MHG Heating Ltd
Simply better.

Installation and Operating Manual for the ProCon HT & HTP 150 & 225 Floor Standing Condensing Boiler Range. **RVS Controlled**

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Contents.

1.0 Appliance Type.

There are five build types within the ProCon HT & HTP range.

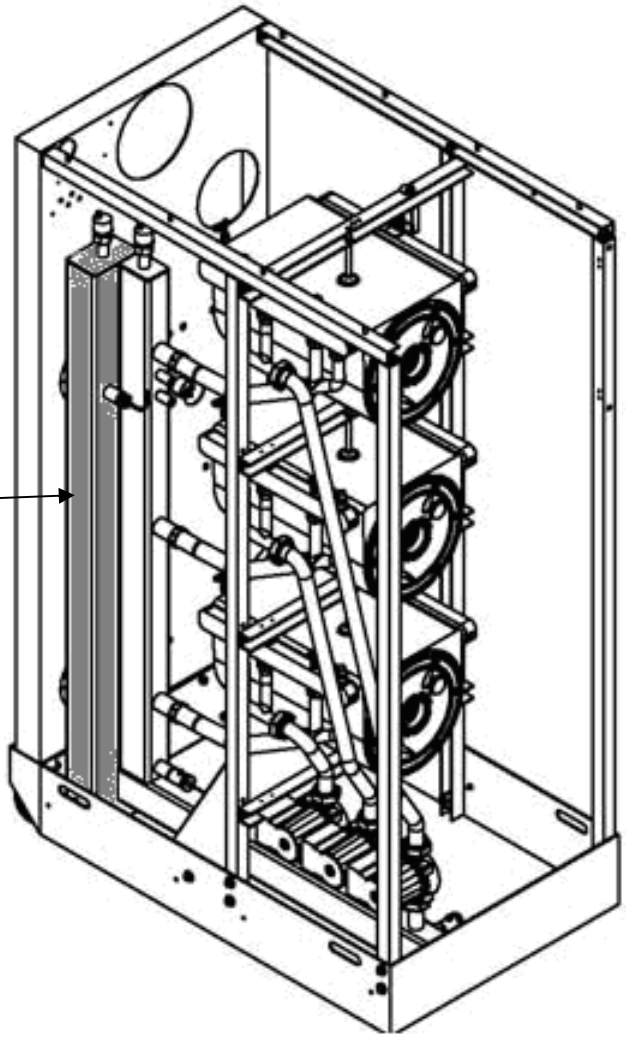
Please ensure you have the correct unit for the application and where required located correctly within the cascade prior to beginning the installation.

1.1 Single Units.

(150 Product Code 96.30000-7182)
(225 Product Code 96.30000-7183)

The Single Unit is supplied with an integral low loss header.
This unit does not require the installation of a second low loss header remote from the appliance.
The system's (Secondary) circulating pumps (Heating / HWS) are to be connected (hydraulically) to the appliances flow and return connections.

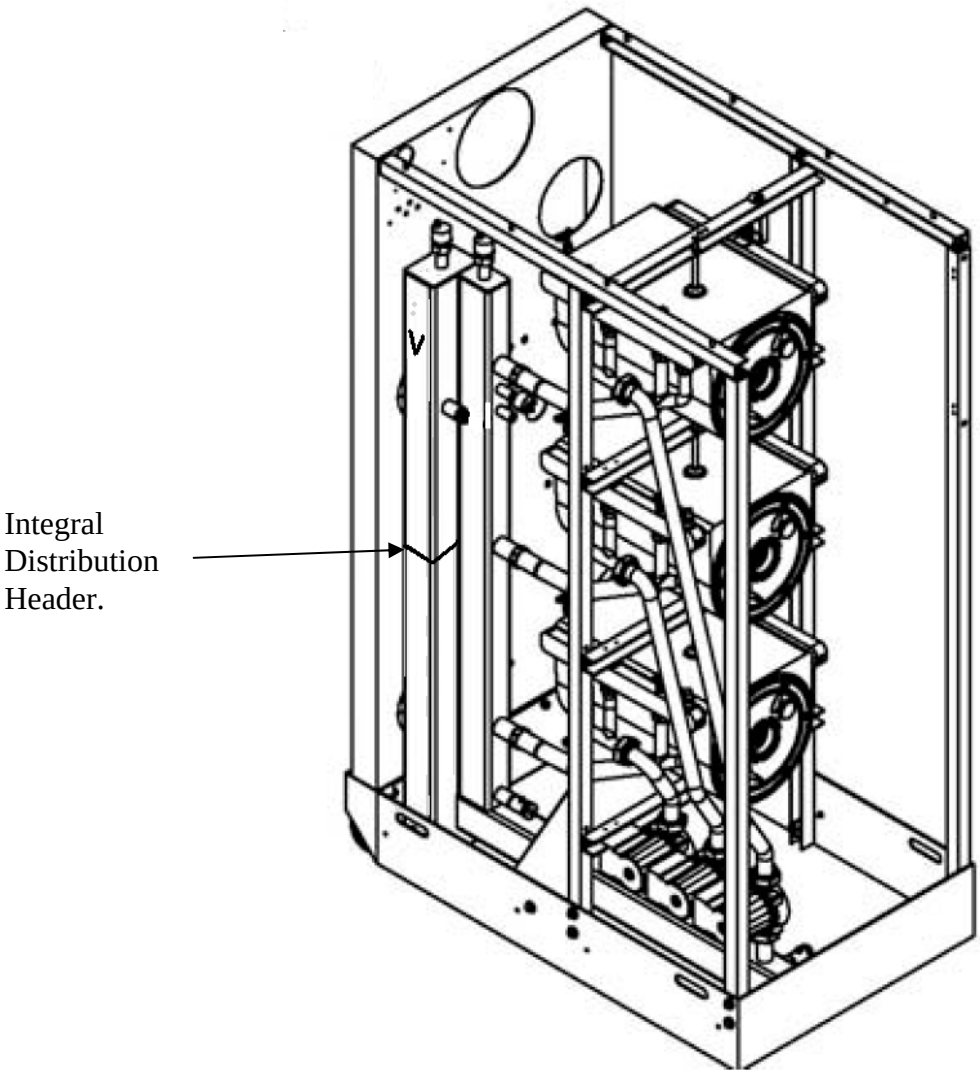
The Single Unit is supplied complete with an integral RVS43 143 Single Unit Cascade Manager wired to integral flow and return sensors.(QAZ36). An outside are sensor (QAC34) is also supplied and located in the base of the unit.



1.2 Cascade Manager Units
(150 Product Code 96.30000-7184)
(225 Product Code 96.30000-7185)

The Cascade Manager Unit is supplied without an integral low loss header.
A suitably sized low loss header must be installed within the system.
The system's (Secondary) circulating pumps (Heating / HWS) are to be connected (hydraulically) to the external low loss header and not to the appliances flow and return connections.

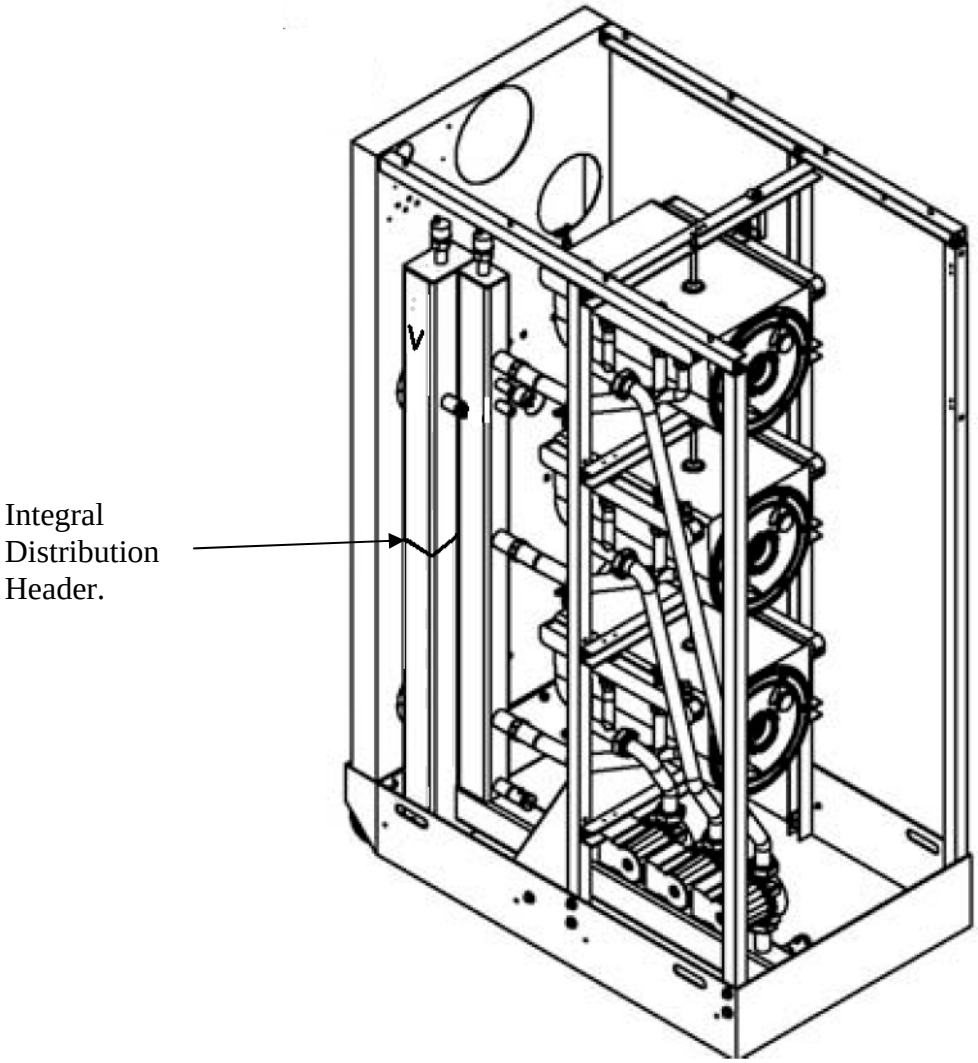
The Cascade Manager Unit is supplied complete with an integral RVS43 143 multiple unit Cascade Manager. Remote Flow and Return sensors (QAD36) must be mounted as indicated in the hydraulic diagram section of manual and wired back the unit. An outside are sensor (QAC34) is also supplied and located in the base of the unit.



1.3 Cascade Slave Units.
(150 Product Code 96.30000-7186)
(225 Product Code 96.30000-7187)

The Cascade Slave Unit is supplied without an integral low loss header and should only installed where a Cascade Manager is also installed
A suitably sized low loss header must be installed within the system.
The system's (Secondary) circulating pumps (Heating / HWS) are to be connected (hydraulically) to the external low loss header and not to the appliances flow and return connections.

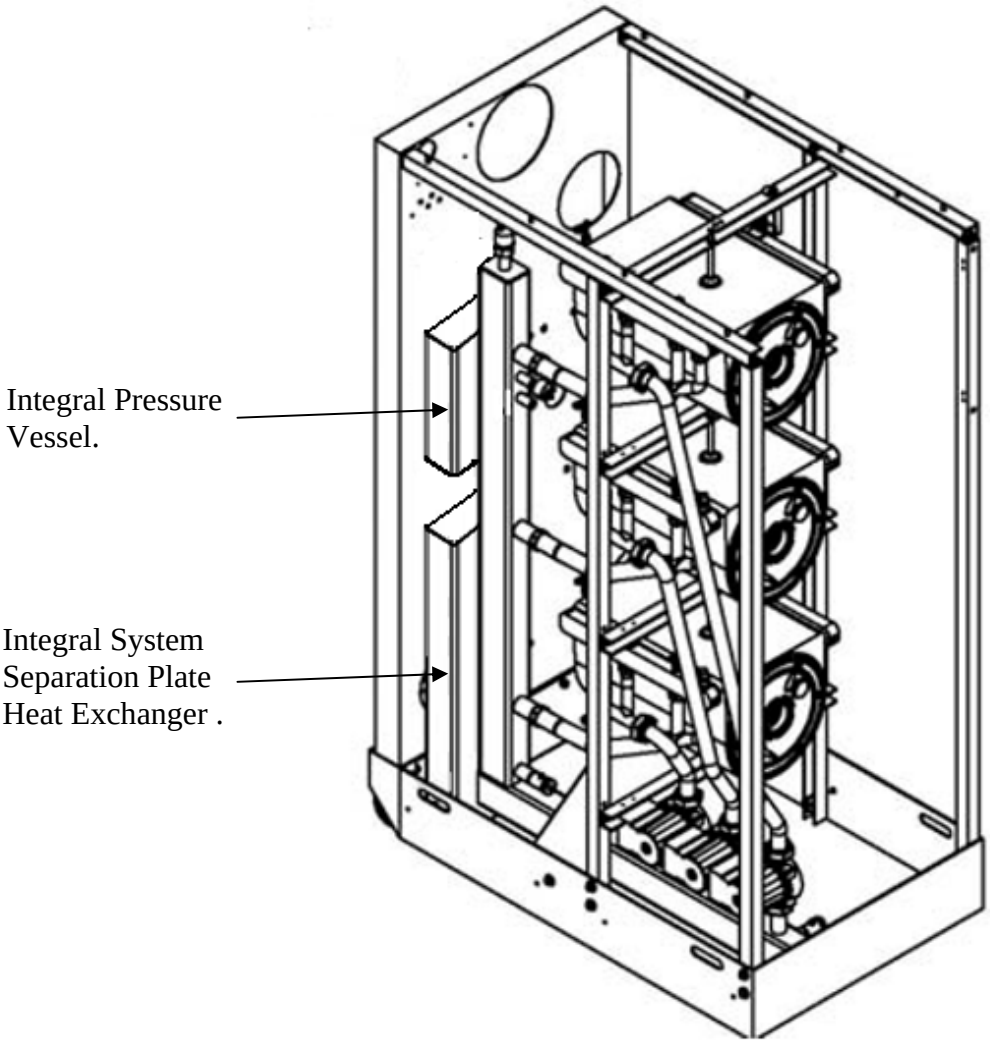
The Cascade Slave Unit is supplied without an integral RVS43 143 multiple unit Cascade Manager and therefore relies on the presence of a Cascade Master Unit to provide operational signals via the LPB communication wiring.



1.4 System Separation Plate Heat Exchanger Units.
(150 Product Code 96.30000-7325)
(225 Product Code 96.30000-7326)

The System Separation Plate Heat Exchanger Unit are supplied with an integral plate heat exchanger that maintains absolute separation of the boilers circuit from the systems circuit.
These units may require the installation of a second low loss header remote from the appliance. Alternatively the system's (Secondary) circulating pumps (Heating / HWS) can be connected (hydraulically) to the appliances flow and return connections.

The System Separation Plate Heat Exchanger Unit is supplied complete with an integral RVS43 143 Single Unit Cascade Manager wired to integral flow and return sensors.(QAZ36). An outside are sensor (QAC34) is also supplied and located in the base of the unit.



2.0 Installation Regulations and Requirements

The installation of ProCon HT boilers must be in accordance with the relevant requirements of Gas Safety (Installation & Use) Regulations 1994, Health & Safety at Work Act, Building Regulations, IEE Regulations, Construction (Design & Management) Regulations 1994, Local Authority Bye-Laws, National, Fire Regulations and Insurance Company requirements.

The following Codes of Practice are also applicable:-

BS 5449: 1990 Specification for forced circulation hot water central heating systems for domestic premises.

BS 6644: 2005 Specification for gas fired hot water boilers of rated inputs between 70kW (net) and 1.8MW(net) (2nd and 3rd family gases).

BS 6798: 1987 Specification for installation of gas fired hot water boilers of rated input not exceeding 60 kW.

BS 6880: 1988 Code of Practice for low temperature hot water heating systems of output greater than 45kW. Parts 1, 2 & 3.

BS 6891: 1988 Specification for installation of low pressure gas pipework of up to 28mm (R1) in domestic premises (2nd family gases)

BS 7593: 1992 Code of Practice for treatment of water in domestic hot water central heating systems.

BS 7671: 1992 Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition.

CISBE Guide reference sections B7, B11 and B13.

CP342 Part 2: 1974 Code of Practice for centralized hot water supply.

GE/UP/2 Gas installation pipework, boosters and compressors on industrial and commercial premises.

IGE/UP/4 Commissioning of gas fired plant on industrial and commercial premises

IGE/UP/10 Installation of gas appliances in industrial and commercial premises. Part 1: Flued appliances.

And any addition prevailing regulation and or code of practice not detailed above.

2.1 Appliance Warranties

All MHG appliances enjoy a full 24 month warranty as detailed in our terms and conditions.

"The guarantee period shall begin on the day of commissioning, or at latest 3 months after delivery has been made.

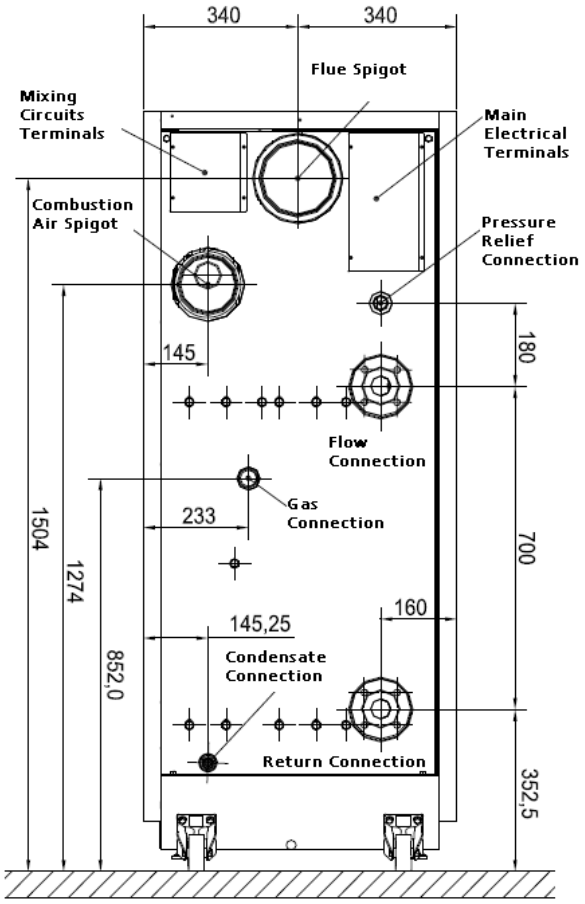
The customer shall only be able to claim against MHG under guarantee if the commissioning of the object of delivery has been carried out by MHG staff or the authorised supplier, if the customer has followed MHG's instructions relating to the treatment and maintenance of the object of delivery, and if no replacement parts of outside origin have been fitted.

Parts subject to wear such as ignition electrodes, seals etc. are strictly excluded from the guarantee."

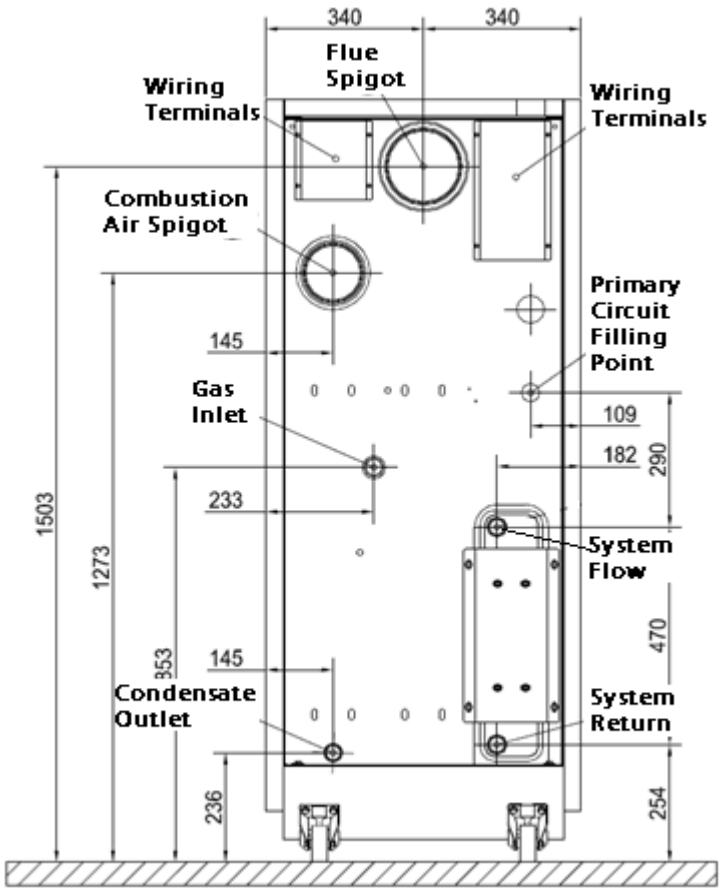
In addition to the above warranties, the Primary Heat Exchangers carry a 60 month guarantee against manufacturing or material defect.

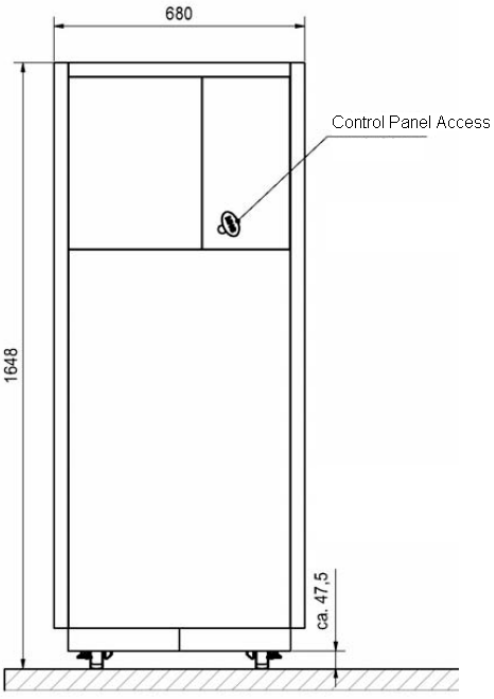
3.0 Dimensions.

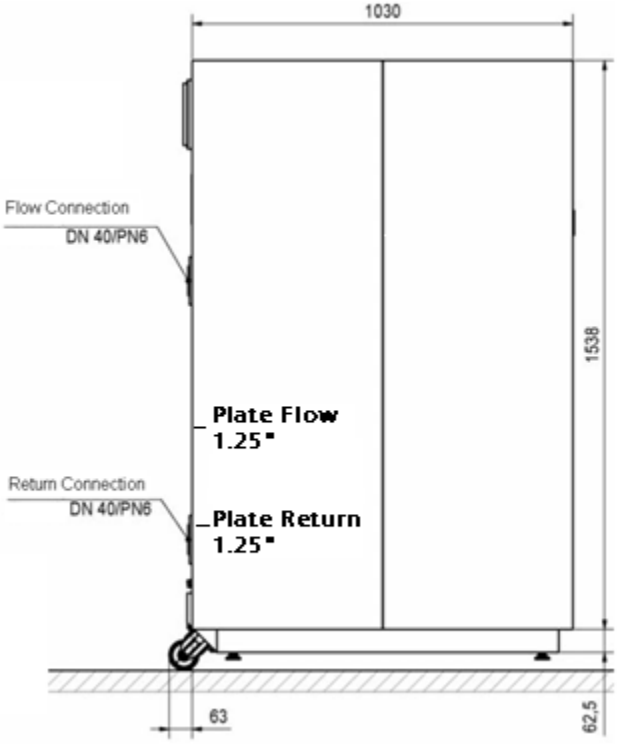
Standard Unit



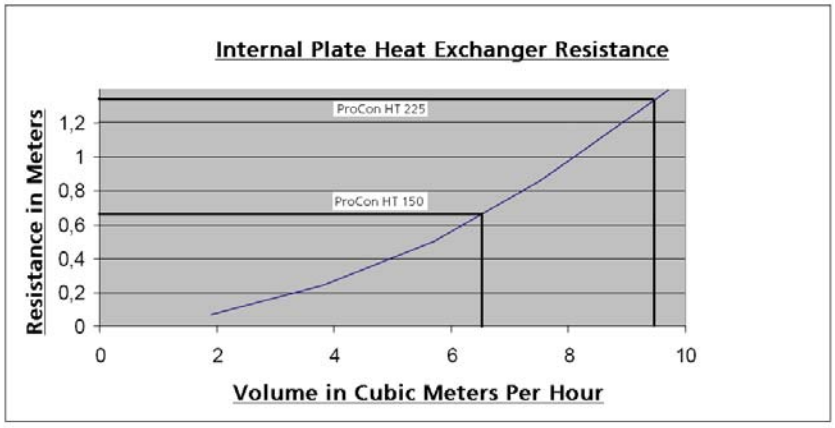
System separation Plate Unit



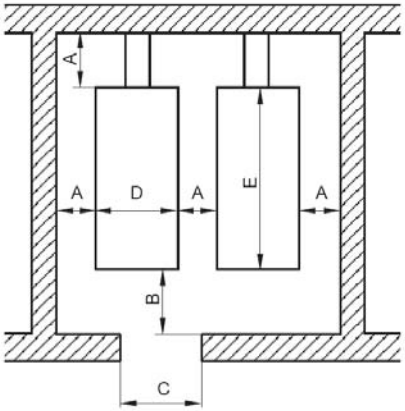




3.1 Plate Heat Exchanger Hydraulic Resistance.



3.2 Installation / Service Clearances



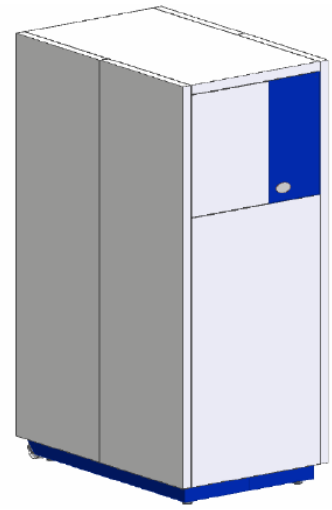
Dimension	[Minimum mm Clearance]
A	500
B	1000
C	700
D	680
E	1050

4.0 Delivery And Mobility.

Each ProCon HT boiler is supplied with a manoeuvring tool. This is to be used to facilitate the correct position of the unit.

