

# **ETHOS 36C and 54C CONDENSING COMBINATION BOILER**

## **Installation and Operating Manual**



1511/05 Issue 1

**INDEX**

<b>1</b>	<b>SAFETY GUIDELINES .....1</b>	5.3	Sensors .....15
1.1	Conditions .....1	5.4	Installer programme .....17
1.2	General guidelines .....1	5.5	Explanation of options for installer .....17
<b>2</b>	<b>TECHNICAL DATA .....2</b>	5.5.1	Programme number J1: Max. CH supply temperature.....17
2.1	Front view .....2	5.5.2	Programme number J2: Max. CH heat output (fan speed during CH mode) .....17
2.2	Explanation of parts .....3	5.5.3	Programme number J3: Pump operation .....17
2.3	Technical data.....4	5.5.4	Programme number J4: Pump CH overrun time.....17
2.4	Introduction .....5	5.5.5	Programme number J5: Pump DHW overrun time.....17
2.5	Operation of ETHOS Boiler.....5	5.5.6	Programme number J6: Step modulation Control .....18
2.6	Control .....5	5.5.7	Programme number J7: Hot water temperature.....18
2.7	Combustion products.....5	5.5.8	Programme number J8: Max. DHW output.19
2.8	Variable fan .....5	5.6	Filling and bleeding the boiler and installation .....19
2.9	On/off pump .....5	5.7	Starting the appliance .....21
2.10	Description of appliance.....5	5.7.1	General .....21
2.11	Ethos ...C .....5	5.7.2	First commissioning .....21
<b>3</b>	<b>INSTALLATION .....6</b>	5.8	Heat input adjustment and setting .....21
3.1	Unpacking .....6	5.8.1	Max. heat input setting .....21
3.2	Selecting a location in the house .....6	5.8.2	CO2 settings .....21
3.3	Suspending the appliance .....6	5.8.3	Checking the max CH input .....21
3.4	Flue System.....7	5.8.4	Min. input setting .....22
3.5	Supply and discharge system.....7	5.9	Conversion for different gas type .....22
3.6	Influence of flue system on heat input .....7	5.10	DHW temperature .....22
3.7	Classification according to evacuation of combustion products .....8	5.11	Shutting down .....22
3.8	Ethos resistance table .....9	<b>6</b>	<b>FAILURES.....23</b>
3.9	Condensate discharge .....10	6.1	Cause of failure .....24
3.10	CH and DHW circuit.....10	6.2	Table of solutions .....26
3.10.1	Attention! Important.....10	<b>7</b>	<b>MAINTENANCE .....28</b>
3.10.2	CH circuit .....10	7.1	General .....28
3.10.3	Expansion Vessel.....10	7.2	Inspection .....28
3.10.4	Main Cold Water Inlet.....10	7.3	Maintenance .....29
3.11	Pump circuit .....11	<b>8</b>	<b>USER INSTRUCTIONS.....30</b>
3.11.1	On/off pump .....11	<b>9</b>	<b>EXPLODED VIEW.....31</b>
3.12	Frost protection .....11	<b>10</b>	<b>PARTS LIST .....32</b>
3.13	Connecting the gas pipe .....11		
<b>4</b>	<b>ASSEMBLY INSTRUCTIONS FOR ELECTRICIAN.....12</b>		
4.1	Mains connection .....12		
4.2	Terminal block connections.....12		
4.3	Wiring diagram.....13		
<b>5</b>	<b>OPERATION .....14</b>		
5.1	Display .....14		
5.2	Diagnosis mode display .....14		
5.2.1	Control buttons.....14		

## **1 SAFETY GUIDELINES**

### **1.1 Conditions**

ETHOS BOILERS shall not be liable for any damages caused by non-compliance with the assembly instructions. Only original ETHOS parts must be used for service purposes.

### **1.2 General guidelines**

It is a statutory requirement that all gas appliances are installed in accordance with the manufactures instructions and all current regulations in force, all instructions should be fully read before installing or using the appliance. All installations should be carried out by competent persons as described in the Gas Safety (Installation & Use) Regulations. i.e. CORGI registered and holding current certification. The work must be carried out by a competent person as described in the I.S. 813 Domestic Gas Installations with reference to the following codes of practices. The Manufacturers instructions **MUST NOT** be taken in any way as overriding statutory obligations.

This boiler has been tested and certified to comply with all necessary European directives, latest building regulations and efficiency requirements for the SEDBUK scheme and as been approved with an efficiency band rating of A and is CE marked and complies with

92/42/EEC Efficiency of Hot Water Boilers Directive

90/396/EEC Gas Appliance Directive

93/68/EEC Low Voltage Directive (was 73/23)

92/31/EEC Electromagnetic compatibility Directive

I.S. 813 Domestic Gas Installations

The boiler should be installed in compliance with

The building regulations (Scotland-consolidated)

Building Regulations (Northern Ireland)

Building Regulations

Water fittings regulations or water bylaws in Scotland

Local water company bylaws

The boiler should not be modified in any way. Any modifications will invalidate the gas approval and invalidate the warranty.

#### **Codes of Practice**

BS 7593:1992 Treatment of water in domestic hot water central heating systems

BS5546:1990 installation of hot water supplies for domestic purposes

BS5440 part 1: 2000 flues

BS5440 part 2: 2000 Ventilation

BS5449:1990 Forced circulation hot water systems

BS6798:2000 installation of gas fired hot water boilers of rated inputs not exceeding 70kW

BS6891:1989 Installation of low pressure gas pipe up to 28mm

BS7671:2001 IEE wiring regulations

BS4814:1990 Specification for expansion vessels

BS5482:1994 installation of LPG

BS7671 requirements for electrical installations

BS5955 -8 plastic pipe work installations

#### **ATTENTION: High Voltage**

Before opening the boiler casing for maintenance or servicing the 230VAC main supply to the boiler must be disconnected!!

## 2 TECHNICAL DATA

### 2.1 Front view

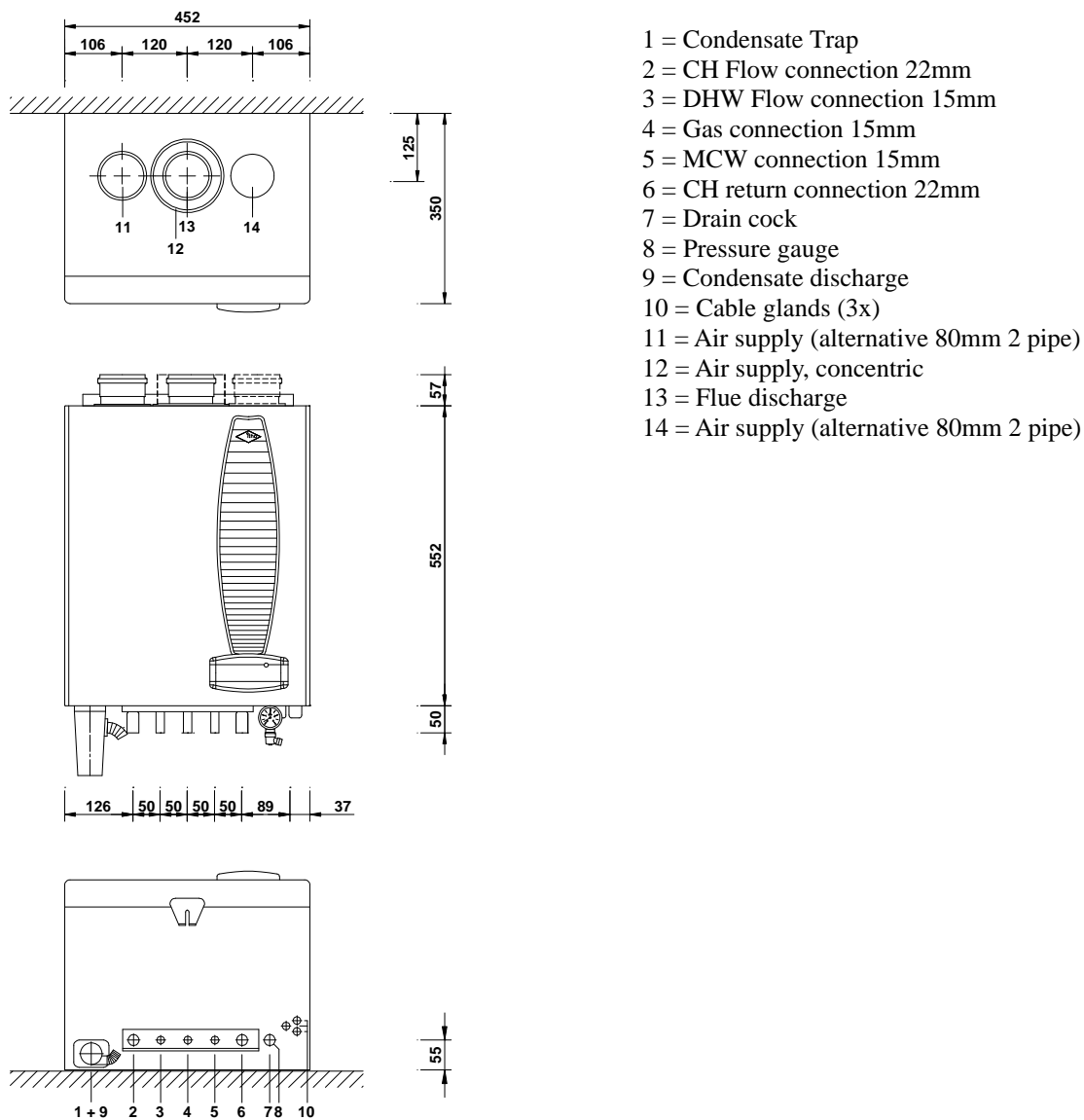
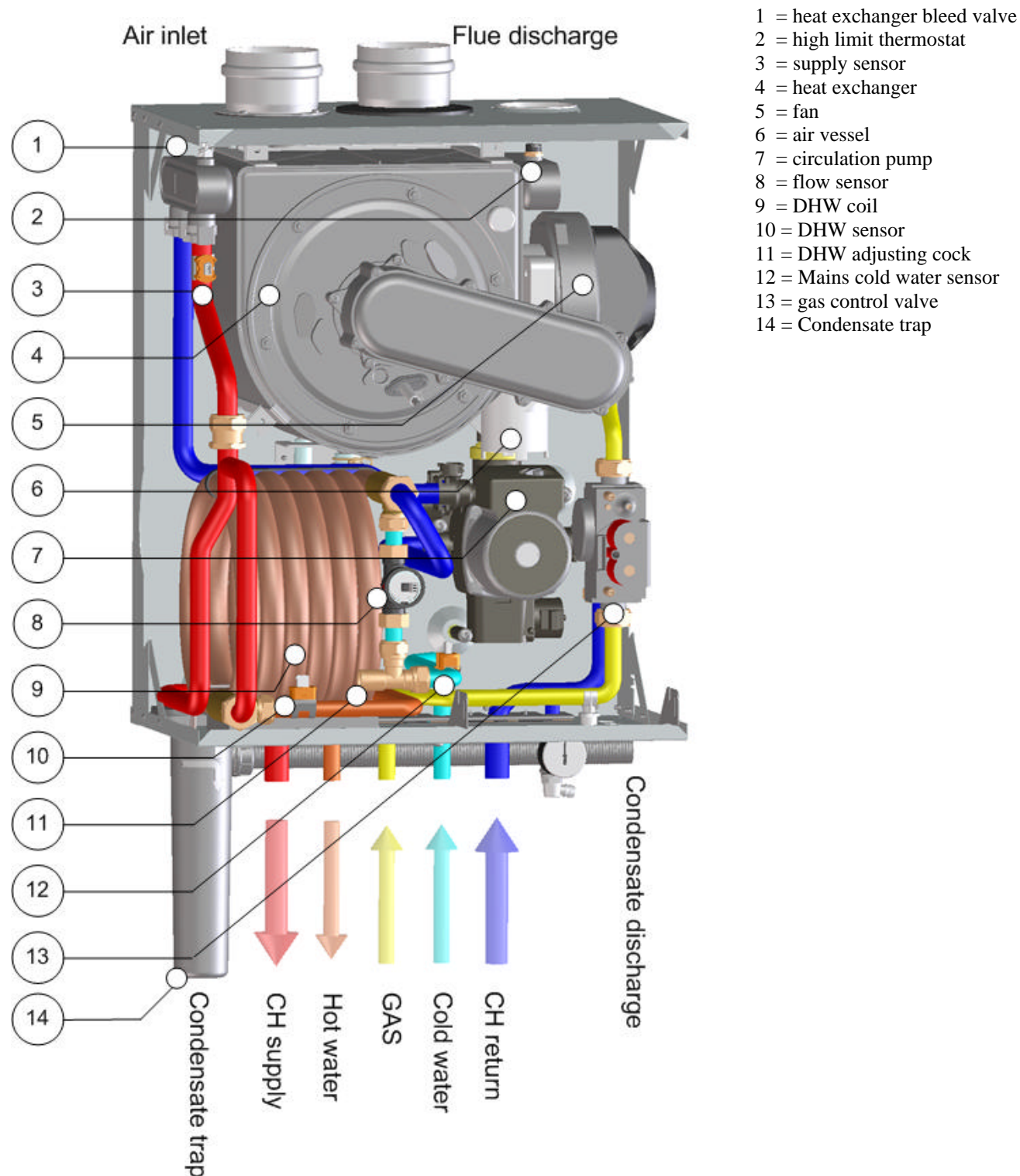


