AMICUS AQUASTORE
INSTALLATION PLANNING GUIDE



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Document Control			
Article	**Language**	**Version**	**Modified by**
Amicus Aquastore Planning guide	English	V1.1 July 2023	S Addis

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Introduction

This document includes all the basic information required for the Design team from stage 2 to stage 5 of the project.

Amicus Aquastore is a packaged Heat pump water heater designed to be installed inside the plantroom and configured to provide DHW only and can supply hot water at temperatures up to 65°C. There are 3 models in the range all featuring an 8kW heat pump but with different sized immersion back-up available from 6kW to 12 kW.

Aquastore has three modes of operation to choose from depending on domestic hot water load and average ambient temperatures:

- Efficiency mode, as the name suggests this is the most efficient mode for the unit to operate in. The immersion heaters will only be switched on in extreme circumstances.
- Hybrid mode, will utilise the immersion heaters more often increasing domestic hot water production
- Electric mode utilises the immersion heaters only and can be used to pasteurise the tank or for breakdown cover in the unlikely event the unit should suffer a failure on the refrigerant side.

Each heat pump has the following standard features:

• 8kW output

• Plug & Play – Quick and easy to install with space saving design

• Touch screen display for custom settings and status reports

• Monoblock construction

• 445 litre storage capacity with external coil for direct heating from the refrigerant

• 65˚C output in heat pump mode, 82˚C in Electric mode

• up to 250l/hr recovery @50˚C temperature rise in Efficiency mode and up to 350l/hr in Hybrid mode

• Built in redundancy – up to 12kW immersion available for backup

Sizing

Aquastore can be sized on either Efficiency or Hybrid mode using the table below, the green row shows a typical one-hour peak supply utilising the stored water and recovery.

		LAAS8-455-6	LAAS8-455-9	LAAS8-455-12	LAAS8-455-6	LAAS8-455-9	LAAS8-455-12
Tcold = 10°C / Tset = 65°C		**Efficiency Mode**			**Hybrid Mode**		
Draw capacity direct ΔT=28 K	ltr.	590	590	590	590	590	590
30 min. ΔT= 28 K	ltr.	690	710	730	750	780	810
60 min. ΔT= 28 K	ltr.	800	830	860	1000	1040	1070
90 min. ΔT= 28 K	ltr.	910	950	990	1250	1300	1340
120 min. ΔT= 28 K	ltr.	1020	1070	1130	1510	1570	1600
Tcold = 10°C / Tset = 65°C		**Efficiency Mode**			**Hybrid Mode**		
Draw capacity direct ΔT=50 K	ltr.	260	260	260	260	260	260
30 min. ΔT= 50 K	ltr.	300	300	300	330	340	350
60 min. ΔT= 50 K	ltr.	350	350	360	460	480	490
90 min. ΔT= 50 K	ltr.	390	400	410	600	620	630
120 min. ΔT= 50 K	ltr.	430	450	470	730	760	780

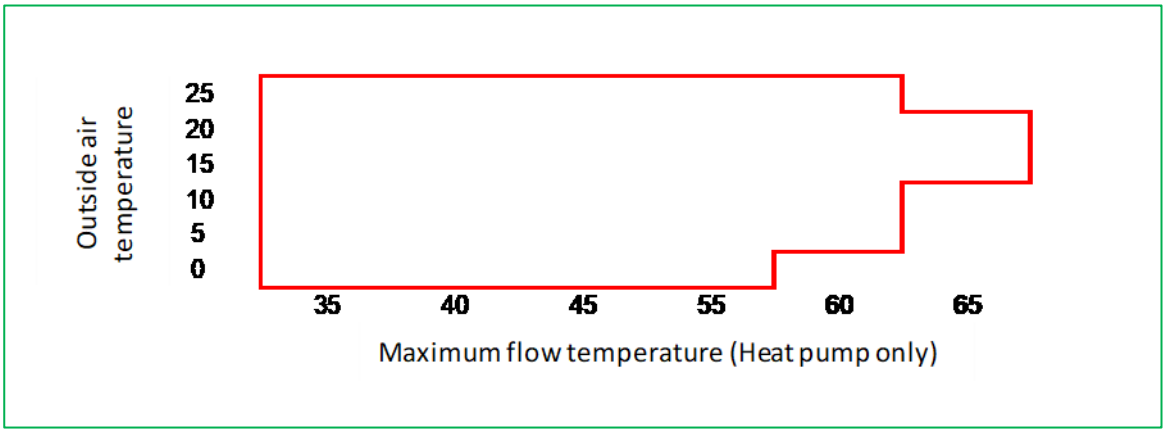
General

Amicus Aquastore should be sited in an area which:

- Can bear the weight of the unit.
- Has enough space around the unit to allow maintenance, see table 2.
- Does not present a noise nuisance to users of the building and neighbours.
- Has enough ventilation, see section Airflow

Operational limits

Amicus Aquastore can provide domestic hot water at temperatures up to 65°C when in Hybrid mode and 85˚C when in power mode using the electrical elements only, for example for pasteurisation. The diagram below shows the general working limits of the heat pump only. Outside these limits the Aquastore will use the immersion heaters to achieve the 65˚C set point.



