

Mikrofill Ethos Condensing combination boiler



Installation & Maintenance Instructions

30/36

42/46

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1 SAFETY PROVISIONS

Conditions:

MIKROFILL shall not be held responsible for damage arising from inadequate compliance with the installation instructions.

For service purposes, only original MIKROFILL spare parts should be used

General conditions:

All Mikrofill boilers must be installed by a competent person with regard to the relevant requirements of the Health and Safety regulations, The Building Regulations, IEE Regulations, Water Supply (Water Fittings) Regulations, Water Byelaws (Scotland), The Gas (Installation and Use) Regulations and any local planning requirements.

1. UK Building regulation Part L1 (Domestic) Part L2 (Commercial) in which reference is made to the following norms:

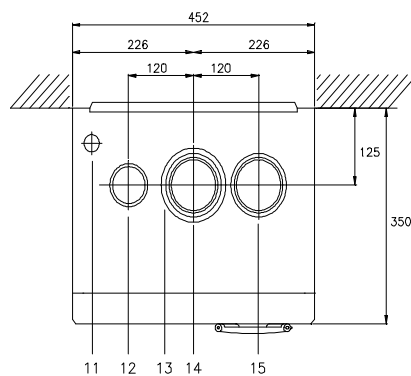
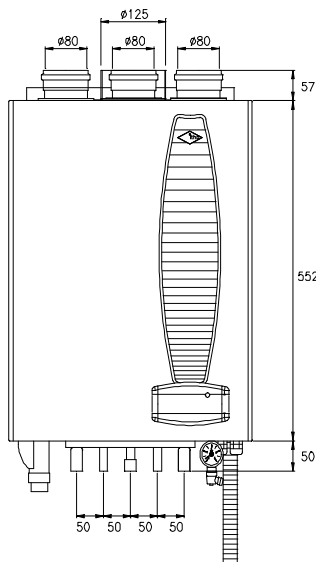
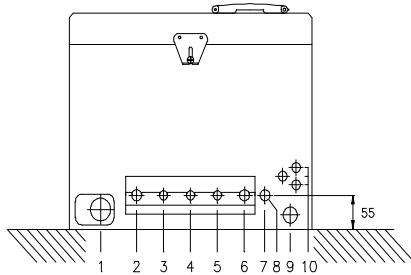
Directives for existing gas installations compiled by British Gas

2. IM16 Guidance notes on the installation of gas pipework
3. BS6644 Installation of gas fired hot water boilers rated inputs above 60kW but not greater than 2 mW
4. British Standards Code of Practice – BS6880 – Code of practice for low temperature hot water heating
5. CP342 – Code of Practice part 2 – Centralised hot water supply

The Mikrofill ETHOS range of boilers are built in total compliance with EN

2 TECHNICAL DATA

2.1 Drawing of front view



- 1 = Condense trap end cap
- 2 = CH flow (22mm)
- 3 = Domestic hot water (15mm)
- 4 = Gas
- 5 = Cold water inlet (15mm)
- 6 = CH return (22mm)
- 7 = Air Vent
- 8 = Manometer
- 9 = Condense drain outlet
- 10 = Cable entry
- 11 = Drain cock
- 12 = Air intake
- 13 = Air intake concentric
- 14 = Flue gas spigot
- 15 = Air inlet spigot

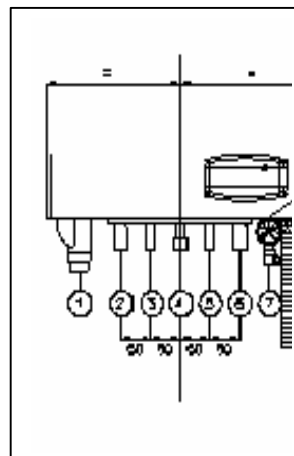


Table 1, Technical data

General			
CE Product ID number	CE 0063 BL 3615- 2000		
Dimensions (h x w x d)	550mm x 450mm x 350mm		
Category	II2L3P		
Type of appliance	Ethos	30/36	42/46
CH water content of appliance	Litre	2,1	2,7
CH water content heat exchanger hot water	Litre	1,5	1,5
Weight (empty)	Kg	39	41
CH connections supply/return	mm	22	22
Gas connection	mm	15	15
Hot water, hot/cold	mm	15	15
Flue gas connection	mm	80	80
Air inlet	mm	80	80
Concentric	mm	80/125	80/125
Electrical power required	kW	0.115	115
IP classification		IP44	IP44

Capacity CH Operation			
Nominal load (output)	kW (min – max)	4.3 – 28.5	5.4 – 38.7
Nominal load (input)	kW (min – max)	4.8 – 31.7	6.0 – 43
Max. gas use	m ³ /hour	3.0	4.4
Efficiency at 50/30°C, full load	%	106	106
Efficiency at 50/30°C, partial load	%	109.5	109.5
Efficiency at 40/30°C, RAL 61	%	110	110
Nominal capacity at 80/60°C	kW	4.1 – 27	5.3 – 38
Nominal capacity at 50/30°C	kW	4.6 – 30	5.8 – 42
Gas approval HR Label		107	107
NOx emissions, RAL 61	mg/kWh	<15	<15
CO emissions, RAL 61	mg/kWh	<20	<20

Capacity Hot water			
Nominal load (lower value)	Kw	4.3 – 36	5.4 – 46
Nominal load (upper value)	kW	4.8 – 40.0	6.0 – 51.0
Tap quantity at 60°C (? T=50K)	l/min	10	12.9
Tap quantity at 40°C (? T=30K)	l/min	17	21.4
WRAS Approval number	0204111		
Annual use efficiency for EPC calculation	%	83	82
Hot water (preset value)	°C	60	60

Technical data			
CO ₂ content flue gas	%	9	
Dew point of the flue gas	°C	52	
Temperature flue gas at 80/60 (with an ambient temperature of 20 °C)	°C	75	
Permitted resistance exhaust system*	Pa	Up to 100	
PH value of the condensate		4 to 5.5	
Available CH pump pressure	kPa	15 at ? T20°C	28 at ? T25°C
Maximum supply temperature	°C	90	
Working pressure CH min/max.	bar	1 / 3	
Connection pressure sanitary water min-max	bar	0.2 - 10	
NOx-class		6	

3 INTRODUCTION

This manual is intended for the installer/user of the MIKROFILL range of condensing boilers. This manual contains the necessary information relating to the installation and settings of the Ethos 30/36 and 42/46.

You need to consult this manual before installation in order to ensure that you carry out all the work correctly. In addition, it is advisable to keep this manual beside the boiler, so it is immediately available if needed later.

3.1 Function of the appliance

High efficiency is achieved by means of a stainless steel heat exchanger, in which the flue gases are cooled to below the condensation point, condense and release further energy.

This is expressed in the efficiency exceeding 100%. The European method of calculation assumes an efficiency of 100% for appliances in which provision is not made for the condensation of flue gases and as a maximum efficiency of 110% in condensing appliances.

In condensing boilers the flue gases are therefore at a low temperature (below 75°C), a stainless steel or thick-walled aluminium (1) HR [HE] approved flue system or purpose designed plastic pipe needs to be used.

(1) When using an aluminium flue pipe, it is advisable to fit a condensation trap in the flue system, to prevent pollution by aluminium corrosion.

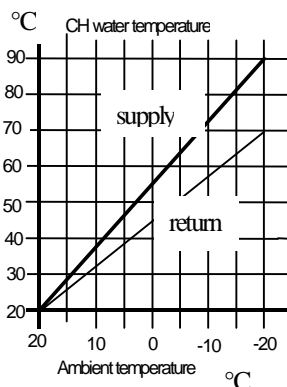
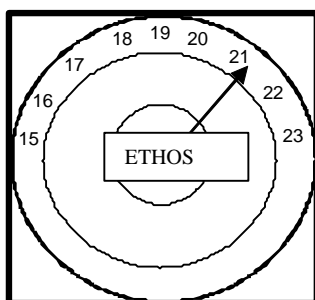
The appliance is approved in accordance to all associated European norms (CE), and the Netherlands requirements for Clean Air (SV), high efficiency (107% HR) and the quality mark (Gas) as well as the quality mark for hot water (hot water class CW) and as reheater for solar panels (NZ approval).

3.2 Control

The boiler can be controlled by way of a conventional thermostat, or a modulating electronic room thermostat (open therm), which can control the boiler output and modulate between 12% and 100% of the total output of the boiler.

The heat output is continuously adjustable ensuring that the output of the boiler maintains a constant temperature in the home irrespective of weather conditions and provides hot water (combination boilers only) at a constant temperature.

This variable heat output can also be achieved by means of the built-in weather-compensation, by way of an independent control or in conjunction with the above thermostats. All forms of control can be used with a conventional time clock.



3.3 Products of combustion

As a result of the variable combustion and the burner used, the results achieved for combustion comply with the strictest norms in Europe. Sedbuk A Rated, Ultra low Nox, Ultra low CO.

3.4 Modulating fan

An energy saving 24 volt high efficiency fan is used with variable speed and current use. The fan revolves more slowly when the heat requirement is less, thus saving electricity.

3.5 Multi-speed pump

The appliance is fitted with a Grundfos pump (type UBS 15 – 60 HP) provided with a 3 speed switch for regulating the speed to enable the correct flow rate to be selected.

3.6 Description of appliance

The appliance is suitable for supplying a central heating installation. It has a variable capacity between 12 and 100%.

3.7 Combination Models

These boilers have a built-in heat exchanger with a limited provision for hot water supply. All connections are internal, while a built-in flow restrictor provides a maximum quantity of hot water maintaining a hot water temperature of approximately 60°C.

The hot water is set at 60°C to prevent contamination with “Legionella” bacteria.

4 INSTALLATION

4.1 Contents

Installation & Users’ Manual

Vent key

Mounting bracket

2 spare fuses

3 spare burner plate nuts for fixing the burner plate (fixed on the front of the gas valve)

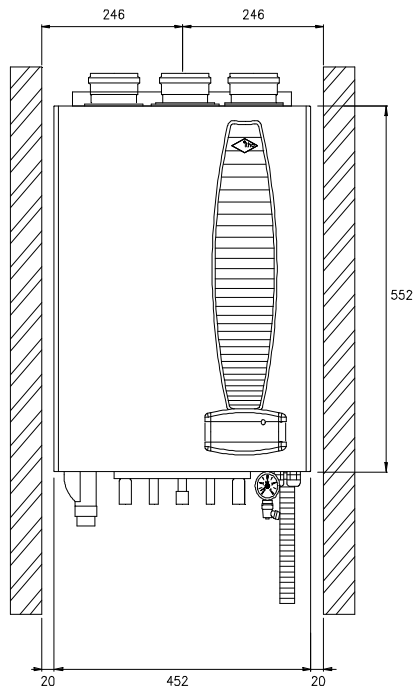
Strainer syphon with tightening nut and packing

Check the contents immediately on receipt.

Any damage must be reported to the supplier immediately.

Mikrofill appliances are completely assembled

4.2 Siting the boiler



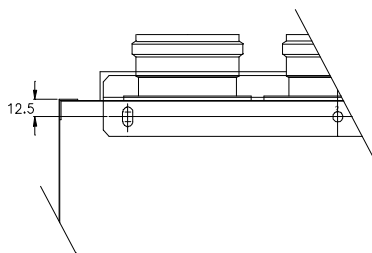
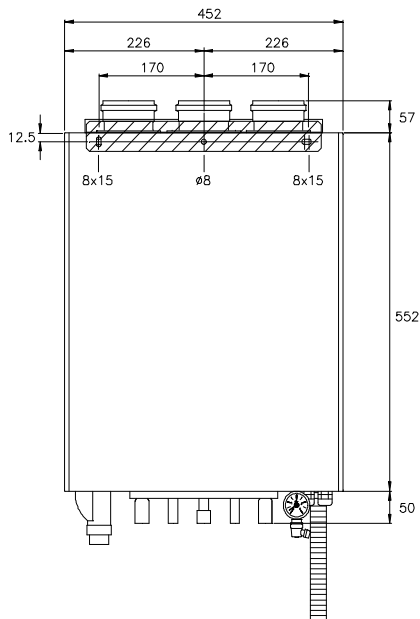
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Mikrofill appliances are suitable for all gas groups G20.

