person in charge of the appliance.

Please read carefully the instructions contained in this manual as they provide important indications regarding the safe installation, use and servicing of this appliance.

Keep this manual in a safe place for future reference.

**The installations for the domestic hot water production MUST be build, in their entirety, with materials (taps, pipes, fittings, etc.) approved for drinkable water.**

The installation and servicing must be carried out in accordance with the regulations in force according to the manufacturer's instructions and by legally competent authorized persons.

By a competent person, we imply a person who has a specific technical qualification in the field of components for central heating systems for domestic use, domestic hot water production and servicing. The person must have the qualifications foreseen by the current laws in force.

Bad or irregular servicing could compromise the safe operation of the appliance, and could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any such injury and/or damage.

Before carrying out any cleaning or servicing turn off the electrical supply to the boiler by means of the ON/OFF switch and/or by means of the appropriate shutdown devices.

Do not obstruct the intake/outlet terminal ducts.

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

Any repairs must be carried out by Unical authorized technicians and using only original spare parts. Non-observance of the above requirement may jeopardize the safety of the appliance.

To guarantee the efficiency and correct functioning of the appliance it is indispensable to have the boiler serviced annually by a qualified person.

Before putting again into service an appliance which has been unused for a certain time, proceed to rinse the domestic hot water circuit, making the water flowing for the time necessary to draw the full content of the domestic circuit.

If the boiler remains unused for long periods, ensure that any dangerous parts are rendered innocuous.

If the appliance is sold or transferred to another owner or if the present user moves home and leaves the appliance installed, ensure yourself that the manual always follows the appliance so that it can be consulted by the new owner and/or installer.

Only original accessories must be used for all appliances supplied with optionals or kits (including electrical ones). This appliance must be used only for the purposes for which it has been expressly designed. Any other use shall be considered incorrect and therefore dangerous

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## TECHNICAL FEATURES AND DIMENSIONS

### 2.1 - TECHNICAL FEATURES

- MODULEX is a compact, gas fired, Low NO<sub>x</sub>, condensing boiler, made up by one sectional boiler body, This boiler body consists of two or more modules (from 2 to 7), which cannot be separated from each other, being under the same protecting casing, and are set to operate separately or in cascade. These modules are connected to a single smoke exhaust manifold and are controlled by a single microprocessor, which manages completely the temperatures from the point of view, both operational and safety.
- Efficiency at full load with temperature 30/50°C = 101%. At part load (30% of the nominal) with 30°C return temperature = 108,2%.
- Efficiency Class: ☆☆☆☆
- Each module, is composed of a combustion chamber, metallic fiber pre-mix burner, modulating fan, gas valve, ignition electrode, flame detection, NTC sensor for management control (BMM), local temperature control and safety thermostat.
- Each single boiler is equipped with NTC sensors for global temperature control on the flow and return manifolds.
- Integral, non allergic, synthetic wool insulation.
- Fully pre-mixed, radiating, modulating, metallic sponge burner, Automatic no return diaphragm for separation from combustion chamber.
- Combustion air intake system from boiler house (type B 23 appliances) or directly from outside the boiler house, via an air duct (type C 63 appliances)
- Nominal input, per module: max. 48 kW, min. 12 kW.
- Noise level at maximum output: lower than 49 dBA.
- Modules configuration possibilities:
- Possible cascade installation of 2 or more MODULEX
- Heating Operation: setting of instantaneous output by a main microprocessor, with a comparison parameters pre-setting between the requested temperature (or calculated by the outer compensator) and the global flow temperature.
- Logic of operation:
  - A) Output sharing on as many modules as possible at min. load (down to 12 kW) for the max. efficiency..
  - B) Automatic operation hour splitting-up system for each module to guarantee the best homogeneous use.
  - C) D.H.W. production, by a priority sensor through the E8 heating controller, with loading pump storage tank .
  - D) Output check of each module for any calibration and/or assistance by secret access code.
- Heating request control: temperature set point and modulation level.
- Monitoring of boiler and temperature status.
- Alarm control.
- Parameters setting.
- Relay for control of the operation of a pump at constant flow rate.
- 0÷10V analogical output for control of a modulating pump.
- Emergency operation: it avoids C.H. system shut down caused by an interruption in communication with the boiler plant's automation system: : (in case of remote control of the complete boiler house):
- Input for "Constant setpoint": 70°C, maximum output 50%.
- Alarm reset input.
- Alarm relay signal.
- Gas connecting pipes, flow/return water pipes, arranged for any connection (by the opposite end).
- Integral easily removable panel set (painted steel panels).
- Smoke exhaust pipe, adjustable on the right, the left and behind the heating system.
- Condensate collecting tank equipped with drain siphon and stainless steel smoke chamber.
- Built-in air vent.
- Weights and dimensions are limited (see table at par. 1.2).

SENSORS supplied with the boiler:

- outdoor temperature sensor
- flow temperature sensor for mixed zone (wired)
- boiler temperature sensor
- D.H.W. storage temperature sensor

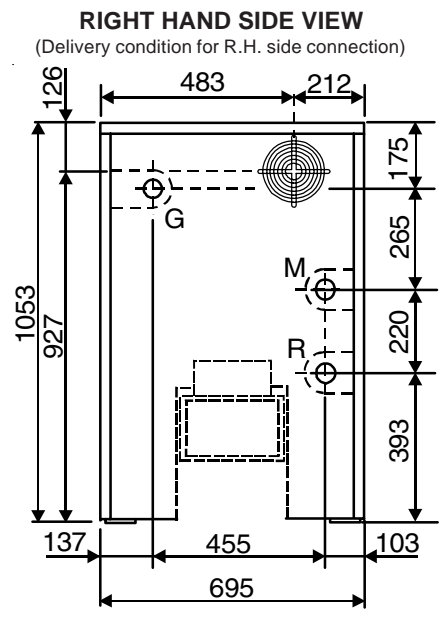
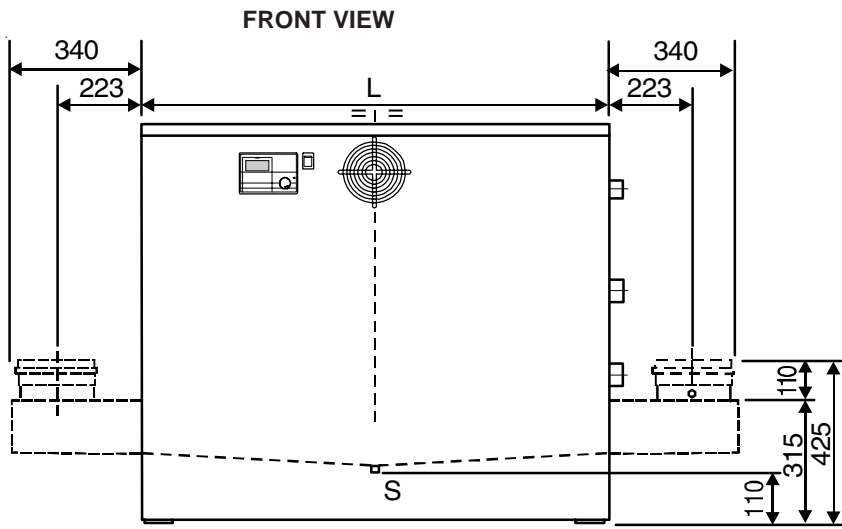
#### Optional accessories

- **Acid condensate inhibitor**
- **Primary circuits: hydraulic system interface with additional safety devices and modulating pump.**
- **Mixing header**
- **"all weather": stainless steel protection for outdoor installation.**

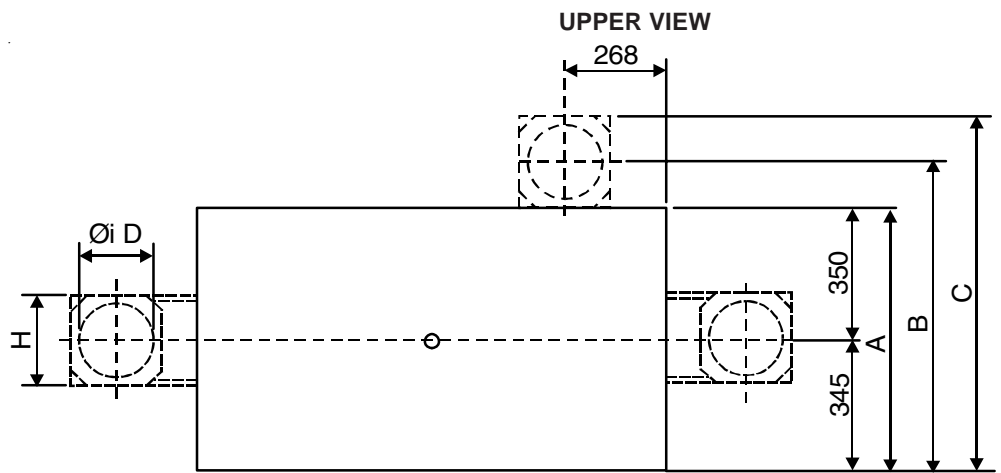
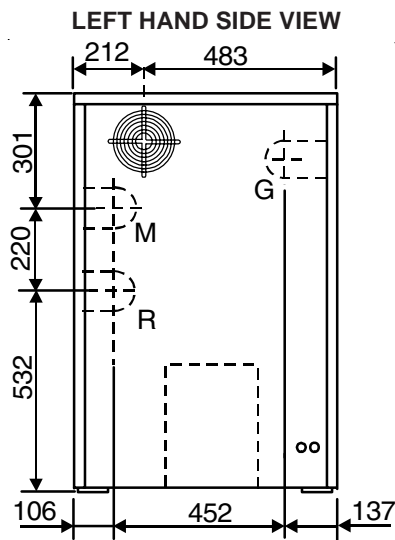
Thermal element No.	Model	Input range kW	Modulation ratio
2	100	12 to 96 kW	1:8 (100 to 12,5%)
3	145	12 to 144 kW	1:12 (100 to 8,3%)
4	190	12 to 192 kW	1:16 (100 to 6,3%)
5	240	12 to 240 kW	1:20(100 to 5,0%)
6	290	12 to 288 kW	1:24 (100 to 4,2%)
7	340	12 to 336 kW	1:28 (100 to 3,6%)

# Technical features and dimensions

## 2.2 - DIMENSIONS



**Warning:**  
Flow/Return connections ( M / R ) change their position whether they are on the R.H. or on the L.H. side of the boiler (see views).



**M** CH flow system  
**R** CH safety system return

**G** Gas inlet  
**S** Outlet condensate drain

	MODULEX	100	145	190	240	290	340
<b>Dimension</b>							
No. of Modules		2	3	4	5	6	7
Height	mm	1053	1053	1053	1053	1053	1053
Width "L"	mm	695	695	834	968	1102	1236
Depth "C"	mm	820	820	820	820	820	820
Depth "A"	mm	695	695	695	695	695	695
Depth "B"	mm	820	820	820	820	820	820
<b>Connections</b>							
Gas	mm (inch)	38(1½)	38(1½)	38(1½)	38(1½)	38(1½)	38(1½)
C.H. system Flow M	mm (inch)	50 (2)	50 (2)	50 (2)	50 (2)	50 (2)	50 (2)
C.H. system Return R	mm (inch)	50 (2)	50 (2)	50 (2)	50 (2)	50 (2)	50 (2)
Chimney connection "D"	mm	150	150	150	200	200	200
Chimney width "H"	mm	240	240	240	240	240	240
Condensate drain diameter	mm	40	40	40	40	40	40



### 2.3 - PERFORMANCE DATA

BOILER TYPE	MODULEX	100	145	190	240	290	340
Appliance category	II <sub>2H3P</sub>						
Nominal Heat Input on P.C.I. $Q_n$	kW	96	144	192	240	288	336
Minimum Heat Input on P.C.I. $Q_{min}$	kW	12	12	12	12	12	12
Nominal Output (Tr 60 / Tm 80 °C) $P_n$	kW	93,22	140,11	187,39	234,72	282,24	329,52
Minimum Output (Tr 60 / Tm 80 °C) $P_{n min}$	kW	11,23	11,23	11,23	11,23	11,23	11,23
Nominal Output (Tr 30 / Tm 50 °C) $P_{cond}$	kW	95,90	145,58	192,38	240,96	289,87	339,36
Minimum Output (Tr 30 / Tm 50 °C) $P_{cond min}$	kW	12,74	12,74	12,74	12,74	12,74	12,74
Efficiency at max. output (Tr 60 / Tm 80°C)	%	97,1	97,3	97,6	97,8	98	98,07
Efficiency at min. output (Tr 60 / Tm 80°C)	%	93,6	93,6	93,6	93,6	93,6	93,6
Efficiency at max. output (Tr 30 / Tm 50°C)	%	99,9	101,1	100,2	100,4	100,65	101
Efficiency at min. output (Tr 30 / Tm 50°C)	%	106,2	106,2	106,2	106,2	106,2	106,2
Efficiency Class acc. to Directive 92/42 CEE		4	4	4	4	4	4
Combustion efficiency at nominal load	%	97,5	97,6	97,8	97,8	97,9	98,1
Combustion efficiency at part load	%	98,48	98,48	98,48	98,43	98,48	98,43
Stand-by losses with burner in operation	%	0,2	0,2	0,2	0,2	0,2	0,2
Flue losses with burner off	%	0,1	0,1	0,1	0,1	0,1	0,1
Flue losses with burner in operation	%	2,46	2,36	2,24	2,16	2,06	2,01
Flue gas temperature $t_f-t_a$ (max)	°C	49,1	47,2	44,8	43,1	41,2	40,1
Flue gas mass flow rate (max)	kg/h	156,90	235,35	313,79	392,24	470,69	549,14
Excess of air $\lambda$	%	25,53	25,53	25,53	25,53	25,53	25,53
(**) $CO_2$ at min/max. output)	%	-	-	-	-	-	-
$NO_x$ (value according EN 297/A3 + EN 483)	mg/kWh	49,15	49,15	49,15	49,15	49,15	49,15
$NO_x$ class		5	5	5	5	5	5
Min. water flow rate in CH circuit ( $\Delta T$ 20°C)	l/h	4008	6025	8058	10265	12136	14169
Minimum pressure in CH circuit	bar	0,5	0,5	0,5	0,5	0,5	0,5
Maximum pressure in CH circuit	bar	7	7	7	7	7	7
DHW specific flow rate	l	10,1	14,2	18,3	22,4	26,5	30,6
Gas Consumption Natural gas G 20 (20 mbar) $Q_n$	m <sup>3</sup> /h	10,15	15,23	20,30	25,38	30,45	35,53
Gas Consumption Natural gas G 20 (20 mbar) $Q_{min}$	m <sup>3</sup> /h	1,27	1,27	1,27	1,27	1,27	1,27
Gas Consumption G25 (supply pressure 25 mbar) $Q_n$	m <sup>3</sup> /h	11,81	17,71	23,61	29,51	35,42	41,32
Gas Consumption G25 (supply pressure 25 mbar) $Q_{min}$	m <sup>3</sup> /h	1,48	1,48	1,48	1,48	1,48	1,48
Gas Consumption G31 (supply pressure 37/50 mbar) $Q_n$	kg/h	7,45	11,18	14,90	18,63	22,36	26,08
Gas Consumption G31 (supply pressure 37/50 mbar) $Q_{min}$	kg/h	0,93	0,93	0,93	0,93	0,93	0,93
Max. available pressure at the chimney base	Pa	100	100	100	100	100	100
Condensate production max	kg/h	15,9	24	32,4	40,8	48	56,4
<b>Emissions</b>							
$CO$ with 0% of $O_2$ in the flue system	ppm	<35	<36	<30	<34	<38	<55
$NO_x$ with 0% of $O_2$ in the flue system	ppm	<30	<34	<34	<29	<30	<24
Sound level	dBA	<49	<49	<49	<49	<49	<49
<b>Electrical Data</b>							
Voltage / Frequency	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50
Fuse on main supply	A (F)	4	4	4	4	4	4
Max power absorbed		145	210	290	362	435	507
Insulation degree	IP	40	40	40	40	40	40
Standby Consumption	W	10	10	10	10	10	10

(\*) Room Temperature = 20°C

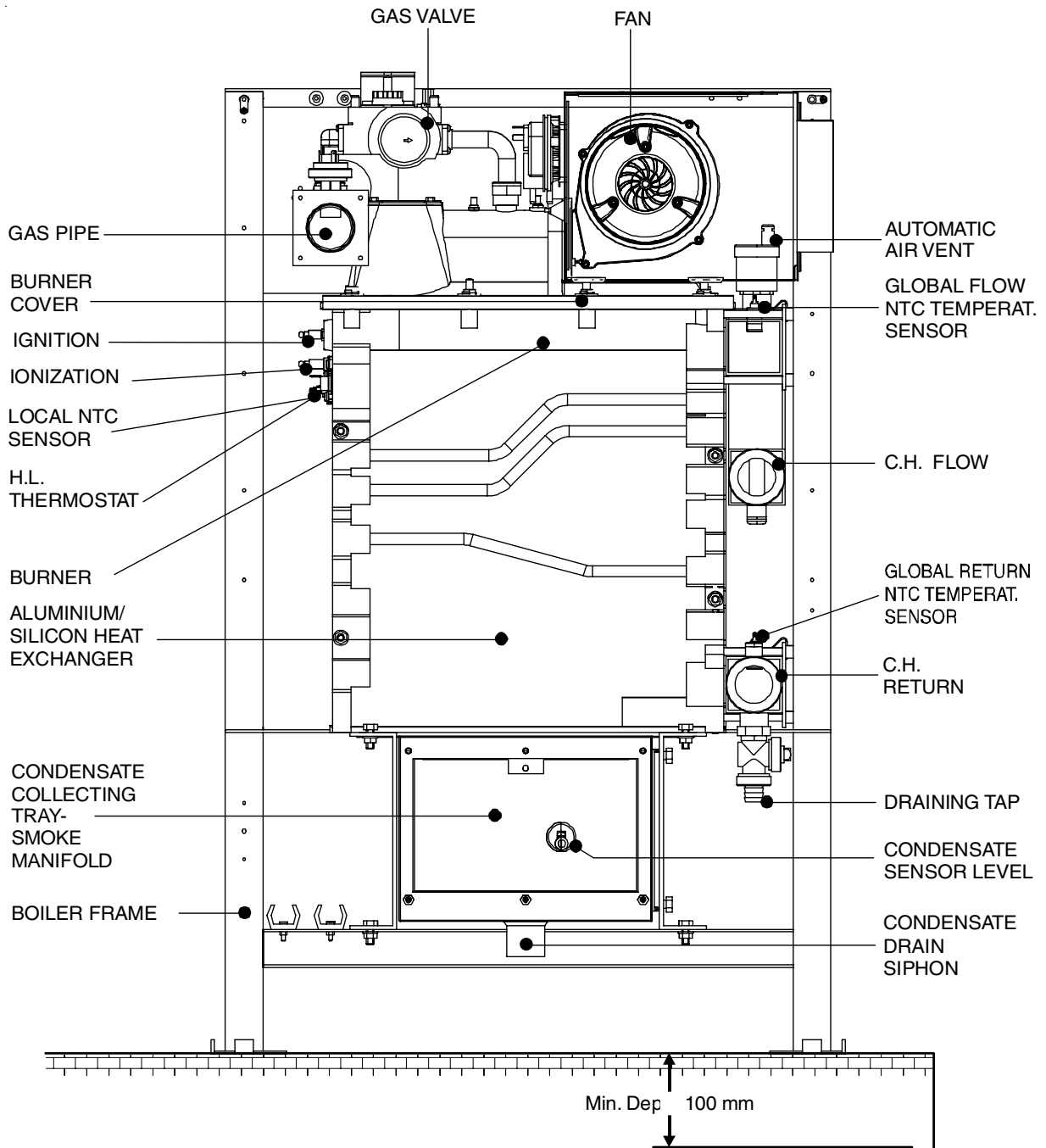
(\*\*) See paragraph "INJECTORS – PRESSURES"



The Technical data plate is placed under the casing over the forehead stirrup.

## Technical features and dimensions

### 2.4 - R.H. SIDE VIEW, WITH MAIN COMPONENTS



The grates for the air suction are placed on the Right side, Left side and Back side.

On the casing panels of the boiler there are some pre-cuttings for the **gas connection**. Once the connection position has been selected, remove the pre-cut part consequently.

Unless special order is placed, the boiler is supplied with:

- **Smoke and condensate evacuation connection** on the R.H. side (furniture condition), back side or L.H. side
- **C.H. flow connection** on the R.H. side (furniture condition), L.H. side
- **C.H. return connection** on the R.H. side (furniture condition), L.H. side
- **Gas connection** on the R.H. side (furniture condition), L.H. side



In case the position of the flue connection, for boilers MODULEX 190 - 240 - 290 - 340, is changed from the standard one (right side) it is necessary to place an order (code 95611308) for the harness of the condensate level sensor.

3

## INSTRUCTIONS FOR THE INSTALLER

### 3.1 - GENERAL WARNINGS



**WARNING!**

This boiler has to be destined for the use for which it has been expressly designed for. Any other use shall be considered improper and therefore dangerous.

This boiler is designed to heat water at a temperature inferior to boiling point at an atmospheric pressure.



**WARNING!**

These appliances are exclusively designed to be installed inside adequate boiler rooms. Therefore these appliances must not be installed and operated externally.



Before installing the boiler the following points have to be carried out by a competent engineer:

- An accurate washing of all the pipes of the installation to remove possible residues or impurity that could jeopardize the good operation of the boiler, also from the sanitary point of view.

- Check that the boiler has been preset for operating with the gas type available.

This is verifiable via the indication on the packaging and on the data badge;

- Check that the chimney/flue pipe has an adequate draught, does not have any constrictions, and that no other appliance's flue outlets have been fitted, unless the chimney is serving more than one heating appliance, according to the specific standards and regulations in force.

The connection between the boiler and chimney/flue outlet can be made only after this verification has been carried out.



**WARNING!**

In rooms where there is the presence of aggressive vapours or dust the appliance must operate independently from the air present in the boiler's location room!



**WARNING!**

The appliance must be installed by a qualified engineer, who complies to the technical-professional requirements according to the national applicable law and who, under his own responsibility, guarantees the compliance with the standards according to the latest regulations.



**WARNING!**

Install the appliance respecting the minimum clearances for operation and servicing.



The boiler must be connected to a heating system which is compatible to its performances and output.

### **3.2 - STANDARD CODES FOR INSTALLATION**

The appliance must be installed in compliance to the instructions contained in this manual.

The installation must be carried out by a competent qualified engineer, whom will assume the responsibility of complying to all the local and/or national regulations published in the official publications, as well as all the applicable codes of practice.

Before installing the appliance please contact the gas supply company.

The installation must be carried in accordance to the codes of practice, the regulations and the requirements hereby indicated which constitute an indicative list, but not a complete one, as these continue to undergo evolve developments.

Moreover, the boiler must be installed in accordance to all the regulations regarding the boiler room, the building regulations and the prescriptions regarding central heating plants in force in the country where the boiler is installed.

The appliance must be installed, commissioned and serviced according to the regulations in force. This is also valid for the hydraulic system, the flue outlet system and the boiler location room.

### 3.3 - PACKING



The boiler MODULEX is delivered assembled and protected by a plastic bag inside a strong cardboard box and fixed on pallet. This allows the boiler to be handled also by forklift. The boiler, with the packaging, can go through a door of 800 mm, whereas, without packaging, it can go through a door of 700 mm.



Remove both straps and finally the cardboard box from above, making sure the product is intact. The packing elements (cardboard box, straps, plastic bags, etc...) **shall not be left to children's hand since they may be dangerous.**

Inside the packing, you can find,

#### on the boiler back:

- the front casing connected to the back one by a thermoretractable film
- the condensate drain pipe, 1 m long, placed under the casing rear panel.