4.1 Case Removal

A 4.0mm Allen Key is required to initiate the removal of the appliances case.



1. Case In Place

2. (1) Turn the MHG Logo, (2) insert Finger and open the cover to the right.

3. Locate the top sprung hinge pin and pull down to release the cover.

4. Using a 4mm Allen Key loosen the two captive bolts.

5. (5)Swing the Control Panel to the right (6) Slide panel A to the right and remove.

6. (5) Swing the control panel back into its rest position, (7) slid panel B up and remove.

7. (8) Lift the top panel up, (8) push to the rear of the unit and remove.

8. (9) Pull the base of each side panel to disengage it from the press studs, (9) lift the panel clear of the top pins.

5.0 Technical Data

Technical Data			150 (150 Plate X)	225 (225 Plate X)
Nominal Heat Input Net	Min/Max	kW	15.0/149.2	15.0/216.0
Nominal Heat Output (50°C/30°C)	Min/Max	kW	16.0/155.0	16.0/225.0
Nominal Heat Output (80°C/60°C)	Min/Max	kW	14.5/143.2	14.5/206.0
Operating Efficiency (40°C/30°C)		%	109.5	109.5
Design Water Flow Rate		Ltr/sec	1.8	2.66
Residual Head from In-built Pumps (Cascade version only)		kPa	15.0 (0)	15.0 (0)
Maximum Input Gas Rate	G20 G31	m³/hr m³/hr	15.0 5.77	21.7 8.35
Gas Inlet Pressure	Min/Max	mbar	18.0/50.0	18.0/50.0
Maximum Flue Gas Mass	G20 (Hot)	Kg/hr	250.9	363.6
Maximum Flue Gas Mass	G31 (Hot)	Kg/hr	231.4	335.1
Residual Fan Pressure		Pa	200	200
Maximum Water Pressure	(Hot)	bar	3.0 (System 10)	3.0 (System 10)
Minimum Water Pressure	(Cold)	bar	1.0 (System 1)	1.0 (System 1)
Maximum Flow Temperature		°C	90 (85)	90 (85)
Power Supply (240 V /50 Hz)		Amps	7	7
Max Power Consumption		Watts	690	800
Water Content		Ltrs	30	35
Lift Weight (Dry)		kg	250	270
Lift Weight (Wet)		kg	280	305
Efficiency @ Full Load Gross		%	86.48	85.67
Efficiency @ 30% of Full Load Gross		%	98.20	98.37
NOx emission @ 0% O_2		Mg/kWh	26.7 (Class 5)	
Flue Classification			B23, C33, C43, C53, C63, C83.	

Standard Unit Connections				
HTG Primary Flow		PN6	DN 40	DN 40
HTG Primary Return		PN6	DN 40	DN 40
Gas		BSP	R1.25"	R1.25"
Flue Connection			DN 160	DN 160
Combustion Air Connection **The combustion air duct must have a resistance no greater than 100Pa**			DN 125	DN 125
Condensate Outlet		Plastic	20mm	20mm

Please note that the condensate disposal system must be installed in Plastic or Stainless Steel. (Copper is not acceptable.)

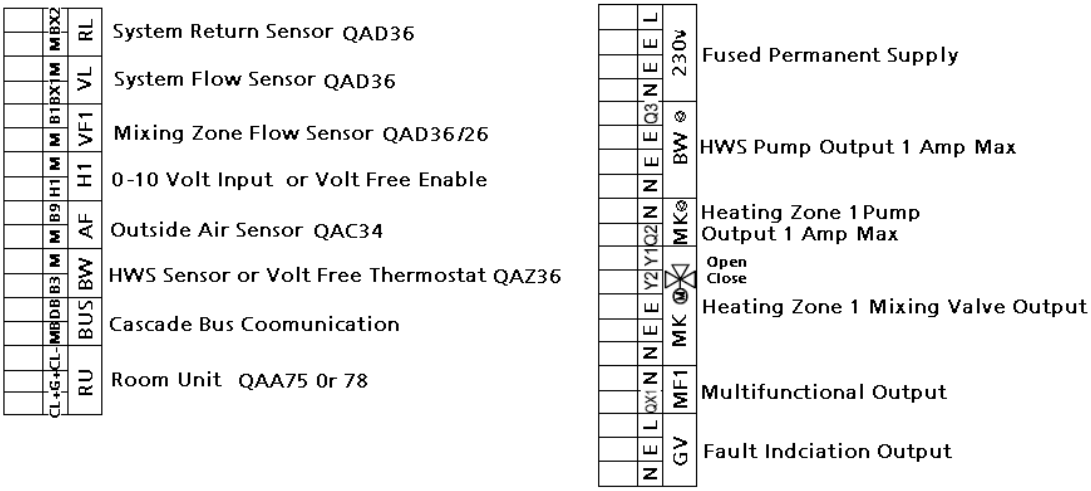
System Separation Plate Heat Exchanger Unit Connections				
HTG Primary Flow		BSP	R1.25"	R1.25"
HTG Primary Return		BSP	R1.25"	R1.25"
Gas		BSP	R1.25"	R1.25"
Flue Connection			DN 160	DN 160
Combustion Air Connection **The combustion air duct must have a resistance no greater than 100Pa**			DN 125	DN 125
Condensate Outlet		Plastic	20mm	20mm

6.0 Pressure (Safety) Relief Valve (Integral within the HTP.)

In accordance with BS 6644: 2005, the installer shall install as suitably sized Pressure (Safety) Relief Valve.
The location of this valve is important with respect to the applied pressure of the boiler circulation pump, it is therefore recommended to locate the Pressure (Safety) Relief Valve on the flow pipe immediately adjacent to the boiler; furthermore, there must not be any means of isolation between the boiler and the Pressure (Safety) Relief Valve.

7.0 Electrical Connections

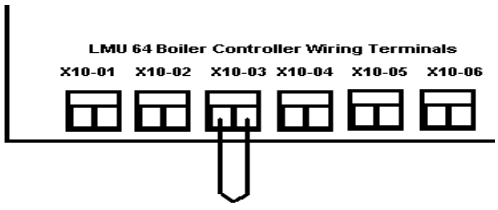
Basic electrical connection for all types of ProCon HT/HTP



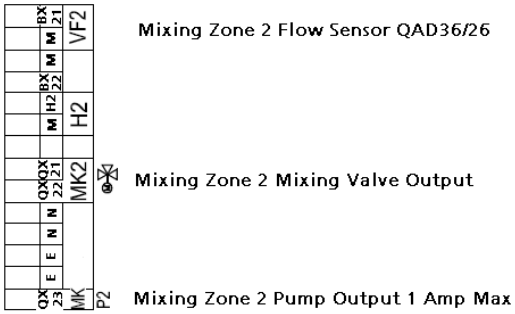
External Flow and return sensors (QAD36) are required for Cascade Manager Units only.
The sensors must be wired to the RL and VL terminals shown above.
(If internal sensors are in place please disconnect and install the remote sensors.)

Module Controller Mounted Safety Interlock Terminals (X10:03) (Low Voltage<25V)

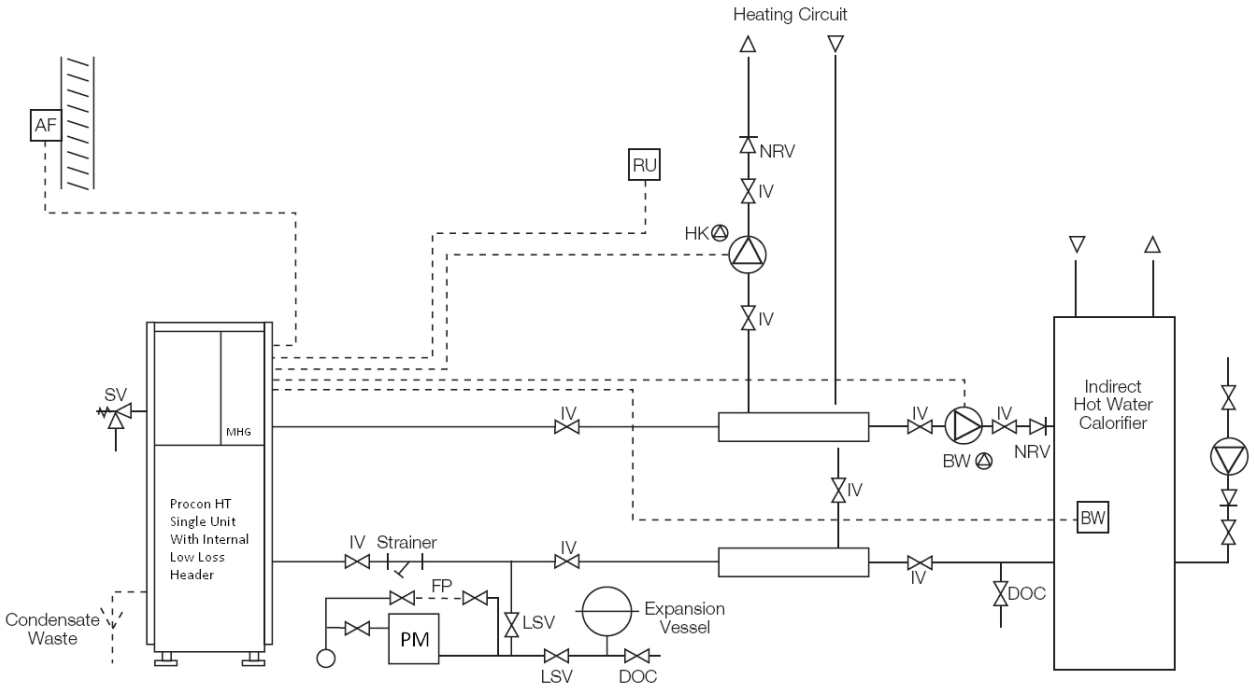
If required each module can be connected to an external safety device. A relay must be used to ensure separation of the voltages generated by each module controller. (X10:03)



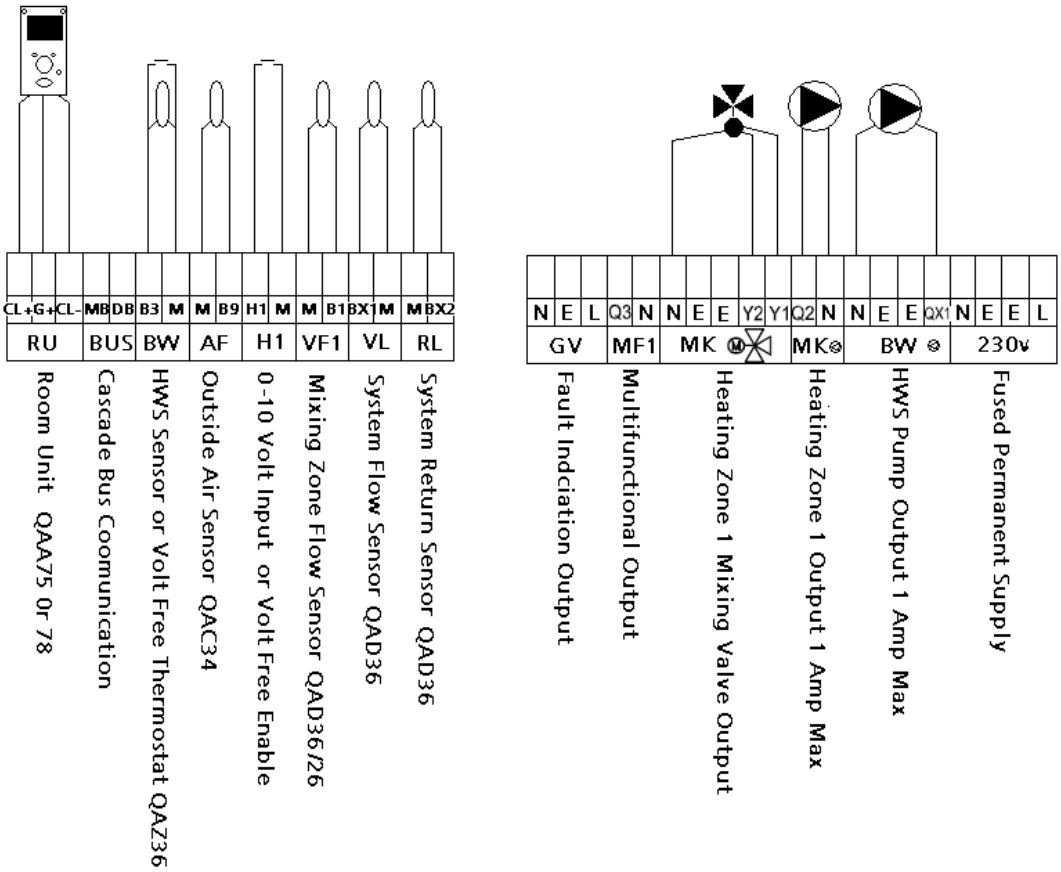
AVS75 Extension Module Mixing Clip Wiring Connections.



8.0 Hydraulic Design Single Unit . (HT and HTP)

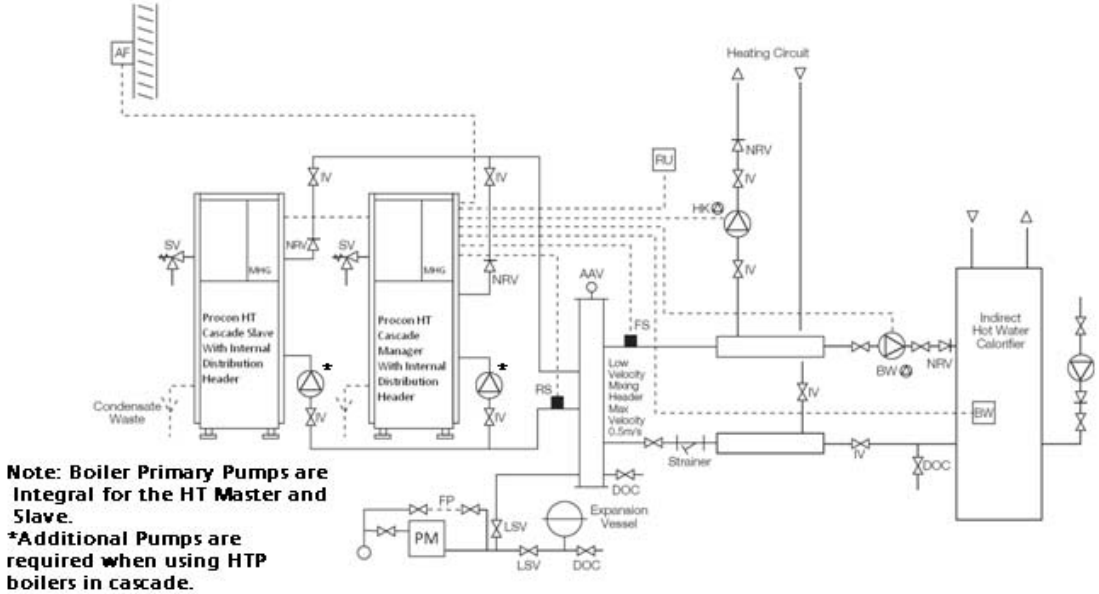


8.1 Electrical Connections Single Unit



If Direct On Boiler Weather Compensation is not required a 3000 Ohm Resistor must be applied to the AF terminals to remove the E10 Error Code from the RVS43 143 Cascade Manager LPB Network.

8.2 Hydraulic Design Cascade Units (HT Only)
(Additional Boiler circuit circulating pumps are required when using multiple HTP units.)

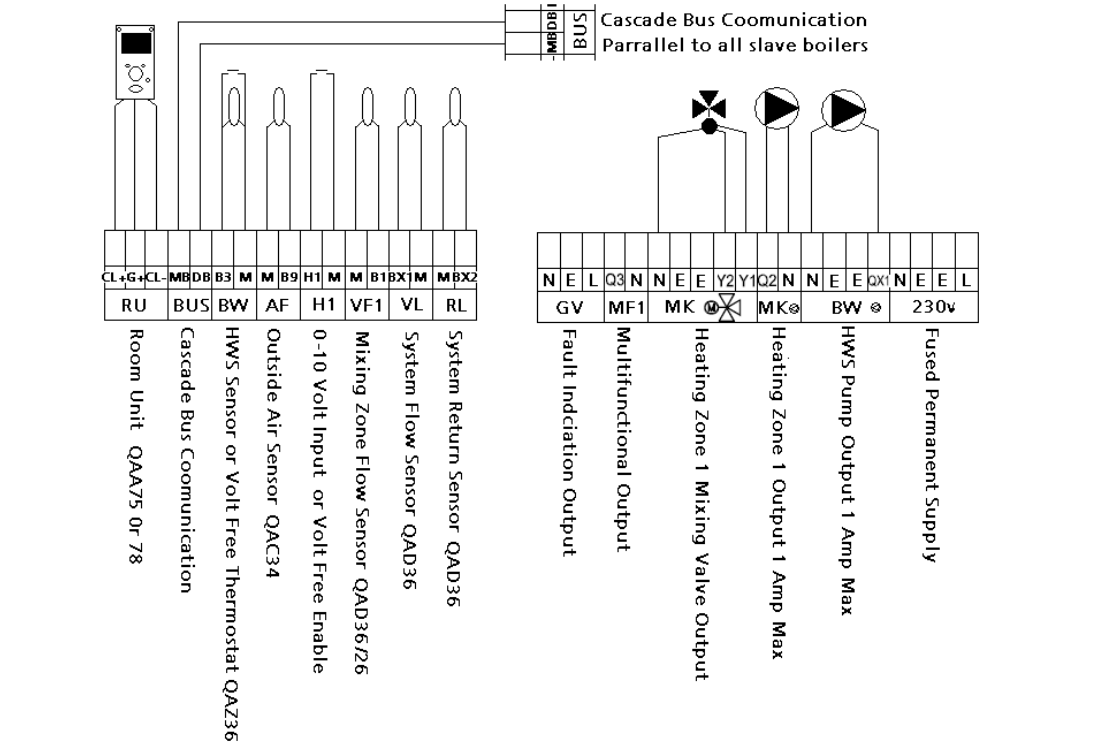


Note: Boiler Primary Pumps are Integral for the HT Master and Slave.
***Additional Pumps are required when using HTP boilers in cascade.**
Pumps to be supplied by others.

Legend

AF	Outside Air Sensor (QAC34)	HK ▷	Heating Circuit Pump
BW	Hot Water Sensor(QAZ36) or VF Thermostat	PM	System Pressure Manager
BW ▷	Hot Water Primary Pump	RU	Room Unit (QAA), BMS etc
FP	System Filling (Approved)	FS	Flow Sensor
RS	Return Sensor		

8.3 Electrical Connections Cascade Units



If Direct On Boiler Weather Compensation is not required a 3000 Ohm Resistor must be applied to the AF terminals to remove the E10 Error Code from the RVS43 143 Cascade Manager LPB Network.

Addition control and hydraulic configurations are possible.

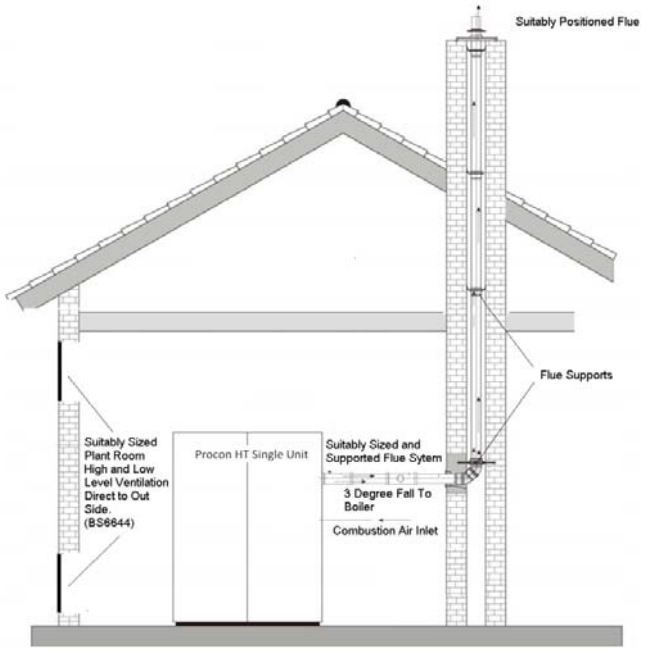
9.0 Fluing Options

Please note that excessive resistance within the flue and combustion air supply systems will lead to a reduction in the output of the appliance and induce operation faults.

Boiler Type	Flue Outlet Size	Flue Size	Maximum Length Flue and Combustion Air Ducts Combined Must Not Have a Resistance of Greater Than 150Pa Max.
ProCon 150	DN 160	DN 160	28m
ProCon 225	DN 160	DN 160	23m

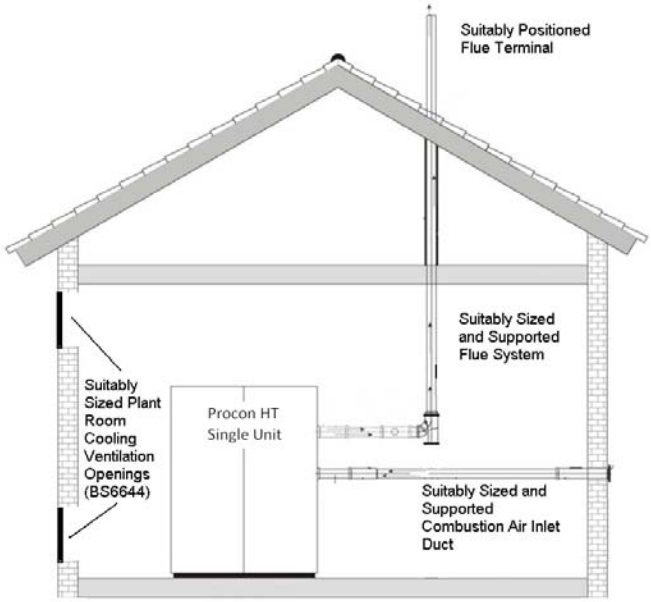
See section 19 for a full list of DN160 flue components

9.1 Single ProCon HT. Conventionally Flued.



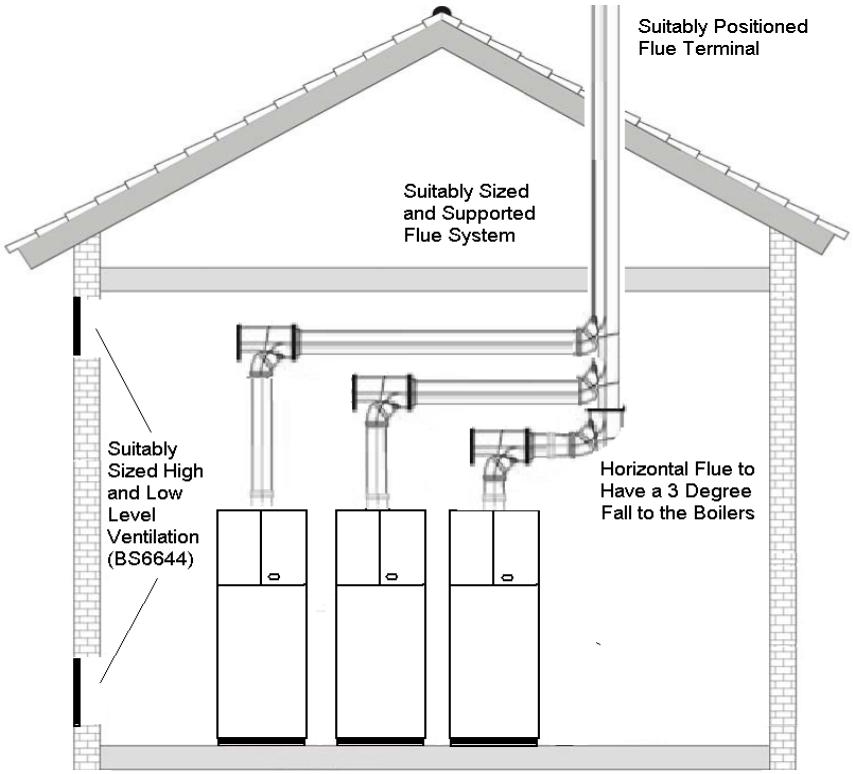
9.2 Single ProCon HT. Balanced Flued.