The flue, whether single or concentric, must be installed in compliance with the current flue recommendations BS5440

Combination boilers should be sited as close as possible to the hot water draw off point to avoid excessive water wastage.

The installer will need to select and install an expansion vessel which will be sized according to performance requirements, along with a pressure relief valve.



For maintenance and service purposes the front and underside of the appliance need to be accessible; both sides need to be at least 20mm from a wall or cupboard wall.

The following need to be available in the room where the appliance is to be mounted

- 240v 1ph Electric.
- A suitable drain for condensation water.
- The wall on which the appliance is going to be mounted must be capable of bearing the weight of the appliance.
- ETHOS boilers incorporate a modulating fan. Although noise levels are minimal care should be taken in siting the boiler to reduce disturbance from noise.

4.3 Mounting the boiler

- Using the mounting bracket, mark the holes for the mounting plate and determine the position for connection of the inlet and outlet pipes..

Warning! 1.

Make sure when you mark the position of the bracket that it is level.

Warning! 2

The head of the fixing bolt, must not be more than 6 mm.

- Secure the mounting bracket to the wall using screws and plugs.
- Mount the boiler.

4.4 Air inlet-flue gas outlet connection

General

There are 2 options of flue connection:

- separate air inlet and flue outlet;
- concentric connection (pipe in pipe)

A. Separate air inlet and flue outlet.

The optimum connection for air inlet and flue gas removal is achieved by using a corrosion-resistant inlet system.

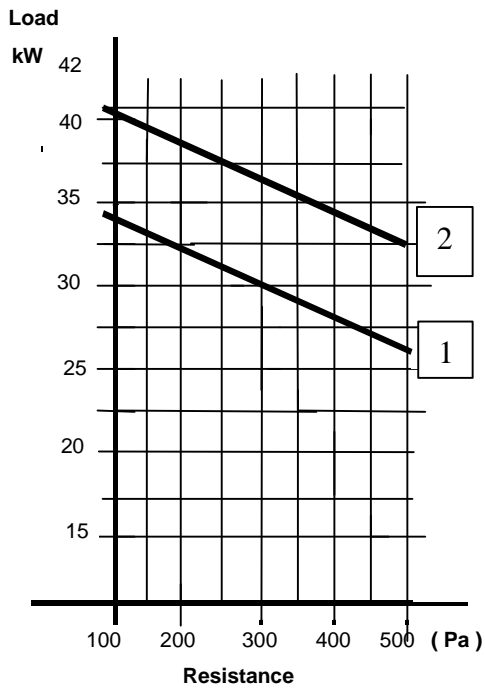
The dimension of the flue gas outlet pipe is 80 mm; the air inlet is similarly 80 mm.

The air inlet can be placed on either the left or right hand side of the flue gas outlet pipe.

B. Concentric connection , a set is available for a concentric connection: air inlet 125 mm and flue gas outlet 80 mm diameter.

Always place the plastic inlet connection on top of the mouth of the air inlet pipe. This plastic connecting piece prevents damage to the appliance if there is moisture present in the inlet pipe. The air inlet with an 80 mm diameter, must be closed with the seal supplied with it.

4.6(T)



1 = ETHOS 30/36
2 = ETHOS 42/46

4.5 Air inlet and flue outlet system.

The MIKROFILL boiler is a room sealed appliance that does not use any oxygen from the room in which it is installed; the casing is air tight, so that oxygen is provided only through the air inlet pipe. The boiler must not be operated without the casing in place.

Note that horizontal parts need to have a gradient of 1% towards the boiler (1 cm per 1 m length). If this is overlooked, condensation can collect in the flue gas outlet pipe which can cause problems.

The resistance of the inlet and outlet system is 100 Pa in instances where the resistance is greater than 100 Pa the maximum output of the boiler will be effected please refer to 4.6(T).

4.6 Influence of exhaust removal on load

The following table gives the ratio between the load and the resistance of the inlet and outlet resistance of the system.

Up to a resistance of 100 Pa the load will remain near enough equal, with greater resistances this changes with respect to the values on the type plate.

The resistance and change in the load influence only the maximum load and not the minimum load.

Take account of possible load changes with hot water production and the transmission calculation.

4.7 Flue material

The appliance must only be connected to systems manufactured from approved flue material and must incorporate water tight seals to eliminate leakage of condensate.

To avoid exterior nuisance pluming (mist) we thoroughly recommend vertical flueing.

4.8 Flue resistance table

The load of the appliance is influenced by the resistance of the air inlet and outlet system through the gas-air connection of the control of the appliance.

With a resistance up to **100 Pa.**, the load will be equivalent to what is shown on the type plate of the appliance. The flue pipe induced draught is: **3 Pa/vertical metre**.

Table 2, Flue resistance table

Concentric Flue System		(mm)	Resistance inlet-outlet system [Pa]	
Part			ETHOS 30/36	ETHOS 42/46
Vertical Terminal		80/125	4.5	12.0
Horizontal Terminal		80/125	3.0	8.0
straight pipe/m		80/125	1.8	4.0
45° bend		80/125	0.9	2.0
90° bend		80/125	1.8	4.0
Two Pipe System		(mm)	Resistance inlet-outlet system [Pa]	
Air Inlet	Part		ETHOS 30/36	ETHOS 42/46
	straight pipe/m	80	0.8	2.2
	45° bend	80	0.5	1.2
	90° bend	80	1.0	2.0
Flue Gas Outlet	Vertical terminal	80	4.5	12.0
	Horizontal terminal	80	3.0	8.0
	straight pipe/m	80	2.0	4.0
	45° bend	80	1.0	2.0
	90° bend	80	2.0	4.0

Example of calculation

Boiler type: 30/36 ETHOS

Air inlet pipe: diameter 80 mm; horizontal length: 5 m; vertical 25 m; 2 x 90° bend

Flue gas outlet pipe: diameter 80 mm; horizontal length 5 m; vertical 25 m; 2 x 90° bend

Concentric vertical flue terminal 80/125

Air inlet:

90° bend: 2 pieces	2 x 1.0	2.0 Pa
Straight pipe : 30 m.	30 x 0.8	24.0 Pa

Flue gas outlet

90° bend: 2 pieces	2 x 2.0	4.0 Pa
Straight pipe : 30 m.	30 x 2.0	60.0 Pa
Vertical terminal		4.5 Pa
		<u>94.5 Pa</u>

Total resistance is now 94.5 Pa minus the vertical flue pipe induced draught of 3 Pa/vertical metre therefore (25 x 3 Pa = 75) = **19.5 Pa (thus below 100 Pa)**; so that the capacity of the boiler is not changed by the resistance.

4.9 Removal of condensation

The condensation outlet is on the underside of the appliance, on the right, and has a 3/4" diameter hose; place this flexible hose in the drain with an open connection .

Only use plastic parts for the condensation water outlet. Metal pipes are not permitted.

The appliance is provided with an in-built siphon, therefore the connection from the appliance can be directly linked with the water supply in the house.

WARNING: blockage of this outlet can cause damage to the appliance. The guarantee for the appliance does not cover any damage that arises in this way. In the correct situation the condensation water flows away visibly, for example via a tundish.

The appliance is constructed in such a way that if the siphon becomes blocked the appliance switches off before damage can occur to the burner.

4.10 Central heating and hot water circulation

4.10.1 General

If plastic pipes are used for supply and return, for radiators or under-floor heating, the pipes should incorporate an oxygen diffusion barrier. In the absence of this barrier it is essential that a Mikrofill air and dirt separator or similar appliance is installed. This is good practice even on steel/copper systems. This prevents contamination of the heat exchanger with system debris and magnetite caused by oxidation of the pipework. The MIKROFILL guarantee may be invalidated by failure to comply.

4.10.2 Connecting the expansion vessel.

Combination boilers

Combination boiler versions require an expansion vessel, safety relief valve and system isolating valves. These can be supplied by Mikrofill.

System boilers

An expansion vessel needs to be fitted with a volume suited to the contents of the central heating installation and static pressure; the expansion vessel is preferably fitted in the water return pipework.

4.10.3 Domestic hot water circuit (Combination boilers only)

The boiler incorporates a domestic hot water flow control valve which must be adjusted according to table 3 below.

Connect the cold water supply according to the current UK water regulations (April 2000); it is advisable to fit a Mikrofill WRAS approved "quick fill loop" to enable recharging of the boiler water system

Table 3, Hot water class

Appliance	Setting	HW class
ETHOS 30/36	10 l/min	5
ETHOS 42/46	12.9 l/min	6

To achieve a tap water temperature of 45°C or higher within 30 seconds, the hot water pipe between the boiler and the outlet must be not more than approximately 20 metres long.

4.10.4 Multi speed pump

The pump has a multi speed regulator which is set at the highest level: in the models ETHOS 30/36, 42/46, setting II will usually be sufficient: **Warning: Do not use level I**, because the flow rate will be insufficient.

The appliance has a built-in pump control with a delayed switch-off time of 3 minutes as standard.

If more heat is demanded the pump will operate at maximum capacity; when the heat demand ceases the pump will run for a further 3 minutes, and then stop.

Similarly the pump will run for 1 minute every 24 hours to reduce the possibility of the pump seizing due to debris in the system.

This 24-hour period begins the moment that the electrical power to the appliance is switched on.

4.11 Frost protection

The appliance has built-in frost protection, which activates the the central heating pump when the water temperature in the boiler drops to 8°C.

At a boiler water temperature of 5°C, the burner ignites and burns until the feed temperature reaches 10°C.

4.12 Connecting the gas supply

The gas supply must be suitable sized to ensure that there is no more than 1mbar of pressure drop from the meter to the appliance, this is a mandatory requirement

Check the gas pipe for leaks. If an inert gas i.e. nitrogen is to be used for the gas test, precautions must be taken to ensure that the maximum pressure in the gas system is below 100mbar.

For the fitting of the gas pipe and valve only, to test for gas leaks, a pressure of 100 mbar is briefly permitted.

Purge the gas pipe carefully, before the appliance is used for the first time.

5 ELECTRICAL INSTALLATION INSTRUCTIONS

Connection to mains voltage.

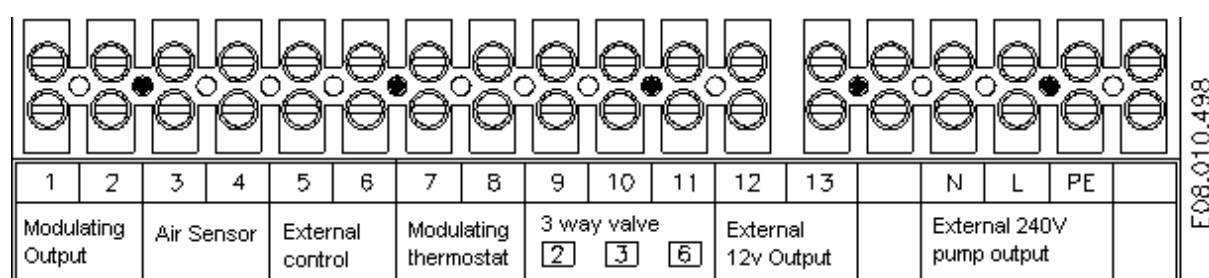
The appliance has an earthed mains plug. The appliance needs to be connected to an earthed 240v single phase supply. Minimum cross-section is 3 x 0.75 mm²; the electrical installation must of course conform to the current regulations (see page 1).

A terminal board is provided for the further connections..

