

# INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

# N

N1 / N2 / N3



*excellence in hot water*



## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>3</b>
Who should read these Instructions	3
Symbols	3
Applicable Standards	3
Warnings	3
<b>USER'S GUIDE</b>	<b>4</b>
Using the Boiler	4
Safety Cutout of the Burner	4
<b>APPLIANCE DESCRIPTION</b>	<b>5</b>
General Description	5
Operating Principles	5
Construction	5
Boiler Representation	5
<b>TECHNICAL CHARACTERISTICS</b>	<b>6</b>
General	6
Maximum Operating Conditions	6
Dimensions	6
DHW Performance	6
Combustion Characteristics	6
<b>INSTALLATION</b>	<b>7</b>
Chimney Connection Characteristics	7
Chimney Connection	7
Heating Connection	8
Electrical Connection	8
N + Smart installation, with ACV control device	10
<b>STARTING UP</b>	<b>12</b>
Filling the Heating Circuits	12
Starting up the Boiler	12
<b>MAINTENANCE</b>	<b>12</b>
Recommendation	12
Boiler Maintenance	12
Inspection of the Safety devices	12
Draining the Boiler	12
<b>DECLARATION OF CONFORMITY - EC</b>	<b>13</b>

WHO SHOULD READ THESE INSTRUCTIONS

- The manual should be read by:
- The specifying engineer
  - The installer
  - The user
  - The maintenance technician

SYMBOLS

The following symbols are used in this manual:



**Essential instruction for the correct operation of the installation.**



**Essential instruction for the safety of persons and the environment.**



**Danger of electrocution**



**Risk of scalding**

APPLICABLE STANDARDS

The appliances described in this manual were certified in accordance with European standards (European Directive 92/42/EEC "Efficiency"). They also bear the Belgian label "OPTIMAZ" (oil boiler).



WARNINGS

This manual is part of the items delivered with the appliance and must be given to the user.

The product must be installed and serviced by an approved and qualified engineer, in accordance with applicable standards and regulations.

The manufacturer 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 the manufacturer.



**Failure to comply with the operation instructions and test procedures can result in personal injury or a risk of environmental pollution.**



**This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless supervised or unless they have been given instruction concerning the use of the appliance by a person responsible for their safety.**

**Children should be supervised to ensure that they do not play with the appliance.**

*Note:*  
The manufacturer reserves the right to change the technical characteristics and features of its products without prior notice.



# USER'S GUIDE

## USING THE BOILER



To guarantee safe and correct operation of the appliance, it is important to have it serviced and maintained every year by an approved installer or maintenance contractor, before the heating season.

### Starting the burner:

In normal operation, the burner starts automatically as soon as the boiler temperature drops below the set temperature.



Before carrying out any work on the boiler, it is important to isolate the electrical supply to the unit. Also put the control panel master switch on "OFF".

### Getting familiar with the control panel (fig. 1)



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

1. Boiler ON/OFF master switch
2. Summer/winter switch (is used to turn the heating pump on or off).
3. Burner safety cutout warning indicator (lights when the primary circuit water temperature is too high).
4. Temperature and pressure gauge (indicates both the temperature of the boiler and the pressure within the primary circuit).
5. Manual reset safety thermostat (allows to reset the boiler after a primary circuit fluid overheat).
6. Control thermostat (allows to adjust the boiler temperature between 60°C (min. position) and 90°C (max. position))

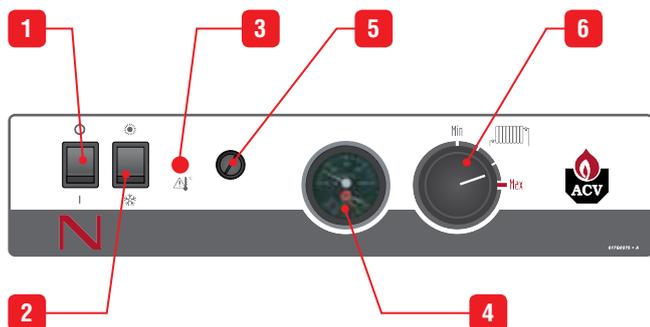


fig. 1

### Operation of the heating pump

The heating pump is controlled by the minimum thermostat fitted at the back of the boiler. It is preset at 45°C, which delays the operation of the heating pump at burner start up and protects the combustion chamber against corrosion.

### Gauge pressure of the heating system

The installation must be fitted with a safety valve set at 3 bar.

Make sure that the system water is always under pressure. When the system is cold and the air has been bled, the pressure gauge must indicate a pressure between 1 and 1.5 bar depending on the building height.

### To add water: (fig. 8, page 8)

- Open the filling valve (1).
- Make sure to close tightly the valve after filling.
- Bleed the air from the installation in order to get an accurate pressure reading on the gauge.

### Safety valves (fig. 8, page 8) - reference 3

If the safety valve discharges water, stop the boiler and contact your installer.

A monthly check is recommended:

Raise the discharge system lever for several minutes to make sure that the safety valve operates properly.



In case of anomaly after this test, contact your installer for advice.



Water discharged by the safety valve may be extremely hot and could cause severe scalding.

## SAFETY CUTOUT OF THE BURNER

If the burner has stopped, please refer to the burner manual to reset it.