#### on the L.H. side of the boiler:

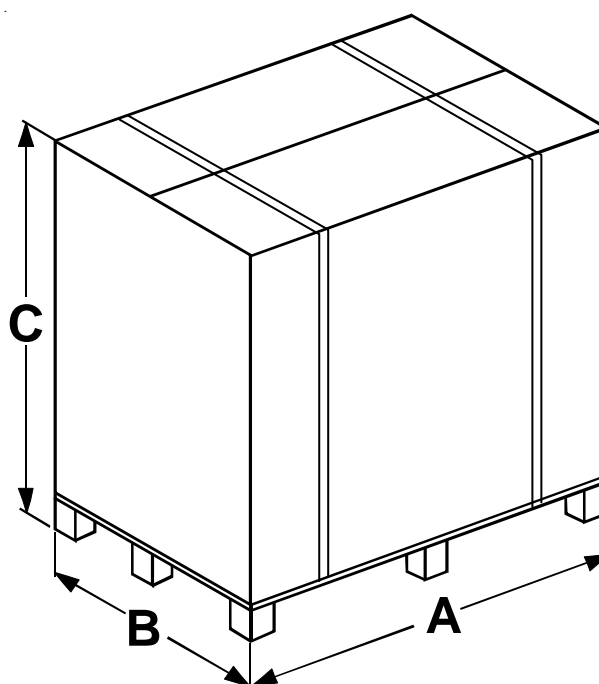
- the R.H. side panel connected to the L.H. side one by a thermoretractable film.

#### on the boiler front:

- the smoke chamber/condensate collecting tray screwed to the pallet
- a plastic bag containing:
  - 3 gaskets (1 rectangular between condensate tray and flue terminal, 1 square between flue socket base and flue terminal and 1 for flue socket Ø 150 or Ø 200 mm according to the model)
  - 2 bends + 1 Tee piece + 1 plastic plug, Ø 40 mm for condensate drain.
  - the screws necessary for fixing
  - 1 plastic box containing the outer sensor.

#### on the boiler top:

- a plastic bag containing:
  - This instruction manual



Model	A	B	C	Gross Weight
100	770	780	1250	181 kg
145	770	780	1250	215 kg
190	908	780	1250	256 kg
240	1042	780	1250	300 kg
290	1176	780	1250	341 kg
340	1310	780	1250	387 kg

- Warranty certificate
- Hydraulic certificate
- This instruction manual
- Instruction manual for person in charge of the appliance
- Libretto uso centralina di controllo E8
- Warranty certificate
- Hydraulic certificate

### 3.4 - BOILER LOCATION INSIDE A BOILER HOUSE

Special attention shall be paid to local regulations and laws about boiler houses and particularly to the obligation of keeping minimum clearances and empty space around the boiler. The installation shall be in compliance with all latest regulations and laws about boiler houses, installations of heating and hot-water systems, ventilation, chimneys capable of evacuating the flue gases of condensing boilers and any other applicable requirement.

**When selecting the position for the installation of the boiler it has to be considered that, for the cleaning and washing operations of the boiler body, one of the boiler sides must be accessible for the removal of a special baffle placed under the aluminum sections.**

This baffle can be fixed, indifferently, from the R.H or L.H. side of the condensate tray. If no modification has been made, the boiler must have its R.H. side accessible, with the chimney connection fitted on the R.H or L.H. side. But, if the

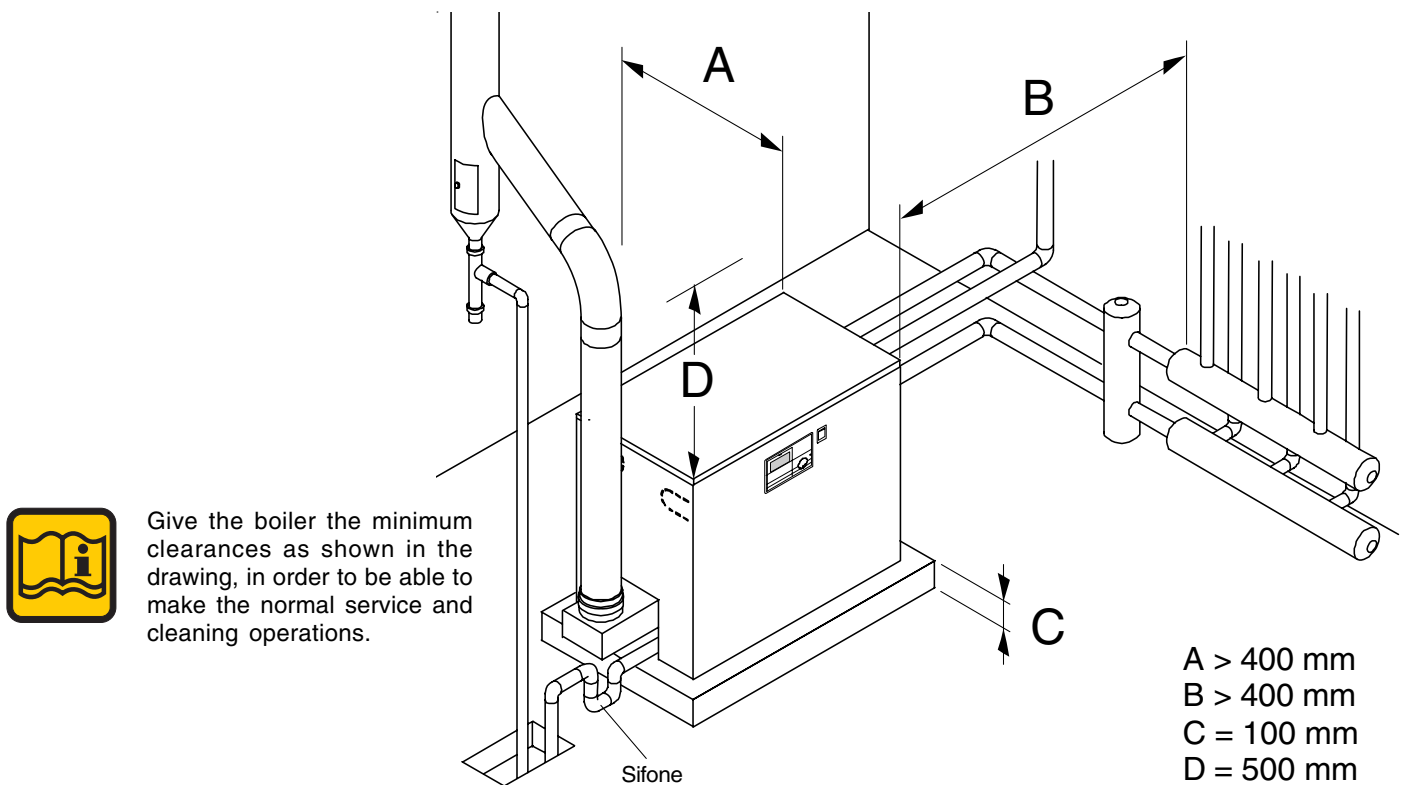
smoke chamber terminal, with the flue socket, is left to the R.H. side and if, from this same side, the baffle has to be removed, then the flue socket must have the possibility to be also removed.

If it is preferred, the baffle can be moved in order to have its fixation screw on the opposite side, regardless the position of the smoke chamber terminal.

The boiler can be put on a flat and sufficiently strong base with the same dimensions as the boiler ones and at least 100mm high (see fig. 2), in order to assemble the condensate drain siphon. An alternative to this base may be a 100mm deep well next to the boiler as siphon housing (see fig. 2). After installation the boiler shall be

perfectly horizontal and stable, to reduce any possible vibrations or noises.

## Instructions for the installer



### 3.5 - INSTALLATION ON EXISTING HEATING SYSTEMS

When the appliance is installed on existing systems, ensure yourself that:

- The flue outlet pipe is suitable for condensing boilers, for the temperature of the products of combustion, calculated and manufactured according to the regulations in force. It must be installed as much as possible in a straight line, tested for soundness, insulated and must not have any occlusions or restrictions.
- The flue outlet pipe has a connection for the discharge of condensate.
- The boiler room has a suitable outlet for the discharge of condensate produce by the boiler.
- The electrical system has been fitted in compliance to the specific norms and the work has been carried out by a competent person.
- The circulation pump's output, the head and flow direction are suitable.
- The gas feeding supply pipe and the eventual tank are constructed according to the regulations in force.
- The expansion vessels assure the total absorption of the dilatation of the fluid contained in the system.
- The system has been cleaned of impurities and lime scale.

**When a Modulex boiler is installed onto an existing heating system:**



In case the replacement of an existing boiler in an old system can be programmed, it is necessary to thoroughly clean out the system with a basic solution. The system must be cleaned 4 weeks before the substitution, with the system firing at a temperature of 35°C to 40°C.

#### WARNING!

If it is noticed that a new Modulex has replaced, in an old system the existing boiler without having first performed what said in the previous paragraph, Do not wash now the system, as residual products, present in the circuit, could lead to system gathering in the boiler body, causing damage. UNICAL recommends contacting a specialised company for water treatment.

**Instead, if installing a Modulex boiler in a new system,** it is still recommended to thoroughly clean out the system with an adequate product and fit a Y filter with two isolating valves on the boiler's return pipe, so that, when necessary, it can be cleaned. This filter will protect the boiler from the dirt coming from the heating system.

When sizing pumps, it is necessary to take into consideration the pressure losses which occur in the primary circuit.

**3.6 - BOILER CONNECTION**

At its delivery the Boiler MODULEX has all the connections on its R.H. side: hydraulic (flow / return), gas, and smoke outlet. The locations of the air intake and the smoke outlet can be decided on site by removing one of the notched parts available on the boiler right, left and back sides. To fix the smoke manifold terminal with the flue socket, use the screws and the gaskets supplied inside the plastic bag and a min. 300 mm long cross screwdriver.

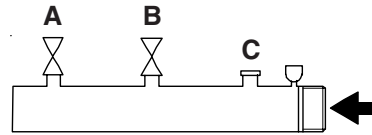
Hydraulic (flow/return) and gas connections can be also moved on the boiler L.H. side by inverting the flow/return manifold on the left side according to the following procedure:

- Remove the complete casing
- Remove the small plates fixing the flow and return global temperature sensors
- Disassemble the flow and return manifolds, leaving at their place, on the aluminum sections, the rubber gaskets (on the upper holes) and the diaphragms (on the lower holes). The diaphragms onto the end sections have a hole of 17 mm dia., while the others have a hole of 22 mm dia.
- Reassemble the manifolds with the threaded connection on the opposite side as shown in the figure of the next page.
- Change, between them, the position of the drain cock and the automatic air vent.
- Reposition the temperature sensor white and red leads onto the new flow manifold and the temperature sensor white and green leads onto the new return manifold.
- It is possible to keep the gas manifold inlet on the R.H. side or, otherwise, it is possible to rotate it of 180° to have it on the L.H. side. In case of reversion from R.H. side to L.H. side of the gas manifold, only on the MODULEX 90 it will be necessary to reverse between them the plug C with the gas valve fitting A.

**POSSIBLE GAS CONNECTION REVERSION**

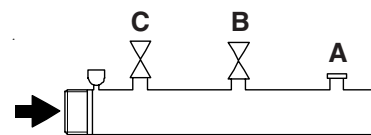
**FRONT VIEW**

**Gas connections on the R.H. side**  
(std delivery condition).



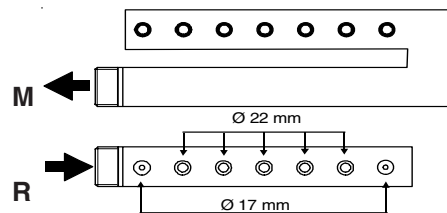
**FRONT VIEW**

**Gas connections on the L.H. side**  
(after modification condition)



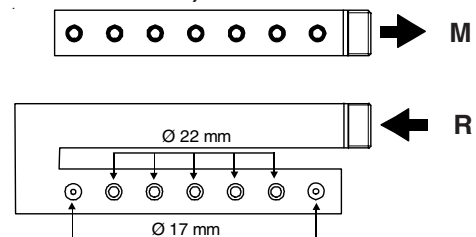
**POSSIBLE WATER CONNECTIONS REVERSION**  
**REAR VIEW**

**C.H. Flow and Return R.H. side connections**  
(std delivery condition).



**REAR VIEW**

**C.H. Flow and Return L.H. side connections**  
(after modification condition)



**Ø 17 =** Diaphragm for the two collectors positioned at the extreme ends

**Ø 22 =** Diaphragm for the internal collectors.

## Instructions for the installer

### 3.7 - GAS CONNECTION

The gas supply pipe must be connected to the boiler via the respective pipe connection 1½" G as indicated on page 8.

The gas supply pipe must have a section which is identical or greater than the one used on the boiler and must assure a correct gas pressure.

It is however important to comply with the specific norms and requirements in force, foreseeing on-off valves, gas filter, anti-vibrating joint etc.



#### WARNING:

In order to protect the boiler it is suggested to install a filter at the connection of the gas feeding pipe.

This filter has to be easily inspectable and conveniently sized in order to grant the supply pressure required by the boiler.

Before commissioning an internal gas distribution system and therefore before connecting it to the gas meter, the complete installation must be tested for gas soundness.

If any part of the system is concealed from view the gas soundness test must be carried out before covering the pipes.



#### DANGER!

The gas connection must be carried out by a registered engineer who will have to respect and comply to the regulations in force and to the requirements indicated by the local gas supplier. An incorrect installation could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any injury and/or damage.



Before installing the boiler it is recommended to thoroughly clean all the supply piping in order to remove any eventual residual grime which could compromise the boilers correct functioning.



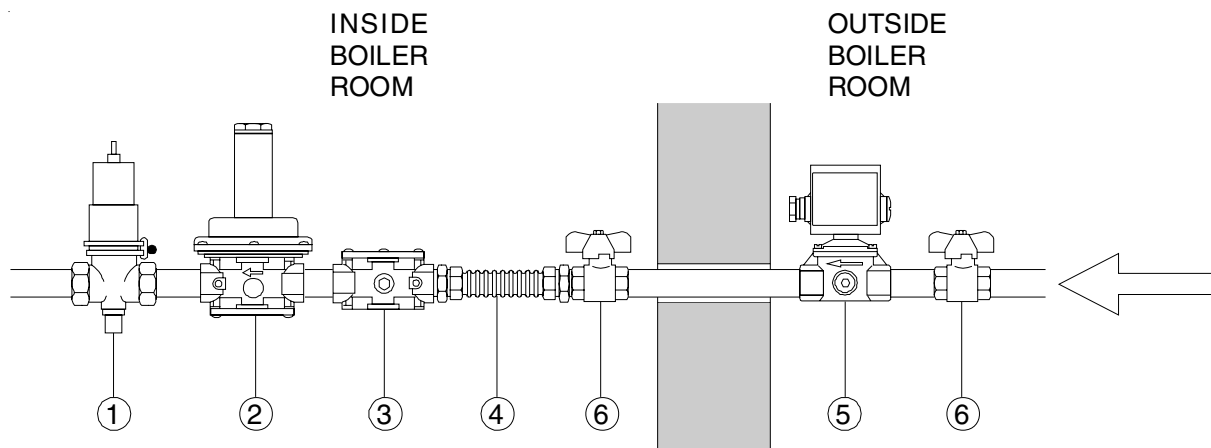
If you smell gas:

- Do not turn on or off electrical switches, use the telephone or any other object which can provoke sparks;
- Open all doors and windows in order to allow fresh air to enter and purify the room;
- Close all gas cocks
- Contact a service engineer, qualified installer or the gas supply company.



As a safety measure against gas leaks, Unical recommends installing a surveillance and protective system made up of a gas leakage detector combined with an on-off selenoid valve on the gas supply line.

### EXAMPLE OF A GAS SUPPLY SYSTEM



1. On-off gas supply valve
2. Double membrane regulator
3. Gas filter
4. Anti-vibrating joint
5. Selenoid valve
6. On-off cock



### 3.8 - FLOW AND RETURN PIPE CONNECTIONS

The CH flow and return circuits have to be connected to the boiler via the respective connections 2" M and R as indicated on page 8.

When determining the size of the CH circuit pipes it is essential to bear in mind the pressure losses induced by any of the system's components and by the configuration of the same system.

The route of the piping has to be conceived taking all the necessary precautions in order to avoid air locks and to facilitate the continuous purging of the system.



**WARNING!**

**Before installing the boiler we recommend that the system is flushed out with a suitable product in order to eliminate any metallic tooling or welding residues, oil and grime which could reach the boiler and affect the proper running of the boiler.**

**Non-observance of these instructions could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any such injury and/or damage.**



Ensure yourself that the system's piping is not used as the earth clamps for the electrical or telephonic system. They are absolutely unsuitable for this use. In a short time this could cause serious damage to the piping, boiler and radiators.



**WARNING!**

**IT IS ABSOLUTELY FORBIDDEN TO FIT ON-OFF VALVES ON THE GENERATOR TO THE FORE OF THE SAFETY DEVICES**

## Instructions for the installer

### 3.9 - DETERMINATION OF PRIMARY BOILER PUMP OR BOILER SYSTEM PUMP

The boiler pump must have a delivery head which can ensure the water flow rate as shown in the diagram "Water pressure losses".

The following table gives an indication of the pump's flow rate in function of the  $\Delta t$  of the primary circuit if the installation has a mixing header.



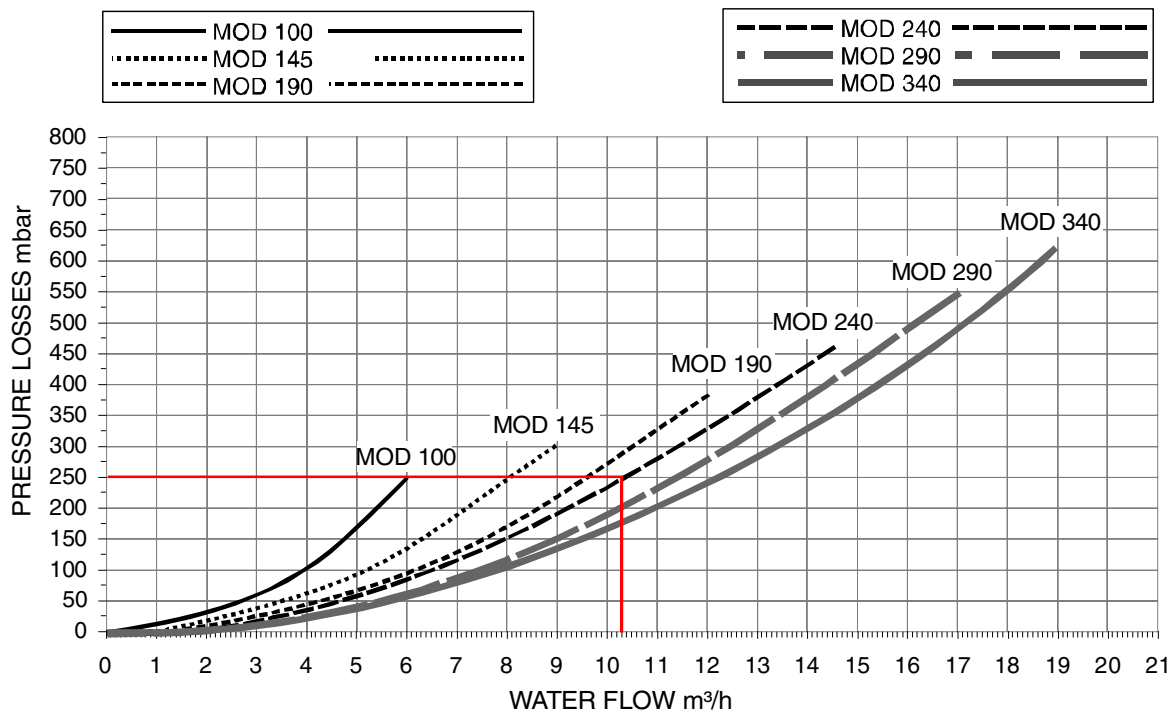
The size of the pumps must be determined by installers or technical engineers according to boiler data and system design.

The water side resistance curve of the boiler is shown in the following diagram. The pump is not an integral part of the boiler.

It is recommended to choose a pump with the rate and delivery head at about 2/3 of its characteristic heating curve.

Boiler Model	100	145	190	240	290	340
Max water flow rate Demanded in l/h ( $\Delta t=15$ K)	5344	8032	10743	13457	16181	18301
Max water flow rate Demanded in l/h ( $\Delta t=20$ K)	4008	6025	8058	10265	12136	14169

WATER SIDE PRESSURE LOSSES



For a  $\Delta T$  20 K, of a MODULEX 240 boiler, the max. water flow rate requested is 10,3 m³/h. From the graph of the boiler's pressure losses, it can be determined that the pump must be able to guarantee a delivery head of at least 250 mbar.



**NOTE:** The use of a mixing header fitted between the boiler circuit and the system circuit is always advisable. It becomes **INDISPENSABLE** if the system requires flow rates superior to the maximum permitted boiler flow rates, which is to say lower than 15K.

### 3.10 - ADDITIONAL SAFETY AND CONTROL DEVICES ACCORDING TO THE ITALIAN LAW

#### CERTIFICATION OF THE ADDITIONAL SAFETY DEVICES:

##### SAFETY DEVICES

**1. On-off gas valve:** a device which has the function of cutting off the gas supply when the water temperature reaches the max. predetermined value. The sensible element has to be installed as nearest as possible to the generator (flow pipe) at a distance which has to be  $< 500$  mm and must not be able to be cut-off.

**2. Pressure relief valve:** it has the function of discharging in the atmosphere the fluid contained in the generator when this has, for whatever motive, reached the maximum working pressure.

**2a** Visible drain funnel

##### PROTECTIVE DEVICES

**3. Overheat thermostat:** it has the function of shutting down the generator if the safety thermostat fitted in the boiler malfunctions. It must be calibrated to a value of  $< 100^{\circ}\text{C}$ , which MUST not be changed.

**6. Safety pressure switch:** it has the function of shutting down the generator if it reaches the maximum working pressure. It must be able to be reset manually.

##### CONTROL DEVICES

**7. Pressure indicator with shock absorber tube (7a) and pressure gauge holder valve (7b):** it indicates the effective pressure existing in the generator. It must be graduated in "bar" and must have the maximum operating pressure in scale and be equipped with a 3-way valve with the connection for the manometer.

**5. Thermometer:** it indicates the effective water temperature contained in the generator. It must be graduated in degrees Celsius with a temperature scale not exceeding  $120^{\circ}\text{C}$ .

**4. Inspection pocket:** approved for inserting the control thermometer

**8. Calibrated expansion vessel:** it permits the absorption of the increase in volume of the system's water following an increase in temperature.

