R290
Natural refrigerant

AMICUS ALTUS

HIGH TEMPERATURE AIR SOURCE HEAT PUMP

INSTALLATION PLANNING GUIDE

KEY FEATURES

- Ultra low GWP heat pump utilising R290 refrigerant
- High operating temperature, up to 75°C
- Fully cascadable with outputs up to 1120kW
- Suitable for heating, cooling, heat recovery and domestic hot water production
- Able to operate in heating mode down to -20°C external air temperature
- Modular system
- Available in 2- and 4-pipe versions
- BMS compatible

Lochinvar®

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Lochinvar - customer-focused, solutions-driven

Lochinvar is a specialist provider of water heating and cooling solutions with over 50 years of experience working closely with contractors, specifiers, consultants and end-users. Our products and solutions have evolved as market expectations and customer demands have changed.

- Heat Pumps
- Vessels
- Water Heaters
- System Ancillaries
- Boilers
- Dedicated Support
- Solar
- Onsite Assistance

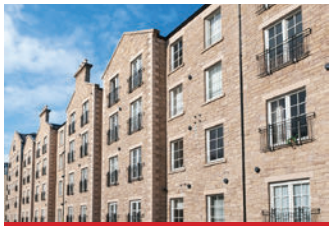
Our Sectors

Lochinvar water heating and cooling systems have been used in a wide variety of commercial and industrial applications; our sectors include:

Public Sector

Industrial

Hotels



Housing

Agriculture

Leisure

Retail

Case studies

BUPA Richmond Villages

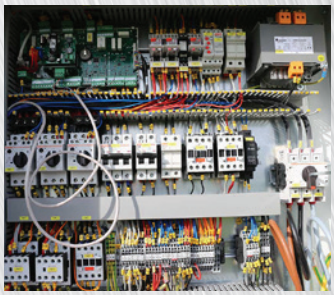
Richmond Villages Willaston, part of the BUPA Group, recently undertook a significant renovation project focused on improving the energy performance and sustainability of its heating system. As a leading residential care home, the facility required a dependable and energy-efficient solution to maintain comfort for residents while supporting the organisation's wider decarbonisation goals.

3 x Amicus Altus R290 Air-Source Heat Pump
1 x LBT storage tank

Metal Components Facility

This metal components facility has built with sustainability in mind, both for environmental reasons and long-term cost savings. When the heating system for the office and one of the two factory halls needed replacement, the Amicus Altus heat pump was selected due to it's high operating temperatures and low-GWP R290 refrigerant.

1 x Amicus Altus R290 Air-Source Heat Pump
1 x LBT storage tank of 1,000 ltr, custom-designed to meet specific client requirements
1 x Control cabinet including a PLC (Programmable Logic Controller)



BUPA's Wykebeck Court Care Home

Lochinvar collaborated with installer Hawley Building Services to deliver a sustainable and efficient replacement water heating solution for BUPA's Wykebeck Court Care Home in Leeds. This partnership ensured the care home's hot water system was upgraded to align with modern sustainability and decarbonisation goals.

6 x Amicus Altus R290 Air-Source Heat Pump

See ***www.lochinvar.ltd.uk/projects*** for more details

Lochinvar
Amicus Altus Heat Pump Range

Amicus Altus are very high temperature air to water heat pumps available in two pipe or four pipe configuration, both versions can supply heating/cooling and domestic hot water. The units are capable of supplying hot water at up to 75˚C.

There are 4 models available:
- Two pipe reversible heating and cooling
- Two pipe reversible heating and cooling with a low noise fan option
- Four pipe simultaneous cooling with heating and heat recovery
- Four pipe simultaneous cooling with heating and heat recovery with a low noise fan option

R290 Natural refrigerant

The units utilise R290, PFAS Free, Hydrocarbon refrigerant which has a Global warning potential (GWP) of only 3 (compared to R410A at 2088 & R454C at 148) it also has an Ozone depletion factor (ODP) of zero and can achieve temperatures up to 75˚C, making them especially useful for use in supplying domestic hot water or when replacing gas boilers.

Frame

All units have a strong compact structure with the base and frame made in high-thickness galvanized steel elements assembled with stainless steel rivets. The base is designed in order to allow the unit to be forked and handled by standard lifting devices.

Refrigerant circuit

The refrigerant utilised is R290. The refrigerant circuit is sealed from the rest of the unit. Internally, it also contains a refrigerant leakage sensor.

User heat exchanger

The heat exchanger is stainless steel “single circuit” plate type, thermally insulated by a flexible closed-cell insulating mat of high thickness and UV-resistant. The evaporator is also equipped with a safety flow switch on the water flow side that does not allow the unit to operate if there is a lack of water in the heat exchanger.

Compressors

The compressors, specially designed to operate with R290, are scroll type with orbiting spirals, optimized for heat pump operating mode and high compression ratios. They are installed in tandem or trio configuration, mounted on rubber dampers, and equipped with direct-start engines cooled by the suctioned refrigerant gas. They are also fitted with built-in thermistor protection with manual reset, which safeguards them from overloads. The crankcase oil sump, PAG type, is equipped with a heating resistor. The compressors terminal block has an IP54 protection rating. Activation and deactivation of the compressors are controlled by the on-board microprocessor, which regulates the thermos-cooling power delivered. The electrical board is equipped also with a inrush counter, an electromechanical device recording the total inrush starts of compressors.

Fans

With external rotor directly coupled to a three-phase electronically commutated motor (EC) they have the possibility of a continuous regulation of the speed by means of a 0-10v signal completely managed by the microprocessor. Aluminium blades with wings profile are suitably designed to avoid any turbulence in the air detachment zone, granting in this way the max efficiency with the minimum noise level. The fan is equipped with galvanized steel protection grid painted after construction. The fan motors are of totally closed type and have got a protection factor IP54 and protection winding-flooded thermostat. Thanks to a more accurate adjustment of air flow, they allow operation of the unit with external temperature down to -20°C.

Electrical Board

The electrical board is designed in accordance with EN 61439-1 and EN 60204-1 standards. It contains all the control system components, those required for starting units, and the magneto thermal protection of the electric motors, which are connected and tested at the factory. The electrical board has a watertight structure, equipped with IP54 cable glands. Inside the electrical board, there are also installed all the power and control components. It includes the microprocessor electronic card with keyboard and display for the visualization of the various functions, main disconnecting switch with the door lock, insulation transformer for auxiliary circuit supply, magneto thermic protection for compressors and fans, fuses for auxiliary circuit devices, terminals for cumulative alarms and remote ON/OFF. It also comprises a terminal block for spring-type control circuits and the possibility of enabling communication with the BMS management systems. Additionally, there is also a phase monitor that controls the correct sequence and/or any failure of one of the three power phases, interrupting the unit's operation if necessary.

Refrigerant gas detection sensor

The unit is equipped with a R290 leakage sensor inside the compressor compartment. This sensor continuously monitors the surrounding air and triggers an alarm if the refrigerant concentration exceeds the defined threshold, indicating a possible leak. The sensor is connected to a control unit located in the electrical panel, which manages its operation. In the unlikely event of a leak, all units will automatically shut down. An emergency fan, running continuously, will extract the refrigerant from the compressor compartment and discharge it safely into the open air.

Standard features

To ensure the heat pump operates effectively in the UK climate, certain ancillaries are fitted as standard.

