CONDENSING BOILERS

TAU 35 UNIT

INSTALLATION AND MAINTENANCE MANUAL

RIELLO

CONFORMITY

RIELLO **TAU UNIT** condensing boilers conform to the following directives:

- Gas Appliances Directive 90/396/EEC
- Boiler Efficiency Directive 92/42/EEC and Annex E of the Italian Presidential Decree 412 dated 26 August 1993 (☆☆☆☆)
- Electromagnetic Compatibility Directive 89/336/EEC
- Low Voltage Directive 73/23/EEC
- EN 677 Standard: Gas-fired central heating boilers; specific requirements for condensing boilers with a nominal heat input not exceeding 70 kW.

CE 0694

RANGE

MODEL	FUEL	CODE
TAU 35 UNIT	Methane - LPG	20011770

Dear heating engineer,

Congratulations on having chosen a **RIELLO** *boiler. You have selected a modern, quality product that is designed to give dependable, efficient and safe service and to provide comfort in the home for many years to come. This manual provides information that is essential to the installation of the appliance. Used in conjunction with your own knowledge and expertise it will enable you to install the appliance quickly, easily, and correctly.*

Once again, please accept our thanks and our congratulations on your choice of product.

Riello S.p.A.

CONTENTS

GENERAL

INSTALLER

TECHNICAL ASSISTANCE SERVICE

The following symbols are used in this manual:

⚠ = Identifies actions that require caution and adequate preparation

⛔ = Identifies actions that you MUST NOT do

This manual, Code 20027521 Rev. 1 (06/10) is made up of 80 pages.

GENERAL SAFETY INFORMATION

⚠ As soon as you open the packaging, check immediately that the contents are all present and undamaged. Contact the **RIELLO** reseller from whom you purchased the product if you notice any problems.

⚠ This **TAU UNIT** boiler must be installed by a legally qualified heating engineer. (In Italy, the law regulating professional heating engineers is Law 46 of the 5th March 1990.) On completion of the installation, the installer must issue the owner with a declaration of conformity confirming that the installation has been completed to the highest standards in compliance with the instructions provided by **RIELLO** in this instruction manual, and that it conforms to all applicable laws and standards.

⚠ This **TAU UNIT** boiler must only be used for the purpose specified by **RIELLO** and for which it is designed. The manufacturer declines all responsibility, contractual or other, for damage to property or injury to persons or animals caused by improper installation, adjustment, maintenance or use.

⚠ If you notice any water leaking from the boiler, disconnect it immediately from the mains electricity supply, shut off the water supply, and notify your local **RIELLO** Technical Assistance Centre or a qualified heating engineer immediately.

⚠ Periodically check that operating pressure in the central heating circuit is **over 1 bar** but below the maximum limit specified for the boiler. If water pressure is consistently low, contact **RIELLO**'s Technical Assistance Service or a professionally qualified heating engineer.

⚠ If the boiler is not going to be used for an extended period of time, proceed as follows to prepare it for shutdown:
- Switch the appliance OFF at the control panel.
- Turn the mains power switch OFF.
- Close the boiler's fuel cock and heating circuit water cock.
- Drain the central heating circuit and domestic hot water circuit if there is any risk of freezing.

⚠ The boiler must be serviced at least once a year.

⚠ This instruction manual is an integral part of the boiler. It must be kept safe and must ALWAYS accompany the boiler, even if it is sold to another owner or transferred to another user or to another installation. If you damage or lose this manual, order a replacement immediately from your local **RIELLO** Technical Assistance Centre.

PRECAUTIONS

The operation of any appliance that uses fuel, electrical power and water demands that a number of fundamental safety precautions be respected.

⛔ Do not allow children or infirm persons to operate the boiler unsupervised.

⛔ Do not operate any electrical devices or equipment, including switches or domestic appliances, etc., if you can smell fuel or fumes. If you detect any suspicious smells:
- Ventilate the room by opening all doors and windows.
- Close the fuel shut-off cock.
- Report the fault immediately to your local RIELLO Technical Assistance Service or a professionally qualified heating engineer.

⛔ Do not touch the boiler when barefoot or wet.

⛔ Never clean or service the boiler without first disconnecting it from the mains electricity supply by turning the main power switch and the control panel switch OFF.

⛔ Do not tamper with or adjust the safety or control devices without prior authorisation and instructions from the boiler's manufacturer.

⛔ Do not plug or block the condensate drain outlet.

⛔ Never pull, disconnect, or twist the electrical cables coming from the boiler even if it is disconnected from the mains electricity supply.

⛔ Do no obstruct or restrict the vents in the room where the boiler is installed. Adequate ventilation is essential for correct combustion.

⛔ Do not expose the boiler to the elements. Do not install the boiler outdoors. It is not designed to work outdoors and is not fitted with the necessary automatic anti-frost systems to do so.

⛔ Do not store containers of flammable substances in the room where the boiler is installed.

⛔ Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.

PRODUCT DESCRIPTION

This **TAU UNIT** condensing boiler is designed to produce hot water for central heating systems. If used in conjunction with a remote storage cylinder, it can also produce domestic hot water. The innovative boiler body uses the condensation of steam from the combustion gases to recover up to 15% extra energy, with obvious benefits in terms of running costs. The boiler body is made from highly corrosion resistant stainless steel to guarantee an extended working life and excellent reliability. The boiler body conforms to the strictest Italian and European standards governing the migration of heavy metals to condensate. A premixed micro-flame burner guarantees extremely low emissions.

The control system applies compensated control logic to maximise energy recovery in all seasons. The combustion gases are cooled to a temperature near that of the central heating return before they leave the boiler body. This makes it possible to use plastic flue pipes instead of metal ones, with significant savings in overall installation costs.

Special accessories are available to increase the number of central heating circuits served, to cascade a number of **TAU UNIT** boilers and to connect single or double return lines to suit the needs of the installation, improving heat stratification in the water inside the body and optimising performance.

SAFETY DEVICES

This **TAU UNIT** condensing boiler is equipped with the following safety devices

An automatic **safety thermostat** that trips at 100° and shuts down the burner.

An **electronic safety system** that monitors flow rate through the central heating system using two sensors, one on the flow pipe and the other on the return pipe. This safety system forces the boiler to perform a safety shutdown if flow rate is insufficient or not detected.

Flue gas safety thermostat.

A flue gas thermostat in the bottom of the heat exchanger that triggers an error condition if flue gas temperature exceeds 75°C. A flue gas temperature sensor in the bottom of the heat exchanger that triggers a transient error if flue gas temperature exceeds 85°C and a permanent error if it exceeds 90°C.

A fan safety system that uses a Hall effect speed sensor to continuously monitor fan speed.

⚠ The activation of a safety device indicates a potentially dangerous malfunction in the modulation system. Contact **RIELLO**'s Technical Assistance Service immediately.

You may attempt to restart the boiler after a short delay (see "Preparing for initial start-up").

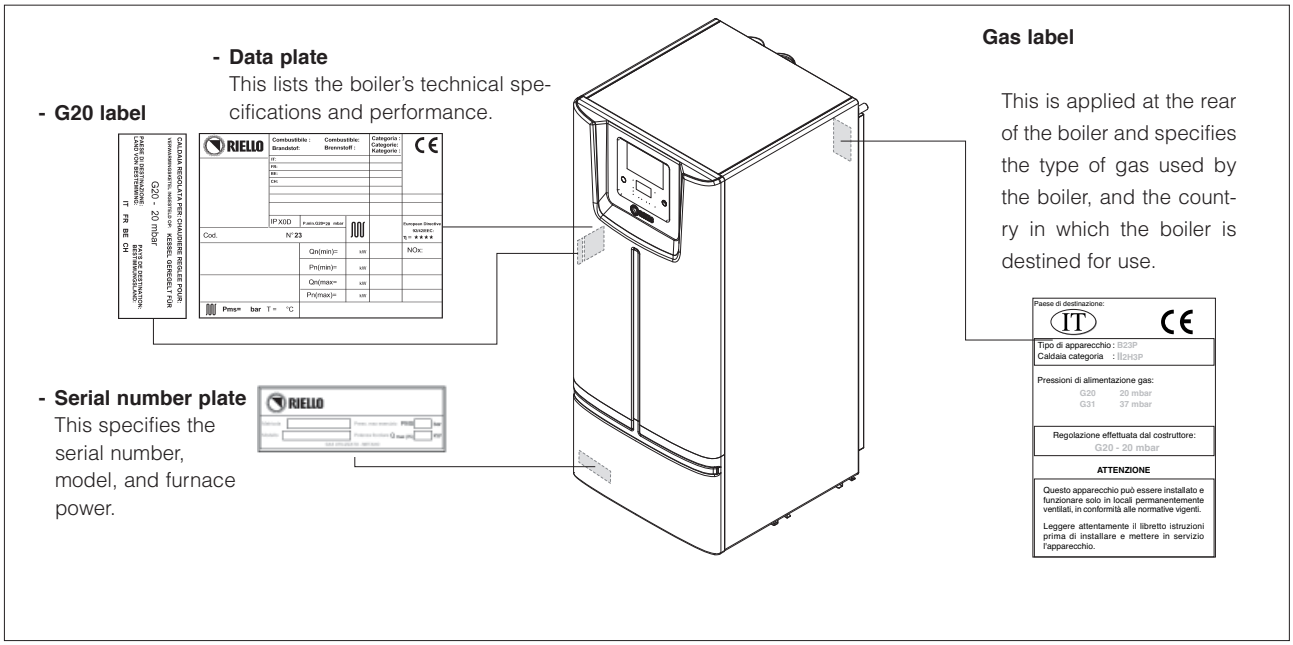
⛔ Never start the boiler up even for a short period if the safety devices are not functioning correctly or have been tampered with.

⚠ Safety devices must only be replaced by **RIELLO**'s Technical Assistance Service using original spare parts. Refer to the spare parts catalogue supplied with the boiler.

Always check that the boiler is functioning correctly after any repairs.

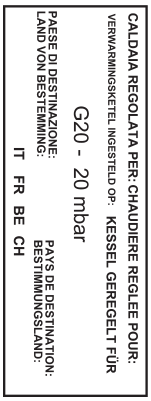
IDENTIFICATION

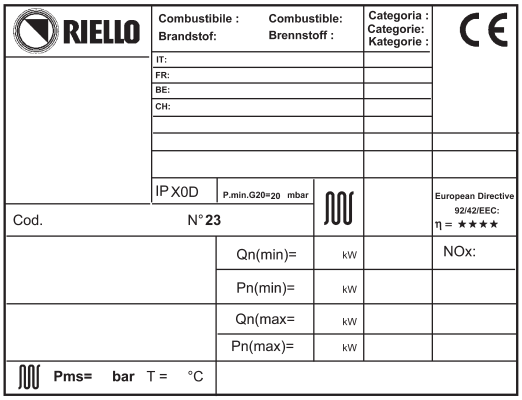
The boiler is identified by the following plates and labels



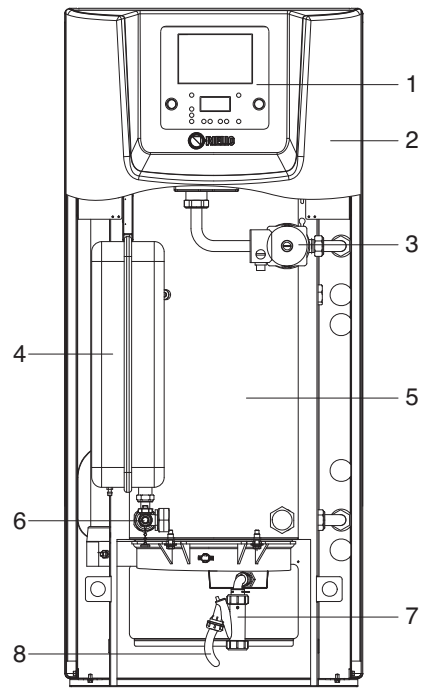
DATA PLATE

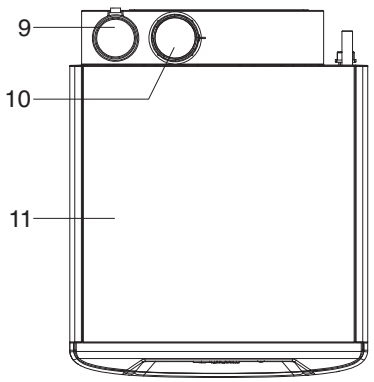
	Central heating circuit characteristics
Qn	Rated heat input
Pn	Rated useful heat output
IP	Index of protection
P.min	Minimum pressure
Pms	Maximum operating pressure, CH system
T	Temperature
η	Efficiency
NO_X	NO_X class

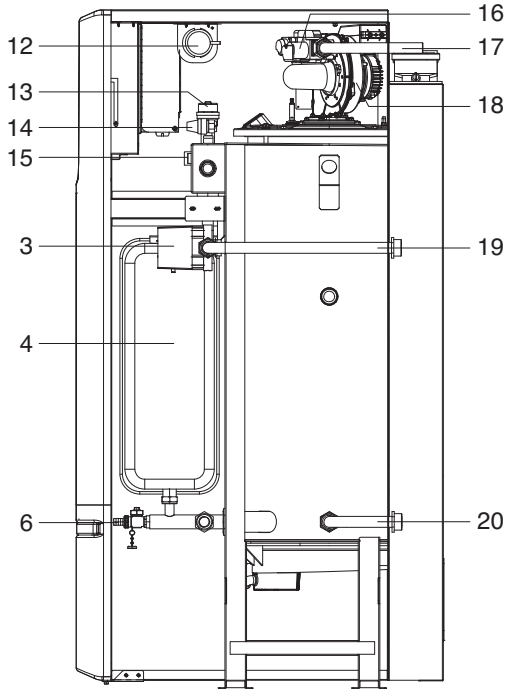




LAYOUT







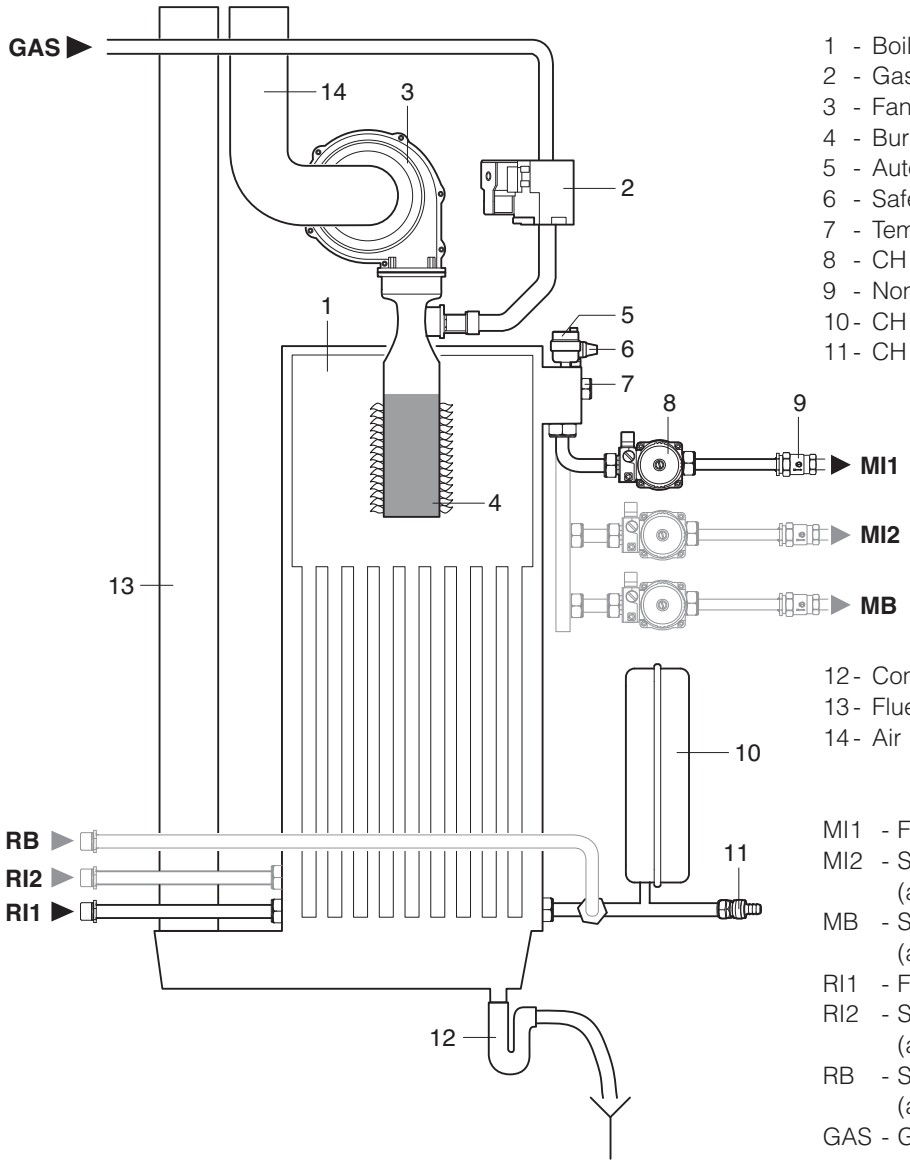
1 - Control panel
2 - Front panel
3 - CH pump
4 - CH expansion vessel
5 - Boiler body
6 - CH circuit drain cock
7 - Condensate drain siphon
8 - Condensate drain pipe
9 - Flue gas exhaust fitting
10 - Comburent air intake fitting
11 - Cover panel
12 - Pressure switch (for combustion chamber)
13 - Automatic vent valve
14 - Safety valve (3 bar)
15 - Sensor sockets
16 - Gas valve
17 - Gas fitting
18 - Burner
19 - Central heating flow
20 - Central heating return

MODELS		TAU 35 UNIT	UM
Class of boiler		II2H3P	
Combustion chamber		Vertical	
Maximum rated heat input (LCV)		34,80	kW
Minimum rated heat input (LCV)		7	kW
Maximum rated heat output (80-60°C)	**G20**	34	kW
Maximum rated heat output (50-30°C)	**G20**	37	kW
Maximum rated heat output (40-30°C)	**G20**	37,3	kW
Minimum rated heat output (80-60°C)		6,7	kW
Useful efficiency at max Pn (80-60°C)		97,8	%
Useful efficiency at min Pn (80-60°C)		95,4	%
Useful efficiency at max Pn (50-30°C)		106,3	%
Useful efficiency at max Pn (40-30°C)		107,2	%
Useful efficiency at 30% of Pn (30°C)		107,7	%
Losses from stack with burner off		0,1	%
Losses from stack with burner on		1,9	%
Gross flue gas outlet temperature		50 - 55	°C
Flue gas mass flow rate (60-80°C)		16	g/sec
Maximum condensation at 100% rated heat output (50-30°C)		4,5	l/h
Values achieved with G20 gas			
CO (Maximum - Minimum)		5 - 10	ppm
CO_2 (Maximum - Minimum)		9,15 - 9,15	%
Flue gas temperature (Maximum - Minimum)		71 - 55	°C
NOx (average)		32	mg/kWh
NOx class		5	
Values achieved with G25 gas			
CO (Maximum - Minimum)		4 - 10	ppm
CO2 (Maximum - Minimum)		9,2 - 9,15	%
Flue gas temperature (Maximum - Minimum)		59 - 55	°C
NOx class		5	
Pressure in combustion chamber		1	mbar
Water-side pressure drop (ΔT 10°C)		50	mbar
Useful CH flow rate (2.5 m w.c.)		2000	l/h
Water capacity		56	l
Max. pressure		3	bar
Minimum supply pressure (STD)		0,5	bar
Maximum CH working temperature		100	°C
Safety thermostat trip temperature		100	°C
CH circuit expansion vessel capacity		12	l
Power supply voltage		230~50	Volt~Hz
Maximum power input		200	W
Index of protection		X0D	IP
Weight		135	Kg
Class of boiler		C13 - C33 - C43 - C53	

ACCESSORIES

DESCRIPTION	CODE
First mixed zone electrical kit	20011764
Second mixed zone electrical kit	20012161
Third mixed zone electrical kit	20011194
CLIMA COMFORT kit for TAU UNIT boilers	20012157
Cascade cabling kit	20012102
Clip-in communication card	4031840
0/10 Volt clip-in card	4031846
Storage cylinder temperature sensor	4031847
Water connection kit for installing an additional mixed zone in the boiler	4031809
Water connection kit for installing an additional direct zone in the boiler	4031819
60/100 concentric collector kit	4031870
Remote storage cylinder kit	4031871
Pipe thermostat, NTC (10k Ohm)	20008753
N2 condensate neutralisation kit	4031810
HN2 condensate neutralisation kit (with drain pump)	4031811

WATER CIRCUIT



1 - Boiler body
2 - Gas valve
3 - Fan
4 - Burner
5 - Automatic vent valve
6 - Safety valve (3 bar)
7 - Temperature sensor sockets
8 - CH pump
9 - Non-return valve
10 - CH expansion vessel
11 - CH circuit drain cock

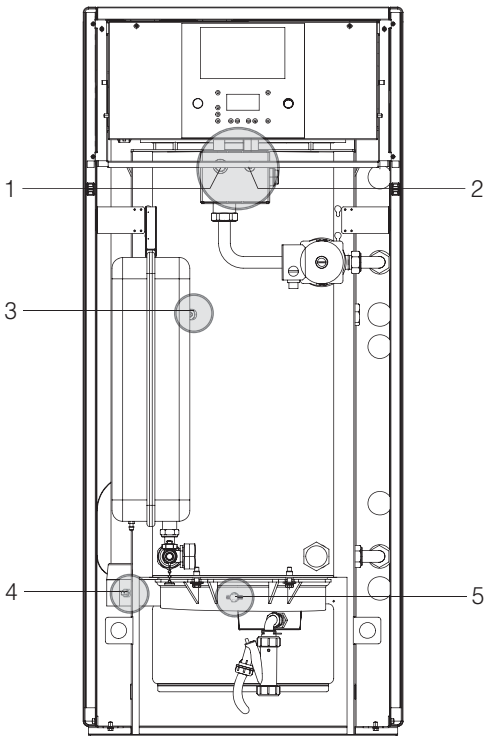
12 - Condensate drain siphon
13 - Flue gas exhaust pipe
14 - Air intake pipe

MI1 - First direct zone flow
MI2 - Second direct zone flow (accessory)
MB - Storage cylinder delivery (accessory)
RI1 - First direct zone return
RI2 - Second direct zone return (accessory)
RB - Storage cylinder return (accessory)
GAS - Gas supply

POSITIONING THE TEMPERATURE SENSORS

SENSORS INSERTED IN THEIR SOCKETS IN THE BOILER:

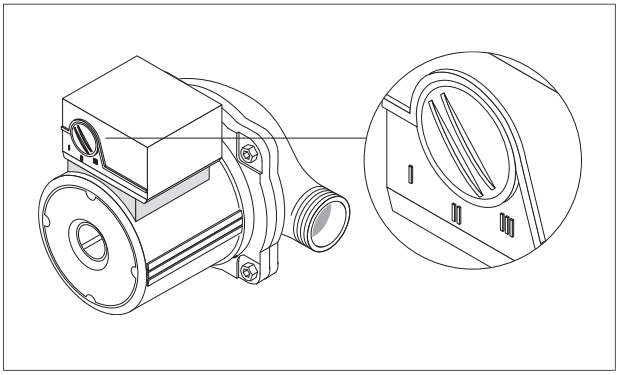
- CH flow temperature sensor (1)
- Safety thermostat temperature sensor (2)
- Control temperature sensor (3)
- Flue gas temperature sensor (4)
- Flue gas thermostat (5)



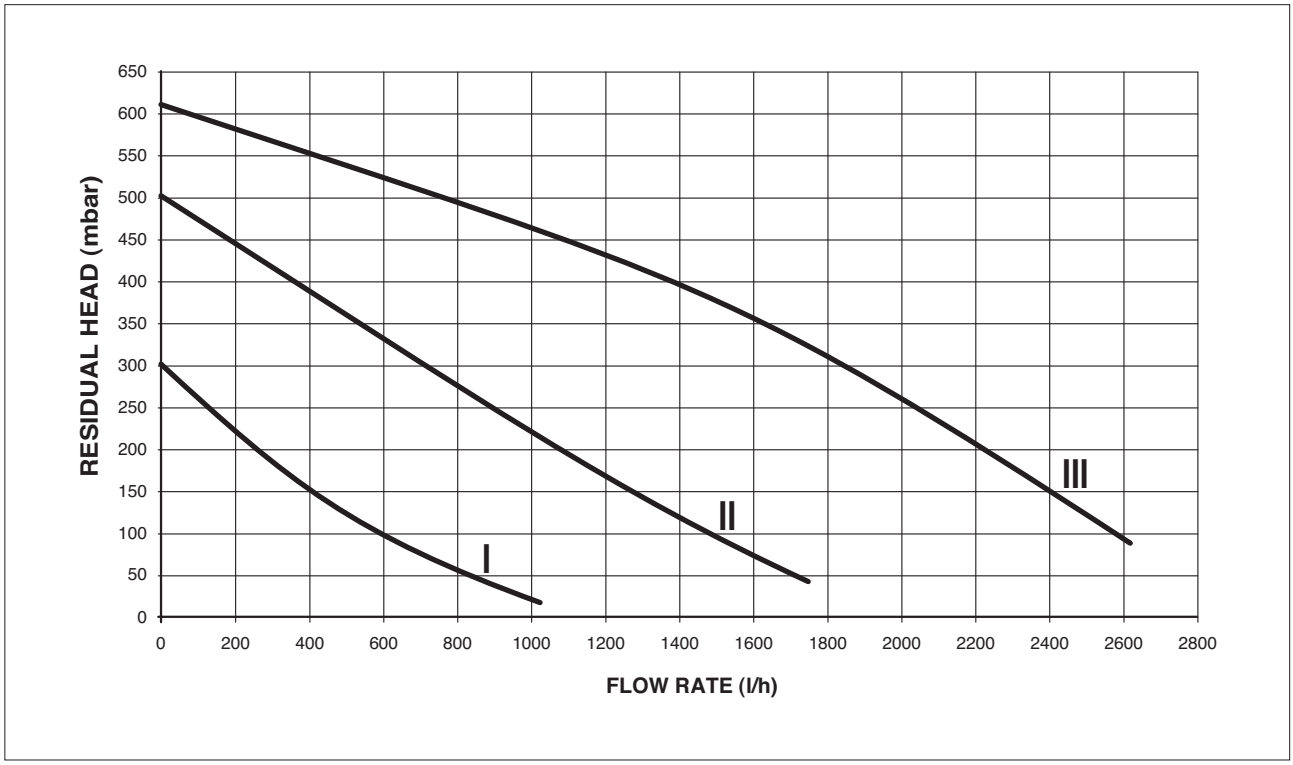
⚠ IMPORTANT!
LEAVE THE SENSORS IN THEIR ORIGINAL POSITIONS EVEN IF THE BOILER IS CONFIGURED FOR USE IN A CASCADED SYSTEM.

PUMPS

This **RIELLO TAU UNIT** boiler comes with a central heating pump ready installed and connected up (electrically and to the water circuit). The pump performance ratings for use in determining individual circuit dimensions are given below.



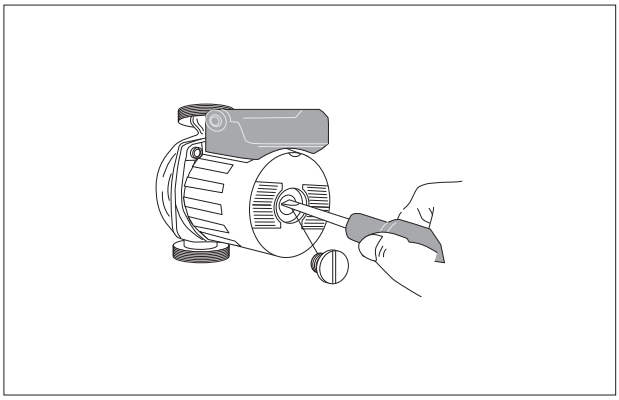
The following diagram shows the flow/head curves for the boiler's central heating pump at the three speeds.



