

# HERALD

FLOOR STANDING GAS FIRED  
CONDENSING BOILERS

Installation, Commissioning, Maintenance And User  
Instructions

MODELS:

HCB116CE

HCB146CE

HCB176CE

HCB206CE

HCB236CE



info@lochinvar.ltd.uk  
**lochinvar.ltd.uk**

Article	Language	Version
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**Table of Contents**

<b>1.0</b>	<b>INTRODUCTION</b> .....	<b>5</b>
<b>2.0</b>	<b>SAFETY GUIDELINES</b> .....	<b>6</b>
2.1	GENERAL DESCRIPTION OF SAFETY SYMBOLS USED .....	6
2.2	WHAT TO DO IF YOU SMELL GAS .....	7
<b>3.0</b>	<b>PRINCIPAL PARTS</b> .....	<b>8</b>
<b>4.0</b>	<b>TECHNICAL DATA</b> .....	<b>11</b>
<b>5.0</b>	<b>DIMENSIONS AND CLEARANCES</b> .....	<b>12</b>
5.1	DIMENSIONAL DRAWINGS .....	12
5.2	CLEARANCES.....	13
<b>6.0</b>	<b>GENERAL REQUIREMENTS</b> .....	<b>14</b>
6.1	RELATED DOCUMENTS .....	14
<b>7.0</b>	<b>WATER QUALITY</b> .....	<b>15</b>
<b>8.0</b>	<b>LOCATION</b> .....	<b>15</b>
8.1	PLANT ROOM REQUIREMENTS.....	15
8.2	GENERAL REQUIREMENTS .....	15
8.3	CLEARANCES.....	16
8.4	CONDENSATE DRAIN .....	16
<b>9.0</b>	<b>GAS SUPPLY</b> .....	<b>16</b>
9.1	SERVICE PIPES.....	16
9.2	METERS .....	16
9.3	GAS SUPPLY PIPES.....	16
9.4	BOOSTED SUPPLIES.....	16
9.5	PLANT-ROOM CONTROL VALVE.....	16
9.6	EQUIPMENT GAS SYSTEM LEAK CHECK.....	17
<b>10.0</b>	<b>FLUE SYSTEM</b> .....	<b>18</b>
10.1	FLUE SYSTEM GENERAL REQUIREMENTS .....	18
10.2	FLUE SYSTEM TECHNICAL DETAILS .....	19
10.3	FLUE DISCHARGE.....	19
10.4	CONDENSATE DRAIN .....	19
10.7	ROOM SEALED (TYPE C) FLUE ASSEMBLY.....	22
10.8	INSTALLATION OF TRANSITION KIT TO HCB116CE BOILERS.....	22
10.9	INSTALLATION OF FLUE CONNECTION KIT TO HCB146CE-HCB176CE.....	24
10.10	INSTALLATION OF FLUE CONNECTION KIT TO HCB206CE – HCB236CE.....	26
<b>11.0</b>	<b>FLUE TERMINAL INSTALLATION</b> .....	<b>29</b>
11.2	FLUE TERMINAL GUARDING .....	30
11.4	TYPE C <sub>33</sub> (Vertical room sealed).....	32
11.1	TYPE C <sub>43</sub> (U duct).....	41
11.2	TYPE C <sub>43</sub> (Twin pipe) .....	41
11.3	TYPE B <sub>23</sub> (Conventional flue with fan assistance).....	46
11.4	C <sub>63</sub> Certified Flue Systems .....	48
<b>12.0</b>	<b>AIR SUPPLY</b> .....	<b>49</b>
12.1	COMBUSTION VENTILATION .....	49
12.2	COOLING VENTILATION.....	49
<b>13.0</b>	<b>WATER CONNECTIONS</b> .....	<b>50</b>
13.1	GENERAL .....	50
13.2	OPEN VENTED SYSTEM ARRANGEMENT.....	50
13.3	SEALED SYSTEM ARRANGEMENT.....	50
<b>14.0</b>	<b>SCHEMATICS</b> .....	<b>52</b>
14.1	KEY FOR SCHEMATICS .....	52
14.2	CIRCULATING PUMPS .....	55
14.3	PRIMARY PIPEWORK HEADER SIZING .....	56
<b>15.0</b>	<b>ELECTRICAL SUPPLY</b> .....	<b>57</b>
15.2	EXTERNAL CONTROLS.....	57
15.3	HIGH VOLTAGE CONNECTOR STRIP.....	58
15.4	LOW VOLTAGE CONNECTOR STRIP.....	58
15.5	ELECTRICAL CONNECTIONS .....	60
15.6	FUSES .....	60
15.7	ARC WELDING PRECAUTIONS .....	60
15.8	WIRING DIAGRAM.....	61
15.9	LADDER DIAGRAM.....	62
<b>16.0</b>	<b>SMART SYSTEM CONTROL</b> .....	<b>63</b>
16.1	GENERAL .....	63
16.2	SMART SYSTEM CONTROL PANEL.....	63
1.1	ACCESS MODES .....	63
16.3	SAVING PARAMETERS .....	64
16.4	STATUS DISPLAY SCREENS .....	66
<b>17.0</b>	<b>COMMISSIONING AND TESTING</b> .....	<b>68</b>
17.1	ELECTRICAL INSTALLATION .....	68
17.2	GAS INSTALLATION .....	68
17.3	WATER CONNECTIONS .....	68
17.4	COMMISSIONING THE EQUIPMENT .....	68
17.5	TEMPERATURE ADJUSTMENT PROCEDURE .....	69
17.6	INSTALLATION NOISE .....	69
<b>18.0</b>	<b>LPG FUEL</b> .....	<b>70</b>
18.1	RELATED DOCUMENTS.....	70
18.2	CONVERSION TO LPG .....	70
18.3	LPG COMMISSIONING AND TESTING.....	74
<b>19.0</b>	<b>MAINTENANCE</b> .....	<b>75</b>
19.1	GENERAL .....	75
19.2	MAINTENANCE SCHEDULE .....	75
19.3	BURNER INSPECTION .....	75
19.4	BURNER REMOVAL.....	76
19.5	CLEANING THE HEAT EXCHANGER.....	76
19.6	DRAINING BOILER SYSTEM.....	76
19.7	REFILLING THE SYSTEM.....	77

19.8	OTHER CHECKS.....	77
<b>20.0</b>	<b>SMART SYSTEM CONTROL SETTINGS.....</b>	<b>78</b>
20.1	DISPLAY PANEL ACCESS MENU.....	78
20.2	PARAMETER SETTING.....	79
<b>21.0</b>	<b>VIEWABLE AND CHANGEABLE CONTROL PARAMETERS.....</b>	<b>83</b>
21.1	GENERAL.....	83
21.2	TEMPERATURE SETTINGS.....	84
21.3	DATA LOGGING.....	85
21.4	FUNCTIONS.....	85
21.5	DHW SETTINGS.....	86
21.6	OUTDOOR RESET.....	88
21.7	ANTI-CYCLING.....	90
21.8	RAMP SETTINGS.....	91
21.9	CONTROL MODES.....	91
21.10	BUILDING MANAGEMENT SYSTEM (BMS).....	93
21.11	CIRCULATION PUMPS.....	95
21.12	SERVICE NOTIFICATION.....	96
21.13	BASIC SETUP.....	98
<b>22.0</b>	<b>ErP DATA TABLE.....</b>	<b>99</b>
<b>23.0</b>	<b>USER INSTRUCTIONS.....</b>	<b>100</b>
23.1	GENERAL REQUIREMENTS.....	100
23.2	PROCEDURE FOR LIGHTING.....	100
23.3	PROCEDURE FOR SHUTTING DOWN.....	100
23.4	SMART SYSTEM CONTROL.....	101
23.5	TEMPERATURE ADJUSTMENT PROCEDURE.....	101
23.6	MAINTENANCE.....	102
23.7	AIR SUPPLY.....	102
23.8	ENTERING DISPLAY ACCESS USER PASSWORD.....	102
23.9	PARAMETER SETTINGS.....	103

## 1.0 INTRODUCTION

- The Lochinvar Herald range is a floor standing gas fired condensing boiler. The equipment comprises a stainless steel radial burner assembly and a heat exchanger that permits fully condensing operation.
- The burner is initiated by a full electronic ignition sequence control that incorporates a spark ignition and a flame rectification device for supervision of the flame.
- The output from the boiler is regulated by a variable speed combustion fan and gas/air ratio controls to maintain the correct combustion at all levels of modulation. This configuration allows modulation down to 20% of the rated output.
- For the correct operation of the boiler, it is essential that a suitably sized pump is utilised to maintain a constant water flow rate through the heat exchanger. A suitable shunt pump is available as an ancillary option from Lochinvar Ltd. See section 14.2.2
- This equipment is intended for use on Group H Natural Gas (2<sup>nd</sup> Family) and LPG propane (3<sup>rd</sup> Family). The information relating to propane firing is to be found in **Section 18.0: LPG FUEL**. This equipment **MUST NOT** use gas other than that for which it has been designed and adjusted.
- This equipment must be installed by a competent person, registered with a H.S.E. approved body. All installations must conform to the relevant Gas Safety and Building Regulations. Health & Safety requirements must also be taken into account when installing any equipment. Failure to comply with the above may lead to prosecution.
- If the equipment is to be connected to an unvented (pressurised) system, care must be taken to ensure all extra safety requirements are satisfied should a high or low-pressure condition occur in the system.
- The equipment is designed for direct connection to a flue system.
- **Ancillary Options:**
  - Primary shunt Pumps See section 14.2.2
  - DHW vessel sensor LL200009A
  - Outside sensor for direct weather compensation of boiler LL200010A
  - Con-X-Us Remote Monitoring App LL100071724
  - Pressurisation Unit
    - Wall mounted – single pump CHCWM1
    - Wall mounted – twin pump CHCWM2
  - Condensate Neutralisation Kit KIT2000
  - Low Velocity Header Contact Lochinvar Limited
  - Flue System Components Contact Lochinvar Limited
  - Plate system separator Contact Lochinvar Limited
  - ModBus Interface Module LL100297842
  - BACnet Interface Module LL100297828

## 2.0 SAFETY GUIDELINES



### READ AND UNDERSTAND THE INSTRUCTIONS

Read and fully understand all instructions before attempting to operate maintain or install the unit.

Keep these instructions near the Boiler for quick reference.

This equipment must be installed by a competent person, registered with the H.S.E. approved body. All installations must conform to the relevant Gas Safety and Building Regulations. Health & Safety requirements must also be taken into account when installing any equipment. Failure to comply with the above may lead to prosecution

Without written approval of the manufacturer the internals of the Boiler may not be changed. When changes are executed without approval, the Boiler certification becomes invalid.

Commissioning, maintenance and repair must be done by a skilled installer/engineer, according to all applicable standards and regulations.

### 2.1 GENERAL DESCRIPTION OF SAFETY SYMBOLS USED



#### BANNED

A black symbol inside a red circle with a red diagonal indicates an action that should not be performed



#### WARNING

A black symbol added to a yellow triangle with black edges indicates danger



#### ACTION REQUIRED

A white symbol inserted in a blue circle indicates an action that must be taken to avoid risk



#### ELECTRICAL HAZARD

Observe all signs placed next to the pictogram. the symbol indicates components of the unit and actions described in this manual that could create an electrical hazard.



#### HOT SURFACES

The symbol indicates those components with a high surface temperature that could create a risk.



This symbol shows essential information which is not safety related



Recover or recycle material

## 2.2 WHAT TO DO IF YOU SMELL GAS



Warning if you smell gas

- No naked flames, no smoking!
- Avoid causing sparks, do not switch on or off electrical equipment or lights
- Open windows and doors
- Shut off the main gas supply
- Warn occupants and leave the building
- After leaving the building alert the local gas supply company
- Do not re-enter the building until it is safe to do so



Lochinvar limited is not liable for any damage caused by inaccurately following these mounting instructions. Only original parts may be used when carrying out any repair or service work.



This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

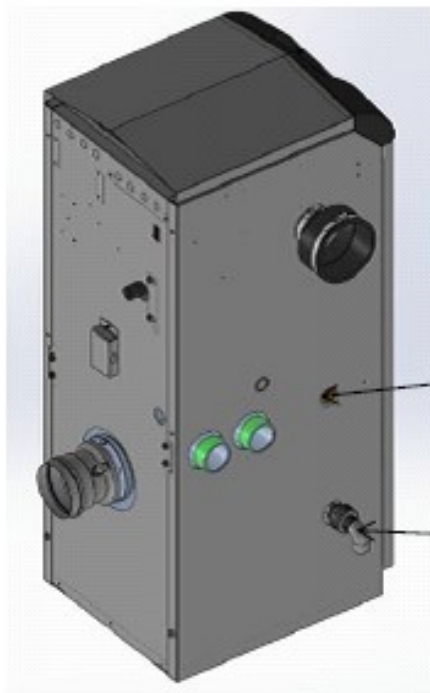
### 3.0 PRINCIPAL PARTS

ITEM	DESCRIPTION	FUNCTION	NOTE
1	Stainless steel heat exchanger	Allows water to flow through specially designed coils for maximum heat transfer, while providing protection against flue gas corrosion. The coils are encased in a jacket that contains the combustion process.	
2	Heat exchanger access cover	Allows access to the combustion side of the heat exchanger coils.	
3	Fan	The fan pulls in air and gas through the venturi (item 5). Air and gas mix inside the fan and are pushed into the burner, where they burn inside the combustion chamber.	Not Shown in 3.1.2
4	Gas valve	The gas valve senses the negative pressure created by the fan, allowing gas to flow only if the gas valve is powered and combustion air is flowing.	Not Shown in 3.1.2
5	Venturi	The venturi controls air and gas flow into the burner.	
6	Flue gas sensor	This sensor monitors the flue gas exit temperature. The control module will modulate and shut down the boiler if the flue gas temperature gets too hot. This protects the flue pipe from overheating.	
7	Boiler outlet temperature sensor	This sensor monitors boiler outlet water temperature.	
8	Boiler inlet temperature sensor	This sensor monitors return water temperature.	
9	Electronic display	The electronic display consists of 7 buttons and a dual line 32-character liquid crystal display.	Not Shown in 3.1.2
10	Flue pipe adapter	Allows for the connection of the flue system to the boiler.	Not Shown in 3.1.2
11	Burner	Made with metal fibre and stainless steel construction, the burner uses pre-mixed air and gas and provides a wide range of firing rates.	Not Shown in 3.1.2
12	Water outlet	BSP water connection that supplies hot water to the system, either 1-1/4" or 2", depending on the model.	Not Shown in 3.1.2
13	Water inlet	BSP water connection that returns water from the system to the heat exchanger, either 1-1/4" or 2", depending on the model.	Not Shown in 3.1.2
14	Gas connection pipe	Threaded pipe connection, 1/2", 3/4", or 1", depending on the model. This pipe should be connected to the incoming gas supply for the purpose of delivering gas to the boiler.	Not Shown in 3.1.2
15	SMART Control Module	The SMART Control responds to internal and external signals and controls the fan, gas valve, and pumps to meet the demand.	Not Shown in 3.1.2
16	Manual air vent	Designed to remove trapped air from the heat exchanger coils.	
17	Air intake adapter	Allows for the connection of the air intake pipe to the boiler.	
18	Mains voltage junction box	The junction box contains the connection points for the mains voltage power and all pumps.	
19	Boiler drain port	Location from which the heat exchanger can be drained.	
20	Low voltage connection board	The connection board is used to connect external low voltage devices.	
21	Low voltage wiring connections (knockouts)	Conduit connection points for the low voltage connection board.	
22	Condensate drain connection	Connects the condensate drain line to a 1/2" PVC union.	
23	Access cover - front	Provides access to the gas train and the heat exchanger.	Not Shown in 3.1.2
24	Ignition electrode	Provides direct spark for igniting the burner.	Not Shown in 3.1.2
25	Flame inspection window	The quartz glass window provides a view of the burner surface and flame.	
26	Gas shutoff valve	Manual valve used to isolate the gas valve from the gas supply.	Not Shown in 3.1.2
27	High limit sensor	Device that monitors the outlet water temperature. If the temperature exceeds its setting, it will break the control circuit, shutting the boiler down.	
28	Flame sense electrode	Used by the control module to detect the presence of burner flame.	
29	Mains voltage wiring connections (knockouts)	Conduit connection points for the mains voltage junction box	Not Shown in 3.1.2
30	Top panel	Removable panel to gain access to the internal components.	Not Shown in 3.1.2
31	Power switch	Turns 230 VAC ON/OFF to the boiler.	
32	Levelling legs	Used to allow the heat exchanger to be levelled. This is needed for the proper draining of the condensate from the combustion chamber	Not Shown in 3.1.2

#### 3.1.1 PRINCIPLE PARTS LIST, TO BE USED IN CONJUNCTION WITH 3.1.2



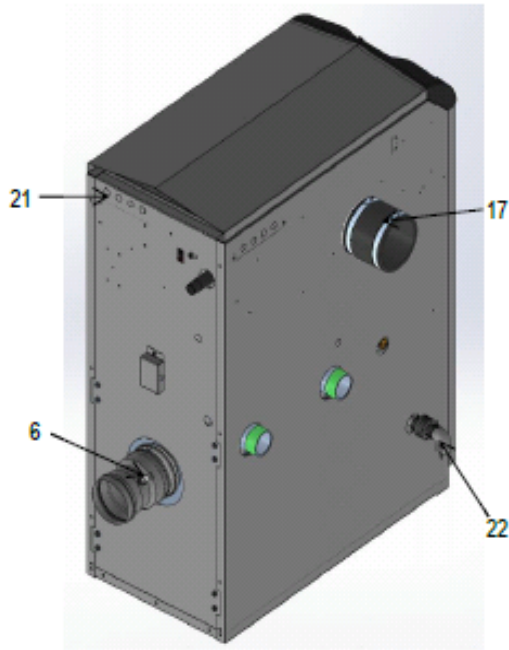
3.1.2 PRINCIPLE PARTS TO BE USED IN CONJUNCTION WITH TABLE 3.1.1



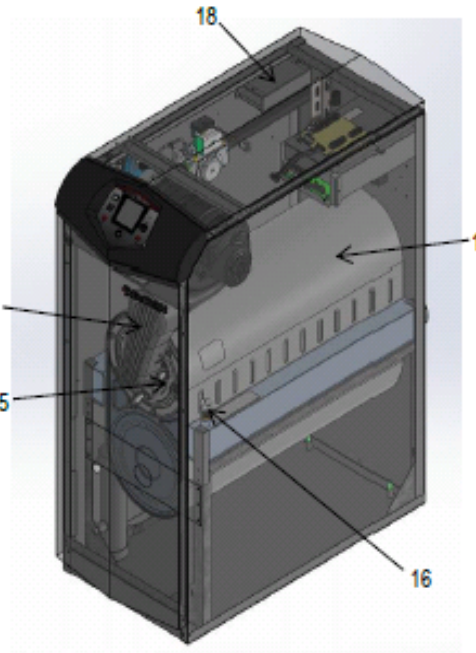
**REAR VIEW  
MODEL HCB116CE**



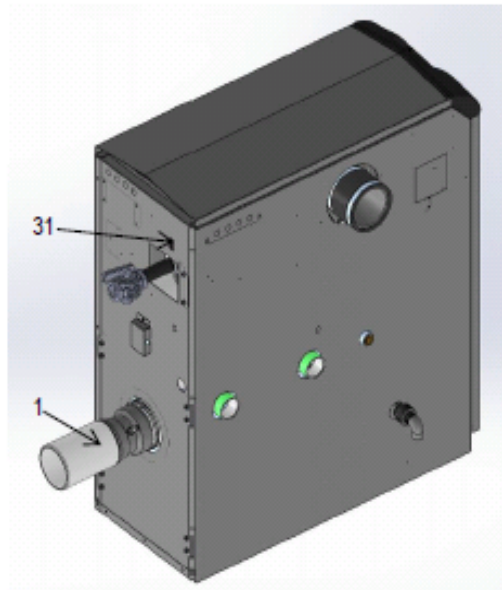
**LEFT SIDE (INSIDE UNIT)  
MODEL HCB116CE**



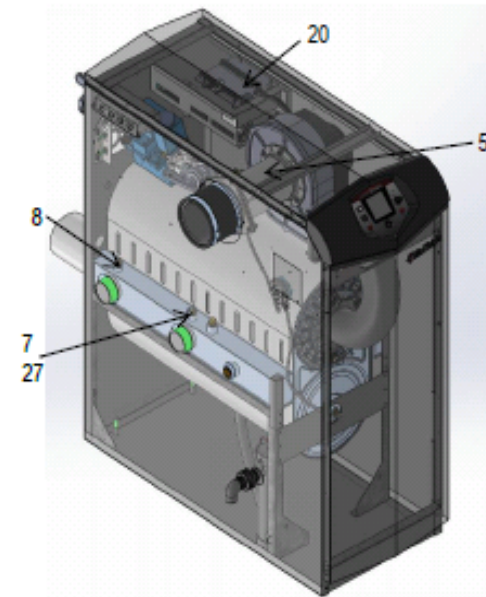
**REAR VIEW  
MODELS HCB146CE**



**RIGHT SIDE (INSIDE UNIT)  
MODELS HCB146CE**



**REAR VIEW  
MODELS HCB176CE-HCB236CE**



**LEFT SIDE (INSIDE UNIT)  
MODELS HCB176CE-HCB236CE**

## 4.0 TECHNICAL DATA

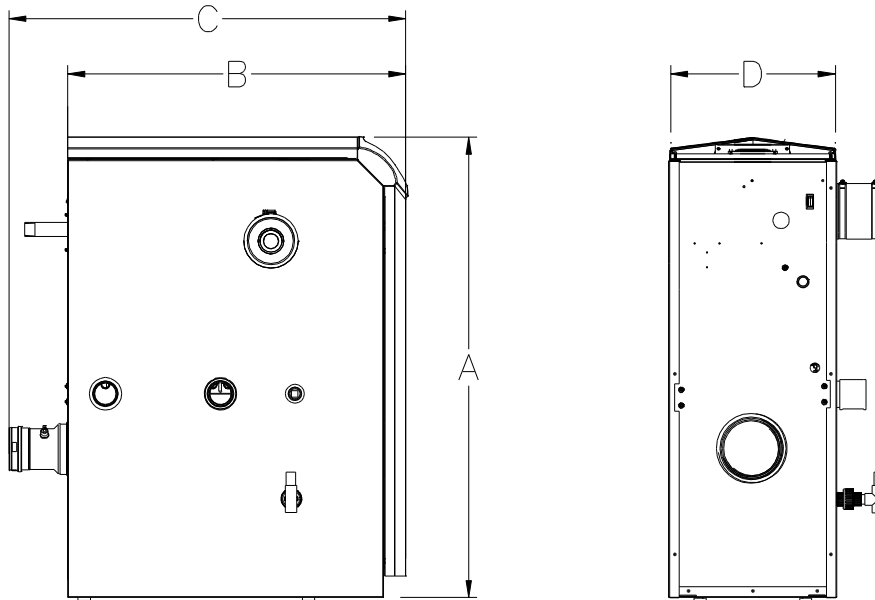
Model Number		HCB116CE	HCB146CE	HCB176CE	HCB206CE	HCB236CE
<b>GENERAL DATA</b>						
Product I.D. Number	CE 0063 CQ3351	CE 0063 CQ3351				
Classification	112H31B/P	112H31B/P				
Input (gross)	kW	116.9	146.5	175.8	205.2	244.2
Input (net)	kW	105.3	132	158.4	184.9	220
Output (50°/30°)	kW	110.6	141.2	162.1	187.4	227.2
Output (80°/60°)	kW	105	131.3	154	180	205
Seasonal Efficiency	%	93	94	95	95	95
Shipping Weight	kg	129	138	154	168	184
NOX @0%o2 According to EU regulation EN15502	mg/kWh	40	40	36	36.2	35
Maximum allowable temperature of the combustion air	°C	40				
<b>GAS DATA – G20</b>						
Nominal gas inlet pressure	mbar	20				
Maximum gas inlet pressure	mbar	25				
Minimum gas inlet pressure	mbar	17.5				
Gas flow rate	m3/hr	11.1	14	16.8	19.6	22.3
Flue gas mass rate (@ 9.0% CO2)	g/sec	42.5	53.2	63.9	74.6	85.2
Gas inlet connection size	" BSP	1	1	1	1	1
<b>GAS DATA – G31</b>						
Nominal gas inlet pressure	mbar	37				
Maximum gas inlet pressure	mbar	45				
Minimum gas inlet pressure	mbar	27				
Gas flow rate – m³/hr	m3/hr	4.4	5.5	6.6	7.7	8.8
Flue gas mass rate (@ 10.5% CO2)	g/sec	44.2	55.4	66.6	77.6	88.8
Gas inlet connection size	" BSP	1	1	1	1	1
<b>ELECTRICAL DATA</b>						
Power consumption	W	180	204	322	322	322
Power supply	Single phase 230v/50Hz					
Protection class	IP00					
<b>WATER DATA</b>						
Water content	litres	12.9	15.9	15.9	18.9	21.6
Water connections (F & R)	" BSP	2				
Max. water pressure (PMS)	bar	11				
Min. water pressure	bar	0.5				
<b>Herald boiler_product data table_August 2019</b>						

### 4.1.1 TECHNICAL DATA TABLE

## 5.0 DIMENSIONS AND CLEARANCES

### 5.1 DIMENSIONAL DRAWINGS

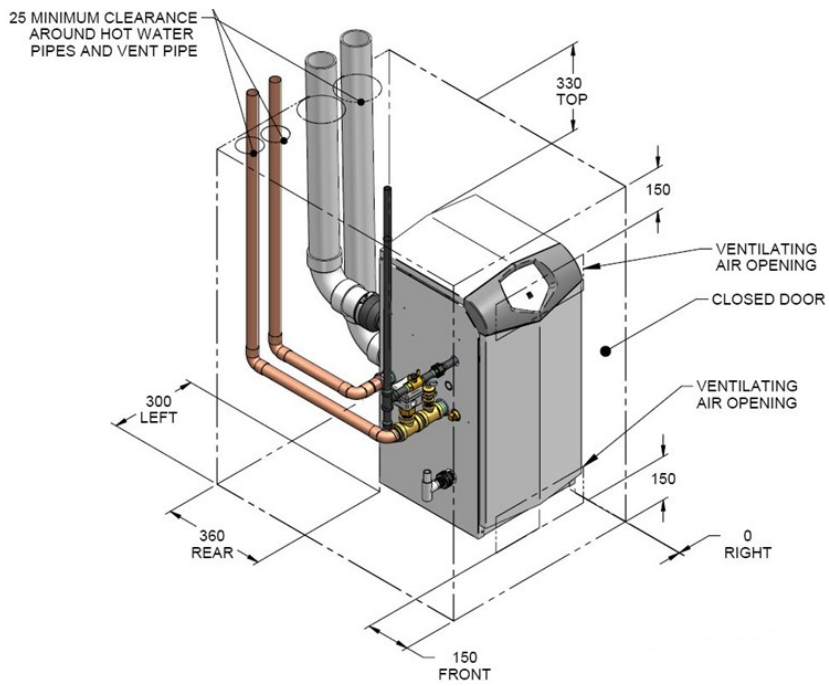
Note full dimensional drawings showing connection sizes and positions are available from Lochinvar technical support



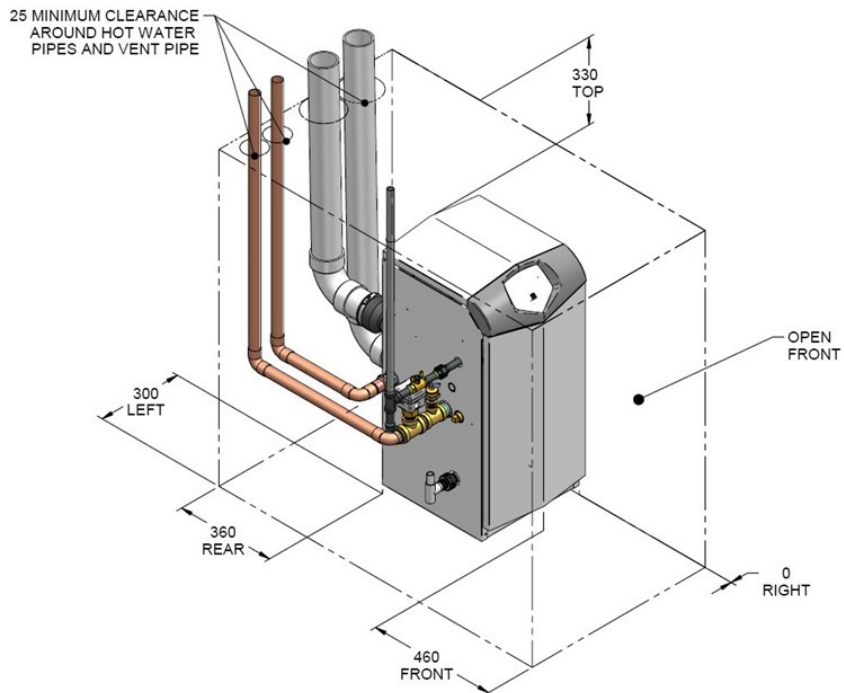
5.1.1 DIMENSIONAL DRAWING MODELS HCB116CE, HCB146CE, HCB176CE, HCB206CE & HCB236CE

Dimension	Unit	Model				
		HCB116CE	HCB146CE	HCB176CE	HCB206CE	HCB236CE
A	mm	1080	1080	1080	1080	1080
B	mm	686	800	921	1022	1149
C	mm	824	916	1059	1153	1153
D	mm	394	394	394	394	394

## 5.2 CLEARANCES



### 5.2.1 ENCLOSURE INSTALLATION CLEARANCES (MM)



### 5.2.2 PLANT-ROOM INSTALLATION CLEARANCES (MM)

## 6.0 GENERAL REQUIREMENTS

The Lochinvar Herald condensing boiler has been designed to operate trouble free for many years. These instructions should be followed closely to obtain the maximum usage and efficiency of the equipment.



### READ AND UNDERSTAND THE INSTRUCTIONS

Read and fully understand all instructions before attempting to operate maintain or install the unit.

### 6.1 RELATED DOCUMENTS

It is law that all gas appliances are installed by competent persons, in accordance with The Gas Safety (Installation and Use) Regulations 1998. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure that this law is complied with.

The installation of the equipment **MUST** be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the bylaws of the local water undertaking. The installation should also be in accordance with any relevant requirements of the local gas distributor and local authority.

In addition, the installation should follow the relevant guidance offered in the following documents. It is not practical to list all relevant information but emphasis is placed on the following documents, as failure to comply with the guidance given will almost certainly result in an unsatisfactory installation:

Regulation	Description
BS EN 1858: 2008 + A1: 2011	Chimneys, Components. Concrete flue blocks.
BS 5440-1: 2008	Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases). Specification for installation of gas appliances to chimneys and for maintenance of chimneys.
BS 5440-2: 2009	Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases). Specification for installation and maintenance of ventilation for gas appliances.
BS 6644: 2011	Specification for Installation of gas-fired hot water boilers of rated inputs between 70 kW (net) and 1.8 MW (net) (2nd and 3rd family gases).
BS 6700: 2006 +A1: 2009	Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
BS 6880: 1988 Parts 1, 2 and 3	Code of practice for low temperature hot water systems of output greater than 45 kW.
BS 7074: 1989 Parts 1 and 2	Application, selection and installation of expansion vessels and ancillary equipment for sealed systems.
BS 7671: 2008 + A3:2015	Requirements for electrical installations, I.E.E. wiring regulations seventeenth edition.
BS 7671: Amendment 2: August 2013	
BSEN 12828:2012+A1:2014	Heating systems in buildings. Design for water-based heating systems.
CP 342 (Part 2 1974):	Code of practice for centralised hot water supply-buildings other than dwellings. Institute of Gas Engineers and Managers (IGEM) Publications
IGE/UP/1 - Edition 2:	Installation pipework on industrial and commercial premises.
IGEM/UP/2 – Edition 3:	Gas installation pipework, boosters and compressors on industrial and commercial premises.
IGEM/UP/4 - Edition 4:	Commissioning of gas-fired plant on industrial and commercial premises.
IGEM/UP/10 - Edition 4:	Installation of flued gas appliances in industrial and commercial premises.

#### Gas Safety (Installation and Use) Regulations 1998

#### CIBSE: Guides

#### Part A Environmental Design

#### Part G Public health engineering

#### H.S.E. guidance

#### INDG 436 Safe management of industrial steam & hot water boilers

#### SAFED BG01 Guidance on safe operation of boilers

#### Third edition of the 1956 Clean Air Act Memorandum on Chimney Heights

*Manufacturer's notes must not be taken in any way as overriding statutory obligations.*

## 7.0 WATER QUALITY

The Lochinvar Herald contains a stainless steel heat exchanger; therefore care must be exercised to ensure that the system water and any water treatment are compatible. Whenever a new boiler is connected to an existing system, the pipework must be thoroughly cleaned and flushed to remove debris, rust particles, carbonate deposits and any existing water treatment that might be incompatible with the heat exchanger. If the existing system is in poor condition and/or cannot be pressurised then consideration should be given to using a Plate system separator. See Section 13.3.2 for details, new systems must also be thoroughly flushed to remove debris and flux deposits.



**Failure of the heat exchanger due to deposits in the water are not covered under the boiler warranty. For advice on system treatment or separation contact Lochinvar technical support.**

Whilst chemical inhibitors remove oxygen from the water, due to uncertainty in dosing levels, there is the possibility that the inhibitor will eventually be diluted to the point where it is no longer effective. To ensure there is effective air separation and removal, an air separator should be fitted to the hottest part of the system, in accordance with the item manufacturer's instructions. In addition to this a means of dirt removal (e.g. dirt separator or strainer) should be fitted to the boiler return pipework to prevent the accumulation of debris within the heat exchanger coils.



**The use of chemical inhibitors alone will not satisfy the terms of the heat exchanger warranty.**

## 8.0 LOCATION

### 8.1 PLANT ROOM REQUIREMENTS

The Lochinvar Herald may only be installed in a room that complies with the appropriate ventilation requirements.

The Lochinvar Herald can be used as a type C<sub>13</sub>, C<sub>33</sub>, C<sub>43</sub> or C<sub>53</sub> (room sealed) appliance. Due to its room sealed design, ventilation allowances for combustion air are not necessary, provided the minimum clearances and service clearances as detailed in

**PLANT-ROOM INSTALLATION CLEARANCES (mm)** are observed. If the appliance is to be installed in a compartment or a hot environment, the minimum clearances detailed in

**ENCLOSURE INSTALLATION CLEARANCES (mm)** should be observed. In addition to this, ventilation for cooling purposes must be fitted. For further guidance, please refer to **Section on AIR SUPPLY** or to **BS5440-2** or **BS6644** as appropriate.

