

N.

Installation, operating and maintenance Instructions

N-Mini / N 1 / N 2 / N 3



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SPARE PARTS See at the end of this manual

WHO SHOULD READ THESE INSTRUCTIONS

- These instructions should be read by:
- the specifying engineer
 - the installer
 - the user
 - the service engineer

SYMBOLS

The following symbols are used in these instructions:



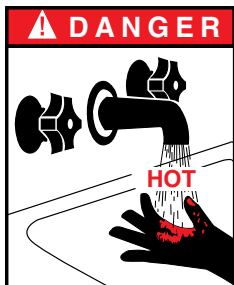
Important instructions for correct operation of the installation.



Essential instructions to ensure the safety of persons and the environment.



Danger of electrocution.



Danger of burning.

APPLICABLE STANDARDS

The products described in this document have been certified at European level (European Directive 92/42/EEC «Efficiency»). They have also been awarded the Belgian “OPTIMAZ” LABEL (fuel oil boiler).



IMPORTANT NOTES

These instructions are an integral part of the equipment to which they relate and must be handed to the user.

The product must be installed and serviced by qualified engineers in accordance with the regulations in force.

ACV declines all liability for any damage caused as a result of incorrect installation or in the event of the use of appliances or accessories that are not specified by ACV.



Failure to follow the instructions describing the test operations and procedures may cause injury to persons or risks of environmental pollution.

N.B.:
ACV reserves the right to change the technical characteristics and specification of its products without notice.

USER GUIDE

USE OF THE BOILER



To ensure that your system operates correctly, please have it serviced annually by a qualified engineer; servicing should be completed before the start of the heating season.

Starting the burner:
in normal operation the burner starts automatically if the temperature of the boiler is below the set point.



Before carrying out any work on the boiler, isolate it from the electrical supply at the switch on the external control box. Also place the main switch on the control panel to "OFF".

You should familiarise yourself with the control panel (fig. 1)



The user must not attempt to gain access to the components inside the control panel.

1. Control thermostat

When the boiler is used for heating only, the boiler temperature may be set at 60 to 90°C. If the boiler is used to generate domestic hot water and heating, the boiler's control thermostat should be set at 80°C to ensure optimum operating conditions.

2. Main switch

Use this switch to turn the boiler on and off.

3. Summer/Winter switch

Use this switch to start and stop the heating pump.

4. Thermostat-pressure gauge

This gauge shows the temperature of the boiler and the pressure in the primary heating circuit. The temperature must not exceed 90°C. If it rises above this point, turn off the boiler and check the settings on the thermostat. If the problem persists, call a technician. The pressure must not fall below 1 bar. If it does fall below this point, look up the section entitled "Gauge pressure of the heating installation" in this section below.

5. Manual reset high-limit thermostat

If the boiler temperature exceeds 103°C, this safety device will be enabled. The boiler temperature must drop below 60°C to re-start. Unscrew the cover and press the re-start key with a pen or an object with a similar sharp point. Replace the cover. If the fault persists, turn off the boiler and call a technician.

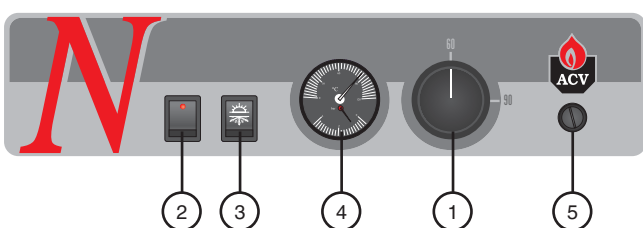


fig. 1 : Control panel



fig. 2 : N-Mini Control panel

Pump operation:

The pump is controlled by a reset high limit thermostat, which is located at the rear of the boiler. This is pre-set at 45°C. When the boiler starts up, it delays the activation of the boiler pump, thereby preventing any risk of corrosion in the combustion chamber.

Gauge pressure of the heating system

Your system must be fitted with a heating safety valve calibrated to 3 bars.

Ensure that the system is always under water pressure. When the system is cold and the air inside it has been vented, the gauge must indicate a pressure between 0.5 and 1.5 bar depending on the height of the building.

To add water: (refer to Fig. 10 on Page 8)

- Open the filling valve (5).
- Close the valve properly after filling.
- Vent the system in order to obtain an accurate reading of the pressure inside the heating circuit.

Safety valves (heating circuit)

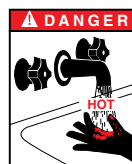
If water is found to be escaping from one of the safety valves, stop the boiler and contact your installer for advice.

A monthly test is recommended:

Lift the lever on the drain cock for a few seconds to ensure that the safety valve is working correctly.



If there is a problem after this short test, please contact your installer for advice.



The water escaping from the safety valve can be extremely hot and cause serious burns.

BURNER SHUTDOWN

If the burner is not working:

1. The burner indicator lamp lights up.
2. Press the burner reset button (Fig. 3) on the burner. Turn the boiler off for several seconds at the main switch, then restart the boiler.
3. If the burner still does not work, rearm the manual reset highlimit thermostat on the control panel (Fig. 4).
4. If the anomaly persists, please contact your installer.



fig. 3



fig. 4

GENERAL DESCRIPTION

- Model **N** is a single boiler (*heating*).
- Equipment required: a water connection kit for the heating circuit supply (*optional*).
- The **N-Mini** control panel includes a control thermostat and a thermostat pressure gauge.
- The control panel on **N 1 - 2 - 3** boilers includes a main switch, a Summer/Winter switch, a thermostat pressure gauge, a control thermostat and a manual reset high-limit thermostat.
- The **N** boiler can be connected directly to the chimney using a B23 chimney connector.
- **N-Mini** Model: output of 16.6 kW.
- **N1** Model: Outputs in the range 20 to 25 kW.
- **N2** Model: Outputs in the range 28 to 36 kW.
- **N3** Model: Outputs in the range 36.5 to 51 kW.

OPERATING PRINCIPLE

Simple to control, safety assured

The temperature of the water in both the heating circuit and the hot water circuit is regulated by a single control. This is achieved by means of the control thermostat and the bulb is located beside the boiler outlet. switch.

- A manual reset high-limit thermostat locks the burner if the primary water temperature reaches 103°C.
- A minimum thermostat, fitted at the rear of the boiler, and preset at 45°C, delays the activation of the boiler pump. This prevents any risk of corrosion in the combustion chamber.

Generation of domestic hot water

Boiler **N** can be combined with the **Smart** tank (100L) superimposed with the boiler or with any other ACV tank.

DESIGN CHARACTERISTICS

Outer body

The outer body which holds the primary water is made from STW 22 heavy gauge steel.

Flue ways

The boiler's flue ways can be accessed from the front and include a set of removable turbulators, in either stainless steel or chrome, which have been specially designed to provide the optimum combustion efficiency.

Combustion chamber

The boiler features a large, water-cooled combustion chamber to guarantee a good flame.

Removable burner chamber plate

The chamber plate is fitted on a hinge (left or right) and made from STW 22 steel. It is protected from the flame by a ceramic fibre padding and a vermiculite brick.

Insulation

The burner body is insulated with rock wool padding (*50mm thick*).

Casing

The boiler is covered with a steel casing that has been stove enamelled at 220°C after scouring and phosphating.

