Amicus HT

High temperature air source heat pump.

R410a

Installation planning guide

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Document Control

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Amicus HT Planning guide	English	V2.3 December 2023	S Addis

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 High temperature air source heat pump range has been designed to provide heating and DHW and can work at temperatures up to 63°C and can work in external air temperatures as low as -20°C. There are 13 models in the range with outputs ranging from 24 to 219kW 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 65°C flow with external air temperatures of +25 to -10°C.

Units are available as either standard HTS versions or low noise HTXL versions, both can also be supplied as RV two pipe heating and/or cooling units.

Each heat pump has the following standard features:

Scroll compressors utilising Economised Vapour Injection (E.V.I) technology, this allows the units to maintain temperature and output at lower external air temperatures than standard 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 900rpm on HTS models and 600rpm on low noise HTXL models.

User heat exchanger made from 316 stainless steel.

(On HTXL models only) Insulated floating frames which hold the compressors to reduce noise and vibration from the unit by typically 10dBa.

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.

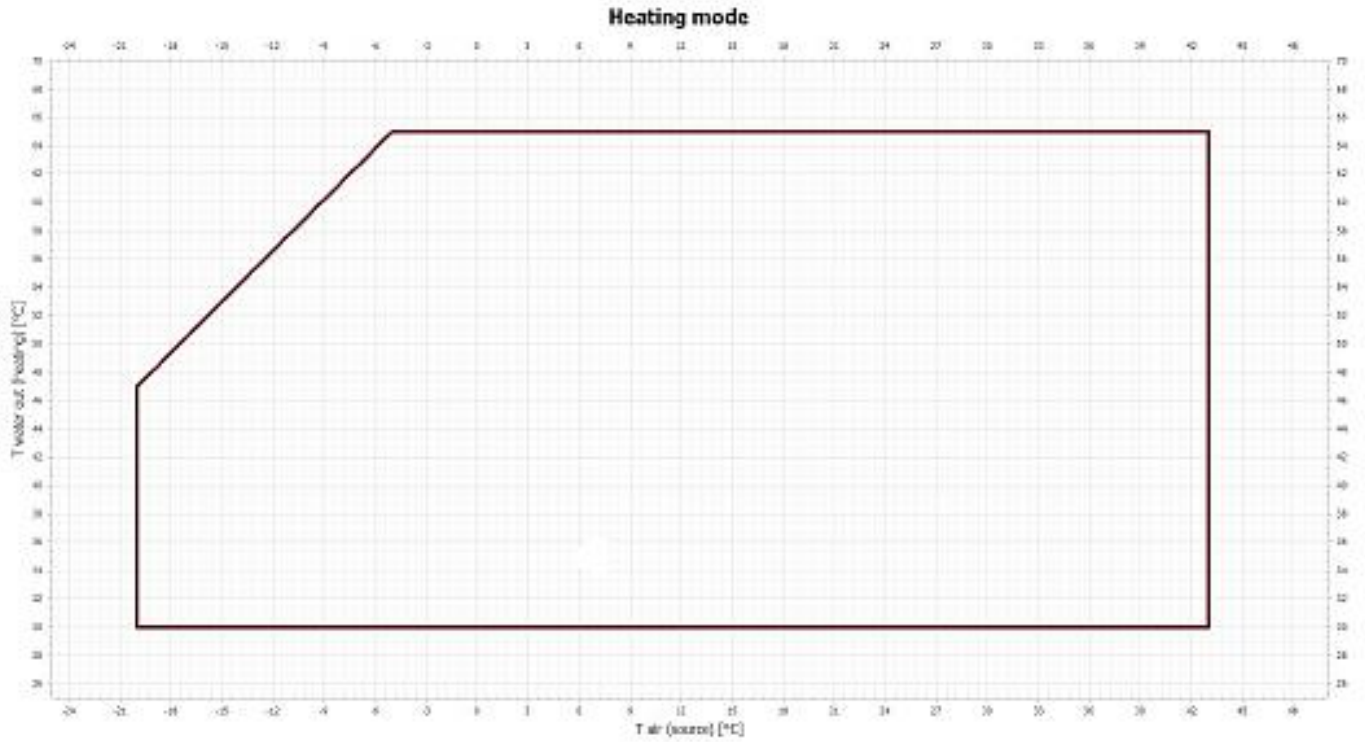
General

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 high temperature heat pumps can provide heating and/or domestic hot water at temperatures up to 63°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 -5C than shown in the standard rated conditions. Lochinvar can help with sizing your project, contact your local area sales manager or email info@lochinvar.ltd.uk

Technical details

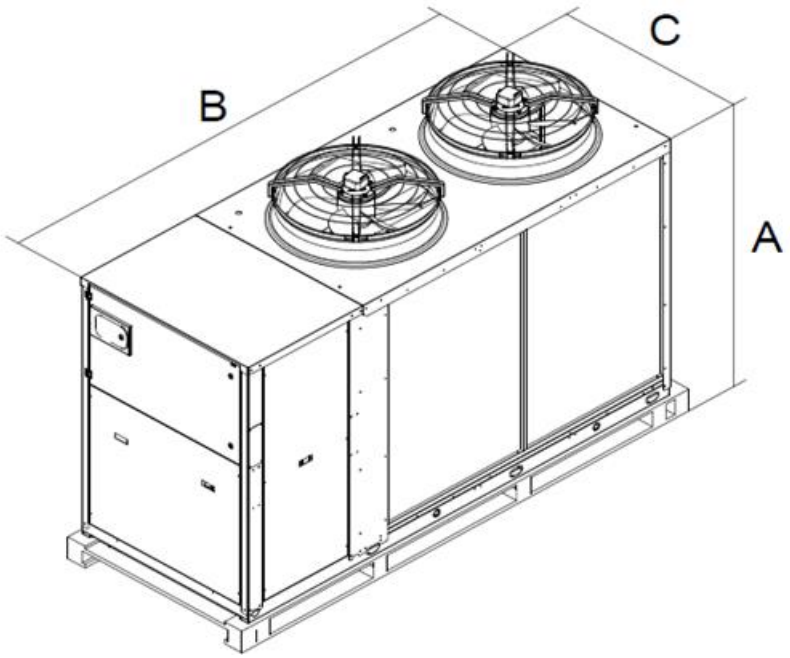
Table 1 Dimensions and weights

Dimensions			LAHP-242HTS	LAHP-292HTS	LAHP-432HTS	LAHP-492HTS	LAHP-592HTS	LAHP-752HTS	LAHP-852HTS	LAHP-1002HTS
Height	A	mm	1494	1494	1673	1673	1673	1839	1839	1750
Length	B	mm	1915	1915	2400	2400	2400	2905	2905	3900
Width	C	mm	875	875	1145	1145	1145	1146	1146	1150
Shipping Weight		Kg	560	560	610	650	740	890	910	1190

Dimensions			LAHP-1202HTS	LAHP-1454HTS	LAHP-1654HTS	LAHP-1854HTS	LAHP-2154HTS
Height	A	mm	1750	1890	1890	1890	1890
Length	B	mm	3900	4695	4695	4695	4695
Width	C	mm	1150	1145	1145	1145	1145
Shipping Weight		Kg	1190	2500	2640	2720	2720

Dimensions			LAHP-252HTXL	LAHP-302HTXL	LAHP-432HTXL	LAHP-492HTXL	LAHP-602HTXL	LAHP-752HTXL	LAHP-852HTXL	LAHP-1002HTXL
Height	A	mm	1468	1468	1673	1673	1820	1820	1920	1890
Length	B	mm	1915	1915	2400	2400	2905	2905	2905	2905
Width	C	mm	875	875	1145	1145	1150	1150	1150	1150
Shipping Weight		Kg	570	590	720	730	1080	1090	1140	1170

Dimensions			LAHP-1202HTXL	LAHP-1454HTXL	LAHP-1654HTXL	LAHP-1854HTXL	LAHP-2154HTXL
Height	A	mm	1890	2360	2360	2360	2360
Length	B	mm	2905	4205	4205	4205	4205
Width	C	mm	1150	2190	2190	2190	2190
Shipping Weight		Kg	1250	2500	2540	2580	2580



Drawing 1 Dimensions

Full technical details including detailed performance data for each model can be found on the technical product submittal at: https://lochinvar.ltd.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-252HTS to LAHP-2154HTS and LAHP252HTXL to LAHP752HTXL when viewed from the front and on both sides on models LAHP-852HTXL to LAHP-2154HTXL. 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.

