

# HM

HeatMaster

## *Installation, Operating and Servicing Instructions*

**HM 71  
HM 101**



*excellence in hot water*

66401100

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## INTRODUCTION

### INTENDED USERS OF THESE INSTRUCTIONS

These instructions are intended for

- specifying engineers
- installing engineers
- end-users
- servicing engineers

### SYMBOLS

The following symbols are used in these instructions:



**Essential instruction for operating the system correctly.**



**Essential instruction for personal safety or environmental protection.**



**Danger of electrocution.**



**Risk of scalding.**

### APPLICABLE STANDARDS

The products have received the "CE" certificate in accordance with the standards prevailing in different countries (European Directives 92/42/EEC, "efficiency", 90/396/EEC "gas appliances"). These products have also received the Belgian "HR+" (gas boilers) marks.



### WARNINGS

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

The product must be installed and serviced by qualified engineers, in compliance with the prevailing standards.

ACV accepts no liability for any damage resulting from incorrect installation or from the use of components or fittings not specified by ACV.



**Failure to observe instructions regarding tests and test procedures can result in personal injury or pollution risks.**

*Note:*

ACV reserves the right to modify the technical specifications and components of its products without prior notice.

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## DESCRIPTION

### OPERATING PRINCIPLE

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The HeatMaster is a high performance, direct fired hot water storage heater, which has indirect heat transfer due to its Tank-in-Tank construction.

At the heart of the HeatMaster is a stainless steel cylinder through which the flue tubes pass. This is surrounded by a mild steel shell containing the primary water (neutral fluid). The outer shell extends down to the combustion chamber and even around the flue tubes. The area of the heat transfer surface is therefore much greater than that of standard direct fired water heaters.

A circulating pump fitted to the primary circuit moves the water around the tank, heating it faster and maintaining an even temperature across the primary jacket.

The burner, either gas or oil, fires onto the primary water which indirectly heats the stainless steel cylinder containing the DHW. As with all Tank-in-Tanks, this is corrugated over its full height and suspended in the HeatMaster by its hot and cold water connections.

The cylinder expands and contracts during use and this, together with the fact that cold water does not come into contact with the intense heat of the burner flame, means that limescale buildup is prevented.

This scale resistant feature, along with the corrosion resistance of stainless steel, eliminates the need for sacrificial anodes.

The HeatMaster has one very major advantage over other direct fired water heaters - because it heats the DHW with a primary circuit, this primary water can be used to provide central heating as well.

By connecting two, three, four or more HeatMasters together in a module, most hot water and heating demands can be met.

Indeed, when used in conjunction with HR and Jumbo hot water storage tanks the Heatmaster can supply even the largest hot water requirement.

### Standard equipment

The HeatMaster 71/101 has the following items as standard :

- On/off switch
- Summer/Winter switch
- MCBA controller, incorporating
  - electronic control and high limit thermostats
  - burner modulation
- primary circulating shunt pump
- primary expansion vessels
- primary safety valve
- pressure and temperature gauge
- drain valve
- body completely insulated in rigid polyurethane foam

### CONSTRUCTION FEATURES

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#### Outer body

The outer body containing the primary fluid is made of carbon steel (STW 22).

#### TANK-IN-TANK heat exchanger

The ring-shaped inner tank with its large heating surface for producing domestic hot water is built of Chrome/Nickel 18/10 stainless steel. It is corrugated over its full height by an exclusive production process and entirely argon arc welded by the TIG (Tungsten Inert Gas) method.

#### Combustion gas circuit

The combustion gas circuit is paint protected and comprises:

- **Flue pipes**

HeatMaster 71/101 models contain 8 steel flue pipes with an internal diameter of 64 mm. Each pipe is fitted with a turbulator of stainless steel designed to improve heat exchange and to reduce flue gas temperature.

- **Combustion chamber**

The combustion chamber on HeatMaster models is entirely water cooled.

#### Insulation

The boiler body is fully insulated by rigid polyurethane foam with a high thermal insulation coefficient, sprayed on without the use of CFCs.

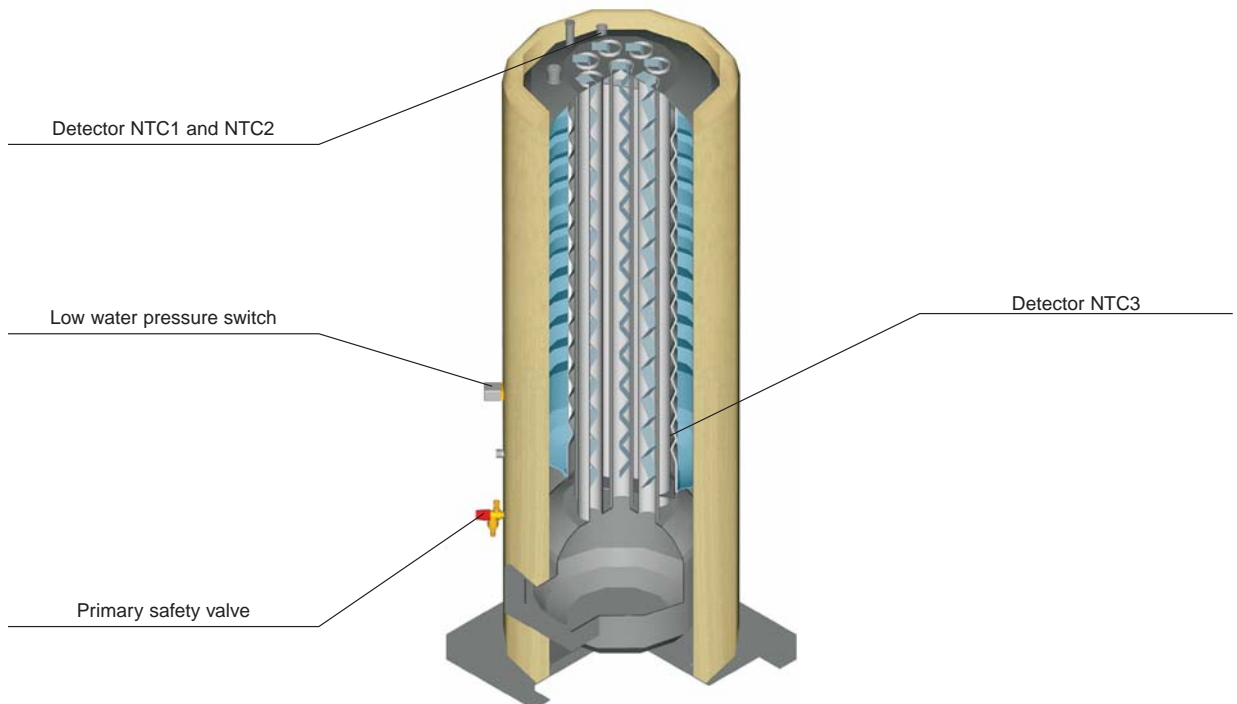
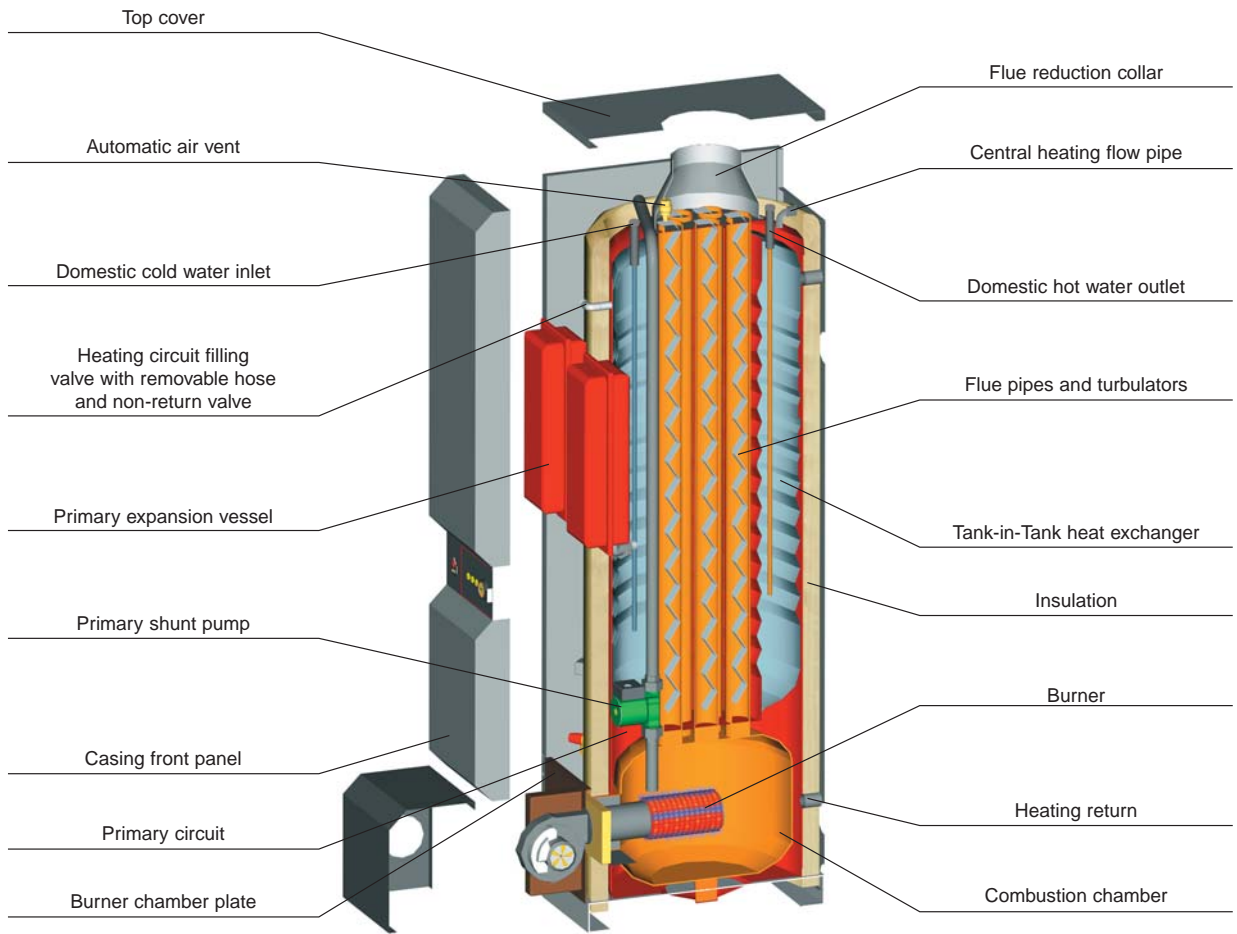
#### Casing