- **Refrigerant gas R290**
  Refrigerant gas charge R290, calculated to ensure proper operation of the unit.
- **Double safety valve**
  A double safety valve is installed on the changeover valves to allow maintenance or the replacement of one of them without stopping the entire unit.
- **Crane lifting hooks**
  Side brackets firmly fixed to the basement to allow the unit to be lifted with hooks and cables (to be removed before proceeding with the placement of modules in the case of a modular system)
- **Pressure gauges**
  These enable the standing charge and the operating pressures to be monitored
- **Anti-freeze resistance on evaporator**
  Electric heater on the evaporator with anti-freeze function and equipped with an independent thermostat.
- **Heating cable on internal water pipes**
  The electric heaters are wrapped around the water pipes of the unit. They are provided with an anti-freeze function and equipped with an autonomous thermostat.
- **RS 485 Interface card**
  Electronic card to be connected to the microprocessor to allow connection of the units to supervision systems, for a remote control and monitoring of the unit.
- **Anti-vibration mounts**
  Bell-type anti-vibration mounts for unit isolation from the supporting base. They are made of galvanized iron base and bell rubber compound.
- **Pipework header kit**
  Kit consisting of water collectors (6” diameter) ball valves, support brackets, and all the necessary for the hydraulic connection between the unit and the collectors.
- **Victaulic cap + socket kit**
  Kit consisting of Victaulic caps, sockets, and couplings necessary for sealing one end of the water collector and for connecting the other end to the user circuit.

Optional ancillaries

- **Coastal protection**
- **Cascade control with remote connect**
- **Remote display**
- **Soft starter**
- **Matched thermal stores**
- **Matched domestic hot water plates**
- **Domestic hot water storage vessels**

Model numbers

The Amicus Altus range will be supplied in a cascade of up to 10 heat pumps, cascade item numbers are in the table below.

Model (tandem)	Number in cascade	Model (Trio)	Number in cascade
LAHP-65HTR290	1	**LAHP-85HTR290**	1
LAHP-130HTR290	2	**LAHP-170HTR290**	2
LAHP-195HTR290	3	**LAHP-255HTR290**	3
LAHP-260HTR290	4	**LAHP-340HTR290**	4
LAHP-325HTR290	5	**LAHP-425HTR290**	5
LAHP-390HTR290	6	**LAHP-510HTR290**	6
LAHP-455HTR290	7	**LAHP-595HTR290**	7
LAHP-520HTR290	8	**LAHP-680HTR290**	8
LAHP-585HTR290	9	**LAHP-765HTR290**	9
LAHP-650HTR290	10	**LAHP-850HTR290**	10

Each model includes:

- Amicus Altus very high temperature air source heat pump (s)
- Refrigerant gas R290
- Double safety valve
- Crane lifting hooks
- Forklift points
- Pressure gauge
- Anti-freeze kit
- RS458 interface card
- Anti-vibration dampers
- Pipework header kit
- Blanks for header kit
- And on models 130/170 and above

LAHP-88HTR290 and LAHP-112HTR290 are the base units without any of the ancillaries option above included. As an example LAHP-65HTR290 is a BOM as per the below:

- LAHP-88HTR290
- Refrigerant gas R290
- Double safety valve
- Crane lifting hooks
- Forklift points
- Pressure gauge
- Anti-freeze kit
- RS458 interface card
- Anti-vibration dampers
- Pipework header kit
- Blanks for header kit

Ancillary equipment available

- Buffer vessels
- DHW plates and storage vessels
- Imperium™ control
- Boost and backup immersion heaters
- Pressurisation units
- Gas fired boiler and water heaters

Which model

The Amicus Altus range is available in several versions as show below. The version required will depend on what the heat pump is serving and where the heat pump is to be sited. First, we need to decide which version of the heat pump we need.

Space heating/cooling or Domestic hot water only – 2 pipe

The standard 2 pipe model should be used, there are optimized in heating mode to achieve a high efficiency even in poor ambient conditions, they can operate at flow temperatures up to 75°C and in external air down to -20°C.

Heating or Domestic hot water and cooling simultaneously – 4 Pipe

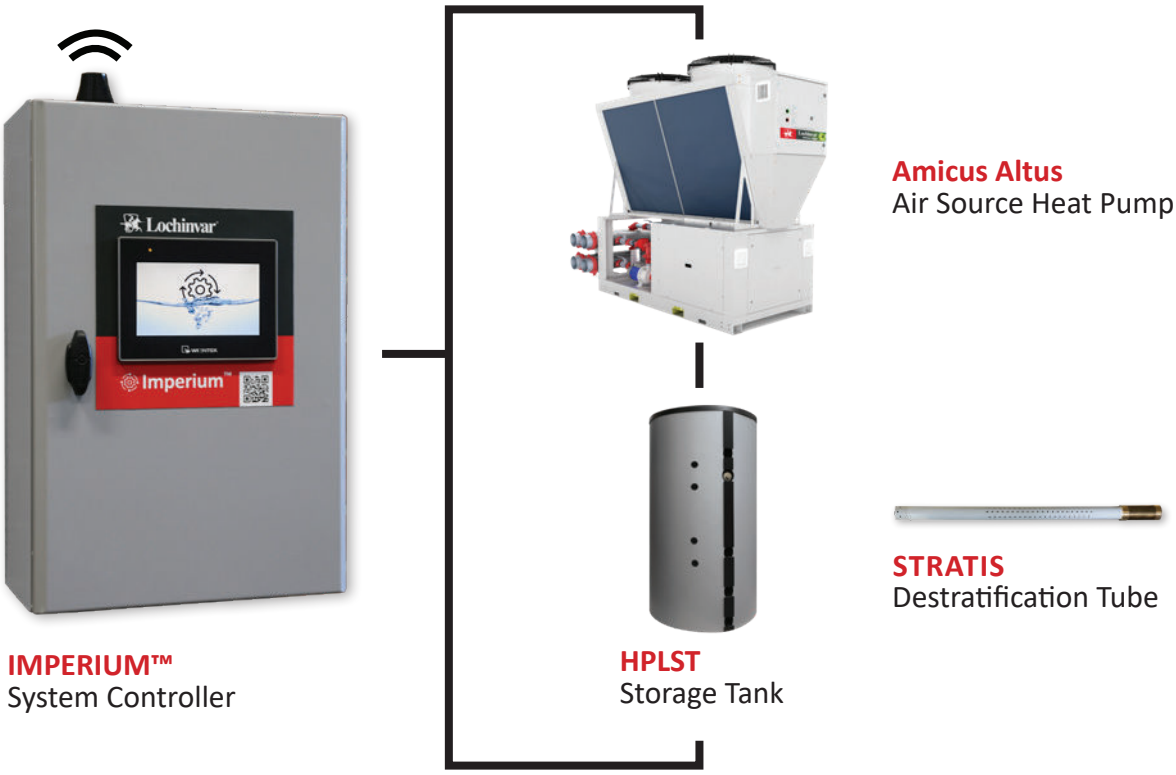
When there is a requirement for both heating or domestic hot water and cooling simultaneously such as where a data centre is present or in large buildings with a north-south split then the 4 pipe version should be chosen, the physical dimensions of the unit do not change.

Imperium™ Solution

Designed from the ground up by our in-house engineering team to maximise the performance of our Amicus Altus R290 Heat Pumps. The Imperium™ solution delivers exceptional system performance without the need to re-program BMS systems. Imperium™ can operate without the need for a BMS system at all, all while offering essential data monitoring via the cloud.

The Imperium™ controller represents a breakthrough in heat pump system efficiency and operation. Imperium™ enables our complete, packaged solution to deliver optimal performance when working together. This innovative paring along with our Stratis, destratification tube and our new HPLST storage tanks are designed to simplify system integration, improve efficiency and reduce costs for customers.

The Imperium™ controller boosts system efficiency and performance by integrating all components. With the Stratis pipe, it simplifies integration and cuts costs. It supports both one-pass and multi-pass modes for tailored installations.