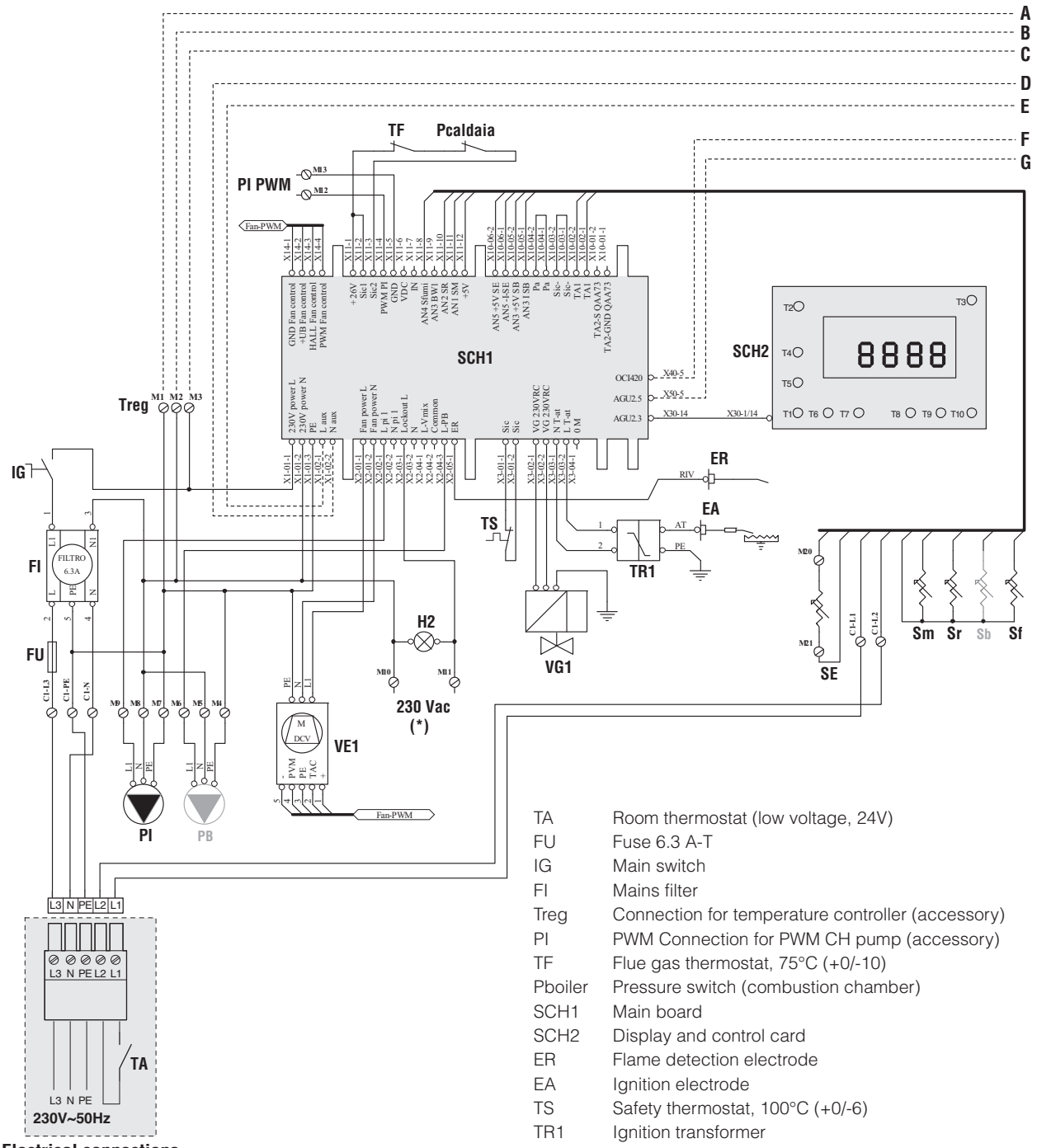
⚠ On initial start-up and at least every year, check that all the pumps in the system rotate freely. Sludge and lime scale can build up and cause seizure, especially after long periods of disuse.

⚠ Protect all electrical devices under the pump before you unscrew the inspection cap just in case water comes out.

⛔ Never run the pump dry.



BOILER CONTROL PANEL

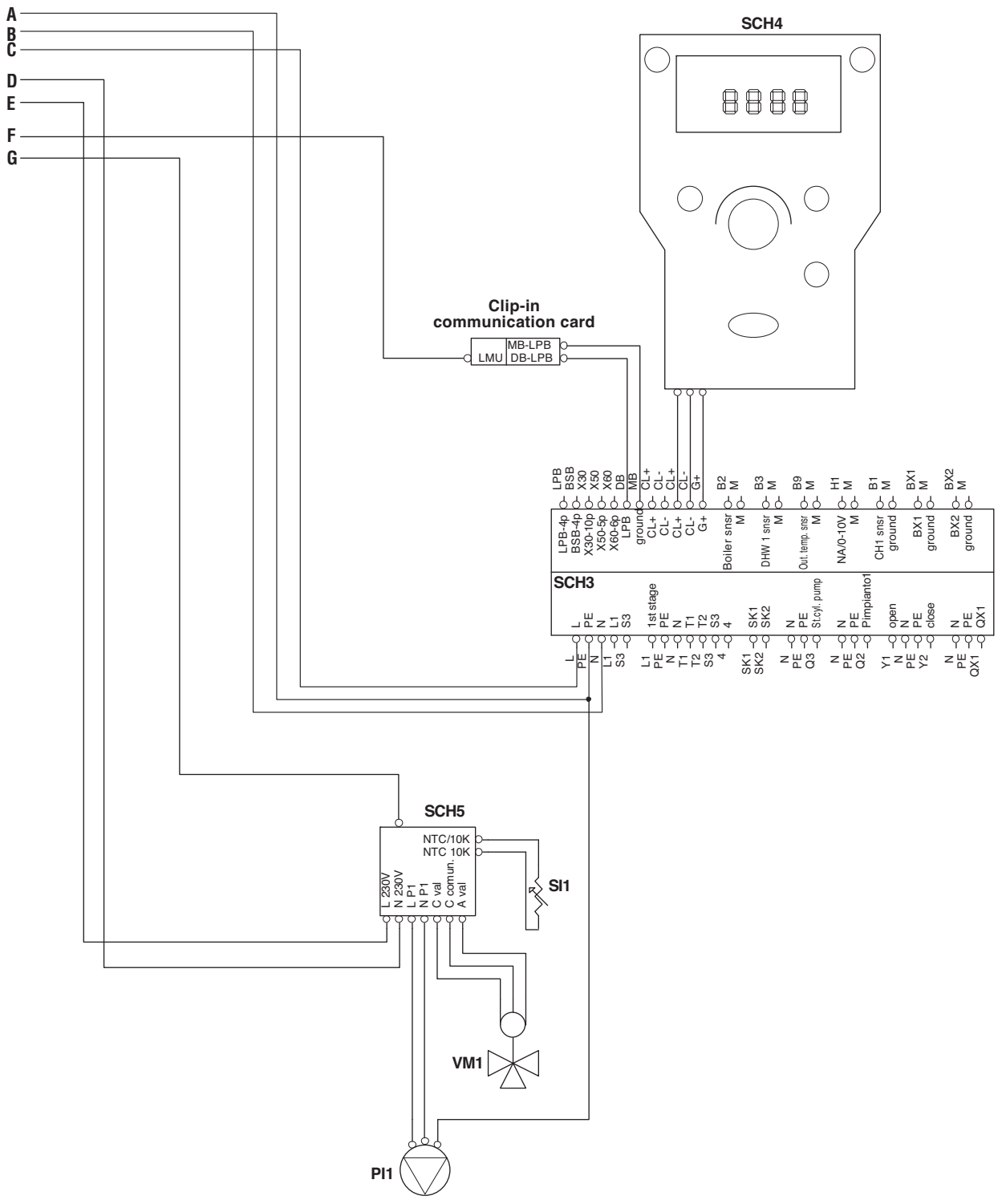


Electrical connections to be made by the heating engineer

TA	Room thermostat (low voltage, 24V)
FU	Fuse 6.3 A-T
IG	Main switch
FI	Mains filter
Treg	Connection for temperature controller (accessory)
PI	PWM Connection for PWM CH pump (accessory)
TF	Flue gas thermostat, 75°C (+0/-10)
Pboiler	Pressure switch (combustion chamber)
SCH1	Main board
SCH2	Display and control card
ER	Flame detection electrode
EA	Ignition electrode
TS	Safety thermostat, 100°C (+0/-6)
TR1	Ignition transformer
VG1	Gas valve
H2	Burner lockout indicator
VE1	Variable speed fan
PI	CH pump
PB	Storage cylinder pump (accessory)
SE	Outdoor sensor (supplied)
Sm	CH flow temperature sensor
Sr	Control temperature sensor
Sb	Storage cylinder temperature sensor (accessory)
Sf	Flue gas temperature sensor

(*) 230Vac output for alarm connection

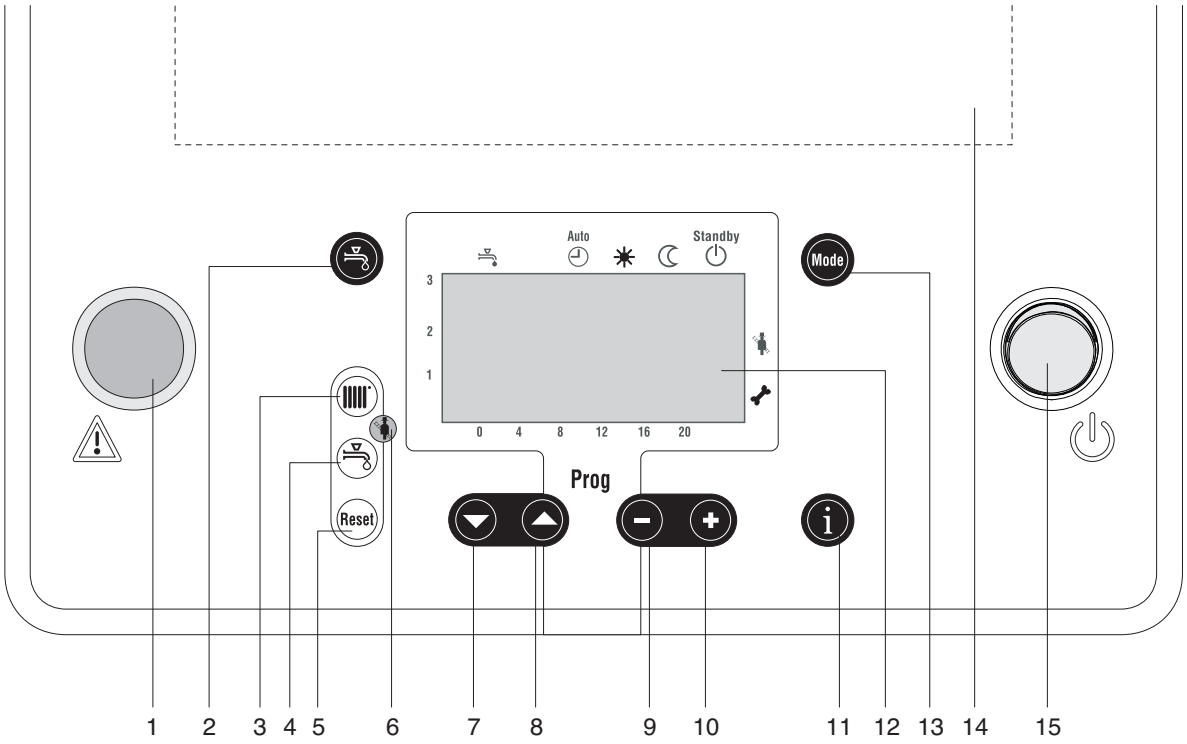
Connection scheme for added accessories



SCH3 RVS control card (**)
SCH4 Room unit control card
SCH5 Mixed zone interface card (clip-in)
PI1 Additional mixed zone pump
VM1 Mixer valve for additional zone
SI1 CH flow temperature sensor for additional mixed zone

(**) Refer to the instructions provided with your card for details on how to connect it to the RVS unit.

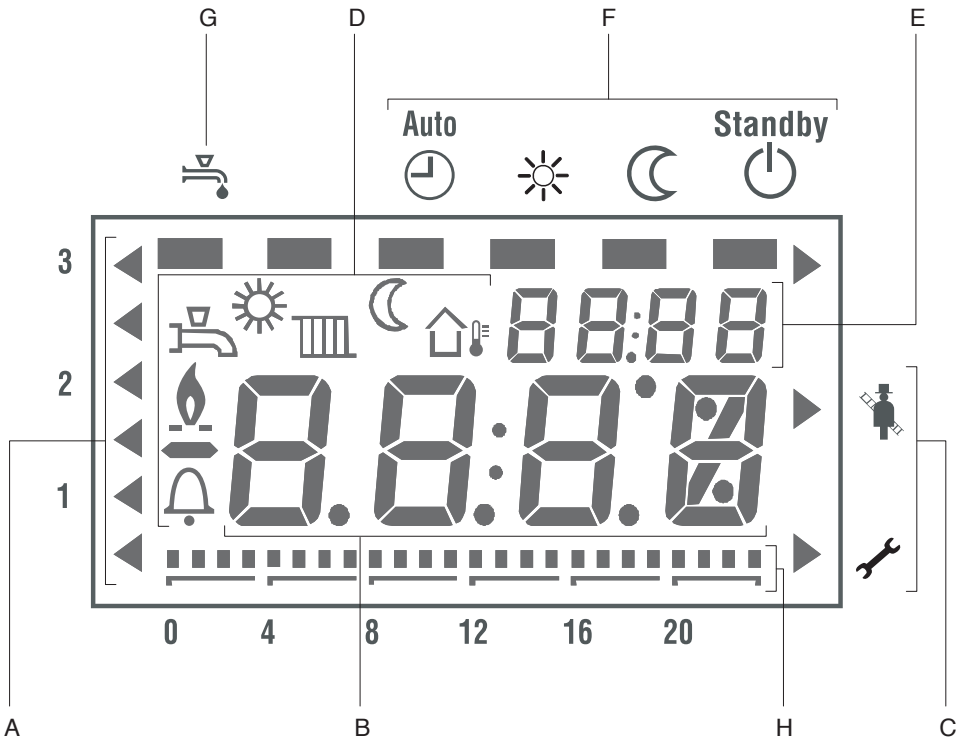
CONTROL PANEL AND SYMBOLS



1 -Burner lockout indicator
2 -DHW mode selector (for use with remote storage cylinder: accessory)
3 -Central heating or room temperature setting key
4 -DHW temperature setting key
(for use with remote storage cylinder: accessory)
5 -Reset key.
Restores normal functioning after a safety shutdown.
6 -Chimney sweep mode selection.
Press and hold keys 3 and 4 (for between 3 and 6 seconds) to enter chimney sweep mode.
7-8 -Parameter selection keys
9-10 -Value decrement/increment keys
11 -Info key
12 -Display
13 -Functioning mode selection button.
A line appears under the symbols:
- Automatic: the boiler functions according to the set program
- Daytime: the boiler operates at daytime (comfort) setpoint
- Night-time: the boiler operates at night-time (reduced) setpoint
- Stand-by

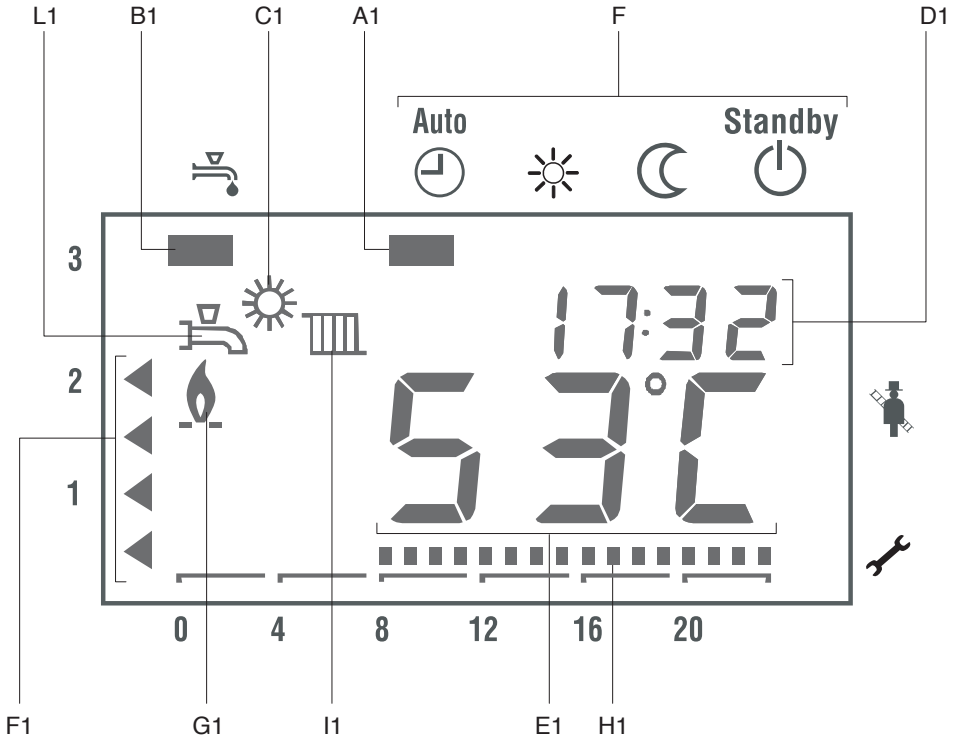
14 -Housing for controller (accessory)
15 -Main switch

DISPLAY



A -Water pressure reading (not used)
B -Large numeric display
Displays current value.
C -Chimney sweep or Service Required symbol
D -Display symbols:
DHW temperature or DHW mode active
CH or room temperature setpoint, or CH mode active
Outdoor temperature
Daytime CH mode
Night-time CH mode
Flame detected
Error
E -Small numeric display
Displays time, parameters and error codes
F -Central heating modes:
Automatic: the boiler functions according to the set program
Daytime: the boiler operates at daytime (comfort) setpoint
Night-time: the boiler operates at night-time (reduced) setpoint
Stand-by
G -DHW mode: ON or OFF
H -Current time display

MAIN SCREEN



A1 -Functioning mode.
Press the Mode key to activate the various modes, as shown by the line under the corresponding symbol.
B1 -DHW mode.
Press the key to activate and deactivate DHW mode.
C1 -Daytime CH mode
D1 -Time of day
E1 -Current boiler temperature
F1 -Water pressure (not used)
G1 -Flame detected
H1 -Current time bar
I1 -CH mode active
L1 -DHW mode active

Notes on functioning

The control panel on the **TAU UNIT** boiler controls the following functions:

- The DHW priority function. This ensures that the boiler can still serve the central heating circuit even when domestic hot water is drawn off.

- The frost protection function.
  This stops water freezing inside the boiler. If boiler temperature falls below 5°C, the burner ignites and runs at full power until temperature reaches 10°C.
  The frost protection function is only active if an outdoor temperature sensor is connected. If outside temperature drops below -5°C the pumps are switched on. If outside temperature is between -4° and 1.5°C, the pumps are switched on for 10 minutes at intervals of 6 hours. If outside temperature is above 1.5°C the pumps are switched off.

- Overtemperature dispersal function. If the temperature threshold thermostat trips (86°C) the boiler shuts down and accumulated heat is dispersed by switching on the central heating pump. If boiler temperature rises to 89°C, the fan is switched on too.

- The cascade control function. The addition of a controller (accessory) allows you to connect a number of boilers in cascade, sharing heat output between a number of burners and improving overall system efficiency.

- Boiler switching differential. This establishes a minimum off time for the burner, to stop it igniting and shutting down repeatedly. The boiler will only start up again if the difference between the setpoint and the actual boiler temperature exceeds a predetermined value.

PROGRAMMING LEVELS

There are three programming levels:
- End user
- Installer
- Manufacturer.

You must follow a precise set of instructions to access any of these levels. The relevant instructions, complete with a list of the keys to press, are provided in the tables below.

END USER LEVEL

This level provides the parameters needed by the end user. For example, it contains parameters for setting CH and DHW functioning times and Summer/Winter mode switching temperature.

See the “Complete list of parameters” section for further details.

	Key	Explanation
1		Press one of these keys to access the END USER programming level
2		Press one of these keys until you reach the parameter you require: the example here shows the parameter Pxx
3		Press these keys to change the current value. **To memorise the new value, you need to move on to another parameter.**
4		Press one of these keys to exit the end user programming level. **Any new settings are not stored in memory.**
5		Press this key to exit the end user programming level. **Any new settings are stored in memory.**

Note 1: If no key is pressed for about 8 minutes, the display automatically returns to the main screen. Any new settings made will not be saved.

Note 2: quando si passa a un altro livello, l’impostazione è memorizzata.

INSTALLER LEVEL

Parameters in this level must only be changed by personnel from **RIELLO**'s Technical Assistance Service.
This level contains, among others, parameters for selecting the slope of the central heating 1 curve and setting the DHW reduced temperature setpoint (if an optional remote storage cylinder is connected).

See the "Complete list of parameters" section for further details.

	Key	Explanation
1		Press one of these keys to access the END USER programming level
2		Press and hold both these keys for at least 3 seconds
3		Press one of these keys until you reach the parameter you require. The example here shows the parameter Hxxx.
4		Press these keys to change the current value. **To memorise the new value, you need to move on to another parameter.**
5		Press one of these keys to exit the installer programming level. **Any new settings are not stored in memory.**
6		Press this key to exit the end user programming level. **Any new settings are stored in memory.**

Note 1: If no key is pressed for about 8 minutes, the display automatically returns to the main screen. Any new settings made will not be saved.
Note 2: quando si passa a un altro livello, l'impostazione è memorizzata.

MANUFACTURER LEVEL

Parameters in this level must only be changed by personnel from **RIELLO**'s Technical Assistance Service.
This level is reserved for the boiler manufacturer.

Using these two keys to represent the numbers

and these two keys as numbers

enter the access code : "**1 2 4 3 4**".

See the "Complete list of parameters" section for further details.

	Key	Explanation
1		Press one of these keys to access the END USER programming level
2		Press and hold both these keys for at least 6 seconds
3		Enter the access code. Provided you have entered the correct code, you enter the MANUFACTURER programming level. If you enter the wrong code, you return to the INSTALLER level.

	Key	Explanation
4		Press one of these keys until you reach the parameter you require. The example here shows the parameter Oxxx.
5		Press these keys to change the current value. **To memorise the new value, you need to move on to another parameter.**
6		Press one of these keys to exit the manufacturer programming level. **Any new settings will either be stored in memory or ignored depending on how the control board parameters are configured**.
7		Press this key to exit the manufacturer programming level. **Any new settings are stored in memory.**

Note 1: If no key is pressed for about 8 minutes, the display automatically returns to the main screen. Any new settings made will not be saved.

INFORMATION LEVELS

BASIC INFORMATION LEVEL

Press the  key to enter the basic information level. Press the  key again to scroll through the values listed below.

	Key	Explanation
1		DHW temperature
2	◄ ◄ ◄ ◄	Water pressure (not used)
3	X.	Functioning phase (see table 1)
4		Outdoor temperature
5	Ex	(Accessory) controller error codes (see the “Error codes” section)
6		Boiler temperature
7		Press one of these keys to return to the main screen

Functioning phases **(table 1)**

Number displayed	Description
00	Standby
01	Ignition prevented
02	Fan start
03	Pre-ventilation
04	Wait time
05	Pre-ignition time
06	Safety time, constant
07	Safety time, variable
10	Central heating mode
11	Domestic hot water mode
12	Simultaneous CH and DHW mode
20	Post-ventilation with last control used
21	Post-ventilation at pre-ventilation level
22	Home run (*)
99	Burner lockout (error code displayed)

(*) Home run = Boiler status after reset.

EXTENDED INFORMATION LEVEL 1: temperatures

Press the  key.

Press and hold both  keys for at least 3 seconds.

Press one of the  keys until you reach the required parameter.

Temperature

Nr	Description
b 0	Control board error code
b 1	Boiler return temperature
b 2	Not used
b 3	Flue gas temperature
b 4	Outdoor temperature
b 5	Compound outdoor temperature
b 6	Attenuated outdoor temperature
b 7	Not used
b 8	Reserved
b 9	Reserved

EXTENDED INFORMATION LEVEL 2: process values

Press the key.

Press and hold both keys for at least 3 seconds.

Press the key.

Press one of the keys until you reach the parameter you require.

Process values

Nr.	Description
C 0	Reserved
C1	Ionisation current
C 2	Fan speed
C 3	Fan control current (PWM)
C 4	Relative boiler heat output
C 5	Pump setpoint (PWM)
C 6	Differential control
C 7	Reserved
C 8	Reserved
C 9	Reserved

EXTENDED INFORMATION LEVEL 3: assistance

Press the key.

Press and hold both keys for at least 3 seconds.

Press the key twice.

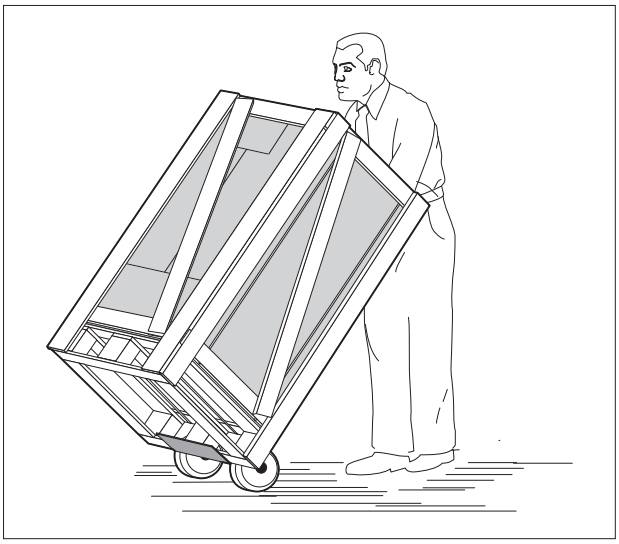
Press one of the keys until you reach the parameter you require.

Assistance

Nr.	Description
d 0	Reserved
d 1	Two stage or modulating control setpoint (PID)
d 2	Current boiler setpoint
d 3	Room temperature setpoint
d 4	DHW setpoint
d 5	Maximum modulation in central heating mode
d 6	Maximum fan speed at maximum central heating power
d 7	Reserved
d 8	Reserved
d 9	Reserved

UNPACKING THE PRODUCT

The boiler is delivered on a wooden pallet, suitably packed and protected by a wooden crate. Check immediately that there is no damage and that the boiler is exactly as ordered. The product specifications are shown on the outside of the packing: model, power, equipment, fuel type. If there is any difference between the boiler ordered and that received, contact your agent, the warehouse or the sales department at head office immediately.



OPENING

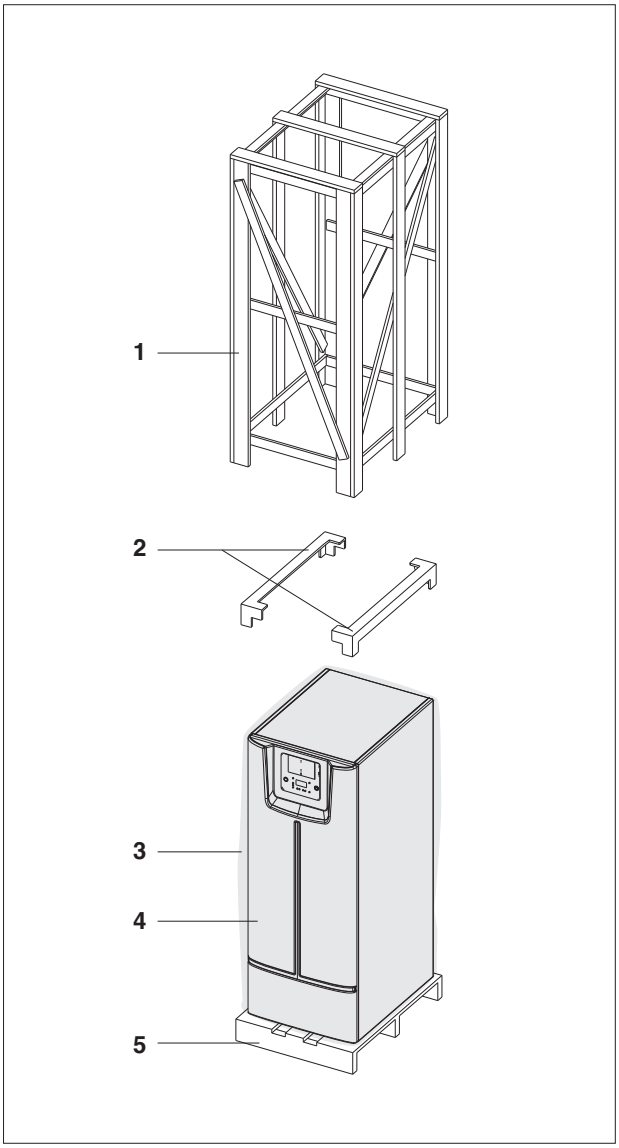
- Remove the wooden crate (1).
- Remove the polystyrene edge protectors (2).
- Pull off the protective bag (3).