The Lochinvar Herald can also be used as a type B<sub>23</sub> (open flue) appliance. If such a configuration is to be used, then appropriate ventilation for cooling and combustion must be provided. For further details, please refer to **Section on AIR SUPPLY** or to **BS5440-2** or **BS6644** as appropriate.

### 8.2 GENERAL REQUIREMENTS

Corrosion of the heat exchanger coils and flue system may occur if air for combustion contains certain chemical vapours. Such corrosion may result in poor combustion and create a risk of asphyxiation. Aerosol propellants, cleaning solvents, refrigerator and air conditioning refrigerants, swimming pool chemicals, calcium and sodium chloride, waxes and process chemicals are corrosive. Products of this sort should not be stored near the boiler or outside by the air intake (if applicable). The fitting of this equipment in a situation where aerosols or other chemicals may be entrained into the combustion air will invalidate the warranty.

The equipment must be installed on a level surface that is capable of adequately supporting its weight (when filled with water) and any ancillary equipment. The operation of the equipment must not cause the temperature of any combustible material in the vicinity of the equipment and its flue to exceed 65°C. If such a situation is unavoidable, appropriate insulation should be provided.

Locate the equipment so that if the appliance or any connecting pipework should leak, water damage will not occur. When such locations cannot be avoided it is recommended that a suitable drain pan be installed under the equipment. The pan should be adequately drained but must not restrict the combustion or ventilation airflow.

### 8.3 CLEARANCES

The location chosen for the equipment must permit the provision for a satisfactory flue system and, where necessary, an adequate air supply. The location must also provide adequate space for servicing and air circulation around each unit. This includes any electrical trunking laid across the floor and to the appliance.

See

#### **PLANT-ROOM INSTALLATION CLEARANCES (mm)**

For dimensions/clearances. Further details regarding locations are given in **BS5440** or **BS6644** as appropriate.

### 8.4 CONDENSATE DRAIN

The condensate drain is located on the left hand side of the boiler. It is fitted with a ½" PVC tee and union, this should be connected to an appropriate condensate drain, sloping continuously away from the boiler at an angle of at least 3° (50mm per metre).

The Water Resources Act requires that trade effluent is discharged to municipal sewers between pH 6.5 and 10.0. If it is determined that these levels cannot be achieved, an in-line condensate neutralisation kit is available from Lochinvar Limited. This unit is capable of neutralising 4000 litres of condensate to a pH of 7.0 before releasing it to a drain.

## 9.0 GAS SUPPLY

The Lochinvar Herald range is suitable for use on second and third family gasses 2H - G20 - 20mbar and 3P - G31 - 37mbar. **For details relating to Propane (3P) please refer to Section on LPG FUEL:**

### 9.1 SERVICE PIPES

The local gas distributor must be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas. An existing service pipe must not be used without prior consultation with the local gas distributor.

### 9.2 METERS

A new gas meter will be connected to the service pipe by the local gas distributor contractor. An existing gas meter should be checked, preferably by the gas distributor, to ensure that it is adequate to deal with the rate of gas supply required.

### 9.3 GAS SUPPLY PIPES

Supply pipes must be fitted in accordance with **IGE/UP/2**. Pipework from the meter to the equipment must be of adequate size. The complete installation must be purged and tested as described in **IGE/UP/1**. Refer to **Section on LPG FUEL** for information on LPG pipework installation guidance.

### 9.4 BOOSTED SUPPLIES

Where it is necessary to employ a gas pressure booster, the controls must include a low-pressure cut-off switch at the booster inlet. The local gas distributor must be consulted before a gas pressure booster is fitted. For details of how to connect a low-pressure cut-off switch, please refer to **Section Error! Reference source not found.**

### 9.5 PLANT-ROOM CONTROL VALVE

A manual valve for plant-room isolation must be fitted in the gas supply line. It must be clearly identified and readily accessible for operation, preferably by an exit.



## 9.6 EQUIPMENT GAS SYSTEM LEAK CHECK

**An approved gas-inlet appliance isolating valve and union should be installed for each unit in a convenient and safe position and be clearly marked.** Ensure that the gas-inlet appliance isolating valve is in the OFF position. Although the equipment receives a gas leak check and gas train component integrity check prior to leaving the factory, transit and installation may cause disturbance to unions, fittings and components. During commissioning a further test for tightness should be carried out on the equipment gas pipework and components.



**Care must be taken not to allow leak detection fluid on or near any electrical parts or connections.**

## 10.0 FLUE SYSTEM

All versions of the Herald Condensing boiler can be installed as either type B23 (fan assisted open flue) or C13, 33, C53 (room sealed) appliances. See the relevant section for details of each flue type and requirements. Standard flue kits are available as an ancillary item, these include the standard pieces to start the flue system, additional elbows, extensions will probably be required depending upon site installation requirements. Further information including part numbers is available in the separate flue guide available from [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)

### 10.1 FLUE SYSTEM GENERAL REQUIREMENTS



Install the horizontal flue components with an angle of 3° back in the direction of the boiler (roughly equal to five centimetres for every linear meter). Failure to install the flue correctly will result in a build-up of condensate within the flue pipework that will cause early component failure.



When using a wall terminal, there is the possible risk of ice building-up on surrounding parts/structures, because the condensate will freeze. This risk should be taken into account during the design phase of the heating installation.



Herald boilers will produce large condensate clouds especially during cold weather, consideration must be taken as to whether this will cause a nuisance to neighbouring properties and if so alternative flue arrangements used.



Herald boilers can operate with very low flue temperatures; as such the flue system used must be suitable for use with condensing appliances made from either Polypropylene or stainless steel and have a temperature class of T120.



Aluminium flue pipe must not be used on this appliance as it may lead to premature failure of the heat exchanger and will invalidate the warranty.



Before installation of any flue system read the installation manual carefully for both the appliance and flue system to be used. Information on the flue system Supplied by Lochinvar can be found within this manual.

Detailed recommendations for the flue system are given in **BS5440-1** for equipment of rated input not exceeding 70kW net, **BS6644** for equipment above 70kW net and **IGE/UP/10** for equipment of rated input above 54kW net. The following notes are intended to give general guidance only.

## 10.2 FLUE SYSTEM TECHNICAL DETAILS

Model Number		HCB116CE	HCB146CE	HCB176CE	HCB206CE	HCB236CE
<b>FLUE DATA TYPE B<sub>23</sub></b>						
Nominal flue diameter –	mm	100		150		
Maximum flue gas temp. –	°C	120				
Maximum equivalent length –	m	60				
Equivalent length 90° bend – mm	mm	1000		1500		
Equivalent length 45° bend – mm	mm	500		900		
Flue draught requirements –	mbar	-0.03 to -0.1				
<b>FLUE DATA TYPE C<sub>13</sub> &amp; C<sub>33</sub></b>						
Nominal flue diameter – mm	mm	100/150		150/220		
Minimum flue gas temp	°C	35				
Average flue gas temp	°C	70				
Maximum flue gas temp. – °C	°C	120				
Maximum equivalent length – m	m	30	30‡			
Equivalent length 90° bend – mm	mm	1000		1500		
Equivalent length 45° bend – mm	mm	500		900		
<b>FLUE DATA TYPE C<sub>43</sub> &amp; C<sub>53</sub></b>						
Nominal flue diameter – mm	mm	100		150		
Minimum flue gas temp	°C	35				
Average flue gas temp	°C	70				
Maximum flue gas temp	°C	120				
Maximum equivalent length	m	60*				
Equivalent length 90° bend	mm	1000		1500		

### 10.2.1 FLUE SYSTEM TECHNICAL DATA TABLE

‡ HCB146CE, HCB176CE, HCB206CE and HCB236CE use a Twin pipe (Parallel) flue system terminating at a concentric terminal. The flue system is to be constructed from 150mm single wall components.

\* On twin pipe systems, the maximum equivalent length is the sum of the air inlet components and the exhaust components.

## 10.3 FLUE DISCHARGE

The flue system must ensure safe and efficient operation of the equipment to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to open external air.

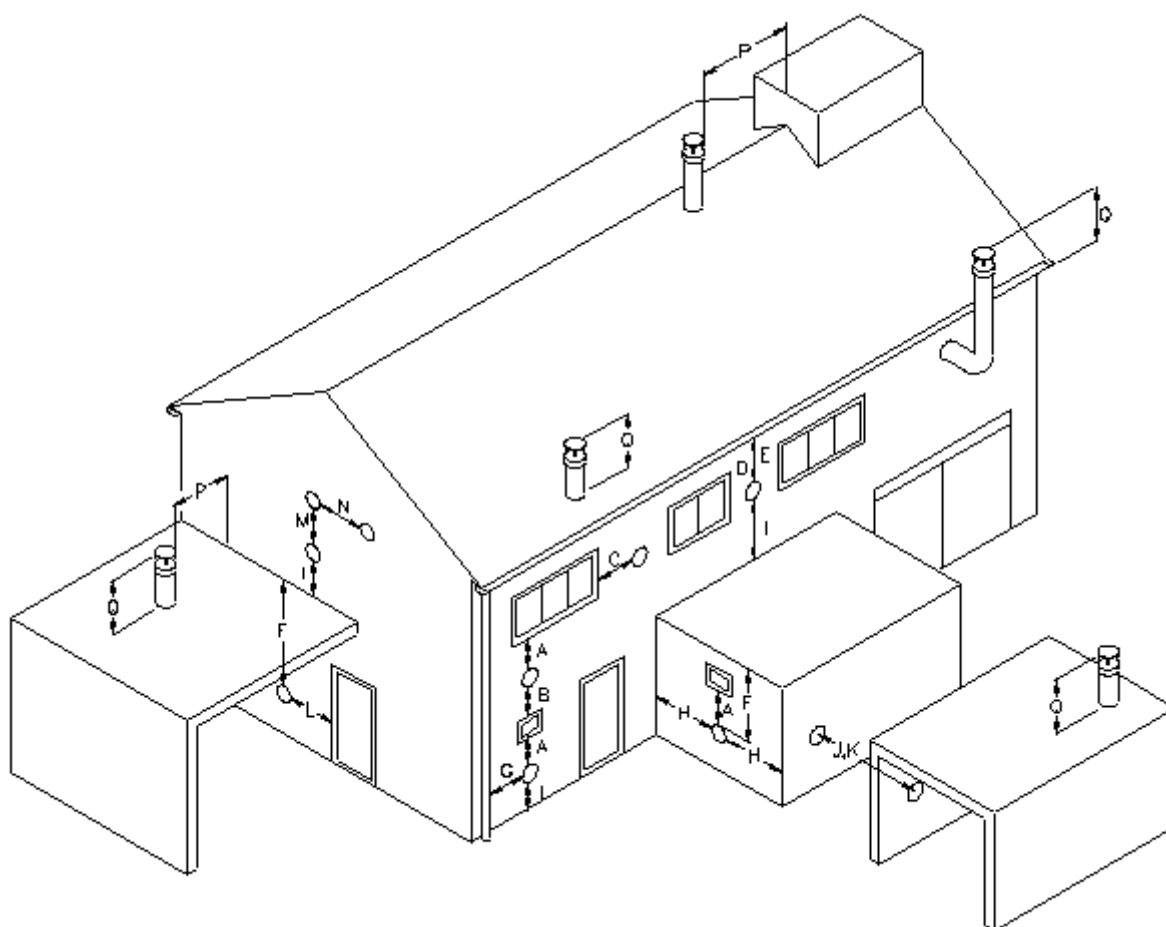
The flue must terminate in a freely exposed position and be so situated as to prevent the products of combustion entering any opening in a building.

Under certain operating and weather conditions, the Herald boiler may generate a plume at the terminal. Consideration should be given to the nuisance this may cause and the terminal should be sited accordingly.

For further information on terminal locations, please see Section 10.4.1

## 10.4 CONDENSATE DRAIN

If the flue system rises at an angle of at least 3° (50mm per metre), no additional condensate drain will be required. Failure to provide an adequate rise in the flue system may lead to pooling of condensate which may lead to premature failure of the flue system.



**10.4.1 FLUE TERMINAL POSITIONS**

Location	Description	HC B116CE – HCB236CE
A	Directly below an opening, air brick, opening windows etc.	2000
B	Above an opening, air brick, opening windows etc.	1000
C	Horizontally to an opening, air brick, opening windows etc.	1000
D	Below a gutter or sanitary pipework	75
E	Below the eaves	200
F	Below a balcony or car port roof	200
G	From a vertical drain or soil pipe	150
H	From an internal or external corner	300
I	Above ground, roof or balcony level	300
J	From a surface facing the terminal	1000
K	From a terminal facing the terminal	2000
L	From an opening in the car port (e.g. door, window) into the dwelling	1200
M	Vertically from a terminal on the same wall	1500
N	Horizontally from a terminal on the same wall	600
P	From a vertical structure on the roof	300
Q	Above intersection with the roof	300

**10.4.2 FLUE TERMINAL POSITION MINIMUM DISTANCES**

## 10.5 APPROVED FLUE SYSTEM



**For Concentric and Twin pipe flue systems only the Lochinvar supplied M&G flue system must be used**



**The approved flue system is not suitable for use external to the building. If external routes cannot be avoided, a flue system manufacturer should be consulted to supply a suitable alternative.**

## 10.6 INSTALLATION PRECAUTIONS

- The approved flue system is rated to 120°C max. To prevent the exhaust temperature exceeding this, the appliance is supplied with a flue gas temperature sensor.



**This must be fitted during the installation of the flue system. Failure to do so may lead to severe personal injury, death or substantial property damage.**



**The Boiler must not be operated unless the complete flue system is installed. This includes the Boiler connections, concentric adaptor (if required) flue pipes, air ducts (if required) and terminals. If discharging at low level, a suitable flue guard must be installed.**



**During assembly precaution should be taken to ensure that the internal sealing ring is seated correctly.**



**Due to the close tolerances in the flue system, it may be necessary to use a twisting action to fit the joints together. No lubrication other than water should be used.**

## 10.7 ROOM SEALED (TYPE C) FLUE ASSEMBLY

In order to install the Herald boiler with a type C (room sealed) flue system a flue transition kit must first be installed, this kit is used for both C<sub>13</sub> (horizontal) and C<sub>33</sub> (vertical) flue systems. The information in this paragraph describes these flue transition kits and there installation.

## 10.8 INSTALLATION OF TRANSITION KIT TO HCB116CE BOILERS



### 10.8.1 FLUE TRANSITION PARTS HCB116CE



Depending upon the flue kit chosen either a vertical or horizontal concentric terminal will be included in the packaging with the transition kit, additional elbows, flue lengths etc. Further items are available as ancillaries and may be required to complete the flue system. Additional wall brackets may be required to ensure the flue system is stable. For a full list of flue components supplied and optional parts to complete the system see the herald flue guide available at [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)

ITEM NUMBER	DESCRIPTION	HCB 116
1	90° ELBOW	3 REQUIRED
2	45° ELBOW	1 REQUIRED
3	SAMPLING POINT	1 REQUIRED
4	CONCENTRIC ADAPTOR	1 REQUIRED
5	AIR INTAKE TRANSITION	1 REQUIRED
6 (a)	100mm X 500mm LENGTH	KEEP 500mm
6 (b)	100mm X 500mm LENGTH	CUT TO 330mm
6 (c)	100mm X 500mm LENGTH	KEEP 500mm

### 10.8.2 HORIZONTAL CONCENTRIC FLUE TRANSITION PARTS HCB116CE

To install the flue connection to the HCB116CE boilers the following procedure should be followed:

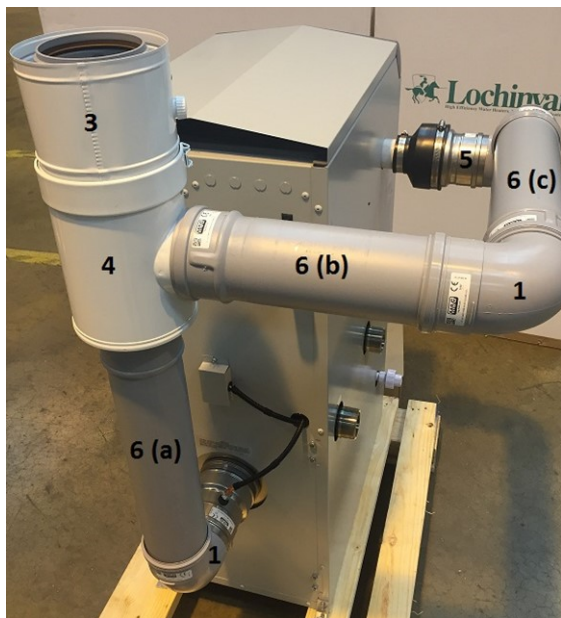
1. Check you have all items shown in Section 10.8.2.
2. Check the flue temperature sensor (supplied with the boiler) is securely located into the hole on the exhaust transition.



**If the flue temperature sensor is not fitted, the flue gas may exceed the maximum temperature rating of the flue and can lead to severe personal injury, death or substantial property damage.**

3. Insert the air intake transition (Item 5) into the intake connection reducer and tighten the worm drive clip.
4. To the bottom (exhaust) connection of the concentric adaptor fit one of the 80mm 90° elbow, then fit the 80mm x500mm flue pipe cut to length as in Section 10.8.2.
5. To the side (intake) connection of the concentric adaptor, fit the remaining 90° elbows.
6. Fit the Concentric adaptor (item 3) to the exhaust flue pipe and air inlet elbows
7. Fit the flue gas test point (Item 2) and clamp using its locking band.

The completed transition kit should look like the photos shown below.



REAR VIEW TRANSITION KIT HCB116CE



SIDE VIEW TRANSITION KIT HCB116CE

#### 10.8.3 TRANSITION KIT FITTED TO APPLIANCE

## 10.9 INSTALLATION OF FLUE CONNECTION KIT TO HCB146CE-HCB176CE



Note: the C13,C33 flue for use with the HCB146CE-HCB176CE utilises a concentric terminal but has 150mm parallel pipes between the appliance and the terminal. See section 11.0 for details.



### 10.9.1 FLUE TRANSITION PARTS HCB146CE-HCB176CE



Depending upon the flue kit chosen either a vertical or horizontal concentric terminal will be included in the packaging with the transition kit, additional elbows, flue lengths etc. Further items are available as ancillaries and may be required to complete the flue system. Additional wall brackets may be required to ensure the flue system is stable. For a full list of flue components supplied and optional parts to complete the system see the herald flue guide available at [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)

ITEM NUMBER	DESCRIPTION	HCB 146	HCB 176
1	EXPANDER 100 to 130 mm	1 REQUIRED	1 REQUIRED
2	EXPANDER 130 TO 150 mm	1 REQUIRED	1 REQUIRED
3	AIR INTAKE TRANSITION	1 REQUIRED	1 REQUIRED
4	90 BEND 100mm	1 REQUIRED	1 REQUIRED
5	90 BEND 150mm	1 REQUIRED	1 REQUIRED
6	SAMPLING POINT 150mm	1 REQUIRED	1 REQUIRED

### 10.9.2 HORIZONTAL CONCENTRIC FLUE TRANSITION PARTS HCB146CE-HCB176CE



To install the flue connection to the HCB146CE-HCB176CE boiler the following procedure should be followed:

1. Check you have all items shown in Section 10.9.1
2. Check the flue temperature sensor (supplied with the boiler) is securely located into the hole on the exhaust transition.



**If the flue temperature sensor is not fitted, the flue gas may exceed the maximum temperature rating of the flue and can lead to severe personal injury, death or substantial property damage.**

3. Insert the 90° elbow (Item 4) in to the exhaust transition ensuring the socket is pointing upwards.
  4. Insert the 100mm to 130mm expander (Item 1) in to the 90° elbow.
  5. Insert the 130mm to 150mm expander (Item 2) in to the 100mm to 130mm expander.
  6. Insert the 150mm sampling point (item 6) into the 130mm to 150mm expander
  7. Insert the air intake transition (Item 3) into the intake connection (Item 1) and tighten the worm drive clip.
- The completed installation should look like the photos shown below



**EXHAUST TRANSITION KIT FITTED HCB146CE-HCB176CE**



**AIR INLET TRANSITION KIT FITTED HCB146CE-HCB176CE**

**10.9.3 TRANSITION KIT FITTED TO APPLIANCE**

## 10.10 INSTALLATION OF FLUE CONNECTION KIT TO HCB206CE – HCB236CE



The C13,C33 flue for use with the HCB206CE-HCB236CE utilises a concentric terminal but has 150mm parallel pipes between the appliance and the terminal. See section 11.0 for details.



### 10.10.1 FLUE TRANSITION PARTS HCB206CE – HCB236CE



Depending upon the flue kit chosen either a vertical or horizontal concentric terminal will be included in the packaging with the transition kit, additional elbows, flue lengths etc. Further items are available as ancillary and may be required to complete the flue system. Additional wall brackets may be required to ensure the flue system is stable. For a full list of flue components supplied and optional parts to complete the system see the herald flue guide available at [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)

ITEM NUMBER	DESCRIPTION	/HCB 206	/HCB 236
1	150mm ELBOW	1 REQUIRED	1 REQUIRED
2	AIR INTAKE TRANSITION	1 REQUIRED	1 REQUIRED
3	EXHAUST SAMPLING POINT	1 REQUIRED	1 REQUIRED

### 10.10.2 HORIZONTAL CONCENTRIC FLUE TRANSITION PARTS HCB206CE – HCB236CE

To install the flue connection to the HCB206CE – HCB236CE boilers the following procedure should be followed:

1. Check you have all items shown above.
2. Check the flue temperature sensor (supplied with the boiler) is securely located into the hole on the exhaust transition.



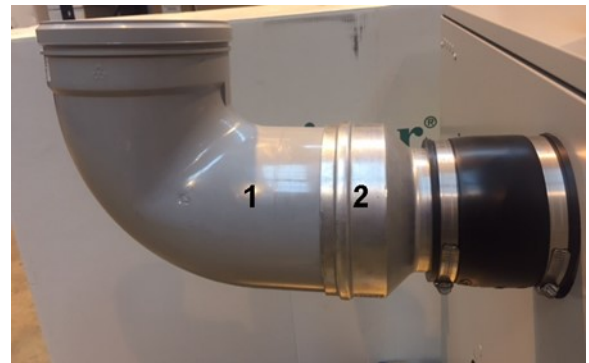
**If the flue temperature sensor is not fitted, the flue gas may exceed the maximum temperature rating of the flue and can lead to severe personal injury, death or substantial property damage.**

3. Insert the air intake transition (Item 2) into the intake connection and tighten the worm drive clip.
4. Insert the 150mm 90 elbow (Item 1) into the air intake transition (Item 2)
5. Insert the 150mm 90 elbow (Item 1) into the exhaust transition
6. Insert the Exhaust sampling point (Item 3) into the 150mm 90 elbow (Item 1).

The completed installation should look like the photos shown below.



**EXHAUST TRANSITION KIT FITTED HCB206CE-HCB236CE**



**AIR INLET TRANSITION KIT FITTED HCB206CE-HCB236CE**

**10.10.3 TRANSITION KIT FITTED TO APPLIANCE**

## 10.11 C13 CONCENTRIC HORIZONTAL FLUE SYSTEMS

Flue system specifications

- MANUFACTURER MUELINK AND GROL (M&G)
- TEMPERATURE CLASS T120
- FLUE GAS MATERIAL PP

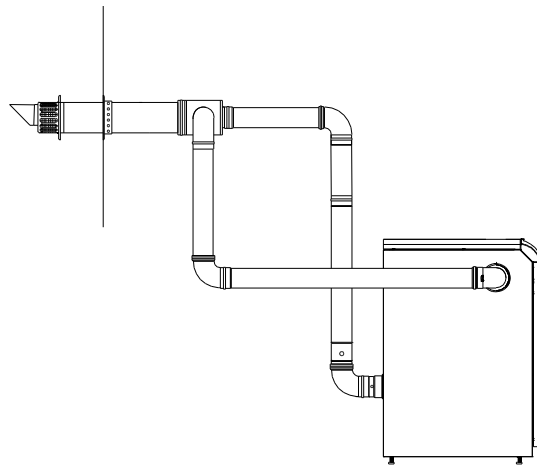
Each concentric horizontal flue kit includes the items shown in the tables below

Item No HBHF002			
CONCENTRIC HORIZONTAL FLUE ASSEMBLY			
MODEL HCB116CE			
COMPONENTS INCLUDED			
Item No.	Description	Number	Quantity
M85181B	BEND 90° 100mm PP	1	3
M85182B	BEND 45° 100mm PP	2	1
M84421B	SAMPLING POINT Ø100/150mm PP	3	1
M75259B	CONCENTRIC ADAPTER TEE Ø100/100mm Ø100/150mm PP	4	1
M75257B	AIR INLET TRANSITION Ø100mm ALU	5	1
M85176B	EXTENSION Ø100mm (500mm) PP CUT TO LENGTH	6	3
M84412B	CONCENTRIC BEND 90° Ø100/150mm PP	7	1
LV310758 B	CONCENTRIC HORIZONTAL TERMINAL Ø100/150mm PP	8	1

Item No HBHF003			
CONCENTRIC HORIZONTAL FLUE ASSEMBLY			
Twin-pipe system with a concentric terminal			
MODELS HCB146CE,HCB176CE			
COMPONENTS INCLUDED			
Item No.	Description	Number	Quantity
M85126B	EXPANDER Ø100mm - Ø130mm PP	1	1
M70262B	EXPANDER Ø130mm - Ø150mm PP	2	1
M87039B	AIR INLET TRANSITION Ø150mm ALU	3	1
M85181B	BEND 90° 100mm PP	4	1
LV310665B	BEND 90° Ø150mm PP	5	4
M70326B	SAMPLING POINT Ø150mm PP	6	1
LV310694B	EXTENSION Ø150mm(1000mm) PP CUT TO LENGTH	7	4
M76561B	HORIZONTAL TERMINAL Ø150/220mm ALU	8	1

Item No HBHF004			
<b>CONCENTRIC HORIZONTAL FLUE ASSEMBLY</b>			
Twin-pipe system with a concentric terminal			
<b>MODELS HCB206CE,HCB236CE</b>			
<b>COMPONENTS INCLUDED</b>			
Item No.	Description	Number	Quantity
M87039B	AIR INLET TRANSITION Ø150mm ALU	1	1
LV310665B	BEND 90° Ø150mm PP	2	5
M70326B	SAMPLING POINT Ø150mm PP	3	1
LV310694B	EXTENSION Ø150mm(1000mm) PP CUT TO LENGTH	4	4
M76561B	HORIZONTAL TERMINAL Ø150/220mm ALU	5	1

## 11.0 FLUE TERMINAL INSTALLATION



### 11.1.1 HORIZONTAL CONCENTRIC ROOM SEALED APPLICATION, MODELS HCB116CE-HCB236CE

When the boiler is installed as a Type C<sub>13</sub> (Horizontal concentric) appliance, the flue system should be installed as follows:

1. Determine the location of the flue terminal, taking into account minimum distances as detailed in **Section 10.4.1** and the relevant British Standards.
2. Taking care to protect the appliance from debris and dust, drill a hole in the desired location. The diameter of the hole should be no more than 10mm greater than the diameter of the air supply pipe of the terminal.
3. Determine the required length of the terminal and cut as necessary.



**When determining the required length for the flue terminal, the outer wall plate or rosette should be flush to the wall. (see 11.1.2)**



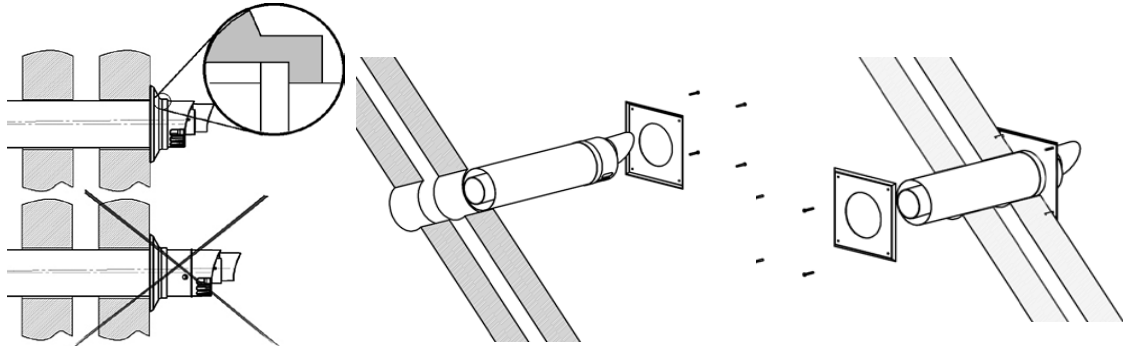
**Once cut; remove all burrs and sharp edges**

4. Insert the terminal into the drilled hole. The terminal section should be installed level or with a fall to outside (Max. 10mm per metre) to prevent the ingress of water.



**When inserting the terminal, ensure the air intake section is at the bottom.**

5. Fill the void between the terminal and wall with water resistant sealant.
6. Fit the wall plates or rosette using appropriate fixings.
7. Fit the concentric adapter (HCB146CE – HCB236CE only) and clamp using its locking band.
8. Install the remainder of the flue system working progressively away from the boiler supporting the pipes as necessary.



#### 11.1.2 HORIZONTAL TERMINAL INSTALLATION

#### 11.2 FLUE TERMINAL GUARDING

If a horizontal flue terminal is to be fitted less than 2 metres from ground level or in a location where it can be touched from a window, door or balcony, a terminal guard must be fitted.

### 11.3 C33 CONCENTRIC VERTICAL FLUE SYSTEMS

Flue system specifications

- MANUFACTURER MUELINK AND GROL (M&G)
- TEMPERATURE CLASS T120
- FLUE GAS MATERIAL PP

Each concentric horizontal flue kit includes the items shown in the tables below

Item No HBVF002			
CONCENTRIC VERTICAL FLUE ASSEMBLY			
MODEL HCB116CE			
COMPONENTS INCLUDED			
Item No.	Description	Number	Quantity
M85181B	BEND 90° 100mm PP	1	3
M85182B	BEND 45° 100mm PP	2	1
M84421B	SAMPLING POINT Ø100/150mm PP	3	1
M75259B	CONCENTRIC ADAPTER TEE Ø100/100mm Ø100/150mm PP	4	1
M75257B	AIR INLET TRANSITION Ø100mm ALU	5	1
M85176B	EXTENSION Ø100mm (500mm) PP CUT TO LENGTH	6	3
M84405B	CONCENTRIC EXTENSION Ø100/150 (500mm) PP CUT TO LENGTH	7	1
LV310754B	CONCENTRIC VERTICAL TERMINAL Ø100/150mm PP	8	1

Item No HBVF003			
CONCENTRIC VERTICAL FLUE ASSEMBLY			
Twin-pipe system with a concentric terminal			
MODELS HCB146CE,HCB176CE			
COMPONENTS INCLUDED			
Item No.	Description	Number	Quantity
M85181B	BEND 90° 100mm PP	1	1
M85126B	EXPANDER Ø100mm - Ø130mm PP	2	1
M70262B	EXPANDER Ø130mm - Ø150mm PP	3	1
M70326B	SAMPLING POINT Ø150mm PP	4	1
M87039B	AIR INLET TRANSITION Ø150mm ALU	5	1
LV310665B	BEND 90° Ø150mm PP	6	3
LV310694B	EXTENSION Ø150mm(1000mm) PP CUT TO LENGTH	7	4
M86929B	VERTICAL TERMINAL Ø150/220mm ALU	8	1

## Item No HBVF004

# CONCENTRIC VERTICAL FLUE ASSEMBLY

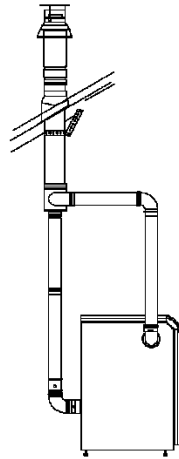
Twin-pipe system with a concentric terminal

## MODELS HCB206CE, HCB236CE

### COMPONENTS INCLUDED

Item No.	Description	Number	Quantity
LV310665B	BEND 90° Ø150mm PP	1	4
M70326B	SAMPLING POINT Ø150mm PP	2	1
M87039B	AIR INLET TRANSITION Ø150mm ALU	3	1
LV310694B	EXTENSION Ø150mm(1000mm) PP CUT TO LENGTH	4	4
M86929B	VERTICAL TERMINAL Ø150/220mm ALU	5	1

### 11.4 TYPE C<sub>33</sub> (VERTICAL ROOM SEALED)



#### 11.4.1 VERTICAL CONCENTRIC ROOM SEALED APPLICATION, MODELS HCB116CE-HCB236CE

When the boiler is installed as a Type C<sub>33</sub> (Vertical Concentric) appliance, the flue system should be installed as follows:

1. Confirm that the roof flashing is correct for the type of roof through which the terminal is to be installed. (See 11.4.2)
2. Determine the desired location for the flue terminal, taking into account minimum distances as detailed in Section 10.4.1 and the relevant British Standards.
3. Taking care to protect the appliance from debris and dust, drill a hole in the desired location. The diameter of the hole should be no more than 10mm greater than the diameter of the air supply pipe of the terminal.



**The hole should be drilled from the outside to ensure that no damage is done to the roofing material. Extra care should be taken to ensure that the hole is drilled vertically.**

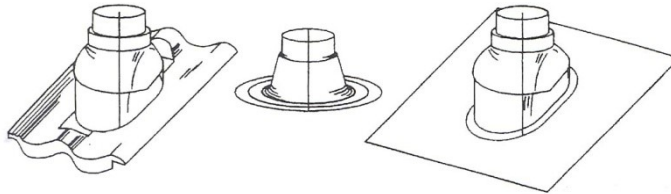
4. Install the roof flashing and secure as appropriate.
5. Carefully insert the roof terminal through the roof flashing and hole in the roof.



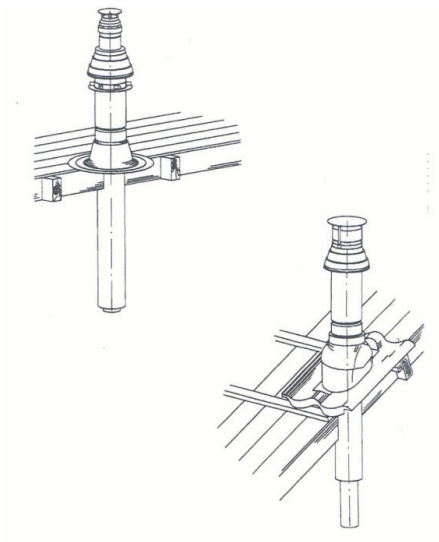
**When inserting the roof terminal do not support or turn the terminal using the cap.**



6. Ensure the terminal is vertical using a spirit level.
7. Fit the support bracket around the terminal and secure using appropriate fixings. Do not tighten the support bracket
8. Fit the concentric adapter (HCB146CE – HCB236CE only) and clamp using its locking band.
9. Install the remainder of the flue system working progressively away from the boiler supporting the pipes as necessary.
10. Once the flue system is fully installed, tighten the clamp to secure the terminal in place.



