USER MANUAL

MBC 500

30.500.000

THERMOBILE

EN | English

TABLE OF CONTENTS

1 INTRODUCTION

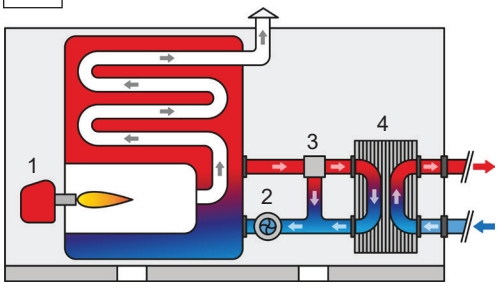
This MBC-500 manual is intended for professional end users such as installers and rental companies who manage the installation, maintenance and transport themselves.

The MBC-500 is a hot water installation with a maximum power of 500 kW.

Applications:
Temporary replacement in case of failure of the existing installation. Temporary heating of new construction and renovation projects and process heating. Heating for events, heating of sports fields during winter periods.

A supply temperature for the heating circuit is set on the boiler. The oil burner first heats up the boiler. An internal circulation pump pumps a water-glycol mixture through the boiler and a plate heat exchanger to transport the heat generated from the primary circuit to the secondary circuit. A three-way valve controls the water flow to the heat exchanger to ensure a stable supply temperature in the secondary circuit.

01



1 - Burner
2 - Pump
3 - Three-way valve
4 - Plate heat exchanger

Explanation of pictograms in this manual:

CAUTION!
Indicates a risk of equipment damage.

WARNING
Indicates a dangerous situation, which death or serious injury may result.

WARNING
Indicates the possibility of fatal shocks.

HOT
Indicates a hazardous surface temperature.

Suggestions and tips to simplify the performance of the relevant tasks or actions.

2 TECHNICAL SPECIFICATIONS

General specifications		
Net capacity	Kw	500-250
Efficiency	%	>95
Temperature difference between flow and return in the boiler	°C	20
Max. outlet temperature	°C	80

Boiler specifications	
Manufacturer	Riello
Type	RTS 511

Burner specifications		
Manufacturer		Riello
Burner type		RL50/2
Fuel type		Diesel, HVO, GTL
Pump pressure	Bar	14
Nozzle Danfoss	USG/h/angle	5,0/60s
Fuel consumption	l/h	52/26
Max. gas oil fuel viscosity	cST mm²/s	6
Max. outlet temperature	°C	220

Emission values			
		High	**Low**
CO_2	%	12,5	12,5
CO	PPM	<10	<10
O	%	4	4
NOx	mg/kWh	<120	<120

Hydraulic specifications			
		Primary Circuit	**Secondary Circuit**
Liquid flow	m³/h	29	22
System volume	L	700	20
Max. system pressure	Bar	5	10
Fluid		ppg 30%	non-corrosive
Pressure loss @25 m³/hr - w. clean filter	kPa	-	45

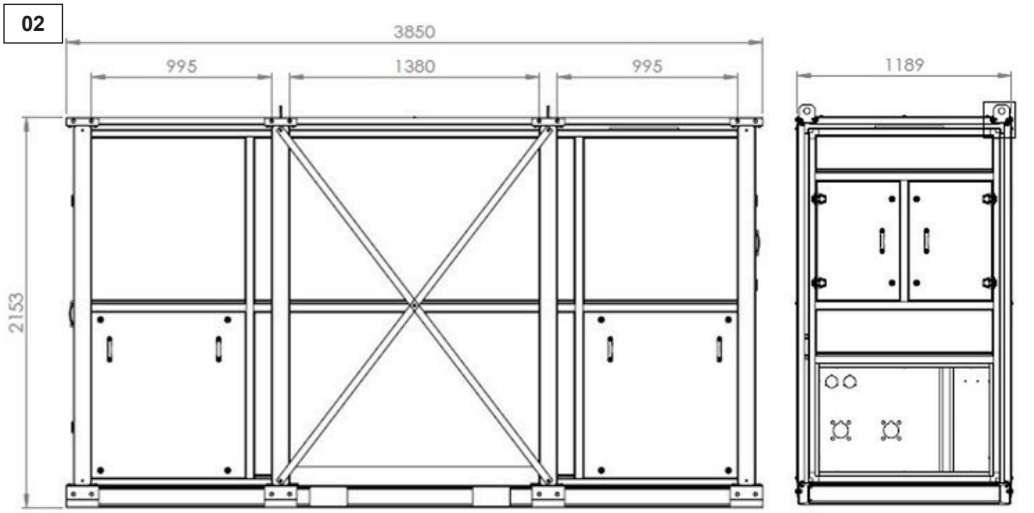
Electrical specifications		
Supply voltage	V	400 3ph
Frequency	Hz	50
Amperage	A	3,2
Voltampère	kVA	2
Electrical connection	Cee-form	32A 3p N E 6h

Noise specifications		
Sound pressure level @5m	dBA	61

Physical specifications		
Total length	mm	3850
Total width	mm	1200
Total height	mm	2200
Total weight (filled)	kg	3100
Fluid connection (cam Lock)	Inches	2
Chimney connection	mm	300
Fuel connection	Quick connect	0,5"
Stackable		Not possible
Lifting device		Forklift slots/Lifting eyes

3 DIMENSIONS

02



4 PRECAUTIONS AND SAFETY INSTRUCTIONS

4.1 General rules

This document contains important information for the safe and confident installation, use and dismantling of the boiler.

The activities described in this manual are intended to be performed by authorised and trained staff only. The MBC-500 is intended for professional use. Unqualified staff are not permitted to operate or maintain this device. The warranty is only valid if original components are used for repairs.

4.2 Use

The Thermobile MBC-500 can be used to supply closed systems with warm or hot water. To heat tap water, an external heat exchanger must always be connected to the secondary circuit of the boiler.

4.3 Installer information

Only use the device for the purpose described in this manual. The manufacturer shall not be held liable for the consequences of incorrect or illogical use. Incorrect use may cause damage to the device and/or create hazardous situations.

The installation and packaging materials may be hazardous, so keep them away from children.

Never modify the device or any part of it without a certificate of approval from the manufacturer, otherwise you and others may be seriously injured. Significant property damage may result.
All repairs must be performed using original components.

The boiler is supplied as standard with a water/propylene glycol mixture (70/30%).
In case of emptying or leakage, expect irritation if the water/propylene glycol mixture comes into contact with the skin.
See the supplied safety sheet "**Propylene glycol**".

Ensure that work is always performed according to the regulations of the local authorities.

LET OP
Do not use points other than the indicated positions to lift or hoist the boiler.

4.4 User information

Inform the user about the operation of the device.
A manual must always be available near the boiler.

The user must check the system pressure of the device regularly.

Never change the burner settings without the use of a flue gas meter.

Pay close attention to the warnings in this manual.

5 DESCRIPTION OF THE PRODUCT

5.1 General

The Thermobile MBC-500 is a boiler with a capacity of 250 to 500 kW. This boiler has a primary circuit filled with 700 litres of water/propylene glycol mixture (70/30%). The primary circuit consists of a Riello boiler, stainless-steel piping and stainless-steel plate heat exchanger.
By means of a three-way valve, the correct temperature is obtained for the heat exchanger.

The secondary circuit of the boiler consists of an open circuit with 2” camlock connections. The circuit has a water filter with differential pressure gauges, a water stroke damper and the plate heat exchanger. The three-way valve in the primary circuit is controlled according to the outgoing temperature of the secondary circuit. This regulation uses PI&D.

The temperature can be set using a dial located in the switch box. The boiler can be switched on or off on the outside of the switch box.

The system is protected by a pressure relief valve, pressostats, maximum temperature sensor and a fire valve in the fuel supply.

5.2 Identification

MBC 500

Net Capacity High	: 500 kW	Efficiency max.	: 95.5%
Net Capacity Low	: 250 kW		
Primary		Secondary	
P safety	: 5 Bar	T out	: 5°C to 90°C
V total	: 700 l	Q minimum	: 22 m3/h
Propylene glycol	: 30%	P max	: 10 Bar

Fuel types	: Diesel, HVO, GTL
Fuel consumption	: max. 52 L/h
Fuel pressure	: 14 Bar
Electrical Input	: 3 x 400V~ 50Hz
Max current	: 3.2 A
Average current	: 2.8 A
Weight	: 3100 kg
Ambient temp.	: -15°C to 40°C

Prod.code. 30500010 REV00

CE Fabr.year 2023 Serial nr : 2303454

Made by THERMOBILE Industries The Netherlands

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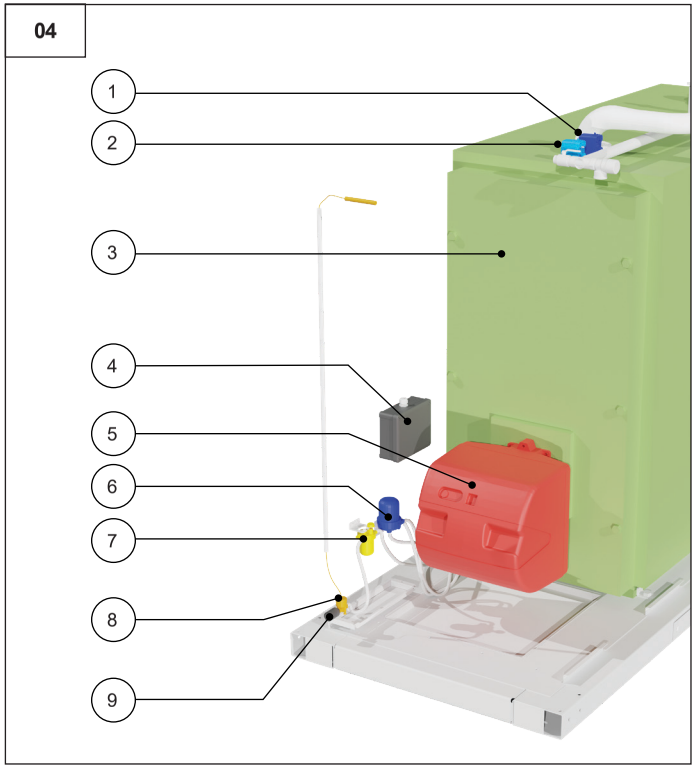