1 - Wooden crate
2 - Edge protectors
3 - Protective bag
4 - Boiler
5 - Pallet

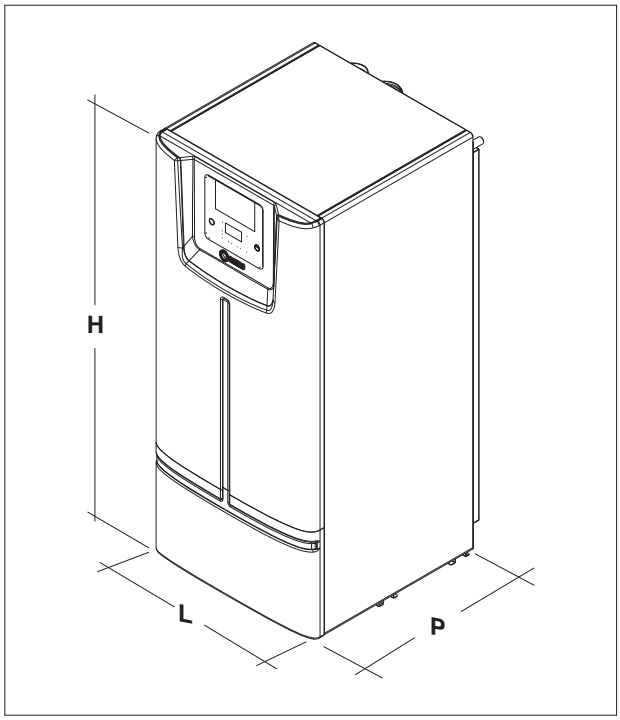
Material supplied in the bag inside the boiler:
- Outdoor temperature sensor
- Torx key for calibrating combustion parameters
- Gas change diaphragm
- Plug for control panel

⚠ Keep all the packaging material safe. Do not throw it away or abandon it as it represents a potential hazard.

⚠ Keep the documentation envelope in a safe place. Any replacement documents must be ordered from **RIELLO** who reserve the right to charge for the cost of the replacement.



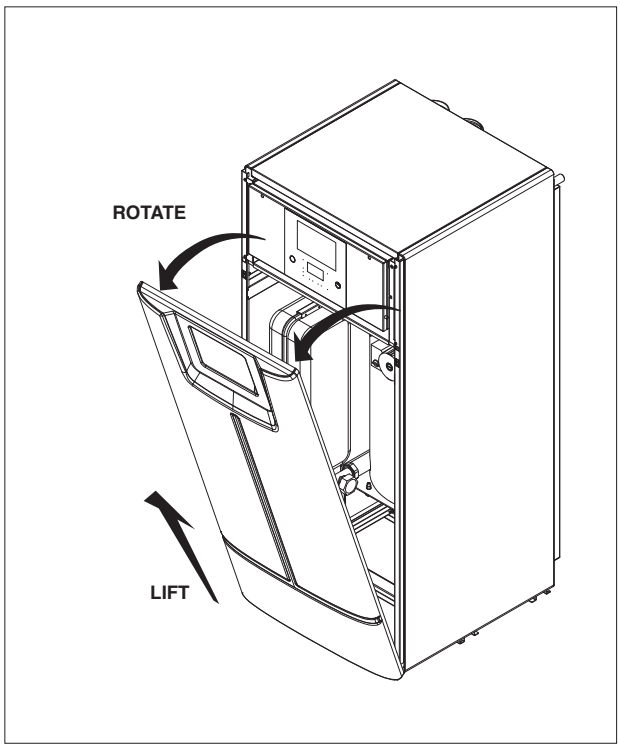
DIMENSIONS AND WEIGHT

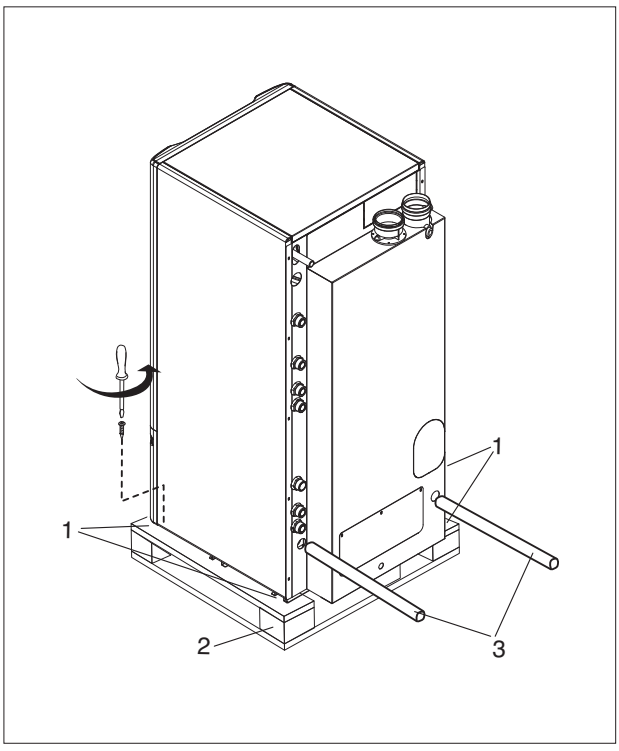


	TAU 35 UNIT
L	600
P	740
H	1365
Weight	135

HANDLING

Proceed as shown to move and handle the boiler in the boiler room:
- Pull the front panel towards you then lift it up to remove it.
- Unscrew the screws (1) securing the boiler to the pallet (2).
- Insert two pipes (3) of suitable length through the lifting holes, so that they protrude equally on both sides. Use the protruding lengths of pipe as lifting handles.





PLACE OF INSTALLATION

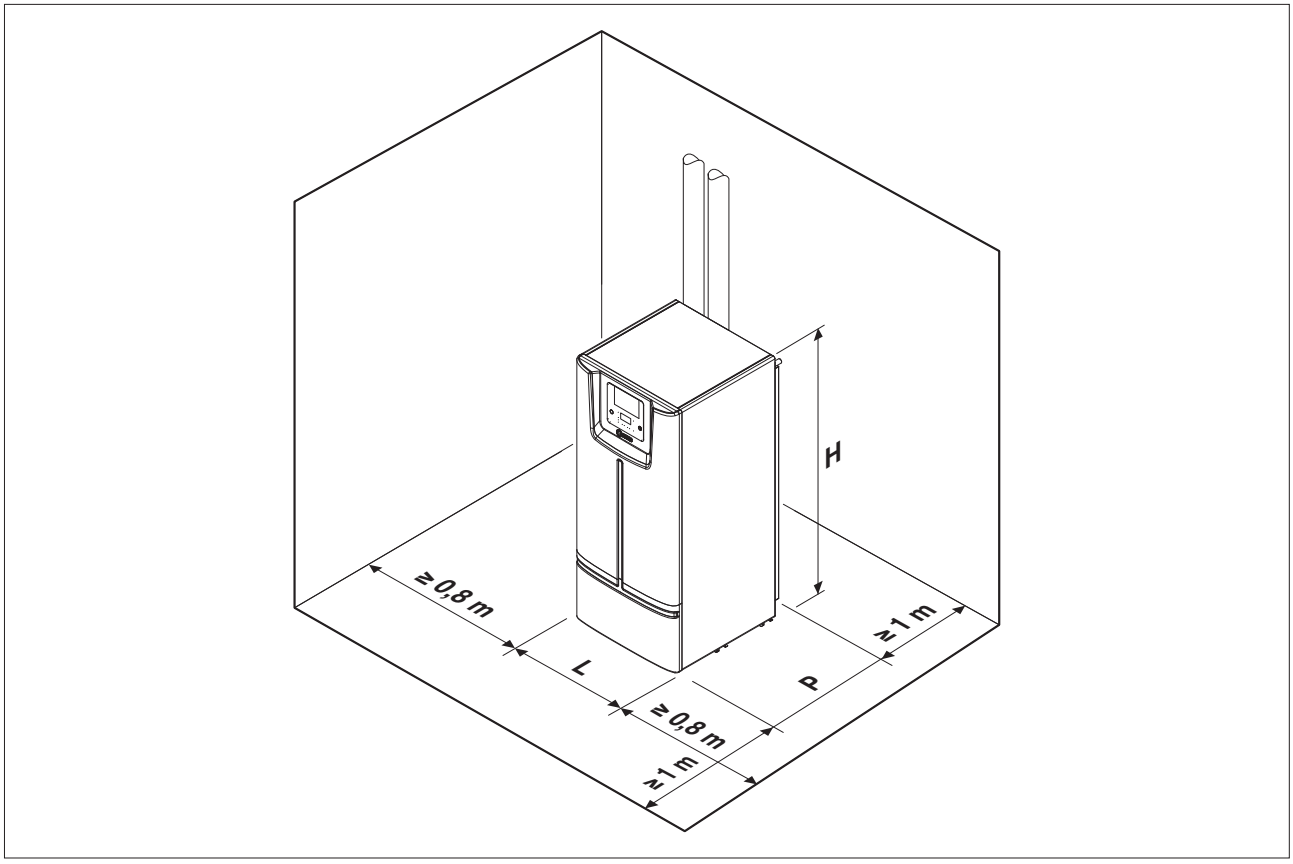
This **TAU 35 UNIT** boiler can be installed in any indoor location provided the flue gases are adequately removed and comburent air drawn in from outdoors. Provided the boiler is properly installed, the boiler room itself does not need any ventilation as such, since the combustion circuit of the **TAU 35 UNIT** boiler is sealed with respect to the environment. If instead comburent air is drawn from inside the boiler room itself, the room must have adequately dimensioned ventilation conforming to the relevant technical standards.

⚠ In Belgium, boilers must be installed according to standards NBN D51.003, NBN B61.002 (heat output < 70 kW), and NBN B61.001 (heat output >70 kW).

⚠ When installing the boiler, allow sufficient space around it to access all safety and control devices and to permit easy maintenance.

⚠ Make sure that the boiler's index of electrical protection is adequate for the characteristics of the room where it is to be installed.

⛔ These boilers must be installed indoors. They are not designed for outside use.



NOTE: See the table on the previous page for boiler dimensions.

INSTALLATION IN OLDER SYSTEMS AND SYSTEMS REQUIRING MODERNISATION

When installing these boilers in older systems or systems requiring modernisation, always perform the following checks.

- Make sure that the flue is suitable for use with condensing boilers, that it is able to withstand the temperature of the combustion gases and that it has been designed and made in compliance with applicable standards. The flue must also be as straight as possible, sealed, insulated and not blocked or choked.
- Make sure that the flue is fitted with a condensation drainage union.
- Make sure that the electrical system has been installed by a qualified electrician in compliance with applicable standards.
- Make sure that flow rate, head and direction of flow of the pumps are suitable and correct.
- Make sure that the fuel feed line and any storage tank are made and installed in compliance with applicable standards.
- Make sure that the expansion vessels are big enough to contain the volume generated by thermal expansion.
- Make sure that the central heating circuit is clean and does not contain any sludge or limescale.

INTRODUCTION

The water used in the central heating system MUST be suitably treated to ensure the correct functioning of the system and to guarantee an extended working life for the boiler and all other system components.
Sludge, limescale and other contaminants in the water supply can cause irreversible damage to the boiler even in relatively short times, and despite the use of top quality materials in its manufacture. It is common practice for water treatment to be applied only to old systems and systems already affected by limescale, deposits and sludge. In stark contrast with this practice, proper water treatment is actually essential to extend component life and to ensure the continued efficiency of new installations too.
For further technical information on water treatment, refer to the following section which contains a study published by ANICA (the Italian National Association of Steel Boiler Manufacturers), and to the appendix to this manual, which contains an extract from UNI standard 8065 governing "Water Treatment in Domestic Heating Systems". Contact RIELLO's Technical Assistance Service for further information on water additives and their use.

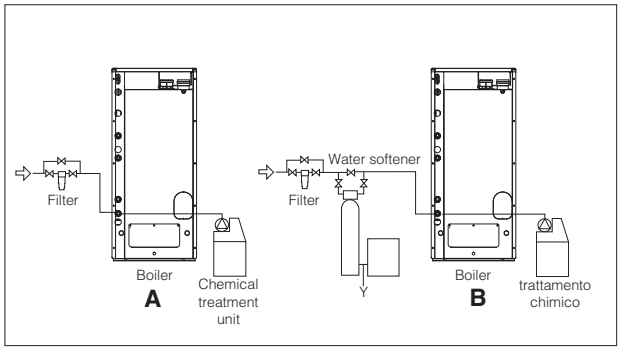
⚠ If it proves impossible to treat the heating system water supply properly because the water charging system is automatic and uncontrolled, if there are no barriers installed to prevent water oxygenation, and if the heating circuit includes an open expansion vessel, then the boiler itself must be separated from the central heating circuit by means of a heat exchanger.

Heating system water: Instructions for the design, installation and management of heating systems.

1. Chemical and physical characteristics

The reference standard UNI-CTI 8065 "Water Treatment in Domestic Heating Systems" (June 1989 edition) prescribes certain required values.
In particular, standard UNI-CT 8065 requires that the chemical and physical composition of heating system water be similar to that of drinking water.
The standard also requires that all systems be fitted with a chemical water treatment device to protect system components as well as an inlet filter to prevent solid particles from entering the system in suspension and causing corrosion or sludge.

Layout showing the water treatment devices required by standard UNI-CTI 8065, according to the system's overall heat output



A
Water treatment for heating systems:
- with heat output < 350 kW and water supply hardness <35° fr
- with heat output > 350 kW and water supply hardness <15° fr
- a filter is recommended for systems with heat output <350 kW
- a filter is obligatory for systems with heat output > 350 kW

B
Water treatment for heating installations:
- with heat output < 350 kW and water supply hardness >35° fr
- with heat output > 350 kW and water supply hardness >15° fr
- a filter is recommended for systems with heat output <350 kW
- a filter is obligatory for systems with heat output >350 kW

Chemical and physical water parameters required by standard UNI-CT 8065

PARAMETER	Unit of measure	System filling water	Circuit water
pH*		-	7÷8
Total hardness ($CaCO_3$)	°fr	<15	-
Iron (Fe)**	mg/kg	-	<0,5
Copper (Cu)**	mg/kg	-	<0,1
Appearance		Clear	Clear if possible

* The maximum limit of pH 8 refers to systems with radiators made from aluminium or light alloy elements.
** Higher pH values are indicative of corrosion.

Identification of water treatments required by standard UNI CTI 8065.

A resin ion exchange type water softener is required. The filter may be either washable or disposable.
The most suitable form of water treatment consists of the addition of specific chemical products (water conditioners) to:

- Stabilise hardness
- Disperse unwanted organic and inorganic deposits
- De-oxygenate the water and passivate component surfaces
- Correct the pH
- Form a protective film over component surfaces
- Control microbiological proliferation
- Provide anti-freeze protection

⚠ Chemical products used for water treatment must be compatible with applicable water pollution laws. Provided it is properly applied, standard UNI-CTI 8065 guarantees the safe functioning of a heating system. The desired effects of the standard may nevertheless be cancelled out by incorrect installation or system management practices, including excessive topping up and the circulation of water through open expansion vessels. The standard is often not properly respected. In particular, in existing systems, insufficient attention is paid to the characteristics of the water supply and to the need to adopt corrective measures.

2. Central heating systems

Possible causes for corrosion and limescale.
Until about twenty years ago, central heating was not in common use in the home, and heating was provided instead by systems that today are considered extremely old-fashioned. The problem of water characteristics was not therefore of any real importance. Then the energy crisis, the widespread appearance of central heating and the introduction of standards governing it stimulated boiler and heating system manufacturers to develop more sophisticated materials and more advanced (though often more delicate) high efficiency heating solutions. Unfortunately because they failed to appreciate the importance of water treatment, the excellent efficiency levels initially achieved were rapidly lost to limescale and corrosion.
Typical problems encountered in central heating systems include:
- the breakage of heated surfaces through overheating caused by the thermal insulation of limescale deposits on the water side
- oxygen corrosion
- deposit corrosion
- stray current corrosion (now rare)
- diffused and localised acid corrosion (caused by the aggressive nature of water with a pH < 7)

2.1 Limescale deposits

Limescale forms when the calcium and magnesium bicarbonates that are dissolved in the water at ambient temperature become chemically transformed when the water is heated. Calcium bicarbonate forms calcium carbonate, water and carbon dioxide, while magnesium bicarbonate transforms into magnesium hydroxide and carbon dioxide.

Calcium bicarbonate $Ca(HCO_3)_2$
----increased temperature---->
$CaCO_3 + H_2O + CO_2$

Magnesium bicarbonate $Mg(HCO_3)_2$
----increased temperature---->
$Mg(OH)_2 + 2CO_2$

Calcium carbonate and magnesium hydroxide precipitate to form insoluble deposits that adhere to and compact on surfaces to form limescale, a substance with an extremely high thermal insulating power. The coefficient of heat exchange of a 3 mm layer of limescale is the same as that of a steel sheet 250 mm thick! It has been calculated that 2 mm of limescale throughout a system causes an increase in consumption of 25%! The reactions that cause limescale to form accelerate as temperature increases. Generally speaking, if water comes from an area rich in calcium and magnesium deposits, it will be 'hard' water and perfectly capable of forming limescale at any temperature above 40°C. Inside a boiler, limescale forms mainly in areas subject to direct heat and high temperatures. That is why it is so common to find deposits localised in a few specific areas, where temperature is the highest.
A coating of limescale of only 1 mm can effectively reduce the cooling of the surface it covers. If that coating continues to increase, it can cause severe overheating in metal parts and consequent breakage through thermal stress. The water used to fill a heating system for the first time never contains enough calcium and magnesium bicarbonates to endanger the boiler. It is continuous topping up that causes thick deposits to form, leading to boiler breakdown.

2.2 Oxygen corrosion

Oxygen corrosion is the result of a natural phenomenon, the oxidation of steel. In nature, iron does not occur in its pure state, but always in combination with other elements and nearly always with oxygen (as ferrous or ferric oxide). Iron can only be separated from its oxygen bond in a blast furnace capable of smelting the ore.
Once solidified in the form of steel (and therefore combined with other elements), iron inevitably tends to re-absorb oxygen from the surrounding air or water in order to re-establish its original equilibrium.
This is the explanation behind the normal process of oxidation. The steel sheets and tubes inside a boiler or heating system absorb oxygen not from the water (H2O), but from micro-bubbles of air naturally dissipated in it.

Remember that air dissolved in water has an oxygen content of around 35%, far higher than air in its natural gaseous state.
It is therefore particularly easy for steel that comes into contact with water in heating systems to absorb oxygen from the micro-bubbles contained in it to form the characteristically red coloured ferric oxide Fe2O3 (rust).
4Fe + 3O2 = 2Fe2O3 (ferric oxide, or rust). If not prevented, oxidation inevitably leads to a reduction in the original thickness of the metal, and eventually to its complete penetration. Corrosion is easily recognisable from the formation of small round pock-marks (like tiny craters) in the surface of the metal. If corrosion ever penetrates all the way through a boiler part, massive leakage is inevitable. Oxygen corrosion affects metal throughout the heating system and not just at determined points. It is therefore a particularly destructive form of corrosion. Furthermore, because it cannot be repaired, it can easily cause permanent leakage from the circuit. If, on the other hand, the system is well protected from the outside world and top-ups of fresh water are not continuously added, the oxygen content in the circuit gradually diminishes.
little oxidation that does occur occurs in a reduced oxygen environment forms black magnetite (Fe3O4), which actually protects steel surfaces against further attack.
3Fe + 2O2 = Fe3O4 (triiron tetraoxide, or magnetite)

2.3 Deposit corrosion
Deposit corrosion is an electro-chemical phenomenon caused by the presence of foreign bodies (sand, rust, etc.) in the water mass. These solid substances generally form deposits (sludge) in the bottom of the boiler.
The lower parts of the boiler can therefore be affected by a chemical reaction of micro-corrosion caused by the electrochemical potential difference created between the metal (steel) and the impurities around it.

2.4 Stray current corrosion
Stray current corrosion is actually very rare today, but can be caused by the different electrical potentials of the boiler water and the metal body of the boiler or piping creating a cathode/anode effect.
All metal parts of the boiler should therefore be connected to an efficient ground (earth) point, even though this form of corrosion is actually caused by the passage of DC current, no longer used for domestic power. Stay current corrosion is easily identified by the regular tiny conical holes it leaves.

2.5 Diffused and localised acid corrosion
Other forms of corrosion exist that are harder to see but nonetheless serious because they affect the entire heating system and not just the boiler.
These forms of corrosion are generally due to the water becoming acidic (pH < 7), and are caused by:
- Incorrect water softening and the presence of carbon dioxide (which lowers the water's pH). Carbon dioxide is released more easily in softened water and also forms during the limescale formation process.
Acid corrosion is diffuse and attacks the entire circuit more or less uniformly. - Incorrect acid washing (e.g. washing done without a passivating agent).
Acid introduced into the circuit can cause localised perforation if it is not properly removed from all parts of the system.
The formation of corrosion can easily be detected by analysing the chemical composition of the water.
Even a minimal iron content is a clear sign that corrosion is occurring.

⚠ The technical details provided in this section refer specifically to domestic and industrial hot water heating systems with working temperatures up to 100 °C.
Users of this type of heating system (unlike users of steam and super-heated water systems) frequently underestimate the potential problems caused by failure to perform proper water treatment and by system design and operating errors.
Unfortunately, failure to cater for the risks involved often leads to serious damage to the boiler and to the entire circuit. In Italy, Article 7 of Law 46/90 governing the treatment of potable water, states that central heating systems and domestic hot water production systems must be constructed according to UNI and CEI reference standards (UNI 8065).
Depending on the conditions of the water supply, suitable treatment systems must be built in from the design stage to ensure that the water used meets the relevant requirements. The system operator must likewise maintain the system within the specified operating limits, using all necessary checks and actions to do so.

3. New central heating systems
Mistakes to avoid and precautions.

From what has been said above we can see that it is essential to avoid two main factors that could lead to corrosion. These are contact between the water in the system and the air and the continuous addition of fresh water to the circuit. To eliminate contact between system water and the air (thus avoiding oxygenation of the system water), we need to:

- ensure that the expansion vessel is a closed vessel, and of the correct size and pre-charge pressure (the pressure to be checked periodically);
- ensure that the system is always kept at a pressure higher than atmospheric pressure at all points (including the pump suction side) and at all operating conditions (precisely because the seals, gaskets and joints in a water circuit are designed to resist pressure from within, but not to resist a vacuum within);
- ensure that no part of the system is made from materials that are permeable to gases (e.g. plastic pipes with no oxygen barrier destined for under-floor heating systems).

⚠ The original system filling water and any topping up water must always be filtered (using synthetic or metal mesh filters with a filtration rating of no less than 50 microns) to prevent sludge from forming and triggering deposit induced corrosion.

⚠ Loss of water from the system, and the consequent need to add water, can be caused not only by leaks from the circuit, but also from the incorrect sizing of the expansion vessel and by an incorrect initial precharge pressure. (If normal thermal expansion causes pressure in the system to increase beyond the setting of the safety valve, the safety valve will keep opening continuously.)

In theory, once filled and bled of all air, a heating circuit should not need any further topping up.
If it does, one of the problems listed above is inevitably occurring. Any top-ups need to be monitored (by a counter), treated and recorded in the heating system's technical log.
It is simply not enough to rely on the reassuring presence of a water softener in conjunction with an automatic filling system. The continuous addition to a system of water softened to 15 °fr will quickly cause deposits/limescale to form on the boiler parts, especially at the hottest points.
Systems should also be heated up slowly the first time they are switched on, then taken to maximum working temperature to facilitate de-aeration (since gas will not be released from the water at low temperatures). If more than one boiler is installed in a large system, all boilers must be switched on at the same time to ensure that the initial small precipitation of limescale is uniformly distributed.

4. Reconditioning old heating systems
Frequent mistakes and necessary precautions.

Frequently, when old central heating systems are reconditioned, especially when old boilers are replaced, it is impossible to make any modifications to the existing circuit.
Nevertheless, failure to pay any attention to the problems involved can cause rapid damage to the new boiler.
Over years of functioning, a protective black coating may well have built up inside an old circuit. This coating (formed mainly from magnetite, Fe_3O_4, which forms when iron oxidises in an oxygen starved environment) actually offers effective protection against further corrosion.
If new parts with clean metal surfaces, especially boilers, are fitted in an old system, they inevitably become the sacrificial anode for the entire heating circuit. If leaks from a system cannot be repaired and topping up is therefore inevitable, great care must be taken in finding a solution to the problem, and particularly in choosing the water treatment system to use. Water treatment systems should be similar to those used in steam heating systems to fully decalcify the incoming water (hardness <0.5°fr) while maintaining a non-aggressive pH.
Film-forming de-oxidising agents will also have to be dosed in, and a physical filtration system fitted to prevent any impurities entering the circuit.
The reconditioned system must then be started up as instructed above.

The following notes deal with a number of important issues, and can be of help in reconditioning old systems and in guaranteeing the correct functioning of new boilers over time.

- If an old heating system has an open expansion vessel, this should be converted to a closed vessel if at all possible. Today, this conversion can be performed without unduly affecting the working pressure in the system. This modification solves many of the problems caused by contact between system water and the air (corrosion etc.) and avoids having to condition the water with de-oxidising products, which would otherwise have to be added at regular intervals in an open vessel system.
- If an old system has a very large circuit or is a radiant panel system connected by plastic pipes with no oxygen barrier, the boiler water circuit should be separated from the heating water circuit by installing a heat exchanger made from corrosion resistant material. This enables the new boiler to remain protected even in old systems that cannot be modernised.

5. Eliminating air and gas from central heating systems.

Another problem that is frequently ignored, even when designing new heating systems, is the need to eliminate the air and other gases that form in the circuit.
Many designers seem to think that after a system has been filled and bled for the first time, further bleeding will not be necessary.
Systems are therefore often made without suitable bleed points, of with incorrectly located vent valves.
The automatic vent valves that are installed are often too small. These become blocked as soon as the system is filled, simply because the union between the valve and the pipe is too small, and only big enough to let the tiniest of bubbles through. Remember that air and gas in the water circuit not only cause the corrosion problems listed above, but also reduce thermal efficiency, cause pump malfunctioning and noise and vibration throughout the circuit.
Bubbles of air and gas inevitably form in heating circuits during normal functioning, especially if the precautions listed above are not fully respected. In particular:

- as temperature increases, oxygen becomes less water-soluble and bubbles therefore begin to form;
- CO2 (carbon dioxide) is generated as the carbonates of calcium and magnesium precipitate out;
- the chemical oxidation of the metals in the system also generates hydrogen.

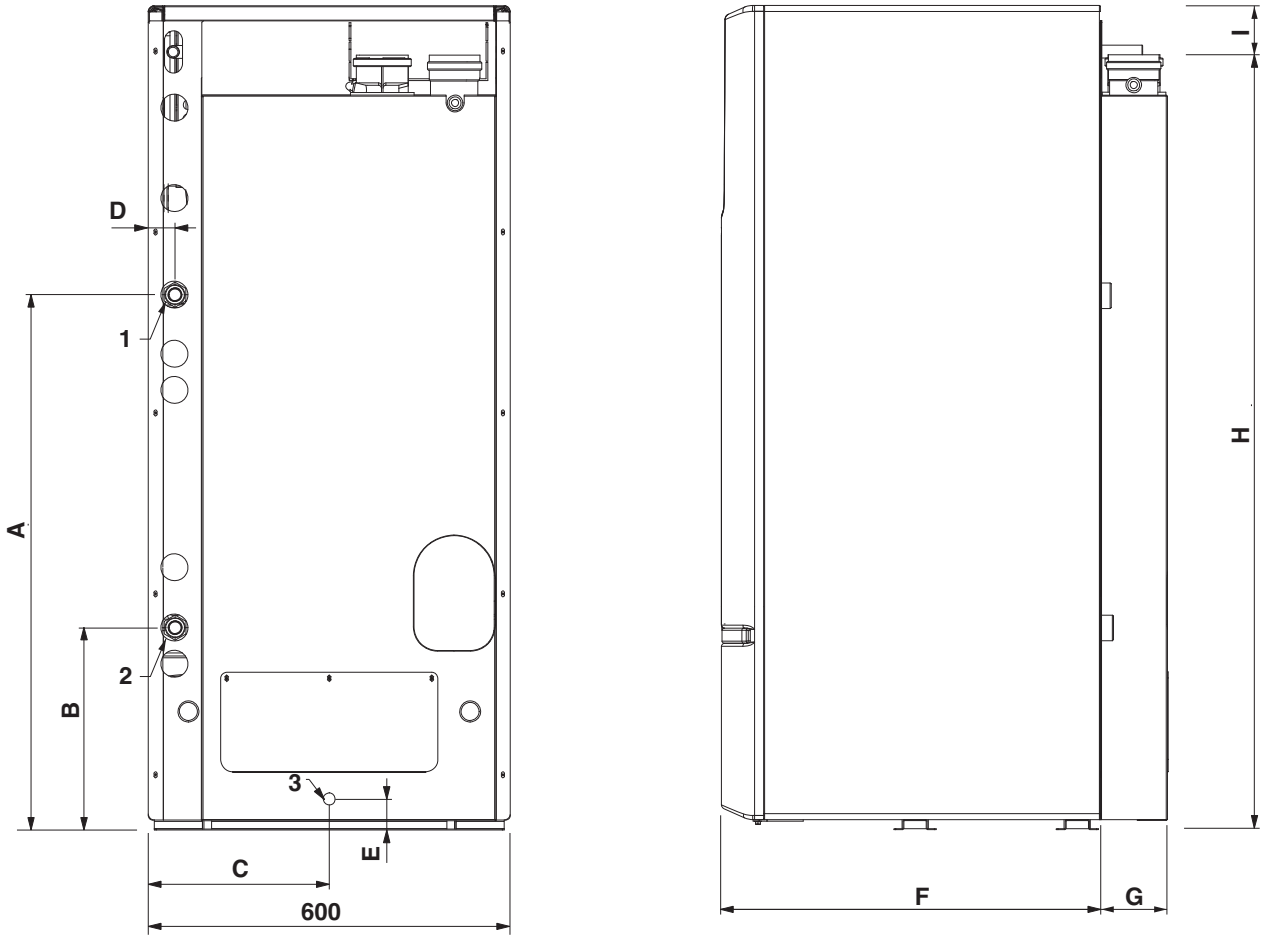
These gases have to be eliminated as they are formed, and this means that the system needs to be designed and installed so that all gases can be vented quickly, easily, and effectively.
One solution is to install a gas collection tank at the highest point of the circuit, with a suitably sized manual bleed valve.
Automatic vent valves cannot be used in these applications because the tank would simply fill with water and not function properly.

