

## Amicus LTS low temperature air source heat pump installation planning guide.



Article	Language	Version	Modified by
Amicus LT Installation and Planning guide	English	V2.3 December 2023	S Hunt

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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.

The Lochinvar Amicus Low temperature air source heat pump range has been designed to provide heating and DHW only and can work at temperatures up to 59°C (at +5°C external air) and can maintain 45°C in external air temperatures as low as -10°C. There are 24 models in the range with outputs ranging from 22 to just over 463kW at standard rating conditions External air+7C 30/35 flow. The individual Technical product submittal for each heat pump supplies detailed data on outputs ranging from 35 to 59°C flow with external air temperatures of +20 to -10°C. All units can also be supplied as RV two pipe heating and/or cooling units.

Each heat pump has the following standard features:

Scroll compressors.

Source heat exchanger made from copper with low air resistance to allow slower rotating fans and thus reduce noise.

Direct drive fans with low speed of only 600rpm.

User heat exchanger made from 316 stainless steel.

Condensate drip tray with antifreeze heater, collects condensation from the source heat exchanger which can then be piped to drain.

Antifreeze kit which prevents internal pipework from freezing whilst the unit is non-operational.

Control panel which can be removed from the heat pump and mounted within the plantroom up to 50 metres away.

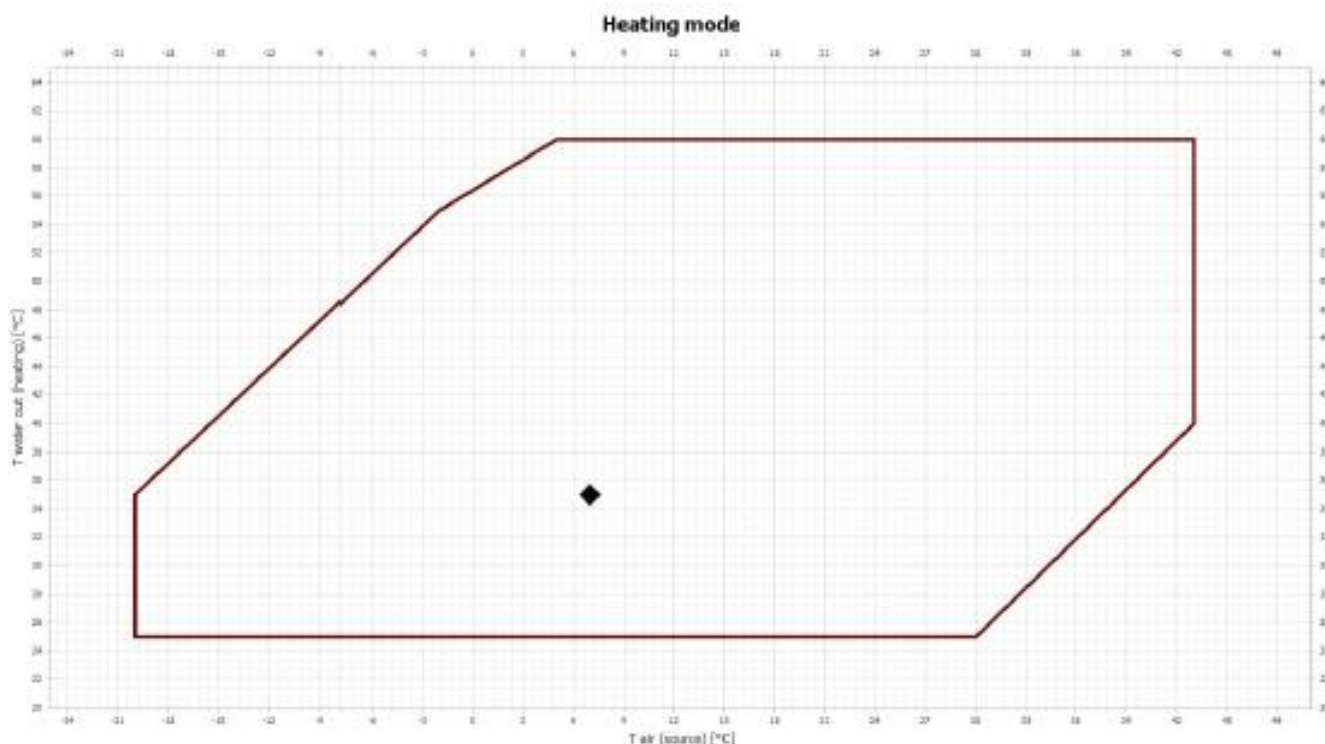
## General

The Amicus air source heat pump should be sited in an area which:

- Can bear the Weight of the unit.
- Has enough space around the unit to allow the correct airflow across the source heat exchanger, see table 2.
- Is not too windy.
- Does not present a noise nuisance to users of the building and neighbours.

### Operational limits

Amicus low temperature heat pumps can provide heating and/or domestic hot water at temperatures up to 59°C, and can operate in external temperatures down to as low as -20°C. The diagram below shows the general working limits and should be crossed reference with the data shown in the individual model Technical Product Submittal as each is slightly different.



### Sizing

When sizing the air source heat pump careful consideration needs to be taken of design outside air temperatures as the output from the heat pump will be much lower at -5°C than shown in the standard rated conditions. Lochinvar can help with sizing your project, contact your local area sales manager or email [sales@lochinvar.ltd.uk](mailto:sales@lochinvar.ltd.uk)

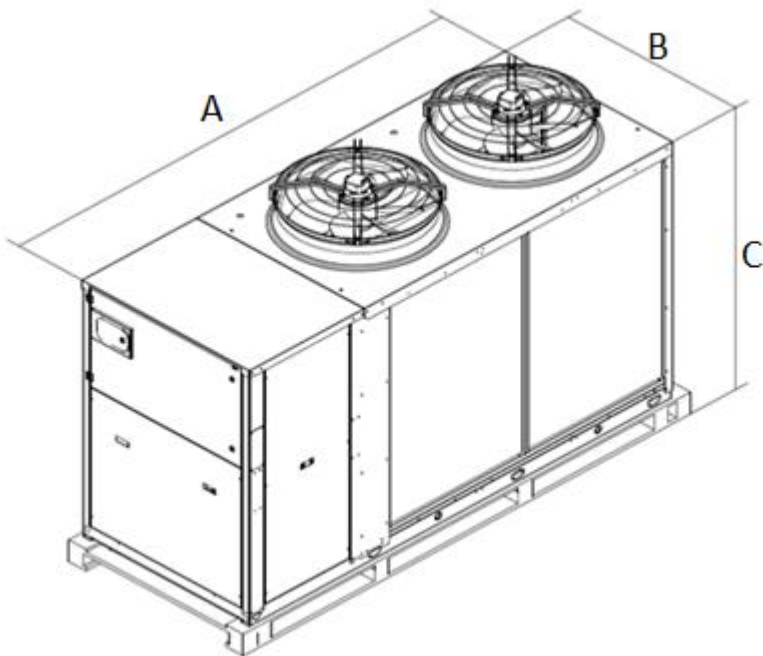
## Technical details

Legend	Data	Unit	242LTS	292LTS	412LTS	432LTS	492LTS	602LTS	702LTS	802LTS
A	Length	mm	1915	1915	2400	2400	2400	2905	2905	2905
B	Width	mm	875	875	1145	1145	1145	1146	1146	1146
C	Height	mm	1468	1468	1690	1690	1690	1840	1840	1840
	Weight	Kg	560	560	670	690	720	1060	1060	1070