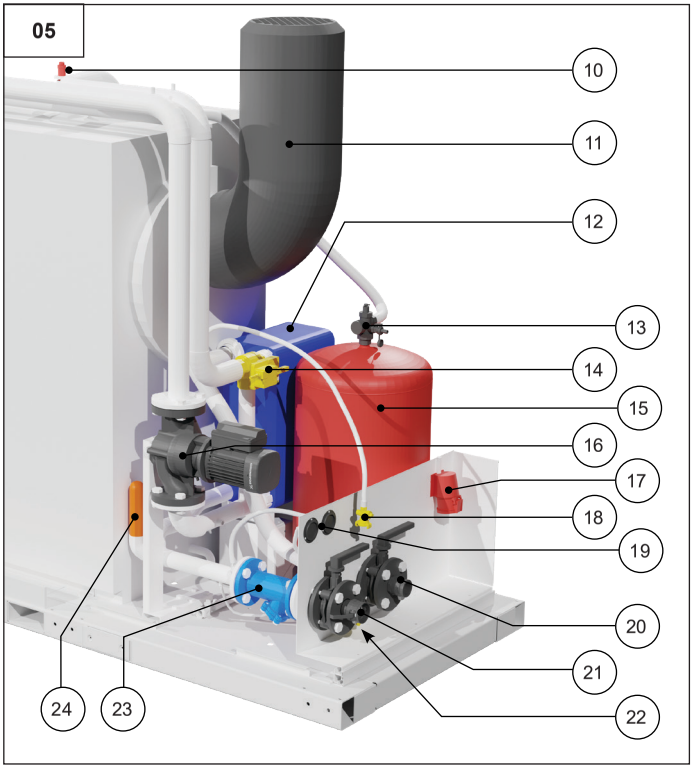

5.3 Main parts

1. Upper pressure switch
2. Under pressure switch
3. Boiler
4. Junction box
5. Burner
6. Tigerloop
7. Oil filter
8. Fire valve
9. Fuel quick coupling
10. De-aerator
11. Flue gas discharge
12. Heat exchanger
13. Primary pressure gauge
14. Three-way valve
15. Expansion vessel
16. Circulation pump
17. 32A 5p CEE wall socket
18. Secondary de-aeration
19. Pressure gauges differential pressure water filter
20. Supply
21. Return
22. Secondary fill/drain
23. Water filter
24. Water stroke damper

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1. Service hatch for burner
2. Service hatch for pump
3. Forklift slots
4. Chimney with gauze
5. Service door
6. Water and electrical connections

6 TRANSPORT AND INSTALLATION

6.1 General

The MBC-500 is built into a frame and equipped with forklift slots and lifting eyes. The MBC-500 can be moved using a truck, crane or forklift. This unit is fully assembled, tested and ready to use.
Shocks must be avoided at all times during transport. Heavy shocks or excessive tilting of the unit can cause damage or a hazardous situation.
Always place the boiler on a firm and stable surface that is suitable for the boiler when it's in operation.
Always place the boiler on a horizontal plane.
Ensure that there is always a gap of 1 metre free of obstacles around the boiler.

6.2 Truck

Ensure that the boiler is correctly secured to the truck or trailer according to the applicable regulations.

6.3 Crane

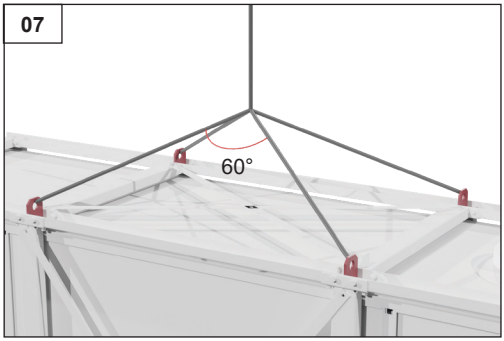
The lifting frame of the boiler makes it possible to lift the unit to a new location.

Ensure that the crane used has sufficient lifting capacity and the correct lifting means. The weight of the MBC-500 is listed in the physical specifications.

CAUTION
Always use all 4 lifting eyes of the frame.

CAUTION
Don't use any other points of the frame for lifting.
The angle of the lifting equipment must not exceed 60 degrees. A larger angle can damage the frame. See Fig. 07

07



6.4 Forklift truck

The boiler has 2 forklift slots. These are located on the long side of the boiler. Lift only at the positions shown in Fig. 08.

08

Ensure that you use a forklift with sufficient lifting capacity. The weight of the MBC-500 is listed in the physical specifications.

WARNING!
Never use a forklift truck to lift the boiler from the ends. Due to the great length and weight of the unit, this is hazardous.

Always ensure that the forks are inserted fully into the slots before lifting the unit. Avoid hard shocks by not lowering the boiler to the floor too quickly.

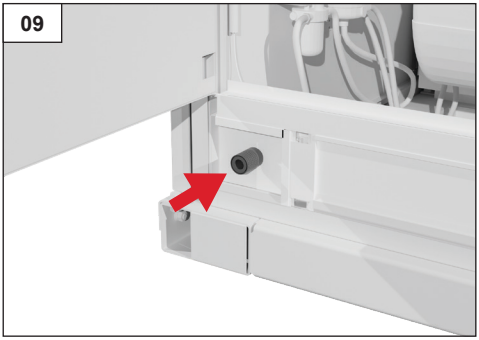
7 INSTALLATION

CAUTION
The installation and commissioning may only be performed by qualified staff.

1. Place the container horizontally/level on a solid and flat surface.
Ensure that the exhaust gases escaping from the chimney don't cause any hazards or nuisance. Observe the local regulations. Ensure unimpeded access to the system.

2. Connect the external fuel tank to the hydraulic quick coupling using a suitable pipe. See Fig. 09

09



3. Open the fuel valve on the filter. See Fig. 10.

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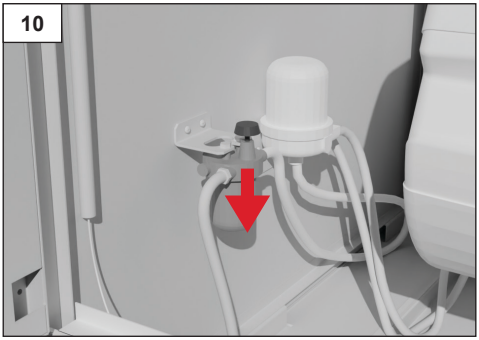

4. Connect the secondary circuit with a pump. Ensure that the pump is always connected as close as possible to the return inlet of the boiler. See Fig. 11.

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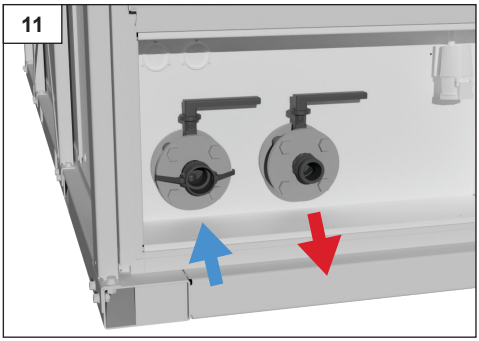

5. Check that the primary circuit is pressurized. If the pressure of the primary circuit is not sufficient, increase the pressure first. See 14.1 for more information.

6. Finally, connect the power supply.

An extended flue gas outlet can be fitted as an option. To do so, remove the grille of the existing flue gas outlet. To connect a single-walled flue gas outlet, Thermobile can offer a process to move from double-walled to single-walled.

LET OP
Never use more than 4 metres of fluegas duct to extend the existing fluegas duct.
Ensure that any bend in the flue gas outlet never exceeds 45 degrees.
See Fig. 12.

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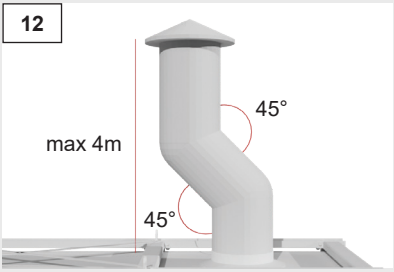

8 COMMISSIONING

CAUTION
For correct operation, ensure that the secondary circuit is filled with water correctly.

1. Power up the system by turning on the main switch.
2. For quick commissioning, the boiler can be set manually to the correct output water temperature. This is done by setting the dial behind the left switch box door to the desired temperature. Further controls are performed automatically with a PLC. See Fig. 13.

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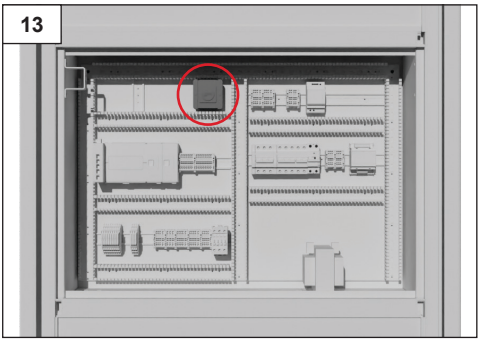

3. Switch the boiler on by pressing the “Start” button located on the right switch box door. The boiler will then heat up to the minimum internal temperature and the internal pump is switched on.

CAUTION
The internal pump remains on until the boiler’s power supply is switched off.

Detailed operation and settings of the system can be found in the following chapters (9 and 10).

9 GENERAL OPERATION

The operation of the boiler consists of two parts.
1: The main control consists of physical buttons and switches
(start, stop, reset, main power & temperature).

2: The digital interface with which other settings and parameters can be configured. This can be done on the device or remotely
(system parameters, test options, alarm screen).

10 MAIN CONTROLS

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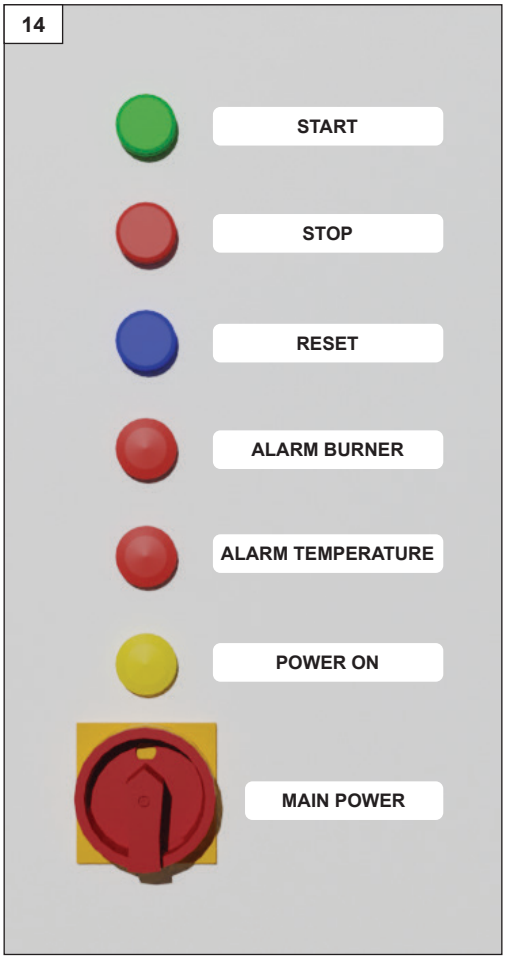

The physical operation of the boiler consists of three buttons, three lamps, a switch and a thermostat. The purpose of each operating component is described in the text below.