Care must be taken to ensure that the isolator for this mains cable is accessible at all times, so that, for servicing for example, the appliance can be disconnected from the power supply.

5.1 Terminal board

The following parts can be connected to the terminal connection board provided, see also the diagram below:



1-2 **PWM pump cable** for the modulating signal for a modulating domestic or CH pump .

3-4. **External sensor for weather compensation.** If desired, the CH installation can be regulated on the basis of the external temperature: if the external temperature drops, the water temperature in the boiler is increased; the water temperature in the boiler is therefore not subject to external influences such as the “sun” in the room, or an open fire.

This regulation can be supplemented by a room thermostat.

If a room thermostat is not fitted, a wire loop needs to be fitted between terminals 5 and 6.

5-6. **Room thermostat/ Time clock/BMS control** can be connected here.
Maximum switch capacity is 2 VA.

7-8 **Modulating thermostat (open therm)**
Mikrofill has a series of modulating thermostats in its range, with which the boiler modulation can be controlled.

9-10-11 **External three-way valve - 24V only.** If an external three-way valve is connected for an indirect cylinder for instance, the three-way valve motor needs to be connected here; in which case gate 9 is the neutral terminal, and terminals 10 and 11 are intended for the 24 V AC Power open/Power closed.

These terminals can also be used for other 24V AC supply not exceeding 3VA



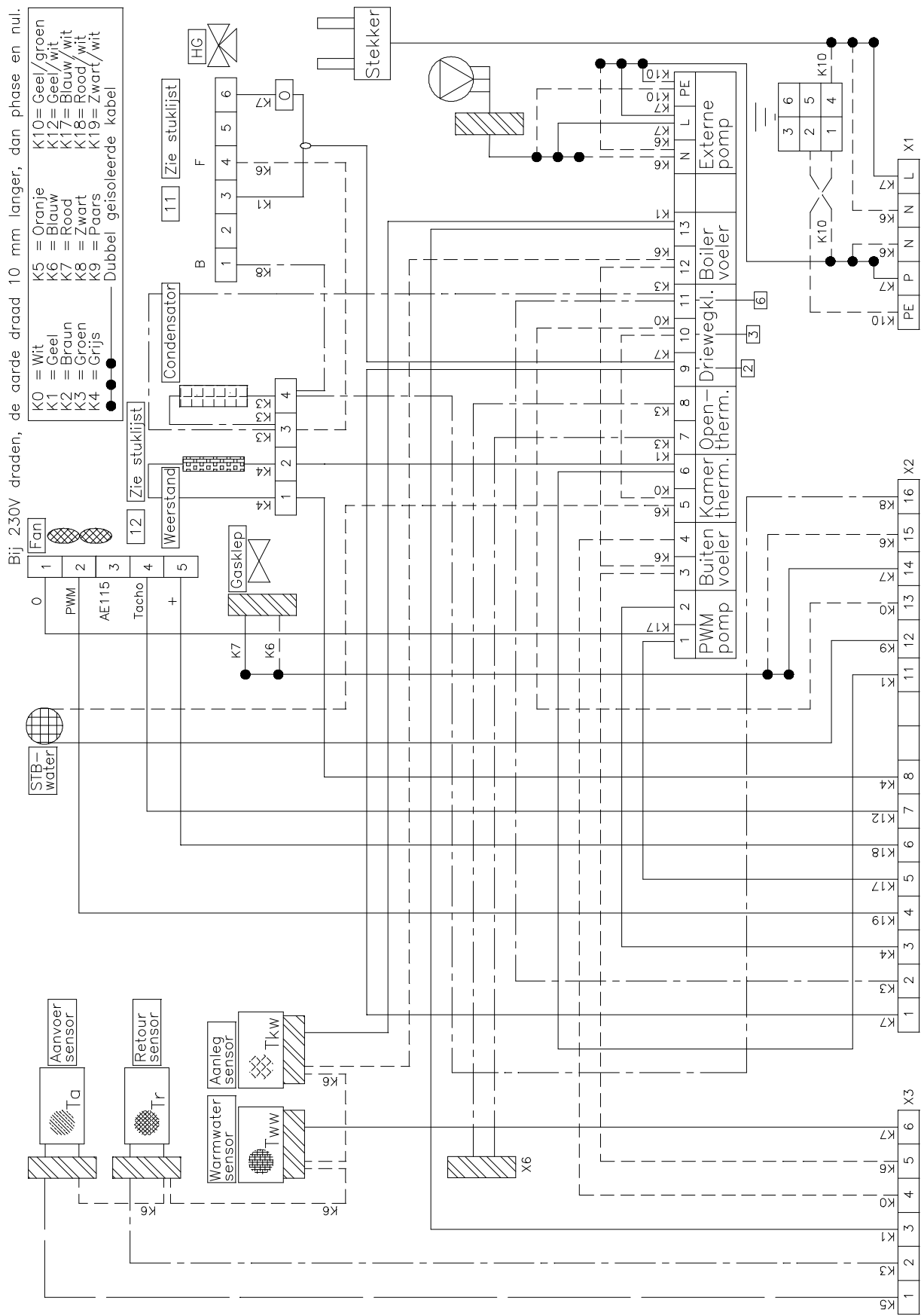
24 V AC For external regulation there is the option of having a 24 VAC power source; terminals 10 and 11 can be used for this, with the limitation that:

- a. remove the anticipation resistor (green) from the 4-gate terminal connection board that is mounted on terminals 1 and 2.
- b. maximum capacity must not exceed 3 VA.

12-13 If an **external cylinder** is connected, a sensor or a thermostat can be connected here. If a sensor is connected, the boiler temperature can be read on the boiler display.

N-L-PE The 230VAC for an **external pump** is connected here; in combination with the PWM signal this is connected to the terminals 1 and 2, or an internal modulating CH pump.

5.2 Wiring Diagram



6. Commissioning

6.1 Control panel

6.1.1. Display

Consists of two digits on the left hand side and one digit on the righthand side: **left hand side digits**: feed water temperature of the boiler; **right hand side digit**: status of the boiler:

- | | |
|---|---|
| 0 | Stand by |
| 1 | Lock out fault/Control stop* |
| 2 | Flame proving/or ionisation fault |
| 3 | Fan pre-purge |
| 4 | Ignition |
| 5 | CH demand or timed overrun on CH pump |
| 6 | Domestic hot water demand |
| 7 | Circulating hot water heat exchanger or overrun on hot water pump |

* With a longer period of “Control stop” may indicate shutdown on outside air temperature. (Only if outside air control is fitted)

6.1.2. Keypad Control

The keypad provides access to various options for setting and controlling the appliance; this always involves a combination of different buttons. The following combinations can be used:

1. Press **“Service”** and **“Reset”** simultaneously for 3 secs = Access to installation menu.

After these buttons have been pressed, the Status window will show **“0”**, while an **“0”** will also appear in the temperature window. By means of the **“+”** and **“-”** buttons in the **temperature display**, the code with the value **“8”** needs to be set. After this press the **service** button, to call up the various parameters.

If the appliance is functioning, a **“-”** sign will be shown first, until combustion ceases, after which the first parameter shows in the service window, and thereafter the various parameters can be called up and adjusted.

Exit this installation menu by pressing the **“Reset”** button until the red LED above it goes out, this stores the adjusted parameters automatically; if this is not required, the service menu is exited automatically after a 1 minute delay, the amended data being stored.

1. Press **“Service”** and **“+”** simultaneously for 3 secs. = Gas valve set position, (an **“h”** is shown in the display). By pressing the **“+”** or **“-”** key, all the required number of revolutions are set. The double display shows the number of revolutions in 100 revolutions (e.g. 35 means 3500 rpm).

Pressing **“+”** and **“-”** keys simultaneously cancels setting the number of revolutions, and the appliance functions automatically.

2. Press “Service” and ”-“ simultaneously for 3 secs. (=Faults). In this situation, an amended software programme can be loaded or adjusted using a computer and the correct software programme.
3. If the “TAP” button is pressed, the following data are displayed depending on the situation:
 - if water is not being drawn off: the heat maintaining temperature of the heating coil.
 - when water is being drawn off: the hot water temperature.

6.2 Sensors

The following temperature sensors are fitted in the boiler:

S1 = flow sensor (vertical pipe on the front of the exchanger)

S2 = return sensor (on horizontal pipe between three-way valve and exchanger).

S3 = priority/heat maintenance sensor (sensor, on the right hand side of the heating coil).

S4= external temperature sensor (if fitted).

S5 = hot water (domestic) sensor (on 15 mm pipe, on the left hand side of the heating coil).
(Combination boilers only)

The sensors used are of the NTC (negative temperature control) type, and have the following characteristics:

Sensor table

Temperature [°C]	Resistance Sensor 1, 2, 3, and 5 [Ohm]	Temperature [°C]	Resistance Sensor 4 [Ohm]
0	32550	-30	171800
5	25340	-25	129800
10	19870	-20	98930
15	15700	-15	76020
20	12490	-10	58880
25	10000	-5	45950
30	8059	0	36130
35	6535	5	28600
40	5330	10	22800
45	4372	15	18300
50	3605	20	14770
55	2989	25	12000
60	2490	30	9804
65	2084	35	8054

70	1753	40	6652
75	1481	45	5522
80	1256		
85	1070		
90	915		
95	786		

In addition the appliance has a high limit safety thermostat; this is mounted on the square distribution pipe, on the right hand side of the stainless steel exchanger.

6.3. Installer's programme

If the installer's code is keyed in (after "Service" and "Reset" have been pressed for 3 secs.), the following parameters can be set and adjusted (adjusted with the "+" and "-" keys), by pressing the "service" button each time:

Programme number	Name programme	Adjustable between	Factory setting
*0	Installer code	0 – 99	Installer code is 8
*1	Boiler type	0 = CH + coaxial coil 3 = CH + boiler with own coil and external three-way valve	0
*2	Pump action	0 = pump overrun 1 = pump continue running	0
*3	Maximum CH capacity	19% and 99%	80%
*4	Maximum capacity during drawing off	19% and 99%	99%
*5	Minimum supply temp. for combustion line	10 ... 25°C	20°C
*6	Minimum external temperature for combustion line	-30°C...10°C	-15°C
*7	Maximum external temperature for combustion line	15°C ...30°C	20°C
*8	Pump overrun for CH function	1...15 min	3 min
*9	Pump overrun for HW function	0...90(0) sec.	6(0) sec = 1min.
*A	OpenTherm Cascade	0 ...99 kW	45 kW
*C	Step modulation	0= step modulation ch is not active 1= step modulation ch is active; 5 minute steps 2= ditto, 10 min steps 3= ditto, 20 min steps	2
*d	Regulating Central Heating	0 = room thermostat with or without clock 1 = switch clock	0
*E	Maximum supply temperature CH function	18°C – 85°C	85°C

Exit this programme, after the parameters have been adjusted, by pressing the "Reset" key until the Faults indicator light goes out.

Explanation of the set up options for the installer:

Programme number 1: Boiler type:

-For the normal combi boiler, key in the digit "0" here.

-if a boiler, with its own heating coil and an external three-way valve is used, programme in "3".

With respect to the three-way valve, a Honeywell three-way valve, type VC 80-10 needs to be connected to the terminal strip, while the valve must be fitted in the circuit in such a way, that the gate marked “B” is connected to the boiler circuit, gate “A” therefore on the CH circuit, and on the “AB” gate on the CH boiler

Programme number 2: Pump action

Here it is possible to opt for the pump to over-run for the ch installation; this programming has no influence on the over-run of the pump after drawing off: this over-run time is established in parameter “9”.

For an over-run time for the CH installation, programme the digit “0”; the length of the over-run time is established under parameter “8”.

If continuous running is chosen (e.g. for underfloor heating), “1” needs to be programmed.