Figure 1 Dimensional sketch of CH boiler connections

## 2.2 Explanation of parts



## 2.3 Technical data

General			
EC product ID number	CE 0063 BQ 3034 (2005)		
Dimensions (HxWxD)	mm	550 x 450 x 350	
Category	II2L3P		
Type of appliance		Ethos 36C	Ethos 54C
CH water content of appliance	litre	2,1	2,7
CH water content of tap water heat exchanger	litre	1,5	1,5
Weight (empty)	kg	37	41
CH supply/return connections	mm	22	22
Gas connections	mm	15	15
Domestic water, hot/cold	mm	15	15
Flue connection	mm	80	80
Air supply	mm	80	80
Concentric	mm	80/125	80/125
Power consumption	W	180	200
Power consumption, partial heat input	W	100	135
Power consumption, standby	W	5	5
IP-classification		IP44	IP44

Central heating			
Nominal Heat Input (net)	kW	6,6 – 28,5	9,9 – 38,7
Nominal Heat Input (gross)	kW	7,3 – 31,7	11,0 – 43,0
Max. gas consumption	m <sup>3</sup> /uur	3,0	4,1
Efficiency at 50/30°C, full heat input	%	105,0	105,4
Efficiency at 50/30°C, partial heat input	%	108,1	108,5
Nominal heat output at 80/60°C	kW	6,3 – 27,6	9,6 – 37,5
Nominal heat output at 50/30°C	kW	7,1 – 29,9	10,7 – 40,8
Sedbuk rate		A	A
NOx-emission	mg/kWh	<15	<15
CO- emission	mg/kWh	<20	<20

Domestic hot water			
Nominal Heat Input (net)	kW	6,6 – 36,0	9,9 – 54,0
Nominal Heat Input (gross)	kW	7,3 – 40,0	11,0 – 60,0
Max. gas consumption	m <sup>3</sup> /uur	3,7	5,6
DHW flow rate at 60°C (ΔT=50K)	l/min	10 **	15 **
DHW flow rate at 40°C (ΔT=30K)	l/min	16 **	25 **
Sanitary pressure loss, at 7,5 l/min DHW flow	bar	0,25	0,25
Sanitary pressure loss, at max. DHW flow (ΔT=50K)	bar	0,38	0,85
WRAS approval number		0204111	
Domestic hot water (fixed setting)	°C	60	60

Technical data			
Max. flue gas volume	m <sup>3</sup> /uur	50,4	75,6
Boiler class (evacuation /air supply)		B23, C13, C33, C43, C53, C63, C83	
Flue gas CO <sub>2</sub> content	%	9	
Flue gas dew point	°C	52	
Flue temperature at 80/60°C (at ambient temperature of 20°C)	°C	75	
Flue material temperature class		T 120	
Permitted maximum resistance of flue system *	Pa	150*	
Condensation pH value		4 tot 5,5	
Available CH pump pressure at ΔT20°C (in meter Water Gauge)	mWG	2,0	1,5
Max. CH supply temperature	°C	90	
CH water pressure (min./max.)	bar	0,5 – 3	
Sanitary water pressure (min./max.)	bar	2 - 10	
NOx class		5	5

Table 1 Specifications

\* With this resistance value the heat input will stay within the specifications indicated on the data plate; if the resistance is higher, the heat input will drop, see [par3.6](#).

\*\* At an initial pressure of 2 bar.

---

## 2.4 Introduction

This Installation and Operating manual is for the installer and the user of the ETHOS boiler.

It contains essential information for installing and adjusting ETHOS boilers. We recommend that you first consult this installation manual, to ensure that the installation is carried out correctly. In addition, it is required that the end user of the boiler be fully instructed on how it operation, and that the installation and operation manual be left near the boiler to make it immediately available for later use, if necessary.

## 2.5 Operation of ETHOS Boiler

This ETHOS; is a high efficiency, condensing, combination Boiler. Flues are cooled below condensation point by a SpiranoX heat exchanger made of stainless steel. This produces an additional heat which will contribute to the boiler efficiency, which is in excess of 107%. The European calculation method assumes 100% efficiency for appliances which do not condense and efficiencies higher than 100% for condensing appliances.

Since flue gases are very low in temperature (lower than 75°C), a stainless steel or PP plastic approved flue pipe must be used.

The appliance is manufactured in according with the European approved requirements (EC) and has the following Dutch Gastec Gaskeur quality marks: Clean combustion (SV) – 107% High Efficiency (HR) – Comfort Hot Water (CW) –, High Efficiency Hot Water (HRww) and – Solar Boiler Reheater (NZ).

## 2.6 Control

The boiler can be controlled using a conventional volt free time clock, room thermostat or by a modulating OpenTherm® room thermostat.

The boiler is fully modulating to help maintain a constant heat temperature both in the house and for the hot water production temperature.

## 2.7 Combustion products

Due to the modulating premix burner, the combustion complies with the strictest European standards.

## 2.8 Variable fan

A speed-controlled fan is used to reduce power consumption: when the heat requirement is low, the fan will rotate more slowly, resulting in lower power consumption.

## 2.9 On/off pump

The appliance has a pump with speed switch. (**Attention! Do not use on position 1**).

## 2.10 Description of appliance

The appliance is a combination boiler suitable for Domestic Hot Water (DHW) production and Central Heating installation.

The boilers are range rateable. The maximum heat output can be set and adjusted to the requested heat output of the central heating.

## 2.11 Ethos ...C

This appliance has a built-in low water content DHW heat exchanger spiral for hot water production. All connections are internal, while a flow restrictor provides a maximum hot water flow with a DHW temperature of approx. 60°C (table 3, page 10).

The tap water temperature is set to 60°C to prevent Legionella contamination.

Note: The 54C boiler has no flow restrictor fitted.

### 3 INSTALLATION

#### 3.1 Unpacking

This appliance is supplied with:

- Installation and Operating manual;
- a user manual with warranty card;
- a bleed key;
- a hanging bracket;
- Condensation trap with condensate discharge hose.

Check the appliance immediately on receipt.

Any damages must be reported to the supplier immediately.

All appliances are completely assembled.

Ethos combination boilers are adapted to natural gas G20

#### 3.2 Selecting a location in the house

The front and bottom side of the appliance have to be accessible for maintenance and service.

Both sides must be placed at least 20 mm from the wall or cabinet wall.

The following facilities must be present at the assembly location:

- A permanent 230 volt single phase power supply with the boiler being protected by a double pole switch with minimum openings of 3mm and fused at 3 amps.
- Drain connection suitable for condensate discharge.
- Wall which can support the boiler weight.

The assembly location should be dry and protected from unsuitable weather conditions such as frost and freezing.

The appliance has a built-in fan which will cause a small degree of noise depending on the heat input: choose a location in the house where this sound production will not cause nuisance, preferably against a brick wall.

#### 3.3 Suspending the appliance

Mark off the holes for the hanging bracket and determine the location for connecting the supply and discharge pipes.