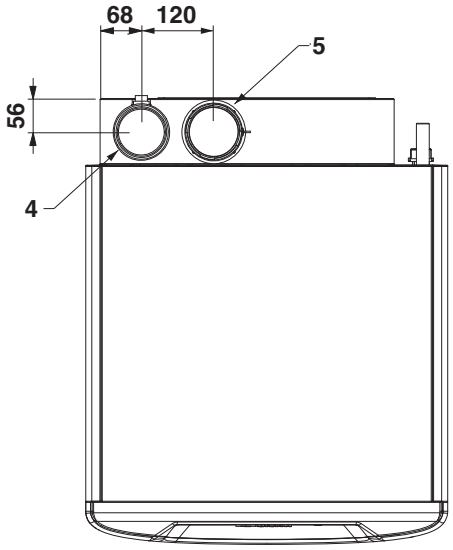
Conclusions
Experience confirms that underestimating the problems described above can have serious consequences, including damage to the boiler and other parts of the heating system. If this happens, blame is often shifted on to the boiler itself.
It is accused of 'producing too much air', or 'furring up because of poor circulation', or 'corroding because of poor quality materials' etc.. Since boilers nowadays are made to excellent quality standards, the real causes are to be sought elsewhere. Never forget that proper water conditioning and proper heating system design not only guarantee safety and security but also ensure significant savings in maintenance costs and overall thermal efficiency.

Finally, never forget that boiler failures caused by encrustation and corrosion are not covered under the terms of the warranty.

TAU UNIT boilers are designed and made for installation in combined central heating and domestic hot water production systems.
The water fittings have the following specifications:

TAU 35 UNIT

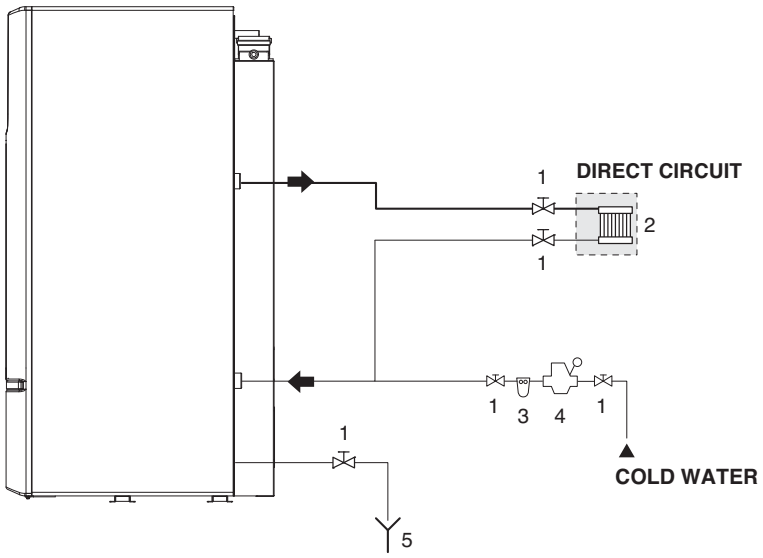




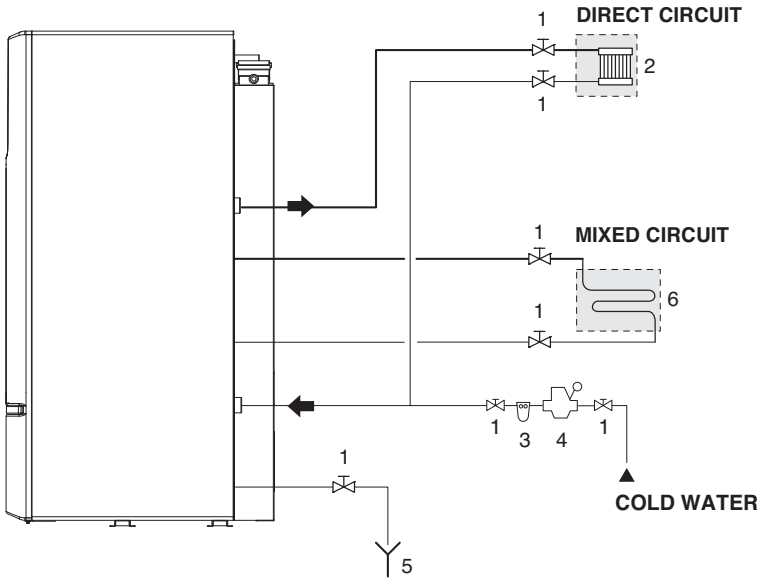
	TAU 35 UNIT
A	887
B	335
C	300
D	43
E	52
F	628
G	112
H	1285
I	80
1 - Central heating flow	-
2 - Central heating return	1"
3 - Condensate drain siphon	Ø 20
4 - Flue gas exhaust	Ø 80
5 - Air intake	Ø 80

Typical water system schematics

TAU UNIT: basic configuration



TAU UNIT: configuration with accessory kit installed



1 - Isolating valve
2 - High temperature heating system user points
3 - Softener filter
4 - Pressure reducer
5 - Drain
6 - Low temperature heating system user points

DRAINING THE CONDENSATE

⚠ **Always maintain a slope "i" of over 3° and ensure that the diameter of any hose used is greater than that of the boiler's own condensate drain pipe.**

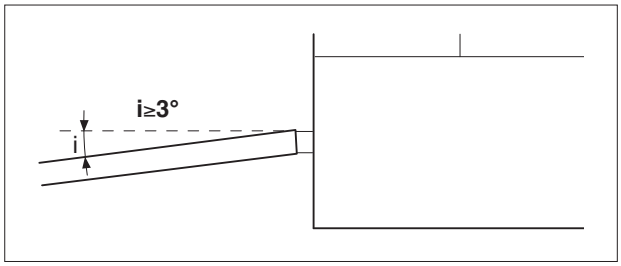
⚠ The connection to the waste water drain must be made in compliance with national and local legislation and standards.

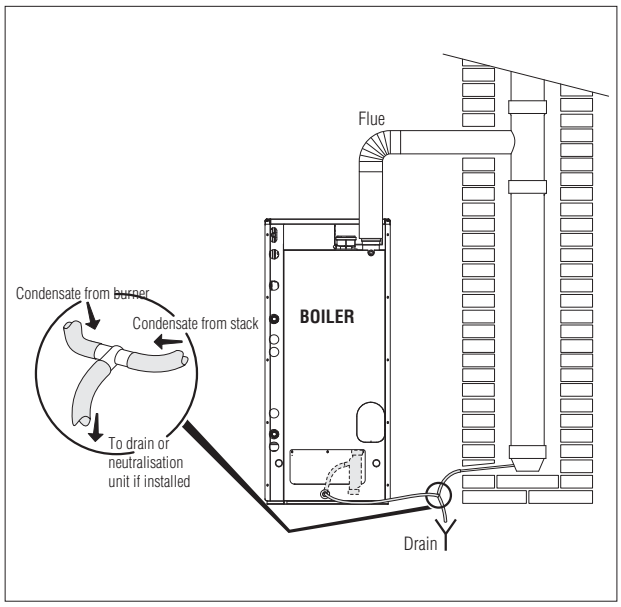
⚠ Fill the siphon with water before you start up the boiler to prevent products of combustion escaping into the room during the first few minutes of boiler functioning.

⚠ **Condensate from the boiler and from the flue should be channelled to the same drain point.**

⚠ The surface on which the boiler stands must be perfectly horizontal and flat over the entire area of the boiler frame in order to avoid condensate drainage problems.

⚠ Any condensate neutralisation units deemed necessary may be connected downstream from the siphon. Evaluate the neutralisation unit after one year of operation to estimate the duration of the neutralisation charge. The total duration of the charge can be estimated from the level after one year.





CONDENSATE NEUTRALISATION UNIT

NEUTRALISATION UNIT TYPE N2

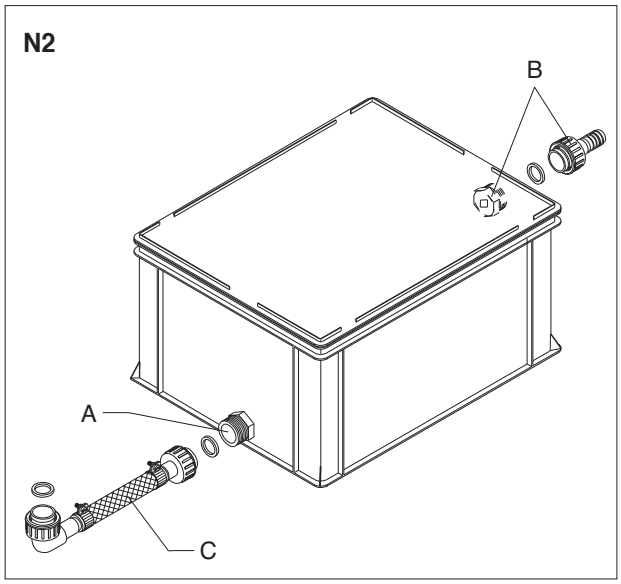
N2 neutralisation units are designed for systems with boiler condensate drain pits located at a lower level than the boiler condensate drain fitting. These neutralisation units do not require any electrical connections.

Type	Q.ty of granulate	Dimensions (mm)	Ø Fitting
N2	25 kg	400x300x220	1"

The inlet fitting (A) of the N2 neutralisation unit (the lower fitting) must be connected to the boiler condensate drain fitting using the flexible hose (C) supplied. This condensate drain hose is specially made to prevent combustion fumes escaping into the atmosphere.

The outlet fitting (B) of the neutralisation unit (the top fitting) must be connected to the boiler room's waste water drain pit using another section of flexible hose (not supplied).

⚠ The boiler room's condensate drain pit must be located at a lower level than the fitting (B) on the neutralisation unit.



⚠ All connecting hoses must be kept as straight and as short as possible. Any curves or sharp bends can lead to the hoses becoming clogged and can therefore prevent proper condensate discharge.

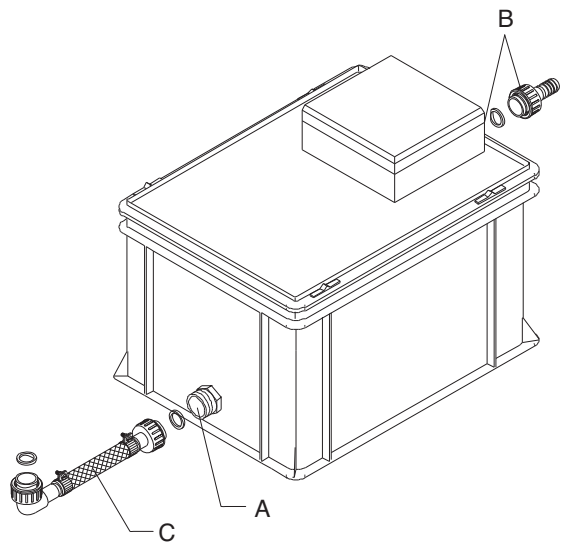
If it ever proves necessary to neutralise the condensate that forms in the flue gas stack, connect the condensate drain fittings of the boiler and flue gas stack together using a 'T' union and connect the leg of the 'T' to the inlet of the N2 or neutralisation unit.

⚠ Make sure that you tighten the hose clamps sufficiently.

NEUTRALISATION UNIT TYPE HN2 (WITH PUMP)

HN2 neutralisation units are designed for systems with boiler condensate drain pits located at a higher level than the boiler condensate drain fitting.
The maximum head that the pump can overcome is 3 metres. The pump is controlled by an electrical level switch in the HN2 neutralisation unit. Refer to the instructions provided to connect these neutralisation units up electrically. These units have an electrical protection rating of IP44.

HN2

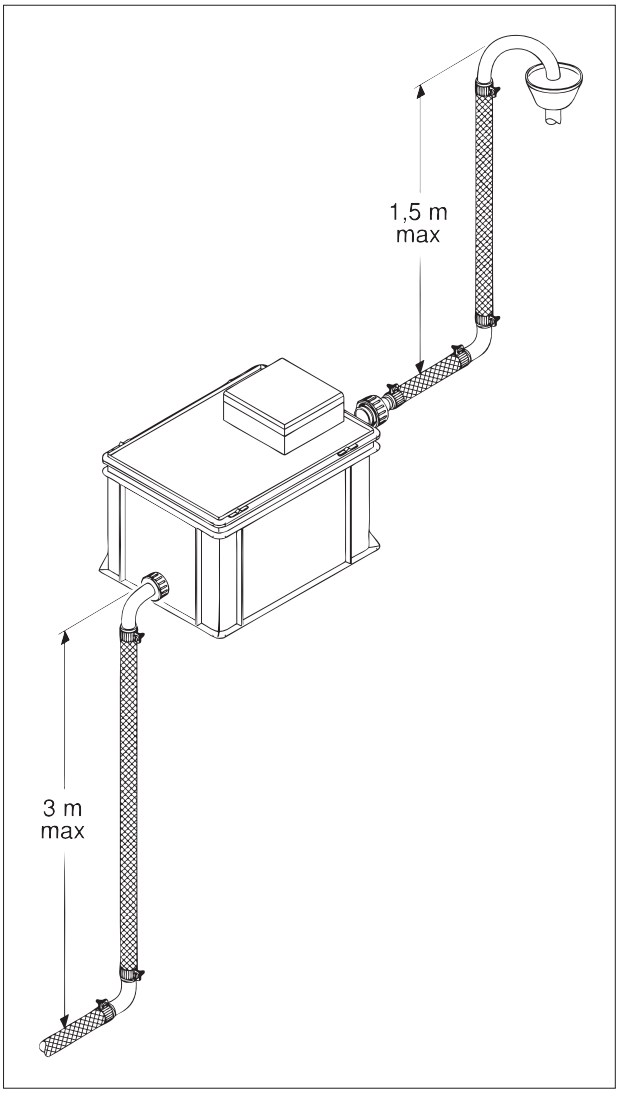


Type	Consumption (W)	Power supply (V-Hz)	Condensate flow (l/m) (*)	Dimensions (mm)	Q.ty of granulate (kg)	Fitting Ø
HN2	50	230-50	12	400x300x220	25	1"

(*) with head = 3m

The inlet fitting (A) of the HN2 neutralisation unit (the lower fitting) must be connected to the boiler condensate drain fitting using the flexible hose (C) supplied. This condensate drain hose is specially made to prevent combustion fumes escaping into the atmosphere.

The outlet fitting (B) of the neutralisation unit (the top fitting) must be connected to the boiler room's waste water drain pit using another section of flexible hose (not supplied).



IMPORTANT

The boiler room's condensate drain pit must be located no more than 1.5 metres above the neutralisation unit.

⚠ All connecting hoses must be kept as straight and as short as possible. Any curves or sharp bends can lead to the hoses becoming clogged and can therefore prevent proper condensate discharge.
Hoses should also be fixed to the floor and suitably protected whenever possible.

MAINTENANCE

The neutralisation unit should be serviced at regular intervals (at least once a year) or as needs require. The frequency of servicing depends on the characteristics of the system. When servicing the unit, always check the level of the granulate. The minimum granulate level is 15 cm below the top of the granulate box. The initial charge of neutralisation product should be enough to last at least one season of heating operation with maximum condensate formation.
The easiest way to check the correct functioning of the neutralisation unit is to use litmus papers for pH testing. These are readily available from chemists' shops and chemical suppliers. Treated condensate leaving the unit must have a pH between 6.5 and 9. If limescale forms on the surface of the neutralisation unit, replace the entire granulate charge.

GAS CONNECTION

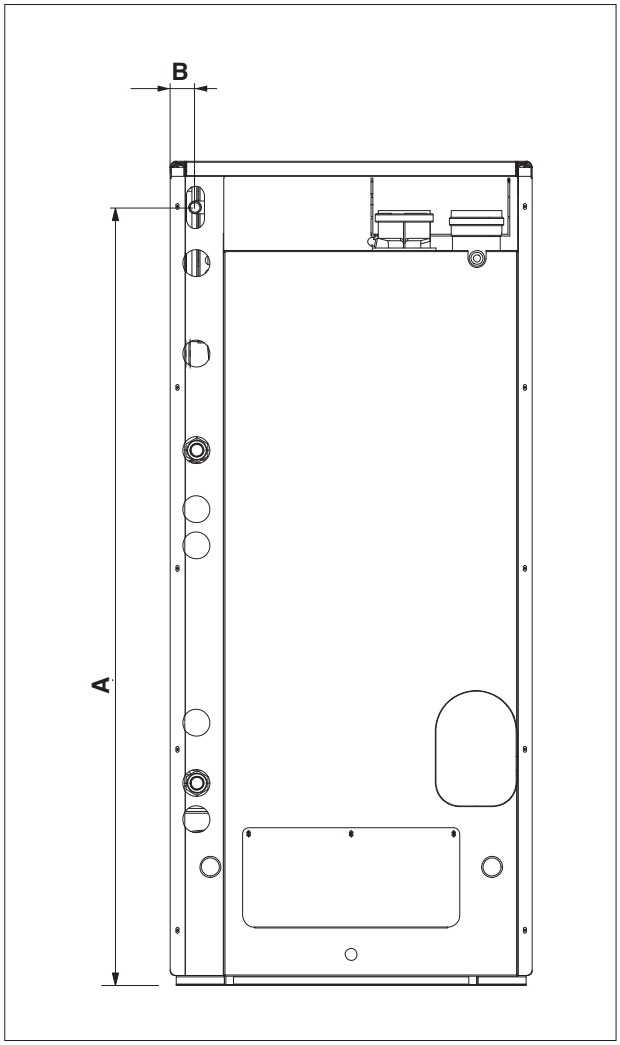
RIELLO TAU UNIT boilers must be connected to the methane or LPG gas supply in compliance with the relevant standards.

Perform the following checks before making the connection:
- Check that the boiler is compatible with the type of gas supply
- Check that the gas supply pipes have been thoroughly cleaned.

A filter of suitable particle rating should be installed.

⚠ The gas feed line must be suitable for the flow rate demanded by the burner. The gas feed system must also be equipped with all the necessary safety and control devices required by applicable legislation and standards.

⚠ On completion of the installation, check that all joints are sealed.



	TAU 35 UNIT
A	1290
B	43
Gas fitting	Ø 1/2" M

CH FROST PROTECTION

TAU UNIT condensing boilers are equipped with an electronic frost protection system. This system starts up the boiler if temperature drops below a certain threshold.

⚠ No special anti-frost additives are therefore needed, unless the system is to be completely shut down for an extended period of time.

⚠ If you do use anti-freeze in the system, make sure that it is of the type that does not attack steel.

FLUE GAS VENT AND COMBURENT AIR INTAKE

TAU UNIT boilers are sealed boilers belonging to classes C13, C23, C33, C43, C53, C63 and C83. The boiler room does not therefore require air vents. The boiler room nevertheless does require safety vents for use with gas fuels (METHANE and LPG).

Vents and intakes must be made in conformity to applicable national, regional, and local standards. (In Italy refer to UNI - CIG 7129/92 standard).

Combustion fumes leave the heat exchanger at an average temperature of 5-10°C above the temperature of the CH return. This makes it possible to use aluminium or polypropylene pipes of 80mm in diameter for both the air intake and the flue gas vent.

To protect the vent pipes against possible damage, **TAU UNIT** boilers are equipped with a flue gas temperature thermostat (as required by European standard EN 677).

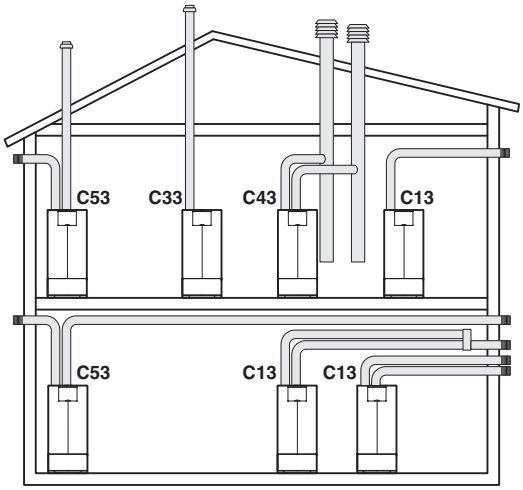
⚠ **Use of a high head fan allows twin flue pipes (intake and vent) to reach lengths of up to 40 metres.**

⚠ Caution! Do not connect the vent flue directly to existing flues used to serve other appliances (cookers, other boilers, etc.). Larger disused flues can nevertheless be used as ducts for routing the boiler's intake and vent flues.

⚠ If the vertical section of vent flue is over 4 metres in height, a condensate drain must be provided at its bottom. This drain point must be connected to the boiler's own condensate collection tank described in the "Draining the condensate" section.

⚠ The horizontal sections of the vent flue must slope down to the boiler at a gradient of at least 3%.

⚠ Never connect two boilers to the same vent flue. Each boiler must have its own dedicated vent flue.



C13 Concentric wall vent. Twin flue pipes can also be used, but the wall through-pipes must be concentric or located close enough to be subjected to similar wind conditions.

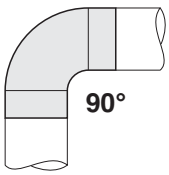
C33 Concentric roof vent. Outlets as for C13.

C43 Vent and air intake via shared twin pipes, subjected to similar wind conditions.

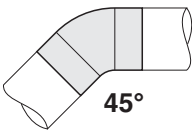
C53 Separate wall or roof vent and air intake, in areas of different pressure

⚠ In Italy, refer to Presidential Decree no. 412 and UNI CIG 7129 standard.

TWIN FLUES (Ø 80):



Pressure drop per 90° curve = 0,8m



Pressure drop per 45° curve = 0,5m

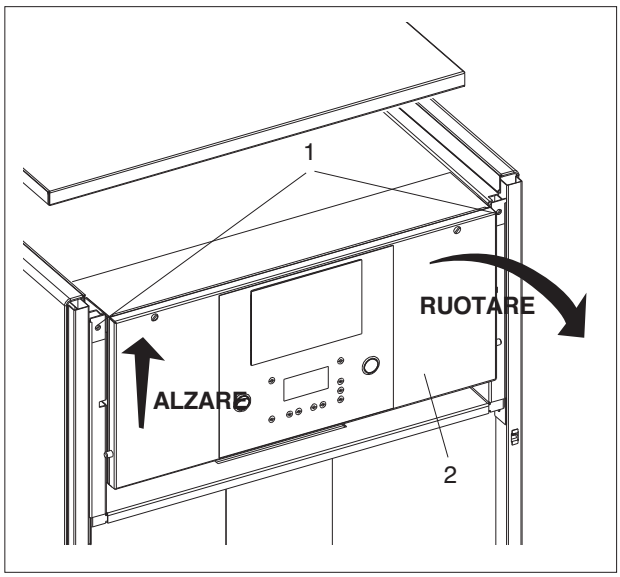
TAU UNIT condensing boilers are fully wired in the factory. Only the following electrical connections remain to be made:

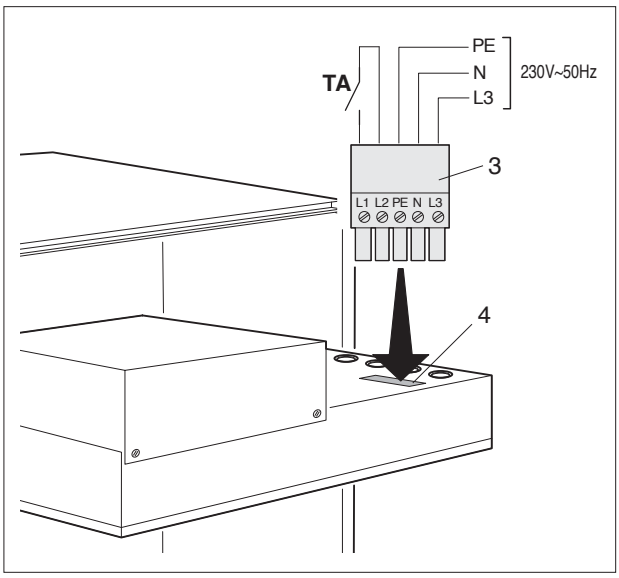
- mains electricity supply;
- room thermostat;
- outdoor temperature sensor;
- storage cylinder pump (if relevant).

Proceed as follows to make these connections:
- Remove the front and top panels from the boiler.
- Unscrew the screws (1) then lift and rotate the control panel (2).
- Connect up the connector (3) and plug it into its socket (4) in the rear of the control panel.

Once you have made all the necessary connections, close the control panel, reversing the steps followed to open it.

See pages 38 and 39 for information on how to connect the temperature sensors and pumps.





⚠ The following instructions are mandatory:

1 - Use a multi-pole magnetic thermal trip switch and disconnector conforming to IEC-EN standards (with a contact gap of at least 3 mm).
2 - Respect the L1 (Phase) - N (Neutral) and PE (ground) connections. Keep the ground wire about 2 cm longer than the power wires.
3 - Use cables with a cross section of 1.5 mm2 or more, complete with end terminals.
4 - Always refer to the electrical wiring diagrams in this manual when performing any electrical work. 5 – Make sure the appliance is connected to an efficient ground.
5 - Make sure the appliance is connected to an effective ground.

⛔ It is strictly forbidden to use fuel and/or water pipes to ground the appliance.

⛔ Do not route the power cable or room thermostat cables near hot surfaces (like heating circuit flow pipes). Use a suitable class of cable if there is any possibility of contact with parts at temperatures above 50°C.

The manufacturer declines all responsibility for damage caused by failing to ground the appliance adequately or by failure to respect the wiring diagrams provided in this manual.

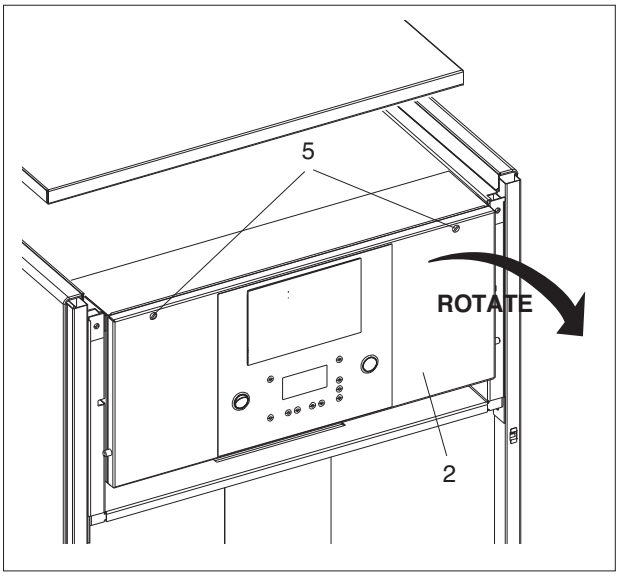
SENSOR CONNECTIONS

Proceed as follows to access the control panel terminal strip.