Programme number 3: Max. CH capacity (/revs of fan when CH functioning)

This allows the maximum CH capacity (40/30 °C) according to the type plate, to be reduced, according to the accompanying table:

CH functioning

Table 4, CH capacity

	30/36 ETHOS	revs	42/46 ETHOS	revs
	kW	rpm	kW	rpm
100%	30.0	6250	42.0	6250
95%	26.6	5938	37.1	5938
90%	23.7	5625	32.8	5625
85%	21	5313	29.0	5313
80%	18.7	5000	25.6	5000
75%	16.6	4688	22.6	4688
70%	14.7	4375	20.0	4375
65%	13.1	4063	17.6	4063
60%	11.6	3750	15.6	3750
55%	10.3	3438	13.8	3438
50%	9.2	3125	12.2	3125
45%	8.1	2813	10.8	2813
40%	7.2	2500	9.5	2500
35%	6.4	2187	8.4	2187
30%	5.7	1875	7.4	1875
25%	5.1	1562	6.6	1562
19%	4.6	1188	5.8	1188

Combination boiler only

Programme number 4: Max. capacity during draw off (revs of fan during HW function).
The revolutions of the fan during HW function are different from the revolutions during the CH function, as the maximum load during draw off is higher.

The table for the load during draw off is shown below:

Table 5, Hot water capacity

	36 ETHOS	revs	46 ETHOS	revs
	kW	rpm	kW	rpm
100%	36.0	7500	46.8	7500
95%	34.1	7110	45.4	7110
90%	32.3	6750	44.0	6750
85%	30.4	6350	42.2	6350
80%	26.6	6000	37.1	6000
75%	23.4	5550	32.4	5550
70%	20.4	5160	28.2	5160
65%	17.9	4800	24.5	4800
60%	14.7	4400	20.0	4400
55%	12.9	4000	17.3	4000
50%	11.2	3600	15.0	3600
45%	9.7	3200	12.9	3200
40%	8.1	2800	10.8	2800
35%	7.0	2400	9.2	2400
30%	6.0	2000	7.9	2000
25%	5.1	1675	6.6	1675
19%	4.6	1200	5.8	1200

Programme number E, 5, 6 and 7

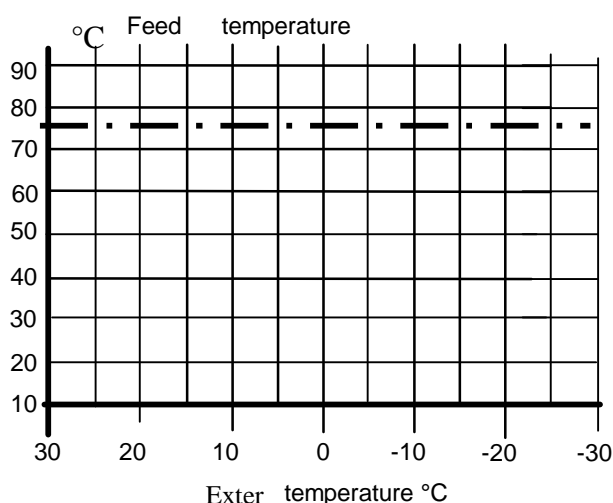
Setting combustion line

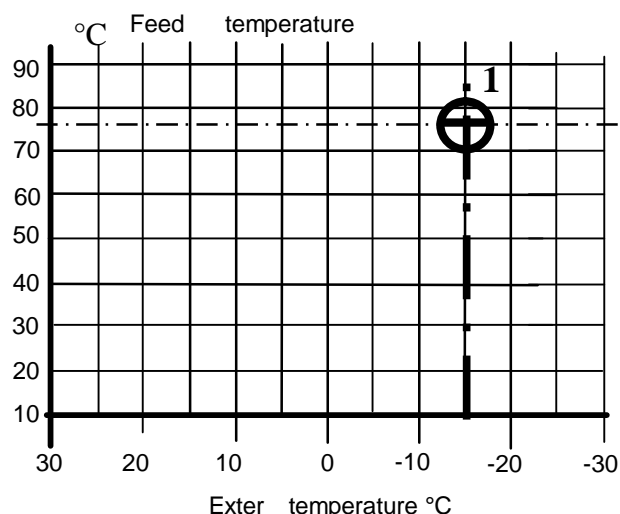
A combustion line is drawn between two points that are determined by a specific external temperature and the associated required feed temperature of the CH water.

Instructions for determining this combustion line are given in the steps below.

1st combustion line point at lowest external temperature.

STEP 1. First of all the maximum feed temperature (design temperature transmission calculation) in the winter must be determined and set; with the help of **Programme number “E”**, enter this temperature (temperature chosen can be between 18°C and 85°C). Choose e.g. 75°C. and fix it by pressing the “Service” key.





STEP 2. Now the associated external temperature, by which this max. supply temperature is required, needs to be programmed in.

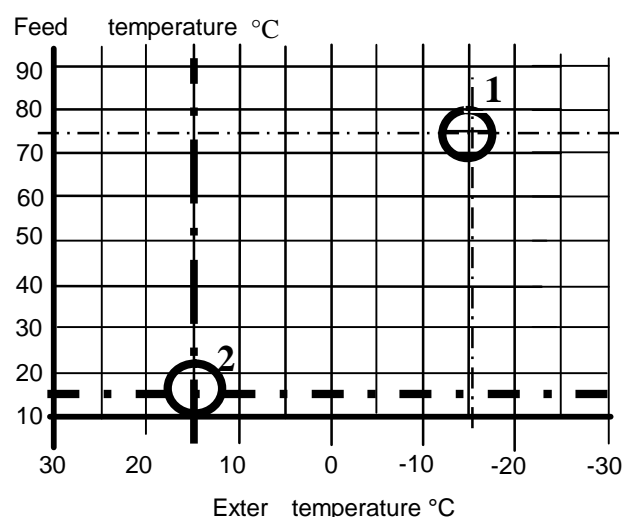
Press the “Service” key until it shows

Programme number 6.

Enter the external temperature here (e.g. – 15°C, this is the temperature that is taken for the transmission calculation).

In this way the first point of the combustion line is established.

2nd combustion line point with a higher external temperature.



STEP 3. Then the external temperature at which no further heating is required needs to be set e.g. 15 °C external temperature.

Programme number 7 needs to be programmed with this value.

STEP 4. As the last step, the supply temperature needs to be set with the chosen external temperature: this feed temperature then needs to be the same as the external temperature otherwise the appliance will not switch off.

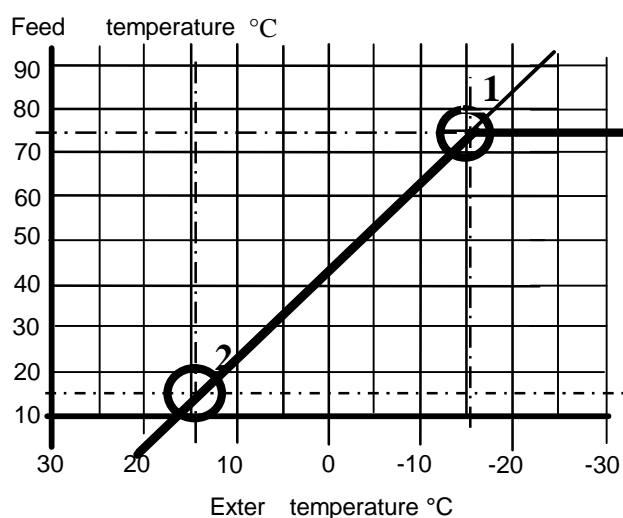
For this **Programme number 5** needs to be programmed, e.g. 15°C.

For buildings that are very solidly built (e.g. castle walls), it will be necessary to allow the appliance to continue burning for longer; in such cases 30°C can, for example, be chosen as the external temperature

This last programming step determines the second point of the combustion line, and a line is drawn automatically between these two points.

As the accompanying drawing shows, at point “1”, the combustion line will set an increasingly high feed temperature even at lower external temperatures, but the setting in Programme “E” prevents this: the temperature set is not exceeded.

At point “2”, the CH boiler will no longer be burning



Programme number 8: Pump over-run time for CH function

This sets the over-run time of the pump after the demand for central heating ceases.
3 minutes is programmed by default.

Programme number 9: Pump over-run time for HW function

This sets the over-run time for the HW pump after the heating of the built in hot water provision.

The setting can be between 0 and 900 seconds (15 minutes); the default is 60 seconds (1 minute): in the display the time is shown by omitting one 0.

Programme A: Open Therm Cascade

If more than one boiler is used for the central heating, the cascade manager function of an Open Therm Control can be used to regulate these boilers (see the data from the suppliers of the Open Therm controls).

In this case the maximum central heating load of each appliance connected needs to be programmed in.

Programme C: Step modulation

This parameter enables the supply temperature to be increased in steps early in the morning as the house is being warmed up, so that during this heating the appliance continues to condense and thus is highly efficient. There are 6 steps to this programme, with a programmable duration:

C 0 = no steps, thus on/off on the basis of the room thermostat

C 1 = 6 steps each lasting 5 minutes

C 2 = 6 steps each lasting 10 minutes (factory setting)

C 3 = 6 steps each lasting 20 minutes

At each step the capacity is increased by 20%, beginning with the minimum capacity.

The boiler therefore starts with the minimum capacity, and this capacity increases every “5, 10 or 20” minutes, by 20%, until the maximum capacity is reached, or this programme finishes, because the house has come up to temperature.

a. With an on/off room thermostat:

When there is no demand for heating, this programme counts back with the same time intervals until there is a new demand for heating: the appliance then starts up with the capacity appropriate to the time.

The efficiency of the boiler during the warming up period will always be greater than 100% and during the day will always have optimum output and avoid undesirable fluctuations in the temperature of the house.

b. With an “Open Therm” thermostat

When the room temperature reaches the set value, the step programme is abandoned, and the “Open Therm” thermostat takes over the regulation of the boiler, and the capacity of the boiler is adapted to the need for heat: the boiler will modulate optimally and the room temperature will be kept very constant.

Programme d: CH Regulation

The controller is extremely flexible and will accept many types of external control. Almost all controls imaginable for the CH installation can be connected or activated and will be automatically detected by the automatic burner, there is however a difference between control on the basis of a simple time switch and a normal room thermostat: if a time switch is used it needs to be programmed in, under this Programme d.

An overview of the options for connection and the operation of it for the central heating installation follows.

1. Simple day/night time switch with a daily or a weekly programme, in association with the built-in external temperature control and the external temperature sensor.

- *No room thermostat is used with this.
- *Fitting each radiator with a thermostatic control valve is recommended.
- *Connect the time clock to terminals 5 and 6 of the terminal board in the boiler .
- *Connect the external sensor to terminals 3 and 4 of the terminal board in the boiler.
- *If the time clock contact is closed (thus heat demand), the boiler supply temperature is going to assume a value according to the combustion line set (see page 21 for setting the combustion line,).
- * If the time clock contact is open (night reduction), an automatic night reduction of 2.5°C in the room temperature is achieved through a value programmed into the automatic burner; this can be adjusted only by means of a special programme (call Mikrofill Infodesk).
- *With the next heat demand (e.g. the early morning warming up) the combustion line will be increased by approximately 5°C for one hour (booster function), to bring the house up to temperature quickly; **the step programme does not need to be activated.**
- *Setting parameters: (**bold type**: need to be adjusted, the others remain unchanged (factory settings): 1-0; 2-0; 3-80; 4-99; 5,6,7 and E are the combustion line settings; 8-3; 9-0; A-45; **C-0; d-1.**

2. An on/off room thermostat (or clock thermostat), in conjunction with the built-in external temperature control in the boiler and the external temperature sensor.