Please note: The combustion air duct must have a resistance no greater than 100Pa

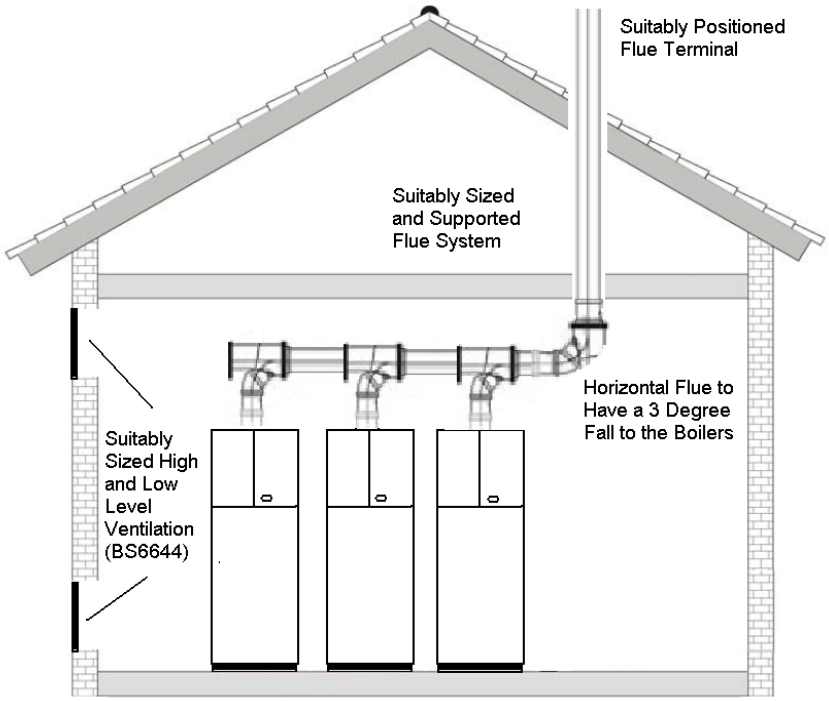


9.3 Multiple Cascade ProCon HT's. Conventionally Flued.

Preferred Method of Fluing Cascaded units



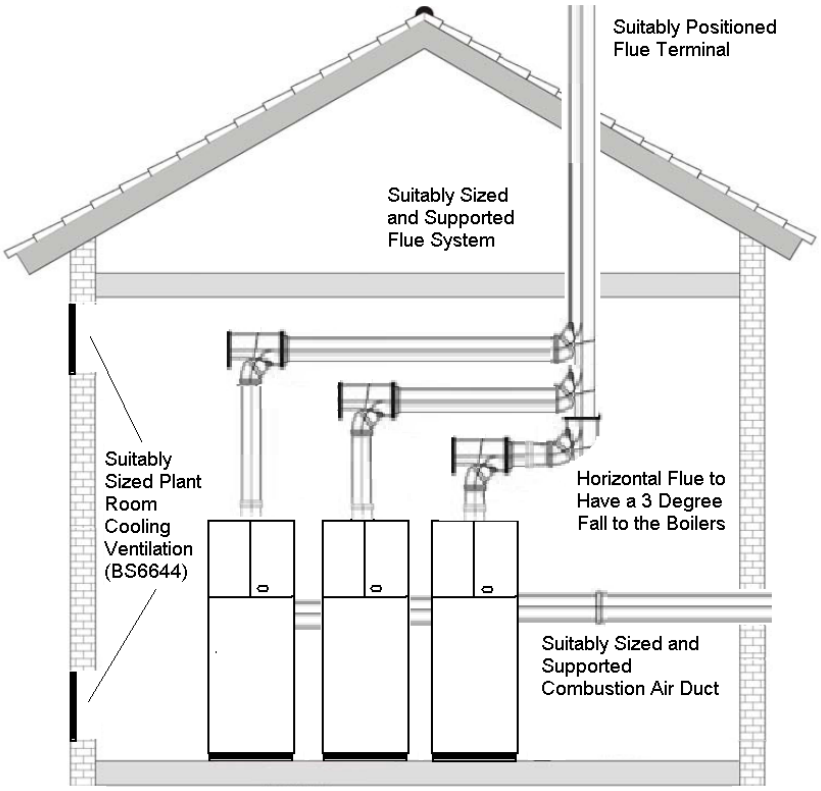
Conventional Flue Header Arrangement.
If this method is utilised the flue must be sized to prevent back pressure effecting other appliances on the flue system.



9.4 Multiple Cascade ProCon HT's. Balanced Flued.

Preferred Method of Fluing Cascaded units

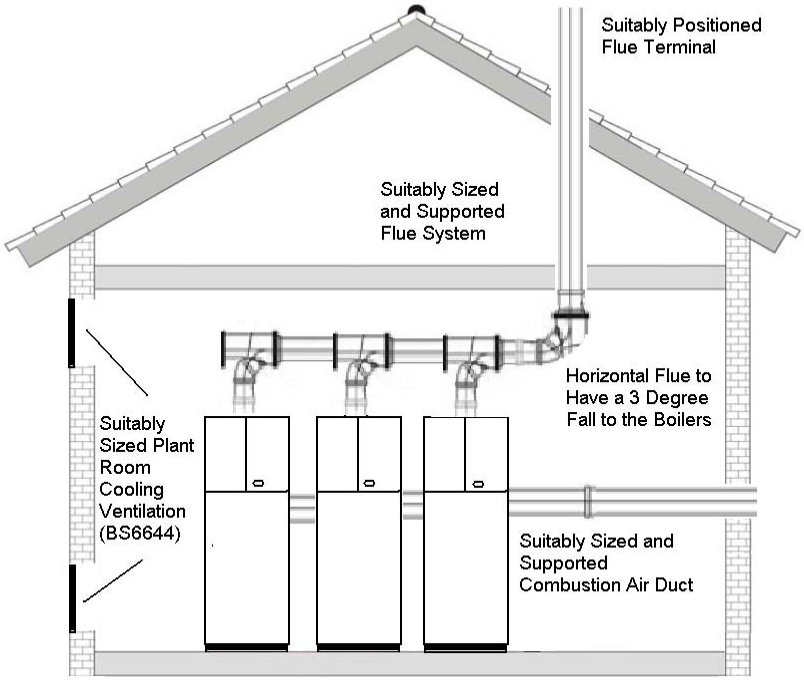
Please note: The combustion air duct must have a resistance no greater than 100Pa



Conventional Flue Header Arrangement.

If this method is utilised the flue must be sized to prevent back pressure effecting associated appliances.

Please note: The combustion air duct must have a resistance no greater than 100Pa



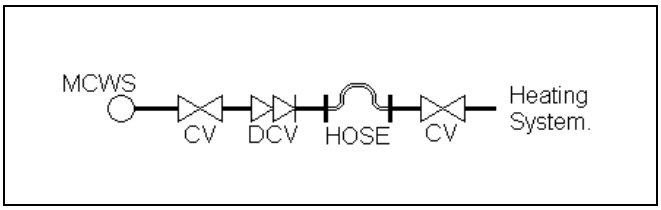
10.0 Filling The System

The Initial filling of a sealed heating system, and subsequent refilling, must be by a method that has been approved by the Water Regulation Advisory Scheme (WRAS) for that type of heating system.

i.e.	Domestic (*In-House*)	Fluid Category 3 (*C-3*)
	Non Domestic (Other than *In-House*)	Fluid Category 4 (*C-4*)

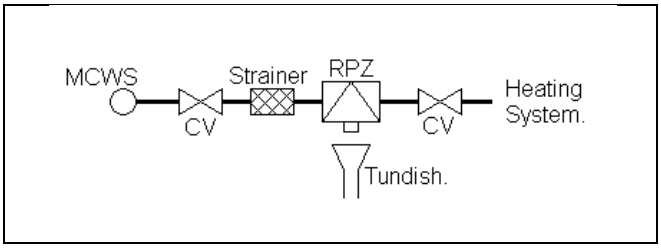
For Category 3 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve incorporating a Double Check Valve on the Mains Cold Water pipework.
- Temporary Connecting Hose, which must be disconnected after use.
- Control Valve, on the heating system.



For Category 4 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve.
- Strainer.
- Verifiable Backflow Device with Reduced Pressure Zone (RPZ Valve)
- Incorporating a 'Type BA' Air Gap.
- Tundish.
- Control Valve.



Further more, in accordance with BS 6644: 2005 system with an input greater than 70kW (nett), an automatic water replenishment unit shall be installed to automatically replenish any lost or evaporated water.

Please refer to BS 6644: 2005 for allowable water replenishment methods for use with sealed/pressurized heating systems.

For information on a comprehensive range of pressurization units that comply with current British Standards and WRAS Regulations, please contact MHG Heating Ltd Sales.

10.1 Expansion Vessel

In accordance with BS 6644: 2005, WRAS Regulations, and Local Authority Water Regulations, as applicable, the installer shall install a suitably sized, and approved, Expansion Vessel to ensure that the water capacity of the system has ample expansion capacity.

The location of the expansion vessel shall only be isolatable from the system via a Lockable Type Service Valve, which shall be locked in the *OPEN* position, to prevent accidental isolation.

Furthermore, a drain facility should be provided adjacent to the expansion vessel to aide the routine maintenance, overhaul, of the vessels Air Pressure setting.

For information on a comprehensive range of expansion vessels that comply with current British Standards and WRAS Regulations, please contact MHG Heating Ltd Sales.

11.0 System Water Quality

Water Treatment, System Cleaning (BS 7592: 2006)(Part L2 Building Regulations)

The entire primary system MUST be thoroughly cleaned and flushed to remove debris, flux residues, etc. before opening the boiler isolation valves & flooding the boiler. Particular care must be taken where the ProCon boiler is being retro-fitted into an old/existing system, as system silt or magnetite can be very damaging to the new boiler.
Following cleaning and flushing the system MUST be dosed with a good quality water treatment to prevent corrosion and the formation of scale. FAILURE TO OBSERVE THESE REQUIREMENTS WILL RENDER THE WARRANTEE ON THE APPLIANCE VOID.
Cleaning, flushing and water treatment must be carried out in accordance with the requirements of BS 7593:1992, prior to commissioning the boiler.
Repeated draining and refilling of the system, without replenishment of water treatment, must be avoided, as this is very damaging to the boiler. The boiler must not operate without the system water being correctly and adequately treated, and maintained, with an appropriate level of corrosion inhibitor.

When utilizing HTP boilers system water treatment must be applied to the primary circuit.

For specific guidance on water treatment, direct contact is advisable with:-

Betz Dearborn Limited
(Sentiel)
Foundry Lane
Widnes
Cheshire
WA8 8UD
Tel: 0151 424 5351
Fax: 0151 420 5447

Alpha-Fry Technologies
(Fernox)
Cookson Electronics
Forsyth Road
Sheerwater
Woking
Surrey
GU21 5RZ
Tel: 0208 665 6666
Fax: 0208 665 4695

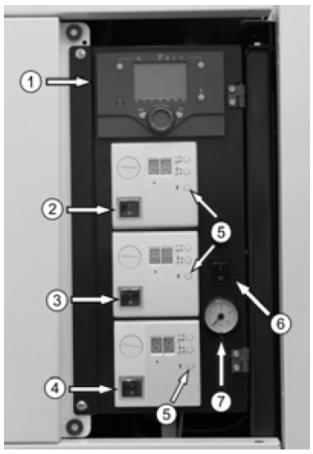
11.1 Care With The Use of Solder Flux

The ProCon HT range has heat exchangers fabricated from 316L Stainless Steel. It is most important that the compatibility of any flux is checked with the supplier before use, and that any flux manufactures recommendations are strictly followed with regards to use in conjunction with Stainless Steel.

12.0 Appliance Controls

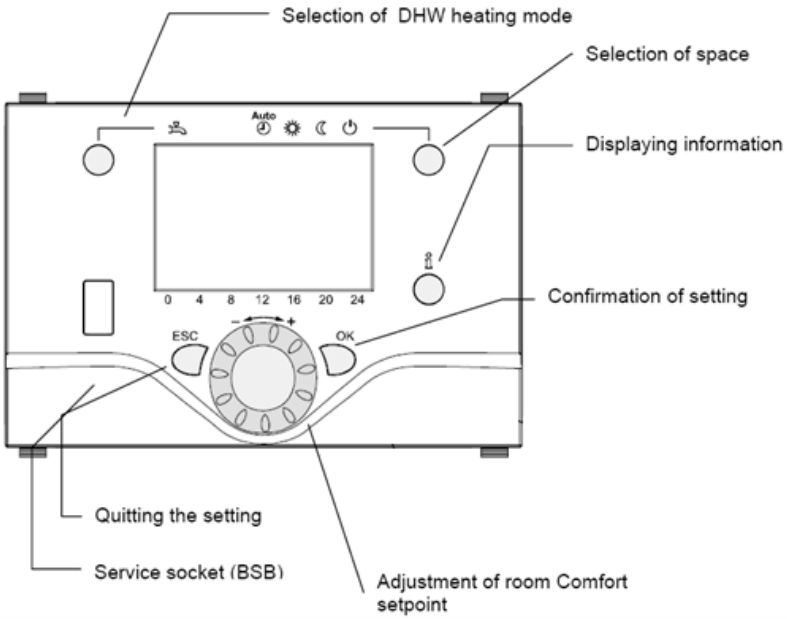
If the controller is displaying German Text undertake the following;
Press the ESC button several times to display the DEFAULT SCREEN.
Press the OK button once, turn the wheel clockwise one click to highlight 'Bedieninheit', Press the OK button, The screen displays 'Bedieninheit Sprache' 'Deutsch', Press the OK button to make 'Deutsch' flash, Turn the wheel one click anticlockwise to select 'English'. Press the OK button. The screen indicates 'OPERATOR SECTION, LANGUAGE', Press the ECS button twice, to return to the main screen.

12.1 Control Panel

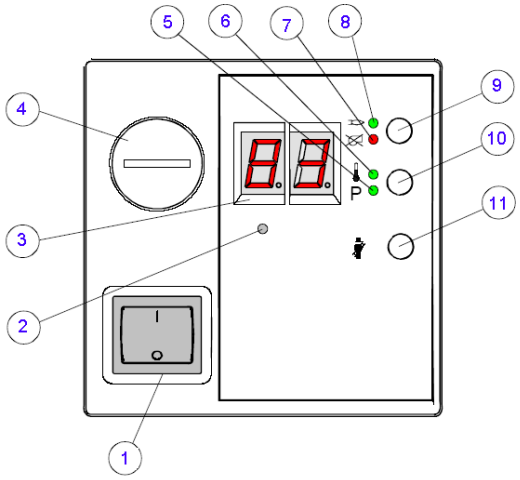


1. RVS43 143 Controller Display
2. Upper Module Power Isolator
3. Middle Module Power Isolator
4. Lower Module Power Isolator
5. Module Commissioning Button
6. Appliance Power Isolator
7. System Manometer

12.2 RVS43 143 Cascade Manager



12.3 Module Controller



Legend

1. Module Power Isolator
2. Infrared Output to Flue Gas Analyser Optional Extra.
3. Module Numerical Indicator
4. Temporary Connection Port For QAA73 for LMU 64 Configuration.
5. Indication of System Pressure P (Not Used)
6. Indication of Module Over Temperature
7. Indication of Module Lockout
8. Indication of Module Burner Activation
9. Module Lockout Reset Button (To be pressed for at least 3 Seconds)
10. Display Alteration Button
11. Commissioning Mode Activation Button

12.4 Module Controller End User Settings.

The Module Controller provides access to the End User adjustable parameters P parameters along with other operational information only settings A, B, C & D parameters.

End User Adjustable Parameters. (Default = Recommended Settings)

Parameter	Function	Range	Default
P0			
P1	Required Module Flow Temperature / Room Temperature. (Outside air sensor attachment dependant. Without = Flow Temperature)	20-90^{0}C / 10-30^{0}C	85 / 20^{0}C
P2	Required HWS Set Point. (Only Used if the Module is Directly Controlling HWS Generation)	10-80^{0}C	60^{0}C
P3	Not used in This Configuration	NA	NA
P4	Not used in This Configuration	NA	NA
P5	Weather Compensation Curve Heating Circuit 1	-- / 40	32
P6	Weather Compensation Curve Parallel Displacement	-31 / +31	0

12.5 Accessing Module Parameters

1. Press the display mode button (10) to choose display level «P» (keep button depressed).
2. Press the display mode button (10) to choose the required parameter (press button briefly).
3. Adjust the value:

Changing parameters: (only P0...P6)

Only parameters P0...P6 can be changed.
To do this, wait until the value of the parameter flashes on the display (3).
Proceed as follows:

P ❍ (+) or (Enter) — Increase value (+): Press display mode button (10) briefly several times (< 1 second)

❍ (-) — Decrease value (-): Press chimney sweep button (11) briefly several times (< 3 seconds)

P ❍ (+) or (Enter) — Save value (Enter): Press display mode button (10) for **at least** 3 seconds

If the displayed value does not require amending or the altered setting is not required do not press any buttons on the controller for a period greater than 12 seconds.

As a confirmation, the display (3) shows P0...P6 in consecutive order and the newly adjusted value.
The new value will only be adopted **after storage**.

Reviewing the Parameter Values

To query the different parameter values, proceed as follows:

Choosing the display mode

Choose the display mode by pressing button (10) for **more than 3 seconds** (display (3): A...). **Keep button (10) depressed** to reach the different display levels b, C, d, P and back to A.
Release the button when the required display level is reached (A, b, C, d, P).

Choosing and displaying individual values or parameters

To change between the different values or parameters (0… max. 7) of the different display
levels (A, b, C, d, P), **press button (10) briefly.**
The current value appears about 2 seconds after choosing the relevant parameter.

12.6 Module Operating Codes

			LED [1]	
Display level	**Name of LMU... variable**	**Description**	6	P 5
General information (enduser level) [2]				
A 0	Meldecode	Diagnostic code (system)	✳	✳ [3]
A 1	TkIst	Boiler temperature (flow)	●	❍
A 2	TbwIst1	D.h.w. temperature sensor 1	✳	❍
A 3	Druck	Water or air pressure	❍	●
A 4	Betr.Phase	Operating phase of burner control	❍	❍
A5	TiAussen	Outside temperature (only AGU2.310...)	❍	❍
Temperatures (service level)				
b 0	DiagnoseCode	LMU...-internal software diagnostic code	✳	✳ [3]
b 1	TkRuec	Boiler return temperature	●	●
b 2	TbwIst2	D.h.w. temperature sensor 2	●	●
b 3	Tabgas	Flue gas temperature	●	●
b 4	TiAussen	Outside temperature	●	●
b 5	TaGem	Composite outside temperature	●	●
b 6	TaGed	Attenuated outside temperature	●	●
b 7	TvIst	Flow temperature AGU2.500...	●	●
Process values (service level)				
C 1	IonStrom	Ionization current	●	●
C 2	Gebl_Drehz	Fan speed	●	●
C 3	Gebl_PWM_AusAkt	Current fan control (PWM)	●	●
C 4	RelModLevel	Relative output	●	●
C 5	Pumpe_PWM	Pump setpoint (PWM)	●	●
C 6	ek0	Control differential	●	●
Setpoints (service level)				
d 1	Tsoll	Setpoint of 2-position or modulating controller (PID)	●	●
d 2	TkSoll	Current boiler temperature setpoint	●	●
d 3	TsRaum	Room temperature setpoint	●	●
d 4	TbwSoll	D.h.w. temperature setpoint	●	●
d 5	PhzMax	Maximum degree of modulation in heating mode	●	●
d 6	NhzMax	Maximum speed at maximum output in heating mode	●	●
Parameters (service level) (Prog Mode) (setting only with special functions or 4) – not with AGU2.310...				
P 0	PhzRelMmi	Start output controller stop (only in operating mode **without** the appropriate setpoint potentiometer, otherwise locked)	●	✳
P 1	Tr/TvSollMmi	Room / flow temperature setpoint (only in operating mode **without** the appropriate setpoint potentiometer, otherwise locked)	●	✳
P 2	TbwSollMmi	D.h.w. setpoint (only in operating mode **without** the appropriate setpoint potentiometer, otherwise locked)	●	✳
P 3	reserviert	Reserved	●	✳
P 4	NqmodMin	Minimum pump speed	●	✳
P 5	Sth1	Slope HC1	●	✳
P 6	DTR1	Parallel displacement HC1	●	✳

1)	LED: ✳ = flashing, ● = lit, ❍ = dark
2)	The parameters of group «**A**» can also be selected by briefly pressing the button for the display mode
3)	Indication flashes alternately
4)	Setting the heating curve when using the heating circuit module AGU...

Note: After about 8 minutes, the display will automatically change to the boiler temperature «**A1**»

13.0 Appliance Error Codes

If a fault is encountered within the appliance or Cascade LPB network, a fault code will be generated and displayed by the failing module and all LPB networked RVS43 143 Cascade Managers.

If a fault is encountered by a module the respective code will be displayed along with a flashing LED. Three digit codes will be displayed in two consecutive sections. I.e. 1-53 = 153.

If a fault is encountered by a RVS43 143 Cascade Manager or communicated to a RVS43 143 Cascade Manager via the LPB network ER will be generated on the display.

Opening the controllers flap and pressing the Down PROG button twice will gain access to parameter line 50 where the generated fault code can be reviewed.

In either case the fault code should be noted for future reference.

If the fault is related to a specific module the unit can be reset by pressing the Lockout Reset Button (9) for at least 3 seconds.

If the fault is related to a RVS43 143 Cascade Manager or the LPB communication network the fault code will clear automatically following the rectification of the fault.

This is also applicable following the rectification of any module fault. This can take up to 10 minutes.

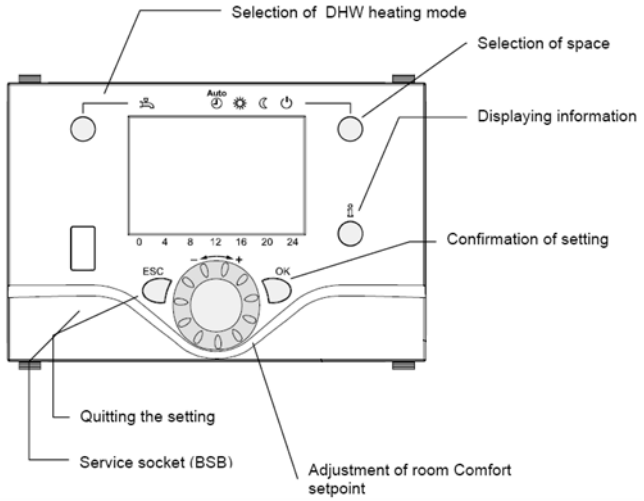
Fault Code	Description
E-0	No Error Detected
E-10	Outside Air Sensor Fault / Not Detected
E-20	Flow Water Sensor Fault / Not Detected
E-26	System Flow Sensor Faulty / Not Detected
E-28	Flue Gas Sensor Fault / Not Detected
E-40	Return Water Sensor Fault / Not Detected
E-46	System Return Water Sensor Fault / Not Detected
E-50	HWS Sensor Short Circuit 1
E-52	HWS Sensor Short Circuit 2 (Not Used)
E-58	HWS Volt Free Switch Fault / Not Detected
E-60	Faulty Room Sensor
E-61	Faulty Room Sensor
E-62	Incorrect Room Unit Connected
E-77	Air Pressure Sensor Not Detected (Not Used)
E-78	Water Pressure Sensor Defective (Not Used)
E-81	LPB Short Circuit (Boiler Cascade Wiring)
E-82	LPB Address Conflict (Boiler Cascade Settings)
E-86	Short Circuit on PPS Connection (Not Used in ProCon Configuration)
E-91	EEPROM
E-92	Hardware Malfunction
E-100	Conflict Between Time of Day Master Control (Boiler / QAA70 / RVS43 143)
E-105	Annual Service of Unit is Due. (QAA73 Service Tool Required to reset timer See Section 16.0)
E-110	Module Water Temperature Overheat
E-111	Module Temperature Too High (Auto Resetting)
E-113	Flue Gas Temperature overheat (Not Used)
E-117	High System Water Pressure Sensor (Not Used)
E-118	Low System Water Pressure Sensor (Not Used)
E-119	System Water Pressure Switch Activated (Below 0.8 bar)
E-124	Module Temperature Too High (Auto Resetting)
E-128	Flame Extinguished During Operation (LMU Version D)

E-129	Air Supply Error. Fan not operating at correct speed (LMU Version D)
E-130	Flue Temperature Too High (Auto Resetting)
E-131	Fault With Burner
E-132	External Safety Interlock Activated (Open Circuit)
E-133	No Flame Detected After Final Ignition Attempt
E-134	Flame Extinguished During Operation (LMU Version C)
E-135	Air Supply Error Fan not operating at correct speed (LMU Version C)
E-140	LPB Segment / Address Not Recognized (Boiler Cascade Settings)
E-142	LPB Missing Partner (Boiler Cascade Settings)
E-145	Wrong Device Connected to PPS Circuit (Not Used in ProCon Configuration)
E-146	Unrecognized Plant Configuration
E-147	Burner Modules Not Connected (PPS Circuit Not Used in ProCon Configuration)
E-148	LPB Interface Not Configured (Boiler Cascade Settings)
E-150	General Boiler Fault
E-151	Module LMU64 Controller Malfunction
E-152	Module LMU64 Controller Parameter Programming Error
E-153	The RESET button has been pressed when no fault is present. Press RESET again.
E-154	Module Operating Outside of Predefined Parameters. (System Hydraulic Error.)
E-160	Fan Not Reaching Set Point
E-161	Module Combustion Fan Speed Too High
E-162	Air Pressure Switch Fault (Not Used)
E-164	Flow Switch / Pressure Switch Open (Not Used)
E-166	Air Pressure Switch Fault (Not Used)
E-180	Module Operating in Chimney Mode 100% Output
E-181	Module Operating in Commissioning Mode
E-183	Module Controller / QAA73 Room Unit in Parameter Setting Mode

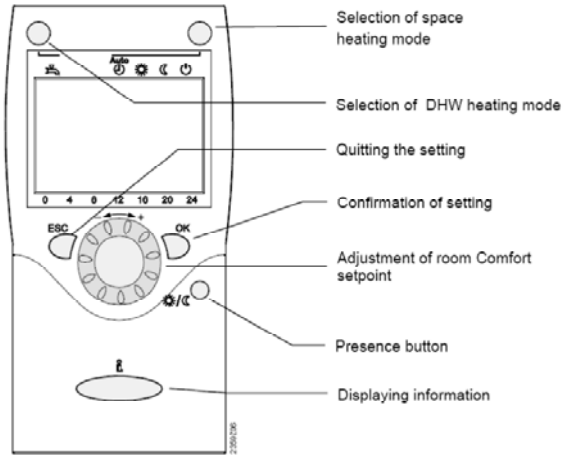
14.0 Control Parameter Default Settings.