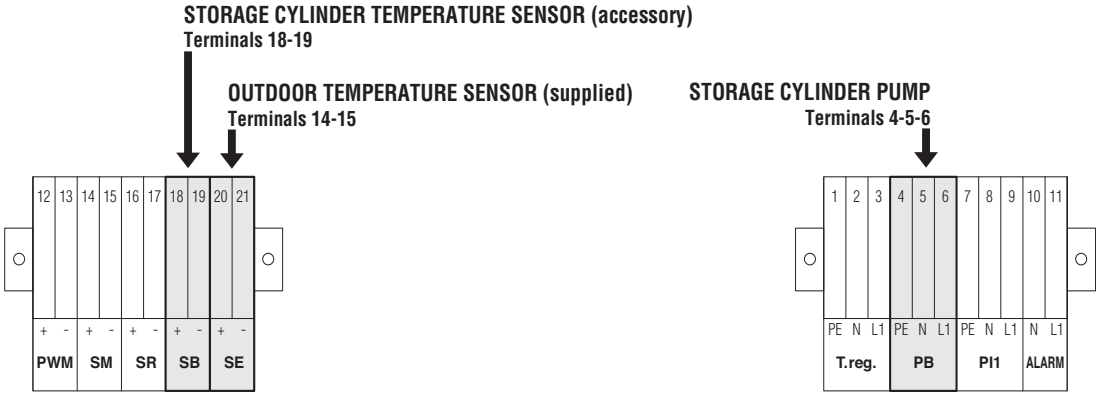
- Unscrew the screws (5) and rotate the control panel (2) outwards

- Route the connection cables through the cable grommets in the rear of the control panel and the slots inside the front of the panel.

Once you have made all the necessary connections, close the control panel, reversing the steps followed to open it.



The control panel terminal strip



SM	- CH flow temperature sensor	T.reg	- Connection for temperature controller (accessory)
SR	- CH return temperature sensor	PB	- Storage cylinder pump
SB	- Storage cylinder temperature sensor (accessory)	PI1	- CH pump
SE	- Outdoor temperature sensor (supplied)	ALARM	- 230 Vac output for burner lockout indicator
		PWM	- Modulating pump (accessory)

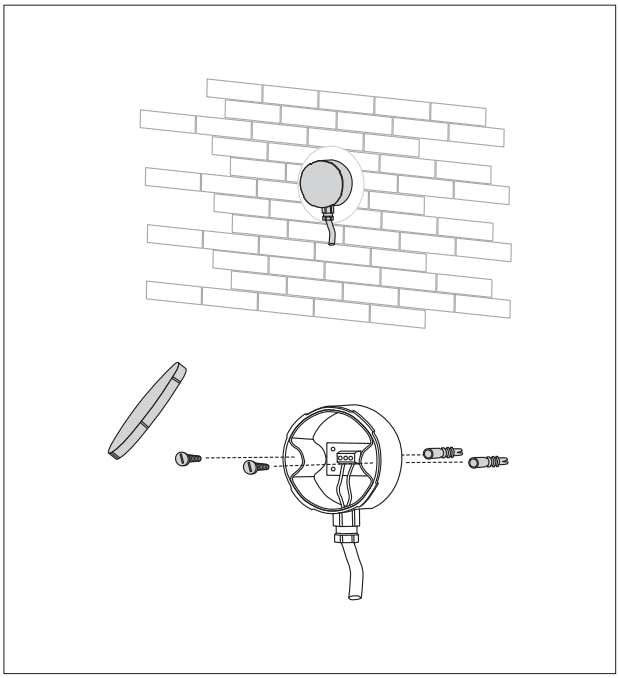
⚠ If a storage cylinder is present, the storage cylinder temperature sensor must be located according to the instructions provided with the storage cylinder.

⚠ For information on how to connect up additional kits, refer to the instructions provided with the kits themselves.

Correct positioning of the outside temperature sensor is essential to proper indoor climate control.
The sensor must be installed outside the building to be heated, about 2/3 of the way up a NORTH or NORTH-WEST facing wall, well clear of any flues, doors, windows and out of direct sunlight.

Fixing the outdoor temperature sensor to the wall

- Unscrew (anti-clockwise) the cover from the sensor casing to access the sensor terminals and fixing holes.
- Use the sensor casing as a template to mark the drilling points on the wall.
- Remove the sensor casing and drill 5x25 holes for the expansion plugs.
- Fix the sensor casing to the wall using the two expansion plugs provided.
- Unscrew the nut on the cable guide and insert a two core cable (with cross section between 0.5 and 1mm2, not supplied) to connect the sensor to terminals 20 and 21 in the boiler (see diagram on previous page).
- Connect the two wires of the cable to the sensor terminals. Polarity is irrelevant.
- Tighten the nut on the cable guide and fit the cover on the sensor casing.



⚠ Position the outdoor temperature sensor on a smooth area of wall. Prepare a smooth contact area for the sensor casing if the wall is made from exposed brick or other rough material.

⚠ Avoid joins in the cable between the outdoor temperature sensor and the control panel. If different cable lengths have to be joined, make sure that the joins are sealed and adequately protected.

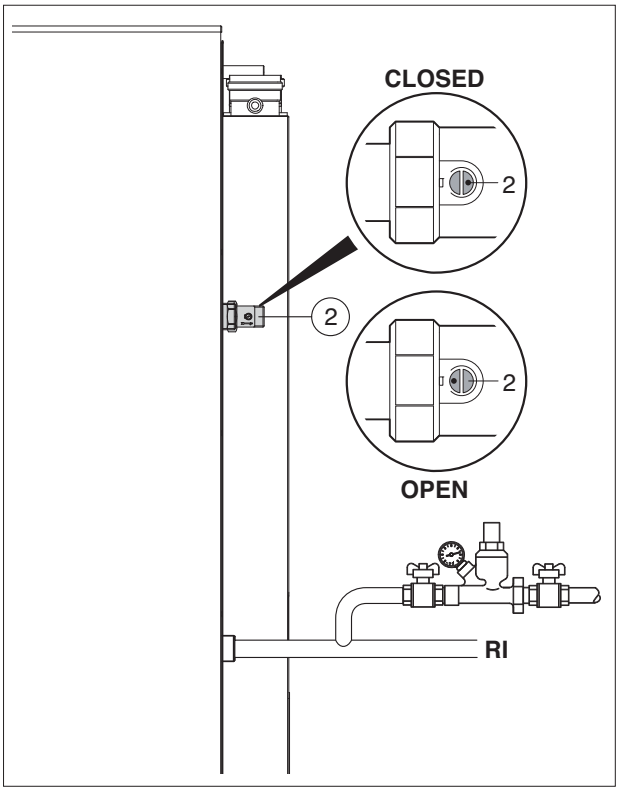
⚠ If cable ducts are used to route the sensor connection cable, keep these well clear of any power cables (230Vac).

Correspondence table

Measured temperature (°C) – Resistance of outdoor temperature sensor (Ω).

T (°C)	R (Ω)	T (°C)	R (Ω)	T (°C)	R (Ω)
-50	43907	-5	3600	40	574.7
-45	31840	0	2857	45	482.8
-40	23374	5	2284	50	407.4
-35	17359	10	1840	55	345.3
-30	13034	15	1492	60	293.8
-25	9889	20	1218	65	250.8
-20	7578	25	1000	70	214.9
-15	5861	30	826.8	75	184.8
-10	4574	35	687.5		

TAU 35 UNIT boilers require a filling pipe connected to the central heating circuit return pipe.



FILLING THE SYSTEM

- Make sure that the boiler's central heating drain cock (1) is closed before you start filling the system.

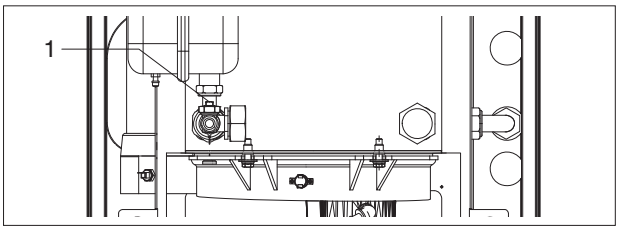
- Open the non-return valve (2) at the rear of the boiler to facilitate filling. See the figure to ascertain the correct position for the dot on the screw.

- Open the central heating circuit shut-off cocks and slowly fill the system until the pressure gauge reads out value of 1.5 bar (cold).

- Close the central heating circuit shut-off cocks.

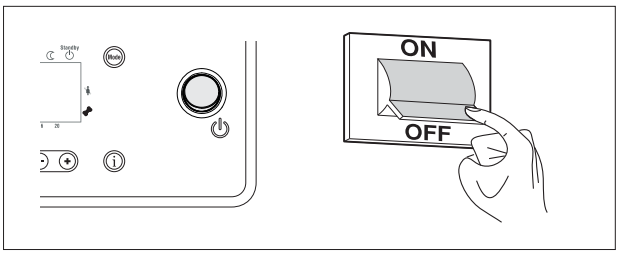
- Close the non-return valve (2). See the figure to ascertain the correct position for the dot on the screw.

NOTE
The system is de-aerated automatically through the vent valves providedv.



DRAINING

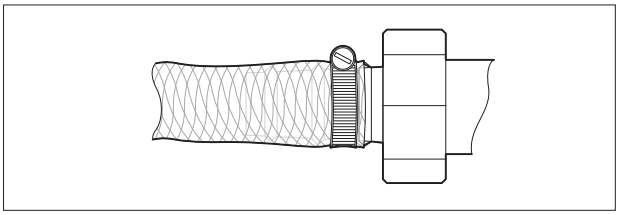
Switch the electricity supply OFF at the system's main switch and at the control panel before starting to empty the boiler.



- Close the shut-off cocks for the central heating circuit.

- Open the non-return valve (2) at the rear of the boiler to facilitate draining. See the figure to ascertain the correct position for the dot on the screw.

- Connect a hose to the hose union on the drain cock and open the cock.

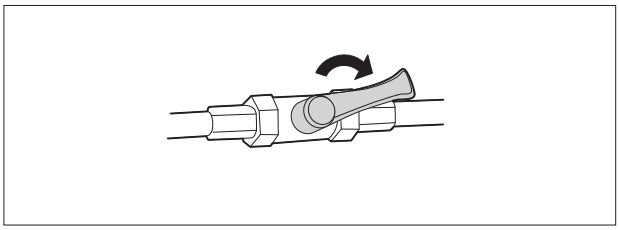


- Close the non-return valve (2). See the figure to ascertain the correct position for the dot on the screw.

PREPARING FOR INITIAL START-UP

It is essential to perform the following checks before starting up or testing the functioning of the boiler.

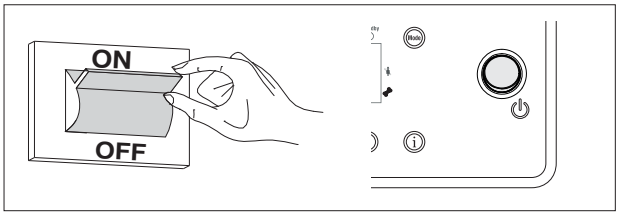
- Check that the water and fuel shut-off cocks are open.
- Check that the water pressure gauge shows a pressure **over 1 bar** with the system cold. Check also that the water circuit is properly de-aerated.
- Check that the expansion vessel is correctly pre-charged.
- Check that the electrical connections have been made correctly.
- Check that the vent and air intake pipes have been correctly installed and connected.



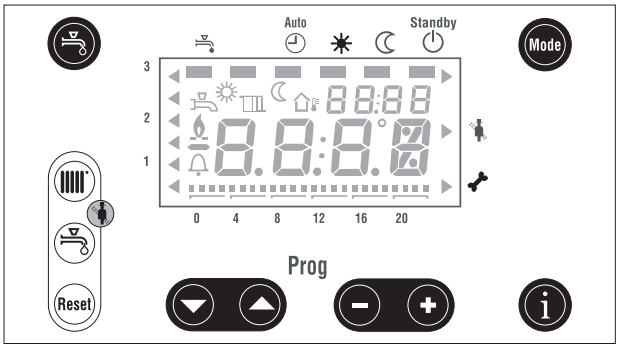
⚠ If you need to convert the boiler from METHANE to LPG, contact **RIELLO**'s Technical Assistance Service.

INITIAL START-UP

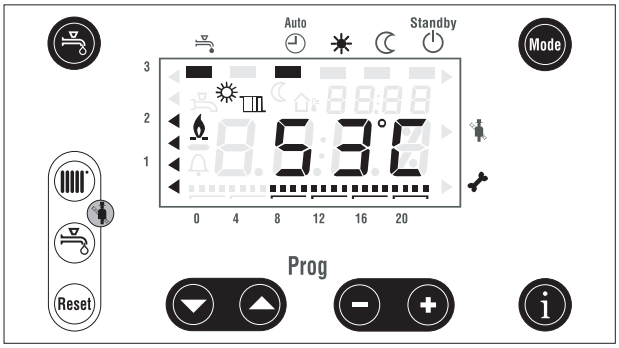
- Switch the electricity supply ON at the system's main switch and at the control panel.



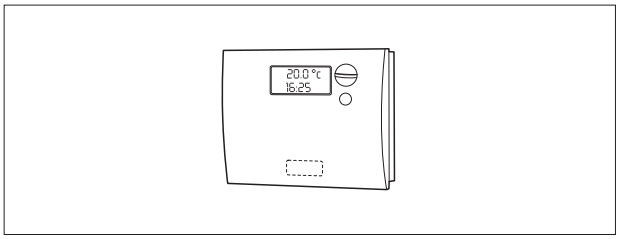
- The boiler switches on and the display shows the software version of the main control board.



- The display shows the system status and the temperature measured by the boiler temperature sensor.



- Set the room thermostat to the desired temperature (20°C).



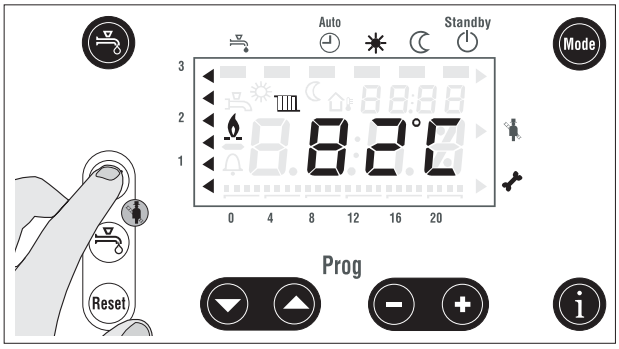
- Press the key:
  - If an outdoor temperature sensor is connected, set the room temperature setpoint
  - If no outdoor temperature sensor is connected, set the central heating circuit temperature setpoint.

  Press the keys to adjust the setpoint

  Press any of the keys to exit:

  Mode

  The new setting is stored in memory.



If a remote storage cylinder (accessory) is present, connect the storage cylinder temperature sensor to the control panel and set the manufacturer level parameter “558b2”=0 (see the “Manufacturer level” section):

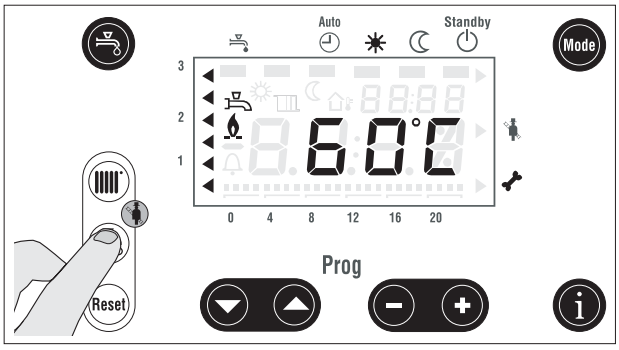
- Press the key

  Press the keys to adjust the setpoint.

  Press any of the keys to exit:

  Mode

  The new setting is stored in memory.



If the remote storage cylinder has its own thermostat, leave the manufacturer level parameter “558b2” = 1 (see the “Manufacturer level” section).

- If an outdoor temperature sensor is installed, set installer parameter “532 Heating curve slope heating circuit 1” as instructed in the section “Setting functioning parameters”.

If any boiler ignition or functioning errors are detected, the display shows the type of error.

Errors can be of two types:

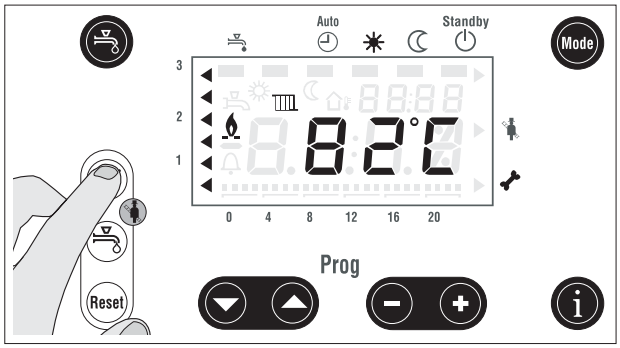
- PERMANENT errors are those that can only be cancelled by pressing the Reset key.
- TRANSIENT errors are those that are automatically cancelled as soon as the cause is rectified (see “Error codes” on page 52).

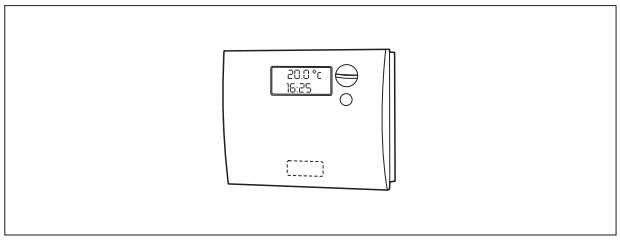
Once the boiler has started up, make sure that it shuts down and re-starts properly when:

- The central heating temperature setpoint is changed (see page 49)

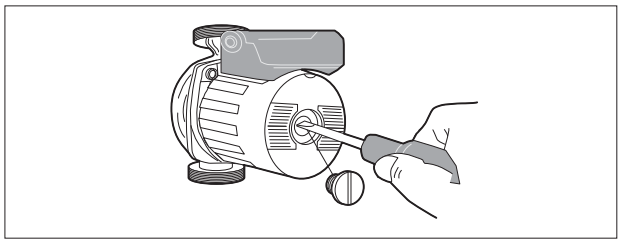
- The control panel is switched OFF

- The room thermostat or timer setting is changed

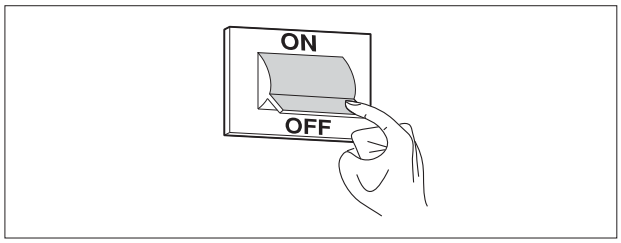




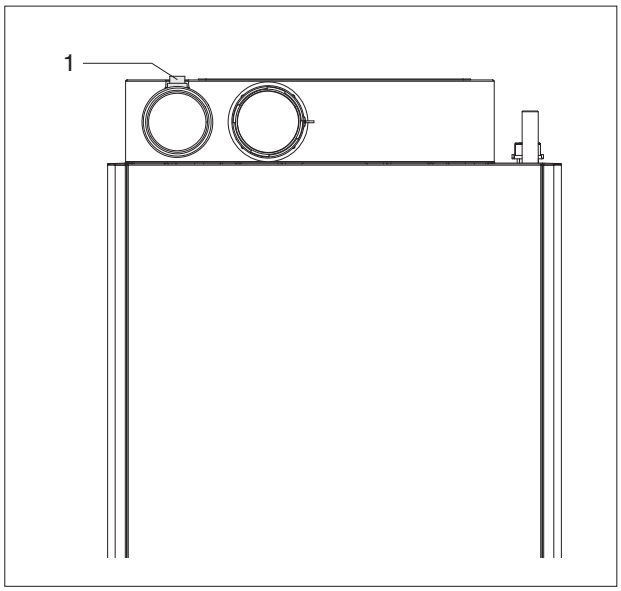
Make sure that all the pumps in the system are free and rotate in the right direction.



Turn the main power switch OFF and make sure that the boiler shuts down completely.



Provided all the above conditions are satisfied, start the boiler up again, then analyse the combustion fumes. To do so, insert the combustion analysis probe into the socket in the flue gas vent fitting (1).

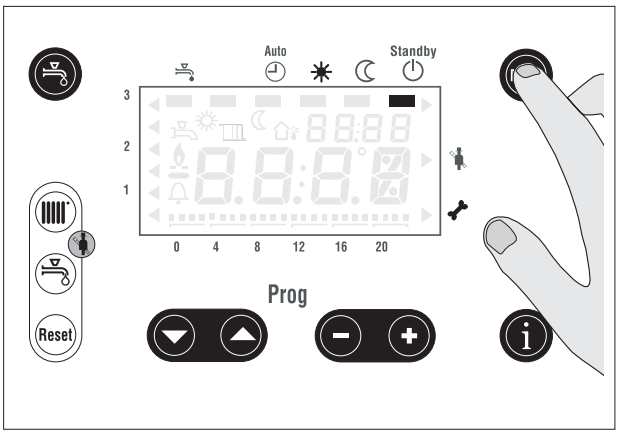


TEMPORARY SHUTDOWN

If you are going to be away for a short period of time like a weekend or a short holiday, etc. proceed as follows:

- Press and hold the Mode key until the bar (1) appears under "Stand-by" mode.

Provided power to the boiler remains switched on, as shown by the green LED, and the fuel supply remains open, the boiler remains protected by the frost protection function.
Boiler frost protection: If boiler temperature falls below 5°C, the burner ignites and runs at full power until temperature reaches 10°C.
CH frost protection: This function is only active if an outside temperature sensor is connected. If outside temperature drops below -5°C the pumps are switched on. If outside temperature is between -4° and 1.5°C, the pumps are switched on for 10 minutes at intervals of 6 hours. If outside temperature is above 1.5°C the pumps are switched off.

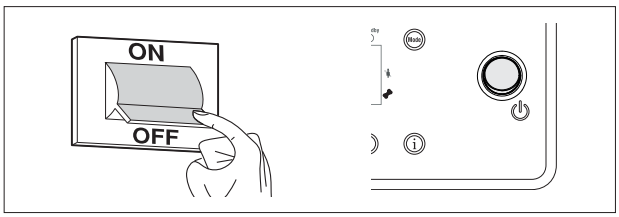


PREPARING FOR EXTENDED PERIODS OF DISUSE

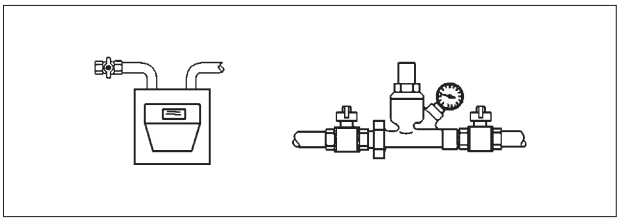
If the boiler is not going to be used for an extended period of time, proceed as follows to prepare it for shut-down.

- Turn the control panel power switch OFF and make sure that the display goes out

- Turn the system's mains power switch OFF



- Close the fuel shut-off cock and the central heating and DHW circuit shut-off cocks.

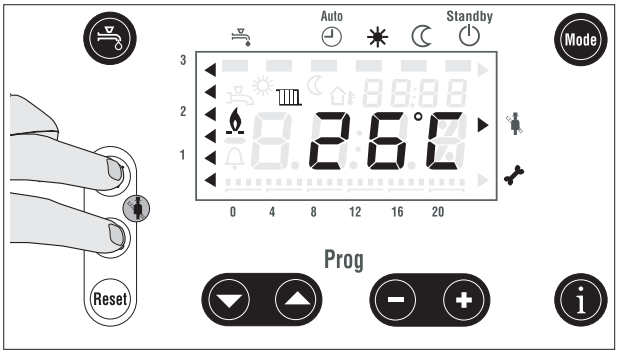


⚠ **Under these conditions the system is not protected against frost. Drain the central heating circuit and domestic hot water circuit if there is any risk of freezing.**

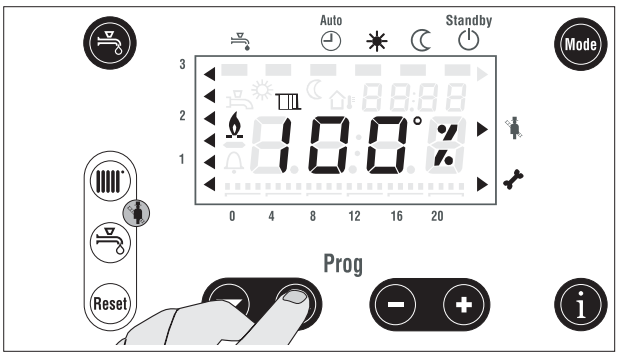
TAU 35 UNIT boilers are calibrated in the factory for G20/G25 20/25 mbar.
If actual combustion parameter values differ from those given in the tables below, contact **RIELLO**'s Technical Assistance Service.

Proceed as follows to set combustion parameters:

- Press and hold the and keys for between 3 and 6 seconds to enter chimney sweep mode. The 'chimney sweep' symbol on the display starts to flash and the display reads out the current boiler temperature.

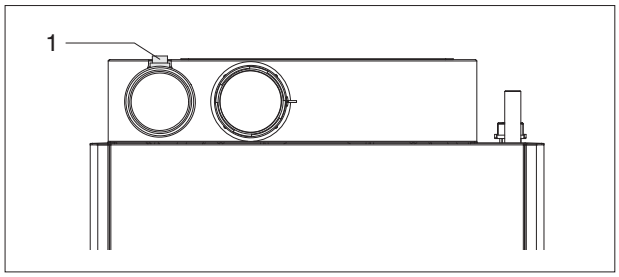


- To set combustion parameters for maximum and minimum power, press and hold the and keys simultaneously for over 6 seconds. The boiler enters fan speed control mode

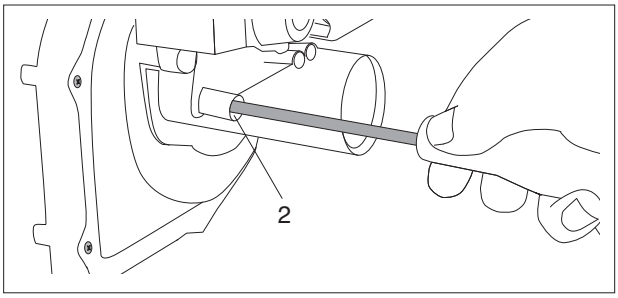


- Press the key.
  The fan switches to maximum speed.

- Insert the combustion analysis probe into the socket (1) in the flue gas vent fitting.



- Set the CO_2 level by turning the adjuster screw (2) on the fan group. Turn the screw clockwise to reduce CO_2, anti-clockwise to increase CO_2.

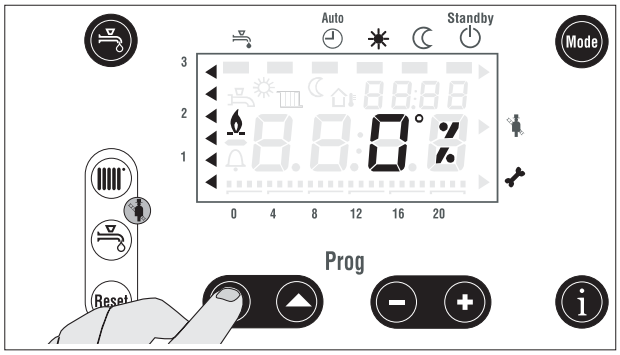


Once the adjustments are complete, the combustion parameters should be as specified in the tables below.

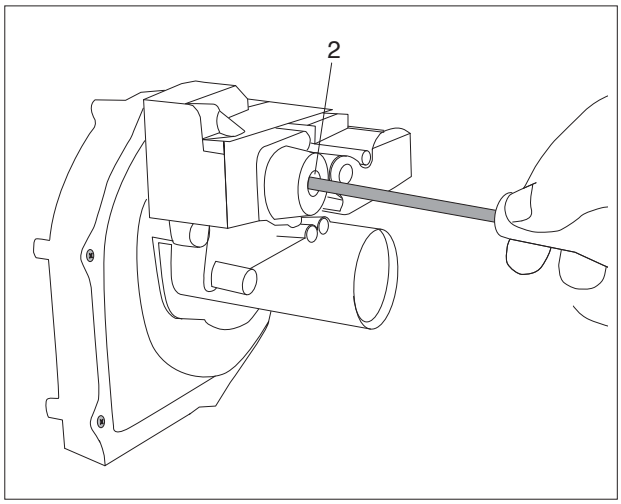
CO_2 values for functioning at MAXIMUM POWER

	TAU 35 UNIT
G20	9,15
G31	10,2

- Press the key.
  The fan switches to minimum speed.



- Set the CO_2 level by turning the adjuster screw (2) on the gas valve with a TORX40 key. Turn anti-clockwise to reduce CO_2, clockwise to increase CO_2.