The boiler is covered by a steel casing which has been scoured and phosphated before being stove enamelled at 220 °C.

#### Burner

71 and 101 models are always delivered with ACV BG 2000-M 71 and 101 air/gas premix burners.

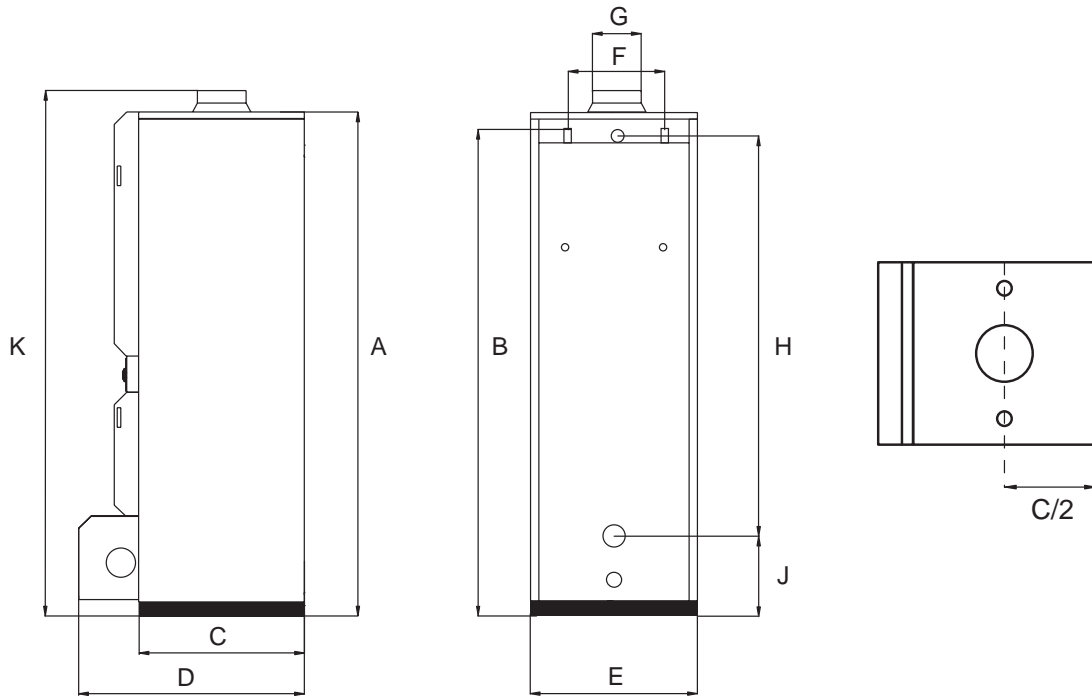
**DESCRIPTION**



## TECHNICAL SPECIFICATION

### DIMENSIONS

The units are delivered fully assembled, tested and packed on a timber base with shockproof edges and protected by heat-shrunk plastic film. On delivery and after unpacking, check the equipment for damage. For transport purposes, refer to the weights and dimensions given below.



	A mm	B mm	C mm	D mm	E mm	F mm	G Ø mm	H mm	J mm	K mm
<b>HM 71</b>	1743	1630	680	937	680	390	150	1289	285	1720
<b>HM 101</b>	2093	2030	680	937	680	390	150	1693	285	2120

### GENERAL FEATURES

		<b>HM 71</b>	<b>HM 101</b>
Fuel	<b>type</b>	Natural gas / propane	Natural gas / propane
Maximum Input	<b>kW</b>	20 - 69.9	25 - 107 / 22 - 110
Maximum Output	<b>kW</b>	63.0	96.8
Maintenance loss at 60 °C of rated value	<b>%</b>	0.5	0.4
Total capacity	<b>L</b>	239.0	330.0
Primary circuit capacity	<b>L</b>	108.0	130.0
Hot water connection	<b>Ø</b>	1"	1"
Heating connection	<b>Ø</b>	1 1/2"	1 1/2"
Flue connection	<b>Ø mm</b>	150	150
Hot water tank heat exchange surface	<b>m²</b>	3.14	3.95
Weight empty	<b>Kg</b>	282	335
Pressure drop primary circuit	<b>mbar</b>	46	83

## TECHNICAL SPECIFICATION

### MAXIMUM OPERATING CONDITIONS

**Maximum service pressure** (tank full of water)

- Primary circuit: 3 bar
- Secondary circuit: 10 bar

**Test pressure** (tank full of water)

- Primary circuit: 4.5 bar
- Secondary circuit: 13 bar

**Operating temperature**

Maximum temperature: 90 °C

**Water quality**

- Chlorures: < 150 mg/l (304)  
< 2000 mg/l (Duplex)
- $6 \leq \text{ph} \leq 8$

### DOMESTIC HOT WATER PERFORMANCES

		HM 71	HM 101
Peak delivery at 40 °C	L/10'	646	905
Peak delivery at 45 °C	L/10'	543	777
Peak delivery at 60 °C	L/10'	346	514
Peak delivery at 70 °C	L/10'	268	385
Peak delivery at 80 °C	L/10'	203	290
Peak delivery at 40 °C	L/60'	2133	3172
Peak delivery at 45 °C	L/60'	1794	2680
Peak delivery at 60 °C	L/60'	1219	1813
Peak delivery at 70 °C	L/60'	971	1378
Peak delivery at 80 °C	L/60'	710	1003
Continuous delivery at 40 °C	L/60'	1835	2776
Continuous delivery at 45 °C	L/60'	1573	2379
Continuous delivery at 60 °C	L/60'	1067	1665
Continuous delivery at 70 °C	L/60'	715	1241
Continuous delivery at 80 °C	L/60'	675	903
Reheat time to 60 °C	min	16	13

### HEATMASTER CONTROL SETTINGS

**Description**

The 71/101 series is fitted with an electronic controller (MCBA) which controls burner operation (ignition, safety and modulation), and provides facilities to adapt the controller to the desired application.