Legend	Unit	Model						
		LAHP-242HTS	LAHP-292HTS	LAHP-432HTS	LAHP-492HTS	LAHP-592HTS	LAHP-752HTS	LAHP-852HTS
A	mm	1000	1000	1500	1500	2000	2000	2000
B	mm	800	800	1000	1000	1000	1000	1000
C	mm	800	800	1000	1000	1000	1000	1000
D	mm	800	800	1000	1000	1000	1000	2000
E	mm	3000	3000	3000	3000	5000	5000	5000
F *	mm	350	350	350	350	350	350	350

Legend	Unit	Model					
		LAHP-1002HTS	LAHP-1202HTS	LAHP-1454HTS	LAHP-1654HTS	LAHP-1854HTS	LAHP-2154HTS
A	mm	2000	2000	2000	2000	2000	2000
B	mm	1000	1000	1000	1000	1000	1000
C	mm	1000	1000	1500	1500	1500	1500
D	mm	2000	2000	2000	2000	2000	2000
E	mm	5000	5000	5000	5000	5000	5000
F *	mm	350	350	350	350	350	350

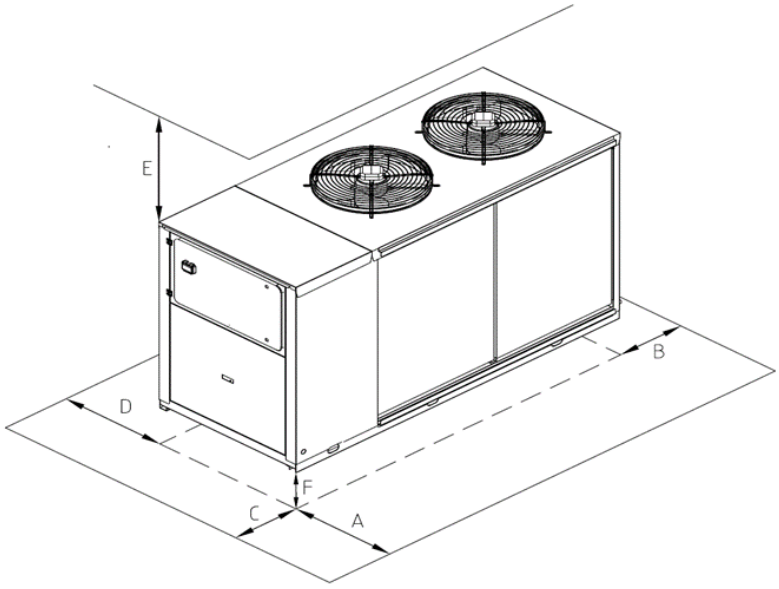
Table 2.1 Airflow clearances required for a single unit model 242-2154HTS version (see table 4 for multiple units).

Legend	Unit	Model						
		LAHP-252HTXL	LAHP-302HTXL	LAHP-432HTXL	LAHP-492HTXL	LAHP-602HTXL	LAHP-752HTXL	LAHP-852HTXL
A	mm	1000	1000	1500	1500	2000	2000	2000
B	mm	800	800	800	1000	1000	1000	1000
C	mm	800	800	800	1000	1000	1000	1000
D	mm	800	800	800	1000	1000	1000	2000
E	mm	3000	3000	3000	3000	5000	5000	5000
F *	mm	350	350	350	350	350	350	350

Legend	Unit	Model					
		LAHP-1002HTXL	LAHP-1202HTXL	LAHP-1454HTXL	LAHP-1654HTXL	LAHP-1854HTXL	LAHP-2154HTXL
A	mm	2000	2000	2000	2000	2000	2000
B	mm	1000	1000	1000	1000	1000	1000
C	mm	1000	1000	1500	1500	1500	1500
D	mm	2000	2000	2000	2000	2000	2000
E	mm	5000	5000	5000	5000	5000	5000
F *	mm	350	350	350	350	350	350

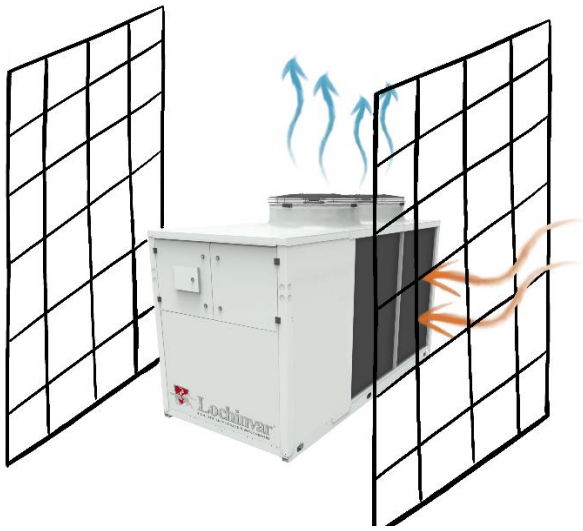
Table 2.2 Airflow clearances required for a single unit model 242-2154HTXL version (see table 4 for multiple units).

*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

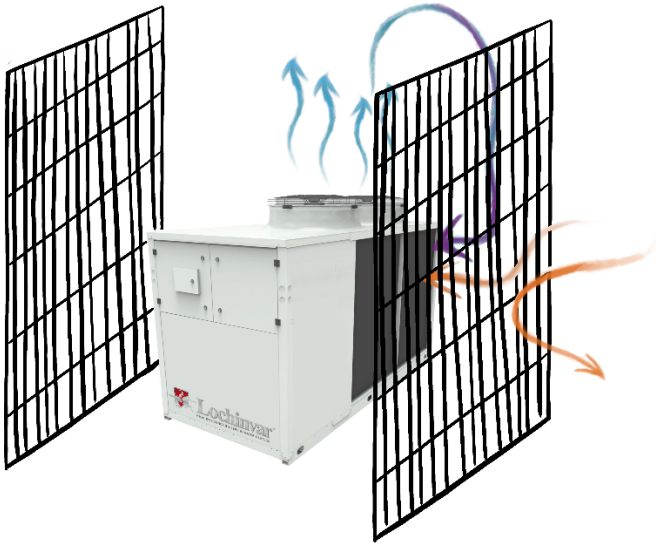


Drawing 3 Airflow clearances required, see table 2

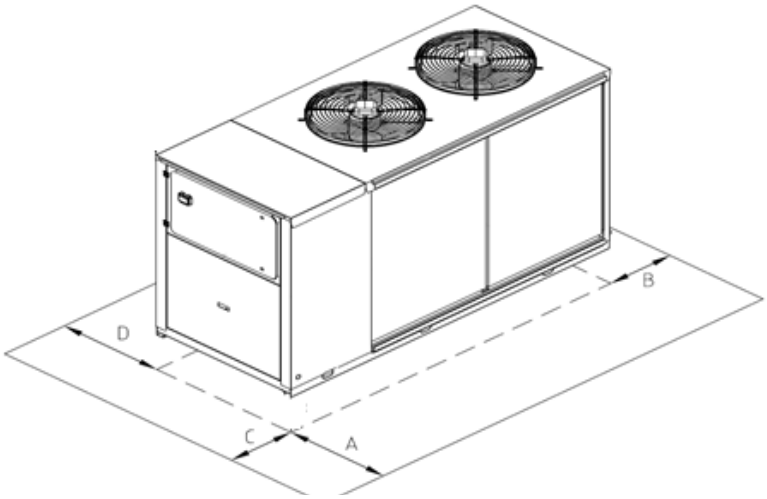
Fencing or an acoustic shroud can be fitted around Amicus units, these must comply with the minimum service clearances shown in table 3 or must be removable for service access. The fence must allow enough airflow as required for the unit to be installed and can be found in the technical submittal for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

When using fencing or an acoustic shield sufficient clearances must be maintained to allow access to all the panels for service and maintenance work on all sides of 1000mm. (These do not override the airflow clearances)

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 3.1 Clearances for Multiple units sited together, models 242-2154 HTS version use with drawings 7 to 11.