Legend	Data	Unit	902LTS	1002LTS	1202LTS	1402LTS	1602LTS	1802LTS	2002LTS	2302LTS
A	Length	mm	2905	2905	2905	3905	3905	3905	3905	3905
B	Width	mm	1145	1145	1145	1145	1145	1145	1145	1145
C	Height	mm	1892	1892	1892	1894	1894	1894	1894	2294
	Weight	Kg	1120	1160	1240	1560	1580	1600	1620	1790

Legend	Data	Unit	2502LTS	2504LTS	3004LTS	3204LTS	3504LTS	4004LTS	4504LTS	5004LTS
A	Length	mm	3905	4205	4205	4205	4205	4805	4805	4805
B	Width	mm	1145	2190	2190	2190	2190	2190	2190	2190
C	Height	mm	2294	2356	2356	2356	2356	2371	2371	2371
	Weight	Kg	1820	3170	3220	3270	3320	3660	3720	3780

Table 1 Dimensions and Weights



Drawing 1 Dimensions

Full technical details including detailed performance data for each model can be found on the technical product submittal at: [LTStps://lochivar.LTSd.uk/amicus-air-source-heat-pumps/](https://lochivar.LTSd.uk/amicus-air-source-heat-pumps/)

## Position on site

Amicus air source heat pumps require minimum clearances around them to enable the fan which is fitted on top of the unit to draw sufficient air through the source heat exchanger (evaporator) which is fitted to the Right-hand side on models LAHP-242LTS to LAHP-802LTS when viewed from the front and on both sides on models LAHP-902LTS to LAHP-5004LTS. Clearances also prevent exhaust air recirculation which can create operational problems for the units.



Drawing 2 Airflow across the unit

The type of model used will impact the required clearances and how multiple units can be laid out.

Table 2 Airflow clearances required for a single unit (see table 4 for multiple units).

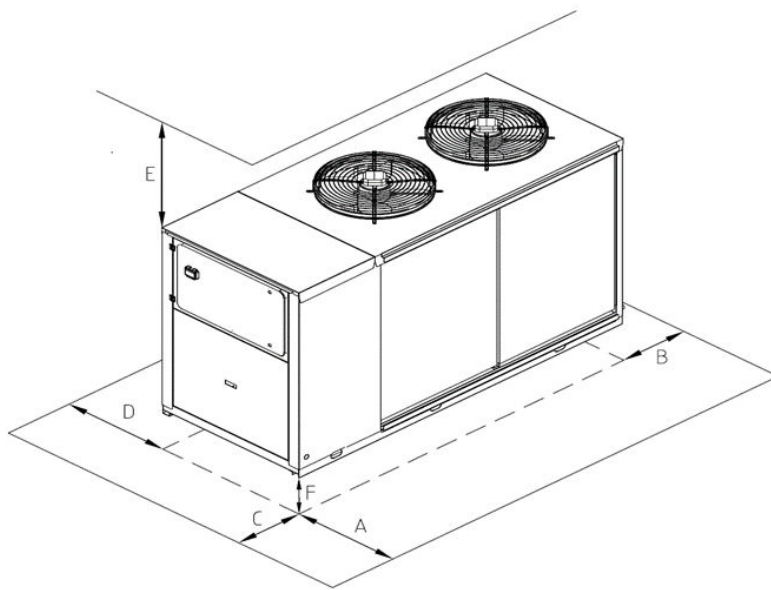
Legend	Unit	Model											
		242	292	412	432	492	602	702	802	902	1002	1202	1402
A	mm	1000	1000	1500	1500	1500	2000	2000	2000	2000	2000	2000	2000
B	mm	800	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
C	mm	800	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
D	mm	800	800	1000	1000	1000	1000	1000	1000	2000	2000	2000	2000
E	mm	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
F*	mm	350	350	350	350	350	350	350	350	350	350	350	350

Legend	Unit	Model											
		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
A	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
B	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
C	mm	1000	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
D	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
E	mm	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
F*	mm	350	350	350	350	350	350	350	350	350	350	350	350





\*All Amicus Air Source Heat Pumps, during defrost mode, produce condensate at the base of the source heat exchanger. If the ambient temperature is below 0°C, the water may freeze, creating a thick layer of ice within the appliance. This layer of ice, in specific conditions, may damage the heat exchanger and therefore, to guarantee correct operation of the unit it is highly recommended to raise the Amicus ASHP by a minimum amount as shown in table 2 using either a bigfoot type system as shown or by making the plinth the same dimensions as the heat pump

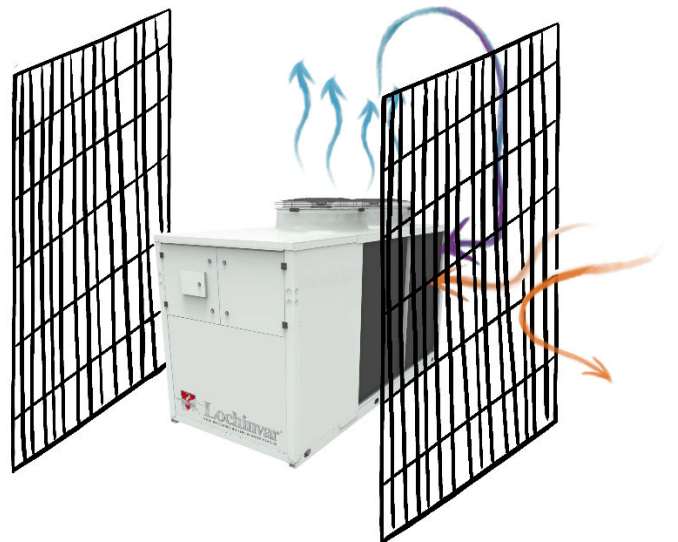


Drawing 3 Airflow clearances required, see table 2

Fencing or an acoustic shroud can be fitted around Amicus units, these must comply with the minimum service clearances shown in table 3 or must be removable for service access. The fence must allow enough airflow as required for the unit to be installed and can be found in the technical submittal for the unit.