- *Connect room thermostat to terminals 5 and 6 of the terminal board in the boiler .
- *Connect the external sensor to terminals 3 and 4 of the boiler terminal connection board.
- *With this type of control, the room thermostat acts as a “safety net”: if it becomes too warm in the room in which the thermostat is situated, the thermostat opens and the boiler is switched off.: the pump will run for 3 minute every 13 minutes, until there is a further heat demand from the room thermostat; if the room thermostat cuts in too often the combustion line needs to be lowered.
- *The supply temperature is determined by the combustion line set.
- *the night time reduction can be set by means of the room thermostat, or via the clock of a clock thermostat.
- *With the next demand for heat (e.g. the early morning warming up) the combustion line will be raised by approximately 5°C for one hour (Booster function), to bring the house up to temperature quickly; **the step programme does not need to be activated.**
- *Setting parameters: (**bold type**, need to be adjusted, the others can remain unchanged (factory settings)): 1-0; 2-0; 3-80; 4-99; 5,6,7 and E are the combustion line settings; 8-3; 9-0; A-45; **C-0; d-0.**

*If a separate time clock combined with an on/off room thermostat and the external temperature control is used instead of a clock thermostat, it needs to be programmed in accordance with **1**.

3. An Open Therm clock thermostat in conjunction with the built-in external temperature control in the boiler and the external temperature sensor.

*Connect the Open Therm thermostat to terminals 7 and 8 of the terminal board in the boiler .

*Connect the external sensor to terminals 3 and 4 of the terminal board in the boiler.

*Except where adjustment is possible, no parameters need to be adjusted for the factory-set pre-programmed combustion line.

*Setting parameters: (**bold type**, need to be adjusted, the others can remain unchanged (factory settings): 1-0; 2-0; 3-80; 4-99; 5,6,7 and E are the combustion line settings; 8-3; 9-0; A-45; C-2; d-0.

4. Connect a room or clock thermostat to the boiler

*Connect the room thermostat to terminals 5 and 6 of the terminal board in the boiler .

*Except for where adjustment is possible, no parameters need to be adjusted for the factory-set pre-programmed values.

*Setting parameters: (**bold type**, need to be adjusted, the others can remain unchanged (factory settings): 1-0; 2-0; 3-80; 4-99; 8-3; 9-0; A-45; C-2; d-0; E-85

5. Connect an Open Therm (clock)thermostat to the boiler

*Connect the Open Therm thermostat to terminals 7 and 8 of the terminal board in the boiler .

*Except where adjustment is possible, no parameters need to be adjusted for the factory-set pre-programmed combustion line.

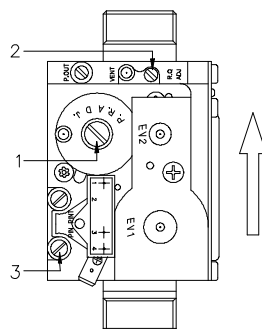
*Setting parameters: (**bold type**, need to be adjusted, the others can remain unchanged (factory settings): 1-0; 2-0; 3-80; 4-99; 8-3; 9-0; A-45; C-2; d-0; E-85.

Programme E: Maximum supply temp. central heating installation.

This sets the maximum central heating temperature of the boiler.

6.4 Filling and venting the boiler and installation

Use the fill and drain tap in the central heating installation to fill the boiler and the



installation.

The correct fill pressure is 1.5 bar.

To prevent corrosion of the central heating installation, pay attention to the following points:

- a. The filling water: **do not add anything** to the CH water, while the pH value needs to be above 5 (if this is not the case you need to contact the supplier).
- b. Flush system thoroughly
- c. If plastic pipes are used, they need to be proof against oxygen diffusion in accordance with DIN 4726/4729; if this is not the case, a separation needs to be introduced between the boiler circuit and the circuit with the plastic piping.
- d. Check for leaks in the circuit

Before starting the appliance for the first time the heat exchanger needs to be vented, once the installation and the boiler have been filled. Open the vent valve, found on the upper left hand side, a whole turn. As soon as water comes out of the vent cock, close the vent valve with the key.

The boiler is provided with an automatic air vent on the top of the CH pump, which needs to be open when the appliance is running; check that the cap is open at least one turn.

Check the fill pressure shortly after the appliance starts up, and if necessary add more water to maintain the required pressure. The electronic control of the wall-mounted boiler has a start-up programme, specially for venting the appliance. This programme is activated when the mains power is switched on for the first time and after the “Reset” button is pressed.

This start-up programme runs for 2 minutes: for the 1st minute display code “7” is shown for the 1st minute and code “5” for the 2nd.

Hot water circuit

The connections for hot and cold water are on the underside of the appliance.

Connect the pipes in accordance with the current regulations; fit an “inlet combination” in the cold water supply pipe; which can be combined with the overflow pipe, with the condensation waste pipe from the boiler.

The built-in limit valve needs to be set, with the appliance working; measure the quantity of water at the furthest removed drain point and set the limiter according to Table 3, page 11.

Closing down

1. Isolate and disconnect the electrical system and turn off the gas tap.

2. If the appliance is switched off when there is a risk of frost, the CH boiler and installation need to be drained; to do this open the fill and drain taps of the CH installation and the boiler drain tap on the right hand underside of the appliance.

6.5 Initial Operation

6.5.1 General

The pre-pressure in the gas pipe can be measured with the test nipple (3) on the gas regulator .

The minimum pre-pressure which will allow the appliance to function correctly with the correct load is 10 mbar.

6.5.2. Starting up the first time

When you have tested the installation and everything is in order, you can connect the electrical system.

When the appliance is connected to the mains supply, the double display will show the supply temperature and the single display the status of the appliance.

An automatic venting programme for the boiler lasting approximately 2 minutes follows the mains connection.

The ETHOS appliance has a built-in provision for hot water.

Set the room thermostat at a high value so that the burner needs to ignite.

In an appliance with provision for hot water, the hot water will be heated up first.

There is a four-fold electronic start, followed by a faults warning on the status display. Next press the RESET button for a return to the attempts to start.

To set the gas pressure, use screw [3].

6.6 Adjusting and setting load

To check the gas regulator or when attaching a new one, there are three methods for setting the correct load:

- A. By measuring the percentage of CO₂
- B. Check the gas consumption via the gas meter method.
- C. By flame colour

Both the minimum and the maximum load need to be set using one of the three methods: the maximum load needs to be set first, followed by the minimum load.

6.6.1 Setting the maximum load

Approximately a minute after ignition, press the keys marked “Service” and “+” simultaneously; the double display shows the revolutions in hundreds, while the single display shows “h” (CH). The number of revolutions of the fan can be increased or reduced by pressing the “+” key or the “-“ key.

To obtain the maximum load press the “+“ key until the maximum number of revolutions is reached.

If the measurement lasts for more than 10 minutes the appliance will return to automatic operation; press the “Service” and “+” again to continue the measurement.

To return to the normal menu without having to wait for 10 minutes, press the “-“ and “+” keys simultaneously.

Table 6, Revolutions

Appliance	ETHOS 36	ETHOS 46
Minimum revs. (rpm) CH or HW	1200	1200
Maximum revs (rpm)	7500	7500

Turn the setting screw for the maximum load if necessary [2], for the following method of setting:

- A. By measuring the percentage of CO₂; this needs to be in accordance with the table below.
- B. Check via the gas meter method.
- C. By flame colour: until a blue colour with red points is achieved on the burner surface.

Table 7, Gas settings

	Type of gas	
	Nat. gas G 25	LPG
Injector:	none	none
Mod. (bw)(MJ/m ³)	41.52	76.64
Cal.value ow (MJ/m ³)	29.25	88.00
CO ₂ max.load (%)	8.8(+/-0.3)*	10.5(+/-0.3)*
CO ₂ min.load (%)	8.6(+/-0.3)*	10.0(+/-0.3)*
* measured without cover		

B. Gas meter method

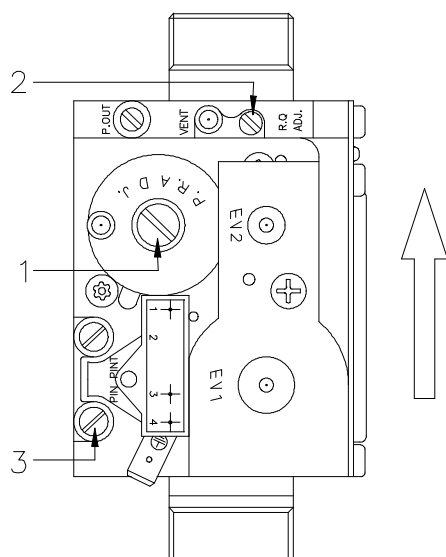
Measured with natural gas or propane according to the table below:

Table 8, Setting the minimum [maximum?]

Note: For adjustment, the methods under B and C approach the correct adjustment: measuring

CO₂ % is the preferred method.

To measure emissions, the measuring point in the heat exchanger can be used by unscrewing the plastic cap.



WARNING !! When measuring do not put the probe more than 2 cm into the heat exchanger to avoid deviations in the result.

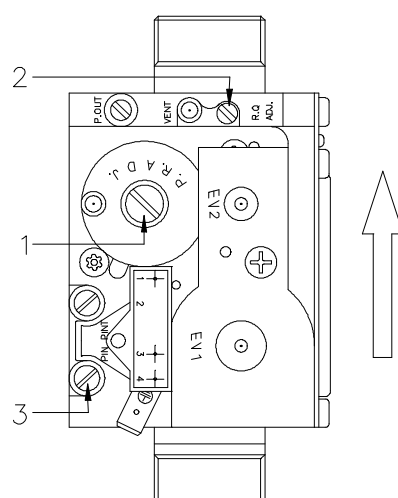
6.6.2 Setting the minimum load

After setting the maximum load press the “-” key until the minimum revolutions are reached (11 to 12 on the display).

To set or adjust this minimum load, turn screw [1] for the minimum setting.

Appliance	30/36	42/46
Natural gas	50 litres in 42 sec.	50 litres in 34 sec.
LPG	15 litres in 38 sec.	15 litres in 30 sec.

Appliance	30/36	42/46
	ETHOS	ETHOS
Natural gas	5 litres in 32 sec.	5 litres in 20 sec.
LPG	2 litres in 39 sec.	2 litres in 31 sec.



The CO₂ % is reduced if the screw is turned anti-clockwise and increased when it is turned clockwise.

A. Setting on the basis of the flame colour.

The flame colour needs to be red/orange.

B. Gas meter method.

Minimum load according to the table below:

Table 9, Setting the maximum [minimum?]

values measured with a boiler water temperature of approximately 60°C.

Press the “-“ and “+” keys simultaneously, which returns the appliance to automatic function; the set-up programme is interrupted in any case after 10 minutes and the appliance returns to automatic function.

6.7 Conversion to another type of gas

If the appliance is set up for LPG the following steps need to be taken.

- a. The white gas-air mixing chamber is situated on the side of the fan. This mixing chamber has one or two air inlet ports, at the front and in the case of a second opening, also at the back, depending on the type of boiler. These ports need to be closed for conversion to butane/propane.

Mikrofill can supply the correct stoppers on request:

ETHOS 32/36 one stop 15 mm

ETHOS 42/46 one stop 15 mm

- b. Turn the screw [2] 4 whole turns (clockwise).

Set the appliance running; if the burner has not ignited after 4 attempts, turn the screw [2] one turn back (anti-clockwise).

- c. If the burner has ignited: press the keys marked “Service” and “+” simultaneously for approximately a minute after the ignition
- d. Display shows the revolutions in hundreds, while the single display shows “h” (CH). By then pressing the “+” key, or the “-“ key, the number of revolutions of the fan can be increased or decreased.
- e. For the maximum load press the “+“ key, until the maximum number of revolutions is shown (75 in the display).

For setting the maximum and minimum burner load, follow the information under paragraphs **Error! Reference source not found.** and **Error! Reference source not found.**, with associated tables.

6.8 Hot water temperature

This is set by the manufacturer at 60°C to avoid danger from “Legionella” bacteria at lower temperatures.

This value **cannot** be adjusted.

