

# HSV THERMAL STORE

## Installation, Commissioning, Maintenance and User Instructions

### Models

HSV500  
HSV800  
HSV1000  
HSV1500  
HSV2000



## Contents

1.0	INTRODUCTION.....	3
1.1	Ancillary Options.....	3
2.0	SAFETY GUIDELINES.....	4
2.1	General description of safety symbols used.....	4
2.2	General.....	4
3.0	TECHNICAL DATA.....	5
3.1.1	Technical data.....	5
4.0	GENERAL REQUIREMENTS.....	6
4.1	Related Documents.....	6
5.0	WATER QUALITY.....	6
5.1	Vessel.....	6
5.2	Stainless Steel Domestic Hot Water Coil.....	6
6.0	WATER CONNECTIONS.....	7
6.1	General.....	7
6.1.1	HSV showing DHW connections and safety devices required.....	7
6.2	Storage Vessel.....	7
6.3	Domestic Hot Water Un-Vented System.....	8
6.3.1	temperature and pressure relief valve.....	8
6.3.2	relief valve discharge pipework.....	8
6.3.3	relief valve discharge pipework.....	9
6.4	Expansion Vessel Sizing.....	9
6.4.1	coefficient of expansion of water at 3.5 bar inlet pressure.....	9
7.0	COMMISSIONING AND TESTING.....	10
7.1	Electrical Installation.....	10
7.2	Water Connection.....	10
7.3	Primary Heat Source.....	10
7.4	Identification.....	10
7.5	Commissioning Check List.....	10
8.0	MAINTENANCE.....	11
8.1	General.....	11
8.1	Other Checks.....	11
8.1.1	RELIEF VALVE.....	11
8.2	Maintenance Schedule.....	11
8.3	Maintenance Record.....	12
8.4	Draining the HSV.....	12
8.5	Re-Filling the System.....	12
9.0	USER INSTRUCTIONS.....	13
10.0	ERP DATA TABLE.....	13

## 1.0 INTRODUCTION

- The HSV is a thermal store for use with Renewable energy to provide a store of energy plus pre-heated domestic hot water via an internal stainless steel coil.
- All installations must conform to the relevant 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.

### 1.1 Ancillary Options

- |  |           |
|--|-----------|
| • UN-VENTED SYSTEM KIT-FOR STANDALONE APPLICATIONS | WH17      |
| • EXPANSION KIT HSV500                             | VEK1      |
| • EXPANSION KIT HSV800                             | VEK2      |
| • EXPANSION KIT HSV1000                            | VEK3      |
| • EXPANSION KIT HSV1500                            | VEK4      |
| • EXPANSION KIT HSV2000                            | VEK5      |
| • DUAL AQUASTAT                                    | LM900117A |

## 2.0 SAFETY GUIDELINES

**Carefully read all the instructions before commencing installation.**

Keep these instructions near the water heater for quick reference.

This equipment must be installed by a competent person. All installations must conform to the relevant 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

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



This symbol shows essential information which is not safety related

### 2.2 General



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.



**READ AND UNDERSTAND THE INSTRUCTIONS**



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

### 3.0 TECHNICAL DATA

	Model	HSV500	HSV800	HSV1000	HSV1500	HSV2000
Total capacity	l	496	635	795	1383	1894
Diameter with Insulation	mm	900	990	990	1260	1360
Diameter without Insulation	mm	700	790	790	1000	1100
Height with insulation	mm	1680	1740	2090	2230	2450
Height without insulation	mm	1630	1690	2040	2130	2350
Tilted height	mm	1690	1740	2085	2230	2440
Max Working pressure Vessel	bar	3	3	3	3	3
Working pressure Heat Exchanger	bar	6	6	6	6	6
Max. Working temperature	° C	95	95	95	95	95
Total Weight without Insulation	kg	187	225	261	351	522
Insulation		100 mm polyester fibre fleece			130 mm polyester fibre fleece	
Insulation Weight	kg	12	14	16	21	25

#### 3.1.1 TECHNICAL DATA

## 4.0 GENERAL REQUIREMENTS

The Lochinvar HSV thermal store 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. **PLEASE** read the instructions fully before installing or using the appliance. These instructions should be read in conjunction with the appropriate Solar Thermal or Heat pump installation manual.