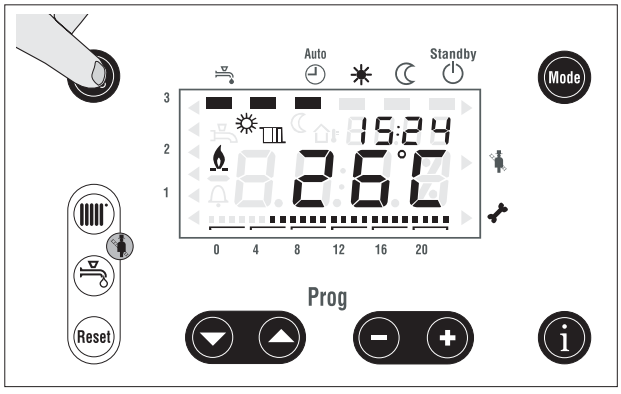


Once the adjustments are complete, the combustion parameters should be as specified in the tables below.

CO_2 values for functioning at MINIMUM POWER

	TAU 35 UNIT
G20	9,15
G31	9,90

- Press or Mode to return to normal functioning mode.

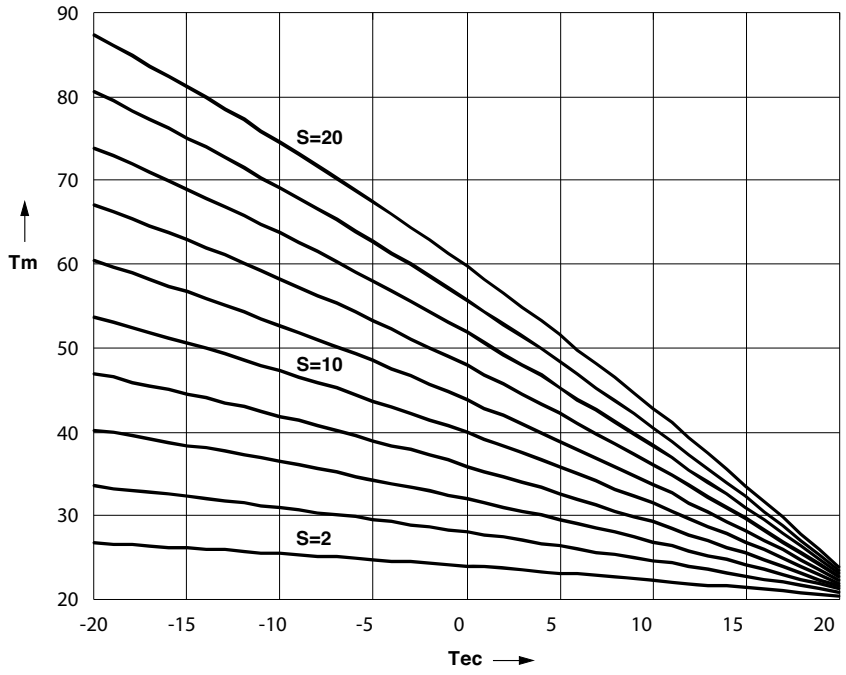


Once all adjustments have been made:
- Carefully screw the plug back on the combustion analysis socket
- Fit the top panel back on.

⚠ Adjustments must only be performed by the **RIELLO** Technical Assistance Service.

If an outdoor temperature sensor is connected, the controller uses the heating curve to generate the CH flow temperature setpoint, thus enabling the boiler to maintain a constant room temperature even without the use of a room unit. The steeper the slope of the heating curve, the higher the flow temperature setpoint at low outdoor temperatures (see Manufacturer parameter 532).

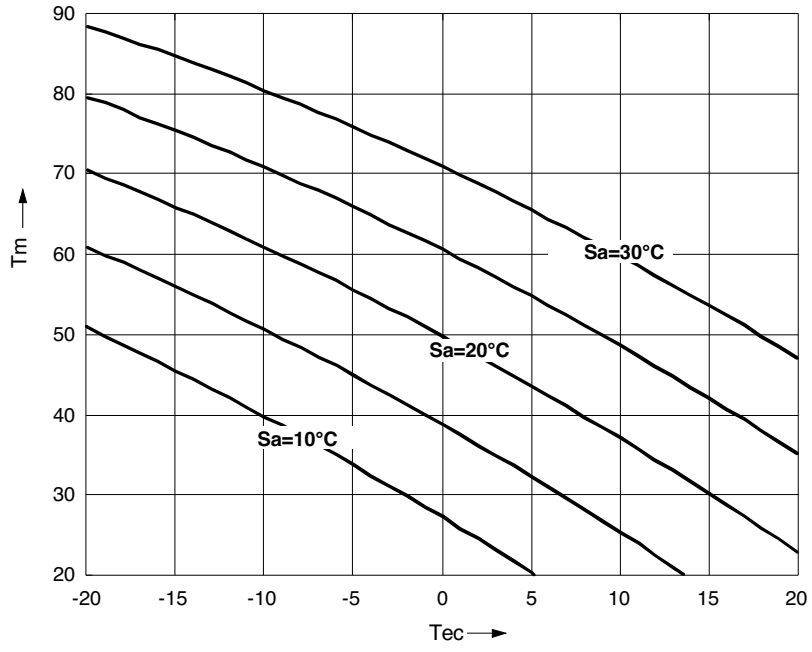
Heating curves with room temperature setpoint = 20°C



Tm - CH flow temperature
Tec - Compound outdoor temperature
S - Slope

If the room setpoint is reduced, these curves shift downwards.

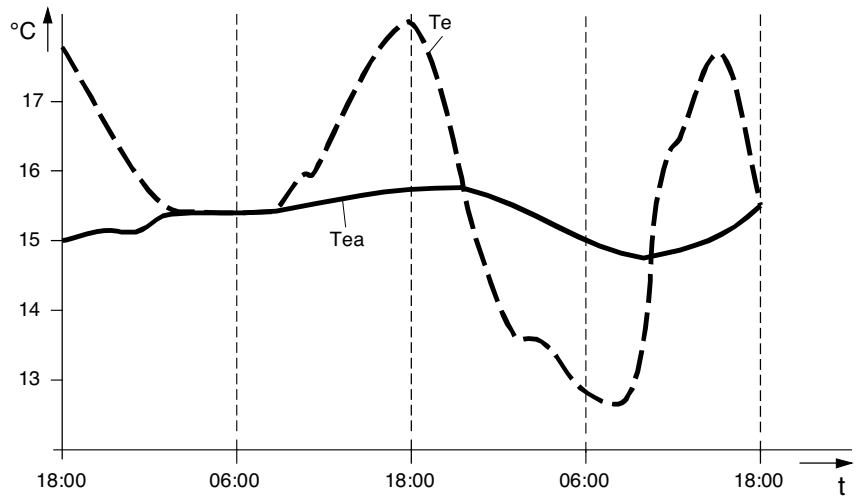
Heating curve with slope = 15



Tm - CH flow temperature
Tec - Compound outdoor temperature
Sa - Room temperature setpoint

Compound outdoor temperature is calculated from effective outdoor temperature and attenuated outdoor temperature. It is calculated at 10 minute intervals on the basis of effective outdoor temperature and directly determines Summer/ Winter mode switching (par. 516).

Attenuated outdoor temperature

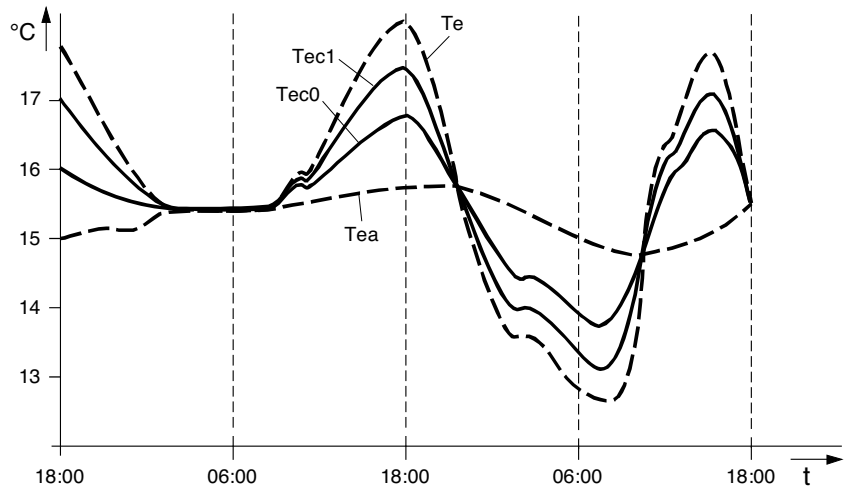


Te - Outdoor temperature
Tea - Attenuated outdoor temperature

Type of building selected	Compound outdoor temperature
Heavy duty (parameter 558-b1=1)	Tec = 1/2Te + 1/2Tea
Light duty (parameter 558-b1=0)	Tec = 3/4Te + 1/4Tea

Compound outdoor temperature acts as a compensating variable in CH flow temperature control, and is linked to prevailing meteorological conditions.

Compound outdoor temperature



Te - Outdoor temperature
Tea - Attenuated outdoor temperature
Tec0 - Compound outdoor temperature for heavy duty buildings
Tec1 - Compound outdoor temperature for light duty buildings

SETTING CENTRAL HEATING PARAMETERS

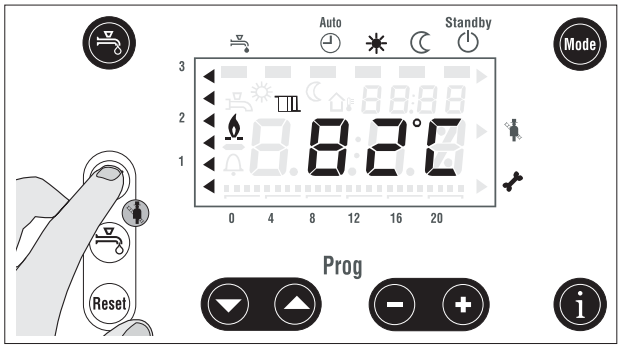
- Press the key
  - With an outdoor temperature sensor connected, set the room temperature setpoint. This setting affects the shifting of the heating curves (see the second figure on page 47).
  - With no outdoor temperature sensor connected, set a fixed boiler temperature setpoint.

Press the keys to adjust the setpoint.

Press any of the keys to exit:

Mode

The new setting is stored in memory.



In the same way, set parameter 5 to "User" to set the "reduced room temperature setpoint" or "reduced boiler setpoint".

Parameter 555-b2 lets you specify whether a room thermostat or a timer-thermostat is connected to the "TA" terminals.

In the first case (room thermostat), the boiler switches off when the contacts open.
In the second case (timer thermostat) the reference curve will be that determined by the reduced room temperature setpoint that has just been set.

SETTING DOMESTIC HOT WATER PARAMETERS

If a remote storage cylinder (accessory) is present, connect the storage cylinder temperature sensor to the control panel and set the manufacturer level parameter “558b2”=0 (see the “Manufacturer level” section).

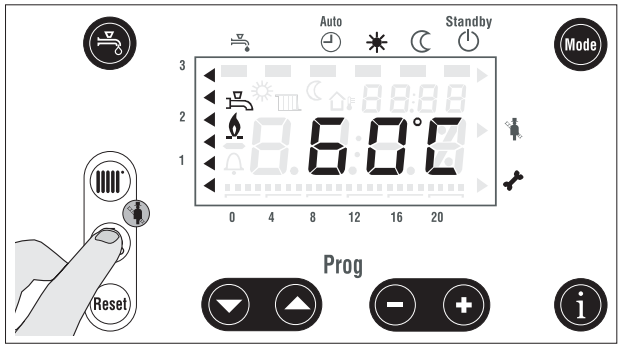
- Press the key.

Press the keys to adjust the DHW setpoint.

Press any of the keys to exit:

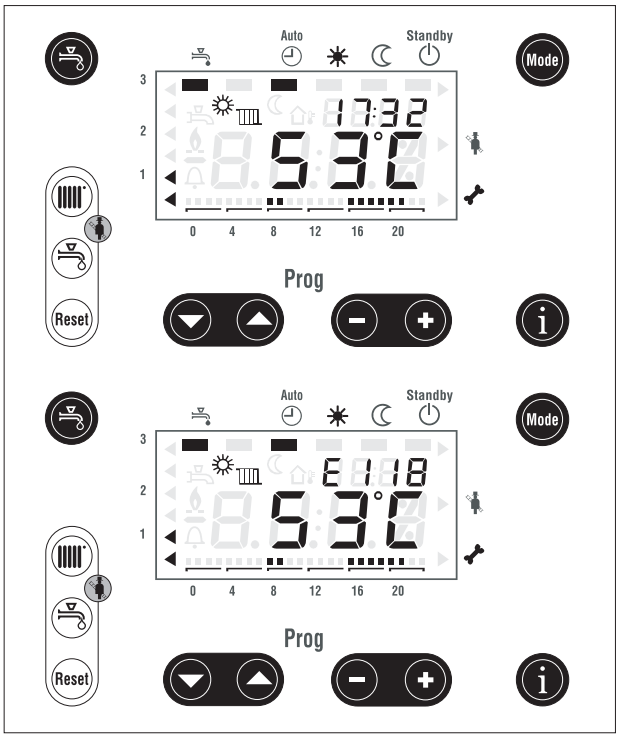
Mode

The new setting is stored in memory.

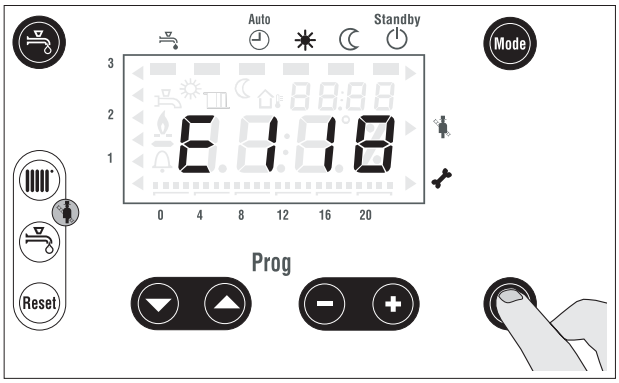


TEMPORARY ERROR DISPLAY

- If a temporary error occurs, the display alternates between displaying the time display and the error code.



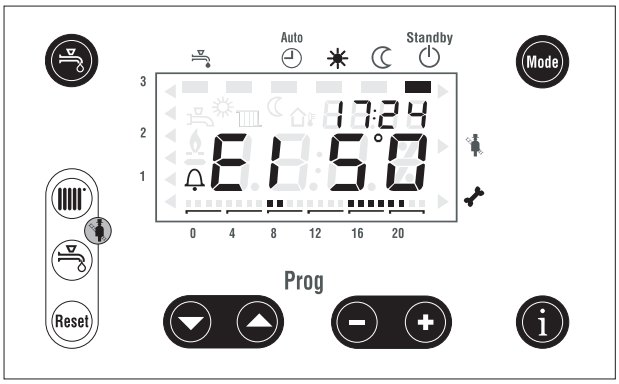
- Press the i key to display the error code on the main display.



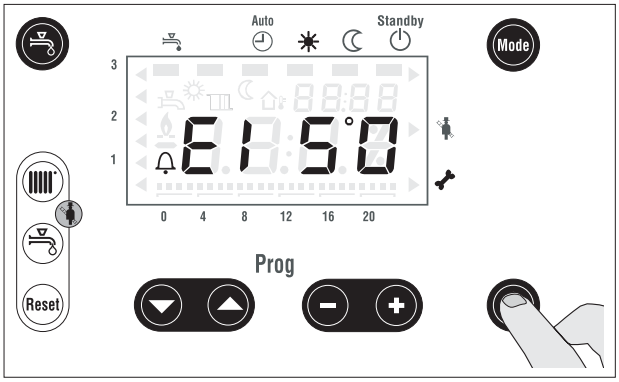
- Press and hold the ▲ and ▼ keys simultaneously for 3 seconds. The internal error code is displayed.
- Press the i key to access the information level.
- Press the 🚿 or Mode key to return to the main screen.

PERMANENT ERROR DISPLAY

- If a permanent error occurs, the error code flashes on the main display. The controller performs a safety shutdown. Example: E150.



- Press the i key to display the error code on the main display.



- Press and hold the ▲ and ▼ keys simultaneously for 3 seconds.

  The internal error code is displayed. Example: 238.

- Press the i key to access the information level.
- Press the 🚿 or Mode key to return to the main screen.

Note: Once you have eliminated the cause of the error, press Reset to reset the boiler.

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
0	0	No input code	No input code	-	-
0	473	No input code	No input code	Message	-
10	150	Outdoor temperature sensor error	Short circuit in outdoor temperature sensor	Message	Check/replace outdoor temperature sensor
10	151	Outdoor temperature sensor error	Outdoor temperature sensor faulty	Message	Check/replace outdoor temperature sensor
20	142	Boiler sensor 1 error	Short circuit in temperature sensor B2	Safety shutdown	Check/replace temperature sensor
20	143	Boiler sensor 1 error	Temperature sensor B2 faulty	Safety shutdown	Check/replace temperature sensor
20	405	Boiler sensor 1 error	Boiler sensor 1 error	Safety shutdown	Check/replace temperature sensor
20	406	Boiler sensor 1 error	Boiler sensor 1 error	Safety shutdown	Check/replace temperature sensor
20	410	Boiler sensor 1 error	Short circuit in temperature sensor B2	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
20	411	Boiler sensor 1 error	Temperature sensor B2 faulty	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
20	412	Boiler sensor 1 error	No further differentiation	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
20	413	Boiler sensor 1 error	No further differentiation	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
28	152	Flue gas sensor error	Short circuit in temperature sensor	Message	Check/replace flue gas temperature sensor
28	153	Flue gas sensor error	Temperature sensor faulty	Message	Check/replace flue gas temperature sensor
28	507	Flue gas sensor error	Temperature reading not plausible	Safety shutdown	Check/replace flue gas temperature sensor
32	524	CH flow sensor 2 error	Short circuit in CH 2 temperature sensor	Message	Check/replace temperature sensor
32	525	CH flow sensor 2 error	CH 2 temperature sensor faulty	Message	Check/replace temperature sensor
32	546	CH flow sensor 2 error	Short circuit in additional zone clip-in temperature sensor (accessory)	Message	Check/replace temperature sensor
32	547	CH flow sensor 2 error	Additional zone clip-in temperature sensor faulty (accessory)	Message	Check/replace temperature sensor
40	144	CH return sensor 1 error	Short circuit in return temperature sensor (B7)	Safety shutdown	Check/replace temperature sensor
40	145	CH return sensor 1 error	Return temperature sensor (B7) faulty	Safety shutdown	Check/replace temperature sensor
40	407	CH return sensor 1 error	No further differentiation	Safety shutdown	Check/replace temperature sensor
40	408	CH return sensor 1 error	No further differentiation	Safety shutdown	Check/replace temperature sensor
40	414	CH return sensor 1 error	Short circuit in return temperature sensor (B7)	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
40	415	CH return sensor 1 error	Return temperature sensor (B7) faulty	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
40	416	CH return sensor 1 error	No further differentiation	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor
40	417	CH return sensor 1 error	No further differentiation	Burner lockout (permanent). Lockout reset required	Check/replace temperature sensor

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
50	146	DHW 1 temperature sensor error	Short circuit in DHW temperature sensor (B3)	Safety shutdown	Check/replace temperature sensor
50	147	DHW 1 temperature sensor error	DHW temperature sensor (B3) faulty	Message	Check/replace temperature sensor
50	462	DHW 1 temperature sensor error	Short circuit and fault in DHW temperature sensor (B3)	Message	Check/replace temperature sensor
52	148	DHW 2 sensor error	Short circuit in DHW temperature sensor (B3)	Message	Check/replace temperature sensor
52	149	DHW 2 sensor error	DHW temperature sensor (B3) faulty	Message	Check/replace temperature sensor
61	126	Room unit 1 error	No further differentiation	Message	Check/replace room unit, room temperature sensor
61	382	Room unit 1 error	No further differentiation	Message	Check/replace room unit, room temperature sensor
61	383	Room unit 1 error	No further differentiation	Message	Check/replace room unit, room temperature sensor
61	384	Room unit 1 error	No further differentiation	Message	Check/replace room unit, room temperature sensor
61	385	Room unit 1 error	Software error detected	Message	Check/replace room unit, room temperature sensor
61	386	Room unit 1 error	Unknown message type	Message	Check/replace room unit, room temperature sensor
61	387	Room unit 1 error	No further differentiation	Message	Check/replace room unit, room temperature sensor
61	471	Room unit 1 error	Unknown datapoint request from room unit	Message	Check/replace room unit, room temperature sensor
61	472	Room unit 1 error	Room unit waiting to write to write-protected parameter	Message	Check/replace room unit, room temperature sensor
62	438	Room unit 1 or timer connection error	Connection error	Message	Check connection to room unit/timer-thermostat. Unit not recognised
73	609	Solar collector sensor error (if solar clip-in option is installed - accessory)	Valid temperature for solar collector not available	Message	Check solar clip-in; check/replace temperature sensor
77	156	Air pressure switch error	Short circuit in temperature sensor	Message	Check/replace air pressure switch
77	157	Air pressure switch error	Pressure switch faulty	Message	Check/replace air pressure switch
78	154	Water pressure switch error	Short circuit in pressure switch	Message	Check/replace water pressure switch
78	155	Water pressure switch error	Pressure switch faulty	Message	Check/replace water pressure switch
78	510	Water pressure switch error	Water pressure too high or too low, or reading not plausible	Burner lockout (permanent). Lockout reset required	Check/replace water pressure switch
78	511	Water pressure switch error	Reading not plausible	Safety shutdown	Check/replace water pressure switch
81	518	LPB communication error	LPB circuit short circuited or not powered	Message	Check the LPB connection. Check the power supply to the control card
82	519	LPB address error	LPB address conflict	Message	Check the LPB connection
91	131	EEPROM data loss	Hardware fault	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
91	258	EEPROM data loss	Data overflow caused by power failure during functioning	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
91	268	EEPROM data loss	Hardware fault	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
91	583	EEPROM data loss	EEPROM read/write test error	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
92	293	Electronic device errors	Hardware error	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
92	294	Electronic device errors	Hardware error	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
92	484	Electronic device errors	Room thermostat input faulty	Message	Contact Riello's Technical Assistance Service
92	485	Electronic device errors	Air pressure switch input faulty	Message	Contact Riello's Technical Assistance Service
92	486	Electronic device errors	Gas pressure switch input faulty	Message	Contact Riello's Technical Assistance Service
92	487	Electronic device errors	Safety relay output faulty	Message	Contact Riello's Technical Assistance Service
92	488	Electronic device errors	Safety valve output faulty	Message	Contact Riello's Technical Assistance Service
92	489	Electronic device errors	DHW flow switch input faulty	Message	Contact Riello's Technical Assistance Service
92	490	Electronic device errors	CH flow switch input faulty	Message	Contact Riello's Technical Assistance Service
92	491	Electronic device errors	Dynamic ignition output faulty	Message	Contact Riello's Technical Assistance Service
95	538	Invalid date	Internal LMU clock invalid	Message	Contact Riello's Technical Assistance Service
100	520	Two master clocks found	Two master clocks found on LPB connection	Message	Contact Riello's Technical Assistance Service
100	539	Two master clocks found	Two master clocks found (on Qaa)	Message	Contact Riello's Technical Assistance Service
105	560	Maintenance message	The hours of functioning exceed the number set at the last service	Message	Service the boiler
105	561	Maintenance message	The burner ignitions exceed the number set at the last service	Message	Service the boiler
105	562	Maintenance message	The months of functioning exceed the number set at the last service	Message	Service the boiler
105	563	Maintenance message	The flame ionisation current has been exceeded	Message	Service the boiler
110	17	Safety thermostat tripped (SLT)	Circuit open	Burner lockout (permanent). Lockout reset required	Circuit open: check connections
110	115	Safety thermostat tripped (SLT)	Maximum temperature exceeded	Safety shutdown	SLT thermostat tripped: check system
110	129	Safety thermostat tripped (SLT)	Thermostat tripped due to residual heat	Burner lockout (permanent). Lockout reset required	SLT thermostat tripped at wrong time: check system

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
110	422	Safety thermostat tripped (SLT)	Thermostat tripped due to residual heat	Burner lockout (permanent). Lockout reset required	SLT thermostat tripped at wrong time: check system
110	470	Safety thermostat tripped (SLT)	Circuit open	Safety shutdown	SLT thermostat tripped: check system
111	141	Threshold thermostat tripped	Threshold thermostat tripped	Safety shutdown	Temperature too high: check system
113	506	Flue gas thermostat tripped	TaAbschal (flue gas temperature threshold for boiler shutdown) parameter exceeded or reading not plausible	Burner lockout (permanent). Lockout reset required	Check flue gas vent; check temperature reading; check/replace temperature sensor
117	512	Water pressure too high	PH2Omax (maximum water pressure in boiler) parameter exceeded	Safety shutdown	Check the water pressure; check the system; check/replace the temperature sensor
117	537	Water pressure too high	dpH2OmaxPuOn parameter (maximum permissible pressure differential after pump start-up) exceeded	Safety shutdown	Check the water pressure; check the system; check the pressure switch
118	513	Water pressure too low	Water pressure is below the value set in the PH2OAbschalt parameter (minimum pressure threshold for deactivating the boiler pump)	Safety shutdown	Check the water pressure; check the system; check the pressure switch; check the pump
118	514	Water pressure too low	Water pressure is below the value set in the PH2Omin parameter (minimum pressure)	Message	Check the water pressure; check the system; check the pressure switch; check the pump
118	536	Water pressure too low	Water pressure is below the value set in the dpH2OminPuOn parameter (minimum pressure differential after pump start-up)	Safety shutdown	Check the water pressure; check the system; check the pressure switch; check the pump
119	139	Flue gas thermostat tripped	Flue gas thermostat tripped	Burner lockout (permanent). Lockout reset required	Check the water pressure; check the system; check the temperature sensor
119	140	Flue gas thermostat tripped	Flue gas thermostat tripped	Safety shutdown	Check the water pressure; check the system; check the temperature sensor
128	98	No flame during functioning	Flame failure during functioning	Safety shutdown	Check the gas supply and gas valve status; check the burner
128	99	No flame during functioning	Flame failure during functioning	Safety shutdown	Check the gas supply and gas valve status; check the burner
128	100	No flame during functioning	Flame failure during functioning	Burner lockout (permanent). Lockout reset required	Check the gas supply and gas valve status; check the burner
128	570	No flame during functioning	Ionisation current is below the threshold set in the IonLimitGrenz parameter; count for number of missing flame readings started	Safety shutdown	Check the gas supply and gas valve status; check the burner
128	571	No flame during functioning	Ionisation current is below the threshold set in the IonLimitGrenz parameter; maximum number of missing flame readings reached	Burner lockout (permanent). Lockout reset required	Check the gas supply and gas valve status; check the burner

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
129	78	Comburent air system error	Air pressure switch tripped	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	79	Comburent air system error	The air pressure switch has been closed incorrectly (toggles repeatedly between open and closed position) or fan speed is too high	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	80	Comburent air system error	The air pressure switch has been closed incorrectly (toggles repeatedly between open and closed position) or fan speed is too low	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	84	Comburent air system error	Maximum fan speed exceeded	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	85	Comburent air system error	Fan speed below minimum	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	86	Comburent air system error	Fan speed below minimum	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	87	Comburent air system error	Fan speed below minimum	Burner lockout (permanent). Lockout reset required	Check the air pressure switch; check the air intake pipe; check the fan
129	89	Comburent air system error	Fan speed below minimum	Safety shutdown	Check the air pressure switch; check the air intake pipe; check the fan
129	90	Comburent air system error	Fan speed has fallen below pre-purge speed	Burner lockout (permanent). Lockout reset required	Check the air pressure switch; check the air intake pipe; check the fan
130	508	Flue gas temperature threshold exceeded	TaAbschal parameter (flue gas temperature threshold for boiler shutdown) exceeded	Safety shutdown	Check the flue gas vent; check the temperature sensor; check the burner; check setting of parameter 592
130	509	Flue gas temperature threshold exceeded	TaBegrenz parameter (flue gas temperature threshold for reducing heat output) exceeded	Message	Check the flue gas vent; check the temperature sensor; check the burner; check setting of parameter 591
132	77	Gas feed pressure switch (GPS) tripped	The input has been configured as a switch that prevents start-up (FaEinstellFlags2) and the switch is open	Safety shutdown	Check for blockages in the air/gas feed lines; check the pressure switch
132	92	Gas feed pressure switch (GPS) tripped	The input has been configured as a switch that prevents start-up (FaEinstellFlags2) and the switch is open	Safety shutdown	Check for blockages in the air/gas feed lines; check the pressure switch
132	93	Gas feed pressure switch (GPS) tripped	The pressure switch input has been configured as a switch that prevents start-up (FaEinstellFlags2) and the switch is open during safety time	Safety shutdown	Check for blockages in the air/gas feed lines; check the pressure switch