IMPERIUM™
System Controller

Amicus Altus
Air Source Heat Pump

HPLST
Storage Tank

STRATIS
Destratification Tube

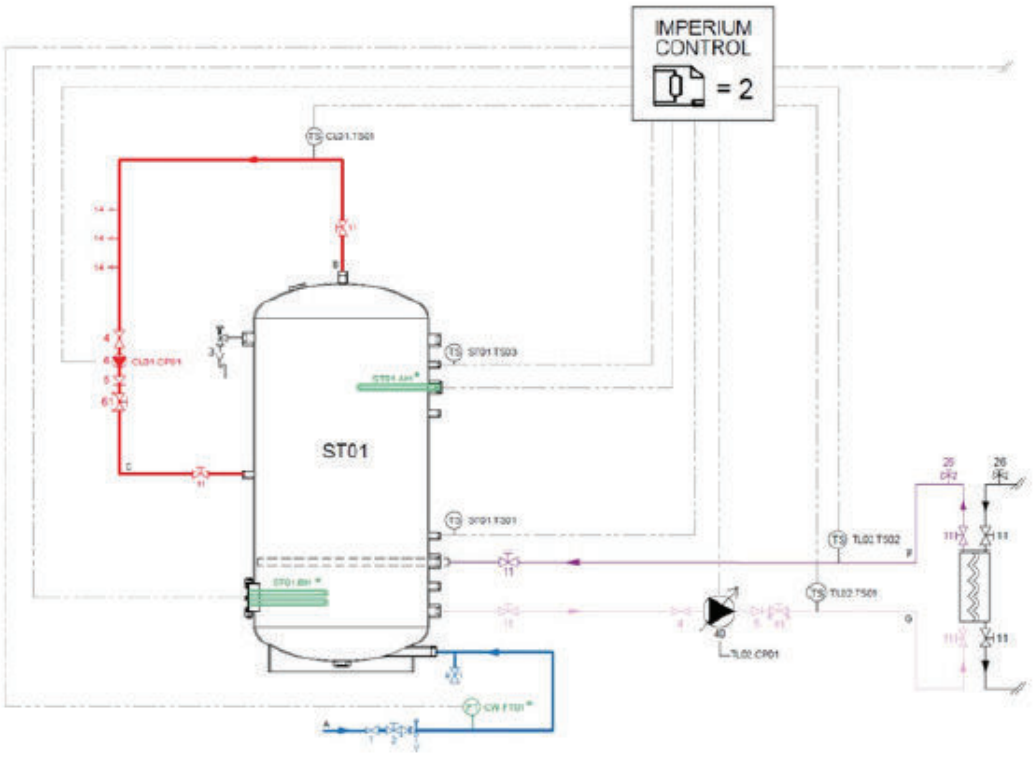
Watch the Video

Features

- Combines one-pass and multi pass in one system
- Intelligent switching for optimal performance
- Simplifies system
- High hot water capacity during peaks
- Cloud-based insights and control

Multi-pass systems

Heat pump connected directly to plate exchanger. No thermal store. Cold water entering tank is heated in steps by multiple passes through the exchanger until setpoint is reached.
Typical increase per pass: 3 to 8K.



Pros

- Higher theoretical efficiency due to smaller temp lift
- Easier to reach 60˚C at tank bottom (with stratification tube)

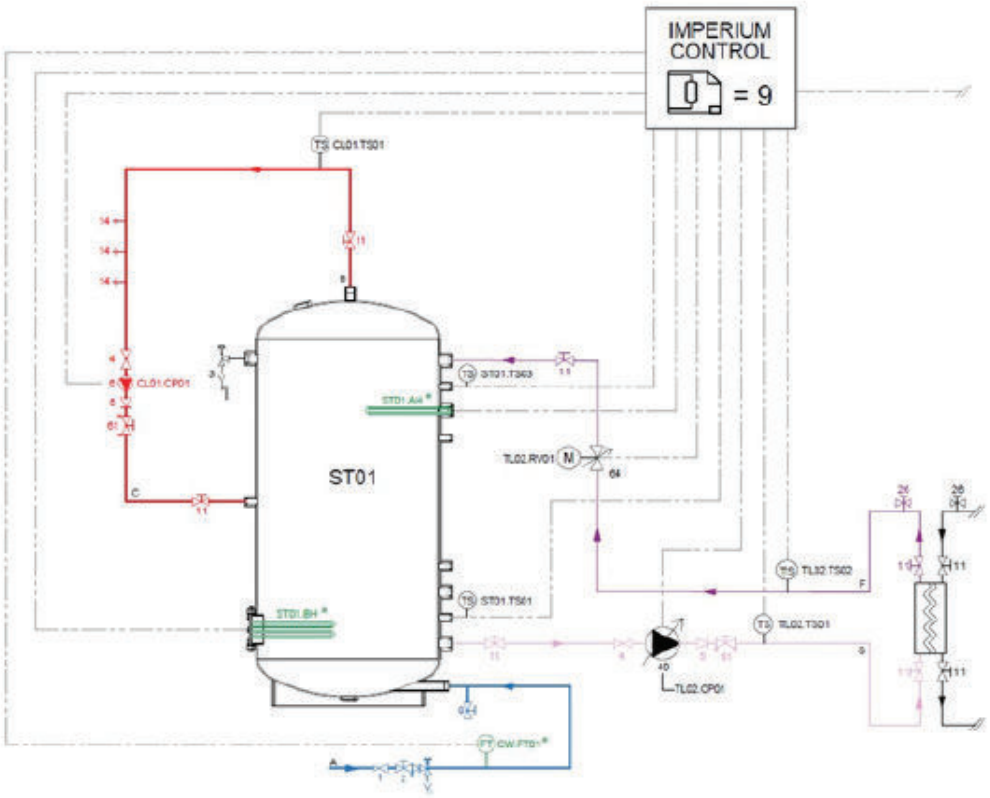
Cons

- Heat pump capacity not available for peak demand—requires large storage
- No stratification tube results in homogenized tank temp, reducing efficiency
- Temp drop during peak as storage runs out

Watch the Video

One-pass systems

Heat pump connected directly to plate exchanger. No thermal store. Cold water is heated in one step and outlet is fed into the top of the tank. Typical increase: 50 to 60K.



Pros

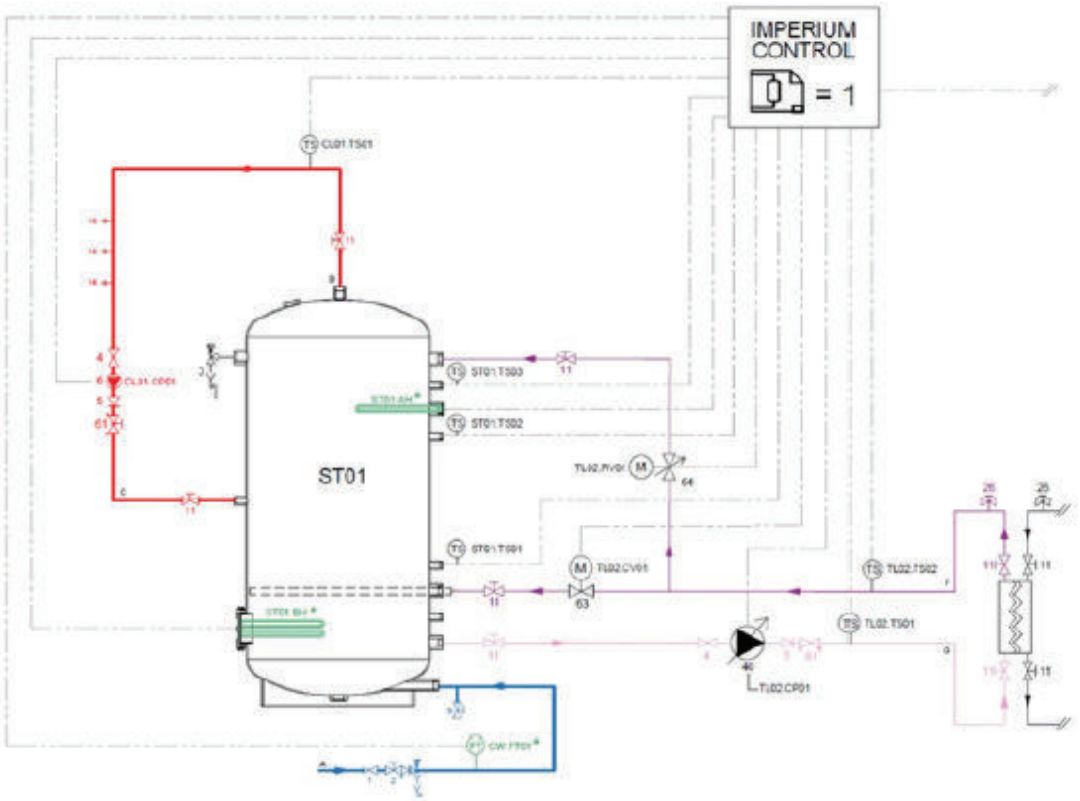
- Heat pump capacity available for peak demand
- Smaller storage volumes required
- Stable tank outlet temperature
- Quick recovery for tank outlet and loop
- Stratified tank setup without stratification tube

Cons

- Lower efficiency due to high temp lift
- Difficult to reach 60˚C at tank bottom

One-pass / Multi-pass switching

Uses one-pass for peaks and multi-pass for regular operation.