Drawing 1 operational limits

Sizing

When sizing the Aquastore heat pump careful consideration needs to be taken of the hot water load and peak demand period. Lochinvar can help with sizing your project, contact your local area sales manager or email info@lochinvar.ltd.uk

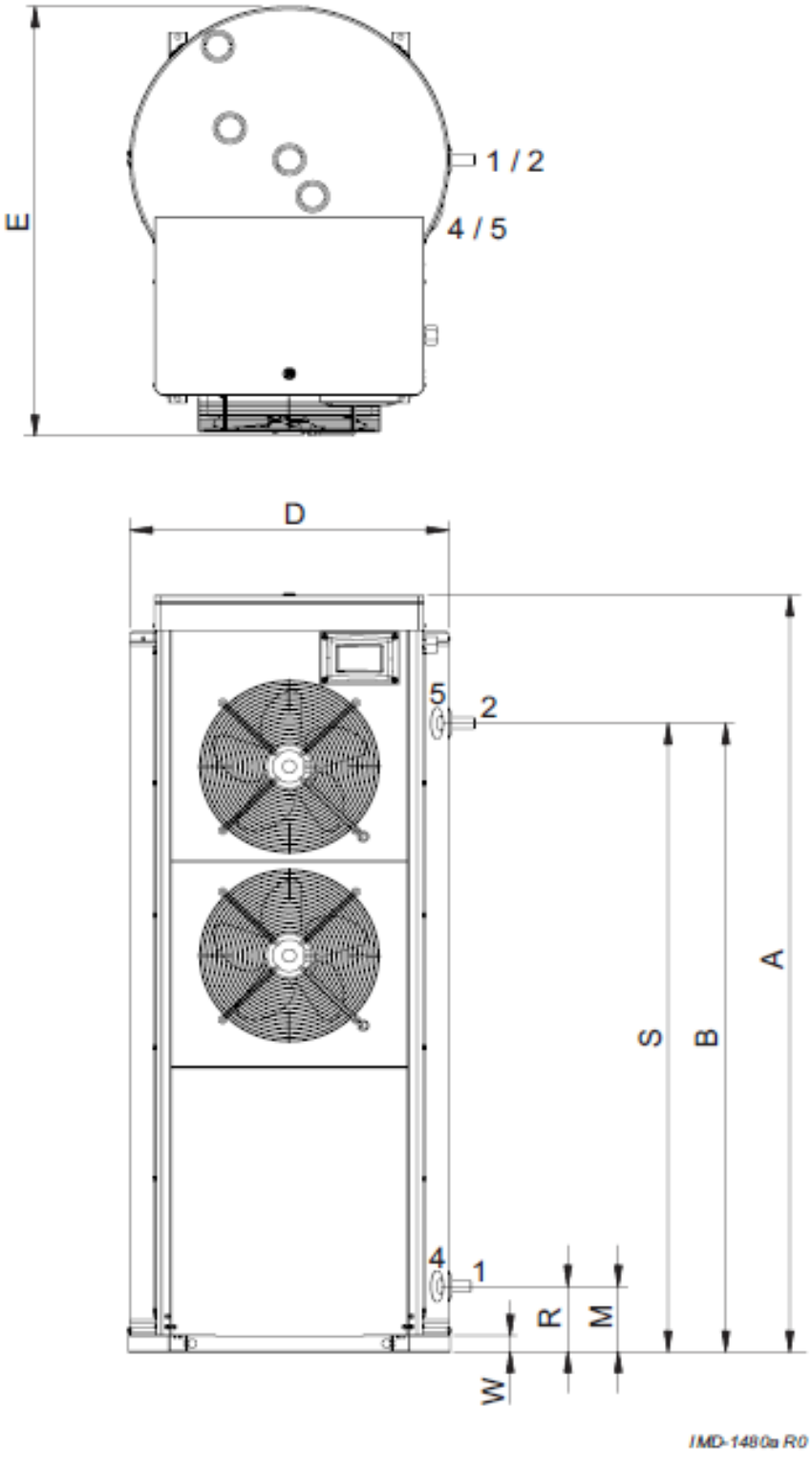
Technical details

Table 1 Technical details

Model		LAAS8-455-6	LAAS8-455-9	LAAS8-455-12
Input power heat pump operation	kW	2.22	2.22	2.22
Heating capacity heat pump (EN 16147 - A15)	kW	8	8	8
Efficiency COP		3.2	3.2	3.2
Heating capacity electric elements	kW	6	9	12
Power supply		400Vac/3N	400Vac/3N	400Vac/3N
Total heating capacity	kW	14	17	20
Peak current	A	39.5	50.8	65.7
Maximum current (L1) - heat pump	A	9.6	9.6	9.6
Maximum input (L2) - back up element 1 + controls + fans	A	16.9	22.5	30
Maximum current (L3) - back up element 2	A	13	18.7	26.1
Refrigerant (weight.CO2 equivalent)	(kg/ton)	R134 (1.85/2.646)	R134 (1.85/2.646)	R134 (1.85/2.646)
Tank volume	Ltr	445	445	445
Max Water Temperature Efficiency or Hybrid mode	°C	65	65	65
Max Water Temperature Immersion heaters only	°C	85	85	85
Operating range	°C	-7 - 43	-7 - 43	-7 - 43
Shipping weight	kg	226	226	226
Weight when full	kg	684	684	684
Sound Power-Indoors	dB	59	59	59

Table 2 Dimensions

			LAAS8-455-6	LAAS8-455-9	LAAS8-455-12
A	Device height	mm	1770		
D	Device width	mm	785		
E	Device depth	mm	995		
M	Height cold water supply connection	mm	165		
B	Height hot water outlet connection	mm	1470		
R	Height drain valve connection	mm	165		
S	Height T&P-valve connection	mm	1470		
W	Height condensate drain connection	mm	15		
1	Cold water supply connection (female)	NPT	3/4"		
2	Hot water outlet connection (female)	NPT	3/4"		
4	Drain valve connection (female)	NPT	3/4"		
5	T&P-valve connection (female)	NPT	3/4"		