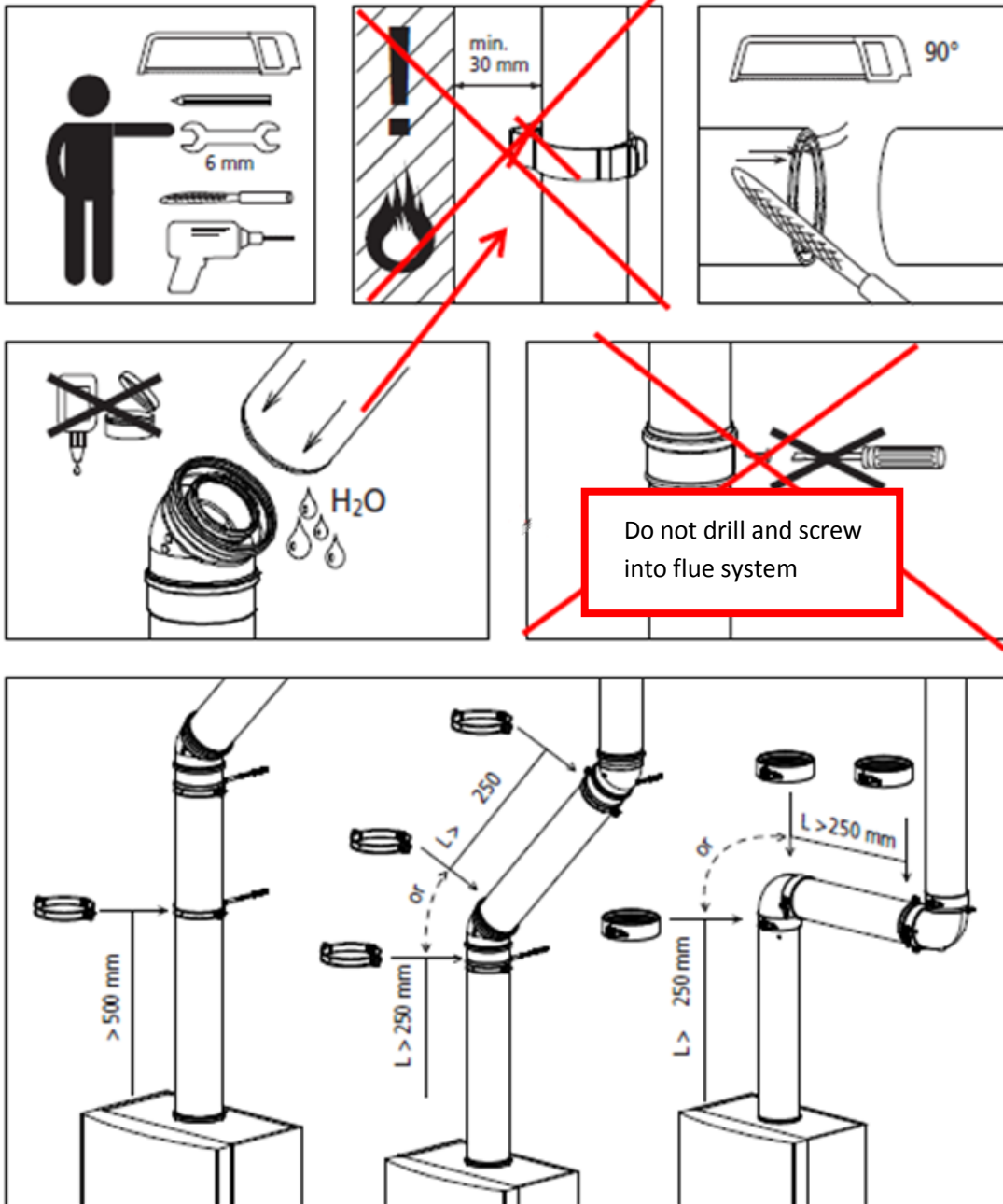
#### 11.4.2 VERTICAL TERMINAL ROOF FLASHINGS FOR SYNTHETIC, FLAT AND TILED ROOFS

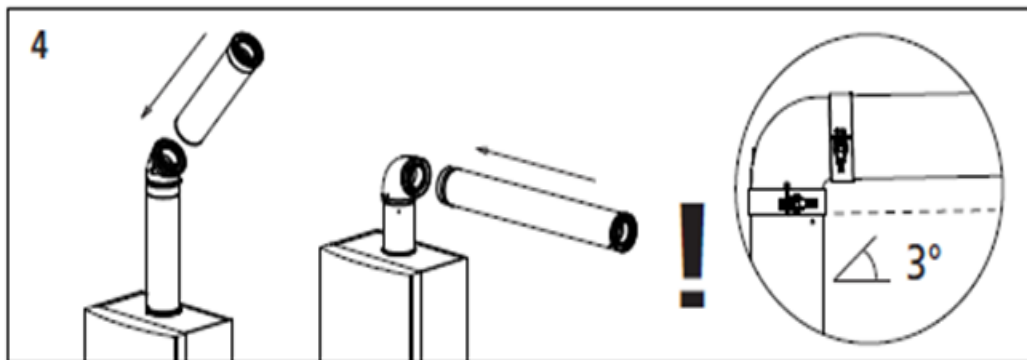
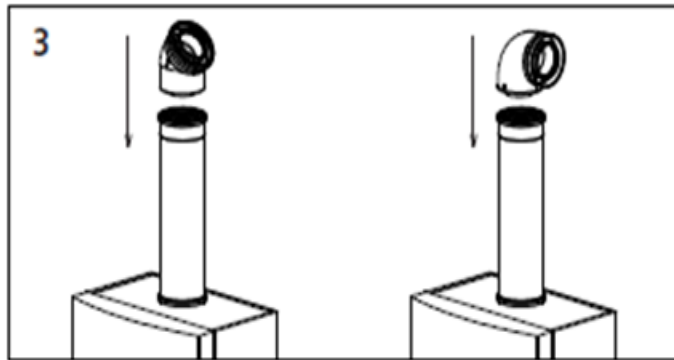
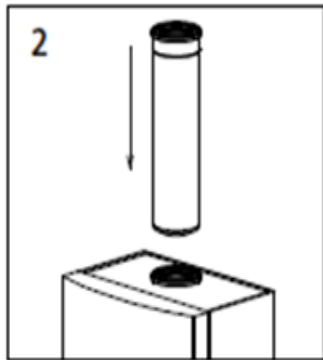
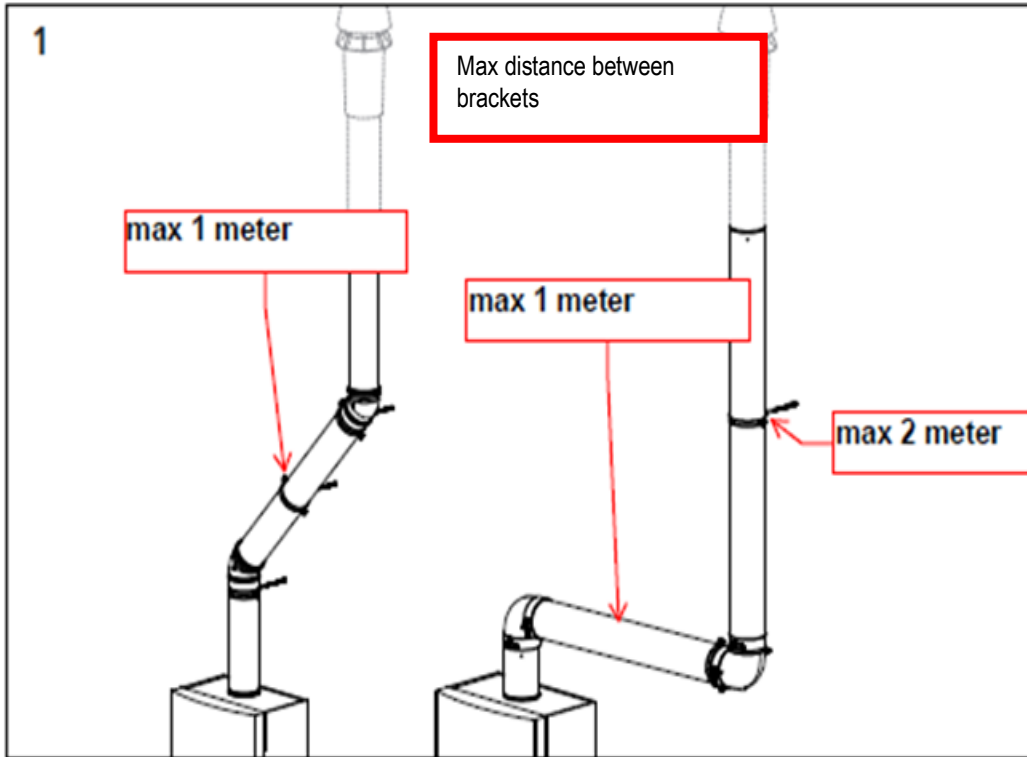


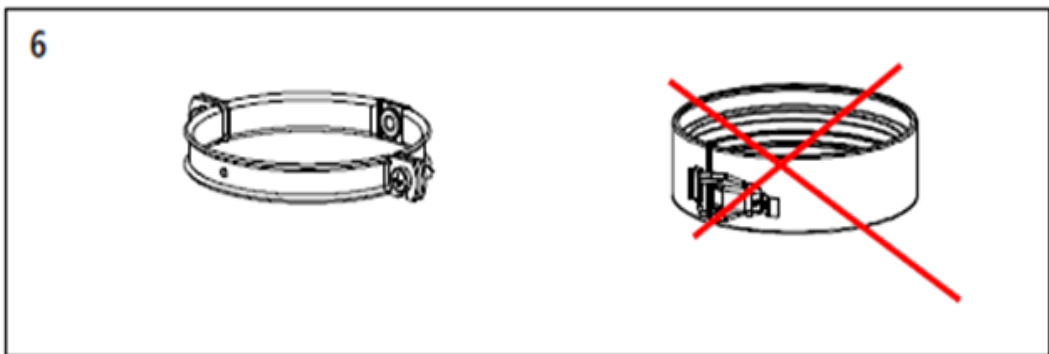
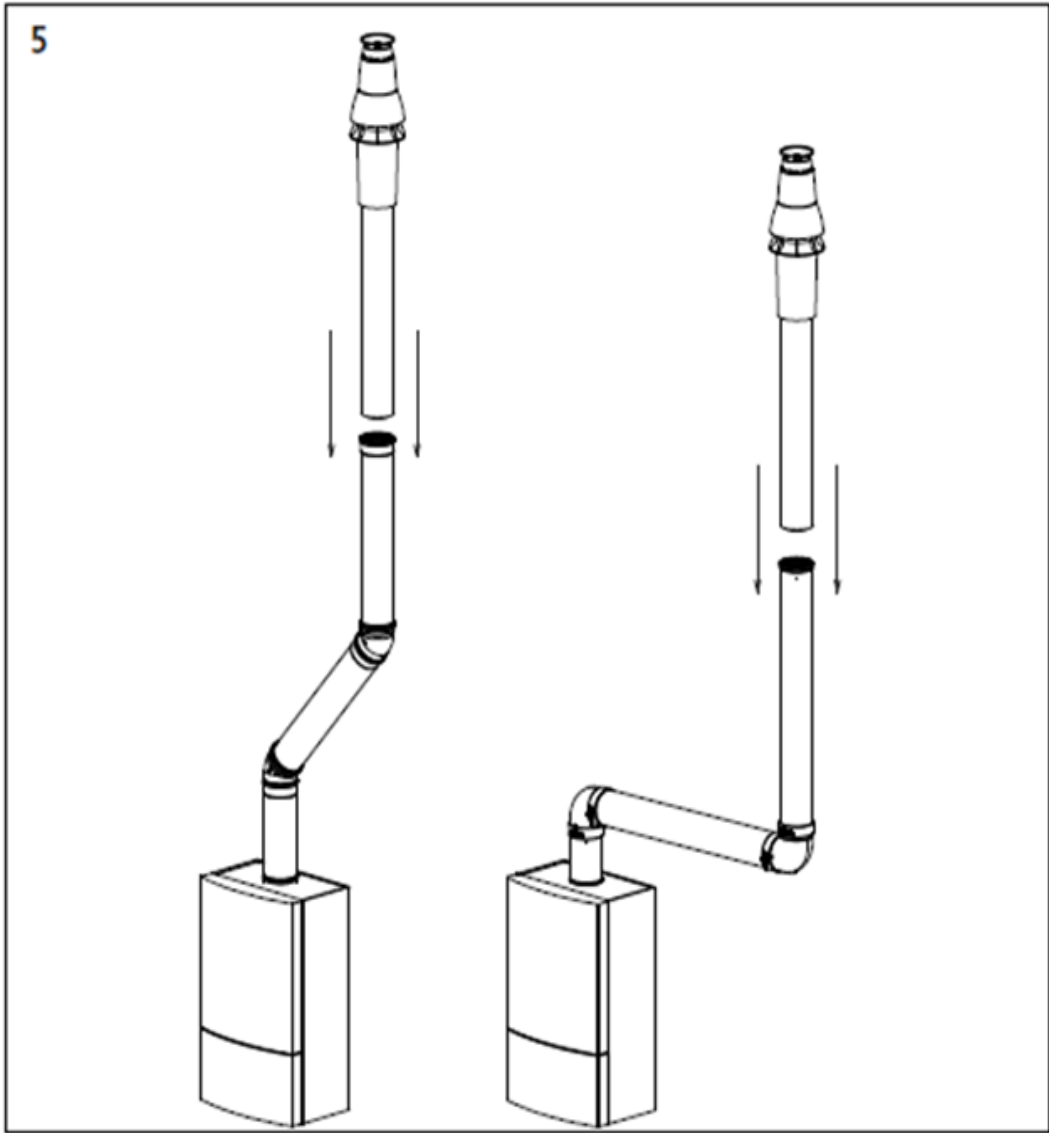
#### 11.4.3 INSTALLING TERMINAL THROUGH ROOF FLASHING

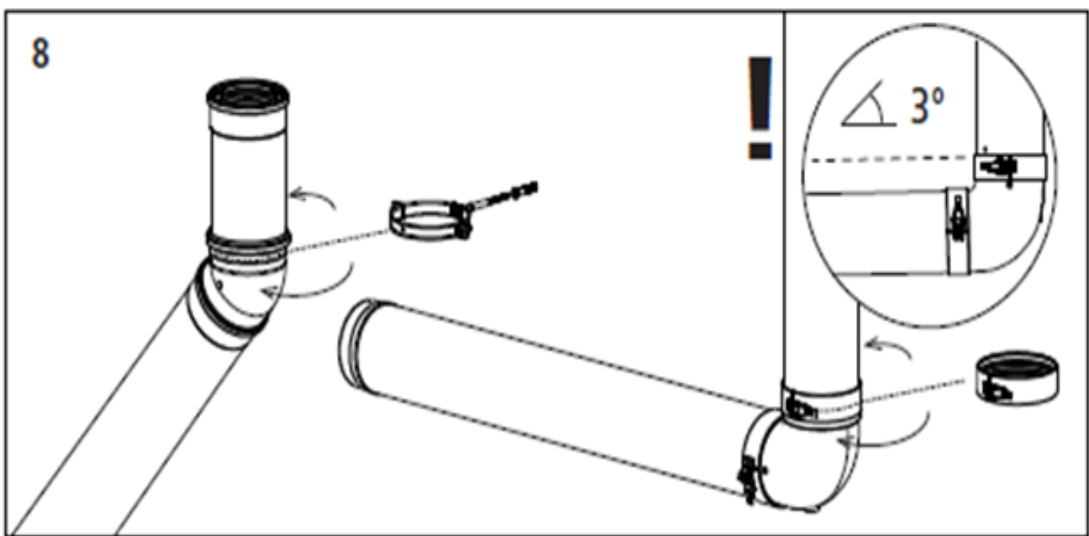
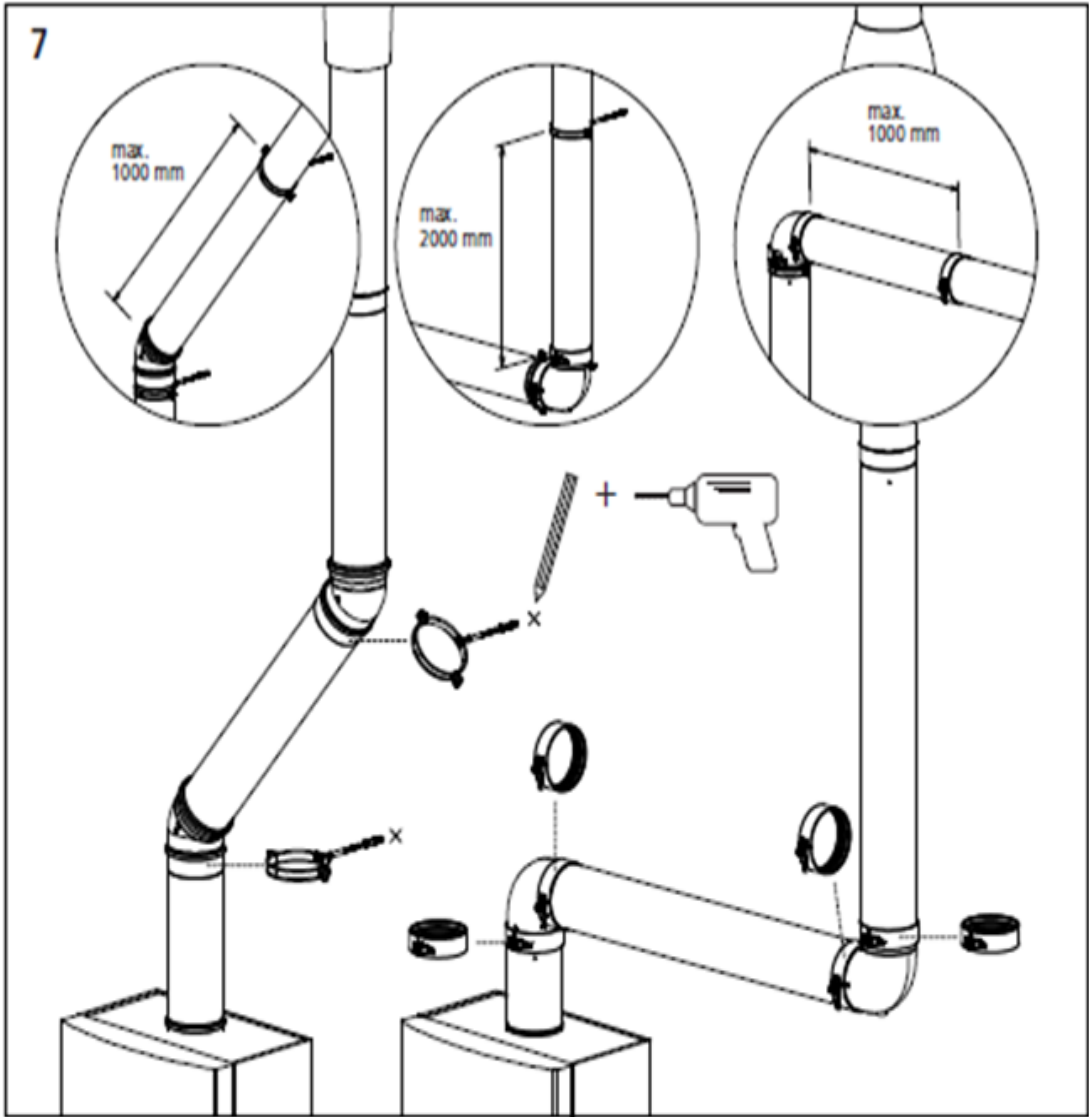


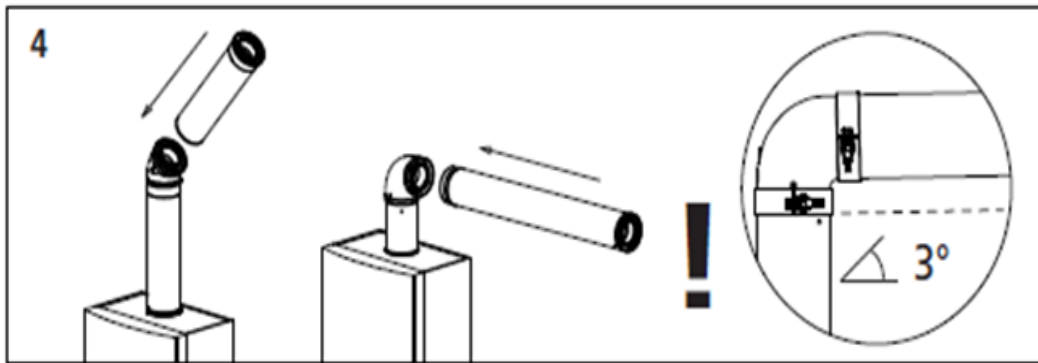
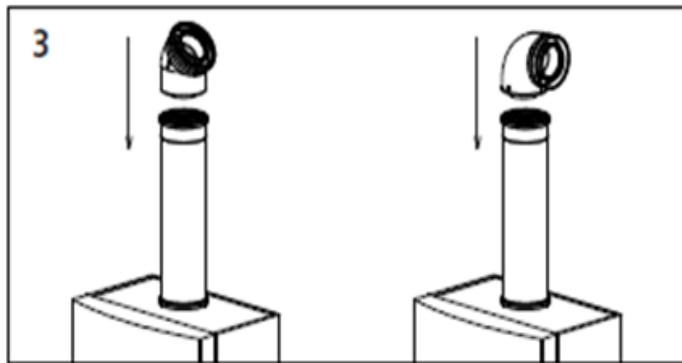
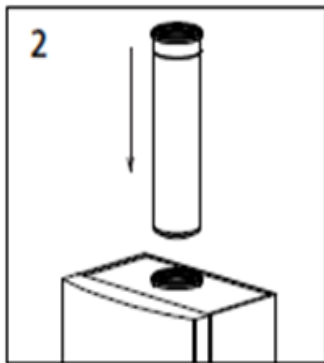
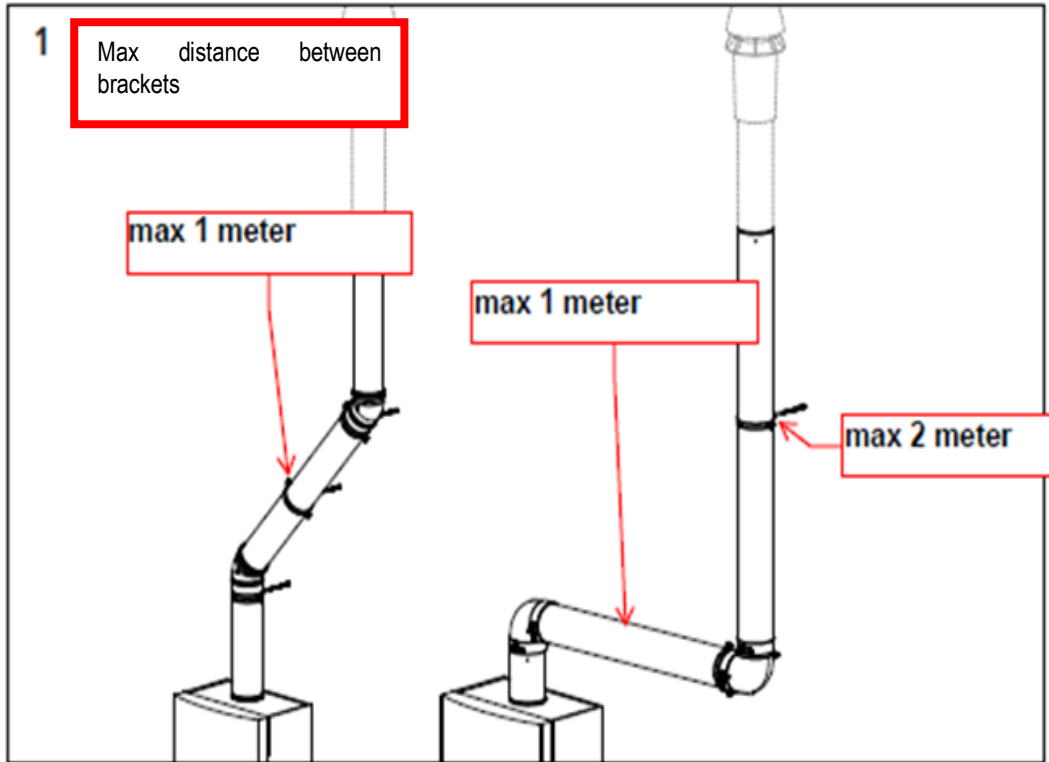
The information in this section is for General guidance only and may not fully represent the installation on site

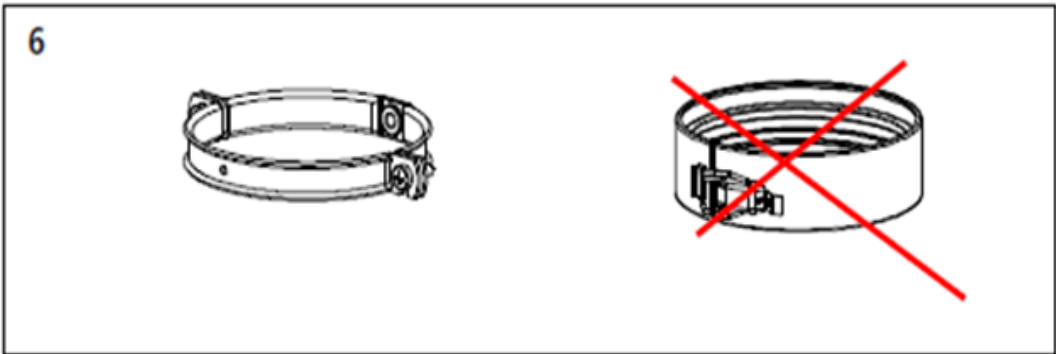
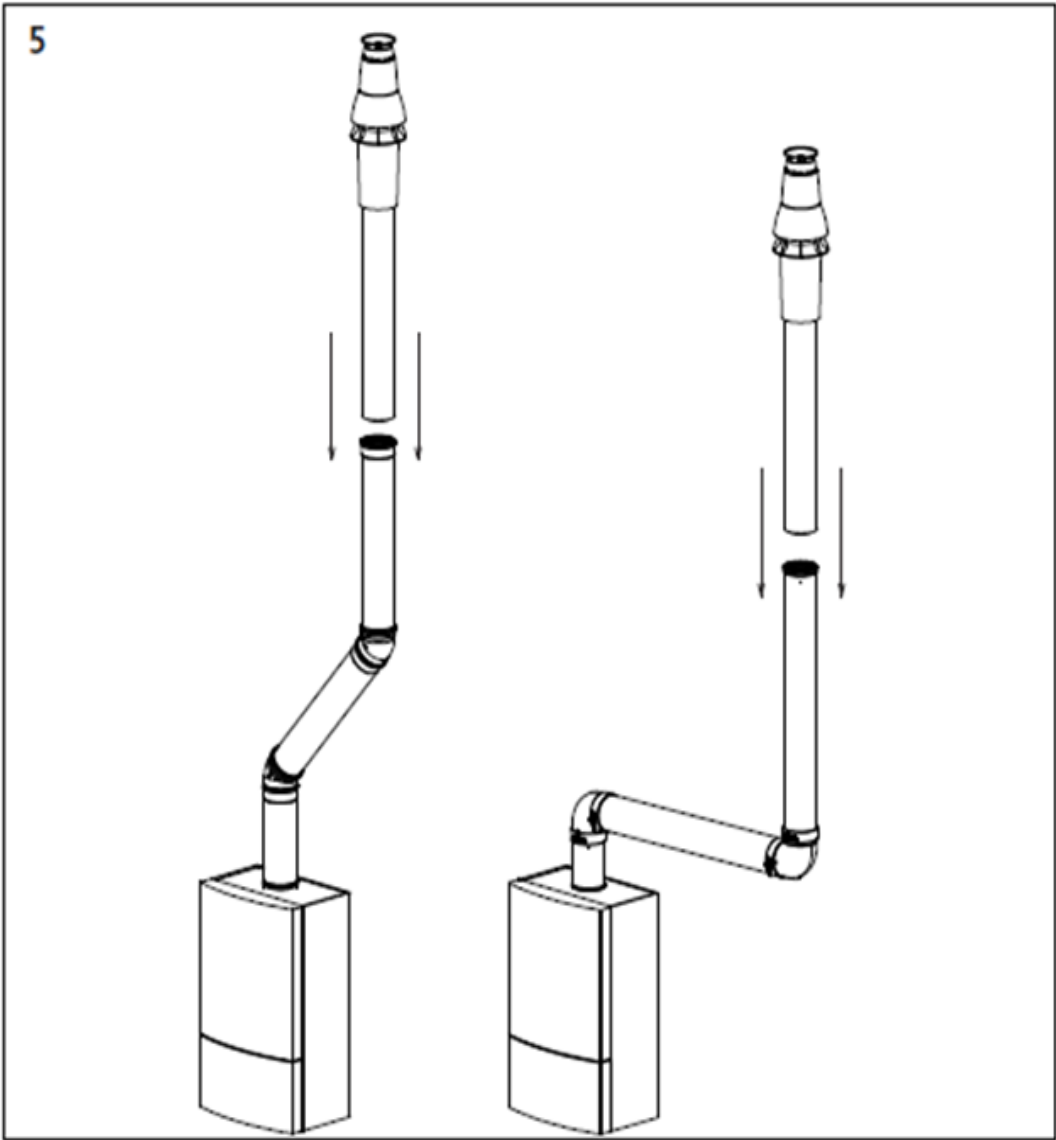


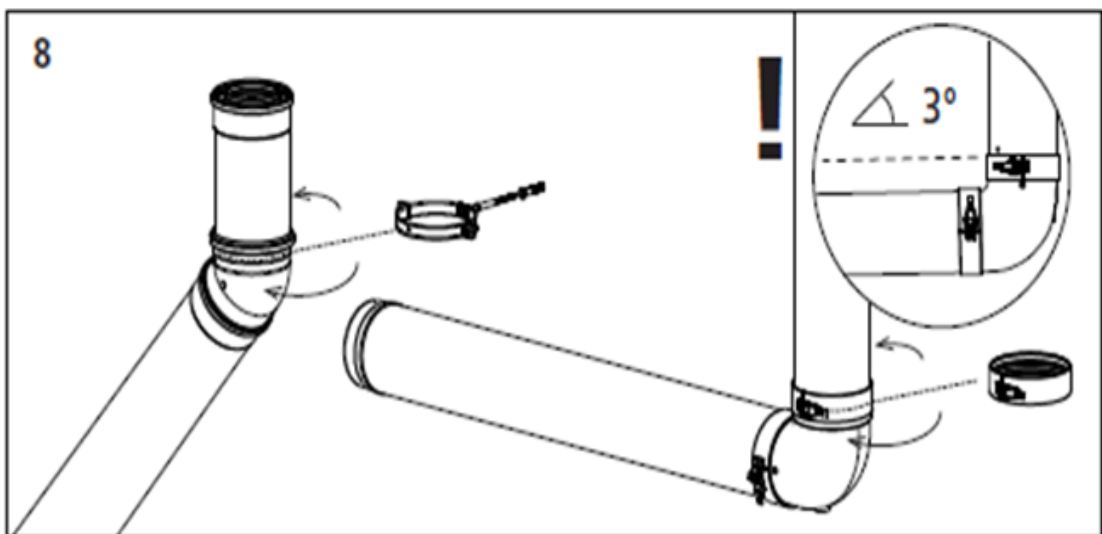
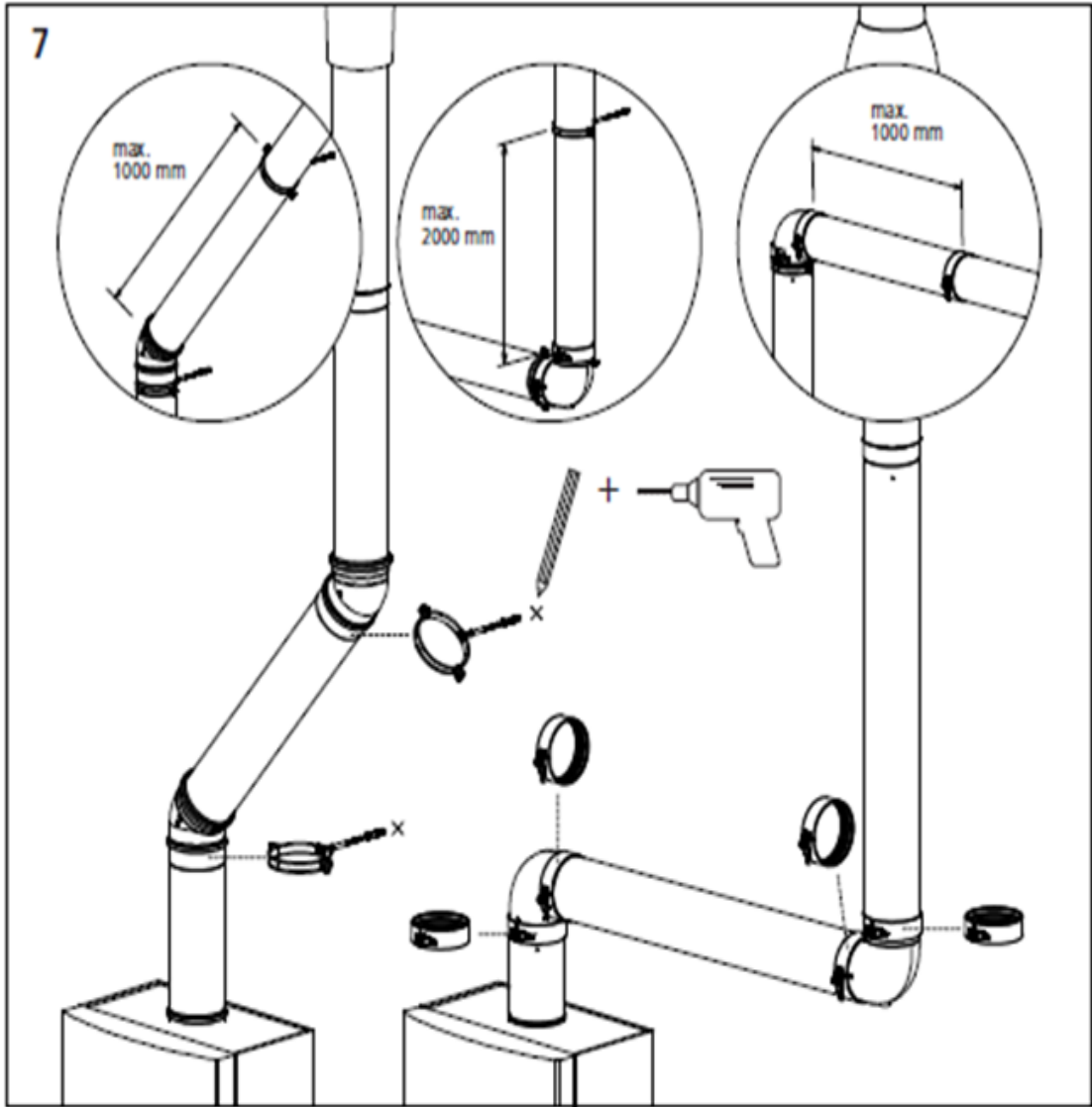














## 11.1 TYPE C<sub>43</sub> (U DUCT)

This appliance can operate on a U-Duct common flue system. The maximum lengths for the interconnecting flue can be found in **Section 10.2.1**.