BOILER VIEWS AND KEY TO PARTS

1. Top cover
2. Heating outlet
3. Heating return
4. Chimney connection
5. Heating circuit
6. Combustion chamber
7. Boiler drain cock
8. Fuel oil burner
9. Left-right removable burner chamber plate
10. Exchanger (flue ways)
11. Front panel
12. Control panel

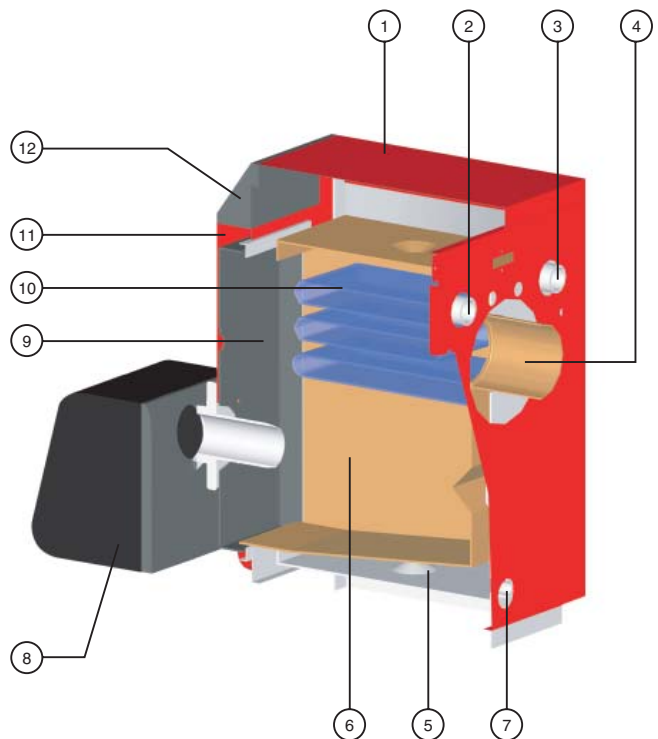


fig. 5

TECHNICAL CHARACTERISTICS

GENERAL

The appliances are supplied fully assembled, tested and packed standing on a timber base with impact protection strips and wrapped in heat-shrunk plastic film. When the appliance arrives, remove the packaging and check that no parts have been damaged in transit. Refer to the dimensions and weights listed below for handling purposes:

OPERATING CONDITION LIMITS

Maximum service pressure (tank filled with water)

- Heating circuit: 3 bar
- Domestic hot water circuit : 10 bar (*)

Test pressure (tank filled with water)

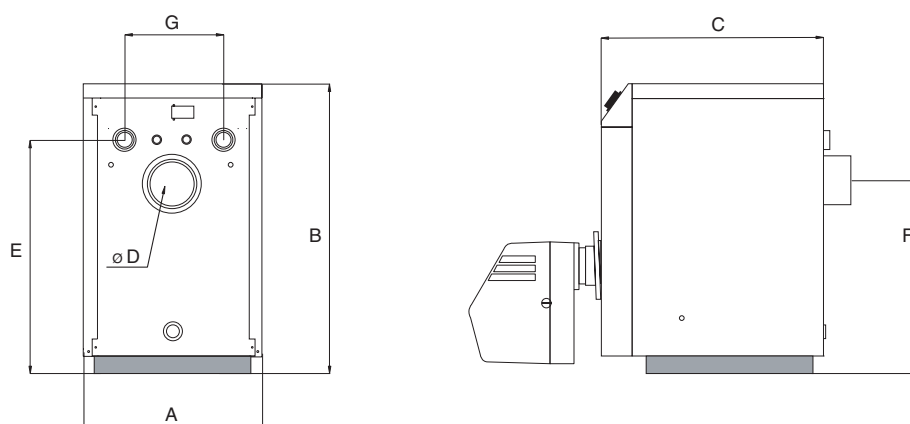
- Heating circuit: 4,5 bar
- Domestic hot water circuit : 13 bar (*)

Operating temperature

- Maximum temperature: 90°C

(*) if the boiler is connected to a domestic hot water production tank.

DIMENSIONS



	A mm	B mm	C mm	D Ø mm	E mm	F mm	G mm	Kg (*)
N-Mini	370	565	495	80	425	357	187	62
N 1	470	700	566	130	550	445	260	108
N 2	470	765	566	130	615	510	260	122
N 3	530	805	656	150	645	550	260	157

(*) The weights shown are the drained weights.

DOMESTIC HOT WATER PERFORMANCE "N + SMART (100 L)"

Operating conditions at 85°C

	N 1	N 2
Peak flow at 45°C (ΔT = 35°C)	L/10'	202
Peak flow at 60°C (ΔT = 50°C)	L/10'	117

GENERAL CHARACTERISTICS

	N-Mini	N 1	N 2	N 3
Input	kW	18.4	22.0 / 28.0	30.4 / 40.0
Output	kW	16.6	20.0 / 25.0	27.0 / 35.7
Pressure loss of the flue gas circuit	mbar	0.11	0.15	0.17
Heating circuit capacity	L	17	31	37
Heating connection (female)	Ø	3/4"	1"	1" 1/4

BOILER ROOM

Important

- Never obstruct the ventilation.
- Do not store inflammable products in the boiler room.
- Avoid storing corrosive products such as paint, solvents, chlorine, salt, soap or other cleaning products near the boiler.

Accessibility

The boiler room should be big enough to allow easy access to the boiler. Minimum clearances around the boiler (mm):

- to the front 500
- to the rear 150
- to the sides 100
- above 700

Ventilation

The boiler room must have both low- and high-level ventilation (see fig. 6).

For your information, the table below gives the minimum ventilation requirements according to Belgian regulations.

The user must ensure that his boiler room ventilation complies with local regulations.

Ventilation		N-Mini	N 1	N 2	N 3
Fresh air supply min.	m³/h	33	50	72	102
High-level ventilation (A)	dm²	150	150	150	150
Low-level ventilation (B)	dm²	150	150	150	170

Base

The base on which the boiler will be mounted must be made from noncombustible materials.

CHIMNEY CONNECTIONS



IMPORTANT

The boiler must be installed by a qualified engineer in accordance with the local standards and codes of practice.



The diameter of the chimney must not be less than the diameter of the boiler's chimney reducer.

Chimney connector type: B23 (fig.6)

The chimney must be connected to the boiler by means of a metal pipe rising at an angle from the boiler to the chimney.

A chimney connector is required.

Chimney		N-Mini	N 1	N 2	N 3
E = 5 m Ø min. F	mm	97	130	143	170
E = 10 m Ø min. F	mm	82	130	130	143
E = 15 m Ø min. F	mm	80	130	130	130

- A. High-level ventilation
- B. Low-level ventilation
- C. Draught stabiliser
- D. Flame inspection window
- E. Height of lined chimney
- F. Chimney diameter

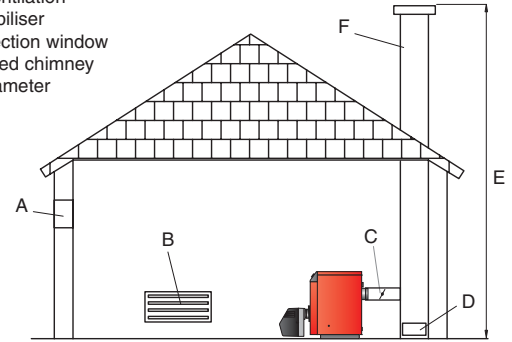


fig. 6 : Boiler ventilation and B23 chimney connector



Important note:

The above table is shown by way of indication only as regulations vary from country to country.