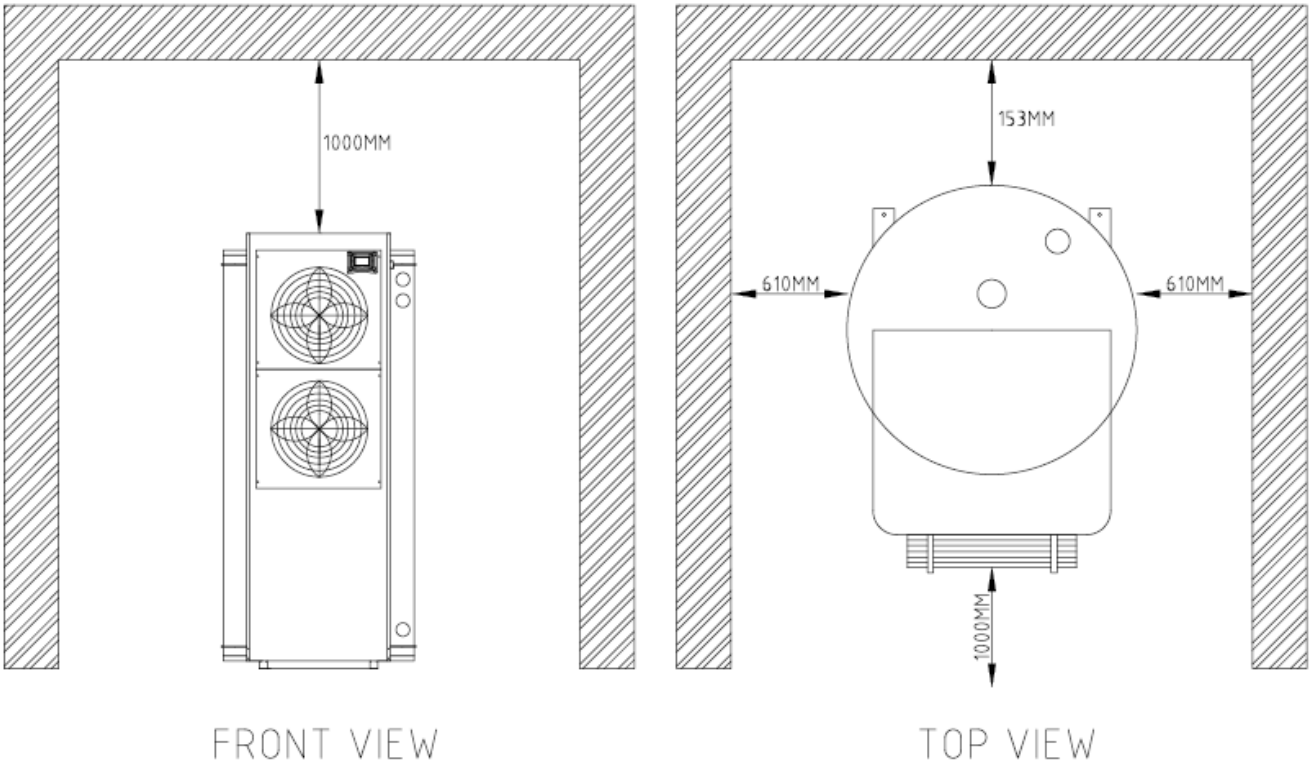


Drawing 2 Dimensions

Position on site

Amicus Aquastore must only be installed in a plantroom it is not suitable for external installation, the plantroom must be large enough to prevent the plantroom from cooling down too much whilst the unit is in operation. The size of the plantroom required will depend on the usage patterns of the heat pump, the larger the peak the larger the plantroom will need to be.