Concrete components of the U-Duct must meet the requirements of **BS EN 1858**.



**Only use a C43 venting system when the common duct is a natural draught chimney. The common duct is part of the building, not a part of the system.**

### 11.1.1 CONDENSATE DRAIN

Condensate can flow back to the appliance, this will travel through the heat exchanger into the condensate drain via the trap. If the flue system rises at an angle of at least 3° (50mm per metre), no additional condensate drain will be required. Failure to provide an adequate rise in the flue system may lead to pooling of condensate, which may lead to premature failure of the flue system

Model No.	Nominal Flue Diameter	Mass Rate @ 100% (@ 9% CO <sub>2</sub> ) (G20)	Mass Rate @ 23% (@ 9% CO <sub>2</sub> ) (G20)	Mass Rate @ 100% (@ 10.5% CO <sub>2</sub> ) (G31)	Mass Rate @ 23% (@ 10.5% CO <sub>2</sub> ) (G31)
HCB116CE	100+/-0.6	42.5g/s	9.8g/s	44.2g/s	10.2g/s
HCB146CE	150+/-0.6	53.2g/s	12.2 g/s	55.4g/s	12.7g/s
HCB176CE	150+/-0.6	63.9g/s	14.7g/s	66.6g/s	15.3g/s
HCB206CE	150+/-0.6	74.6g/s	17.1 g/s	77.6g/s	17.9g/s
HCB236CE	150+/-0.6	85.2g/s	19.6g/s	88.8g/s	20.4g/s

### 11.1.2 FLUE GAS MASS RATES TABLE

## 11.2 TYPE C<sub>53</sub> (TWIN PIPE)

Flue system specifications

- MANUFACTURER MUELINK AND GROL (M&G)
- TEMPERATURE CLASS T120
- FLUE GAS MATERIAL PP

Each Twin-Pipe starter assembly includes the items shown in the tables below

<b>Item No HBTF002</b>			
<b>TWIN-PIPE FLUE STARTER ASSEMBLY</b>			
Kit contains components to start the connection to the appliance only			
<b>MODEL HCB116CE</b>			
<b>COMPONENTS INCLUDED</b>			
Item No.	Description	Number	Quantity
M75257B	AIR INLET TRANSITION Ø100mm ALU	1	1
M85189B	SAMPLING POINT Ø100mm PP	2	1

<b>TWIN-PIPE FLUE STARTER ASSEMBLY</b>	
<b>MODELS HCB206CE, HCB236CE</b>	
The concentric flue assembly for models HCB206CE and HCB236CE consists of a twin-pipe flue system with a concentric terminal- this system should be used if a twin-pipe assembly is required for these models.	

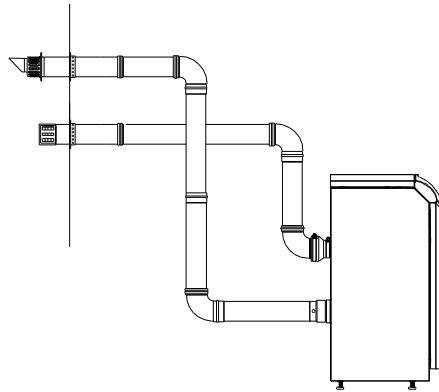
<b>TWIN-PIPE FLUE STARTER ASSEMBLY</b>	
<b>MODELS HCB206CE, HCB236CE</b>	
The concentric flue assembly for models HCB206CE and HCB236CE consists of a twin-pipe flue system with a concentric terminal- this system should be used if a twin-pipe assembly is required for these models.	



When installing the Boilers as a Type C53 appliance, it should be noted that the terminals must not be installed on opposite sides of the building.



If the flue temperature sensor is not fitted, the flue gas temperature may exceed the maximum temperature rating of the flue and can lead to severe personal injury, death or substantial property damage.



#### 11.2.1 TYPICAL HORIZONTAL TWIN PIPE FLUE ARRANGEMENT

When installing the Herald on a C<sub>53</sub> twin pipe flue system, the Lochinvar Twin pipe flue kit must be fitted first including the flue temperature sensor.



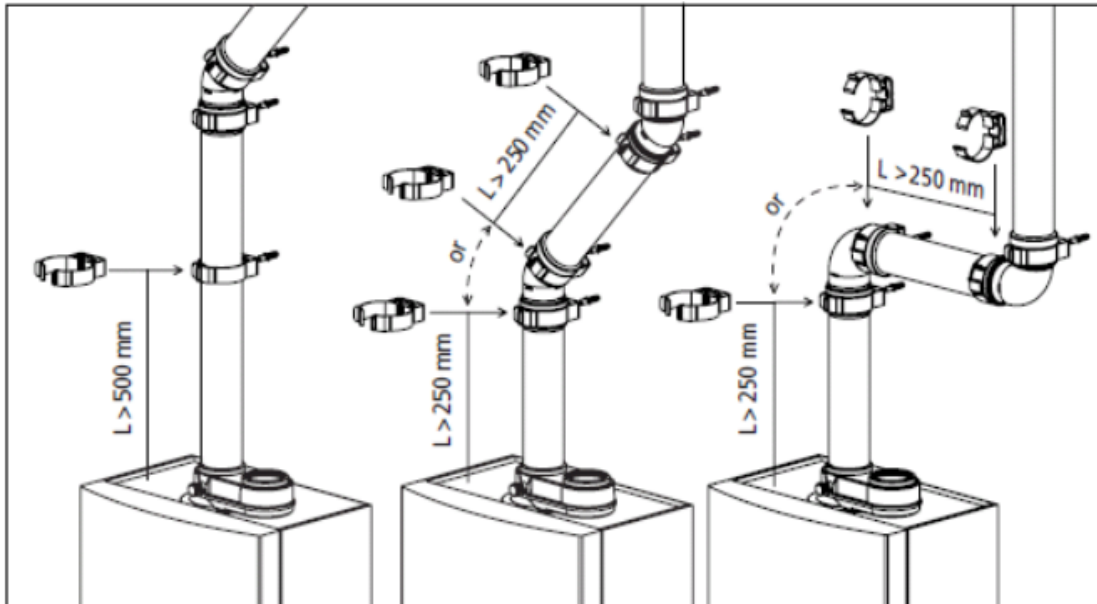
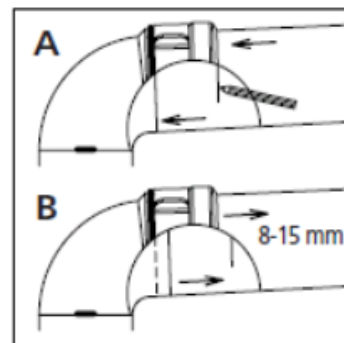
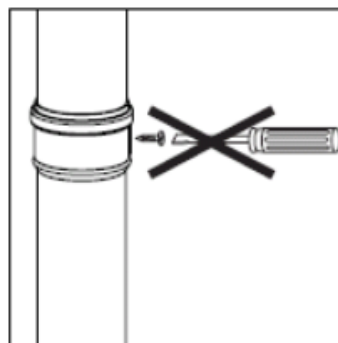
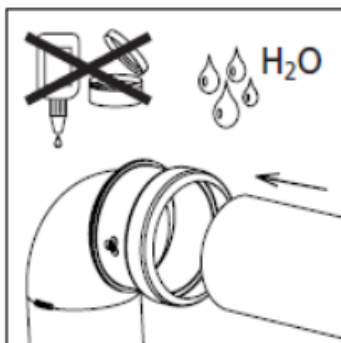
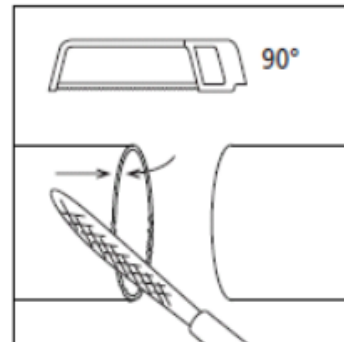
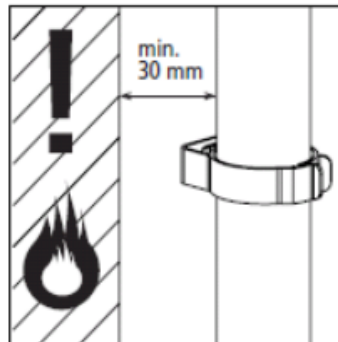
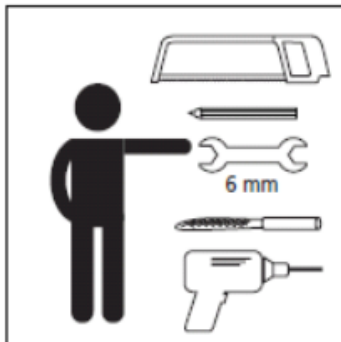
If the flue temperature sensor is not fitted, the flue gas may exceed the maximum temperature rating of the flue and can lead to severe personal injury, death or substantial property damage.

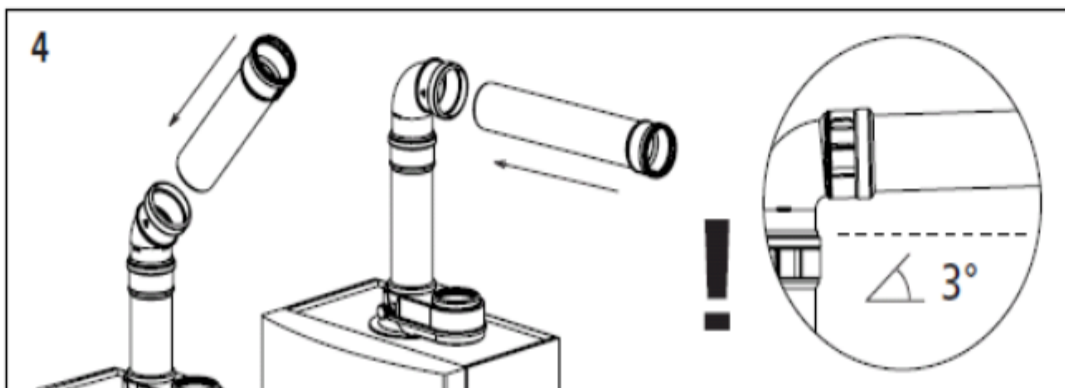
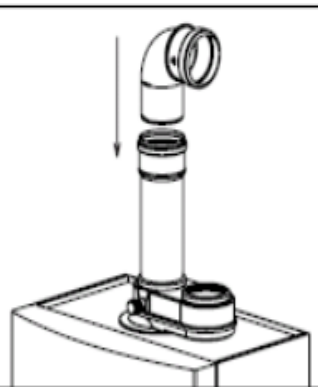
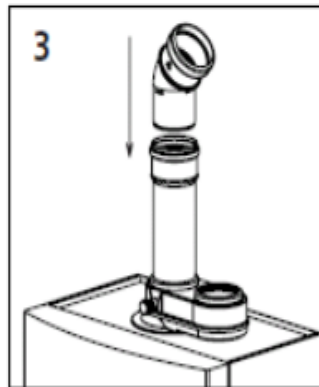
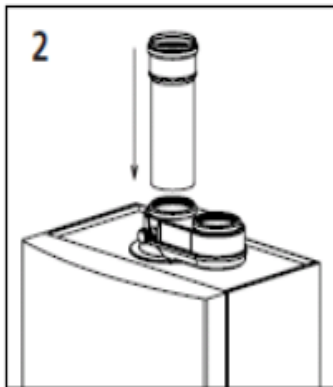
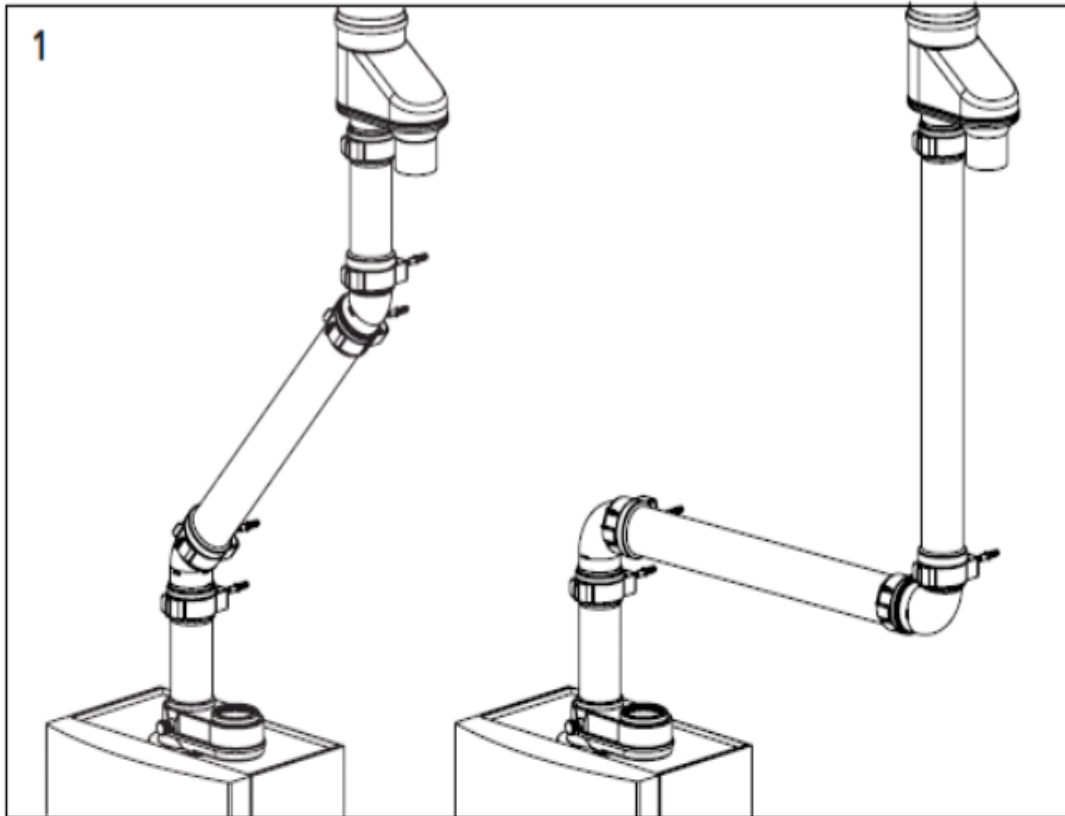
To install a Type C<sub>53</sub> terminal or air inlet, the procedure for either a Type C<sub>13</sub> (horizontal) or a Type C<sub>33</sub> (vertical) terminal should be followed noting that the annular space of the terminal should be sealed off.

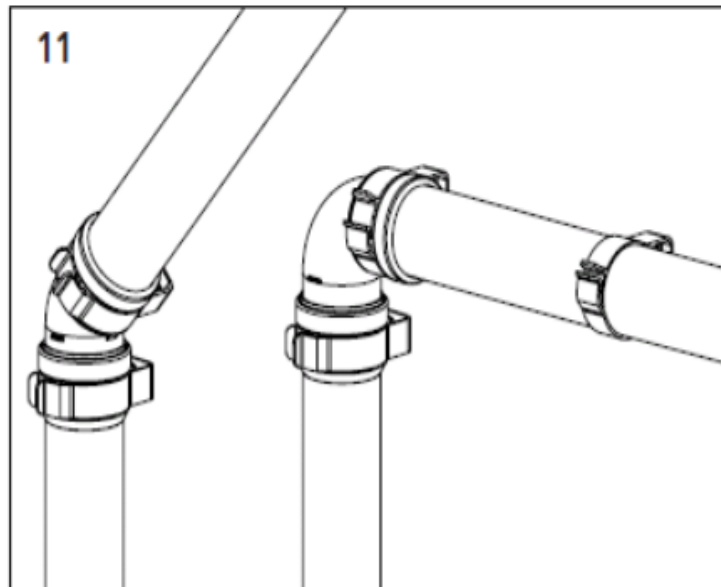
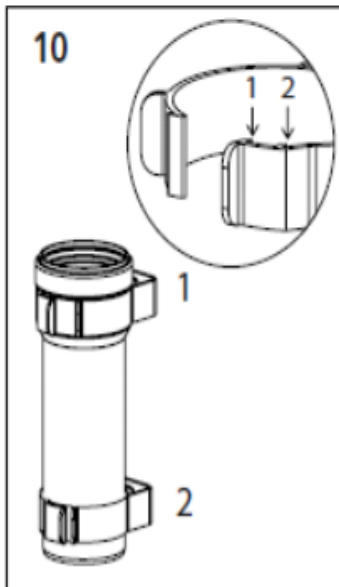
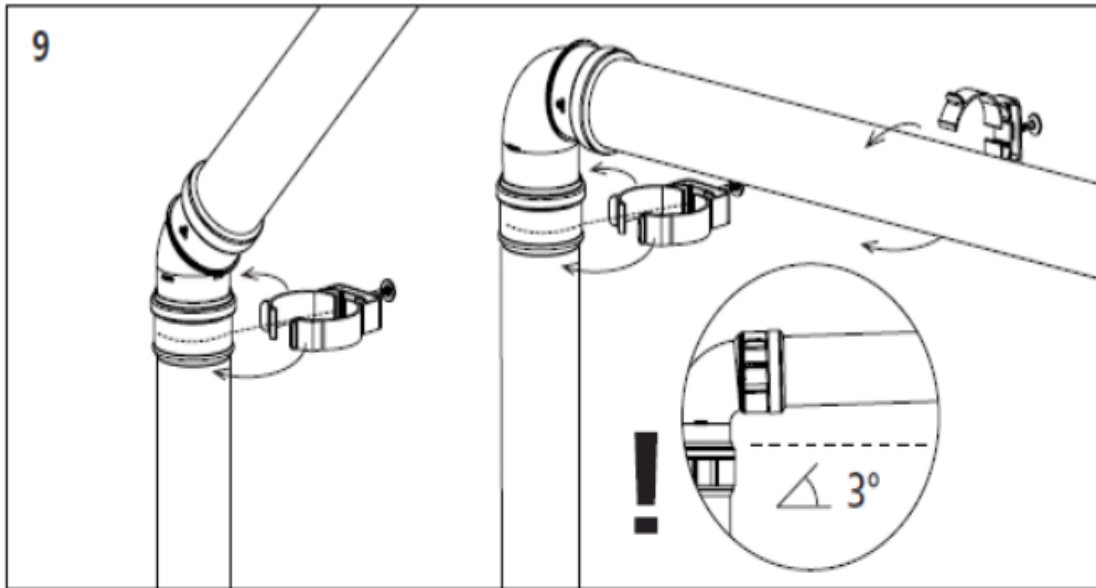
11.2.1 GENERAL TWIN-PIPE INSTALLATION GUIDELINES



The information in this section is for General guidance only and may not fully represent the installation on site







To install a Type C<sub>53</sub> terminal or air inlet, the procedure for either a Type C<sub>13</sub> (horizontal) or a Type C<sub>33</sub> (vertical) terminal should be followed noting that the annular space of the terminal should be sealed off.

### 11.3 TYPE B<sub>23</sub> (CONVENTIONAL FLUE WITH FAN ASSISTANCE)

When the boiler is installed as a Type B<sub>23</sub> appliance, the flue system should be installed in accordance with the flue manufacturer's specific instructions.

Flue system specifications

- MANUFACTURER MUELINK AND GROL (M&G)
- TEMPERATURE CLASS T120
- FLUE GAS MATERIAL PP

Each Conventional Flue starter assembly includes the items shown in the tables below

<b>Item No HBCF002</b>			
<b>FAN ASSISTED OPEN FLUE STARTER ASSEMBLY</b>			
Kit contains components to start the connection to the appliance only			
<b>MODEL HCB116CE</b>			
<b>COMPONENTS INCLUDED</b>			
Item No.	Description	Number	Quantity
M75257B	AIR INLET TRANSITION Ø100mm ALU	1	1
M86787B	APPLIANCE AIR INLET GUARD Ø100mm	2	1
M85189B	SAMPLING POINT Ø100mm PP	3	1

<b>Item No HBCF003</b>			
<b>FAN ASSISTED OPEN FLUE STARTER ASSEMBLY</b>			
Kit contains components to start the connection to the appliance only			
<b>MODELS HCB146CE,HCB176CE</b>			
<b>COMPONENTS INCLUDED</b>			
Item No.	Description	Number	Quantity
M75257B	AIR INLET TRANSITION Ø100mm ALU	1	1
M86787B	APPLIANCE AIR INLET GUARD Ø100mm	2	1
M85181B	BEND 90° 100mm PP	3	1
M85126B	EXPANDER Ø100mm - Ø130mm PP	4	1
M70262B	EXPANDER Ø130mm - Ø150mm	5	1
M70326B	SAMPLING POINT Ø150mm PP	6	1

## Item No HBCF004

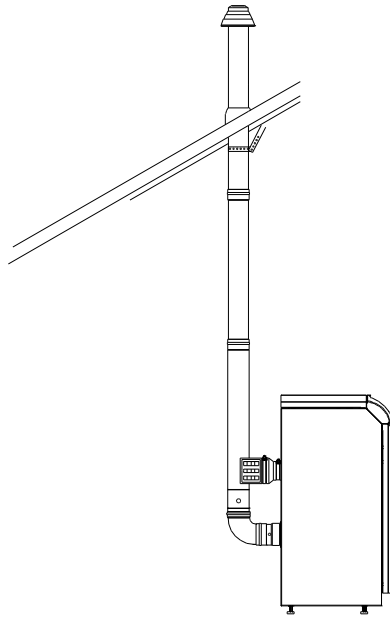
# FAN ASSISTED OPEN FLUE STARTER ASSEMBLY

Kit contains components to start the connection to the appliance only

## MODELS HCB206CE, HCB236CE

### COMPONENTS INCLUDED

Item No.	Description	Number	Quantity
M75257B	AIR INLET TRANSITION Ø100mm ALU	1	1
M86787B	APPLIANCE AIR INLET GUARD Ø100mm	2	1
M70326B	SAMPLING POINT Ø150mm PP	3	1



#### 11.3.1 TYPICAL CONVENTIONAL FLUE ARRANGEMENT

A kit of components to facilitate conventional fluing of the appliance is available from Lochinvar Limited. This kit must be fitted before any other flue components are used.

1. Check the flue temperature sensor (supplied with the boiler) is securely located into the hole on the exhaust transition.



**If the flue temperature sensor is not fitted, the flue gas may exceed the maximum temperature rating of the flue and can lead to severe personal injury, death or substantial property damage.**

2. Insert the air intake into the intake connection and tighten the worm drive clip.
3. Insert the air inlet grill into the air inlet transition.

## 11.4 C<sub>63</sub> CERTIFIED FLUE SYSTEMS

In general, Boilers are certified with their own purpose supplied Concentric or Twin Pipe flue systems, C<sub>63</sub> certified appliances allow the installer to use other flue systems when installing the Boilers however, they must be of a suitable minimum standard as per Table below.

CE string flue gas material	EU standard	Temperature class	Pressure class	Resistance to condensate	Corrosion resistance class	Metal: liner specifications
Min required PP	EN 14471	T120	P1	W	1	n/a
Min required INOX	EN 1856-1	T120	P1	W	1	L20040
CE string flue gas material	Soot fire resistance class	Distance to combustible material	Plastics location	Plastics fire behaviour	Plastics enclosure	
Min required PP	O	30	I of E	C/E	L	
Min required INOX	O	40	n/a	n/a	n/a	

### 11.4.1 C<sub>63</sub> FLUE SYSTEM SPECIFICATION

Material	Boiler	d <sub>nom</sub>	D <sub>outside</sub>	d <sub>inside</sub>	L <sub>insert</sub>
PP	HCB116 CE	100	100 +/-0.6		50 +20/ -2
PP	HCB146 CE	150	150 +/-0.6		50 +20/ -2
PP	HCB176 CE	150	150 +/-0.6		50 +20/ -2
PP	HCB206 CE	150	150 +/-0.6		50 +20/ -2
PP	HCB236 CE	150	150 +/-0.6		50 +20/ -2



When installing the boiler as a Type C<sub>63</sub> appliance, it should be noted that the terminals must not be installed on opposite sides of the building.



The maximum allowable recirculation rate is 10% under wind conditions



Aluminium flue pipe must not be used on this appliance as it may lead to premature failure of the heat exchanger and will invalidate the warranty.

### 11.4.2 CONDENSATE DRAIN

Condensate can flow back to the appliance; this will travel through the heat exchanger into the condensate drain via the trap.

If the flue system rises at an angle of at least 3° (50mm per metre), no additional condensate drain will be required. Failure to provide an adequate rise in the flue system may lead to pooling of condensate, which may lead to premature failure of the flue system.

Model Number		HCB116CE	HCB146CE	HCB176CE	HCB206CE	HCB236CE
<b>FLUE DATA TYPE C<sub>63</sub></b>						
Minimum flue gas temp	°C	35				
Average flue gas temp	°C	70				
Maximum flue gas temp. –	°C	120				
Max pressure difference between air inlet and flue gas outlet	mbar	Contact Lochinvar Technical support				

### 11.4.3 C<sub>63</sub> FLUE SYSTEM TECHNICAL DETAILS



## 12.0 AIR SUPPLY

The following information is based on single boiler installations only. If more than one boiler is being used, **BS5440-2** or **BS6644** (as appropriate) should be consulted to calculate the necessary requirements.

### 12.1 COMBUSTION VENTILATION

When used as a Type C (room sealed) appliance, provided sufficient clearance is provided, ventilation for combustion is not necessary as the combustion air is ducted directly from outside.

When used as a Type B (open flue) appliance, the combustion air requirements are as follows:

Model	Input (Gross) kW	Input (Net) kW	Plant Room						Enclosure					
			Low Summer Use		Medium Summer Use		High Summer Use		Low Summer Use		Medium Summer Use		High Summer Use	
			High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )
<b>HC B116CE</b>	117.2	105.6	212	424	318	530	424	636	530	1060	636	1166	742	1272
<b>HC B146CE</b>	146.5	132.0	264	528	396	660	528	792	660	1320	792	1452	924	1584
<b>HC B176CE</b>	175.8	158.4	318	636	477	795	636	954	795	1590	954	1749	1113	1908
<b>HC B206CE</b>	205.2	184.5	370	740	555	925	740	1110	925	1850	1110	2035	1295	2220
<b>HC B236CE</b>	234.5	211.3	424	848	636	1060	848	1272	1060	2120	1272	2332	1484	2544

12.1.1 COMBUSTION VENTILATION REQUIREMENTS HCB116CE – HCB236CE

### 12.2 COOLING VENTILATION

When used as a type C (room sealed) appliance, installed in a compartment or an enclosure, cooling ventilation should be provided as follows:

Model	Input (Gross) kW	Input (Net) kW	Enclosure/Compartment		Enclosure/Compartment		Boiler Room	
			(Direct to Outside)		(To Internal Space)		High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )
			High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )	High (cm <sup>2</sup> )	Low (cm <sup>2</sup> )		
<b>HC B116CE</b>	117.2	105.6	530	530	1060	1060	212	212
<b>HC B146CE</b>	146.5	132.0	660	660	1320	1320	264	264
<b>HC B176CE</b>	175.8	158.4	795	795	1590	1590	318	318
<b>HC B206CE</b>	205.2	184.5	925	925	1850	1850	370	370
<b>HC B236CE</b>	234.5	211.3	1060	1060	2120	2120	424	424

12.2.1 COOLING VENTILATION REQUIREMENTS

When used as a type B (open flue) appliance, provision for cooling ventilation is included in the combustion ventilation allowance.

## 13.0 WATER CONNECTIONS

### 13.1 GENERAL



Adaptors are required to convert the NPT (male) thread on the heat exchanger to BSP (female). These adaptors can be found in the packing carton. The BSP section of the adaptor is indicated with blue paint.



The requirements of minimum water flow are given in **Section 14.2**. Recommendations for the water circulation system are given in **BS6644** and **CP 342**. The following notes are of particular importance.

1. It is strongly recommended that a low velocity header be used to separate the primary circuit from the secondary circuit.
2. Circulating pipework not forming part of the useful heating surface should be insulated. Cisterns, expansion vessels and pipework situated in areas exposed to freezing conditions should also be insulated.
3. Drain valves must be located in accessible positions that will permit draining of the entire system including the unit and the storage vessel.
4. Tapping sizes for connection to the system are detailed in **TECHNICAL DATA**.
5. Ideally, individual valves should be fitted to each unit to enable isolation from the system. The arrangement must comply with the requirements of **BS6644** and must incorporate a small expansion vessel and correctly sized safety valve.

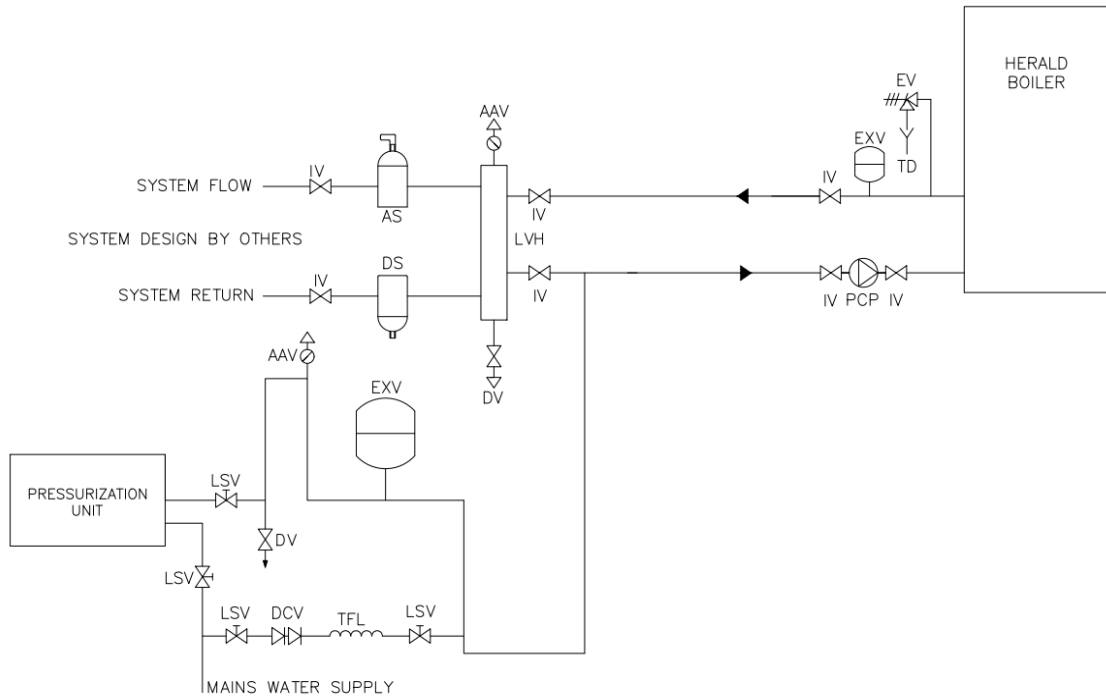
A suitably sized low velocity header or plate separator is available from Lochinvar Limited as ancillary item.

### 13.2 OPEN VENTED SYSTEM ARRANGEMENT

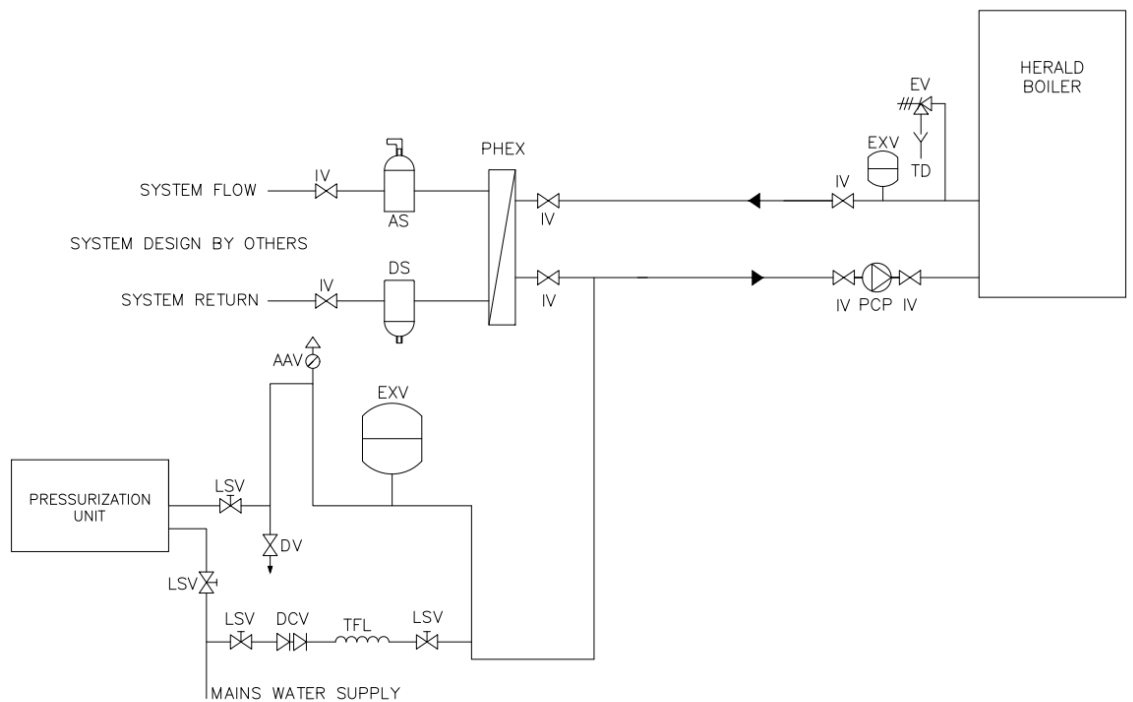
The Lochinvar Herald can be used in an open vented arrangement provided that a vent pipe in accordance with **CP 342** or **BS6644** as appropriate is fitted. The minimum static head requirement for an open vented system is 0.5 bar.