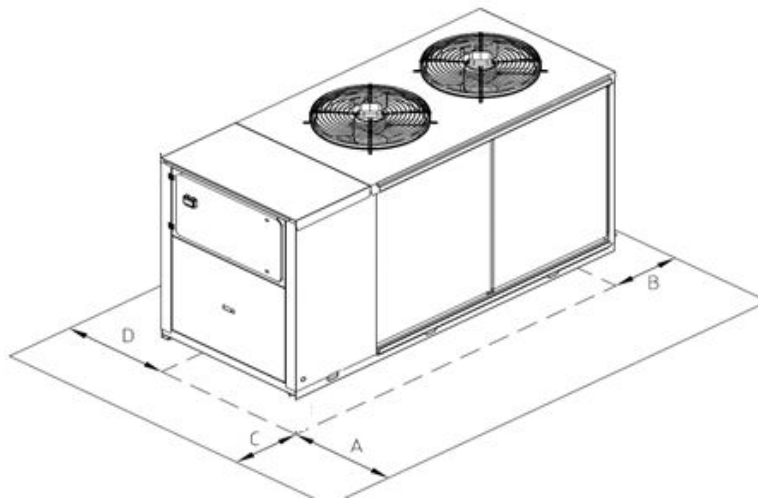


Drawing 4 Airflow across the unit when sited within a correctly constructed screen



Drawing 5 Short cycling caused by an incorrectly constructed screen





Drawing 6 Service clearances required, see table 3

Table 3 Service clearances required (these do not override airflow clearances).

Legend	Unit	Model											
		242	292	412	432	492	602	702	802	902	1002	1202	1402
A	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
B	mm	800	800	800	800	800	800	800	800	800	800	1200	1200
C	mm	800	800	800	800	800	1200	1200	1200	1200	1200	1200	1200
D	mm	800	800	800	800	800	800	800	800	1000	1000	1000	1000

Legend	Unit	Model											
		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
A	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
B	mm	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
C	mm	1200	1200	1200	1200	1200	2000	2000	2000	2000	2000	2000	2000
D	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

#### Locations near the coast

If the heat pumps are to be located within one mile of the coast or tidal water, then the unit should be ordered with the source heat exchanger treated to ensure premature saltwater corrosion does not occur.

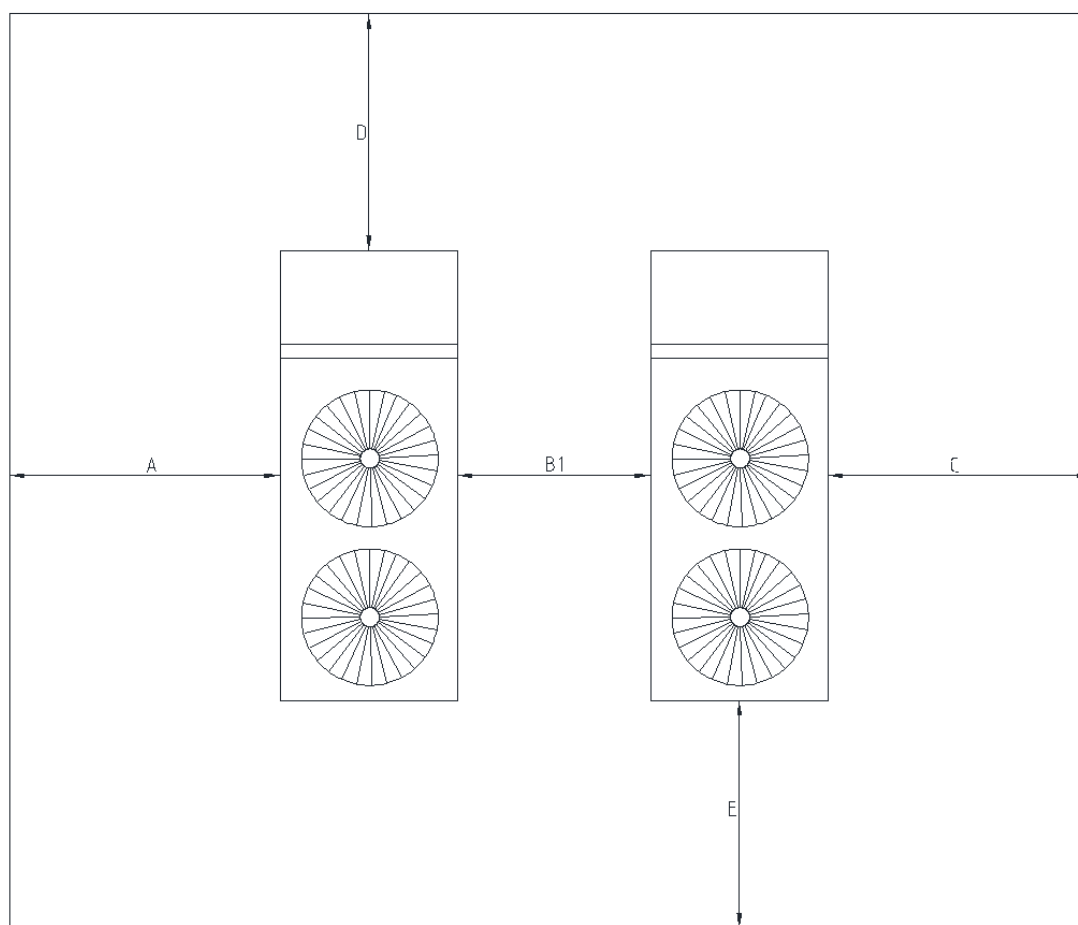
## Positioning multiple units

When positioning muLTiple Amicus units' minimum distances must be observed according to model size to ensure uninterrupted airflow and service access, to make the most of the available space some suggested plant layouts are shown in the layout drawings 7 to 11.

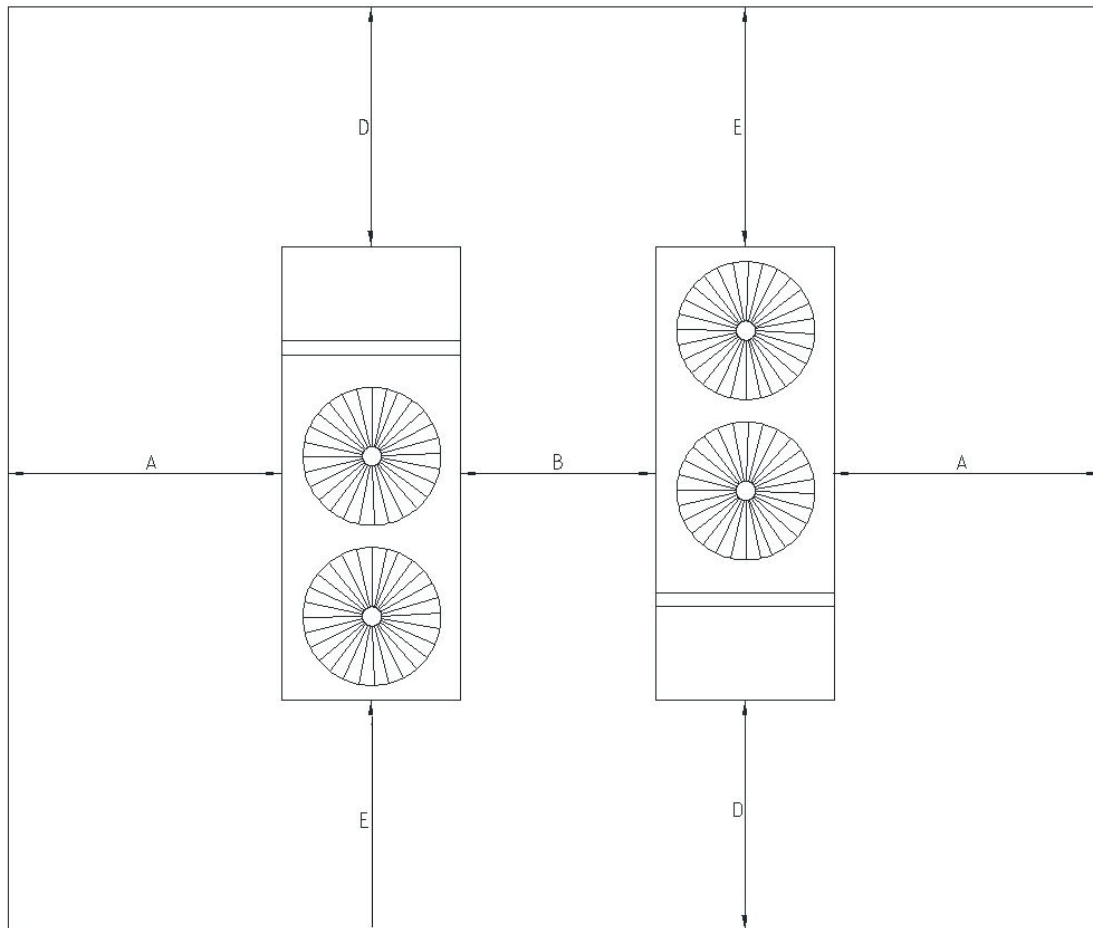
Table 4 Clearances for Multiple units sited together, use with drawings 7 to 11.