Start: (Green)
The “Start” button switches the boiler on. On the first start, after powering up the machine, the internal circulation pump starts to run.
The burner turns on to reach the desired temperature. First, the burner allows any condensation present to evaporate, after which the primary circuit control valve comes into operation. The control valve controls the output temperature of the secondary circuit. During operation in the start cycle, the “start” button lights up green.

Stop: (Red)
The “Stop” button turns the burner off and opens the control valve fully for the set follow-up time. During this follow-up time, the boiler is cooled optimally. The circulation pump of the primary circuit continues to operate as long as the machine is under voltage. When the boiler is in stop mode, the “Stop” button lights up red.

Reset: (Blue)
In the event of a fault, the “Reset” button lights up red. Once the fault has been eliminated, e.g. by first resetting the burner, the control can be reset by pressing the “Reset” button. After resetting, the reset lamp goes out and the “Stop” lamp lights up.

Power ON: (Yellow)
The “Power on” lamp lights up yellow when the machine is under voltage. This means that 400V 32A is connected to the plug and the “Main Power” switch is turned on.

Alarm Burner: (Red)
The “Alarm Burner “ lamp lights up when the burner has in a fault. After resetting the burner, this alarm can be stopped using the “Reset” button.

Alarm Temperature: (Rood)
The “Alarm Temperature” lamp lights up when the boiler overheats (>110°C). After this alarm, it’s necessary to check the cause of the overheating carefully. The maximum
thermostat must be reset manually inside the switch box. After this, the control can be reset with the “Reset” button.

Main Power:
The “Main Power” switch interrupts the power supply. In position “O”, the power is interrupted and the “Power on” lamp is off. The machine is voltage-free from the switch and can therefore be worked on safely.

Temperature input:
The temperature input is located in the switch box behind the left switch box door. This is a dial used to set the output boiler temperature. The PID control ensures that the output is kept as stable as possible at this temperature. See Fig. 15.

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Set the temperature by turning the temperature classification knob with the desired value towards the arrow.

When the values are adjusted in the PLC, the temperature input will use a percentage value (0 to 100%) between these settings.

11 SETTING UP THE PLC FOR USE

11.1 Connecting to the PLC (wired)

Before you can connect to the PLC via a CAT (internet) cable, the IP address of the network adapter must first be set. Then the screen of the PLC can be accessed with “VNC Viewer”.

11.2 Setting the IP address network adapter (Windows)

1. Go to network and internet settings at the bottom right of the Windows taskbar.

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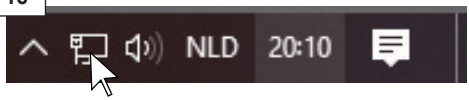

2. Right-click on network and internet settings and then select “Open network and internet settings”

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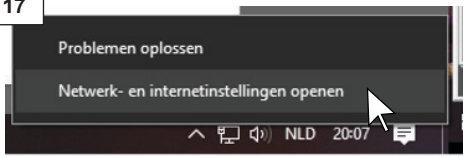

3. After that, under the “Change network settings” heading, click “Change adapter options”.

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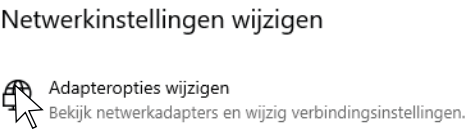

4. The network connections screen opens. All network adapters are listed here. Select the network adapter of the LAN connection.

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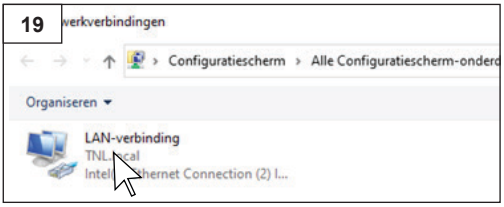

5. Right-click on the LAN network adapter and select “Properties”.

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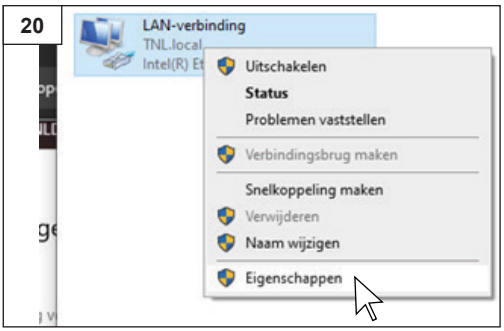

6. In the LAN connection properties, select “Internet Protocol Version 4 (TCP/IPv4)”. After selecting it, select “Properties”.

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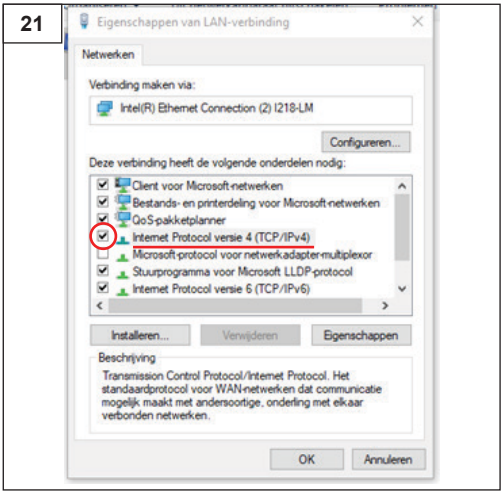

7. In the properties of Internet Protocol Version 4 (TCP/IPv4), select “Use the following IP address”.

Enter the following information:
IP-address: 192.168.1.245
Subnet Mask: 255.255.255.0

Confirm these settings with “OK”.

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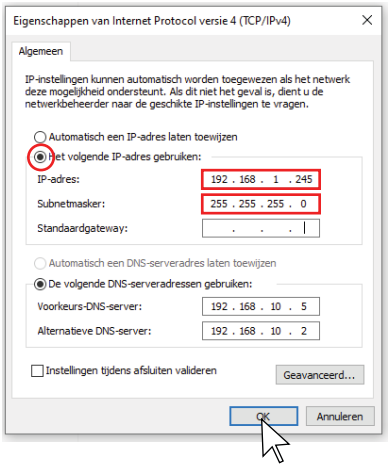

11.3 Using VNC Viewer

1. Download “VNC Viewer” from the address below:
www.realvnc.com/en/connect/download/viewer/

2. Launch the downloaded. EXE file and go through the installation process.
3. Connect the PLC to a laptop via a CAT cable (internet cable).
4. After installation, open VNC Viewer.

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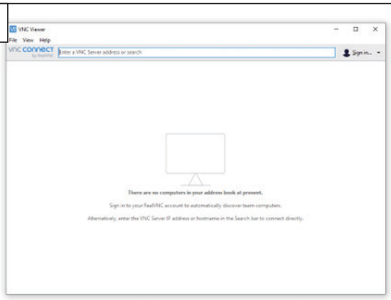

5. In the top bar, type the IP address of the PLC: 192.168.1.1

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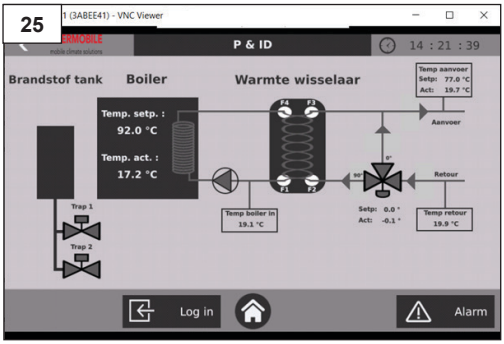
6. After filling it in, click on “Connect to address or hostname “192.168.1.1”; the screen will then be connected and controllable via the computer. The screen can also be operated via a touchscreen.

12 PLC CONTROL

12.1 Main screen



The main screen is visible after connecting to the PLC. The current status is displayed on this screen. The following data can be read from left to right:

- **Fuel tank (burner stage)**
  The current burner setting.

- **Boiler**
  Temperature of the primary circuit with circulation pump status.

- **Heat exchanger**
  Control valve position of the secondary circuit with input and output temperature.

Buttons:

- **Log in**
  Log in as a user to access more data/settings.

- **Home**
  Shown as a house icon. You can always return to this main screen.

- **Alarm**
  Overview of all active faults and list of all possible faults.

12.2 Login screen

You can log in for more control options by clicking the “Log in” button on the main screen.

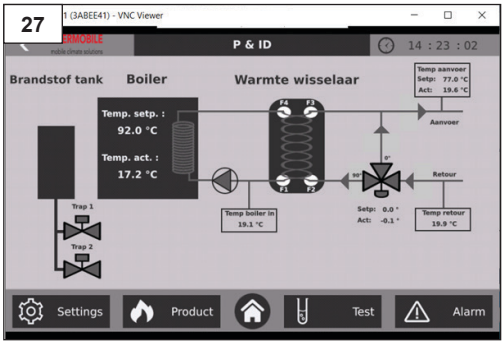
Select the user “Tester” through the triangle behind the input screen of “Username”.

Enter the following
password: “1234”. Then log in by clicking “OK”.

CAUTION
The settings available after logging in are only intended for trained staff and installers.

12.3 Main screen after logging in

After logging in, three new buttons appear on the screen.