14.1 RVS43 143 Cascade Manager Settings.

Boiler Mounted Unit AVS37



Room Unit QAA75



Heating to Comfort setpoint	INFO Info level activated
Heating to Reduced setpoint	PROG Programming activated
Heating to frost protection setpoint	ECO Heating temporarily switched off ECO function active
Process running – please wait	Holiday function active
Change battery	Reference to heating circuit
Burner operating (only oil / gas boiler)	Maintenance / special operation
	Error messages

If the controller is displaying German Text undertake the following;
Press the ESC button several times to display the DEFAULT SCREEN.
Press the OK button once, turn the wheel clockwise one click to highlight 'Bedieninheit', Press the OK button, The screen displays 'Bedieninheit Sprache' 'Deutsch', Press the OK button to make 'Deutsch' flash, Turn the wheel one click anticlockwise to select 'English'. Press the OK button. The screen indicates 'OPERATOR SECTION, LANGUAGE', Press the ECS button twice, to return to the main screen.

Selection of space heating mode

This setting is used to switch between the different operating modes. The selection made is indicated by a bar which appears below the respective symbol.

Automatic mode AUTO

Automatic mode controls the room temperature according to the time program.
Characteristics of automatic mode:
- Heating mode according to the time program
- Temperature setpoints according to the heating program "Comfort setpoint" ☼ or "Reduced setpoint" ☾
- Protective functions active
- Automatic summer / winter changeover (ECO functions)

Continuous operation ☼ or ☾

Continuous operation maintains the room temperature at the selected operating level.

☼ Heating to Comfort setpoint
☾ Heating to Reduced setpoint

Characteristics of continuous operation:
- Heating mode with no time program
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and 24-hour heating limit inactive in the case of continuous operation with Comfort setpoint

Protection

When using Protection mode, the heating system is off, but it remains protected against frost (frost protection temperature) provided there is no power failure.
Characteristics of Protection:
- Heating off
- Temperature according to frost protection
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and automatic 24-hour heating limit active

Selecting the DHW heating mode

The button is used to switch DHW heating mode on and off. The selection made is indicated by a bar which appears below the respective symbol.

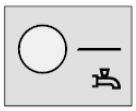
DHW heating mode

- On

The DHW is heated according to the selected switching program.

- Off

No DHW heating, but the protective function is active.

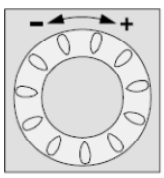


DHW push

Triggering is effected by keeping the DHW operating mode button on the operator or room unit depressed for at least 3 seconds.
It can also be started when:
- The operating mode is “Off“
- Operating mode changeover acts via H1 or centrally (LPB)
- All heating circuits use the holiday function

Adjusting the room temperature setpoint

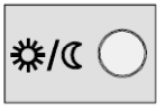
Turn the setting knob to increase or decrease the **Comfort setpoint** ☼.
For the **Reduced setpoint** ☾
- Press OK
- Select operating page “Heating circuit“ and
- adjust the “Reduced setpoint“



After each readjustment, wait at least 2 hours, allowing the room temperature to adapt.

Presence button

If you do not use the rooms for a certain period of time, you can press the presence button to reduce the room temperature, thus saving heating energy.
When the rooms are occupied again, press again the presence button to resume heating operation.



☼ Heating to Comfort setpoint
☾ Heating to Reduced setpoint

- The presence button is only active in automatic operation
- The current selection is active until the next switching action according to the heating program takes place

Displaying information

Various data can be displayed by pressing the info button.

Possible displays

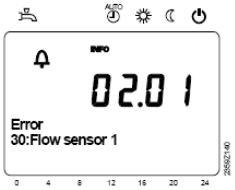
Depending on the type of unit, configuration and operating state, some of the info lines listed below may not appear.
Display:
- Possible error messages from the error code list on page 151
- Possible service messages from the maintenance code list on page 152
- Possible special mode messages from page 152

Other displays:
- Room temperature.
- Room temperature minimum
- Room temperature maximum
- Boiler temp
- Outside temperature
- Outside temp min
- Outside temp max
- DHW temp 1
- State of heating circuit 1
- State of heating circuit 2
- State heating circuit P
- State of DHW
- State of boiler
- State of solar
- State solid fuel boiler
- State buffer storage tank
- State swimming pool
- Date and time of day
- Telephone customer service

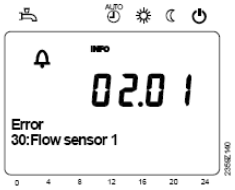
Exception

In exceptional cases, the basic display shows one of the following symbols:

Error messages
If this symbol appears, an error in the plant has occurred. Press the info button and read further information.



Maintenance or special operation
If this symbol appears, a maintenance alarm is delivered or the plant has changed to special mode. Press the info button and read further information.

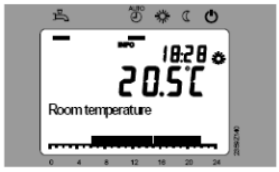
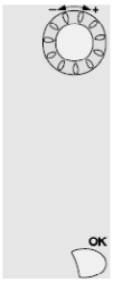
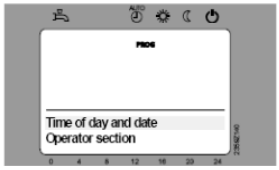
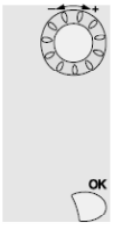


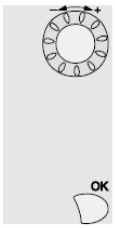
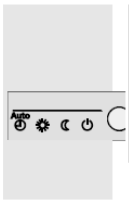
Setting principle

Settings that cannot be made directly with the operating elements require programming. For this purpose, the individual settings are structured in the form of operating pages and operating lines, thus forming practical groups of settings.
The following example shows how to set the time of day and the date.

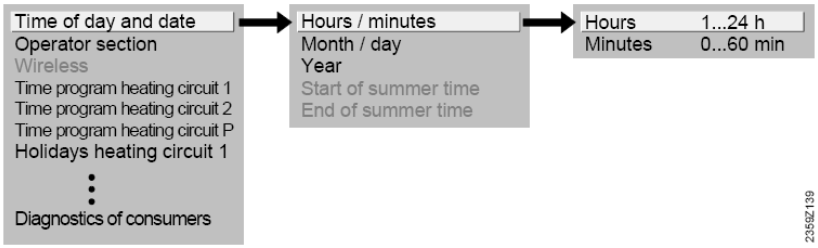
Example: "Setting the time of day"

- Press *ESC* to go one step back at a time, readjusted values are not be adopted
- If no setting is made for 8 minutes, the display returns automatically to the basic display
- Operating lines may be hidden, depending on the type of controller, the configuration made and the user level

	Operation	Display example	Description
1			Basic display. If the basic display is not shown, press the ESC button to return to it. Press OK.
2			The bottom section of the display shows a number of operating pages. Turn the setting knob until operating page *Time of day and date* appears. Press OK to confirm.
3			In the bottom section of the display, the first operating line of operating page *Time of day and date* appears. Turn the setting knob until operating line *Hours / minutes* appears. To confirm, press OK.
4			The display shows the hours flashing. Turn the setting knob until the hours of the time of day are correct. To confirm, press OK.

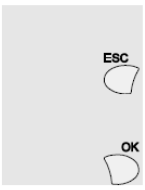
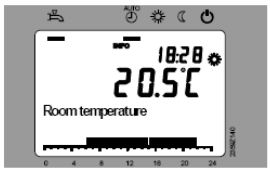
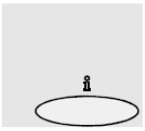
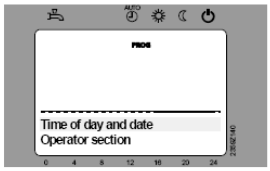
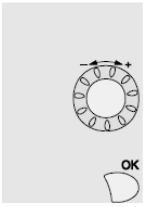
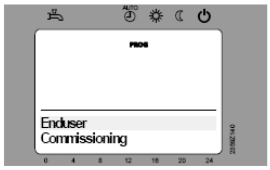
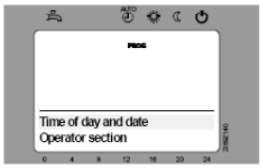
5			The display shows the minutes flashing. Turn the setting knob until the minutes of the time of day are correct. To confirm, press OK.
6			The settings are saved and the displays stops flashing. Now, you can make further settings or you press the operating mode button to return to the basic display.
7			Now, you see the basic display again.

Example of menu structure



5.1.3 User levels

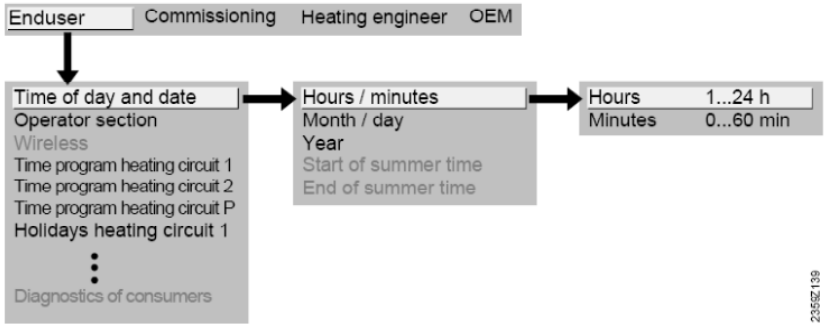
The user levels only allow authorized user groups to make settings. To reach the required user level, proceed as follows:

	Operation	Display example	Description
1			Basic display. If the basic display is not shown, press the ESC button to return to it. Press OK.
2			You are on the user level *End user*. Press INFO for 3 seconds.
3			You are now given a choice of user levels. Turn the setting knob until the required user level is reached. Press OK.
			You are now on the required user level.

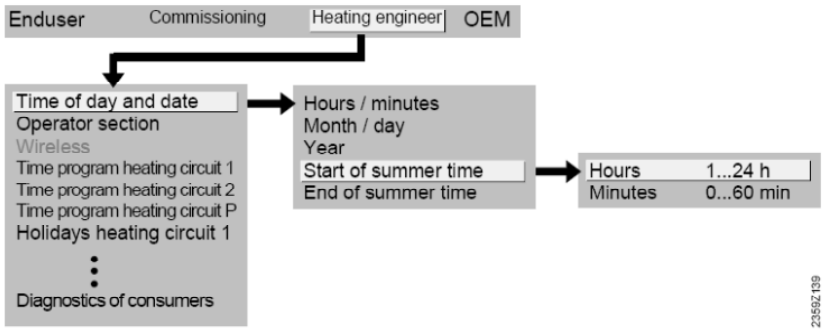
To reach the OEM level, the relevant code must be entered.

Setting the structure "End user"

The example given here shows that certain user levels do not allow certain settings to be made. The example shows them highlighted. On the unit, they are hidden.



Setting the structure "Heating engineer"



A full list of defaults can be found in the respective controller guide supplied with the appliance.

14.1.1 RVS 43 Defaults

To access the most useful menu press the OK button once then press and hold the INFO button for 5 seconds until the lower section of the screen changes. Use the wheel to highlight the ENGINEER setting. Press the OK button.

Access to all setting below is now possible.

Clock				
Line no.	Data point	Default Value	Unit	Additional Comments
	Clock time	Set Actual Date & Time		
	Summertime start	25 March ----		
	Summertime end	25 October ----		
Wireless				
Line no.	Data point	Value	Unit	Additional Comments
130	Room unit 1	-------		
131	Room unit 2	-------		
132	Room unit 3/P	-------		
133	Outside sensor	-------		
134	Repeater	-------		
135	Operator unit 1	-------		
136	Operator unit 2	-------		
137	Operator unit 3/P	-------		
138	Service unit	-------		
140	Delete all devices	No		
Time switch program 1				
Line no.	Data point	Value	Unit	Additional Comments
501-506	Time switch program HC1 Monday	06:00 (On); 22:00 (Off); -; -; -; -		
501-506	Time switch program HC1 Tuesday	06:00 (On); 22:00 (Off); -; -; -; -		
501-506	Time switch program HC1 Wednesday	06:00 (On); 22:00 (Off); -; -; -; -		
501-506	Time switch program HC1 Thursday	06:00 (On); 22:00 (Off); -; -; -; -		
501-506	Time switch program HC1 Friday	06:00 (On); 22:00 (Off); -; -; -; -		
501-506	Time switch program HC1 Saturday	06:00 (On); 22:00 (Off); -; -; -; -		
501-506	Time switch program HC1 Sunday	06:00 (On); 22:00 (Off); -; -; -; -		
516	Standard values TSP heating circuit 1	No		
Time switch program 2				
Line no.	Data point	Value	Unit	Additional Comments
521-526	Time switch program HC2 Monday	06:00 (On); 22:00 (Off); -; -; -; -		
521-526	Time switch program HC2 Tuesday	06:00 (On); 22:00 (Off); -; -; -; -		
521-526	Time switch program HC2 Wednesday	06:00 (On); 22:00 (Off); -; -; -; -		

521-526	Time switch program HC2 Thursday	06:00 (On); 22:00 (Off); -; -; -; -		
521-526	Time switch program HC2 Friday	06:00 (On); 22:00 (Off); -; -; -; -		
521-526	Time switch program HC2 Saturday	06:00 (On); 22:00 (Off); -; -; -; -		
521-526	Time switch program HC2 Sunday	06:00 (On); 22:00 (Off); -; -; -; -		
536	Standard values TSP heating circuit 2	No		
Time switch program 3				
Line no.	Data point	Value	Unit	Additional Comments
541-546	Time switch program 3 Monday	06:00 (On); 22:00 (Off); -; -; -; -		
541-546	Time switch program 3 Tuesday	06:00 (On); 22:00 (Off); -; -; -; -		
541-546	Time switch program 3 Wednesday	06:00 (On); 22:00 (Off); -; -; -; -		
541-546	Time switch program 3 Thursday	06:00 (On); 22:00 (Off); -; -; -; -		
541-546	Time switch program 3 Friday	06:00 (On); 22:00 (Off); -; -; -; -		
541-546	Time switch program 3 Saturday	06:00 (On); 22:00 (Off); -; -; -; -		
541-546	Time switch program 3 Sunday	06:00 (On); 22:00 (Off); -; -; -; -		
556	Standard values TSP3	No		
Time switch program 4				
Line no.	Data point	Value	Unit	Additional Comments
561-566	Time switch program 4 Monday	06:00 (On); 22:00 (Off); -; -; -; -		
561-566	Time switch program 4 Tuesday	06:00 (On); 22:00 (Off); -; -; -; -		
561-566	Time switch program 4 Wednesday	06:00 (On); 22:00 (Off); -; -; -; -		
561-566	Time switch program 4 Thursday	06:00 (On); 22:00 (Off); -; -; -; -		
561-566	Time switch program 4 Friday	06:00 (On); 22:00 (Off); -; -; -; -		
561-566	Time switch program 4 Saturday	06:00 (On); 22:00 (Off); -; -; -; -		
561-566	Time switch program 4 Sunday	06:00 (On); 22:00 (Off); -; -; -; -		
576	Standard values TSP 4	No		
Time switch program 5				
Line no.	Data point	Value	Unit	Additional Comments
601-606	Time switch program 5 Monday	06:00 (On); 22:00 (Off); -; -; -; -		
601-606	Time switch program 5 Tuesday	06:00 (On); 22:00 (Off); -; -; -; -		
601-606	Time switch program	06:00 (On); 22:00 (Off);		

	5 Wednesday	-; -; -; -		
601-606	Time switch program 5 Thursday	06:00 (On); 22:00 (Off); -; -; -; -		
601-606	Time switch program 5 Friday	06:00 (On); 22:00 (Off); -; -; -; -		
601-606	Time switch program 5 Saturday	06:00 (On); 22:00 (Off); -; -; -; -		
601-606	Time switch program 5 Sunday	06:00 (On); 22:00 (Off); -; -; -; -		
616	Standard values TSP 5	No		
Holiday programs HC1				
Line no.	Data point	Value	Unit	Additional Comments
642	Holiday period 1 HC1: first day	-------		
643	Holiday period 1 HC1: last day	-------		
642	Holiday period 2 HC1: first day	-------		
643	Holiday period 2 HC1: last day	-------		
642	Holiday period 3 HC1: first day	-------		
643	Holiday period 3 HC1: last day	-------		
642	Holiday period 4 HC1: first day	-------		
643	Holiday period 4 HC1: last day	-------		
642	Holiday period 5 HC1: first day	-------		
643	Holiday period 5 HC1: last day	-------		
642	Holiday period 6 HC1: first day	-------		
643	Holiday period 6 HC1: last day	-------		
642	Holiday period 7 HC1: first day	-------		
643	Holiday period 7 HC1: last day	-------		
642	Holiday period 8 HC1: first day	-------		
643	Holiday period 8 HC1: last day	-------		
648	Holiday operating level HC1	Frost		
Holiday programs HC2				
Line no.	Data point	Value	Unit	Additional Comments
652	Holiday period 1 HC2: first day	-------		
653	Holiday period 1 HC2: last day	-------		
652	Holiday period 2 HC2:	-------		

	first day			
653	Holiday period 2 HC2: last day	-------		
652	Holiday period 3 HC2: first day	-------		
653	Holiday period 3 HC2: last day	-------		
652	Holiday period 4 HC2: first day	-------		
653	Holiday period 4 HC2: last day	-------		
652	Holiday period 5 HC2: first day	-------		
653	Holiday period 5 HC2: last day	-------		
652	Holiday period 6 HC2: first day	-------		
653	Holiday period 6 HC2: last day	-------		
652	Holiday period 7 HC2: first day	-------		
653	Holiday period 7 HC2: last day	-------		
652	Holiday period 8 HC2: first day	-------		
653	Holiday period 8 HC2: last day	-------		
658	Holiday operating level HC2	Frost		
Holiday programs HCP				
Line no.	Data point	Value	Unit	Additional Comments
662	Holiday period 1 HC3/P: First day	-------		
663	Holiday period 1 HC3/P: Last day	-------		
662	Holiday period 2 HC3/P: First day	-------		
663	Holiday period 2 HC3/P: Last day	-------		
662	Holiday period 3 HC3/P: First day	-------		
663	Holiday period 3 HC3/P: Last day	-------		
662	Holiday period 4 HC3/P: First day	-------		
663	Holiday period 4 HC3/P: Last day	-------		
662	Holiday period 5 HC3/P: First day	-------		
663	Holiday period 5 HC3/P: Last day	-------		
662	Holiday period 6 HC3/P: First day	-------		
663	Holiday period 6 HC3/P: Last day	-------		

662	Holiday period 7 HC3/P: First day	-------		
663	Holiday period 7 HC3/P: Last day	-------		
662	Holiday period 8 HC3/P: First day	-------		
663	Holiday period 8 HC3/P: Last day	-------		
668	Holiday operating level HC3/P	Frost		
Heat circuit 1				
Line no.	Data point	Value	Unit	Additional Comments
700	Operating mode heat circuit 1	Protection		
710	Room temperature Comfort setpoint HC1	21	°C	
712	Room temp reduced setpoint heat circuit 1	16	°C	
714	Room temp frost protection setpoint HC1	10	°C	
716	Comfort setpoint max heating circuit 1	35	°C	
720	Heating curve 1 slope	3.2		
721	Heating curve parallel displacement HC1	0	°C	
726	Heating curve adaptation heat circuit 1	Off		
730	Summer/winter changeover temp heat circuit 1	18	°C	
732	24-hour heating limit HC1	-3	°C	
740	Flow temp min limitation heat circuit 1	8	°C	Set to required minimum flow temperature
741	Flow temp max limitation heat circuit 1	80	°C	Set to required maximum heating flow temperature
750	Room temp gain factor heat circuit 1	20	%	
760	Room temperature limitation heating circuit 1	1	°C	
770	Room temp setpoint boost HC1 (boost heating)	5	°C	
780	Quick setback heat circuit 1	Down to reduced setp		
790	Optimum start control max forward shift HC1	00:00	h:m	
791	Optimum stop control max forward	00:00	h:m	

	shift HC1			
800	Start reduced room temp setpoint increase HC1	-------	°C	
801	End reduced room temp setpoint increase HC1	-15	°C	
820	Pump heating circuit overtemp protection HC1	On		
830	Mixing valve setpoint boost heating circuit 1	5	°C	
832	Actuator control mode heat circuit 1	Three-position		
833	Actuator switching differential heat circuit 1	2	°C	
834	Actuator running time heat circuit 1	120	s	
835	P-band (Xp) heat circuit 1	32	°C	
836	Integral action time (Tn) heat circuit 1	120	s	
850	Flooring plaster dry up function HC1	Off		
851	Floor setpoint manually HC1	25	°C	
861	Overtemperature drop heating circuit 1	Always		
870	Heating circuit 1 with buffer	Yes		
872	Heating circuit 1 with precontr/primary pump	Yes		
900	Operating mode changeover heating circuit 1	Protection		
Cooling circuit 1				
Line no.	Data point	Value	Unit	Additional Comments
901	Operating mode cooling circuit 1	Automatic		
902	Room temp Comfort setpoint cooling circuit 1	24	°C	
907	Release cooling circuit 1	24h/day		
908	Flow setpoint at outside temp 25°C CC1	20	°C	
909	Flow setpoint at outside temp 35°C CC1	16	°C	
912	Cooling limit at outs temp cooling circuit 1	20	°C	
913	Remaining time after	24	h	

	heating cooling circuit 1			
918	Start summer compensation at ouside temp CC1	26	°C	
919	End summer compensation at ouside temp CC1	35	°C	
920	Summer compensation setpoint increase CC1	4	°C	
923	Flow setpoint min at outside temp 25°C CC1	18	°C	
924	Flow setpoint min at outside temp 35°C CC1	18	°C	
928	Room temperature gain factor cooling circuit 1	80	%	
932	Room temp limitation cooling circuit 1	0.5	°C	
938	Mixing valve decrease cooling circuit 1	0	°C	
939	Actuator control mode cooling circuit 1	Three-position		
940	Actuator switching diff cooling circuit 1	2	°C	
941	Running time actuator cooling circuit 1	120	s	
942	P-band (Xp) cooling circuit 1	12	°C	
943	Integral action time (Tn) cooling circuit 1	90	s	
945	Mixing valve cooling circuit 1 in heating mode	Controlled		
946	Locking time dew point limit CC1	60	min	
947	Flow boost hygrostat cooling circuit 1	10	°C	
948	Flow setp incr start at rel Humidity CC1	60	%	
950	Flow temp diff dewpoint	2	°C	
962	Cooling circuit 1 with buffer	No		
963	Cooling circuit 1 with precontr/primary pump	No		
969	Operating mode changeover cooling circuit 1	Off		

Heat circuit 2				
Line no.	Data point	Value	Unit	Additional Comments
1000	Operating mode heat circuit 2	Automatic		
1010	Room temperature Comfort setpoint HC2	20	°C	
1012	Room temp reduced setpoint heat circuit 2	16	°C	
1014	Room temp frost protection setpoint HC2	10	°C	
1016	Comfort setpoint max HC2	35	°C	
1020	Heating curve 2 slope	3.2		
1021	Heating curve parallel displacement HC2	0	°C	
1026	Heating curve adaptation heat circuit 2	Off		
1030	Summer/winter changeover temp heat circuit 2	18	°C	
1032	24-hour heating limit HC2	-3	°C	
1040	Flow temp min limitation heat circuit 2	8	°C	Set to required minimum flow temperature
1041	Flow temp max limitation heat circuit 2	80	°C	Set to required maximum heating flow temperature
1050	Room temp gain factor heat circuit 2	20	%	
1060	Room temperature limitation heating circuit 2	1	°C	
1070	Room temp setpoint boost HC2 (boost heating)	5	°C	
1080	Quick setback heat circuit 2	Down to reduced setp		
1090	Optimum start control max forward shift HC2	00:00	h:m	
1091	Optimum stop control max forward shift HC2	00:00	h:m	
1100	Start reduced room temp setpoint increase HC2	-------	°C	
1101	End reduced room temp setpoint increase HC2	-15	°C	
1120	Pump heating circuit overtemp protection HC2	On		
1130	Mixing valve setpoint	5	°C	

	boost heating circuit 2			
1132	Actuator control mode heat circuit 2	Three-position		
1133	Actuator switching differential heat circuit 2	2	°C	
1134	Actuator running time heat circuit 2	120	s	
1135	P-band (Xp) heat circuit 2	32	°C	
1136	Integral action time (Tn) heat circuit 2	120	s	
1150	Flooring plaster dry up function HC1	Off		
1151	Floor setpoint manually HC2	25	°C	
1161	Overtemperature drop heating circuit 2	Always		
1170	Heating circuit 2 with buffer	Yes		
1172	Heating circuit 2 with precontr/primary pump	Yes		
1200	Operating mode changeover heating circuit 2	Protection		
Heating circuit P				
Line no.	Data point	Value	Unit	Additional Comments
1300	Operating mode HC3/P	Automatic		
1310	Room temperature Comfort setpoint HC3/P	20	°C	
1312	Reduced room temperature setpoint HCP	16	°C	
1314	Room temperature frost protection setpoint HC3/P	10	°C	
1316	Comfort setpoint max HC3/P	35	°C	
1320	Heating curve slope HC3/P	1.5		
1321	Heating curve parallel displacement HC3/P	0	°C	
1326	Heating curve adaption HC3/P	Off		
1330	Summer/winter changeover temperature HC3/P	18	°C	
1332	24-hour heating limit HC3/P	-3	°C	
1340	Flow temperature min limitation HC3/P	8	°C	