GENERAL DESCRIPTION

- The **N** model is a single circuit boiler (*heating*).
- The **N 1 - 2 - 3** boiler control panel is comprised of an ON/OFF master switch, a summer/winter switch, a safety cutout warning indicator, a manual reset safety thermostat, a temperature and pressure gauge and a control thermostat.
- The **N** boiler can be directly connected to the flue pipe, using a B23-type connection (*fig. 7, page 7*).
- **N 1** model : maximum output between 20 and 25 kW.
- **N 2** model : maximum output between 28 and 36 kW.
- **N 3** model : maximum output between 36.5 and 51 kW.

OPERATING PRINCIPLES

**Easy control, guaranteed safety**

The heating circuit water temperature is adjusted through a single component: the control thermostat, whose bulb is located next to the outlet section of the boiler.

- A manual reset safety thermostat stops the burner if the primary circuit fluid temperature reaches 103°C.
- A minimum thermostat, fitted at the rear of the boiler and preset at 45°C, delays the heating pump activation. This prevents the risks of corrosion of the combustion chamber.

**Production of domestic hot water**

The "N" boilers can be combined with any ACV hot water production tank.

CONSTRUCTION

**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 6 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 burner 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 heat insulation brick.

**Insulation**

The burner body is insulated with a 30 mm thick rock wool padding piece.

**Casing**

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

BOILER REPRESENTATION (*fig. 4*) and (*fig. 5*)

1. Control panel
2. Turbulators (6 pieces)
3. Heat insulation
4. Heating body
5. Burner chamber plate with insulation brick
6. Oil burner (not provided)
7. Heating circuit outlet
8. Electrical supply connection plug of the boiler
9. Auxiliary heating circulation loop
10. Flue pipe connection
11. Minimum thermostat set at 45°C (T.O.D.)
12. Draining valve



fig. 4



fig. 5

# TECHNICAL CHARACTERISTICS

## GENERAL

The appliances are delivered fully assembled, tested and packaged on a wooden support, protected by anti-shock corner pieces and wrapped in a heatshrink plastic film. At product reception and after removal of packaging, check the package contents and that the appliance is free of damages

For transportation, refer to dimensions and weights indicated below.

## MAXIMUM OPERATING CONDITIONS

### Maximum Service Pressure (DHW tank full of water)

- Primary circuit : ..... 3 bar
- DHW circuit \* : ..... 8,6 bar
- Recommended safety valve (central heating) : ..... 3 bar
- Recommended safety valve (DHW) \* : ..... 7 bar

### Mains supply pressure

- Max 6 bar, without a pressure reducing valve being required (to avoid discharge of the safety pressure valve)

### Maximum Operating Conditions

- Maximum temperature : ..... 90 °C

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

## DIMENSIONS

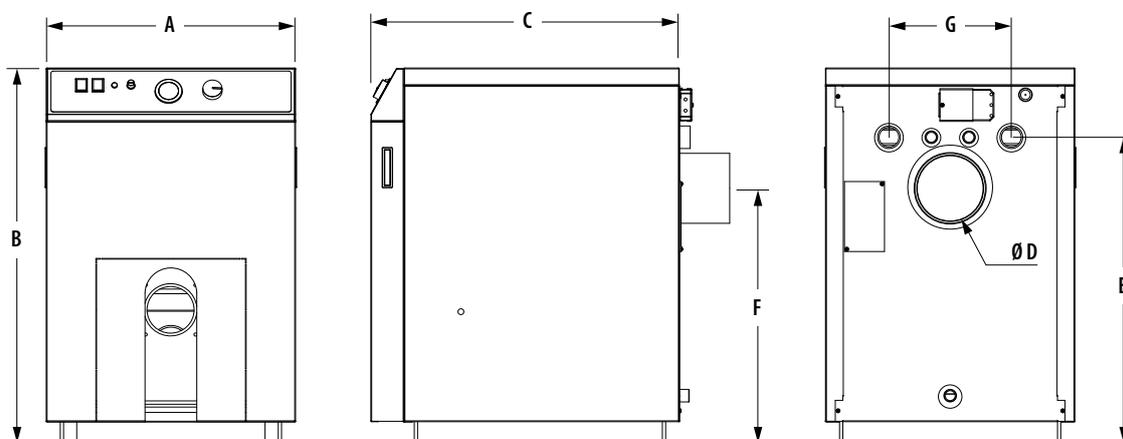


fig. 6

	A mm	B mm	C mm	D Ø mm	E mm	F mm	G mm	Kg (*)
<b>N 1</b>	470	700	566	130	550	445	260	108
<b>N 2</b>	470	765	566	130	615	510	260	122
<b>N 3</b>	530	805	656	150	645	550	260	157

(\* ) The weigh values are drained weight values.

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

Operating conditions at 85 °C

		<b>N 1</b>	<b>N 2</b>
Peak flow at 45 °C [ΔT = 35 K]	<b>L/10'</b>	202	202
Peak flow at 60 °C [ΔT = 50 K]	<b>L/10'</b>	117	117

## COMBUSTION CHARACTERISTICS

		<b>N 1</b>	<b>N 2</b>	<b>N 3</b>
Maximum input	<b>kW</b>	22.0 / 28.0	30.4 / 40.0	40.0 / 57.0
Maximum output	<b>kW</b>	20.0 / 25.0	27.0 / 35.7	36.5 / 51.0
Pressure loss of the flue gas circuit	<b>mbar</b>	0.15	0.17	0.15
Heating circuit capacity	<b>L</b>	31	37	53
Heating connection	<b>Ø</b>	1"	1"	1"1/4

CHIMNEY CONNECTION CHARACTERISTICS

**Important**

- Never obstruct the air vents.
- Do not store any flammable products in the boiler room.
- Do not store any corrosive products, paint, solvents, salts, chloride products and other detergent products near the appliance.