Legend	Unit	Model											
		242	292	412	432	492	602	702	802	902	1002	1202	1402
A	mm	1000	1000	1500	1500	1500	2000	2000	2000	2000	2000	2000	2000
B	mm	800	800	1000	1000	1000	1000	1000	1000	2000	2000	2000	2000
B1	mm	1500	1500	2250	2250	2250	3000	3000	3000	3000	3000	3000	3000
C	mm	800	800	1000	1000	1000	1000	1000	1000	2000	2000	2000	2000
D	mm	800	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
E	mm	800	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

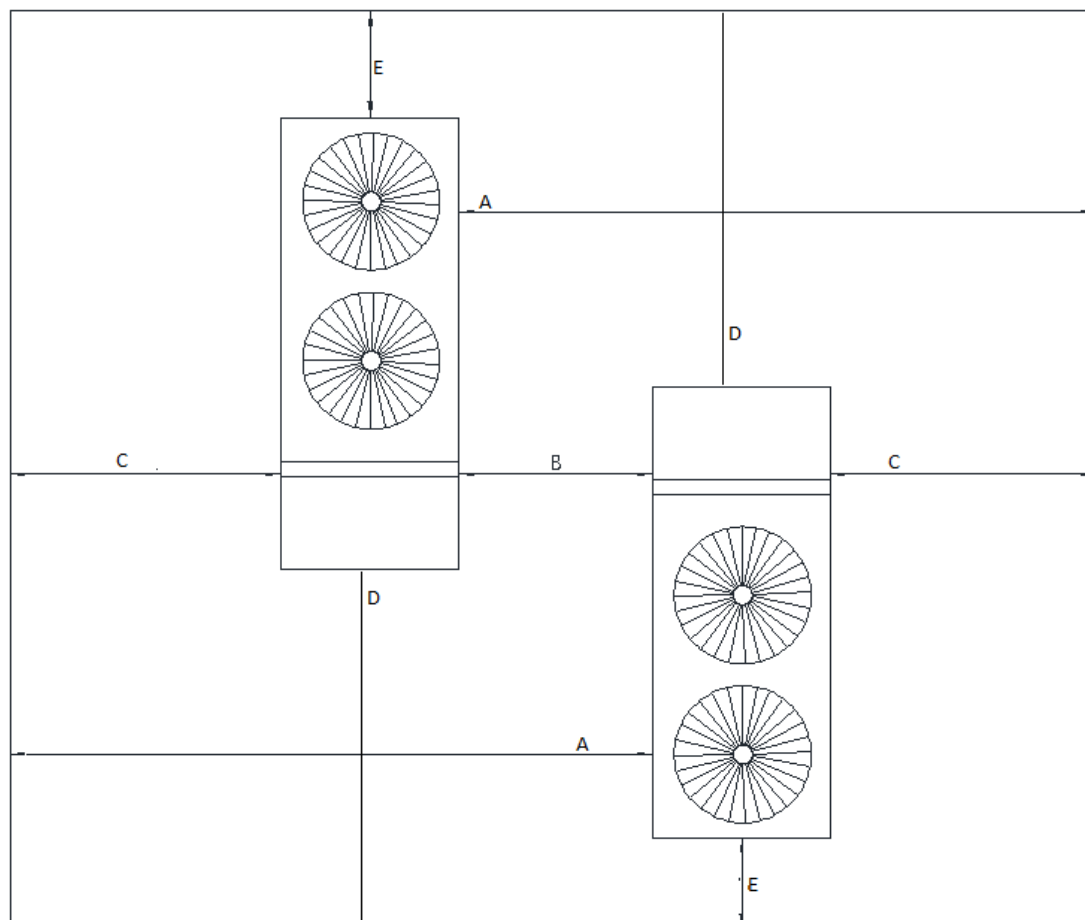
Legend	Unit	Model											
		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
A	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
B	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
B1	mm	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
C	mm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
D	mm	1000	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
E	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



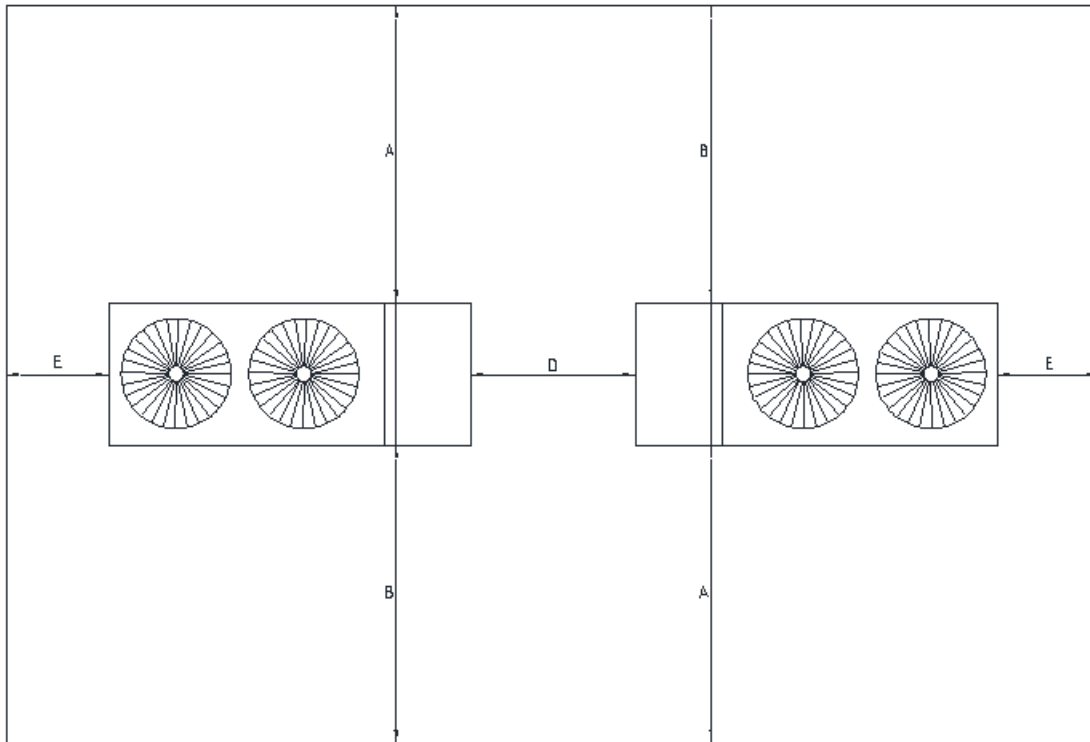
Drawing 7, Units sited side by side facing the same way