1341	Flow temperature max limitation HC3/P	80	°C	
1350	Room temperature authority HC3/P	20	%	
1360	Room temperature limitation HC3/P	1	°C	
1370	Room setpoint boost HC3/P (boost heating)	5	°C	
1380	Quick setback HC3/P	Down to reduced setp		
1390	Optimum start control max forward shift HC3/P	00:00	h:m	
1391	Optimum stop control max forward shift HC3/P	00:00	h:m	
1400	Start reduced room temp setpoint increase HC3/P	-------	°C	
1401	End reduced room temp setpoint increase HC3/P	-15	°C	
1420	Pump heating circuit overtemp protection HC3/P	On		
1450	Floor curing function HC3/P	Off		
1451	Floor setpoint manually HC3/P	25	°C	
1455	Flow temperature setpoint floor curing HC3/P	-------	°C	
1456	Floor curing day HC3/P	-------		
1457	Floor curing HC3/P days fulfilled	0		
1461	Overtemperature drop heating circuit 3/P	Always		
1470	Heating circuit 3/P with buffer	Yes		
1472	Heating circuit 3/P with precontr/primary pump	Yes		
1500	Operating mode changeover HC3/P	Protection		
DHW				
Line no.	Data point	Value	Unit	Additional Comments
1600	DHW operating mode	On		
1610	DHW temperature nominal setpoint	55	°C	
1612	DHW temperature reduced setpoint	40	°C	
1614	DHW temperature nominal setpoint max	65	°C	

1620	DHW release	Heating programs with forward shift		
1630	DHW charging priority	Shifting, absolute		
1640	Legionella function	Fixed weekday		
1641	Legionella function periodicity	3		
1642	Legionella function day	Monday		
1644	Time for legionella function	-------	h:m	
1645	Legionella function setpoint	65	°C	
1646	Dwelling time at legionella function setpoint	30	min	
1647	Circul. pump operation during legionella func	On		
1660	DHW circulating pump release	DHW release		
1661	DHW circulating pump cycling	On		
1663	DHW circulating setpoint	45	°C	
Hx pump				
Line no.	Data point	Value	Unit	Additional Comments
2008	H1 pump DHW charging priority	Yes		
2010	Pump H1 overtemperature drop	On		
2012	H1 pump with buffer	Yes		
2014	H1 pump with precontr/primary pump	Yes		
2015	H1 Refrigeration request	2-pipe system cooling		
2033	H2 pump DHW charging priority	Yes		
2035	Pump H2 overtemperature drop	On		
2037	H2 pump with buffer	Yes		
2039	H2 pump with precontr/primary pump	Yes		
2040	H2 Refrigeration request	2-pipe system cooling		
Swimming pool				
Line no.	Data point	Value	Unit	Additional Comments
2055	Pool setpoint solar heating	26	°C	
2056	Pool setpoint producer heating	22	°C	

2065	Pool charging priority solar	No		
2070	Pool temperature maximum	32	°C	
2080	Pool with solar	Yes		
Precontroller/primary pump				
Line no.	Data point	Value	Unit	Additional Comments
2110	Flow temp min limitation precontroller	8	°C	
2111	Flow temp max limitation precontroller	80	°C	
2112	Flow temp min limitation cooling precontroller	8	°C	
2130	Mixing valve setpoint boost precontroller	10	°C	
2131	Mixing valve decrease precontroller	0	°C	
2132	Actuator control mode precontroller	Three-position		
2133	Actuator switching differential precontroller	2	°C	
2134	Actuator running time precontroller	120	s	
2135	P-band (Xp)precontroller	32	°C	
2136	Integral action time (Tn) precontroller	120	s	
2150	Precontroller/primary pump	Downstream from buffer		
Boiler				
Line no.	Data point	Value	Unit	Additional Comments
2200	Boiler operating mode	Automatic mode without boiler run time extension		
2203	Release oil-/gas boil below outside temp thresh	-------	°C	
2205	Boiler with economy mode	Off		
2208	Full charging buffer	Off		
2210	Boiler temp min limitation	8	°C	
2211	Boiler temp min limitation OEM	8	°C	
2212	Boiler temp max limitation	90	°C	
2213	Boiler temp max limitation OEM	95	°C	
2240	Boiler switching differential	8	°C	

2241	Burner running time min limitation	4	min	
2250	Pump overrun time	5	min	
2260	Protective startup consumer	On		
2261	Protective startup boiler pump	On		
2262	Optimum start control min limitation boiler temp	Off		
2270	Return temp limitation	8	°C	
2271	Min. limitation of the boiler return temp EXP	8	°C	
2272	Boiler return flow	On		
2282	Actuator running time return temp limitation	120	s	
2283	P-band (Xp) return temp limitation	32	°C	
2284	Integral action time (Tn) return temp limitation	120	s	
2285	Derivative action time (Tv) return temp lim	10	s	
2290	Bypass pump switching differential	6	°C	
2291	Bypass pump control	According to boiler return temp		
2300	Frost protection for plant boiler pump	Off		
2310	TR function	On		
2315	Temperature stroke min	-------	°C	
2316	Temperature stroke max	-------	°C	
2330	Nominal power boiler	50	kW	
2331	Nominal power first stage	30	kW	
Cascade				
Line no.	Data point	Value	Unit	Additional Comments
3510	Cascade control strategy	Early on, late off		
3511	Power range, lower limit (Pmin)	20	%	
3512	Power range, upper limit (Pmax)	85	%	
3530	Release limit producer sequence	25	°C*min	
3531	Reset limit producer sequence	20	°C*min	
3532	Restart lock time	30	s	
3533	Switch-on delay lag heat source	1	min	

3534	Forced time basic stage during producer turn on	0	s	
3540	Time to automatic producer sequence switching	10	h	
3541	Exclude at automatic producer sequence switching	none		
3544	Leading producer	Producer 1		
3550	Protective startup cascade pumpe	Off		
3560	Cascade return setpoint minimum	8	°C	
3561	Cascade return setpoint minimum OEM	8	°C	
3562	Cascade return flow	On		
3570	Actuator running time return temp limitation	120	s	
3571	P-band (Xp) return temp limitation	32	°C	
3572	Integral action time (Tn) return temp limitation	120	s	
3590	Min temp differential hydraulic balancing	2	°C	
Solar				
Line no.	Data point	Value	Unit	Additional Comments
3810	Temp differential on solar	8	°C	
3811	Temp differential off solar	4	°C	
3812	Min charging temperature DHW storage tank	-------	°C	
3813	Temperature differential ON buffer	-------	°C	
3814	Temperature differential OFF buffer	-------	°C	
3815	Min charging temperature buffer	-------	°C	
3816	Temperature differential swimming pool ON	-------	°C	
3817	Temperature differential swimming pool OFF	-------	°C	
3818	Min charging temperature swimming pool	-------	°C	
3822	Charging priority storage	DHW storage tank		

3825	Charging time relative priority	-------	min	
3826	Wait time relative priority	5	min	
3827	Wait time parallel operation	-------	min	
3828	Start delay secondary pump	60	s	
3830	Collector Start function	-------	min	
3831	Min collector pump running time	20	s	
3832	Collector Start function on	07:00	h:m	
3833	Collector Start function off	19:00	h:m	
3834	Collector Start function gradient	-------	min/°C	
3840	Collector frost protection temp	-------	°C	
3850	Collector overtemperature protection	-------	°C	
3860	Evaporation temperature of heat carrier	-------	°C	
3880	Type of antifreeze added	None (water)		
3881	Antifreeze concentration	30	%	
3884	Volumetric flow solar pump	200	l/h	
Solid fuel boiler				
Line no.	Data point	Value	Unit	Additional Comments
4102	Solid fuel boiler locks other producers	On		
4110	Min solid fuel boiler setpoint	40	°C	
4130	Temp differential on solid fuel boiler	8	°C	
4131	Temp differential off solid fuel boiler	4	°C	
4133	Comparative temperatur solid fuel boiler	Setpoint min		
4140	Pump overrun time solid fuel boiler	20	min	
4141	Overtemperature drop solid fuel boiler	90	°C	
4170	Frost protection for plant solid fuel boiler	Off		
Buffer tank				
Line no.	Data point	Value	Unit	Additional Comments
4720	Automatic producer lock	With B4		

4721	Automatic producer lock switching differential	8	°C	
4722	Diff. Buffer/HC temp to producer release	-5	°C	
4723	Temp diff buffer/CC to source release	0	°C	
4724	Min buffer temp while heating mode	-------	°C	
4726	Max buffer temp while cooling mode	25	°C	
4739	Buffer stratification protection	Off		
4740	Buffer stratification protect Temp diff max	5	°C	
4743	Buffer stratification protect foreseeable time	60	s	
4744	Buffer stratification prot integral action time	120	s	
4746	DHW protection combi storage	Off		
4750	Buffer charging temp max	80	°C	
4751	Buffer temp max	90	°C	
4755	Return cooling temperature buffer	60	°C	
4756	Buffer return cooling DHW/HC	Off		
4757	Buffer return cooling Collector	Off		
4783	Buffer with solar	No		
4790	Return diverting temp differential On	10	°C	
4791	Return diverting temp differential Off	5	°C	
4795	Comparative temperatur return diverting	Buffer sensor B42		
4796	Operating action return diverting	Return temp rising		
4800	Buffer partial charging setpoint	-------	°C	
4810	Full charging buffer	Off		
4811	Full charging temperature min	8	°C	
4813	Full charging sensor	With B42/B41		
DHW storage tank				
Line no.	Data point	Value	Unit	Additional Comments
5010	DHW charging	Several times/day		
5020	DHW flow setpoint boost	16	°C	
5021	Dhw transfer boost	8	°C	
5022	DHW recharging	With sensors B3 and		

	control	B31		
5024	DHW switching differential	5	°C	
5030	DHW charging time limitation	150	min	
5040	DHW discharging protection	Automatically		
5050	DHW charging temperatrure max	80	°C	
5051	DHW storage tank temperature max	90	°C	
5055	DHW storage tank return cooling temperature	80	°C	
5056	DHW storage tank return cooling Producer/HC	Off		
5057	DHW storage tank return cooling Collector	Off		
5060	DHW electric immersion heater operating mode	Backup mode		
5061	DHW electric immersion heater release	DHW release		
5062	DHW electric immersion heater control	DHW sensor		
5070	DHW automatic push	On		
5071	charging priority time push	0	min	
5085	DHW storage tank overtemperature drop	On		
5090	DHW storage tank with buffer	No		
5092	DHW storage tank with precontr/primary pump	No		
5093	DHW storage tank with solar	Yes		
5120	Mixing valve setpoint boost DHW precontr	2	°C	
5124	Actuator running time DHW precontr	120	s	
5125	P-band (Xp) DHW precontr	32	°C	
5126	Integral action time (Tn) DHW precontr	120	s	
5130	Transfer strategy	Always		
5131	Comparative temperatur transfer	DHW sensor B3		
DHW flow heater				
Line no.	Data point	Value	Unit	Additional Comments

5406	Min setp diff to tank temp	4	°C	
5544	Actuator running time DHW instantaneous heater	60	s	
5545	P-band (Xp) DHW instantaneous heater	20	°C	
5546	Integral action time (Tn) DHW instan heater	150	s	
5547	Derivative action time (Tv) instantaneous heater	4.5	s	
Configuration				
Line no.	Data point	Value	Unit	Additional Comments
5710	Heating circuit 1	On		
5711	Cooling circuit 1	Off		
5712	Mixing valve 1 appliacation	Heating and cooling		
5715	Heating circuit 2	Off		
5730	DHW sensor B3	Sensor		*Change to Thermostat if Volt Free is required.*
5731	DHW actuating device Q3	Charging pump		
5736	Dhw dedicated	Off		
5770	Producer type	Single-stage burner		
5840	Solar actuating device	Charging pump		
5841	External solar exchanger	Commonly		
5890	Relay output QX1	None		
5930	Sensor input BX1	Segment flow sensor B10		
5931	Sensor input BX2	Cascade return sensor B70		
5950	Input H1 function selection	Operating mode changeover HCs+DHW		*Change to HCS only or 010 Volt Control. If 0-10 Volt control is required reduce #720 to as low as possible*
5951	Type of contact H1	normal opened		*Change to NC if Volt Free enabling is required.*
5952	Function value contact H1	90	°C	*Change to 80 °C*
5953	Voltage value 1 H1	0	V	
5954	Function value 1 H1	0		
5955	Voltage value 2 H1	10	V	
5956	Function value 2 H1	100		*Change to 80 °C*
6014	Function mixing valve group 1	Heat circuit 1		
6020	Function extension module 1	Heat circuit 2		
6021	Function extension module 2	No function		
6030	Relay output QX21	None		

6031	Relay output QX22	None		
6032	Relay output QX23	None		
6040	Sensor input BX21	None		
6041	Sensor input BX22	None		
6046	Input H2 function selection	Operating mode changeover HCs+DHW		
6047	Type of contact H2	normal opened		
6048	Function value contact H2	70	°C	
6049	Voltage value 1 H2	0	V	
6050	Function value 1 H2	0		
6051	Voltage value 2 H2	10	V	
6052	Function value 2 H2	100		
6097	Sensor type collector	NTC		
6098	Measured value corr collector sensor 1 (B6)	0	°C	
6099	Measured value corr collector sensor 2 (B61)	0	°C	
6100	Outside temp sensor measuring correction	0	°C	
6101	Sensor type flue gas temperature	NTC		
6102	Measured value corr flue gas sensor (B8)	0	°C	
6110	Building time constant	15	h	
6112	Gradient room model	60	min/°C	
6116	Time constant setpoint compensation	0	min	
6117	Central setpoint shift	3	°C	
6118	Setpoint reduction delay	60	K/min	
6120	Frost protection for the plant	Off		
6128	Heat demand release below outside temp thresh	-------	°C	
6129	Heat demand release above outside temp thresh	-------	°C	
6131	Heat req with economy mode	Off		
6135	Air dehumidifier	Off		
6136	Release air dehumidifier	24h/day		
6137	Air dehumidifier r.h. on	55	%	
6138	Air dehumidifier r.h. SD	5	%	
6140	Water pressure max	-------	bar	
6141	Water pressure min	-------	bar	
6142	Water pressure critical min	-------	bar	
6150	Water pressure 2 max	-------	bar	

6151	Water pressure 2 min	-------	bar	
6152	Water pressure 2 critical min	-------	bar	
6200	Store sensor	No		
6204	Store parameter	No		
6205	Reset parameter	No		
6212	Control number heat generation 1	0		
6213	Control number heat generation 2	0		
6215	Control number storage tank	0		
6217	Control number heating circuits	2		
6220	Device SW version	3.4		
6222	Device operating hours	2112	h	
6224	Device identification	RVS43.143/109		
	Partial diagram oil/gas-fired boiler	0		
	Partial diagram solar collector	0		
	Partial diagram heat circuit 1	2		
	Partial diagram cooling circuit 1	0		
	Partial diagram heat circuit 2	0		
	Partial diagram heat circuit P	0		
	Partial diagram buffer	0		
	Partial diagram dhw storage	0		
	Partial diagram converter	0		
	Partial diagram solid fuel boiler	0		
	Partial diagram swimming pool	0		
	Partial diagram hydraulic balancing	2		
	Partial diagram instantaneous heater	0		
	Partial diagram H1	No		
	Partial diagram H2	No		
	Cascade status	Active		
LPB				
Line no.	Data point	Value	Unit	Additional Comments
6600	LPB address	S0/G1		
6604	LPB power supply function selection	Automatic		
6605	LPB power supply status	On		
6610	Display system	Yes		

	message			
6612	Alarm delay	-------	min	
6620	Central switch-over working area	System		
6621	Summer/winter changeover automatic	Local		
6623	Operating mode changeover	Central		
6624	Manuall producer lock	local		
6625	Dhw allocation	All controllers within system		
6627	Cool demand	Local		
6630	Cascade master	Always		
6631	Ext source with eco mode	Off		
6632	Outside temp limit external source accept	No		
6640	Clock time source	Controller is the clock time master		
6650	Outside temp source	S0/G1		
Error				
Line no.	Data point	Value	Unit	Additional Comments
6710	Reset alarm relay	No		
6740	Time flow temperature alarm HC1	-------	min	
6741	Time flow temperature alarm heating circuit 2	-------	min	
6743	Time boiler temperature alarm	-------	min	
6745	Time DHW charging alarm	-------	h	
6746	Time flow temperature alarm cooling circuit 1	-------	min	
6800	Time stamp error history entry 1	01 January 2004 01:02		
6801	Error code history entry 1	10:Outside sensor error		
6802	Time stamp error history entry 2	01 January 2004 01:11		
6803	Error code history entry 2	102:Clock time master without power reserve		
6804	Time stamp error history entry 3	01 January 2004 01:02		
6805	Error code history entry 3	10:Outside sensor error		
6806	Time stamp error history entry 4	01 January 2004 01:02		
6807	Error code history entry 4	10:Outside sensor error		
6808	Time stamp error	01 January 2004 01:11		

	history entry 5			
6809	Error code history entry 5	102:Clock time master without power reserve		
6810	Time stamp error history entry 6	01 January 2004 01:02		
6811	Error code history entry 6	10:Outside sensor error		
6812	Time stamp error history entry 7	01 January 2004 01:02		
6813	Error code history entry 7	10:Outside sensor error		
6814	Time stamp error history entry 8	01 January 2004 01:11		
6815	Error code history entry 8	102:Clock time master without power reserve		
6816	Time stamp error history entry 9	01 January 2004 01:02		
6817	Error code history entry 9	10:Outside sensor error		
6818	Time stamp error history entry 10	01 January 2004 01:11		
6819	Error code history entry 10	102:Clock time master without power reserve		
6820	Reset error history	No		
Service/special operation				
Line no.	Data point	Value	Unit	Additional Comments
7040	Burner hours run maintenance interval	-------	h	
7041	Burner hours run since maintenance	0	h	
7042	Burner starts maintenance interval	-------		
7043	Burner starts since maintenance	0		
7044	Maintenance interval	-------	Months	
7045	Time since maintenance	0	Months	
7053	Flue gas temp limit	-------	°C	
7054	Delay flue gas temp signal	0	min	
7119	Eco function	Locked		
7120	Eco operation	-------		
7130	Chimney sweep function	Off		
7140	Manual operation	Off		
7150	Outside temp simulation	-------	°C	
7170	Telephone customer service			
IO test				***Used to check inputs and outputs***
Line no.	Data point	Value	Unit	Additional Comments
7700	Relay test	No test		

7730	Outside temperature B9	-------	°C	
7732	Flow temperature B1	-------	°C	
7750	DHW temperature B3	-------	°C	
7760	Boiler temperature B2	-------	°C	
7820	Sensor temperature BX1	23.1	°C	
7821	Sensor temperature BX2	-------	°C	
7830	Sensor temperature BX21 module 1	-------	°C	
7831	Sensor temperature BX22 module 1	-------	°C	
7832	Sensor temperature BX21 module 2	-------	°C	
7833	Sensor temperature BX22 module 2	-------	°C	
7840	Voltage signal H1	0	V	
7841	Contact state H1	Open		
7845	Voltage signal H2	0	V	
7846	Contact state H2	Open		
7870	Signal burner fault S3	0V		
7881	Signal 1st burner stage E1	0V		
Status				
Line no.	Data point	Value	Unit	Additional Comments
8000	Status heating circuit 1	Room frost protection active		
8001	Status heating circuit 2	---		
8002	Status heating circuit P	---		
8003	Status DHW	---		
8004	Status cooling circuit 1	---		
8005	Status boiler	---		
8007	Status solar	---		
8008	State solid fuel boiler	---		
8010	Status buffer	---		
8011	Status pool	---		
Diagnostic Cascade				
Line no.	Data point	Value	Unit	Additional Comments
8100	Priority producer 1	0		
8101	Status producer 1	Not available		
8102	Priority producer 2	2		
8103	Status producer 2	Released		
8104	Priority producer 3	3		
8105	Status producer 3	Not released		
8106	Priority producer 4	1		
8107	Status producer 4	Not released		
8108	Priority producer 5	0		
8109	Status producer 5	Not available		

8110	Priority producer 6	0		
8111	Status producer 6	Not available		
8112	Priority producer 7	0		
8113	Status producer 7	Not available		
8114	Priority producer 8	0		
8115	Status producer 8	Not available		
8116	Priority producer 9	0		
8117	Status producer 9	Not available		
8118	Priority producer 10	0		
8119	Status producer 10	Not available		
8120	Priority producer 11	0		
8121	Status producer 11	Not available		
8122	Priority producer 12	0		
8123	Status producer 12	Not available		
8124	Priority producer 13	0		
8125	Status producer 13	Not available		
8126	Priority producer 14	0		
8127	Status producer 14	Not available		
8128	Priority producer 15	0		
8129	Status producer 15	Not available		
8130	Priority producer 16	0		
8131	Status producer 16	Not available		
8138	Cascade supply temperature actual value	23.1	°C	
8139	Cascade supply temperature setpoint	29.4	°C	
8140	Cascade return temp actual value	-------	°C	
8141	Cascade return temp actual setpoint	-------	°C	
8150	Time to automatic producer sequence switching	10	h	
	State cascade pump (Q25)	-------		
	Status cascade return mixing valve opens (Y25)	-------		
	Status cascade return mixing valve closes (Y26)	-------		
Diagnosis producer				
Line no.	Data point	Value	Unit	Additional Comments
8300	State burner stage 1 (T2)	-------		
8310	Boiler temp actual value	-------	°C	
8311	Boiler temp setpoint	-------	°C	
8312	Boiler switch point	0	°C	
8314	Return temp actual value	-------	°C	
8315	Boiler return temp setpoint	-------	°C	

8316	Flue gas temp actual value	-------	°C	
8318	Flue gas temp max actual value	-------	°C	
8330	Burner hours run stage 1	0	h	
8331	Number of burner starts stage 1	0		
8510	Collector temp 1 actual value (B6)	-------	°C	
8511	Collector temp max actual value 1 (B6)	-------	°C	
8512	Collector temp min actual value 1 (B6)	-------	°C	
8513	Temp differential collector 1/DHW	-------	°C	
8514	Temp differential collector 1/buffer	-------	°C	
8515	Temp differential collector 1/pool	-------	°C	
8519	Solar flow sensor for yield measurement B63	-------	°C	
8520	Solar return sensor for yield measurement B64	-------	°C	
8526	24-hour yield solar energy	0	kWh	
8527	Total yield solar energy	0	kWh	
8530	solar yield operating hours	0	h	
8531	Collector overtemp protection operating hours	0	h	
8547	Collector temp 2 actual value (B61)	-------	°C	
8548	Collector temp max actual value 2 (B61)	-------	°C	
8549	Collector temp min actual value 2 (B61)	-------	°C	
8550	Temp differential collector 2/DHW	-------	°C	
8551	Temp differential collector 2/buffer	-------	°C	
8552	Temp differential collector 2/pool	-------	°C	
8560	Solid fuel boiler temperature B22	-------	°C	
8570	Operating hours solid fuel boiler	0	h	
	Status boiler pump (Q1)	-------		
	Status return mixing valve opens (Y7)	-------		
	Status return mixing valve closes (Y8)	-------		

	Status boiler bypass pump (Q12)	-------		
	Producer locking via contact H	Inactive		
	Status collector pump 1 (Q5)	-------		
	Status collector pump 2 (Q16)	-------		
	Status solar pump ext. Exchanger K9	-------		
	Status solar actuator buffer (K8)	-------		
	Status solar actuator pool (K18)	-------		
	Status Solid fuel boiler pump (Q10)	-------		
	Flue gas relay	-------		
Diagnosis consumer				
Line no.	Data point	Value	Unit	Additional Comments
8700	Outside temp	-------	°C	
8703	Outside temp attenuated	-3.4	°C	
8704	Outside temp composite	-1.6	°C	
8720	Relative room humidity	-------	%	
8721	Room temperature	-------	°C	
8722	Dewpoint 1	-------	°C	
8730	Status heat circuit pump (Q2)	On		
8731	Status heat circuit mixing valve opens (Y1)	-------		
8732	Status heat circuit mixing valve closes (Y2)	-------		
8740	Room temp actual value heat circuit 1	-------	°C	
8741	Room temp setpoint actual HC1	10	°C	
8742	Room model temperature HC1	10	°C	
8743	Flow temp actual value heat circuit 1	-------	°C	
8744	Flow temp setpoint resulting HC1	29.4	°C	
8751	State cooling circuit pump 1	-------		
8752	State cooling circuit mixing valve 1 opening	-------		
8753	State cooling circuit mixing valve 1 closing	-------		
8754	State diverting valve cooling	-------		
8756	Flow temperature	-------	°C	

	actual value cooling circuit 1			
8757	Flow temp setpoint resulting CC1	-------	°C	
8760	State heating circuit pump 2	-------		
8761	State heating circuit mixing valve 2 opening	-------		
8762	State heating circuit mixing valve 2 closing	-------		
8770	Room temp actual value heat circuit 2	-------	°C	
8771	Room temp setpoint actual HC2	-------	°C	
8772	Room model temperature HC2	-------	°C	
8773	Flow temp actual value heat circuit 2	-------	°C	
8774	Flow temp setpoint resulting HC2	-------	°C	
8800	Room temperature actual value HC3/P	-------	°C	
8801	Room temperature setpoint current HC3/P	-------	°C	
8802	Room model temperature HC3/P	-------	°C	
8803	Flow temperature setpoint resulting HC3/P	-------	°C	
8820	State DHW pump (Q3)	-------		
8830	DHW temperature actual value top (B3)	-------	°C	
8831	DHW temperature setpoint current	-------	°C	
8832	DHW temperature actual value bottom (B31)	-------	°C	
8835	DHW circulating temperatur	-------	°C	
8836	DHW charging temperature	-------	°C	
8850	DHW precontroller temperatur actual value	-------	°C	
8851	DHW precontroller temperatur setpoint	-------	°C	
8852	DHW consumption temp	-------	°C	
8853	DHW instantaneous heater setpoint	-------	°C	
8900	Actual value of the swimming pool temp B13	-------	°C	
8901	Setpoint temperature	-------	°C	

	swimming pool			
8930	Precontroller actual value	-------	°C	
8931	Precontroller setpoint	29.4	°C	
8950	Segment flow temperature actual value	23.1	°C	
8951	Segment flow temperature setpoint	29.4	°C	
8952	Segment return temp	-------	°C	
8957	Common flow setp refrig	-------	°C	
8980	Buffer temp actual value top (B4)	-------	°C	
8981	Buffer storage tank setpoint	-------	°C	
8982	Buffer temp actual value bottom (B41)	-------	°C	
8983	Buffer temp actual value middle (B42)	-------	°C	
9000	Flow temperature setpoint H1	-------	°C	
9001	Flow temperature setpoint H2	-------	°C	
9005	Water pressure H1	-------	bar	
9006	Water pressure H2	-------	bar	
9031	State multifunctional relay (QX1)	Off		
9050	State multifunctional relay (QX21 Modul 1)	-------		
9051	State multifunctional relay (QX22 Modul 1)	-------		
9052	State multifunctional relay (QX23 Modul 1)	-------		
9053	State multifunctional relay (QX21 Modul 2)	-------		
9054	State multifunctional relay (QX22 Modul 2)	-------		
9055	State multifunctional relay (QX23 Modul 2)	-------		
	State 2nd speed heating circuit pump (Q21)	-------		
	Operating mode changeover heating circuit 1	Inactive		
	State 2nd speed heating circuit pump (Q22)	-------		
	Operating mode changeover heating circuit 2	Inactive		
	State heating circuit pump 3/P	-------		
	Stat 2nd speed heating circuit pump (Q23)	-------		