6.9 Closing down

It is advisable to keep the appliance switched on winter and summer. This prevents the appliance freezing and moving parts seizing up due to corrosion.

Switch off the appliance by reducing the setting of the room thermostat: this will ensure minimum power consumption, as the CH pump and fan stop running after a short time.

If the appliance does need to be closed down, the following precautions need to be taken:

- a. Close the gas valve
- b. Disconnect mains electric
- c. If there is a risk of frost drain the appliance and the installation.

To drain down the boiler, isolate the boiler from the heating system or drain the heating system. Attach a suitably sized hose to the drain valve on the boiler and open drain valve.

For the domestic water supply part, the inlet combination stopcock needs to be closed and a hot water tap opened.

7. Faults

In the unlikely event that the appliance develops a fault, it can be set to run again simply by pressing the “Reset” button.

The following faults can occur, in which the digit below flashes in the single Status display and a code appears in the two digit display.

You will find the solution to the faults in Table 12 on page 34 and Table 13 on page 36

Table 10, Faults

Flashing faults text in the single display	Two digit display code:	Description of the fault:	Cause of the fault (see page 34)
no indication	none	Fault with electrical supply	14;50
no indication	none	Fan runs continually	49
0		Maximum thermostat open	4;5;21;23;24;29;30;42;46
0		Glass fuse F5 defective	15
0	F1	Short circuit feed sensor (S1)	3;41;42;43
0	F2	Short circuit return sensor (S2)	3;41;42;43
0	F5	Short circuit HWsensor (S5)	3;41;42;43
0	1	Lack of feed sensor (S1)	41;42;43
0	2	Lack of return sensor (S2)	41;42;43
0	5	Lack of HW sensor (S5)	41;42;43
1	E1	Temp. feed sensor too high (S1)	4;5;23;29;46
1	E2	Temp. feed sensor too high (S2)	4;5;23;29;46
1	E3	Temp. priority sensor too high (S3)	24;45;46;51
1	E5	Temp. HW sensor too high (S5)	24;45;46;51
2	5	Feed and return sensor exchanged	
2	21	Feed temp. lower than return temperature, during running.	4;21;23;24;29;47
2	E	Feed and return temp. unequal during stand by	23;43
3		Supply temperature rises too quickly	4;5;21;24;28;29;46;51
4		No flame after 4 ignition attempts	10;11;16;18;22;25;35;48
5		Flame decreases while running	11;12;16;22;26;44
6		Flame signal during stand by	18;35;61
7		Appliance is programmed	62
8,9,A		Fan revs incorrect	7;8;9;13;19;39;40;41
B		One or more parameters are incorrect	63
C		Gas valve or gas valve circuit is not correct	17;20;30;34;36;37
D		Check on gas valve reg. shows fault	17;20;30;34;37
E		Check on the mains voltage	64
F		Software fault; EMC external radiation	34
H		Reset button hanging or is defective; if the “H” does not flash: memory defective.	65

Fuse F 1: for ignition 63 mA;

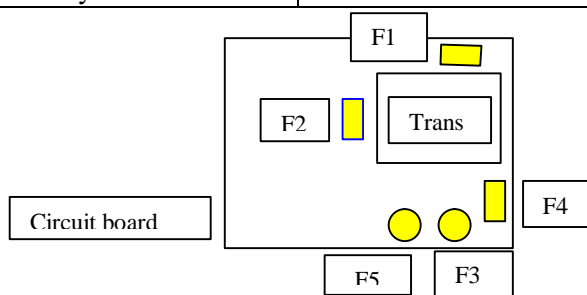
Fuse F 2: for regulation 630 mA;

Fuse F 3: 35 VAC 3.15 A; for fan

Fuse F4: 230 VAC 3.15 A; for mains voltage

Fuse F 5: 24 VAC 1 A, for three-way valve

All fuses are of type: Anti-surge



In addition there are also a number of faults that **cannot** be shown on the display.
A number of these faults or symptoms are shown below:

Table 11, Other faults

	Symptom	Cause of fault (see p34)
a	House does not reach temperature, appliance firing	45;53;54
b	Ignition is loud	35
c	Boiler burns continuously but CH water does not warm up	45
d	Room thermostat demands heat, but boiler does not ignite	1;42;52
e	Boiler burning continuously, house too warm	2
f	Boiler very noisy when CH working	29;46
g	Radiators not hot enough at the top	55
h	Water drawn off but water from the hot tap remains cold	24;56
i	Hot water much too hot	51;57
j	Water is drawn off, but the water from the hot tap does not reach 60°C	51;58
k	Boiler very noisy during HW operation	23;59
l	Fault after replacement of automatic burner	60

7.1 Causes of faults

The following causes can account for the faults on pages 32/33.

Table 12, Causes of faults

1.	Room thermostat is incorrectly connected.
2.	Room thermostat does not switch off, short circuit in the cable.
3.	Sensor makes a short circuit in the cable or internally.
4.	Pump does not run; stuck
5.	Water pressure in the CH installation is too low.
6.	Water pressure in the CH installation is too high.
7.	Fan is not connected (forgotten to connect plug).
8.	Fan is dirty.
9.	Fan is defective.
10.	Valve is not open.
11.	Gas pressure is too low.
12.	Incorrect pipe size
13.	Fuse F3 defective
14.	Fuse F4 defective.
15.	Fuse F5 defective.
16.	Gas valve setting at the lowest revs. is not correct.
17.	Gas valve is not connected or incorrectly connected electronically.
18.	Ignition cable not correctly connected.
19.	Transformer defective.
20.	Connection plug to gas valve incorrectly connected, or moisture in the surround
21.	Pump plug incorrectly connected.
22.	Siphon blocked.
23.	Hand bleeder opens and closes after bleeding.
24.	Three-way valve is dirty.
25.	Too much resistance in the supply system or supply system dirty.
26.	Exhaust system leaks to supply system; recirculation flue gas, only with conc. connection.
27.	Supply system lets in water.
28.	Through flow setting tap is dirty.
29.	Heat exchanger is blocked (insufficient circulation)
30.	Maximum thermostat defective (insufficient circulation)
31.	Maximum load too high.
34.	Automatic burner defective.
35.	Ignition electrode defective (porcelain cracked), gap to burner is incorrect
36.	Moisture on the cables of the gas valve.
37.	Moisture on printed circuit board of the automatic burner.
38.	Moisture in the pump wiring.
39.	Moisture on fan and/or connection.
40.	Fan plug connected incorrectly.
41.	Plug incorrectly connected.
42.	Connection cable damaged.
43.	Sensor defective.
44.	Flue gas circulation behind from the heat exchanger.
45.	Hot water drain tap leaking

46	Position of the revolution switch on the pump is set too low
47	Sensors interchanged (return sensor S2 and hot water sensor S5)
48	Fuse F1
49	Fuse F2
50	Mains voltage 230 VAC
51	Parameter(s) in the installers programme entered incorrectly
52	Open Therm room thermostat, or normal thermostat on an incorrect terminal board gate
53	Step programme in the installers menu not correctly programmed; or steps too long
54	Clock programme of the clock thermostat needs to start earlier in the morning
55	Supply and return pipe interchanged on the appliance
56	Cable or plug to three-way valve incorrectly connected
57	Preference sensor (S3) is incorrectly placed or is defective.
58	The through flow setting tap in the cold water pipe needs to be adjusted.
59	Coil exchange for hot water needs to be descaled
60	Cable loom plugs on the printed circuit board incorrectly fitted
61	Gas regulator defective
62	After programming with a computer, confirmation of new settings
63	Incorrect parameters, or a value outside the scope of the programme, have been programmed
64	The automatic burner carries out a frequent check on the supply voltage
65	Mechanical defect with the Reset button with a flashing "H"; with a steady H, there is a defect in the automatic burner.

7.2 Table of solutions

Numbers correspond to Table 12

Table 13, Table of solutions

1.	Check cable or replace cable, check if it is connected to the correct terminal board.
2.	Replace room thermostat or replace cable: is the correct thermostat fitted.
3.	Replace sensor or trace fault in cable.
4.	Try to free the pump shaft or replace the the driving part of the pump.
5.	Top up water and trace the leak, also check the expansion vessel for internal leaks.
6.	Too much topped up or check pressure of expansion vessel or replace expansion vessel.
7.	Insert plug: plug part with cables is on the side of the fan.
8.	Clean the blades of the fan.
9.	Replace the fan.
10.	Open the gas tap.
11.	Check the pipe and gas meter, possibly calculate resistance.
12.	Replace gas pipe.
13.	Replace fuses; F3 fan check: moisture, short circuit, plug, wiring
14.	Replace fuses; F4 check all 230 V connections: pump, circuit board connection
15.	Replace fuses; F5 check the connection, the plug and the motor for the three-way valve
16.	See paragraph 6.4
17.	Check the cabling using the wiring diagram, check the connection to the gas valve, check for moisture.
18.	Check cable for short circuit, overheating close by or pinched between steel plate; check the spark plug cap for cracks, replace the cap.
19.	Replace the automatic burner.
20.	Moisture inclusion, check on the cable sockets which need to be plugged in correctly to the electric plug, check the position of the cable sockets, possibly straighten, before the plug is put in.
21.	Check whether the plug(s) fit(s) correctly in each other, with the correct press-on force.
22.	Open the flush pipe (left side of the appliance), by unscrewing the cap: hold a jar under it, to catch the water that runs out. Poke out this pipe with a thin rod, to both upper left and upper right. If necessary remove the burner unit from the appliance, and pour water into the heat exchanger to rinse out the siphon.
23.	Venting, not simply the boiler but the whole installation – with this complete venting, the 230 V plug of the appliance can be removed from the socket, as the CH does not need to function during bleeding.
24.	Inspect the shut-off valve of the three-way valve, by removing the pump motor by unscrewing the four fixing screws; the valve can be inspected on the inside of the housing. The drive motor can be removed, by removing the fixing screw on the front of the housing (below right), and then pressing in the “snap” lip, situated on the side of the housing, just above the motor, and at the same time pushing the motor downwards.
25.	Check the feed-discharge pipe for blockages.
26.	Check the feed-discharge system.
27.	See 26.
28.	Take off the cold water connection from the appliance and remove and clean the through flow setting cock.

29.	<p>It is advisable to remove the automatic burner from the appliance first, to avoid water damage to the printed circuit board.</p> <p>After the appliance has been drained, the coupling of the T-piece in the supply pipe, and the flat coupling of the return should be loosened near the pump.</p> <p>Detach the earth and the spark plug cables, and the wires of the maximum thermostat (above right).</p> <p>After this detach the three tension bars, push the heat exchanger partially forward, and detach the electrical plug on the fan; then remove the exchanger from the appliance.</p>
30.	Replace the maximum thermostat by unscrewing it from the brass nut: the system does not need to be drained (do not remove the brass nut).
31.	Follow the setting up procedure in paragraph 6.4.1.
34.	<p>Remove the automatic burner with housing from the appliance by:</p> <ol style="list-style-type: none"> Removing the lid Remove the wiring on the printed circuit board –1 x 2 pin connector (back of printed circuit, with green wires), 1 x 8 pin connector (front left), 2 x 16 pin connector, and the 230V plug (righthand side). <p>Remove two screws on the underside securing the housing, then the housing including the automatic burner can be removed from the appliance.</p> <p>Next remove the small display cable from the printed circuit board, push the automatic burner out of the housing and replace it.</p>
35.	Replace or bend. warning: bend close to the burner plate, otherwise it could break.
36.	Dry off, possibly blow dry with warm air (hairdryer) and check that it functions correctly, Replace if necessary.
37.	See 36.
38.	See 36. Remove the connection and dry it; possibly by blowing or blow dry with a hairdryer.
39.	See 36. Remove the connection and dry it; possibly by blowing or blow dry with a hairdryer.
40.	Plug wire connection needs to point to the exterior of the fan and to drop with one side in the slot of the printed circuit board.
41.	Check the plugs and push them into each other correctly.
42.	Check cables for possible damage or kinking and replace if necessary.
43.	Check pipe connections, replace sensor.
44.	Check the connection of the heat exchanger on the flue gas box, if necessary re-fit, fit new lip ring.
45.	Check all draw-off points, and possibly HW pipes for leaks.
46.	Set the switch for the pump to position 3.
47.	There is a sticker on the pipe indicating the colour of the sensor cabling.
48.	Possibly replace the fuse (must be a reason for the defect); there is no spare fuse, see diagram on p.22.[?]
49.	Possibly replace the fuse (must be a reason for the defect); there is no spare fuse, see diagram on p.22. [?]
50.	Check the mains cable, the wall socket box for voltage; main fuse.
51.	Check the programmed parameters on p.18
52.	Check the type of room thermostat, and the sticker with the indication on the terminal connection board on the appliance.