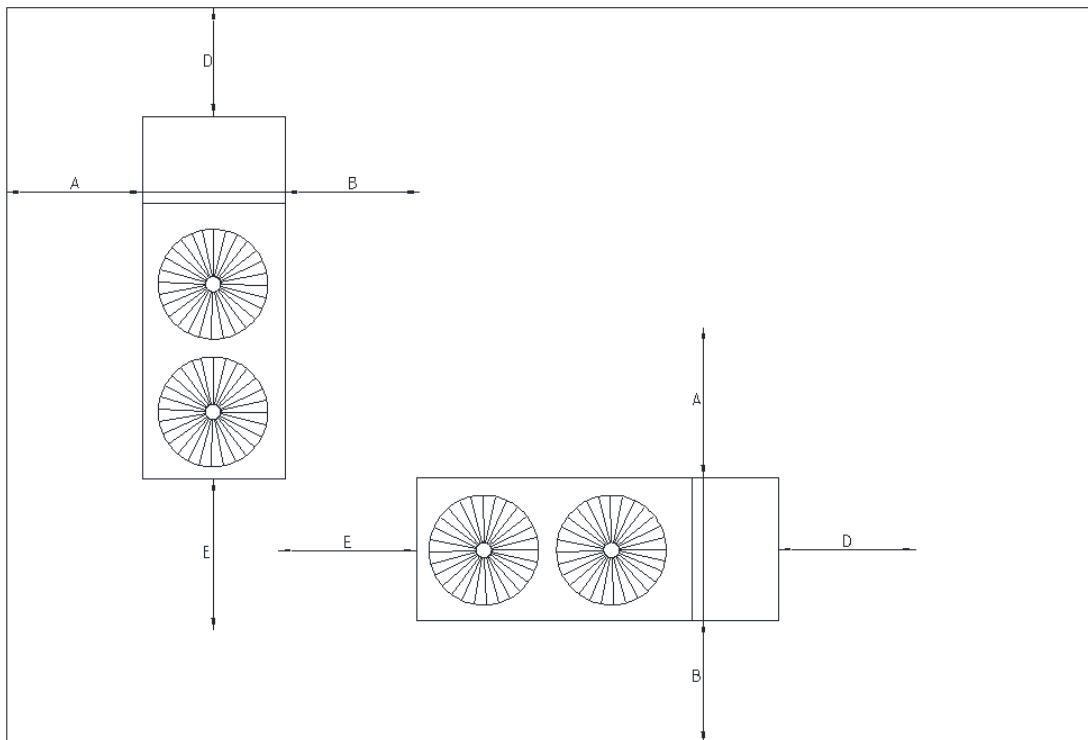
Drawing 8, Units sited side by side facing opposite ends, useful when using models 242-802 as they have the source heat exchanger on one side only.



Drawing 9, Units sited side by side facing opposite ends and front overlap



Drawing 10, Units sited facing each other



Drawing 11, Units sited in a corner

## Sound Power data

Table 5 Sound power levels for standard LTS units

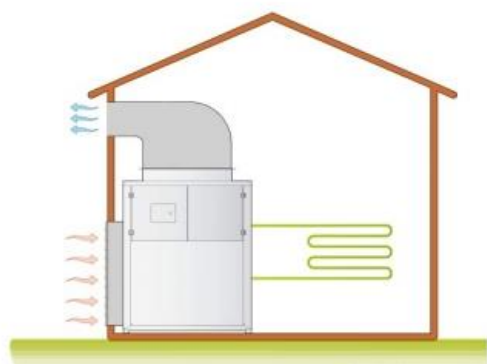
Model	Octave band (Hz)								Lw		Lp
	63	125	250	500	1K	2K	4K	8K			
	dB	dB	dB	dB	dB	dB	dB	dB	Db	dB(A)	dB(A)
242	86.1	77.3	71.2	69.7	68.6	63.2	59.8	50.7	86.9	78	46
292	87.1	78.3	72.2	70.7	69.6	64.2	60.8	51.7	87.9	79	47
412	87.1	78.3	72.2	70.7	69.6	64.2	60.8	51.7	87.9	74	42
432	88.1	79.3	73.2	71.7	70.6	65.2	61.8	52.7	88.9	80	48
492	89.1	80.3	74.2	72.7	71.6	66.2	62.8	53.7	89.9	79	47
602	89.1	80.3	74.2	72.7	71.6	66.2	62.8	53.7	89.9	80	48
702	90.1	81.3	75.2	73.7	72.6	67.2	63.8	54.7	90.9	81	49
802	91.1	82.3	76.2	74.7	73.6	68.2	64.8	55.7	91.9	82	50
902	95.1	86.3	80.2	78.7	77.6	72.2	68.8	59.7	95.9	86	54
1002	96.1	87.3	81.2	79.7	78.6	73.2	69.8	60.7	96.9	87	55
1202	98.1	89.3	83.2	81.7	80.6	75.2	71.8	62.7	98.9	88	56
1402	99.1	90.3	84.2	82.7	81.6	76.2	72.8	63.7	99.9	89	58
1602	100.1	91.3	85.2	83.7	82.6	77.2	73.8	64.7	100.9	89	57
1802	100.1	91.3	85.2	83.7	82.6	77.2	73.8	64.7	100.9	90	58
2002	100.1	91.3	85.2	83.7	82.6	77.2	73.8	64.7	100.9	90	58
2302	102.1	93.3	87.2	85.7	84.6	79.2	75.8	66.7	102.9	92	60
2502	104.1	95.3	89.2	87.7	85.6	81.2	77.8	68.7	104.9	93	61
2504	101.1	92.3	86.2	84.7	83.6	78.2	74.8	65.7	101.9	91	59
3004	102.1	93.3	87.2	85.7	84.6	79.2	75.8	66.7	102.9	92	60
3204	103.1	94.3	88.2	86.7	85.6	80.2	76.8	67.7	103.9	92	60
3504	103.1	94.3	88.2	86.7	85.6	80.2	76.8	67.7	103.9	93	61
4004	103.1	94.3	88.2	86.7	85.6	80.2	76.8	67.7	103.9	94	64
4504	105.1	96.3	90.2	88.7	87.6	82.2	78.8	69.7	105.9	96	64
5004	105.1	96.3	90.2	88.7	87.6	82.2	78.8	69.7	105.9	94	62

Lw: Sound power level according to ISO 9614

Lp: Sound pressure level measured at 10 metres from the unit in free field conditions direction factor Q=2 to ISO 9614

## Internal installations

Amicus units can be installed within a plantroom but must be upgraded to include high static fans, these fans generally have 150Pa available at the exit to overcome ducting to be fitted. The units should be allowed to pull free air across the source heat exchanger with the air ducted to outside to prevent air recirculation. Spacing as shown in Table 2 must be maintained.