	Operating mode changeover HC3/P	Inactive		
	State DHW circulating pump (Q4)	-------		
	State electric immersion heater DHW	-------		
	Operating mode changeover DHW	Off		
	Flowswitch	Off		
	State pump H1 (Q15)	-------		
	State pump H2 (Q18)	-------		
	Status primary pump (Q14)	-------		
	Status precontroller mixing valve opens (Y19)	-------		
	Status precontroller mixing valve closes (Y20)	-------		
	Output heat generation lock (Y4)	-------		
	Status time program 5 relais (K13)	-------		
	Status return temp valve (Y15)	-------		
	Status heat demand (K27)	-------		
	Status cool demand (K28)	-------		
	State air dehumidifier (K29)	-------		
	Status DHW charging controller Y31	-------		
	Status DHW charging controller Y32	-------		
	Status instantaneous heater pump (Q34)	-------		
	Status instantaneous heater opens (Y33)	-------		
	Status instantaneous heater closes (Y34)	-------		
	State storage transfer pump (Q11)	-------		
	State DHW stirring pump (Q35)	-------		
	DHW intermediate circuit pump (Q33)	-------		
Info				
Line no.	Data point	Value	Unit	Additional Comments
6700	Error signal			
	Error origin			
	Error signal 2			
	Error origin			
7000	Maintenance message	No maintenance message pending		

	Maintenance origin	S0/G1		
	Maintenance message 2	No maintenance message pending		
	Maintenance origin	S0/G1		
2214	Boiler temperature setpoint in manual operation	-------	°C	
7131	Chimney sweep function burner output	High-fire		
855	Flow temp setpoint flooring plaster dry up HC1	-------	°C	
856	Flooring plaster dry up day HC1	-------		
857	Floor curing HC1 days fulfilled	0		
1155	Flow temp setpoint flooring plaster dry up HC2	-------	°C	
1156	Flooring plaster dry up day HC2	-------		
1157	Floor curing HC2 days fulfilled	0		
8310	Boiler temp actual value	-------	°C	
8700	Outside temp	-------	°C	
8701	Outside temperature min	-------	°C	
8702	Outside temperature max	-------	°C	
8830	DHW temperature actual value top (B3)	-------	°C	
8510	Collector temp 1 actual value (B6)	-------	°C	
8560	Solid fuel boiler temperature B22	-------	°C	
8980	Buffer temp actual value top (B4)	-------	°C	
8900	Actual value of the swimming pool temp B13	-------	°C	
	Status heating circuit 1	Frost protection active		
	Status cooling circuit 1	---		
	Status heating circuit 2	---		
	Status heating circuit P	---		
	Status DHW	---		
	Status boiler	---		
	Status solar	---		
	State solid fuel boiler	---		
	Status buffer	---		
	Status pool	---		
	Clock time			

7170	Telephone customer service	08456 448802		

Control Parameter Default Settings.

14.2 Module LMU64 Setting. (Images of QAA73 Room Unit/Service Tool in Section 16.3)

The Single and Cascade Master units are preset for correct operation.
However the slave units may require modest parameter updating. (Usually limited to H605)

The following Pages detail the parameters of the modules and the Standard Factory settings, please note, the installer/commissioning engineer may have changed some of these settings to suit the system installed.

To access the parameters detailed below a QAA73 Room Unit is required. The unit must be connected to the respective Module Controller Via the dedicated Plug, Behind cover plate (4) or directly to the respective LMU64 module controller. Via the X10:01 Terminal.

There are two levels of access available, as follows. If you cannot access a particular parameter line, please consult with MHG Heating Ltd Technical Department for further assistance.

Level One (Installer) - Press & Hold the ▽ ⊡+ or △ ⊡- Program Buttons simultaneously for at least 3 seconds. Use the ▽△ Program Buttons to access the desired parameter line. Use the ⊡-⊡+ Button to alter the displayed parameter to the required setting.

Level Two (OEM) - Press & Hold the ▽△ Program Buttons simultaneously for at least 3 seconds Use the ▽△ Program Buttons to access the desired parameter line. Use the ⊡-⊡+ Button to alter the displayed parameter to the required setting.

An altered parameter will be saved to the controllers memory by leaving the displayed parameter when either of the ▽△ Program Buttons are pressed.

To exit the parameter review and amendment levels the INFO Button of the QAA73 must be pressed. Any unsaved parameter alterations will be lost if the QAA73 is version 1.3 or lower.

QAA73 #	Description	Range	150 & 225 Single Defaults	150 & 225 Cascade Master Defaults	150 & 225 Cascade Slave Defaults
H90	Reduced Temperature for DHW	8….60	10	10	10
H91	DHW Production Control *(0=Time control 1=Constant)*	0…1	0	0	0
H93	DHW Production Control 0=Non Eco 1=Eco	0…1	0	0	0
H94	DHW Secondary Pump Control *(0= As H91. 1= As HWS Time Switch) (K2, X2:03, H615:6)*	0…1	0	0	0
H503	Minimum boiler setpoint temperature *(20 °C<=TkSmin<=TkSmax)*	20 ... 90 °C	20	20	20
H504	Maximum boiler setpoint temperature *(TkSmin<=TkSmax<=90 °C)*	20 ... 90 °C	90	90	90
H505	Boiler setpoint at design outside temperature	20 ... 90 °C	85	85	85
H506	Minimum flow setpoint temperature *(20 °C<=TvSmin<=TvSmax)*	20 ... 90 °C	25	25	25
H507	Maximum flow setpoint temperature *(TvSmin<=TvSmax<=90 °C)*	20 ... 90 °C	90	90	90

H516	Summer / winter changeover temperature *(30 °C: S / W changeover deactivated)*	8 ... 30 °C	18	18	18
H532	Heating curve slope heating circuit 1	1 ... 40	32	32	32
H533	Heating curve slope heating circuit 2	1 ... 40	32	32	32
QAA73 #	**Description**	**Range**	**150 & 225 Single Defaults**	**150 & 225 Cascade Master Defaults**	**150 & 225 Cascade Slave Defaults**
H536	Maximum speed at maximum output in heating mode *(maximum speed limitation)*	0 ... 9950 rpm	7000	7000	7000
H541	Maximum degree of modulation in heating mode *(LmodTL <= PhzMax <= LmodVL)*	0 ... 100 %	100	100	100
H542	Minimum boiler output in kW *(lower calorific value)*	0 ... 9999 kW	15	15	15
H543	Maximum boiler output in kW *(lower calorific value)*	0 ... 9999 kW	75	75	75
H544	Overrun time of pumps, max. 210 min *(setting 255: continuous operation of Q1)*	0 ... 255 min	10	10	10
H545	Minimum burner pause time *(heat demand-dependent switching hysteresis)*	0 ... 3600 s	300	300	300
H551	Constant for quick setback without room influence	0 ... 20	2	2	2
H552	Hydraulic system adjustment	0 ... 255	80	80	80
H554	Setting flags: status code open-circuit sensor for ANx channel suppressed / not suppressed	0 ... 255	b0=1 b1=0 b2=1 b3=1 b4=0 b5=1 b6=0 b7=0	b0=1 b1=0 b2=1 b3=1 b4=0 b5=1 b6=0 b7=0	b0=1 b1=0 b2=1 b3=1 b4=0 b5=1 b6=0 b7=0
H555	Setting flags	0 ... 255	b0=0 b1=0 b2=0 b3=0 b4=1 b5=0 b6=0 b7=0	b0=0 b1=0 b2=0 b3=0 b4=1 b5=0 b6=0 b7=0	b0=0 b1=0 b2=0 b3=0 b4=1 b5=0 b6=0 b7=0
H558	Setting flags	0 ... 255	b0=1 b1=0 b2=0 b3=0 b4=0 b5=0 b6=1 b7=0	b0=1 b1=0 b2=0 b3=0 b4=0 b5=0 b6=1 b7=0	b0=1 b1=0 b2=0 b3=0 b4=0 b5=0 b6=1 b7=0
H596	Running time of actuator in heating circuit 2 *(TimeOpening / TimeClosing)*	30 ... 873 s	150	150	150
H605	LPB device number of LMU * Module numbering 150 Single & Master Upper 2 Lower 3 Cascade Slave Upper 4, Lower 5.....16 ETC 225 Single & Master Upper 2, Middle 3, Lower 4 Cascade Slave Upper 5, Middle 6, Lower 7.....16 ETC	0 ... 16*	2,3, (150)* 2,3,4 (225)*	2,3, (150)* 2,3,4 (225)*	4,5-16 (150)* 5,6,7-16(225)*
H606	LPB segment number of LMU	0 ... 14	0	0	0
H614	Program input LMU basis	0 ... 255	3	3	3
H615	Function programmable output K2 LMU	0 ... 255	0	0	0
H618	Progr input on clip-in function module	0 ... 255	0	0	0

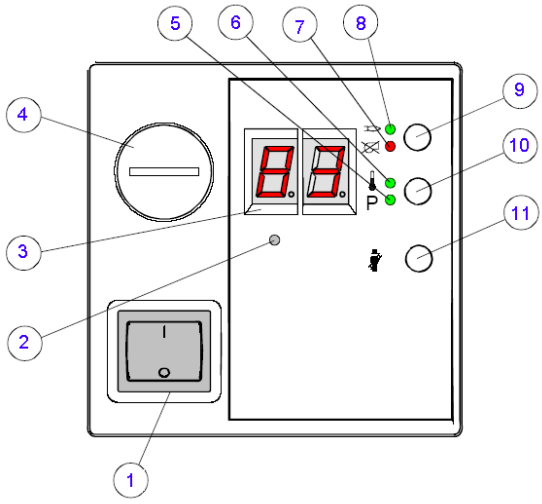
H619	Function output1 clip-in function module	0 ... 255	0	0	0
H620	Function output2 clip-in function module	0 ... 255	0	0	0
H621	Function output3 clip-in function module	0 ... 255	0	0	0
QAA73 #	**Description**	**Range**	**150 & 225 Single Defaults**	**150 & 225 Cascade Master Defaults**	**150 & 225 Cascade Slave Defaults**
H622	Maximum value of heat demand with external predefined temperature setpoint *(5 °C< = TAnfoExtMax< = 130 °C)*	5 ... 130 °C	85	85	85
H630	Setting flags of maintenance alarms	0 ... 255	b0=1 b1=0 b2=0 b3=0 b4=0 b5=0 b6=0 b7=0	b0=1 b1=0 b2=0 b3=0 b4=0 b5=0 b6=0 b7=0	b0=1 b1=0 b2=0 b3=0 b4=0 b5=0 b6=0 b7=0
H636	Months (interval) since last service visit	0 ... 255 months	0	0	0
H700	1st Historical Fault – Number of Occurrences.				
H701	1st Historical Fault – Operating Phase.				
H702	1st Historical Fault – Operating Error Code				
H703	2nd Historical Fault – Number of Occurrences.				
H704	2nd Historical Fault – Operating Phase.				
H705	2nd Historical Fault – Operating Error Code				
H706	3rd Historical Fault – Number of Occurrences.				
H707	3rd Historical Fault – Operating Phase.				
H708	3rd Historical Fault – Operating Error Code				
H709	4th Historical Fault – Number of Occurrences.				
H710	4th Historical Fault – Operating Phase.				
H711	4th Historical Fault – Operating Error Code				
H712	5th Historical Fault – Number of Occurrences.				
H713	5th Historical Fault – Operating Phase.				
H714	5th Historical Fault – Operating Error Code				
H715	Current Historical Fault – Number of Occurrences				
H716	Current Historical Fault – Operating Phase.				
H717	Current Historical Fault – Operating Error Code				
H718	Hours run burner	0 ... 131070 hrs	0	0	0
H719	Hours run heating mode	0 ... 131070 hrs	0	0	0
H720	Hours run DHW heating	0 ... 131070 hrs	0	0	0
H721	Hours run zone	0 ... 131070 hrs	0	0	0

H722	Start counter	0 ... 327675	0	0	0
H727	Current Fault Code – ALBATROS Error Code	0 ... 583			
H728	1st Historical Fault – ALBATROS Error Code				
QAA73 #	**Description**	**Range**	**150 & 225 Single Defaults**	**150 & 225 Cascade Master Defaults**	**150 & 225 Cascade Slave Defaults**
H729	2nd Historical Fault – ALBATROS Error Code				
H730	3rd Historical Fault – ALBATROS Error Code				
H731	4th Historical Fault – ALBATROS Error Code				
H732	5th Historical Fault – ALBATROS Error Code				
H732	Current Historical Fault – ALBATROS Error Code				
H755	Measured value of ionization current	-			

Module Controller

Legend

1. Module Power Isolator
2. Infrared Output to Flue Gas Analyser Optional Extra.
3. Module Numerical Indicator
4. Temporary Connection Port For QAA73 Unit
5. Indication of System Pressure P (Not Used)
6. Indication of Module Over Temperature
7. Indication of Module Lockout
8. Indication of Module Burner Activation
9. Module Lockout Reset Button (To be pressed for at least 3 Seconds)
10. Display Alteration Button
11. Commissioning Mode Activation Button

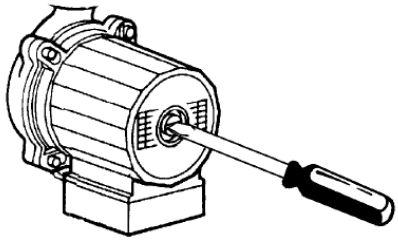


15.0 Commissioning The Appliance

15.1 Pre-Commissioning Checks

Prior to undertaking the commissioning of the unit please ensure that the system water has been cleansed and treated with a suitable inhibitor as detailed in Filling the system and system water quality.

Prior to applying power to the individual modules their dedicated circulation pumps should be bleed and checked to ensure free rotation of the armature.



15.2 Combustion System Commissioning.

The commissioning function enables the boiler to be started up in heating mode by pressing the Chimney Sweep Button (11) on the module controller.

There are two levels of operation accessed via the Chimney Sweep Button (11)

Operation at Maximum Output With No Adjustment.

Pressing the Chimney Sweep Button (11) for more than 3 seconds but less than 6 seconds places the respective module in High Fire mode.

To indicate that the module is operating under the control of the Chimney Sweep Button the display (3) will indicate SF and the red Lockout LED (7) will flash with a single pulse.

This mode is maintained until the limit thermostat temperature is reached or the Chimney Sweep Button is pressed from more than 1 second.

Operation at Maximum or Minimum Output For Flue Gas Analysis and Gas Valve Adjustment

Pressing the Chimney Sweep Button (11) for more than 6 seconds. places the respective module in High Fire mode.

To indicate that the module is operating under the control of the Chimney Sweep Button the display (3) will indicate 100 for High Fire and 0 for Low Fire and the red Lockout LED (7) will flash with a double pulse.

To alternate the module between High Fire and Low Fire the Chimney Sweep and **P** Buttons must be pressed for less than 1 second.

P Button	High Fire	**Button**	Low Fire

This mode is maintained until the limit thermostat temperature is reached or the Chimney Sweep or **P** Button is pressed from more than 1 second. The module stops operating when the button is released.

Whilst the module is operating under the control of the Chimney Sweep Button (with adjustment) the gas valve can be adjusted to give correct flue gas analysis readings.

Each module is equipped with a modulating gas valve.

The modulating gas valve must be set at High Fire and Low Fire to ensure correct operation throughout its modulating range.

It is advisable to check the combustion figures on High and Low Fire prior to carrying out any adjustments.

Adjusting the High Fire has a marked effect on the Low Fire figures.
Where as adjusting the Low Fire has little effect on the High Fire figures.

The High fire adjustment is carried out via the 2.5mm Allen Key socket D

The High Fire adjustment is a Gate type restrictor.

Therefore turning the screw clockwise will close the gate and thus restrict the quantity of gas passing through to the burner.

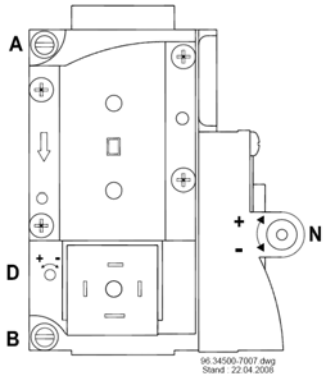
The Low fire adjustment is carried out via the 2.5mm Allen Key socket N

The Low Fire adjustment is a diaphragm governor.

Therefore turning the screw clockwise will increase the pressure on the diaphragm and thus increase the quantity of gas passing through to the burner.

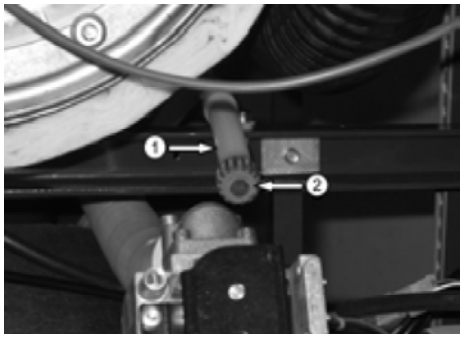
Legend

A. Valve Inlet Gas Pressure Test Point
B. Valve Outlet Gas Pressure Test Point
D. High Fire Adjuster (Gate Type)
N. Low Fire Adjuster (Governor Type)



Each module must be analysed and adjusted separately.

This is undertaken by inserting the analysers probe in to the silicone sampling tube secured to the top of each module and sealed with a black plug. If fluctuating figures are obtained the flue gas analyser should be inserted directly into the module flue spigot once the silicone tube has been temporally removed. (Taking care not to dislodge the grommet)



Each module must be set to the following combustion figures.

Gas Type	Injector Size	High Fire	Low Fire
Natural Gas (G20)	15mm (Exploded Part #79)	8.5% $C0_2$	9.0% CO_2
LPG (G31)	10mm (Exploded Part #79)	11.0% CO_2	11.0% CO_2

15.3 Conversion of the Appliance to Operate on LPG (G31).

Unless specified at the time of ordering the appliance/s will be supplied ready to operate on a Natural Gas (G20) fuel supply.

The appliances data badge will indicate the type of fuel gas the modules have been set to operate with.

Prior to firing the unit for the first time it is advisable to check the size of the gas injector of each module. The injectors are located on the outlet of module gas valves.

The table above indicates the size of injector for the respective fuel gas.

If the unit is required to operate on a fuel gas different from that to which it is currently set, the following conversion procedure must be undertaken.

Isolate the fuel and electrical supplies at the appliances or module isolator.

Disconnect the electrical connection for the gas valves solenoid coils.

Disconnect the gas valve from the yellow gas supply tubing at the union immediately prior to the gas valves inlet.

Remove the 'Circlip' located at the outlet of the valve securing the injector to the fan inlet elbow.

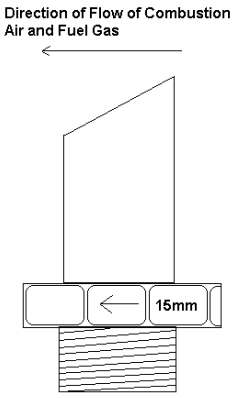
Extract the gas valve and injector from the fan inlet elbow. Noting the orientation of the injector with regards to the flow of combustion air/gas into the modules burner.

Install the correctly sized injector into the outlet of the gas valve ensuring to apply the sealing washer.

A 'Gas Flow Direction Arrow' has been marked on the injector to ensure the injector is installed in the correct position/orientation.

Reinstall the gas valve/s complete with correct sized injector/s in the reverse order.

Following completion of the re-injectoring of all modules the units will require recommissioning as detailed in section 15.2.



16.0 Routine Inspection and Servicing. (A QAA73 Room Unit/service tool is required to reset the modules service interval timer.)

As with all Gas Appliances, we would highly recommended that a competent heating engineer services the ProCon HT, at least every 12 months. This is assuming a normal daily usage of 8 – 10 hours.
If however the boiler is to be operated 24 hours a day, 7 days, we would recommend services every 6 months

The ProCon HT boilers will display an E105 Error Code when 12 months has lapsed, indicating that the appliance requires a Routine Service Inspection. This code will also be displayed on the RVS43 143 cascade manager.

If the Installer/Commissioning Engineer is unable to undertake the Routine Service Inspection, as detailed Section 16.1, please contact the MHG Technical Department, who will be able to arrange the Routine Service Inspection to be undertaken.

16.1 Routine Service Inspection (E:105 Indication Reset via H630 bit 6 0-1)

Before commencing any service/maintenance work, the following tasks must be undertaken.

a) Ask the end user about any problems with the operation of the boiler unit and note their comments.
b) Check the water pressure of the installation.
c) Remove the boiler casing and visually inspect all pipe and water joints for signs of leakage.
d) Inspect the top of the casing and the top of the heat exchangers for signs of water leakage or ingress.
e) Run the unit in Commissioning Mode HIGH FIRE; with the use of a flue gas analyzer record the CO_2 level. See section 15.2
f) Run the unit in Commissioning Mode LOW FIRE; with the use of a flue gas analyzer record the CO_2 level. See section 15.2
g) Listen to the sound of the combustion fan. Utilizing a QAA73 room unit/service tool if available and the instructions in Section 14.2, review the modules LMU Operating Error Codes, and note the recorded codes onto the Service Report. (H700 – H722)
h) Undertake a System Water Analysis to check the concentration level of the Water Treatment, and note the level onto the Service Report.
i) Check the flue route including the terminal position for conformity with prevailing regulations, and trim back any foliage that may be around the terminal.
j) Check the plant room/compartment ventilation system for conformity with prevailing regulations.
k) Check the Pressure (Safety) Relief Valve size, rating and orientation, for conformity with prevailing regulations.

The results of the Inspections undertaken above must be acted upon, and all discrepancies should be recorded on the Service Report and brought to the Client / End User's attention.
Undertake any maintenance, and if necessary any preventative maintenance, that's required.

16.2 Routine Cleaning & Maintenance (E:105 Indication Reset via H630 bit 6 0-1)

As part of the Routine Service Inspection, certain areas of the boiler need to the checked and cleaned as necessary.

a) Turn the boiler OFF at the ON/OFF switch and electrically isolate the boiler by removing the plug or fuse from the boiler supply.
b) Turn off the gas at the boiler isolation tap, fitted by the installer, adjacent to the appliance.
c) Remove both electrical connections from the module fan assemble.
d) Disconnect the earth lead, HT cap and Lead from the ignition electrodes.
e) If installed remove the combustion air intake duct from the combustion fan air inlet elbow.
f) Remove the 'Circlip' securing the gas injector into the fan inlet elbow and extract the gas valve and injector assembly. (Inspect and clean both the injector and gas valve assembly.)
g) Disassemble the burner by removing the six M6 nuts around the burner door, using a 10mm Spanner. Pull the burner forward and remove from the heat exchanger. Gently put to one side.
h) Once access has been gained to the combustion chamber and front section of the heat exchanger, visually inspect the heat exchanger coils.
It is usually only necessary to clean the front section of the heat exchanger. If server deposits are found, the rear section of the heat exchanger should also be checked and cleaned, which will necessitate the removal of the heat exchanger from the boiler.

If any coils appear to be significantly dis-coloured, then a blockage of either scale, magnetite, or general system debris has occurred which will have allowed excessive overheating to have occurred within the coil.
If dis-colouration has occurred, then specialist de-scaling of the heat exchanger will be required, however, stress cracking may have occurred, and the heat exchanger may become porous following the de-scale works.

i) If the heat exchanger has not suffered from dis-colouration, as 'Item h' above, then a Standard Service can be undertaken. Using a natural bristled brush ONLY, remove the worst of the mineral/debris build up.
With the use of the dissolved *ProCon Combustion Chamber Cleaning Granules*, spray the solution onto the heat exchanger surface and leave for approximately 5 minutes. This will help to remove any stubborn mineral deposits. Finally brush the heat exchanger whilst rinsing thoroughly with copious amounts of fresh water. *ProCon Combustion Chamber Cleaning Granules* are available from MHG Heating Ltd Spares Department. **A STEEL OR PVC BRUSH MUST NOT BE USED TO CLEAN THE HEAT EXCHANGER.**

j) Following the cleaning of the Heat Exchangers, the condensate syphon must be flushed to ensure that all mineral deposits/debris that has been washed from the heat exchanger surface is correctly removed. Open the syphon cleaning point cap at the base of the boiler, with a suitable receptacle directly below to collect the syphon contents. Safely dispose of the contents of the syphon. Replace the receptacle below the cleaning point and poor 2 litres of clean tap water into each of the heat exchangers, which will drain through the cleaning point. Refit the cleaning point cap and poor half a litre of clean tap water into one of the heat exchangers to ensure the syphon is re-flooded. Check the cleaning point cap for leaks.

k) Visually check the burner surface for signs of damage and debris build-up. Remove any debris build up with compressed air. If excessive debris build-up is identified, the burner lance should be removed and the inner metal surface should be washed and cleaned. **A BRUSH, OF ANY KIND, MUST NOT BE USED TO CLEAN THE BURNER SURFACE.** If damage has occurred to the burner surface, the burner MUST be replaced.

l) To ensure that the rectification circuit operates correctly the resistance between the burner and burner door must be check with a multi-meter to ensure that it is less than 1 Ohm (<1 Ohm.)

m) Clean with abrasive material and inspect the ignition electrode. Replace if necessary. Adjust the spark gap to 4mm.

n) Check the combustion fan blades for debris build-up. Remove any debris with a soft bristle brush or preferably compressed air. **DO NOT TOUCH, OR SPIN, THE FAN BLADES WITH YOUR FINGERS AS THIS COULD AFFECT THE BALANCING OF THE FAN BLADES.**

o) Re-fit the Burners, in the reverse order of dismantling, ensure that all electrical connections are correctly and securely connected.

p) Inspect all water joints. Any joints found to be leaking MUST be replaced. It is also advisable when replacing water joints to also change any adjacent joints at the same time.

q) Inspect all gas joints with a suitable leak detection method. Any joints found to be leaking MUST be replaced. It is also advisable when replacing gas joints to also change any adjacent joints at the same time.

r) Via the tappings on the boiler connector elbow or straight a flue gas recirculation check must be undertaken when the boiler is operating on high and low fire modes.

s) Inspect and clean the condensate neutralising tank, replenishing the neutralising granules as required. Granules available from MHG Heating Ltd Spares Department.

t) With the use of a suitable Flue Gas Analyser, check and adjust the combustion settings, as detailed in Section 15.2.

u) Inspect the general condition of the flue system, including the termination, repair as necessary or advise on any remedial action as required.