**Accessibility**

The boiler room must be large enough to allow an easy access to the boiler. Make sure to have the following clearance dimensions around the boiler (mm):

- to the front 500
- to the rear 150
- to the sides 100
- above 300

**Fresh air supply**

The boiler room must be provided with a high and a low fresh air supply (fig. 7).

Each user must make sure that the boiler room fresh air supply complies with the local regulations in force.

For information, the table below indicates the values defined according to the Belgian regulation.

Ventilation		N 1	N 2	N 3
Fresh air supply	m <sup>3</sup> /h	50	72	102
High-level air supply (A)	cm <sup>2</sup>	150	150	150
Low-level air supply	cm <sup>2</sup>	150	150	170

**Base**

The base (or floor) on which the boiler rests must be made of non-combustible materials.

CHIMNEY CONNECTION



**IMPORTANT**

The product must be installed and serviced by an approved and qualified engineer, in accordance with applicable standards and regulations.



The chimney flue pipe diameter must not be smaller than that of the boiler flue reduction collar.

**Type of Chimney Connection: B23 (fig. 7)**

The boiler is connected to the chimney by a metal pipe rising at an angle from the boiler to the chimney.

A flue disconnection piece is required.

Chimney		N 1	N 2	N 3
E = 5 m Ø min. F	mm	130	150	170
E = 10 m Ø min. F	mm	130	130	150
E = 15 m Ø min. F	mm	130	130	150

- A. High-level fresh air supply
- B. Low-level fresh air supply
- C. Draught stabilizer
- D. Manhole opening
- E. Chimney height
- F. Chimney diameter

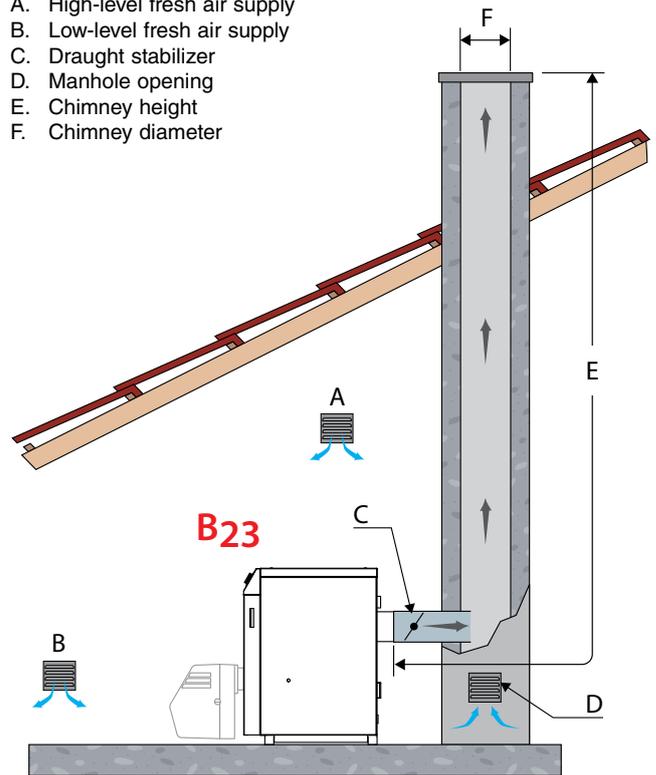


fig. 7



**Note:**

Given that regulations vary from one country to another, the table is given by way of indication only.



Due to the high efficiency of our boilers, the flue gases exit at a low temperature. Therefore, there is a risk that the flue gases condense and possibly damage the chimney. It is thus strongly recommended to line the chimney. Please contact your installer for any further information.

# INSTALLATION

## HEATING CONNECTION

### Example of single circuit connection (fig. 8)

1. Primary circuit filling valve
2. Check valve
3. Safety valve set at 3 bar with pressure gauge
4. Expansion vessel
5. Heating pump
6. Heating circuit isolating valve
7. Room thermostat (option)
8. Draining valve
9. Automatic air bleed valve