Amicus Aquastore require minimum clearances around them to enable maintenance of the unit.



Drawing 3 clearances single unit

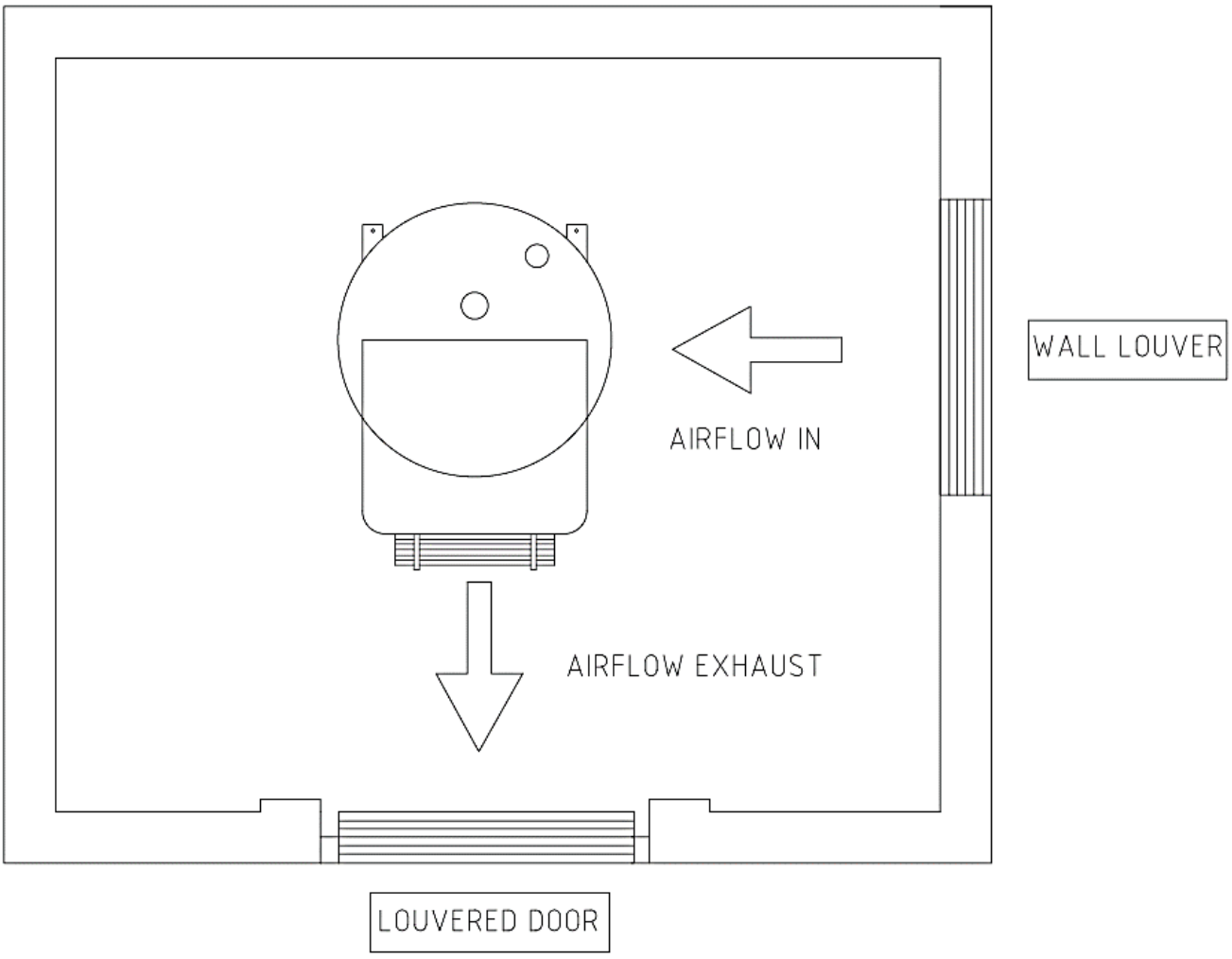
The front of the unit must maintain a clearance of at least 1000mm to ensure the exhaust fans are not restricted which will cause operational issues. Side clearances are required for future maintenance and are critical to enable the immersion heaters to be removed for inspection for example.