### 4.1 Related Documents

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:

<b>BS 6700: 1997</b>	Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages
<b>BS 7074: 1989 1 and 2</b>	Application, selection and installation of expansion vessels and ancillary equipment for <b>Parts</b> sealed systems
<b>BS 7671: 2008</b>	Requirements for electrical installations, I.E.E. wiring regulations seventeenth edition
<b>CP 342: Part 2 1974</b>	Code of practice for centralised hot water supply-buildings other than dwellings

## 5.0 WATER QUALITY

### 5.1 Vessel

On systems where the HSV is working with Solar Thermal the storage vessel is isolated from all other services and acts as an energy store heating and then cooling the water (as domestic hot water is used) within the vessel. The water within this vessel must be treated with a suitable inhibitor and Biocide. Contact a water treatment specialist for further guidance.

On systems where the HSV is working with Heat Pumps, CHP, Gas condensing boilers or any other direct heat source then the HSV should be treated as per the rest of the system. See main heat source ICM for further guidance.

### 5.2 Stainless Steel Domestic Hot Water Coil

Water supply quality may adversely affect the efficiency and performance of water heaters and hot water systems. The situation can intensify where higher temperatures or demands exist.

Water hardness should not exceed 205ppm CaCO<sub>3</sub> and TDS (Total Dissolved Solids) of untreated water should not exceed 350ppm. If these values are exceeded, contact a water treatment specialist for guidance.

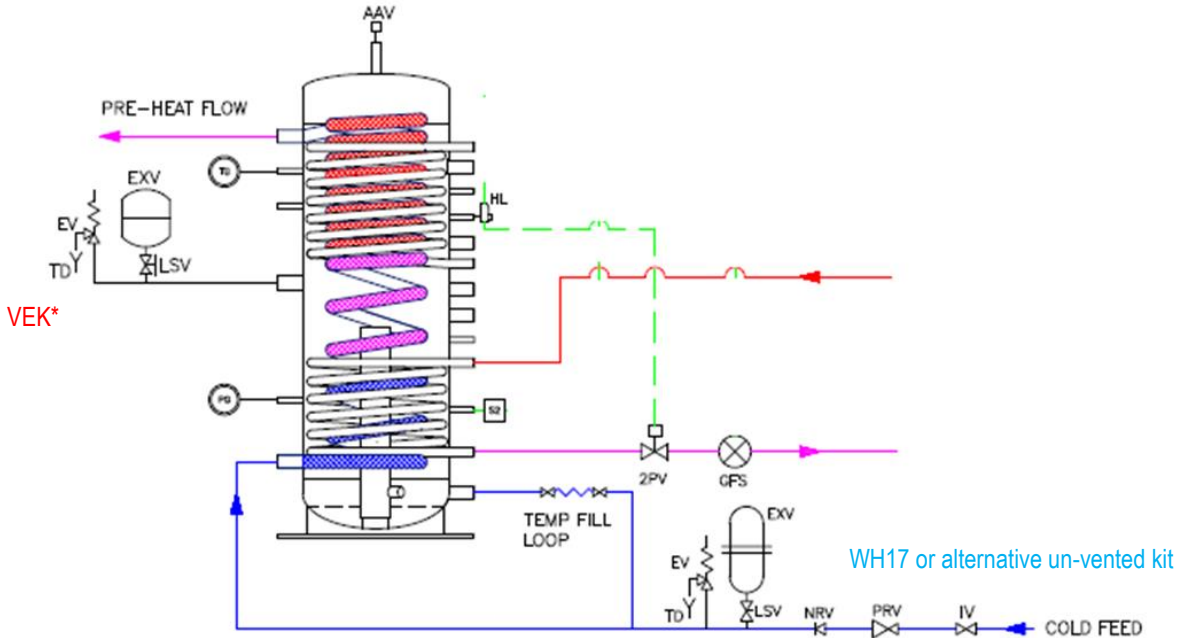
## 6.0 WATER CONNECTIONS

### 6.1 General

1. Circulating pipework should be insulated; cisterns, expansion vessels and pipework situated in areas exposed to freezing conditions should also be insulated.
2. Drain valves must be located in accessible positions that will permit draining of the entire system.
3. Individual valves should be fitted to each unit to enable isolation from the system.



If the HSV Thermal store can be heated to temperatures above 60°C a suitable tempering valve should be fitted on the Domestic hot water outlet to prevent scalding risks at the outlets.



#### 6.1.1 HSV SHOWING DHW CONNECTIONS AND SAFETY DEVICES REQUIRED



\*On systems where the HSV thermal store is not connected to a heating circuit or does not incorporate an automatic top up, the T&P valve shown at VEK must not be fitted. An additional high limited safety device must be fitted instead to prevent the water from reaching above 94C.