### 13.3 SEALED SYSTEM ARRANGEMENT

If a sealed system arrangement is required, a suitable pressurisation unit is available from Lochinvar Limited on request. Sealed systems should incorporate a safety valve with a lift pressure no greater than the maximum pressure rating of any component in the heating system. The maximum working pressure of the boiler is 11.0 bar. A suitably sized expansion vessel should also be fitted to the system in accordance with **BS4814**.



**13.3.1 TYPICAL SCHEMATIC, SINGLE BOILER WITH LOW LOSS HEADER**



**13.3.2 TYPICAL SCHEMATIC, SINGLE BOILER WITH PLATE SYSTEM SEPARATOR**

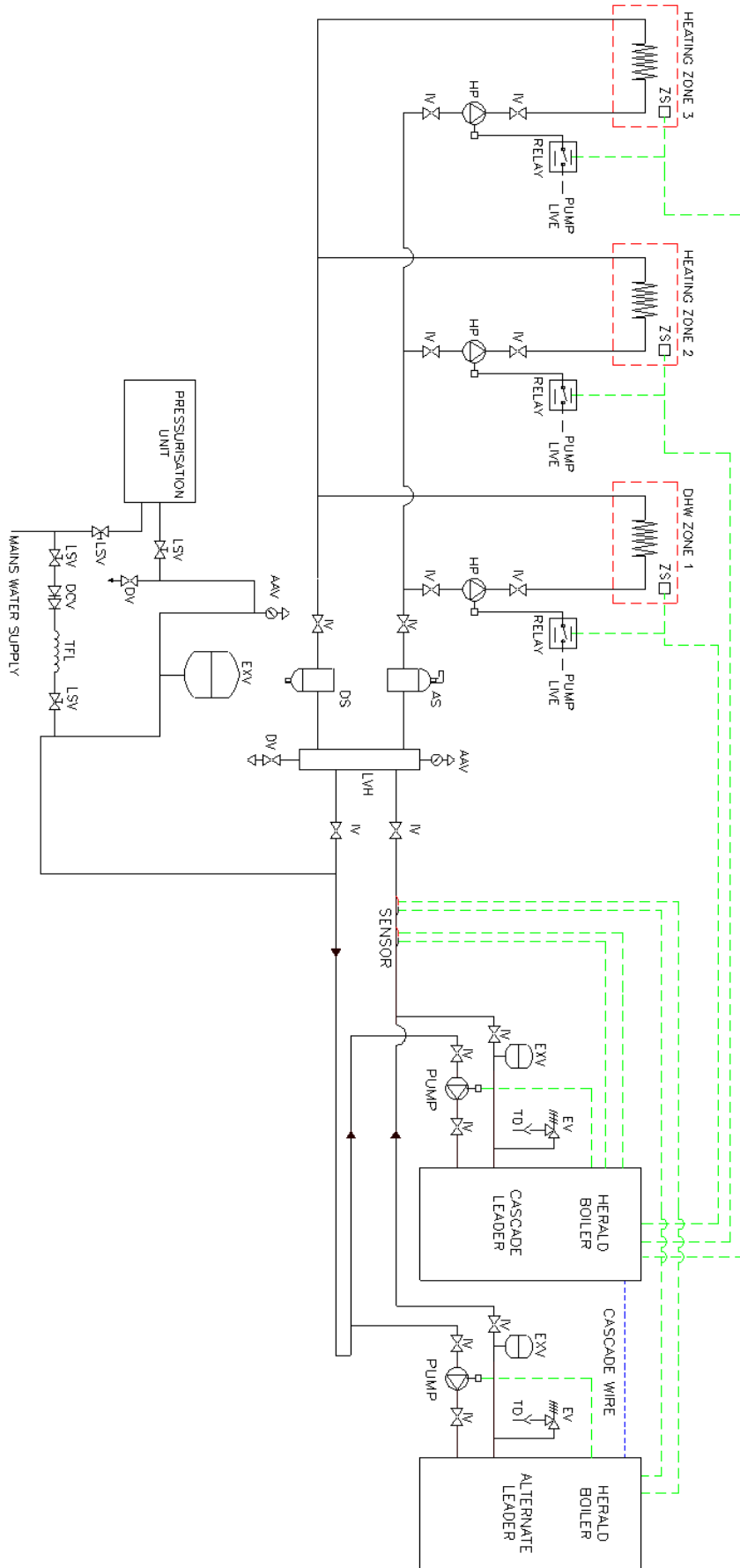
## 14.0 SCHEMATICS

### 14.1 KEY FOR SCHEMATICS

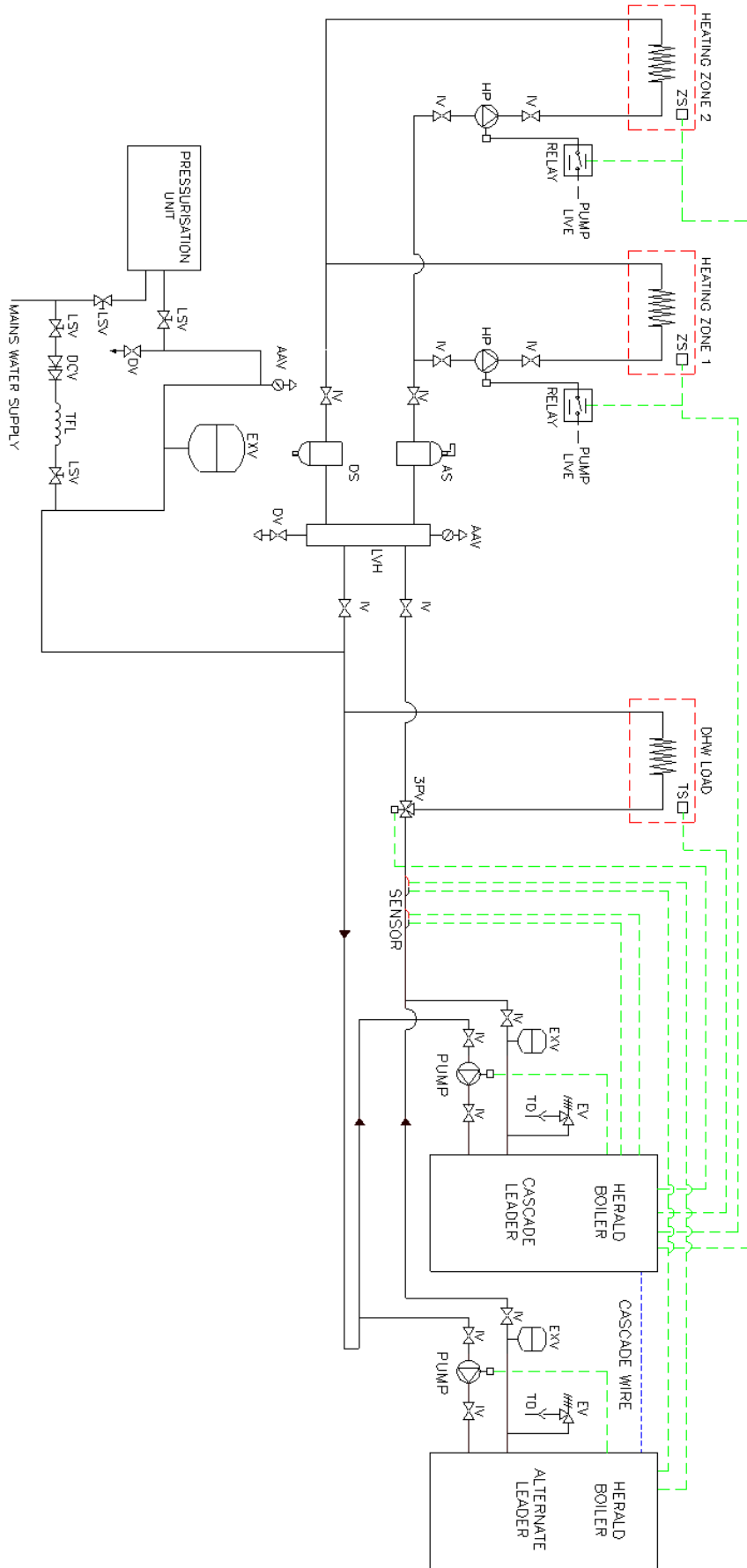


Lochinvar limited may provide technical advice and guidance to assist with best practice, optimisation and installation of Lochinvar products; however, we will not be liable for any duties as designers under construction (design and management regulations 2015). In all cases where information is provided, the customer must assess and manage risks associated with the technical information and advice provided.

SYMBOL	DESCRIPTION
IV	ISOLATION VALVE
LSV	LOCKSHIELD VALVE
TD	TUNDISH
EXV	EXPANSION VESSELQ
EV	EXPANSION VALVE
PRV	PRESSURE REDUCING VALVE
NRV	NON RETURN VALVE
PCP	PRIMARY CIRCULATING PUMP
TS	TEMPERATURE SENSOR (VESSEL SENSOR)
ZS	ZONE SENSOR
HP	HEATING PUMP
AAV	AUTOMATIC AIR VENT
RLY	RELAY
LVH	LOW VELOCITY HEADER
DCV	DOUBLE CHECK VALVE
AS	AIR SEPARATOR
DS	DIRT SEPARATOR
TFL	TEMP FILL LOOP



14.1.1 TYPICAL INSTALLATION SHOWING MULTIPLE HERALD BOILERS WITH CASCADE CONTROL AND ALTERNATIVE LEADER DHW WORKING AS A ZONE



14.1.1 TYPICAL INSTALLATION SHOWING MULTIPLE HERALD BOILERS WITH CASCADE CONTROL AND ALTERNATIVE LEADER DHW PRIORITY

#### 14.1.2 EXPANSION VESSEL SIZING

The following information is based on a static head of 35 metres and a cold fill pressure of 3.8 bar. For other system parameters a new calculation will need to be made.

$$V V = \frac{S V * e}{0.45}$$

Where:

V V = Vessel Volume  
 S V = System Volume  
 e = Coefficient of Expansion (See 14.1.3)

Flow Temp. °C	30	35	40	45	50	55	60
e	0.005	0.006	0.008	0.010	0.012	0.015	0.017
Flow Temp. °C	65	70	75	80	82	85	90
e	0.020	0.023	0.026	0.030	0.031	0.033	0.037

#### 14.1.3 COEFFICIENT OF EXPANSION OF WATER AT 3.8 BAR COLD FILL PRESSURE

### 14.2 CIRCULATING PUMPS

A suitable primary pump, sized in accordance with 14.2.1 should be fitted to the inlet to the boiler. Primary pumps are available from Lochinvar Limited as ancillary items.

ΔT (°C):	13.89		16.67		19.44		22.22		25.00	
Model	l/sec	Metre-H <sub>2</sub> O	l/sec	Metre-H <sub>2</sub> O	l/sec	Metre-H <sub>2</sub> O	l/sec	Metre-H <sub>2</sub> O	l/sec	Metre-H <sub>2</sub> O
HCB116CE	1.85	4.30	1.55	3.14	1.32	2.29	1.16	1.98	1.03	1.68
HCB146CE	2.32	4.73	1.94	3.81	1.66	2.87	1.45	2.23	1.29	1.92
HCB176CE	2.78	6.71	2.40	5.49	2.02	3.96	1.86	3.65	1.65	3.04
HCB206CE	3.28	6.10	2.84	4.88	2.33	3.35	2.17	2.84	1.93	2.28
HCB236CE	3.79	7.01	3.22	5.49	2.65	3.66	2.47	3.04	2.20	2.47

\*Boiler primary system piping based on 6 meters of piping, 4 - 90° elbows, and 2 - fully ported ball valves.

#### 14.2.1 SYSTEM TEMPERATURE RISE CHART (\*INCLUDES PRIMARY PIPING)

Model	Primary shunt pump
HCB116CE	LE022500012
HCB146CE	LE022500013
HCB176CE	LM900338A
HCB206CE	LM900338A
HCB236CE	LM900338A

#### 14.2.2 PRIMARY SHUNT PUMP FOR USE WITH HERALD BOILER RANGE



If a modulating type pump is used the 0-10v must be controlled via the Herald boiler to ensure the correct flow rate is maintained at all times. If the modulating pump is controlled externally this can cause low flow rates across the boiler which may cause permanent damage to the heat exchanger. Any such damage caused will not be covered by the boiler warranty

### 14.3 PRIMARY PIPEWORK HEADER SIZING



The pipework header between the primary Herald Boiler circuit and the secondary heating circuit must be sized as per the guidance given in this section. Failure to use the correct size of pipe header will cause operational problems and potential early failure of the boiler; this will not be covered under the boiler warranty. If your installation is outside the scope of this guidance, please contact Lochinvar Technical support before proceeding with the installation.

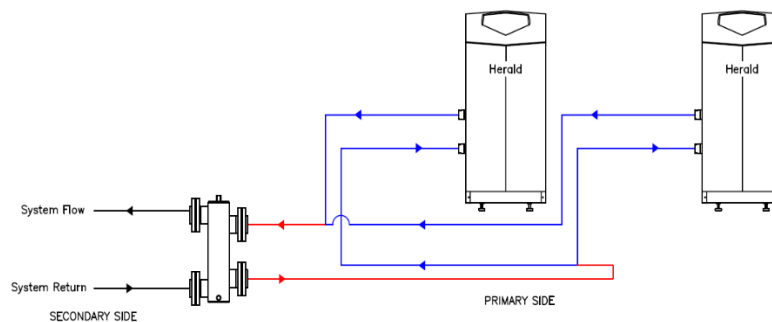
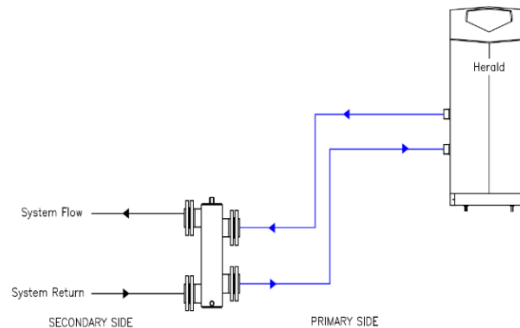
The tables below show the pipework header sizing required in order to ensure the correct flow rate is maintained between the Herald boiler primary circuit and the heating secondary circuit. Using the simple schematics shown in section Error! Reference source not found. size the pipework header (A) shown in blue and pipework header (B) shown in red.

Using the example schematics shown and assuming the Herald Boiler is an HCB176CE in both cases the header would be sized as:

Single unit = as there is only a single heater there is no common header so all the pipework should be 54mm.

2 units = the common header shown in red (B) should be sized according to the table at 67mm with the pipework between the header and each individual units shown in blue (A) at 54mm.

MODEL	PIPEWORK (A) BLUE SIZE (mm)	PIPEWORK (B) RED SIZE (mm)			
	NUMBER OF HERALD BOILERS				
	1	2	3	4	
HCB116CE	54	54	67	67	
HCB146CE	54	54	76	76	
HCB176CE	54	67	76	108	
HCB206CE	54	67	76	108	
HCB236CE	54	67	108	108	





## 15.0 ELECTRICAL SUPPLY

Wiring external to the equipment must be installed in accordance with the I.E.E. Regulations and any local regulations that apply.

Model	Normal Supply Voltage	External Fuse Rating	Power Consumption
HCB116CE	230V AC 50 Hz 1 PH	6.0 A	180 W
HCB146CE			204 W
HCB176CE			322 W
HCB206CE			322 W
HCB236CE			322 W

### 15.1.1 ELECTRICAL SUPPLY REQUIREMENTS



**WARNING: this appliance must be earthed**



**A suitably competent person must check wiring. Normal supply required is 230 volts ac, single phase, 50 hz. An isolator with a contact separation of at least 3mm in all poles should be sited close to the equipment and must only serve that equipment. The double pole switch must be readily accessible under all conditions**

## 15.2 EXTERNAL CONTROLS

The Herald boiler can be controlled via a BMS system either utilising a simple on/off arrangement or by directly modulating the output. The boiler has the following inputs/outputs:

- Building Management System (BMS) 0-10VDC analogue input
- Volt-free "burner on" (runtime) signal
- Volt-free "lock-out" (alarm) signal
- 0-10V "burner firing rate"
- 0-10V "Boiler pump speed"
- 0-10V "System pump speed"
- 24VAC auxiliary device enable signal (e.g. to start fan dilution system)

The Herald boiler is also compatible with the following control and safety systems allowing the boiler to operate as a complete standalone system. See the relevant sections within 54 for details of programming the various functions required for a standalone system.

- Room thermostat up to 3no (on/off type)
- System sensor (modulating type)
- Storage vessel thermostat (on/off type)
- Storage vessel sensor (modulating type)
- Internal sequencing control
- Gas pressure switch (e.g. gas booster under pressure/over pressure safety switch)
- Water flow proving device (e.g. differential pressure switch or flow switch)
- Auxiliary safety system proving switch (e.g. fan dilution system proving switch)

### 15.2.1 REMOTE ENABLING

There are two ways to enable the Herald boiler using a BMS:

1. Using a 0-10V signal via connections 35-36
2. Using a volt free enable signal via connections 21-22



**The boiler will still fire on a DHW demand if the Herald is directly controlling the DHW via the sensor point at 29-30**

### 15.3 HIGH VOLTAGE CONNECTOR STRIP

DRY CONTACTS PROVIDED				
 DHW C    N/O	 BOILER C    N/O	 SYSTEM C    N/O	 230V~50Hz MAINS L        N	  100285316 REV A
MAX 25 AMPS PER REPLAY				

#### 15.3.1 HIGH VOLTAGE CONNECTION STRIP

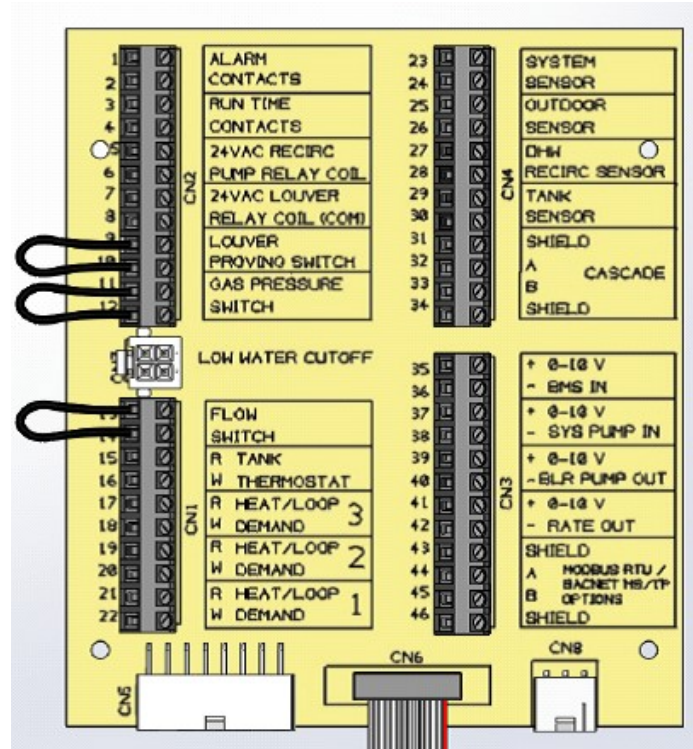


The three pump outputs are relays, each can accept up to 25amp maximum. If the pumps are larger than this please contact Lochinvar Technical support for further assistance.

CONNECTION	NOTES
DHW	Relay connection for a DHW primary pump. If the pump rating exceeds 25Amps contact Lochinvar for further advise
BOILER	Relay connection for a boiler shunt pump. If the pump rating exceeds 25Amps contact Lochinvar for further advise
SYSTEM	Relay connection for the primary system pump. If the pump rating exceeds 25Amps contact Lochinvar for further advise
MAINS	Connections for a 230V ~ 1 ph 50Hz power supply. <b>NOTE:</b> The power supply cable should be secured using the anchor supplied.

#### 15.3.2 HIGH VOLTAGE CONNECTION TERMINAL DETAILS

### 15.4 LOW VOLTAGE CONNECTOR STRIP



#### 15.4.1 LOW VOLTAGE CONNECTION STRIP

PIN	CONNECTION	OUTPUT / INPUT	NOTES
1-2	ALARM CONTACTS	Volt free – Close on alarm	An internal volt free contact across pins 1 and 2 will close in the event of the heater locking out. This connection can be used by a BMS to monitor the operation of the heater.
3-4	RUNTIME CONTACTS	Volt free – Close when unit running	An internal volt free contact across pins 3 and 4 will close in the event of the burner operating. This connection can be used by a BMS to monitor the operation of the heater
5-6	24VAC RECIRC PUMP RELAY COIL	24VAC Output – when recirc sensor calls – switches on Neutral	When the heater gets a call for heat from the DHW RECIRC SENSOR a 24VAC supply will be sent to a DHW recirculation pump relay (field supplied)
7-8	24VAC LOUVER RELAY COIL (COM)	24VAC Output – When unit calls for heat.	When the heater gets a call for heat, a 24VAC supply becomes present on pin 7. Used in conjunction with the ground pin (pin 8), these terminals can be used to send a signal to energise an auxiliary device such as a fan dilution system or mechanical ventilation system.
9-10	LOUVER PROVING SWITCH	24VAC Output – When unit calls for heat.	If an auxiliary device such as a fan dilution system or mechanical ventilation system is to be used, the link should be taken out of pins 9 and 10 and the auxiliary device safety circuit wiring installed. If there is no continuity across the terminals the heater will not fire.
11-12	GAS PRESSURE SWITCH	24VAC Output – constant when unit is powered	If a gas pressure switch is to be used to ensure the incoming gas pressure is correct, the link should be taken out of pins 11 and 12 and the gas pressure switch wiring installed. If there is no continuity across the terminals the heater will not fire.
13-14	FLOW SWITCH	24VAC Output – constant when unit is powered	If a flow switch is to be used to ensure the primary pump is operating, the link should be taken out of pins 13 and 14 and the flow switch wiring installed. If there is no continuity across the terminals the heater will not fire.
15-16	TANK THERMOSTAT	24VAC Output – constant when unit is powered	An on-off type thermostat located in an indirect Calorifier can be connected to terminals 15 and 16 to control the output from the boiler. This connection is not polarity sensitive. Not to be used in conjunction with the tank sensor.
17-18	HEAT/LOOP DEMAND 3	24VAC Output – constant when unit is powered	An on-off type thermostat or modulating room sensor can be connected to terminals 17 and 18 to control the output from the boiler. This connection is not polarity sensitive. Can also be used for a BMS 0V enable signal
19-20	HEAT/LOOP DEMAND 2	24VAC Output – constant when unit is powered	An on-off type thermostat or modulating room sensor can be connected to terminals 19 and 20 to control the output from the boiler. This connection is not polarity sensitive. Can also be used for a BMS 0V enable signal
21-22	HEAT/LOOP DEMAND 1	24VAC Output – constant when unit is powered	An on-off type thermostat or modulating room sensor can be connected to terminals 21 and 22 to control the output from the boiler. This connection is not polarity sensitive. Can also be used for a BMS 0V enable signal
23-24	SYSTEM SENSOR	Contacts read a resistance	When configured in a cascade, the Master boiler will use the system sensor to monitor and control the output from the cascade. This sensor should be mounted in the boiler flow.
25-26	OUTDOOR SENSOR	Contacts read a resistance	If the boiler is to be compensated to the outside temperature, an outdoor sensor should be connected to pins 25 and 26. This connection is not polarity sensitive.
27-28	DHW RECIRC SENSOR	Contacts read a resistance	The heater can control a DHW recirculation pump. A sensor must be installed in the circulation loop return and connected to terminals 27 and 28.
29-30	TANK SENSOR	24VAC Output – When unit calls for heat.	A sensor located in an indirect Calorifier can be connected to terminals 29 and 30 to control the output from the boiler. This connection is not polarity sensitive. Not to be used in conjunction with the tank thermostat
31-34	CASCADE	Communication	If the heaters are to be operated in a cascade, shielded 2-wire twisted pair communication cable should be used. The shielding should be connected to pin 31 or 34 and then all "A" terminals (pin 32) should be linked together and all "B" terminals (pin 33) should be linked together.
35-36	BMS IN	0 – 10 V DC input	When the heater is to be controlled by a 0-10V DC analogue output from a Building Management System (BMS), the 0-10V 0V line should be connected to pin 35 and the 0V line should be connected to pin 36.
37-38	SYS PUMP IN	0 – 10 V DC input	If a variable speed pump is used in the primary loop, and a 0-10V signal is available from the speed control, this signal can be used to control the modulation of the boiler as primary flow increases or decreases. The 0-10V line should be connected to pin 37 and the 0V line to pin 38
39-40	BLR PUMP OUT	0 – 10 V DC output	This 0-10V output is available to control the speed of a variable speed boiler pump in order to maintain a minimum temperature difference across the heat exchanger. This feature is only to be used with primary/secondary piping systems and a supply sensor MUST be installed.
41-42	RATE OUT	0 – 10 V DC output	Provides a 0-10V signal that is proportional to the firing rate of the heater. This may be used by a BMS system to monitor the actual rate of the heater.
43-46	MODBUS/BACNET OPTION	Communication	When an optional ModBus or BACnet interface module is installed the RS-485 cable is connected to these terminals.

#### 15.4.2 LOW VOLTAGE CONNECTION TERMINAL DETAILS

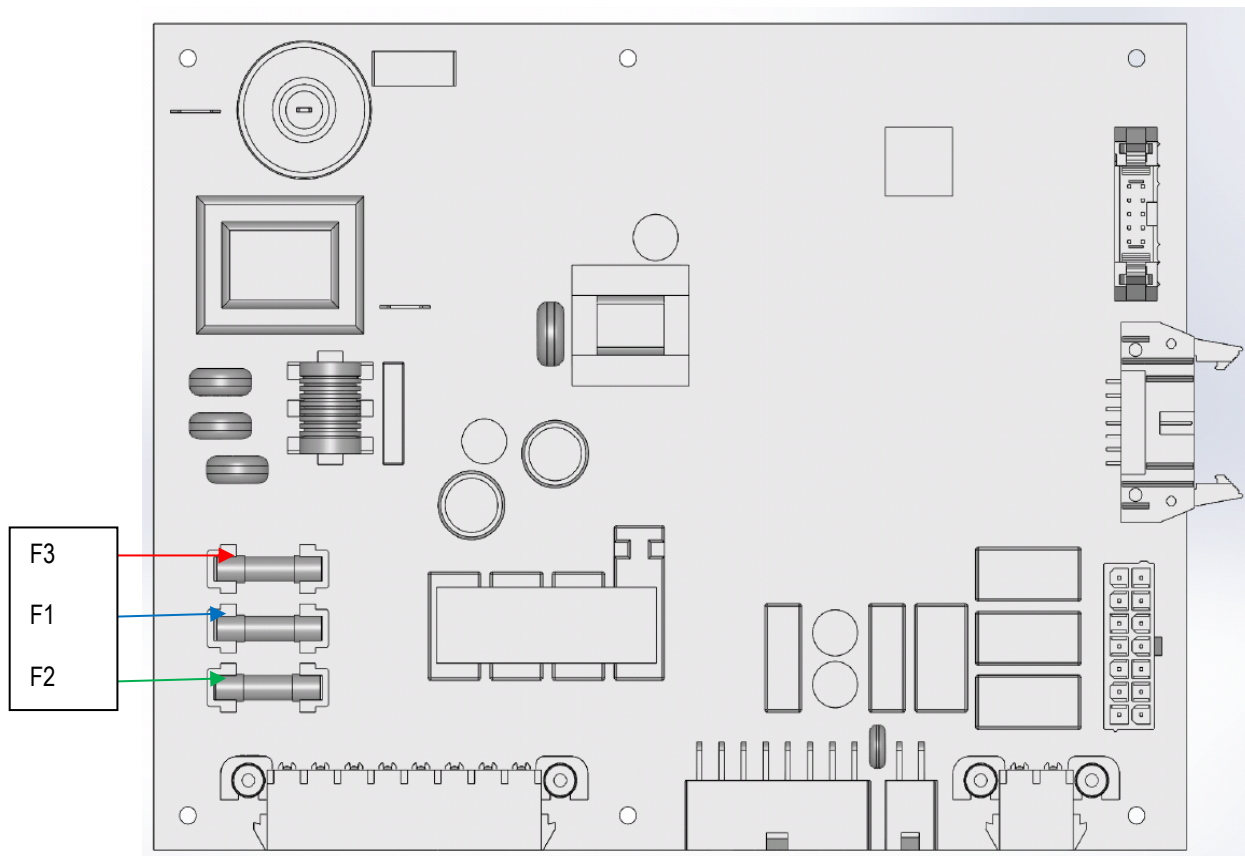
## 15.5 ELECTRICAL CONNECTIONS

Access to the High Voltage and Low Voltage Connection Strips can be made by removing the appropriate knockouts on the back panel of the boiler. All connections should be secured using an appropriate cord anchorage. One cord anchor is supplied with the boiler for securing the mains supply to the unit. If additional controls and ancillaries are to be used, the appropriate knockout should be removed and an anchor such as RS Components part number 607-897 plus locking nut 607-910 should be fitted.



If a knockout is removed by mistake, the resulting hole must be blocked with an appropriate anchor, plug or grommet to prevent accidental access to the live parts within the boiler.

## 15.6 FUSES



The Herald has three internal fuses. All are slow blow fuses, located and rated as follows:

F1	5 A
F2	3.15A
F3	80A

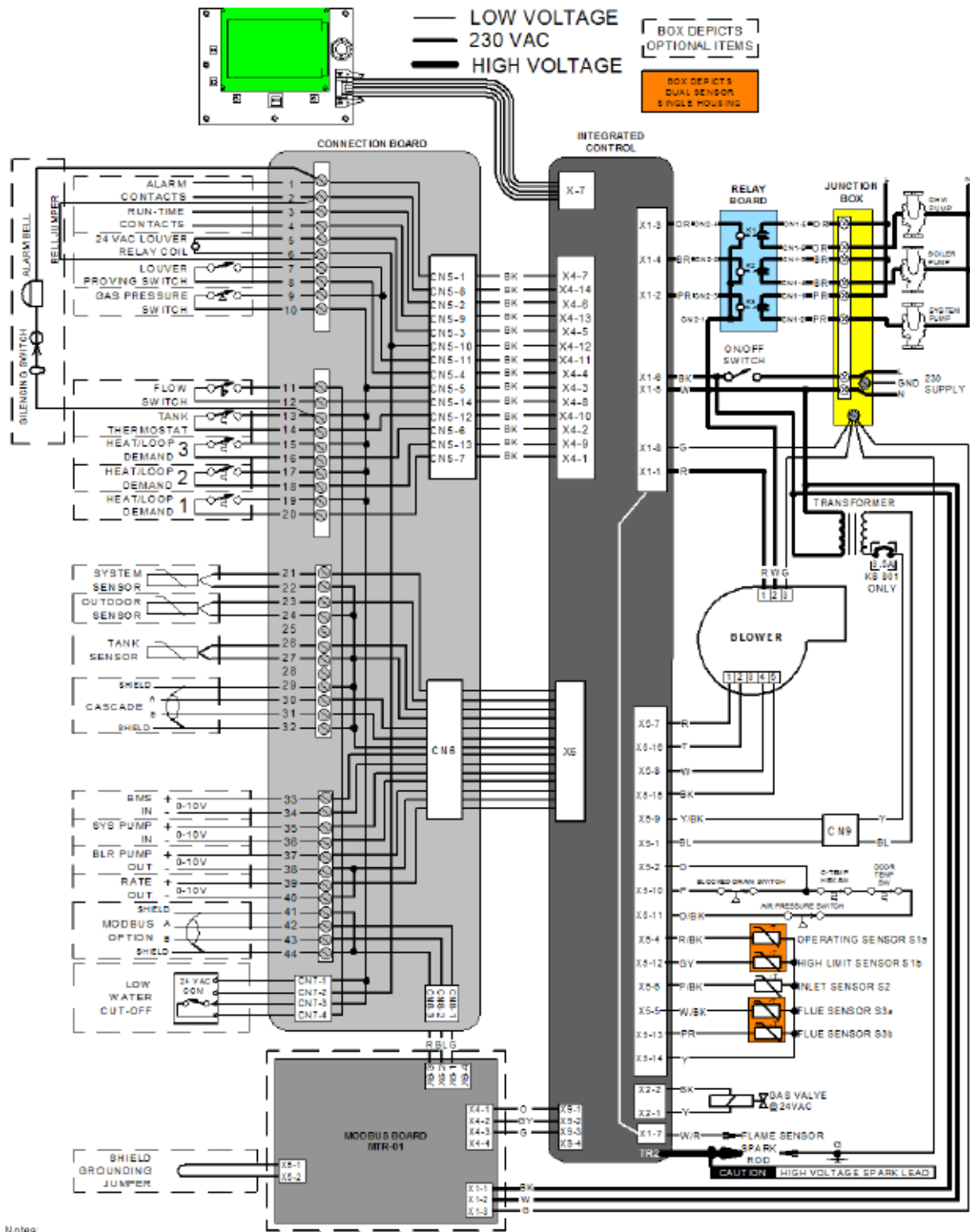
### 15.6.1 FUSE RATINGS AND LOCATIONS

The boiler has three spare fuses in a plastic bag attached to the control module cover. Only replace with an equivalent rated fuse. Use of non-equivalent fuses or link wires will invalidate the warranty.