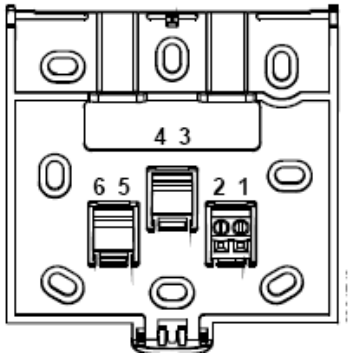
v) Following the satisfactory completion of the above service procedure, the internal Routine Service Control Timer needs to be reset. Utilising the QAA73 Room Unit/Service Tool gain access to the Second Level Parameters, as detailed in Section 14.2, and select Parameter Line H630 – Bit 6. using the + button, adjust the value from 0 to 1 and press the INFO button to reset the Service Interval counter.

16.3 QAA73 Room Unit/Service Tool

QAA73 Door Closed

QAA73 Door Open

QAA73 Mounting Plate



The QAA73 Room Unit/Service Tool must be connected to the X10:01 terminals (Not Polarity Sensitive) of the respective LMU64 controller to access the required fault history parameters and to reset the service interval timer as detailed in sections 16.1 and 16.2.

Turn Off the power to the respective LMU64.

Connect the QAA73 to the respective LMU64 via terminal X10:01.

Turn On the power to the respective LMU64 and allow the unit to fully synchronise. (This takes approximately 30 seconds)

To reset the service interval indicator you will need to access level two.

During this process the module LED diplay will indicate 183 indciated as 1 followed by 83.

Open the flap.

To Access Level One.

Simultaneously press + ▼ for at least 3 seconds until **"BMU PARAMETERISATION"** appears on the display.

To Access Level Two.

Simultaneously press ▼ / ▲ for at least 3 seconds until **"BMU SERVICE"** appears on the display.

[[Level Three. (Access password required.)

*Simultaneously press ▼ / ▲ for at least 9 seconds until **"BMU SERVICE"** appears on the display. If you inadvertently access this level press the Mode button to return the controller to a standard screen.]]*

Once in level two a series of H parameters will be accessible.

To prevent operational problems please do not alter any of the parameters from their default values.

Press the ▲ button to access parameter H630 the display will indicate H630 b0. Do not alter this BIT.

Press the ▲ button to access H630 B6.

Press the + button to change 0 to 1.

Press the ▲ button to access H630 B7 to store the adjustment.

Press the button to exist from the adjustment level.

Alternatively whilst in this level the operational history of the module can be checked.

Press the ▲ button to access H700.

Operation History.

Parameter Level	Description
H700	1st Historical Fault / Number of Consecutive Occurrences.
H701	1st Historical Fault / Operational Phase When Fault Occurred.
H702	1st Historical Fault / Internal Diagnostic Code.
H703	2nd Historical Fault / Number of Consecutive Occurrences.
H704	2nd Historical Fault / Operational Phase When Fault Occurred.
H705	2nd Historical Fault / Internal Diagnostic Code.
H706	3rd Historical Fault / Number of Consecutive Occurrences.
H707	3rd Historical Fault / Operational Phase When Fault Occurred.
H708	3rd Historical Fault / Internal Diagnostic Code.
H709	4th Historical Fault / Number of Consecutive Occurrences.
H710	4th Historical Fault / Operational Phase When Fault Occurred.
H711	4th Historical Fault / Internal Diagnostic Code.
H712	5th Historical Fault / Number of Consecutive Occurrences.
H713	5th Historical Fault / Operational Phase When Fault Occurred.
H714	5th Historical Fault / Internal Diagnostic Code.
H715	Current Fault / Number of Consecutive Occurrences.
H716	Current Fault / Operational Phase When Fault Occurred.
H717	Current Fault / Operating Fault Code.
H718	Burner Hours Run.
H719	Hours Run Heating Mode.
H720	Hours Run HWS Mode.
H721	Hours Run Heating Zone.
H722	Start Count.
H727	Current Fault / Display Fault Code.
H728	1st Historical Fault / Display Fault Code.
H729	2nd Historical Fault / Display Fault Code.
H730	3rd Historical Fault / Display Fault Code.
H731	4th Historical Fault / Display Fault Code.
H732	5th Historical Fault / Display Fault Code.
H755	Ionisation Current

17.0 Optional System Controls.

If required the following controls can be applied to the ProCon HT range to enhance boiler and system operational efficiency and longevity. (Further detailed guidance can be obtained from the respective controller manuals.)

RVS63 Dual Zone Extension Controller.

This dual zone controller has the capability to control up to two independent CT/VT or a mixture of both. The RVS63 dual zone controller communicates with the master boiler mounted RVS43 143 Cascade Manager via LPB, offering enhanced communication, zone and module temperature control. A dedicated housing is also available to ease the installation process.

AVS75 Single Zone Extension Controller.

This single zone extension controller has the capability to control one CT/VT zone. The AVS75 single zone controller communicates with the master boiler mounted RVS43 143 Cascade Manager via LPB, offering enhanced communication, zone and module temperature control. A dedicated housing is also available to ease the installation process.

QAA75 Modulating Full Function Room Unit.(One unit per zone.)

This modulating full function room unit offers the heating user full remote access to the all functions that effect the provision of heat to the respective zone. The unit also displays information from all attached temperature sensors. Boiler, Hot water and Outside.

QAA78 Wireless Modulating Full Function Room Unit.(One unit per zone.)

This modulating full function room unit offers the heating user full remote access to the all functions that effect the provision of heat to the respective zone. The unit also displays information from all attached temperature sensors. Boiler, Hot water and Outside.

QAA55 Modulating Limited Function Room Unit.(One unit per zone.)

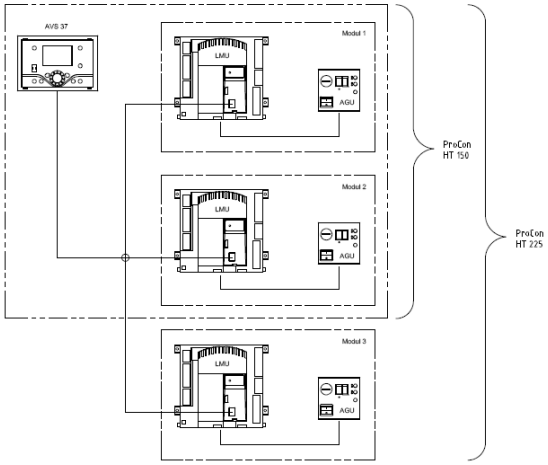
This modulating limited function room unit offers the heating user reduced remote access to operating mode and temperature functions that effect the provision of heat to the respective zone.

18.0 Internal Wiring

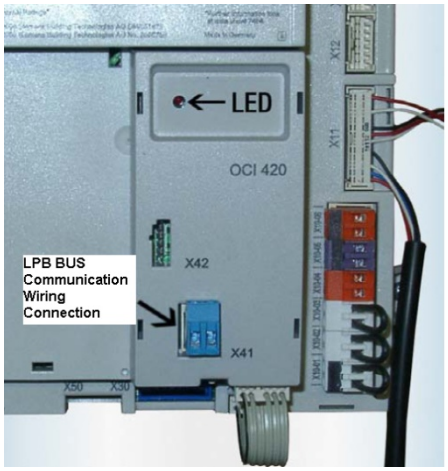
The internal wiring configurations of the ProCon HT 150/225 differ dependant upon the model. Single/Cascade Manager/Cascade Slave.

In all but the Cascade Slave units a RVS43 143 Cascade Manager is installed. The RVS43 143 Cascade Manager Communicates with the individual LMU64 module controllers via the LPB wiring loom.

In the case of the Cascade Slave unit the LPB wiring is in place, however the control communication is generated by the RVS43 143 Cascade Manager housed in the Cascade Master boiler.



18.1 Module Operation Indication



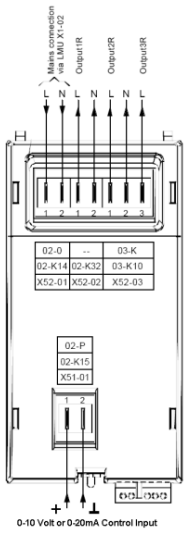
Communication Operation Indications

The RED LED on the OCI420 communication clip mounted on the front of each LMU64 module controller flashes to indicate the detected operational status of the module dictated by the LPB communication from the ProCon HT Masters RVS43 143 Cascade Manager.

LED FLASH STATUS	INTERPRETATION OPTIONS
LED ON Constantly	OCI420 not configured to operate with LMU64
LED OFF Constantly	OCI420 Configured. LPB Short Circuit / No Power.
LED ON 93% OFF 7%	OCI420 and LUM64 Not Compatible / LPB Address inadmissible.
LED ON 5% OFF 95%	Boiler being controlled via LPB and required to be not operating.
LED ON 5% OFF 20% ON 5% OFF 70%	Boiler being controlled via LPB and required to be operating.

18.1.1 BMS Interface Clip Installation and Parameter Alteration

Following the installation of the AGU2.511 communication clip (complete with base mounted wiring connection) onto the front of the LMU64 controller a number of operational parameters within the unit must be altered to ensure the clips operates as required.



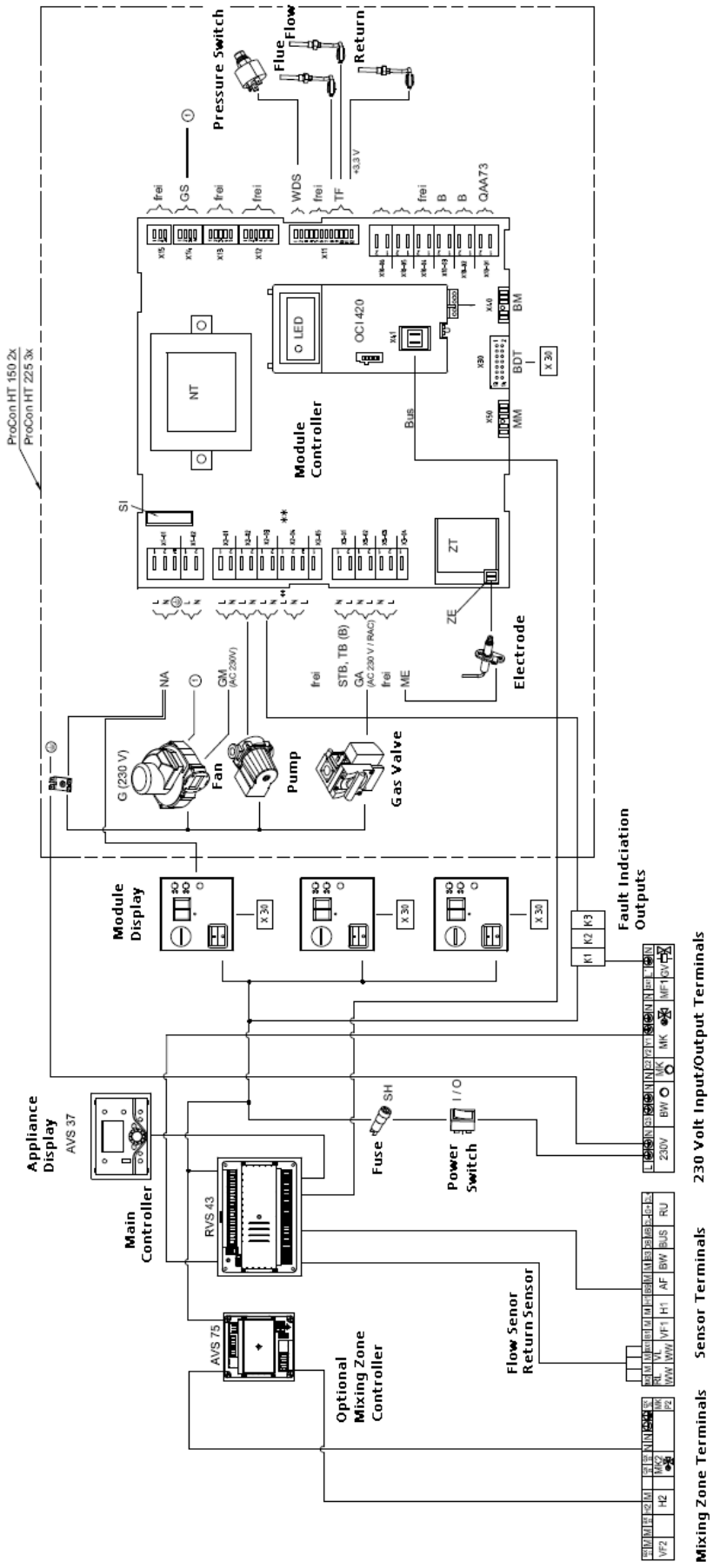
LMU64 Pictured above with AGU2.511 and OCI420 communication clips.

A number of parameters will require altering within the LMU64 controller from their standard default setting to allow the AGU2.511 communication clip to operate correctly.

Access is gained to the H parameters by pressing the PROG ▽△ buttons simultaneously for 3 seconds unit H 90 appears on the screen. The required H parameters can then be reached by using the PROG ▽ or △ buttons.
Once at the required H parameter the required setting is achieved by using the ⊖⊕ buttons.
To save the alteration in the controller the INFO button must be pressed.

Parameter #	Description	Default	New Setting
	Programmable Inputs (Not to be used With ProCon HT as the control is achieved via the RVS43 143 Cascade Manager.)		
H618	*Input control configuration* *Input value interpretation affected by H622 or H623 Dependant upon control requirement.* *(4 is recommended.)*	*0*	*4. Predefined Temperature set point* *5. Predefined Boiler Output* *6. Low Loss Header Sensor*
H622	*Maximum Temperature Via X51 input 0-10 Volt* *When H618 is set to 4*	*85*	*85*
H623	*Percentage level reached by input prior to boiler activation.* *When H618 is set to 5*	*5*	*5*
	Programmable Outputs		
H619	Relay designation for Output from Orange Plug Left Terminal Live. Right Terminal Neutral. Output rated at 240 Volts 0.5 Amp	0	0. Hydraulic Diagram Derived. 1. LPG SSOV Output. 2. Boiler Fault Output. 3. Boiler Operating Output. 4 -12 Non Supported Output.
H620	Relay designation for Output from Clear Plug Left Terminal Live. Middle Terminal Neutral. Output rated at 240 Volts 0.5 Amp	0	0. Hydraulic Diagram Derived. 1. LPG SSOV Output. 2. Boiler Fault Output. 3. Boiler Operating Output. 4 -12 Non Supported Output.
H621	Relay designation for Output from Clear Plug Right Terminal Live. Output rated at 240 Volts 0.5 Amp	0	0. Hydraulic Diagram Derived. 1. LPG SSOV Output. 2. Boiler Fault Output. 3. Boiler Operating Output. 4 -12 Non Supported Output.