### 6.2 Storage Vessel

The HSV storage vessel is often a standalone system but regardless must always be protected with a 3 bar safety valve



The safety valve shown on drawing 6.1.1 (VEK) must be rated no higher than 3 bar. There must be no isolating valves between the HSV and this safety valve.

The connections used will depend upon the system the HSV is fitted to; you must consult the relevant drawing and /or ICM instructions for the Solar thermal or Heat pump also being installed.

A suitable expansion vessel must always be fitted to the HSV thermal store; a suitable sized vessel can be supplied as part of the (VEK) Expansion kit available from Lochinvar Ltd.



All safety equipment as shown in drawing 6.1.1 must be fitted to the HSV. Failure to install any of the safety equipment shown will render the HSV Warranty void



## 6.3 Domestic Hot Water Un-Vented System



**It is the law that all unvented hot water systems be installed by an approved installer.**

If the Lochinvar HSV is to be used in an unvented arrangement, the system should follow the guidance given in **BS6700** and must comply with **The Building Regulations: Part G3 in England and Wales, P5 in Northern Ireland and P3 in Scotland**. A kit of components that have been suitably sized for the unvented or boosted operation of the appliance is available from Lochinvar Limited. For further information, contact Lochinvar Limited.

### 6.3.1 TEMPERATURE AND PRESSURE RELIEF VALVE

A temperature and pressure relief valve is provided in the unvented water system kit. This valve has a lift pressure of 7 bar and a lift temperature of 90°C. The valve must be fitted to the Domestic hot water pipework after the HSV thermal store.



**There must be no isolating valves between the T&P valve and HSV Stainless Domestic hot water coil**

### 6.3.2 RELIEF VALVE DISCHARGE PIPEWORK

It is important that any discharge water does not collect in the discharge pipe-work and can run freely to the tundish. The tundish should be mounted in a vertical and visible position located in the same space as the unvented hot water storage system and be fitted as close as possible and within 600mm of the safety device e.g. the temperature relief valve.

The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal or other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard, and:

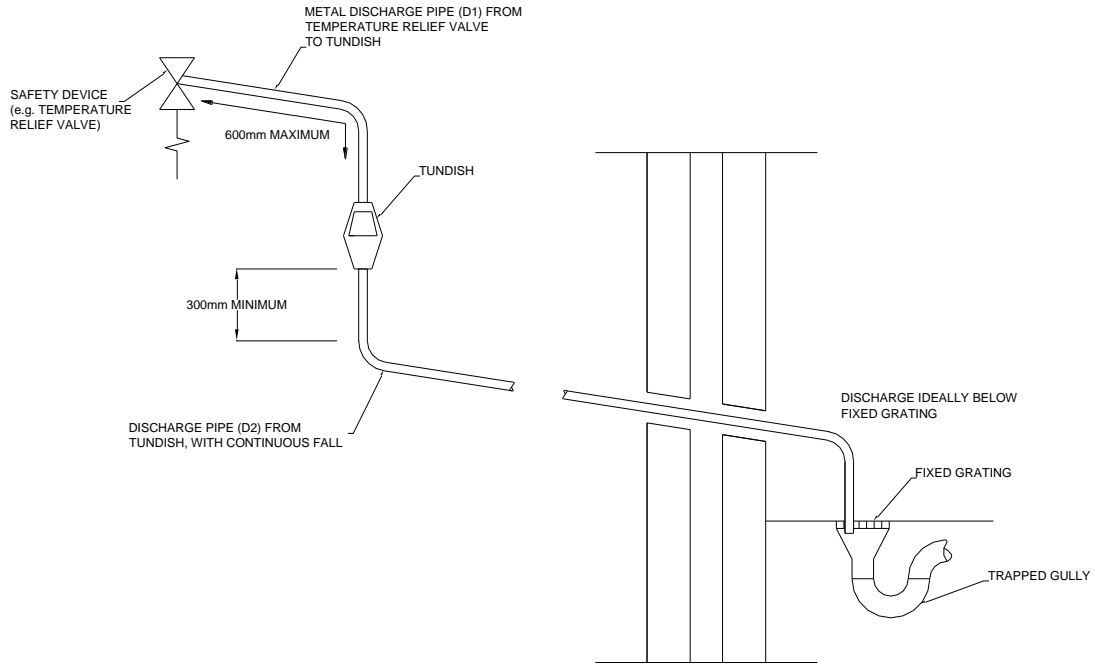
- a) Be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance.