## 15.7 ARC WELDING PRECAUTIONS

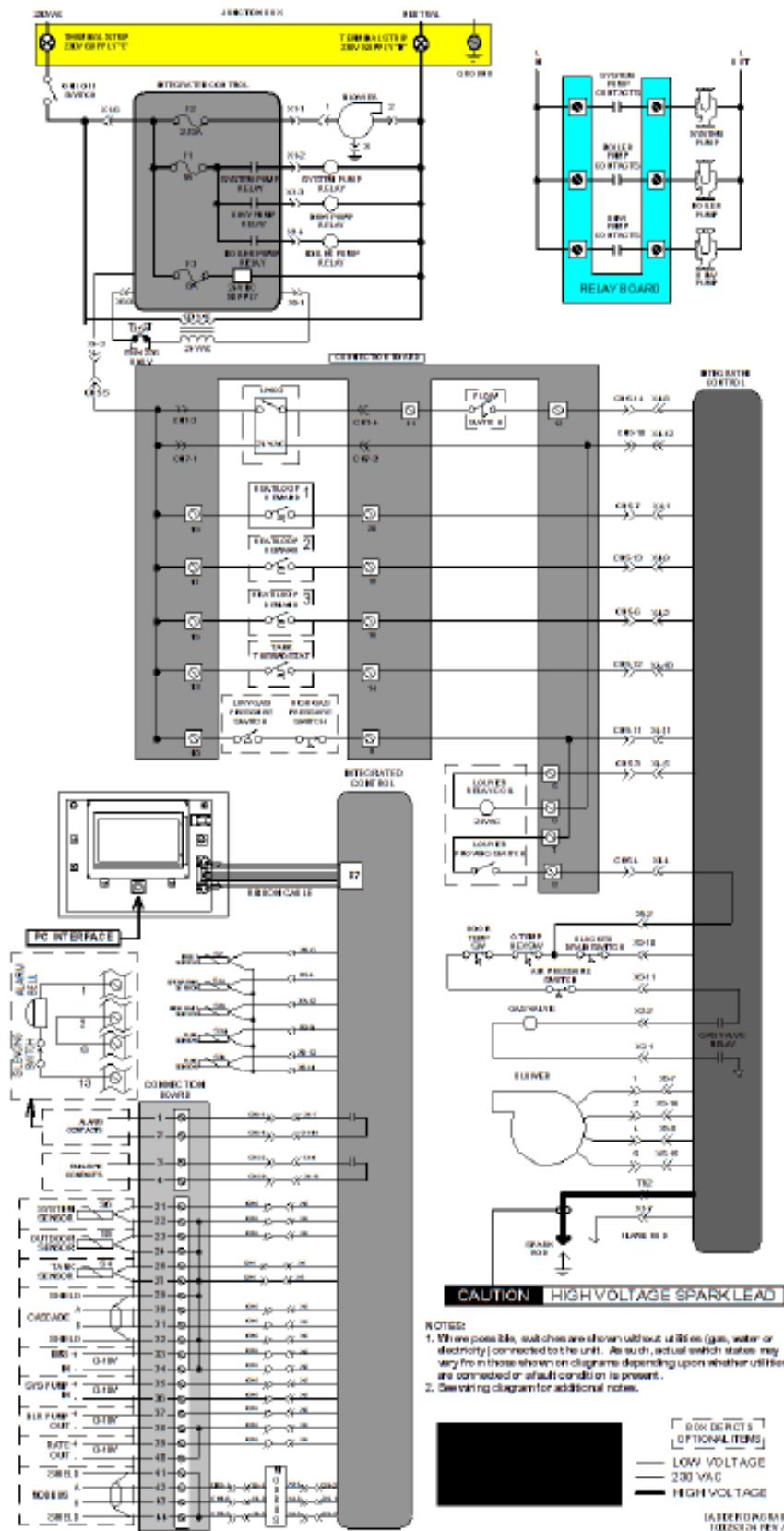
The appliance must be isolated from the mains electricity supply in the event of electric arc welding being carried out on any connecting pipework.

15.8 WIRING DIAGRAM



15.8.1 WIRING DIAGRAM

15.9 LADDER DIAGRAM



15.9.1 LADDER DIAGRAM

## 16.0 SMART SYSTEM CONTROL

### 16.1 GENERAL

The Lochinvar Herald uses the SMART SYSTEM control interface. The control panel display give information on set-up, system status and diagnostic data in words rather than codes.

### 16.2 SMART SYSTEM CONTROL PANEL



- 1 USB Drive
- 2 PC Connection
- 3 Left select key
- 4 Navigation dial
- 5 Reset switch
- 6 Right select key

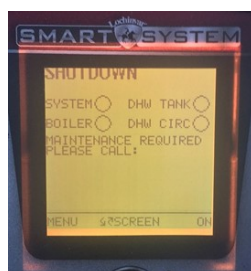
The information on the bottom of the display shows the functions of the two SELECT keys on both corner, and the NAVIGATION dial in the centre.

MENU	Left SELECT key
SETPOINTS	NAVIGATION dial-pressing down
SHDN	Right SELECT key

The smart system control face instantly informs the user of the status of the boiler by changing colour according to the status of the boiler as below.



Normal operation



Service due



Boiler is not working

### 1.1 ACCESS MODES

#### 16.2.1 USER

The user can adjust tank target temperatures by pressing the NAVIGATION dial when "↓SETPOINTS" is flashing at the bottom of the display. The date, time and the temperature units can also be changed.

#### 16.2.2 INSTALLER

Most parameters are available only for the installer, accessible by entering the installer password.

## 16.3 SAVING PARAMETERS



Please note that the brackets ([]) denote screen status.

### 16.3.1 TO SAVE PARAMETERS AND EXIT PROGRAMMING

Press the RIGHT SELECT (SAVE) key and then press the RIGHT SELECT (HOME) KEY.

### 16.3.2 TO ENTER A PARAMETER AND CONTINUE PROGRAMMING

Press the RIGHT SELECT (SAVE) key 1 time to return to the parameter listings, press again to return to the menu listings. Remember to press the RIGHT SELECT key when programming is completed in order to save the changes made.






### 16.3.3 SEQUENCE OF OPERATION

Operation	Display
1 Upon a call for heat , the gas pressure switch(s) must be closed	<p><b>STANDBY</b> </p> <p>SYSTEM <input type="radio"/> DHW TANK <input type="radio"/></p> <p>BOILER <input type="radio"/> DHW CIRC <input type="radio"/></p> <p>SYSTEM: 117°F (118)</p> <p>TANK: 124°F (130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
2 Once the gas pressure switch(s) are closed the control turns on the appropriate pumps. The flow switch and or LWCO must close	<p><b>STANDBY</b> </p> <p>SYSTEM <input checked="" type="radio"/> DHW TANK <input type="radio"/></p> <p>BOILER <input checked="" type="radio"/> DHW CIRC <input type="radio"/></p> <p>SYSTEM: 117°F (118)</p> <p>TANK: 124°F (130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
3 The control turns on power to the louvre relay, the louvre proving switch and blocked drain switch must close	<p><b>START</b> </p> <p>SYSTEM <input checked="" type="radio"/> DHW TANK <input type="radio"/></p> <p>BOILER <input checked="" type="radio"/> DHW CIRC <input type="radio"/></p> <p>SYSTEM: 117°F (118)</p> <p>TANK: 124°F (130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
4 The control starts the pre-purge cycle by initiating the fan	<p><b>PRE-PURGE</b> </p> <p>SYSTEM <input checked="" type="radio"/> DHW TANK <input type="radio"/></p> <p>BOILER <input checked="" type="radio"/> DHW CIRC <input type="radio"/></p> <p>SYSTEM: 117°F (118)</p> <p>TANK: 124°F (130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
5 The control starts the trial for ignition by firing the spark electrode and opening the gas valve	<p><b>IGNITION</b> </p> <p>SYSTEM <input checked="" type="radio"/> DHW TANK <input type="radio"/></p> <p>BOILER <input checked="" type="radio"/> DHW CIRC <input type="radio"/></p> <p>SYSTEM: 117°F (118)</p> <p>TANK: 124°F (130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>



<p>6 If flame is not detected after spark ends the control will perform a post-purge, then start another pre-purge cycle and try to light the boiler again. On the 146 model up the control will lock out after this second attempt on the 116 down a further four attempts will be made before the unit goes to lock-out.</p>	<p><b>POST-PURGE</b> </p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
<p>7 If the flame is detected it holds the firing rate steady for a few seconds then begins to modulate the firing rate based on a set point or some other command (such as the 0-10v signal)</p>	<p>41%  </p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
<p>8 If a space heating call for heat is active and the tank thermostat or sensor starts a DHW call for heat, the boiler will switch to the DHW mode. The DHW pump will turn on first then the boiler pump will turn off this will divert the water to the indirect tank coil. The control will modulate to maintain the DHW set point.</p>	<p>41%  1 </p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
<p>9 If the boiler is not part of a Cascade and both heating and DHW calls for heat remain active for long enough the boiler will switch back and forth between the 2 modes until either heating or the DHW load is satisfied.</p>	<p>41%   </p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
<p>10 Once both calls for heat are satisfied the control will turn off the burner. The fan will continue to run during the post-purge period.</p>	<p><b>POST-PURGE</b></p> <p>ANTI-CYCLING</p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
<p>11 Any pumps that are running will continue for their respective pump overrun time period before switching off. A 60 second anti-cycle period will start which will delay any call for heat.</p>	<p><b>BLOCKED</b></p> <p>ANTI-CYCLING</p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>
<p>12 In standby ready to start a new cycle.</p>	<p><b>STANDBY</b></p> <p>SYSTEM  DHW TANK </p> <p>BOILER  DHW CIRC </p> <p>SYSTEM: 117°F(118)</p> <p>TANK: 124°F(130)</p> <p>OUTDOOR: 56°F</p> <p>INLET: 109°F</p> <p>OUTLET: 124°F</p> <p>DHW RECIRC: 115°F</p> <hr/> <p>MENU  SCREEN SHDN</p>

## 16.4 STATUS DISPLAY SCREENS

Section	Display	Description
A (Boiler status bar)	STANDBY	The unit has not received a call for heat
	START	The unit has received a call for heat and is checking all safety circuits
	PREPURGE	The unit has received a call for heat and has initiated a pre-purge period
	IGNITION	The unit has initiated the spark ignition to the main burner
	% 	The unit has fired and is running at the displayed firing rate
	POSTPURGE	The call for heat has ended, the unit runs the fan for a set period to purge the combustion chamber and vent the system of additional flue products
	SHUTDOWN	The unit is in the OFF position
	SETPOINT MET	The control temperature has exceeded the set point and offset
	BLOCKED	The unit has detected a condition that has temporarily interrupted the call for heat
B (Call for heat indicators)	1	Room thermostat 1 has called for heat
	2	Room thermostat 2 has called for heat
	3	Room thermostat 3 has called for heat
		DHW tank thermostat or sensor has called for heat
		Indicates which room thermostat has priority
		The unit is being controlled by a 0-10V BMS signal
		The member unit is supplying heat whilst in Cascade mode

Section	Display	Description
C (Operational Information)	DETAILS SCREEN 1	a. SYSTEM TEMP
		b. TANK TEMP
		c. OUTDOOR TEMP
		d. INLET TEMP
		e. OUTLET TEMP
		f. DHW RECIRC TEMP temperature of DHW recirc sensor if fitted
	DETAILS SCREEN 2	a. DELTA T
		b. FLUE TEMP
		c. FLAME CURRENT
		d. FAN SPEED
		e. LOOP 1 TEMP as reported by the MTLC control
		f. LOOP 2 TEMP as reported by the MTLC control
		g. LOOP 3 TEMP as reported by the MTLC control
	I/O SCREEN	a. GAS PRESSURE SW
		b. FLOW SW
		c. LOUVRE RELAY
		d. LOUVRE SW
		e. BLOCKED DRAIN
f. GAS VALVE		

Section	Display	Description	
C(Operational information)	BMS SCREEN	a. 0-10V BMS IN	
		b. 0-10V BMS OUT	
		c. BMS ADDRESS	
		d. BMS CONTROL?	
		e. SYS PUMP SPEED	
		f. BLR PUMP OUT	
	HISTORY SCREEN	a. SH RUN TIME	total space heating run time
		b. SH CYCLES	total space heating demand cycles
		c. DHW RUN TIME	total DHW running time
		d. DHW CYCLES	total DHW demand cycles
		e. POWER TIME	total time powered on
		f. IGNITIONS	total number of successful ignition attempts
		g. IGN ATTEMPTS	total number of ignition attempts
	LAST 10 FAULTS	a. FAULT NO	
		b. FAULT NO	
		c. DATE	
		d. TIME	
	CASCADE STATUS	a. CASCADE STATUS	
		b. CASCADE POWER	
		c. PRESENT	
	NIGHT SETBACK	a. TRIGGER 1	next space heating night setback trigger
		b. TRIGGER 2	next DHW night setback trigger

Section	Display	Description
D (LEFT SELECT key function)	USB	Press the LEFT SELECT key to access the USB and installer menu
E (NAVIGATION dial function)	MODIFY	Pressing the NAVIGATION dial will allow the installer to change the text
F (RIGHT SELECT key function)	SHDN	Press the RIGHT SELECT key to turn the boiler off
	ON	Press the RIGHT SELECT key to turn the boiler on
	NO	Press the RIGHT SELECT key to cancel the shutdown operation
	SAVE	Press the RIGHT SELECT key to save the current change
	HOME	Press the RIGHT SELECT key to return to the Status Screen and upload parameter changes

## 17.0 COMMISSIONING AND TESTING

### 17.1 ELECTRICAL INSTALLATION

Notes on the requirements for electrical installation are provided in **Section Error! Reference source not found.**. A schematic drawing of the control circuit is shown in **Section Error! Reference source not found.: WIRING DIAGRAM.**

### 17.2 GAS INSTALLATION

For design see 9.0: **GAS SUPPLY.** See **Section3.0:** for details on the position of the gas connection.

### 17.3 WATER CONNECTIONS

For design see **Section 13.0: WATER CONNECTIONS**



**The system should be thoroughly flushed out with cold water without any circulating pumps in position. Ensure all the valves are open.**

Check the system for leaks and repair as necessary. If the system is configured in a sealed arrangement, check the expansion vessel cushion pressure and pressurisation unit settings.

### 17.4 COMMISSIONING THE EQUIPMENT

#### 17.4.1 GENERAL CHECKS PRIOR TO LIGHTING



**A person deemed competent must be responsible for the commissioning of this equipment. Before attempting to commission any equipment, ensure that personnel involved are aware of what action is about to be taken and begin by making the following checks:**

1. Flueway passages are clear.
2. Adequate ventilation exists in the plant room (if necessary).
3. The system is fully charged with water, ready to receive heat. All necessary valves are open and all allied pumps are circulating water.
4. The gas supply pipework is clear of any loose matter, tested for soundness and purged.
5. The condensate drain is installed correctly and the condensate trap is filled with water.



**If the condensate trap is not filled before use, products of combustion may escape and can lead to severe personal injury or death**

#### 17.4.2 EQUIPMENT CHECKS PRIOR TO LIGHTING

**This unit has been designed for a nominal gas inlet pressure of 20.0 mbar when used on natural gas. Information relating to propane firing can be found in Section 18.0: LPG FUEL**

1. Gas supply is connected but turned to the “off” position. Any unions or fittings are correctly tightened, test points are closed and the flame sense electrode lead is connected correctly. Ensure the ceramic sheath around the flame sense electrode is not cracked or broken.
2. Ensure electricity supply is connected.

### 17.4.3 PROCEDURE FOR INITIAL LIGHTING

#### IF THE UNIT IS TO OPERATE ON LPG REFER TO SECTION 18.0 BEFORE PROCEEDING

1. Ensure that the external gas-inlet appliance isolating valve, provided by the installer, is in the “off” position.
2. Press the power rocker switch, positioned on the back of the appliance to bring the equipment on.
3. The combustion fan should ramp up to full speed to purge the combustion chamber and then drop back to half rate in order to light. The spark generator should create a spark, visible through the burner sight glass. As the gas-inlet appliance isolating valve is closed, the controls should go to a flame failure condition after four ignition attempts (HCB116CE) or two ignition attempts (HCB146CE – HCB236CE). If the above occurs correctly, open the gas-inlet appliance isolating valve and reset the unit by depressing the Enter/Reset button on the control panel.
4. The combustion fan will repeat the pre-purge procedure and attempt to light. Once a flame is established, the LCD display will change to display the rate at which it is firing.
5. Allow the system to reach temperature to check operation of the control sensors.
6. Once the appliance has reached temperature and shut down, check that the flame has extinguished.

### 17.4.4 GAS PRESSURE ADJUSTMENT AND COMBUSTION CHECKS



The Lochinvar herald series are supplied with a pre-set gas/air ratio inlet assembly. This must not be tampered with. Any attempt to adjust the gas valve or venturi will invalidate the warranty.

Combustion figures should be as follows:

Model No.	CO <sub>2</sub>	CO
HCB116CE	8.8% ±0.5%	<100 ppm
HCB146CE	8.8% ±0.5%	<100 ppm
HCB176CE	9.0% ±1.0%	<100 ppm
HCB206CE	9.0% ±1.0%	<100 ppm
HCB236CE	9.0% ±1.0%	<100 ppm

### 17.4.5 NATURAL GAS COMBUSTION FIGURES

If the combustion figures are not within the range specified, contact Lochinvar Technical support for further guidance. Combustion figures for Propane firing can be found in **Section 18.0: LPG FUEL**.

## 17.5 TEMPERATURE ADJUSTMENT PROCEDURE

### 17.5.1 CENTRAL HEATING SETPOINT

With the boiler firing, the setpoint can be adjusted using the **NAVIGATION** dial on the SMART SYSTEM control panel. When **SETPOINT** is flashing at the bottom of the display the **NAVIGATION** dial can be used to set and store the desired setpoint.

### 17.5.2 DHW SETPOINT

If the stored water temperature is to be controlled by a thermostat, the setting should be adjusted on the thermostat itself. If the stored water temperature is to be controlled by a tank sensor, the default setpoint is 52°C. a DHW sensor is available as an ancillary, part number LL200009A.

The setpoint should be adjusted to ensure that the water is stored above 60°C and distributed at 50°C within 1 (one) minute at all outlets. Care is needed to avoid much higher temperatures because of the risk of scalding. At 50°C the risk of scalding is small for most people, but the risk increases rapidly with higher temperatures and for longer exposure times. The risk to young children and to those with a sensory or mobility loss will be greater. Where a significant scalding risk has been identified, the use of thermostatic mixing valves on baths and showers should be considered to reduce temperature, these need to be placed as close to the point of use as possible.

## 17.6 INSTALLATION NOISE

If care has been taken to follow the manufacturer’s instructions there should be no discernible noise from the equipment. The allied pump motor may have a level of sound that could lead to consideration for acoustic insulation, but care must be taken not to impede ventilation or airflow to the pump motor.

## 18.0 LPG FUEL



It is strongly recommended that, on LPG installations, gas detection equipment is fitted. This equipment should be positioned near the appliance and at low level. It is also important that the space housing the appliance is adequately ventilated at high and low level. This appliance must not be located below ground e.g. in a cellar.

### 18.1 RELATED DOCUMENTS

In addition to those documents listed in **Section 5.1: RELATED DOCUMENTS** within the main body of the installer's guide the gas installation should also comply with the guidance offered in the following documents.

#### BS 5482-1: 2005

Code of practice for domestic butane and propane gas burning installations.

**Part 1:** Installations at permanent dwellings, residential park homes and commercial premises, with installation pipework sizes not exceeding dn25 for steel and dn28 for corrugated stainless steel or copper.

The operation of the Herald range on LPG-Propane (3<sup>rd</sup> Family) 3P is similar to that on Natural Gas (2<sup>nd</sup> Family) 2H and the design and installation details described in the main body of the installer's guide should be followed.

### 18.2 CONVERSION TO LPG



This process must be carried out in the order stated before the boiler is switched on. Failure to follow the following procedure may lead to non-warrantable damage to the boiler. The conversion must be carried out by a competent person certified for work on LPG fuel.



In the event of any seal or gasket being broken it is essential that the seal or gasket be replaced. Contact Lochinvar limited for replacement seals and gaskets.

Model	Part No.	Stamp	Size
HCB116CE	ORF20000	8	8.0 ± 0.02
HCB146CE	ORF20003	6	6.0 ± 0.02
HCB176CE	ORF20002	10.2	10.2 ± 1.0
HCB206CE	ORF20002	10.2	10.2 ± 1.0
HCB236CE	ORF20002	10.2	10.2 ± 1.0

#### 18.2.1 LPG ORIFICE MARKINGS

If the boiler is already installed and operational, you must turn off the gas supply, turn off the power supply and allow the boiler to cool before proceeding. The conversion procedure is as follows:

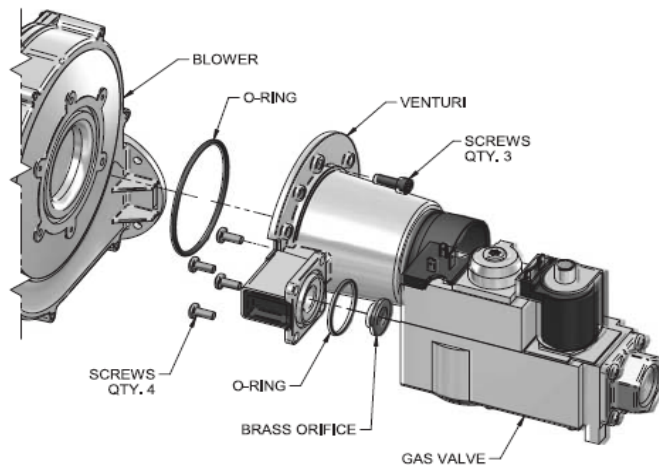
#### 18.2.2 HCB116CE

1. Remove the top and front access covers from the unit (no tools required for removal).
2. Remove the impulse tube and wiring plug from the gas valve.
3. Remove the three screws securing the venturi to the fan.



**When separating the venturi from the fan, take care not to damage the o-ring inside the fan (figure 14.2).**

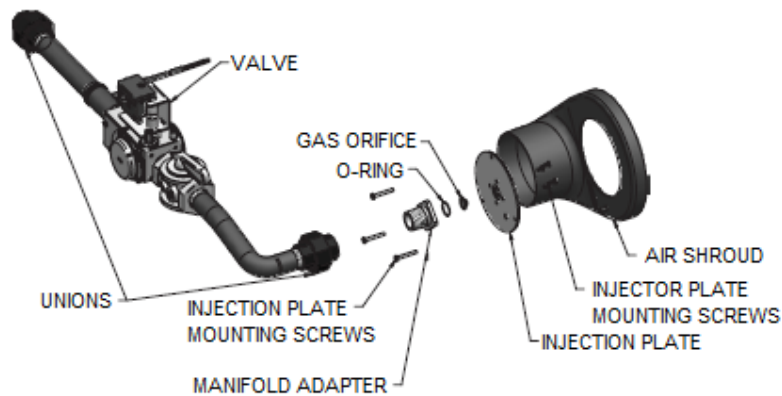
1. Remove the four cap-head screws securing the gas valve to the venturi (see CONVERSION PROCEDURE HCB116CE).
2. Locate the propane orifice disk from the conversion kit bag. Verify that the stamping on the orifice disk is correct for the boiler (see LPG ORIFICE MARKINGS).
3. Remove the existing orifice from the O-ring in the side of the gas valve and replace it with the orifice from the kit. Position and secure the orifice in the valve as shown in (see CONVERSION PROCEDURE HCB116CE).
4. Reposition the gas valve against the venturi and replace the star-drive screws (see CONVERSION PROCEDURE HCB116CE), securing the valve to the venturi.
5. Inspect the O-ring inside the fan. Handle the O-ring with care, do not damage. Reposition the venturi against the fan and replace the screws securing the venturi to the fan (see CONVERSION PROCEDURE HCB116CE).
6. Refit the impulse tube and wiring plug to the gas valve.
7. After installation is complete, attach the propane conversion label (in the conversion kit bag) next to the boiler rating plate. Attach the LPG caution label (in the conversion kit bag) to the left side of the unit in the lower left corner.
8. Replace the top and front access covers.



#### 18.2.3 CONVERSION PROCEDURE HCB116CE

#### 18.2.4 HCB146CE

1. Remove the top and front access covers from the unit (no tools required for removal).
2. Remove the gas valve and manifold from the unit via the unions on each end (see CONVERSION PROCEDURE HCB146CE).
3. Remove the three screws mounting the injector plate on the air shroud (see CONVERSION PROCEDURE HCB146CE).
4. Remove the four screws securing the manifold adapter to the injector plate taking care not to damage the O-ring.
5. Locate the propane orifice disk from the conversion kit bag. Verify that the stamping on the orifice disk is correct for the boiler (see LPG ORIFICE MARKINGS).
6. Remove the existing orifice from the O-ring in the side of the injector plate and replace it with the orifice from the kit. Position and secure the orifice in the injector plate as shown in CONVERSION PROCEDURE HCB146CE.
7. Reposition the manifold adapter to the injector plate and replace the four manifold adapter mounting screws. Handle the O-ring with care, do not damage.
8. Reposition the injector plate to the air shroud and replace the three injector plate mounting screws.
9. After installation is complete, attach the propane conversion label (in the conversion kit bag) next to the boiler rating plate. Attach the LPG caution label (in the conversion kit bag) to the left side of the unit in the lower left corner.
10. Replace the top and front access covers.

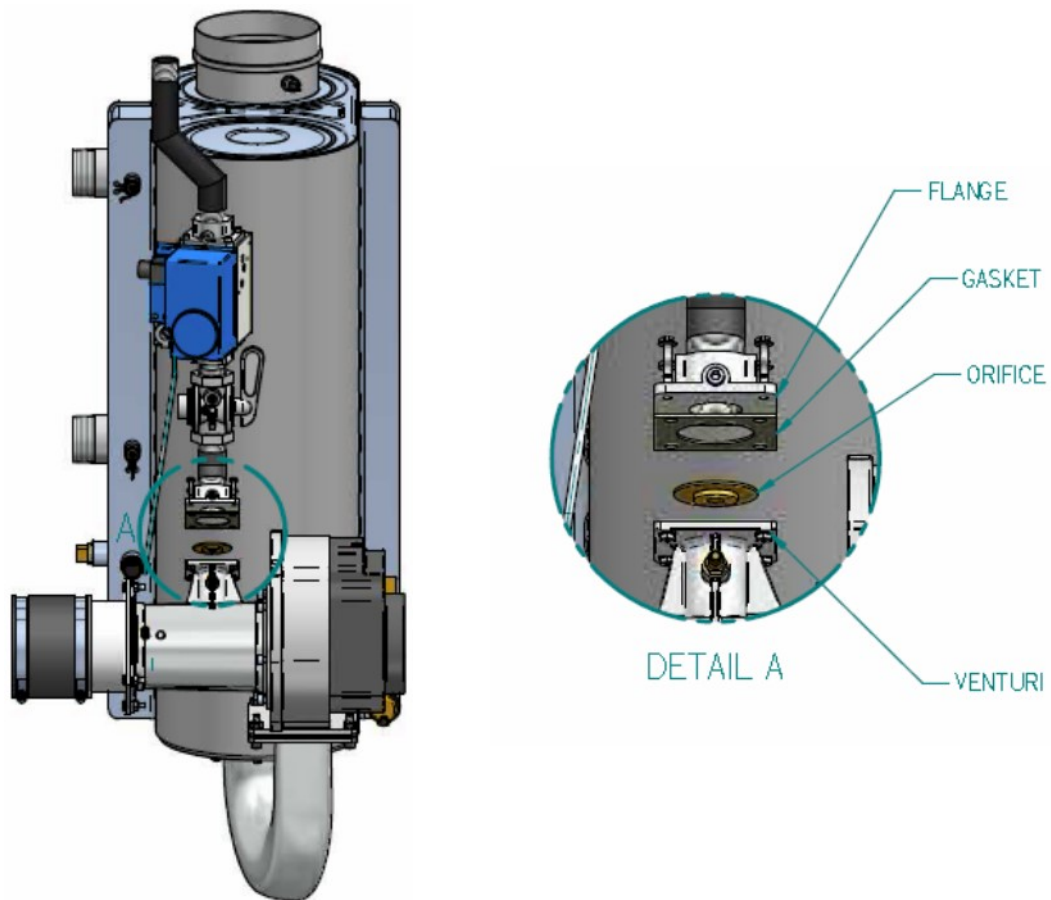


#### 18.2.5 CONVERSION PROCEDURE HCB146CE



### 18.2.6 HCB176CE – HCB236CE

1. Remove the top and front access covers from the unit (no tools required for removal).
2. Remove the four screws and nuts that hold the adaptor flange to the inlet of the venturi.
3. Separate the flange and venturi ensuring the gasket is not damaged.
4. Locate the propane orifice disk from the conversion kit bag. Verify that the stamping on the orifice disk is correct for the boiler (see LPG ORIFICE MARKINGS).
5. Fit the orifice plate ensuring its correct orientation (CONVERSION PROCEDURE HCB176CE – HCB236CE)
6. Reinstall the four screws and nuts holding the adaptor flange to the inlet of the venturi ensuring the correct location of the gasket.
7. After installation is complete, attach the propane conversion label (in the conversion kit bag) next to the boiler rating plate. Attach the LPG caution label (in the conversion kit bag) to the left side of the unit in the lower left corner.
8. Replace the top and front access covers.



### 18.2.7 CONVERSION PROCEDURE HCB176CE – HCB236CE

### 18.3 LPG COMMISSIONING AND TESTING

The commissioning procedure on LPG is similar to that when the boiler is firing on Natural Gas. As such, the same procedure should be followed taking in to account the following information:

#### 18.3.1 LPG PRESSURE ADJUSTMENT AND COMBUSTION CHECKS



**The Lochinvar herald series boilers are supplied with a pre-set gas/air ratio inlet assembly. This must not be tampered with. Any attempt to adjust the gas valve or venturi will invalidate the warranty.**

Combustion figures should be as follows:

Model No.	CO <sub>2</sub>	CO
HCB116CE	10.5% ±0.5%	<100 ppm
HCB146CE	10.5% ±0.5%	<100 ppm
HCB176CE	10.0% ±1.0%	<100 ppm
HCB206CE	10.0% ±1.0%	<100 ppm
HCB236CE	10.0% ±1.0%	<100 ppm

#### 18.3.2 LPG COMBUSTION FIGURES

If the combustion figures are not within the range specified, contact Lochinvar Technical support for further guidance.

## 19.0 MAINTENANCE

### 19.1 GENERAL



**Keep appliance area clear and free from combustible materials and flammable vapours and liquids.**

A competent person should check and ensure that the flue, its support and terminal, the ventilation to the boiler house, safety valve, drain, pressure gauge etc. are in a serviceable and working condition and still comply with the relevant standards and codes of practice, as detailed in **Section 5: GENERAL REQUIREMENTS**.

Servicing is recommended at intervals no greater than 12 months to aid trouble free operation. Even if a maintenance schedule is determined to be less than annually, it is important that all controls and safety features are checked for correct operation on an annual basis.

Measuring flue gas CO<sub>2</sub> and flue gas temperatures will give an indication of the state of the flue and burner. Results of the flue gas analysis should be compared with previously measured values to identify any changes in operational characteristics.

### 19.2 MAINTENANCE SCHEDULE

The boiler has a built in function that reminds the user that routine maintenance is due. As a default, this is set to 12 months 10,000 operational hours or 10,000 ignition cycles. Lochinvar Limited recommends that this be the maximum service interval.

### 19.3 BURNER INSPECTION

The heat exchanger has a sight glass for inspection of the flame picture.



**If the appliance has been in recent operation, this area may be hot. Appropriate precautions should be taken to prevent personal injury.**

To check the flame picture at high and low fire, the following procedure should be followed:

1. Place the boiler into service mode. This is done by depressing the small button below the Enter/Reset button for 5 seconds.
2. The boiler should shut down and relight.
3. Depress the service button momentarily, this should ramp the boiler up to full rate.
4. Check the flame condition.
5. Depress the service button momentarily, this should ramp the boiler down to low rate.
6. Check the flame condition.
7. Press and hold the service button for 5 seconds to take the unit out of service mode.

## 19.4 BURNER REMOVAL

If it has been determined that the flame picture is unacceptable, the burner can be removed and cleaned using the following procedure:

1. Isolate the electrical and gas supplies to the heater.
2. Allow the boiler to cool down.
3. Disconnect the wiring connections to the ignition electrode.
4. Disconnect the power and control connection leads and earthing wire from the combustion fan.
5. Apply a suitable release oil to the 6 studs around the edge of burner door.
6. Remove the 6 retaining nuts around the edge of the burner door.



**Once loosened, the nuts should be removed by hand. If any of the nuts seize, the nut should gently be re-tightened and additional release oil used.**

7. Withdraw the heat exchanger front plate and burner assembly from the heat exchanger complete with the combustion fan.
8. With the burner assembly away from the boiler, the burner can be gently cleaned with the brush attachment of a vacuum cleaner.

The reassembly procedure is the reverse of the above taking care to ensure that the for the heat exchanger front plate sealing gasket, the combustion fan connection gasket, the burner door insulation and the combustion chamber rear wall insulation are in good condition or are replaced as necessary.



**Particular attention should be paid to the combustion chamber rear wall insulation. If any deterioration in the insulating material is noted, the insulation panel must be replaced.**

## 19.5 CLEANING THE HEAT EXCHANGER

To clean the heat exchanger, the following procedure should be carried out:

1. Remove the burner as above.
2. Use a vacuum cleaner to remove any accumulation on the heating surfaces. Do not use any solvent.
3. Finish cleaning using a clean cloth dampened with warm water.
4. Reinstall the burner.
5. Close isolation valves on piping to isolate the appliance from the system. Attach a hose to the appliance drain valve and flush the heat exchanger thoroughly with clean water by using purging valves to allow water to flow through the water make-up line to the appliance.
6. Once the heat exchanger has been flushed, close the drain valve and open the isolation valves.
7. Restart the boiler as detailed in Section 17.4.3.

## 19.6 DRAINING BOILER SYSTEM

The boiler must be drained if it is to be shut down and exposed to freezing temperatures. Maintenance and service procedures may also require draining the boiler.

1. Turn off the boiler electrical disconnect switch.
2. Connect a hose to the system drain valve.
3. Locate hose's discharge in an area where hot water will not cause any damage or injury.
4. Close the cold-water inlet valve from the header tank or pressurisation unit to boiler system.
5. Open the drain valve.
6. Working systematically from the highest point in the heating system, open bleed valves to allow the system to drain.
7. Close all bleed valves
8. If the boiler is being drained for an extended shutdown, it is suggested the drain valve be left open during this period.



**The heat exchanger cannot be completely drained of water without purging with compressed air at a pressure of 1 bar.**

## 19.7 REFILLING THE SYSTEM

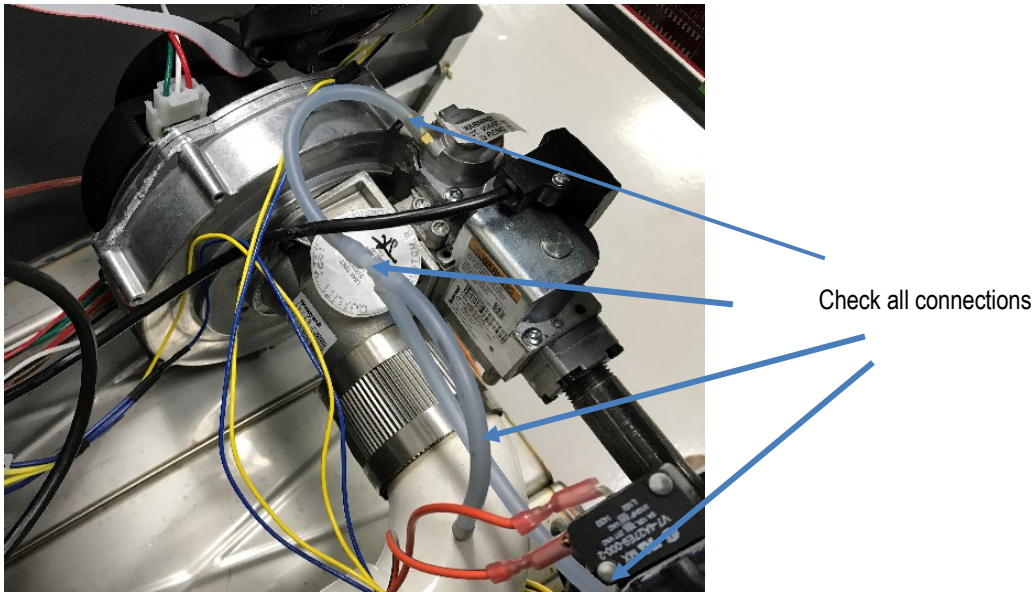
1. Close the drain valve.
2. Open the cold-water inlet valve from the header tank or pressurisation unit to boiler system.
3. Working systematically towards the highest point in the system, open all bleed valves and allow any trapped air to escape.
4. Follow the lighting instructions as detailed in **Section 17.4.3**.
5. Check for water leakage and airlocks, remedy as necessary.