Drawing 11, typical internal airflow arrangement

For help with internal installation please contact your local area sales manager.

## Pipework sizing and flow rates

Pipework should always be sized to match the flow rates below and maintaining a 5k delta T, this will result in larger pipework compared to a traditional 20k system design. Amicus can be supplied with a hydraulic kit which includes a suitably sized primary pump within the unit or alternatively one can be specified by the design engineer and fitted within the plantroom, this will enable a twin-head pump to be used if required. A suitable flow setter must be fitted to every Amicus unit installed to set the correct flow rate at commissioning.

Table 6 Design flow rates

	Unit	242LTS	292LTS	412LTS	432LTS	492LTS	602LTS	702LTS	802LTS	902LTS	1002LTS	1202LTS	1402LTS
Design flow rate	m <sup>3</sup> /hr	3.872	5.168	6.485	8.252	8.881	10.82	11.86	13.2	16.04	18.2	20.1	23.76

	Unit	1602LTS	1802LTS	2002LTS	2302LTS	2502LTS	2504LTS	3004LTS	3204LTS	3504LTS	4004LTS	4504LTS	5004LTS
Design flow rate	m <sup>3</sup> /hr	26.21	29.4	32	36.77	42.12	40.01	47.12	51.39	59.56	63.53	69.63	81.29

## Buffer vessel sizing

Amicus air source heat pumps require a certain amount of system volume to ensure problem free running and to reduce the number of starts and hence wear and tear on the compressor. In practise in most installations a buffer vessel will be required. The minimum system volume will:

1. Prevent the unit cycling during low demand.
2. Allow the unit to defrost without affecting the heat available to the system.

Table 7 Minimum water content required.

Min water content in the user circuit	Unit	242LTS	292LTS	412LTS	432LTS	492LTS	602LTS	702LTS	802LTS	902LTS	1002LTS	1202LTS	1402LTS
	litre	240	340	400	480	560	650	750	820	1000	1120	1240	1440

Min water content in the user circuit	Unit	1602LTS	1802LTS	2002LTS	2302LTS	2502LTS	2504LTS	3004LTS	3204LTS	3504LTS	4004LTS	4504LTS	5004LTS
	litre	1600	1800	1920	2000	2200	1230	1400	1530	1700	1970	2240	2420

Lochinvar will offer a suitably sized buffer vessel depending upon what the Amicus units are supplying but are generally sized according to the output of the unit at 2°C ambient. Multiple units with cascade control fitted do not require a substantially larger buffer as only one unit will be allowed to go into defrost at a time. For example, two number LAHP-602LTS units may only require 800litres.

## DHW Supply

Amicus LTS can supply low temperature hot water at up to 59°C for use in providing domestic hot water (DHW), because of the way the internal control works this will result in a maximum temperature within the DHW vessel of 57°C. The Amicus LTS range will only achieve this maximum temperature when external air temperatures are above +5°C so an immersion heater or gas fired water heater will be required to assist during cold winter days. Lochinvar can provide a full bespoke bi-valent hot water system, contact us for further details. Generally, DHW is provided by a specially designed plate and buffer arrangement which has been sized according to the required flow rate, delta T and only a 2k temperature drop between the primary and secondary side of the plate. (See drawing 13) The plate must be sized according to the Amicus kW rating during summer months to take advantage of the extra power available. For system requiring DHW to be stored above these temperatures or those requiring a higher temperature pasteurisation this will need the assistance of a boost immersion heater fitted to the DHW vessel.

If the Amicus is supplying DHW only then the DHW storage vessel will also act as the buffer vessel.

## Electrical Connections

All models require a 3-phase supply with standard electrical requirements as per table 8.

Table 8 electrical requirements for a standard unit.

Electrical Data	Unit	242LTS	292LTS	412LTS	432LTS	492LTS	602LTS	702LTS	802LTS	902LTS	1002LTS	1202LTS	1402LTS
Maximum input power	kW	11	13	17	21	23	28	31	33	36	42	48	53
Maximum input current standard unit	A	19	24	28	36	46	48	54	66	72	78	87	95
Peak input current standard unit	A	63	69	81	115	136	144	147	175	212	263	272	319
Peak input current unit with soft start option fitted	A	42	46	55	77	92	97	100	119	143	148	182	190
Fuse rating (delayed)	A	32	40	50	100	100	100	125	125	160	160	200	200
Optional Hydraulic kit input power	kW	0.4	0.5	0.55	0.9	0.9	1.1	1.1	1.1	1.1	1.5	1.5	1.85
Optional Hydraulic kit maximum input current	A	1.43	1.65	1.58	2.37	2.45	2.45	2.45	2.45	2.45	3.43	3.43	4.53

Electrical Data	Unit	1602LTS	1802LTS	2002LTS	2302LTS	2502LTS	2504LTS	-3004LTS	-3204LTS	3504LTS	-4004LTS	4504LTS	5004LTS
Maximum input power	kW	58	66	74	87	96	100	114	124	140	156	178	196
Maximum input current standard unit	A	101	118	132	157	175	172	195	212	246	280	321	356
Peak input current standard unit	A	324	362	379	402	500	357	419	436	490	524	646	681
Peak input current unit with soft start option fitted	A	215	232	255	319	337	267	310	327	366	400	483	518
Fuse rating (delayed)	A	200	200	250	250	250	250	250	315	400	400	400	400
Optional Hydraulic kit input power	kW	1.85	3	3	3	3	3	4	4	5.5	5.5	5.5	7.5
Optional Hydraulic kit maximum input current	A	4.53	6.33	6.33	6.33	6.33	6.33	7.75	7.75	10.4	10.4	10.4	14.1

Provision should be made for local isolation with a lockable isolator fitted on or very close to the heat pump. If the heat pump is to be sited some way from the plantroom, a single weatherproof 230v plug socket should also be fitted to aid commissioning and future maintenance of the unit.

Standard electrical connections available

Standard electrical connections	
Connection	Note
BTI sensor	Monitor's temperature in the buffer vessel
BTs sensor	Monitor's temperature in the DHW vessel
Primary pump	Either integrated as part of Hydraulic kit or fitted within the plantroom
DHW Primary pump	Fitted between the heat pump plate and DHW storage vessel
Remote on/off	
Summer/winter mode	Switches to DHW only in summer
Hot water priority	
General alarm	
3-way valve	Switches between heating and DHW

Electrical ancillaries available

1. Cascade control, this will be supplied as standard on projects with more than one heat pump.
2. Soft start, this reduces the peak Amps at start-up as shown in table 8.