Pros

- Combines benefits of both
- Less storage volume needed—saves space and cost
- Quick outlet temp recovery and stable temperatures
- Efficient system recovery (especially with stratification tube)
- Guaranteed 60˚C at tank bottom with stratification tube

Cons

- Less efficient during peak

One-pass or Multi-pass?

Switching

Our Imperium™ system comprises of our all new Imperium system controller and our Altus R290 air source heat pumps. The system benefits from brand new supporting accessories such as our Stratis, destratification tube and our new HPLST storage tanks.

The Imperium™ system optimises DHW by switching between top (one-pass) and bottom (multipass) heating depending on demand. Primary tank is heated from the top during peaks, while secondary tanks heat gradually from the bottom for efficiency.

ONE-PASS

- Heats water directly to outlet temperature
- Heat pump contributes directly to delivery
- Allows smaller tanks
- Fast outlet temperature recovery

MULTI-PASS

- Gradual, consistent heating
- Optimised HP efficiency

COMPATIBLE PRODUCTS

- Amicus Altus R290
- HPLST tank
- LBT buffer tank
- Stratis

SYSTEM SIMPLIFICATION

With Imperium™, buffer tanks aren't needed for DHW, heat transfers directly to the DHW tank, reducing complexity and costs.

Intelligent switching for optimal performance
Seamless switching ensures peak system performance with cost-effectiveness

BENEFITS

- Complete solution
- Better efficiency
- Remote real-time monitoring
- Cost savings
- User-friendly interface
- Easy installation
- Remote support

CLOUD BASED INSIGHTS & CONTROL

- Real-time monitoring of system components
- View system and temperature data remotely
- Receive fault alerts and email notifications
- Optional: Monitor water use, track return temperature, measure pressure

Technical data tables

		Model			
		LAHP-88HTR290	LAHP-88HTR290-LNF	LAHP-112HTR290	LAHP-112HTR290-LNF
Heating data					
Heating capacity (EN14511)[1]	kW	88.9	88.9	112	111
Total power input (EN14511)[1]	kW	22.2	22.2	33.7	29.2
COP (EN14511)[1]	W/W	4	4	3.32	3.8
Nominal flow rate	m^3/h	15.43	15.43	19.37	18.74
Pressure drop across the heat pump	kPa	43.6	43.6	45.4	44.2
Static pressure available from the pump	kPa	48.7	48.7	78.5	79.8
Design air flow rate	m^3/h	32480	32480	47600	30950
EcoDesign data[2]					
SCOP low temperature 35°C		3.87	3.87	3.55	4.29
Seasonal efficiency low temperature 35°C	%	152	152	139	169
SCOP medium temperature 55°C		3.21	3.21	2.97	3.51
Seasonal efficiency medium temperature 55°C	%	125	125	116	137
Cooling Data					
Cooling capacity (EN14511)[3]	kW	66.3	66.3	89.2	86.4
Total power input (EN14511)[3]	kW	26.4	26.4	39.8	38.4
EER (EN14511)[3]	W/W	2.51	2.51	2.24	2.25
Nominal flow rate	m^3/h	11.36	11.36	17.07	16.26
Pressure drop across the heat pump	kPa	27.4	27.4	32.4	30.7
Design air flow rate	m^3/h	35390	35390	45710	29100
General data					
Refrigerant type		R290	R290	R290	R290
Refrigerant charge	Kg	6.1	6.1	8.1	8.1
Compressor type		Scroll	Scroll	Scroll	Scroll
Number of compressors		2	2	3	3
Number of circuits		1	1	1	1
Capacity steps		2	2	3	3
Minimum capacity step	%	50	50	33.3	33.3
Sound power level	dB(A)	86.5	81.5	89.5	82.3
Sound pressure level (10m)	dB(A)	54.6	49.5	58	50
Minimum water content in the user circuit	litre	900	900	1200	1200
Shipping weight	Kg	835	835	1025	1025
Electrical Data					
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50
Maximum input power	kW	44	44	66.9	66.9
Maximum input current standard unit	A (per phase)	79.2	79.2	113	113
Peak input current standard unit	A (per phase)	231	231	276	276

1) external air +7C 30/35 flow
2) average conditions according to EU/811/2013
3) Cooling external air +35˚C 12/7 flow

Sound Power data

Model	Octave bands (hz)								Lw	Lp1	Lp10
	63	125	250	500	1K	2K	4K	8K	dB(A)	dB(A)	dB(A)
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)			
LAHP-88HTR290	43	51	69	76	79	84	76	63	86.5	68.3	54.6
LAHP-88HTR290-LNF	72	72	71	76	76	72	66	56	81.5	63.2	49.5
LAHP-112HTR290	57	70	77	83	85	84	76	66	89.5	71.2	57.6
LAHP-112HTR290-LNF	54	60	71	79	78	73	67	56	82.3	64.1	50.4
LAHP-88HTR290-RV	43	51	69	76	79	84	76	63	86.5	68.3	54.6
LAHP-88HTR290-RV-LNF	72	72	71	76	76	72	66	56	81.5	63.2	49.5
LAHP-88HTR290-4P	43	51	69	76	79	84	76	63	86.5	68.3	54.6
LAHP-88HTR290-4P-LNF	72	72	71	76	76	72	66	56	81.5	63.2	49.5
LAHP-112HTR290-4P	57	70	77	83	85	84	76	66	89.5	71.2	57.6
LAHP-112HTR290-4P-LNF	54	60	71	79	78	73	67	56	82.3	64.1	50.4

88HTR290		
Number of modules	Lw	Lp10
	db(A)	db(A)
1	86.5	54.6
2	87.3	55.3
3	89.1	56.9
4	90.3	58
5	91.3	58.8
6	92.1	59.5
7	92.8	60
8	93.4	60.5
9	93.9	60.9
10	94.3	61.2

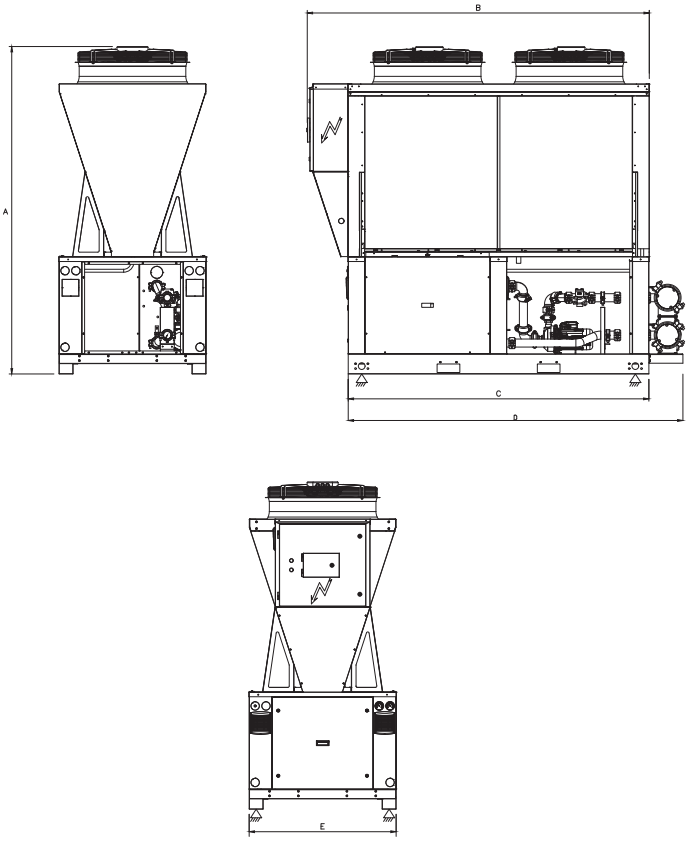
88HTR290-LNF		
Number of modules	Lw	Lp10
	db(A)	db(A)
1	81.5	49.5
2	82.3	50.2
3	84.1	51.9
4	85.3	53
5	86.3	53.8
6	87.1	54.5
7	87.8	55
8	88.3	55.5
9	88.9	55.9
10	89.3	56.2