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
132	94	Gas feed pressure switch (GPS) tripped	The pressure switch input has been configured as a switch that prevents start-up (FaEinstellFlags2) and the switch is open during safety time. Start-up prevented for two hours	Safety shutdown	Check for blockages in the air/gas feed lines; check the pressure switch
132	285	Gas feed pressure switch (GPS) tripped	Shutdown at wrong time. The error masking time has been interrupted	Safety shutdown	Check for blockages in the air/gas feed lines; check the pressure switch
133	101	No flame	The flame does not appear at the end of the safety time--> Repetition	Safety shutdown	Check the connections to the burner
133	102	No flame	The flame does not appear at the end of the safety time	Burner lockout (permanent). Lockout reset required	Check the connections to the burner
140	521	Illegal LPB address	Illegal segment number or LPB device number	Message	Contact Riello's Technical Assistance Service
148	517	Interface/base unit LPB incompatibility	LPB incompatibility between interface unit and base unit	Message	Contact Riello's Technical Assistance Service
151	1	Internal control board error	Software error or internal error	Can be a Message or a Safety Shutdown or a (permanent) burner lockout with manual reset request	Contact Riello's Technical Assistance Service
151	…	Internal control board error	Software error or internal error	Can be a Message or a Safety Shutdown or a (permanent) burner lockout with manual reset request	Contact Riello's Technical Assistance Service
151	632	Internal control board error	Software error or internal error	Can be a Message or a Safety Shutdown or a (permanent) burner lockout with manual reset request	Contact Riello's Technical Assistance Service
152	6	Parameter setting error	Wrong setting	Can be a Message or a Safety Shutdown or a (permanent) burner lockout with manual reset request	Contact Riello's Technical Assistance Service
152	…	Parameter setting error	Wrong setting	Can be a Message or a Safety Shutdown or a (permanent) burner lockout with manual reset request	Contact Riello's Technical Assistance Service
152	610	Parameter setting error	Wrong setting	Can be a Message or a Safety Shutdown or a (permanent) burner lockout with manual reset request	Contact Riello's Technical Assistance Service
153	259	Lockout caused by unit	Generic error or internal error	Burner lockout (permanent). Lockout reset required	Undefined software error. Reset the control card
154	400	Generic error	The boiler return temperature is above the safety threshold (boiler temperature + Sd_RL_ groesser_VL)	Safety shutdown	OEM parameter not editable via QAA. Generic error. Check the system. Return temperature too high
154	401	Generic error	The boiler return temperature is above or equal to the boiler temperature + Sd_RL_ groesser_VL - 2K)	Safety shutdown	OEM parameter not editable via QAA. Generic error. Check the system. Return temperature too high
154	402	Generic error	No further differentiation	Safety shutdown	Undefined software error

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
154	404	Generic error	Error 400 has occurred more times than permitted by the burner parameter GrenzeRL_ groesserVL	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Generic error. Check the system. Return temperature too high
154	425	Generic error	Error 426 has occurred more times than permitted by the burner parameter GrenzeGradient	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Generic error. Check the system. Boiler temperature rises too quickly
154	426	Generic error	Boiler temperature has risen more quickly than permitted by parameter TempGradMax	Safety shutdown	OEM parameter not editable via QAA. Generic error. Check the system. Boiler temperature rises too quickly
154	427	Generic error	The reset criterion for error 426 has not been reached (criterion: boiler temperature < boiler setpoint and dT < dTkTrSTB)	Safety shutdown	OEM parameter not editable via QAA. Generic error. Check the system. Boiler temperature rises too quickly
154	433	Generic error	dT is > dTkTrSTB + 16K	Safety shutdown	OEM parameter not editable via QAA. Generic error. Check the system. The temperature differential in the boiler is excessive
154	434	Generic error	The reset criterion for error 433 has not been reached (criterion: dT < ½ dTkTrSTB)	Safety shutdown	OEM parameter not editable via QAA. Generic error. Check the system. The temperature differential in the boiler is excessive
154	435	Generic error	Error 433 has occurred more times than permitted by the burner parameter GrenzeDeltaT	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Generic error. Check the system. The temperature differential in the boiler is excessive
154	474	Generic error	The DHW setpoint for HMI is < TbwSmin	Message	OEM parameter 508, editable via password. Check the DHW system; temperature too low
154	475	Generic error	The DHW setpoint for HMI is > TbwSmax	Message	OEM parameter 508, editable via password. Check the DHW system; temperature too low
154	476	Generic error	HMI flow temperature is < TkSmin	Message	Installer parameter 503. Check system, boiler setpoint
154	477	Generic error	HMI flow temperature is > TkSnorm	Message	Installer parameter 505. Check system, boiler setpoint
154	478	Generic error	HMI room temperature setpoint is < TrSim	Message	Installer parameter 501. Check system, zone setpoint
154	479	Generic error	HMI room temperature setpoint is > TrSim	Message	Installer parameter 501. Check system, zone setpoint
154	498	Generic error	Water schematic with CH circuit 2 and room unit unavailable	Message	Check HMI programming
160	83	Fan speed threshold not reached	The acceptable speed range for starting the ignition sequence was not reached during start-up	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
160	281	Fan speed threshold not reached	Fan speed is below required threshold, phase Ph_TLO: (N_TL-N_TH_Delta), phase Ph_TNN: NoG_Null.	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Fan differentials exceeded. Contact Riello's Technical Assistance Service
160	282	Fan speed threshold not reached	Speed thresholds exceeded, PH_THL1_1: (N_Vor - N_Vor_Delta), PH_THL1_2: (N_ZL - N_ZL_Delta), PH_THL2_2: (N_Vor - N_Vor_Delta).	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Fan differentials exceeded. Contact Riello's Technical Assistance Service
161	110	Maximum fan speed exceeded	Maximum fan speed exceeded	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Fan differentials exceeded. Contact Riello's Technical Assistance Service
162	82	Air pressure switch contacts not closed	Air pressure switch contacts not closed	Burner lockout (permanent). Lockout reset required	Check the air pressure switch. External error
164	137	Water pressure switch/ CH circuit flow switch error	No further differentiation	Burner lockout (permanent). Lockout reset required	Check the heating circuit. External error
164	138	Air pressure switch error	No further differentiation	Safety shutdown	Check the heating circuit. External error
166	81	Air pressure switch does not open	The air pressure switch does not open. Check the contacts for sticking	Burner lockout (permanent). Lockout reset required	Check the air pressure switch. External error
169	164	Internal error	Internal error	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
169	167	Stepper motor feedback is not correct	Stepper motor feedback is not correct	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
169	362	Free to be assigned	No further differentiation	Safety shutdown	--
169	…	Free to be assigned	No further differentiation	Safety shutdown	--
169	373	Free to be assigned	No further differentiation	Burner lockout (permanent). Lockout reset required	--
169	375	Circuit open	Circuit open	Burner lockout (permanent). Lockout reset required	Contact Riello's Technical Assistance Service
169	586	Free to be assigned	No further differentiation	Message	--
169	587	Software error	Differential control has exceeded upper threshold (645)	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Contact Riello's Technical Assistance Service
169	588	Software error	Differential control has fallen below lower threshold (646)	Burner lockout (permanent). Lockout reset required	OEM parameter not editable via QAA. Contact Riello's Technical Assistance Service
169	595	Software error	Differential control has exceeded upper threshold (694)	Message	OEM parameter not editable via QAA. Contact Riello's Technical Assistance Service
169	596	Software error	Differential control has exceeded upper threshold (695)	Message	OEM parameter not editable via QAA. Contact Riello's Technical Assistance Service

Error code via QAA	Diagnostic info	Description of error	Type of fault	System action	Procedure
169	597	Software error	Drift test has exceeded programmed limit W1 (655)	Message	OEM parameter not editable via QAA. Contact Riello's Technical Assistance Service
169	598	Software error	Drift test has exceeded programmed limit W2 (656)	Message	OEM parameter not editable via QAA. Contact Riello's Technical Assistance Service
180	168	Chimney sweep function active	Chimney sweep function active	Message	Check whether chimney sweep function is active
181	169	Service request function active	Controller stopped - functions active	Message (only controller stopped)	Check programming mode/parameter transfers
183	104	Control board in parameter setting mode	Mode switched to programming mode (PC tool)	Safety shutdown	Check programming mode/parameter transfers
183	105	Control board in parameter setting mode	Unit in programming mode (PC tool)	Burner lockout (permanent). Lockout reset required (programming mode)	Check programming mode/parameter transfers
183	279	Control board in parameter setting mode	Request for programming via OT bus	Safety shutdown	Check programming mode/parameter transfers
183	497	Control board in parameter setting mode	Request for parameter programming via LPB	Safety shutdown	Check programming mode/parameter transfers
184	602	Modem function active	Modem function active	Message	Check whether modem function is active
185	608	Floor curing function active	Floor curing function active	Message	Check whether floor curing function is active

LIST OF END USER LEVEL PARAMETERS

Nr.	Description	Range	U/M	Default setting
1	Time of day	0…23.59	h/min	---
Setpoints				
5 (*)	Parameter not used if a room unit is connected:			
	Room temperature reduced setpoint	10…30	°C	20
	Boiler temperature reduced setpoint	30...Boiler temperature setpoint		
CH circuit 1 program				
11	Start of heating period 1	00:00…24:00	hh:mm	06:00
12	End of heating period 1	00:00…24:00	hh:mm	22:00
13	Start of heating period 2	00:00…24:00	hh:mm	24:00
14	End of heating period 2	00:00…24:00	hh:mm	24:00
15	Start of heating period 3	00:00…24:00	hh:mm	24:00
16	End of heating period 3	00:00…24:00	hh:mm	24:00
DHW program (only used in conjunction with a storage cylinder)				
31	Start of preparation for DHW period 1	00:00…24:00	hh:mm	06:00
32	End of preparation for DHW period 1	00:00…24:00	hh:mm	22:00
33	Start of preparation for DHW period 2	00:00…24:00	hh:mm	24:00
34	End of preparation for DHW period 2	00:00…24:00	hh:mm	24:00
35	Start of preparation for DHW period 3	00:00…24:00	hh:mm	24:00
36	End of preparation for DHW period 3	00:00…24:00	hh:mm	24:00
45	Standard programs for central heating and domestic hot water (Press and hold the − and + keys simultaneously for 3 seconds)	No/Yes	---	No
516	Summer / Winter switching temperature	8…30 (30=switching disabled)	°C	20
520	PARAMETER FIXED IN THIS MODEL. DO NOT CHANGE SETTING			10
629	Maintenance alarm display	(0/1=disabled/enabled)		0
726	Maintenance code: a numeric value that identifies the cause of the error	0…255		0

(*) Outdoor temperature sensor connected: set the room temperature reduced setpoint.
Outdoor temperature sensor not connected: set the boiler temperature reduced setpoint.

LIST OF INSTALLER LEVEL PARAMETERS

Nr.	Description	Range	U/M	Default setting
90	DHW reduced setpoint	20…DHW setpoint	°C	20
91	DHW program	0=according to DHW prog. 1=24h/24h		0
93	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			0
506	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			20
507	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			45
516	THG= Automatic Summer/Winter switching temperature (THG=30°C: switching disabled)	8…30	°C	20
520	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			10
532	Slope for heating circuit 1	1…40		20
533	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			10
534	Change room temperature setpoint for CH circuit 1	-31…31	K	0
535	PARAMETER FIXED IN THIS MODEL. DO NOT CHANGE SETTING			0
629	Maintenance alarm display	(0/1=disabled/enabled)		0
726	Maintenance code: a numeric value that identifies the cause of the error	0…255		0
727	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			102

LIST OF MANUFACTURER LEVEL PARAMETERS

Nr.	Description	Range	U/M	Default setting
501	Minimum room temperature setpoint Parameter only active if an outside temperature sensor is connected	10…30	°C	10
502	Maximum room temperature setpoint Parameter only active if an outside temperature sensor is connected	10…30	°C	30
506	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			20
507	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			45
511	Boiler frost protection activation temperature 5°C<=par. 511<=par. 512	5…50	°C	5
512	Boiler frost protection de-activation temperature par. 511<=par. 512<=50°C	5…50	°C	10
514	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			15

LIST OF MANUFACTURER LEVEL PARAMETERS

Nr.	Description	Range	U/M	Default setting
516	Automatic Summer/Winter switching temperature (30°C=switching disabled)	8…30	°C	20
517	Maximum control differential If the boiler temperature setpoint - boiler temperature >=par. 517, the minimum pause time after burner shutdown is interrupted	0…90	K	30
519	External design temperature	-50…20	°C	-5
520	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		10	
532	Slope for heating curve 1	1…40		20
533	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		10	
534	Room temperature setpoint adjustment for CH circuit 1	-31…31	K	0
535	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
552	Water circuit setting	0…255		66
553	Assignment of room unit circuits to boiler circuits	0…255		10
555	Parameter with 8 bits (= b7b6b5b4b3b2b1b0)			
	b1b0=DHW priority b1b0=00 ----> Absolute priority b1b0=10 ----> No priority			00
	b2= Assignment of room temperature thermostat (TA) terminal b2=1-------> Timer thermostat b2=0-------> Room thermostat			0
	b3=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
	b4=Activation of CH frost protection function (0/1=OFF/ON)			1
	b5=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
	b6=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
	b7=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
558	Parameter with 8 bits (= b7b6b5b4b3b2b1b0)			
	b0=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
	b1=Type of building 0/1=Light/heavy duty			0
	b2=Connection of storage cylinder temperature sensor b2=1-------> Storage cylinder thermostat (*) b2=0-------> Temperature sensor			1
	b3=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
	b4=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
	b7b6b5=PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			0 0 0

(*) Storage cylinder not connected or with own thermostat: set to 1. Storage cylinder with temperature sensor: set to 0. If a thermostat is connected to the input terminal of the storage cylinder temperature sensor, top quality contacts (e.g. gold contacts) must be used.

Nr.	Description	Range	U/M	Default setting
566	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING	s	1500	
567	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
568	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		130	
569	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0,188	
570	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING	s	0	
571	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING	s	300	
596	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING	s	120	
604	Parameter with 8 bits (= b7b6b5b4b3b2b1b0)	0…255		
	b1b0=Functioning of control board or local/system time 00= Independent 01= Slave without remote adjustment 10= System master time			00
	b2=LPB bus distributed power 0= bus distributed power OFF 1= AUTOMATIC bus distributed power			0
	b3=LPB bus distributed power status 0= bus distributed power OFF 1= bus distributed power ON			1
	b4=Storage of LPB bus events in non-volatile memory 0= Not permitted 1= Permitted			0
	b6b5=DHW filled from own circuit, own section, system 00 = Local 01 = Section 10 = System			00
	b7=Priority required for accessory controller over other predefined external output 0/1= priority no/yes			0
605	LPB address			1
606	LPB section			0
608	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		28	
609	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		8,5	
610	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		77,0	
611	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		3500	
612	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		1450	
613	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		5800	
618	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	

Nr.	Description	Range	U/M	Default setting
619	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
620	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
621	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
625	Limit to number of hours of functioning after last service	0…9998	h	
626	Limit to number of burner ignitions after last service	0…9995		
627	Limit to number of months after last service	0…255	months	
628	Maximum service fan speed	0…9950	1/min	
629	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
630	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			
	b0			0
	b1			0
	b2			0
	b3			0
	b4			0
	b5			0
	b6			0
	b7			0
633	Maintenance alarm repeat period after initial display	0…255	days	
634	Hours of functioning since last service	0…10000	h	
635	Number of burner ignitions since last service	10000		
636	Number of months since last service	0…255	months	
647	Ionisation current alarm signalling (0/1=on/off)	0…1		
653	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		28	
654	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		3500	
660	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
661	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
662	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
663	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
664	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		8	
665	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		4	
666	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
667	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		30	
668	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		80	

Nr.	Description	Range	U/M	Default setting
669	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		80	
670	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		120	
671	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING			
	b0			0
	b7			0
672	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		60	
700	First previous value of lockout code counter			
701	First previous value of lockout phase			
702	First previous value of internal diagnostic code			
703	Second previous value of lockout code counter			
704	Second previous value of lockout phase			
705	Second previous value of internal diagnostic code			
706	Third previous value of lockout code counter			
707	Third previous value of lockout phase			
708	Third previous value of internal diagnostic code			
709	Fourth previous value of lockout code counter			
710	Fourth previous value of lockout phase			
711	Fourth previous value of internal diagnostic code			
712	Fifth previous value of lockout code counter			
713	Fifth previous value of lockout phase			
714	Fifth previous value of internal diagnostic code			
715	Current value of lockout code counter			
716	Current value of lockout phase			
717	Current value of internal diagnostic code			
718	Total hours of burner functioning	0…131070	h	
719	Hours of CH functioning	0…131070	h	
720	Hours of DHW functioning	0…131070	h	
721	Hours of zone functioning	0…131070	h	
722	Start of count	0…327675	h	
723	Mean boiler heat output			
724	Summer/Winter mode selection	0…255	h	
725	Software version of boiler control board on Open Therm parameter setting level	0…131070	h	
726	Maintenance code: a numeric value that identifies the cause of the error	0…255		
727	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		102	
728	First previous value of accessory controller error code			
729	Second previous value of accessory controller error code			
730	Third previous value of accessory controller error code			
731	Fourth previous value of accessory controller error code			
732	Fifth previous value of accessory controller error code			
733	Current value of accessory controller error code			
734	PARAMETER FIXED IN THIS MODEL DO NOT CHANGE SETTING		0	
755	Measured value of ionisation current			

The **TAU 35 UNIT** boiler comes configured for use with G20 (methane) gas. The boiler can also be converted for use with G31 gas (LPG) using the conversion kit provided.

⚠ Note that all modifications to the gas feed system are forbidden in Belgium.

In Belgium, contact **RIELLO**'s Technical Assistance Service.

Before starting any conversion work:

- Switch the electricity supply OFF at the system's main switch and at the control panel
- Close the gas shut-off cock
- Loosen the screw (3) and remove the gas valve (1) from the venturi assembly (2)

- Remove the diaphragm (4) from the gas valve and fit the one supplied inside the "Warranty" envelope

The table alongside shows the diaphragm diameter required for the different gas types and boiler models.

- Fit the valve gas back and perform the necessary calibrations as instructed in the section "Calibrating combustion parameters" on page 45.

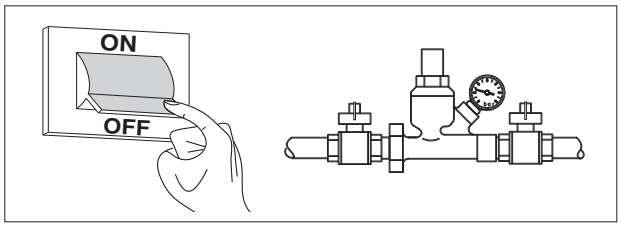
⚠ The following pressures are required from the gas supply:

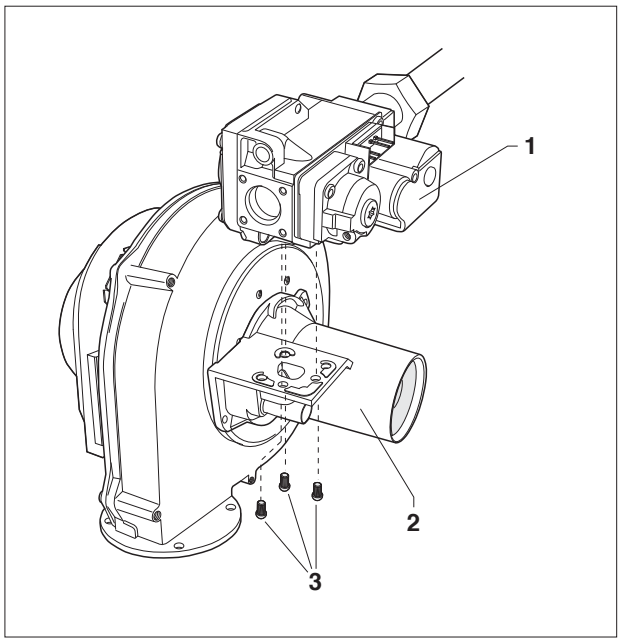
- G20 gas = 20 mbar

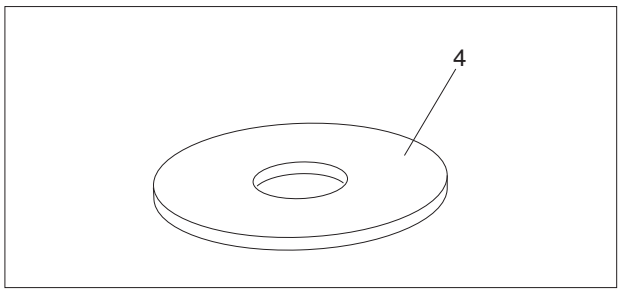
- G31 gas = 37 mbar

⚠ Conversions must only be performed by qualified personnel from **RIELLO**'s Technical Assistance Service, even after the boiler has been installed.

⚠ On completion of the conversion, adjust the boiler following the instructions given in the "Calibrating combustion parameters" section of this manual.





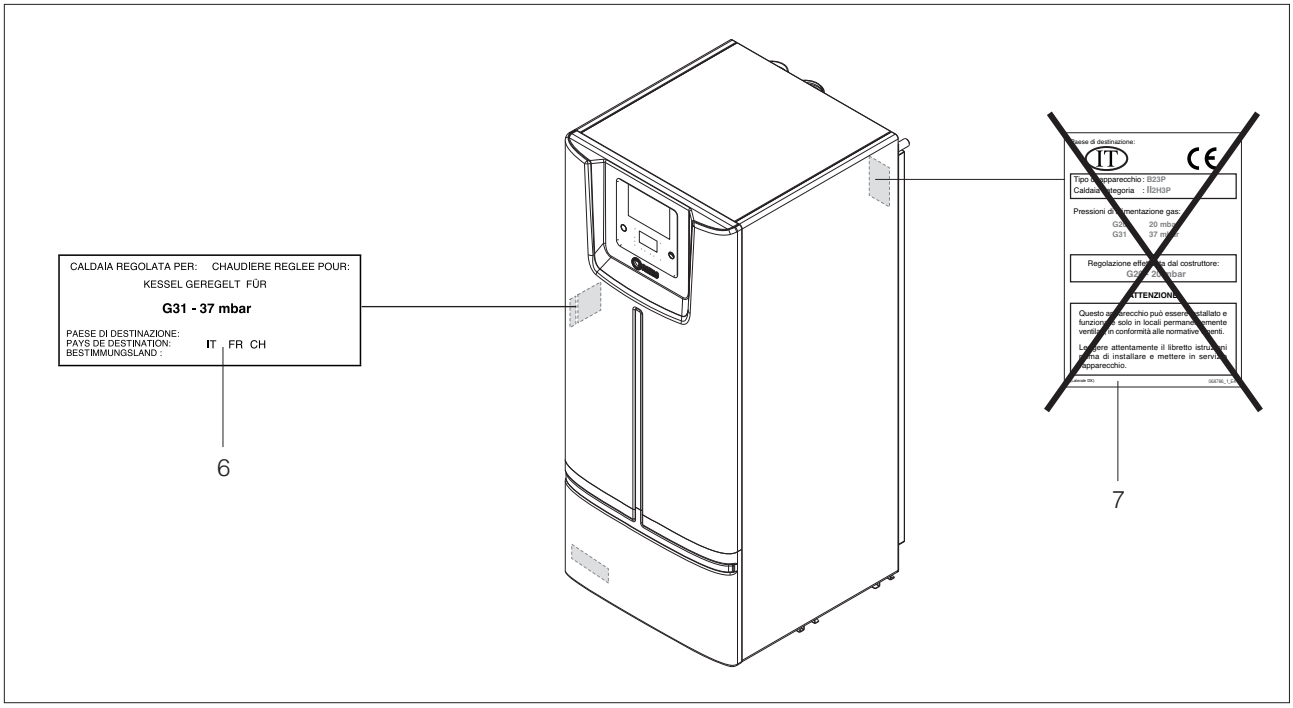


Calibrated diaphragm diameter (Ø)

	TAU 35 UNIT
G20	7
G31	4,5

- Apply the adhesive label (6) for G31 gas (supplied with the conversion kit) inside the boiler casing and remove the old G20 gas label.

- Remove the old gas label (7) from the outside of the boiler casing.



⚠ On completion of kit installation, check the tightness of all the joints made.

Regular maintenance is a legal requirement. In Italy it is required by Presidential Decree 412 of the 26 August 1993. It is also essential for the safety, efficiency and durability of the boiler. Proper maintenance keeps consumption and emissions down, and ensures that the boiler continues to operate reliably over time.

Perform the following operations before beginning any maintenance:
- Switch the electricity supply OFF at the system's main switch and at the control panel
- Close the fuel shut-off cocks.

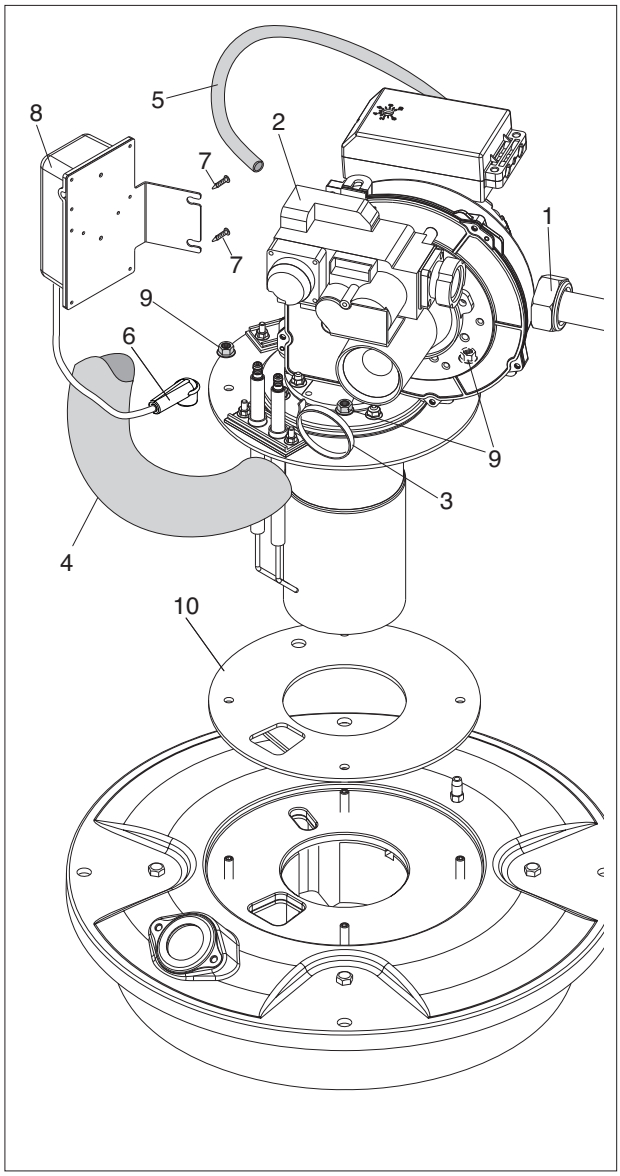
⚠ On completion of maintenance, the original settings must be restored and combustion fumes analysed to verify correct functioning.

REMOVING THE BURNER

Proceed as follows to remove the burner:

- Remove the front panel and the top panel from the boiler.
- Unscrew the nut (1) securing the gas feed pipe to the gas valve (2).
- Loosen the hose clamp (3) and remove the air intake pipe (4).
- Pull the hose (5) off the pressure measurement union on gas valve (2).
- Disconnect the cable (6) from the ignition electrode.
- Unscrew the screws (7) and remove the ignition transformer (8).
- Remove the three nuts (9) securing the burner to the flue gas box. Remove the burner, taking care not to damage the seal (10).

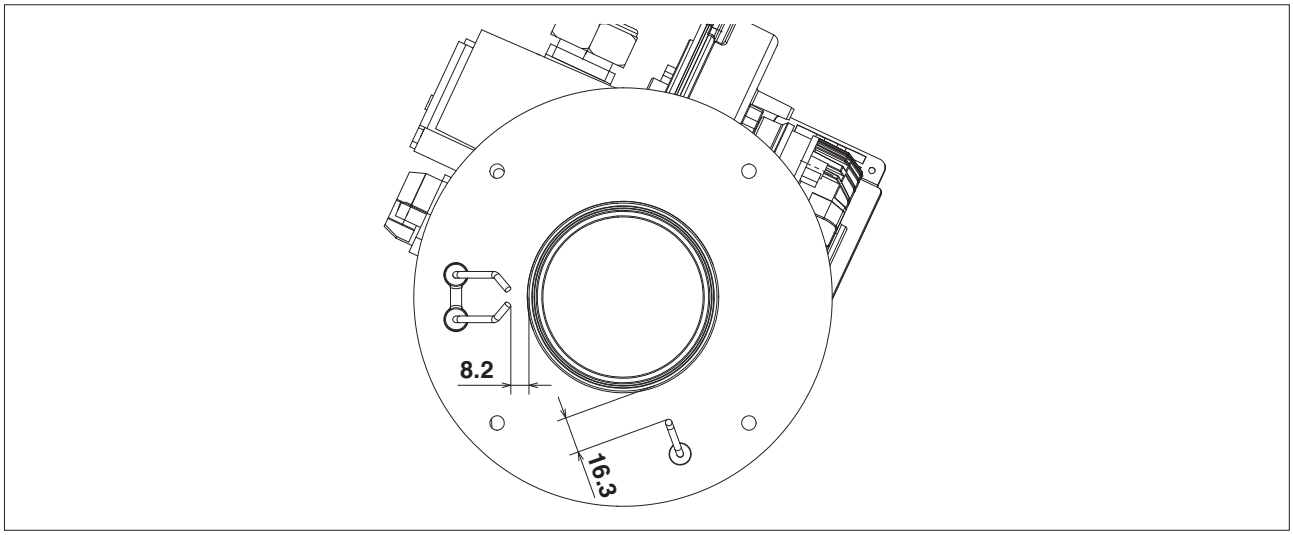
Reverse the above steps to fit the burner again.