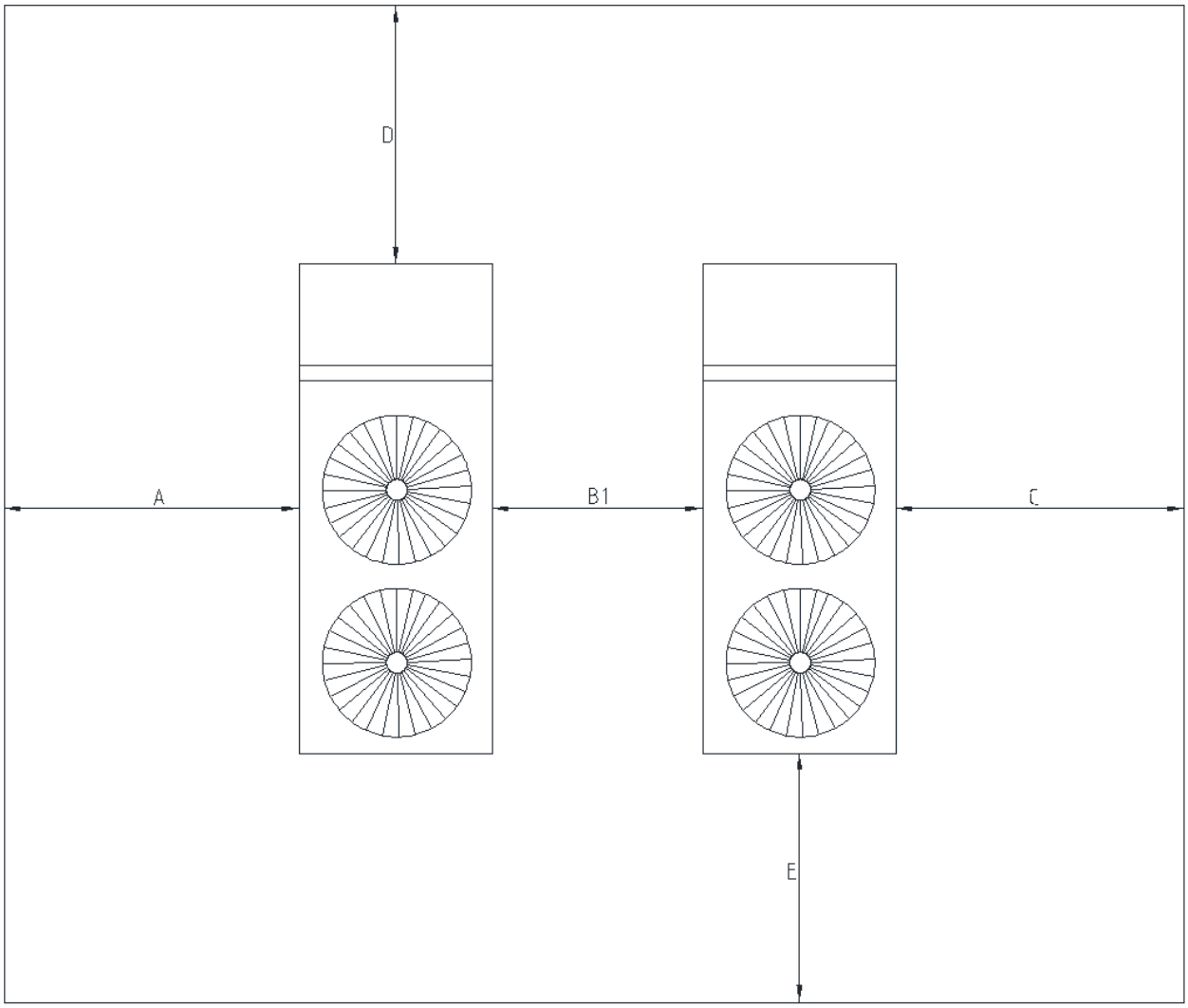
Legend	Unit	Model						
		LAHP-252HTS	LAHP-302HTS	LAHP-452HTS	LAHP-502HTS	LAHP-602HTS	LAHP-752HTS	LAHP-852HTS
A	mm	1000	1000	1500	1500	2000	2000	2000
B	mm	800	800	1000	1000	1000	1000	1000
B1	mm	1500	1500	2250	2250	3000	3000	3000
C	mm	800	800	1000	1000	1000	1000	1000
D	mm	800	800	1000	1000	1000	1000	1000
E	mm	800	800	1000	1000	1000	1000	1000

Legend	Unit	Model					
		LAHP-1002HTS	LAHP-1202HTS	LAHP-1454HTS	LAHP-1654HTS	LAHP-1854HTS	LAHP-2154HTS
A	mm	2000	2000	2000	2000	2000	2000
B	mm	1000	1000	1000	1000	1000	1000
B1	mm	3000	3000	3000	3000	3000	3000
C	mm	1000	1000	2000	2000	2000	2000
D	mm	1000	1000	1000	1000	1000	1000
E	mm	1000	1000	1000	1000	1000	1000

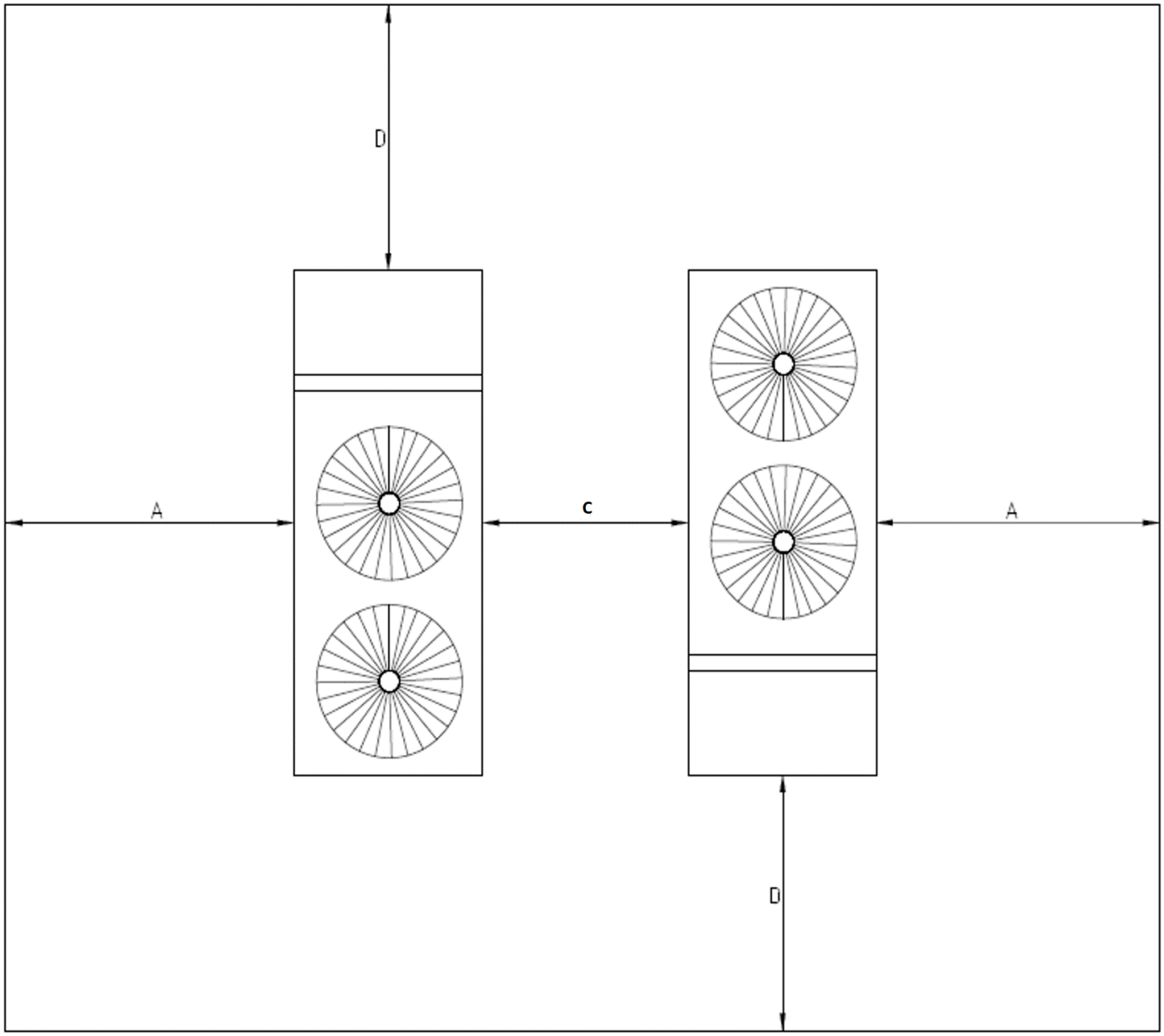
Table 3.2 Clearances for Multiple units sited together, models 242-2154 HTXL version use with drawings 7 to 11.