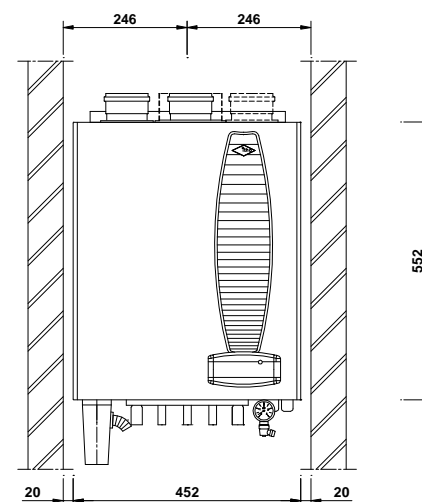


Figure 2 Dimensional sketch of clearances

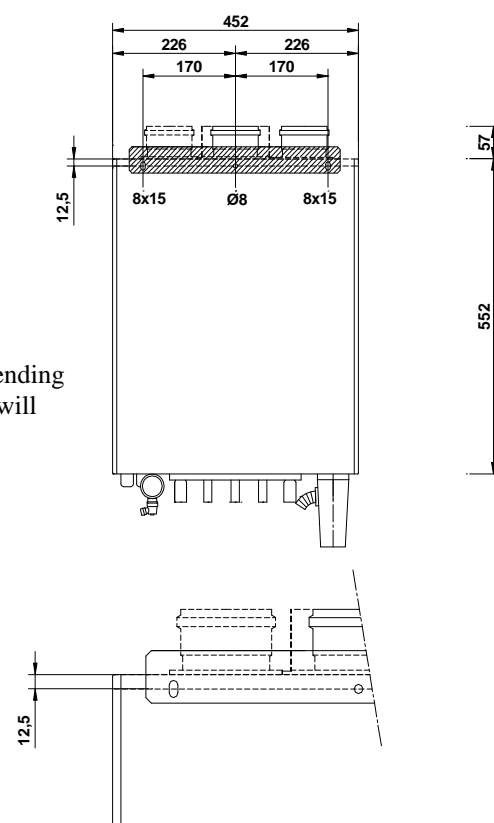


Figure 3 Dimensional sketch of wall bracket



### 3.4 Flue System

#### General

Air supply material: PP plastic or stainless steel

Flue discharge material: plastic (temperature resistant up to 120° C, air flushed) or stainless steel

#### Attention!

First connect all pipes and fill up and bleed the installation before commissioning the boiler.

The high flue gas temperature protection for plastic discharge material is built into the boiler as a safety feature. This protection cuts off the gas supply as soon as the flue temperature gets too high, after which the appliance is interlocked and error code 't0' starts to flash.

There are two types of connections:

- Concentric connection (80mm / 125mm with one pipe inside the other)
- Two Pipe system (80mm air intake with a separate 80mm Flue outlet)

#### Concentric connection (standard)

The concentric connection kit is standard: diameter air supply pipe 125 mm and flue pipe 80 mm.

Always place the plastic supply connection on top of the air inlet connection.

#### Two Pipe System (optional)

The optimal connection for air supply and flue pipes is obtained by using a stainless steel or plastic discharge system.

The connection diameter for the flue pipe is 80 mm and for the air supply pipe also 80 mm.

The air supply pipe can be placed on the left or right side of the flue pipe by moving the connecting tube

### 3.5 Supply and discharge system

The Ethos boiler is a room sealed appliance with the air needed for combustion being drawn in from outside. The casing jacket is sealed airtight to the back plate, so air can only be supplied through the air supply pipe. Therefore, always make sure that the front door is placed on the appliance when the boiler is operating.

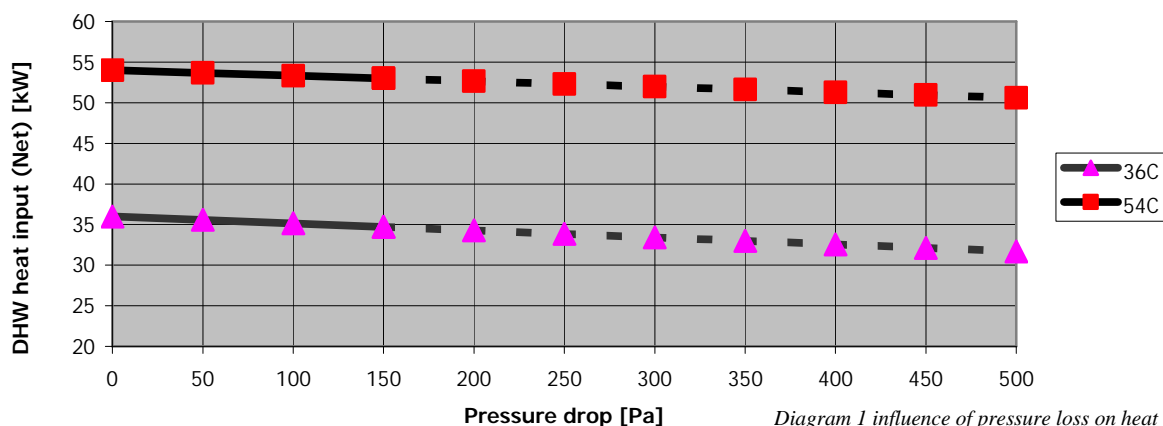
#### Attention!

Note that any horizontal flue pipe must be sloped back toward the boiler at a rate of 10mm per 1 metre. If not, condensation can accumulate in the flue pipe, and may result in water damage to the boiler.

### 3.6 Influence of flue system on heat input

The diagram shows the ratio between the kW input and the flue systems resistance. For the maximum Boiler output a resistance of 150 Pa or less is used.

Should the flue resistance be more than 150Pa the boilers output will be reduced; of further information contact the technical department.



### 3.7 Classification according to evacuation of combustion products

<i>Class</i>	<i>System description</i>	<i>Comments:</i>
B23	<ul style="list-style-type: none"> <li>Non-room sealed application; flue connected to outside but combustion air is being drawn directly from room where boiler is installed.</li> </ul>	<ul style="list-style-type: none"> <li>Appliance complies with <b>Class C</b></li> <li>Max. back pressure 1mbar (100Pa)</li> </ul>
C13	<ul style="list-style-type: none"> <li>Room sealed premix appliance with horizontal outlet</li> <li>Air intake and flue gas discharge through concentric exterior wall terminal</li> </ul>	<ul style="list-style-type: none"> <li>Type exterior wall duct</li> <li>Max. resistance 150 Pa</li> <li>Ducts sloped to drain toward boiler (1cm/m)</li> </ul>
C33	<ul style="list-style-type: none"> <li>Room sealed premix appliance with vertical outlet terminal</li> <li>Air intake and flue gas discharge through concentric exterior roof terminal</li> </ul>	<ul style="list-style-type: none"> <li>Type roof duct</li> <li>Max. resistance 150Pa</li> </ul>
C43	<ul style="list-style-type: none"> <li>Room sealed premix appliance with collective supply and discharge</li> </ul>	<ul style="list-style-type: none"> <li>Max. resistance 150Pa</li> <li>Ducts sloped to drain toward boiler (1cm/m)</li> <li>Collective discharge with under pressure</li> </ul>
C53	<ul style="list-style-type: none"> <li>Room sealed premix appliance with separate supply from exterior wall and separate discharge through roof</li> </ul>	<ul style="list-style-type: none"> <li>Air terminal not provided by boiler manufacturer</li> <li>Roof terminal not provided by boiler manufacturer</li> <li>Max. resistance 150Pa</li> <li>Ducts sloped to drain toward boiler (1cm/m)</li> <li>Supply and discharge to be installed on the same side of the building</li> </ul>
C63	<ul style="list-style-type: none"> <li>Room sealed premix appliance with separate approved and marketed system</li> </ul>	<ul style="list-style-type: none"> <li>Only connect to UK approved discharge material</li> <li>Max resistance 150Pa</li> </ul>
C83	<ul style="list-style-type: none"> <li>Room sealed premix appliance with separate supply from exterior wall and collective discharge</li> </ul>	<ul style="list-style-type: none"> <li>Type exterior wall duct not provided</li> <li>Max. resistance 150Pa</li> <li>Ducts sloped to drain toward boiler (1cm/m)</li> </ul>



Vertical terminal



Horizontal terminal

### 3.8 Ethos resistance table

By using different flue installations, either concentric or the 2 pipe system different flue lengths can be achieved, Up to a resistance of **150 Pa**. At this pressure the heat input will be equal ( $\pm 5\%$ ) to the heat input specified on the data plate of the appliance. In case a concentric system is used, its length should not exceed 12 meters.

Concentric Flue System		(mm)	Resistance system [Pa]	
Part			ETHOS 36 C	ETHOS 54C
Vertical Terminal		80/125	19	40
Horizontal Terminal		80/125	36	75
straight pipe/m		80/125	5,3	11,3
45° bend		80/125	4,1	8,4
90° bend		80/125	6,1	12,4
<b>Two Pipe System</b>				
Air Inlet	Part			
	straight pipe/m	80	1,7	3,4
	45° bend R=0,5D	80	2,0	3,8
	90° bend R=1,0D	80	3,2	5,8
Flue Gas Outlet	Vertical terminal	80	19	40
	Horizontal terminal	80	36	75
	straight pipe/m	80	2,1	4,9
	45° bend R=0,5D	80	2,5	5,8
	90° bend R=1,0D	80	3,9	8,9

Table 3 Flue discharge resistance

#### Example of calculation boiler type: Ethos 54C

Concentric pipe 80/125mm vertical 5m + horizontal 1m=total 6m concentric straight pipe  
 2x Concentric 90° bend ;  
 2x Concentric 45° bend ;  
 Vertical terminal 80/125.

			Resistance
Concentric pipe 80/125:	6m	6 x 11,3	67,8 Pa
Concentric 90° bends :	1 pieces	1 x 12,4	12,4 Pa
Concentric 45° bends :	2 pieces	2 x 8,4	16,8 Pa
Vertical terminal 80/125			<u>40 Pa</u>
<b>Total Resistance</b>			<b>137,0 Pa</b>

Total resistance is 137 Pa, so the boiler output is not changed by the resistance (lower than 150 Pa) and total concentric length is less than maximum allowed 12 meters.

### 3.9 Condensate discharge

The condensate discharge must be installed during the assembly. Install the condensate discharge as follows: Slide the supplied cup bottle trap over the two condensate hoses under the boiler, so the arrows are facing each other. Then push the cup against the bottom of the boiler.

Turn the trap in position until the condensate discharge faces the desired direction. Attach the condensate discharge hose to the trap with a plastic swivel and seal. The connection is linked to a suitable drain via the flexible hose.

Only use plastic parts for the condensation discharge. Metal pipes are not allowed.

#### Attention!

If this discharge is blocked, the appliance may be damaged.

### 3.10 CH and DHW circuit

#### 3.10.1 Attention! Important

If plastic central heating pipe is used on the system, it should be a barrier protected against oxygen diffusion.

On existing installations, the system should be fully cleaned and flushed, with a suitable strainer being installed in the return pipe work before being connected to the boiler.

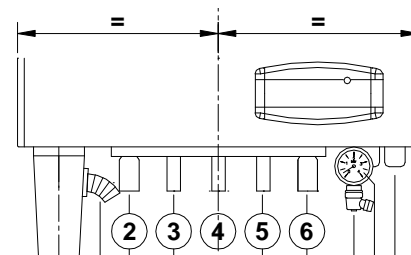
#### 3.10.2 CH circuit

The supply and return connections are based on connecting the installation by using compression fittings.

These connections are located at the bottom of the appliance.

It is essential to install isolation valves for service purposes. The appliance has a drain cock at the bottom, so it can be easily drained.