112HTR290		
Number of modules	Lw	Lp10
	db(A)	db(A)
1	89.5	57.6
2	90.3	58.3
3	92.1	59.9
4	93.3	61
5	94.3	61.8
6	95.1	62.5
7	95.8	63
8	96.4	63.5
9	96.9	63.9
10	97.3	64.2

112HTR290-LNF		
Number of modules	Lw	Lp10
	db(A)	db(A)
1	82.3	50.4
2	83.1	51.1
3	84.9	52.7
4	86.1	53.8
5	87.1	54.6
6	87.9	55.3
7	88.6	55.8
8	89.2	56.3
9	89.7	56.7
10	90.1	57

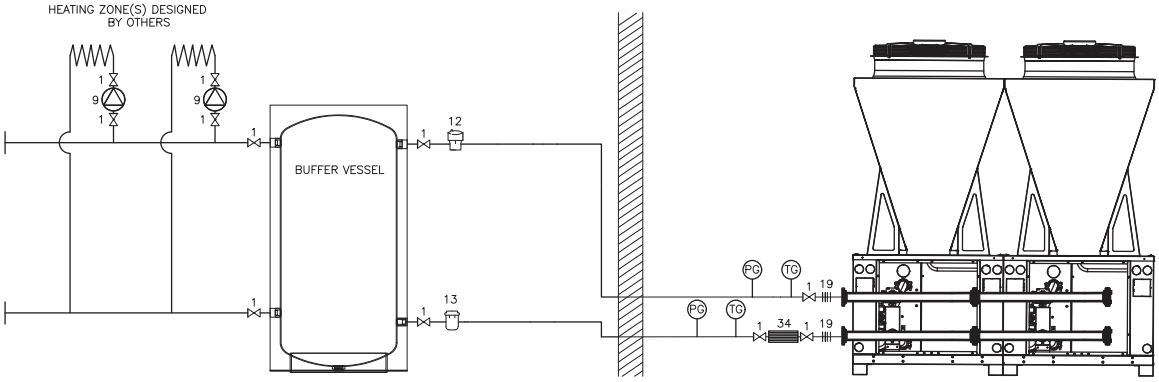
Dimensions

Item	Description	Unit	LAHP-88HTR290 (2 Pipe unit)	LAHP-112HTR290 (2 Pipe unit)
A	Height	mm	2450	2450
B	Length including control box	mm	2560	2560
C	Length of base	mm	2250	2250
D	Length of base including pipework header		2515	2515
E	Width	mm	1100	1100
L	Width of multiple umits	mm	-E* number of units in the cascade	-E* number of units in the cascade
-	Operating width	Kg	840	1035

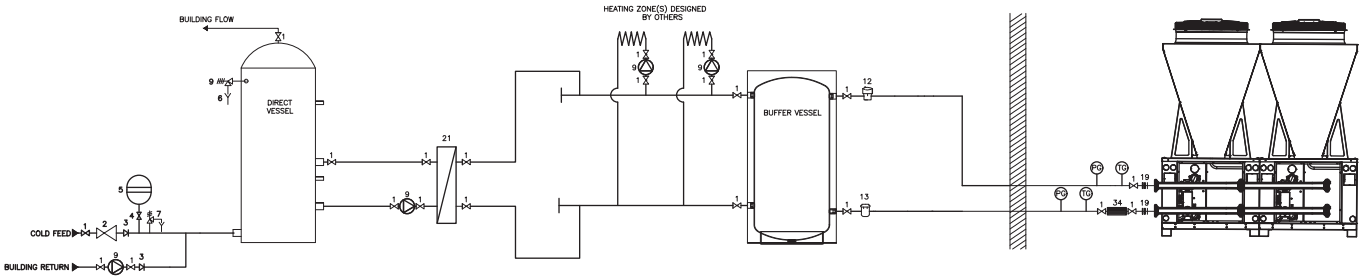


Standard installation schematics

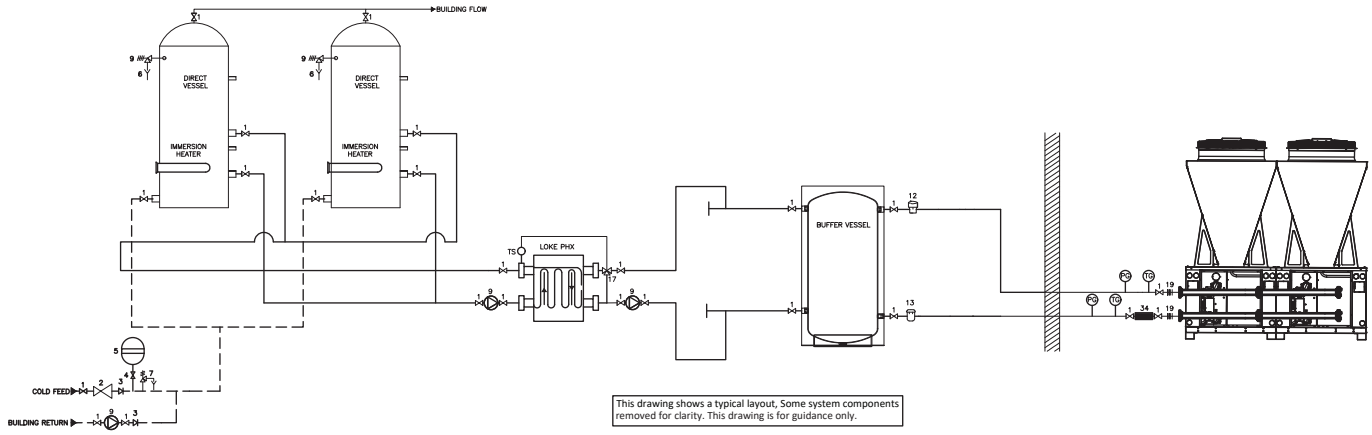
This section contains various standard schematics showing the concept installation options for the Amicus range. These drawings must not be used for detailed design but can be built upon by the design team to produce their own installation drawings.