An alternative approach for sizing discharge pipes would be to follow BS6700 Specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

- b) Have a vertical section of pipe at least 300mm long, below the tundish before any elbows or bends in the pipework.
- c) Be installed with a continuous fall of at least 1 in 200.
- d) Have discharges visible at both the tundish and the final point of discharge but where this is not possible or is practically difficult there should be clear visibility at one or other of these locations.

Examples of acceptable discharge arrangements are:

- I. Ideally below the fixed grating and above the water seal in a trapped gully.
- II. Downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact whilst maintaining visibility.
- III. Discharges at a high level; e.g. into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering systems that would collect such discharges (tundish visible).
- IV. Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.



### 6.3.3 RELIEF VALVE DISCHARGE PIPEWORK

## 6.4 Expansion Vessel Sizing

The following information is based on an inlet pressure of 3.5 bar. If a different inlet pressure is to be used, please consult **BS6700**.

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

Where:

- V V = Vessel Volume
- S V = System Volume
- e = Coefficient of Expansion

Stored Temperature °C	30	35	40	45	50	55	60
e	0.005	0.006	0.008	0.01	0.012	0.015	0.017
Stored Temperature °C	65	70	75	80	82	85	90
e	0.02	0.023	0.026	0.03	0.031	0.033	0.037

### 6.4.1 COEFFICIENT OF EXPANSION OF WATER AT 3.5 BAR INLET PRESSURE

## 7.0 COMMISSIONING AND TESTING

### 7.1 Electrical Installation

Any ancillary item that requires an electrical supply should be installed and commissioned as per instructions.

### 7.2 Water Connection

For design, see **Section 5: Water connections**



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

If a building return pump is to be fitted, it should be fitted before the system is filled and air locks cleared. Check the system for leaks and repair as necessary. If the system is configured in an unvented arrangement, check the expansion vessel cushion pressure.

### 7.3 Primary Heat Source

The primary heat source operating in conjunction with the HSV Thermal store should be installed and commissioned in accordance with the relevant ICM Instructions provided.

### 7.4 Identification

Once the system has been commissioned and is operational it is important that a suitable identification label is attached referring end users to the ICM instructions and also identifying the fact the HSV is a thermal store and not an Indirect Domestic Hot Water storage vessel. This will avoid any confusion going forwards and stop false Legionella scares during routine maintenance.

### 7.5 Commissioning Check List



**Failure to follow and complete the commissioning procedure and checklist will invalidate all warranties.**

WHAT PRIMARY HEAT SOURCE IS CONNECTED TO THE HSV

SOLAR THERMAL

AIR SOURCE HEAT PUMP

GAS CONDENSING BOILERS

OTHER-PLEASE SPECIFY

WHAT IS THE MAXIMUM FLOW/RETURN TEMPERATURE OF THE PRIMARY HEAT SOURCE(S)

FLOW

RETURN

WHAT IS THE MAXIMUM WORKING PRESSURE OF THE PRIMARY HEAT SOURCE(S)

HAS A T&P VALVE BEEN FITTED TO THE BODY OF THE HSV

IF YES IS THE HSV CONNECTED TO AN AUTOMATIC TOP UP EITHER DIRECTLY OR VIA THE HEATING CIRCUIT

IS THE HSV CONNECTED TO A DHW SYSTEM

IS THIS VENTED OR UN-VENTED

IS THE INSTALLATION IN A HARD WATER AREA (ABOVE 205PPM)

IF YES HAS SUITABLE WATER TREATMENT BEEN USED

WHAT IS THE MAKE AND MODEL OF THIS WATER TREATMENT

WHAT TEMPERATURE HAS THE HSV THERMOSTAT BEEN SET AT

WHAT TEMPERATURE IS THE HIGH LIMIT SET AT

HAS A SUITABLE UNVENTED SYSTEM KIT BEEN FITTED

WHAT IS THE MAXIMUM PRESSURE OF THE DHW SYSTEM

## 8.0 MAINTENANCE

### 8.1 General

Regular servicing is required, to ensure trouble free operation. Even if a maintenance schedule is determined to be less than annually, it is important that all controls and safety features be checked for correct operation on an annual basis.