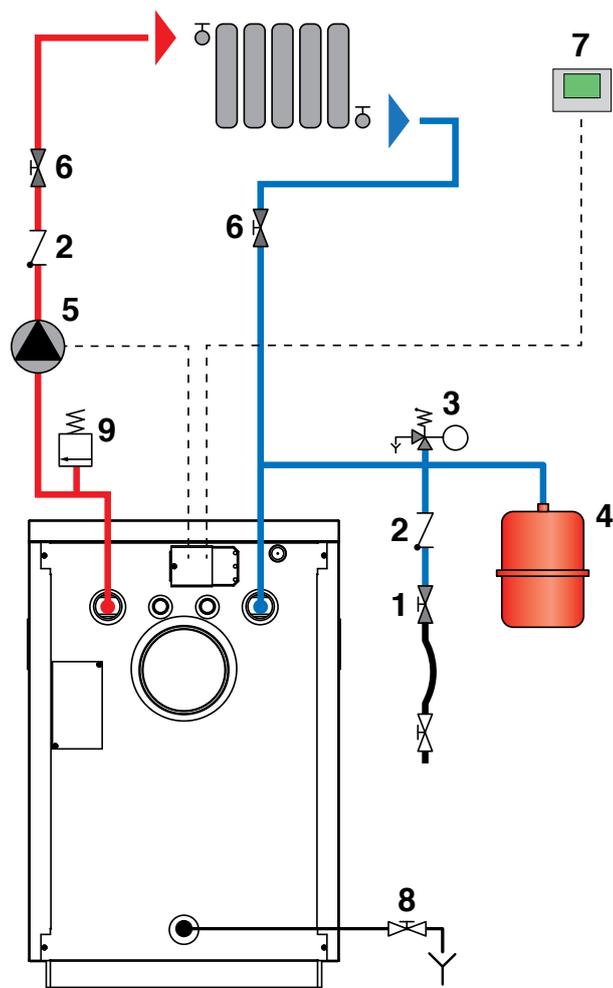


fig. 8



The draining valve and safety valve must be connected to the sewer.

## ELECTRICAL CONNECTION

### Power supply

The boiler operates on a single-phase 230V/50 Hz supply. A fuse box should be installed outside the boiler, containing a circuit breaker and 6A fuses to allow the boiler to be isolated from the supply for servicing and repairs.

### Statutory compliance

The product must be installed in accordance with applicable standards and regulations.



Before carrying out any work on the boiler, it is important to isolate the electrical supply to the unit.

1. Room thermostat
2. Installation heating pump
3. Bridge (to be removed before installing the room thermostat)

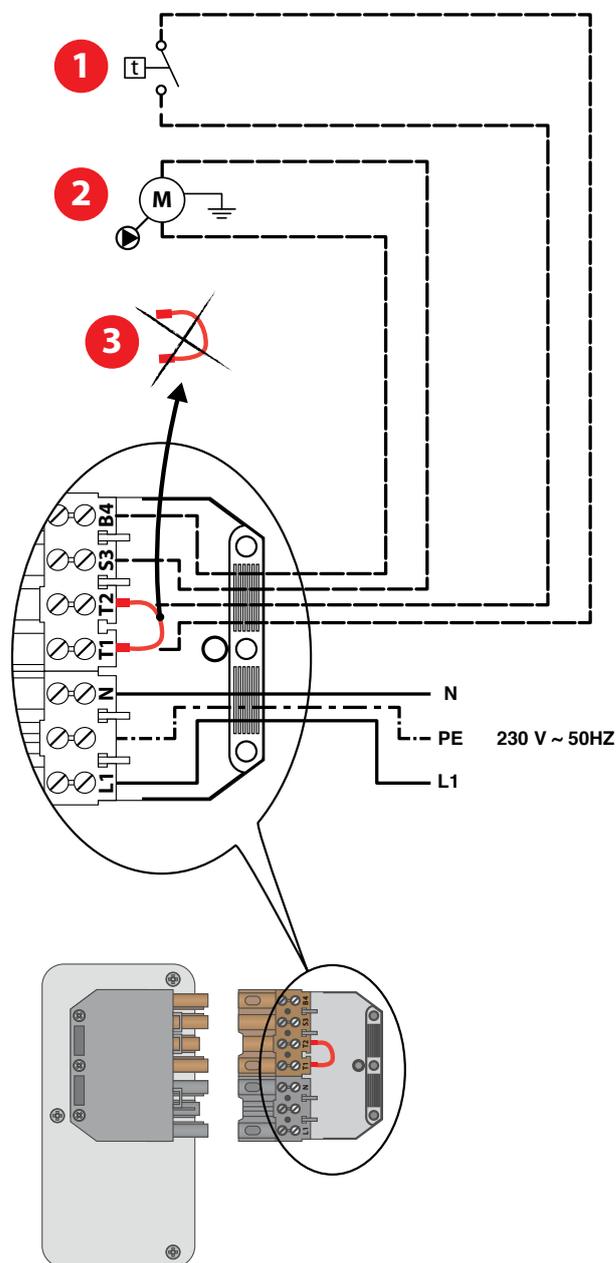


fig. 10

N1/N2/N3 boiler wiring diagram (fig. 11)

1. ON/OFF master switch
2. Minimum thermostat set at 45°C (T.O.D.)
3. Summer/winter switch
4. Manual reset high limit thermostat (103°C max.)
5. Burner
6. Safety cutout warning indicator
7. Room thermostat (option)
8. Installation heating pump (not provided)
9. Control thermostat of the boiler
10. Burner plug (not provided)

