CAHA Midi

Floor standing multi-sectional gas boilers

Installation, Usage and Maintenance Instructions

Models 340, 425, 510 and 600

Thank you for selecting a CAHA Midi Boiler. This product is the result of extensive research and experience in heating system design.

(!) This manual is an integral part of the product and should be retained. Please read it carefully, as it provides important information regarding the installation and maintenance of the product.

The product should only be installed and maintained by a person qualified in the design and installation of heating systems. Failure to properly install or maintain the CAHA Midi may lead to injury, death or property damage.

WARNING

⚠ Carefully read the instructions contained in the manual as they provide important information regarding safe installation and maintenance. The installation and maintenance must be performed in accordance with current standards and according to the manufacturer's instructions.

In the case of failure or malfunction of the appliance, do not attempt to repair it yourself. Please contact RVR Energy Technology Ltd by email at info@rvr.ie.

Repairs must be only be carried out by a qualified technicians. Failure to comply with these requirements can compromise the safety of the device.

INSTRUCTIONS FOR THE USER

If you have questions concerning the use of your boiler or heating system, please ask your installer. It is in your own interest and that of the installer that you are aware of how to operate your boiler and heating system safely and efficiently.

⚠ *The appliance is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge. Children, even if being supervised, must not play with the appliance.*

In the case of failure or malfunction of the appliance, do not attempt to repair it yourself. Please contact your installer. Repairs must only be carried out by qualified technicians. Failure to comply with these requirements can compromise the safety of the appliance.

OPERATION

Water, coming from the radiators or from the DHW unit is heated in the aluminium heat exchanger. The CH or DHW pump guarantees circulation of water. The air needed for combustion is sucked in by a rpm controlled fan. At low boiler temperatures the flue gases can be cooled down sufficiently for condensation of the water. This water is drained to the sewer via a built in syphon. This drainage must never be blocked. A burner controller with built in micro processor provides the electrical control of the boiler.

TOPPING UP

The built in manometer indicates if the waterpressure is sufficient. As soon as the water pressure drops below 1 bar topping up is necessary. If topping up becomes a regular occurrance, your installation should be checked by an installer.

Disconnect from the main. Connect the filling hose to the cold water tap and to the fill and drain valve of the boiler. Before tightning the coupling in the installation slowly fill the hose with water allowing present air to escape. Now open the fill and drain valve and slowly fill the installation until a pressure between 1.5 and 2.0 bar is reached. When finished connect again to the main.

BLEEDING

To remove any air present in the heating system and boiler, bleeding is necessary. Disconnect from the main. Open all the radiator valves. Bleed the air from all the radiators starting with the ones at the lowest point in the system. After bleeding, check the water pressure and top-up if required (if water pressure has dropped below 1 bar). Connect to the main again.

STARTING THE BOILER

Please ask your installer how to start the boiler. Depending on how your heating system is controlled, this could be via an external timeclock, thermostat, switch or otherwise. Once the boiler volt-free enable contacts are closed, the boiler will commence its starting sequence.

BOILER FLOW TEMPERATURE

The burner controller can adjust the flow temperature between 20 ° and 85 °C. The temperature setting can be changed using the control panel. The installation manual provides the instructions for setting the flow temperature.

DHW (HOT WATER) TEMPERATURE

From the factory, the DHW temperature is set to a value of 60 °C. This set value can be changed to any value between 35 and 65 °C using the buttons on the control panel. If the DHW device has a thermostat the DHW temperature can be adjusted by setting this thermostat.

SWITCHING OFF THE BOILER

During summer time the room thermostat can be set to a lower value to turn off the boiler. During winter or during a longer period of absence this temperature never should be set to a lower value than 15 °C. ***Don't switch off the power.*** During a period of frost ***all*** the radiators should be partly or totally opened to avoid danger of freezing.

The integrated pump control will activate the pump every 24 hours for a short period even if no demand is present. This prevents the pump jamming.

Only when work on the boiler is being carried out may the main electricity supply and gas supply be turned off (your installer can show where these are located).

ERRORS

If an error occurs first check the following:

- Is the room thermostat properly set?
- Is the boiler connected to the main? Power supply present?
- Is the gas valve opened?
- Are the radiator valves open?
- Is the water pressure in the installation higher than 1 bar?
- Is the installation bled thoroughly?

An error is indicated by a code on the display. It is very important for the sake of a correct diagnosis to mention this code when calling your installer. Reset the burner controller by pressing the ok button on the control panel. If the error occurs frequently contact your installer.

MAINTENANCE

A yearly inspection of the boiler must be done by your installer. The lifespan and the reliability of the installation are improved by doing so. The casing of the boiler may be cleaned with a soft cloth (no abrasives). Never use solvents like thinner!

CAUTION

The air supply (for air needed for combustion) and the flue parts are essential parts for safe and efficient operation of the boiler. Changes on these systems by non qualified persons are not allowed e.g. the settings of the gas valve. The gas/air ratio is set to a lambda value of approximately 1.26. This corresponds with a CO_2 level of 9,3 % (full load). For further information see installation manual.
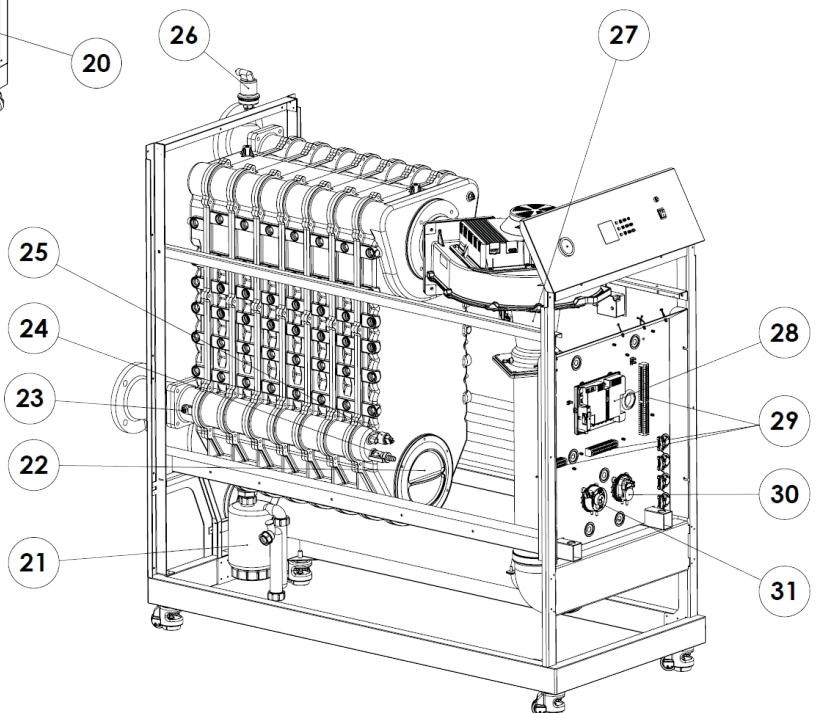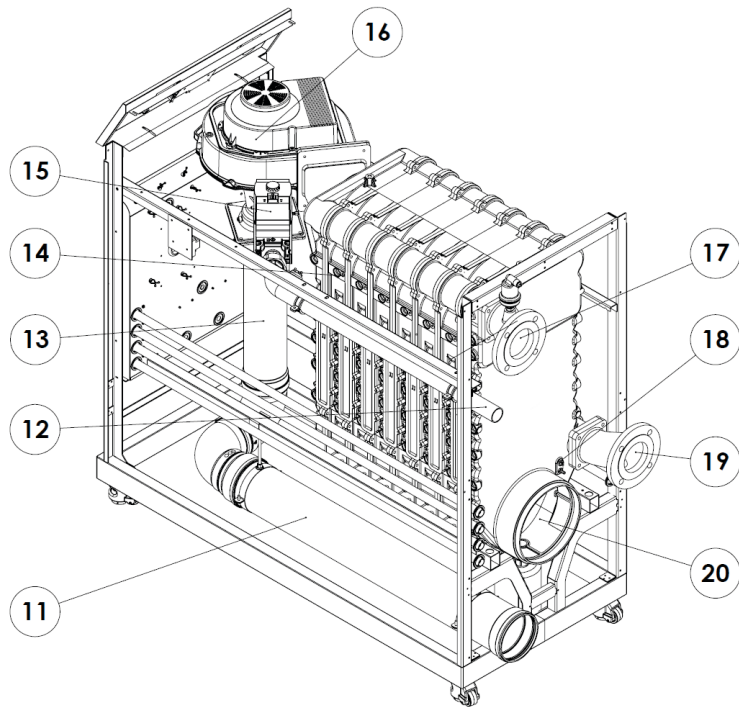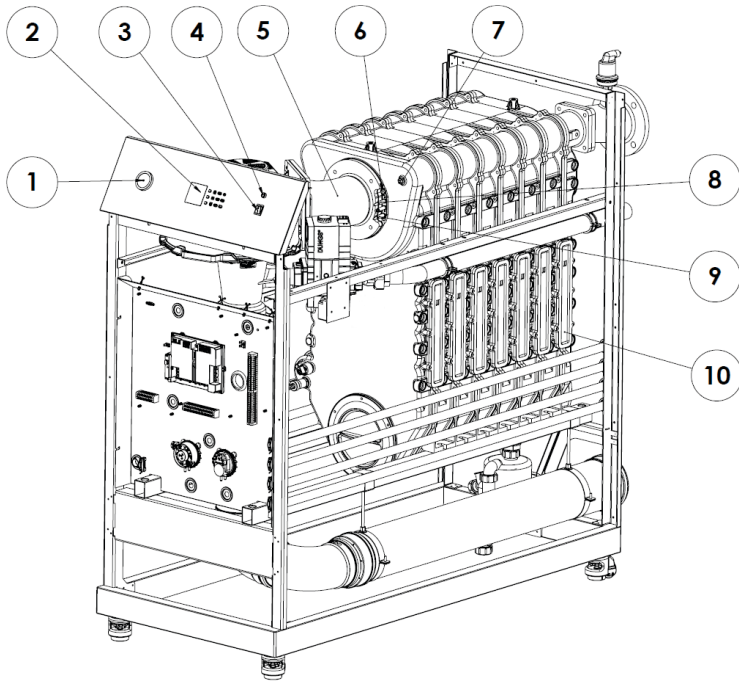
CONTENTS

CONTENTS

1. DESCRIPTION - BOILER

1	MANOMETER
2	DISPLAY LCD
3	POWER SWITCH
4	FUSE
5	BURNER HOOD
6	SIGHT GLASS
7	FLOW NTC
8	IGNITION ELECTRODE
10	INSPECTION COVER
11	AIR SUPPLY
12	GAS PIPE
13	AIR INTAKE RETARDER
14	OVERHEAT LIMITER SWITCH
15	GAS VALVE
16	FAN
17	FLOW
18	FLUE GAS NTC
19	RETURN
20	FLUE GAS OUT
21	SYPHON
22	SUMP INSPECTION COVER
23	RETURN NTC
24	FILL AND DRAIN VALVE
25	WATER PRESSURE SWITCH
26	AUTO AIR VENT
27	VENTURI
28	BOILER CONTROLLER (MAXSYS)
29	TERMINAL STRIP
30	AIR PRESSURE SWITCH
31	SYPHON PRESSURE SWITCH

2. TECHNICAL DATA

Technical data CAHA Midi series					
Model	**340**	**425**	**510**	**600**	
Central Heating					
Nominal input max load (Hi)	340	425	510	595	kW
Nominal input min load (Hi)	68	85	102	119	kW
Nominal ouput max load 80-60 °C	331	413.1	495.7	578.3	kW
Nominal output min load 80-60°C	66	82.5	99	115.6	kW
Efficiency max load 80-60 °C (Hi)	97.2	97.2	97.2	97.2	%
Efficiency min load 80-60 °C (Hi)	97	97	97	97	%
Efficiency max load 50-30 °C (Hi)	103.1	103.1	103.1	103.1	%
Efficiency 30 % load 30 °C (return) (Hi)	108.1	108.1	108.1	108.1	%
Standing loss	5.57	7.83	8.72	10.15	kW
Fluegas					
Temperature flue-gas max load 80-60 °C	65-70	65-70	65-70	65-70	°C
Temperature flue-gas min load 80-60 °C	60-65	60-65	60-65	60-65	°C
Mass-flow flue-gasses at max load G25	556	695	835	974	m³/h
Mass-flow flue-gasses at min load G25	111	139	167	195	m³/h
Maximum flue-resistance	250	250	300	300	Pa
Emission CO (Gaskeur SV)	116	110	100	90	ppm
Emission NOx (Gaskeur SV)	20	20	20	20	ppm
Types B23.C33.C63	yes	yes	yes	yes	
Gas					
Gasflow max load G25	41.8	52.3	62.8	73.2	m³/h
Gasflow min load G25	8.4	10.5	12.6	14.6	m³/h
Gasflow max load G20	36	45	54	63	m³/h
Gasflow min load G20	7.2	9	10.8	12.6	m³/h
CO_2 content max load G25/G20	9.3	9.3	9.3	9.3	%
CO_2 content min load G25/G20	9.1	9.1	9.1	9.1	%
Water					
Maximum flow temperature	85	85	85	85	°C
Content heat-exchanger (without manifolds)	36.2	43.7	51.1	58.5	ltr
Minimum/maximum operating pressure	0.8/6	0.8/6	0.8/6	0.8/6	bar
Hydraulic resistance (DT 20 nominal flow at full load 80-60	200	210	220	230	mbar
Maximum DT max load/min load	25/35	25/35	25/35	25/35	°C
Maximum waterflow	28.5	35.6	42.7	49.8	m³/h
Weight					
Mass heat-exchanger*	150	180	215	245	kg
Total mass of boiler	330	365	429	464	kg
Casing					
Width	700	700	700	700	mm
Depth without exhaust connection	1222	1222	1553	1553	mm
Height (including wheels)	1540	1540	1540	1540	mm
Height (without wheels)	1431	1431	1431	1431	mm
Electrical					
Protection	00B	00B	00B	00B	IP
Electrical voltage/frequency	230/50	230/50	230/50	230/50	V/Hz
Standby power consumption*	21	21	36	36	W
Min load power consumption*	78	78	105	105	W
Max load power consumption*	587	587	874	874	W
Maximum allowable power consumption	2300	2300	2300	2300	W
Fuse	10	10	10	10	A

* as coming from factory without extra devices connected

2.1   COMPONENT MATRIX

Overview of main components used in the CAHA Midi:

Part	340	425	510	600
Boiler control Honeywell Maxsys	S4966V2052	S4966V2052	S4966V2052	S4966V2052
Display (user interface)	DSP 49G2193	DSP 49G2193	DSP 49G2193	DSP 49G2193
Fan MVL 230 VAC	G3G200-GN20-30	G3G200-GN20-30	G3G250-GN17-01	G3G250-GN17-01
Gas-valve Dungs 230 VAC	MBC-700-SE-S02	MBC-700-SE-S02	MBC-700-SE-S02	MBC-700-SE-S02
Venturi Honeywell	VMU500A	VMU500A	VMU680	VMU680
Texi Burner round 130 mm Worgas	433	529	623	718
Silencer air-inlet	yes			
Silencer flue-gas round 250 mm L=300mm	yes double	yes single	yes single	yes single
NTC 12 k L=50	3	3	3	3
NTC 12 k OTC	optional	optional	optional	optional
Water low pressure device 1,6/0,8 bar	yes	yes	yes	yes
Pressure difference switch 40 Pa in and 25 Pa out	yes	yes	yes	yes
Syphon pressure difference switch 12,4 mbar out	yes	yes	yes	yes