The MCBA has three levels of settings : manufacturer, installer and user. There are three temperature detectors located in the primary and secondary circuits.

**It provides two operating modes.****1. Heating mode**

Temperature set by the user at between 60 and 90 °C.

- Differential "ON", burner starts.
- Differential "OFF", burner stops.
- PI (Proportionnel Integral) regulator in "heating" mode.
- The regulator compares the primary temperature with the setting and modulates.

The room thermostat detects the heating demand

**2. Hot water mode** (with hot water priority)

The detector located in the secondary tank detects the hot water demand.

When a draw-off is detected the controller goes to "hot water demand" mode:

- The primary shunt pump starts.
- The heating pump switches off.
- The burner starts and the controller uses the data from the primary detector to control modulation.

**User-accessible parameters**

1. "Hot water" setting adjustable from 20 to 90 °C.
2. "Hot water" mode: ON/OFF.
3. "Heating" mode: ON/OFF.
4. "Heating" setting adjustable from 60 to 90 °C.

**Parameters accessible in servicing**

Main default settings:

- Hot water priority active.
- Heating demand detection by room thermostat.
- A single heating circuit.

An access code is required for "service" access.

For more technical information, contact your ACV dealer.

# INSTALLATION

## BOILER ROOM

### Important

- Keep vents free at all times.
- Do not store inflammable products in the boiler room.
- Do not store corrosive products near the boiler, such as paints, solvents, chlorine, salt, soap and other cleaning products.
- If you smell gas, do not switch on the light or light a flame. Turn off the mains gas tap at the meter and inform the appropriate services immediately.

### Access

The boiler room must be large enough to allow good access to the boiler. The following minimum distances are required around the boiler:

- front 500 mm
- side 100 mm
- behind 150 mm
- above 700 mm

### Ventilation

The boiler room must be fitted with top and bottom vents according to the prevailing local standards and regulations.

The table below gives an example conforming to the Belgian standards.

Ventilation		71	101
Min. fresh air requirement	m <sup>3</sup> /h	126	194
Bottom vent	dm <sup>2</sup>	2.4	3.20
Top vent	dm <sup>2</sup>	2.0	2.0

Other countries should refer to their own standards.

### Base

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

## CHIMNEY CONNECTIONS



### IMPORTANT

Boilers must be installed by an approved heating engineer, in accordance with the prevailing local standards and regulations.



Flue size should not be less than the outlet size of the boiler.

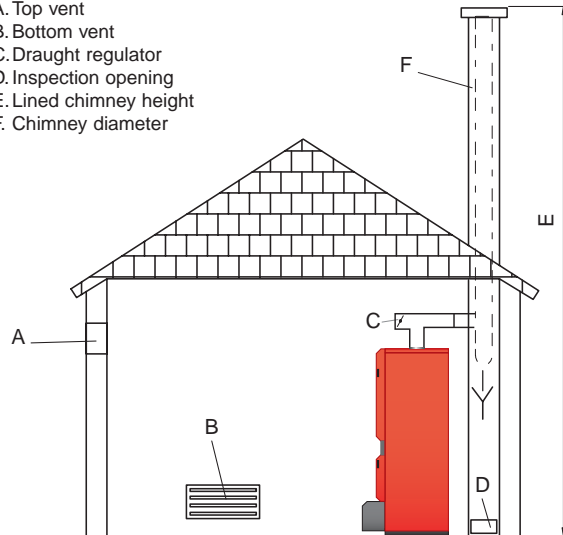
### Chimney connection type: B23

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.**

This must be easy to remove to give access to the flue pipes when servicing the boiler.

- A. Top vent
- B. Bottom vent
- C. Draught regulator
- D. Inspection opening
- E. Lined chimney height
- F. Chimney diameter



Chimney / minimum flue diameter	71	101
E = 5 m Ø F min. mm	189	234
E = 10 m Ø F min. mm	159	178
E = 15 m Ø F min. mm	150	150



### Note:

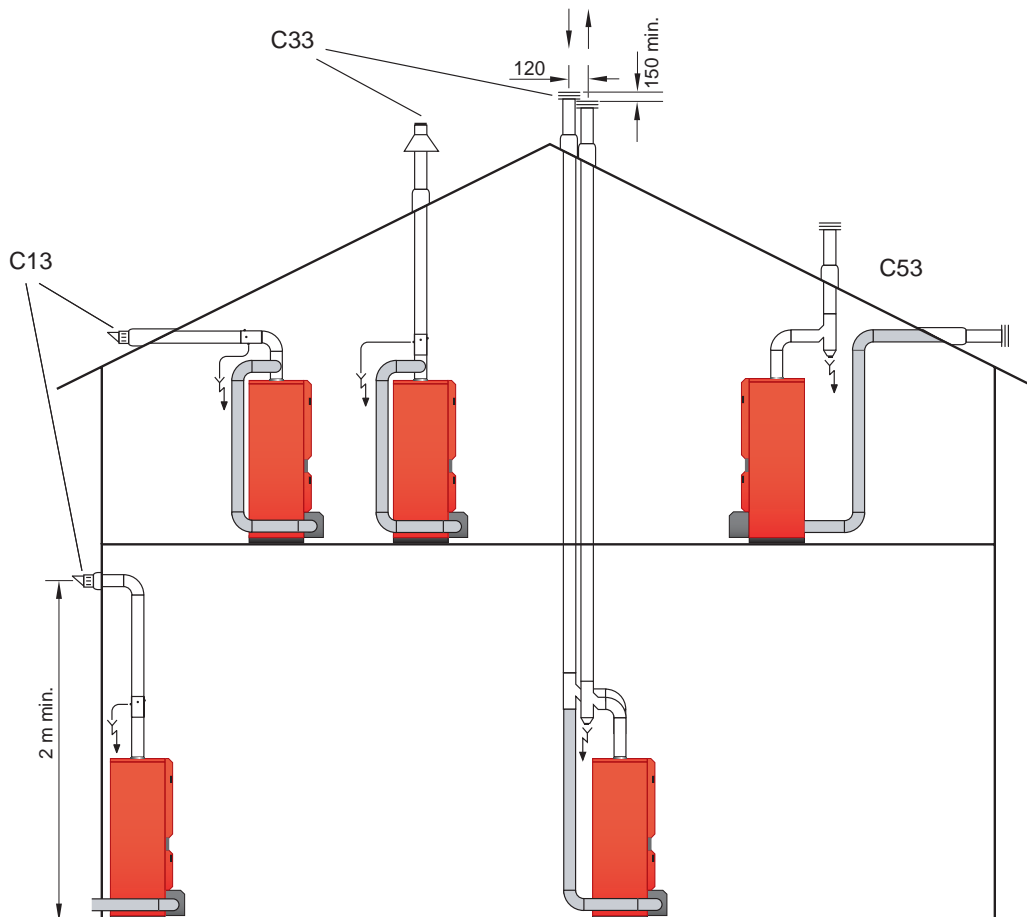
Regulations vary from country to country therefore the table above is intended only as a guide.



Due to the high efficiency of our boilers, the flue gasses exit at low temperature. Accordingly, there is risk that the flue gasses could condense, which could damage the chimney. In order to avoid this risk, it is strongly recommended that the chimney be lined.

## Balanced flue boiler connection type: C

- C13: concentric horizontal connection
- C33: concentric vertical connection
- C53: parallel chimney connection
- C63: concentric vertical connection without terminal (only in Germany and Luxembourg).



**Maximum length concentric : 6 metres**

**Maximum length parallel : 12 metres**

**Note: a 90 degree bend = 1 metre equivalent length**



A condensation drain outlet must be fitted close to the boiler to prevent condensation products from the chimney running into the boiler.