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

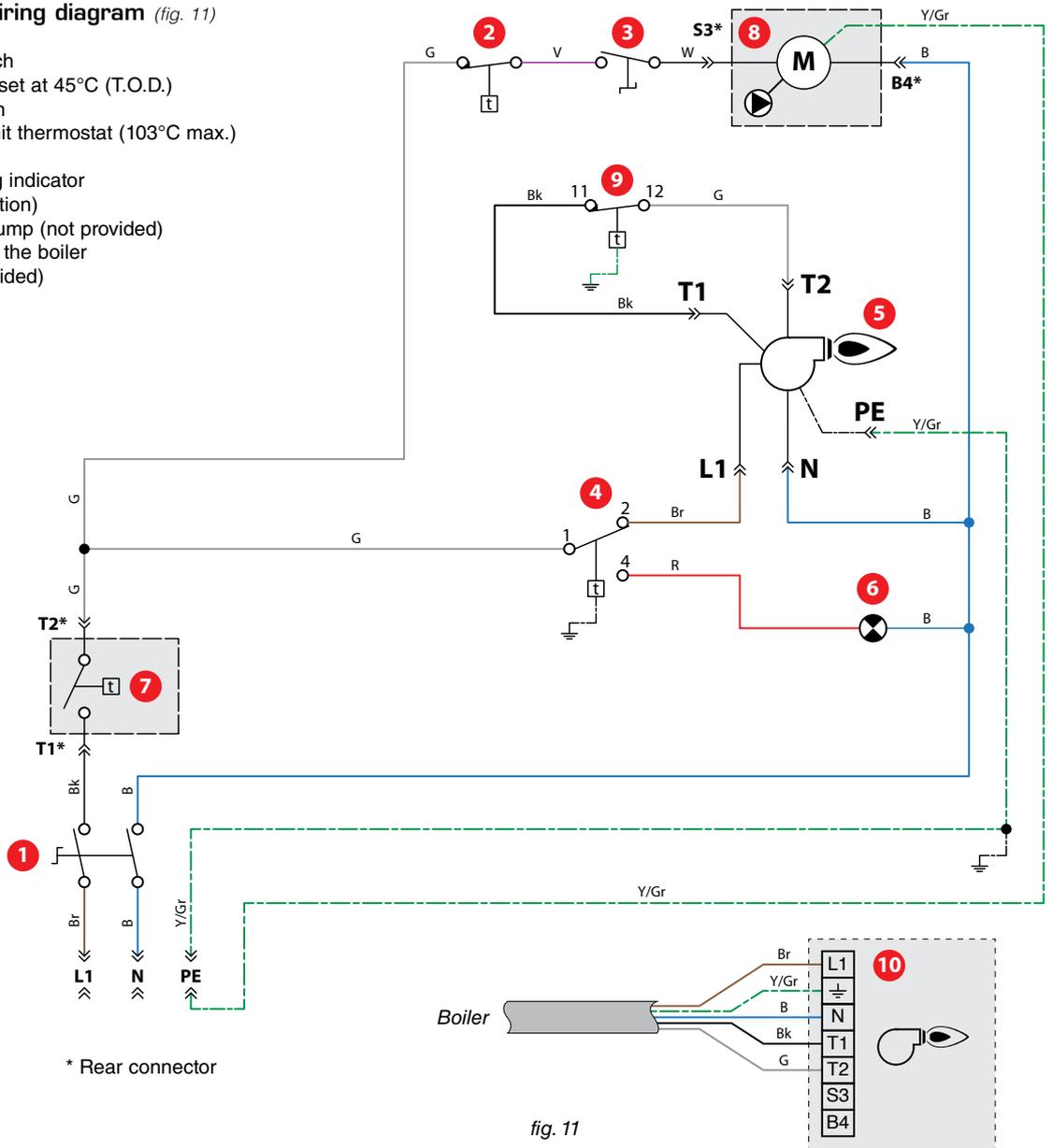


fig. 11

Boiler Control BC 01



- This control box is used to connect a single- or dual-energy domestic hot water (DHW) production tank to a heating boiler, without DHW priority.

Boiler Control BC 03



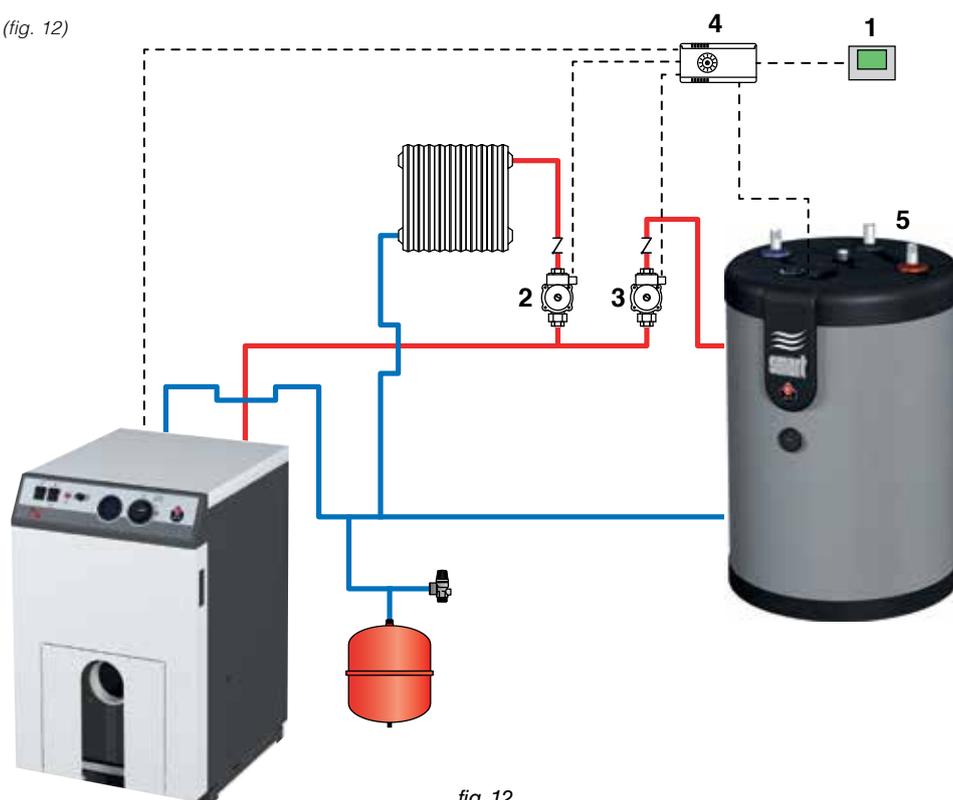
- The Boiler Control BC 03 controls a heating boiler combined with a DHW production tank, without DHW priority: it controls the burner operation, the heating pump and the DHW tank - either through the DHW pump or the DHW 3-way valve.
- The Boiler Control BC 03 includes a heating pump anti-lock device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