53	Adjust the step programme, see pp. 18 and 21.
54	Introduce an adjustment in the times for “rising”, in the clock thermostat.
55	Supply (water leaving) is on the left hand side of the appliance return on the right.
56	Push the 4-core cable with miniplug into the three-way valve motor; check the three cables (2 x red and 1 x yellow) in the terminal connection board gate 9, on the cover, remove and re-fit.
57	Check the correct fitting of this in-feed sensor in the immersion sleeve.
58	Set with an Allen key of the correct size (8 mm).
59	The appliance needs to be drained on both the CH side and the HW side. The drain spiral can be taken out of the appliance if the two T pieces on each side of the spiral are removed with the aid of the flat couplings. Remove the fixing bracket on the underside of the spiral. The space between the inner and outer tubes is rinsed with water from the domestic system and may be furred up or dirty; this part needs to be washed through.
60	It is possible that one pin has been shifted too far in the 18-pin printed circuit board connector so that the wiring does not connect with the correct pins: check both the left and right hand sides of the printed circuit board to ascertain whether or not the connector(s) is/are correctly fitted.
61	There are usually two reasons for a defective gas regulator: the electric coils are defective or there is an internal fault in the gas valve; in either case it is advisable to replace the whole gas tap.
62	If the boiler control can be adjusted using the “service software” and the adjusted parameters are programmed, this is the confirmation that the boiler control has accepted the new parameters.
63	The correct software (please check this) must be used for programming, at the same time the threshold values must not be exceeded; try to programme again.
64	The supply voltage needs to be checked with a universal meter; if the supply voltage is correct (it needs to be between 190 and 250 Volt) the automatic burner needs to be replaced.
65	In order to repair the Reset button, the display can be removed from the plastic spacers and can once again be checked for correct functioning: if negative, the display needs to be replaced; if the display functions outside the appliance, you need to check whether the button has sufficient space under the plastic cover (is it jammed?); loosen it. If the “H” does not flash the automatic burner needs to be replaced.

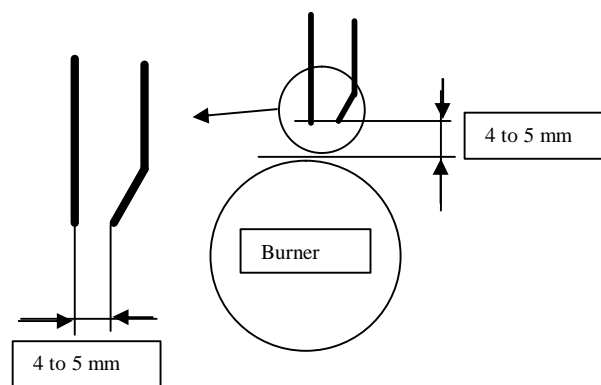
8 MAINTENANCE

General maintenance / inspection needs at least every 12 months or sooner if the appliance is not working correctly or the boiler control generates the same fault codes a number of times.

Inspection:

The following operations need to be carried out for inspection.

- a. Ask the user about possible problems with the CH appliance and/or any other problems.
- b. Check the installation (water) pressure.
- c. Remove the cover of the appliance and inspect all pipes and connections for traces of water and/or water leaks.
- d. Inspect the upper side of the cover and upper side of the appliance for signs of water or leaks from the air inlet pipe or the venter.
- e. Open the siphon, and remove any dirt.
- f. If a laptop is available, connect it and check the service page about the reports of faults, starts and failed/successful attempts at starting.
- g. Set the appliance to maximum combustion and measure the load and CO₂ % when operating.
- h. Set the appliance to minimum combustion and measure the load and CO₂ % when operating.
- i. Note the noise of the CH pump and the fan.
- j. For an ETHOS boiler, measure the quantity of hot water and the hot water temperature with the hot water tap fully opened.
- k. While the hot water is warming up, check that the supply to the CH installation does not become warm.
- l. Dismantle the burner unit by removing the 6 M6 nuts, disconnecting the ignition cable and pulling the burner unit forward.
If the burner is pulled halfway along the furnace, the plug needs to be removed from the fan cable.
Check the inside of the heat exchanger.
- m. Dismantle the plastic air inlet box on the inlet side of the fan, inspect the fan blades.
- n. Check the distance between the electrode and burner; this gap needs to be 4 to 5 mm.



Maintenance:

Depending on the result of the inspection, the maintenance should be preventative as far as possible.

The reason for this is:

re a. The comments and remarks of the client need to be taken seriously and the causes need to be found for any faults and problems.

re b. Pressure of the installation needs to be brought up to between 1 and 2 bar: any leaks in the installation need to be traced; possibly rectified by installer or service department.

re c. Any leaks need to be rectified.

re d. If water is leaking from the air inlet pipe the cause must be traced; it may be in the roof or in a concentric pipe, through leakage from the flue gas exhaust pipe.

re e. If the condensation water from the siphon is very dirty this needs to be rinsed out; there are a number of options for this :

1. If the burner has already been removed, fill the water pipe in the heat exchanger, which will reach the siphon automatically.
2. Push the supply pipe up (if possible) so that water can be added to the supply of the appliance.

re f. Select conclusion from the service screen and note the parts that are the cause of these faults using the service programme and a laptop.

re g. See h.

re h. If necessary adjust the gas setting to minimum load on the gas valve.

re i. If the CH pump is noisy, and especially if it is more than 5 years old, replacement of the pump motor is recommended as a precaution.

re j. With a hot water quantity less than the value in Table 3 (page 11), the water flow regulator needs to be checked for dirt. If this is clean, and the hot water quantity shows a value less than Table 3 (page 11), the heat exchanger for the hot water needs to be de-scaled or replaced, as it is 99% likely that limescale deposited in the domestic exchanger is the cause.

re k. If the supply water increases in temperature during draw off, it means that the three-way valve is dirty on the inside and this needs to be cleaned or replaced.

re l. The burner itself must never be cleaned. If the heat exchanger is dirty on the inside and/or there are deposits on the inside from the stainless steel pipe, this needs to be removed with citric acid or a stiff brush (do not use a **wire brush!**).

Then remove the dust with a vacuum cleaner.

re m. If the blades of the fan have deposits of dirt, each blade needs to be cleaned carefully until the material of the blade is visible. If this is not done evenly the fan will not run evenly and an imbalance will occur.

re n. Carefully adjust the electrode, without bending the burner, until the correct gap is achieved. (see page 29)

9 USERS INSTRUCTIONS

Brief the user how to operate the whole installation. In particular make sure the user is familiar with the safety provisions.

Tell the user that the boiler needs to undergo inspection and maintenance every 12 months.

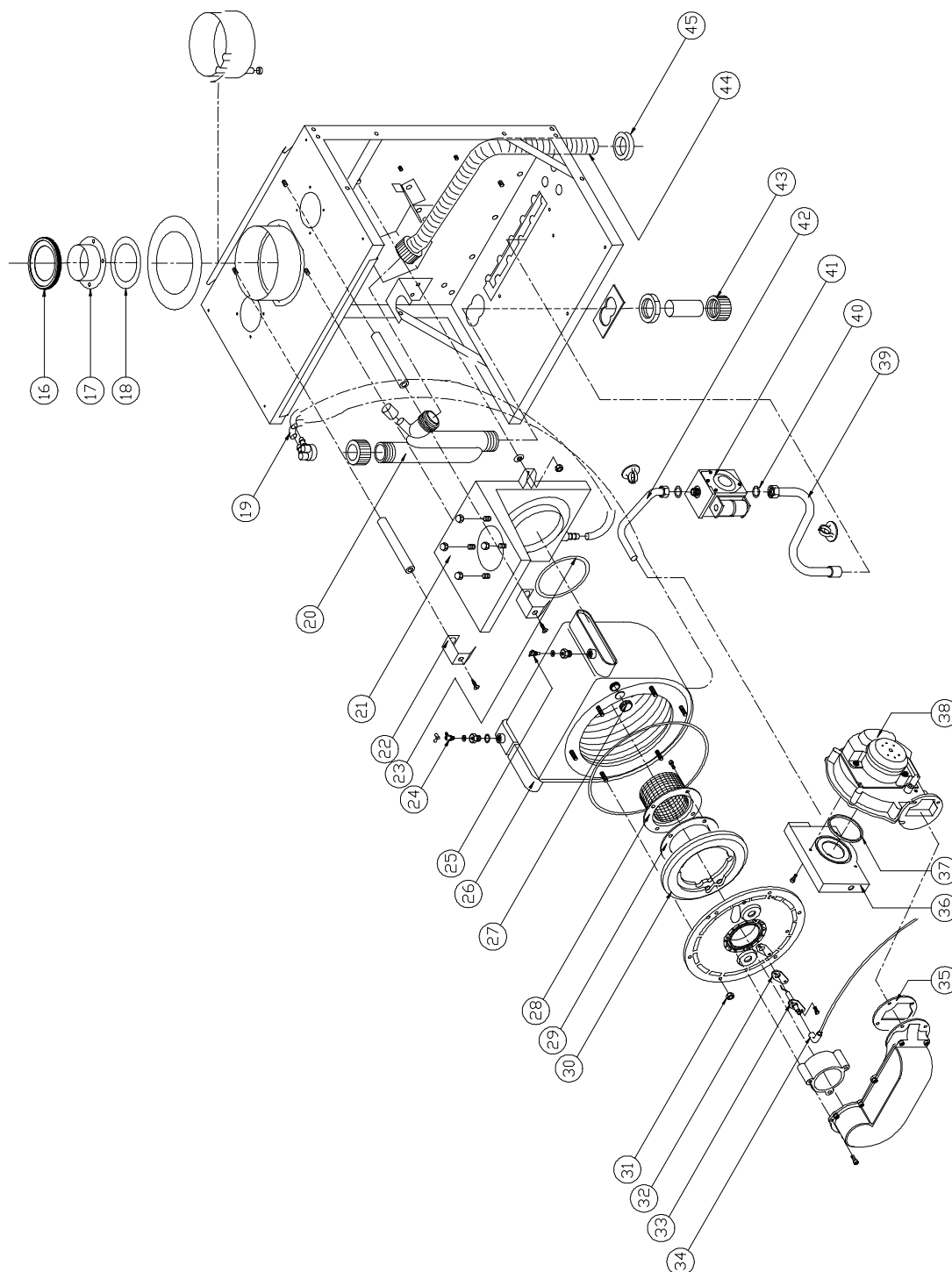
Regular servicing is needed for the boiler to function safely.

Hand over the paperwork supplied with the boiler to the user.