To avoid condensation water running out of the terminal, all horizontal flue runs must fall back towards the boiler.



# INSTALLATION

## HOT WATER CONNECTIONS

### Pressure reducing valve

If the mains water pressure is greater than 6 bar, a pressure reducing valve must be fitted.

### Expansion relief valve

The tank expansion relief valve must be ACV approved and calibrated to a maximum of 7 bar. The valve discharge must be connected to the drain.

### Hot water expansion vessel

A hot water expansion vessel must be installed.

### Hot water circulation

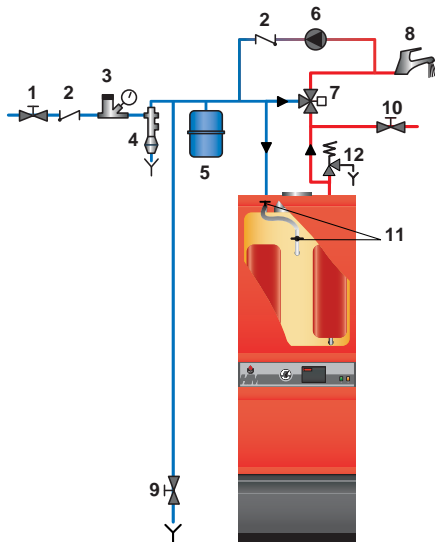
If the tank is situated a long way from the point of use, then installing a recirculation loop can provide a faster supply of hot water to the outlets.

### Temperature and pressure relief valve

If using the HeatMaster as an unvented hot water unit, in some countries, a temperature and pressure relief valve must be fitted - consult your ACV stockist for assistance.

### Example of hot water connection with thermostatic mixer

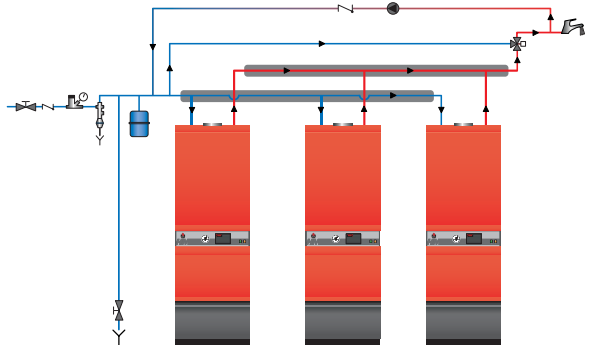
1. Stop cock
2. Non-return valve
3. Pressure reducing valve
4. Expansion relief valve
5. Hot water expansion vessel
6. Hot water secondary pump (if fitted)
7. Thermostatic mixing valve
8. Drawoff tap
9. Drain cock
10. Stop cock for cleaning
11. Primary circuit filling valves
12. Temperature relief valve (UK only)



**DANGER!**  
As a safety measure against scalding, we strongly recommend installing a thermostatic mixing valve.

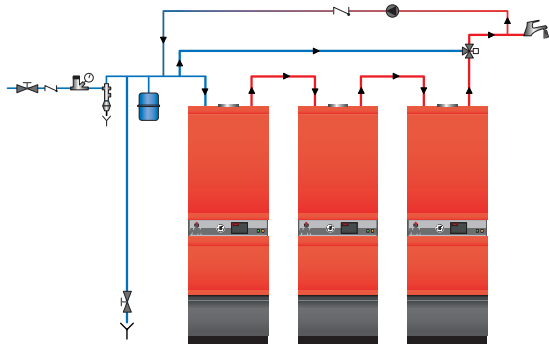
### Example of parallel connection

Recommended for applications with a high continuous flow.



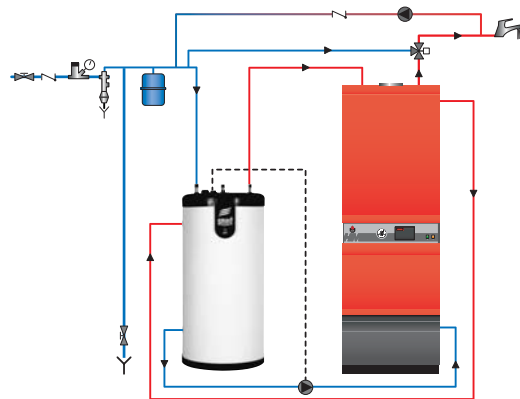
### Example of series connection

Preferable for high temperature applications with up to three units.



### Example of heating + storage connection

Recommended for applications requiring a high peak flow.



## HEATING CONNECTION

The HeatMaster has two connections at the rear that can be used to connect a central heating circuit. Connecting a heating system may reduce the domestic hot water performance.



### WARNING

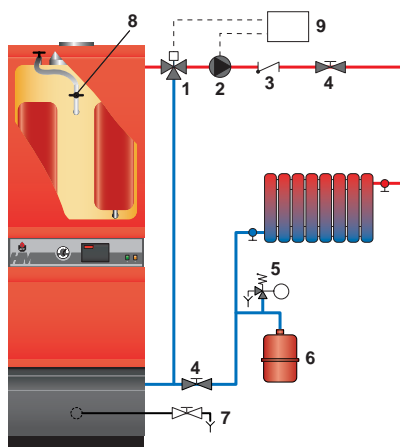
The maximum pump motor load for the MCBA is 250 Watt. If a larger pump is required, install a relay between the pump and the MCBA.

### Expansion

HeatMaster 71/101 models are fitted with two 10 litre expansion vessels, which are sized for hot water operation only. If a heating system is connected to the primary circuit, calculate the expansion capacity necessary for the total volume of the heating system (Refer to the technical instructions from a relevant manufacturer of expansion vessels.)

### Example of a single circuit connection

1. 3-way valve.
2. Heating pump.
3. Non-return valve.
4. Isolating valve.
5. Safety valve set to 3 bar with pressure gauge.
6. Expansion vessel.
7. Drain cock.
8. Primary circuit filling valve.
9. Controller.



### WARNING

The primary safety valve is supplied with a plastic tube connected to the discharge outlet - this is for test purposes only and should be removed. The safety valve should be connected to a drain using a metallic pipe eg. copper.

# INSTALLATION

## ELECTRICAL CONNECTION

### Power supply

The boiler operates with a 230 V - 50 Hz single phase supply. A double pole isolator with a 6 amp fuse or a 6 amp MCB must be fitted outside the boiler to allow power to be shut off during servicing and before any repairs are carried out on the boiler.

### Conformity

Boiler installation must comply with the prevailing local standards and legislation.

### Safety

The stainless steel tank must be earthed separately.



The power to the boiler must be switched off before any work is carried out.

### Alarm - module

- Connect the flat ribbon cable from the alarm-module "X7" to MCBA connector "X8".

The volt free relays mounted on the alarm module will now be activated as described below:

#### 1 - Alarm:

This contact closes if the MCBA is in lock out.

#### 2 - External gas valve / burner - run indication:

This contact closes if a heat request is present and the fan is running.

#### 3 - Domestic Hot Water pump:

This contact closes if a Domestic Hot water heat request is present.

- Technical data:

- Ambient temperature: 0...60 °C
- Contact ratings:  $I_{RMS} \leq 1A$   
230 V (+10% / -15%) 50 Hz

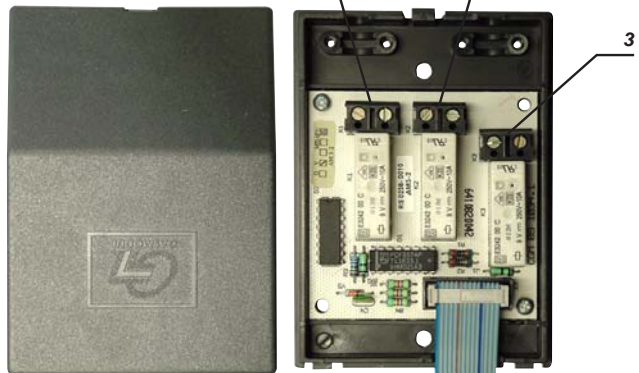


If inductive loads are connected, take precautions over these loads against peak voltages (e.g. RC-network).