## INSTALLATION

### N + SMART INSTALLATION, WITH ACV CONTROL DEVICE

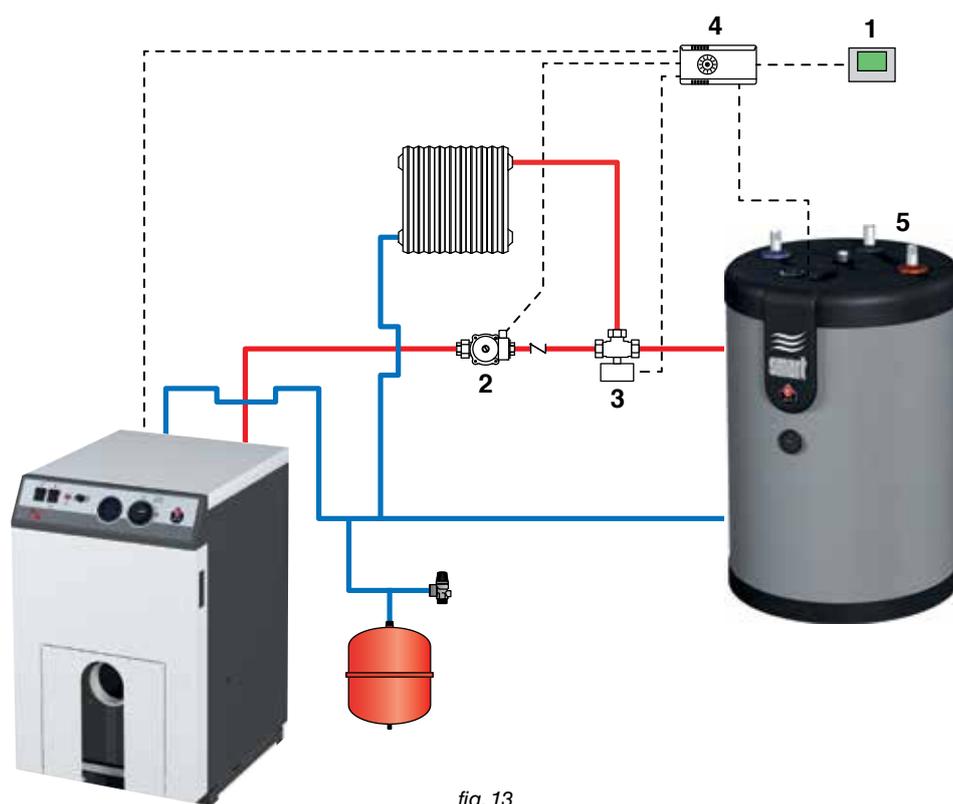
#### Installation with 2 heating pumps (fig. 12)

1. Room thermostat
2. Heating pump
3. DHW charging pump
4. Boiler Control BC 01 or BC 03
5. Hot water production tank Smart 100L



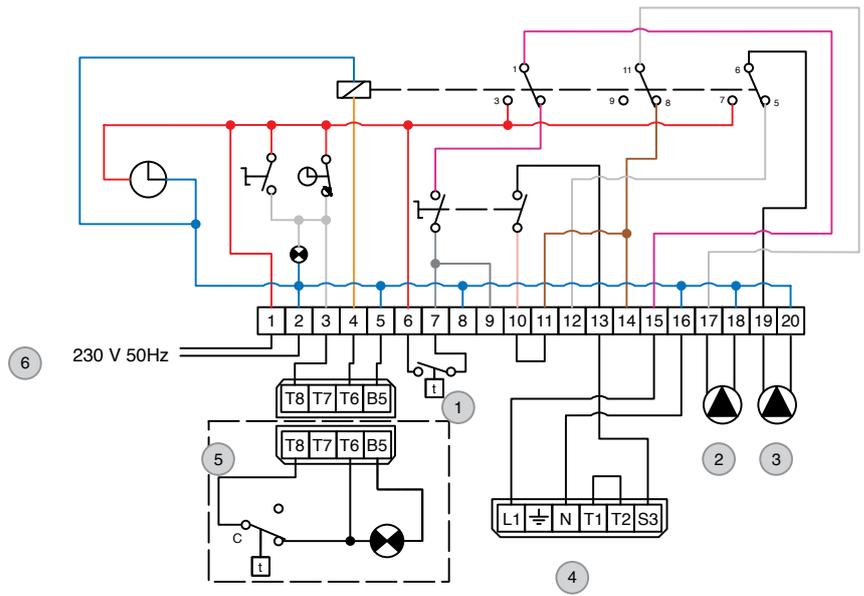
#### System with 1 Heating pump and one motorised diverting valve (fig. 13)