Figure 4 CH boiler piping connections



- 1= Condensate trap
- 2= CH supply
- 3= Domestic hot water connection
- 4= Gas
- 5= Cold water sanitary fittings
- 6= CH return
- 7= Drain cock
- 8= Pressure gauge
- 9= cable glands 3x
- 10= Condensate trap

#### ATTENTION !

The appliance is **not** equipped with a pressure relief valve; A suitable valve normally with a 3 bar setting must be installed in the installation's pipe work, in the immediate vicinity of the appliance.

#### ATTENTION !

The appliance is **not** equipped with an internal bypass. A suitable automatic bypass valve should be fitted in accordance with current regulations, and at such a distance from the boiler as to allow suitable flow rates. Before the installation is operated for the first time, it must be thoroughly flushed and treated with suitable system cleaners and inhibitors.

#### 3.10.3 Expansion Vessel

The boiler is not fitted with an internal expansion vessel; so an expansion vessel should be sized to suit the volume of water in the central heating installation and static pressure. The expansion vessel should be connected to the return pipe work.

#### 3.10.4 Main Cold Water Inlet

In the cold water pipe of the appliance a flow restrictor (Ethos 36 only) (par 2.2, No. 11) is mounted, used for setting a restriction according the appliance's hot water rate (see table 3). There is no adjusting valve in the Ethos 54C combination boiler.

Connect the pipes according to statutory regulations.

### 3.11 Pump circuit

Depending on the boiler version, several types of pumps can be found inside the appliance; a built-in Grundfos UPS 15-60 HB pump or a Grundfos UPS 15-70 HB pump (Ethos 54C only).

#### 3.11.1 On/off pump

The pump has a speed switch which is factory-adjusted to the highest position.

**Attention!**

The pump speed should not be adjusted

The appliance has a built-in pump overrun timer.

Position	I	II	III
Ethos 36C	X	Right	Right
Ethos 54C	X	X	Right

### 3.12 Frost protection

The boiler has a built-in frost protection for activating the central heating pump when the boiler water temperature is 8°C. When the boiler water temperature is 5°C, it will also ignite the burner until the supply temperature is 10°C.

**Attention!**

Any other parts of the installation that may be subjected to frost or freezing should have additional protection fitted.

### 3.13 Connecting the gas pipe

At the planning stages it may be necessary to contact the local gas supplier to ensure an adequate supply of gas is available.

An existing service pipe must not be used without first contacting the local gas supplier.

All gas pipe work should be installed by a competent person and in accordance with all current standards and regulations.

The boilers gas pipe should be calculated and sized to supply adequate gas working inlet pressure of 20mbar (minimum) for natural gas and 37mbar for LPG.

All gas pipe work should be tested for gas tightness.

Only pressure-test the gas supply pipe as far as the boilers isolation valve. The gas valve cannot withstand the high-test pressure, since it was designed for a maximum working pressure of 60 mbar.

Bleed the gas pipe carefully in the open air, before operating the appliance for the first time.

## 4 ASSEMBLY INSTRUCTIONS FOR ELECTRICIAN

### 4.1 Mains connection

The boiler requires an earthed 230 volt 50 Hz single phase supply and must be connected in accordance with all current regulations and requirements. A permanent supply to the boiler is needed at all times to the boiler, which should be protected by a maximum 3 Amp double-poled isolator with at least 3mm of contact separation on both poles.

The single phase cable colour coding should be wired correctly, although the boiler is not polarity sensitive. All control switching is volt free.

#### ATTENTION!

**AT NO TIME SHOULD 230 VOLT BE USED TO SWITCH THE BOILER.**

### 4.2 Terminal block connections

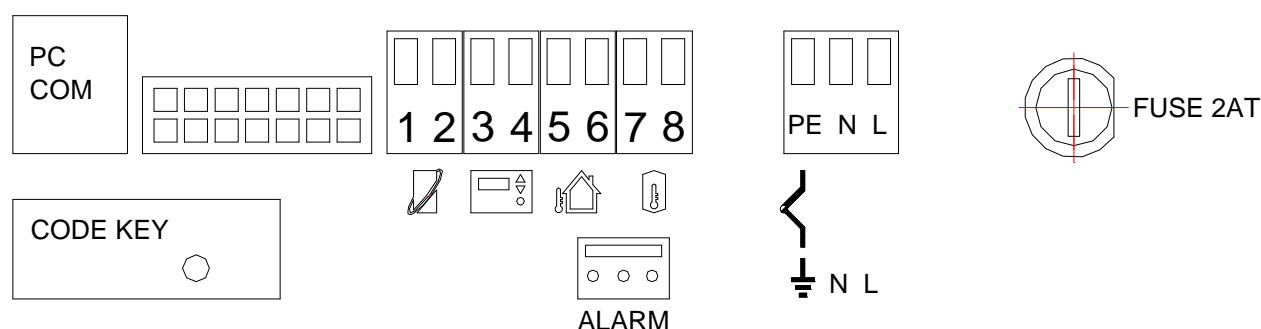


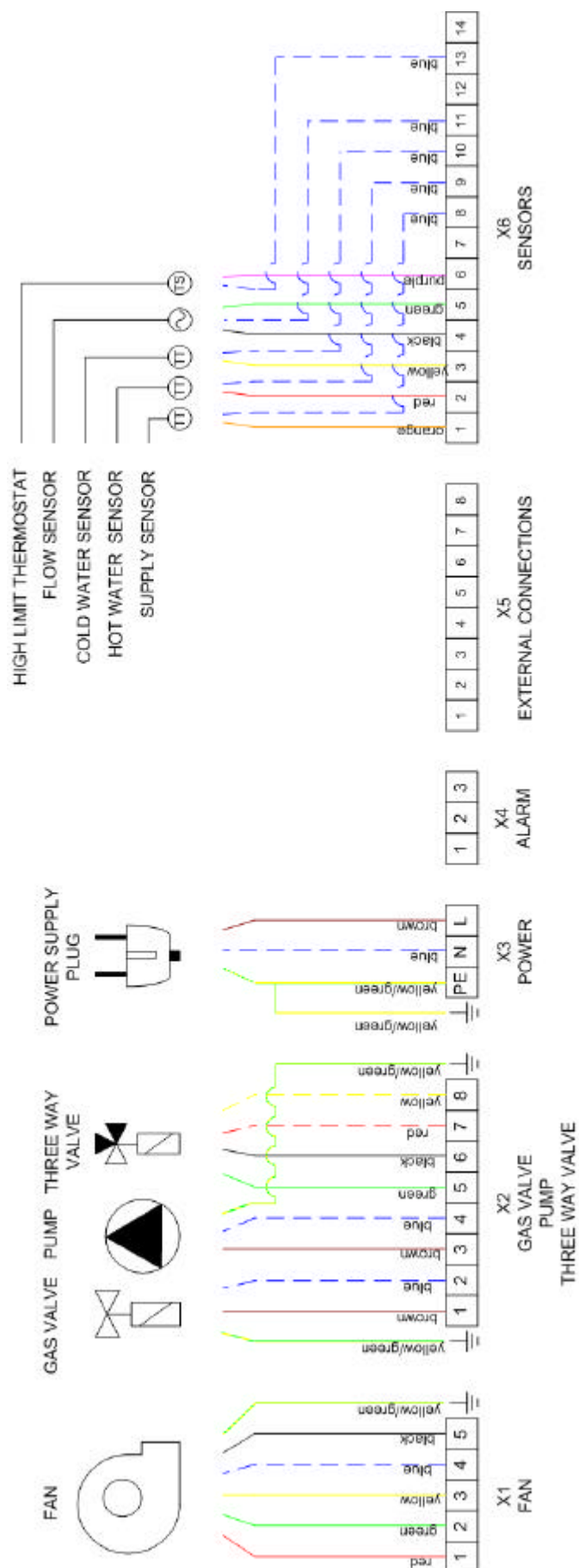
Figure 6 Electric terminals

The following parts can be connected to the terminal block, see illustration

PC COM	<b>PC communication.</b> The manufacturer can use this connection for reading-out or modifying data or settings by using a PC and connecting cable.
1-2	<b>OpenTherm® room thermostat / time clock.</b> Can be used to fully modulate the boiler.
3-4.	<b>On/off room thermostat / time clock.</b> For connecting clock or conventional room thermostats. The heat acceleration element of the on/off thermostat must be set at 0.12A; the max. permissible resistance of the room thermostat circuit should not exceed 10 ohm. <b>Attention!</b> Do not connect an OpenTherm® room thermostat to this terminal.
5-6.	<b>Outside temperature sensor.</b> If an OpenTherm® thermostat with weather dependent control is used, the outside temperature sensor must be connected to terminals 5 and 6. The OpenTherm® thermostat contains the settings for weather dependent control.
7-8	<b>External DHW cylinder.</b> The external water heater can be connected to the boiler with a sensor (NTC) or thermostat; if a sensor is used, the boiler display can show the water heater temperature. Only applicable for <b>Ethos ...SD</b> boilers
PE. N. L	<b>Power supply connection 230V.</b> Connection for earthed cable. PE= earth N= Neutral L= phase 230V 50Hz
CODE KEY	<b>Code key.</b> A code key is a small PCB which contains the settings per boiler type. When the burner control unit is replaced, the code key must be installed in the new burner control unit.
ALARM	<b>External failures.</b> This connection can be used for showing external messages by using a relay on terminals 1 and 3. A LED can be connected to terminals 2 and 3.

Table 4 Explanation of electrical connections

### 4.3 Wiring diagram



## 5 OPERATION

### 5.1 Display

The display has two digits, which indicate the supply temperature of the central heating water in the boiler:

By pressing the Info button, the operating status can be displayed. If the Info button is pressed twice, the display will show the water temperature of the central heating water. If the display shows a code that starts with a (t), the boiler will temporarily shut down, except for code t4 and t5. If these are active, the boiler will run an emergency programme. If a (t) condition is automatically restored, the boiler will operate normally again.

- .0 Standby
- .2 Fan start
- .3 Fan pre-purge
- .4 Ignition
- .5 CH mode heat demand or CH pump overrun
- .6 DHW operation
- .7 DHW preheating or DHW pump overrun
- t0 High limit thermostat >opened 30sec.
- t1 Supply temperature too high during CH demand or anti-recycle timer
- t2 Supply temperature too high during hot water mode
- t3 Hot water temperature too high
- t4 Supply sensor interrupted / short-circuited
- t5 DHW sensor interrupted / short-circuited
- t7 Room thermostat anti-recycle timer active
- t8 Bleed programme active
- t9 VKK check error None UK code
- tc Temperature Delta-T during start too low

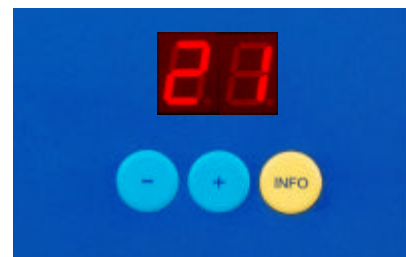


Figure 1 Display

### 5.2 Diagnosis mode display

In this menu various current settings and the last 10 failures or interlocks can be consulted, without using a laptop.