Legend	Unit	Model						
		LAHP-252HTXL	LAHP-302HTXL	LAHP-452HTXL	LAHP-502HTXL	LAHP-602HTXL	LAHP-752HTXL	LAHP-852HTXL
A	mm	1000	1000	1500	1500	2000	2000	2000
B	mm	800	800	1000	1000	1000	1000	1000
B1	mm	1500	1500	2250	2250	3000	3000	3000
C	mm	800	800	1000	1000	1000	1000	2000
D	mm	800	800	1000	1000	1000	1000	1000
E	mm	800	800	1000	1000	1000	1000	1000

Legend	Unit	Model					
		LAHP-1002HTXL	LAHP-1202HTXL	LAHP-1454HTXL	LAHP-1654HTXL	LAHP-1854HTXL	LAHP-2154HTXL
A	mm	2000	2000	2000	2000	2000	2000
B	mm	1000	1000	1000	1000	1000	1000
B1	mm	3000	3000	3000	3000	3000	3000
C	mm	2000	2000	2000	2000	2000	2000
D	mm	1000	1000	1000	1000	1000	1000
E	mm	1000	1000	1000	1000	1000	1000

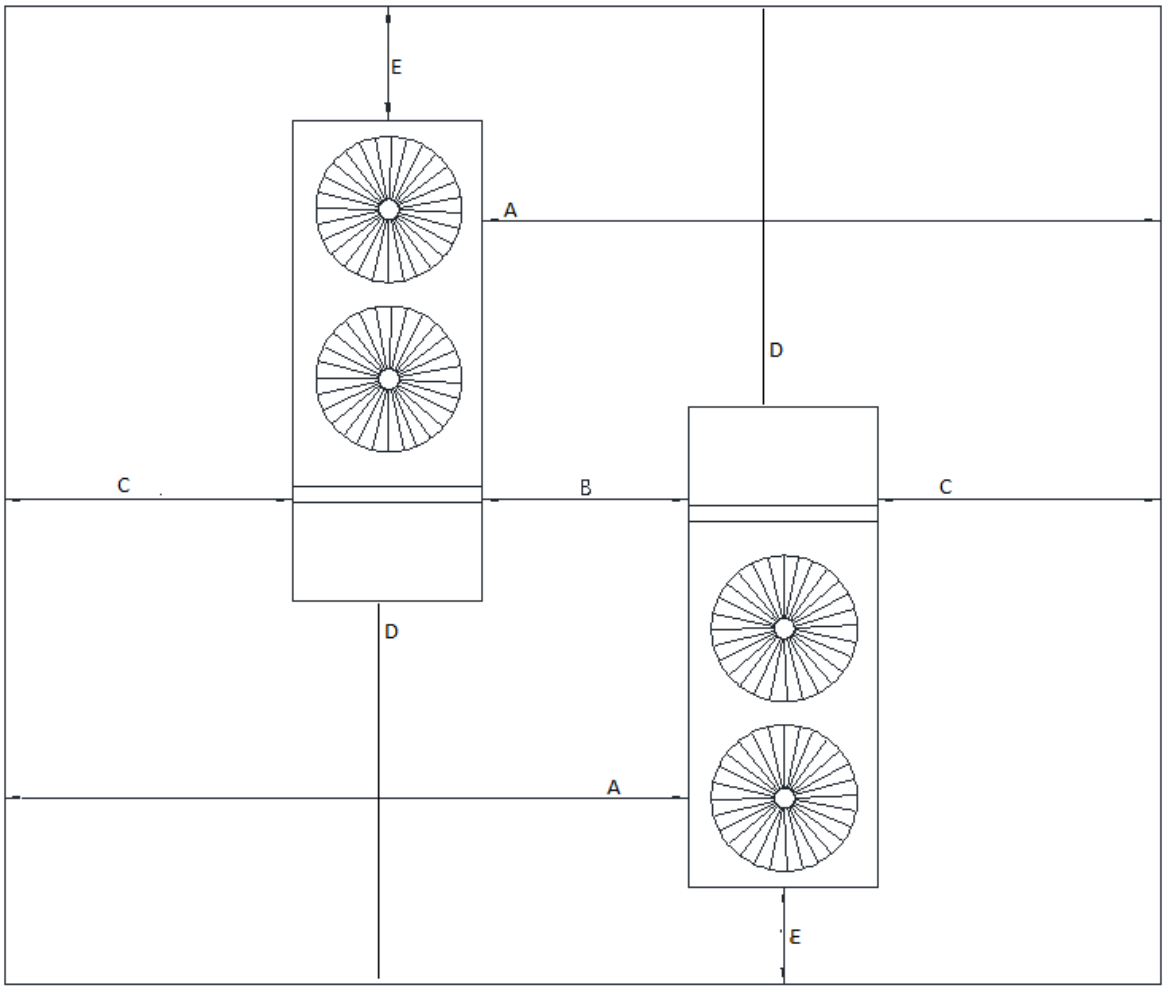


Drawing 7, Units sited side by side facing the same way all models

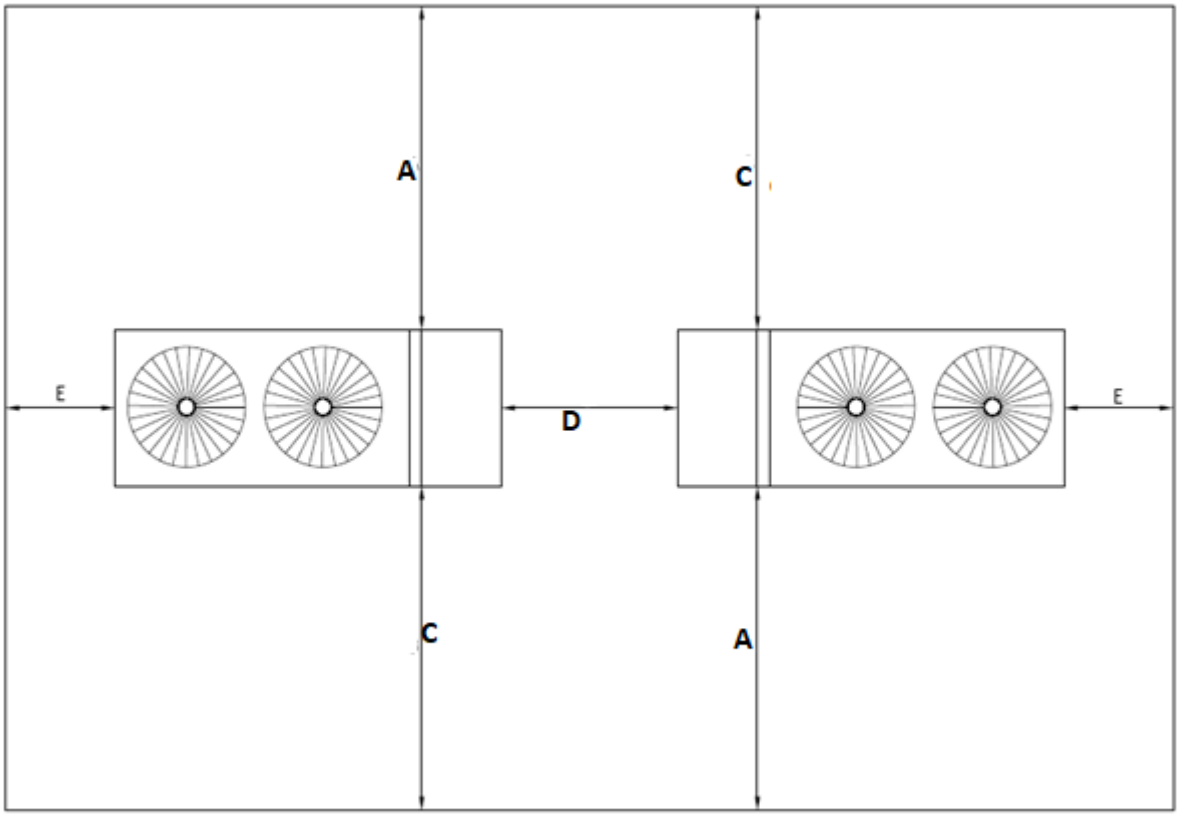


Drawing 8, Units sited side by side facing opposite directions. Useful when using Some models as they only have the evaporartor on one side. Can only be used with the following models:

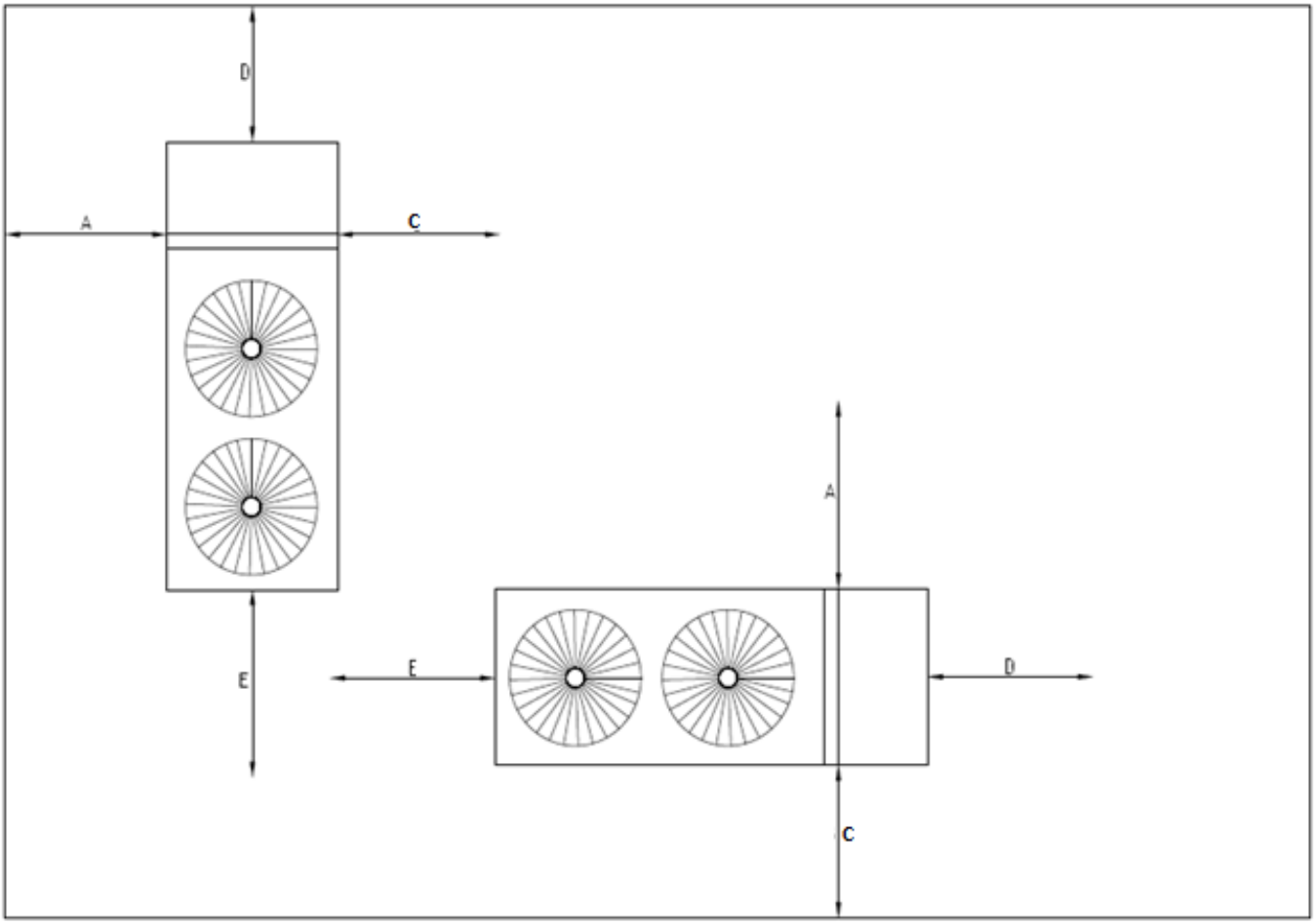
LAHP-252HTS	**LAHP-252HTXL**
LAHP-302HTS	**LAHP-302HTXL**
LAHP-452HTS	**LAHP-452HTXL**
LAHP-502HTS	**LAHP-502HTXL**