The new buttons work as follows:

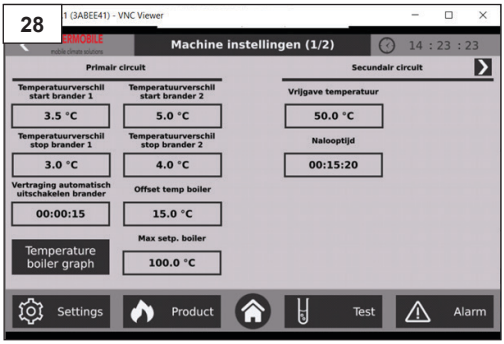
- **Settings**
  Brings up the two screens with additional settings. Opens with screen 1, from which you can navigate to screen 2 of the settings. In the settings, among other things, the temperatures can be changed when the various burner stages are switched on and off.

- **Product**
  Under Product, you can find the hour counters and specific data of the boiler. This also include the adjustment of the PID control.

- **Test**
  The test menu gives the possibility to test different inputs and outputs manually.

12.4 Settings 1

After clicking on “Settings”, the following screen “Machine settings (1/2)” appears.



This is the first of the two settings screens. On this screen, the temperature can be adjusted when the two burner stages switch on and off.

- **Temperature difference starts burner 1**
  Burner 1 represents the low stage of the burner, which is 250 kW. These settings permit the burner to start when the temperature deviates further downward from the desired boiler temperature. This can be described as:

  “desired boiler temperature” –
  “temperature difference start burner 1” =
  “temperature start burner stage 1”
  60 – 3.5 = 56.5°C

- **Temperature difference starts burner 2**
  Burner 2 represents the high stage of the burner, which is 500 kW. This setting permits the high stage of the burner to start when the temperature deviates further downward from the desired boiler temperature. This can be described as:

  “desired boiler temperature” –
  “temperature difference start burner 2” =
  “temperature start burner stage 2”
  60 – 5.0 = 55.0°C

- **Temperature difference Stop burner 1**
  This setting permits burner 1 (low stage) to stop when the temperature rises further and deviates less from the desired boiler temperature. This can be described as:

  “desired boiler temperature” –
  “temperature difference stop burner 1” =
  “temperature stop burner stage 1”
  60 – 3 = 57°C

- **Temperature difference Stop burner 2**
  This setting causes burner 2 (high stage) to stop when the temperature rises further and deviates less from the desired boiler temperature. This can be described as:

  “desired boiler temperature” –
  “temperature difference stop burner 2” =
  “temperature stop burner stage 2”
  60 – 4 = 56.0°C

- **Automatic burner switch-off delay:**
  Delay time after which the burner is switched off when the temperature has been reached.

- **Offset temp boiler**
  This setting determines the internal temperature of the boiler. The temperature of the secondary circuit is selected with the rotary thermostat in the switch box. The boiler temperature is determined by adding the offset temp boiler to the selected secondary circuit temperature.

- **Temperature boiler graph**
  This button gives access to the temperature history of the boiler.

- **Max setp. boiler**
  This setting determines what the maximum temperature of the boiler can be. The set value is the limit of the desired boiler temperature, regardless of whether the offset temp boiler is higher. For example:

  Set secondary circuit = 90°C
  Offset temp boiler = 15°C
  Max setp. Boiler: 100°C

  90+15=105°C

  Desired boiler temperature = 100°C

- **Release temperature**
  This setting indicates the temperature that the primary circuit must reach and maintain before controlling the temperature of the secondary circuit. The three-way valve only opens above this temperature. This prevents excessive condensation from forming in the burner chamber.

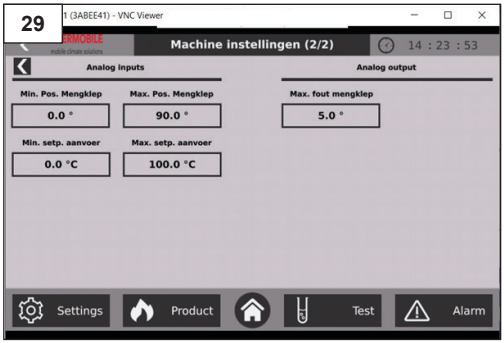
  The release temperature must be a minimum of 45°C.

- **Follow-up time**
  This setting determines how long the three-way valve remains fully open during system shutdown.

  After pressing the “Stop” button on the control, the three-way valve is opened fully to cool down the primary system quickly. The duration of the valve opening is determined with this setting.

12.5 Settings 2

When the arrow on “Machine settings (1/2)” is pressed, “Machine settings (2/2)” appears.



The second machine settings screen has settings for the analogue inputs and outputs. The description of each field is as follows.

- **Min. Pos. Three-way valve**
  This is the minimum position of the three-way valve that the PID controller maintains during regulation.

- **Max pos three-way valve**
  This is the maximum position of the three-way valve that the PID controller maintains during regulation. It is also the position that is maintained for the follow-up time.

- **Min. setp. supply**
  This is the minimum supply temperature to be set for the secondary circuit. This value is equal to the minimum value of the dial in the switch box. With factory settings, the numbers on the dial correspond to the desired temperature.

CAUTION
When you change this value, the setpoint will not match the values on the dial and is the percentage between the Min. setp. supply and Max. setp. supply set by the user on the PLC.

- **Max setp. Supply**
  This is the maximum supply temperature to be set for the secondary circuit. This value is equal to the maximum value of the dial in the switch box. With factory settings, the numbers on the dial corre spond to the desired temperature.

CAUTION
When you change this value, the setpoint will not match the values on the dial and is a percentage between the Min. setp. supply and max. setp. (0-100%). supply set by the user on the PLC.

- **Max. error three-way valve**
  This is the maximum difference that the PLC of the three-way valve can register. If the deviation is too large, an error message is produced.

12.6 Product 1

After pressing the “Product” button on the main screen, the “Product settings” screen below appears.

This is the first of the two “Product” screens. Product includes data such as burning hours and current temperatures. The settings for the PID can also be found here.

- **Fuel tank on off (Future function)**
  Possibility to read an external fuel tank and report when it’s empty.

- **Alarm low level (Future function)**
  Level of the fuel tank when an alarm must be triggered.

- **Min. fuel level (Future function)**
  Minimum fuel level, setting to enter fuel tank data.

- **Max. fuel level (Future function)**
  Maximum fuel level, setting to enter fuel tank data.

- **Minimum pressure contact boiler (Future function)**
  Monitoring of whether the system pressure is too low.

- **Manual**
  Option to store a digital manual on the SD card here. This button opens a PDF viewer with the manual on the SD card.

- **Electrical**
  Option to save a digital schematic here on the SD card. This button opens a PDF viewer with the schematic on the SD card.

- **Spare parts**
  Option to store a digital parts list on the SD card. This button opens a PDF viewer with the parts list on the SD card.

- **Hour gauge stage 1**
  This value refers to the hours that the burner has been burning in the low stage.

- **Hour gauge stage 2**
  This value refers to the hours that the burner has been burning in the high stage.

- **Hour gauge boiler**
  This value refers to the total number of hours that the boiler has burned.

- **Reset hours**
  This button resets the burning hours of Stage 1 and Stage 2 back to 0.

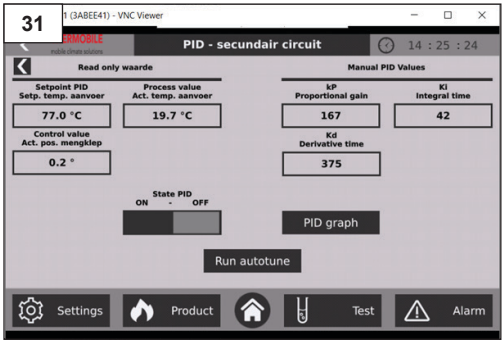
- **Switches trap 1**
  This value refers to the total number of starts of the burner in the low position.

- **Switches trap 2**
  This value refers to the total number of switches to the high stage.

- **Reset switches**
  This button resets the stage 1 and stage 2 switches back to 0.

12.7 Product 2

By pressing the arrow in the top right corner of the first product screen, you can navigate to the second product screen “PID - secondary circuit”.



Here you can find the data and settings of the PID control.

- **Setpoint PID Setp. temp. supply**
  The value to which the PLC control is set with the PID control.

- **Process value Curr. Temp. supply**
  Current temperature measured at the output water flow of the secondary circuit. The PID control will set this value. With correct setting, this value will remain stable at the set value. With incorrect setting, this value will continue to fluctuate.

- **Control value Curr. Pos. three-way valve**
  This is a readout value of the position of the three-way valve.

- **State Pid On Off**
  Button to turn the PID control on and off. After turning off the PID, a PID auto tune can be started to tune the system to the connected circuit.

- **kP Proportional gain**
  The proportional band is proportional to the current measured value.

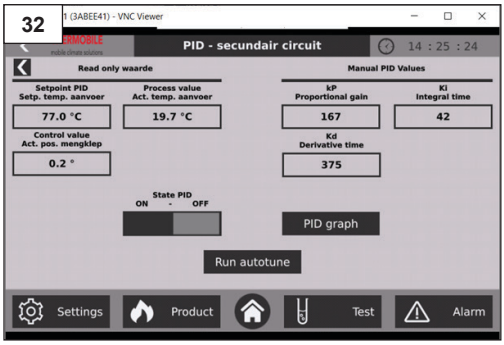
- **Ki Intergral time**
  This value helps to set the PID control based on the error history of the setpoint and the process variable.

- **Kd Derivative time**
  This value helps to predict the setting in the future and adjust it in a timely manner.

- **Pid graph**
  This button displays the graph of the history of the PID control. This only works if the PLC contains a micro SD card.

12.8 PID auto tune

Screen like product 2 with state PID set to Off; the button “Run Auto tune” is now available.



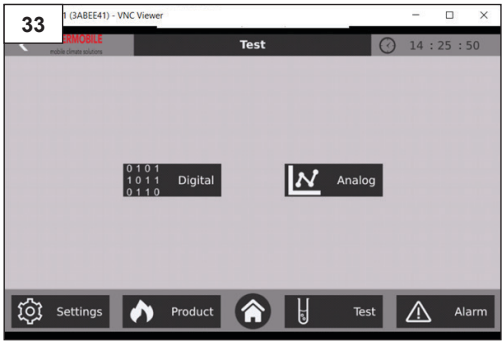
- **Run auto tune**
  This button starts the auto tune process. The boiler is switched on and opened and closed several times. The temperatures are measured and the best kP, kI and Kd are determined.

LET OP

The auto tune process can take a long time (several hours). When the boiler is disconnected or stopped during the auto tune, the PLC can be disrupted.

12.9 Test main screen

You can navigate to the test menus with the “Test” button in the lower navigation bar.