**9 Y filter**

**10 Modulating pump**

**11 Mixing bottle**

**12 Automatic air vent. Not supplied by Unical**

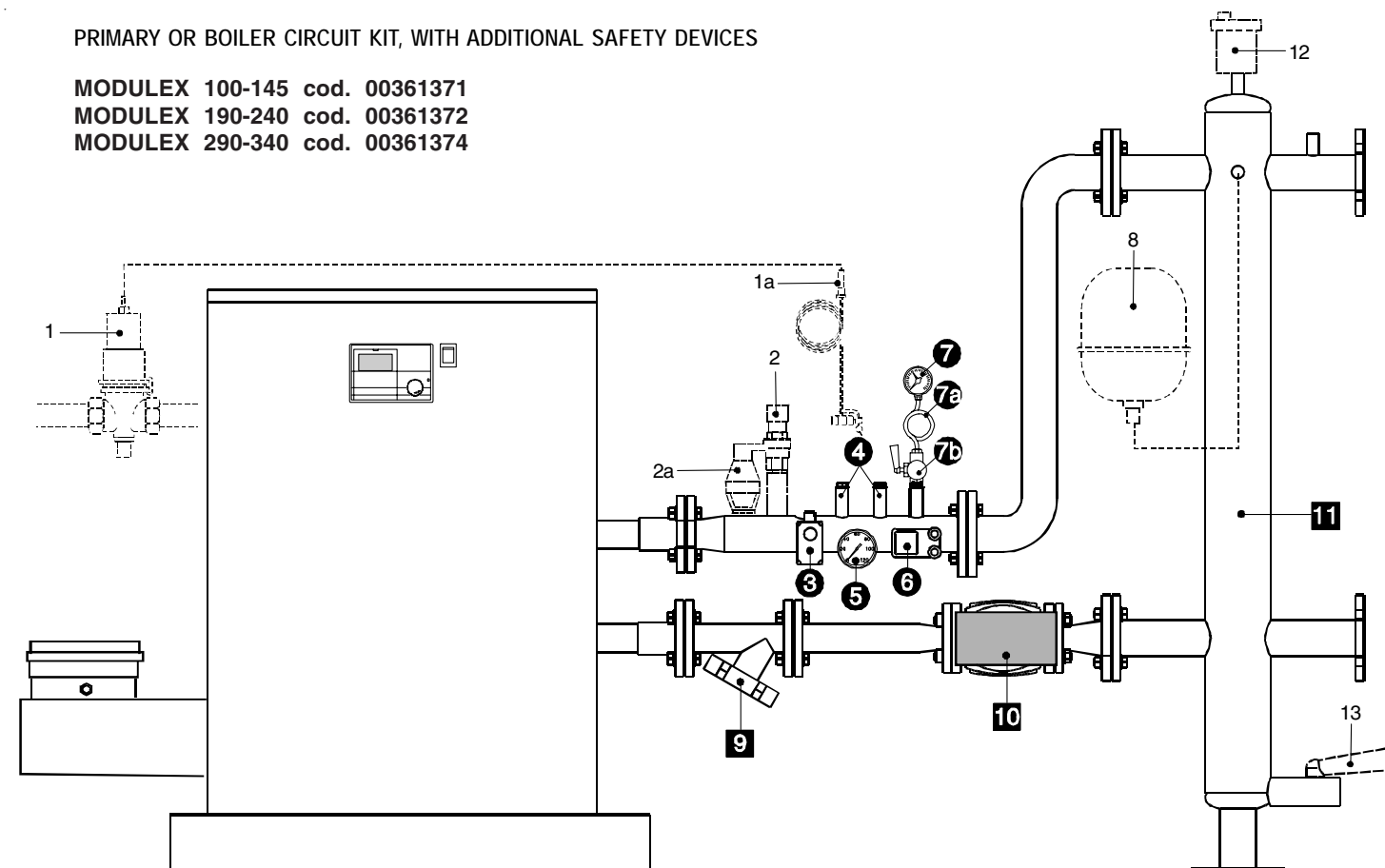
**13 Drain cock. Not supplied by Unical.**

#### PRIMARY OR BOILER CIRCUIT KIT, WITH ADDITIONAL SAFETY DEVICES

MODULEX 100-145 cod. 00361371

MODULEX 190-240 cod. 00361372

MODULEX 290-340 cod. 00361374

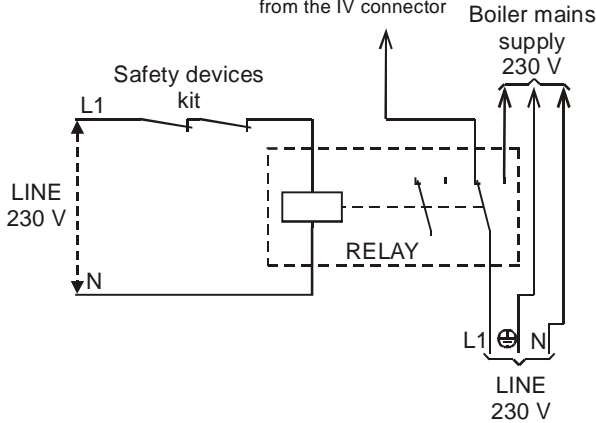


## Instructions for the installer

### 3.11 - WIRING DIAGRAM FOR ADDITIONAL SAFETY DEVICES:

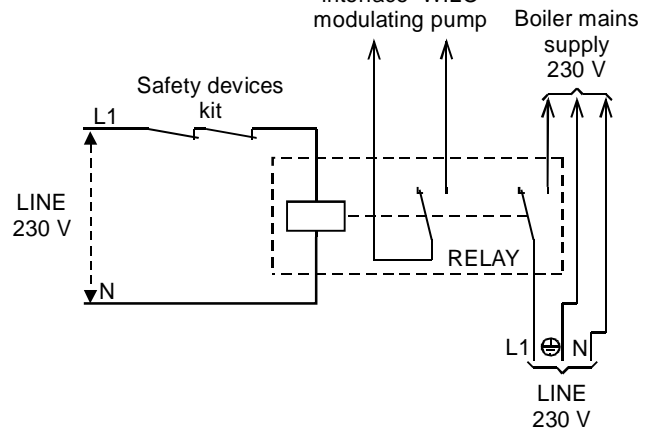
#### WITH ON-OFF PUMP

Pump management via E8 to the terminal 4 (A10) from the IV connector



#### WITH MODULATING PUMP

Terminals EXT-MIN interface WILO modulating pump



### 3.12- PRESSURE RELIEF VALVE DRAIN PIPE



A pressure relief valve must be fitted on the flow pipe, within 0,5 m from the boiler. It must be dimensioned for the capacity of the boiler and must comply to the regulations in force,



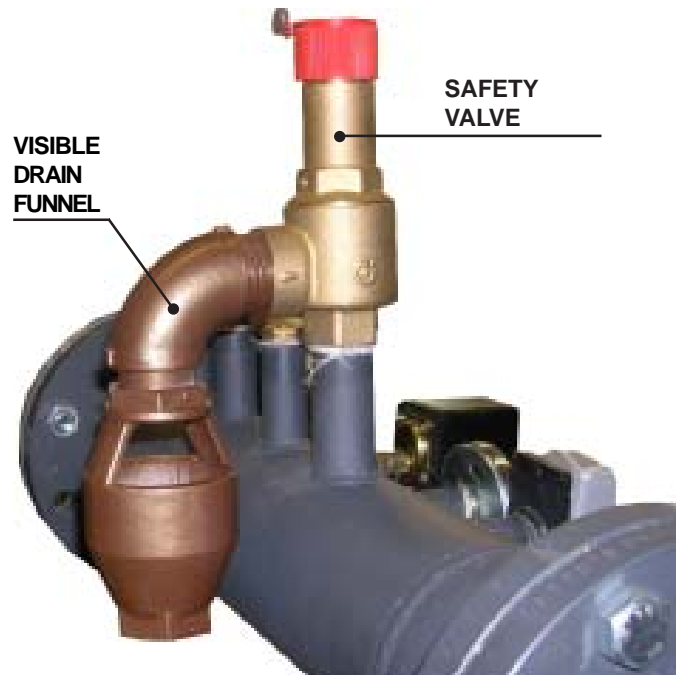
#### WARNING!

Please remember that it is forbidden to interpose, between the boiler and the pressure relief valve, any type of cutting-off device. Moreover it is recommended to use cutting-off valves which do not exceed the maximum allowable operating pressure.



#### WARNING!

In correspondence to the heating pressure relief valve foresee the installation of a discharge pipe with a funnel and a siphon which lead to an adequate drainage. The drainage has to be controllable by sight. If this precaution is not made, an eventual intervention of the pressure relief valve could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any injury and/or damage.



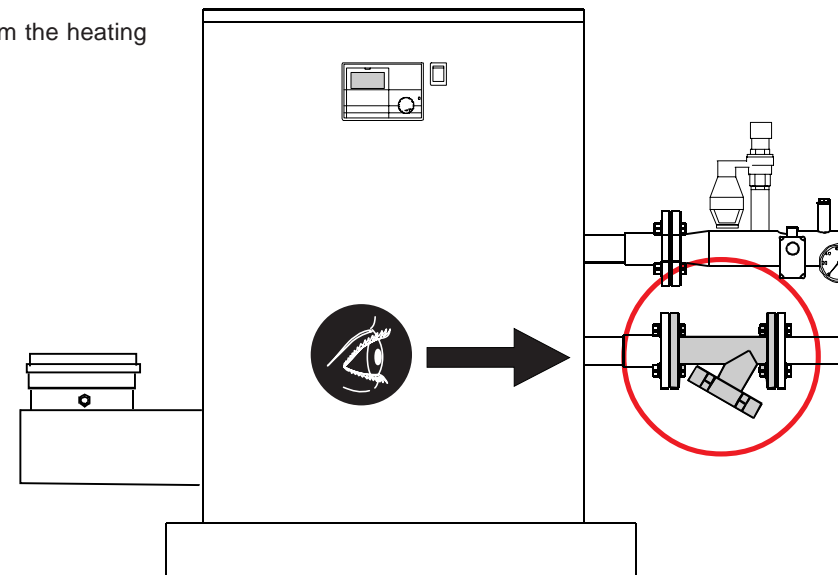
### 3.13 - MIXING HEADER FILTER.



**WARNING:**

It is always suggested to fit, on the return pipe to the boiler, a filter Y shaped.

This filter will protect the boiler from the heating system dirt.



### 3.14 - BALLSTOP VALVES

The installation of ballstop gate valves, on the C.H. flow and return connection, is recommended.

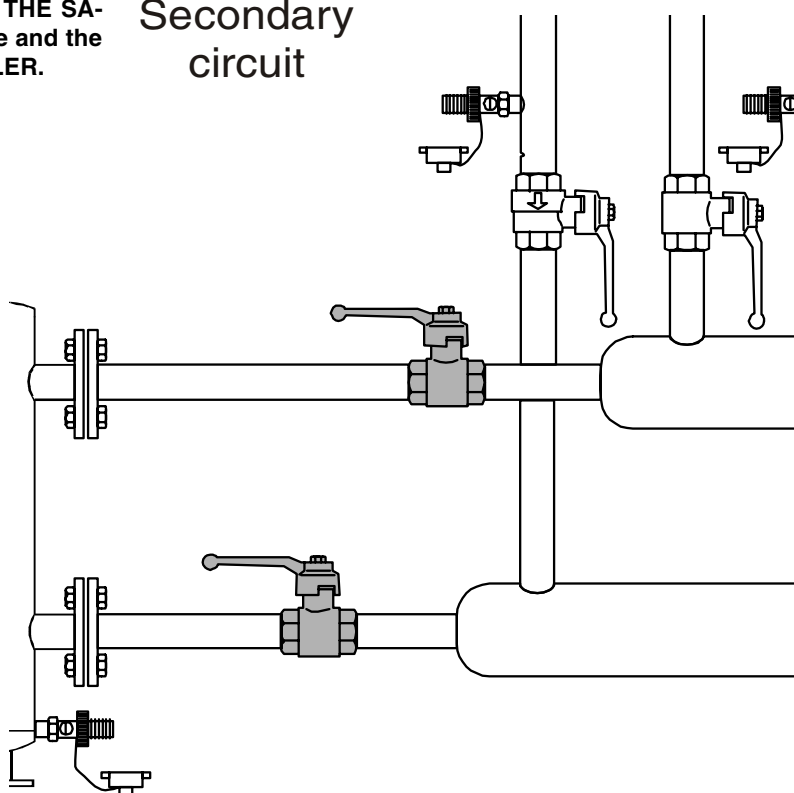
Doing so, in case of normal or extraordinary service, the boiler can be drained without emptying the whole C.H. system.



**WARNING!**

**IT IS NOT ALLOWED TO ISOLATE THE SAFETY DEVICES, as the safety valve and the expansion vessel, FROM THE BOILER.**

Secondary circuit



## Instructions for the installer

### 3.15 - BOILER FREEZE PROTECTION

Should the flow temperature (measured at global flow temperature NTC) decrease under 7°C, the system pump is set up. Should temperature decrease to under 3°C, all modules will start at min. output until the return temperature reaches 10°C. Such protection device is exclusively for the boiler. For the protection of the system, a second freeze protection thermostat is necessary to switch on the heating system pump. To protect the C.H. system from freezing when boiler is not in operation during cold season, it is necessary to add to the C.H. system water an anti freezing solution.

**NB: The antifreezing solution must be compatible with the materials present in the system, and mainly with the aluminum.**



#### WARNING

**AFTER A LONG INOPERATION PERIOD OF THE BOILER, IN CASE THE BOILER TEMPERATURE IS BELOW 3°C, ABSOLUTELY DO NOT TRY TO START THE BOILER.**

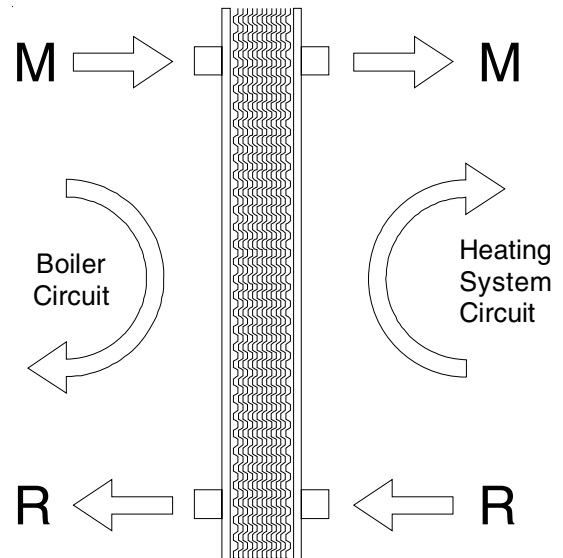
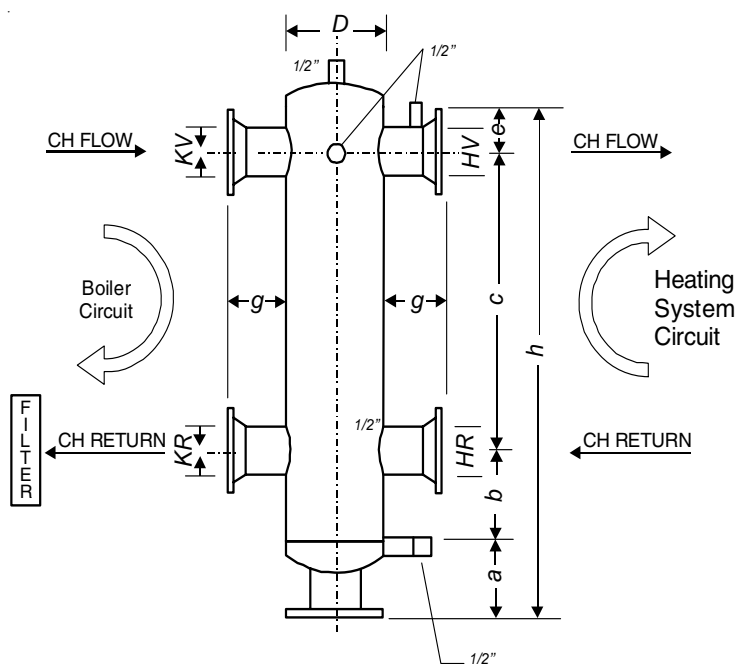
**THIS CAN BE ALLOWED ONLY IF YOU ARE SURE THAT AN ANTIFREEZE SOLUTION HAS BEEN ADDED, IN THE PROPER PERCENTAGE, TO THE C.H. WATER.**

### 3.16 - MIXING HEADER AND PLATE HEAT EXCHANGER

In order to ensure correct boiler operation it is necessary to use a mixing header which guarantees:

- the separation and collection of circuit dirt
- optimal air venting
- hydraulic de-coupling of the two hydraulic circulation circuits
- balancing of the circuits

The plate heat exchanger, conveniently dimensioned, has the advantage to keep hydraulically the two circuits (primary and secondary), thus allowing the installation of the MODULEX boiler also in industrial processes.



**TABLE FOR THE RECOMMENDED DIMENSION OF THE HYDRAULIC COMPENSATOR**

MODULEX MODEL	FLOW RATE l/h	D mm	KV DN	KR DN	HV DN	HR DN	a mm	b mm	c mm	e mm	h mm	g mm
100 kW	4.000	100	50	50	200	300	1.000	150	1.650	200		
145 kW	8.000	150	65	65	200	300	1.000	150	1.650	200		
190 kW	12.000	200	80	80	200	300	1.000	150	1.650	200		
240 - 290 kW	20.000	200	100	100	200	300	1.000	150	1.650	200		
power supply over > 340 kW	30.000	250	125	125	200	300	1.000	150	1.650	200		
	50.000	300	150	150	250	300	1.000	150	1.700	200		



See the Unical catalogue and the price list to identify the most convenient mixing header and primary circuit.

## 3.17- CONDENSATE DRAIN

Avoid the condensate stagnation inside the combustion products evacuation system, (for this reason the evacuation duct must have an inclination toward the drain of at least 30 mm/m (3/8 in. / ft) except the liquid column, inside the condensate siphon, which needs to be filled with water after installation: its minimum height, when all the fans are in operation, must be at least 25 mm (1 in.).

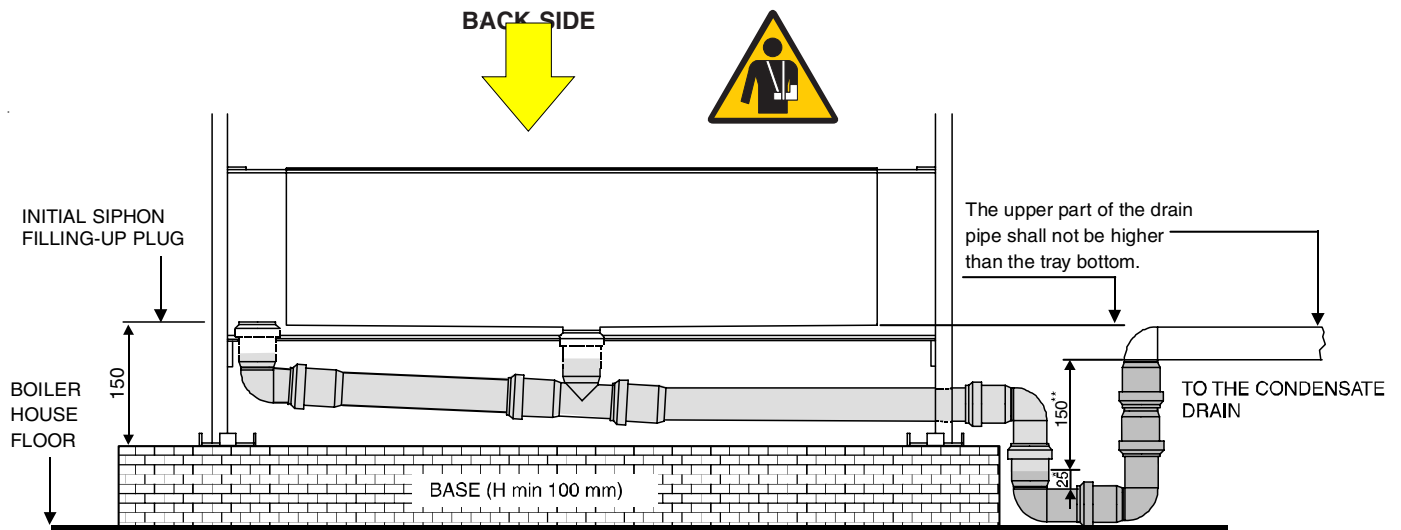
In order to avoid ice formation while the boiler is operating, which can cause the stop of the boiler, the whole condensate evacuation system has to be well insulated. It is forbidden to evacuate the condensate through a gutter: risk of ice forming and corrosion.

The condensate, before being evacuated to the sewer, has to be neutralized, neutralisation which can be obtained by mixing the drain water coming from washing machines, dish washing machines, etc., which normally have a basic pH.

The connection to the sewer will be through a visible drain. Given the high acidity degree (pH 3 to 5) only plastic material can be used for the condensate evacuation pipes. Moreover it must be dimensioned and constructed so as to allow the correct out-flow of drains, preventing any bottleneck and any leakage.

The outlet of the condensate drain pipe will be on the same side of the smoke chamber, passing below the smoke chamber.

**Before commissioning the boiler fill the condensate siphon with water, from the dedicated filling-up plug.**



\* Min. height of the condensate column, with all fans operating at max. speed, requested by the EN standards.

\*\* Min. height of the condensate column, with all fans operating at max. speed. In the case it is not possible to create a 100 mm basement, install the boiler on the floor and foresee a min. 100 mm well to lodge the siphon.

## Instructions for the installer

### 3.18 - WATER TREATMENT

The chemical-physical characteristics of the filling water and reinstatement water in heating systems are of fundamental importance for guaranteeing correct and safe boiler operation.

Before filling the CH circuit with water, it is necessary to analyse the water and decide for a proper treatment.

The purpose of this treatment is finalized to eliminate or substantially reduce the following problems:

- lime scale deposit
- corrosions
- deposits
- biological growths (moulds, bacteria, algae, fungi, etc)

**The chemical treatment of the network water enables the prevention of these problems and guarantees safe boiler operation and economical advantages, in terms of maintenance and global thermal efficiency.**

The chemical analysis of the water enables us to obtain a lot of information on the system's condition and state of "health".

It is essential to avoid any problems with the boiler.

The pH is a measure of the acidity or alkalinity of a solution.

The pH scale has a range of 0-14, where 7 is neutral.

Values inferior to 7 indicate acidity, values above 7 indicate alkalinity.

**The ideal pH value for water in heating systems fitted with aluminium boilers is between 6,5 and 8, with a hardness of 15°F.**

In heating systems where the water has a value outside this range, this considerably accelerates the destruction of the protective oxidized layer which naturally develops inside the aluminium bodies: if the pH is below 6, acidity is present, if it is above 8, the water is alkaline or it is caused by an alkaline treatment (for example phosphate or glycol used as an antifreeze) or in several cases it is due to the natural formation of alkaline in the system.

Vice versa, if the pH value is between 6,5 and 8, the aluminium surfaces of the boiler body are passivated and protected from further corrosive attacks.

**To minimize corrosion it is essential to use a scale inhibitor, however in order for this to function correctly, the metallic surfaces have to be clean.**

**The best corrosion inhibitors on sale also contain a protective system for aluminium which acts by stabilizing the water's pH value, preventing unforeseen variations.**

**We recommend that the heating system's water pH value is systematically controlled (minimum twice a year). In order to do this, it is not necessary to run a chemical analysis in a laboratory, but it is sufficient to use a simple analytical 'kit' contained in portable cases, easily found on sale.**

Therefore, prior to filling the heating system with water it will be necessary to fit the devices indicated in the figure below.



**THE CONNECTION MUST BE FITTED ON THE PRIMARY CIRCUIT'S RETURN PIPE DOWNSTREAM OF THE CIRCULATING PUMP**

All the necessary precautions must be taken in order to avoid the formation and localization of oxygen in the system's water. For this reason, the plastic pipes used in underfloor heating systems must be impermeable to oxygen.

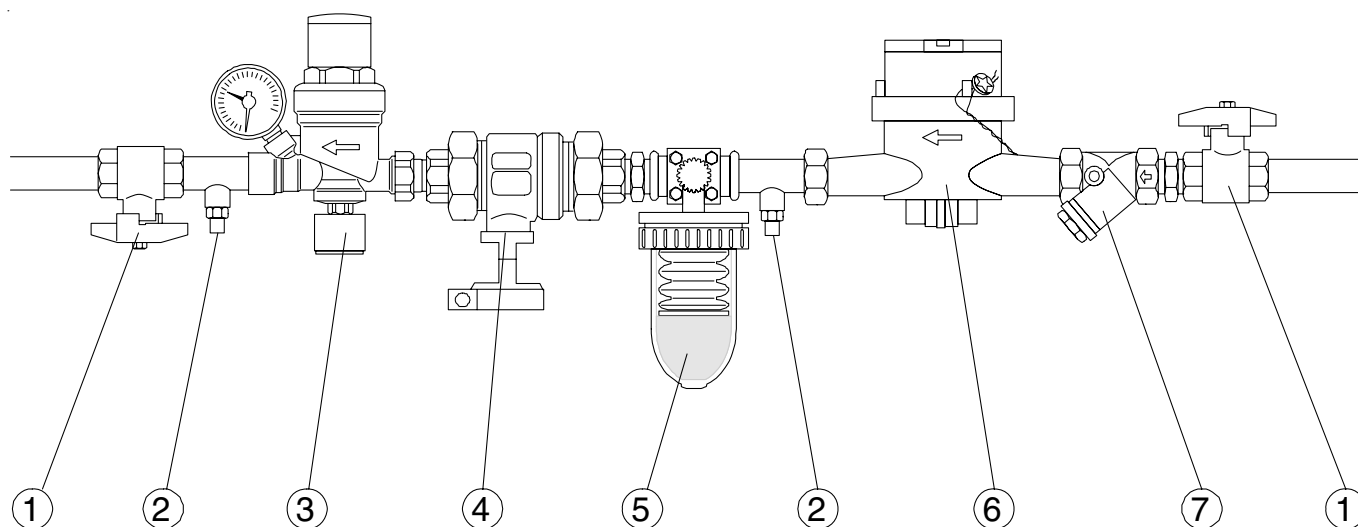
If any antifreeze solutions are used ensure yourself that they are compatible with aluminium and with any other components and materials fitted on the system.