## 19.8 OTHER CHECKS

### 19.8.1 AIR PRESSURE SWITCH LINES

During the annual service, check the lines to/from the air pressure switch to ensure:

1. They are correctly fitted
2. There is no damage



### 19.8.2 RELIEF VALVE

At least once a year, the pressure relief valve should be checked to ensure correct operation. To check the valve, the manual override lever should be operated several times. The valve should seat properly and operate freely.

If water does not flow, drain the boiler, remove the inoperative valve and inspect for obstructions or corrosion. Replace with a new valve of equivalent size as necessary.

### 19.8.3 FLUE SYSTEM

Examine the exhaust and air intake system at least once a year. Points of inspection are as follows:

1. Check for obstructions and/or deterioration of flue piping and terminal. Replace immediately where needed.
2. Check the terminal for any foreign material and remove as necessary.
3. Check all flue system connections for leakage and reseal as required.
4. Check that ventilation grilles comply with current regulations.

### 19.8.4 CONDENSATE NEUTRALISATION KIT

If fitted the condensate neutralisation kit will require replacing after 12 months of operation. Please refer to the item specific instructions for further details.

## 20.0 SMART SYSTEM CONTROL SETTINGS






### 20.1 DISPLAY PANEL ACCESS MENU

To access menus from the display panel, use the procedure shown below:



**Only suitably qualified engineers should alter the settings and parameters within the herald boiler. Incorrect settings could lead to operational problems within the boiler. These problems would not be covered under the herald boiler warranty**

#### 20.1.1 DISPLAY PANEL ACCESS MENU

Button	Screen Status	Operation	Display
	MENU	Press and hold the LEFT SELECT soft key menu for 5 seconds	<b>STANDBY</b> SYSTEM <input type="radio"/> DHW TANK <input type="radio"/> BOILER <input type="radio"/> DHW CIRC <input type="radio"/> SYSTEM: 117°F (118) TANK: 124°F (130) OUTDOOR: 56°F INLET: 109°F OUTLET: 124°F DHW RECIRC: 115°F MENU <input type="radio"/> SCREEN <input type="radio"/> SHDN <input type="radio"/>
		Rotate the NAVIGATION dial clockwise until 5 is displayed (first digit on the left)	<b>STANDBY</b> SYSTEM <input type="radio"/> DHW TANK <input type="radio"/> BOILER <input type="radio"/> DHW CIRC <input type="radio"/> PASSWORD 0000 EXIT <input type="radio"/> <input type="radio"/> NEXT <input type="radio"/> SAVE <input type="radio"/>
		Press the NAVIGATION dial to select the next digit. Rotate the NAVIGATION dial clockwise until 3 is displayed	<b>STANDBY</b> SYSTEM <input type="radio"/> DHW TANK <input type="radio"/> BOILER <input type="radio"/> DHW CIRC <input type="radio"/> PASSWORD 5000 EXIT <input type="radio"/> <input type="radio"/> NEXT <input type="radio"/> SAVE <input type="radio"/>
		Press the NAVIGATION dial 2 times to move to the last digit. Rotate the NAVIGATION dial counter clockwise until 9 is displayed	<b>STANDBY</b> SYSTEM <input type="radio"/> DHW TANK <input type="radio"/> BOILER <input type="radio"/> DHW CIRC <input type="radio"/> PASSWORD 5300 EXIT <input type="radio"/> <input type="radio"/> NEXT <input type="radio"/> SAVE <input type="radio"/>
	SAVE	Press the RIGHT SELECT soft key (SAVE)	<b>STANDBY</b> SYSTEM <input type="radio"/> DHW TANK <input type="radio"/> BOILER <input type="radio"/> DHW CIRC <input type="radio"/> PASSWORD 5309 EXIT <input type="radio"/> <input type="radio"/> NEXT <input type="radio"/> SAVE <input type="radio"/>

## 20.2 PARAMETER SETTING

Menu	Description	See Section	User Access	Installer Access
GENERAL	Vacation Mode (On/Off)	21.1	Yes	Yes
	Time and Date	21.1	Yes	Yes
	Software Version (read only)	21.1	No	Yes
	Temperature Units (°C/°F)	21.1	Yes	Yes
	SH Night Setback Offset IF SH NSB > 0: i. SH Night Setback On Times ii. SH Night Setback Off Times	21.1 21.1 21.1	No	Yes
	DHW Night Setback Offset IF DHW NSB > 0: i. DHW Night Setback On Times ii. DHW Night Setback Off Times	21.1 21.1 21.1	No	Yes
	Display Timeout	21.1	No	Yes
	Display Contrast	21.1	Yes	Yes
	TEMPERATURE SETTINGS	SH1 Set Point User	21.2	Yes
Minimum SH Set Point		21.2	No	Yes
Maximum SH Set Point		21.2	No	Yes
Offset SH1 Set Point		21.2	No	Yes
Differential SH1 Set Point		21.2	No	Yes
SH2 Set Point User		21.2	Yes	Yes
Offset SH2 Set Point		21.2	No	Yes
Differential SH2 Set Point		21.2	No	Yes
SH3 Set Point User		21.2	Yes	Yes
Offset SH3 Set Point		21.2	No	Yes
Differential SH3 Set Point		21.2	No	Yes
3-Way Valve Time		21.2	No	Yes
DATA LOGGING	Reset Last 10 Errors	21.3	No	Yes
FUNCTIONS	Service Mode Delay	21.4	No	Yes
	Freeze Protection Pump On	21.4	No	Yes
	Freeze Protection Burner On	21.4	No	Yes
	Freeze Protection Burner Differential	21.4	No	Yes
DHW SETTINGS	Tank Set Point	21.5	Yes	Yes
	Tank Set Point Differential	21.5	No	Yes
	DHW Boiler Set Point	21.5	No	Yes
	Boiler Set Point Offset	21.5	No	Yes
	Boiler Set Point Differential	21.5	No	Yes
	DHW Recirc Pump Offset	21.5	No	Yes
	DHW Recirc Pump Differential	21.5	No	Yes

20.2.1 SMART SYSTEM CONTROL PARAMETERS

Menu	Description	See Section	User Access	Installer Access
DHW SETTINGS (CONT.)	Tank Minimum Set Point	21.5	No	Yes
	Tank Maximum Set Point	21.5	No	Yes
	DHW Max Rate	21.5	No	Yes
	DHW Type (normal, zone) i. SH/DHW Switching Time ii. DHW/SH Switching Time ELSE: i. DHW FORCES SYSP (YES/NO) ii. DHW BLOCKS SYSP (YES/NO)	21.5	No	Yes
OUTDOOR RESET	IF Outdoor Sensor Connected:			
	Low Outdoor Temperature 1	21.6	No	Yes
	High Outdoor Temperature 1	21.6	No	Yes
	SH1 Set Point at Low Outdoor Temp	21.6	No	Yes
	SH1 Set Point at High Outdoor Temp	21.6	No	Yes
	Outdoor Shutdown Temp 1	21.6	No	Yes
	Outdoor Shutdown Differential 1	21.6	No	Yes
	Shift Heat Curve 1	21.6	No	Yes
	Low Outdoor Temperature 2	21.6	No	Yes
	High Outdoor Temperature 2	21.6	No	Yes
	SH2 Set Point at Low Outdoor Temp	21.6	No	Yes
	SH2 Set Point at High Outdoor Temp	21.6	No	Yes
	Outdoor Shutdown Temp 2	21.6	No	Yes
	Outdoor Shutdown Differential 1	21.6	No	Yes
	Shift Heat Curve 2	21.6	No	Yes
	Low Outdoor Temperature 3	21.6	No	Yes
	High Outdoor Temperature 3	21.6	No	Yes
	SH3 Set Point at Low Outdoor Temp	21.6	No	Yes
	SH3 Set Point at High Outdoor Temp	21.6	No	Yes
	Outdoor Shutdown Temp 3	21.6	No	Yes
	Shift Heat Curve 3	21.6	No	Yes
Boost Temperature IF Boost Temperature > 0 i. Boost Time	21.6	No	Yes	

20.2.2 17.21 CONTINUED



Menu	Description	See Section	User Access	Installer Access
ANTI-CYCLING	Anti-cycling Time	21.7	No	Yes
	Anti-cycling Override Differential	21.7	No	Yes
	Ramp Delay (Enable/Disable)	21.8	No	Yes
	Modulation Factor	21.8	No	Yes
CONTROL MODES	Controlling Sensor(Outlet/System Supply/Inlet)	21.9	No	Yes
	Cascade Address IF Address = 0: Maximum Cascade Outlet Set Point  Cascade Offset Cascade Differential Cascade Type (L/L, EFF) Minimum On/Off Time Minimum Next On Time Minimum Pumps On  ELSE IF Address = 1: Alternate Leader? (Y/N) IF Yes: Maximum Cascade Outlet Set Point  Cascade Offset Cascade Differential Cascade Type (L/L, Eff) Minimum On/Off Time Minimum Next On Time Minimum Pumps On	21.9	No	Yes
	Boiler Size i. Cascade Address ii. Type ii. Type iii. Input	21.9	No	Yes
BMS	BMS (Active, Inactive) IF Active: i. BMS Type (Power, Set Point) IF Power: 1. Power at Minimum Volts 2. Power at Maximum Volts ELSE: 1. Set Point at Minimum Volts 2. Set Point at Maximum Volts ii. Minimum Volts iii. Maximum Volts iv. TStat Input (Active, Inactive) IF Inactive: 1. On Volts 2. Off Differential Volts	21.10	No	Yes
	ModBus/BACNet (Active, Inactive) IF Active: i. BAS Timeout	21.10	No	Yes

20.2.3 17.21 CONTINUED

Menu	Description	See Section	User Access	Installer Access
CIRCULATION PUMPS	System Pump Delay	21.11	No	Yes
	Boiler Pump Delay	21.11	No	Yes
	DHW Pump Delay	21.11	No	Yes
	System Pump Anti-Seize Delay	21.11	No	Yes
	Boiler Pump Anti-Seize Delay	21.11	No	Yes
	DHW Pump Anti-Seize Delay	21.11	No	Yes
	System Pump Type (CFH, WWSD)	21.11	No	Yes
	Boiler Pump Delta T Set Point	21.11	No	Yes
	Boiler Pump Minimum Volts	21.11	No	Yes
SERVICE NOTIFICATION	Service Notification Months	21.12	No	Yes
	Service Notification Running Time	21.12	No	Yes
	Service Notification Cycles	21.12	No	Yes
	Reset Service Reminder	21.12	No	Yes
	Installer Name	21.12	No	Yes
	Installer Phone Number	21.12	No	Yes
BASIC SETUP	Time & Date	21.13	No	Yes
	IF Outdoor Sensor Connected: i. Low Outdoor Temperature 1 ii. High Outdoor Temperature 1 iii. SH1 Set Point at Low Outdoor Temperature iv. SH1 Set Point at High Outdoor Temperature v. Outdoor Shutdown Temperature vi. Outdoor Shutdown Differential 1	21.13	No	Yes
	Cascade Address IF Address = 0: i. Maximum Cascade Set Point ii. Cascade Offset iii. Cascade Differential iv. Cascade Type (L/L, EFF)	21.13	No	Yes
	BMS (Active, Inactive) IF Active: i. BMS Type (Power, Set Point) IF Power: 1. Power at Minimum Volts 2. Power at Maximum Volts ELSE: 1. Set Point at Minimum Volts 2. Set Point at Maximum Volts ii. Minimum Volts iii. Maximum Volts iv. TStat Input (Active, Inactive) IF Inactive: 1. On Volts 2. Off Differential Volts	21.13	No	Yes
USB		21.13	No	Yes

1.11

20.2.4 17.21 CONTINUED

## 21.0 VIEWABLE AND CHANGEABLE CONTROL PARAMETERS



**Before changing parameters, note the settings so that the unit can be returned to its original operating parameters.**

### 21.1 GENERAL

#### 21.1.1 VACATION MODE

This parameter forces the Space Heating (SH) and DHW set points to decrease by the amounts programmed in the Night Setback Offset parameters. It is used to save energy, such as when the building is unoccupied for an extended period of time. For this function to work, the Space Heating Night Setback Offset and/or DHW Night Setback Offset parameters must be set to a value higher than 0°. The default value of this parameter is OFF.

#### 21.1.2 TIME AND DATE

The control uses an internal clock for the night setback feature and for logging of events. For these features to work correctly, the clock must be set when the boiler is first installed or anytime the boiler has been powered off for more than four (4) hours. This parameter must be accessed to set the clock.



**The internal clock does not adjust for british summer time and therefore, will require a manual adjustment. The clock is automatically updated whenever a pc is connected and the win\_pro installer program is started.**

#### 21.1.3 SOFTWARE VERSION

The software version allows the user to view the software version in use by the control. This software controls the operation of the boiler. When a new software version becomes available, the existing control can be replaced with a new control to update the software. Software version is read only.

#### 21.1.4 TEMPERATURE UNITS (°C / °F)

The control can be configured to display temperature in either °C or °F. This parameter can be changed by the user or the installer by accessing the Temperature Units parameter. The default is °F.

#### 21.1.5 SPACE HEATING (SH) AND DOMESTIC HOT WATER (DHW) NIGHT SETBACK OFFSET

Once the unit's internal clock has been set correctly, the Night Setback feature can be used to program a lower set point during unoccupied times. Both the space heating and DHW can be programmed for night setback. When in night setback, the control reduces the set point by a fixed amount. For space heating, it subtracts the space heating night setback offset from each of the SH user set points (SH1, 2, and 3 Set point parameters), or the calculated outdoor reset set point (if lower). For DHW, it subtracts the DHW night setback offset from the tank set point (Tank Set point parameter).



**The DHW night setback will not work without a tank sensor installed.**

The installer may adjust the space heating night setback offset by accessing the SH Night Setback Offset parameter and the DHW night setback offset by accessing the DHW Night Setback Offset parameter. The minimum setting is 0°C and the maximum setting is 50°C.

#### 21.1.6 SPACE HEATING (SH) AND DOMESTIC HOT WATER (DHW) NIGHT SETBACK ON AND OFF TIMES

These are the times at which the SH Night Setback and DHW Night Setback Offsets become active and inactive. There are seven (7) stop times and seven (7) start times each for the SH and DHW night setback functions. Any start or stop time may be set to any time during the week. When a start time and a stop time are programmed for the same day and time, the stop time has priority (this is how a start time can be disabled). The installer can adjust the SH Night Setback start and stop times by accessing the parameter SH NSB On/Off Times. The installer can access the DHW Night Setback start and stop times by accessing the DHW NSB On/Off Times parameter. These settings can be adjusted as follows:

1. When the screen is first accessed, start and stop triggers 1 are displayed. If a different trigger number is desired, rotate the NAVIGATION dial until the desired trigger number appears. Once it is found, press the NAVIGATION dial to adjust the start and stop times. The day of the week for the start time will flash.
2. Rotate the NAVIGATION dial to adjust the day of the week of the start trigger. Once it is set to the desired day of the week, press the NAVIGATION dial again. The start time hour will flash.
3. Rotate the NAVIGATION dial to adjust the start time hour to the desired time. Press the NAVIGATION dial again. The start time minutes will flash.
4. This process may be continued until the start and stop days and times are adjusted as desired. When finished with this set of triggers, press the [SAVE] key.
5. Rotate the NAVIGATION dial to select another set of start and stop triggers, or press the [EXIT] key to return to the previous menu.

#### 21.1.7 NIGHT SETBACK OVERRIDE

Any Night Setback On trigger currently active or scheduled within the next seven (7) days can be skipped. To skip a trigger, go to the Night Setback Status Screen and press the SKIP button. Rotate the NAVIGATION dial until the arrow (>) is next to the trigger you wish to skip. Press the NAVIGATION dial once. "SK" will appear next to that trigger to indicate that it will be skipped. You can restore an upcoming trigger by selecting that trigger, and pressing the NAVIGATION dial again. The "SK" next to that trigger will disappear.

To save any changes and return to the Home Screen, press the RIGHT SELECT [HOME] key. To return to the Status Screen without saving the changes, press the LEFT SELECT [EXIT] key.

#### 21.1.8 DISPLAY TIMEOUT

This is the time in which the display remains illuminated. The range is 10 seconds to 10 minutes. The default is 10 minutes.

#### 21.1.9 DISPLAY CONTRAST

The contrast of the LCD display can be adjusted to improve readability. The contrast is adjusted automatically when the display board is tested at the factory, but different ambient conditions may warrant changing the setting. This parameter can be changed by accessing the Display Contrast setting. The range of this parameter is -10 to +10. The default setting is 0.

### 21.2 TEMPERATURE SETTINGS

#### 21.2.1 SPACE HEATING (SH1, SH2, SH3) SET POINT

There are three (3) individual user set points for better zone control. These are listed as SH1 Set Point through SH3 Set Point. If multiple set points are calling for heat the highest set point has priority. The range is SH Minimum Set point to SH Maximum Set point. The default is 52°C.

#### 21.2.2 SPACE HEATING (SH) MINIMUM SET POINT

The SH minimum set point sets the minimum water temperature set point that can be used for space heating operation. The user or installer will not be able to program the control with a lower SH set point. This parameter can only be changed by the installer by accessing Minimum SH Set point parameter. The temperature range of this parameter is 0°C to the space heating maximum set point. The default value is 16°C.

### 21.2.3 SPACE HEATING (SH) MAXIMUM SET POINT

The SH maximum set point sets the maximum water temperature set point that can be used for space heating. The user or installer will not be able to program the control with a higher SH set point. This parameter can only be changed by the installer by accessing Maximum SH Set point parameter. The temperature range of this parameter is the space heating minimum set point to 88°C. The default value is 85°C.

### 21.2.4 SH1 - SH3 OFFSET SET POINT

The SH offset sets how many degrees above set point the temperature has to go before the boiler will shut off. This parameter can only be changed by the installer by accessing parameters SH1, 2 and 3 Offset Set point parameters. The temperature range of these parameters is 0°C to 20°C. The default value is 10°C.

#### SH1 - SH3 Differential Set Point

The SH differential sets how many degrees below the offset the temperature has to drop before the boiler turns back on. This parameter can only be changed by the installer by accessing the SH1, 2 and 3 Differential Set point parameters. The range is 0°C to 60°C. The default is 20°C.

## 21.3 DATA LOGGING

### 21.3.1 RESET LOG ERRORS

The reset log errors function clears the last 10 errors log.

## 21.4 FUNCTIONS

### 21.4.1 SERVICE MODE DELAY

By pressing the pin button on the front of the display for five (5) seconds, the control will be placed in Service Mode. This will override all other heat demands. The Service Mode allows the installer to set the unit to any firing rate for the purpose of combustion analysis. The delay sets the length of time the boiler will stay in the Service Mode if no keys have been pressed before going back to its original state. This parameter can only be changed by the installer by accessing the Service Mode Delay parameter. The time range of this parameter is 1 to 10 minutes. The default value is 10 minutes.

### 21.4.2 FREEZE PROTECTION PUMP ON

The SMART SYSTEM control will turn on the boiler and system pump outputs whenever the inlet temperature drops below this setting. This is done to prevent the water in the heat exchanger from freezing. Certain low-temperature applications (such as snow melt) can operate at temperatures around freezing, so this setting needs to be lowered in these cases. The installer can adjust the temperature at which the pump outputs are turned on by accessing the Freeze Protection Pump On parameter. The minimum setting is -19°C, and the maximum setting is 7.2°C. The default setting is 7.2°C.

### 21.4.3 FREEZE PROTECTION BURNER ON

If running the pumps does not prevent the inlet temperature from falling closer to freezing, the SMART SYSTEM control will fire the burner at low fire. The installer can adjust the temperature at which the burner fires by adjusting the Freeze Protection Burner On parameter. The minimum setting is -19°C, and the maximum setting is the Freeze Protection Pump On parameter. The default setting is 2.8°C.

### 21.4.4 FREEZE PROTECTION BURNER DIFFERENTIAL

Once the burner has started firing due to a low inlet temperature, the inlet temperature must increase by this amount before the burner turns back off. The installer can adjust this differential by accessing the Freeze Protection Burner Differential parameter. The minimum setting is 0°, and the maximum is 11°C. The default setting is 2.8°C.

## **21.5 DHW SETTINGS**

### **21.5.1 DHW TANK SET POINT**

By installing a tank sensor, the SMART SYSTEM control can perform the tank thermostat function. The SMART SYSTEM control automatically detects the presence of this sensor, and generates a DHW call for heat when the tank temperature drops below the tank set point differential (Tank Set point Differential parameter), and finishes the call for heat when the tank temperature reaches tank set point. This parameter can be changed by the installer by accessing the DHW Tank Set point parameter. The temperature range of this parameter is from the tank minimum set point to the tank maximum set point. The default value is 49°C.

When the tank sensor is connected the boiler will still fire during a DHW demand even if the Herald is turned off via the BMS connections.

### **21.5.2 TANK SET POINT DIFFERENTIAL**

When a tank sensor is installed, the tank temperature must drop this amount below the tank set point (DHW Tank Set point parameter) before the boiler turns back on. The installer can adjust this setting by accessing the Tank Set point Differential parameter. The minimum setting is 0°C, and the maximum is 22°C. The default setting is 3°C.

### **21.5.3 DHW BOILER SET POINT**

When a DHW call for heat becomes active, the control will use the DHW boiler set point to determine the firing rate of the boiler based on the boiler outlet water temperature, or system temperature when DHW is programmed as a zone. This parameter can be changed by the installer by accessing the DHW Boiler Set point parameter. The temperature range of this parameter is 20°C to 88°C. The default value is 82°C.

### **21.5.4 DHW BOILER OFFSET**

This parameter reflects the degrees above DHW boiler set point the temperature has to go before the boiler will shut off. The range is 0°C to 11°C. The default setting is 2.8°C.

### **21.5.5 DHW BOILER DIFFERENTIAL**

This parameter reflects the degrees below DHW boiler offset set point the temperature has to go before the boiler turns back on. The range is 0°C to 33°C. The default setting is 6°C.

### **21.5.6 DHW RECIRCULATION PUMP OFFSET (RECIRCULATION PUMP)**

The SMART SYSTEM control will turn the DHW recirculation pump on when the DHW return water temperature drops below the DHW Tank Set Point minus the DHW Recirculation Pump Offset. The range for this parameter is 0° to 30°C. The default value is 5°C.

### **21.5.7 DHW RECIRCULATION PUMP DIFFERENTIAL**

Once the SMART SYSTEM control turns the DHW recirculation pump on, the DHW return water temperature must increase by the DHW Recirculation Pump Differential before the control turns the DHW recirculation pump back off. The range of this parameter is 0° to 50°C. The default value is 2°C.

### **21.5.8 TANK MINIMUM SET POINT**

This setting controls the minimum tank set point for the tank temperature. The installer can adjust this by accessing the Tank Minimum Set point parameter. The minimum setting is 16°C and the maximum setting is the maximum tank set point (Tank Maximum Set point parameter). The default value is 16°C.

### **21.5.9 TANK MAXIMUM SET POINT**

This setting controls the maximum tank set point for the tank temperature. The installer can adjust this by accessing the Tank Maximum Set point parameter. The minimum setting is the minimum tank set point (Tank Minimum Set point parameter) and the maximum setting is 88°C. The default value is 88°C.

#### **21.5.10 FAN SPEED LIMITING FOR INDIRECT DHW TANK**

This parameter determines the maximum fan speed (and therefore the maximum kW rate) to be used when heating an indirect DHW tank. This setting may be used when the tank is unable to accept all of the kW available from the boiler. This parameter may be adjusted by the installer by accessing the Fan Speed Limiting for Indirect DHW Tank parameter. The default value is the maximum fan speed for that model.

#### **21.5.11 DHW TYPE**

This parameter determines whether the boiler treats the indirect DHW tank as a separate load or as a zone on the primary loop. When programmed as a separate load, the boiler will turn on the DHW pump and then turn off the boiler pump when an indirect DHW demand begins. When programmed as a zone, the boiler will turn on the DHW pump, leave the boiler pump on and change the system set point to the DHW boiler set point (DHW Boiler Set point parameter).

This setting may be changed by the installer by accessing the DHW Type parameter. The choices are NORMAL and ZONE. The default setting is NORMAL.

#### **21.5.12 SH/DHW SWITCHING TIME**

When a boiler has a space heating demand and it receives a DHW demand, it will immediately switch to the DHW demand and start a timer. Once the timer has expired, the boiler will switch back to the space heating demand and start another timer. Once this other timer expires, it will switch back to the DHW demand. The installer can adjust the length of time the boiler will service the space heating demand by accessing the SH/DHW Switching Time parameter. The minimum setting is 0 minutes and the maximum setting is 55 minutes. The default time is 30 minutes.

#### **21.5.13 DHW/SH SWITCHING TIME**

When a boiler has a DHW demand and it receives a space heating demand, the SMART SYSTEM control will start a timer. Once the timer expires, it will stop the DHW demand and service the space heating demand. The installer can adjust the length of time the boiler will service the DHW demand by accessing the DHW/SW Switching Time parameter. The minimum setting is 0 minutes and the maximum setting is 55 minutes. The default setting is 30 minutes.

#### **21.5.14 DHW FORCES SYS PUMP**

When the indirect DHW tank is connected as a zone on the primary loop, the DHW Forces Sys Pump parameter tells the system pump if it must run when there is a DHW demand. To have the system pump constantly running during a DHW demand, set the DHW Forces Sys Pump parameter to YES (the parameter DHW Blocks Sys Pump must be set to NO). If this parameter and the DHW Blocks Sys Pump parameter are both set to NO, the system pump operation will be based strictly on the System Pump Type parameter setting. The default setting of this parameter is YES.

#### **21.5.15 DHW BLOCKS SYS PUMP**

When the indirect DHW tank is connected as a zone on the primary loop, the DHW Blocks Sys Pump parameter tells the system pump if it is allowed to run during a DHW demand. To force the system pump to turn off during a DHW demand, set the DHW Blocks Sys Pump parameter to YES. The default setting is NO.

## 21.6 OUTDOOR RESET

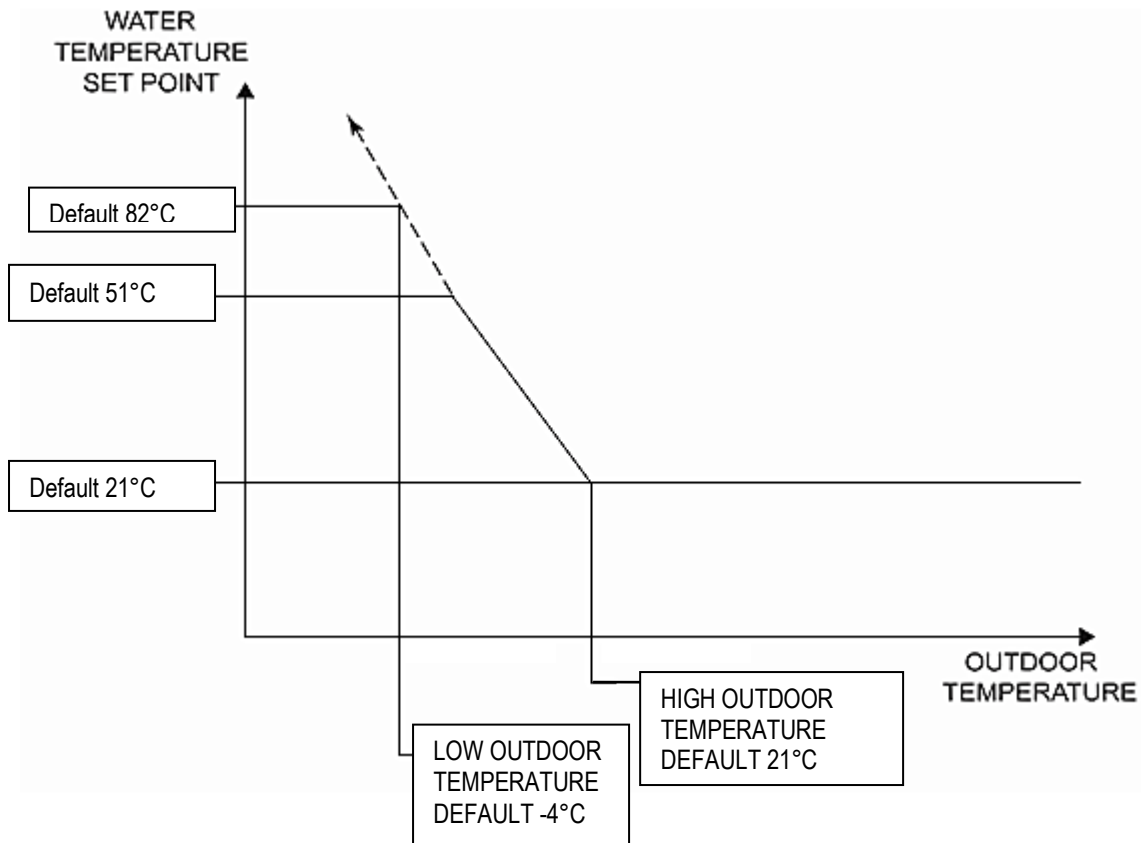
The option of controlling up to three (3) different outdoor resets for low outdoor temperatures is available.

### 21.6.1 OUTDOOR (1 - 3) Low

When the outdoor air temperature drops to this point, the water temperature will be at the Set point 1 at Low Outdoor Temp 1, Set point 2 at Low Outdoor Temp 2 and Set point 3 at Low Outdoor Temp 3 parameters. If the outdoor air temperature drops further, the set point will continue to increase above this setting. This parameter can be changed by the installer by accessing the Outdoor (1-3) Low parameter. The temperature range of this parameter is  $-39^{\circ}\text{C}$  to high outdoor temperature set point. The default value is  $-4^{\circ}\text{C}$ .

### 21.6.2 OUTDOOR (1 - 3) HIGH

When the outdoor air temperature rises to or above this point, the water temperature will be at the Set point 1 at High Outdoor Temp 1, Set point 2 at High Outdoor Temp 2 and Set point 3 at High Outdoor Temp 3 parameters. This parameter can be changed by the installer by accessing the Outdoor (1-3) High parameter. The temperature range of this parameter is low outdoor temperature set point to  $40^{\circ}\text{C}$ . The default value is  $21^{\circ}\text{C}$ .



### 21.6.3 OUTDOOR AIR CURVE

### 21.6.4 SET POINT (1 - 3) AT LOW OUTDOOR TEMPERATURE

When the outdoor air temperature drops to the Outdoor (1 - 3) Low parameters, the calculated set point will be at this setting (FIG. 1-1). If the outdoor air temperature drops further, the set point will continue to increase above this setting. However, if SH1, SH2, and SH3 are set lower, the water temperature will be limited by these set points instead. These parameters can be changed by the installer by accessing the Set point 1 at Low Outdoor Temp 1, Set point 2 at Low Outdoor Temp 2 and Set point 3 at Low Outdoor Temp 3 parameters. The temperature range of this parameter is  $20^{\circ}\text{C}$  to  $88^{\circ}\text{C}$ . The default value is  $82^{\circ}\text{C}$ .



#### **21.6.5 SET POINT (1 - 3) AT HIGH OUTDOOR TEMPERATURE**

When the outdoor air temperature rises to or above Outdoor (1 - 3) High parameters, the calculated set point will be at this setting (FIG. 1-1). These parameters can be changed by the installer by accessing the Set point 1 at High Outdoor Temp 1, Set point 2 at High Outdoor Temp 2 and Set point 3 at High Outdoor Temp 3 parameters. The temperature range of this parameter is 20°C to 88°C. The default value is 21°C.

#### **21.6.6 OUTDOOR AIR SHUTDOWN (SH1 - SH3)**

When the outdoor temperature rises above this point, the control will block the corresponding SH demand (DHW demands will still be active). These parameters can be changed by the installer by accessing the Outdoor Air Shutdown SH1, SH2, and SH3 parameters. The temperature range of this parameter is 0°C to 40°C. The default value is 21°C.

#### **21.6.7 OUTDOOR AIR SHUTDOWN DIFFERENTIAL (SH1 - SH3)**

The outdoor air shutdown differential parameter is the number of degrees below Outdoor Air Shutdown SH1, SH2, and SH3 parameters the outdoor air temperature must go before the boiler will respond to the corresponding SH demand. These parameters can be changed by the installer by accessing the Outdoor Air Shutdown Differential SH1, SH2, and SH3 parameters. The temperature range of this parameter is 0°C to 30°C. The default value is 6°C.

#### **21.6.8 SHIFT RESET CURVE (SH1 - SH3)**

There is a shift reset parameter for each outdoor reset curve. The shift reset parameter shifts the actual set point above or below the calculated set point by the number of degrees in this parameter. These parameters can be changed by the installer by accessing the Shift Reset Curve SH1, SH2, and SH3 parameters. The temperature range of this parameter is -10°C to 10°C. The default value is 0°C. This feature will be active if this parameter is set to anything other than 0°C.

#### **21.6.9 BOOST TEMPERATURE**

If a SH demand lasts longer than the programmed time delay setting and there have been no DHW demands, the control will increase the water temperature set point by the amount in this parameter. If the SH demand continues through another time period, the set point will be increased again. This will continue until either the SH demand ends, a maximum of 20 increases has occurred, or SH1, SH2, SH3 maximum set point has been reached. Once the SH demand has been satisfied the set point will revert back to its calculated setting. The boost temperature can be changed by the installer by accessing the Boost Temperature parameter. The temperature range of this parameter is 0°C to 14°C. The default value is 0°C. This feature will be active if this parameter is set to anything other than 0°C.