1. Room thermostat
2. Heating pump
3. Motorised diverting valve
4. Boiler Control BC 01 or BC 03
5. Hot water production tank Smart 100L



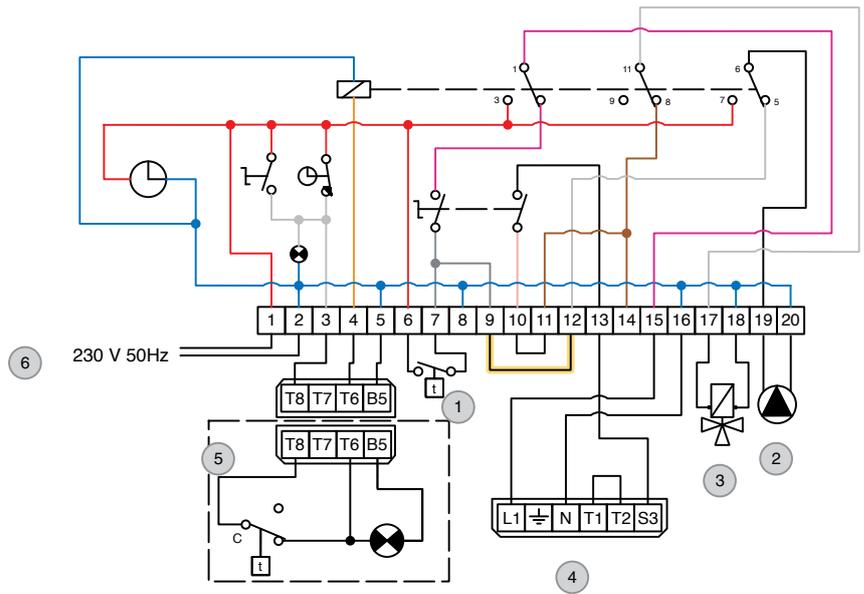
### Electrical connection of BC 01 with 2 pumps

1. Room thermostat
2. Heating pump
3. DHW charging pump
4. Electrical supply connection plug of the boiler
5. Hot water production tank Smart 100L
6. Power supply



### Electrical connection of BC 01 with 1 motorised diverting valve + 1 pump

1. Room thermostat
2. DHW charging pump
3. Motorised diverting valve
4. Electrical supply connection plug of the boiler
5. Hot water production tank Smart 100L
6. Power supply

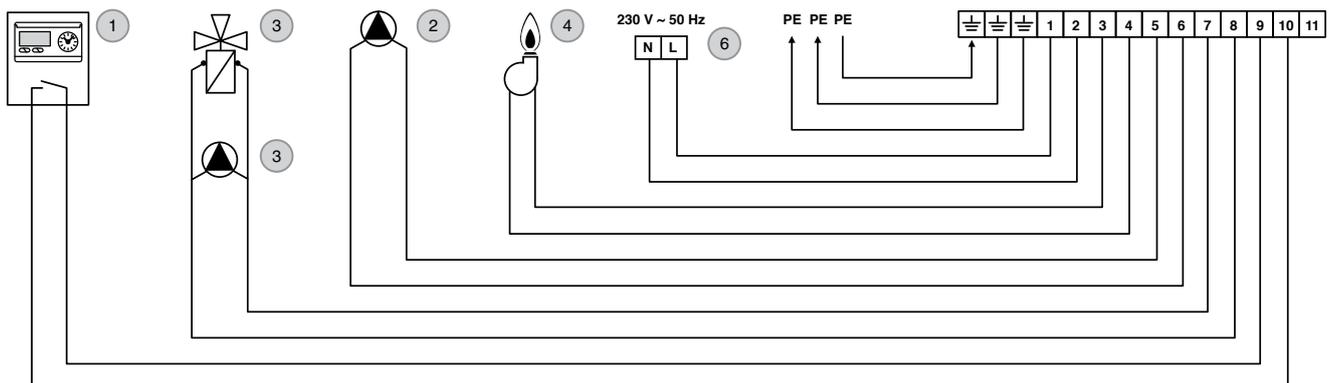




**Caution**

For this configuration, a bridge must be added between 9 and 12.

### Electrical connections of BC 03



## STARTING UP

### FILLING THE HEATING CIRCUIT (fig. 14)



#### IMPORTANT

If your "N" boiler is combined to an ACV hot water production tank, it is essential to fill the DHW circuit before starting to fill the heating (primary) circuit.