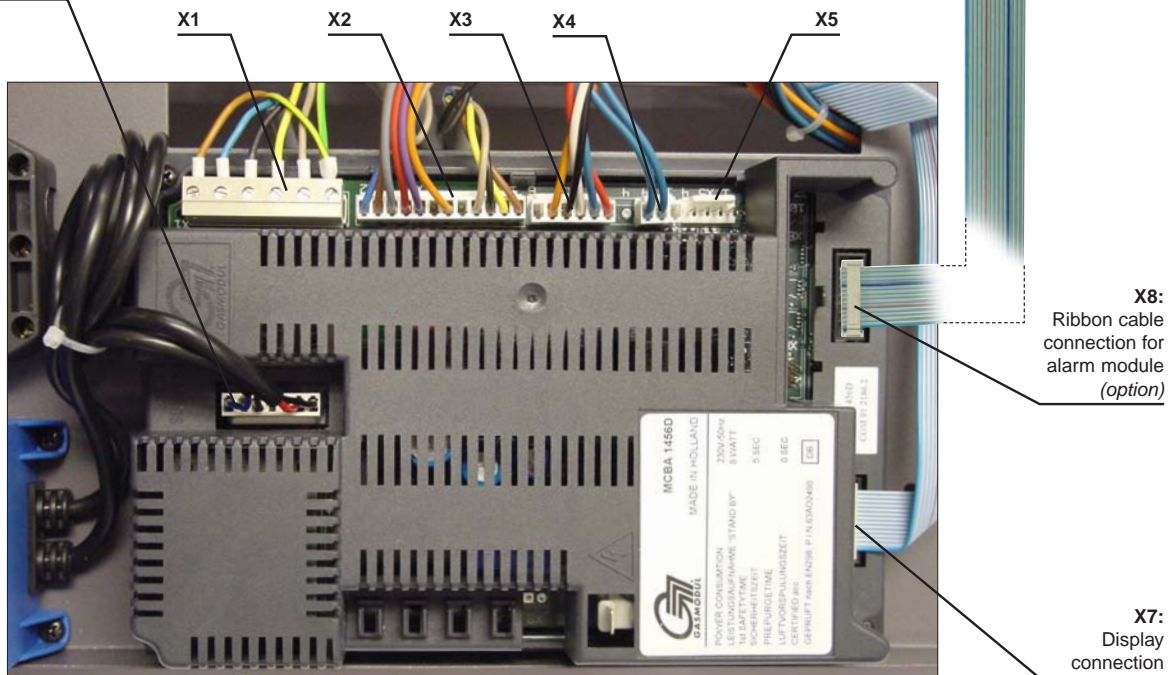
### Internal MCBA connections

- X1: Connection MCBA 230 Volt
- X2: 24 Volt connector
- X3: NTC - connector
- X4: NTC 5 - analogue in connector
- X5: Communication / NTC 4 - connector

Alarm - module



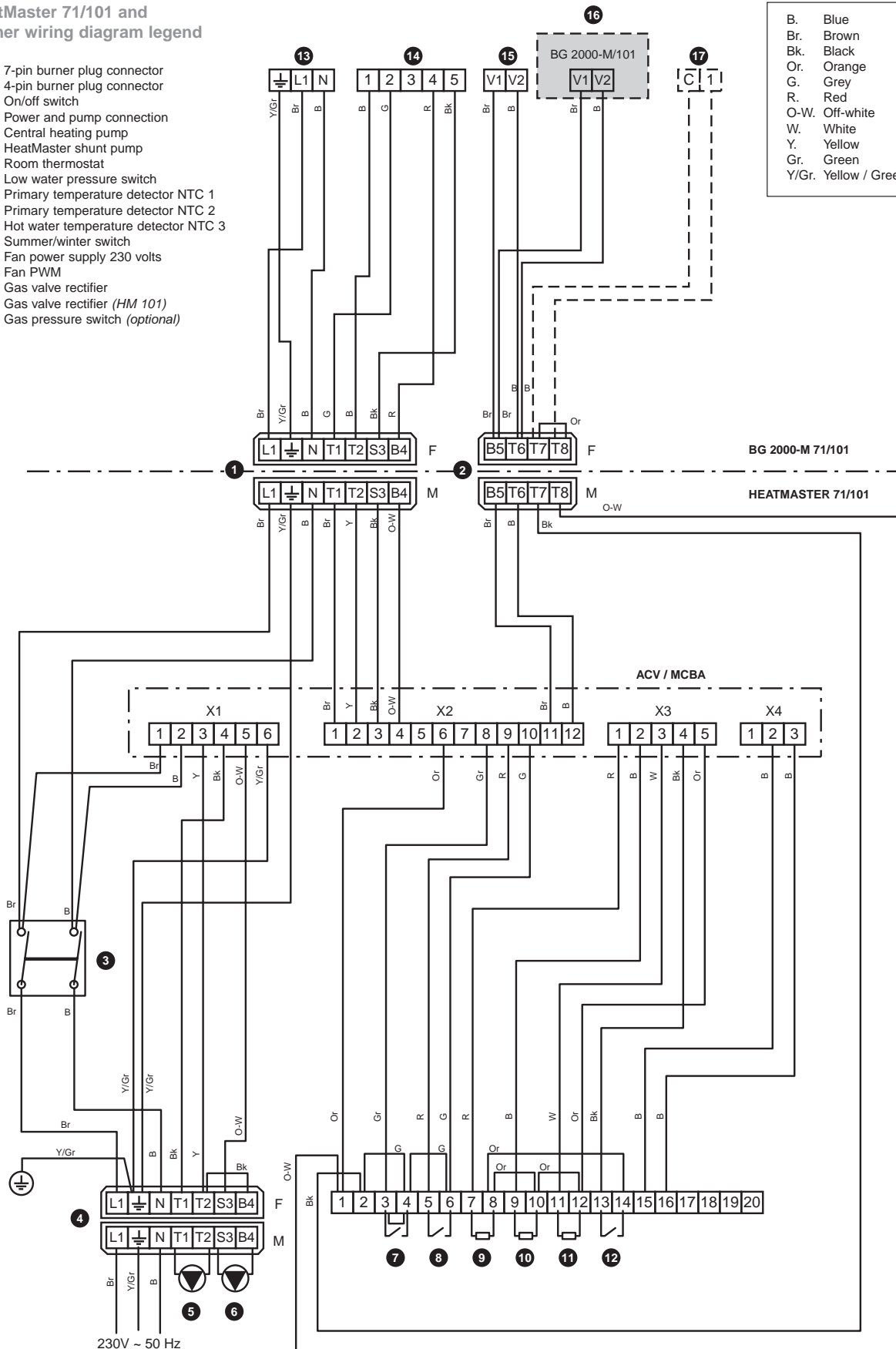
Connection for transformer



**HeatMaster 71/101 and burner wiring diagram legend**

1. 7-pin burner plug connector
2. 4-pin burner plug connector
3. On/off switch
4. Power and pump connection
5. Central heating pump
6. HeatMaster shunt pump
7. Room thermostat
8. Low water pressure switch
9. Primary temperature detector NTC 1
10. Primary temperature detector NTC 2
11. Hot water temperature detector NTC 3
12. Summer/winter switch
13. Fan power supply 230 volts
14. Fan PWM
15. Gas valve rectifier
16. Gas valve rectifier (HM 101)
17. Gas pressure switch (optional)

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

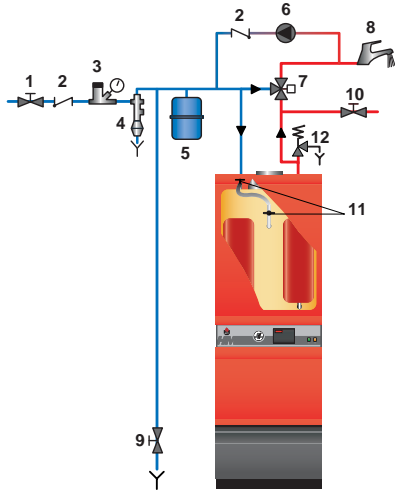


FILLING THE HOT WATER AND HEATING CIRCUITS

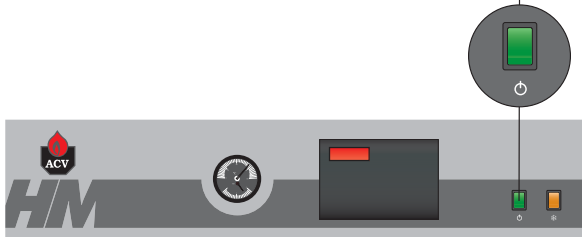


**IMPORTANT**  
The hot water tank must be pressurised before the heating circuit is filled.

1. Close the primary circuit filling valves (11).
2. Open the stop valve (1) and the drawoff tap (8). When water flows out of the tap, the hot water tank is full and the drawoff tap (8) should be closed.
3. Fill the primary (heating) circuit by opening the valves (11) and pressurising to 1 bar.