3.   DIMENSIONS
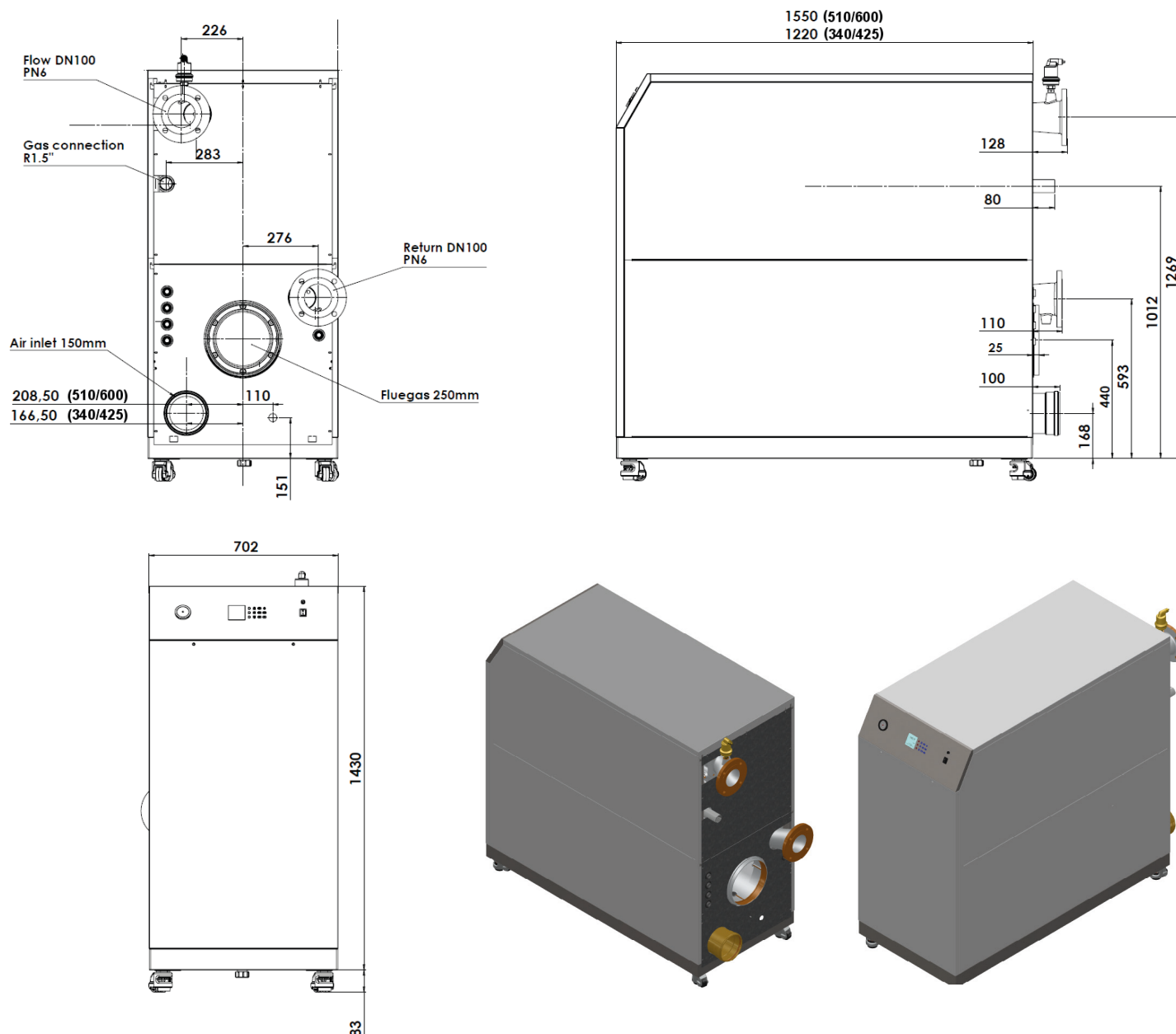
4. OPERATION

The appliance is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge. Children, even if being supervised, must not play with the appliance.

In the case of failure or malfunction of the appliance, do not attempt to repair it yourself. Please contact your installer. Repairs must only be carried out by qualified technicians. Failure to comply with these requirements can compromise the safety of the appliance.

4.1   GENERAL

The CAHA Midi is a floor standing boiler, equipped with a cast aluminium heat-exchanger. During heat demand the controller activates the pump. The controller checks the air pressure switch (zero check) and increases the fan speed to perform an airflow-check. Once the air pressure switch closes, the fan speed increases to ignition speed and a 5 second pre-purge is performed. The water pressure sensor, gas pressure switch and siphon pressure switch are checked. When all pressure switches are closed and the water pressure is ok, the ignition is started.

The air needed for combustion is taken in from the outside (if room sealed) or the boiler house (type B flue installation) by the fan. The air is transported through a gas/air mixing device creating a negative pressure. This negative pressure is an indication of the amount of air being transported. The negative pressure is supplied to the gas valve by an internal tube. The gas valve automatically adjusts the amount of gas that will be injected into the venturi and that will be mixed with the air-flow. This mixture is supplied to the burner.

Ignition and flame-control of the mixture is done by two separate electrodes mounted on the burnerhood.
Temperature control and safeguarding is done using two NTC sensors. The boiler monitors the sensors continuously in order to control operation and ensure safe operation.

4.2   CENTRAL HEATING (CH)

4.2.1 ON-OFF ROOM THERMOSTAT

As standard the boiler is programmed for using an on-off room thermostat. The room thermostat has to be connected to the pin nrs. 1 + 2 on the terminal strip. Open Therm will be recognized if connected on 1 + 2. The desired flow temperature is adjustable, but as standard is set to 85 °C.

At CH heat request from the room thermostat (and no DHW heat request present) the CH-pump is activated after 10 seconds. The controller will adjust the burner-input in such a way that a flow-temperature of 85 °C towards the CH-circuit is achieved.

⚠️ ***Warning : do not supply any voltage to these terminals as you may damage the controller***

4.2.2 OPTIONAL 0-10V

The boiler may be controlled using a 0-10 V DC signal. Connect the negative (0V DC) to No. 3, and the positive (0-10V DC) to No.4 on terminal strip C2.

A loop of wire must be placed between the pin nrs. 1 and 2 of terminal strip C2. In the technician menu , enable 0-10V in the advanced CH settings menu by setting , CH request to either 0-10V DC % or 0-10V DC SP.

4.2.2.1 0-10V DC % POWER CONTROL

A value between 2 and 10V DC generates a CH power demand proportional to this value between 0 and 100% (0% = minimum load, 100% = nominal load). The heat demand is removed when the control signal falls below 1 volt.
The setpoint of maximum flow temperature is set to 90°C. In the user/technician menu , under diagnostics, boiler information the actual voltage input and target power are displayed.

4.2.2.2 0-10V DC SETPOINT

A value between 2 and 10V DC generates a CH setpoint demand proportional to this value between CH minimum flow temperature and maximum CH flow temperature. The heat demand is removed when the control signal falls below 1 volt. The minimum and maximum CH flow temperature can be set in the technician menu, advanced CH settings, CH temperatures.

In the user/technician menu , under diagnostics, boiler information the actual voltage input and boiler setpoint are displayed.

⊙ **_Caution : Ensure that the 0-10V DC signal is free from electrical interference!_**

4.2.3 OUTSIDE TEMPERATURE CONTROL OTC (OPTIONAL)

The boiler may use an outdoor sensor to provide weather compensation (OTC).

To activate weather compensation connect an oudoor sensor to numbers 5 and 6 on the terminal strip C2. Pin numbers 1 and 2 have to be bridged by a wire. Alternatively those pin numbers (1 and 2) can be used for connecting room thermostat on/off. In the technician menu, under advanced CH settings, CH request, OTC only must be selected. The outdoor sensor is then automatically detected by the controller. The parameters corresponding with A-E in the figure below can be set in the technician menu (advanced CH settings).

A OTC offset: minimum CH setpoint value
B OTC setpoint maximum: maximum CH setpoint value
C OTC weather cold: external temperature value at which the maximum CH value will be used.
D OTC weather warm: external temperature value at which the minimum CH   value will be used
E OTC warm weather shutdown: external temperature value at which the CH demand will end
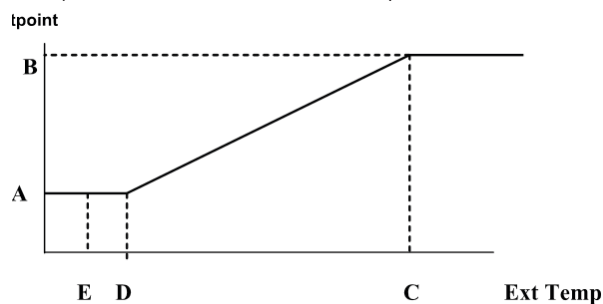
In the user menu an eco setpoint reduction (night reduction) can be set. Day, week and weekend options are also available (on, eco, off)

The outdoor sensor is available as an optional accessory.

The sensor should be installed on the north-side of the building at a height of approximately 2 meters.

Note : The resistance of the outdoor NTC should be 12 kOhm at 25 °C.

Also see table of resistance for NTC's at 6.6.2

4.2.4 OPTIONAL DIGITAL COMMUNICATION

The boiler supports digital communication with room thermostats using Open-Therm communication protocols (automatically recognised if connected to pins 1 + 2 on terminal strip C2, also see 4.2.1.)
.

4.2.5 SLOW START

The boiler uses the "slow start" procedure to prevent the boiler from supplying excessive power in low load situations. After "zero check" APS and closure APS with pre purge ignition starts. Following, a stabilization period, the boiler modulates down to low capacity and maintains this capacity for 1 minute. Subsequently the boiler power increases at a target rate of 4 °C/min until maximum capacity or set temperature has been reached. Once heat demand has finished the burner will turn off following a set post purge period.

The graph below illustrates this.
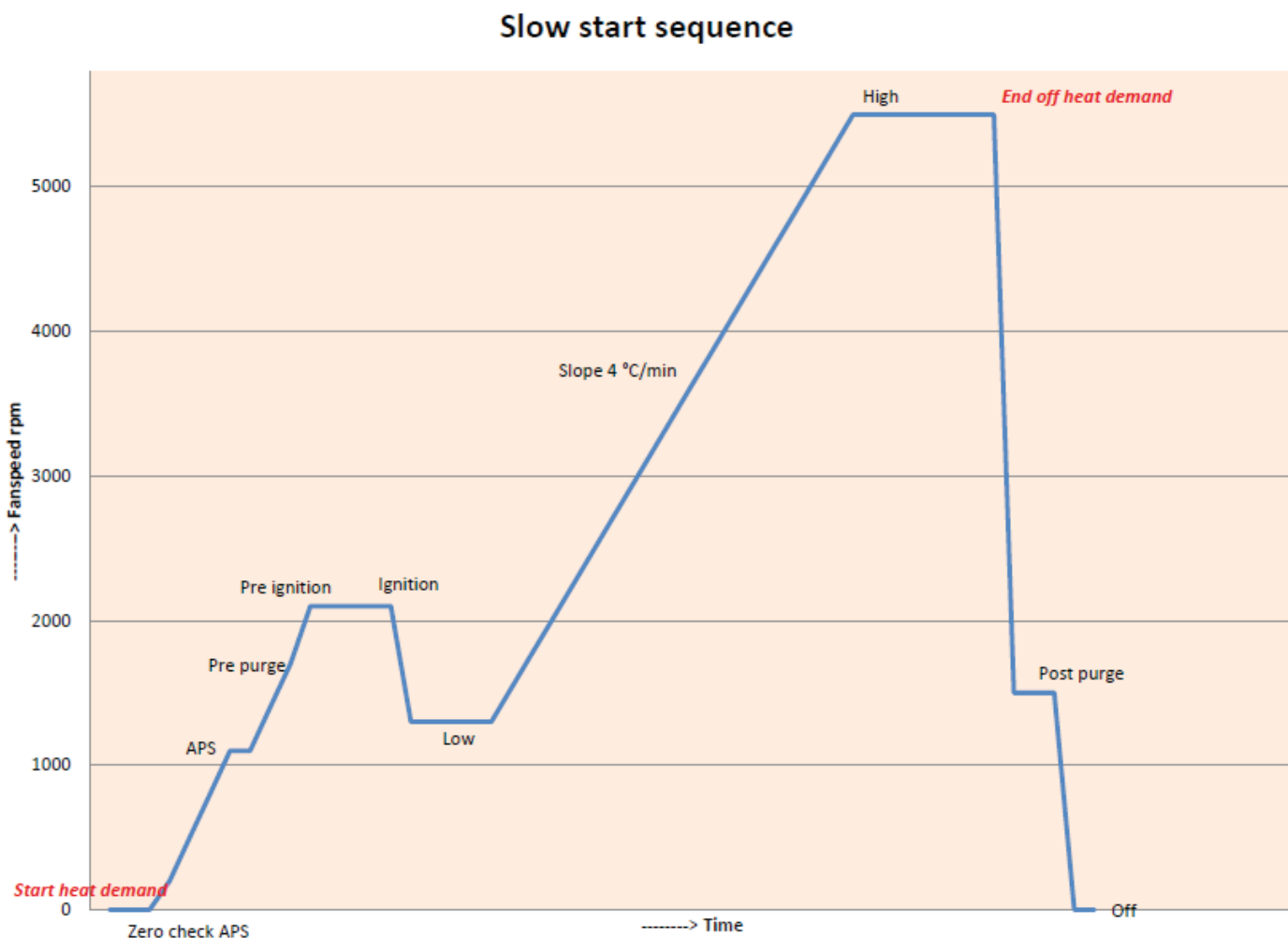
4.2.6 PROTECTION AGAINST INSUFFICIENT FLOW THROUGH BOILER

When the requirements of 6.3.2 are fulfilled the boiler will protect itself against insufficient flow. This is done by checking the difference in temperature between flow and return (so called ΔT).

In a low flow scenario the ΔT will rise rapidly. The ΔT safe-guarding principle is as follows:

- At ΔT > 22 the boiler starts modulating
- At ΔT between 22 and 27 the boiler continues modulating
- At ΔT > 27 boiler the fan speed will reduce until T < 25

4.3   DOMESTIC HOT WATER (DHW)

4.3.1 EXTERNAL STORAGE TANK WITH THERMOSTAT (ELECTRIC 3-WAY VALVE)

As standard the DHW configuration is factory pre-set for an external storage tank + tank thermostat.
For hydraulic connection of an external storage tank to the boiler via an electric 3 way valve one should either use :

- the default configuration 2 pumps: 230 VAC DHW pump (terminal strip C1: 12,13,14) and CH pump (terminal strip C1: 15,16,17)
- an electric 3-way valve with a maximum travel time of 255 sec. (terminal strip C1: 13,14,15,16). At the end of the travel time in either direction DHW or CH the 230 VAC on the 3-way valve will be switched off.

The 2 wires of the tank thermostat must be connected to numbers 7 and 8 on terminal strip C2.
In the case of using an electric 3-way valve adjust the setting in the technician menu, system settings, boiler parameters, number of pumps to: pump and 3-way valve.

The 3-way valve travel time can be changed in the technician menu, system setting, boiler parameters, 3-way valve travel time.

4.3.2 EXTERNAL STORAGE TANK WITH NTC SENSOR

In case the storage tank is equipped with an NTC sensor, adjust the setting in technician menu, advanced DHW settings, DHW request to sensor.

Note: The resistance of the NTC sensor must have a value of 12 kOhm at 25 °C.

The 2 wires of the tank NTC sensor must be connected to numbers 7 and 8 on terminal strip C2.
The set point temperature of the storage tank is adjustable (default set at 60°C,the flow temperature is DHW setpoint + 20K). Warning : if a CH heat demand exists immediately after finishing the heat request for DHW, it is possible for high temperatures to flow into the CH system regardless of CH set point (hot shot).