POSITIONING THE ELECTRODES

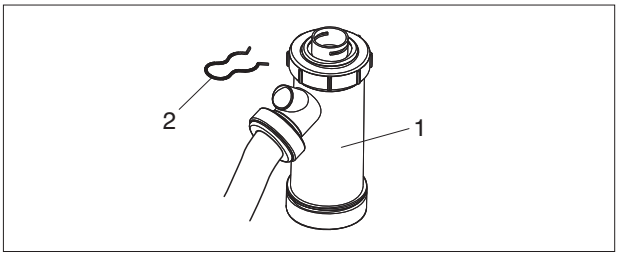
Correct positioning of the ignition electrode and flame detection sensor is essential for efficient ignition and combustion.
With the burner removed, verify the state of wear and the positioning of the ignition electrode and flame detection sensor according to the figure below. Replace if damaged or worn.

⚠ It is essential to respect the dimensions in the figure.



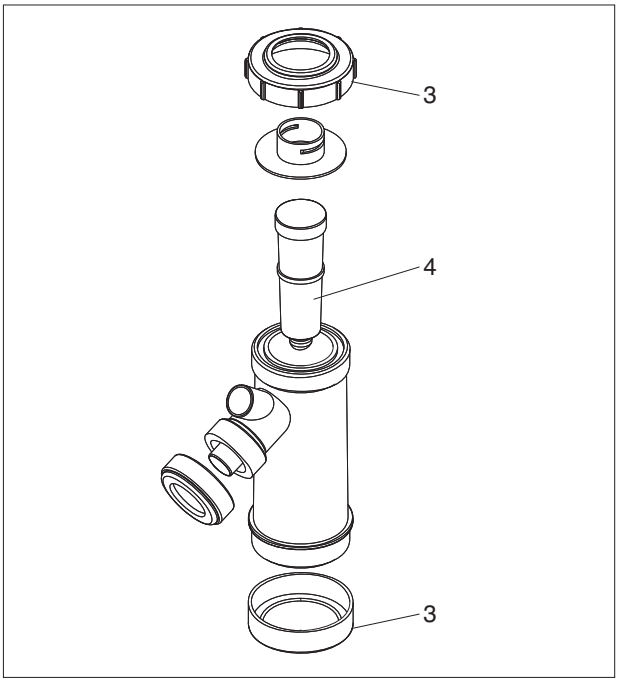
CLEANING THE CONDENSATE DRAIN AND SIPHON

- Remove the front panel from the boiler and locate the condensate drain siphon (1)



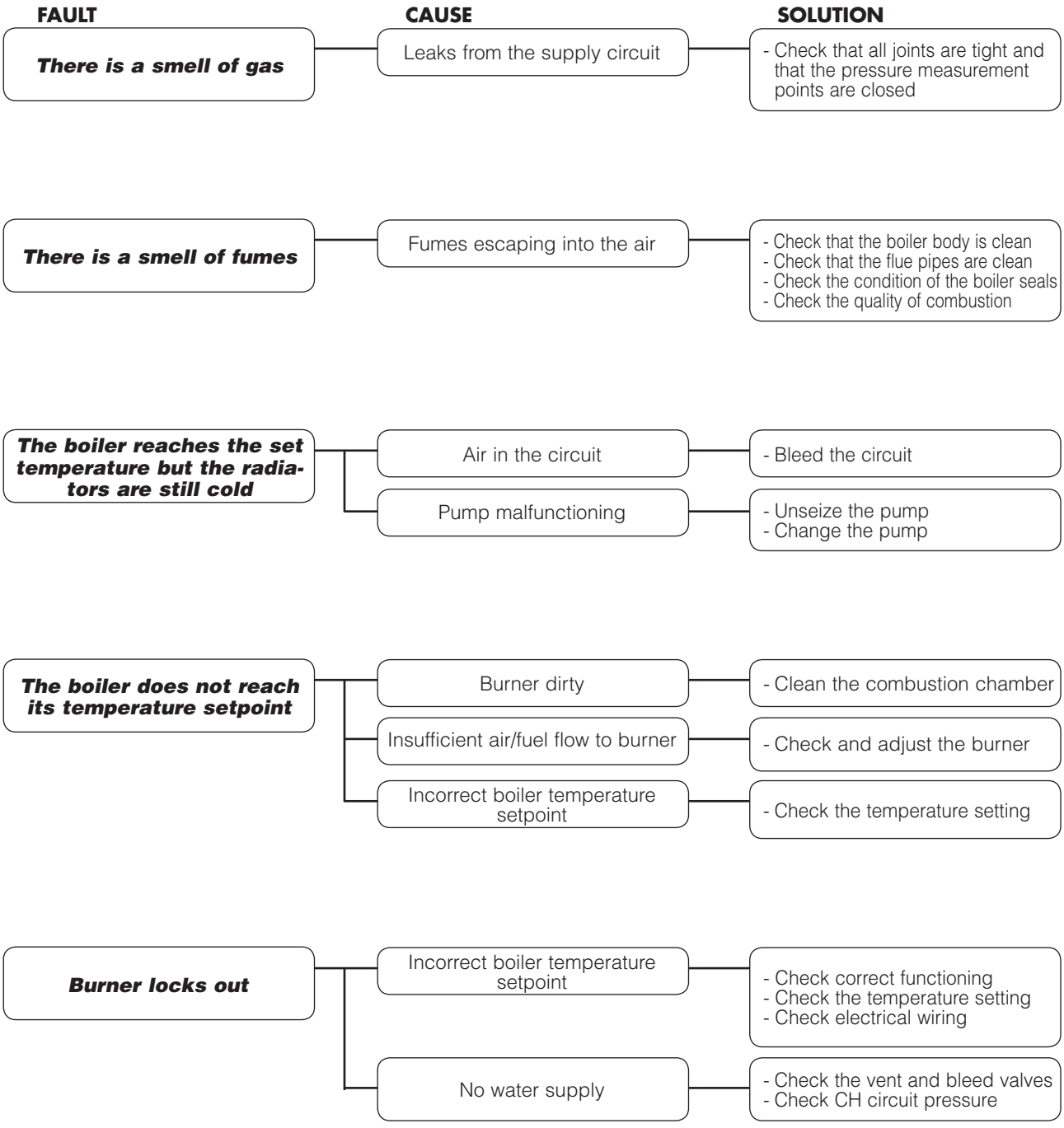
- Remove the spring clip (2), detach the corrugated condensate drain hose, and remove the siphon. Unscrew the two caps (3) to disassemble the siphon

- Remove the float (4) and clean all internal components



On completion of cleaning, follow the above steps in the reverse order to refit all removed parts.

FAULT	CAUSE	SOLUTION
The burner performs pre-ventilation and ignition correctly but shuts down about 5 attempts	Flame not detected	- Call Technical Assistance
	No gas supply	- Make sure gas shut-off cock is open
The burner shuts down during pre-ventilation	Flue blocked	- Check flue
	Flame detection error	- Call Technical Assistance
	The flame is already lit	- Call Technical Assistance
	Air intake obstructed	- Check for blockage
The burner shuts down after pre-ventilation because the flame fails to ignite	Gas valve feeds too little gas	- Check gas supply pressure
	Gas valve faulty	- Call Technical Assistance
	Weak or no ignition arc	- Call Technical Assistance
	Air in gas line	- Bleed the gas feed circuit
The burner does not start when it receives the control signal	No electrical power	- Check voltage at gas valve terminals - Check the condition of the fuses
	No gas supply	- Make sure gas shut-off cock is open
	Electrical short circuit	- Call Technical Assistance


FAULT
CAUSE
SOLUTION
There is a smell of gas
Leaks from the supply circuit
- Check that all joints are tight and that the pressure measurement points are closed
There is a smell of fumes
Fumes escaping into the air
- Check that the boiler body is clean
- Check that the flue pipes are clean
- Check the condition of the boiler seals
- Check the quality of combustion
The boiler reaches the set temperature but the radiators are still cold
Air in the circuit
- Bleed the circuit
Pump malfunctioning
- Unseize the pump
- Change the pump
The boiler does not reach its temperature setpoint
Burner dirty
- Clean the combustion chamber
Insufficient air/fuel flow to burner
- Check and adjust the burner
Incorrect boiler temperature setpoint
- Check the temperature setting
Burner locks out
Incorrect boiler temperature setpoint
- Check correct functioning
- Check the temperature setting
- Check electrical wiring
No water supply
- Check the vent and bleed valves
- Check CH circuit pressure

Extract from standard UNI 8065 :
"Water Treatment in Domestic Heating Systems"

The purpose of this standard is:
- to establish acceptable ranges for the chemical and chemical-physical parameters of water destined for use in domestic heating systems in order to ensure the efficiency, safety, durability, and correct functioning over time of all auxiliary appliances, and to minimise energy consumption in conformity to applicable laws and standards
- to lay down guidelines for the correct design and installation of water treatment systems
- to establish methods for testing and analysis as part of proper system operation even during periods of shutdown
- to define the technical responsibilities of the purchaser, supplier and operator of water treatment systems

⚠ For the purposes of this standard, water destined for use in domestic heating systems must have characteristics similar to those of normal drinking water even prior to treatment.

The main chemical and chemical-physical characteristics of heating system water and their effect on system operation

Appearance
The appearance of water depends on the presence of sediment, in suspension or in colloidal form, and on the presence of dissolved substances that create easily identifiable conditions like turbidity, colouration or foaming.
These substances can lead to limescale, sludge, corrosion, abrasion, microbial growth and foaming.
Their presence in a heating system indicates either that the filling water has not been sufficiently purified and has been topped up, or that there are problems inside the circuit, (such as corrosion, leaks, etc.). It is essential to identify the source of any such impurities so that the correct remedial action can be taken.

Temperature
The temperature reached at different points in a heating circuit is extremely important, since it determines whether phenomena like limescale, corrosion and microbial growth will occur and how quickly they will develop.
Temperature must be accurately specified at all stages of the system design process, and must be checked carefully as soon as any malfunctioning is detected.

pH
The pH value, referred to 25°C, expresses how acidic or basic a solution is, in a scale from 0 to 14:

- 0 defines maximum acidity
- 7 defines neutrality
- 14 defines maximum basicity

pH is a fundamental parameter in evaluating how corrosive system water might be. It also represents an extremely important factor in the development of limescale, corrosion and microbial growth. Generally speaking, any pH value lower than the range specified in the "Characteristics of filling and refilling water" section can cause generalised corrosion, while any pH higher than that range can lead to limescale, sludge and corrosion.

Fixed residues at 180°C – Electrical conductivity
Fixed residue offers a direct measurement by weight of the quantity of salts contained in a sample of water evaporated at 180°C.
Since the electrical conductivity of a water based solution depends largely on its salt content, electrical conductivity is often taken as an alternative measurement to fixed residue.
Since conductivity is also influenced by temperature, any measurement taken with a conductivity meter must be referred to 25°C. Conductivity is expressed in microsiemens per centimetre (µS/cm).
As a practical means of measurement, it is assumed that fixed residue (expressed in mg/kg) corresponds to about 2/3 of the corresponding conductivity measurement (in µS/cm). A high salt content can cause limescale, corrosion and sludge, and can also point to design errors or poor operating practices (e.g. insufficient bleeding) of the heating system or water treatment system.

Hardness
The total hardness of a water sample is an expression of the sum total of all the calcium and magnesium salts dissolved in it.
The temporary hardness value expresses the sum total only of calcium and magnesium bicarbonates.
Hardness is expressed in mg/kg of $CaCO_3$ or in degrees 'French' (1°fr = 10 mg/kg $CaCO_3$).
The use of hard water without suitable treatment can lead to the formation of limescale.

Alkalinity
M-alkalinity or total alkalinity represents the sum total of all alkaline salts (bicarbonates, carbonates, hydrates and alkaline phosphates) present in a water sample. P-alkalinity or phenolphthalein alkalinity expresses the content of hydrates and half the carbonates. The phenolphthalein alkalinity of naturally occurring water is normally zero. Alkalinity is expressed in mg/kg of $CaCO_3$. High P-alkalinity values can lead to increases in pH, and are generally caused by inadequate venting and bleeding. .

Iron
Iron content is expressed in mg/kg of Fe. Free iron in a water circuit can lead to sludge and/or secondary forms of corrosion. If the iron content of the raw water supply exceeds the established limits, suitable pre-treatment must be provided. Iron found in system water as the result of corrosion points to the fact that the heating system or the treatment system is not being operated properly.

Copper
Copper content is expressed in mg/kg of Cu. The presence of copper in system water can cause dangerous localised corrosion.
Copper is seldom found in any appreciable quantity in raw water. If it is detected, it is therefore the result of corrosive processes inside the heating circuit.
There is only any point in measuring the copper content of the water if the system actually contains copper components that might be affected by corrosion.

Chlorides and sulphates
These values are expressed in mg/kg of Cl and SO4 respectively. Since the system filling water is considered to be drinkable, no specific limits are laid down for chloride and sulphate content. These salts can nevertheless cause corrosion if they come into contact with certain metals (certain stainless steels in the case of chlorides and copper in the case of sulphates).

Microbial growth
A wide range of algae, fungus, mould and bacteria species can live and breed inside heating circuits. These microbes not only form living colonies of organisms but also cause corrosion and bad smells when they die and decompose.

Water analysis
Water must be properly analysed to identify the type of treatment it needs.

Typical heating system water problems and possible remedies

The purpose of establishing limits for certain parameters in water destined for use in heating systems is to eliminate or significantly reduce the problems typically caused by the use of unsuitable water. Untreated water can seriously reduce the efficiency of a heating system and can cause serious wastage of energy. Typical problems include:

- Limescale
- Corrosion
- Sludge
- Microbial growth

These problems often occur together. Any solutions must suit the characteristics of the heating system in question.

Limescale
Limescale deposits are caused mainly by hard water salts precipitating out and covering the walls of a circuit in a more or less solid, hard coating. Limescale reduces the efficiency of the heating system by reducing heat exchange and blocking pipes, and often leads to corrosion too. Limescale can be prevented by chemically stabilising the water and/or softening it with ion exchange resin softeners.

Corrosion
Corrosion is generally an electro-chemical process. It begins by destroying the surface of a metal, but can go so far as to penetrate the metal completely. Corrosion is promoted by the presence of oxygen and is triggered by unsuitable water characteristics or by non-homogenous conditions, caused, for example, by contact between different metals, non-uniform metallurgy in system components, solid substances coming into contact with each other, sludge, and system design and operating errors. Corrosion is also favoured by heat, high salt content (especially chlorides) and high water pumping speeds. Corrosion can be reduced by specific or generic chemical water conditioning.

Sludge
Sludge is formed by the precipitation of insoluble organic and inorganic substances. Unlike limescale, sludge forms soft deposits. Sludge can be caused by the characteristics of the system water or by atmospheric pollution (especially if the heating circuit is open to the air). Sludge can give rise to the same problems as limescale. Sludge can be prevented by filtering incoming water, by proper bleeding and venting, and by chemically treating the system water.

Microbial growth
In this context, the term ‘microbial’ refers to any form of organic life normally classified as algae, fungi, moulds and bacteria. Their growth is favoured by light, heat, sludge and accidental pollution. Perhaps the most dangerous microbes for a heating system are autotrophic bacteria (e.g. ferrobacteria and sulphate reducing bacteria). These are one of the direct causes of localised corrosion. Microbial growth can be prevented by using suitable biocides.

Note: This standard does not deal directly with the problems caused by microbial growth, but simply defines intrinsic water characteristics in order to identify suitable treatments. It is nevertheless essential to ensure that heating systems are installed to the highest standards. Failure to do so can lead to a wide range of problems.

Water treatment

Classification of water treatments

The types of water treatment that can be applied to heating system filling and refilling water are classified as follows:

- physical and chemical-physical treatments ('external' treatments)
- chemical conditioning ('internal' treatments)

Physical and chemical-physical treatments

Two forms of treatment are generally required if heating systems are filled from the normal water supply, or with drinking water:

- precautionary filtration to protect the boiler and water circuit
- softening in an ion exchange resin water softener

If the supply water is not normal drinking water, other specific pre-treatments may be needed.

Chemical conditioning

Chemical conditioning:

- stabilises water hardness
- disperses soft organic and inorganic sludge
- deoxygenates the water and passivates internal surfaces
- corrects alkalinity and pH
- forms a protective film
- controls microbial growth
- provides anti-freeze protection

Selecting the right treatment

Water treatments must be chosen to suit the characteristics of the water to be treated, the type of heating system and the required purity parameters. The various types of treatment (physical, physical-chemical, and chemical) can be used alone or in combination as required. It is up to the customer to define the characteristics of the heating system he or she requires. It is then up to the supplier to propose the most suitable water treatment for that type of system. This process will also help the customer to choose the type of system that best matches their technical and economic needs (bearing in mind both initial cost and running costs) and is also the easiest to operate. These responsibilities can, of course be delegated to competent third parties acting as consultants, provided their responsibilities are agreed in advance by the parties.

Description of physical and chemical-physical treatments

Filtration
Purpose

In general, filtration is used to filter out undissolved substances by passing water through one or more filter elements. The elements themselves can be of various types (minerals of various grain size, ceramic or fibre filters, mesh filters, membranes, etc.).
There are two common types of filter for practical purposes and for the purposes of the present standard: those made from inert, washable granular materials of suitable grain size, and those made from disposable or washable filter elements.

Principle of functioning

a) Filters with washable granular filter materials

These are generally made in the form of closed containers (pressure filters) containing one or more layers of inert granular material. Suspended solid particles are filtered out of the water as it passes through the filter material.
These filters need to be regenerated cyclically by backwashing, with or without the aid of compressed air.

b) Filters with washable or disposable elements

In this type of filter, suspended particles are mechanically removed by the small or tiny passages through the filter element. The element itself gradually becomes clogged and must be washed or replaced.

Resin softening
Purpose

Softening water with synthetic resins replaces the limescale forming or hard ions (calcium and magnesium) with other ions that do not form limescale (sodium).

Principle of functioning

Water softeners are closed tanks containing ion exchange resins (organic polymers) whose functional groups determine the unit's capacity for exchanging sodium ions for calcium and magnesium ions. The unit gradually loses its capacity for ion exchange and must be regenerated it intervals by adding normal kitchen salt (sodium chloride). The cyclical phases of exhaustion and regeneration can be repeated almost indefinitely.

Chemical conditioning

The chemical conditioning of water in a heating system is achieved by adding suitable doses of chemical reactants to integrate (if necessary), or in certain cases replace, the filling water treatment originally performed with the physical and chemical-physical means described above.

Classification of conditioners

The following table lists the various types of chemical water conditioner, arranged according to action and characteristics of the most common product. Conditioners can be used alone or in combination with other products, if more than one effect is required.

Types of chemical conditioner

Action	Purpose	Type	Notes
Correction of alkalinity and pH	To maintain a pH that minimises the corrosive action of the water on the material it comes into contact with throughout the circuit	Non-volatile alkalinising agents: formulae based on phosphates, silicates, hydrates and sodium carbonate	
		Volatile alkalinising agents: formulae based on ammoniacal compounds and non-aromatic amines	
	To correct excessive alkalinity	Non-volatile de-alkalinising agents: formulae based on phosphates, sulphates and acid reacting sulphates	
Stabilisation of water hardness	To prevent the formation of insoluble salt deposits on heat exchange surfaces and to prevent the precipitation of insoluble salts in general	Sequestrants and complexants: formulae based on polyphosphates, phosphonates, EDTA, polycarboxylic acids etc.	
Precipitation of limescale forming salts	To promote the formation of insoluble compounds in the form of soft sludge	Inorganic precipitants: formulae based on phosphates	
Dispersion of soft sludge	To disperse undissolved compounds in order to prevent them sticking to the internal surfaces of the circuit	Natural or synthetic organic products: formulae based on tannins, lignins, polyacrylates, etc.	
Deoxygenation of water and passivation of internal surfaces	To eliminate oxygen from the circuit and consequently create the conditions needed to form and preserve protective coatings over internal metallic surfaces (passivation)	Non-volatile de-oxygenating agents: formulae based on sulphites	
		Volatile de-oxygenating agents: formulae based on non-aromatic reducing amines	
Formation of protective films	To form a protective monomolecular film at the water-metal interface, thus blocking the corrosive action of the water and simultaneously discouraging the formation of limescale and microbial growth on internal surfaces	Volatile film-forming agents: formulae based on aliphatic polyamines	
Control of microbial growth	To prevent the proliferation of algae, mould, fungus and bacteria	Biocides: formulae based on quaternary ammonium salts, halogen derivatives, etc.	
Frost protection	To prevent water from freezing inside the system	Organic compounds: formulae based on passivated non-toxic glycol	

Dosing system
The dosing system must permit reactants to be added at the desired points in the heating system, and at the flow rates and concentrations needed to maintain water parameters within the required ranges. Conditioners must only be dosed into domestic hot water by means of dosing units capable of ensuring that dosing is always proportional to the water flow rate.

Choice and application of conditioners
The "Characteristics of water destined for use in heating systems" section below provides a general introduction as to whether chemical conditioning is useful or necessary. Precise instructions cannot be given because treatment details depend on the characteristics of the circuit in question.
In any case, it must be fully understood that conditioning is designed mainly to provide specific or polyvalent actions aimed at protecting the heating system against corrosion and limescale.

Reconditioning heating systems
The treatments listed above are designed to maintain system water in optimal operating conditions. These treatments may also, over time, help recondition older systems that have been affected by non-serious limescale or corrosion. If the corrosion or limescale has already reached a serious level, however, proper reconditioning must be performed by specialist personnel prior to the use of normal water treatments.

Characteristics of water destined for use in heating systems

This section lists minimum and maximum parameters for water destined for use in filling, refilling and operating heating systems. Provision must be made from the design stage for all the treatment and conditioning sub-systems needed to treat incoming water and produce water with the characteristics given below. It is the responsibility of the system operator to perform all the checks and actions necessary to ensure that water parameters remain within the specified range at all times.

⚠ The establishment and maintenance of water parameters within the ranges specified guarantees compliance with the present standard. It is nevertheless essential to point out that compliance with this standard also depends on the correct design and operation of the entire heating system. Failure to design and operate systems correctly can lead to various problems that are often erroneously attributed to water characteristics. The main design problems to avoid are:

- lack of or inadequate temperature control
- bi-metallic and pluri-metallic contacts and wrong metal sequences
- excessive refilling of the heating circuit
- poor pipe jointing
- excessive water speed through the circuit
- circulation through open expansion vessels
- use of unsuitable materials
- inadequate venting

Hot water heating systems

Prescribed water treatments
Chemical water conditioning is required for all heating systems. The installation of a safety filter is obligatory in systems with a heat output above 350 kW (and advisable in all systems). If the total hardness of the water exceeds 15°fr, a softener must also be installed to bring the water back within the permitted hardness range.

Treatment points
Treatment systems must be installed upstream from the heating system they are designed to protect, and typically on the filling and refilling pipes, where they can treat the initial filling water and the water subsequently used to refill the system. Water conditioning agents must be added at a point that ensures the rapid action of those agents. The ideal point of entry into the system is in the system's main flow, at a point of maximum turbulence, e.g. upstream from the pump.

Characteristics of filling and refilling water

Appearance	Clear
Total hardness	below 15°fr

Note: In heating systems of less than 350 kW in heat output, if the filling or refilling water has a hardness value of less than 35°fr, the water softening unit can be replaced by a suitable chemical conditioning unit

Characteristics of circuit water

Appearance	Clear
pH	Higher than 7 (with radiators made from aluminium or light alloy elements, the pH must also be lower than 8)
Condizionanti Conditioners	Present in the concentration specified by the supplier
Iron (Fe)	< 0,5 mg/kg
Copper (Cu)	< 0,1 mg/kg

Checks
As is the case with checks for water parameters, it is the responsibility of the system operator to ensure that any water treatment systems are functioning properly, in compliance with instructions and at the specified intervals. The supplier's responsibility ends with the supply and commissioning of the right conditioning system for achieving and maintaining the required water parameters.

Advice on sampling

In order to arrive at a correct analysis of the chemical and physical characteristics of a water sample, sampling systems and methods must be capable of guaranteeing precision and repeatability. The sampling system must, in addition, not add further contaminants to the sample. For this reason it is preferable for the sampling system to be made from the same material as the pipe or tank in which it is installed. If the temperature of the water being sampled is hotter than 35°C, a cooling coil must also be provided to reduce its temperature to no more than 25°C. Before taking the sample of water or steam for testing, bleed the sampling system for 5 minutes to eliminate any oxides or other materials in suspension that might have accumulated in it. The sample container must likewise by made from an inert material compatible with the sample collected (e.g. glass or polyethylene). Wash any containers thoroughly in the water to be sampled before actually taking the sample.

Ordinary analysis and checking, frequency and sampling points

The following symbols and terms are used to identify sampling frequency and the location of sampling points:

Frequency of analysis	A - Twice a year, in the season in which the heating system is in use
	B - Once a month
	C - Once every 15 days
	D - Once a week
Sampling points	1 - Filling water
	2 - Filling and/or refilling water
	3 - Water in the boiler or heating circuit

The following table lists the sampling frequencies and sampling locations for the various types of heating system.

Type of system Analyses and checks	Hot water heating system	Note
Appearance	2A - 3A	
PH	3A	
Total hardness	2B	
Fixed residue		Electrical conductivity measurement can be used instead
Electrical conductivity		Fixed residue measurement can be used instead
Iron	3A	
P-alkalinity		
Chemical conditioner	3A	
Copper	3A	

Recommendations and requirements

Recommendations and requirements for the customer
The customer must provide the following details in order to permit the supplier to identify and supply the systems, appliances and chemical conditioners needed to treat the water correctly:

- characteristics of the system: type (heating, domestic hot water), delivery/flow rate, pressure, working temperature, power rating
- schematic of the circuit
- characteristics of the water available to supply the system
- state of preservation of the boiler and heating circuit (cleanliness, limescale, corrosion, etc.)

On completion of commissioning, responsibility for operating the system passes entirely to the customer, who must implement all the checks and actions necessary to maintain water parameters within the specified ranges.

Recommendations and requirements for the supplier
As part of the offer and subsequent supply of an external treatment system, conditioner dosing system and chemical conditioners (internal treatment), the supplier must:
- ensure that the information supplied by the customer, and especially the information provided on the characteristics of the water supply, is sufficient to identify the right treatment, and in case of doubt must perform the necessary analyses for himself
- offer the customer the most suitable treatment but also clearly state any viable alternatives
- explain any chemical-physical limitations on the use of the chosen treatment, specify what performance can be expected (if a system is supplied) or what minimum and maximum concentrations must be maintained (if a chemical product is supplied), and specify what methods of analysis must be applied
- in the construction of any dosing systems, use only components and materials suitable for use with the chosen conditioners, or provide all the details necessary to identify the same

In particular, suppliers of chemical conditioners must provide the customer with a data sheet listing the chemical characteristics, performance and toxicological properties of any product.
- specify the right method for adding conditioners to the system, and specify concentrations, points of entry, frequencies, dosing times and any other information necessary or useful for the proper use of the conditioners and treatment system
- during final commissioning, check that all the specified water parameters are respected
- specify what technical assistance and after-sales service can be supplied.

Cod. 20027521

Instructions for the correct disposal of the product pursuant to European Directive 2002/96/EC

At the end of its working life, the product cannot be disposed of as municipal waste. It can be delivered to separate waste collection centres operated by local councils, if such exist, or to the resellers that provide this service. Separate disposal of appliances avoids possible negative consequences for the environment and the health due to unsuitable disposal and allows the recovery of the components, with significant savings in terms of energy and resources. The symbol (crossed-out wheeled bin) shown on the product indicates that the appliance must be disposed of separately.

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