If no failures are saved in the burner control unit memory, the display shows '- -'.

By pressing the '-' button (approx. 1 sec.), the diagnostic menu is shown. By pressing the Info button, the following information is shown:

- D1 = current supply temperature
- D2 = domestic hot water temperature
- D3 = domestic cold water temperature
- D4 = outside temperature
- D5 = DHW flow litres/min
- D6 = pump on 1 /pump off 0
- D7 = three-way valve position C = CH / T = DHW
- D8 = ionisation current (micro Amp)
- D9 = not active
- E0 = --last failure ... E1--E9= other stored failures

#### 5.2.1 Control buttons

These buttons give access to different options for adjusting and checking the appliance; by pressing a button or a combination of buttons, the following functions can be performed:

##### 1. Switching DHW production on or off

By pressing the '+' button (3 sec.), the DHW function can be activated.

H1/ - - alternately shown on display: DHW is switched off.

H1/ t a alternately shown on display: DHW is switched on.

By pressing the Info button again, a selection can be made between the Eco or Comfort mode for keeping the internal DHW heat exchanger warm. The display alternately shows H2 / EC or H2 / CF.

H2 / EC, DHW heat exchanger temperature is not maintained hot, longer waiting time for hot water.

H2 / CF, DHW heat exchanger is maintained warm and tapping hot water is faster. Adapt this setting by using the '+' or '-' button. Press the Info button to save the modified setting.



## 2. Installer menu:

Perform the following actions to access the Installer menu.

- First press the '-' and 'Info' buttons simultaneously (3 sec.).
- After pressing these buttons, the window will show a '0'.
- Then enter code '8' by using the '+' or '-' buttons and press the Info button to access the Installer menu (see [5.4 Installer programme](#)).
- Exit this Installer menu by pressing the Info button until the display shows the central heating water temperature. Then the modified parameters will be automatically saved. If you do not wish to save the modifications, wait 1 minute and you will automatically exit this service menu without saving the modified settings.

## 3. Adjusting the gas valve:

Pressing the '-' and '+' buttons simultaneously (3 sec.) = Gas valve adjusting mode for 20 minutes, (display shows an 'H' or 'L'). By pressing the '+' or '-' buttons again, the high and low setting speeds can be accessed. The display alternately shows the speed in thousandths (e.g. 6.2 is 6,200 rpm) and an 'H' for max CH output. The display alternately shows an 'L' and e.g. 1.5 (1,500 rpm) for the minimum CH output.

Cancel the gas valve adjusting mode by simultaneously pressing the '+' and '-' buttons and the appliance will operate automatically.

## 4. Programming with a computer:

The boiler is equipped with a pc-interface. The boiler control unit of the boiler can be linked to a pc using a special cable interface and software

This option can be used to read-out information from the burner control unit or programme new settings or updated boiler software. Contact Mikrofill for further information.

## 5.3 Sensors

The following temperature sensors are used:

### 10K NTC:

supply sensor (Number: 36, par [9 Exploded view](#))

cold water sensor (Number: 30, , par [9 Exploded view](#))

hot water sensor (Number: 31, , par [9 Exploded view](#))

### 12K NTC:

outside temperature sensor (if installed)

### Temperature

Sensor 10 K NTC resistance

### Temperature

Sensor 12K NTC resistance (outside temperature sensor)

Table 5 Resistance table for sensors

Temperature [°C]	Resistance sensor 10K NTC [Ohm]	Temperature [°C]	Resistance sensor 12K NTC (outside temperature sensor) [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		

**High limit thermostat:**

In addition, the appliance has a high limit thermostat which is placed on top of the distribution pipe, on the right side of the stainless steel exchanger (Number: 11-1, 9 Exploded view).

## 5.4 Installer programme

If the installer code is entered (after pressing the '-' and 'Info' buttons for 3 sec.), the following parameters can be set or modified (modify by using the '+' and '-' buttons). See table 7.

After modifying the parameters, you can exit this programme by pressing the 'Info' button (3 sec.). The modified settings will be saved automatically.

## 5.5 Explanation of options for installer

### 5.5.1 Programme number J1: Max. CH supply temperature

This option is used to set the max. supply temperature of the central-heating boiler during the central heating mode. Settings range from 10°C to 90°C.

### 5.5.2 Programme number J2: Max. CH heat output (fan speed during CH mode)

This option can be used to increase or decrease the max. central heating heat output (40/30°C) as specified on the data plate, according to the table below:

	<b>Ethos 36C kW</b>	<b>Ethos 54C kW</b>
99%	30	42,0
95%	28	40
90%	27	38
85%	25	36
80%	24	34
75%	22	31
70%	21	29
65%	19	27
60%	18	25
55%	16	23
50%	15	21
45%	13	19
40%	12	17
35%	10	15
30%	9	13

Table 6 CH heat output

### 5.5.3 Programme number J3: Pump operation

This option is used to select a continued central heating pump circulation for the installation. This setting has no influence on the continued pump circulation after tapping hot water: this overrun time is recorded in parameter 'J5'. Enter '0' for the pump overrun time for the central heating installation. The length of the pump overrun time is recorded in parameter 'J4'.

If the pump must operate continuously (e.g. for floor heating), enter '1'.

### 5.5.4 Programme number J4: Pump CH overrun time

This option is used for setting the pump overrun time after the heat demand for central heating has finished. Settings range from 0 to 30 minutes; the default setting is 3 minutes.

### 5.5.5 Programme number J5: Pump DHW overrun time

This option is used for adjusting the pump-overrun time after heating up the built-in hot water supply. Settings range from 0 to 30 minutes; default pump overrun time is 1 minute.

Programme number	Programme description	Setting range	Default setting
	Installer code	0 – 99	Installer code is 8
*J1	Max. CH supply temperature	10°C – 90°C	85°C
*J2	Max. CH heat output	30% en 99%	80%
*J3	Pump operation	0 = pump overrun time active 1 = pump continuous	0
*J4	Pump overrun time for CH mode	0...30 min.	3 min.
*J5	Pump overrun time for DHW mode	0...30 min..	1 min.
*J6	Step modulation	0= Step modulation, CH off 1= Step modulation, CH active; 5 minute steps 2= ditto, 10 minute steps 3= ditto, 20 minute steps	1
*J7	DHW temperature	55°C - 65°C	60°C
*J8	Max. DHW heat output	30% en 99%	99%

Table 7 parameter settings

### 5.5.6 Programme number J6: Step modulation Control

This parameter can be used to increase the heat output in steps while heating the installation, so the appliance is condensing continuously, generating a high efficiency. This step programme consists of 6 steps, each with an adjustable interval:

J6- 0 = no steps, so on/off, based on the room thermostat

J6- 1 = 6 steps, each with a 5 minute interval (factory setting)

J6- 2 = 6 steps, each with a 10 minute interval

J6- 3 = 6 steps, each with a 20 minute interval

With each step the heat output is increased with 20%, starting with the min. heat output.

The boiler will start with the lowest heat output and increase this with 20% every '5, 10 or 20' minutes until the max. heat output is reached or the boiler ends this programme because the installation has reached the set temperature.

#### a. When using an on/off room thermostat:

If there is no heat demand, this programme will count backwards with the same intervals until a renewed heat demand is present; the appliance will then start with a heat output corresponding to the deducted interval. Consequently, the boiler efficiency during heating will always be higher than 100% and the boiler will always have an optimal heat output during the daytime period. This prevents undesirable fluctuations of the room temperature.

#### b. When using an 'OpenTherm®' thermostat:

If the calculated water temperature of the thermostat is reached, the step programme will be stopped and the 'OpenTherm®' thermostat will take over the boiler control. The boiler heat output is adjusted to the heat requirement: the boiler will modulate optimally and a steady room temperature will be maintained

### 5.5.7 Programme number J7: Hot water temperature

Use this parameter to adjust the hot water temperature of the tap water between 55 – 65°C.

### 5.5.8 Programme number J8: Max. DHW output

This parameter enables you to adjust the heat output for DHW.

	Ethos 36C kW	Ethos 54C kW
99%	36	54
95%	34	51
90%	32	49
85%	31	46
80%	29	43
75%	27	41
70%	25	38
65%	23	35
60%	22	32
55%	20	30
50%	18	27
45%	16	24
40%	14	22
35%	13	19
30%	11	16

#### 1. An OpenTherm® clock thermostat with a built-in outside temperature control and outside temperature sensor\*\*

Connect the OpenTherm® thermostat to terminals 1 and 2 of the terminal block in the boiler.

Connect the outside temperature sensor to terminals 5 and 6 of the terminal block in the boiler. Except for adjusting the combustion line, which is pre-programmed by the manufacturer, no parameters have to be modified.

\*\* The proper operation of this installation depends on the OpenTherm® room thermostat.

If this thermostat supports burner line control, the outside temperature is processed and set by the thermostat control.

#### 2. Connecting a room or clock thermostat to the boiler

- Connect the room thermostat to terminals 3 and 4 of the terminal block in the boiler.
- Except for adjusting the values pre-programmed by the manufacturer, no parameters have to be modified.

#### 3. Connecting an OpenTherm® (clock) thermostat to the boiler

- Connect the OpenTherm® thermostat to terminals 1 and 2 of the terminal block in the boiler.
- Except for adjusting the values pre-programmed by the manufacturer, no parameters have to be modified.

### 5.6 Filling and bleeding the boiler and installation

Fill the central-heating boiler and heating installation by using the filling and drain cock in the installation.

The filling pressure must be 1 to 1.5 bar.

The following points must be considered to prevent corrosion of the central heating installation:

- a. The CH system water should be treated to give neutral pH value, +/-7. Only use approved additives.
- b. Thoroughly flush the central heating installation
- c. If plastic pipes are used, they must be of an oxygen diffusion barrier and be suitable for central heating systems, in according with DIN 4726/4729. If they are not, make a separation between the boiler circuit and the circuit with plastic pipes.
- d. Check the circuit for leaks.

After filling the installation and boiler, bleed the heat exchanger once before the first commissioning. To do so, open the bleeder on the upper left side one full turn. As soon as water starts to pour out of the bleeder, close it again.

The wall boiler is equipped with an automatic bleeder at the top of the circulation pump.

Shortly after commissioning the appliance, check the filling pressure. If necessary, add water to maintain the required pressure. The wall boiler's electric control has a special start-up programme for bleeding the appliance. This

---

programme is started when the power supply is switched on for the first time or when pressing the Info button after a failure.