**WARNING!  
ANY DAMAGE CAUSED BY THE BOILER, DUE TO THE FORMATION OF LIME SCALE OR DUE TO CORROSIVE WATER WILL INVALIDATE THE APPLIANCE WARRANTY.**



### EXAMPLE OF SCALE REDUCING DEVICE CONNECTION FOR WATER TREATMENT



1. Ball valve
2. Inspection pocket
3. Filling-up group
4. Disconnector

5. Scale reducing device
6. Litre counter (recommended)
7. "Y" filter

### 3.19- CONNECTION TO THE CHIMNEY

In a condensing boiler the smokes are evacuated at a very low temperature (Max about 84°C). Then it is necessary that the chimney is perfectly impermeable to the condensate of the combustion products and is made of materials corrosion resistant.

The different spigot joints must be well sealed and equipped with suitable gaskets, in order to prevent the outlet of condensate and the inlet of air.

Concerning the cross section and the height of the chimney, it is necessary to make reference to the national and local rules in force.

For the dimensioning follow the instruction in pr EN 13384. In order to prevent, during the operation, the formation of ice, the temperature of the internal wall of the combustion product evacuation system, in all its length, has not to be below 0°C. For condensation operating conditions of the appliance at the external design temperature, it will be necessary to foresee a condensate evacuation system, discharging, according to the installation condition, in the boiler condensate tray or in another dishpan separated from it.

**In the construction of the flue duct it is necessary to use materials resistant to the combustion products, in class W1, according to EN 1443, as stainless steel or plastic certified materials.**



As PVDF (polyvinildimethylfluorure) or PPS (polypropylene transparent simple) certified for this use. Other materials ant thicknesses are also authorized provided they can guarantee, at least, equivalent characteristics.

**Any contractual or extra-contractual responsibility of the supplier, for damages caused by mistakes in the installation and in the use, and, in any case, due to the non respect of the instructions given by the supplier, is excluded.**

Model	Modules	Ø Flue socket
100	2	150
145	3	150
190	4	150
240	5	200
290	6	200
340	7	200

### 3.20- ROOM SEALED VERSION

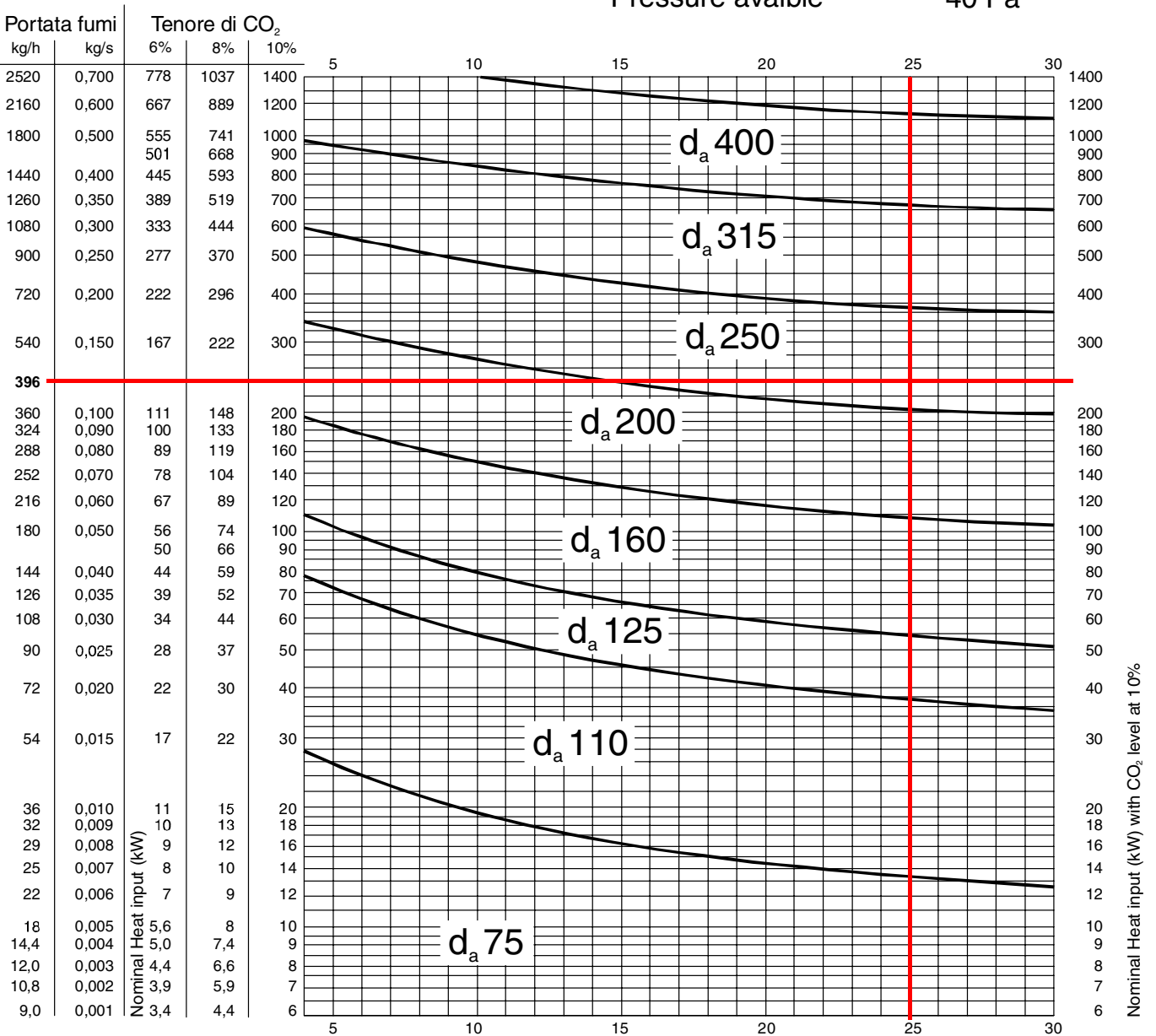
The MODULEX boiler is suitable also for installation in C 63 type, by taking the combustion air from outside the boiler house via an air duct.

To convert the boiler for type C 63 operation, a special kit has to be ordered to UNICAL.

# Instructions for the installer

Chimney dimension  
DIN 4705

Flue Gas Temperature 40°C  
Pressure available 40 Pa



Flue gas mass flow rate	
Modulex	Flue gas mass flow rate (max) kg/h
100	158,4
116	191,4
145	237,6
190	317
240	396
290	475
340	554,3

Example:  
MODULEX 240  
Flue gas mass flow rate = 396 Kg/h  
Chimney height = 25 m  
Chimney connection Ø = 250 mm



**NOTA:**  
Il diagramma  
fornisce valori indicativi

**3.21 - BOILER OPERATION**

The boiler consists of mutually connected combustion chambers; each of them has its own burner - fan, with air pressure switch for control - gas valve, with ignition and ionisation device - BMM (Burner Modular Manager) control.

In each cast aluminum section there is a temperature sensor NTC (Negative Temperature Coefficient), called local NTC, which locally checks the flow temperature of each aluminum section, and a High Limit thermostat.

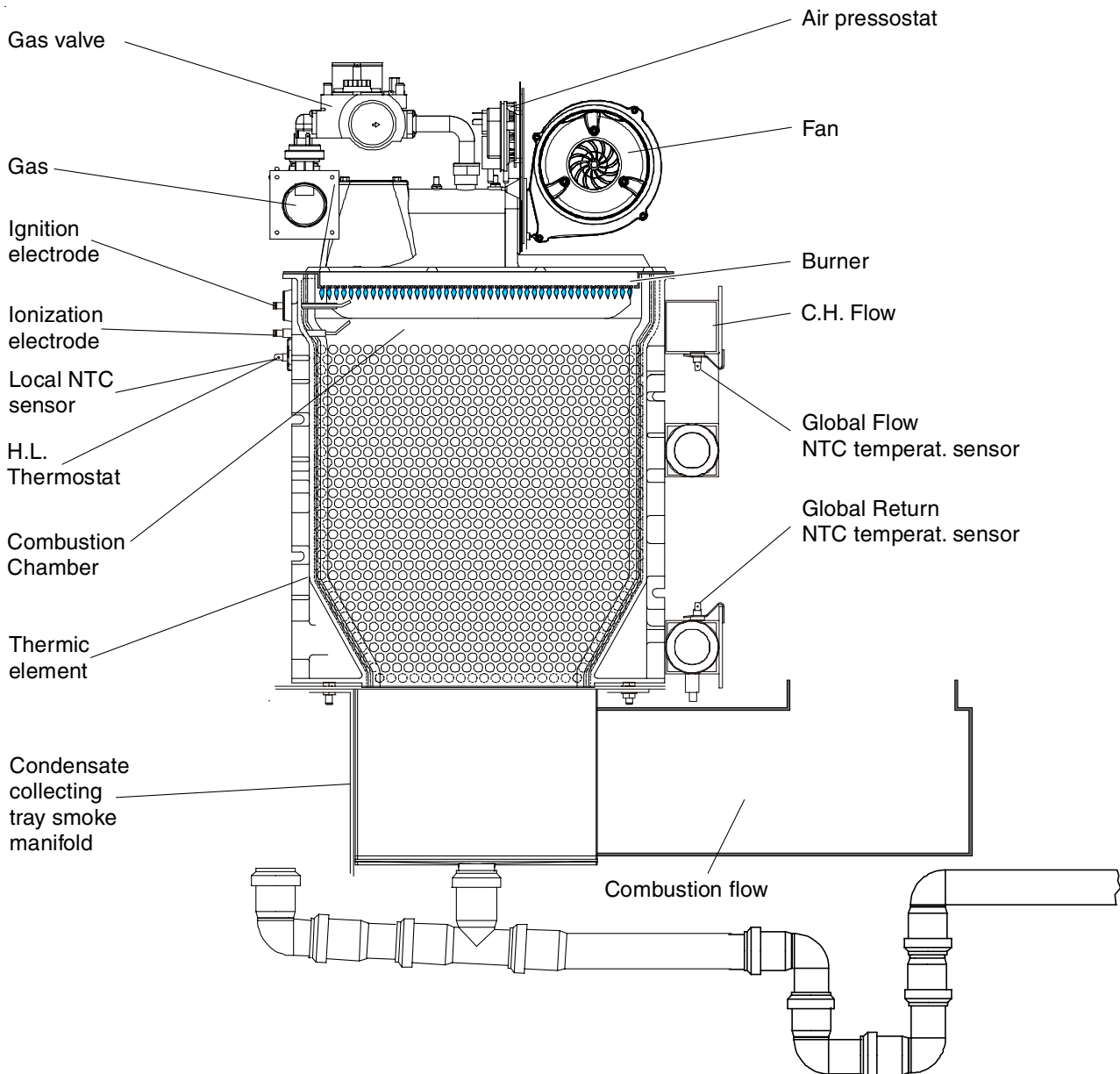
The flow temperature at the boiler outlet and the return temperature at the boiler inlet are controlled by global NTC temperature sensors.

In case of more heat request by heating or DHW systems, the boiler starts up and water will be heated by an aluminum boiler body. Then the boiler pump sends water to the mixing bottle, and, from here, the C.H. pump will send it to the radiators, according to the heating system chosen.

The combustion air is supplied by fans and taken in from the boiler room (for type B 23 boilers), or from outside through pipes (for type C 63 boilers, i.e. room sealed combustion boilers).

The combustion air is then pushed into the pre-combustion-chamber through a diaphragm.

Beyond the diaphragm, the air mixes with gas and such mixture passing through the non-return valve is sent to the burner. Then, on leaving the burner surface, the air/gas mixture ignites electrically and the resulting combustion gases, after being transported (and cooled) through pinned sections, enter the condensate collecting manifold and then are evacuated through the boiler chimney.



## Instructions for the installer

When there is a heat request from the E8 controller or from a BCM (Boiler Cascade Manager), the E8 or BCM calculates the necessary output according to the difference between the set temperature (or the temperature calculated by the outer compensator) and the global flow temperature. The number of thermal elements (each thermal element represents a maximum input of 48 kW) x 100% determines the maximum input expressed in %.

When the input has been determined, the boiler pump (not supplied by Unical) is set up and the fan of one thermal element is set in motion at starting speed. The gas valve opens and ignition is to occur within 5 sec. When the ionisation electrode detects the flame, the thermal element starts operating. Subsequently other thermal elements are likely to start in the same way. One of the operation principles for this boiler is letting as many burners as possible operate simultaneously at minimum load to reach the maximum efficiency.

For example, if a 4 thermal element boiler is requested to operate at its max input, this shall be 400% i.e. :

**48 kW x 4 thermal elements = 192 kW = 400%.**

If it is requested to operate at 200% input, thanks to the input

sharing system on the highest number of thermal elements, each thermal element will operate at 50% output i.e. :

**200% : 4 thermal elements = 50% equal to a total of 96 kW, that is 24 kW for each thermal element.**

Such principle provides clearly efficiencies much higher than those obtained in traditional groups of small boilers installed in cascade.

When the input shared on each thermal element is less than 12 kW, one thermal element after the other is automatically excluded and the remaining input is shared on thermal elements having the smallest number of operation hours (by the automatic operation-time calculating system).

Modulation, i.e. input reduction, is based on the difference between the set temperature (or the temperature calculated by the outer compensator) and the global flow temperature.

When no ignition occurs, the ignition device repeats two more times the ignition sequence and then puts to lock out position the thermal element concerned.

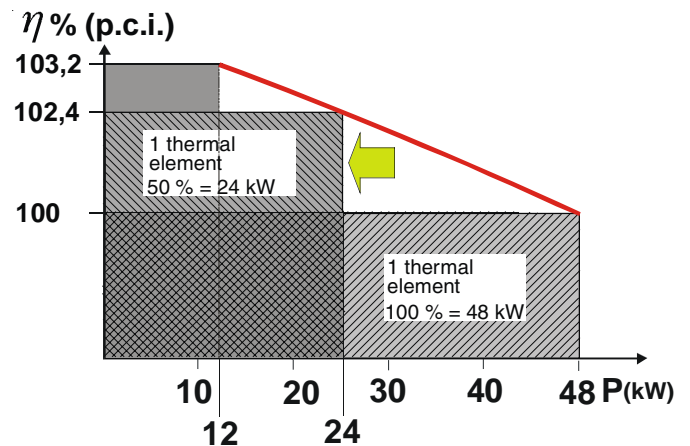
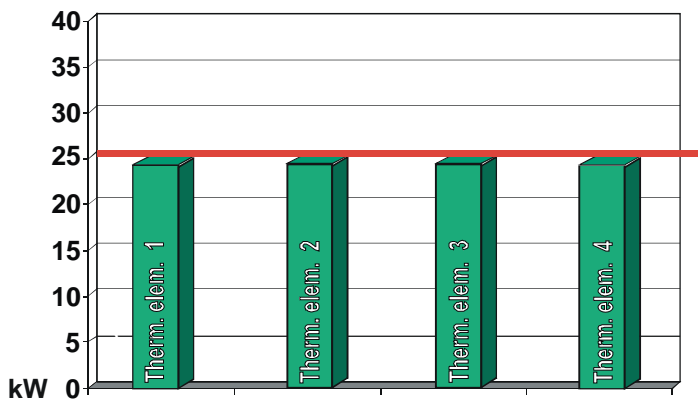
1 Thermal element (module) = 48 kW = 100%  
4 Thermal elem. = 48 kW x 4 = 192 kW = 400%

400% : 192 kW = 200% : X

X = (192 x 200) : 400 = 96 kW input shared on 4 thermal elements

Input shared on 4 thermal elements : total input = 96 : 192 = 0,5 = 50%

4 thermal elements of 48 kW each working at 50% of the output give = 96 kW = (200%), i.e. 24 kW / thermal element



Efficiency of a thermal element working at full capacity 48 kW = 100 % (in condensation)

Efficiency of a thermal element working at reduced capacity 24 kW = 102,4 % (in condensation)

Efficiency of a thermal element working at minimum capacity 12 kW = 103,2 % (in condensation)

All the thermal elements work in parallel at the same output, equalizing, thus, the C.H. system efficiency to the one of the thermal element.

### 3.22 - ELECTRICAL CONNECTIONS

#### Regulations in force

The gas and water feeding pipes and the CH system pipes cannot be used as ground plates.

Ensure that the above safety electrical requirements subsist; in case of doubt, ask for a professionally qualified technician to check the appliance's electrical system.

UNICAL refuses responsibility for any damages arising from failure to earth the boiler correctly.

It is necessary that a qualified technician verifies that the electrical system is adequate to the appliance's maximum absorbed power, indicated on the data plate, verifying in particular that the section of the system's cables is suitable to the appliance's maximum absorbed power.

For the appliance's general electrical supply the use of adaptors, multiple sockets and/or extension cords is strictly forbidden.

The use of any power supplied equipment implies the observance of several fundamental rules, such as:

- Do not touch the appliance with any wet part of your body and/or barefooted;
- Do not pull the supply cables
- Do not expose the boiler to sunlight, rain, etc., unless it is explicitly foreseen;
- Do not permit children or inexperienced people to use the appliance.



#### Mains electrical supply connection 230V

The boiler is provided complete with a mains supply cable 1,5 m long and with a cross section area of 3x0,75 mm<sup>2</sup>.

The electric connections of the boiler are shown in the section named "WIRING DIAGRAMS" (paragraph 3.23 page 33)

A mains supply of 230 V – 50 Hz is required. The wiring to the boiler must be in accordance with the current CEI regulations.



#### WARNING!

We remind you that upstream of the electrical connection, it will be necessary to foresee a service relay (NOT SUPPLIED) which, when the electrical safety devices (ISPESL) intervene, shuts down the electrical supply to the on-off fuel valve fitted on the gas supply circuit, but not to the boiler so as to guarantee the running of the pump and permit the boiler to cool down.



#### DANGER!

The electrical connections must be carried out only by a qualified engineer. Before carrying out the connections or any other operation on the electrical parts, always switch off and disconnect the electricity supply and ensure yourself that it cannot be accidentally turned on.

It is necessary to fit a double pole switch on the electrical supply line, having a 3 mm contact separation in both poles, in an easy accessible position in order to make quick and safe the servicing operations.

The boiler electrical supply (230 V – 50 Hz – single phase) is to be done directly on the three pole plug supplied with the boiler.

It is necessary to fit a double pole switch on the supply line in an easy accessible position in order to make quick and safe the service operations.



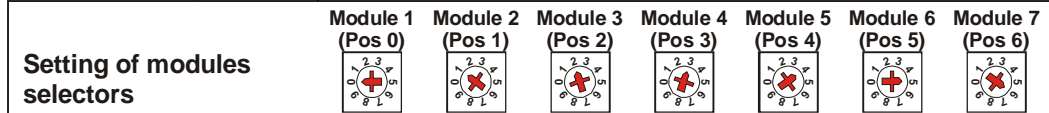
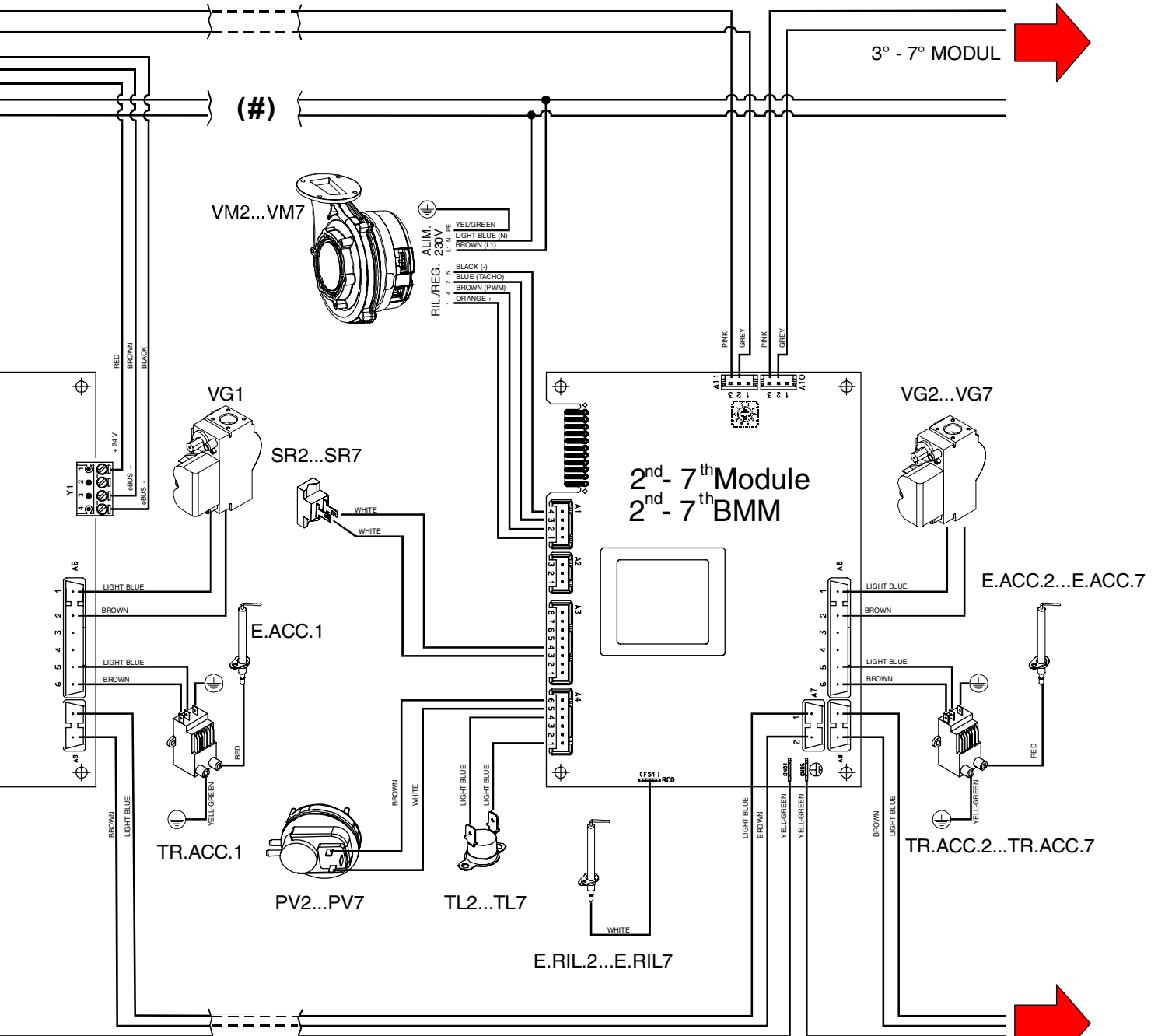
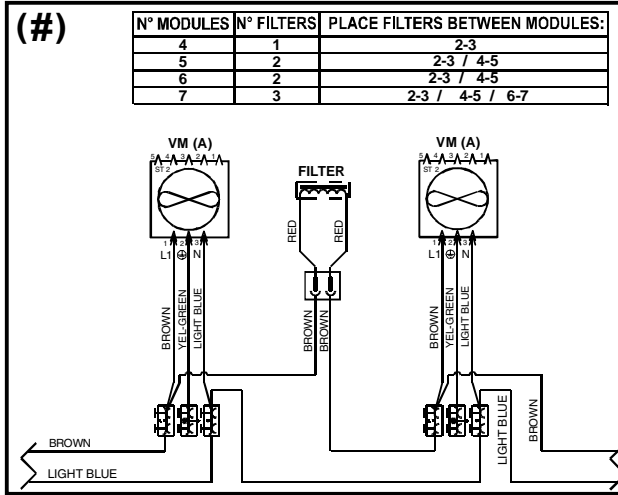
#### WARNING!

230 V cables shall be separated from 24 V ones, using the two plastic conduits supplied within the boiler casing L.H. side panel.