The high output of our boilers means that the flue gases are at a low temperature. The attendant risk of condensation may cause damage to some chimneys. To avoid this risk we strongly advise that you line the chimney. Please contact your installer for any further information.

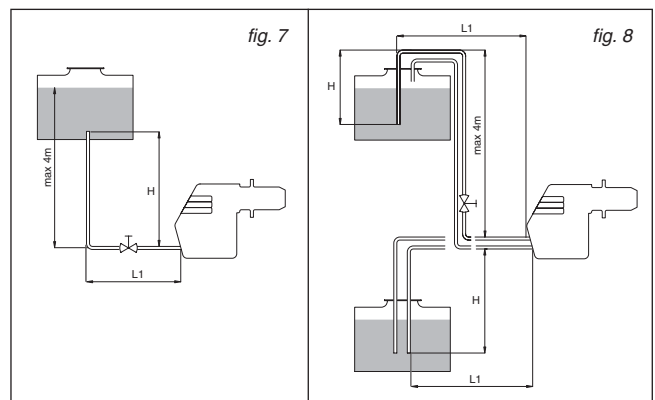
FUEL OIL SUPPLY

Single-pipe installation (fig. 7)

Height H	Ø 8 mm	Ø 10 mm
0,5 m	L = 10 m	L = 20 m
1.0 m	L = 20 m	L = 40 m
1.5 m	L = 40 m	L = 80 m
2.0 m	L = 60 m	L = 100 m

Two-pipe installation (fig. 8)

Height H	Ø 8 mm	Ø 10 mm
0 m	L = 35 m	L = 100 m
0.5 m	L = 30 m	L = 100 m
1.0 m	L = 25 m	L = 100 m
1.5 m	L = 20 m	L = 90 m
2.0 m	L = 15 m	L = 70 m
3.0 m	L = 8 m	L = 30 m
3.5 m	L = 6 m	L = 20 m



INSTALLATION

CONNECTING THE HEATING SYSTEM

ACV water kit

ACV can supply an optional pre-assembled water kit.

This kit comprises:

- A pump;
- A 3-way manual valve. This valve can be power-operated if required;
- Connection pipes that can be used to connect a second heating circuit;
- Two isolating valves;
- Connectors for the right- or efhand mounting of the expansion vessel, the safety valve with pressure gauge and the fill valve.

The expansion vessel is not included.

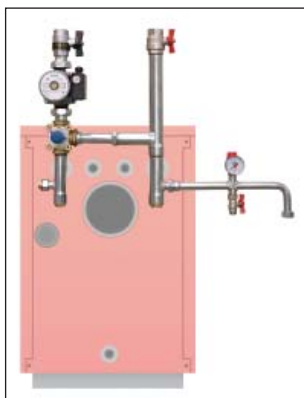


fig. 9 : ACV water kit

Typical single-circuit connection

1. 3-way power-operated mixer valve
2. Safety valve calibrated to 3 bar, with pressure gauge
3. Pump
4. Non-return valve
5. System filling valve
6. Expansion vessel
7. ACV 13.00 controller (see Controller Kit on page 9)
8. Heating system isolating valve
9. Drain cock

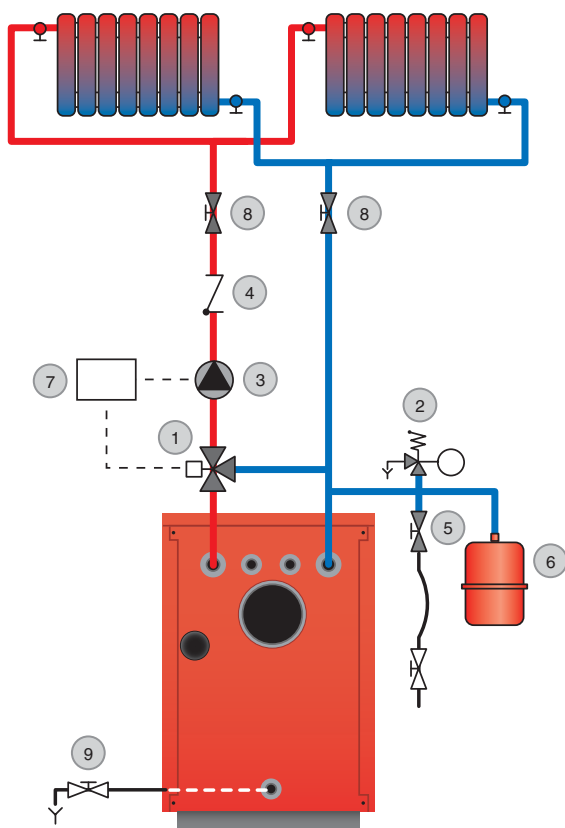


fig. 10 : Heating system connection

Drain

The drain cock and safety valve must be connected to the building drain.

HOT WATER CONNECTION

Pressure reducing valve

If the mains water pressure exceeds 6 bar, a pressure reducing valve calibrated to 4.5 bar must be installed.

Safety group

The safety group of the water tank must be approved by ACV and calibrated to 7 bar; the group's valve discharge must be connected to the drain.

Hot water expansion vessel

Installing a hot water expansion vessel will prevent any risk of excess pressure due to water hammer or pressure fluctuations.

Hot water circulation

If the water tank is a long way from the point of use, installing a closed recirculation circuit can ensure a faster hot water drawoff at any time.

Typical N + SMART domestic hot water connection (100 L) with thermostat valve

1. Safety group
2. Pressure reducing valve
3. Thermostatic mixer
4. Hot water pump
5. Non-return valve
6. Hot water expansion vessel
7. Cold water supply tap
8. Drawoff tap
9. Drain cock
10. Air vent
11. Isolating valve

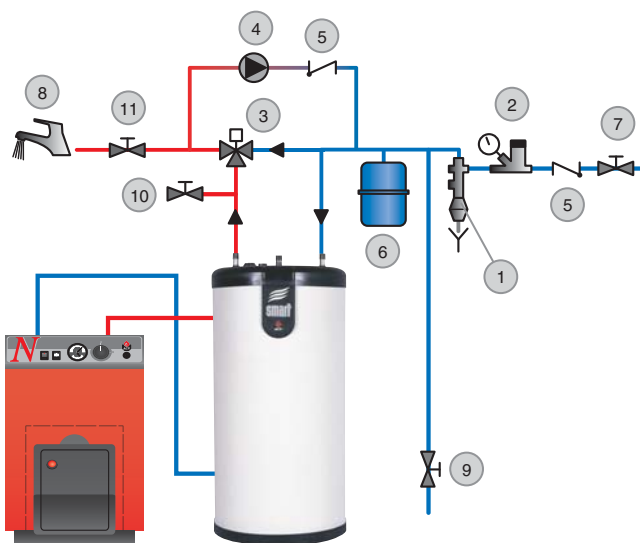


fig. 11 : Hot water system connection



IMPORTANT

As a safety measure, we strongly advise the installation of a thermostatic mixer to prevent any risk of burning to persons.