LAHP-602HTS	**LAHP-602HTXL**
LAHP-752HTS	**LAHP-752HTXL**
LAHP-852HTS	
LAHP-1002HTS	
LAHP-1202HTS	



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



Drawing 10,Units sited facing each other



Drawing 11, units placed in a corner

Sound power data

Table 4.1 Sound power levels for standard HTS units

model	octave bands (hz)								lw		lp
	63	125	250	500	1k	2k	4k	8k			
	db	db	db	db	db	db	db	db	db	db	db
252HTS	91.1	82.3	76.2	74.7	73.6	68.2	64.8	55.7	91.9	82	50
302HTS	91.1	82.3	76.2	74.7	73.6	68.2	64.8	55.7	91.9	83	51
432HTS	92.1	83.3	77.2	75.7	74.6	69.2	65.8	56.7	92.9	84	52
492HTS	93.1	84.3	79.2	76.7	75.6	70.2	66.8	57.7	93.9	84	52
602HTS	93.1	84.3	79.2	76.7	75.6	70.2	66.8	57.7	93.9	83	51
752HTS	93.1	84.3	79.2	76.7	75.6	70.2	66.8	57.7	93.9	84	52
852HTS	93.1	84.3	79.2	76.7	75.6	70.2	66.8	57.7	93.9	84	52
1002HTS	93.1	84.3	79.2	76.7	75.6	70.2	66.8	57.7	93.9	84	52
1202HTS	93.1	84.3	79.2	76.7	75.6	70.2	66.8	57.7	93.9	87	55
1454HTS	100.1	91.3	85.2	83.7	82.6	77.2	73.8	64.7	100.9	88	56
1654HTS	100.1	91.3	85.2	83.7	82.6	77.2	73.8	64.7	100.9	89	57
1854HTS	101.1	92.3	86.2	84.7	83.6	78.2	74.8	65.7	101.9	88	56
2154HTS	102.1	93.3	87.2	85.7	84.6	79.2	75.8	66.7	102.9	89	57