# Instructions for the installer

- E.ACC 1....7 Ignition electrode
- E.RIL 1....7 Ionization electrode
- IG Main switch
- IS Insert BCM Board
- KF Global Flow Temperature Sensor E8
- LTLG Warning lampe for the General Limit Thermostat
- PG Minimum Gas pressure swich (not supplied)
- PR Reset push button
- PV 1....7 Fan pressure switch
- SMG Global Flow Temperature Sensor BCM
- SL Condensate level sensor
- SE8/BCM E8/BCM selector
- SR Flow NTC Temperature sensor
- SR 1....7 Local Flow NTC Temperature sensor
- SRR Global Return NTC Temperature sensor
- TL High limit thermostat
- TL 1....7 Local High limit thermostat
- TLG Global High limit thermostat
- VG 1....7 Gas Valve
- TRA.ACC 1....7 Ignition Transformer
- VM 1....7 Modulating Fan
  
- DL1 Yellow LED = Blinking (communication between BMM and BCM) OK
- DI2 Green LED = ON (Active Pump)
- DI3 Red LED = ON (Failure code detected)
- SW Address selector

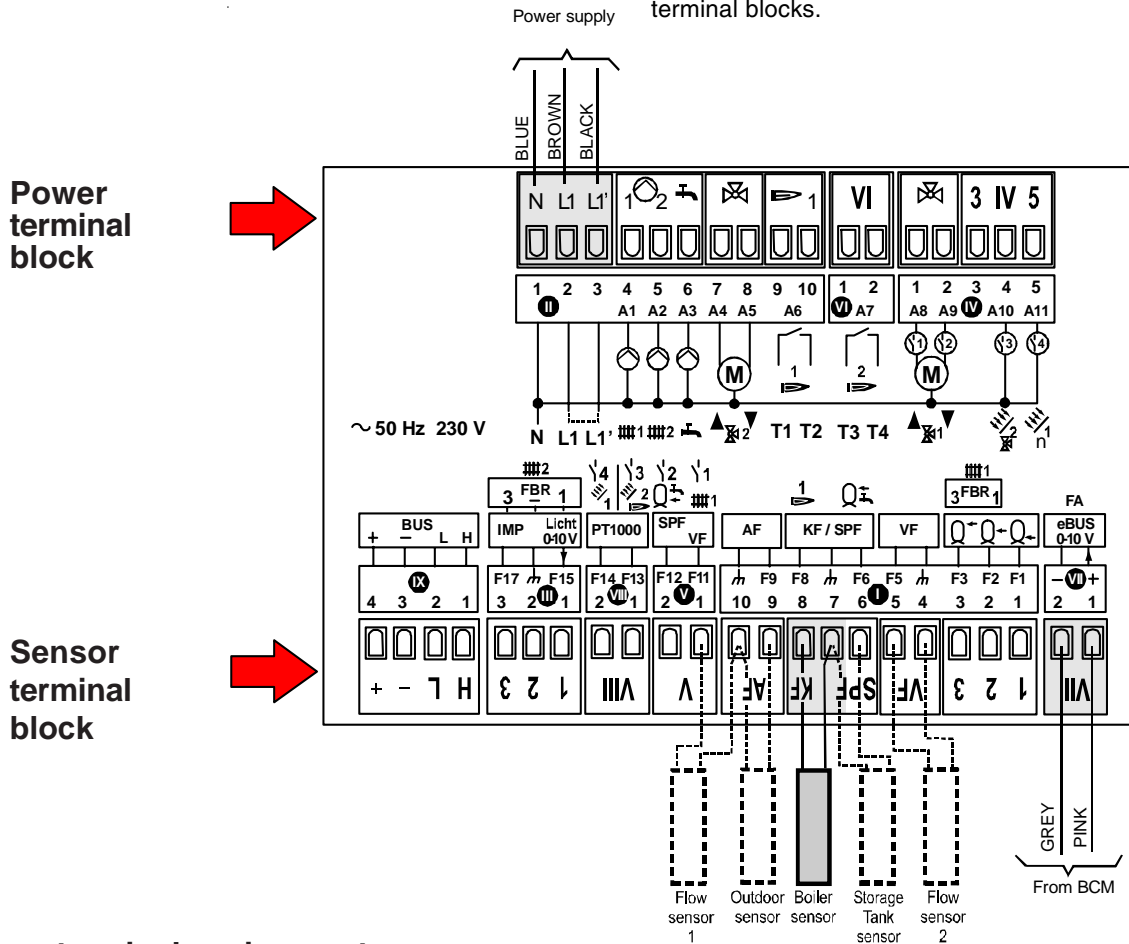


# Instructions for the installer

## 3.24 - WIRING DIAGRAM FOR CONNECTIONS AND MANAGING

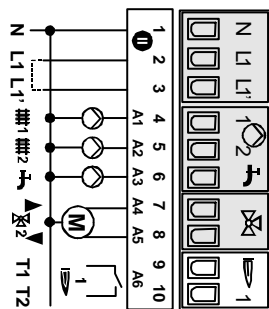
On the back side of the E8 regulator there are two terminal blocks, of which one is for the mains (230 V) connections and the other one is for the low tension connections.

The main controls, necessary for the C.H. system management and for the boiler control, as well as some components which are part of the boiler house, must be connected to the terminal blocks.



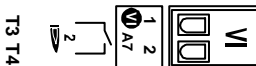
### Power terminal assignments

#### Terminal II

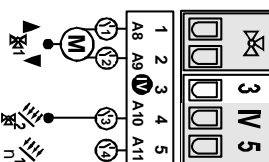


- N: Neutral conductor, mains
- L1: Power supply, unit
- L2: Power supply to relay
- ##1: heating circuit pump HK 1
- ##2: heating circuit pump HK 2
- ⚡: Storage tank charging pump
- ⌘2▲: Mixer open, heating circuit 2
- ⌘2▼: Mixer closed, heating circuit 2

#### Terminal VI



#### Terminal IV

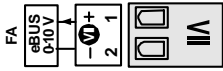


- ⌘1▲: Mixer open, heating circuit 1
- ⌘1▼: Mixer closed, heating circuit 1
- Multifunction relay
- Recycle pump / Multifunction relay



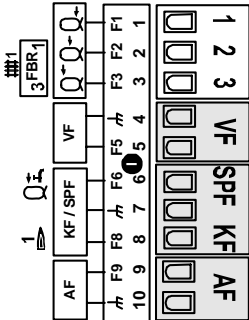
Sensor terminal assignments

**Terminal VII**  **Connection to BCM**



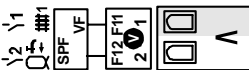
Pin 1: eBUS (FA) or 0-10V output  
Pin 2: (Ground)

**Terminal I** 



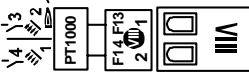
Pin 1: Buffer storage tank low sensor  
Pin 2: Buf. stor. tank middle sensor / FBR heat. circ. 1 (room sensor)  
Pin 3: Buf. stor. tank top sensor / FBR heat. circ. 1 (set value)  
Pin 4: VF Pin 4: Flow sensor, heating circuit 2 (ground)  
Pin 5: VF Pin 5: Flow sensor, heating circuit 2  
Pin 6: SPF Pin 6: Storage tank sensor  
Pin 7: SPF Pin 7: Storage tank and boiler sensor (ground)  
Pin 8: KF Pin 8: Boiler sensor  
Pin 9: AF Pin 9: Outdoor sensor  
Pin 10: AF Pin 10: Outdoor sensor (ground)

**Terminal V** 



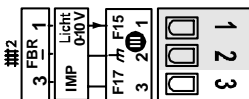
Pin 1: VF Pin 1: Flow sensor heating circuit 1 / sensor multifunction 1  
Pin 2: SPF Pin 2: Service water low sensor / sensor multifunction 2

**Terminal VIII** 



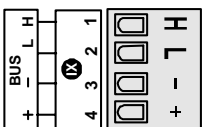
Pin 1: F13 Pin 1: Sensor HS2 / Solar 2 / Multifunction relay 3  
Pin 2: F14 Pin 2: Sensor Solar 1 / Sensor multifunction relay 4

**Terminal III** 



Pin 1: F15 Pin 1: FBR heating circuit 2 (room sensor) / 0-10V IN / Light  
Pin 2: Pin 2: FBR heating circuit 2 (ground)  
Pin 3: F17 Pin 3: FBR heating circuit 2 (set value) / Pulse counter for

**Morsetto IX**  **For connection to remote control devices**



Pin 1: H CAN Bus Pin 1 = H (Data)  
Pin 2: L CAN Bus Pin 2 = L (Data)  
Pin 3: - CAN Bus Pin 3 = - (ground, Gnd)  
Pin 4: + CAN Bus Pin 4 = + (12V supply)

# Instructions for the installer

## 3.25 - INSTALLATION EXAMPLES (functional wiring and connections description)

### INSTALLATION OF A BOILER WITH CONNECTION TO A DIRECT HEATING ZONE

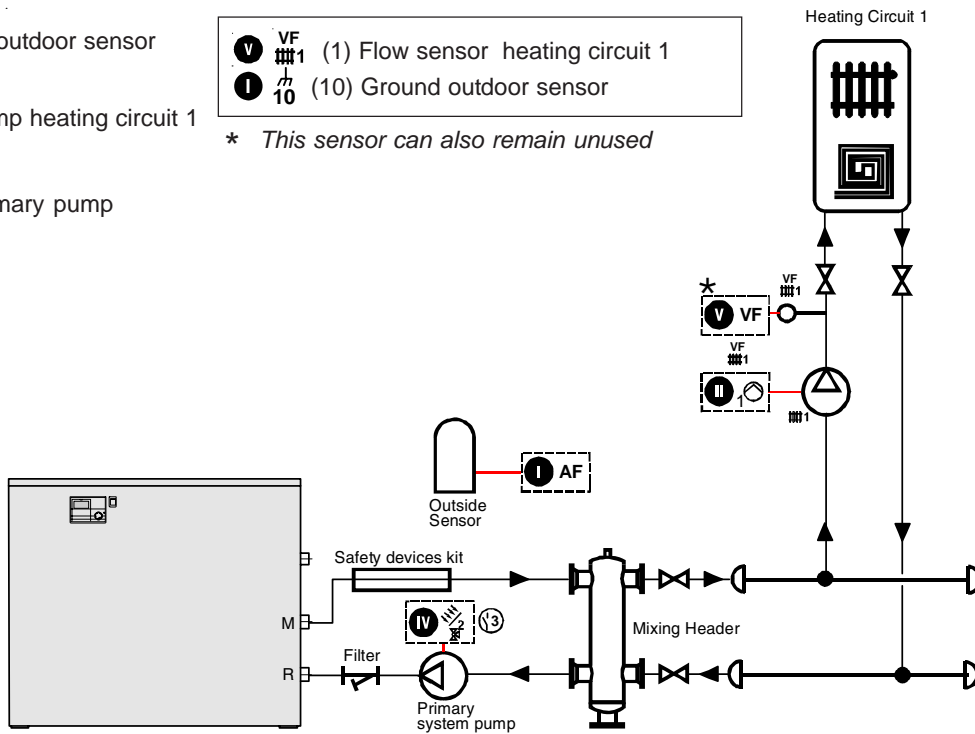
I AF (9-10) outdoor sensor

VF (1) Flow sensor heating circuit 1  
 I 10 (10) Ground outdoor sensor

II #1 (4) Pump heating circuit 1

\* This sensor can also remain unused

IV #2 (4) Primary pump



### INSTALLATION OF A BOILER WITH CONNECTION TO TWO DIRECT HEATING ZONES + D.H.W. PRODUCTION

\* This sensor can also remain unused

I VF (4-5) Flow sensor heating circuit 2  
 \*\* necessary for enabling 2° circuit

VF (1) Flow sensor heating circuit 1  
 I 10 (10) Ground outdoor sensor

SPF (6-7) Storage tank sensor

AF (9-10) outdoor sensor

II #1 (4) Pump heating circuit 1

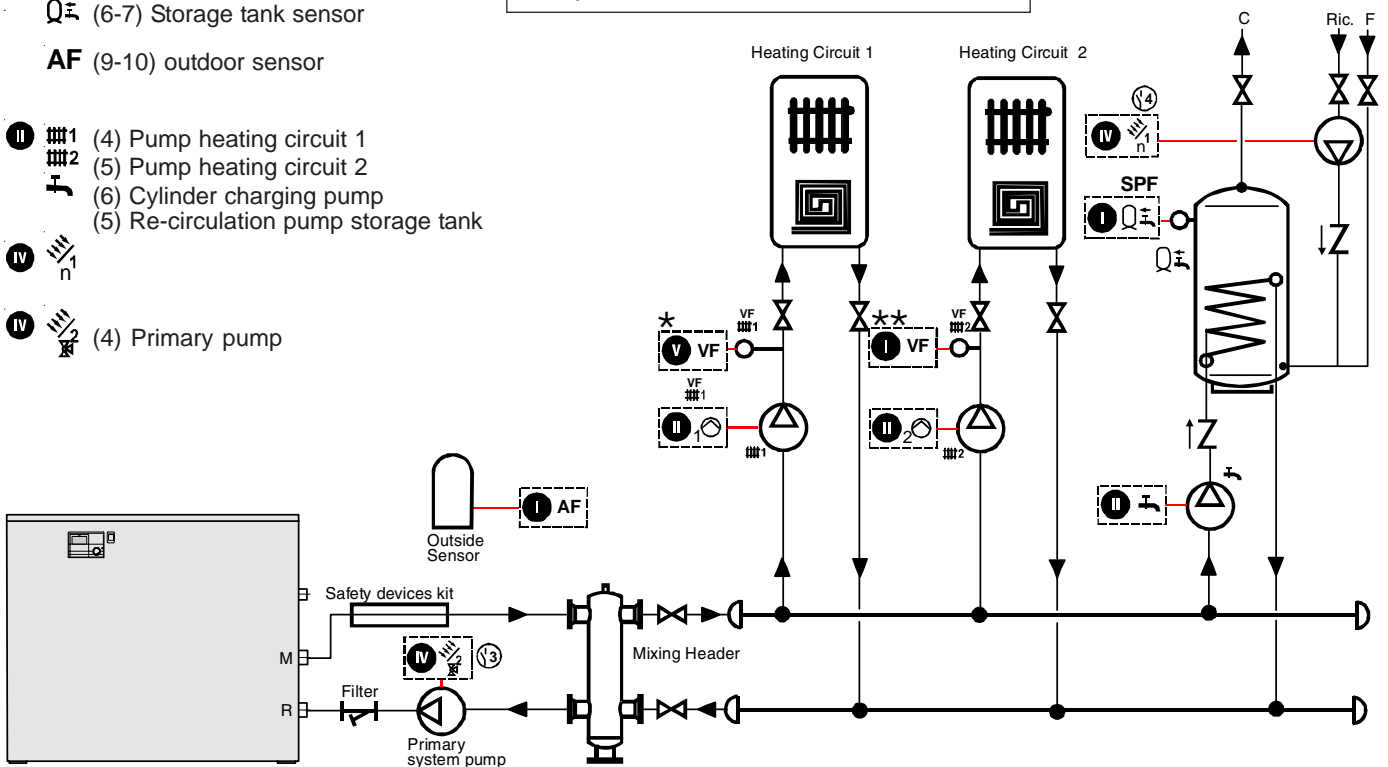
II #2 (5) Pump heating circuit 2

III #1 (6) Cylinder charging pump

III #2 (5) Re-circulation pump storage tank

IV #2 (4) Primary pump

IV #3 (4) Primary pump



# Instructions for the installer

## INSTALLATION OF A BOILER WITH CONNECTION TO ONE MIXED AND ONE DIRECT HEATING ZONES + D.H.W. PROD.

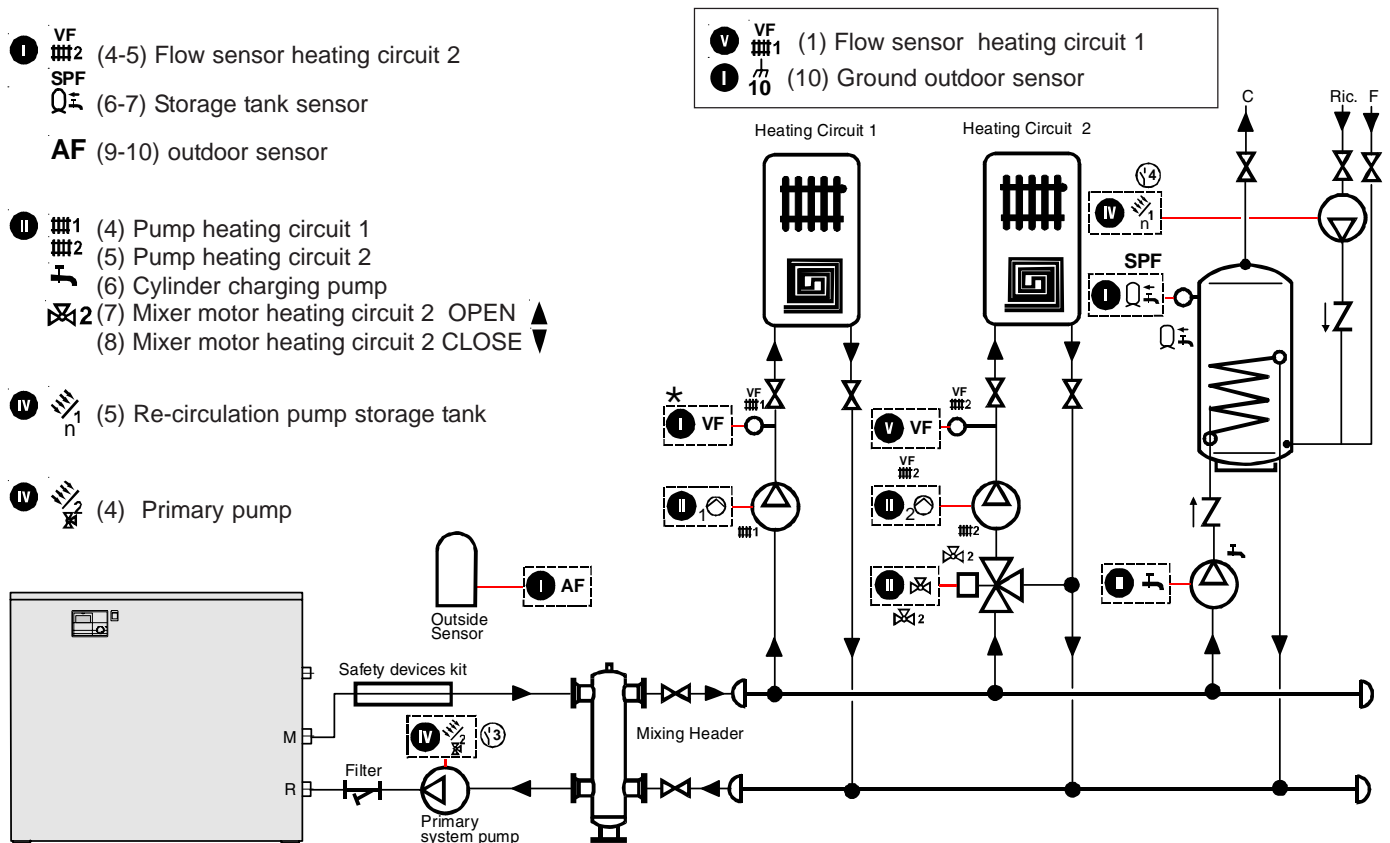
\* This sensor can also remain unused

- I** VF #2 (4-5) Flow sensor heating circuit 2
- SPF (6-7) Storage tank sensor
- Q # (6-7) Storage tank sensor
- AF (9-10) outdoor sensor

- II** #1 (4) Pump heating circuit 1
- #2 (5) Pump heating circuit 2
- J (6) Cylinder charging pump
- 2 (7) Mixer motor heating circuit 2 OPEN
- 2 (8) Mixer motor heating circuit 2 CLOSE

- V** n1 (5) Re-circulation pump storage tank

- IV** (4) Primary pump



## INSTALLATION OF A BOILER WITH CONNECTION TO TWO MIXED ZONES + D.H.W. PRODUCTION

\* necessary for mixing valve control

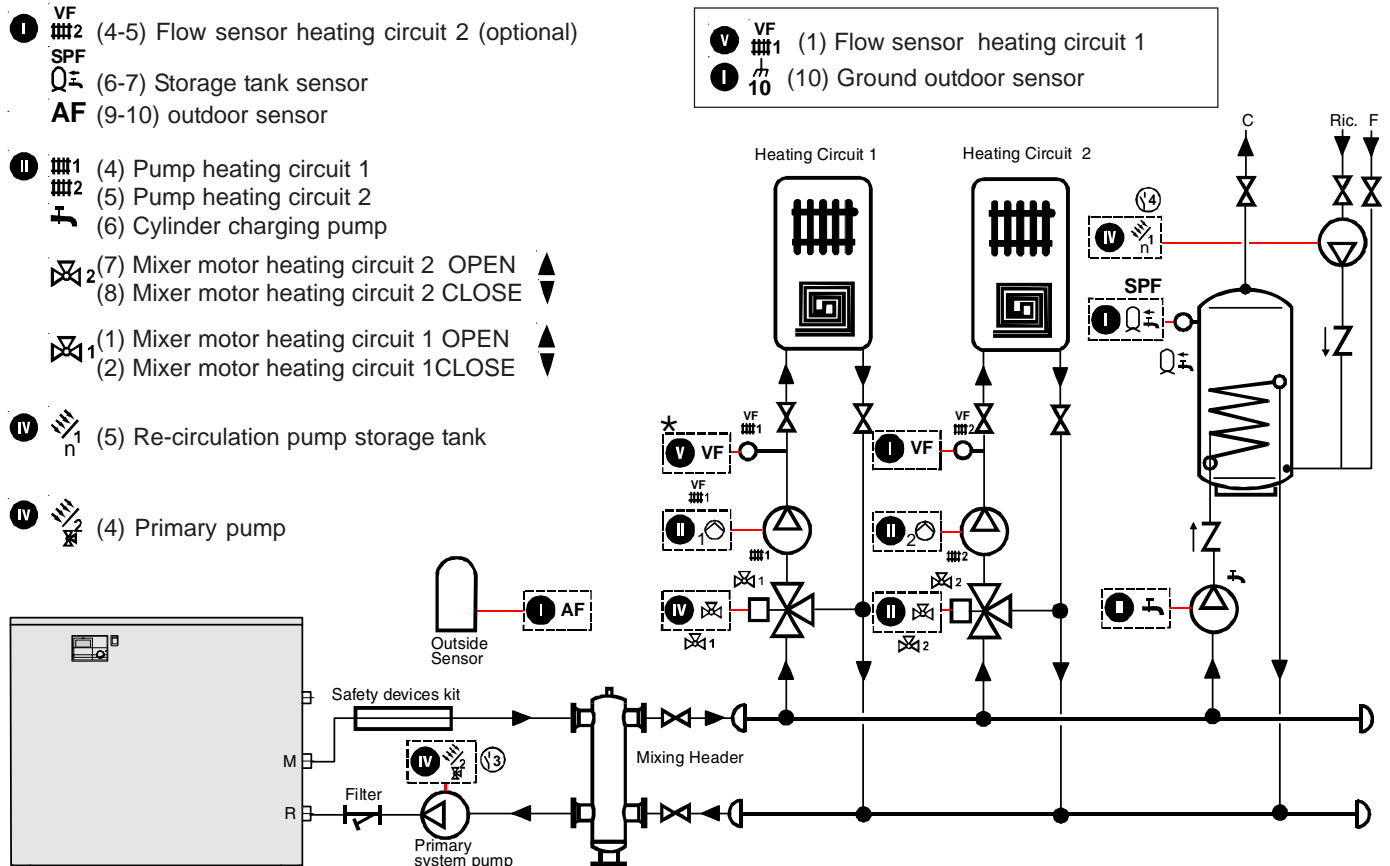
- I** VF #2 (4-5) Flow sensor heating circuit 2 (optional)
- SPF (6-7) Storage tank sensor
- Q # (6-7) Storage tank sensor
- AF (9-10) outdoor sensor