Optional accessories

Safety group	Ø 3/4"
Pressure reducing valve	Ø 3/4"
Thermostatic mixer	Ø 3/4"
Expansion vessel	5 litres

ELECTRICAL CONNECTIONS

Power supply principle

The boiler operates on a single-phase supply of 230 V/50 Hz. You should install a control box with main switch and 6A fuses externally to the boiler to allow the boiler to be isolated from the supply for servicing and repairs.

Statutory compliance

The installation must comply with your local standards and codes of practice.

Safety

The stainless steel if present water tank must be provided with a separate earth.



The boiler must be isolated from the electrical supply before any work is carried out on it.

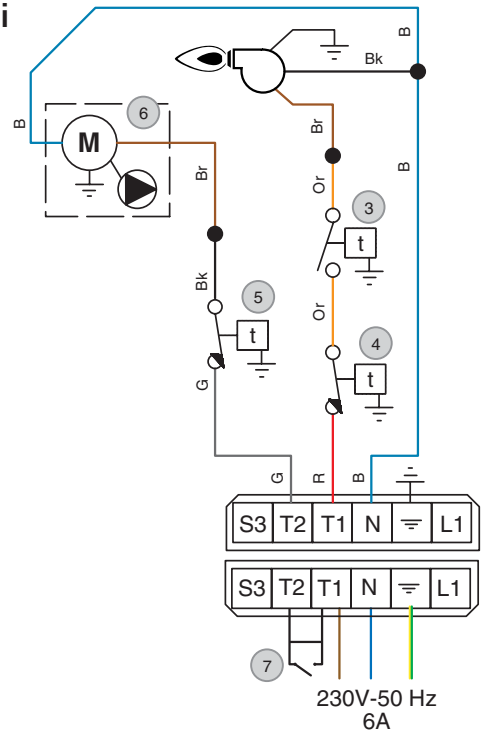
Electrical wiring of N boilers

1. Main switch
2. Summer/Winter switch
3. Control thermostat (60/90°C)
4. Manual reset high-limit thermostat (103°C max.)
5. Minimum thermostat 45°C (T.O.D)
6. Pump (optional)
7. Room thermostat

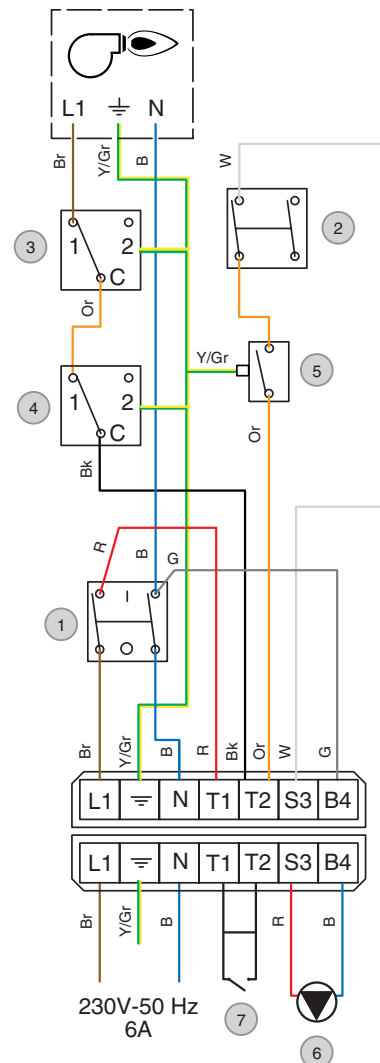
Wiring diagram key

- B. Blue
- Bk. Black
- Br. Brown
- G. Grey
- Or. Orange
- R. Red
- W. White
- Y/Gr. Yellow/Green

N-Mini




**N 1
N 2
N 3**



INSTALLATION


CONTROL KITS (OPTIONAL)

ACV 13 electrical controller




- Direct control of the burner (ON/OFF) or modulating control of a power-operated valve.
- Domestic hot water priority.

QAD 22 heating outlet sensor




- For configuration with an air temperature controller.

QAC 32 Outdoor sensor



- For configuration with an air temperature controller.

SSY 319 servomotor



- SSY 319 electromechanical servomotor for 3-way valves.

SQK 349 servomotor



- SQK 349 electromechanical servomotor for 3-way valves.

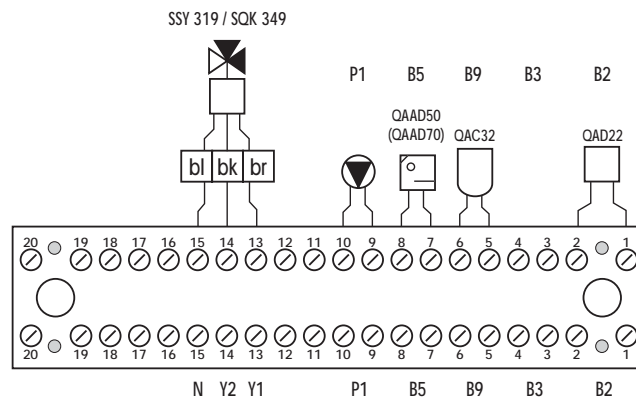
Wall-mounted case



- ACV 13 connecting wiring case.

Electrical wiring diagram of the wall-mounted case

- B2. Temperature sensor
- B9. Outdoor sensor
- B5. Analogue/digital room sensor
- P1. Pump
- Y1/Y2/N. Servomotor (SSY 319 or SQK 349)
- bl. Blue N
- n/z. Black Y2
- br. Brown Y1




Please contact your installer if you require any further information.

Boiler Control BC 01



- This control box is used to connect a single- or dualfuel boiler to a heating system boiler, without hotwater priority.

Boiler Control BC 03



- The Boiler Control BC 03 controls a heating system boiler without domestic hot water priority with a boiler: it controls the burner operation, the heating pump and the boiler - either through the SCE pump or the 3-way SCE valve.
- The Boiler Control BC 03 incorporates a pump anti-lock device that regularly starts up the pump for a few seconds after a long period of non-use.

N + SMART INSTALLATION WITH ACV CONTROL

1. Room thermostat
2. Heating pump
3. Loading pump indirect tank
4. Boiler burner
5. Smart 100 L boiler
6. Electrical supply