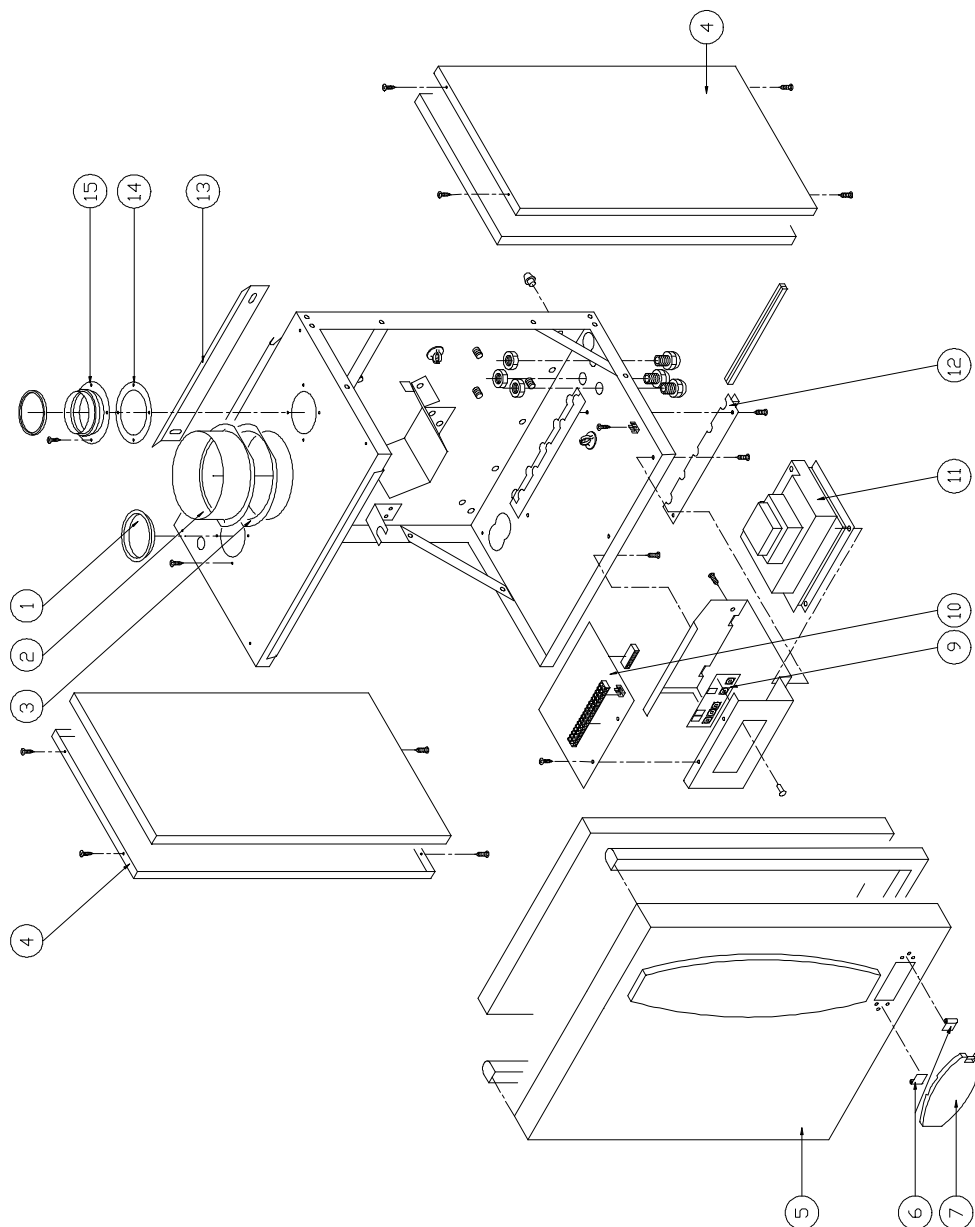
10 EXPLODED VIEW DRAWING

1-5-2000

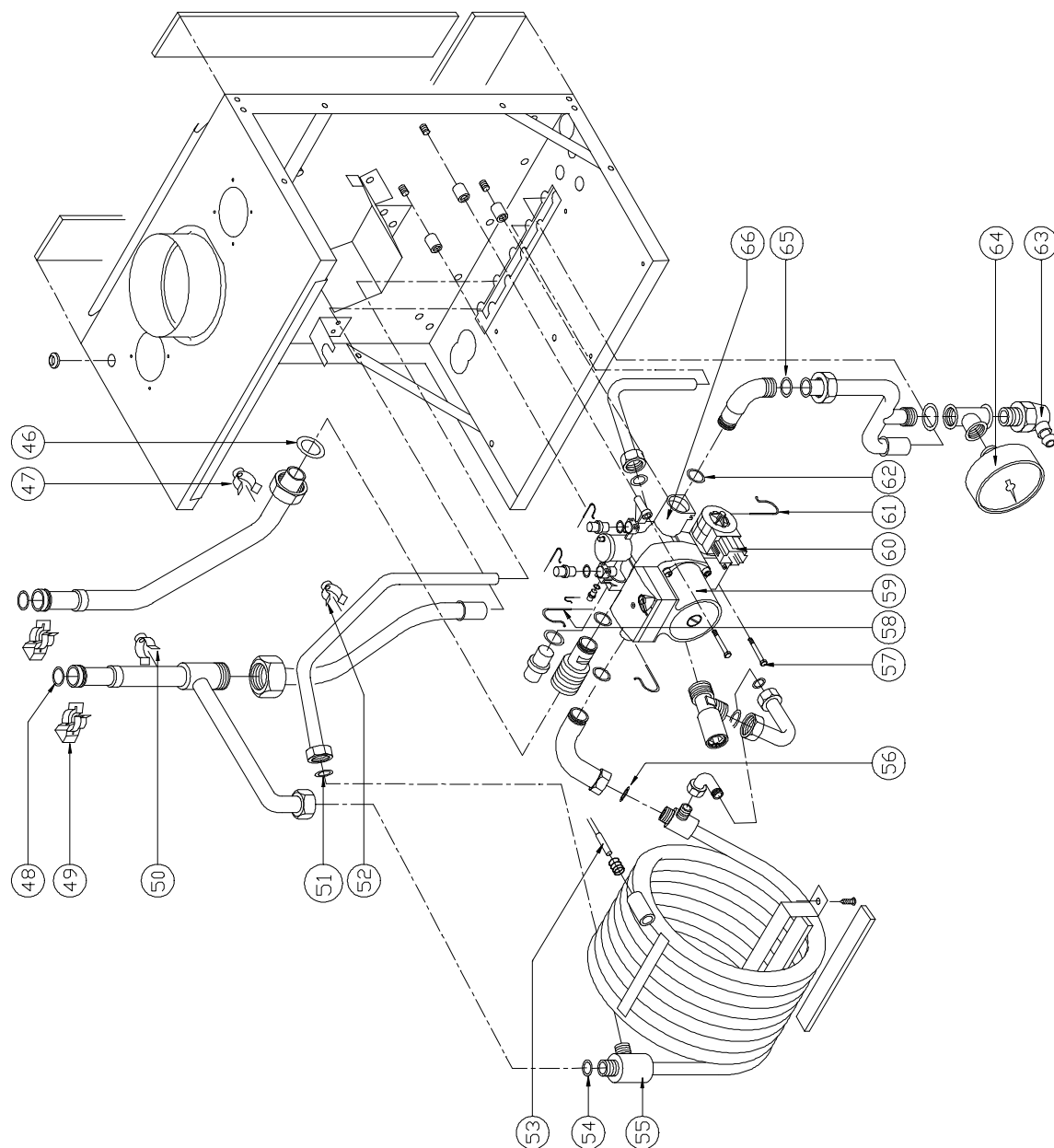
Burner+fan+gas pipe



Cladding+electronics



Pipes+pump+coaxial coil



11 LIST OF SPARE PARTS

Po s nr.	Name	Orderno.			
1	Cover air inlet 80 mm	545-2020	34	Spark plug cover	545-2053
2	Air inlet pipe mouth 125 mm	545-	35	Packing gas/air channel 30/36; 42/46 ETHOS	545-
3	Packing pipe mouth 125 mm	545-	35	Packing gas/air channel 30/36 ETHOS (red)	545-
4	Side panel+insulation	545-	36		545-
5	Front panel+front valve+insolation	545-	36	Gas/air mix chamber 30/36	545-
6	2x Hinge+Front valve	545-2012	36		545-
7	Front valve	545-2011	36	Gas/air mix chamber 42/46	545-
9	Display+ribbon cable	545-2051	37	“O” ring mixing chamber	545-
10	Cover with cable harness complete	545-	38	Fan	545-2054
11	Boiler control (automatic burner)	545-2060	39	Gas pipe lower	545-
12	Pipe entry	545-	40	Packing gas pipe (NBR)	545-
13	Mounting bracket	545-	41	Gas valve	545-2055
14	Packing air inlet 80 mm	545-2025	42	Gas pipe upper	545-
15	Air inlet pipe mouth, 80 mm	545-	43	Strainer siphon, with seal	zie 20
16	Seal 125 mm to 80 mm	545-	44	Flex hose siphon outlet	zie 20
17	Pipe mouth flue gas outlet	545-	45	Entry socket 25 mm	545-2021
18	Packing flue gas outlet	545-	46	“O” ring 4 mm	545-
19	Siphon inlet with hose	zie 20	47	Return sensor 18 mm	545-2056
20	Siphon complete	545-	48	Giannoni “O” ring	545-
21	Fluegas collecting chamber	545-	49	Giannoni clamping spring	545-2100
22	Tension frame	545-2013	50	Feed sensor 18 mm	zie 47
23	Lip ring flue gas chamber	545-2080	51	Flat packing ½” mm	545-
24	Bleeder 1/8”	545-2090	52	Hot water sensor 15 mm	545-2057
25	Maximum thermostat	545-2052	53	Internal sensor 6 mm	545-2058
26			54	Flat packing ¾”	545-
	Heat exchanger 30/36 ETHOS	545-	55	Tap changer	545-
		545-	56	Flat packing ¾”	545-
	Heat exchanger 42/46 ETHOS	545-	57	Pump attachment bolt	545-
27	Cap gauge point+packing	545-2021	58	Pump spring 10 mm	545-2150
28			59	CH pump motor (without housing)	545-2061
28	Burner bar 30/36 ETHOS	545-	60	Threeway valve drive	545-
28			61	Pump spring 18 mm	545-2151
28	Burner bar 42/46 ETHOS	545-	62	“O” ring 4 mm	545-
29	Packing burner	545-2081	63	Drain tap	545-2091
30	Insulation burner plate	545-	64	Manometer	545-2050
31	Nut M6 burner plate	545-	65	Flat packing ¾”	545-
32	Packing electrode	545-	66	CH pump complete	545-
			67	Bleed key	545-2085
33	Electrode 30/36 t/m 42/46	545-2009	68	Fixing bolt tension frame	545-
			69		
			70		
			71	Fixing bolt air chamber	545-
			72	Fixing bolt burner	545-
			73	Siphon entry	545-

74	Printed circuit support	545-2024
75	Parker with sharp point	545-
76		545-
77	Cable entry	545-2023
78	Parker with blunt point	545-
79		545-
80	Lip ring pipe mouth 80 mm	545-2083
81		545-
82	Pump spring 10 mm	
83	“O” ring pump 6 mm	
84	Pump spring 6 mm	545-2152
85		
	Vent entry	545-2022

12. GUARANTEE

The Mikrofill guarantee covers only the failure of the boiler due to defective components. The guarantee does not cover faulty installation or failure to follow installation instructions including incorrect siting.

Each component is guaranteed against defect for a period of 2 years from purchase.

The stainless steel heat exchanger is guaranteed against defect* for a period of 10 years from purchase

*** leakage/corrosion**

Declaration of conformity

in accordance with the EC DIRECTIVES relating to machines
(89/392/EEC, 91/386/EEC, 93/68/EEC)
and the EC DIRECTIVES relating to EMC
(89/336/EEC, 91/263/EEC, 92/31/EEC, 93/68/EEC)

Mikrofill

Hereby declares, that its Central Heating Boilers:

Name: Mikrofill

Type : ETHOS

have been manufactured in accordance with the stipulations of the
EC DIRECTIVES relating to machines and the EC DIRECTIVES relating to EMC.

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