- II** #1 (4) Pump heating circuit 1
- #2 (5) Pump heating circuit 2
- J (6) Cylinder charging pump
- 2 (7) Mixer motor heating circuit 2 OPEN
- 2 (8) Mixer motor heating circuit 2 CLOSE

- 1 (1) Mixer motor heating circuit 1 OPEN
- 2 (2) Mixer motor heating circuit 1 CLOSE

- V** n1 (5) Re-circulation pump storage tank

- IV** (4) Primary pump



# Instructions for the installer

## INSTALLATION OF A BOILER WITH CONNECTION TO TWO MIXED ZONES + D.H.W. PRODUCTION BY SOLAR PANELS

- I** VF (4-5) Flow sensor heating circuit 2 (optional)
- SPF (6-7) Storage tank sensor
- Q (6-7) Storage tank sensor
- AF (9-10) outdoor sensor

\* necessary for mixing valve control

- V** VF (1) Flow sensor heating circuit 1
- II** 10 (10) Ground outdoor sensor

- III** 1 (4) Pump heating circuit 1
- 2 (5) Pump heating circuit 2
- J (6) Cylinder charging pump

- 2 (7) Mixer motor heating circuit 2 OPEN ▲
- 8 (8) Mixer motor heating circuit 2 CLOSE ▼

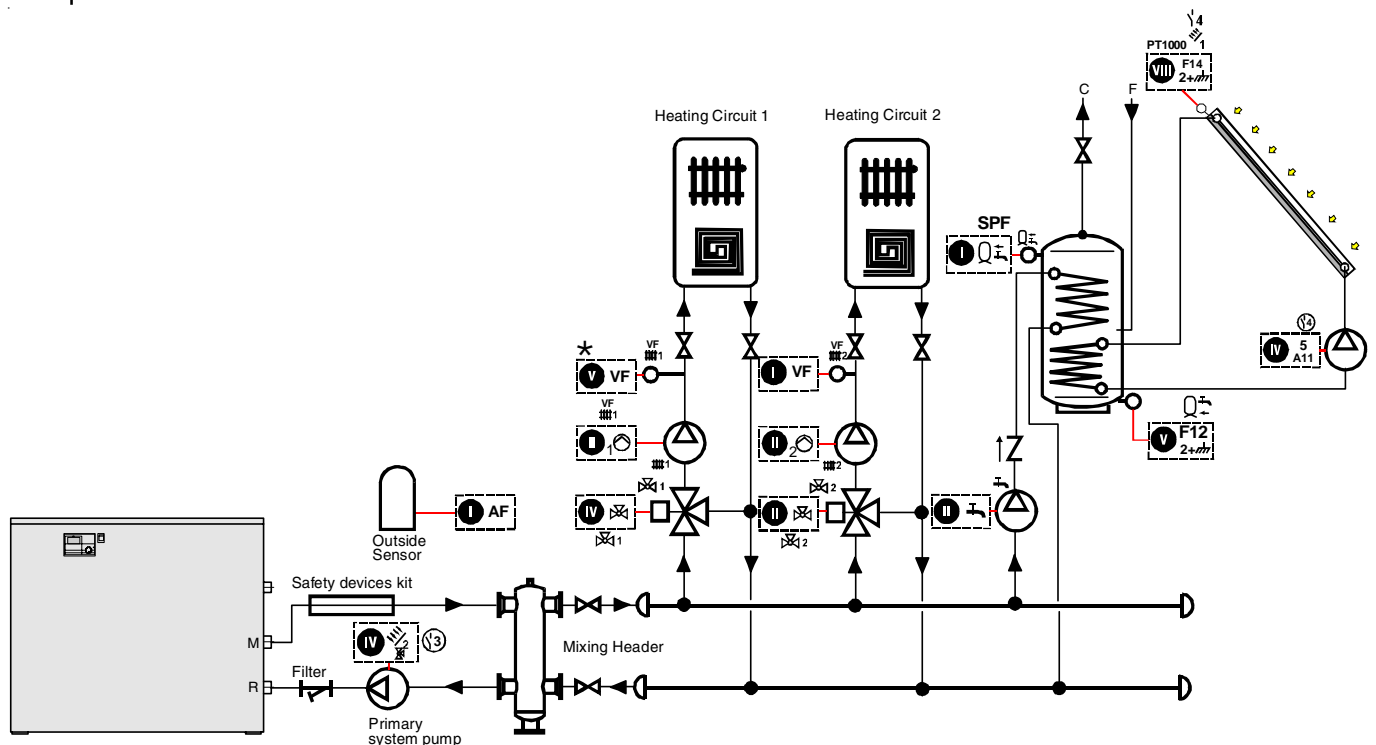
- 1 (1) Mixer motor heating circuit 1 OPEN ▲
- 2 (2) Mixer motor heating circuit 1 CLOSE ▼

- IV** n1 (5) Solar pump

- IV** 2 (4) Primary pump

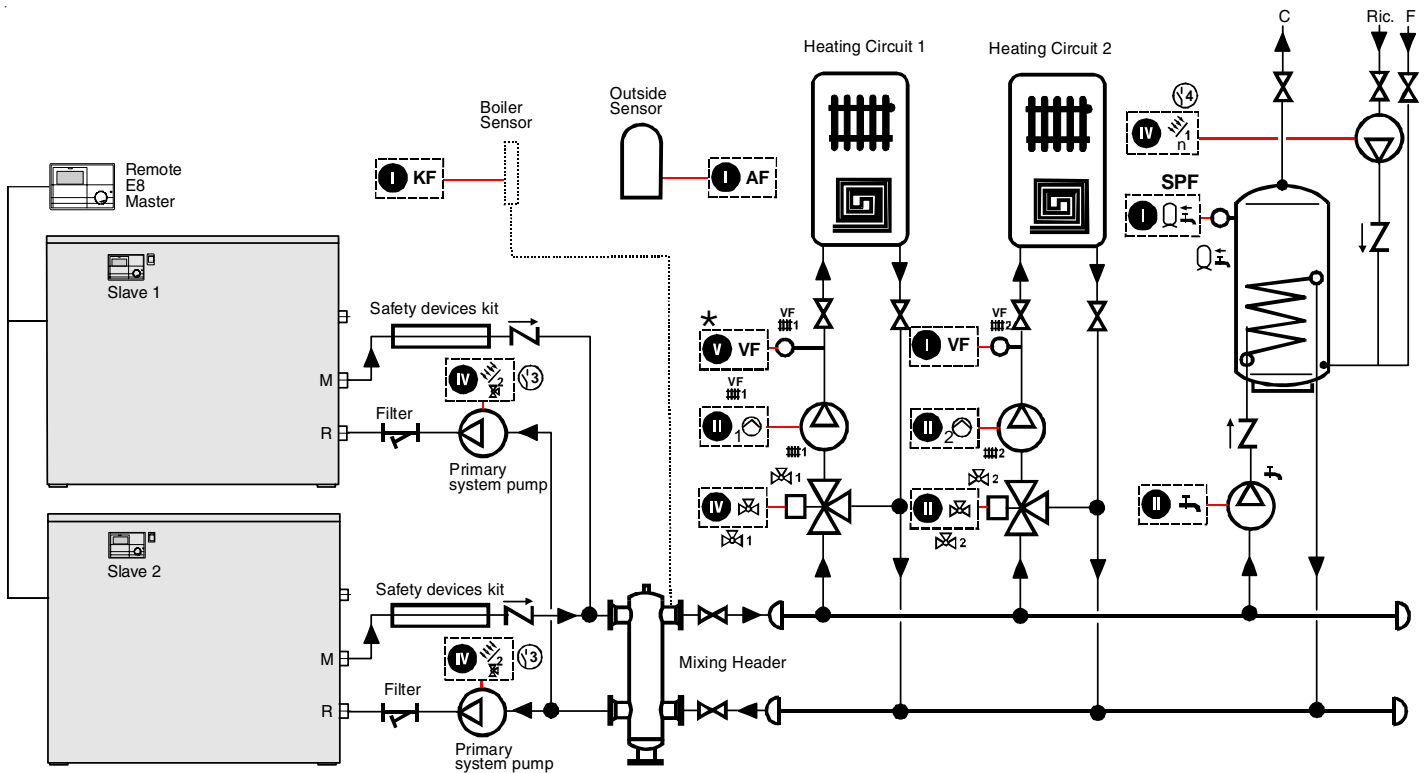
- V** Q (2) Hot water tank low / Multifunction relay sensor 2 (optional)

- VIII** 4 (2) PT1000 sensor solar 1 / Multifunction relay sensor 4 (optional)



**For the connection to a solar installation it is necessary to change some parameters. See Table:**  
**Expert AREA ⇒ Level SOLAR / MF ⇒ MF 4**  
**FUNCTION = "23"**

## INSTALLATION OF A BOILER WITH CONNECTION TO TWO MIXED ZONES + D.H.W. PRODUCTION



### ATTENTION!

In this type of installation it is necessary to adjust, in the E8 controller, the parameter **BUS-ID HS**.

The external regulator E8 (MASTER) has to be set to: **----**,  
the boiler regulators E8 (SLAVES) have to be set to: **01 to 08**.

### Connections on to the MASTER controller

The connections of the secondary circuit have to be done on to the MASTER controller.

- I** VF #2 (4-5) Flow sensor heating circuit 2 (optional)
- SPF (6-7) Storage tank sensor
- Q (6-7) Storage tank sensor
- KF (7-8) Cascade global sensor
- AF (9-10) outdoor sensor
- II** #1 (4) Pump heating circuit 1
- #2 (5) Pump heating circuit 2
- J (6) Cylinder charging pump
- IV** #2 (7) Mixer motor heating circuit 2 OPEN ▲
- #2 (8) Mixer motor heating circuit 2 CLOSE ▼
- IV** #1 (1) Mixer motor heating circuit 1 OPEN ▲
- #1 (2) Mixer motor heating circuit 1 CLOSE ▼
- #n (5) Re-circulation pump storage tank

\* necessary for mixing valve control

- V** VF #1 (1) Flow sensor heating circuit 1
- I** 10 (10) Ground outdoor sensor

### 3.26 - CASCADE MANAGER (BCM)

#### Application:

The BCM completes the range of functions offered by the Modulex boilers:

- ON/OFF alarm control
- Control of a modulating primary pump with the aim of significantly increasing efficiency at low heating loads.
- Possibility of integrating the Modulex boilers in PLC controlled boiler plants
- Thanks to LonWorks/Modbus protocol converters been readily available also opens the road to installing Modulex boilers in the most advanced Building Automation Systems.

#### Features:

The BCM can be connected to the automation system of a boiler plant via one of its interfaces:

- eBUS: for connection to the series of E8 heating controllers or to an additional BCM
- Modbus: application in PLC controlled boiler plants

The communication protocols enable complete system management:

- Control of heating request: temperature set point and modulation level
- Monitoring of boiler operation and temperature status
- Alarm control
- Functional parameters setting

Management of the header pump:

- Relay command for running a pump at fixed rate
- 0÷10 analogical output for control of a modulating pump

#### Special functions

Emergency: it avoids system shutdown caused by an interruption in communication with the boiler plant's automation system:

- Input for "Constant setpoint" request: 70°C, maximum output 50%
- Alarm reset input
- Alarm relay signal

#### Monitor:

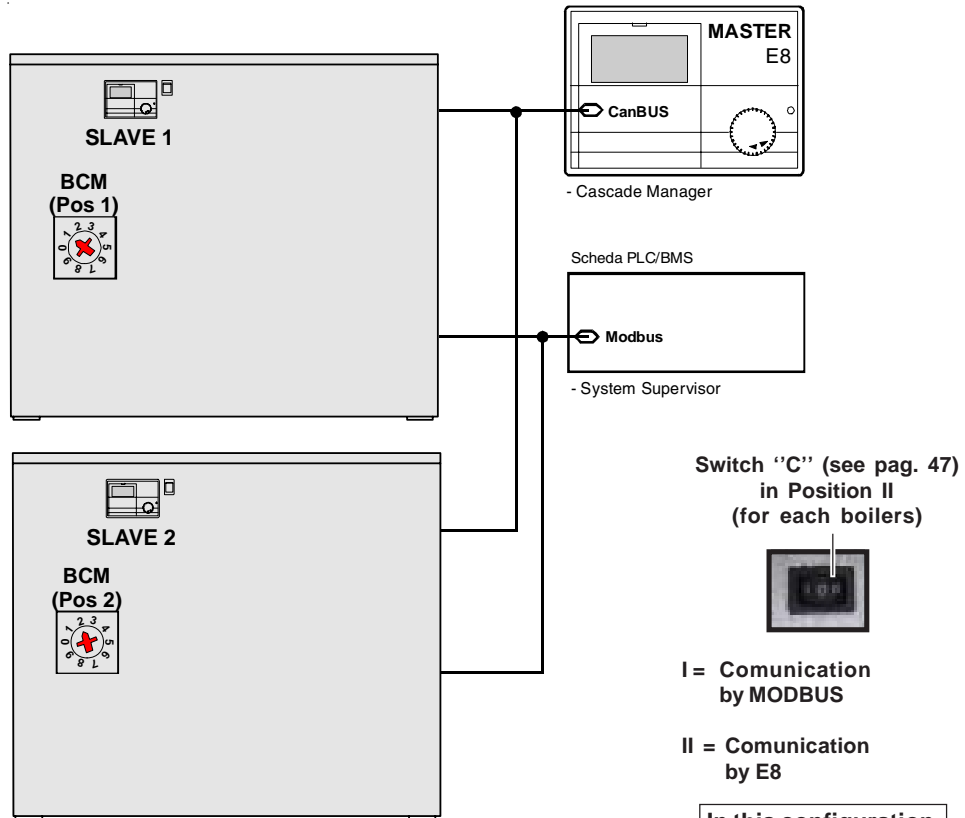
a external BCM connected to a group of heating generators managed by a E8 heating controller, automatically selects the "monitor" mode.

In this condition the following services are supplied:

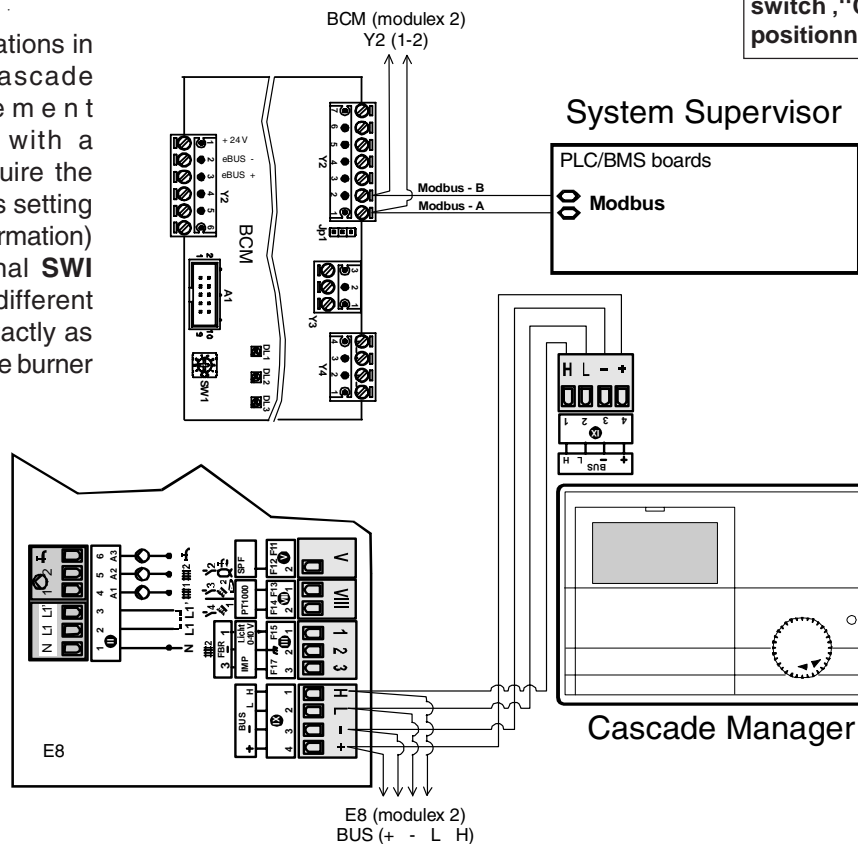
- Acquisition of all the operating data and diagnostics via the Modbus interface.
- Control of the modulating pump
- Control of the Alarm relays and control of the header pump
- If the E8 malfunctions, the BCM automatically resets normal boiler operation control and can enable the emergency function previously described.

# Instructions for the installer

Connection for boilers in a cascade arrangement managed by a external E8 heating controller with PLC supervision.



The applications in a cascade arrangement managed with a PLC (Modbus) require the correct boiler address setting (within the cascade formation) via the BCM's internal **SWI selector**: 1....7, all different and in sequence, (exactly as requested by the single burner modules).

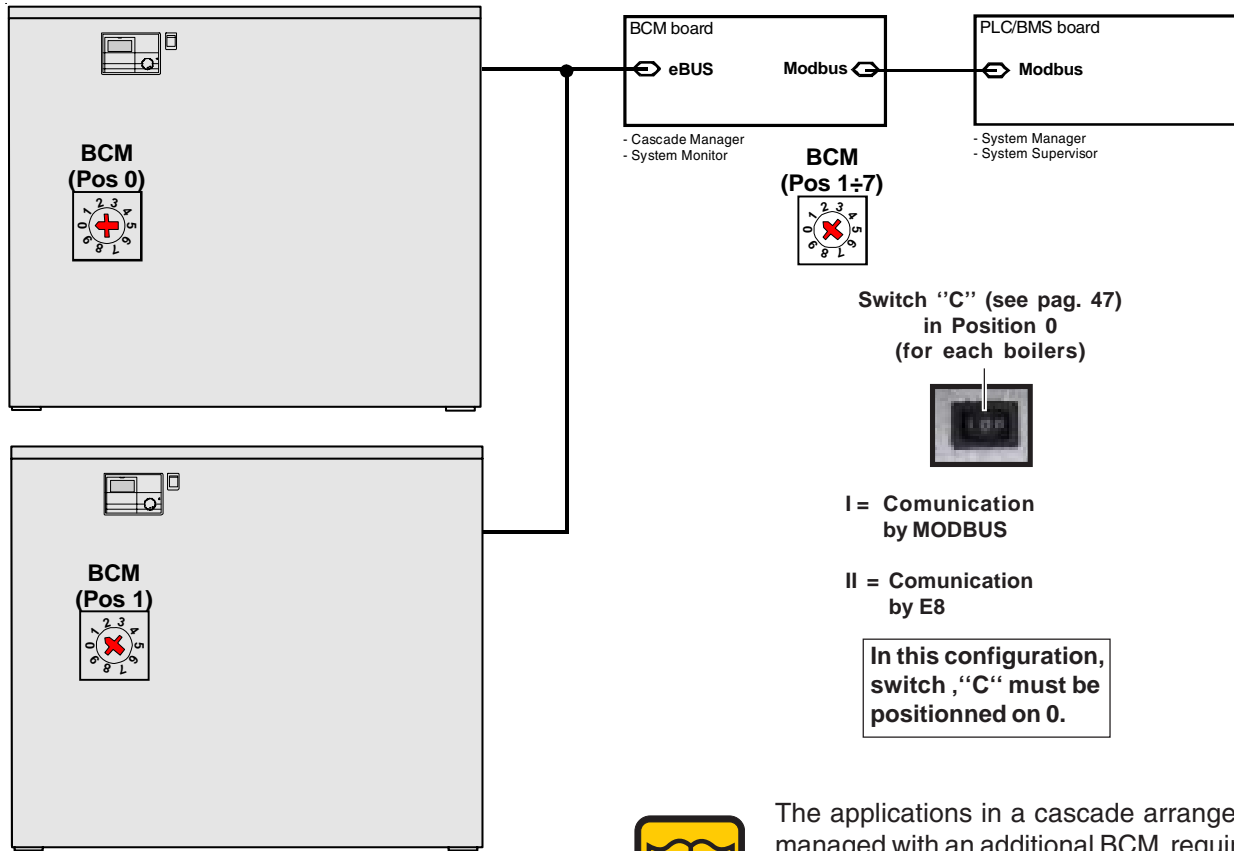


**WARNING!**  
In this connection the "BUS-ID HS,, parameter must be set on the E8 heating controller

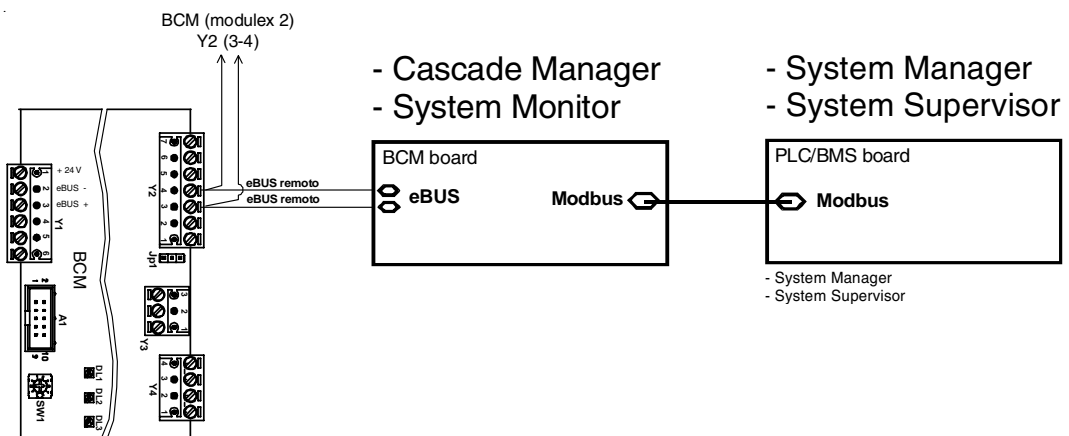
The external E8 heating controller (MASTER) must be set to: - - - -,  
The E8 heating controllers fitted on each boiler (SLAVE) must be set from: **01 to 08**.

## Instructions for the installer

Connection for boilers in a cascade arrangement connected to an external BCM optional and managed by PLC/BMS (E8 disconnected).

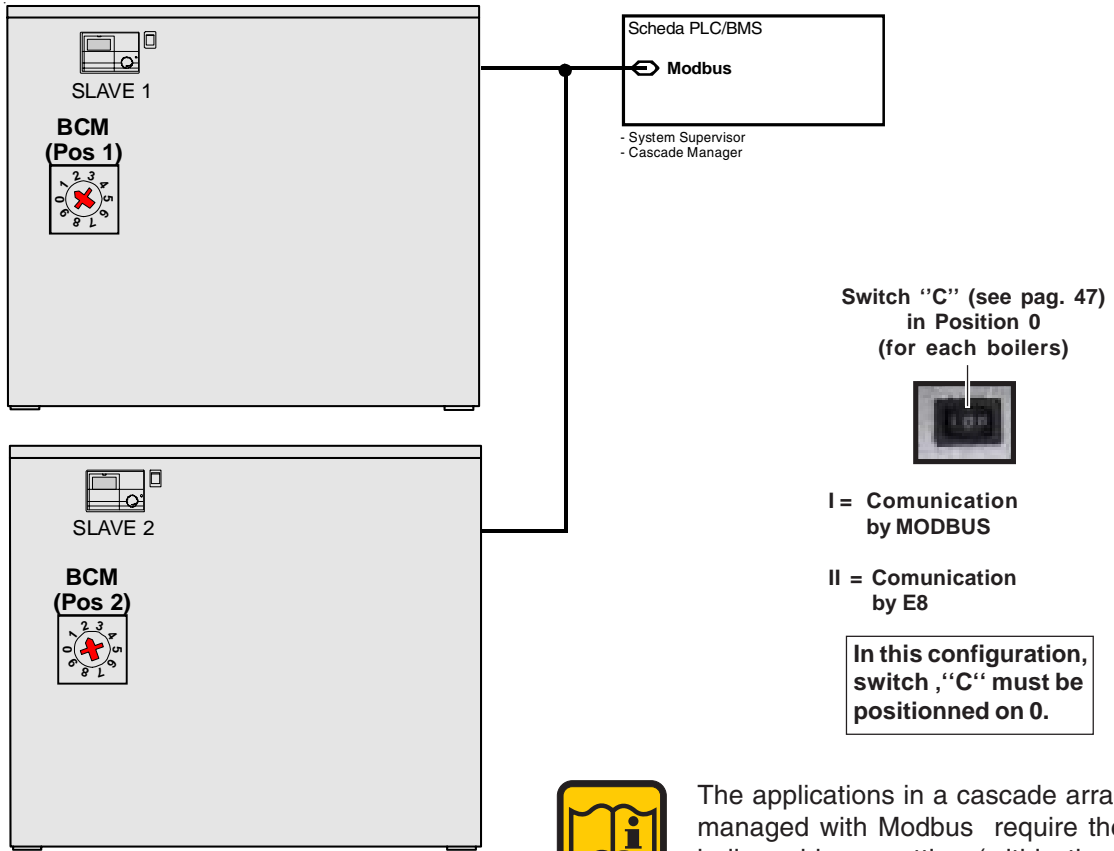


The applications in a cascade arrangement managed with an additional BCM require the correct boiler address setting (within the cascade formation) via the BCM's internal **SWI selector: 0...7**, all different and in sequence, (exactly as requested by the single burner modules).