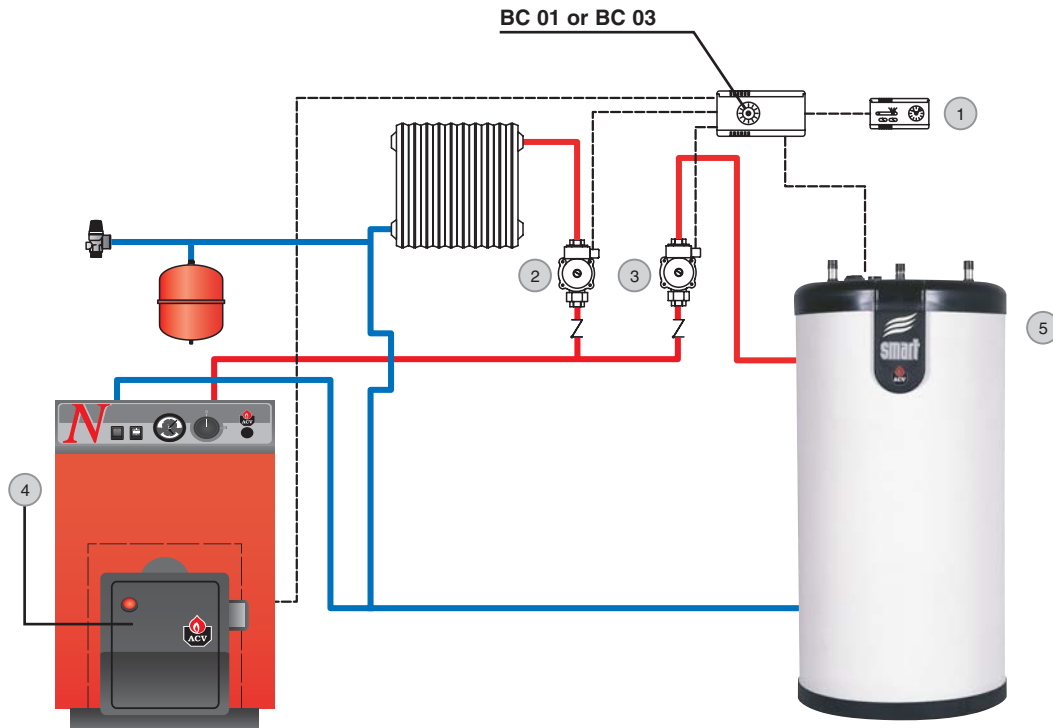


fig. 12 : Installation with two pumps.

1. Room thermostat
2. Loading pump indirect tank
3. 3-way power-operated valves
4. Boiler burner
5. Smart 100 L boiler
6. Electrical supply

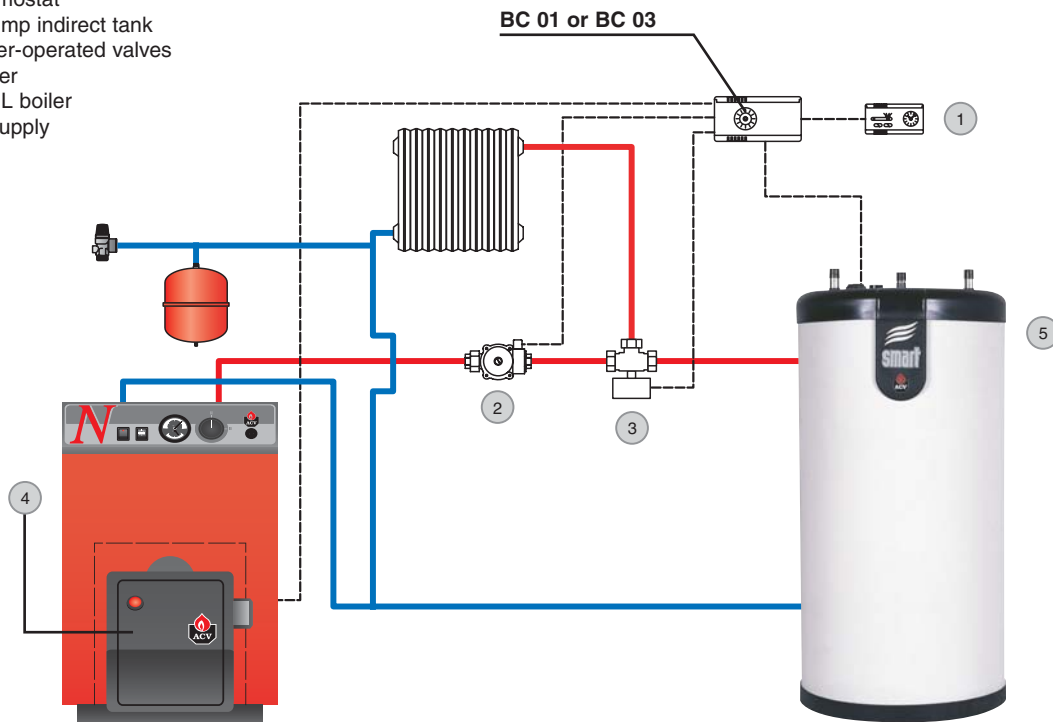
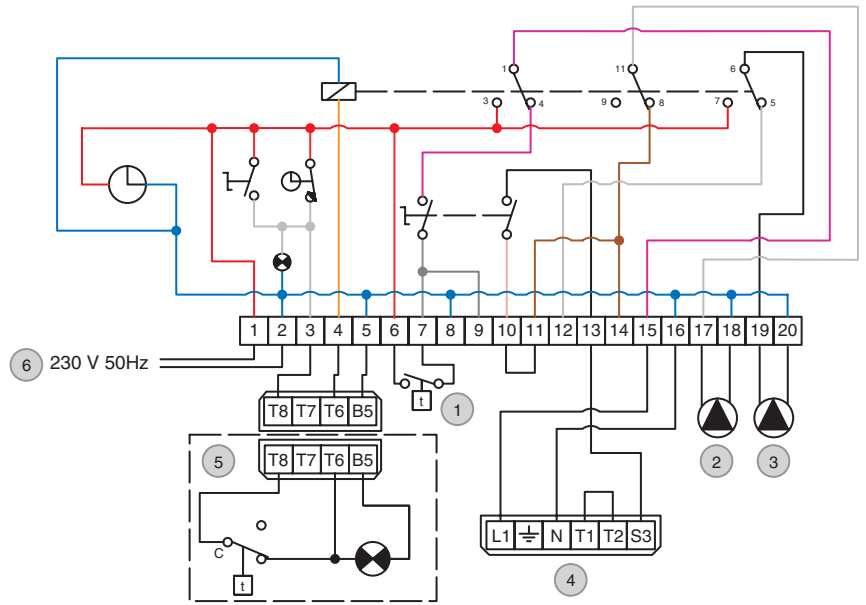


fig. 13 : Installation with 1 pump and one 3-way power-operated valve.

INSTALLATION

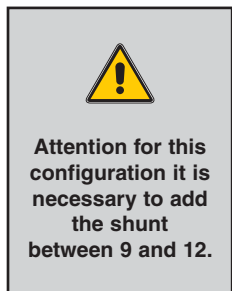
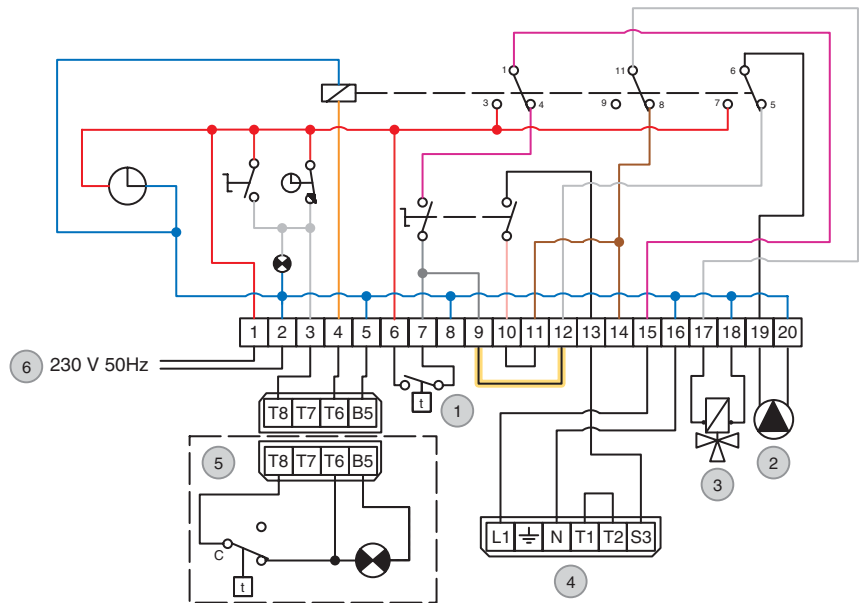
Electrical connection of BC 01 with 2 pump