#### **21.6.10 BOOST TIME**

The boost time parameter sets the amount of time that must elapse with a SH demand before the water temperature calculated set point will be increased. This parameter can be changed by the installer by accessing the Boost Time parameter. The time range for this parameter is 0 minutes to 55 minutes. The default value is 0 minutes.

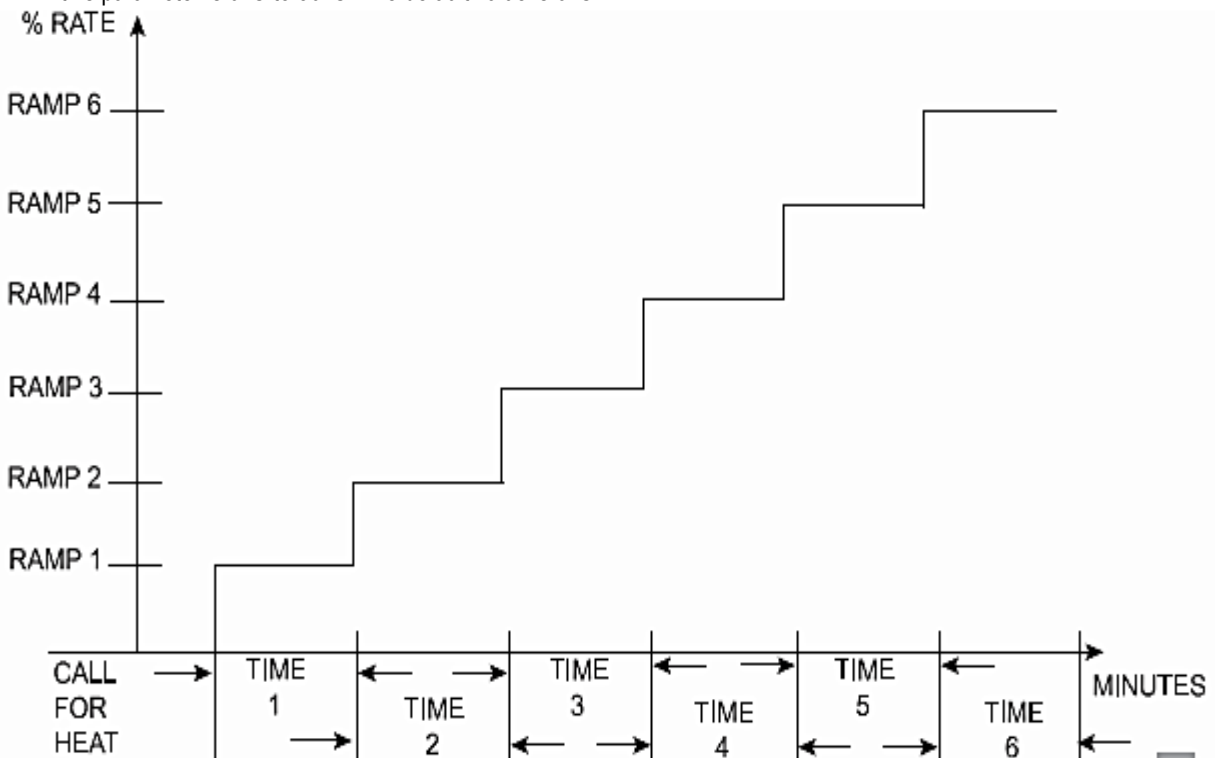
## 21.7 ANTI-CYCLING

### 21.7.1 ANTI-CYCLING TIME

Once the burner turns off, a set amount of time must elapse before the control will respond to a new demand. The control will block the new heat demand and anti-cycling will be shown in the display until the time has elapsed or the water temperature drops below the Anti-Cycling Override Differential parameter. This parameter can be changed by the installer by accessing the Anti-Cycling Time parameter. The time range for this parameter is 1 minute to 10 minutes. The default value is 1 minute.

### 21.7.2 ANTI-CYCLING OVERRIDE DIFFERENTIAL

The control will bypass the anti-cycling time if the inlet water temperature drops too much. The control will use the inlet water temperature present at the boiler when it shuts off as the starting point. If the inlet temperature drops below the temperature parameter the control will abort anti-cycling and allow the boiler to fire. This parameter can be changed by the installer by accessing the Anti-Cycling Override Differential parameter. The temperature range of this parameter is 0°C to 30°C. The default value is 6°C.



### 21.7.3 RAMP DELAY (ENABLE / DISABLE)

This parameter allows the installer to enable or disable the SH ramp delay. The default setting is disabled.

### 21.7.4 MODULATION FACTOR

This parameter allows the installer to reduce the responsiveness of the temperature control function, for situations where, for example, redundant heating capacity is installed. The values that are available are 40, 50, 60, 70, 80, 90, and 100, with 100 being the most responsive. The default value is 100.

## 21.8 RAMP SETTINGS



Please note that the brackets ([]) denote screen status.

The SMART SYSTEM control can be programmed to limit the firing rate for a fixed period of time at the start of a space heating or BMS set point demand. There are six (6) possible limits, each with their own time delay. The first limit applies as soon as the burner starts. Once its time delay expires, the second limit is applied and its timer begins. The control steps through these limits until the 6th (sixth) limit expires. Note, however, that the 6th limit will also limit the rate for the rest of that heat demand. The installer can adjust the firing limits and time delays by accessing the Ramp Settings parameter. Once this parameter is selected, the screen will show the step number, the time delay for that step and the limit value corresponding with that step. If the installer wishes to adjust one of the values in that step, he can press the NAVIGATION dial until the value he wishes to change is flashing. The installer can then rotate the NAVIGATION dial to adjust that value. If the installer presses the RIGHT SELECT [SAVE] key while the limit value is flashing, the step value will flash again. The installer can then select the next step and adjust the delay and limit values corresponding with that step.

When finished, the installer can press the RIGHT SELECT [SAVE] key to store the new settings, or the LEFT SELECT [EXIT] key to return to the Anti-Cycling parameter list without saving the changes. The delay value can be set between 0 minutes and 40 minutes. The limit value can be set between 0% and 100%.

## 21.9 CONTROL MODES

### 21.9.1 CONTROLLING SENSOR

The SH controlling sensor parameter selects the sensor the control will use to regulate the boiler firing rate. This parameter is adjustable by the installer by accessing the Controlling Sensor parameter. The sensor selections are as follows: The outlet sensor regulates the firing rate based on the outlet water temperature of the boiler and the inlet sensor regulates the firing rate based on the inlet water temperature of the boiler. If the outlet sensor is selected, and the optional system supply sensor is connected, the control will regulate the firing rate based on the system supply sensor temperature. The default sensor is the Outlet Sensor.

### 21.9.2 CASCADE ADDRESS

The boiler designated as the Leader needs to be programmed with address 0. All the Member boilers require addresses from 1 to 7, and the addresses must be different for each Member. The addresses can be in any order, regardless of the order in which the units are wired together. This parameter is adjustable by the installer by accessing the Cascade Address parameter. The outdoor air (if used) and system supply sensor must be connected to the Leader boiler. The default address is 1.

### 21.9.3 MAXIMUM CASCADE SET POINT

This parameter determines the set point used by the individual boilers in a Cascade when a system sensor is connected to the Leader boiler. When a boiler is commanded to fire by the Leader boiler, it will attempt to achieve this temperature at its outlet. The Leader boiler will limit the modulation of the boiler(s) in order to hold the temperature at the system supply sensor to the user set point. If any of the boiler outlet temperatures reach the maximum cascade set point, that boiler will then modulate down on its own in order to keep its outlet temperature within the maximum cascade set point. Therefore, this parameter can be used to limit the outlet temperatures of all the boilers in a Cascade. Note that this parameter does not apply when the boiler is heating an indirect DHW tank programmed as normal. This parameter is adjustable by the installer by accessing the Maximum Cascade Set Point parameter. The temperature range of this parameter is 0°C to 88°C. The default maximum cascade set point is 85°C.

### 21.9.4 CASCADE OFFSET

This parameter determines how much the temperature must go above set point before the lead boiler will turn off. This parameter can be adjusted by the installer by accessing the Cascade Offset parameter. The temperature range of this parameter is 0° to 11°C the default value is 6°C.

#### 21.9.5 CASCADE DIFFERENTIAL

This parameter determines how much the temperature must go below the turn off temperature (Set point + Offset) before the lead boiler turns on. This parameter can be adjusted by the installer by accessing the Cascade Differential parameter. The temperature range of this parameter is 0°C to 33°C The default value is 11°C.

#### 21.9.6 CASCADE TYPE (L/L / EFF)

There are two (2) options for the way a Cascade divides the load between its heaters. The first is Lead/Lag, designated as L/L in the menu. This method is used when it is desired to have the least amount of total flow through the boilers. This method will modulate the last two (2) boilers that are firing. This provides for smooth transitions when a boiler turns on or off. When the last boiler reaches 100% and the calculated load is still increasing, it will start the next boiler at 20% and reduce the previous boiler to 80%, thus eliminating the sudden jump in total output of the Cascade. When the calculated load is decreasing and the last boiler gets down to 20% fire, it will hold it there and start lowering the firing rate on the next-to-last boiler. When the next-to-last boiler reaches 20%, it will turn the last boiler off and raise the rate of the next-to-last boiler to 40%, thus eliminating the sudden drop in total output of the Cascade.

The other Cascade divider method is Efficiency Optimisation, designated as EFF in the menu. This method is used, as the name implies, when it is desired to have the most efficient system. When the first boiler reaches 100% rate, it lowers its rate to 50% and turns on the next boiler at 50%. The two (2) boilers then modulate at the same rate. As the calculated load increases further and both boilers ramp up to 100%, it lowers the rate of the first two (2) boilers to 67% and brings the next boiler on at 67%. The three (3) boilers then modulate together. As the calculated load decreases, the boilers will reach 20%, at which time the last boiler (the third in our example) will turn off and the Cascade will increase the rates of the remaining boilers to provide the equivalent total output as before  $((3 \times 20\%) / 2 = 30\%$  in our example).

Efficiency optimisation is automatically selected when boilers of different sizes are programmed into the Leader control (see Boiler Size on page 27).

#### 21.9.7 MINIMUM ON/OFF TIME

In order to prevent units in a Cascade from short cycling, this parameter defines the minimum ON and OFF time for each unit. The installer can adjust this time by accessing the Minimum On/Off Time parameter. The minimum setting is 0 seconds and the maximum setting is 10 minutes. The default is 30 seconds.

#### 21.9.8 MINIMUM NEXT ON TIME

In order to reduce the risk of temperature overshoot with a Cascade, this parameter defines the minimum time delay from starting one unit until the next unit may be started. The installer can adjust this time delay by accessing the Minimum Next On Time parameter. The minimum setting is 0 minutes and the maximum setting is 10 minutes. The default is 60 seconds.

#### 21.9.9 MINIMUM NUMBER OF PUMPS ON

When the boiler is a Cascade Leader, it can force a minimum number of boiler pump outputs to be on continuously, regardless of how many boilers are firing. This is normally used when the boilers are piped in a full-flow configuration, and the boiler pump outputs are controlling isolation valves. The Leader will force the boiler pump output on the highest priority boiler to turn on first, then the boiler pump output on the second highest priority boiler, and so forth, until the minimum number of pump outputs are turned on. The range of this parameter is 0 to 8. The default value is 0.

### 21.9.10 ALTERNATE LEADER

This parameter allows the Member 1 boiler to automatically assume control of the Cascade should it lose communication with the Leader boiler. When programmed to YES, it is recommended that the Member 1 boiler have its own set of external sensors installed (such as the system supply sensor), to maintain the same level of temperature control as with the Leader boiler. Voltage signals (such as the 0 - 10V system pump speed input) can be connected to both boilers.



**Do not connect the sensors connected to the leader boiler to the member 1 boiler. The actual water temperatures will be higher than expected, which could lead to property damage and/or personal injury..**

When communication is re-established with the Leader boiler, Member 1 will automatically relinquish control of the Cascade to the Leader boiler.

The default value of this parameter is NO.

### 21.9.11 BOILER SIZE

When boilers of different sizes are connected together in a Cascade, the Leader boiler has to know the size of each boiler in that Cascade. The Boiler Size parameters allow the installer to program the size based on the Cascade address. This screen shows the Cascade address and the size of the boiler with that address (in Btu/hr):

1. When the Boiler Size screen is first accessed, Cascade Address (SELF) is shown.
2. Press the NAVIGATION dial twice to access the Input setting. Rotate the NAVIGATION dial to increase the boiler input. Input settings 0 - 400 Btu/hr can be adjusted in increments of 5 (5000 Btu/hr). When the closest approximate boiler size is shown, press the RIGHT SELECT [SAVE] key.
3. Rotate the NAVIGATION dial to select the address of the next boiler in the Cascade. Repeat Step two above.
4. Once the size of the last boiler in the Cascade has been entered and saved, press the LEFT SELECT [EXIT] key to return to the Control Modes menu.
5. If no other parameters are to be adjusted, press the RIGHT SELECT [HOME] key to save the new settings and return to the Status screens.

The SMART SYSTEM control automatically uses the Efficiency Optimisation Cascade type when controlling boilers of different sizes.

## 21.10 BUILDING MANAGEMENT SYSTEM (BMS)

### 21.10.1 BMS

The set point or modulation of the boiler may be controlled through the 0 - 10V BMS input, BACnet, or ModBus. When the BMS parameter is set to INACTIVE, the 0 - 10V input will be ignored. When set to ACTIVE, the set point or modulation will be controlled by the voltage on the 0 - 10V input (in the case of 0 - 10V BMS control), or the 0 - 10V input value received through ModBus or BACnet. The default value is INACTIVE.

### 21.10.2 BMS TYPE

When programmed for BMS control through the 0 - 10V BMS input or through ModBus/BACnet, the 0 - 10V signal can be interpreted as either a modulation command or a set point. When the BMS Type parameter is set to POWER, the 0 - 10V signal will control the modulation. When set to SETPOINT, the 0 - 10V signal will control the SH set point. The default setting is SETPOINT.

### 21.10.3 RATE AT MINIMUM VOLTS

When programmed for BMS control through the 0 - 10V BMS input or through ModBus/BACnet and the BMS Type is programmed as POWER, the modulation percentage represented by the Volts at Minimum parameter is set by the Rate at Minimum Volts parameter. The minimum value is 0% and the maximum is the Rate at Maximum Volts setting. The default value is model dependant.

### 21.10.4 RATE AT MAXIMUM VOLTS

When programmed for BMS control through the 0 - 10V BMS input or through ModBus/BACnet and the BMS Type is programmed as POWER, the modulation percentage represented by the Volts at Maximum parameter is set by the Rate at Maximum Volts parameter. The minimum value is the Rate at Minimum Volts setting and the maximum is 100%. The default value is 100%.

### 21.10.5 SET POINT AT MINIMUM VOLTS

When programmed for BMS control through the 0 - 10V BMS input or through ModBus/BACnet and the BMS Type is programmed as SETPOINT, the set point represented by the Volts at Minimum parameter is set by the Set Point at Minimum Volts parameter. The minimum value is 32°F (0°C) and the maximum is the Set Point at Maximum Volts setting. The default value is 70°F (21°C).

### 21.10.6 SET POINT AT MAXIMUM VOLTS

When programmed for BMS control through the 0 - 10V BMS input or through ModBus/BACnet and the BMS Type is programmed as SETPOINT, the set point represented by the Volts at Maximum parameter is set by the Set Point at Maximum Volts parameter. The minimum value is the Set Point at Minimum Volts setting and the maximum is 190°F (88°C). The default value is 180°F (82°C).

### 21.10.7 VOLTS AT MINIMUM

When programmed for BMS control through the 0 -10V BMS input or through ModBus/BACnet, the Volts at Minimum parameter should be set to the minimum voltage signal sent to the SMART SYSTEM control. The range of this parameter is 0.0V to the Volts at Maximum value. The default setting is 2.0V.

### 21.10.8 VOLTS AT MAXIMUM

When programmed for BMS control through the 0 -10V BMS input or through ModBus/BACnet, the Volts at Maximum parameter should be set to the maximum voltage signal sent to the SMART SYSTEM control. The range of this parameter is the Volts at Minimum value to 10.0V. The default value is 10.0V.

### 21.10.9 BMS THERMOSTAT INPUT

When controlling the boiler through the 0 - 10V BMS input, BACnet, or ModBus, the boiler can be enabled one of two ways. With the BMS Thermostat Input parameter set to ACTIVE, the boiler will be enabled by closing the Heat/ Loop Demand 1 input. When set to INACTIVE, the boiler will be enabled by the voltage level on the 0 - 10V input (in the case of 0 - 10V BMS control), or the 0 - 10V input value received through BACnet or ModBus. The default value is INACTIVE.



**The boiler will still fire on a DHW demand if the Herald is directly controlling the DHW via the sensor point at 29-30**

### 21.10.10 ON VOLTS

When programmed for BMS control through the 0 -10V BMS input or through ModBus/BACnet and the BMS Thermostat Input is set to INACTIVE, the On Volts parameter determines the 0 - 10V BMS input voltage at which the boiler is enabled. The minimum value is 0.5V and the maximum is 10.0V. The default value is 2.0V.

#### 21.10.11 OFF DIFFERENTIAL VOLTS

When programmed for BMS control through the 0 - 10V BMS input or through ModBus/BACnet and the BMS Thermostat Input is set to INACTIVE, the Off Differential Volts parameter determines how far below the On Volts setting the 0 - 10V BMS input voltage must be in order to disable the boiler. The minimum value is 0.2V and the maximum is the On Volts setting. The default value is 1.0V.

#### 21.10.12 MODBUS/BACNET

When BMS is set to ACTIVE (see BMS Active / Inactive) and the boiler is being controlled through BACnet or ModBus, set ModBus/BACnet parameter to ACTIVE. Otherwise, set the ModBus/BACnet parameter to INACTIVE. Note that the boiler can still be monitored by ModBus or BACnet with this parameter set to INACTIVE. The default value is INACTIVE

#### 21.10.13 BAS T/O

This is the amount of time the unit controls will wait to receive a communication string from the BMS controller before reverting back to its own internal parameters. This parameter is adjustable by the installer by accessing the BAS T/O parameter. The adjustment range of this parameter is 5 seconds to 2 minutes. The default value is 10 seconds.

### 21.11 CIRCULATION PUMPS

#### 21.11.1 SYSTEM PUMP DELAY

The system pump delay parameter sets the length of time the system pump (if connected) will run after a SH demand has been satisfied or outdoor shutdown has begun. This parameter is adjustable by the installer by accessing the System Pump Delay parameter. The time range for this parameter is 1 second to 40 minutes. The default time is 30 seconds.

#### 21.11.2 BOILER PUMP DELAY

The SH pump delay parameter sets the length of time the boiler pump will run after a SH demand has been satisfied. Setting the delay time to 0 will disable the pump. This parameter is adjustable by the installer by accessing the Boiler Pump Delay parameter. The time range for this parameter is 1 second to 40 minutes. The default time is 30 seconds.

#### 21.11.3 DHW PUMP DELAY

The DHW pump delay parameter sets the length of time the DHW pump (if connected) will run after a DHW demand has been satisfied. This parameter is adjustable by the installer by accessing the DHW Pump Delay parameter. The time range for this parameter is 10 seconds to 40 minutes. The default time is 1 minute.

#### 21.11.4 SYSTEM PUMP ANTI-SEIZE DELAY

If the boiler pump does not run for 24 hours, it will be turned on briefly to prevent it from seizing. The length of time it runs is determined by the System Pump Anti-Seize Delay parameter. The range of this setting is 0 seconds to 40 minutes. The default setting is 20 seconds.

#### 21.11.5 BOILER PUMP ANTI-SEIZE DELAY

If the boiler pump does not run for 24 hours, it will be turned on briefly to prevent it from seizing. The length of time it runs is determined by the Boiler Pump Anti-Seize Delay parameter. The range of this setting is 0 seconds to 40 minutes. The default setting is 20 seconds.

#### 21.11.6 DHW PUMP ANTI-SEIZE DELAY

If the boiler pump does not run for 24 hours, it will be turned on briefly to prevent it from seizing. The length of time it runs is determined by the DHW Pump Anti-Seize Delay parameter. The range of this setting is 0 seconds to 40 minutes. The default setting is 20 seconds.

#### 21.11.7 SYSTEM PUMP TYPE

The system pump can be programmed to operate in response to any of the Room Thermostat inputs, or to run continuously until all three (3) SH demands go into Outdoor Shutdown. To program the system pump to operate only with a space heating call for heat, set the System Pump Type parameter to CFH. To program the system pump to run continuously until outdoor shutdown starts, set the System Pump Type parameter to WWSD. The default setting is CFH.

#### 21.11.8 BOILER PUMP DELTA T SET POINT

When using a variable speed boiler pump, and controlling it by means of the 0 - 10V Boiler Pump Speed Output, the boiler pump will be controlled in order to maintain a minimum Delta T across the heat exchanger in the boiler (other factors may override this target). This feature is to be used with Primary / Secondary piping systems only. A system supply sensor MUST be installed. This parameter sets the target minimum Delta T it will use. The range of this parameter is 8°C to 33°C. The default value is 11°C.

#### 21.11.9 BOILER PUMP MINIMUM VOLTAGE

The speed of the boiler pump can be controlled by the SMART SYSTEM control in order to maintain a minimum 'T through the heat exchanger. Thus, as the firing rate decreases, the speed of the boiler pump can decrease as well. The SMART SYSTEM control outputs a 0 - 10V signal to the boiler pump to control its speed. The Boiler Pump Minimum Voltage parameter determines the minimum voltage given to the boiler pump, thereby setting its minimum speed. The range of this setting is 2.5V to 10V. The default setting is 3.5V.



The standard pumps supplied with the Herald boiler are **A** rated high efficiency fixed speed pumps

### 21.12 SERVICE NOTIFICATION

#### Service Notification in Months

When the boiler control determines that a scheduled service is due based on days of installation, the boiler display will turn yellow and a new status screen will appear informing the user that maintenance is required. This parameter is adjustable by the installer by accessing the Service Notification in Months parameter. The time range for this parameter is 0 months to 100 months. The default time is 12 months.

#### 21.12.1 SERVICE NOTIFICATION RUNNING TIME

When the boiler control determines that a scheduled service is due based on the hours of actual operation, the boiler display will turn yellow and a new status screen will appear informing the user that maintenance is required. This parameter is adjustable by the installer by accessing the Service Notification Running Time parameter. The time range for this parameter is 0 hours to 17,500 hours. The default time is 8,760 hours.

#### 21.12.2 SERVICE NOTIFICATION CYCLES

When the boiler control determines that a scheduled service is due based on the number of boiler cycles, the boiler display will turn yellow and a new status screen will appear informing the user that maintenance is required. This parameter is adjustable by the installer by accessing the Service Notification Cycles parameter. The range for this parameter is 0 cycles to 100,000 cycles. The default is 50,000 cycles.



### 21.12.3 RESET MAINTENANCE REMINDER



- 1 USB Drive
- 2 PC Connection
- 3 Left select key
- 4 Navigation dial
- 5 Reset switch
- 6 Right select key

Once servicing has been completed, the service notification counter should be reset. This parameter can be reset by the installer by accessing the Reset Maintenance Reminder parameter as shown below.

- Press and hold the **L/H SELECT button (3)**
- Enter the code **5309** using the **DIAL (4)** scan through the numbers and pushing the dial to accept correct number
- Press **SELECT (6)**
- "installer Code" should be displayed
- Scroll through the sub menus using the **DIAL (4)** until you find **Service notification**
- Press **SELECT (6)**
- Scroll using the **DIAL (4)** to **Reset service reminder**
- Press **SELECT (3)**
- It will ask you to **confirm**
- Press **SELECT (3)**
- You should see the word "engaged" briefly displayed.
- Press the **R/H SELECT (6)** button **three times** to return to the front display screen

The service notification is now reset

### 21.12.4 SERVICE NAME AND PHONE NUMBER



Please note that the brackets ([]) denote screen status.

When a Maintenance Reminder timer or counter has expired, a Maintenance Reminder screen will appear on the display. By programming the installer's name and phone number, this information will appear on the Maintenance Reminder Screen at that time. This can be programmed by accessing the Service Name and Phone Number parameter. When selected, another menu will appear with PHONE and NAME.

1. Rotate the **NAVIGATION dial** to point to the name/phone number to program and press the **NAVIGATION dial**. The screen will now display the selected item (either **PHONE** or **NAME**).
2. Press the **NAVIGATION dial** again. A cursor will appear at the bottom of the screen. By rotating the **NAVIGATION dial**, various numbers and characters will appear. When the desired number/character is found, press the **NAVIGATION dial**. The cursor will move to the next position.

3. Repeat this procedure until the entire message is entered. If you make a mistake and wish to back up one character, rotate the NAVIGATION dial until the back arrow (◀) character is displayed and press the NAVIGATION dial.
4. When finished, press the RIGHT SELECT [SAVE] key to return to the previous menu.

### **21.13 BASIC SETUP**

The Basic Setup Menu contains the most frequently used parameters from the list above. See the descriptions above to set these parameters.

#### **21.13.1 USB**

Parameter files can be copied directly to and from a USB flash drive. When USB is selected from the Main Menu, the display will ask you to insert a flash drive into the USB-A (rectangular) port next to the display. Once a drive is inserted, the display will search the root directory of this drive for a folder named "Lochinvar". If it does not find it, the display will ask if you want it to create this folder. Press either the [YES] or [NO] key. If you press [NO], no further operations are allowed, so you must remove the flash drive. If you press [YES], it will create the folder in the flash drive. If the flash drive contains a folder named Lochinvar, the display will show all of the parameter files stored in that folder.

If you wish to copy the parameters from the Smart System control into the flash drive, press the [SAVE] key. The display will create a file name based on the current date and time (year-month-date-hours-minutes). If you wish to cancel this operation, press the [NO] key. If you wish to change the filename, press the NAVIGATION dial. The first character of the filename will flash. Rotate the NAVIGATION dial to change this character. Once it is correct, press the NAVIGATION dial again, and edit the next character as before. When the new filename is ready, press the [SAVE] key. The control will save the parameters to the flash drive, and the new file will appear in the list of parameter files. Press the [EXIT] key to return to the Main Menu.

If you wish to copy a parameter file from the flash drive into the Smart System control, rotate the NAVIGATION dial until the file you wish to copy is selected. Press the NAVIGATION dial once. The display will ask you if you want to load the parameters from the file you selected. You can press [NO] to cancel the operation, or press [YES] to continue with writing the parameters into the control. Once the loading process is complete, the display will return to the Main Status Screen

## 22.0 ERP DATA TABLE

Type Boiler:	HC B116CE	HC B146CE	HC B176CE	HC B206CE	HC B236CE
Condensing boiler:	Yes	Yes	Yes	Yes	Yes
low temperature boiler:	Yes	Yes	Yes	Yes	Yes
B11 boiler:	No	No	No	No	No
Cogeneration space heater:	No	No	No	No	No
Combination heater:	No	No	No	No	No
	Value	Value	Value	Value	Value
<b>Rated heat output</b>	<b>105</b>	<b>131.3</b>	<b>154</b>	<b>180</b>	<b>205</b>
P-rated (P4) at 60-80C	103.4	130.6	152	177.4	199
Heat output (p1) 30% at 30-37C	37.2	43.5	54.1	63.1	70.8
<b>Seasonal space heating energy efficiency (<math>\eta_s</math>).</b>	<b>93</b>	<b>94</b>	<b>95</b>	<b>95</b>	<b>95</b>
Energy efficiency ( $\eta_4$ ) at 58-77C	89.6	89.6	87.6	87.6	87.6
Energy efficiency ( $\eta_1$ ) at 30-37C	98.0	99.3	100.6	100.6	100.6
<b>Auxiliary electricity consumption</b>					
At full load (elmax).	0.144	0.170	0.280	0.280	0.280
At part load (elmin)	0.043	0.051	0.084	0.084	0.084
In standby mode (Psb)	0.006	0.007	0.011	0.011	0.011
<b>Other</b>					
Standby heat loss (Pstby)	0.334	0.414	0.481	0.557	0.632
Ignition burner power consumption	nil	nil	nil	nil	nil
Emissions (NOx) of nitrogen oxides (EN15502)	40	40	36	36.2	35
Sound power level, indoors (EN 14436-1:2006)	64	66	69	69	69

## 23.0 USER INSTRUCTIONS

Once the installation and commissioning is complete, the equipment owner or their representative should be made aware of the operation of the appliance and its safety devices. A practical demonstration should be given describing each functional step. Incorrect use may result in injury and will also invalidate the warranty.

### 23.1 GENERAL REQUIREMENTS



**This equipment must be installed by a competent person, registered with an H.S.E. approved body. All installations must conform to the relevant gas safety and building regulations. Health & safety requirements must also be taken into account when installing any equipment.**



**A competent person must also undertake any alterations that require the gas train or flue system to be broken.**



**Any interference with a sealed component is forbidden.**



**Failure to comply with the above may lead to prosecution.**



**Incorrect use may result in injury and will also invalidate the warranty**

### 23.2 PROCEDURE FOR LIGHTING

7. Ensure that the gas inlet appliance isolating valve, provided by the installer, is in the “off” position.
8. Press the power rocker switch, positioned on the back of the appliance to bring the equipment on.
9. The combustion fan should ramp up to full speed to purge the combustion chamber and then drop back to half rate in order to light. As the gas inlet appliance isolating valve is closed, the controls should go to a flame failure condition after four ignition attempts (HCB116CE) or one ignition attempt (HCB146CE – HCB236CE). If the above occurs correctly, open the gas inlet appliance isolating valve and reset the unit by depressing the Enter/Reset button on the control panel.
10. The combustion fan will repeat the pre-purge procedure and attempt to light. Once a flame is established, the LCD display will change to display the rate at which it is firing.

### 23.3 PROCEDURE FOR SHUTTING DOWN

To take the appliance out of service, hold down the RIGHT SELECT key (SHDN) in the main menu and choose yes. If the appliance is to be shut down for a long period of time, the power supply should be isolated using the rocker switch on the back and the gas supply should be isolated at the manual isolation valve.

## 23.4 SMART SYSTEM CONTROL

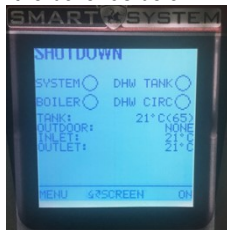


- 1 USB Drive
- 2 PC Connection
- 3 Left select key
- 4 Navigation dial
- 5 Reset switch
- 6 Right select key

The information on the bottom of the display shows the functions of the two SELECT keys on both corner, and the NAVIGATION dial in the centre.

MENU	Left SELECT key
SETPOINTS	NAVIGATION dial-pressing down
SHDN	Right SELECT key

The smart system control face instantly informs the user of the status of the boiler by changing colour according to the status of the boiler as below.



Normal operation



Service required



Boiler is not working

## 23.5 TEMPERATURE ADJUSTMENT PROCEDURE

### 23.5.1 CENTRAL HEATING SETPOINT

With the boiler firing, the setpoint can be adjusted using the **NAVIGATION dial** on the SMART SYSTEM control panel. When "↓SET POINTS" is flashing at the bottom of the display the NAVIGATION dial can be used to set and store the desired set point.

### 23.5.2 DHW SETPOINT

If the stored water temperature is to be controlled by a thermostat, the setting should be adjusted on the thermostat itself. If the stored water temperature is to be controlled by a tank sensor, the default setpoint is 52°C. The setpoint should be adjusted to ensure that the water is stored at 60°C and distributed at 50°C within 1 (one) minute at all outlets. Care is needed to avoid much higher temperatures because of the risk of scalding. At 50°C the risk of scalding is small for most people, but the risk increases rapidly with higher temperatures and for longer exposure times. The risk to young children and to those with a sensory or mobility loss will be greater. Where a significant scalding risk has been identified, the use of thermostatic mixing valves on baths and showers should be considered to reduce temperature, these need to be placed as close to the point of use as possible.

Should the default value need adjusting, please refer to **Section 21.2 Temperature adjustment**

### 23.6 MAINTENANCE

See section 19.0 Maintenance

### 23.7 AIR SUPPLY

- When installed as a conventionally flued appliance, the room in which the appliance is installed must be ventilated.



**Blocking these vents may lead to severe injury, serious property damage or death.**

- The area in which the appliance is installed should not be used to store any other materials

### 23.8 ENTERING DISPLAY ACCESS USER PASSWORD

See section 20.0 display panel access

## 23.9 PARAMETER SETTINGS



The tables below show the parameters that can be changed by the user, these are highlighted in green. All other parameters should only be changed by a competent engineer.

Menu	Description	See Section	User Access	Installer Access
GENERAL	Vacation Mode (On/Off)	21.1.1	Yes	Yes
	Time and Date	21.1.2	Yes	Yes
	Software Version (read only)		No	Yes
	Temperature Units (°C/°F)	21.1.4	Yes	Yes
	SH Night Setback Offset		No	Yes
	DHW Night Setback Offset		No	Yes
	Display Timeout	21.1	No	Yes
	Display Contrast	21.1.9	Yes	Yes
TEMPERATURE SETTINGS	SH1 Set Point User	21.2.1	Yes	Yes
	Minimum SH Set Point		No	Yes
	Maximum SH Set Point		No	Yes
	Offset SH1 Set Point		No	Yes
	Differential SH1 Set Point		No	Yes
	SH2 Set Point User	21.2.1	Yes	Yes
	Offset SH2 Set Point		No	Yes
	Differential SH2 Set Point		No	Yes
	SH3 Set Point User	21.2.1	Yes	Yes
	Offset SH3 Set Point		No	Yes
	Differential SH3 Set Point		No	Yes
3-Way Valve Time		No	Yes	
DATA LOGGING	Reset Last 10 Errors		No	Yes
FUNCTIONS	Service Mode Delay		No	Yes
	Freeze Protection Pump On		No	Yes
	Freeze Protection Burner On		No	Yes
	Freeze Protection Burner Differential		No	Yes
DHW SETTINGS	DHW Tank Set Point	23.5.2	Yes	Yes
	Tank Set Point Differential		No	Yes
	DHW Boiler Set Point		No	Yes
	Boiler Set Point Offset		No	Yes
	Boiler Set Point Differential		No	Yes
	DHW Recirc Pump Offset		No	Yes
	DHW Recirc Pump Differential		No	Yes

23.9.1 SMART SYSTEM CONTROL PARAMETERS WITH USER ACCESS



**Lochinvar<sup>®</sup>**

8 Lombard Way, The MXL Centre, Banbury, Oxon, OX16 4TJ

Tel: +44(0) 1295 269 981, Fax: +44(0) 1295 271 640, Email: [info@lochinvar.ltd.uk](mailto:info@lochinvar.ltd.uk)

[www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)