Heating only



Heating and domestic hot water

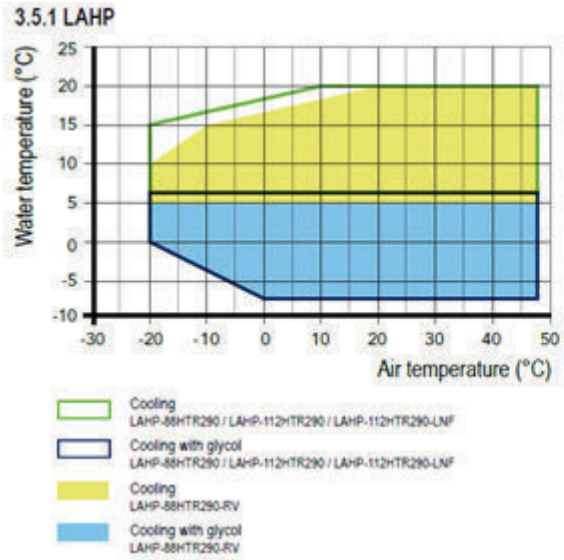


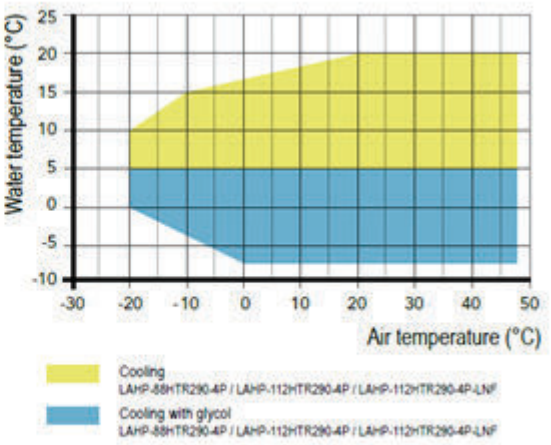
Domestic hot water only

Operational limits

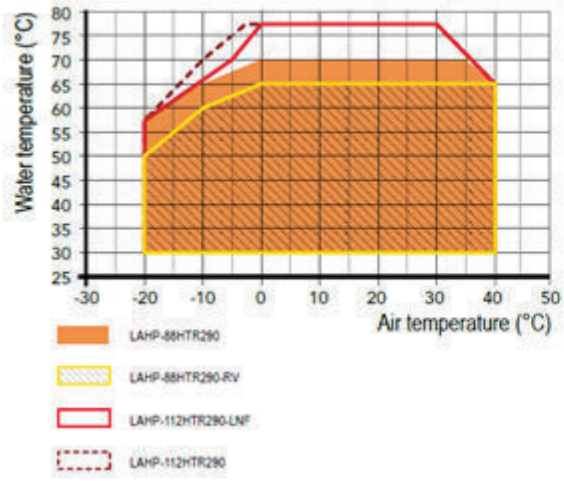
The graphs below show typical operational limits for the Altus range of heat pumps. The below operation limits may vary slightly based on the specific options chosen for your heat pump. Specific operational limits can be supplied for your chosen heat pump.

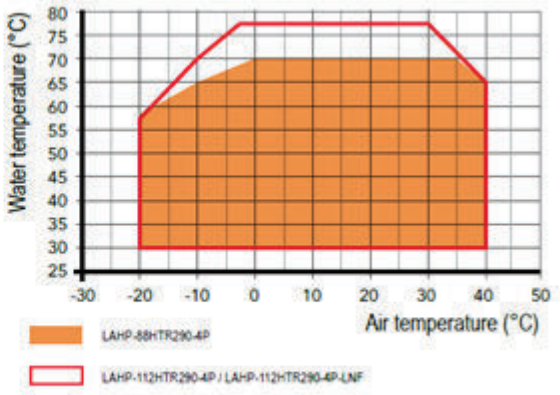
3.5.1 LAHP





3.5.2 LAHP RV





Performance data

LAHP-88HTR290		Heating OUT								Max flow temperature
Water Delivery Temperature		35˚C	40˚C	45˚C	50˚C	55˚C	60˚C	65˚C	70˚C	
-10	Heat output (kW)	52.8	51.9	50.8	49.7	48.7	47.8	47.1	N/A	65˚C
	Efficiency COP	2.37	2.21	2.06	1.92	1.78	1.66	1.55	N/A	
-5	Heat output (kW)	60.5	59.4	58.2	56.9	55.6	54.3	53.2	N/A	65˚C
	Efficiency COP	2.64	2.44	2.27	2.12	1.96	1.81	1.68	N/A	
-4	Heat output (kW)	62.1	61	59.7	58.3	57	55.7	54.5	N/A	65˚C
	Efficiency COP	2.69	2.5	2.32	2.15	1.99	1.84	1.7	N/A	
-3	Heat output (kW)	63.8	62.5	61.3	59.9	58.6	57.2	56	N/A	65˚C
	Efficiency COP	2.75	2.54	2.37	2.19	2.03	1.88	1.74	N/A	
-2	Heat output (kW)	65.7	64.5	63.2	61.9	60.5	59.1	57.7	N/A	65˚C
	Efficiency COP	2.82	2.61	2.42	2.25	2.09	1.93	1.78	N/A	
-1	Heat output (kW)	67.8	66.5	65.2	63.8	62.4	61	59.6	N/A	65˚C
	Efficiency COP	2.9	2.68	2.49	2.3	2.14	1.97	1.82	N/A	
0	Heat output (kW)	69.9	68.6	67.2	65.8	64.2	62.8	61.4	60.1	70˚C
	Efficiency COP	2.99	2.77	2.57	2.39	2.21	2.05	1.89	1.74	
1	Heat output (kW)	71.9	70.5	69.1	67.6	66.1	64.7	63.6	62.4	70˚C
	Efficiency COP	3.1	2.88	2.67	2.48	2.3	2.12	1.96	1.81	
2	Heat output (kW)	73.8	72.6	71.6	70.6	69.6	68.6	67.6	66.6	70˚C
	Efficiency COP	3.21	2.98	2.79	2.6	2.43	2.25	2.09	1.93	
3	Heat output (kW)	77.4	76.5	75.5	75.3	74.1	73.1	72	70.5	70˚C
	Efficiency COP	3.39	3.16	2.95	2.79	2.59	2.4	2.22	2,04	
4	Heat output (kW)	82.4	81.4	80.3	78.5	76.8	75.1	73.5	72	70˚C
	Efficiency COP	3.66	3.39	3.16	2.91	2.69	2.47	2.27	2.08	
5	Heat output (kW)	85.4	83.7	81.9	80.1	78.3	76.6	75	73.5	70˚C
	Efficiency COP	3.81	3.5	3.24	2.98	2.75	2.52	2.31	2.12	
6	Heat output (kW)	87.1	85.4	83.6	81.8	79.9	78.1	76.6	75.1	70˚C
	Efficiency COP	3.91	3.59	3.3	3.05	2.8	2.57	2.36	2.16	
7	Heat output (kW)	88.9	87.1	85.3	83.7	81.8	80	78.3	76.6	70˚C
	Efficiency COP	4	3.68	3.38	3.12	2.87	2.63	2.41	2.2	
20	Heat output (kW)	114	111	108	106	103	100	97.5	95.1	70˚C
	Efficiency COP	5.07	4.59	4.17	3.83	3.48	3.14	2.86	2.6	
21	Heat output (kW)	115	113	110	107	104	101	98.6	96.1	70˚C
	Efficiency COP	5.11	4.67	4.23	3.85	3.5	3.18	2.88	2.62	
22	Heat output (kW)	117	114	111	108	105	103	99.8	97.2	70˚C
	Efficiency COP	5.18	4.69	4.27	3.87	3.52	3.23	2.91	2.63	
23	Heat output (kW)	118	115	113	110	107	104	101	98.1	70˚C
	Efficiency COP	5.2	4.71	4.33	3.93	3.58	3.24	2.94	2.65	
24	Heat output (kW)	120	117	114	111	108	105	102	99	70˚C
	Efficiency COP	5.29	4.8	4.35	3.96	3.6	3.26	2.96	2.67	
25	Heat output (kW)	121	118	115	112	109	106	103	99.8	70˚C
	Efficiency COP	5.31	4.82	4.37	3.99	3.62	3.28	2.98	2.68	