4.3.3 DHW PRIORITY/GENERAL BEHAVIOUR WITH EXTERNAL STORAGE TANK

Disabling hot water operation : press Summer-Winter button R2-C4(not active in main screen). See later in manual for further explanation.

Enabling hot water operation : press Summer-Winter button R2-C4 (active in main screen). See later in manual for further explanation.

In the default boiler configuration, (2 pumps-DHW and CH pump), a DHW request has priority over CH request

In the technician menu, advanced DHW settings, DHW priority, the DHW priority over CH can either be disabled or a maximum DHW priority time can be set.

In the case where the DHW priority is disabled and both demands are active at the same, both pumps (CH and DHW) will be activated. During this time the flow temperature is set to either 80 °C (tank thermostat) or DHW setpoint + 20K (NTC sensor).

Notice : In some countries, at outputs ≥ 40 kW double separation between exchanging media is required. Please check your local regulations.

5. BOILER CONTROL

5.1 CONTROL PANEL

The control panel has 12 buttons and a display as shown in the figure below.
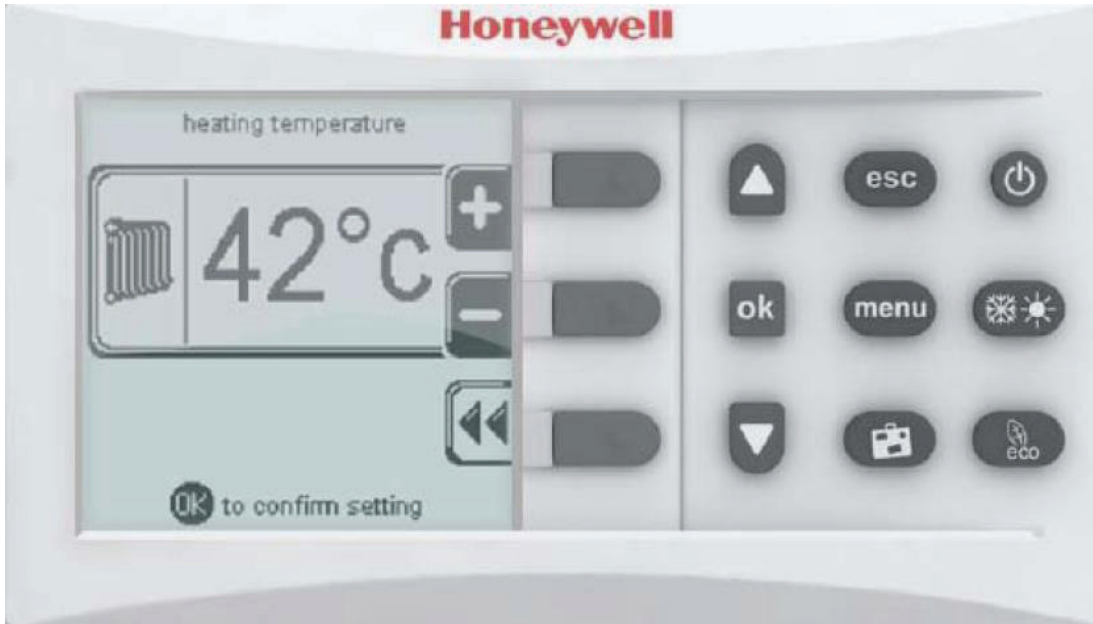
5.2 PUSH BUTTONS ON CONTROL PANEL
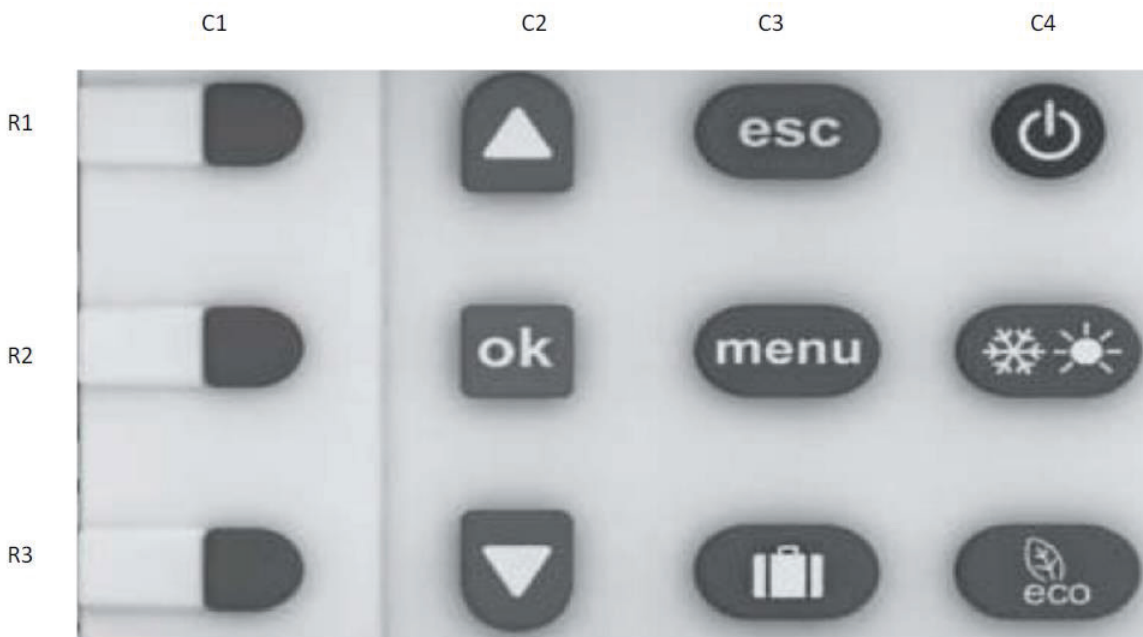
R1-C1, R2-C1 and R3-C1(back) buttons follow, if pressed, the associated icon in the display (left)
R1-C2 and R3-C2 (up-down) buttons, scroll, if pressed, through the different menus
R2-C2 button confirms, if pressed, the highlighted selection, or confirms what is required by LCD
R1-C3 button (escape) returns, if pressed, to main screen
R1-C4 (on-off) button puts boiler in off mode, main logo and date/time stay displayed
R2-C3 (menu) button enables, if pressed, access to both user and installer menu
R2-C4 (summer-winter) button enables-disables, if pressed, CH and DHW in main screens
R3-C3 (holiday) button enables, if pressed, holiday function in main screens
R3-C4 (eco) enables, if pressed, eco function in main screens

5.3   USER MENU

By pressing the "menu-button" the display will show the text as given in the figure below.
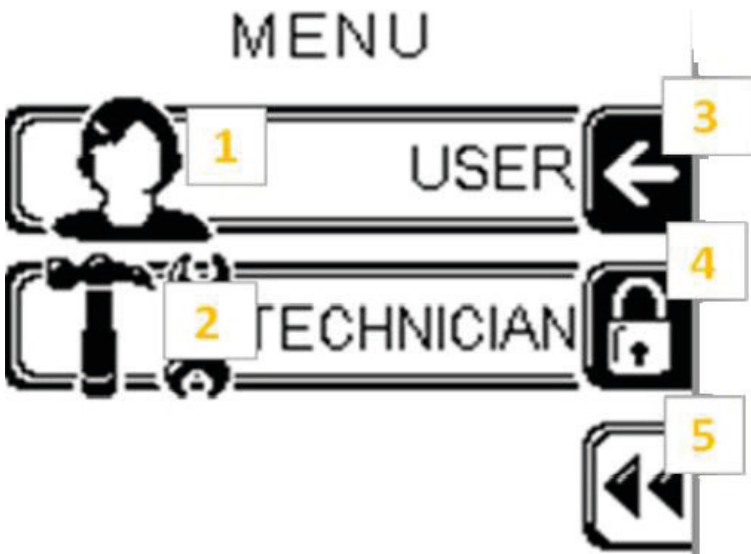
By pressing the button marked "3"in the figure shown, the user menu is accessed.

Pressing the button rmarked "5" returns back to the main screen.

By pressing the button marked "4", the installer menu is accessed.

In the user menu the following options will be shown :

1. HEATING
2. DOMESTIC HOT WATER
3. HOLIDAY
4. MAINTENANCE

5. SETTINGS
6. CHIMNEY-SWEEPER
7. DIAGNOSTICS

By pressing up and down (R1-C2 and R3-C2) one of the six options as shown above will highlight the desired parameter. By pressing the OK button (R2-C2) the chosen option will be selected.

Once an option has been slected it is possible to change the parameters corresponding with the chosen option.

5.3.1 PARAMETER/VALUE SETTING

Pressing the up and down (R1-C2 and R3-C2) buttons will highlight the desired parameter. Pressing the OK button (R2-C2) will allow the chosen parameter to be modified. This is shown below.
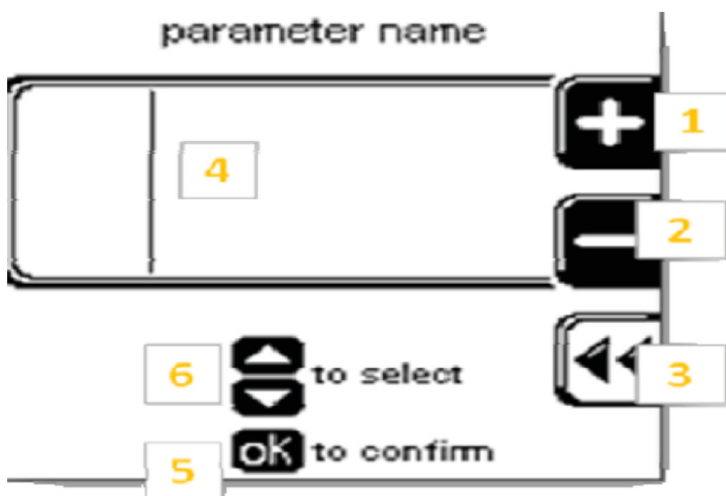
The actual value can be changed by pressing the R1-C1 and R2-C1 buttons.

The changed value can be confirmed by pressing the OK (R2-C2) button.

Pressing the back (R3-C1) button leaves the actual displayed parameter.

If there are more parameters shown in the parameter value area (4) the desired parameter can be selected by pressing the up and down ((R1-C2 and R3-C2) buttons.

5.3.2 PARAMETERS ACCESSIBLE BY USER

An overview of the parameters accessible by the user is given on the next pages

USER MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES
1 Heating					Heating user settings
	1 CH temperature /OTC set				Set the CH temperature and OTC curves parameters
		1 CH setpoint			Adjust setpoint of CH circuit
		2 Outside temperature for CH off			Set the external temperature at which Heat demand is removed . If set OFF, heat demand will never be removed by controller (Only by removing RT or bridge between terminal strip C2:1,2)
	2 ECO setpoint reduction				Set the temperature that will be subtracted from the actual setpoint when ECO mode is activated
	3 Scheduler set				Invoke scheduler menu
		1 Enable/disable on board scheduler			Based on selection is possible to enable/disable on board scheduler
			Enable		Enable on board scheduler
			Disable		Disable on board scheduler
		2 Scheduler set			Select to set scheduler
			1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6 Saturday 7 Sunday 8 Monday – Friday 9 Monday – Sunday 10 Saturday - Sunday		Used to program on board scheduler (On, Off , Eco)
2 Domestic hot water					Domestic hot water user settings
	1 DHW set point				Set the DHW temperature (in case of a DHW with sensor this is the actual DHW temperature, in case of DHW with thermostat this is the base boiler flow temperature)
	2 ECO set point reduction				Set the temperature that that will be subtracted from the actual setpoint when ECO mode is activated
	3 Scheduler set				Invoke scheduler menu
		1 Enable/disable on board scheduler			Based on selection possible to enable/disable DHW on board scheduler
			Enable		Enable on board scheduler
			Disable		Disable on board scheduler
		2 Scheduler set			Select to set scheduler
			1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6 Saturday 7 Sunday 8 Monday – Friday 9 Monday – Sunday 10 Saturday - Sunday		Used to program on board scheduler (On, Off, Eco)

USER MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES
3 Holiday					Holiday temperatures settings
	1 CH holiday set point				Set CH temperature used when Holiday mode active
	2 DHW holiday set point				Set DHW temperature used during holiday mode
4 Maintenance					Set maintenance related info
	1 Service information				Used to display service company phone number or entered info
	2 Service due date				Show next service due date . When date expire a MSG is shown on lower part of main screen asking for service
5 Settings					Boiler option settings
	1 Select Language				Allow selection of a different language
		English			Select for English
		Italian			Select for Italian
		German			Select for German
		Russian			Select for Russian
	2 Select units				Allow selection of different unit
		Fahrenheit			Select for Fahrenheit
		Celsius			Select for Celsius
	3 Set date				Allow RTC date setting
	4 Set time				Allow RTC time set. When selected a screen asking for time format 24/12 Hours is opened. When selected appropriate format screens jump to time entering screen
		24 hours			Select for 24 hours clock
		12 hours			Select for 12 hours clock
	5 Restore factory data				Pressing OK all the user settings will be restored to the original factory default settings. See 1)
6 Chimney sweeper					Manual mode. Hitting OK will force boiler to operate at % of power
					Timeout 15 minutes. While test in progress navigating through other menus is allowed.
7 Diagnostics					Will display boiler usage information and errors
	1 Boiler information				Boiler information
		"1 CH request 2 DHW demand 3 Firing rate 4 Flame ionization current 5 Boiler set point 6 Boiler supply temperature 7 Return temperature 8 Flue temperature 9 Outdoor temperature 10 DHW storage temperature 11 Boiler fan speed 12 CH ignitions 13 CH runtime 14 DHW ignitions 15 DHW runtime 16 System pressure 17 Heat Exchanger Temp. 18 0-10V input 19 Target power"			Will display the information shown in SUBMENU 2 When the line has a * at the end of the line means that hitting OK when the line is highlighted will open a graph that shows the latest 120 variable values stored every 12 minutes (24 hour history)

5.4   INSTALLER (TECHNICIAN) MENU

If the button marked "4" (see page 14) is pressed the screen as given in the figure below will appear.
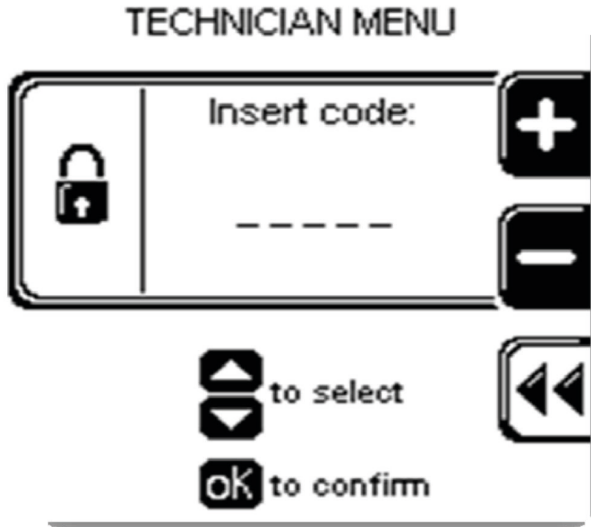
+ - (R1-C1 and (R2-c1) buttons ared used to increment/decrement value
Up and down (R1-C2 and R3-C2) buttons are used to select character to be modified
ok (R2-C2) button confirms value

Please contact RVR Energy Technology Ltd to receive the technician access code.

Once the menu is accessed by entering the code the following options will be shown

1. ADVANCED CH SETTINGS
2. ADVANCED DHW SETTINGS
3. SYSTEM SETTINGS
4. DIAGNOSTICS

5. USER SETTINGS
6. CASCADE
7. RESTORE FACTORY SETTINGS

Pressing the up and down (R1-C2 and R3-C2) buttons will highlight the desired parameter group. Pressing the OK button (R2-C2) selects the chosen parameter group.