1. Room thermostat
2. Heating pump
3. Loading pump indirect tank
4. Boiler burner
5. Smart 100 L boiler
6. Electrical supply

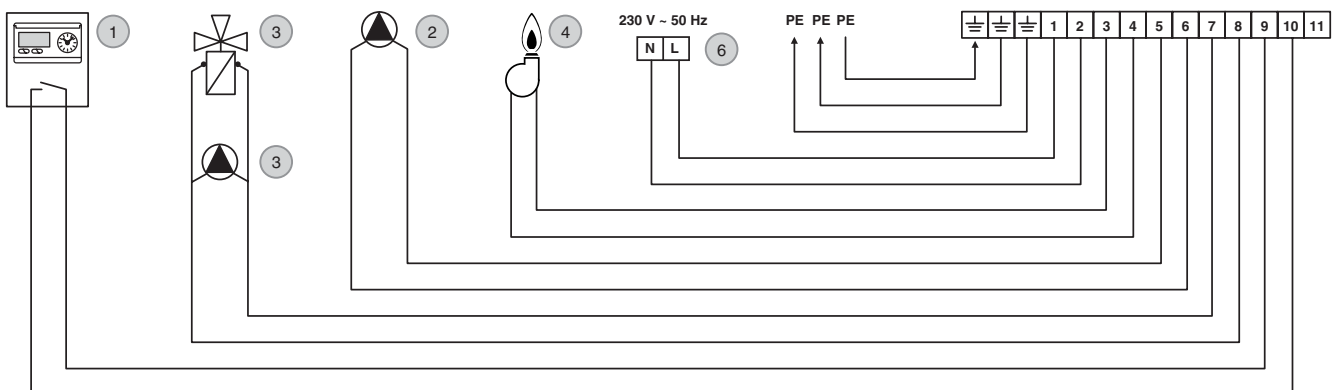


Electrical connection of BC 01 with one 3-way motorised mixer valve + 1 pump

1. Room thermostat
2. Loading pump indirect tank
3. 3-way power-operated valves
4. Boiler burner
5. Smart 100 L boiler
6. Electrical supply



Connecting the system's electrical components to the BC 03



DESCRIPTION OF THE BURNER

This new generation of fuel oil burners comply with current requirements in terms of performance and the cleanliness of combustion gases.

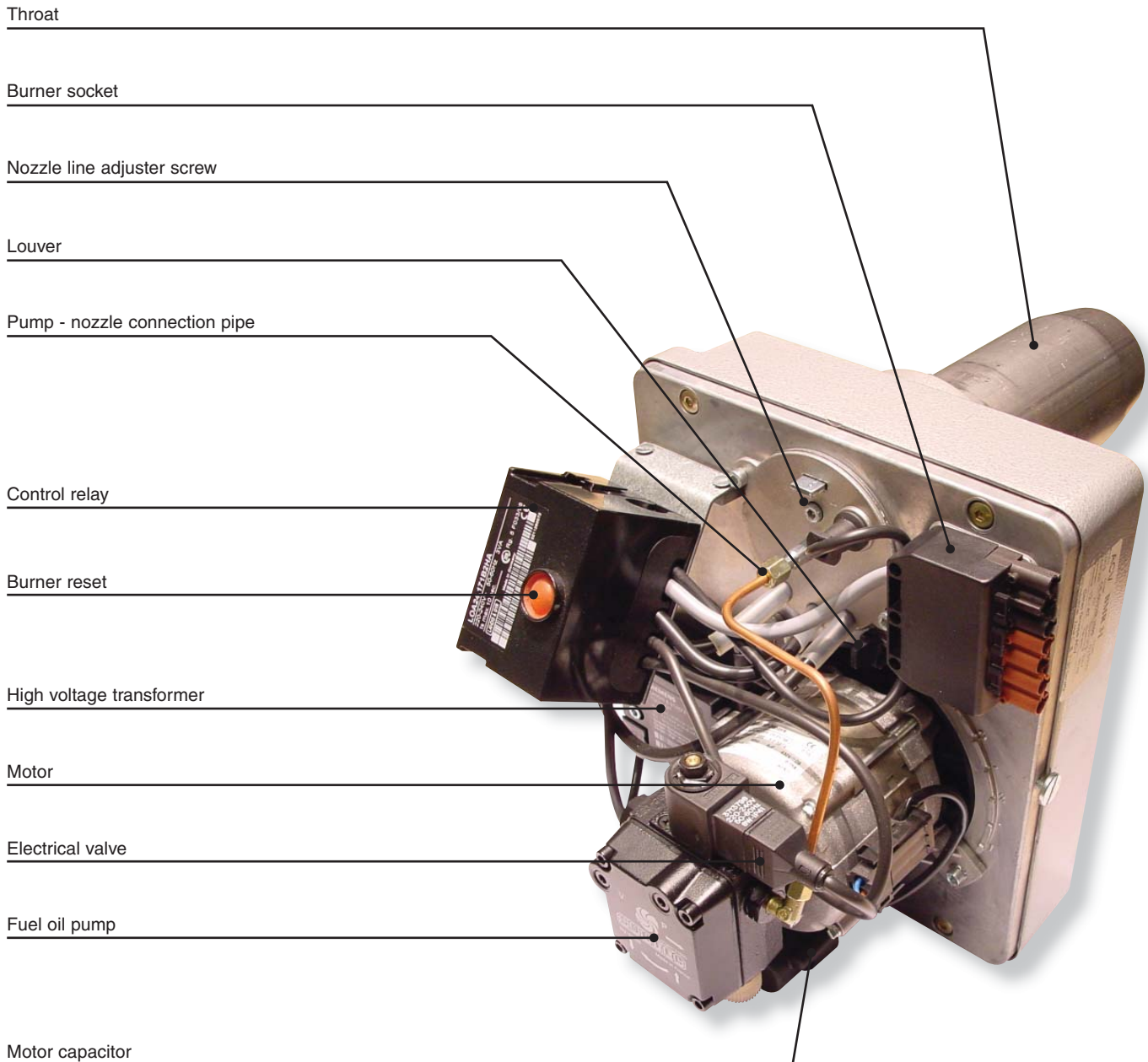
The burner is fitted with the finest quality components reflecting the latest developments in technology and the fuel-oil is pre-heated.

Components:

- "Landis & Gyr" relay
- "A.E.G." motor
- "Suntec" pump
- "May & Christe" transformer
- "Danfoss" fuel-oil preheater

Advantages

- Simple to install, it is fitted with a safety switch and a new burner suspension system.
- A special key is provided with the burner for any maintenance work needed.
- The burner air pressure adapts to the pressure in the combustion chamber.
- An automatic stop check valve stops the airflow when the boiler is turned off, preventing it from cooling.
- Silent and very reliable operation.
- Adapts to the depth of the boiler with the adjustable nozzle clamp.
- Three air-regulation points to ensure the optimum air/fuel oil mixture.
 - The air is pre-regulated upstream;
 - primary regulation;
 - combustion head regulation.