LAHP-88HTR290-LNF		Heating OUT								Max flow temperature
Water Delivery Temperature		35˚C	40˚C	45˚C	50˚C	55˚C	60˚C	65˚C	70˚C	
-10	Heat output (kW)	52.8	51.8	50.8	49.8	48.7	47.8	47.1	N/A	65˚C
	Efficiency COP	2.37	2.2	2.06	1.92	1.78	1.66	1.55	N/A	
	Input power (kW)	22.3	23.5	24.7	25.9	27.3	28.8	30.4	N/A	
-5	Heat output (kW)	60.5	59.4	58.2	56.9	55.6	54.3	53.2	N/A	65˚C
	Efficiency COP	2.63	2.44	2.27	2.12	1.96	1.81	1.68	N/A	
	Input power (kW)	23	24.3	25.6	26.9	28.4	30	31.7	N/A	
-4	Heat output (kW)	62.1	61	59.7	58.4	57	55.7	54.5	N/A	65˚C
	Efficiency COP	2.69	2.5	2.31	2.15	1.99	1.84	1.7	N/A	
	Input power (kW)	23.1	24.4	25.8	27.1	28.6	30.2	32	N/A	
-3	Heat output (kW)	63.8	62.6	61.3	59.9	58.6	57.2	56	N/A	65˚C
	Efficiency COP	2.75	2.54	2.37	2.19	2.03	1.88	1.74	N/A	
	Input power (kW)	23.2	24.6	25.9	27.3	28.8	30.4	32.2	N/A	
-2	Heat output (kW)	65.7	64.5	63.2	61.9	60.5	59.1	57.7	N/A	65˚C
	Efficiency COP	2.82	2.61	2.42	2.25	2.09	1.93	1.78	N/A	
	Input power (kW)	23.3	24.7	26.1	27.5	29	30.7	32.5	N/A	
-1	Heat output (kW)	67.8	66.5	65.2	63.9	62.4	61	59.6	N/A	65˚C
	Efficiency COP	2.89	2.68	2.49	2.31	2.14	1.97	1.82	N/A	
	Input power (kW)	23.5	24.8	26.2	27.7	29.2	30.9	32.7	N/A	
0	Heat output (kW)	69.9	68.6	67.2	65.8	64.3	62.8	61.4	60.1	70˚C
	Efficiency COP	2.99	2.77	2.57	2.39	2.22	2.05	1.89	1.74	
	Input power (kW)	23.4	24.8	26.1	27.5	29.00	30.7	32.5	34.60	
1	Heat output (kW)	71.9	70.5	69.1	67.6	66.1	64.7	63.6	62.4	70˚C
	Efficiency COP	3.1	2.88	2.67	2.48	2.3	2.12	1.96	1.81	
	Input power (kW)	23.2	24.5	25.9	27.3	28.8	30.5	32.4	34.5	
2	Heat output (kW)	73.8	72.6	71.6	70.6	69.6	68.6	67.6	66.6	70˚C
	Efficiency COP	3.21	2.98	2.79	2.6	2.43	2.26	2.09	1.93	
	Input power (kW)	23	24.4	25.7	27.2	28.7	30.4	32.4	34.5	
3	Heat output (kW)	77.4	76.5	75.5	75.3	74.1	73.1	72	70.5	70˚C
	Efficiency COP	3.39	3.16	2.95	2.79	2.59	2.4	2.22	2.04	
	Input power (kW)	22.8	24.2	25.6	27	28.6	30.4	32.4	34.6	
4	Heat output (kW)	82.4	81.4	80.3	78.6	76.8	75.1	73.5	72	70˚C
	Efficiency COP	3.66	3.39	3.16	2.92	2.69	2.47	2.27	2.08	
	Input power (kW)	22.5	24	25.4	26.9	28.6	30.4	32.4	34.6	
5	Heat output (kW)	85.4	83.7	81.9	80.1	78.3	76.6	75	73.5	70˚C
	Efficiency COP	3.81	3.5	3.24	2.98	2.75	2.52	2.31	2.12	
	Input power (kW)	22.4	23.9	25.3	26.9	28.5	30.4	32.4	34.6	
6	Heat output (kW)	87.1	85.4	83.6	81.7	79.9	78.1	76.6	75.1	70˚C
	Efficiency COP	3.91	3.59	3.3	3.05	2.8	2.57	2.36	2.16	
	Input power (kW)	22.3	23.80	25.3	26.8	28.5	30.4	32.4	34.7	
7	Heat output (kW)	88.9	87.1	85.3	83.7	81.8	80	78.2	76.6	70˚C
	Efficiency COP	4	3.68	3.38	3.12	2.87	2.63	2.41	2.2	
	Input power (kW)	22.2	23.7	25.2	26.8	28.5	30.4	32.4	34.8	
20	Heat output (kW)	114	111	108	106	103	100	97.5	95.1	70˚C
	Efficiency COP	5.07	4.61	4.17	3.83	3.48	3.15	2.87	2.6	
	Input power (kW)	22.5	24.1	25.9	27.7	29.6	31.7	34	36.6	
21	Heat output (kW)	115	113	110	107	104	101	98.6	96.1	70˚C
	Efficiency COP	5.11	4.67	4.23	3.85	3.5	3.18	2.88	2.62	
	Input power (kW)	22.5	24.2	26	27.8	29.7	31.8	34.2	36.7	
22	Heat output (kW)	117	114	111	108	105	103	99.8	97.2	70˚C
	Efficiency COP	5.18	4.69	4.27	3.87	3.52	3.23	2.91	2.63	
	Input power (kW)	22.6	24.3	26	27.9	29.8	31.9	34.3	36.9	
23	Heat output (kW)	118	115	113	110	107	104	101	98.1	70˚C
	Efficiency COP	5.2	4.71	4.33	3.93	3.58	3.24	2.94	2.65	
	Input power (kW)	22.7	24.4	26.1	28	29.9	32.1	34.4	37	
24	Heat output (kW)	120	117	114	111	108	105	102	99	70˚C
	Efficiency COP	5.29	4.8	4.35	3.96	3.6	3.26	2.96	2.67	
	Input power (kW)	22.7	24.4	26.2	28	30	32.2	34.5	37.1	
25	Heat output (kW)	121	118	115	112	109	106	103	99.7	70˚C
	Efficiency COP	5.31	4.82	4.37	3.99	3.62	3.29	2.98	2.68	
	Input power (kW)	22.8	24.5	26.3	28.1	30.1	32.2	34.6	37.2	