Pressing the up and down (R1-C2 and R3-C2) buttons will highlight the desired parameter subgroup. Pressing the OK button (R2-C2) selects the chosen parameter subgroup.

Once a parameter subgroup option has been chosen it is possible to change the parameters corresponding with the selected subgroup

Follow the instructions as per 5.3.1 to set or change a parameter.

5.4.1 PARAMETERS ACCESSIBLE BY INSTALLER (TECHNICIAN)

An overview of the parameters accessible by the installer (technician) is given on the following pages.

Certain paramaters are marked with a caution or warning symbol. Setting inappropriate values in these parameters may lead to instability or overheating, or in extreme cases damage to the boiler, connected equipment, or persons. RVR does not accept responsibility for any damage caused by inappropriate settings.

Take care when altering the value of parameters marked with the caution symbol (!)

Parameters carrying the warning symbol ⚠ have explicit directions associated with them. Failure to observe these directions will immediately invalidate the product's warranty.

TECHNICIAN MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES	
	Lockout history				Show a list of recent errors. Hitting OK on the highlighted error will open screens that contain details on boiler status when error occurred	
1 Advanced CH settings					Heating installer advanced settings	
	1 CH power set				Set power of boiler in CH mode	
		1 Maximum power			Set % of boiler maximum power in CH mode	
		2 Minimum power			Set % of boiler minimum power in CH mode	(i)
	2 CH temperatures				Set (selecting OK) and show CH temperatures	
		1 Absolute max temp			Set CH absolute max temperature (CH temperature boiler settings will never exceed). **DO NOT EXCEED 90°C**	⚠
		2 CH maximum set point			Determine higher boundary of CH setpoint	
		3 CH minimum set point			Determine lower boundary of CH setpoint	
		4 CH set point hysteresis			Set CH setpoint hysteresis (temperature above setpoint at which boiler will be switched off)	
	3 OTC parameters				Set the OTC parameters	
		1 Outside temp for max CH			Define external temperature at which OTC will set maximum CH setpoint	
		2 Outside temp for min CH			Define external temperature at which OTC will set the minimum CH setpoint	
		3 Outside temp for CH off			Set the external temperature at which Heat demand is removed . If set OFF heat demand will never be removed.by controller (Only by removing RT or bridge between terminal strip C2:12)	
		4 OTC set point table			Show in a table the link between external temperature and actual setpoint determined by the OTC parameter selection	
		5 OTC curve			Show in a curve the link between external temperature and actual setpoint determined by the OTC parameter selection	
	4 CH pump settings				Set pump usage related parameters	
		1 post pump time			Set the CH pump overrun time.	
	5 CH anti cycling timer				Set the ant cycling timer (minimum time between boiler goes off till next ignition)	(i)
	6 CH request type				Allow selection of different CH requests:	
		Only OTC			Select OTC: outdoor Temperature controller 3)	
		Room Tstat			Select RT/OT: Room Thermostat or OpenTherm	
		0-10V Signal [%]			Select 0-10Vdc input for Power mode 3)	
		0-10V Signal[SP]			Select 0-10Vdc input for setpoint mode 3)	
2 Advanced DHW settings					Domestic hot water advanced settings	
	1 DHW power				Set power of boiler in DHW mode	
		1 Maximum power			Set % of boiler maximum power in DHW mode	
		2 Minimum power			Set % of boiler minimum power in DHW mode	(i)
	2 DHW temperatures				Set (selecting OK) and show DHW temperatures	
	2 DHW temperatures				Set (selecting OK) and show DHW temperatures	
		1 Storage temperature set point			Set Flow temperature during DHW mode when DHW done via a thermostat (Switch)	
		2 Boiler temperature set point			Set DHW temperature setpoint when DHW done with temperature sensor	

TECHNICIAN MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES
	3 DHW pump settings				Define pump usage in DHW mode
		DHW post pump time			Set the DHW pump overrun time added to the prefixed time of 3 minute.
	4 DHW priority				Define DHW priority over CH
		1 DHW priority status			Enable /disable DHW priority over CH
			Enabled		Enable
			Disabled		Disable
		2 DHW priority timeout			Define after how much time DHW priority is ended. (CH can be served if present for the same amount of time).
			Off		Select for no timeout (While DHW priority status is enabled)
			1..60	minutes	Set timeout in minutes. (While DHW priority status is enabled)
	5 DHW request type				Define DHW request switch or sensor
		Switch			DHW start when DHW thermostat closes
		Sensor			DHW start based on required vs actual DHW temperature
3 System setting					Boiler and system parameters
	1 Boiler parameters				Boiler related parameters
		1 Ignition power			⚠ Set power % used when igniting burner. **DO NOT EXCEED 30%**
		2 Delay siphon check			⚠ Delay time to validate a syphon error **DO NOT ALTER**
		3 Number of boiler pump			Define Pump and 3-way valve or 2 pumps
			Pump and 3WayValve		System with pump and 3-way valve
			Two pumps		System with 2 pumps
		4 Pump speed max			ⓘ Maximum % of PWM pump speed
		5 Pump speed min			Minimum % of PWM pump speed
		6 Antilegionella			Based on selection possible to enable/disable Antilegionella protection
			Enabled		Enable Antilegionella protection
			Disabled		Disable Antilegionella protection
		7 Modbus parameters			Set Modbus parameters
			Address		Set address default: 1
			Baudrate		Set baudrate default: 38400 bps
			Frame		Set frame 8N!
		8 3 Way valve travel time			Select for setting travel time 3WV in seconds
	2 User interface settings				
		1 Select language			Allow selection of a different language
			English		Select for English
			Italian		Select for Italian
			German		Select for German
			Russian		Select for Russian

TECHNICIAN MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES
		2 Select unites			Allow selection of different unit
			Fahrenheit		Select for Fahrenheit
			Celsius		Select for English
		3 Set date			Set system date
		4 Set time			Set system time
	3 Service settings				Service information
		1 Service information			Used to insert service company phone number (selection done as per technician password enter)
		2 service due date			Next service due date (input done as per date entering)
4 Diagnostics					Boiler information and lockout history
	1 Boiler information				Boiler information
		"1 CH request 2 DHW demand 3 Firing rate 4 Flame ionization current 5 Boiler set point 6 Boiler supply temperature 7 Return temperature 8 Flue temperature 9 Outdoor temperature 10 DHW storage temperature 11 Boiler fan speed 12 CH ignitions 13 CH runtime 14 DHW ignitions 15 DHW runtime 16 System pressure 17 Heat Exchanger Temp. 18 0-10V input 19 Target power"			Will display the information shown in SUBMENU 2 When the line has a * at the end of the line means that hitting OK when the line is highlighted will open a graph that shows the latest 120 variable values stored every 12 minutes (24 hour history)
	2 Lockout history				Shows the list of recent errors. Hitting OK on the highlighted error will open new screen that contains details of the boiler status when the error occurred.
	3 Manuel test				See chimney sweeper.
5 User settings					Access the user settings from the advanced menu.
	1 Heating				Heating user settings
		1 CH temperature/ OTC set			Set the CH temperature and OTC curves parameters
			1 CH set point		Adjust setpoint of CH circuit
			2 Outside temperature for CH off		Set the external temperature at which Heat demand is removed .
		2 ECO set point reduction			Set the temperature that will be subtracted from the actual setpoint when ECO mode is activated
		3 Scheduler set			Invoke scheduler menu
			1 Enable/disable on board scheduler		Based on selection is possible to enable/disable on board scheduler
				Enable	Enable on board scheduler
				Disable	Disable on board scheduler

TECHNICIAN MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES
			2 Scheduler set		Select to set scheduler
				"1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6 Saturday 7 Sunday 8 Monday – Friday 9 Monday – Sunday 10 Saturday - Sunday"	Used to program on board scheduler
	2 Domestic hot water				Domestic hot water user settings
		1 DHW set point			Set the DHW temperature (in case of a DHW with sensor this is the actual DHW temperature, in case of DHW with thermostat this is the base boiler flow temperature)
		2 ECO set point reduction			Invoke scheduler menu
		3 Scheduler set			Invoke scheduler menu
			1 Enable/disable on board scheduler		Based on selection is possible to enable/disable on board scheduler
				Enable	Enable on board scheduler
				Disable	Disable on board scheduler
			2 Scheduler set		Select to set scheduler
				"1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6 Saturday 7 Sunday 8 Monday – Friday 9 Monday – Sunday 10 Saturday - Sunday"	Used to program on board scheduler
	3 Holiday				Holiday temperatures settings
		1 CH holiday set point			Set CH temperature used when Holiday active
		2 DHW holiday set point			Set DHW temperature used during holiday mode

TECHNICIAN MENU	SUBMENU 1	SUBMENU 2	SUBMENU 3	SUBMENU 4	NOTES	
7 Cascade					Access to cascade information and settings	
	1 Cascade set					
		1 cascade switch delay			Delay between switching on and of different boilers	🙂
		2 cascade min power			Minimum power of boilers in cascade	🙂
		3 Burner power			Max power of SINGLE boiler in cascade	
		4 Boiler for DHW			Number of boilers assigned to DHW	
		5 PI loop period			Base time for PI loop calculation	🙂
		6 Burner water flow delay			Water propagation time delay. **DO NOT ALTER**	⚠
		7 Different boiler size			Heterogeneous mode with 2 power groups DHW+ CH /CH only	
			Disabled		Disable Heterogeneous mode	
			Enabled		Enable Heterogeneous mode	
		8 Cascade pump speed max			Cascade pump full speed	
		9 Cascade pump min speed			Cascade pump min speed	
	2 Cascade info	1 Cascade role			Role of boiler in cascade mode= MASTER, SLAVE, TERMINAL SLAVE. If not in cascade mode : STANDALONE	
		2 System temperature *			Cascade temperature value. Hitting OK when highlighted will open graph that shows the latest 120 variable values stored every 12 minutes (over the past 24 hours). Samples will not be averaged over the 12 minutes period.	
		3 Numbers of burners on			Number of burners that are switched on	
		4 Modulation level			Actual percentage of cascade modulation level	
	3 Cascade auto detect				Pressing OK will start the auto detection of the cascade configuration. Can only be started from the master boiler.	
7 Restore factory settings					Pressing OK all the advanced settings will be restored to the original factory defaults[1] **SEE NOTE BELOW**	⚠

[1] Do not perform a factory reset prior to consulting with RVR Energy Technology Ltd. Depending on the firmware version present on the controller, additional steps may be required to restore normal operation.

5.5   MANUAL CHIMNEY SWEEP MODE

For routine maintenance and/or service purposes a CH request can be generated to force the burner to a specific load from minimum to nominal (0-100%). This is only possible if no error condition is present. The chimney sweep function can be started from the user menu and will be active for 15 minutes.While active it is possible to navigate through other menus to check the boiler status and functionality.

5.6   DISABLING CH REQUEST

The CH function can be disabled. See 5.3.2 parameters accessible by user at 1 HEATING nr 3 scheduler set.

5.7   SERVICE CODE

To access the service-level of the controller it is necessary to enter the service-code. How this done is explained in 5.4 installer (technician) menu.

5.8   TACHO FAN SPEED

For service purposes it is possible to read the fan speed. See 5.4.1 parameters accessible by installer (technician) at 4 DIAGNOSTICS nr 1 boiler information.

5.9   ERRORS

For service purposes it is possible to see a list of recent errors. See 5.3.2 parameters accessible by user at 6 DIAGNOSTICS nr error history.

5.10   ECO WORKING MODE

When the ECO button (R3-C4) is pressed a programmable value (see user menu 1.HEATING under 2 ECO set point reduction) is automatically subtracted from the flow temperature setpoint weather compensated (OTC) set point, or 0-10V setpoint. . The same principal is applicable for DHW (see user menu 2.DOMESTIC HOT WATER under 2 ECO set point reduction)

5.11   HOLIDAY MODE

When the Holiday button (R3-C3) is pressed a start and end date of a holiday period may be entered.The desired flow temperature and the DHW temperature for this period can be set (see user menu 3. HOLIDAY under 1 and 2)

5.12   SCHEDULES FOR CH AND DHW

For CH and DHW separate schedules can be set. Both schedules are set to enabled and always on by default. Schedules may be set (ON, ECO, OFF) for each day, for a group of weekdays, for weekend days or for an entire week. The status of the schedule is shown on the main screen (ON, ECO, OFF). The schedule can be set in the user menu, heating or domestic hot water or in the technician menu, user settings, heating or domestic hot water.

Eco mode can also be forced by pushing the ECO button on the control panel (R3-C4).

5.13   CASCADE AND MODBUS

Cascade and Modbus options are shown in two separate attachments "Modbus" and "Cascade".

5.14   PARAMETER SETTINGS

The parameter settings are listed on the following pages.

User Menu

Section	No.	Sub	Item	Recommended	Min	Max	After factory reset
HEATING	1		CH temperature/OTC set				
		1	Ch setpoint	85	20	90/Technician	75
		2	Outside temperature for CH off	OFF	7	30	OFF
	2		ECO setpoint reduction	50	0	50	50
	3		Scheduler set				
		1	Enable/disable on board scheduler	Enabled	Disabled	Enabled	Enabled
		2	Scheduler set	ON	ON I OFF	ECO	ON
DOMESTIC HOT WATER	1		DHW setpoint (Switch)	80	35	85	80
		1	DHW setpoint (NTC sensor)	60	10	65	60
	2		ECO setpoint reduction	20	0	50	20
	3		Scheduler set				
		1	Enable/disable on board scheduler	Enabled	Disabled	Enabled	Enabled
		2	Scheduler set	ON	ON I OFF	ECO	ON
HOLIDAY	1		CH holiday setpoint	20	20	90/Technician	20
	2		DHW holiday setpoint (Thermostated)	80	35	85	80
	2		DHW holiday setpoint (NTC sensor)	60	10	65	60
MAINTENANCE	4	1	Service information	Service tel. set by Technician			
		2	Service due date	Date set by Technician			
SETTINGS	5	1	Select language	English	English I Italian	German I Russian	
		2	Select units	Celsius	Fahrenheit	Celsius	
		3	Set date		set date		
		4	Set time	24 hours	24 hours	12 hours	
		5	Restore factory settings		Reset to factory/check settings		
CHIMNEY SWEEPER	6	1	Boiler information	OFF	0	100	
DIAGNOSTICS	7	2	Lockout history		Real time boiler status		
			Overview lockout history		Status boiler at time of lock/block		

Technician Menu

Section	No.	Sub	Item	Recommended	Min	Max	After factory
ADVANCED CH SETTINGS	1		CH power set				
		1	Maximum power	100	0	100	100
		2	Minimum power	0	0	100	0
	2		CH temperatures				
		1	Absolute max. temperature	90	20	90	80
					Higher than 90 not allowed		
		2	CH maximum setpoint	85	20	100 (Abs. max CH)	75
		3	CH minimum setpoint	20	20	70	40
		4	CH setpoint hysteresis	5	2	10	3
	3		OTC parameters				
		1	Outside temp for max CH	-10	-34	10	-10
		2	Outside temp for min CH	18	15	25	18
		3	Outside temp for CH off	OFF	7	30	OFF
		4	OTC setpoint table		OTC table		
		5	OTC curve		OTC curve		
	4	1	CH pump settings / Post pump time	10	1	30	5
	5		CH anticycling timer	3	0	15	
	6		CH request type	RT+SP/OT	onlyOTCIRT	01-Vdc % I SP	RT+SP/OT
ADVANCED DHW SETTINGS	1		DHW power				
		1	Maximum power	100	0	100	100
		2	Minimum power	0	0	100	0
	2		DHW temperatures				
		1	Storage temperature setpoint	80	35	85	80
		2	Boiler temperature setpoint	60	35	65	60
		3	DHW setpoint hysteresis	6	2	10	3
	3	1	DHW pump settings / DHW post time	1	OFF	180	30
	4		DHW priority				
		1	DHW priority Status	Enabled	Enabled	Disabled	Enabled
		2	DHW priority TimeOut	Off	1	60	Off
	5		DHW request type	Switch	Switch	Sensor	Switch