**Failure to follow and complete the commissioning procedure and checklist will invalidate all warranties.**

HAS THE PRIMARY HEAT SOURCE CONNECTED TO THE HSV BEEN SERVICED	<input type="checkbox"/>
WHAT IS THE MAXIMUM WORKING PRESSURE OF THE PRIMARY HEAT SOURCE(s)	<input type="text"/>
CHECK T&P VALVE (IF FITTED) TO THE BODY OF THE HSV	<input type="checkbox"/>
CHECK ANY AUTOMATIC TOP UP EITHER DIRECTLY OR VIA THE HEATING CIRCUIT IS OPERATIONAL	<input type="checkbox"/>
CHECK EXPANSION VESSEL FITTED TO BODY OF HSV	<input type="checkbox"/>
CHECK CONDITION OF HSV FOR SIGNS OF LEAKING	<input type="checkbox"/>
CHECK CONDITION OF HSV INSULATION FOR DAMAGE	<input type="checkbox"/>
IS THERE ANY SIGNS OF SCALING	<input type="checkbox"/>
CHECK WATER TREATMENT IS STILL OPERATIONAL	<input type="checkbox"/>
CHECK OPERATION OF THERMOSTAT AND ANY ALLIED VALVES	<input type="checkbox"/>
CHECK OPERATION OF HIGH LIMIT AND ANY ALLIED VALVES	<input type="checkbox"/>
CHECK UNVENTED SYSTEM KIT INCLUDING ANY EXPANSION VESSELS	<input type="checkbox"/>

### 8.1 Other Checks

#### 8.1.1 RELIEF VALVE

At least once a year, the temperature and pressure relief valve and safety valve should be checked to ensure that they are in operating condition. To check each valve, lift the lever or turn the screw cap at the end of the valve several times. The valve should operate freely and seat properly.

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

### 8.2 Maintenance Schedule

It is good practice to service the HSV every 12 months. Lochinvar Limited recommend that this is the maximum service interval, however in hard water areas; it may be necessary to reduce this time period to ensure correct operation of the storage vessel and associated equipment.

### 8.3 Maintenance Record

<b>SERVICE 1</b> <u>    </u> Date
Engineer name
Company name
Comments
Signature

<b>SERVICE 2</b> <u>    </u> Date
Engineer name
Company name
Comments
Signature

<b>SERVICE 3</b> <u>    </u> Date
Engineer name
Company name
Comments
Signature

<b>SERVICE 4</b> <u>    </u> Date
Engineer name
Company name
Comments
Signature

### 8.4 Draining the HSV

The following procedure must be observed to prevent damage to the HSV and ancillary items connected to it.

1. Ensure any heat source connected to the HSV is either turned off or disconnected from the HSV if safe to do so. (check the ICM of the heat source before any further action is taken)
2. Turn off the water if applicable.
3. Connect a hose to the system drain valve.
4. Locate hose's discharge in an area where hot water will not cause any damage or injury.
5. Open a nearby hot water outlet to vent the system.
6. Open the drain valve.
7. If the vessel is being drained for an extended shutdown, it is suggested the drain valve be left open during this period.

### 8.5 Re-Filling the System

1. Close the drain valve.
2. Open a hot water fixture to allow air to escape.
3. Open the cold water supply to water heater and allow the vessel to fill.
4. Check automatic air valve on top of the HSV is operating correctly
5. Check for water leakage.

## 9.0 USER INSTRUCTIONS

Your HSV Thermal store has been designed to give many years of trouble free service. Where applicable, it may be fitted with an electric immersion heater which heats the water to 60°C for use as a back-up should the primary heat source fail for any reason. Note that the hot water supply will be limited whilst using the immersion heaters.

The flow temperature of the hot water can be set to your requirements on the immersion heater (ideally 60°C maximum). Higher temperatures can cause tripping of the high limit thermostat and introduce more energy loss from the cylinder.

When a hot tap is turned on there may be a short surge of water, this is quite normal with unvented systems and does not mean there is a fault.

When you first fill a basin the water may sometimes appear milky. This is due to very tiny air bubbles in the water which will clear very quickly.



**Warning:** If cold/warm water exits from the temperature and pressure relief valve (TPV) or from the pressure relief valve (PRV) call your installer. If very hot water exits from either valve, switch off the heat source immediately and isolate the electricity supply to the cylinder and separate heat source.



The solar system is configured to heat the water to its maximum economic temperature which may vary with ambient temperature and weather conditions. The immersion may be programmed to operate during fixed periods of the day or night.



If the hot water runs cool it may be necessary to manually switch on the immersion to heat the water – please see the relevant instructions for your alternative energy device.

## 10.0 ERP DATA TABLE

Model	HSV500	HSV800	HSV1000	HSV1500	HSV2000
Energy label	C	C	C	C	C
PSTBY (WATTS)	118	127	141	132	164
Storage volume	488	635	795	1383	1884

## NOTES

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## IMPORTANT INFORMATION

These instructions must be read and understood before installing, commissioning, operating or maintaining the equipment.