Harmonics

Power supply companies often ask for information regarding the harmonics of the units, all Amicus air source heat pumps are constructed in compliance with the following standards:

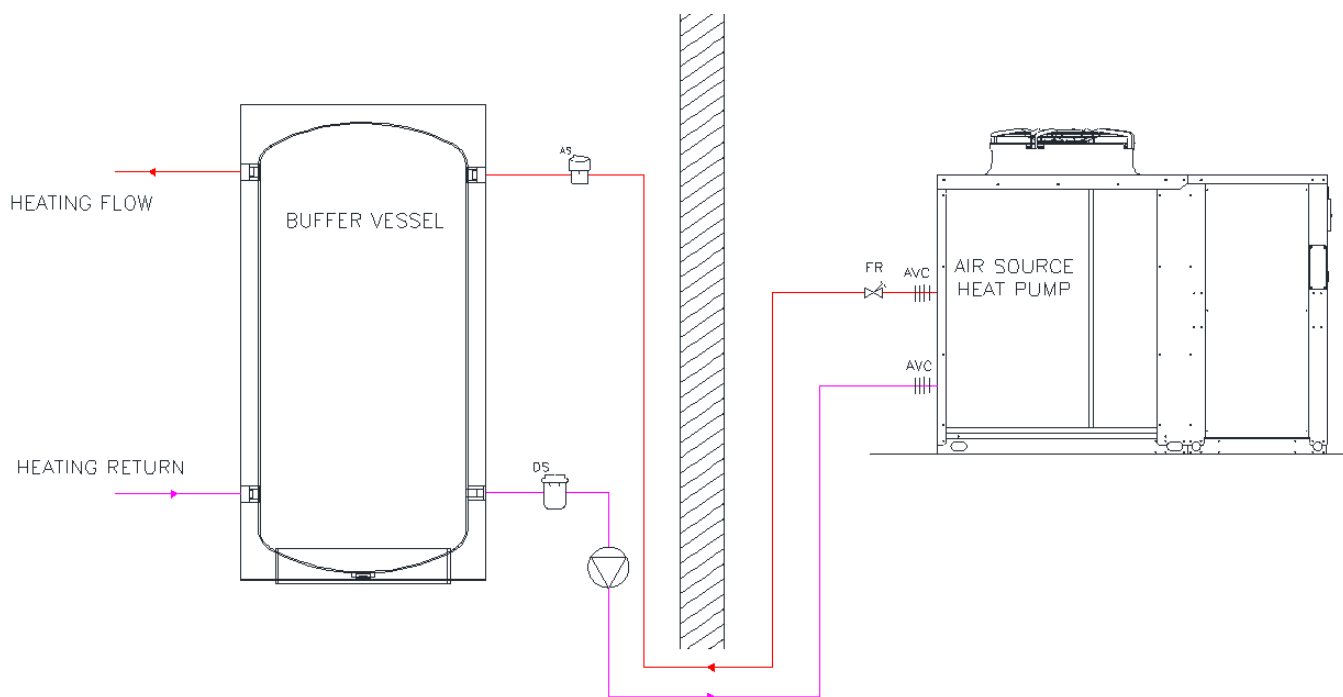
1. EN61000-3-2
2. EN61000-3-3
3. EN61000-3-11
4. EN61000-3-12

This will satisfy the Power supply company that the heat pump will not give problems on site.

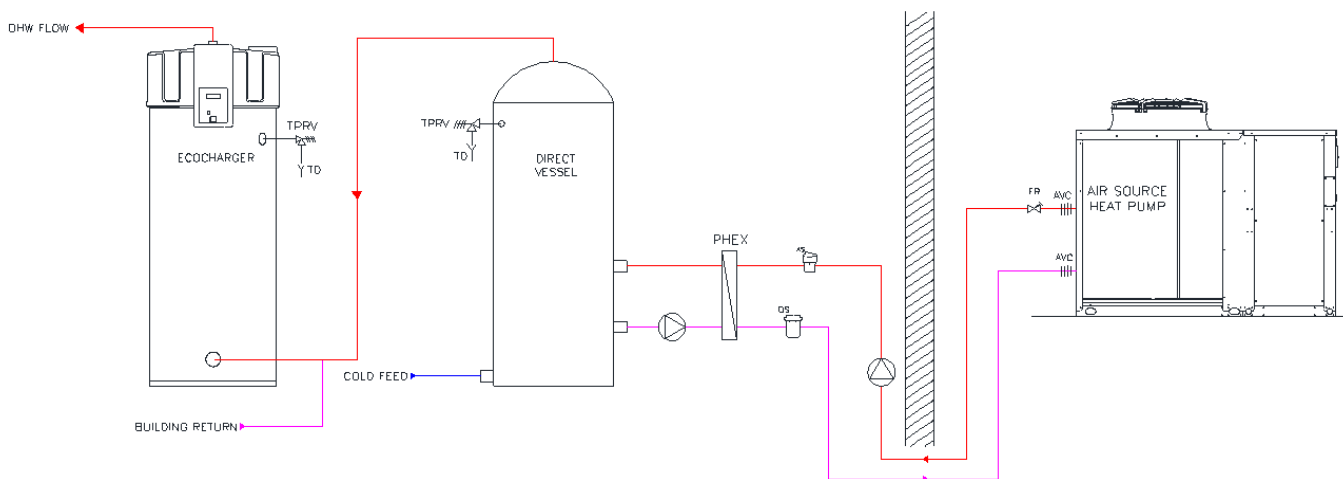


## Standard installation schematics

This section contains various standard schematics showing the concept installation options for the Amicus range. These drawings must not be used for detailed design but can be built upon by the design team to produce their own installations drawings. Lochinvar does not provide detailed installation drawings but can review any produced by the design team.