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

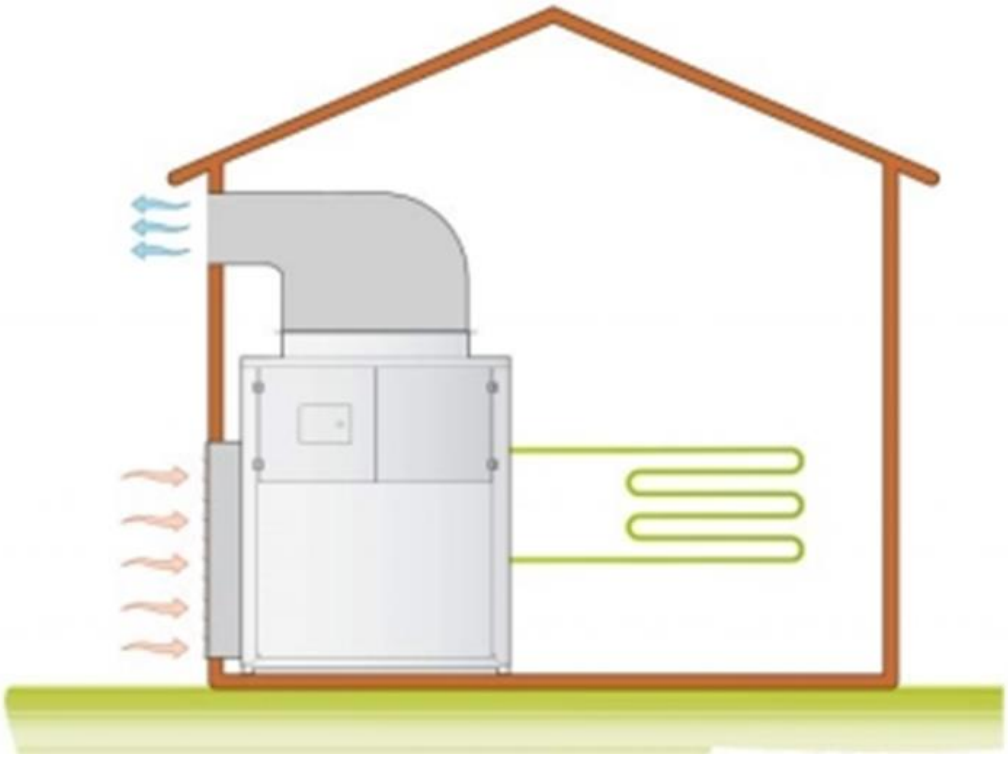
Table 4.2 Sound power levels for standard HTXL units with floating frame fitted

model	octave bands (hz)								lw		lp
	63	125	250	500	1k	2k	4k	8k			
	db	db	db	db	db	db	db	db	db	db	db
252HTXL	83.1	74.3	68.2	66.7	65.6	60.2	56.8	47.7	83.9	70	42
302HTXL	83.1	74.3	68.2	66.7	65.6	60.2	56.8	47.7	83.9	70	42
432HTXL	85.1	76.3	70.2	68.7	67.6	62.2	58.8	49.7	85.9	72	44
492HTXL	85.1	76.3	70.2	68.7	67.6	62.2	58.8	49.7	85.9	72	44
602HTXL	87.1	78.3	72.2	70.7	69.6	64.2	60.8	51.7	87.9	74	46
752HTXL	87.1	78.3	72.2	70.7	69.6	64.2	60.8	51.7	87.9	74	46
852HTXL	87.1	78.3	72.2	70.7	69.6	64.2	60.8	51.7	87.9	74	46
1002HTXL	88.1	79.3	73.2	71.7	70.6	65.2	61.8	52.7	88.9	75	43
1202HTXL	88.1	79.3	73.2	71.7	70.6	65.2	61.8	52.7	88.9	75	43
1454HTXL	92.1	83.3	77.2	75.7	74.6	69.2	65.8	56.7	92.9	79	47
1654HTXL	92.1	83.3	77.2	75.7	74.6	69.2	65.8	56.7	92.9	79	47
1854HTXL	93.1	84.3	78.2	76.7	75.6	70.2	66.8	57.7	93.9	80	48
2154HTXL	93.1	84.3	78.2	76.7	75.6	70.2	66.8	57.7	93.9	80	48

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.



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.

Design flow rates
Design flow rates can be found on the heat pump individual Technical Product Submittal available from https://lochinvar.ltd.uk/amicus-air-source-heat-pumps/

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.

Minimum water content required.
Minimum water content can be found on the heat pump individual Technical Product Submittal available from https://lochinvar.ltd.uk/amicus-air-source-heat-pumps/

Lochinvar will offer a suitably 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-602HT units may only require 800litres.

DHW Supply

Amicus HT can supply low temperature hot water at up to 63C 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 60-61C. Generally, DHW is provided by a specially designed Lochinvar 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. See drawing 13

Electrical Connections

All models require a 3-phase supply with standard electrical requirements as per table 7

Table 5.1 electrical requirements for standard HTS versions.

Data	Unit	Model						
		LAHP-242HTS	LAHP-292HTS	LAHP-432HTS	LAHP-492HTS	LAHP-592HTS	LAHP-752HTS	LAHP-852HTS
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Maximum input power	kW	11.8	14.6	21.1	24.6	28.9	33.5	38.9
Maximum input current standard unit	A	21	24.6	36.9	42.1	47.1	56.9	69.9
Peak input current standard unit	A	63.3	83.8	122	152	144	171	211
Peak input current unit with soft start option fitted	A	42	55	74	82	88	112	139
Fuse rating (delayed)	A	32	40	100	100	100	100	125

Data	Unit	Model					
		LAHP-1002HTS	LAHP-1202HTS	LAHP-1454HTS	LAHP-1654HTS	LAHP-1854HTS	LAHP-2154HTS
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Maximum input power	kW	36	36	70	80	76	94
Maximum input current standard unit	A	70	80	120	146	148	166
Peak input current standard unit	A	211	216	234	288	289	316
Peak input current unit with soft start option fitted	A	141	147	178	218	219	241
Fuse rating (delayed)	A	160	200	200	200	200	200

Table 5.2 electrical requirements for HTXL low noise versions

Data	Unit	Model						
		LAHP-252HTXL	LAHP-302HTXL	LAHP-432HTXL	LAHP-492HTXL	LAHP-602HTXL	LAHP-752HTXL	LAHP-852HTXL
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Maximum input power	kW	11.7	14.5	20.7	24.3	28.5	33.2	39.3
Maximum input current standard unit	A	22	25.6	35.9	41.1	46	56	71.9
Peak input current standard unit	A	64.3	84.8	121	150	143	170	213
Peak input current unit with soft start option fitted	A	44	57	72	80	94	114	143
Fuse rating (delayed)	A	32	40	100	100	100	100	125

Data	Unit	Model					
		LAHP-1002HTXL	LAHP-1202HTXL	LAHP-1454HTXL	LAHP-1654HTXL	LAHP-1854HTXL	LAHP-2154HTXL
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Maximum input power	kW	41.3	47.3	67.7	78.5	85.1	94.7
Maximum input current standard unit	A	72.9	83.7	117	144	152	169
Peak input current standard unit	A	214	214	231	285	293	300
Peak input current unit with soft start option fitted	A	143	143	171	211	217	238
Fuse rating (delayed)	A	160	200	200	200	200	200