4. Open the automatic air vent located on top of the boiler.  
**IMPORTANT - the screw cap must be left loose to allow future automatic venting to take place.**
5. After venting the air from the system, bring the pressure up to the static head plus 0.5 bar: 1.5 bar = 10m and 2 bar = 15 m.
6. Check that the electrical connection and boiler room ventilation conform to the relevant standards.
7. Switch the on/off switch to the ON position.



8. Set the temperature settings (see pages 15-16).
9. Check the gas supply pressure (see page 13).
10. When the burner operates, check the chimney connection for leaks.
11. After 5 minutes of operation, turn the boiler off and vent the heating circuit system again maintaining the water pressure at 1 bar.
12. Then restart the unit and check the combustion (see page 13).

**Burner troubleshooting**

See page 15-17

**Spare parts**

Refer to the specific document available from ACV or your distributor.

ACV BG 2000-M MODULATING PREMIX GAS BURNERS

**Description of operation:**

The BG 2000-M modulating burner continually adjusts output to demand, improving operating efficiency. The burner tube is coated with metal fibre (NIT) which, in addition to its remarkable heat exchange capabilities, gives greater durability.

The main components are a venturi and one (model 71) or two (model 101) gas valves, technology specially developed by Honeywell for low Nox premix air/gas burners with automatic ignition and ionisation flame detection.

The pressure at the gas valve outlet is equal to the air pressure in the neck of the venturi, less the offset. The fan sucks combustion air through the venturi, into which the gas inlet emerges.

As it passes through, the air produces a pressure differential in the constriction of the venturi and sucks the gas into the venturi outlet. A perfect mix of air and gas then passes through the fan to the burner tube.

**This design ensures very quiet and safe operation:**

- If there is an air blockage, the pressure differential in the venturi falls, the gas flow diminishes, the flame goes out and the gas valve closes: the burner is in safety shutdown mode.
- If there is a blockage in the chimney outlet, the air flow diminishes, and the same reactions as those described above cause the burner to shut down in safety mode.
- The BG 2000-M burner fitted to the HeatMaster 71 and 101 is regulated by a MCBA controller (Honeywell) which controls burner operating safety as well as temperature modulation.



**BG 2000-M burners are preset at the factory for natural gas.**

**Conversion to propane:**

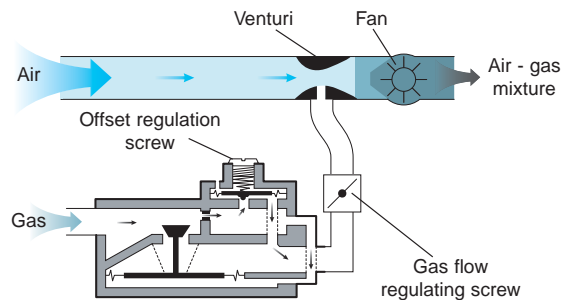


**Not applicable for Belgium.**

Conversion kit included with burner comprising:

- Cap(s)
- Nameplate(s)
- Sticker with settings.
- Mounting instructions.

**Air-gas mixture control system**



## BURNER FEATURES

### 71/101 Gas burner features

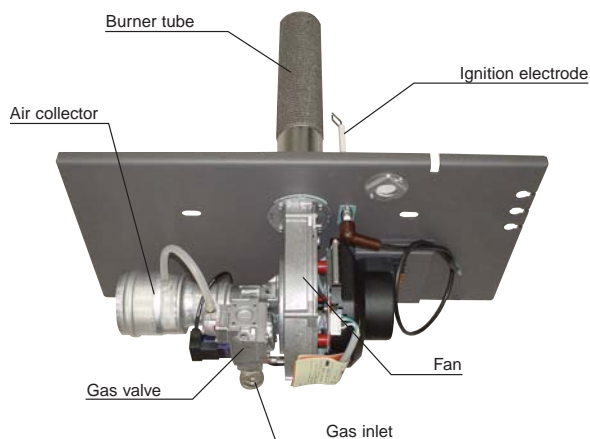
Type		HM 71	HM 101
Input	Kw	22.0 - 69.9	25.0 - 107 / 22.0 - 110 (*)
Output	Kw	18.4 - 63.0	23.0 - 96.3 / 20.2 - 99.0 (*)
Combustion efficiency - natural gas	%	92.0	92.1
Natural gas CO <sub>2</sub>	%	9.0	9.5
<b>Gas G20 - 20 mbar - I 2E(S)B - I 2 Er - I 2H</b>			
Flow	m <sup>3</sup> /h	2.12 - 7.40	2.64 - 11.32
<b>Gas G25 - 20/25 mbar - I 2L - I 2ELL</b>			
Flow	m <sup>3</sup> /h	2.46 - 8.60	3.80 - 13.17
<b>Gas G31 - 37/50 mbar - I 3P</b>			
Flow	m <sup>3</sup> /h	0.82 - 2.86	0.94 - 4.50
Pressure drop combustion chamber	mbar	0.6	1.4
Flue gas temperature (net)	°C	172	165
Mass flow rate of combustion products ( <i>grammes per second</i> )		9.2 - 32.1	11.5 - 49.2

(\*) propane

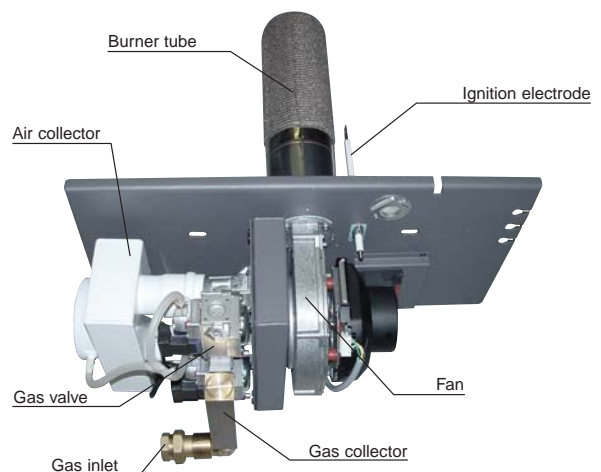
### Gas category

	BE	FR	AT	DK	ES	UK	IT	PT	IE	SE	NL	LU	DE
I 2Er	X												
I 2E(S)B	X												
I 2H			X	X	X	X	X	X	X	X			
I 3P	X	X			X	X		X	X				
I 2L											X		
I 2ELL												X	X

BG 2000-M/71



BG 2000-M/101



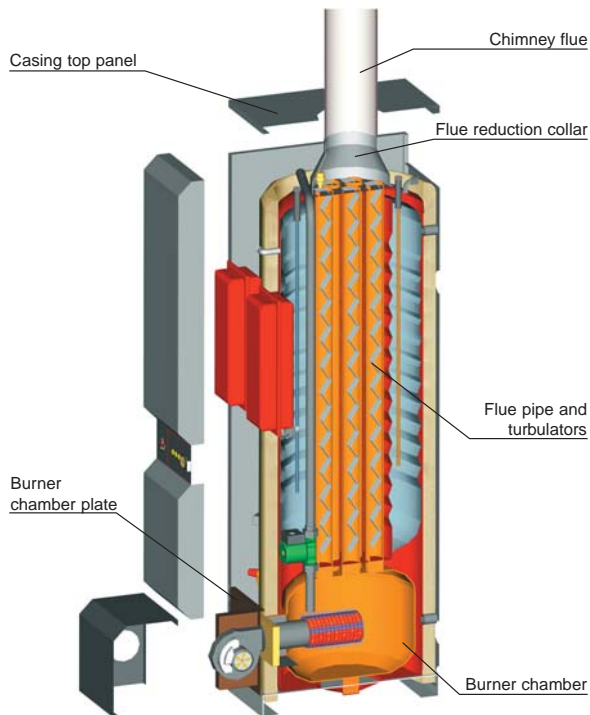
## MAINTENANCE

### SERVICE INTERVALS

ACV recommends that boilers should be serviced at least once a year. The burner must be serviced and tested by a competent engineer. If a boiler is subject to heavy use, it may require servicing more than once a year - consult ACV for advice.