						Reccommended	Min	Max	After factory reset
3	SYSTEM SETTINGS	1	Boiler parameters	1	Ignition power		0	100	
				2	Delay siphon check	3	0 (Higher than 30 not allowed)	20	
					Check syphon is not emptied by new value				
				3	Number of boiler pumps	2 pump	Pump 3-w-valve	2 pump	2 pump
				4	PWM pump speed Max	100	1	100	100
				5	PWM pump speed min	40	1	100	30
				6	Antilegionella	Enabled	Disabled	Enabled	Disabled
				7	Modbus parameters	Adress	Baudrate	Frame	
				8	3 Way valve travel time	180	1	255	10
		2	User interface settings	1	Select language	English	English l Italian	German l Russian	
				2	Select units	Celsius	Fahrenheit	Celsius	
				3	Set date	Set date	Set service date		
				4	Set time	24 Hours	24 hours	12 hours	
		3	Service settings	1	Service information		Set telephone number		
				2	Service due date		Set service date		
4	DIAGNOSTICS	1	Boiler information				Real time boiler status		
		2	Lockout history		Overview lockout history		Status boiler at time of lock/block		
		3	Manual test				See chimney sweeper		
5	USER SETTINGS	1	CH temperature/OTC set	1	CH set point	85	20	90/abs max CH	75
				2	Outside temperature for CH off	off	7	25	off
		2	ECO setpoint reduction			50	0	50	
		3	Scheduler set	1	Enable/disable on board scheduler	Enabled	Disabled	Enabled	
				2	Scheduler set	Set time scheduler (Time/On/ECO/OFF)			
		1	DHW setpoint (NTC sensor)			60	35	65	
		1	DHW setpoint (Thermostated)			80	35	85	
		2	ECO setpoint reduction			20	0	50	
		3	Scheduler set	1	Enable/disable on board scheduler	Enabled	Disabled	Enabled	
				2	Scheduler set	Set time scheduler (Time/On/ECO/OFF)			
		1	CH holiday setpoint			20	20	90/Abs max CH	
		1	DHW holiday setpoint (Thermostated)			80	35	85	
		2	DHW holiday setpoint (Sensor)			60	10	65	
6	CASCADE	1	Cascade set	1	Cascade switch delay	30	0	255	
				2	Cascade min power	20	0	100	
				3	Burner power (default value)	x	0	2550	
				4	Boiler for DHW	0	1	6	0
				5	PI loop period	5	0	15	5
				6	Burner water flow delay	30	0	255	30
				7	Different boiler size	Disabled	Disabled	Enabled	Disabled
				8	Cascade pump speed mx.	100	15	100	100
				9	Cascade pump speed min	40	15	100	30
		2	Cascade info	1	Cascade Role : see Cascade auto	Standalone	Standalone	Master l Slave	
				2	System temperature	Actual temperature Cascade system sensor			
				3	Number of boilers on	Actual number of burners /boilers on in cascade			
				4	Modulation level	Actual cascade modulation level			
		3	Cascade auto detect : press OK to start detecting role boiler in cascade chain			Standalone	Standalone	Master l Slave	
7	RESTORE FACTORY SETTINGS					Reset to factory/check settings			

6. INSTALLATION

6.1 INSTALLING THE BOILER

The installation must be done in accordance with all local and national codes, regulations and standards, and in accordance with the directives of all relevant authorities.

1. The boiler must only be installed in an area where it is allowed to install it. Make sure that this area is protected against the danger of freezing.
2. The area should have sufficient ventilation and cooling to prevent overheating.
3. When delivered the boiler is on a pallet. Install the boiler on a flat non-combustible floor and level it by using its positioning bolts.
4. A minimum free space of 50 cm should be left on each side of the boiler for service access.
5. Remove the sealing/protection caps from the connection tubes. Warning : take care as residual water from testing may drip
6. Fill the condensate trap with clean water. This can be done by flushing some water into the cast aluminium exhaust connection from the rear. This water will then drain into the syphon and fill it.

6.2 FROST PROTECTION

The **boiler** is protected against frost.

If the boiler detects an NTC flow temperature below 8 ºC, the CH-pump will be activated. If temperatures continues to fall the boiler will start at a flow temperature of 6 ºC and it will run on minimum load until the flow NTC senses a temperature of 15 °C. The CH-pump will stay running for another 10 minutes. **This only protects the boiler and does not protect the installation, pipework or radiators against freezing.**

During longer periods of absence in the winter, the installation itself should be protected by activating the heating periodically and by partly opening the radiator valves. Where a room thermostat is controlling the demand, do not set the room thermostat to a value below 15 °C.

To protect frost sensitive radiators against frost it is possible to connect a frost thermostat in parallel with a Volt free room thermostat.

It is also possible to set the CH pump to activate automatically under OTC settings when an outdoor sensor is present (this must be set by the installer). In this case,the CH pump will be activated if the outdoor temperature drops below 8 ºC.

6.3   WATER CONNECTION

6.3.1 PUMP

The boiler does not have a built in CH-pump. Therefore a CH-pump must be mounted separately . Select a pump that matches the hydraulic resistance of the boiler and the installation. The graph below shows the resistance characteristics for the different boiler models

Hydraulic Pressure Drop CAHA Midi Series
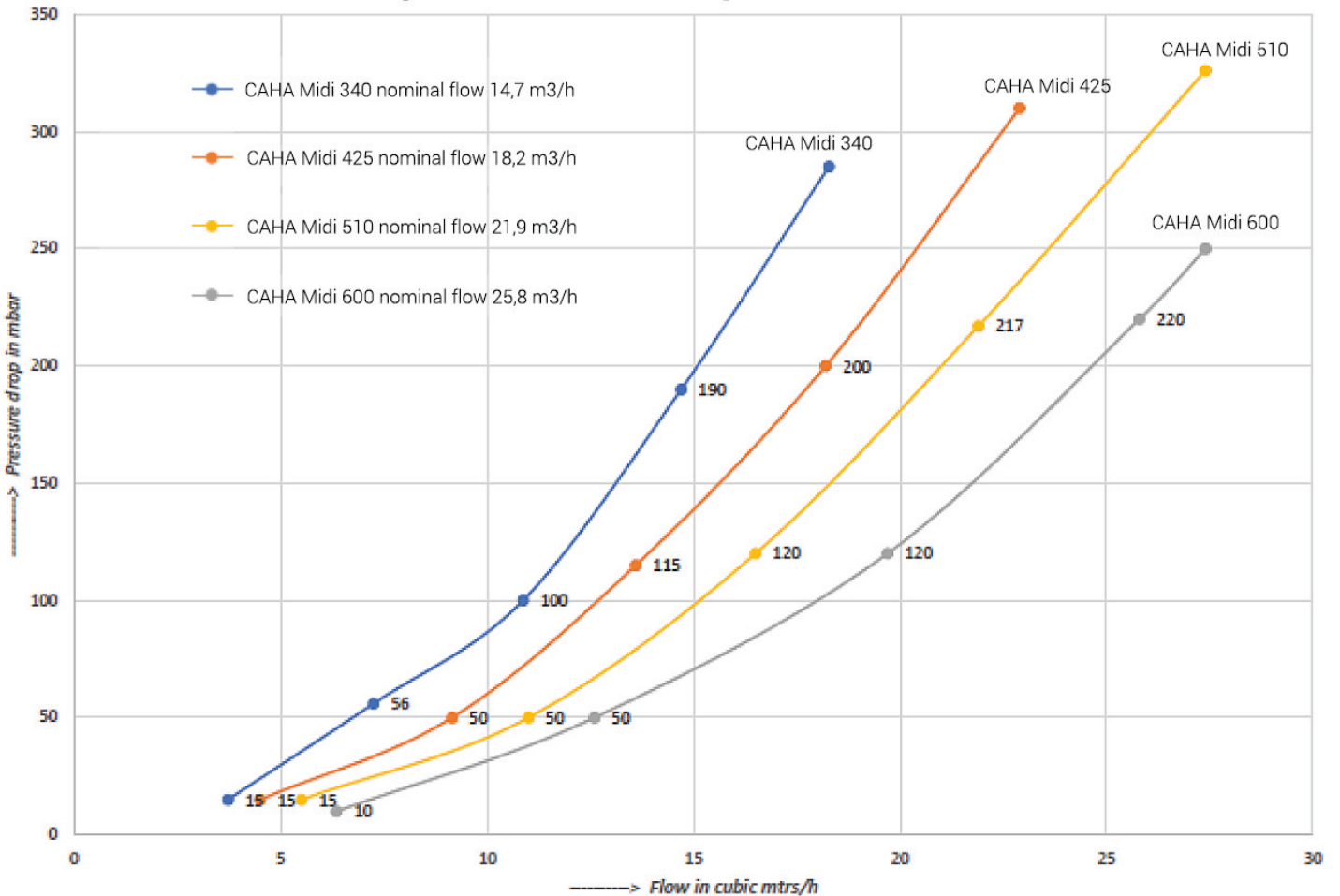
For electrical connections see chapter 6.7.

6.3.2 MINIMUM FLOW

The minimum flows shown below must be guaranteed.

Type	Flow [m³/h] @ ΔT25 Full Load	Flow [m³/h] @ ΔT30 Start = 15%	Flow [m³/h] @ ΔT30 Part Load
340	11.7	3.1	1.9
425	14.6	3.9	2.4
510	17.5	4.7	2.9
600	20.5	5.5	3.4

6.3.3 WATER-TREATMENT

(!) Before filling up the installation (old and new), the installation should be rinsed thoroughly with clean water from the tap.There are some rinsing/cleaning products listed below and it is recommended that these are used.

- The pH must be kept between 7 and 8,5 at all times
- The maximum allowed content of chlorides is 150 mg/ltr.
- The water hardness of the heating system must be according to the German VDI guideline 2035. See following table:

<0,11 °dH = demineralised °dH =German VDI hardness	Installation < 20 ltr/kW	Installation between 20 and 50 ltr/kW	Installation > 50 ltr/kW
50-300kW total boiler capacity	<11,2 °dH	<8,4 °dH	<0,11 °dH
300-600kW total boiler capacity	<8,4 °dH	<0,11 °dH	<0,11 °dH
>600kW total boiler capacity	<0,11 °dH	<0,11 °dH	<0,11 °dH

- Example: for a CAHA Midi 340kW boiler and a total hardness of 8,40 °dH (German VDI hardness) the total volume of filled, refilled and topped up water must not exceed 20 ltrs/kW. If this hardness value is exceeded the total amount of filling, refilling and topping up water is (8,4 / actual hardness in °dH) x ltrs/kW. In the case of water hardness of 15°dH the maximum volume/kW is: (8,4/15) x 20 = 11,2 ltr/kW. If higher values are present, the water should be softened.
- The water may only be partly softened to a value of 20% of its original value. Example : if the initial hardness is 15°D, then it may only be softened to 3,0 °D Note that water softening by means of ion exchange principle is not allowed. If the installation is filled with demineralised or distilled water additives must be added to stabilise the pH value in order to prevent corrosion. Before filling with demineralised water the complete installation must be rinsed.
- The conductivity of the non treated installation water must not exceed the value of 300 µs/cm in combination with a max O_2 content of 0,1 mg/ltr. If the O_2 content is lower than 0,02 mg/ltr a higher conductivity limit of 600 µs/cm is allowed. if the conductivity is higher than the values mentioned above, empty the system, flush and fill with clean tap water, prefeably by adding the recommended cleaning products.
- The water pressure must be higher than 0,8 bar
- The water quality must be checked on a regular basis (at least annually)
- There are many products available on the market which pretend to clean and protect heating systems. Unfortunately there are only a few that have really proven this in practice.Therefore RVR Energy Technology only allows the following quality products for water treatment ;

  Producer : Fernox www.fernox.com
  - Cleaner F3 : removes corrosion, lime and sludge
  - Protector F1 : protects against corrosion, lime and sludge
  - Alphi-11 : anti-freeze and protection against corrosion and lime

  Producer : Sentinel www.sentinelprotects.com
  - X100 : Inhibitor scale and corrosion protection
  - X200 : Noise reducer long life system treatment to eliminate noise
  - X300 : System cleaner for new hydronic heating systems
  - X400 : System restorer non acid cleaning of older systems
  - X500 : Inhibites antifreeze against scale and corrosion in all types of indirect heating systems at low temperatures

  Note that these products must be used strictly in accordance with the water treatment manufacturers instructions.

Furthermore we strongly recommend the following ;

- Use the above mentioned water treatment protection products to fill and protect the installation
- Use a log book to record water filling, refilling, topping up, water quality measurements and water treatment
- Only use diffusion tight material, especially for under floor heating
- Always mount air vents at the highest points in the installation.
- Install isolation/check valves near the boiler and on strategic locations (anticipating any future expansions of the system) to avoid fills, refills and topping up as much as possible.
- Install a water meter to check the amount of filled, refilled and topped up water.
- Install a filter (magnetic and dirt) in the return.
- Install an isolation heat-exchanger to separate the boiler from the installation to protect dirt or lime in the secondary system from affecting the boiler.
- Avoid leaks and if there is a leak, repair as soon as possible.

6.3.4 WATER CONNECTION GENERAL

1. Water connections for flow and return are size DN100
2. The installation must have a pressure relief valve (with a capacity higher than the boiler output) and an expansion vessel. The capacity of this vessel should be sufficient for the installation.
3. To avoid blocking and non volatile lock-out of the boiler control it is recommended to install a by-pass in the installation to guarantee the minimum flow through the boiler. The by-pass valve should be mounted as far away from the boiler as possible to have the biggest possible content of the bypass-circuit (also a big radiator without valves could be used).
4. Drain the condensate via a tundish and an U-trap to the sewer.
5. At the highest point of the installation a de-airing device should be mounted.

6.4 GAS CONNECTION

6. The gas connection must be done in accordance with all local and national codes, regulations and standards, and in accordance with the directives of all relevant authorities.
7. The gaspipe of the boiler has a R 1,5" connection.
8. In order to avoid blockage of the gas valve, ensure that there is no dirt in the gas pipework prior to commissioning.
9. The maximum allowable inlet pressure for the gas valve is 50 mbar.
10. Check the heat input of the boiler. The load as given on the type plate should be checked.

6.5 AIR-SUPPLY AND FLUE-GAS CONNECTION

Air connection :   All types have air connection ø 150 mm
Flue gas connection :   ø 250 mm for all types
Allowed Appliance types: Possibilities for air / flue system ; B23 C33 C63
                          Note : C63 is not possible for Belgium.

6.5.1 B23

As standard the boiler is delivered as type B23 where the supply air is taken from the room where the boiler has been installed in.

If the inlet air contains dust or dirt one should install a filter or a leaf catcher in the air supply.

A vertical terminal is recommended

Roof terminals and extensions and/or condensate trap/collector must be approved by RVR Energy Technology. See page 33.

For pressure drop calculation of appliance type B23 use the table for pressure drop per component and the table for total pressure drop calculation. See page 44.

For total available pressure drop see table on page 42.

6.5.2 C33

A vertical terminal is recommended.

Roof terminals and extensions and/or condensate trap/collector must be approved by RVR Energy Technology. See page 44.