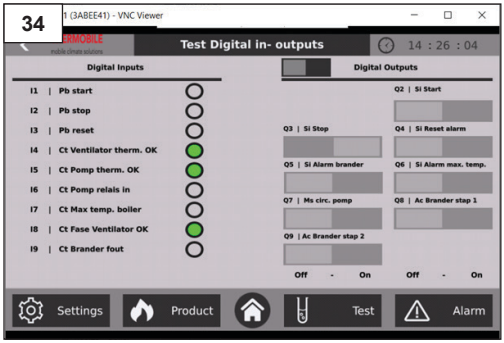


The test menu consists of a menu to test/check the digital inputs and outputs and an analogue menu to test/check the analogue inputs and outputs.

- **Digital**
  Button to go to the overview of digital inputs and outputs.

- **Analog**
  Button to go to the overview of analogue inputs and outputs.

12.10 Test: Digital



The Test digital screen shows all digital inputs and outputs. The confirmation of digital inputs is displayed visually. Digital outputs can be tested manually.

Digital inputs:

- **I1 Pb start**
  Signal of the start button on the service door.

- **I2 Pb Stop**
  Signal of the stop button on the service door.

- **I3 Pb reset**
  Signal of the reset button on the service door.

- **I4 Ct Fan therm. Ok**
  Not relevant. (this is not present)

- **I5 Ct Pump therm. Ok**
  Signal of thermal relay during normal operation.

- **I6 Ct Pump relais in**
  Signal of the magnetic contactor switched on/off.

- **I7 Ct max temp. Boiler**
  Signal maximum thermostat triggered.

- **I8 Ct phase Fan Ok**
  Signal phase registration relay.

- **I9 Ct Brander fout**
  Signaal branderstoring.

Digital outputs:

The digital outputs buttons switch the below functions on and off manually. The automatic control of the boiler is thus ended.

- **Q2 Si Start**
  Control lamp start button

- **Q3 Si Stop**
  Control lamp stop button

- **Q4 Si Reset alarm**
  Control lamp reset button

- **Q5 Si Alarm Brander**
  Control lamp alarm burner

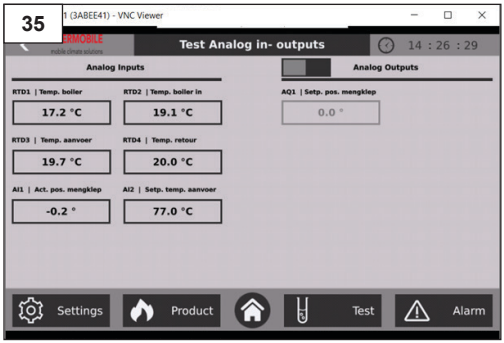
- **Q6 Si Alarm max. temp.**
  Control lamp alarm max.

- **Q7 Ms circ. Pomp**
  Control pump magnetic contactor.

- **Q8 Ac brander stap 1**
  Control relay first burner stage.

- **Q9 Ac Brander stap 2**
  Control relay second burner stage.

12.11 Test: Analogue



The Test analogue screen shows all analogue inputs and outputs. Incoming signals are displayed. Analogue outputs can be tested and used manually.

Analogue inputs:

- **RTD1 | Temp. boiler**
  Measured value of the internal temperature of the boiler. This is also the input temperature of the primary circuit heat exchanger. A temperature between 0°C and 110°C is normal.

- **RTD2| Temp. boiler in**
  Measured value of the temperature of the input water/glycol flow of the boiler. A temperature between 0°C and 110°C is normal.

- **RTD3 | Temp. supply**
  Measured value of the temperature of the output water/glycol flow of the secondary circuit. A temperature between 0°C and 100°C is normal.

- **RTD4 | Temp. return**
  Measured value of the temperature of the input water/glycol flow of the secondary circuit. A temperature between 0°C and 100°C is normal.

- **AI1 | Act. pos. three-way valve**
  The current position of the three-way valve feedback shows the current position of the three-way valve.

- **AI2 | Setp. temp. supply**
  The setpoint temperature supply shows the current position of the dial in the switch box.

  This state is determined by the settings of “Min. setp. supply” and “Max. setp. supply”. The position of the dial can be read as a percentage from 0 to 100%. The set percentage is multiplied by delta between “Min. setp. supply” and “Max. setp. supply”. Adding the value from this to the “min. setp. flow” gives the setpoint supply temperature.

The setpoint temperature supply is used as input of the PID control.

Example:

Min. setp. supply=	0°C
Max. setp. supply=	100°C
Dial =	60%

Max. setp. supply -
Min. setp. supply = 100°C
100 * 0.5 = 50°C

AI2 setp. temp. supply:
0 + 50 = 50°C

Analog outputs:

The analogue output can be operated manually by turning the dial. The automatic control is interrupted until the slider is replaced.

- **AO1 Setp. pos. three-way valve**
  The setpoint for the position of the three-way valve is an output signal to the servomotor of the three-way valve. The three-way valve adopts the position of this issued value.

12.12 Alarm

The alarm screen shows whether alarms are active. The colour of the alarm shows how serious it is for the functioning of the boiler.

The following options are available:

Yellow: (Minor) Minor fault.

Orange: (Major) General fault.

Red: (Critical) Critical fault; the boiler will and must not function. This fault will always be displayed first in the event of several faults at the same time.

12.13 Alarmenlijst

ID	Class	Name	Description
1	Minor	Fan burner thermal fault	This fault occurs in the event of a thermal fault in the three-phase automatic circuit breaker (code schematic). This may be because the burner motor is using too many amps. Check that the motor is not blocked and not running.
2	Minor	Circulation pump thermal fault	This alarm occurs in the event of a thermal fault in the motor protection switch. Check whether the pump can still rotate correctly and freely. Replace the pump if it is running too stiffly.
3	Minor	Circulation pump relay not energized	No feedback to the PLC from the magnetic contactor after switching on the circulation pump.
4	Critical	Phase monitoring fan fault	If the phase sequence is incorrect, the pump and burner motor may have the wrong rotating field. This alarm only applies if no automatic phase change has been built in.
5	Major	Burner fault	Fault signal from the burner. The burner control unit issues a fault signal if it cannot ignite, if the flame fails or if it detects scattered light for too long. For more information, refer to the burner manual.
6	Major	Boiler temperature sensor defective	Deviating measured value of the PT100 in the boiler kettle.
7	Minor	Low fuel level	Only when connecting an external tank with sensor. Not enough diesel in the tank.
8	Major	Boiler temperature sensor defective	Deviating measured value of the PT100 in the supply of the boiler kettle.
9	Major	Maximum boiler temperature reached	Signal registration of the maximum thermostat, 110°C.
10	Minor	Maximum boiler temperature reached	The PT100 in the boiler kettle measures a value higher than 110°C
11	Minor	Servo three-way valve not good	The servo feedback and the servo control values deviate by too much for too long.
12	Major	Supply temperature sensor defective	Deviating measured value of the PT100 in the supply of the secondary circuit.
13	Major	Supply temperature return defective	Deviating measured value of the PT100 in the return of the secondary circuit.

13 FUNCTIONALITY OF SAFETY COMPONENTS

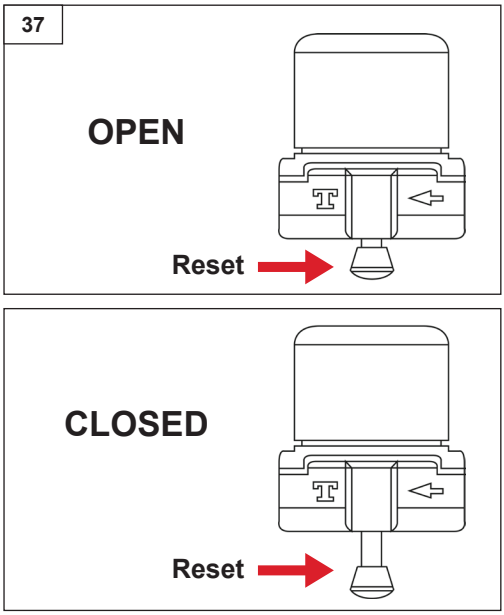
13.1 Fire valve

The fire valve is located in the fuel supply line. The fire valve has a temperature sensor mounted on the ceiling of the boiler. When the temperature rises to 90°C, the fuel supply to the burner is cut off. This prevents possible uncontrollable leakage due to an excessively high temperature inside the device.

If the fire valve is triggered, the reset button must be operated manually. Fig. 37 shows the open and closed position of the fire valve

CAUTION
Once the fire valve has been triggered, the heat source and its cause must first be investigated before resetting the fire valve.

37

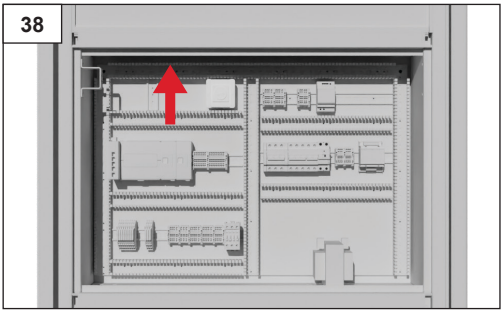


13.2 Maximum thermostat

The boiler is protected internally against overheating. Overheating is very hazardous in a boiler because high pressure can arise in the boiler and the connected pipes.

The maximum thermostat is located in the ceiling of the switch box. After the boiler has been secured and cooled down, the maximum thermostat can be reset by removing the protective cover of the thermostat and pressing the green button with a pointed object. The reset procedure is successful when a clicking sound is heard.

38

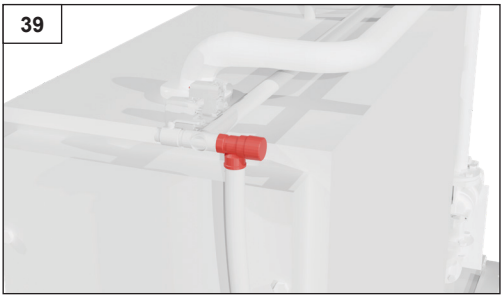


CAUTION
If the temperature sensor in the boiler has not cooled down sufficiently, resetting the maximum thermostat is not possible.

13.3 Pressure relief valve (5 bar)

There is a pressure relief valve in the primary circuit. If the pressure of the primary circuit rises above 5 bar, the valve will open and discharge the excess water.