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

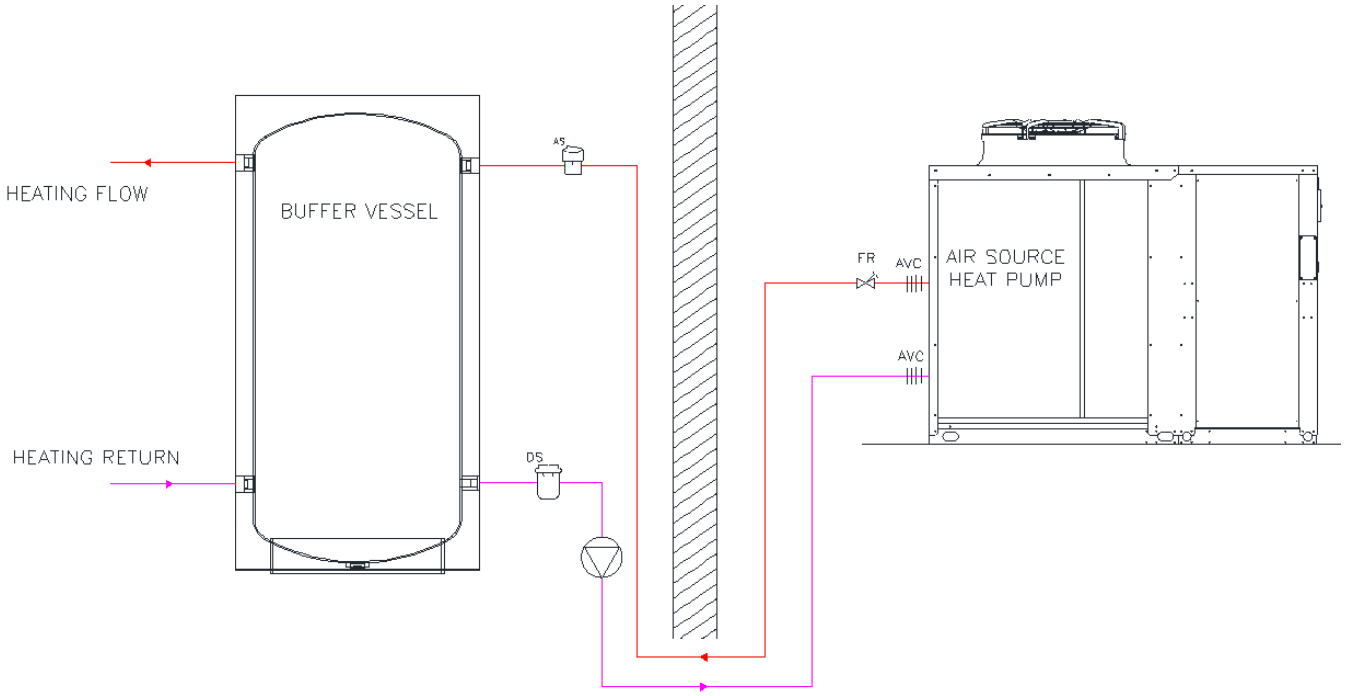
Standard electrical connections	
Connection	**Note**
BTI sensor	Monitor's temperature in the buffer vessel
BTs sensor	Monitor's temperature in the DHW vessel
Primary pump	Either integrated as part of Hydraulic kit or fitted within the plantroom
DHW Primary pump	Fitted between the heat pump plate and 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

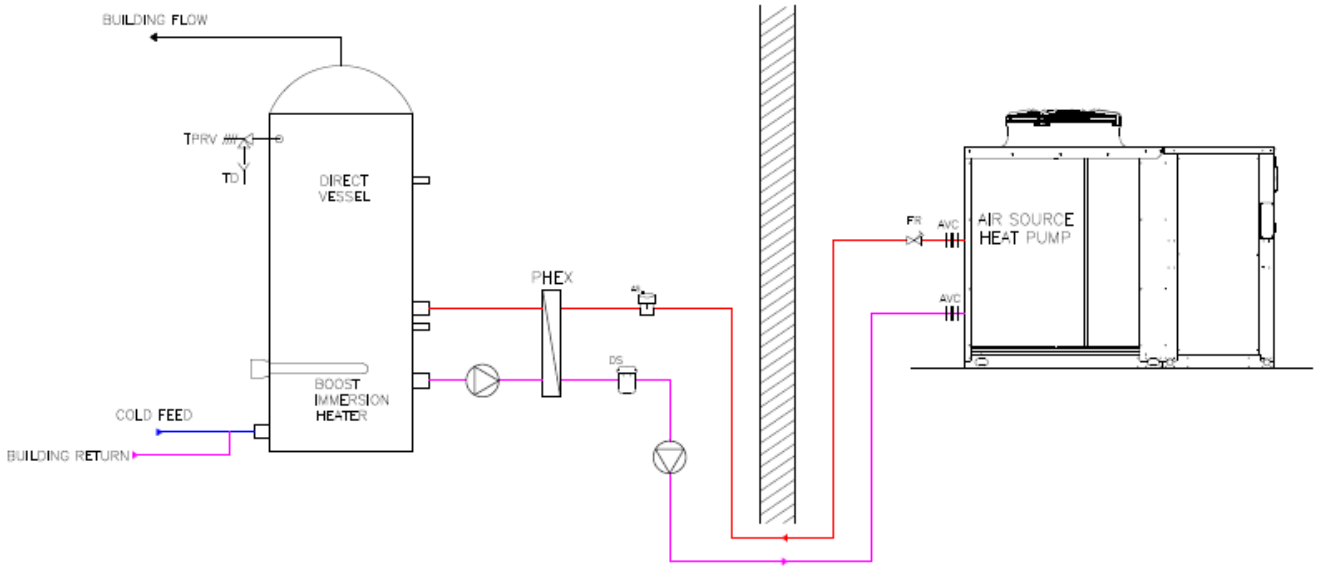
1. Cascade control, this will be supplied as standard on projects with more than one heat pump.
2. Soft start, this reduces the peak Amps at start-up as shown in table 8.1 and 8.2.

Standard installation schematics

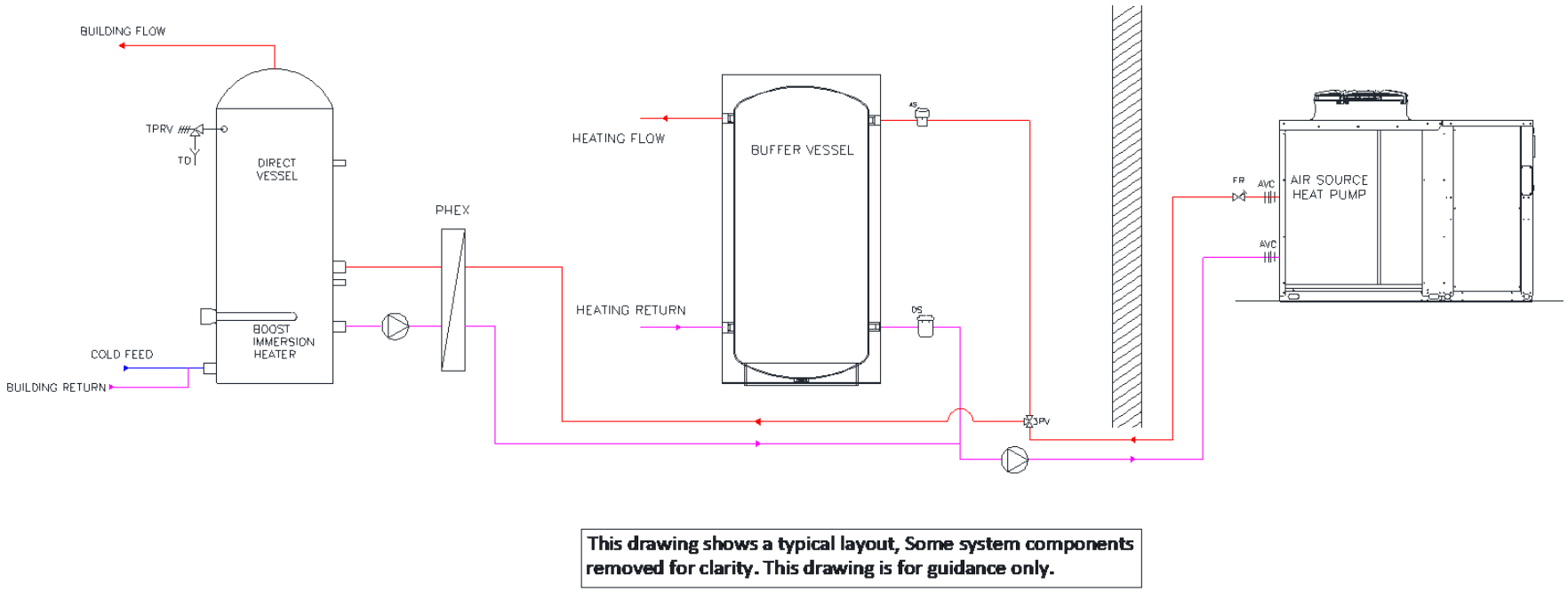
This section contains various standard schematics showing the concept installation options for the Amicus range. These drawings must not be used for detailed design but can be built upon by the design team to produce their own installations drawings. Lochinvar does not provide detailed installation drawings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