### SERVICING THE BOILER

1. Turn OFF the on/off switch on the boiler control panel and isolate external electrical supply.
2. Turn off the gas supply to the boiler.
3. Remove the flue to gain access to the top of the boiler.
4. Remove the casing top panel and lift off the flue reduction collar by undoing the fastening bolts.
5. Remove the turbulators from the flue pipes for cleaning.
6. Unscrew the burner chamber plate and remove the burner.
7. Brush the flue pipes .
8. Clean the burner chamber and the burner.
9. Re-assemble turbulators, flue reduction collar and flue, checking that the gasket on the flue reduction collar is in good condition. Replace gasket if necessary.



### SERVICING THE SAFETY DEVICES

- Check that all thermostats and safety devices are working properly.
- Test the safety valves on the central heating and hot water circuits.

### SERVICING THE BURNER

- Check that the insulation and gasket on the burner chamber plate are in good condition - replace if necessary.
- Check and clean the burner and electrodes. Replace electrodes if necessary (*under normal use once a year*).
- Check that the safety components are working properly.
- Check the combustion (CO<sub>2</sub>, CO and gas pressure) and record the values and any remarks in the Service Record on page 18.

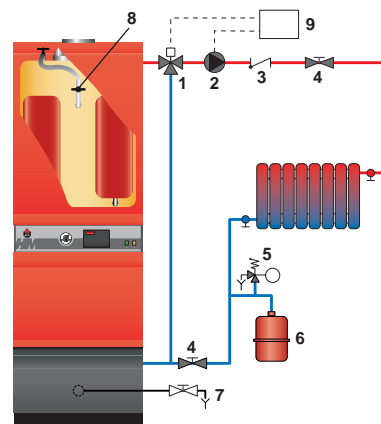
### DRAINING THE BOILER



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

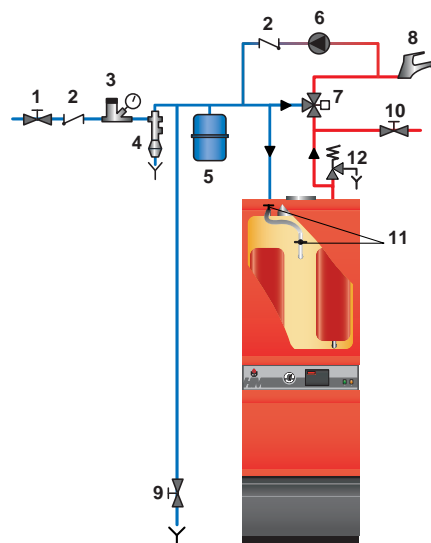
#### Draining the heating circuit

1. Turn OFF the on/off switch on the boiler control panel, isolate external electrical supply, and turn off the gas supply to the boiler.
2. Close the isolating valves (4).
3. Connect a hose to the drain cock (7).
4. Open the drain cock to drain the primary circuit.



#### Draining the hot water circuit

1. Turn OFF the on/off switch on the boiler control panel, isolate external electrical supply, and turn off the gas supply to the boiler.
2. Release the pressure in the heating circuit until the pressure gauge indicates zero bar.
3. Close stop cock (1) and turn off tap (8).
4. Open valve (9) then valve (10).
5. Let the water empty into the drain



**For the tank to be emptied, valve (9) must be situated at ground level.**

USING THE BOILER

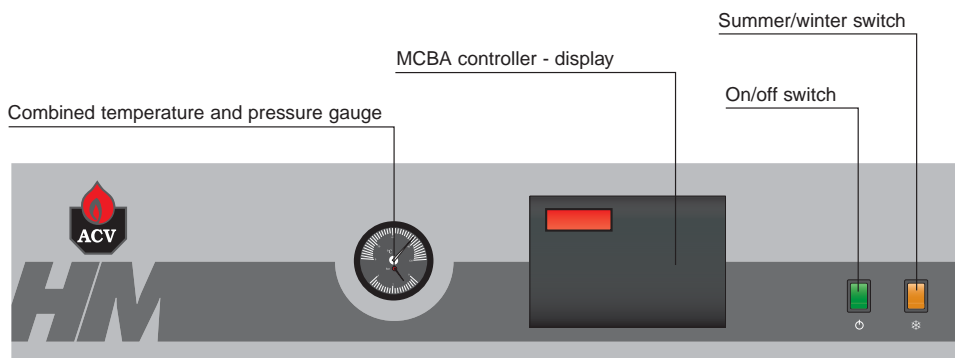


Your system should be serviced at least once a year by a qualified engineer. If the boiler is subject to heavy use, it may require servicing more than once a year - consult your service engineer for advice.

**Starting the burner:**

In normal operation, the burner starts automatically whenever the boiler temperature falls below the set temperature.

Understanding the control panel



There are no user parts inside the control panel.

Heating system pressure



From time to time you may need to top up the heating system pressure. This pressure is indicated by the combined temperature and pressure gauge on the boiler control panel.

The minimum pressure when the boiler is cold should be 1 bar. The precise operating pressure required depends on the height of the building, and your installer will have informed you of this value at the time of installation (see Commissioning Section - Filling the hot water and heating circuits).

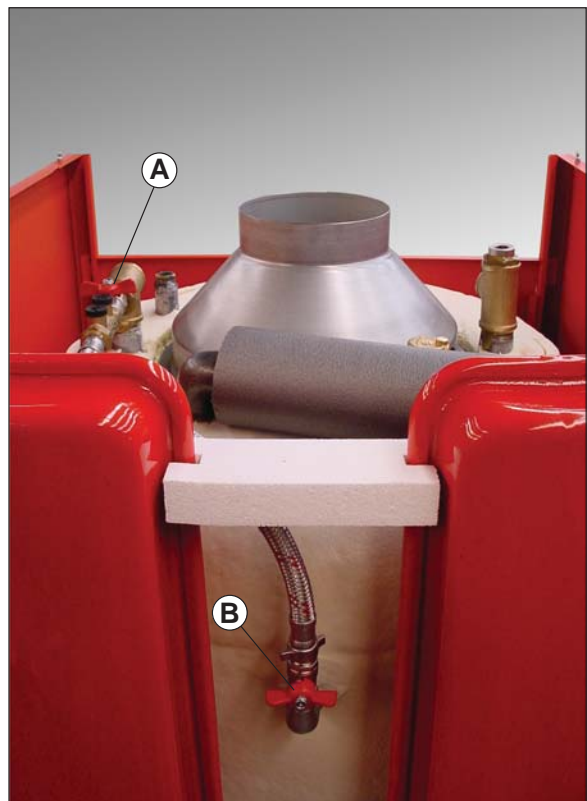
If the pressure falls below 1 bar, the boiler water pressure switch will turn the boiler off until pressure is restored.

To re-pressurise, the system needs to be topped up with water.

First, switch the boiler OFF on the on/off switch and isolate the external electrical supply. Then remove the casing top front panel by pulling it forward. The filling valves "A" and "B" can now be seen. Open both valves and allow the system to fill. When the combined temperature and pressure gauge shows the required pressure, close both valves. Replace the casing top front panel. Restore the power supply and switch the boiler on.