39



WARNING!
Hot water and steam will often be released during an overpressure. Never work in the boiler when it's hot. Always ensure that you keep an eye on the pressure gauge in the expansion vessel and stop working in the boiler at a pressure above 3 bar.

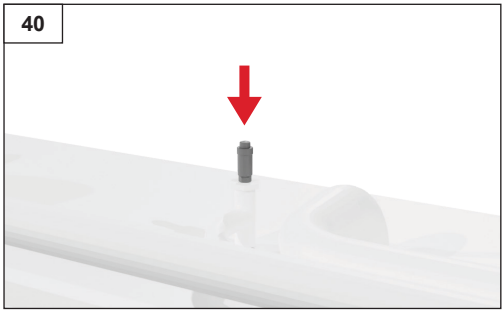
The boiler features an overpressure collection container to collect the water that is discharged in case of overpressure in the primary circuit.
Make sure the container is empty at all times.

13.4 Automatic de-aerator

In the boiler's complex piping system during filling, air bubbles can accumulate. Over time, the air bubbles will move to the top of the boiler.

Air in the primary circuit can cause irregular flow and pressure. It's important to ensure that as little air as possible is inside the boiler and the primary circuit. To remove these air bubbles from the system, an automatic de-aerator is located on top of the boiler.

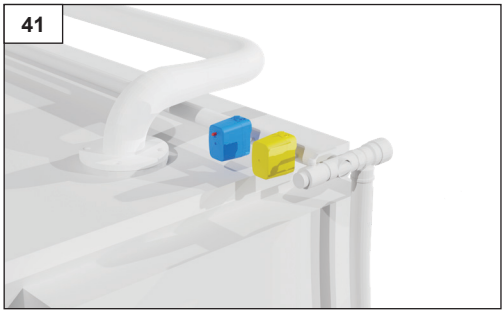
40



13.5 Upper and lower pressure switches

On the primary circuit, there is both a upper and a lower pressure switch. These are found side by side on the top of the circuit. (fig. 41)

41



The upper or lower pressure switches switch when the primary pressure is out of the range of 0.5 to 4.5 Bar.

In case of activation, the switches can be reset by means of a red button. For the upper pressure switch this button is at the front and for the lower pressure switch it is at the back.

14 MAINTENANCE AND MAINTENANCE SCHEDULE

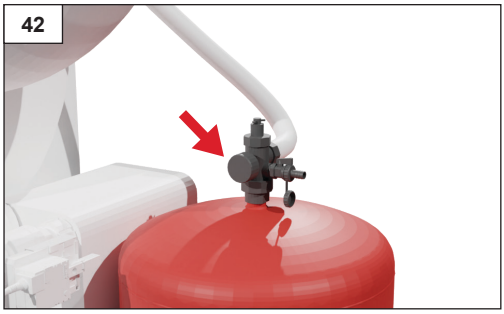
WARNING!
Before performing maintenance or repairs, always disconnect the boiler from the power supply

WARNING!
During and after operation, the chimney opening and the camlock connections of the secondary circuit are hot.

14.1 Primary pressure refill boiler

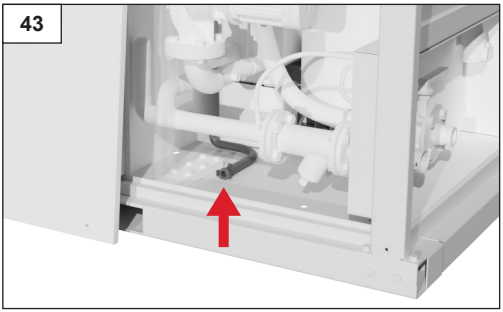
It's important for the primary circuit to maintain a pressure above 0.5 bar at all times. Thermobile maintains a filling pressure of 1.2 bar at 20°C. There is a pressure gauge on the expansion vessel to read the system pressure.

42



If the pressure is too low, it can be refilled via the connection (filling valve) at the bottom of the boiler. The connection is located at the bottom of the boiler behind the inspection hatch of the pump.
See Fig. 41.

43



Use a sturdy hose to refill the boiler.
Allow the hose to fill with water as much as possible before connecting it. Remove the cap from the filling valve. Then connect the hose to the filling valve.

Turn on the water supply of the hose gently, then open the filling valve in small increments until the pressure starts to rise on the pressure gauge. Once the desired pressure has been reached, the filling valve must first be closed, then the water supply must be cut off.

CAUTION
Always refill the boiler with clean tap water. It is preferable to supplement the boiler with demineralised water. This improves the life of the boiler.

14.2 Cleaning the oil filter

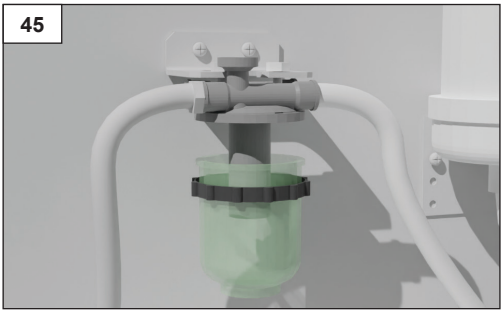
Many oil tanks are heavily contaminated. Especially if the tank is almost empty or if it is refilled during operation of the boiler, a lot of dirt from the burner can get into the fuel circuit filter. it.

If the filter is too dirty or appears to be dirty, clean it as follows:

44

1. Make sure the sump is empty before opening the filter.

45



2. Unscrew the retaining ring of the filter cup and carefully remove the filter cup with the filter from the base.

3. Empty the filter cup into the collection container and take the empty filter cup and filter to a cleaning station.

CAUTION
If you don't have a stainless-steel filter, you can't clean this filter and you must replace the filter.

4. Once the filter and the filter cup are clean, they can be mounted back.
5. After mounting, check that there are no leaks by running the boiler briefly until the filter cup is filled with fuel again.

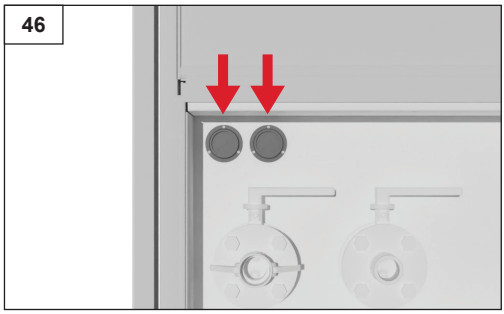
TIP
Add a scraper filter to the fuel tank to prevent frequent cleaning of the oil filter. A scraper filter is much easier to clean and can be used on several boilers.

WARNING!
Always wear gloves suitable for handling fuel when cleaning the oil filter.

14.3 Cleaning the water filter

The secondary circuit of the boiler has a water filter. The pressures upstream and downstream of the filter can be read on the pressure gauges at the secondary circuit connections.

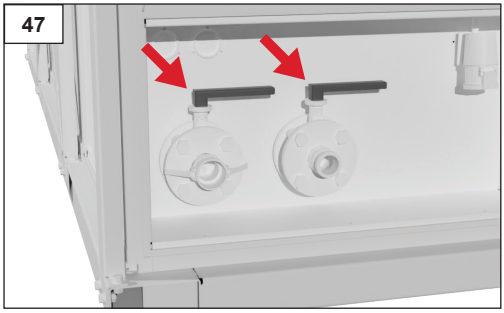
46



If the difference in pressure exceeds 1 bar, then the filter must be cleaned.

Clean the filter by following these steps:

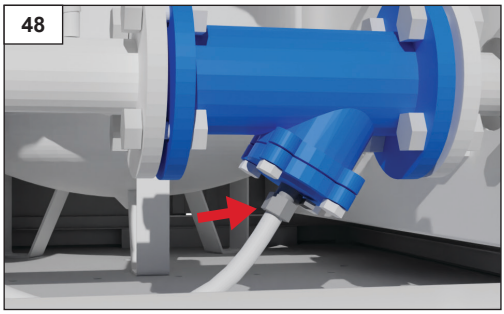
47



1. Close the secondary circuit with the two butterfly valves on the secondary circuit connections.

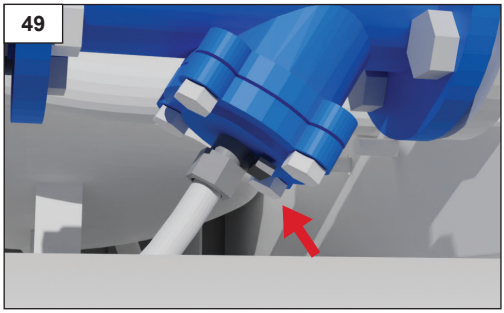
2. Remove the service hatch and set it to one side.

48



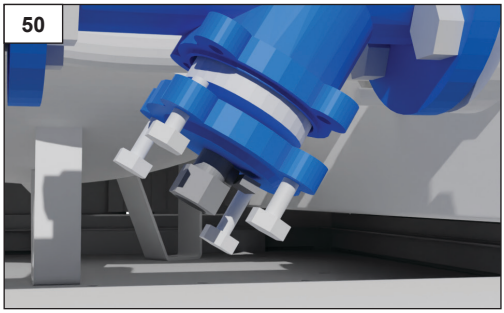
3. Connect a hose to the bottom of the filter, then place the end of this hose in a suitable drain.

49



4. Open the tap on the filter to drain the heat ex changer and the filter.

50



5. Once the system is completely empty, remove the filter by loosening the 4 bolts on the filter.

6. Take the filter gauze with jacket to a cleaning station and rinse the filter until no more dirt is present.

7. Replace the filter and fit the cover again with the 4 bolts.

CAUTION
Don't forget to install the cover gasket and replace it if necessary to prevent leakage.

14.4 Maintenance components

The components to be ordered for general maintenance are as follows:

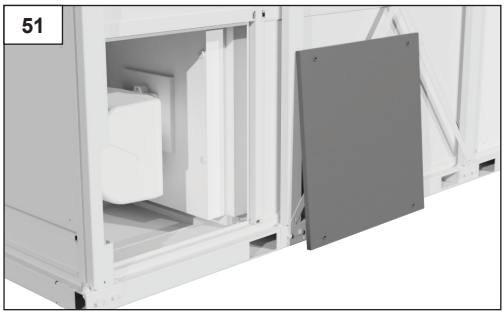
Component	Number	Interval
Nozzles 5gph	40504711	Replace annually.
Oil filter	41520031	Clean as soon as soiled.
Flange Gasket DN 50	30500190	Replace as soon as visible.
Flange Gasket DN 65	30500191	Replace as soon as visible.
Camlock Gasket	30500194	Replace as soon as visible or annually.