For pressure drop calculation of appliance type C33 use the table for pressure drop per component and the table for total pressure drop calculation. See page 42. For total available pressure drop see table on page 42.

⚠️ ***Terminals should be installed in the same pressure area (within a plane of 1m2)***

6.5.3 C63

C63 appliances may only be equipped with Gastec QA materials and terminals or according NEN 14989-2

> ⓘ **Note: When using a C63 type flue configuration it is essential to ensure that C63 is allowed in the country were the boiler is installed.**

It is recommended to use a full aluminium flue system. A PP (Temperature class T120) or stainless steel flue system can also be used (See TPW table below). In this case the condensate must be drained before it flows back into the aluminium parts of the boiler. Otherwise aggressive condensate from the non-aluminium flue system can corrode the aluminium parts of the boiler. A condensate trap/collector must be mounted just before entering the silencer(s) of the boiler (also see 6.5.5.1 general).

T-P-W Class	
Temperature range	T120
Pressure range	P1
Condensate resistance (W=wet / D=Dry)	W

The minimal combustion products temperature, mass flow rate and CO_2 are given in the table below.

Model	Part Load	Vol. Flue m³/h	Vol. Air m³/h	CO_2 %	T Fluegas ºC	rho kg/m³
340	68	88	76	9.1	30	1.12
425	85	110	95	9.1	30	1.12
510	102	132	115	9.1	30	1.12
600	119	154	134	9.1	30	1.12

The maximum allowed recirculation rate under wind conditions is 10 %

Maximum allowable combustion air temperature 45 °C

The tables below give an indication of maximum lengths (in mtrs) for parallel air supply and flue outlet pipes. The equivalent of pipe length in mtrs of bends 90 ° and 45 ° is given

Model	Max. allowed pressure drop*	Parallel Air/Fluegas Ø150/ø200	Parallel Air/Fluegas Ø150/ø250	Parallel Air/Fluegas Ø180/ø250
340	250 Pa	36m	48 m	89 m
425	250 Pa	20 m	29 m	54 m
510	250 Pa	15 m	24 m	43 m
600	250 Pa	8 m	16 m	30 m

(*) : Without roof terminal, bend(s) and condensate trap

Equivalent of pipe length in meters			
Bend	Pipe Diameter		
	Parallel Air/Fluegas Ø150/ø200	Parallel Air/Fluegas Ø150/ø200	Parallel Air/Fluegas Ø180/ø250
Bend 90°	4.4	4.1	4.3
Bend 45°	2.2	1.9	2.1

> ⚠ **Warning : Do not install the terminals for supply of combustion air and for the exhaust of combustion products on opposite walls of the building**
>
> **Terminals should be installed in the same pressure area (within a plane of 1m²).**

6.5.4 PRESSURE DROP CALCULATIONS

The first 90 ° bend must be mounted directly to the boiler and followed by the chimney silencer (this bend is not part of the calculation (as it is already taken into account)).

Flue-outlet and air-supply calculations:
Total pressure drop available for flue-outlet and air-supply is given in the table below.
Air connection :   All types have air connection ø 150 mm
Flue gas connection :   ø 250 mm for all types

Type	Total available Pressure drop in [Pa] for B23, C33, C63
340	250
425	250
510	300
600	300

For pressure drop calculation of appliance types **B23,C33** use the next two tables on the following pages.

PRESSURE DROP TABLE PER COMPONENT

Boiler type								
	1	2	3	4	5	6	7	8
	340		425		510		600	
Pressure drop [Pa]	Flue gas [Pa]	Air [Pa]	Flue gas [Pa]	Air [Pa]	Flue gas [Pa]	Air [Pa]	Flue gas [Pa]	Air [Pa]
Pipe length 1m Ø 250mm	0.6		0.9		1.3		1.8	
Pipe length 1m Ø 150mm		4.2		6.5		9.4		12.7
Bend 90° Ø 250mm	3.4		5.2		7.5		10.3	
Bend 90° Ø 150mm		16.2		25.3		36.5		49.7
Bend 45° Ø 250mm	5.3		8.3		12.0		16.3	
Bend 45° Ø 150mm		6.9		10.7		15.4		21.0
Terminal C33 Ø250mm, Ø150mm	20.8		32.5		46.8		63.7	
Terminal B23 Ø200mm	6.2		9.8		14.0		19.1	

1	2	3	4	5	6	7	8	9
	Number Flue gas Ø250mm	Number Air Ø150mm	delta pressure component Fluegas	delta pressure component Air	Total pressure drop Flue-gas out [Pa] (2*4)	Total pressure drop Air in [Pa] (3*5)	Total Pressure Terminal In [Pa]	Total pressure drop Fluegas + air in [Pa] (6 + 7 + 8)
1 Meter Pipe								
Bend 90°								
Bend 45°								
Terminal:								
					Total delta pressure [Pa]			

How to use the table:

- Column 1 : used material
- Column 2: total number of used material of column 1 for flue gas out
- Column 3: total number of used material of column 1 for air in
- Column 4: pressure drop from pressure drop table /component for flue gas components
- Column 5: pressure drop from pressure drop table /component for air components
  Select the correct column for the selected boiler type
  (340: 1,2 , 425: 3,4 , 510: 5,6 600: 7,8)
- Column 6: total pressure drop flue gas: multiply column 2 *4
- Column 7: total pressure drop air: multiply column 3 *5
- Column 8: total pressure drop terminal
- Column 9: total pressure drop flue gas and air: column 6 + 7 + 8
- Finally add all together column 9

⚠️ **Total pressure drop must be lower than 250 Pa (CAHA Midi 340 and CAHA Midi 425) or 300 Pa (CAHA Midi 510 and CAHA Midi 600).**

If the combined inlet/outlet system exceeds the maximum allowed pressure, this will result in a decrease of more than 5 % of heat capacity. **This is not allowed.**

Components must be approved by RVR Energy Technology. A list of allowed articles with corresponding OEM nrs is given below.

COMPONENTS	RVR ART. NO
ALUMINUM Ø 250 mm	
90° Bend Aluminium 250mm	SIA532
45° Bend Aluminium 250mm	SIA533
1m Extension Aluminium 250mm	SIA530
500mm Extension Aluminium 250mm	SIA531
Roof Terminal Aluminium 250mm B23	SIA535
Roof Terminal Aluminium 250/250mm to 250mm/350mm C33	SIA536
PP Ø 150 mm	
ELBOW PP 160 90°	SIA1032
ELBOW PP 160 45°	SIA1033
EXTENSION PP 160x2000	SIA1031
EXTENSION PP 160x1000	SIA1030
EXTENSION PP 160x500	SIA1034
Leaf catcher DN 160x180	SIA1037
150 to 160mm Adaptor	SIA1080
GENERAL	
Wall Bracket 250	SIA537
Wall Bracket 160	SIA1035
Seal EPDM 250 mm	SIA538
Seal EPDM 160 mm	SIA1036
Weather slate flat ALU 368 0°	SIA1090
Weather slate steep LEAD 210 25°-45°	Per Application

APPLIANCE TYPE B23

FLUEGAS OUTLET:
ROOF TERMINAL ALU 250

SUPPLY AIR INLET:
LEAF CATCHER ALU DN 150 X180

B23

APPLIANCE TYPE C33

FLUEGAS OUTLET:
ROOF TERMINAL ALU 250

SUPPLY AIR INLET:
LEAF CATCHER ALU DN 150 X180

6.5.5 INSTALLING FLUE -EXHAUST AND AIR INLET

6.5.5.1 GENERAL

- Do not use materials from different manufacturers for either exhaust or air inlet
- Only the manufacturers of flue way and air inlet components as mentioned in this manual may be used
- Both systems (exhaust and air) should be mounted free of tension

CONDENSATE, ICE-FREE TERMINAL, TUNDISH AND U-TRAP

The boilers can produce flue gasses with very low temperatures, which can lead to condensation in the flue pipes and flue terminal. Therefore one should always mount an ice free terminal. Drain the condensate via a tundish and a U-trap to the sewer.

AIR INLET

If PP material is used for the air inlet a minimum distance of 35 mm between exhaust and air inlet should be respected. The minimum insert length of the sleeve, leaf catcher or pipe must be 40 mm.

FLUE EXHAUST

A horizontal flue gas (exhaust) pipe must be installed with a fall of 3° (50 mm per mtr) downwards towards the boiler to allow condensate to flow back in the sump or condensate collector.

The minimum insert length into the sleeve and the minimum length of the pipe end for aluminium and stainless steel must be 40 mm.

If PP is used pay attention to the expansion (elongation) of the PP due to rise in flue gas temperature.

Insert the PP pipe into the sleeve and redraw over a length of 10 mm (10 mm for maximum pipe length of 2 mtr). After mounting the minimum insert length into the sleeve and the pipe end must be 40 mm.

CONDENSATE TRAP/COLLECTOR

The condensate trap/collector must be either connected by
a tube to a syphon that provides the same height of water column as the one supplied with the boiler or by a T-piece to the syphon as supplied with the boiler

Note: The chimney pieces (silencers) that are delivered with the boiler need to be mounted correctly as shown in the figures beneath

For 6,7 and 8 section boilers one silencer must be mounted with its sticker as shown in the first figure below. For the 5 section boiler two silencers must be mounted with its sticker as shown overleaf.

Silencer of 6,7 and 8 section boiler (425-600 kW)		Two silencers mounted on a 5 section boiler (340 kW)	
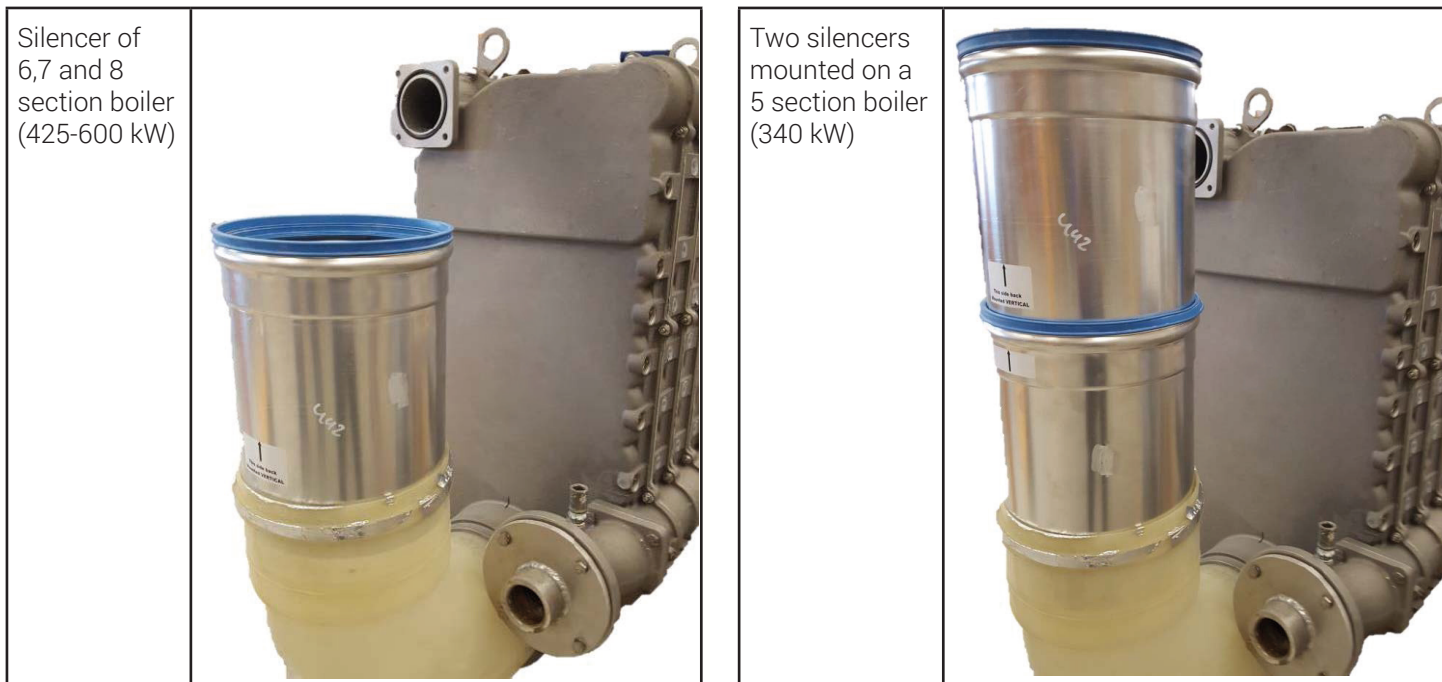
6.5.5.2 BRACKETS, MOUNTING

AIR INLET

- The first bracket should be mounted 0.5 mtr away from the boiler
- Horizontal and non vertical pipes should be bracketed equally divided with a maximum distance of 1 mtr between the brackets
- Vertical pipes should be bracketed equally divided with a maximum distance of 2 mtrs between the brackets
- In case of a chimney shaft, first identify the air inlet. The end of the air inlet pipe should be at least 0.5 mtr above the shaft. The last component before entering the shaft should be fixed. If a bend is the last component also fix the component before the bend.

FLUE GAS (EXHAUST)

- A bracket must be mounted to every component except in the case that the length of the pipe before and after the bend < 0.25 mtr. In this case mount the first bracket at a length of max 0.5 mtr away from the boiler
- Horizontal and non vertical pipes that have a distance between the fixing brackets > 1 mtr should be equipped with a non clamping (to allow minor movement) bracket in between
- Vertical pipes should be bracketed equally divided with a maximum distance of 2 mtrs between the brackets
- In case of a chimney shaft, first identify the flue outlet. Check if the used shaft pipes are damaged or blocked.The ends of the exhaust pipe should be at least 0.5 mtr above the shaft. The last component before entering the shaft should be fixed. If a bend is the last component also fix the component before the bend.

6.5.5.3 SEALING AND JOINING

- Prevent incorrect or damaged seals by shortening pipes squarely and by deburring after shortening.
- Joins or connections in the exhaust flue may not be screwed.
- In the air inlet only aluminium or stainless steel joins or connections may be screwed. It is not allowed to screw PP joins or connections.
- Do not use glue or foam like silicon or PUR.
- To assure soundness all components must be sealed.
- For smooth joining only use a soap solution (1% in water). Do not use oil, grease or (acid free) Vaseline

Important notice

If instructions as written above are not followed and or the materials for air inlet and flue gas exhaust as quoted above are not used RVR Energy Technology can not be held responsible for eventual consequences

1. The electrical installation should be in accordance with national and local codes and regulations.

2. As standard the boiler is configured for 230 VAC / 50 Hz

3. The terminal strip is accessible by opening the front cover (unscrew with hexagonal wrench) behind which the control is mounted.

4. A means of disconnection must be incorporated in the fixed wiring in accordance with the wiring rules. Use the lower cable guide indicated with a 230 VAC sticker on the backpanel of the boiler. As it is a stationary appliance without means for disconnection from the supply a contact separation in all poles that provide full disconnection under voltage category III must be provided. The minimum cross section of the supply wire is 3 x 1.0 mm2 and must be connected to the numbers, 1 (=PE), 2 (=L) and 3 (=N) of strip C1. The supply wire should be secured by a pull relief.