Due to the condense drain exiting at the bottom the unit should be stood on a base of at least 100mm, a suitable metal base is available from Lochinvar, item number LM900474A as can be seen in the photo on page 9.

Airflow

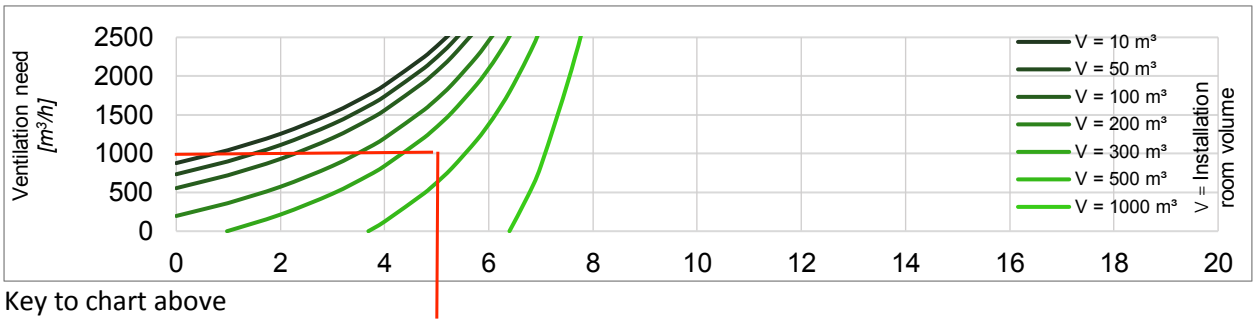
Amicus Aquastore require a constant air flow when in operation of 2275 m3/h across the evaporator, this will result in a gradual cooling of the plantroom air. The unit should not cool the room by more than 8C, if it does this indicates that there is insufficient air within the plantroom. Ideally air should be drawn from an indoor space to increase seasonal efficiency as shown in the warehouse installation picture on page 9. If the unit is to be sited within a plantroom the amount of ventilation should be calculated as per table 3 with both inlet and exhaust air louvres provided as per drawing 4 on page 9.





Drawing 4 airflow requirements

Table 3 airflow calculations based on an ambient air temperature of 10˚C



Key to chart above

V= room volume in m^3

Bottom numbers show the minimum plant room temperate acceptable

Left hand numbers show ventilation required in m^3/hr

Example airflow calculation 1

Plantroom is 7m x6m x 2.5m high = 105m3

Closest line is the 100m^3 3rd from the left, if we do not want the plantroom to drop below 5C we will require 2000m3/hr of air into and exhaust from the plant room