This start-up programme takes 2 minutes: the display shows code 't8'. After the bleeding programme has finished, the boiler will start to operate.

### **DHW circuit**

The cold and hot tap water connections are located at the bottom of the appliance. Connect the pipes according to statutory regulations. Adjust the built-in water flow rate restrictor cock (No. 11, [2.2 Explanation of parts](#)) while the appliance is switched off.

Measure the water flow rate at the farthest hot water tap outlet and adjust the restrictor.

Note: the Ethos 54C is not fitted with a flow restrictor.

### **Shutting down the appliance**

1. Isolate the boiler from the electrical supply and close the gas tap.
2. When working at the water intake side of the appliance or CH system, always isolate the boiler from the electrical supply.
3. When shutting down the appliance because of frost risk, drain the central-heating boiler and installation. To do so, open the filling and drain cock of the central heating installation and the boiler drain cock at the lower right side of the appliance. In case of frost risk, also drain the water pipe.

## 5.7 Starting the appliance

### 5.7.1 General

The initial pressure in the gas pipe can be measured with the gas control valve measuring nipple (3).  
The minimum initial pressure for the proper operation of the appliance must be 10 mbar.

### 5.7.2 First commissioning

When you have tested the installation and everything is in order, you can insert the plug of the central-heating boiler's mains cord into the wall socket.

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

After the appliance is connected to the mains, an automatic air bleed programme for the boiler will be started. This will take approx. 2 minutes.

The Ethos ..C appliance has a built-in hot water supply and the boiler will start by heating up the DHW coil.

Adjust the room thermostat to a high value, which will ignite the burner after heating up the tap water.

The appliance will ignite electronically several times until a flame is produced (max. 5 times); if no ignition is obtained after several attempts; check whether an initial gas pressure is present and if the gas valve is adjusted correctly.

Use the screw [3] on the gas control valve for measuring the initial gas pressure.

## 5.8 Heat input adjustment and setting

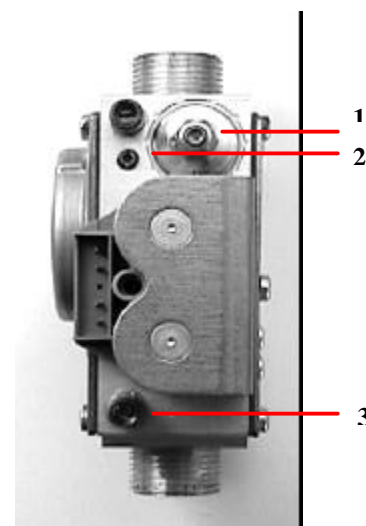
Adjust the boiler heat input by measuring the CO<sub>2</sub> percentage when checking or installing a new gas control valve.

**By measuring the CO<sub>2</sub> percentage, both the min. and max. heat input can be adjusted. First adjust the max. heat input and then the min. heat input.**

### 5.8.1 Max. heat input setting

Pressing the '-' and '+' buttons simultaneously (3 sec.) = Gas valve adjusting mode for 10 minutes, (display shows an 'H' or 'L'). By pressing the '+' button, the high position speeds can be accessed. The display alternately shows the speed in hundreds (e.g. 6.2 is 6,200 rpm) and an 'H'.

If required, the max. input can be adjusted by using the adjusting screw [2]. Turning the adjusting screw to the left (anticlockwise) will increase the max. heat output. Turning the adjusting screw to the right (clockwise) will reduce the max. heat output (see arrows under the adjusting screw). Adjust the max. input, if necessary



### 5.8.2 CO<sub>2</sub> settings

	Type of gas	
	Natural gas G20	Propane
Injector	None	None
Wobbe index (Ws )(gross) (MJ/m <sup>3</sup> )	50,72	76,64
Calorific value (net) (MJ/m <sup>3</sup> )	34,02	88,00
CO <sub>2</sub> max.input (%)	8,8(+/-0,3)*	10,5(+/-0,3)*

\* Measured without jacket

Table 8 Gas settings

### 5.8.3 Checking the max CH input

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

Appliance	Ethos 36C	Ethos 54C
Natural gas	50 litre in 54 sec.	50 litre in 39 sec.
Propane	15 litre in 46 sec.	15 litre in 34 sec.

**Note:** After adjusting with a CO<sub>2</sub> % measurement, the gas meter can be used to check if the required input is reached.

#### 5.8.4 Min. input setting

After setting the max. input, press the '-' button. The display alternately shows the lower position min. speed which is 1.5 or 1.7 (= 1,500 rpm Ethos 36C and 1,650 rpm Ethos 54C), depending on the applied type, and an 'L'.

Turn the screw [1] for the min. setting to adjust this min. input.

Note: When adjusting the CO<sub>2</sub> percentage, turn the adjusting screw only slightly.

The CO<sub>2</sub> percentage will be reduced if the screw is turned anticlockwise and increased if turned clockwise

		Type of gas	
		Natural gas G20	Propane
Injector		None	None
Wobbe index Ws (gross)	(MJ/m <sup>3</sup> )	41,52	76,64
Calorific value Hi (net)	(MJ/m <sup>3</sup> )	30,5	88,00
CO <sub>2</sub> min. heat input	(%)	8,3(+/-0,3)*	10,1(+/-0,3)*
* measured without jacket			

Cancel the gas valve adjusting mode by simultaneously pressing the '+' and '-' buttons and the appliance will operate automatically.

#### 5.9 Conversion for different gas type

Please contact ETHOS Boilers before converting the appliance for LPG use.

After conversion to propane, the CO<sub>2</sub> settings must be checked:

- Turn screw [2] 4 full turns clockwise.
- Switch on the appliance. If appliance doesn't fire after 4 ignition attempts, turn screw [2] one full turn back (anticlockwise).
- If burner is ignited: press (approx 1 minute after ignition) the '-' and '+' buttons simultaneously (3 sec). Boiler will now operate for 20 minutes in gas valve setting mode.
- Check / set max. and min. heat input and CO<sub>2</sub> setting according to par. 5.8.1 to 5.8.4.

#### 5.10 DHW temperature

This temperature is set by the manufacturer at a fixed value of 60°C to prevent Legionella contamination at low temperatures.

It is advisable not to set this temperature at a lower value.

#### 5.11 Shutting down

It is advisable to keep the appliance switched on during winter and summer. This prevents the appliance from freezing and moving parts from seizing.

Switch off the appliance by decreasing the value of the room thermostat: this ensures a minimum power consumption (+/- 5 watt), since the central heating pump and fan will stop after a short time delay.

If it is necessary to shut down the appliance, perform the following actions:

- Close the gas tap.
- isolate the boiler from the electrical supply.
- In case of frost risk, drain the appliance and installation.
- In case of frost risk, also drain the water pipes.

First drain the installation and then open the draining point on the boiler to drain the appliance. For the DHW first isolate the MCW inlet supply and open the hot water taps.



## 6 FAILURES

There are a number of situations during which the appliance will shut down due to a failure and can only be activated again by pressing the Info button. Failures are indicated by a flashing dot behind the water temperature in the lower right side corner of the display. By pressing the Info button, the failure will be shown briefly and the boiler will automatically start operating again.

The following 'lock-out' failures can occur. A flashing F followed by a digit on the display shows the type of failure.

Display code:	Failure description:	Cause of failure (see table 11):
Blank	Power supply failure	14;20;27;36;37;38;50
F0	High limit thermostat opened	4;5;21;23;24;28;29;30;31 42;43;46;47
F1	Code key error	13;63
F2	Manually generated boiler failure for programming with computer	15;63
F4	Ionisation failure	10;11;16;17;18;22;25;35;34
F6	Ionisation during rest	18;35;61
F7	End of programming	48
F8	Fan error	7;8;9;13;19;39;40;41
F9	VKK coupling error ( <b>not applicable for UK</b> )	41;42;67

Table 9 Failures

Fuse: 250 VAC 2A. Delay fuse



Display code:	Failure description:	Cause of failure
t messages	Temporarily blocked	See section. 5.1.

In addition, there are a number of failures or problems which cannot be shown on the display.  
Below a number of these failures or problems are listed:

Table 10 Other types of failures

	Symptom	Cause of failure (see table 11):
a	Room temperature not reached, appliance does fire	45;53;54
b	Noisy ignition	35
c	Boiler runs continuously but CH water does not warm up	45
d	Room thermostat demands heat, but boiler does not ignite	1;42;52
e	Boiler firing continuously, house too warm	2
f	Boiler is very noisy in CH operation	29;46;66
g	Top of radiators not getting hot enough	55
h	Water drawn off but water from the hot tap remains cold	24;56
i	Domestic 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 DHW operation	23;59
l	Fault after replacement of burner control unit	60

## 6.1 Cause of failure

Failures can be caused the following:

Table 11 Cause of failure

1.	Room thermostat is not connected properly.
2.	Room thermostat does not switch off, short circuit in cable.
3.	Sensor has caused a short circuit in the cable or internally.
4.	Pump does not rotate; is stuck.
5.	Water pressure in central heating installation is too low.
6.	Water pressure in central heating installation is too high.
7.	Fan is not connected (plug is not connected).
8.	Fan is dirty.
9.	Fan is defective.
10.	Gas tap is not turned on.
11.	Gas pressure is too low.
12.	Gas pipe diameter too small.
13.	Code key not installed; code key not connected properly to burner control unit; wrong type of code key.
14.	Fuse defective.
15.	This code is shown after programming with a PC.
16.	Gas valve setting at lowest speed is wrong.
17.	Gas valve is not or not properly connected electrically.
18.	Ignition cable interrupted or not connected properly.
19.	Transformer defective.
20.	Gas valve connector not fitted properly or moisture inclusions.
21.	Pump connector not fitted properly.
22.	Siphon clogged.
23.	Air in system; open and close manual bleeder after bleeding.
24.	Three-way valve is dirty.
25.	Resistance in the discharge system too high or discharge system dirty.
26.	Discharge system is leaking toward supply system; flue recirculation only at concentric connection.
27.	Supply system lets in water.
28.	Flow adjusting cock is dirty; if applicable, check bypass, filter dirty.
29.	Heat exchanger interior is dirty (insufficient circulation)
30.	High limit thermostat defective (insufficient circulation)
31.	Max. heat input too high.
34.	Burner control unit defective.