BURNER CHARACTERISTICS

REGULATION PARAMENTER

		BM R 31		BM R 51
		N1	N2	N3
Power	kW	23.0	30.0	49.0
Electrical power	W	150	150	150
Nozzle	gal/h	0.50	0.75	1.25
Nozzle angle		60°	60°	60°
Fuel oil rate of flow	Kg/h	1.94	2.53	4.13
Pump pressure	bar	13.5	10.5	10
Flue gas index		0.6	0.6	0.6
Louver regulation		3	4.5	4
Combustion head regulation		2	1	2
Weight	Kg	12	12	12

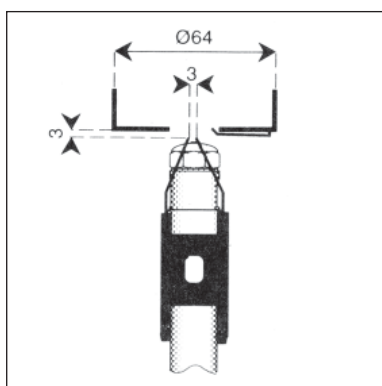


fig. 14 :
Electrode distance



fig. 15 :
Combustion head
adjuster screw

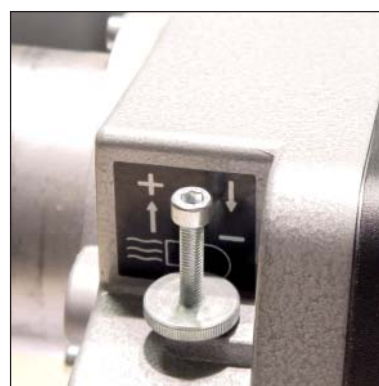


fig. 16 :
Air flow adjuster screw
(fine tuning)

BURNER DIMENSION

	A mm	B mm	C mm	D mm	E mm	F mm	G Ø mm	L Ø mm	LK Ø mm
BM R 31	240	270	215	280	60-130	M 8	80	85	140-165
BM R 51	240	270	215	280	60-130	M 8	80	85	140-165

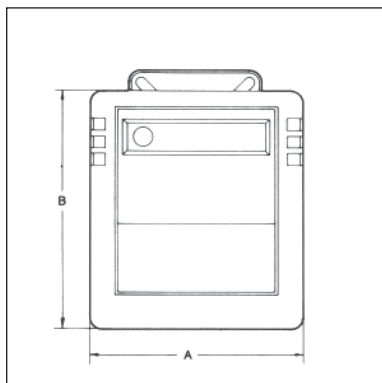


fig. 17

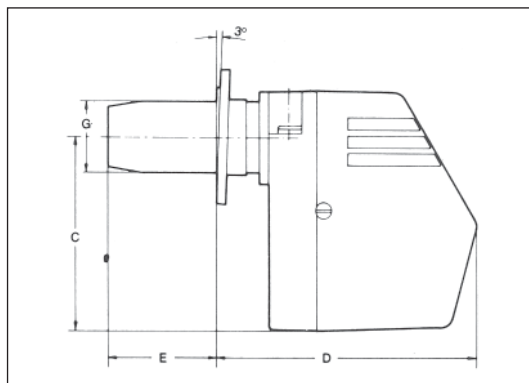


fig. 18

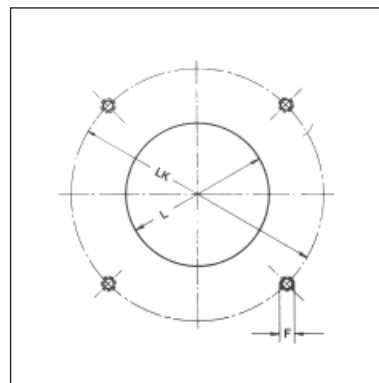


fig. 19

FILLING THE HEATING CIRCUIT



IMPORTANT
If your "N" boiler is connected to an ACV tank, it is essential to fill the domestic water circuit before the heating circuit.

1. Open valves 5 and 8 to fill the heating circuit and make sure the pressure does not exceed 2 bars.

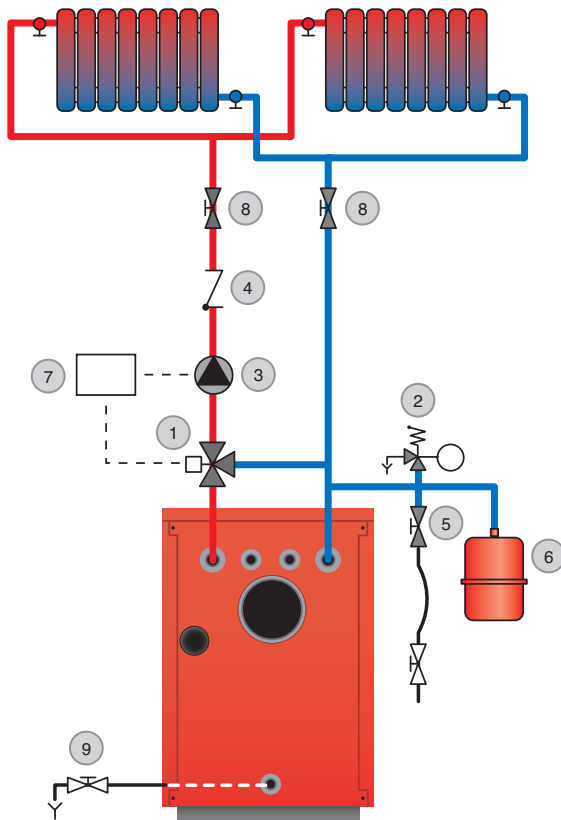


fig. 20

2. Vent the system.
3. Once you have vented the system, return the pressure to the static pressure plus 0.5 bar.

Height of the heating system:

- 10 m ⇒ heating circuit pressure = 1.5 bar
- 15 m ⇒ heating circuit pressure = 2 bar

USING THE BOILER FOR THE FIRST TIME

1. Check the fuel oil supply connection and ensure that it is free from leaks.
2. Check the electrical connection to the boiler and the boiler room ventilation, and ensure that the flue gas discharge pipes and the burner chamber plate are properly gas tight.
3. Set the boiler thermostat to between 60° and 90°C.
4. Place the Summer/Winter switch to the required position.
5. Place the main switch to "ON".
6. Carry out the necessary venting operations, measurements and settings.

RECOMMENDATION

It is compulsory to have the boiler serviced once a year. Boiler servicing and checking must be carried out by a qualified engineer.

MAINTAINING THE BOILER

1. Isolate the boiler from the electrical supply at the switch on the external control box and close the fuel oil supply valve.
2. Place the main switch on the control panel to "OFF" (except for the N-Mini).
3. Remove the boiler front panel (1) (except for the N-Mini).
4. Loosen the two nuts or locking clamps for the N-Mini to open the burner chamber plate (2).
5. Remove the insulating brick (for the N-Mini only).
6. Remove the stainless-steel turbulators (3).
7. Brush the flue ways, clean the chamber and vacuum up any soot deposits.
8. Check the insulation of the burner chamber plate (4).
9. Before reassembling, clean the burner combustion head (5).
10. Check that the thermostats and safety valves are working correctly.