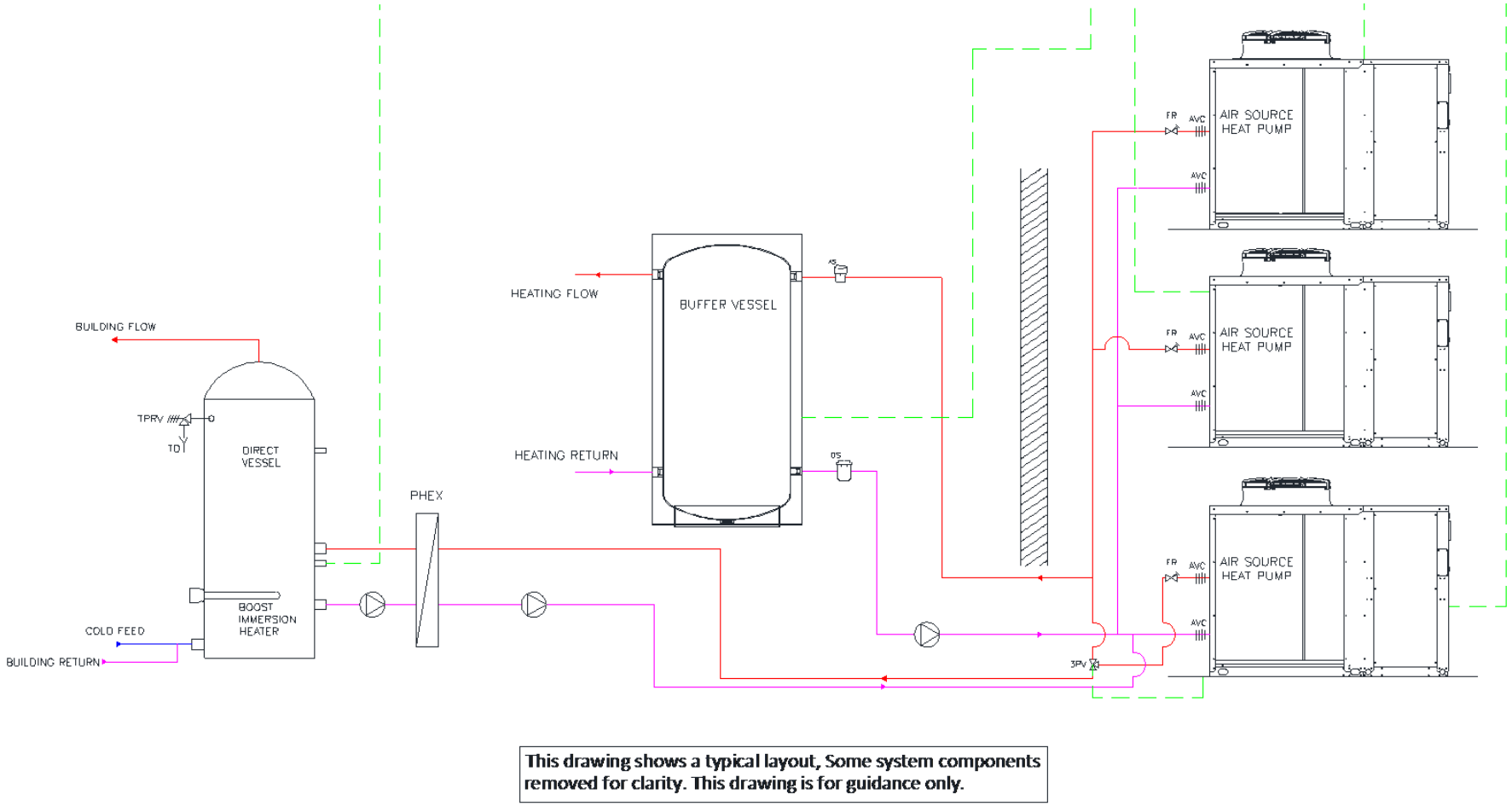
Drawing 12, Amicus unit supplying heating buffer



Drawing 13, Amicus unit supplying domestic hot water only



Drawing 14, Amicus unit supplying heating and domestic hot water with domestic hot water priority



Drawing 15, Amicus unit supplying heating and domestic hot water. Domestic hot water as a zone

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.

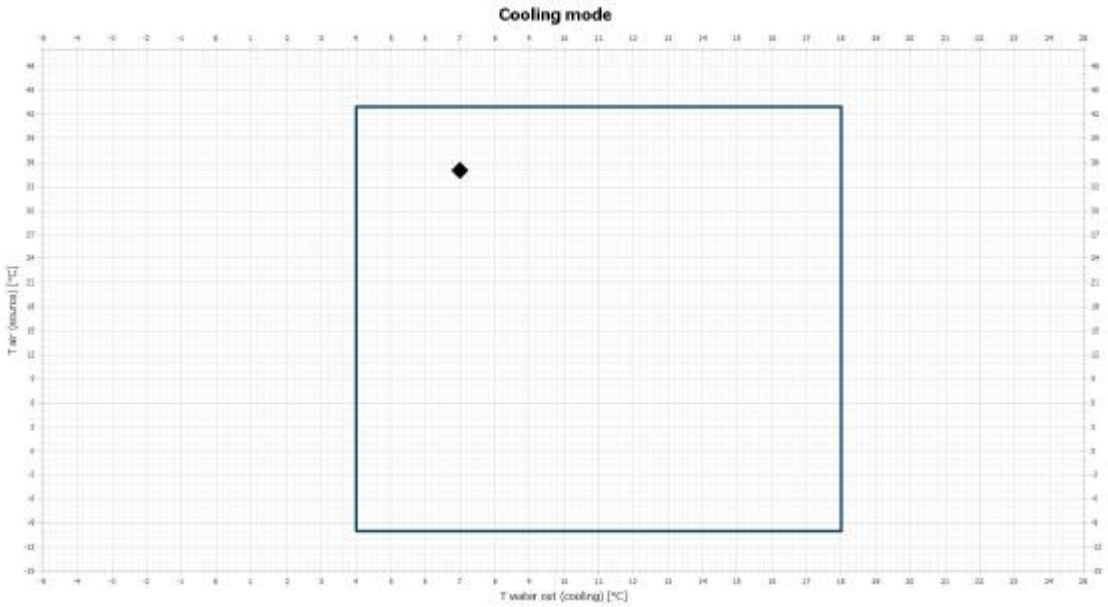
Cooling

Both standard and low noise versions 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/

Operational limits

Amicus high temperature heat pumps can provide cooling even with external air temperatures of 40°C thanks to the use of E.V.I. 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.



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