5. It is not permissible to alter the internal wiring as fitted by the manufacturer.

6. The enable connected to numbers 1 and 2 of the strip C2 must be Volt free (also see warning under 4.2.1). To set, select from the technician menu, advanced settings, CH request to Room Tstat. The 0-10 V DC (Power or Setpoint mode) should be connected to the numbers 3 (=negative-) and 4 (=plus+) and a short wire loop should be placed between the numbers 1 and 2 of strip C2. To set, from the technician menu, advanced CH settings, CH request select either 0-10V % (power mode) or 0-10 V SP (setpoint mode). Digital communication (open Therm OT+ version 3.0) should be connected to the numbers 1 and 2 of the strip C2. Select from the technician menu, advanced CH settings, CH request for Room Tstat. For digital communication with EBV like RS30 or Theta an additional communication module is required. For the internal OTC (outdoor temperature controller) a 12 kohm at 25° C (see NTC table at 6.2.2) should be connected to the numbers 5 and 6 of strip C2 and a short wire loop should be placed between the numbers 1 and 2 of strip C2. Finally from the technician menu, advanced CH settings, CH request, select only OTC.

7. If a storage tank is connected to the boiler, the tank thermostat (or the tank NTC) should be connected to the numbers 7 and 8 on the strip C2. Note that a tank NTC should be12 kohm at 25 °C (see NTC table at 6.6.2.)

8. The CH system pump should be connected to the numbers 9 (=PE), 10 (=L), 11 (=N) on strip C1 if in use in combination with a 3-way valve. (also see chapter 4.3). A PWM pump should be connected to 18 (=PE), 19 (=L) and 20 (=N) on strip C1.The PWM signal should be connected to 14 (PWM signal) and 13 (PWM ground) om strip C2. From the technician menu, system settings, boiler parameters the max and min pump speed can be set.

9. The DHW pump (or 230 VAC 3-way valve) should be connected to 12 (=PE), 13 (=L), and 14 (=N) on strip C1. If a CH pump is used it should be connected to 15 (=PE), 16 (=L) and 17 (=N) on strip C1.

10. If the system pump, CH pump, PWM pump, DHW pump, alarm connection or the 3-way valve consumes more than 0,8 A, it needs to be switched by an auxiliary relay.

11. The alarm output on the numbers 24 and 25 on strip C1 is a potential free relay output (230 VAC), max 0,8 A). The cascade/system pump output on the numbers 29 and 30 on strip C1 is a potential free relay output (230 VAC, 0,8A).

12. The B-B (Burner Block) on the numbers 31 and 32 on strip C1 provides an external (remote) burner block (error 77). The external contact must be a potential free contact (rated at 230 VAC).

13. The SPS_B (Burner Block) on the numbers 11 and 12 on strip C2 also provides an external (remote) burner block (error 77). In this case the external contact must be a potential free contact (rated at 24 VDC).

14. The B-L (Burner Lock) on the numbers 9 and 10 on strip C2 provides an external burner lock (error 3). The external contact must be a potential free contact (rated at 24 VDC).

15. The main-fuse (10,0 A) is near the on/off switch on the right side of the control panel.

16. If the supply wire needs to be replaced, act as described under 4.

17. Connect current carrying conductors in such a way that they become taut before earthing conductor. See figure to the right.

General remarks :

Use the tube on the left side to guide the low voltage connections from C2 and C3

Use the 4 tubes on the right side to guide the 230 V connections from C1

Also see wiring diagram on next pages
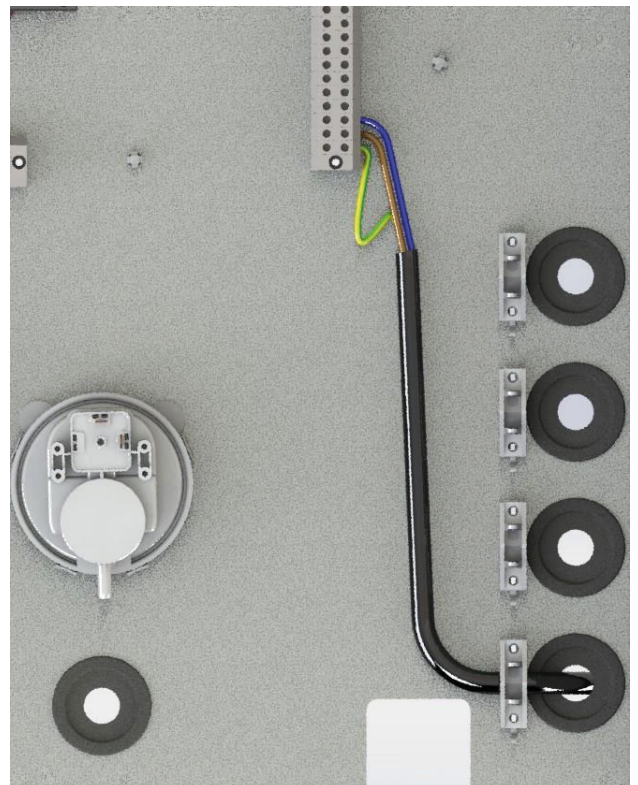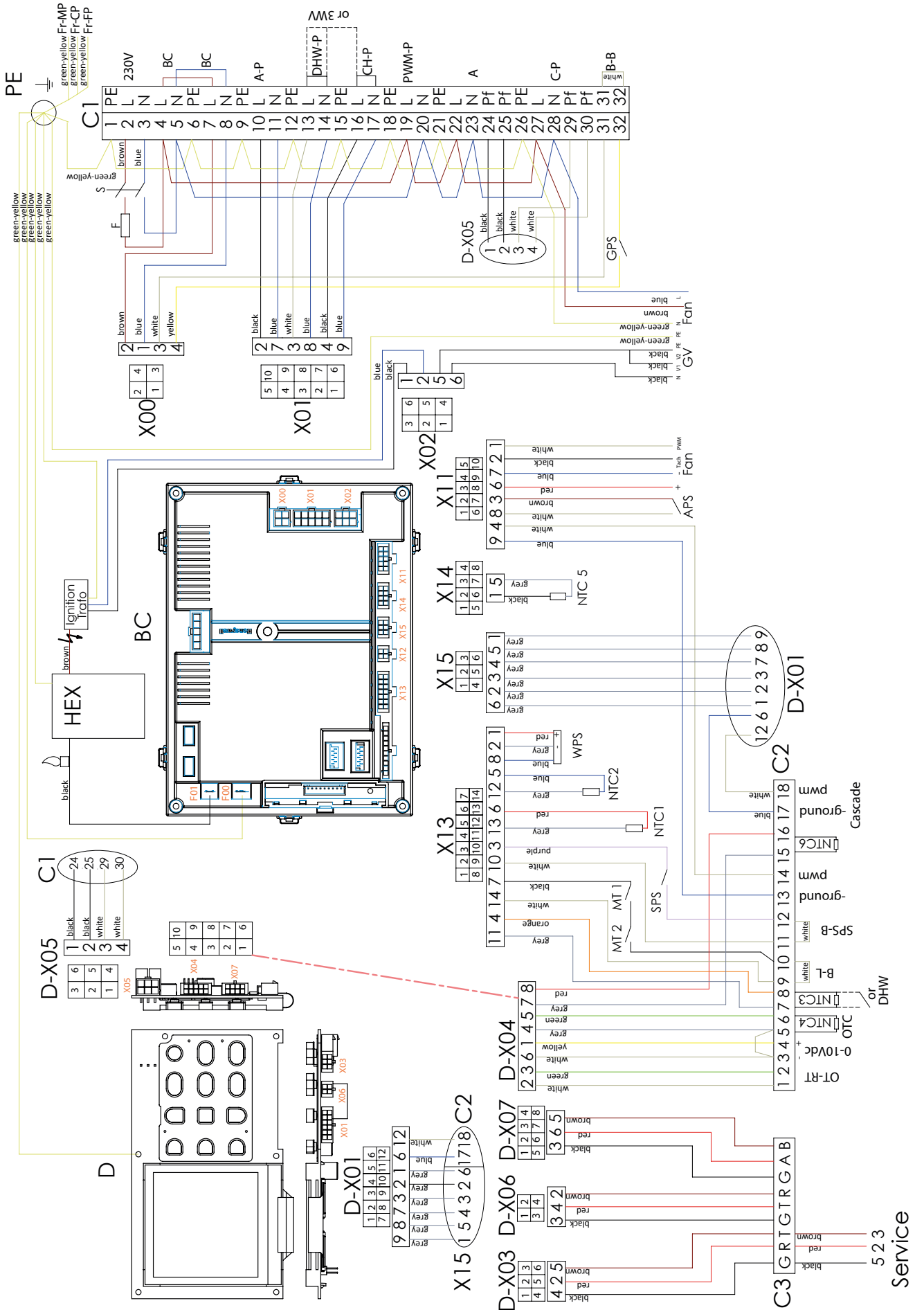
Legend	
BC	Burner control
D	Display
C1	Connector 230V
C2	Connector low voltage
CH-P	Central heating pump
DHW-P	Domestic hot water pump
PWM-P	Modulating pump
A-P	Appliance pump max 0,8A
HE	Heat exchanger
NTC1	Flow temperature sensor
NTC2	Return temperature sensor
NTC3	Domestic hot water sensor or switch
NTC4	Outside temperature sensor
NTC5	Flue gas temperature sensor
NTC6	Cascade sensor
WPS	Waterpressure sensor
APS	Air pressure switch
SPS	Siphon pressure switch
GPS	Gas pressure switch
GV	Gas valve
S	Switch on/off
3WV	3 way valve
OT-RT	Open therm or room thermostat on
OTC	Outdoor temperature control 12K
F	Fuse
SPS-B	Siphon pressure switch block
B-L	Burner lock
A	Alarm
C-P	Cascade pump potential free contact
B-B	Burner block
PE	Earth cable or connector
Fr	Frame
MP	Mounting plate
CP	Cover plate
FP	Front plate

6.6.2 NTC RESISTANCE TABLE (12K)

Temperature [°C]	Resistance [kΩ]	Temperature [°C]	Resistance [kΩ]	Temperature [°C]	Resistance [kΩ]
-30		30	9.80	85	1.47
-20	98.20	35	8.05	90	1.26
-15	75.90	40	6.65	95	1.10
-10	58.80	45	5.52	100	0.95
-5	45.90	50	4.61	105	
0	36.10	55	3.86	110	

6.7 PNEUMATIC CONNECTIONS

A pneumatic diagram for the CAHA Midi 340 (5 sections) and the CAHA Midi 510 (7 sections) is given in the figure below.
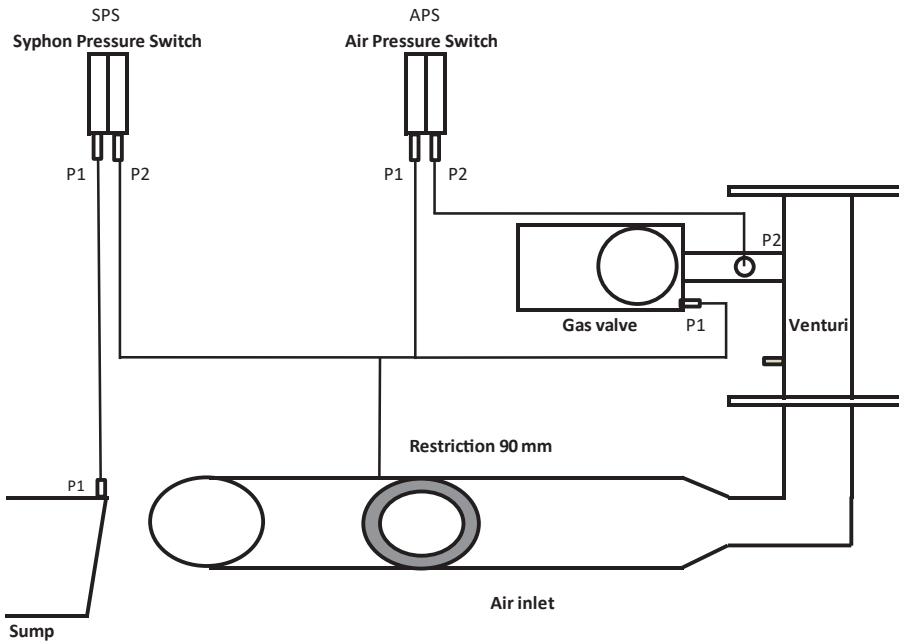
A pneumatic diagram for the CAHA Midi 425 (6 sections) and the CAHA Midi 600 (8 sections) is given in the figure below.
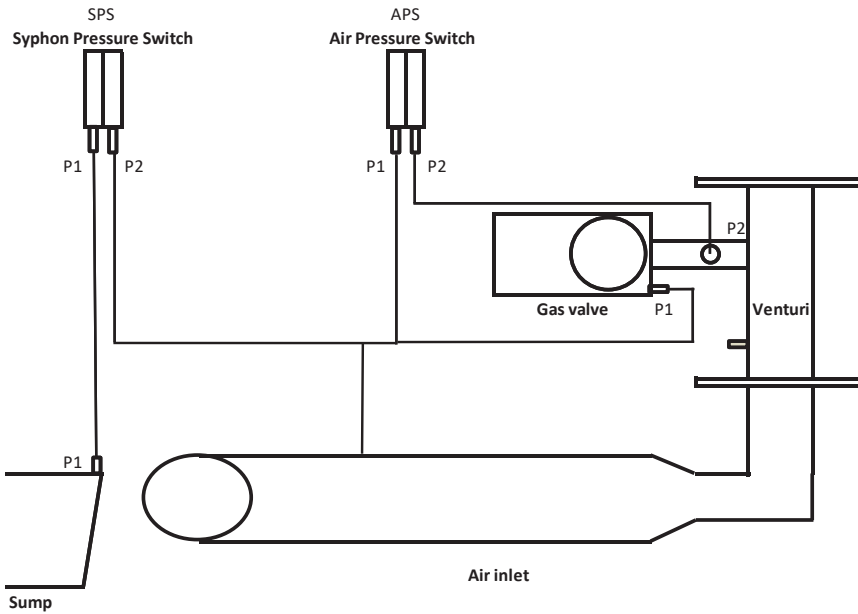
The siphon pressure switch, connected to the sump (P1), prevents overflow of the syphon in the case of excess back pressure in the flue.

The air pressure switch, (P1 and P2), connected to the venturi, checks the amount of air (by means of a Δp measurement) before startup.

6.8 PC-CONNECTION

For information regarding connection of a PC to the boiler please contact your supplier.

7. COMMISSIONING

1. Fill and bleed the system. Fill the boiler until a pressure between 1.5 and 2 bar isachieved. The maximum working pressure is 6 bar. The boiler (not the installation!) is automatically bled by a built in automatic air vent.

2. Check all gas and water connections thoroughly for leaks.

3. Bleed the gas pipe.

4. As standard the boiler is set for G20 or G25. Check that the installation provides the correct type of gas to the boiler.

5. Check the inlet pressure : 20 mbar or 25 mbar

6. Turn on the boiler by setting the main switch on the control panel of the boiler to position 1 (on).

7. Generate (create) a heat demand.

8. Just before ignition the control checks if the contacts of the gas pressure,syphonpressure and water pressure switches are closed.If not, the boiler will block and the display will show E76.

9. If gas, water syphon pressure switches are closed the burner will be ignited.

10. Perform a thorough check on flue-gas joints for leakage.

11. Check the heat input and the gas pressure at maximum load.

12. Heat up the installation. Stop the heat request.

13. Bleed the installation again, topping up the water system pressure if required.

14. Explain the operation of the boiler to the user.

15. Explain to the user the significance of error codes and the need to report themwhen requesting service engineer support.

16. After installation the datasheet as shown in chapter 9.1 should be filled in.This should be repeated at every service-interval.

17. Safely store the installation and the user manual preferably in close proximity to the boiler.

7.1   GAS CATEGORY

The types of gas and supply pressures vary by country. In the table below the gas category and supply pressure are listed by country.