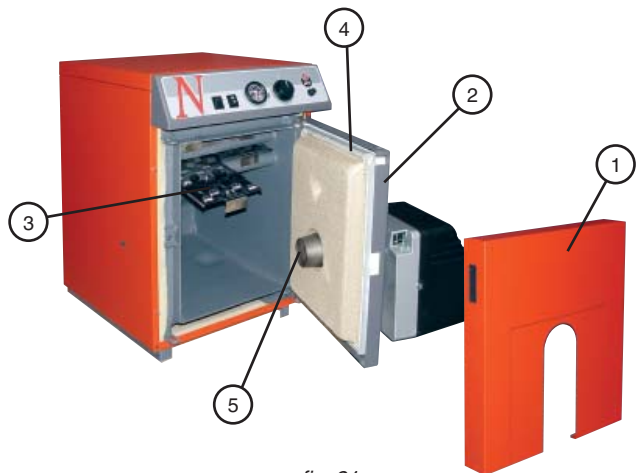


fig. 21

MAINTENANCE OF SAFETY EQUIPMENT

- Check that all thermostats and safety devices operate correctly: the boiler thermostat and the manual reset high-limit thermostat (103°C).
- Check the heating circuit safety valves.

DRAINING THE BOILER



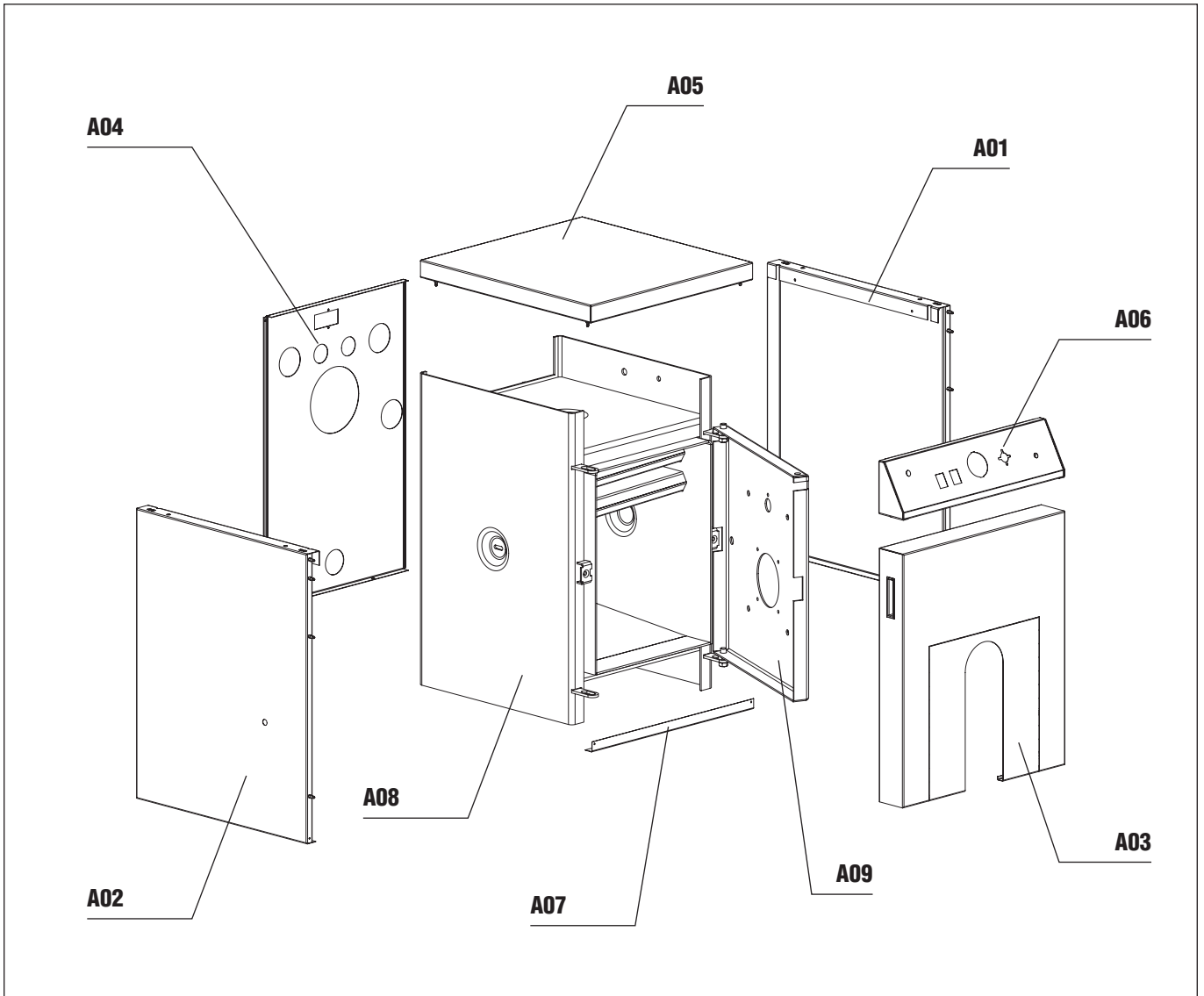
The water draining from the drain cock is very hot and can cause serious burns. Keep all persons away from running hot water.

Draining the heating circuit (fig. 20)

1. Place the main switch on the control panel to "OFF", isolate the boiler from the electrical power supply at the switch in the external control box.
2. Close the isolating valves (8) in the heating circuit.
3. Connect a flexible tube to the drain cock (9).
4. Open the drain cock (9) to drain the heating circuit.



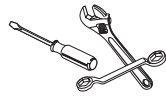
Handwriting practice lines consisting of a solid top line, a dashed midline, and a solid bottom line, repeated down the page.










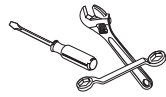
N°	N-MINI	N 1	N 2	N 3
A01	21471387	21471380	21471381	21471382
A02	21472387	21472380	21472381	21472382
A03	-	21473380	21473381	21473382
A04	21474387	21474380	21474381	21474382
A05	21475387	21475380	21475380	21475382
A06	21477387	21477380	21477380	21477382
A07	21473387	21479380	21479380	21479382
A08	30465160	30465153	30465154	30465155
A09	2147P371	2147P380	2147P381	2147P382





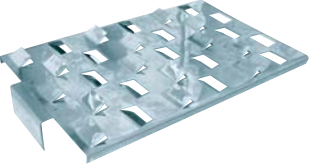




	N-MINI	N 1	N 2	N 3
	—	24614108	24614108	24614109
	—	54428116	54428116	54428116
	—	54428107	54428107	54428107
	54442045	54442045	54442045	54442045
	—	54764009	54764009	54764009
	54442015	—	—	—
	54442027	54442027	54442027	54442027



	N-MINI	N 1	N 2	N 3
	54763009	—	—	—
	—	54441008	54441008	54441008
	—	55426001	55426001	55426001
	—	47405252	47405252	47405252
	47438008	47438008	47438008	47438008
	—	49410280	49410280	49410280
	50423008	50423008	50423008	50423008



	N-MINI	N 1	N 2	N 3
	63438001	63438001	63438001	63438001
	47405137	-	-	-
	47405004	47405004	47405004	47405004
	47405005	47405005	47405005	47405005
	50423098	50423097	50423097	50423098
	51701000	-	-	-
	-	51701001	51701002	51701003