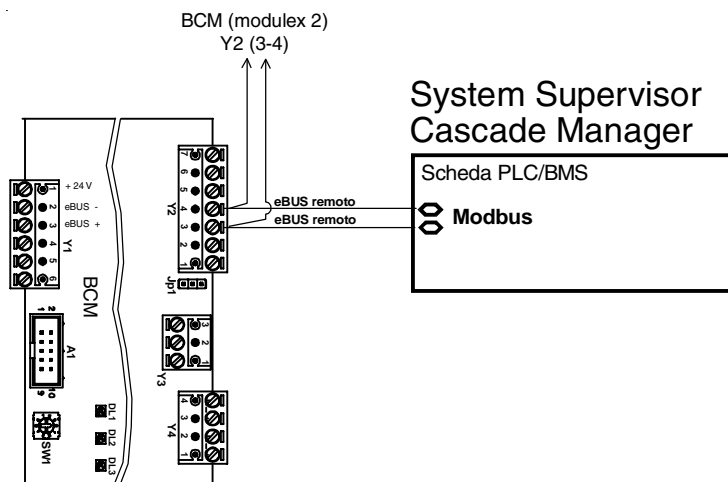




## Connection for boilers in a cascade arrangement managed by an external PLC (E8 disconnected)



The applications in a cascade arrangement managed with Modbus require the correct boiler address setting (within the cascade formation) via the BCM's internal **SWI selector: 1....7**, all different and in sequence, (exactly as requested by the single burner modules).



## 3.27 - CONFIGURATION

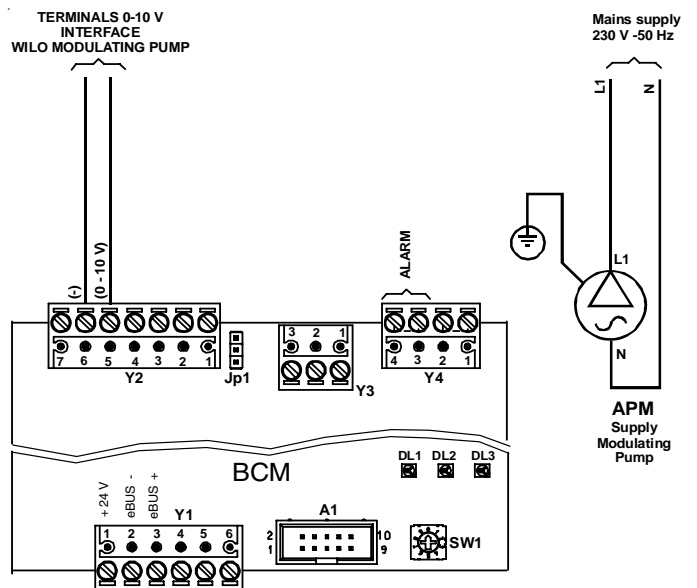
### Modulating pump

The BCM board elaborates the data concerning the thermal head ( $\Delta t$  between primary flow and return and supplied heat output). When the supplied heat output diminishes, the number of the pump's revolutions decreases and subsequently the hourly rate, maintaining the thermal head practically constant. Thus obtaining a higher efficiency in condensing mode and reducing energy costs.

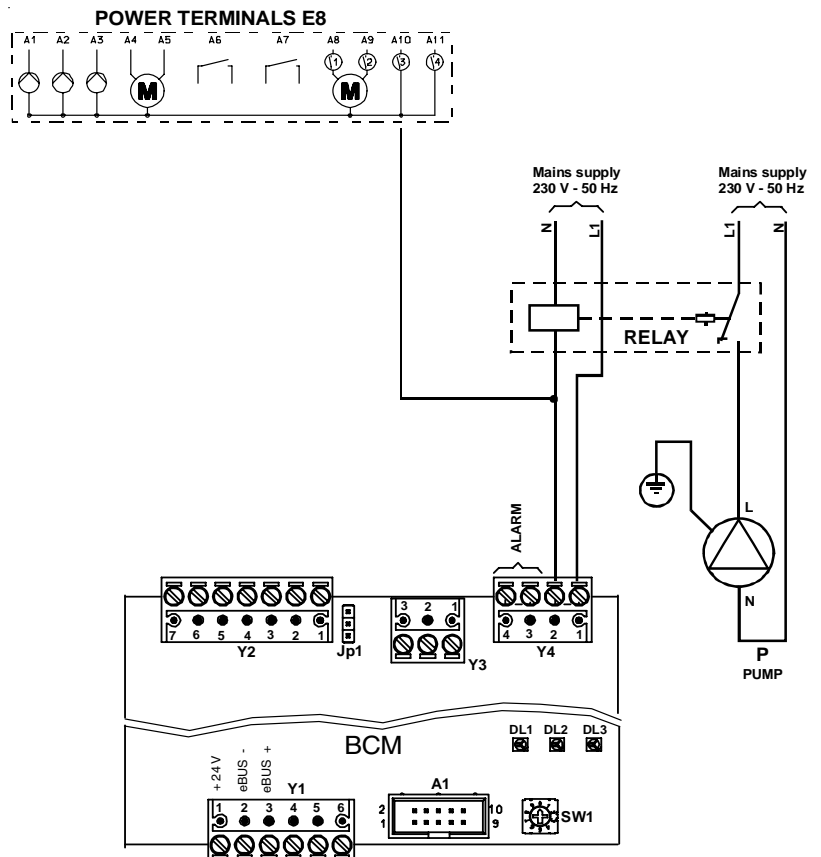


The 0÷10 Volt modulation signal is preset to:  
 -3 for minimum speed  
 -10 Volt for maximum speed  
 These values can be changed according to the type of pump fitted. For further information on the 0÷10 Volt signal, please also refer to the pump's manual.

### WITH MODULATING PUMP



### WITH ON-OFF PUMP



### 3.28- FILLING THE SYSTEM



#### Warning!

Do not mix the CH system's water with anti-freeze or anti-corrosion solutions using wrong concentrations! It could cause damage to the washers and could provoke noise during normal boiler operation.

UNICAL refuses all liability for injury to persons, animals or damage to property deriving from not having respected the above mentioned recommendations.

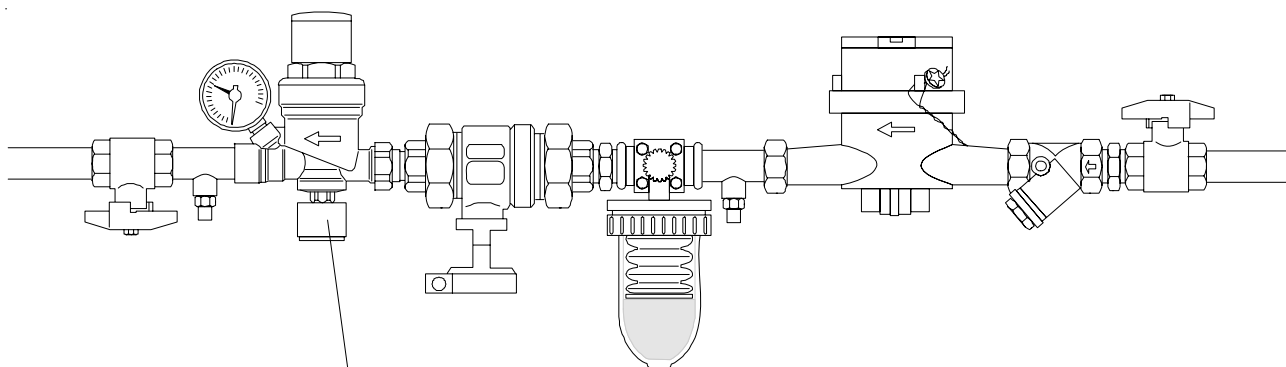
The system itself shall be equipped with its own draining tap, whose size depends on the system capacity. The application of a filter on the return pipe to the boiler is advisable.

**For filling-up the system a filling tap has to be foreseen on the system return pipe.**

**The filling-up can also be made through the draining tap on the boiler return manifold.**

**Never** use such a tap to drain the system, since the system dirt could gather in the boiler and compromise its operation.

#### EXAMPLE OF FILLING-UP SYSTEM MANIFOLD



Filling group with PRV



#### IMPORTANT NOTE

Once the system has been filled up at the right filling pressure, the filling group has to be closed.

## Instructions for the installer

### 3.29 - BURNER ADJUSTMENT

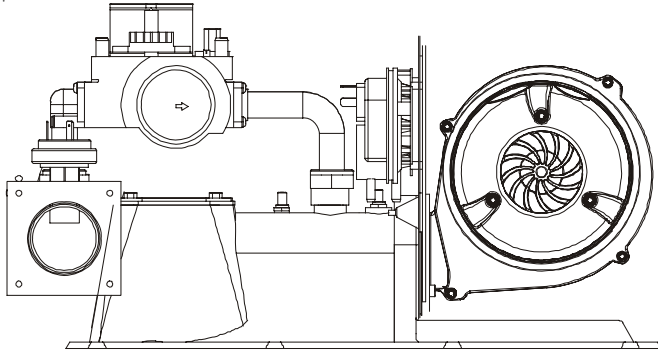


#### WARNING!

All the instructions indicated below are for the exclusive use of qualified UNICAL service technicians or installers.

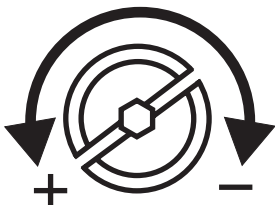
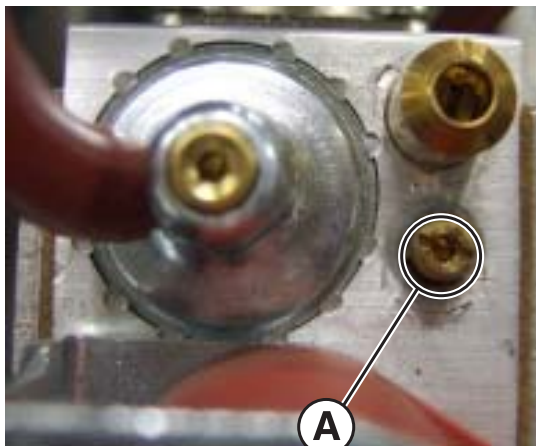


All the boilers are supplied already calibrated and tested. If it is necessary to change the calibration due to gas conversion or adaptation to the mains supply system, the gas valve must be re-calibrated. (Using service mode function)



#### A) MAXIMUM OUTPUT ADJUSTMENT

- Remove the cap of the combustion gases sampling point
- Connect a suitable CO<sub>2</sub> gas analyser to the sampling point in the flue outlet terminal.
- Force the desired burner working at nominal output (CASCADE MAN 100%)
- Check that the CO<sub>2</sub> values are within the values indicated in the table "Burner pressures"
- If necessary correct the value by turning the adjustment screw "A" in a CLOCKWISE direction to decrease the value and in an ANTICLOCKWISE direction in order to increase it.



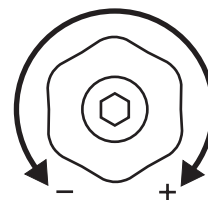
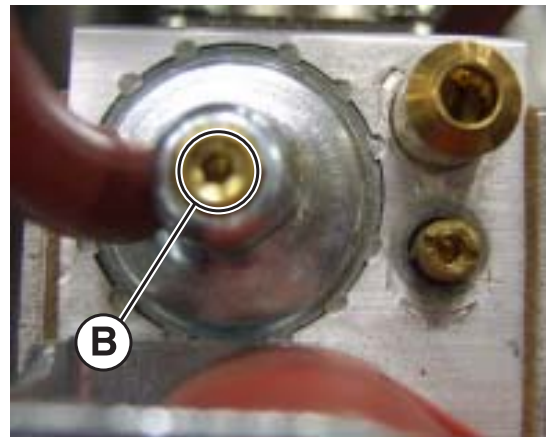
MAXIMUM OUTPUT  
ADJUSTMENT SCREW



Smokes sampling point

#### B) MINIMUM OUTPUT ADJUSTMENT

- Force the desired burner working at minimum output (CASCADE MAN 10%)
- Check that the CO<sub>2</sub> values are within the values indicated in the table "Burner pressures"
- If necessary correct the value by turning the adjustment screw "B" in a CLOCKWISE direction to increase the value and in an ANTICLOCKWISE direction in order to decrease it.



MINIMUM OUTPUT  
ADJUSTMENT  
SCREW



Follow this procedure also for the other burners

If the CO<sub>2</sub> percentage is too low, check if the air and smoke ducts are not obstructed. If they are not obstructed, check if the burner and/or the exchanger (aluminium sections) are well cleaned.

### C) COMPLETION OF THE BASIC ADJUSTMENTS

- Check the CO<sub>2</sub> values at the minimum and maximum outlet
- If necessary make the required adjustments



To ensure correct operation the CO<sub>2</sub> values have to be adjusted with extreme care respecting the values indicated in the table.



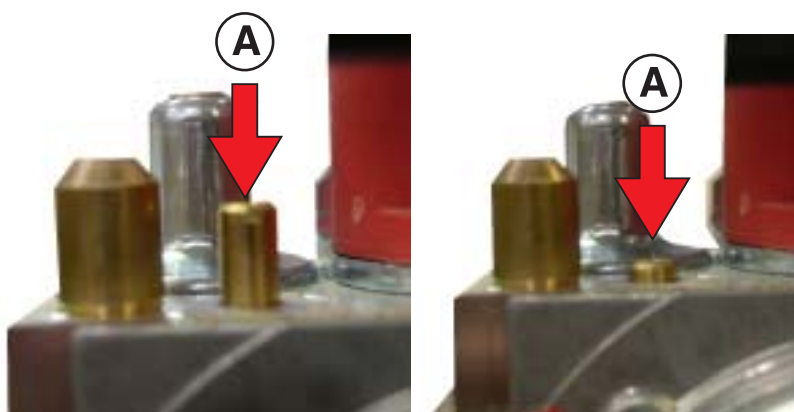
Do not force the end switches of the adjusting screw.

- Close the sampling test point in the flue outlet terminal

In case of gas valve replacement or difficult ignition:

Tighten the maximum adjustment screw "A" in a clockwise direction until you arrive to the abutting end, than slacken for 7 turns. Verify the boiler ignition; if the boiler goes into lockout slacken the screw "A" again of one turn, than retry the ignition. If the boiler goes into lockout again, carry out the above indicated operations until the boiler is lighted.

At this point carry out the burner adjustment as previously indicated.




### INJECTORS – PRESSURES

Check the CO<sub>2</sub> levels often, especially at low flow rate

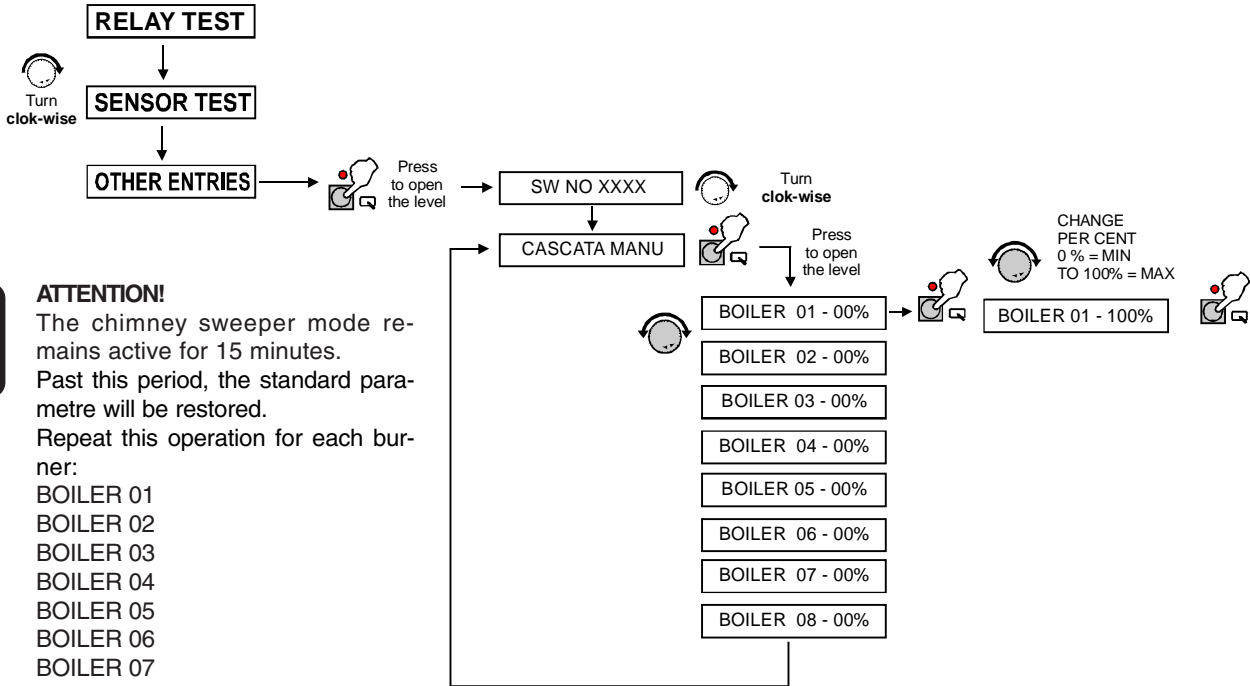
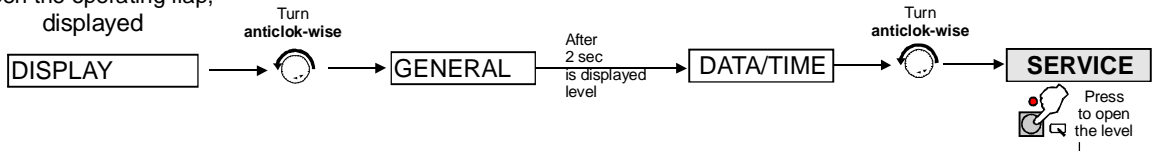
MODULEX 100 - 145 - 190 240 - 290 - 340	Gas type	Supply pressure (mbar)	Ø Injectors (mm)	Diaphragm	Fan speed		CO <sub>2</sub> levels (%)		Starting power IG (%)
					min (rpm)	max (rpm)	min	max	
	Nat. gas (G20)	20	9,6	conic	1920	5400	9,1	9,1	75
	Nat. gas (G25)	25	9,6	conic	1920	5400	9,1	9,1	75
	Propan (G31)	37	9,6	conic	1920	5400	10,2	10,4	75

# Instructions for the installer

## SERVICE MODE FUNCTION

Before open the operating flap  
turn clock-wise Shaft encoder,  
to symbol 

Open the operating flap,  
displayed

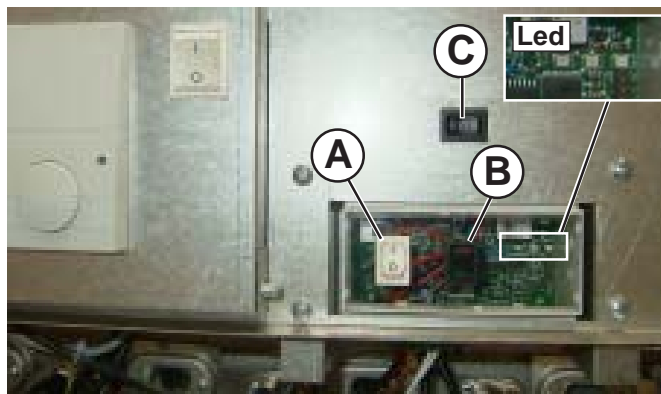


**ATTENTION!**

The chimney sweeper mode remains active for 15 minutes. Past this period, the standard parametre will be restored. Repeat this operation for each burner:  
 BOILER 01  
 BOILER 02  
 BOILER 03  
 BOILER 04  
 BOILER 05  
 BOILER 06  
 BOILER 07

## 3.30 - EMERGENCY FUNCTIONS

The BCM It avoids system shutdown in case the main boiler plant's system E8 5064 management is out of use.



- (A) In position I the plant will operate when requested at "CONSTANT SETPOINT": 70°C – Max heat output 50%

- (B) Enables burner reset in case of lock-out

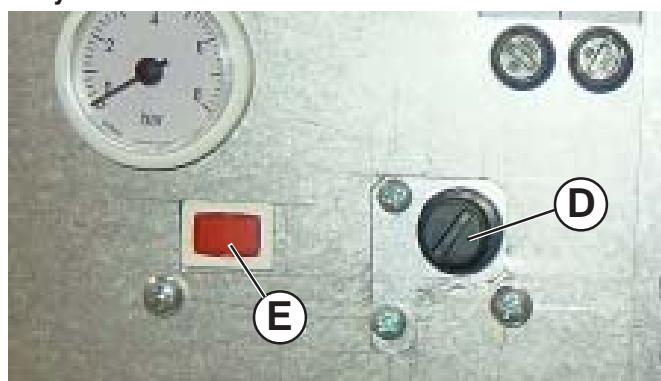


Yellow LED = Blinking  
(communication between BMM and BCM) OK

Green LED = ON (Active Pump)

Red LED = ON (Failure code detected)

Only for MODULEX 340

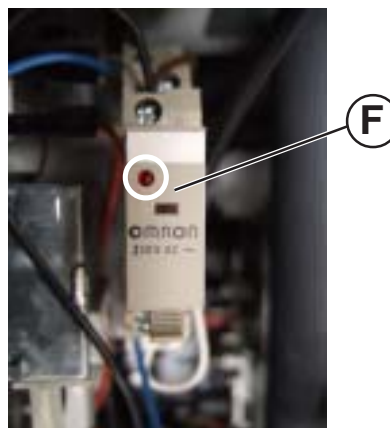


Relay condensate level sensor  
(positioned behind manometer)

- (C) Change-over Series/Parallel (switch BCM / E8)
  - 0 = Emergency is active (position to activate emergency combination with switch A)
  - I = Series connection (the cascade is managed by the BCM)
  - II = Parallel connection (the cascade is managed by the E8)

- (D) Only for MODULEX 340  
TLG General Limit Thermostat: when it acts, it cuts the power supply to the boiler, the warning lamp E lights. To reset, remove the cap and push the reset button.

- (E) Only for MODULEX 340  
Warning lamp of the thermostatic lockout from TLG



Condensate level sensor position

- (F) Relay of the condensate level sensor: when the led is Off it means every thing is OK; when the led is On it means that the condensate level sensor has cut the power supply to the boiler, and the boiler stays Off till the level of the condensate decreases under a certain level.



Note: The switches are positioned under the front panel.



Note: The emergency function enables the boiler's burners to fire only at 70% and at 50°C in system return. All the system's heating loads, including the header pump, must be controlled manually.



## Instructions for the installer

### 3.31 INITIAL LIGHTING

#### PRELIMIARY CHECKS



The first ignition must be carried out by a qualified technician. Failure to do so could cause injury to persons, animals or damage to property. UNICAL shall not be held liable for any injury and/or damage.