Example airflow calculation 2

Unit to be installed in a warehouse space 40m x25m x 6m high = 6000m^3

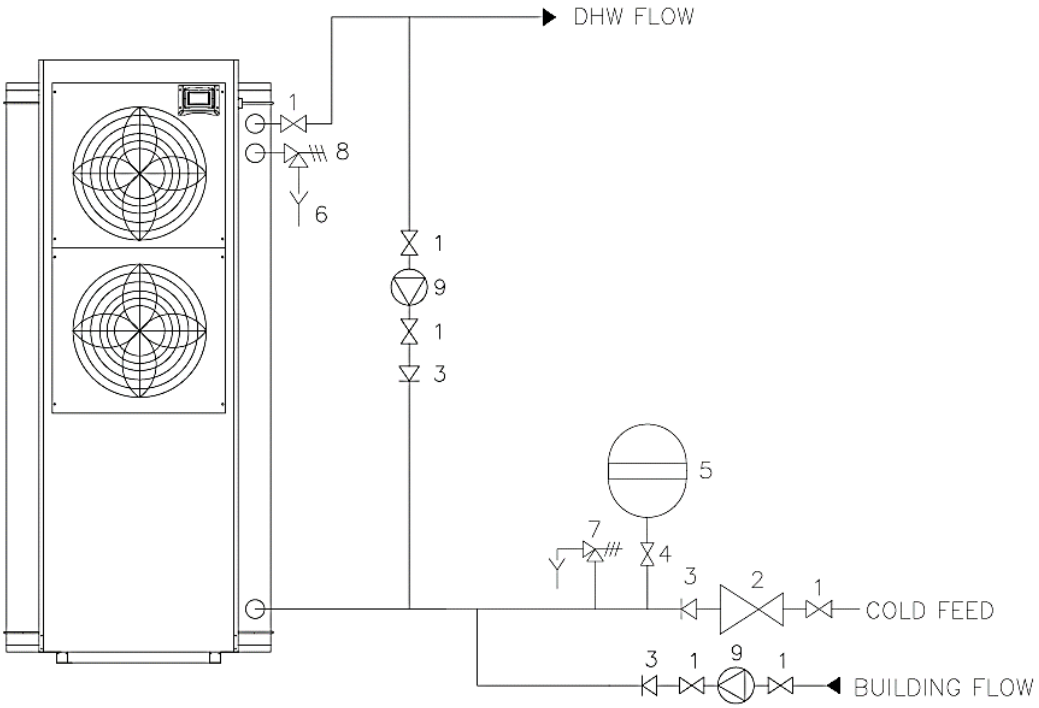
Additional ventilation is not required

Positioning multiple units

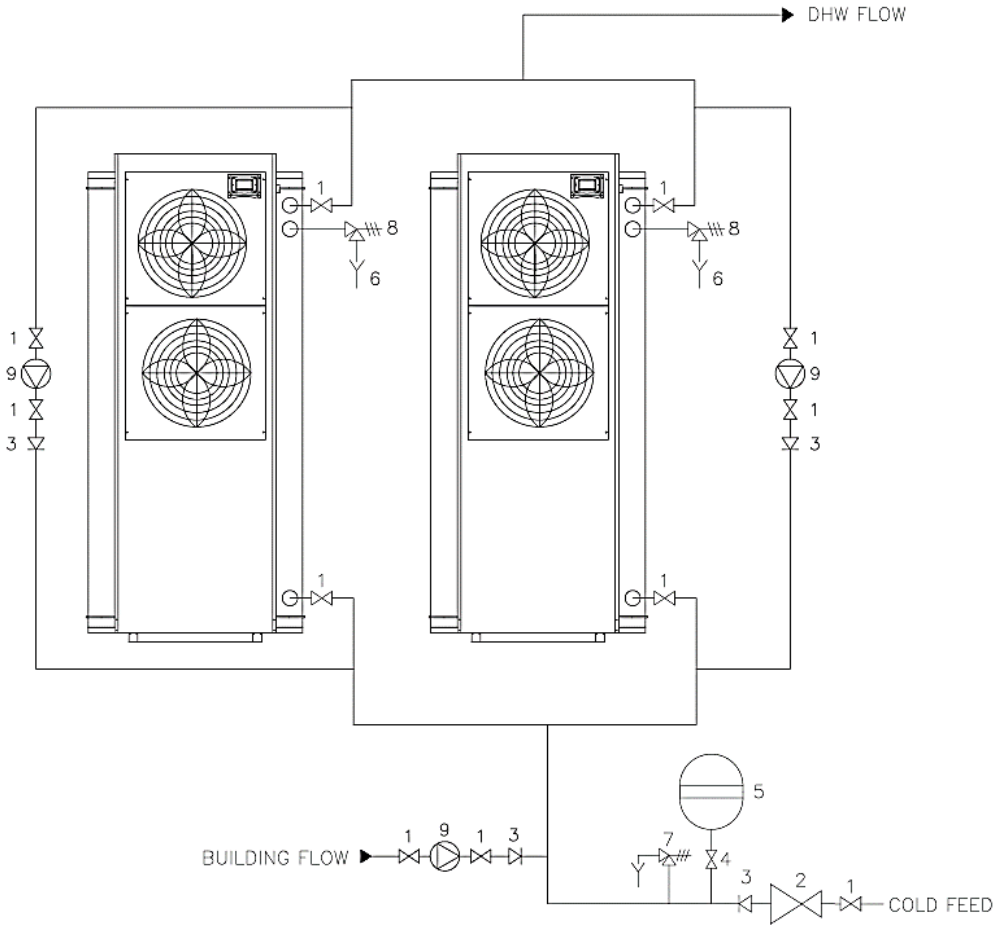
When positioning multiple units' minimum distances must be observed as per drawing 3, airflow requirements will also be larger. please contact Lochinvar technical support for further help and guidance.