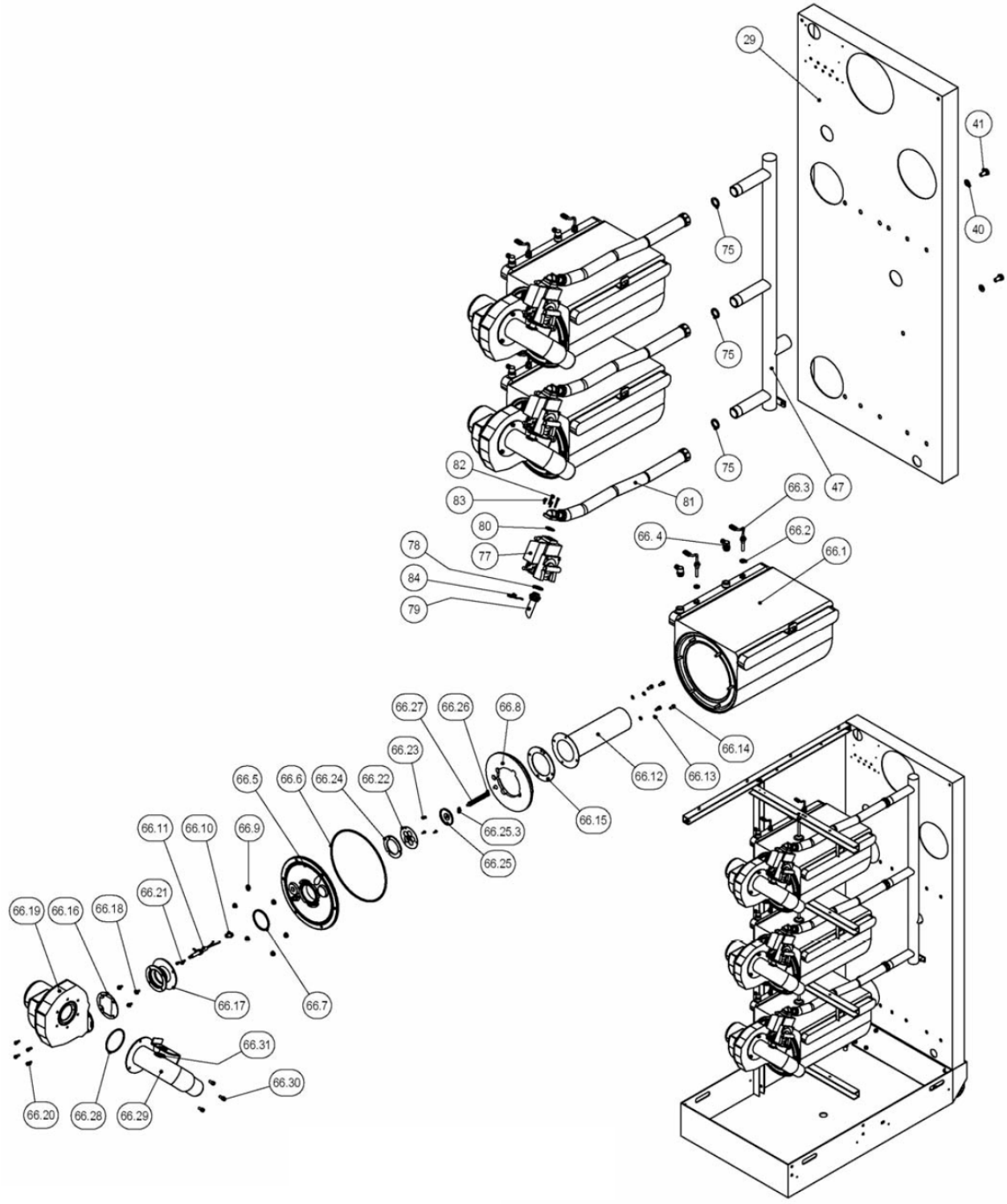
18.2 Internal Wiring Diagram

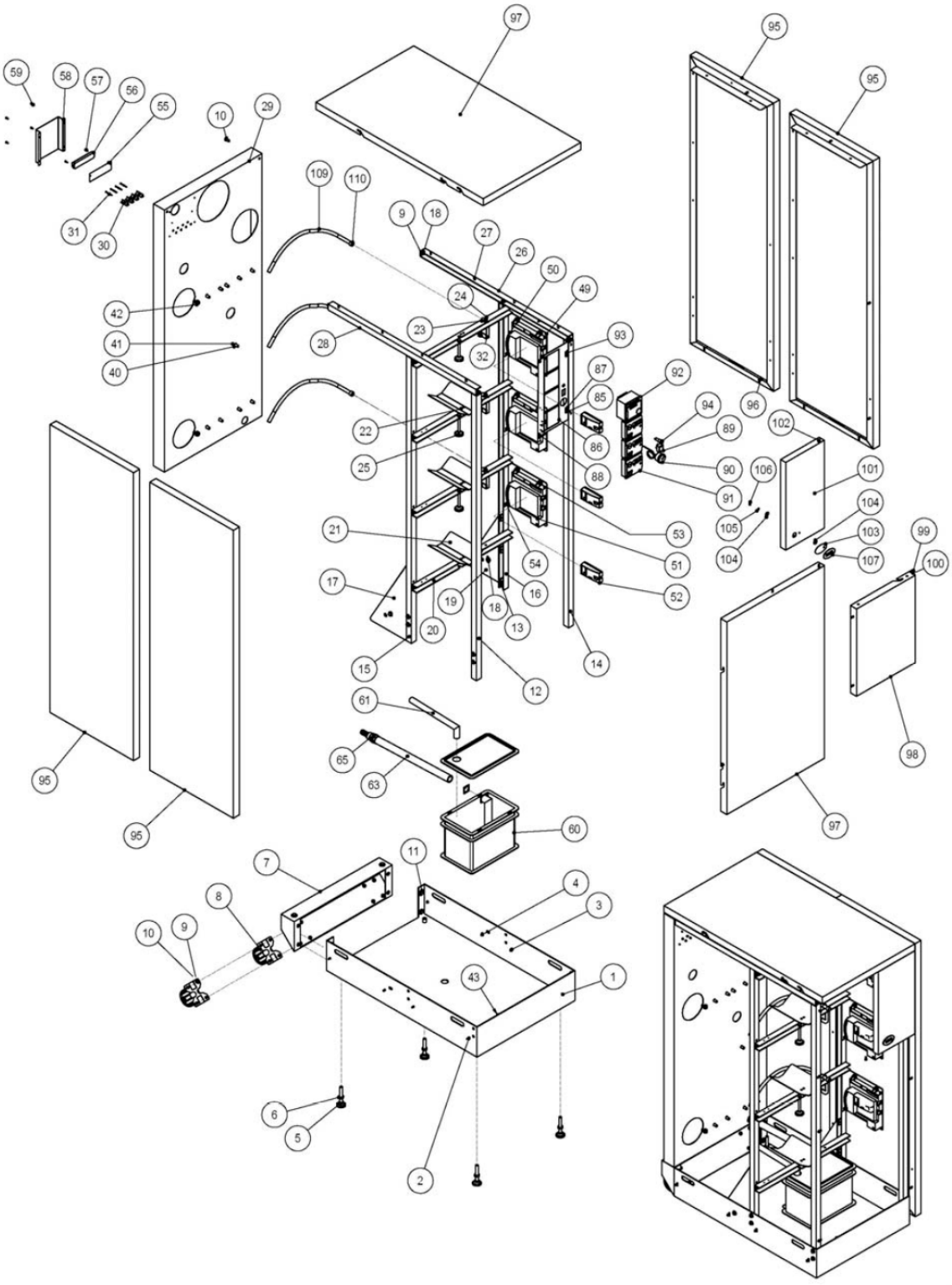


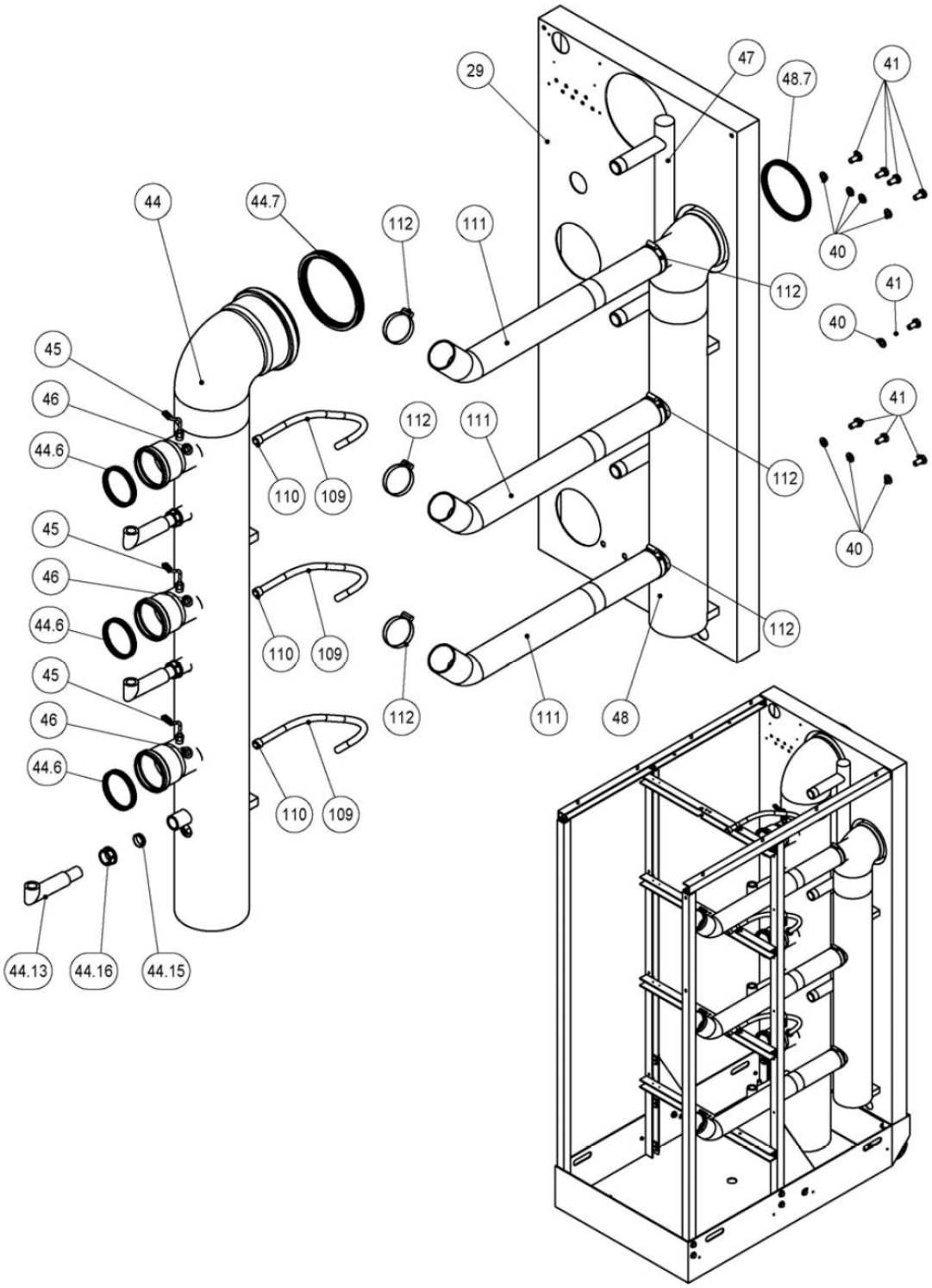
19.0 Flue Component Options

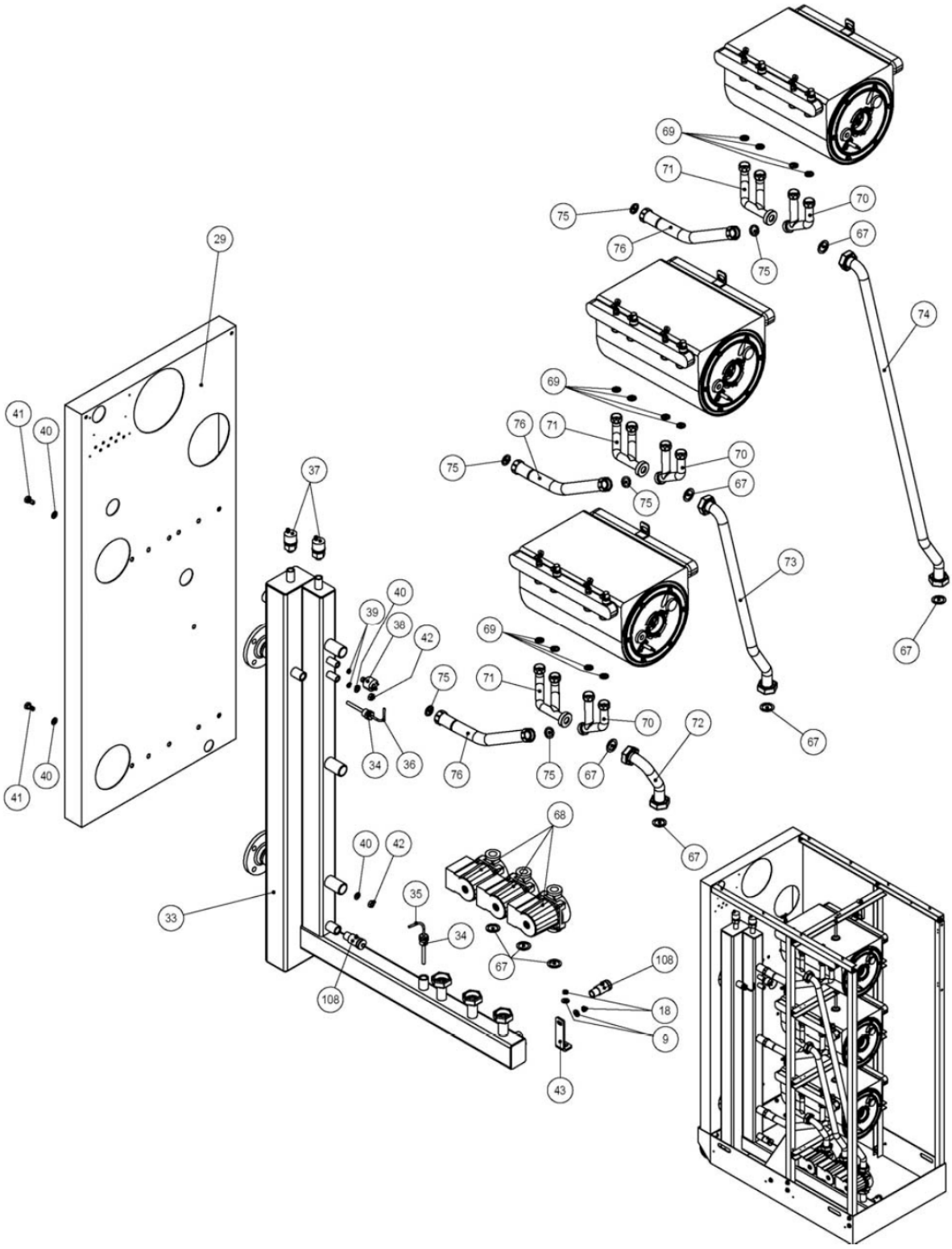
Description	Image	Item Number
DN160 / 500mm Straight		94.61280-4205
DN160 / 955mm Straight		94.61280-4210
DN160 / 1955mm Straight		94.61280-4220
DN160 / 35°		94.61285-4202
DN160 / 45°		94.61285-4203
DN160 / 87°		94.61285-4204
DN125-DN160 reducer for combustion air inlet		ATEC 6104
DN160 Flexible 10-50m		Upon Request Length Dependant
DN160 Flexible Centralising Bracket		94.68275-4201
DN160 Riser Elbow		96.00060-1796
DN160 Bird Mesh		BIRDMESH-160
DN160 Bracket		MHG-ALU-BRKT-DN160

20.0 Exploded Diagram Standard Units









MHG Heating Ltd, Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey, KT20 5LR
P:0845 6448802 F:0845 6448803 E: info@mhgheating.co.uk W: www.mhgheating.co.uk

21.0 Spares Listings

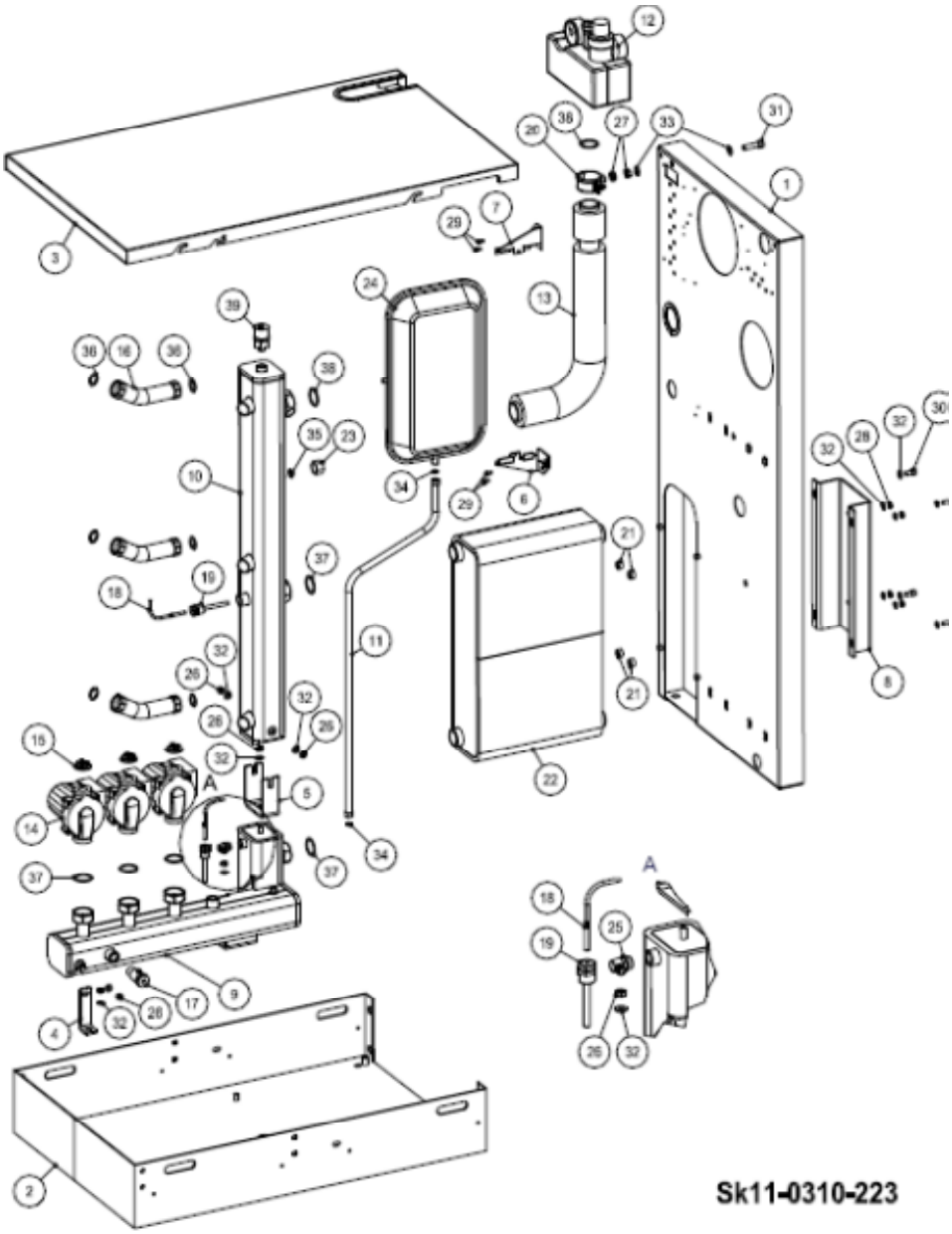
#	150 Single	150 Cascade Master	150 Cascade Slave	225 Single	225 Cascade Master	225 Cascade Slave	Description	Part Number
1	1	1	1	1	1	1	Base Tray	96.35460-7020
2	8	8	8	8	8	8	Base Tray Securing Bolts	94.15393-5001
3	32	32	32	32	32	32	Toothed Washer ; A5.3	On Request
4	32	32	32	32	32	32	Hexagonal Nut ; M5	On Request
5	4	4	4	4	4	4	Leveling Feet ; M12 x 98	94.17230-7001
6	4	4	4	4	4	4	Hexangular Nut for Levelling Feet ; M12;	On Request
7	1	1	1	1	1	1	Roller Mounting Panel	96.36560-7032
8	2	2	2	2	2	2	Roller D= 80 mm, H= 108 mm	94.17273-7001
9	44	44	44	45	45	45	Washer ; 8,4	On Request
10	46	46	46	47	47	47	Bolt ; M8 x 16	On Request
11	9	9	9	9	9	9	Washer 8,4 x 24 x 2	On Request
12	1	1	1	1	1	1	Vertical Support Left Front	96.35760-7004
13	25	25	25	25	25	25	Rectangular Nut M8, 30 x 20 x 4	95.99196-0022
14	1	1	1	1	1	1	Vertical Support Right Front	96.35760-7003
15	1	1	1	1	1	1	Vertical Support Left Rear	96.35760-7006
16	1	1	1	1	1	1	Vertical Support Right Rear	96.35760-7005
17	1	1	1	1	1	1	Vertical Support Support Left	96.35760-7011
18	16	16	16	19	19	19	Rectangular Nut; M8;	On Request
19	1	1	1	1	1	1	Vertical Support Support Right	96.35760-7012
20	4	4	4	4	4	4	Brace Support	96.35760-7007
21	2	2	2	3	3	3	Heat Exchanger Cradle	96.36560-7030
22	4	4	4	6	6	6	Pop rivet 6,4 x 12,5	On Request
23	2	2	2	3	3	3	Cable Brackets D=12,7	95.99186-0060
24	2	2	2	3	3	3	Cable Bracket Bolt M5	On Request
25	2	2	2	3	3	3	Heat Exchanger Support Bolt	94.17230-7002
26	1	1	1	1	1	1	Horizontal Frame Support Left	96.35760-7001
27	21	21	21	21	21	21	Case Mounting Stud	96.36689-7008
28	1	1	1	1	1	1	Horizontal Frame Support Right	96.35760-7002
29	1	1	1	1	1	1	Rear Casing Panel	96.35460-7021
30	4	4	4	4	4	4	Cable Supports	96.39658-7001
31	8	8	8	8	8	8	Cable support screws	On Request
32	2	2	2	3	3	3	Heat Exchanger Support	96.36560-7031
33	1?	1	1	1?	1	1	Low Loss Header Assembly	96.36144-7042
33	---	1	1	---	1	1	Distribution Header Assembly Cascade Units Only	96.36144-7046
34	2	2	2	2	2	2	Return Senor Pocket ½"x80mm	96.38235-7001
35	1	1	1	1	1	1	Return Temperature Sensor QAZ36/0720	96.00022-0943
36	1	1	1	1	1	1	Flow Temperature Sensor QAZ36/0720	94.19314-5001
37	2	2	2	2	2	2	Automatic Air Releases 3/8"	94.74400-5003
38	1	1	1	1	1	1	Water Pressure Switch, 0,8 bar	96.32547-7005
39	2	2	2	2	2	2	Sealing Washer	95.99187-0036
40	14	14	14	14	14	14	Washers 10,5; DIN 125, St A3C	On Request
41	12	12	12	12	12	12	Mounting Bolts M10x20;	On Request
42	2	2	2	2	2	2	Blank Plug M10; DIN 934 A3B	On Request
43	1	1	1	1	1	1	Drain Valve Support	96.36560-7033
44	1	1	1	1	1	1	Flue Gas Collector DN 160	96.36400-7003

#	150 Single	150 Cascade Master	150 Cascade Slave	225 Single	225 Cascade Master	225 Cascade Slave	Description	Part Number
o.A.	1	1	1	---	---	---	Flue Spigot Blanking Plug	96.36400-7006
44.6	3	3	3	3	3	3	Heat Exchanger Flue Seal	95.99287-0087
44.7	1	1	1	1	1	1	Appliance Flue Seal	95.99287-0092
44.13	2	2	2	3	3	3	Condensate Waste Elbows	96.36444-7001
44.15	3	3	3	4	4	4	Condensate Elbow Seal	96.36487-7004
44.16	2	2	2	3	3	3	Condensate Elbow Locknut	96.36496-7001
o.A.	1	1	1	---	---	---	Condensate Plug	96.36496-7003
45	2	2	2	3	3	3	Flue Gas Temperature Sensor QAK 36.670/109, M8	94.19314-5023
46	2	2	2	3	3	3	Flue Gas Sensing Tapping	95.95120-0035
o.A.	1	1	1	---	---	---	Flue Gas Sensing Plug	95.23188-0052
47	1	1	1	1	1	1	Gas Distribution Pipe	96.36344-7013
48	1	1	1	1	1	1	Combustion Air Collector	96.36400-7004
o.A.	1	1	1	---	---	---	Combustion Air Plug DN 60	96.36400-7007
48.7	1	1	1	1	1	1	Combustion Air Seal DN 125	95.99287-0091
49	2	2	2	3	3	3	LMU64 Controller Plate	96.35660-7005
50	2	2	2	3	3	3	LMU64 Controller 6.3 A Fuse	95.95112-0019
51	2	2	2	3	3	3	Module Controller LMU 64.015C180,	96.39100-7026
52	2	2	2	3	3	3	OCI420 Communication Clip	96.39100-7023
53	8	8	8	12	12	12	LMU64 Controller Mounting Screws	On Request
54	6	6	6	8	8	8	LMU64 Controller Mounting Bracket	95.99194-0009
55	1	1	1	1	1	1	Wiring Connections Label	96.38791-7028
56	1	1	1	1	1	1	Wiring Connections Strip	96.39216-7005
57	2	2	2	2	2	2	Strip Mounting Screws	On Request
58	1	1	1	1	1	1	Wiring Connection Cover Plate	96.35560-7001
59	4	4	4	4	4	4	Cover Plate Mounting Screws	On Request
60	1	1	1	1	1	1	Condensate Neutralising Box	94.68500-4124
61	1	1	1	1	1	1	Condensate Feed Pipe	96.36444-7003
63	1	1	1	1	1	1	Condensate Outlet Pipe	96.36444-7005
65	2	2	2	2	2	2	Condensate Outlet Adapter	96.36496-7002
66.1	2	2	2	3	3	3	Heat Exchanger	96.31000-7006
66.2	4	4	4	6	6	6	Sealing Washer	95.99187-0029
66.3	4	4	4	6	6	6	Flow / Return Sensor QAK 36.350	94.19314-5011
66.4	4	4	4	6	6	6	Manual Air Release 3/8	96.00025-0019
66.5	2	2	2	3	3	3	Burner Door	96-34600-7006
66.6	2	2	2	3	3	3	Burner Door Seal	96.00025-1220
66.7	2	2	2	3	3	3	Burner Door Air / Gas Seal	96.00025-1255
66.8	2	2	2	3	3	3	Burner Door Insulation	96.31587-7002
66.9	12	12	12	18	18	18	Burner Door Nuts M10	96.00025-1082
66.10	2	2	2	3	3	3	Ignition/Rectification Gasket	96.34487-7001
66.11	2	2	2	3	3	3	Ignition/Rectification Electrode	96.34236-7001
66.12	2	2	2	3	3	3	Burner (l = 238,5mm)	96.00025-2111
66.13	8	8	8	12	12	12	Toothed Washer A 6,4 (V2A)	95.99197-0206
66.14	8	8	8	12	12	12	Burner Mounting Screws M6	95.99194-0046
66.15	2	2	2	3	3	3	Burner Graphite Gasket	96.00025-1745
66.16	2	2	2	3	3	3	Fan Outlet Gasket	96.00025-2107
66.17	2	2	2	3	3	3	Premix Adapter Plate	96.34784-7007
66.18	6	6	6	9	9	9	Premix Adapter Mounting Screws	95.99194-0017

#	150 Single	150 Cascade Master	150 Cascade Slave	225 Single	225 Cascade Master	225 Cascade Slave	Description	Part Number
66.19	2	2	2	3	3	3	Combustion Fan RG 148	96.34000-7006
66.20	8	8	8	12	12	12	Fan Outlet Mounting Screws M5	On Request
66.21	4	4	4	6	6	6	Electrode Mounting Screws M4	On Request
66.22	2	2	2	3	3	3	Non Return Valve Base	96.34317-7001
66.23	6	6	6	9	9	9	Non Return Valve Mounting Screws 3,9x9,5	On Request
66.24	2	2	2	3	3	3	Non Return Valve Gasket	96.34387-7001
66.25	2	2	2	3	3	3	Non Return Valve Plate	96.34318-7001
66.25.3	2	2	2	3	3	3	Non Return Valve Circlip	95.99197-0011
66.26	2	2	2	3	3	3	Non Return Valve Spindle	96.34394-7001
66.27	2	2	2	3	3	3	Non Return Valve Spring	95.23171-0013
66.28	2	2	2	3	3	3	Fan Inlet Gasket	96.00025-0006
66.29	2	2	2	3	3	3	Fan Inlet Tube	96.34784-7008
66.30	6	6	6	9	9	9	Fan Inlet Tube Mounting Screws M6x12	95.99194-0612
66.31	2	2	2	3	3	3	Gas Injector Sealing Grommet	96.00025-1254
67	7	7	7	9	9	9	Return Pipe Seals	95.99187-0004
68	2	2	2	3	3	3	Module Pump 7m	96.32100-7025
o.A.	1	1	1	---	---	---	Blanking Plug For Pump	95.23188-7003
69	8	8	8	12	12	12	Heat Exchanger Header Seals	95.99187-0017
70	2	2	2	3	3	3	Heat Exchanger Flow Connection	96.36144-7017
71	2	2	2	3	3	3	Heat Exchanger Return Connection	96.36144-7041
72	---	---	---	1	1	1	Lower Module Return Pipe	96.36144-7043
73	1	1	1	1	1	1	Middle Module Return Pipe	96.36144-7044
74	1	1	1	1	1	1	Upper Module Return Pipe	96.36144-7045
75	8	8	8	9	9	9	Flow Pipe & Gas Pipe Seals	95.99187-0006
76	2	2	2	3	3	3	Module Flow Pipe (All)	96.36144-7018
o.A.	1	1	1	---	---	---	Header Flow / Return Plug	95.99185-0208
77	2	2	2	3	3	3	Module Gas Valve 240V	96.34500-7007
78	2	2	2	3	3	3	Gas Injector Seal	95.99187-0022
79	2	2	2	3	3	3	Gas Injector Natural Gas 15mm	96.34344-7080
79	2	2	2	3	3	3	Gas Injector LPG 10mm	96.34344-7081
80	2	2	2	3	3	3	Gas Valve Inlet Flange Seal	95.99287-0067
81	2	2	2	3	3	3	Gas Valve Inlet Pipe	96.36344-7014
o.A.	1	1	1	---	---	---	Gas Pipe Cap	95.99185-0208
82	4	4	4	6	6	6	Gas Valve Flange Screws; M4 x 25	On Request
83	4	4	4	6	6	6	Gas Valve Flange Screws; M4 x 12	On Request
84	2	2	2	3	3	3	Gas Injector Circlip	96.00025-1055
85	2	2	2	2	2	2	Hinge For Control Console	96.00025-8207
86	1	1	1	1	1	1	Control Console	96.35760-7008
87	2	2	2	2	2	2	Hinge For Control Panel	96.00025-8206
88	2	2	2	2	2	2	Hinge Mounting Screws	95.99198-0030
89	1	1	1	1	1	1	Appliance Electrical Isolator	96.39444-7002
90	1	1	1	1	1	1	Appliance Pressure Manometer	96.33590-7003
91	2	2	2	3	3	3	Module Displays AGU 2.361	96.39100-7036
o.A.	1	1	2	---	---	1	Module Display Blanking Plate	94.85560-5020
92	1	1	---	1	1	---	Appliance Cascade Manager RVS43 143.320/380	96.39100-7024

#	150 Single	150 Cascade Master	150 Cascade Slave	225 Single	225 Cascade Master	225 Cascade Slave	Description	Part Number
93	8	8	8	8	8	8	Mounting Post AD-510, 4x12,5	On Request
94	1	1	1	1	1	1	Appliance Fuse Holder	96.39400-7001
95	4	4	4	4	4	4	Side Panel	96.35160-7002
96	8	8	8	8	8	8	Panel Spring Clips	94.15371-5001
97	2	2	2	2	2	2	Top & Lower Front Panel	96.35360-7025
98	1	1	1	1	1	1	Upper Front Panel	96.35360-7026
99	2	2	2	2	2	2	Magnetic Catch	96.36689-7009
100	2	2	2	2	2	2	Catch Mounting Screws	On Request
101	1	1	1	1	1	1	Control Panel Door	96.35360-7027
102	1	1	1	1	1	1	Retractable Pin Hinge	96.36689-7007
103	1	1	1	1	1	1	Protective Cover Plate	96.35360-7028
104	2	2	2	2	2	2	Name Badge Clip	95.99198-0029
105	1	1	1	1	1	1	Spring Disk Clip	On Request
106	1	1	1	1	1	1	Hexagonal Locking Nut M5	On Request
107	1	1	1	1	1	1	MHG Badge	On Request
108	2	2	2	2	2	2	Drain Valve 1/2	96.00025-0022
109	2	2	2	3	3	3	Flue gas sensing Tube Di=12x1, L=650	95.95213-0025
110	3	3	3	3	3	3	Flue Gas sensing End Cap d=12 mm	95.23188-0044
111	2	2	2	3	3	3	Combustion Air Supply Pipe (Flexible, d=60mm)	96.00025-8149
112	5	5	5	6	6	6	Securing Ring, 50-65 mm	96.00025-8160
o.A.	1	1	1	1	1	1	Appliance Wiring Harness	96.39200-7026
o.A.	2	2	2	3	3	3	Module Wiring Harness	96.39200-7027
o.A.	2	2	2	3	3	3	LMU64 to OCI420 Clip Wiring Connector	96.39200-7015
o.A.	2	2	2	3	3	3	Module Ignition Cable & Cap	96.39200-7028
o.A.	1	1	1	1	1	1	LMU64 to Display Ribbon Cable Lower Module	96.39200-7029
o.A.	1	1	1	1	1	1	LMU64 to Display Ribbon Cable Middle Module	96.39200-7030
o.A.	1	1	1	1	1	1	LMU64 to Display Ribbon Cable Upper Module	96.39200-7031
o.A.	2	2	2	3	3	3	Electrode Earth Lead 450mm	96.39200-7032
o.A.	2	2	2	3	3	3	Flow / Return Wiring Harness	96.39200-7034
o.A.	1	1	1	1	1	1	Pump Wiring Harness	96.39200-7035
o.A.	2	2	2	3	3	3	Pump Electrical Connection	96.39200-7036
o.A.	---	---	---	1	1	1	Transport Documentation	96.39200-7042
o.A.	1	1	1	---	---	---	Transport Documentation	96.39200-7043
o.A.	X	X	X	X	X	X	Screw Set	96.36600-7080
o.A.	2	2	2	2	2	2	Condensate Neutralising Granules 1.4Kg	94.18564-5006
o.A.	1	1	1	1	1	1	ProCon Combustion Chamber Cleaning Granules	On Request

22.0 Exploded Diagram System Separation Plate Heat Exchanger Unit



23.0 Installer / End User Notes