35.	Ignition electrode defective (porcelain cracked); wrong distance to burner
36.	Moisture on gas valve cables or ignition cable.
37.	Moisture on printed circuit board in burner control unit.
38.	Moisture in pump wiring.
39.	Moisture in fan or connection.
40.	Fan plug not connected properly.
41.	Mains plug not connected properly.
42.	Connecting cable damaged.
43.	Sensor defective.
44.	Flue re-circulation at the back of the heat exchanger.
45.	Hot water tap leaking or leak in hot water piping (boiler in hot water mode)
46.	Position of pump speed switch is set too low.
47.	Sensors interchanged, sensors not installed properly on pipe.
48.	Settings programmed with PC are saved (boiler reset by using Info button).
49.	Fuse defective.
50.	No mains voltage 230Vac.
51.	Wrong parameter(s) entered in installer programme.
52.	OpenTherm® room thermostat or conventional thermostat connected to the wrong terminal.
53.	Wrong programming of step programme in installer menu or steps too long.
54.	Clock programme in clock thermostat should start earlier in the morning.
55.	Supply and return pipe on appliance interchanged.
56.	Cable or plug to three-way valve not connected properly.
57.	(Hot water) sensor is not installed properly or defective.
58.	Flow adjusting cock in the cold water pipe must be adjusted.
59.	DHW exchanger must be de-scaled.
60.	Wire harness connectors on printed circuit board not installed properly; no code key installed.
61.	Gas control valve defective.
62.	Confirmation of new settings after programming with computer.
63.	Wrong parameters or value outside the setting range programmed.
64.	Burner control unit frequently checks the supply voltage.
65.	Wrong gas valve adjustment for max. heat input.
66.	Programme numbers J1 or J2 of installer programme have wrong settings.
67.	Failure in boiler ventilation coupling (VKK coupling). <b>NOT APPLICABLE for UK</b>
68.	DHW flow restrictor in boiler not adjusted properly.

## 6.2 Table of solutions

Table 12 Solutions to failures

1.	Check or replace the cable; check the connection on the terminal block.
2.	Replace room thermostat or cable: check if the proper thermostat is installed.
3.	Replace sensor or locate error in cable.
4.	Try to loosen the pump shaft or replace pump drive.
5.	Add water and locate leak; also check the expansion tank for internal leaks.
6.	Too much water added, check expansion tank pressure or replace expansion tank.
7.	Install plug: plug section with cables at fan side.
8.	Clean fan blades.
9.	Replace fan.
10.	Turn on gas tap.
11.	Check pipe and gas meter; if necessary, make a resistance calculation.
12.	Modify gas pipe.
13.	Install code key, check if code key is connected properly
14.	Replace fuse; check all 230 V connections: pump, three-way valve, fan, PCB connection
15.	Reset burner control unit by pressing the Info button
16.	See section <u>5.8.1 Max. heat input setting</u>
17.	Check wiring by using wiring diagram; check its connection to the gas valve; check for moisture.
18.	Check the cable for short circuits or overheating close to the steel plate; check spark plug cap for cracks and replace cap, if necessary.
19.	Replace burner control unit.
20.	Moisture inclusion, check if cables sleeves are inserted properly into connector; check cable sleeve position and rectify, before connector is inserted.
21.	Check if connector(s) are pressed together with the right amount of pressure.
22.	Open the flush pipe (left side of the appliance) by removing the sediment strainer; hold a container or bucket under the pipe to collect the water. Use a pin to puncture the pipe to the upper left and upper right. If necessary, remove the burner unit from the appliance and pour water into the heat exchanger to flush the siphon.
23.	Not only bleed the boiler, but also the entire installation. Pull the appliance's 230V plug from the socket for this type of bleeding, because the central heating pump should be switched off for bleeding.
24.	Inspect the shut-off valve of the three-way valve by removing the pump motor with the 4 mounting screws. The valve can be inspected from the inside of the pump housing. The drive motor can be disassembled by removing the mounting screw at the front of the housing (lower right) and then pressing the clicking lip at the side of the housing, just above the motor, and at the same time pushing the motor downwards.
25.	Check if the supply/discharge pipe is clogged.
26.	Check discharge and supply system.
27.	Check discharge and supply system.
28.	Loosen the cold water connection of the appliance; remove the flow adjusting cock and clean it.
29.	It is recommendable to first remove the burner control unit from the appliance to avoid water damage to the printed circuit board. After draining the appliance, the T-piece couplings in the supply pipe and the flat coupling of the return pipe at the pump must be removed. Remove the earth cable, the spark plug cable and the high limit thermostat wires (upper right). Loosen the 3 clamp-screws holding the heat exchanger. Pull heat exchanger partly forward and disconnect the fan plug.
30.	Replace limit thermostat by unscrewing it from the brass connector. System doesn't need to be drained. ( Note, do not remove brass adaptor )
31.	Adjust according to par <u>5.5.1 Max. CH supply temperature</u> or <u>5.5.2 Max. CH heat output</u>
34.	Remove the burner control unit with housing from the appliance by: a. Removing the cover b. Removing the wiring on the PCB connectors. Then remove the display cable from the PCB and remove the burner control unit from the housing and replace it.
35.	Replace or bend. Always bend the electrode near the burner plate or else it might break.
36.	If necessary, dry with hot air (blow-dryer) and check if it functions properly. If not, replace.
37.	See 36.
38.	See 36.
39.	See 36. Remove the connection and dry it by blowing and/or using a blow dryer.

40.	Plug/wire connection should point toward the outside of the fan and fall into the PCB groove on one side.
41.	Check plugs and make sure that they are pressed together properly.
42.	Check if the cables are damaged or jammed and replace, if necessary.
43.	Check pipe connections, replace sensor.
44.	Check heat exchanger seal on flue box, reinstall if necessary, install new lip ring.
45.	Check all outlets and hot water pipes for leaks.
46.	Set pump switch in position 3.
47.	Check sensor wiring / colours; see <a href="#">4.3 Wiring diagram</a>
48.	Replace fuse, if necessary (must be causing the failure); spare fuse available, see picture on par <a href="#">6 Failures</a> .
49.	Replace fuse, if necessary (must be causing the failure); no spare fuse available, see picture on par <a href="#">6 Failures</a>
50.	Check the voltage of the mains cord and wall socket; main fuse.
51.	Check the programmed parameters on <a href="#">5.5 Explanation of adjusting options for installer table 7</a>
52.	Check type of room thermostat and the label on the connectors of the appliance.
53.	Modify the step programme, see <a href="#">5.5.6 Programme number J6: Step modulation</a> .
54.	Modify the wake-up times in the clock thermostat.
55.	Supply (of outlet water) on the left side of the appliance; return on the right.
56.	Push the four-core cable with mini plug in the three-way valve motor; check the three cables.
57.	Check if this sensor is installed properly.
58.	Adjust with an appropriate Allen key (8 mm).
59.	The appliance must be drained at the central heating side and at the sanitary water intake side. The coil can be removed from the appliance after removing the two T-pieces on each side of the coil by using the flat couplings. Remove the mounting bracket at the bottom of the coil. Sanitary water flows between inner and outer tube of the DHW heat exchanger. This might be scaled or dirty; this section must be flushed.
60.	The printed circuit board connector is probably not installed properly, which means that the wiring communicates with the wrong pins: check both the left and right side of the printed circuit board connector to determine whether the connector(s) are installed properly.
61.	A gas control valve failure usually has two causes: the electric coils are defective or the gas valve has an internal defect; in both cases the entire gas valve must be replaced.
62.	The boiler control can be adjusted by using special service software. If the modified parameters are programmed, this confirms that the boiler control has accepted the new parameters.
63.	Use the proper software (check!) for programming and do not exceed the threshold values; try to reprogram.
64.	Check the supply voltage; if the voltage is correct (between 190 and 250 volt), replace the burner control unit.
65.	To check the operation of the Info button. Remove the display from the plastic spacers and check if it functions properly. If not, replace the display. If the display is functioning properly outside the appliance, check whether there is enough room for the button in the plastic cover (the button might be blocked). If necessary, make more room for the button.
66.	Check the installation menu settings: enter '0' in programme line 1.
67.	Check the operation and filters of the ventilation system; check the cable connection between boiler and coupling. <b>(NOT APPLICABLE FOR UK boilers)</b>
68.	Adjust the water restrictor cock value as described in table 4, page 10. (only Ethos 36C)

---

## **7      MAINTENANCE**

### **7.1      General**

Maintenance tasks / inspections must be performed by a registered installer or gas service company, if:

1. The appliance generates a number of similar error codes.
2. A max. interval of 12 months has expired after installation or last inspection/maintenance.

### **ATTENTION: High Voltage**

Before opening the boiler casing for maintenance or servicing parts, the 230VAC main supply to the boiler must be disconnected!

### **7.2      Inspection**

The following operations must be performed during an inspection:

- a. Ask the user if there are any problems with the central heating appliance.
- b. Check the installation for (water) pressure. Pressure should range from 1 to 2 bar.
- c. Remove the jacket from the appliance and inspect all pipes and connections for trails of water and/or water leaks.
- d. Inspect the top side of the jacket and the bottom side of the appliance for water leaks or trails of water from the air supply pipe or bleeder.
- e. Open the siphon and clean it, if necessary.
- f. If you have a computer and software, connect the computer to the appliance and check the service page for error messages, starts and failed/successful start attempts.
- g. Let the appliance operate at maximum input and check the input and CO<sub>2</sub>%.
- h. Let the appliance operate in the minimum input and check the input and CO<sub>2</sub>%.
- i. Listen to the sound of the central heating pump and fan.
- j. Measure the water flow rate and temperature in a hot water boiler with the hot water tap fully opened.
- k. While the DHW is being heated, check if the supply to the central heating installation stays cold.
- l. Disassemble the burner unit by removing the 6 M6 nuts, the ignition cable and earth cable and by pulling the burner unit forwards.

When the burner is pulled halfway forwards, remove the fan cable plug from the fan.

Check the interior of the heat exchanger.

- m. Disassemble the plastic gas/air mixing box at the fan suction side and inspect the fan wheel.

### 7.3 Maintenance

Depending on the inspection results, maintenance or preventive maintenance must be performed.

Reasons for maintenance are:

ad. a Comments or complaints from the client about the operation of the central-heating boiler can reveal possible hidden defects or problems.

ad. b The installation pressure must be between 1 and 2 bar: locate possible leaks in the installation which must be repaired by an installer or service department.

ad. c Possible leaks must be repaired.

ad. d In case of water leaks in the air supply pipe, locate the cause of the leaks, possibly in the roof plane or a concentric pipe due to leaks in the flue pipe.

ad. e If the condensation in the siphon is very dirty, flush the siphon.