Installation

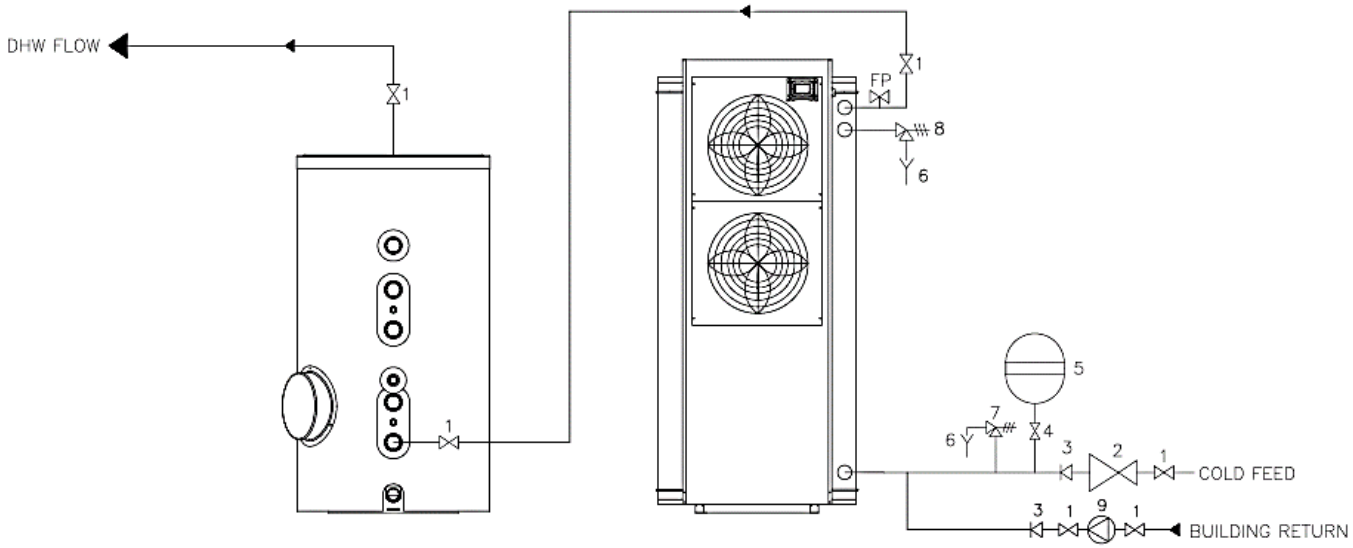
Amicus Aquastore can be installed as a single unit or in multiples depending upon the load, if there is a larger peak load than the unit can supply and then a prolonged period with limited demand (such as a football training ground), Aquastore can be matched with a suitable sized buffer vessel see drawing 7. This will reduce capital cost whilst allowing an efficient method of producing hot water without using extra immersion heaters.



Drawing 5- Single Aquastore on an unvented system



Drawing 6- Multiple Aquastore on an unvented system



Drawing 7-Aquastore with buffer vessel

Drawings Master Key	
Number	**Description**
1	Isolation Valve
2	Pressure Reducing Valve
3	Non-Return Valve
4	Lockshield Valve
5	Expansion Vessel
6	Tundish
7	Expansion Valve
8	Temperature & Pressure Relief Valve
9	Pump
10	Drain Valve
11	Tank Temperature Sensor
12	Air Separator
13	Dirt Separator
14	Plate System Separator
15	Double Check Valve
16	Automatic Air Vent
17	3 Port Valve
18	Temporary Fill Loop
19	Anti-Vibration Coupling
20	Flow Regulator/Commissioning Set
21	Plate Heat Exchanger
22	Hydraulic Kit
23	Heat Meter
24	Grundfos Flow Sensor
25	2 Port Valve
26	Solar Expansion Vessel
27	Solar Collector Sensor
28	Solar Vessel Sensor
29	High Limit Stat
30	Solar Pump Station

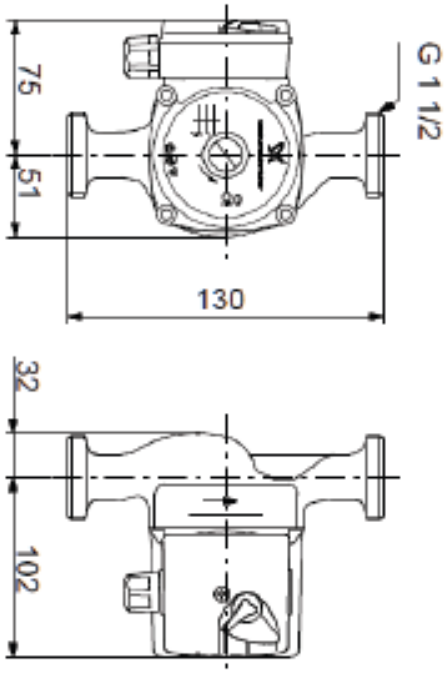
A suitable unvented systems kit is available from Locinvar,item number WH15A-RF which consists of

- 22mm Monoblock incorporating a pressure reducing valve, non-return valve and 6 bar pressure relief valve
- ¾" temperature and pressure relief valve
- 22mm tundish
- 25 litre flow through expansion vessel c/w flow through valve