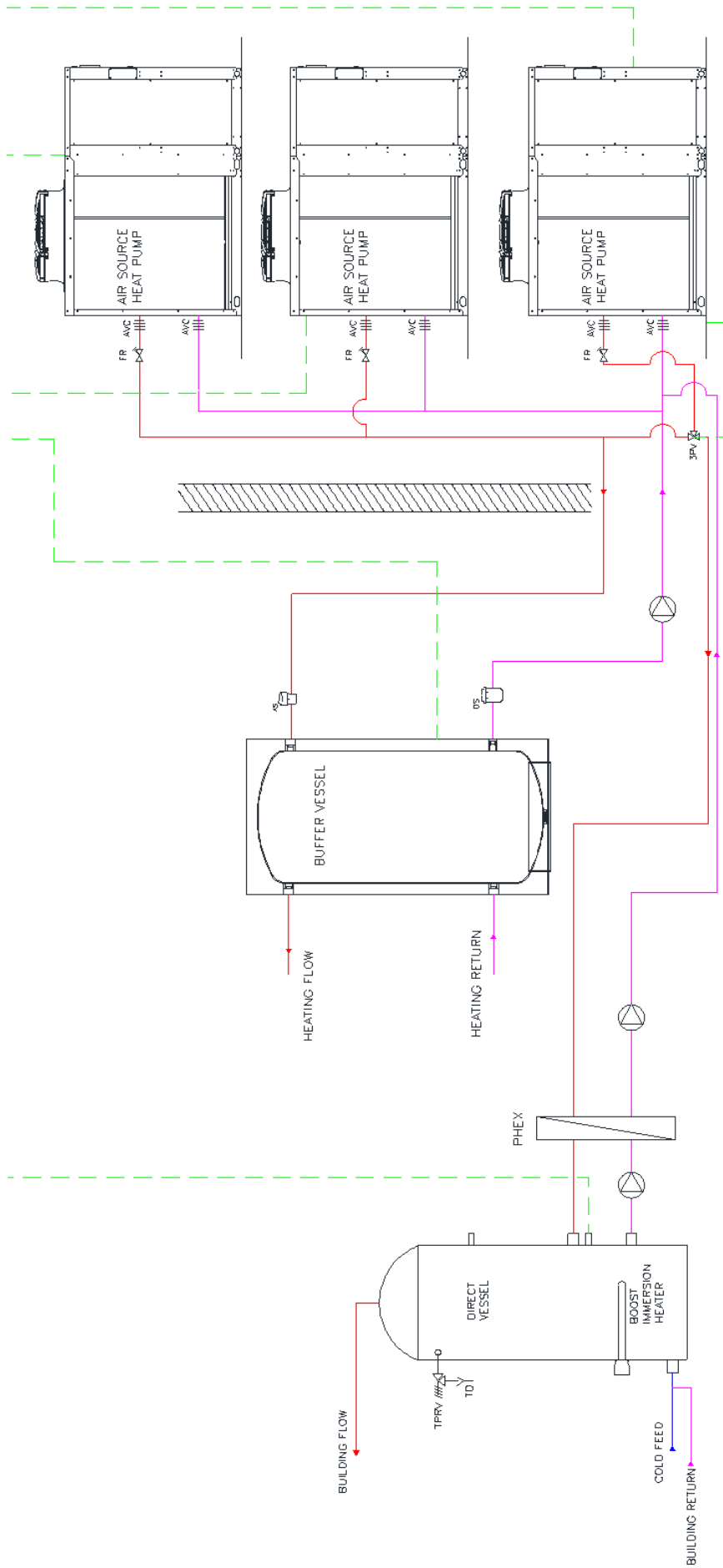


Drawing 12, Amicus unit supplying heating buffer



Drawing 13, Amicus unit supplying domestic hot water only in a pre-heat BI-valent system





Drawing 15, Multisple Amicus unit supplying heating and domestic hot water with domestic hot water priority

## Installation assistance

Included in the cost of every Amicus unit is the use of the Lochinvar Project Engineer and commissioning. This helps ensure the units are installed correctly and the end user has the assurance the unit has been commissioned by the manufacturer. After orders are placed a Project Engineer will contact the installer and offer:

1. Initial pre-start visit to ensure the installer has all the required information to install the units and has the Project Engineer contact details for telephone and email support during the construction phase.
  - a. This visit covers flow rates, Location of equipment, wiring/controls, integration with other equipment and any other questions the installers may have.
2. A second visit during installation to make sure everything is OK.
  - a. This visit will review the progress and check everything is going ok, answer any further questions relating to the install – at this stage it is also good to meet the controls/BMS team.
3. A pre-commissioning visit to ensure all installation work is complete prior to the Lochinvar commissioning engineer visit.
  - a. On this visit we will complete the pre-com sheet ensure all works are complete and plan in a commissioning date.
4. Commissioning visit

On completion of the commissioning the installer will receive a detailed report.

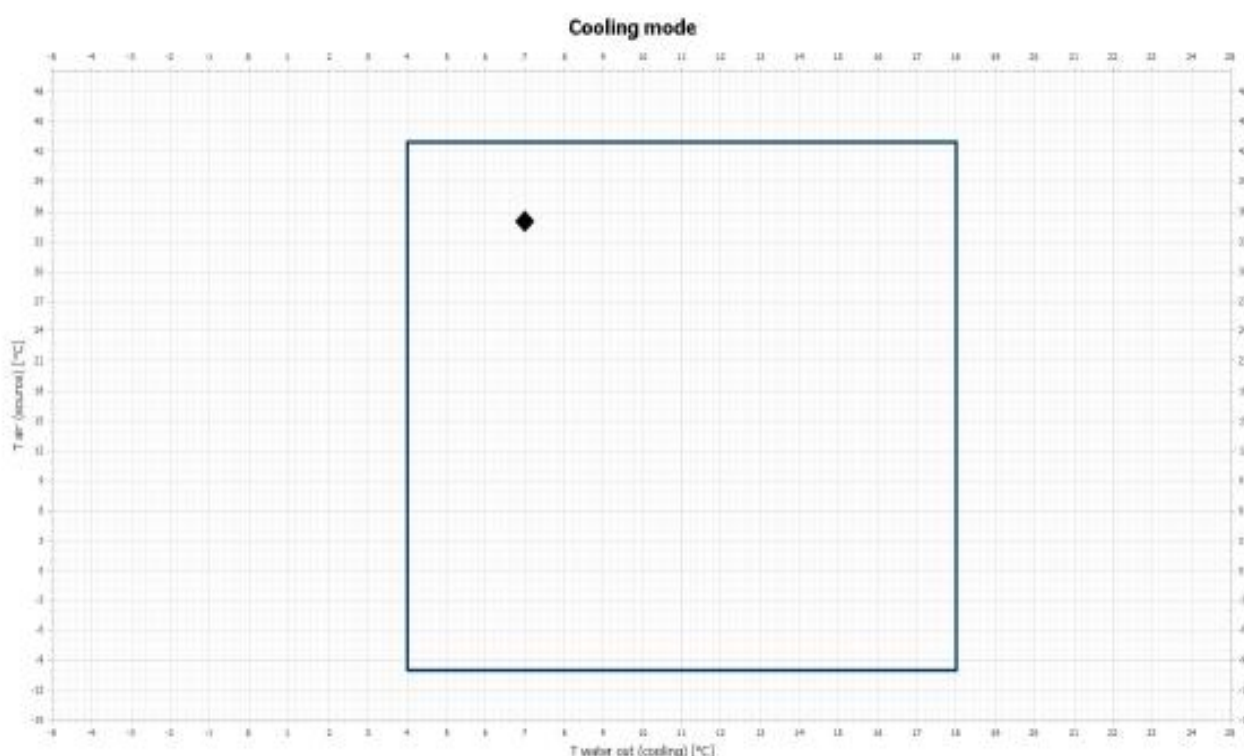
## Cooling

Amicus LTS models can be supplied as RV models, these are two pipe heating and/or cooling units with domestic hot priority in either heating or cooling mode.

The units are identical in size to the heating only versions with all technical data available on the individual model Technical product submittal available from <https://lochinvar.ltd.uk/amicus-air-source-heat-pumps-lt/>

### Operational limits

Amicus high temperature heat pumps can provide cooling even with external air temperatures of 40°. The diagram below shows the general working limits and should be crossed reference with the data shown in the individual model Technical Product Submittal as each is slightly different.





Lochinvar Limited  
7 Lombard way,  
The MXL centre,  
Banbury  
OX16 4TJ  
01296 269981  
[www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)