If the burner is already removed, use a filling hose to fill the heat exchanger with water. This water will automatically reach the siphon.

ad. f If necessary, change the gas adjustment for min. and max. input at the gas valve.

ad. g If the central heating pump is too noisy, it is advisable to replace it as a precaution.

ad. h When the DHW flow is too low, check if the water restrictor is dirty(Only Ethos 36C). If it is clean and the water flow is lower than the value from par 2.3 Technical data, de-scale or replace the DHW heat exchanger. In 99% of all cases, this problem is caused by scale in the sanitary fittings of the heat exchanger.

ad. i If the supply water temperature increases during tapping, the three-way valve is dirty on the inside and must be cleaned or replaced.

ad. j Never clean the burner itself. If the heat exchanger is dirty on the inside and/or scale has built-up inside the stainless steel pipes, scale can be removed by using a hard nylon brush or citric acid (never use a wire brush!). Then remove the dirt with a vacuum cleaner.

ad. k If the fan blades are dirty, each blade must be cleaned carefully, until the blade material is visible again. If they are cleaned unevenly, the fan will rotate irregularly and get out of balance.

ad. l Bend the electrode carefully, without touching the burner, until the correct distance is obtained (see figure below).

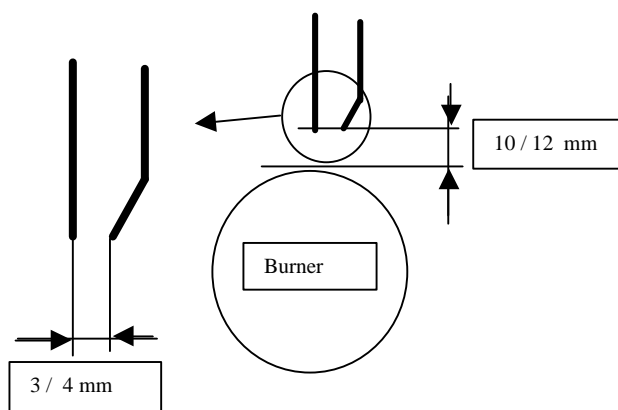


Figure 8 Ignition electrode

---

## **8      USER INSTRUCTIONS**

Instructing the user:

Show the user how to operate the boiler and the installation. It is especially important to familiarise him or her with the safety equipment.

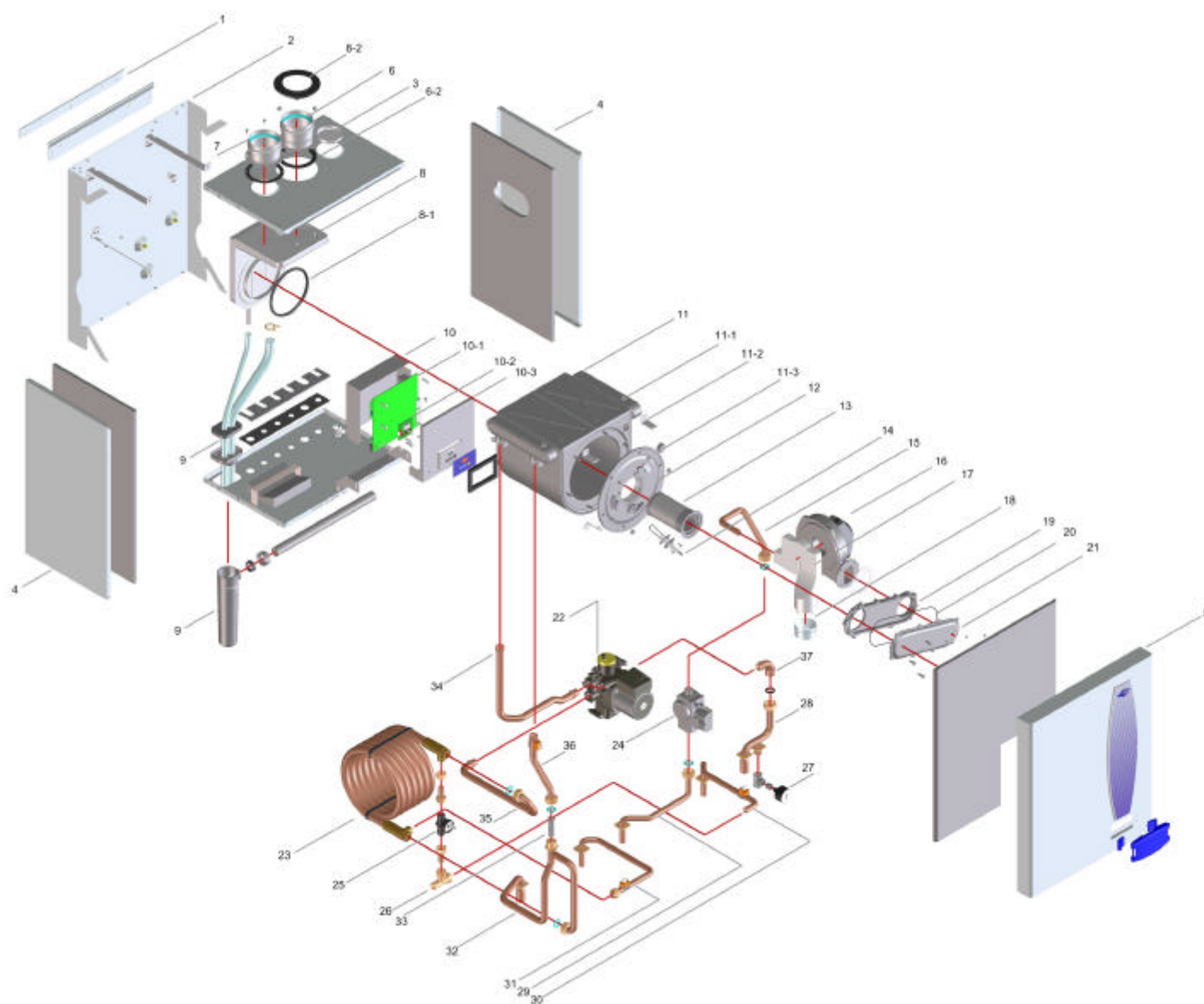
Tell the user that the central-heating boiler requires a service inspection/maintenance at no more than 12 months intervals from installation.

A periodic service is essential for the safe operation of the central-heating boiler.

Give the user the documentation supplied with the central-heating boiler.



## 9 EXPLODED VIEW



## 10 PARTS LIST

Table 13, Spare parts

Pos No.	Description	Order No.			
1	Mounting bracket	106-0085	17	Gas/air mixing box Ethos 36C	106-0562
2	Rear panel	x		Gas/air mixing box Ethos 54C	
	Cable gland	106-0062	18	Insert Gas/air mixing Ethos 36C	106-0351
3	Air supply seal 80 mm	106-0059			
4	Side panel incl. insulation	106-0103		Insert Gas/air mixing Ethos 54C	106-0352
5	Front panel, complete				
	Front panel lid incl. hinge		19	Gas-air duct	x
6	Flue pipe 80 mm	106-0082	20		
	Flue pipe gasket 80mm	106-0081	21		
7			22	Pump, complete Ethos 36C	106-0540
				Pump, complete Ethos 54C	106-0609
8	Flue box	106-0083		Pump motor Ethos 36C	
8-1	Flue box gasket 80mm	106-0120		Pump motor Ethos 54C	
8-2	Seal, flue pipe / jacket	106-0116		Pump O ring set	
9	Siphon, complete	106-0529		Pump stoppers incl. spring clip	
	Hose clip for condensate discharge	106-0573		Pump bleeder	
	Hose set for condensate discharge	106-0597		Pump bleeder cap	106-0456
10	Burner control unit cover			Three-way valve motor	
10-1	Burner control unit (excl code key)	106-0565			
			23	DHW heat exchanger	106-0542
	Code key Ethos 36C	106-0567	24	Gas valve	106-0543
				Gas valve gasket	106-0156
	Code key Ethos 54C	106-0622	25	DHW flow switch	106-0544
	Wiring harness, complete	106-0582		Flow switch gasket	
10-2	Control panel PCB	106-0572	26	DHW flow restrictor cock	106-0142
10-3	Burner control housing, incl. labels and jacket seal		27	Manometer	106-0087
				Manometer T-piece	106-0050
11	Heat exchanger Ethos 36C	106-0525		Drain cock	106-0126
			28	CH return pipe	x
	Heat exchanger Ethos 54C	106-0527		Flat gasket ¾"	106-0158
	Heat exchanger bleeder valve	106-0537	29	Lower gas pipe	x
	Heat exchanger spring clip	106-0134		Gas valve gasket ¾"	106-0156
	Heat exchanger insulation disc	106-0074	30	Cold water inlet pipe	x
11-1	High limit thermostat	106-0089		Cold water sensor	106-0433
	Adapter incl. high limit thermostat	106-0086	31	Hot water outlet pipe,	x
11-3	Measuring point cap incl. gasket	106-0060		Hot water pipe sensor	106-0433
12	Burner plate		32	CH supply pipe, in	x
	Burner plate insulation	106-0575		Flat gasket ¾"	106-0158
	Burner plate incl. insulating plate	106-0531	33	Filter	106-0553
	Burner plate M6 nuts (set of 6 nuts)	106-0079	34	CH return pipe, in	x
13	Burner Ethos 36C	106-0532		CH return pipe O ring	106-0136
	Burner Ethos 54C	106-0533	36	CH supply pipe to heat exchanger	x
	Burner gasket	106-0576		NTC sensor 18mm	106-0434
14	Ignition electrode	106-0534		CH supply pipe O ring Heat exch	106-0136
	Gasket ignition electrode	106-0080	37	Return pipe elbow 90 gr	x
	Screws ignition electrode	106-0510			
15	Gas pipe air-mixing box	x			
	Gas pipe gasket	106-0156			
16	Fan	106-0537			
	Gasket, fan /gas-air mixing box	106-0577			
	Gasket, fan / gas-air duct	106-0578			

Declaration of conformity according to the EC Machine DIRECTIVE  
(89/392/EEG, 91/386/EEG, 93/68/EEG)  
and the EC EMC DIRECTIVE  
(89/336/EEG, 91/263/EEG, 92/31/EEG, 93/68/EEG)

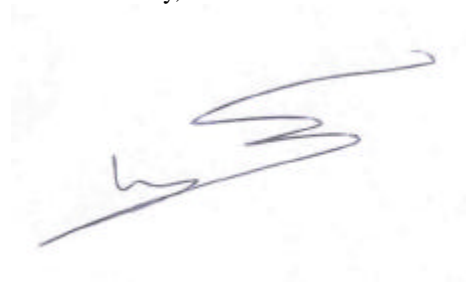
Itho bv  
in Schiedam, the Netherlands

Hereby declares that its central-heating boilers:

Name: Ethos  
Type: 36C, 54C

are built in accordance with the applicable provisions in the EC Machine DIRECTIVES and the EC EMC DIRECTIVE.

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'W. van den Bogerd', is written over a faint, circular embossed seal. The signature is fluid and cursive.

W. van den Bogerd,  
General Manager