To improve stratification within the vessel it may be a site requirement to install a de-stratification pump, this is available from Lochinvar as an ancillary extra, item number WH9. This kit consists of:

- 1no LM900139A Bronze pump
- 2no 28mm gate valves
- 1no 28mm NRV

DRIVE		
Pump Type		Potable
Motor		Electric with integrated motor protection
Electrical Requirements		230V /1Ph/ 50hz
Enclosure Rating		IP44
Thermal Class		F
Temperature Class		TF 110
Enclosure class		IP44
Bearings		Product lubricated special plain bearing
Operating Modes		3 fixed speed levels
GENERAL DATA		
Pump housing		Stainless steel
Impellor		Composite PES/PP
Connection Type		Screw end
Connection Size	inch	R1¼
Maximum Pressure	bar	10
Maximum Temperature	°C	110
Weight	kg	2,9
Power Consumption speed 1/2/3	W	35/45/50
Current Draw speed 1/2/3	A	0.16/0.2/0.23
Approvals		CE,WEEE,WRAS
DIMENSIONS		
Port to port length	mm	130



Electrical Connections

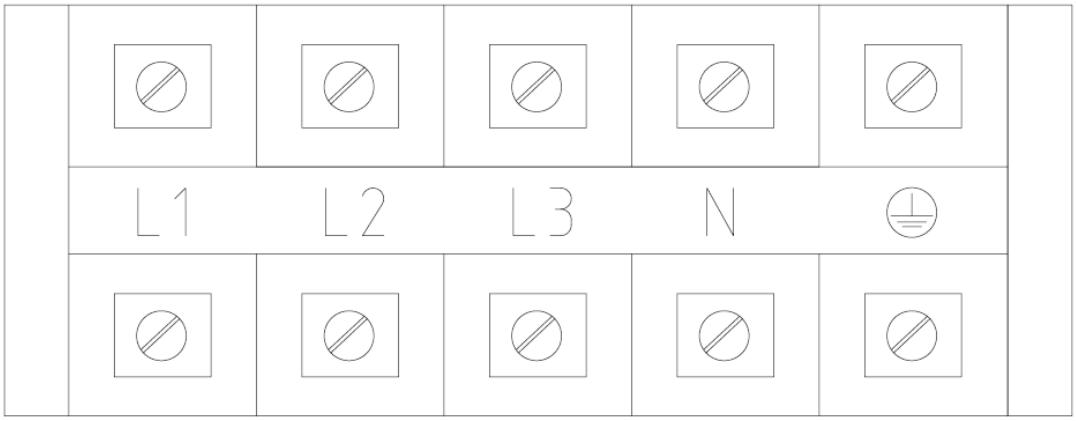
All models require a 3-phase supply with standard electrical requirements as per table 3

Table 4 Electrical requirements

Electric data				
Power supply	VAC / Ph / Hz	400 / 3 / 50		
Electric input (Peak)	kW	9.1	11.7	15.1
Number of backup elements	-	2	2	2
Back up element power (each)	kW	3	4.3	6
Backup element power (total)	kW	6	8.6	12
Maximum current (L1) - heat pump	A	9.6	9.6	9.6
Maximum input (L2) - back up element 1 + controls + fans	A	16.9	22.5	30.0
Maximum current (L3) - back up element 2	A	13.0	18.7	26.1
Peak current	A	39.5	50.8	65.7
IP-class	-	IPx4		

Provision should be made for local isolation with a lockable isolator fitted on or very close to the heat pump. A single 230v plug socket should also be fitted close to the unit to aid commissioning and future maintenance.

Standard electrical connections available



Installation assistance

Lochinvar can supply expert assistance to designers and installers during all phases of construction, whilst the product is simple to install it is important that plantroom size and ventilation are correctly calculated before commissioning. See section Positioning on site for further details.

Frequently asked questions

Q1 Can Aquastore be fitted outside?

A1 No Aquastore is not electrically rated to be fitted outside, it must be fitted inside a plantroom or space. See section

Q2 Does the Aquastore have BMS Connectivity?

A2 Aquastore is a plug and play water heater and has no BMS connectivity

Q3 What is the maximum working temperature of Aquastore?

A3 In efficiency or Hybrid more the maximum water heater temperature is 65˚C, in Power mode using the immersion heaters only the maximum working temperature is 85˚C

Q4 Why are the clearances around the unit so large?

A4 Clearances are required to ensure good airflow around the unit but crucially are required for service/ maintenance access to working parts.

Q5 Why is the Amps per phase not balanced?

A5 Aquastore is a single-phase unit but due to the high power required a three-phase supply is more suitable. Each phase supplies a 230v supply to different areas of the heat pump, see table 4 for details.

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