Component	Interval
Burner chamber	Clean annually.

14.5 Opening and cleaning the boiler

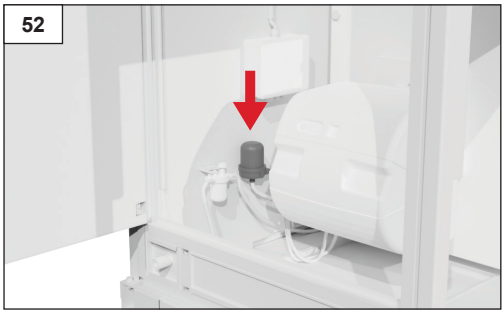
At least annually, the boiler must be cleaned and carbon residues removed. This is essential to extend the life of the boiler.

51



1. Remove the service hatch and set it to one side.

52

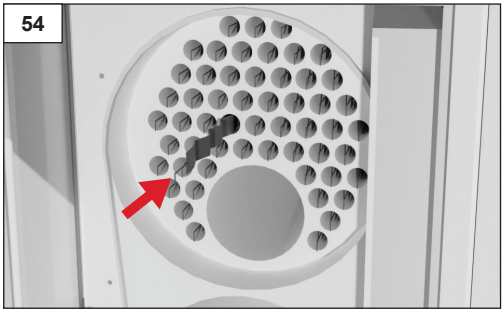


2. Detach the tiger loop from the wall.

53

3. Unscrew the 6 bolts of the door.
4. Open the door.

54



5. Remove the flue gas inhibitors.

6. Clean the inside with a brush or other suitable tool.

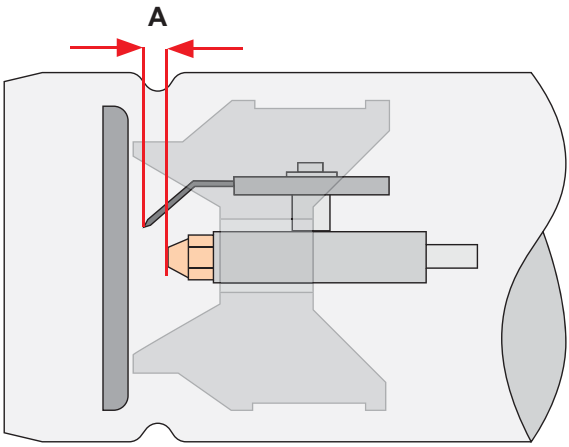
15 BURNER MAINTENANCE

Extensive explanations and details of the installed burner can be found in the manual supplied by the manufacturer.

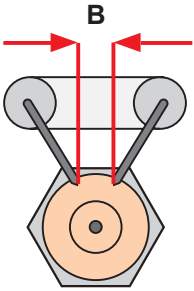
CAUTION
Adjusting the air supply must always be done in combination with a CO2 measurement. It must always be between 12 - 12.5%.

15.1 Burner settings

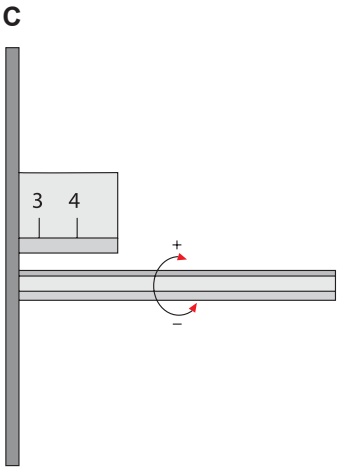
55



56



57



A	2 mm
B	3.5-4mm
C	6

Nozzle
2x 5GHP 60°S

Pump pressure
12 Bar

15.2 Nozzle
Don't clean the nozzle opening. Never open the nozzle. The nozzle filter may be cleaned or replaced if necessary. Replace a nozzle every year or after 1,000 burning hours.

15.3 Fuel pump
The pressure of the pump must be 12 bar. It must never fall below 11.5 bar. Unusual noises coming from the pump indicate wear.

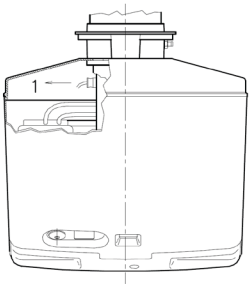
If the pump pressure is unstable or the pump is too noisy, remove the flexible supply pipe from the oil filter. Use a local fuel supply to test if the problem lies in the pump or the supply oil filter.

If the problem lies in the pump, clean the oil filter of the pump. If the problem seems to be in the supply line, ensure that it's completely clean and that no air is being sucked in.

15.4 Fan
Check that no excess dust has accumulated in the fan or on the fan blades. If there's a lot of dust, the fan must be cleaned. Too much dust on the fan or in the fan housing can reduce the airflow, which can cause inefficient burning.

15.5 Photocell
Clean the glass housing of the photocell. Remove the photocell (1) to pull it out from the clamped position.

58

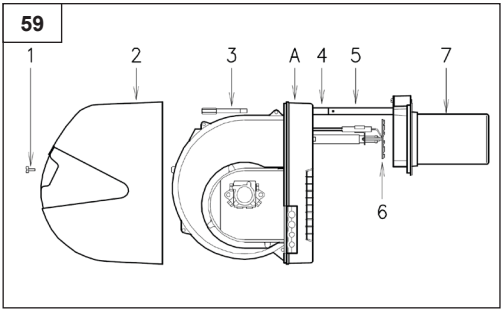


15.6 Fuel supply
Check regularly that the fuel supply to the burner is sufficiently clean. If there's a lot of water or dirt in the tank or pipes, they must be cleaned. Use an external pump to suck water and other impurities out of the tank.

Clean the tank every 5 years or when necessary.

15.7 Opening the burner
Open the burner and remove the burner chamber by following the steps below; the numbers correspond to the indications on the image.

59



1. Switch off the power to the boiler.
2. Remove the screw (1) with the protective cap (2) from the burner.
3. Remove the bolt (3) to slide the burner out of the burner pipe.
4. Place the extension sliding guides (4), if supplied, on the existing guides.
5. Pull part A back, taking care to keep the burner straight to prevent damage to the baffle plate (6).

15.8 Burner control unit diagnostics and reset

During startup, the signal lamp on the burner control unit lights up as follows:

Status	Colour code
Pre-purification	●○●○●○●○●
Ignition phase	●○●○●○●○●
Operation, flame OK	□□□□□□□□□
Working with weak flame signal	□○□○□○□○□
Power supply less than ~170V	●▲●▲●▲●▲●
Lock	▲▲▲▲▲▲▲▲▲
Extremely light	▲□▲□▲□▲□▲
○ Off ● Yellow □ Green ▲ Red	

The burner control unit has a diagnostic mode for easy identification of the causes of burner faults (Indicator: RED LED).

To use this function, wait minimum 10 seconds after the start of the safety condition (Lock-out).
Then press down the reset button for more than 3 seconds.
The burner control unit generates a sequence of pulses (1 second apart) that are repeated at an interval of 3 seconds.
After identifying the fault through the pulses, the system must be reset by pressing down the button for between 1 and 3 seconds.

RED LED lights up wait min. 10s	Lock	Press min. 3s reset	Pulsating	Interval 3s	Pulsating
			● ● ● ● ●		● ● ● ● ●

The codes with associated faults are shown in the table in chapter 17.2 Burner faults.

16 DECOMMISSIONING

16.1 Switching off the boiler

Always switch off the boiler using the “Stop” button. The Stop button lights up and the unit starts cooling down. The set follow-up time determines the time during which the three-way valve is fully opened to permit the unit to cool down as quickly as possible. During this process, run the secondary circuit to dissipate the heat.

CAUTION
Always leave the unit to cool down below 50°C before taking any other actions. After the “Stop” of the boiler, the internal circulation pump will always continue to run as long as the boiler is under voltage. Running the pump ensures good mixing of the liquid and prevents the liquid from freezing during the winter period.

CAUTION
When the boiler is de-energized due to a power fault or manually switching off the main switch, the pump will only \ start running again when the “Start” button has been pressed once.

16.2 Turning off the power

To make the boiler completely de-energized, the main switch must be turned to 0. This switch must be blocked with a lock during maintenance on the device.
To be able to work completely without voltage in the switch box, the mains plug must be disconnected.

After performing these actions, it’s safe to work on the boiler.

16.3 Emptying the system

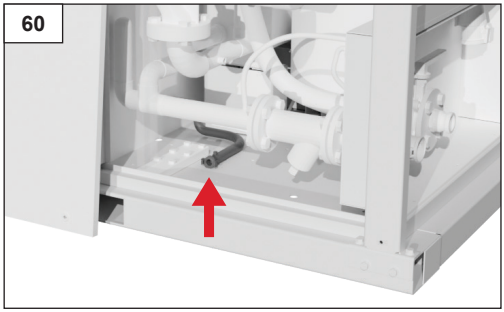
To make changes or repairs to the waterside circuit, the circuit filled with a water/glycol filling must be emptied.

CAUTION
Always ensure that the boiler has cooled down completely before emptying or disconnecting the system.

WARNING!
The primary circuit has an expansion vessel and the circuit is pressurized under normal conditions. In the event of leakage or disconnection of the pipes, high-pressure liquid can be released.

The filling point of the primary circuit is located behind the pump inspection hatch at the bottom of the boiler.

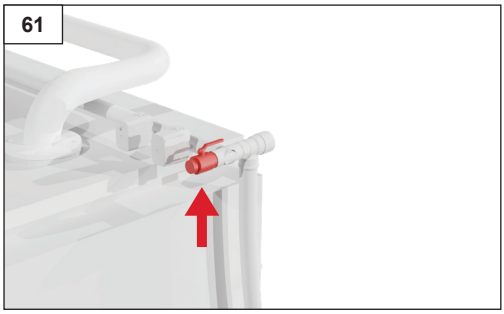
60



Connect a hose to the filling point and place the other end of the hose in a suitable drain or disposal tank. Turn on the tap carefully until liquid flows out of the hose.
The liquid flow will decrease as the pressure in the circuit decreases.

Once the pressure has decreased and the liquid flow is minimal, the ball valve on top of the boiler can be opened to allow the liquid to flow better.