1. Open the valves (1) and (6) to fill the heating circuit, and ensure not to exceed a pressure of 2 bar.

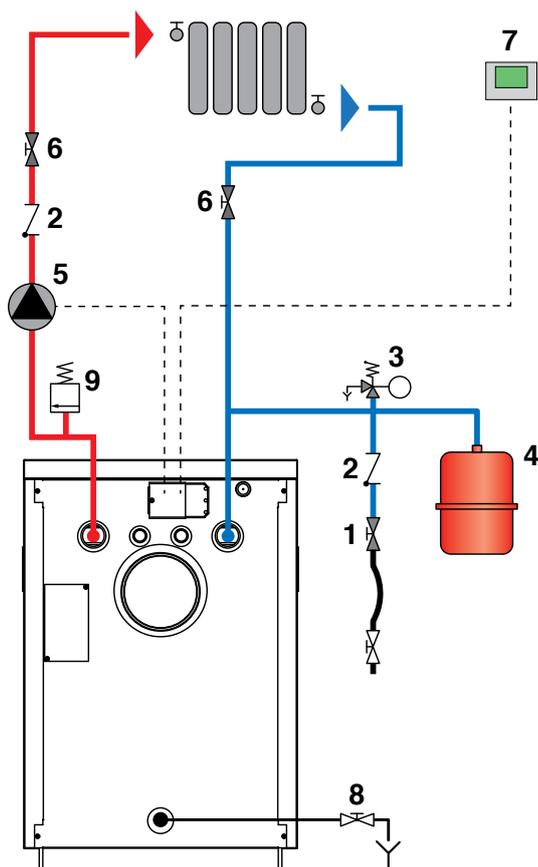


fig. 14

2. Bleed the air contained in the system.
3. Once the air is bled from the system, bring the pressure back to the static pressure plus 0.5 bar.

#### Heating system height

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

### STARTING UP THE BOILER

1. Check the correct connection and tightness of the oil supply.
2. Check the boiler electrical connection, the boiler room fresh air supply, the tightness of the flue gas outlet pipes and of the burner chamber plate.
3. Set the boiler thermostat between 60 and 90°C.
4. Put the summer/winter switch on "Winter".
5. Put the ON/OFF master switch on "ON".
6. Carry out the required bleeding operations, measurements and adjustments.

## MAINTENANCE

### RECOMMENDATION

It is compulsory to have the boiler serviced once a year. Maintenance and the burner control must be performed by a qualified engineer.

### BOILER MAINTENANCE (fig. 15)

1. Put the control panel master switch on "OFF".
2. Isolate the external electrical supply and turn off the oil supply to the boiler.
3. Remove the boiler front panel (1).
4. Open the burner chamber plate (2) by releasing two nuts.
5. Remove the stainless steel turbulators (3).
6. Brush the flue ways, clean the burner chamber and vacuum-clean any soot deposit.
7. Check the condition of the burner chamber plate insulation (4).
8. Before reassembling, clean the burner combustion head (5).
9. Check that the thermostat and safety valves operate properly in the heating circuit (and DHW circuit if any).

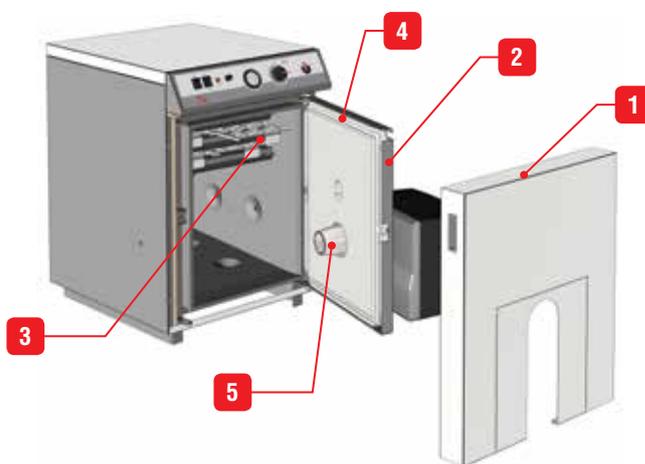


fig. 15

### INSPECTION OF THE SAFETY DEVICES

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

- Test the safety valves on the heating circuit (and domestic hot water circuit if any).

### DRAINING THE BOILER



Water flowing out of the drain valve may be extremely hot and could cause severe scalding. Keep people away from discharge of hot water.

#### Draining the heating circuit (fig. 14)

1. Put the control panel master switch on OFF and isolate the external electrical supply to the boiler.
2. Close the isolating valve (6) of the heating circuit.
3. Connect a hose to the draining valve (8).
4. Open the draining valve (8) to empty the primary circuit.



excellence in hot water



## DECLARATION OF CONFORMITY - CE

Name and address of manufacturer: **ACV International SA / NV**  
Kerkplein, 39  
B-1601 Ruisbroek

Description of product type: **Low temperature boilers fired with liquid fuels**

Models: **N1 - N2 - N3**

CE #: **0461BP0881**

We declare hereby that the appliance specified above is conform to the type model described in the CE certificate of conformity to the following directives:

Directives	Description	date
92/42/CEE	Efficiency Requirements Directive	20.03.2008
2006/95/CE	Voltage Limits Directive	12.12.2006
2004/108/CE	Electromagnetic Compatibility Directive	15.12.2004

We declare under our sole responsibility that the product N complies with the following standards and directives:

EN 303-1	EN 55014-1	EN 61000-3-2
EN 60335-2-102	EN 55014-2	EN 61000-3-3

Ruisbroek, 21/03/2013

Date

Director R & D  
Marco Croon





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