Safety Valves

If water discharges from any of the safety valves, switch the boiler off and call a service engineer.





## USER GUIDE

### CONTROL SETTINGS

The boiler is controlled by the MCBA (microprocessor), with the control panel housed behind a flap on the front of the boiler - see picture on page 16.

#### Standby Mode

Standby Mode is the normal operation display setting.

The first digit shows the boiler sequence. This sequence relates to current boiler status. The last two digits show the boiler temperature.

Sequence	Boiler status
0	Stand By, no heat request
1	Pre-purge, post-purge
2	Ignition
3	Burning in CH-mode
4	Burning in DHW-mode
5	Waiting for opening of Air pressure switch (max. 1 Min.) Waiting for closing of Air pressure switch (max. 2 x 1 Min.)
6	Burner off because the set-value has been reached
7	Overrun time pump in CH-mode
8	Overrun time pump in DHW-mode
9	Burner off because of protection: <i>(automatic restart occurs when the condition has cleared)</i> <ul style="list-style-type: none"> <li>• "b08": airflowsensor did not close</li> <li>• "b18": T1 &gt; 95 °C</li> <li>• "b19": T2 &gt; 95 °C</li> <li>• "b24": T2 - T1 &gt; 10,20 or 40 °C after 19 minutes</li> <li>• "b25": dT1/dt &gt; Maximum Gradient T1</li> <li>• "b26": Minimum gas pressure switch not closed</li> <li>• "b28": no fan signal</li> <li>• "b29": fan signal, incorrect fan rotation</li> <li>• "b30": T1 - T2 &gt; Max. delta</li> <li>• "b33": NTC3 short circuit</li> <li>• "b35": NTC5 short circuit</li> <li>• "b38": NTC3 open circuit</li> <li>• "b40": NTC5 open circuit</li> <li>• "b52": T5 &gt; T5max</li> <li>• "b61": airflowsensor closed</li> <li>• "b65": wait for fanstart</li> </ul>
A	Internal control
G	Burner on for holding boiler warm
H	Burner-high function: Testmode max. RPM in CH-mode
L	Burner-low function: Testmode min. RPM in CH-mode
t	Burner on for manual fanspeed (servicing)

If the burner is turned off because of an extra protection, the display shows boiler-sequence 9 and the flow-temperature. This alternates with the error code eg. b26.



#### Changing the MCBA settings: Parameter mode

Proceed as follows:

- Press the "MODE" button once; the display will show "PARA".
- Press the "STEP" button once; the first digit is "1" and the last two show the setting for the first parameter.
- To change these last two, press "+" to increase and "-" to decrease.
- Save the new setting selected with the "STORE" button.
- To access the next parameter, press "STEP".
- Press the "MODE" button twice to return to standby mode.

List of accessible parameters:

Parameter N°	Description	Range
1	hot water setting	20 - 90 °C
2	"Hot water" system status	O = OFF; 1 = ON
3	"Heating" system status	O = OFF; 1 = ON
4	Heating setting	60 - 90 °C

#### Temperature measurement display: Info mode

Proceed as follows:

- Press the "MODE" button twice; the display will show "INFO".
- Press the "STEP" button once; the first digit is the measurement number and the last two its value.
- Press the "STEP" button to display the next measurement.
- To return to standby mode, press the "MODE" button once.

List of measurements available:

Measurement N°	Description
1	Temperature T1 - primary
2	Temperature T2 - primary
3	Temperature T3 - secondary
4	-
5	-
6	Setting for T1
7	Variation of T1 - °C/s
8	Variation of T2 - °C/s
9	Variation of T3 - °C/s

**Safety shutdown**

If an operating error develops, the system locks and the display flashes: the first digit shows the sequence the burner was in when the error occurred, the last two digits show the error code (see table below); the first digit and the next two flash alternately.



**To reset the system:**

- Press the “**RESET**” button on the MCBA display.
- If an error occurs again, call an approved heating engineer.

**Table of error codes and corrective action**

codes	Error description	Fault repair
00	No flame detected	- check wiring / - change electrode / - change MCBA
02	No ignition after 5 attempts	- check ignition electrode and its positioning
03-07	Internal error	- if the problem persists after 2 resets, change the MCBA
11	Eprom error	- if the problem persists after 2 resets, change the MCBA
12	Low water pressure or 24V fuse failure	- top up the primary circuit (see <i>Using The Boiler - Heating System Pressure</i> ). - call engineer to check fuse
13-17	Internal error	- if the problem persists after 2 resets, change the MCBA
18	Primary temperature 1 > 110 °C	- check that sensor NTC1 is properly housed in its pocket - if so, change sensor NTC1
19	Primary temperature 2 > 110 °C	- check that sensor NTC2 is properly housed in its pocket - if so, change sensor NTC2
25	Primary temperature 1 gradient too high	- check that the shunt pump is operating, and if so vent the boiler
28	No fan signal	- if the fan is turning: • check the PWM connection • if the problem persists after 2 resets, change the fan • if the problem persists after 2 resets, change the MCBA  - if the fan is not turning: • check the 230 Volt power to the fan
31	Short circuit in temperature 1 sensor	- change sensor NTC1
32	Short circuit in temperature 2 sensor	- change sensor NTC2
33	Hot water temperature sensor	- change sensor NTC3
36	Temperature 1 sensor: circuit open	- check the connection of sensor NTC1 to the terminal strip - if the problem persists, change sensor NTC1
37	Temperature 2 sensor: circuit open	- check the connection of sensor NTC2 to the terminal strip - if the problem persists, change sensor NTC2
38	Hot water temperature sensor: circuit open	- check the connection of sensor NTC3 to the terminal strip - if the problem persists, change sensor NTC3
44	Internal error	- if the problem persists after 2 resets, change the MCBA

---

## SERVICE RECORD

### INSTALLATION DETAILS

---

Date installed: _____	Flue gas T° : _____	Model : _____
% CO <sub>2</sub> (min. load) : _____	Efficiency : _____	Serial number : _____
% CO <sub>2</sub> (max. load) : _____	Gas pressure : _____	Heating system pressure setting : _____
<input type="checkbox"/> Gas _____		
<input type="checkbox"/> LPG _____	Name and signature : _____	

### SERVICE RECORD

---

Date serviced : _____	Flue gas T° : _____	Remarks : _____
% CO <sub>2</sub> (min. load) : _____	Efficiency : _____	_____
% CO <sub>2</sub> (max. load) : _____	Gas pressure : _____	_____
<input type="checkbox"/> Gas _____		
<input type="checkbox"/> LPG _____	Name and signature : _____	

---

Date serviced : _____	Flue gas T° : _____	Remarks : _____
% CO <sub>2</sub> (min. load) : _____	Efficiency : _____	_____
% CO <sub>2</sub> (max. load) : _____	Gas pressure : _____	_____
<input type="checkbox"/> Gas _____		
<input type="checkbox"/> LPG _____	Name and signature : _____	

---

Date serviced : _____	Flue gas T° : _____	Remarks : _____
% CO <sub>2</sub> (min. load) : _____	Efficiency : _____	_____
% CO <sub>2</sub> (max. load) : _____	Gas pressure : _____	_____
<input type="checkbox"/> Gas _____		
<input type="checkbox"/> LPG _____	Name and signature : _____	

---

Date serviced : _____	Flue gas T° : _____	Remarks : _____
% CO <sub>2</sub> (min. load) : _____	Efficiency : _____	_____
% CO <sub>2</sub> (max. load) : _____	Gas pressure : _____	_____
<input type="checkbox"/> Gas _____		
<input type="checkbox"/> LPG _____	Name and signature : _____	

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Date serviced : _____	Flue gas T° : _____	Remarks : _____
% CO <sub>2</sub> (min. load) : _____	Efficiency : _____	_____
% CO <sub>2</sub> (max. load) : _____	Gas pressure : _____	_____
<input type="checkbox"/> Gas _____		
<input type="checkbox"/> LPG _____	Name and signature : _____	

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