Before lighting the boiler check that:

- the boiler installation has been carried out in accordance with the specific Standards.
- the combustion air inlet and the discharge of the products of combustion occur in the correct way in accordance to the specific Standards in force;
- the gas supply system is correctly dimensioned for the boiler's output;
- the boiler's electrical supply is 230 V - 50 Hz;
- the system has been filled with water (pressure registered on the gauge 0,8/1 bar with pump not running);
- any of the system's on-off valves are open;
- the mains supply gas corresponds to the one which the boiler has been calibrated for: otherwise convert the boiler to use the available gas (refer to section: "GAS CONVERSION"); this operation must be carried out by a qualified technician in compliance to the regulations in force;
- the gas supply cock is open;
- there are no gas leaks;
- the external mains supply switch is on;
- the boiler system's safety valve is not blocked and that it is connected to the sewage system;
- the condensate drain siphon has been filled with water and that it is connected to the sewage system;



#### **DANGER!**

Before firing the appliance fill up the siphon through the filling hole and check the correct drainage of the condensate.

If the appliance is used with the condensate drain siphon empty this could cause poisoning caused by the leakage of the flue gasses.

- there are no water leaks;
- all the necessary ventilation conditions and minimum clearance distances are guaranteed for subsequent servicing in case the boiler is sited in a cupboard compartment.

#### Information to be passed on to the user

The user of the appliance must be instructed on the use and operation of his boiler and in particular detail:

- Hand over to the end user the booklet: "USER'S INSTRUCTIONS GUIDE", as well as all the other literature relative to the appliance and placed in the envelope contained in the packaging. **The user of the appliance must retain this literature for any future reference.**
- Inform **The user** of the importance of the air vents and of the flue outlet system, stressing the fact that absolutely no alteration can be made.
- Inform the user regarding the control of the system's water pressure and how to restore it to the correct value.
- Explain and demonstrate to **The user** the correct function and adjustment of the temperature, thermostats and radiators for the economic use of the system.
- Remind the user that in order to comply to the regulations in force the boiler has to be inspected and serviced regularly as indicated by the manufacturer.
- If the appliance is sold or transferred to another owner or if the present user moves home and leaves the appliance installed, ensure yourself that the manual always follows the appliance so that it can be consulted by the new owner and/or installer.



# 4 SERVICING SCHEDULE



To ensure the continued safe and efficient operation of the boiler it is highly recommended that it is checked at regular intervals and serviced when necessary, and that only original spare parts are used. The law in force states that the boiler must be serviced annually.



If the boiler is not checked and serviced when necessary it could cause material and personal damages.

For this reason UNICAL recommends that a servicing contract should be made with a heating installer.

The regular inspection is useful to determine the actual state of an appliance and to compare it with an optimum state. This is achieved through measurement, control and observation.

The service is necessary to eliminate eventual deviations of the actual state from the optimum state. This is normally done through the cleaning, the parameters setting and the eventual replacement of single components subject to mechanical wear.

The frequency of servicing will be determined by the service engineer and will depend on appliance's state of condition.

## INSTRUCTIONS FOR SERVICING



To ensure a long life to all your boiler components and in order not to alter the conditions of the approved product only original UNICAL spare parts must be used.

After having carried out all the necessary maintenance, always follow these steps:

- Switch OFF the main switch
- Isolate the boiler from mains via a device having, at least, a 3 mm in the switch contacts (e.g.: safety devices or power switches) and make sure it cannot be switched ON accidentally.
- Switch off the gas gate valve upstream the boiler.
- If necessary, and in function of the type of work to be carried out, close any on-off valves fitted on the CH flow and return pipes, as well as the cold inlet valve.
- Remove the appliance's front panel.

After maintenance works have been finished, follow the next steps:

- Open the CH flow and return valves as well as the cold inlet valve (if previously closed),
- Purge and, if necessary, proceed with restoring the heating system's pressure until a pressure of 0,8/1 bar is reached.
- Open the on-off gas valve.
- Reconnect the appliance to the electrical supply and switch on the mains electrical supply.
- Test for gas soundness, on the gas side and on the water side.
- Replace the appliance's front panel..

**TABLE OF THE RESISTANCE VALUES IN FUNCTION OF THE HEATING SENSOR (SR) AND RETURN HEATING SENSOR TEMPERATURE (SRR)**

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 nom. resistance (Ohm) of the heating sensor SR and the return heating sensor SRR.

Example: At 25°C, the nominal resistance is 10067 Ohm  
At 90°C, the nominal resistance is 920 Ohm

## Service schedule



We recommend that periodical service is made by qualified technical personnel according to the frequency stated by national rules in force.

As much as the dust present in the air will be sucked inside the combustion chamber, the smoke side resistance will increase, which, finally, will result in a reduced heat input (and consequently a reduced output). Before cleaning the boiler body sections, check the boiler input and the CO<sub>2</sub> percentage (see 3.24).

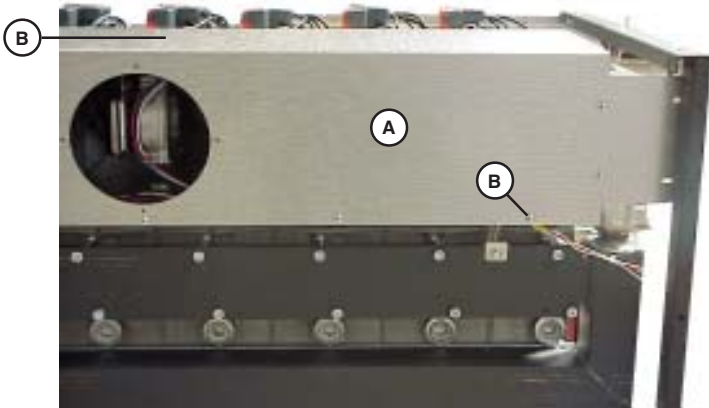
Note! A reduction of the input can be caused by the obstruction of the evacuation duct or of the air intake. Check, first of all, that this is not the reason.



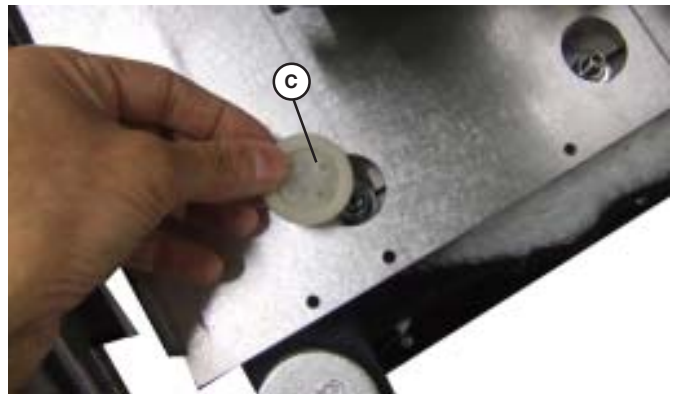
If the actual input (with the correct CO<sub>2</sub>) is within 5% of the value shown in the chapter 3.24, the boiler does not need to be cleaned. The operation then, can be limited to the cleaning of the siphon.

### 1<sup>st</sup> phase - Disassembly

- Switch off power and gas supply and ascertain the gas cock is well closed.
- Unscrew the coupling at the gas inlet.
- Remove the front, rear and top panels of the casing.
- After the removal of "B" screws, remove the cover "A" of the fan chamber.



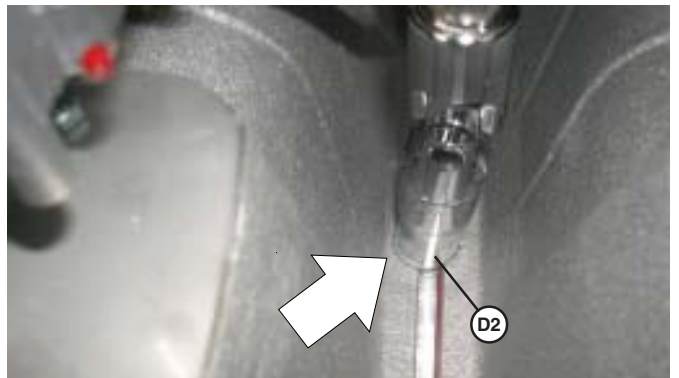
- Remove the air filters



- Remove the diaphragms "C" from the bottom of the fan chamber to get access to the screws fixing the burner covers.



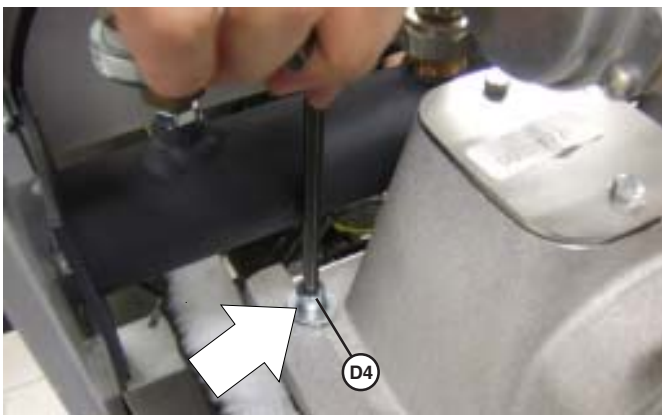
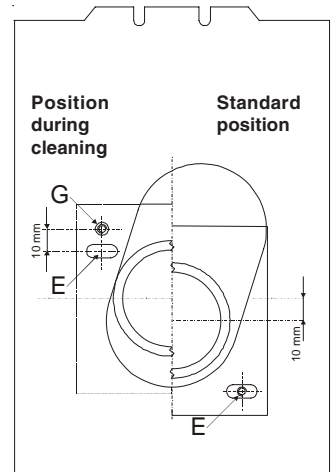
- Remove the screws "D1 - D2 - D3", fixing the burner covers, with a 13 mm socket wrench, - and the D4 with a 6 mm Allen wrench.



## Servicing schedule

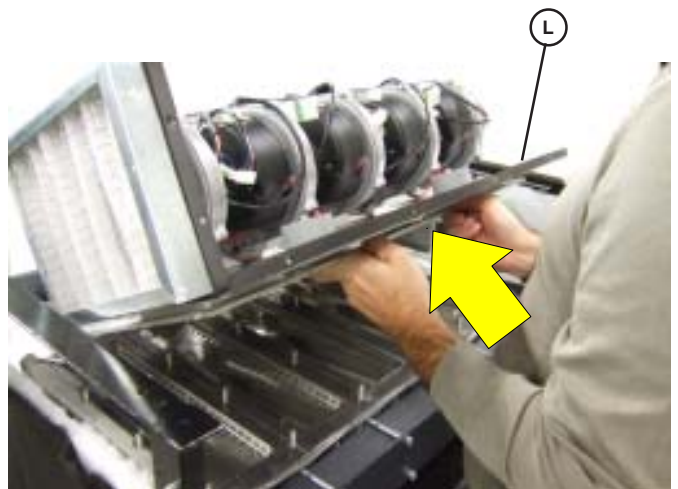


- Fix the burner manifold, at the two sides, in a position 10 mm higher than the standard one. It is possible to get this by positioning the tapped hole of the gas pipe flange in correspondence of the "G" hole of the side support and inserting one of the two screws "E" previously removed (see following pictures and drawing).

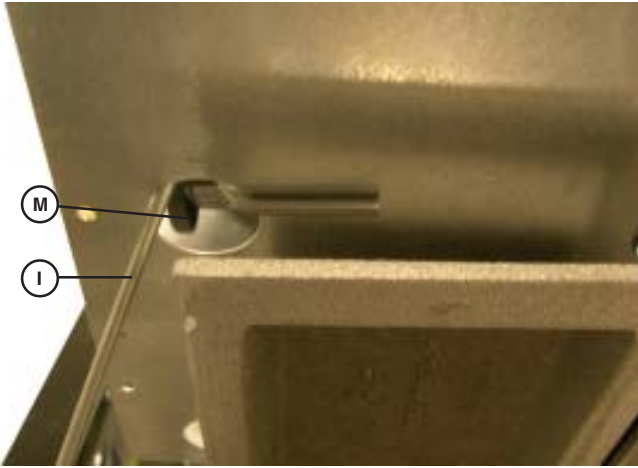


- Bring up the fan group "L" by rotating it on the gas manifold axis and keep it up by inserting the stings "I", binded to the frame, in the holes "M".

- Remove the "E" fixing screws on the two sides of the burner manifold.
- Remove the sheet metal protections "F" on the two sides of the burner manifold.



## Servicing schedule



### Second phase - Cleaning

- Remove the gaskets and the burners.
- Perform cleaning of the burners only by blowing, with compressed air, acting from the "side flame"
- Verify visually the state of the spot weldings of the L profiles and the burner mesh.



**The burner gaskets must be replaced at every cleaning operation.**



back side

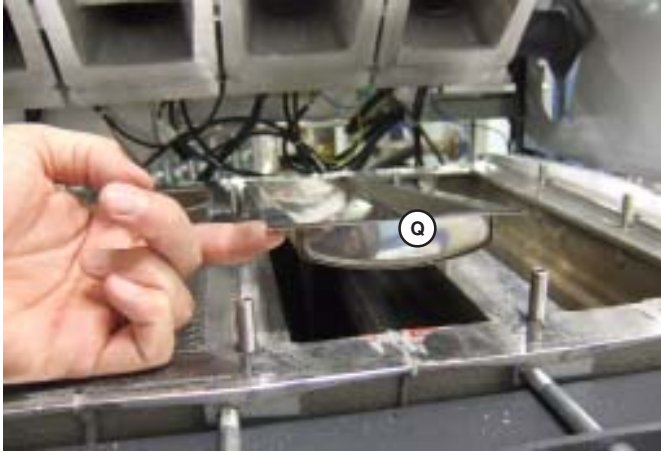


**Compressed air**



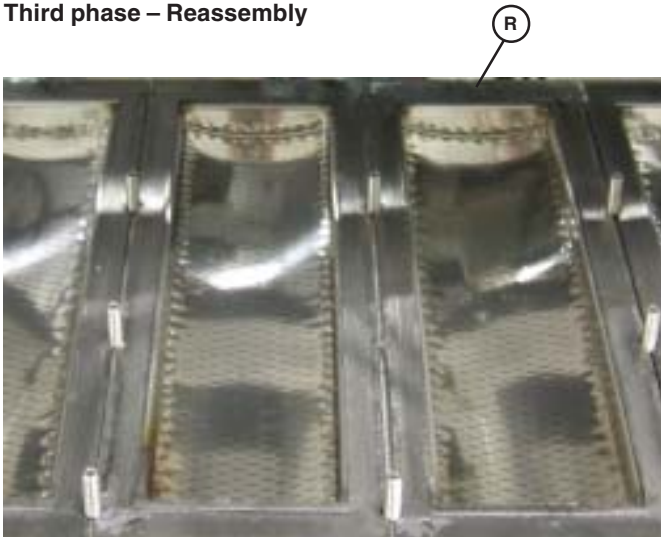
- Wash with water the combustion chamber, avoiding to wet the electrical harness  
During this operation it will be necessary to ascertain that the condensate drain pipe is free, so that the washing water does not come out from the inspection hole.
- Blow the combustion chamber with compressed air, trying to remove all the dirt still fixed to the fins.
- Once the washing of the aluminium sections is finished, make sure the siphon for the evacuation of the condensate is free: if necessary clean it
- Inspect the smoke evacuation pipe and the chimney

## Servicing schedule



- After the cleaning of the boiler body and/or the burners, re position the burners "Q" in their seats.

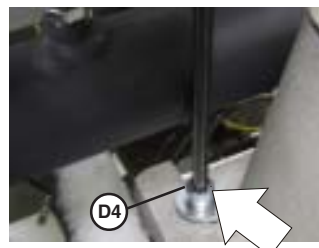
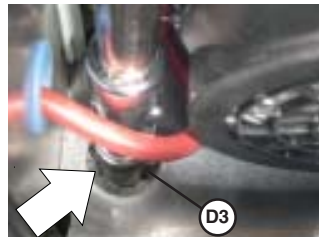
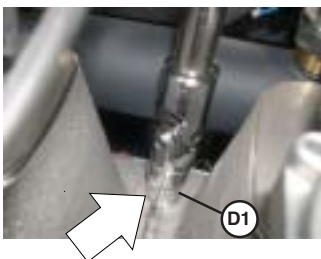
### Third phase – Reassembly



- Position the new gaskets in **graphite "R"**



**When reassembly, proceed in the reverse order, taking care to tight the fixing screws of the mixer/fan group to the body, with a tightening torque of 13 Nm**



**WARNING**  
**AT EACH MAINTENANCE OPERATION IT IS COMPULSORY TO REPLACE THE SEALING GASKETS ON EACH BURNER.**

**Spare parts code:**

**95261173 - KIT OF BURNER GASKETS FOR MODULEX (5 pcs.)**

- Before lighting the boiler make sure the si phon has been filled with water.
- Before opening the gas feeding cock, previously unloosed, make sure it is well tight. To do this open the gas cock and check with a soap solution.
- When a single burner is started, check immediately for the soundness between its gas valve and the relevant premixing chamber.
- Perform the combustion analysis check its parameters.
- Make sure that all the pressure test nipples, previously opened, have been closed.

# DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY

**Unical AG s.p.a**

con sede / with headquarters in Castel d' Ario (MN) - via Roma, 123

in qualità di azienda costruttrice di caldaie a gas a condensazione / as gas fired condensing boiler manufacturers

## DICHIARA / DECLARE

che tutti i modelli delle gamme / that all the models of the ranges:

<b>Modulex...u:</b>	<b>80u - 120/16u - 120u - 160u - 200u - 240u - 280u - 300u</b>
<b>Modulex...p:</b>	<b>90p - 140p - 180p - 230p - 280p - 320p</b>
<b>Modulex 100:</b>	<b>100 - 116 - 145 - 190 - 240 - 290 - 340</b>
<b>Modulex:</b>	<b>349 - 360 - 450* - 540* - 630*</b>
<b>Supermodulex:</b>	<b>348 - 440* - 550* - 660* - 700* - 900* - 360 - 450* - 540* - 630* - 720*</b>

(\*) questi modelli non sono coperti dalla direttiva / These models are not covered by the European directive 92/42/EEC

non appartengono a nessuna delle categorie dell'art.9 del Decreto Legislativo n. 93 del 25 febbraio 2000, in attuazione della direttiva 97/23/CE (in materia di attrezzature a pressione) e che tutti i modelli sopra citati sono completi di tutti gli organi di sicurezza e di controllo previsti dalle norme vigenti in materia e rispondono, per caratteristiche tecniche e funzionali, alle prescrizioni delle norme: / do not belong to any of the categories specified in clause 9 of the European Directive 97/23/EC (regarding pressure equipment) and that all the a.m. models are fully equipped with all the safety and control instruments foreseen by the latest relevant regulations, and comply, with regards to the technical and operating characteristics, to the requirements stated in the following Standards and Directives:

<b>EN 15417</b>	<b>Caldaie per riscaldamento centralizzato alimentate a combustibili gassosi. Requisiti specifici per caldaie a condensazione con portata termica nominale maggiore di 70 kW ma non maggiore di 1000 kW. / Gas-fired central heating boilers - Specific requirements for condensing boilers with a nominal heat input greater than 70 kW but not exceeding 1000 kW.</b>
<b>EN 656</b>	<b>Caldaie a gas per riscaldamento centrale alimentate a combustibili gassosi. Caldaie di tipo "B" di portata termica nominale maggiore di 70 kW ma non maggiore di 300 kW. / Gas-fired central heating boilers - Type B boilers of nominal heat input exceeding 70 kW but not exceeding 300 kW.</b>
<b>pr EN 15420</b>	<b>Caldaie per riscaldamento utilizzando combustibile gassoso - Caldaie di tipo "C" con portata termica nominale superiore a 70 kW ma inferiore a 1000 kW. / Gas-fired central heating boilers - Type C boilers of nominal heat input exceeding 70 kW, but not exceeding 1000 kW.</b>
<b>90/396/EEC</b>	<b>Direttiva Gas / Gas Appliances Directive</b>
<b>92/42/EEC</b>	<b>Direttiva Rendimenti / Boiler Efficiency Directive</b>
<b>2006/95/EC</b>	<b>Direttiva Bassa Tensione / Low Voltage Directive</b>
<b>2004/108/EC</b>	<b>Direttiva Compatibilità Elettromagnetica / Electromagnetic Compatibility Directive</b>

Gli apparecchi sopra menzionati hanno ottenuto i requisiti di rendimento energetico corrispondente a 4 "Stelle", secondo la Direttiva Rendimenti 92/42/EEC, dall'Ente Omologante CERTIGAZ / The a.m. appliances, with output up to 400 kW, have obtained the 4 stars efficiency classification, according to the Efficiency Directive 92/42/EEC, from the notified body CERTIGAZ.

Sono inoltre marchiate /  
All these boiler ranges have  
the following



**PIN n° 1312BM3615**  
**PIN n° 1312BR4912**  
**PIN n° 1312BR4795**  
**PIN n° 1312BP4012**  
**PIN n° 1312BS4959**

Modulex ...u  
Modulex ...p  
Modulex 100  
Modulex 360  
Supermodulex



In attuazione del decreto ministeriale 18 febbraio 2007 e successive modifiche e integrazioni, attuativo della legge Finanziaria 2007 Gli apparecchi sopra menzionati hanno un rendimento termico utile, con carico pari al 100% della potenza utile nominale, maggiore o uguale a  $93 + 2 \log P_n$ , (dove  $\log P_n$  è il logaritmo in base 10 della potenza utile nominale del singolo generatore, espressa in kW), come richiesto dal comma 1a dell'art. 9.

La Unical AG s.p.a. DECLINA ogni responsabilità per sinistri a persone, animali o cose derivanti da manomissioni dell'apparecchio da parte di terzi non autorizzati, ovvero da un'errata installazione, od una manutenzione o riparazione carente o irregolare. / Unical declines any responsibility for injuries to persons, animals or to property deriving from wrong handling of the boiler by unauthorized third parties, or by bad installation or servicing.

Unical AG s.p.a.

Castel d' Ario, 13 Maggio / May 2009

Direttore Tecnico / Technical Manager

**Dino Lanza**

(Directives 90/396/CEE « Appareils à gaz » et 92/42/CEE « Rendement des chaudières »)  
(« Gas appliances » 90/396/EEC and 92/42/EEC « Boilers efficiency » Directives)

**Numéro : 1312BR4795** (rév. 4)

**CERTIGAZ**, après examen et vérifications, certifie que l'appareil :

**CERTIGAZ**, after examination and verifications, certifies that the appliance :

- **Fabriqué par :**  
*Manufactured by :* **UNICAL AG SpA**  
**Via Roma, 123**  
**I-46033 CASTEL D'ARIO (MN)**
- **Marque commerciale et modèle(s) :**  
*Trade mark and model(s) :*

<b>UNICAL</b>
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  - > MODULEX 100 – MODULEX 145
  - > MODULEX 190 – MODULEX 240
  - > MODULEX 290 – MODULEX 340
  - > MODULEX 116
- **Genre de l'appareil :**  
*Kind of the appliance :* **CHAUDIERE CONDENSATION (types B23P,C63)**  
**CONDENSING BOILER (TYPES B23P/C63)**
- **Désignation du type :**  
*Type designation :* **MODULEX 100**

Pays de destination <i>Destination countries</i>	Pressions (mbar) <i>Pressures (mbar)</i>	Catégories <i>Categories</i>
FR	20/25 ; 37	I12Esi3P
ES-GB-IE-IT-PT-GR-SE-NO	20 ; 37	I12H3P
DE	20 ; 50	I12ELL3P
HU	25 ; 50	I12HS3P
AT-CH-TR-HR-CZ-SK-SI	20 ; 50	I12H3P
LV-EE-LT	20	I2E
BE	20/25	I2E(R)B
BE	37	I3P
NL	25 ; 50	I12L3P
BG-CN-RU-RO-YU	20	I2H
PL	20 ; 13 ; 37	I12E3P
LU	20 ; 50	I12E3P

est conforme aux exigences essentielles des directives « Appareils à gaz » 90/396/CEE et « Rendement des chaudières » 92/42/CEE  
is in conformity with essential requirements of 90/396/EEC « Gas appliances » and 92/42/EEC « Boiler efficiency » directives.

**CERTIGAZ**  
Le Directeur Général

Paris le : 16/12/2008




**Yannick ONFROY**

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