Countries	Countries	Category	Pressure	Countries	Countries	Category	Pressure
AT	Austria	I2H	20	IT	Italy	I2H	20
BE	Belgium	I2E(R)	20/25	LT	Lithuania	I2H	20
BG	Bulgaria	I2H	20	LU	Luxembourg	I2E	20
HR	Croatia	I2H	20	LV	Latvia	I2H	20
CY	Cyprus	I2H	20	NL	Netherlands, the	I2L , I2EK	25
CZ	Czech Republic	I2H	18	PL	Poland	I2E	20
DE	Germany	I2E	20	PT	Portugal	I2H	20
DK	Denmark	I2H	20	RO	Romania	I2E, I2H	20
EE	Estonia	I2H	20	SE	Sweden	I2H	20
ES	Spain	I2H	20	SL	Slovenia	I2H	20
FI	Finland	I2H	20	SK	Slovakia	I2H	20
FR	France	I2Esi , I2Er	20 / 25	NO	Norway	I2H	20
GB	United Kingdom	I2H	20	CH	Switzerland	I2H	20
GR	Greece	I2H	20	LI	Liechtenstein	I2H	20
HU	Hungary	I2H	25	IS	Iceland		
IE	Ireland	I2H	20	MT	Malta		

This boiler can be adjusted for category K(I2K) and is in this case suitable for the use of G and G+ distribution gasses according to the specifications as shown in NTA 8837:2012 Annex D with Wobbe-index 43,46-45,3 MJ/m3 (dry, 0 °C, Hs) or 41,23 – 42,98 (dry, 15 °C, Hs)

This boiler can also be converted and re-adjusted for category E (I2E)

This means that the boiler is : either is suitable for G+ gas and H-gas or provable suitable is for G+ gas and provable can be made suitable for H-gas as meant by "Besluit van 10 Mei 2016" until changes in this document are made

As the responsible manufacturer of my products, I'm aware that the above mentioned countries have adopted the Gas Appliance Directive 2009/142/EC in their national law. I understand that the CE mark has meaning only in these countries, where the GAD is implemented in the national regulations.
Although other countries might value and respect the CE mark, it has no formal value.

7.2 ADJUSTMENT % CO_2 AND CHECK INPUT

The boiler is equipped with an automatic gas/air regulator. This means that the amount of gas is regulated depending on the amount of air. The % CO2 needs to be adjusted according to the table below ;

Type of boiler	Gas type	Inlet pressure	%CO_2 on max load	%CO_2 on min load
340	G20 / G25	20 / 25 mbar	9.3 +0.2-0.05	9.1 +0.15-0.2
425	G20 / G25	20 / 25 mbar	9.3 +0.2-0.05	9.1 +0.15-0.2
510	G20 / G25	20 / 25 mbar	9.3 +0.2-0.05	9.1 +0.15-0.2
600	G20 / G25	20 / 25 mbar	9.3 +0.2-0.05	9.1 +0.15-0.2

The boiler has a gas valve that is connected to a venturi. See figure below.

ADJUSTMENT FOR MAX. LOAD

* Wait until the boiler is stable and measure % CO_2
* If required, correct CO_2 with the throttle ; turning towards + gives a higher CO_2 percentage (a ½ turn (180°) causes a change of approximately 0,85 % CO_2)
*

ADJUSTMENT FOR MIN. LOAD

* Wait until the boiler is stable
* If required, correct the CO_2 with the off-set ; turning towards + gives a higher CO_2 percentage. Note : this offset adjustment is very sensitive : half a turn (180°) causes a change of approximately 1 % CO_2.

Throttle

Off-set
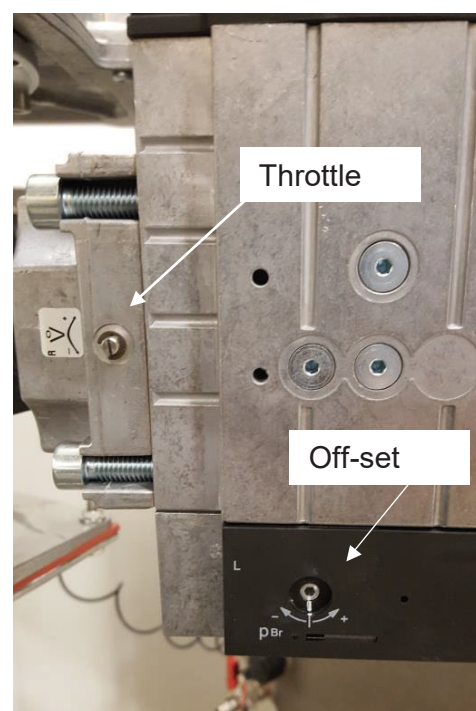
CHECK ON HEAT INPUT

In the table below the relationship between nominal input and fan speed and gasflow is given. The nominal fan speed can be ± 5% due to adjustments in production

Model	340	425	515	600	
Nominal input	340	425	515	595	[kW Hi]
Fan speed nominal	4600	4600	4600	4600	[rpm]
Gasflow G20	36	45	54	63	[m3/h]

If the gas flow is too low it may be due to an obstruction (dirt) in the air/flue system. Check and if necessary clean. The gas flow must then be re-checked.

8. ERRORS

8.1 GENERAL

If there is no data visible on the display, the fuse (10,0 A Slow blow) in the control panel ,near the main switch, should be checked (as well as the position of the on/off switch) and should if required be replaced (after the cause for break down has been determined and rectified).

⚠️ **WARNING! THIS FUSE IS PART OF THE 230 V CIRCUIT. DISCONNECT THE BOILER FROM THE MAINS ELECTRICITY SUPPLY BEFORE REPLACING THE FUSE!**

If there is still no data visible on the display, one has to check if there is 230 VAC present on the connections "L" and "N" of connector X1 in the MAXSYS. Also see electrical wiring diagram.

If there is 230 VAC present (terminal connector C1: 12,13) , then the 230 V fuses F1 and F2 inside the Maxsys should be renewed. Disconnect the boiler from the main 230V supply and remove the connectors from the Maxsys.

Notice : for this it is not necessary to unscrew the Maxsys from the mounting plate

Release the six security clips with a long thin screw driver. Then remove the protective cover of the Maxsys. Replace the 230 V fuse(s) F1: T3.15 AL 250V and/or F2 T3.15 AL 250V inside the Maxsys.

A blown fuse in the Maxsys controller could be caused by a short-circuited pump. It is recommended to also check the CH-pump and also the DHW pump in this case.

If the 230 V fuses are OK and the display is still blank, then the cable of the display to the Maxsys (X15) should be checked. If this is also ok, the Maxsys should be replaced.

Six security clips

F1: T3.15A 250 V
F2: T3.15A 250 V
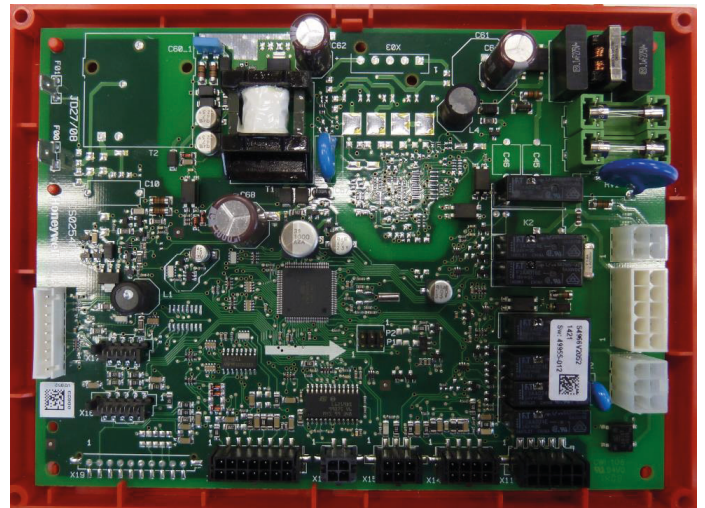
If you are not sure that there is any heat demand, you can force the boiler to start as described in 5.5.

On heat demand, the boiler control will perform a zero-check of the air pressure switch before starting the fan. Following this, the fan will start and wait for air pressure switch to close. As soon as APS has closed, starting procedure will continue.

APS closes at P > 40 Pa.

If there is a problem with APS, the display will show blower speed error.

The boiler control checks the status of the built-in pressure switches for water, gas and syphon just before ignition ; Water pressure should be > 1,4 bar (E47); Gas pressure should be > 14 mbar (E76); Syphon pressure should be < 12,4 mbar (E77)

8.2   DHW ERRORS

Boiler does not respond to DHW heat request

- Check the storage tank-NTC or thermostat and its wiring (also see electrical wiring diagram).
- Check if DHW is enabled using the control panel

Insufficient DHW flow

- Dirty filters in taps.
- Insufficient water pressure.

DHW temperature too low

- Tapping flow too high
- Temperature set point too low
- 3 way valve not fully in DHW position
- Faulty DHW pump
- DHW operation set to off
- Storage tank-NTC or thermostat and or wiring defect.
- Input too low due to too much resistance in air/flue system.

Boiler operates only for DHW

- Storage tank-NTC or thermostat defect and or its wiring.
- 3-way valve stuck (remains in direction towards storage tank)

8.3   CH-ERRORS

CH circuit stays cold

- Incorrect connection to the mains electricity supply
- Main switch on control panel is switched off (boiler off).
- Room thermostat defect, incorrect wiring, temperature set too low
- Outdoor sensor and/or its wiring defect.
- CH operation off
- 3-way valve defect (remains in direction towards storage tank)

8.4   ERRORS (HARD AND SOFT LOCKOUTS)

Errors are indicated by a text and an E-code on the bottom line on the display.

The error message can be displayed by pressing the "information" button

Following an error with a hard lockout, the boiler will not fire again until a manual reset is performed (eg max temp limit).

These errors can be found under column "hard lockout code" in the following table.

Following an error with a soft lockout, the boiler will automatically resume normal operation after the cause of block is solved (eg gas pressure too low). They can be found under column "soft lockout code" in table beneath.

The cause of error (hard or soft lockout) can be found with the help of the error-list in the following table.

After the cause of error has been determined and the error has been resolved, the boiler can be put back into operation again.

Hard Lockouts	
Hard Lockout Code	**Description**
E1	Failed ignition
E2	False flame
E3	High boiler temperature
E4	Air flow/damper
E5	Blower speed
E6	Air flow/damper
E8	Flame circuit error
E9	Gas valve circuit error
E15	Sensor drift
E16	Supply sensor stuck
E17	Return sensor stuck
E18	Sensor failure
E21	Internal control fault
E30	Supply sensor shorted
E31	Supply sensor open
E43	Return sensor shorted
E44	Return sensor open
E80	Return > Flow
E87	External limit open

Soft Lockouts	
Soft Lockout Code	**Description**
E7	High flue temperature
E12	Internal control fault
E13	Reset limit reached
E25	Internal control fault
E32	DHW sensor shorted
E33	DHW sensor open
E34	Low voltage
E37	Low water
E45	Flue sensor shorted
E46	Flue sensor open
E47	Water pressure error
E76	Low gas pressure
E77	Siphon error
E81	Sensor drift
E87	Overtemp lockout
E89	Incorrect setting
E90	Firmware mismatch
E91	System sensor shorted
E92	System sensor open
E93	Outdoor sensor shorted
E94	Internal display fault
E95	Supply sensor error
E96	Outdoor sensor open
E97	Cascade mismatch
E98	Cascade bus error
E99	Controller bus error

9. ANNUAL SERVICE

⚠️ **Maintenance should only be done by a qualified installer or technician. The following maintenance routine should be done annually (see also 9.1)**

The appliance is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge. Children, even if being supervised, must not maintain or clean the appliance

Put the boiler into operation on max. load (see section 5.5). Determine the heat input of the boiler. Check % CO_2 . Compare the heat input with that measured at installation. If the heat input is now considerably lower then there is probably an obstruction in the air inlet or the flue-outlet or in the boiler itself.

Switch off the boiler. First check the air-inlet and the exhaust flue-outlet.

Disconnect from the mains electricity supply. Remove the front cover, top cover and side cover.

Remove the syphon and clean it.

Remove the inspection cover* of the sump on the front side beneath the controls.

The inner part of the sump and the bottom part of the heat-exchanger should be inspected and, if necessary, be cleaned.

If the bottom part of the heat-exchanger is clogged, the inspection covers on the left-hand side of the heat-exchanger should be removed*. Using a special tool (see figure below) makes it possible to clean the heat-exchanger lids partially . In case of dirt in the sump it is also advisable to inspect the upper part of the heat-exchanger as well. Remove the fan* together with the burner hood*, the gas valve* and the gas pipe*. Now the burner* is visible and can be taken out and inspected. If necessary clean the cold side with a vacuum cleaner (or carefully with compressed air) and a nylon brush **(never use a steel brush)**. Inspect the combustion chamber. In case of a dirty heat-exchanger it can be cleaned with water. Check the burner seal* and replace if necessary.

Refill the condensate trap with clean water and reconnect it.

Check the electrode, especially the distance between the two pins (4,5± 0,5 mm).

Replace electrode if necessary.

Put everything back in its place. Check the CO_2-content and correct if necessary.

Check the gas-parts for leakages.

Check the flue-gas parts for flue-gas leakages and condensate leakages.

*Note: be careful during inspection not to damage seals. Any seals damaged by ageing or other causes should be replaced.

⚠️

9.1 SERVICE-MAINTENANCE TABLE

When commissioning the boiler, it is recommended to measure load, CO2, CO, T flow, T return, P air pressure switch and Psyphon pressure switch and write the values down in the table below.

Measure these values when the boiler is in equilibrium at maximum load (also see chapter 5.5).

During annual maintenance we advise to measure and write down these values also and compare them to the previous values and analyse any changes.

Date	Gasflow [m3/h] or load [kW]	CO$_2$ [%]	CO [ppm]	Tflow [°C]	Treturn [°C]	P air pressure switch [mbar]	P syphon pressure switch [mbar]

At the factory the maximum load of the boiler was measured within 5% tolerance from the nominal load.

In the field the load can decrease due to increased resistance in the boiler, the air inlet or the exhaust outlet or due to malfunctioning of the fan or other causes.

At maximum load the installation should be designed for nominal T of 15 K to 20 K.

When the T is higher than 25 K, the boiler cannot continue at maximum load anymore and will start to modulate because water flow through the boiler is insufficient.

T flow and T return can be read in "info mode" on the display (see 5.4 diagnostics)

Valves, malfunctioning pumps, dirt, corrosion products from the installation, dirty filters etc. can have negative impact on water flow through the boiler.

Before ignition the boiler control checks P aps during prepurge. During burner operation this check will be carried out. If the value decreases over successive years, this could indicate a problem, e.g. malfunctioning of the fan, dirty air inlet, dirty burner, dirty heat exchanger or dirty exhaust system.

Syphon pressure (P sps) should be lower than the maximum allowable flue resistance. If P sps is too high (> 12,4 mbar), the boiler will be stopped.

In this case the exhaust system may be blocked.

EC Conformity Declaration

CE

0063

RVR Energy Technology hereby declares that the condensing central heating boilers, types

CAHA Midi 340, 425, 510 and 600

Conform to and comply with the essential requirements of the following European standards and directives

GAD	Directive 2009/142/EC (30-11-2009) Standards EN 15502-1 and EN 15502-2
BED	Directive 92/42/EEC (21-5-1992) and/or No. 813/2013 (2-8-2013) Standards EN 15502-1 and EN 15502-2
Low Voltage	Directives 73/23/EEC and 93/68/EEC Standard EN 60335-2-102
EMC	Directive 2004/108/EC Standards EN 55014-1, EN 55014-2, EN 610003-2 and EN 610003-3

M. Hayes

Managing Director

Contact us:

RVR Energy Technology Limited

Kenmare
Co. Kerry
V93 F386
Ireland

Sales direct line: +353 (0)64 6689522 **Email:** sales@rvr.ie