61



To empty the system more quickly, you can also use a suitable pump and hose.

CAUTION
Dispose of the water/glycol mixture according to the regulations of the local authorities.

17 FAULTS AND REPAIRS

Faults may occur in various components of the boiler.
There are only 2 components of the boiler that can indicate faults visually. The PLC and the burner inform the user by means of a light signal that a fault has occurred during operation.

17.1 PLC faults

Description	Cause	Solution
Circulation pump thermal fault	Excessive current consumption of the pump. Possible motor defective or pump blocked.	Check whether the pump can still rotate freely. If it is blocked, remove the obstruction. If the motor is defective, it must be replaced.
Circulation pump relay not energized.	Defective magnetic switch or loose wiring.	Check the wiring according to the schematic. Replace the magnetic switch.
Burner fault	The burner sends a fault signal to the PLC. The burner can have various faults.	Resetting can be done with the button on the burner; troubleshooting is described in chapter 17.2 Burner faults and table.
Maximum boiler temperature reached	Maximum thermostat was triggered by an internal temperature >110°C	Find the cause of the excessive temperature. Reset the maximum thermostat inside the switch box.
Servo three-way valve not OK	The PLC measures a too great a difference between the controlled state of the three-way valve and the feedback state of the three-way valve.	Clean the three-way valve.
Boiler temperature sensor defective	Temperature is outside of the usual range.	Check connections. Replace the sensor.
Boiler temperature sensor defective	Temperature is outside of the usual range.	Check connections. Replace the sensor.
Supply temperature sensor defective	Temperature is outside of the usual range.	Check connections. Replace the sensor.
Supply temperature return defective	Temperature is outside of the usual range.	Check connections. Replace the sensor.

17.2 Burner faults

SIGNAL	PROBLEM
None	The burner does not start.
POSSIBLE CAUSE	**ADVICE**
1 - No power supply.....	Close all the switches. Check the plugs.
2 - A limit or safety check has been opened.....	Adjust or replace them.
3 - Locking of the control box.....	Reset the switch box (not earlier than 10s after locking).
4 - Pump is stuck.....	Replace.
5 - Incorrect electrical connections.....	Check connections.
6 - Defective switch box.....	Replace.
7 - Defective electric motor.....	Replace.

SIGNAL	PROBLEM
2x flashing ● ●	After the pre-rinsing and safety time, the burner becomes locked.
POSSIBLE CAUSE	**ADVICE**
9 - No fuel in tank; water on bottom of tank.....	Fill with fuel or suction up water.
10 - Incorrect adjustment of head and air valve.....	Adjust.
11 - Solenoid valves don't open..... (1st stage or safety)	Check connections; replace coil.
12 - 1st nozzle clogged, dirty or deformed.....	Replace.
13 - Dirty or poorly adjusted burner electrodes.....	Adjust or clean.
14 - Earthed electrode due to defective insulation....	Replace.
15 - High-voltage cable defective or earthed.....	Replace.
16 - High-voltage cable deformed due to high..... temperature.	Replace and protect.
17 - Ignition transformer defective.....	Replace.
18 - Incorrect electrical connections of valves..... or transformer.	Check.
19 - Control box defective.....	Replace.
20 - Pump not primed.....	Fill the pump and see: "Pump unprimes".
21 - Pump/motor coupling defective.....	Replace.
22 - Suction line pump connected to return line.....	Correct the connection.
23 - Valves upstream of pump closed.....	Open it.
24 - Dirty filters: pipe - pump - nozzle.....	Clean.
25 - Defective photocell or switch box.....	Replace photocell or switch box.
26 - Dirty photocell.....	Clean.
27 - 1st stage of cylinder is defective.....	Replace the cylinder.
28 - Motor protection triggered.....	Reset the thermal protection.
29 - Defective motor control.....	Replace.
30 - Missing phase. Thermal protection is switched..	Reset the thermal protection when the third phase is reconnected.
31 - Wrong direction of rotation of the motor.....	Change the motor's electrical connections.

SIGNAL	PROBLEM
4x flashing ● ● ● ●	The burner starts and then becomes locked.
POSSIBLE CAUSE	**ADVICE**
32 - Photocell short-circuit.....	Replace photocell
33 - Light goes inside or flame is simulated.....	Eliminate light or replace control box

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Flame detachment
POSSIBLE CAUSE	**ADVICE**
34 - Badly adjusted head.....	Adjust.
35 - Badly adjusted or dirty..... ignition electrodes.	Adjust.
36 - Badly adjusted fan air gate: ..... too much air.	Adjust
37 - 1st nozzle too large (pulsation).....	Reduce 1st nozzle
38 - 1st nozzle too small (flame loss).....	Increase 1st nozzle
39 - 1st nozzle dirty or deformed.....	Replace
40 - Unsuitable pump pressure.....	Adjust to between 10 and 14 bar.
41 - 1st stage nozzle unsuitable for burner or..... boiler.	Reduce 1st stage
42 - Defective nozzle 1st stage.....	Replace

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	The burner does not switch to the 2nd stage
POSSIBLE CAUSE	**ADVICE**
43 - Control device TR does not close.....	Adjust or replace
44 - Defective switch box.....	Replace
45 - Sol. valve spool 2nd stage defective.....	Replace
46 - Piston jammed in valve unit.	Replace entire unit

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	The fuel goes to the second stage, but the air remains in the first stage.
POSSIBLE CAUSE	**ADVICE**
47 - Low pump pressure.....	Increase
48 - 2nd stage operation of cylinder is defective.....	Replace the cylinder

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Burner stops in transition between 1st and 2nd phases. Burner repeats the start cycle.
POSSIBLE CAUSE	**ADVICE**
49 - Nozzle dirty..... 50 - Photocell dirty..... 51 - Excessive air.....	Replace the nozzle Clean Reduce

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Uneven fuel supply
POSSIBLE CAUSE	**ADVICE**
52 - Check whether the cause is in the pump or the fuel supply system.	Burner power supply from tank near burner.

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Internally corroded pump
POSSIBLE CAUSE	**ADVICE**
53 - Water in tank pump	Suction water from bottom of tank with a separate pump.

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Noisy pump, unstable pressure
POSSIBLE CAUSE	**ADVICE**
54 - Air has entered the suction line..... - Pressure value too high (above 35 cm Hg): 55 - Tank/burner height difference too great..... 56 - Pipe diameter too small..... 57 - Suction filters clogged..... 58 - Suction valves closed..... 59 - Fuel solidified by low temperature.....	Tighten the connectors. Feed burner with loop circuit. Increase. Clean. Open. Add additive to the fuel.

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Pump cuts out after a prolonged pause.
POSSIBLE CAUSE	**ADVICE**
60 - Return pipe not immersed in fuel..... 61 - Air enters suction line.....	Move it to the same height as the suction pipe Tighten the couplings.

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Pump is leaking fuel.
POSSIBLE CAUSE	**ADVICE**
62 - Leakage of sealing member	Replace pump.

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Smoke in flames - Dark Bacharach
POSSIBLE CAUSE	**ADVICE**
63 - Not enough air.....	Adjust head and fan gate.
64 - Nozzle worn or dirty.....	Replace
65 - Nozzle filter clogged.....	Clean or replace
66 - Incorrect pump pressure.....	Adjust to 10 - 14 bar
67 - Flame stability coil dirty, loose or deformed.....	Clean, tighten or replace
68 - Insufficient air openings in the boiler space.....	Increase
69 - Excessive air.....	Adjust head and fan gate.

SIGNAL	PROBLEM
7x flashing ● ● ● ● ● ● ●	Dirty burner head
POSSIBLE CAUSE	**ADVICE**
70 - Nozzle or filter dirty.....	Replace.
71 - Unsuitable nozzle or angle.....	See recommended nozzles.
72 - Loose nozzle.....	Tighten.
73 - Impurities on flame stability coil.....	Clean.
74 - Incorrect head adjustment or not enough air.....	Adjust. Open valve.
75 - Length of nozzle not adapted to boiler.....	Contact the boiler manufacturer.

SIGNAL	PROBLEM
10x flashing ● ● ● ● ● ● ● ● ● ●	The burner becomes locked.
POSSIBLE CAUSE	**ADVICE**
76 - Connection or internal fault.....	
77 - Presence of electromagnetic interference.....	Use the radio interference protection kit.

17.3 Other faults

Description	Cause	Solution
Poor flow through the secondary circuit	Dirty water filter	Clean the water filter in the secondary circuit.
Regular overheating of the boiler >110°C	Poor flow in the primary circuit	Check circulation pump for blockage; replace circulation pump if necessary.
Scraping or squealing noises in oil pump	Excessive resistance in the diesel supply circuit. Excessive dirt in filters or closed tap on oil supply.	Check the pipes for blockages. Clean the oil filter and clean the pump filter. Clean the fuel tank if heavily soiled.
Fluctuating secondary circuit supply temperature	PID control disrupted.	Adjust PID control or activate an auto tune.
Black smoke from flue gas discharge	Bad combustion with too little oxygen and too high a CO2 value	Open the air slide on the burner until the black smoke disappears. Use a flue gas meter to analyze the flue gases and re-adjust the burner to a CO2 value of 12.5%
White smoke from flue gas exhaust	Poor combustion due to excessive air in the fuel.	Check the oil supply for leaks.
White vapor from flue gas discharge	Cold flue gases during startup or boiler temperature set too low.	Increase boiler temperature to minimum 45°C. Wait 15 minutes for boiler to heat up.

18 ENVIRONMENT

18.1 Antifreeze (Propylene Glycol).
Thermobile uses propylene glycol (maximum 30%) as the antifreeze in the primary circuit of the boiler. Propylene glycol has lower toxicity than other anti-freezes and is more environmentally friendly. However, liquid from the boiler must always be disposed of according to local regulations.
See the supplied safety sheet “Propylene glycol”.

19 DISMANTLING AND DISPOSAL

All materials released during the dismantling of this machine must be disposed of according to local government regulations.

20 EC DECLARATION OF CONFORMITY

The EC Declaration of Conformity can be found at www.thermobile.com.

Datum Date Datum Date	Omschrijving: Onderhoud of Storing Description: Maintenance or Failure Beschreibung: Wartung oder Fehler Description: Entretien ou Erreur	Actie door Action by Aktion durch Action par

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