Performance data

LAHP-112HTR290		Heating OUT									Max flow temperature
Water Delivery Temperature		35˚C	40˚C	45˚C	50˚C	55˚C	60˚C	65˚C	70˚C	75˚C	
-10	Heat output (kW)	67.4	66.9	66.8	66.8	67	67.5	68.3	69.5	N/A	70˚C
	Efficiency COP	2.11	1.96	1.82	1.69	1.57	1.46	1.36	1.27	N/A	
	Input power (kW)	31.9	34.2	36.7	39.6	42.8	46.3	50.3	54.8	N/A	
-5	Heat output (kW)	76.1	75.4	74.8	74.4	74.2	74.3	74.6	75.2	76.0	75˚C
	Efficiency COP	2.34	2.17	2.01	1.86	1.71	1.59	1.47	1.36	1.27	
	Input power (kW)	32.5	34.8	37.3	40.1	43.3	46.8	50.8	55.1	59.9	
-4	Heat output (kW)	78.1	77.3	76.6	76	75.8	75.7	75.9	76.4	77.2	75˚C
	Efficiency COP	2.4	2.21	2.05	1.89	1.75	1.61	1.49	1.38	1.29	
	Input power (kW)	32.6	34.9	37.4	40.3	43.4	46.9	50.9	55.2	60	
-3	Heat output (kW)	80	79.2	78.4	77.7	77.4	77.3	77.3	77.8	78.8	75˚C
	Efficiency COP	2.45	2.26	2.09	1.92	1.78	1.64	1.52	1.41	1.31	
	Input power (kW)	32.7	35	37.5	40.4	43.5	47	50.9	55.3	60.1	
-2	Heat output (kW)	82	81.1	80.2	79.5	79.2	79.1	79.2	79.7	80.6	75˚C
	Efficiency COP	2.49	2.3	2.13	1.96	1.81	1.68	1.55	1.44	1.34	
	Input power (kW)	32.9	35.2	37.7	40.5	43.7	47.2	51.1	55.4	60.2	
-1	Heat output (kW)	84.1	83.1	82.3	81.7	81.2	81.2	81.4	81.8	82.4	75˚C
	Efficiency COP	2.55	2.35	2.18	2.01	1.85	1.72	1.59	1.47	1.37	
	Input power (kW)	33	35.3	37.8	40.7	43.8	47.3	51.2	55.6	60.3	
0	Heat output (kW)	86.7	85.7	84.8	84.2	83.6	83.5	83.5	83.8	85	75˚C
	Efficiency COP	2.62	2.42	2.23	2.06	1.90	1.76	1.62	1.50	1.40	
	Input power (kW)	33.1	35.4	38	40.8	43.90	47.5	51.4	55.70	60.50	
1	Heat output (kW)	89.3	88.3	87.4	86.6	85.9	85.7	86.5	87.9	89.6	75˚C
	Efficiency COP	2.69	2.49	2.29	2.12	1.95	1.8	1.68	1.57	1.48	
	Input power (kW)	33.2	35.5	38.1	40.9	44.1	47.6	51.5	55.9	60.7	
2	Heat output (kW)	92	90.9	89.8	89.2	89.4	90.4	91.3	92.6	94.2	75˚C
	Efficiency COP	2.76	2.55	2.35	2.17	2.02	1.9	1.77	1.65	1.54	
	Input power (kW)	33.3	35.7	38.2	41.1	44.2	47.7	51.7	56.1	61	
3	Heat output (kW)	94.9	94.6	94.5	94.4	94.6	94.9	96.2	95.9	96	75˚C
	Efficiency COP	2.84	2.65	2.47	2.3	2.14	1.98	1.85	1.7	1.57	
	Input power (kW)	33.4	35.7	38.3	41.1	44.3	47.9	51.9	56.3	61.2	
4	Heat output (kW)	100	100	99.8	99.6	99.4	98.5	98.1	97.7	97.7	75˚C
	Efficiency COP	2.99	2.8	2.61	2.42	2.23	2.05	1.88	1.73	1.59	
	Input power (kW)	33.4	35.7	38.3	41.2	44.5	48.1	52.1	56.5	61.4	
5	Heat output (kW)	106	106	104	103	102	101	100	99.5	99.3	75˚C
	Efficiency COP	3.17	2.96	2.71	2.49	2.29	2.1	1.91	1.76	1.62	
	Input power (kW)	33.4	35.8	38.4	41.4	44.6	48.2	52.3	56.6	61.2	
6	Heat output (kW)	110	108	107	105	104	103	102	101	101	75˚C
	Efficiency COP	3.28	3.00	2.77	2.52	2.32	2.13	1.96	1.8	1.66	
	Input power (kW)	33.5	36.00	38.6	41.6	44.8	48.3	52.1	56.2	60.8	
7	Heat output (kW)	112	111	109	107	106	105	104	103	103	75˚C
	Efficiency COP	3.32	3.07	2.81	2.58	2.38	2.19	2.01	1.84	1.7	
	Input power (kW)	33.7	36.1	38.8	41.5	44.6	48	51.7	55.9	60.5	
20	Heat output (kW)	149	146	142	139	136	134	131	129	127	75˚C
	Efficiency COP	4.64	4.23	3.82	3.46	3.13	2.85	2.57	2.33	2.12	
	Input power (kW)	32.1	34.5	37.2	40.2	43.4	47	51	55.3	60	
21	Heat output (kW)	151	148	145	142	139	136	133	131	129	75˚C
	Efficiency COP	4.7	4.28	3.89	3.52	3.2	2.89	2.6	2.36	2.14	
	Input power (kW)	32.1	34.6	37.3	40.3	43.5	47.1	51.1	55.4	60.2	
22	Heat output (kW)	154	151	148	145	141	138	135	133	130	75˚C
	Efficiency COP	4.78	4.35	3.96	3.59	3.23	2.92	2.64	2.39	2.16	
	Input power (kW)	32.2	34.7	37.4	40.4	43.7	47.3	51.2	55.6	60.3	
23	Heat output (kW)	157	154	150	147	144	140	137	135	132	75˚C
	Efficiency COP	4.88	4.43	3.99	3.63	3.29	2.95	2.67	2.42	2.19	
	Input power (kW)	32.2	34.8	37.6	40.5	43.8	47.4	51.4	55.7	60.4	
24	Heat output (kW)	159	156	153	149	146	142	139	136	134	75˚C
	Efficiency COP	4.94	4.47	4.06	3.66	3.32	2.98	2.7	2.44	2.21	
	Input power (kW)	32.2	34.9	37.7	40.7	44	47.6	51.5	55.8	60.6	
25	Heat output (kW)	162	158	155	151	148	144	141	138	136	75˚C
	Efficiency COP	5.03	4.53	4.1	3.7	3.36	3.02	2.73	2.46	2.24	
	Input power (kW)	32.2	34.9	37.8	40.8	44.1	47.7	51.7	56	60.7	

LAHP-112HTR290-LNF		Heating OUT									Max flow temperature
Water Delivery Temperature		35˚C	40˚C	45˚C	50˚C	55˚C	60˚C	65˚C	70˚C	75˚C	
-10	Heat output (kW)	67.9	67.7	67.7	67.8	68.2	69	69.9	N/A	N/A	°°
	Efficiency COP	2.43	2.24	2.07	1.91	1.76	1.63	1.51	N/A	N/A	
	Input power (kW)	27.9	30.2	32.7	35.5	38.7	42.3	46.2	N/A	N/A	
-5	Heat output (kW)	76.5	75.8	75.7	75.5	75.4	75.6	76.2	77	N/A	70˚C
	Efficiency COP	2.67	2.47	2.27	2.09	1.92	1.77	1.63	1.51	N/A	
	Input power (kW)	28.6	30.7	33.3	36.2	39.3	42.8	46.7	50.9	N/A	
-4	Heat output (kW)	78.4	77.7	77.4	77.1	77	77	77.5	78.2	N/A	70˚C
	Efficiency COP	2.73	2.51	2.31	2.12	1.95	1.79	1.66	1.53	N/A	
	Input power (kW)	28.7	30.9	33.5	36.3	39.4	42.9	46.8	51	N/A	
-3	Heat output (kW)	80.3	79.7	79.1	78.8	78.7	78.1	78.9	79.5	N/A	70˚C
	Efficiency COP	2.78	2.55	2.35	2.16	1.99	1.82	1.68	1.55	N/A	
	Input power (kW)	28.9	31.2	33.6	36.4	39.6	42.8	46.9	51.2	N/A	
-2	Heat output (kW)	82.3	81.7	80.9	80.5	80.2	80.2	80.3	81	N/A	70˚C
	Efficiency COP	2.84	2.61	2.4	2.2	2.02	1.86	1.71	1.58	N/A	
	Input power (kW)	29	31.3	33.7	36.6	39.7	43.2	47	51.3	N/A	
-1	Heat output (kW)	84.4	83.6	82.9	82.3	82.1	82	82.2	82.9	83.8	75˚C
	Efficiency COP	2.89	2.66	2.44	2.24	2.06	1.89	1.74	1.61	1.49	
	Input power (kW)	29.2	31.4	34	36.8	39.9	43.3	47.2	51.4	56.1	
0	Heat output (kW)	86.5	85.6	84.9	84	84	84	84.1	84.6	85.4	75˚C
	Efficiency COP	2.95	2.71	2.49	2.29	2.1	1.94	1.78	1.64	1.52	
	Input power (kW)	29.3	31.6	34.1	36.7	40	43.4	47.2	51.5	56.2	
1	Heat output (kW)	88.7	87.9	87.2	86.6	86.2	86	85.8	86.3	87.2	75˚C
	Efficiency COP	3.01	2.77	2.55	2.34	2.16	1.98	1.82	1.68	1.55	
	Input power (kW)	29.5	31.7	34.2	37	40	43.5	47.2	51.5	56.3	
2	Heat output (kW)	91.2	90.3	89.5	88.9	88.3	88	88	88.3	91.8	75˚C
	Efficiency COP	3.08	2.84	2.61	2.4	2.2	2.02	1.85	1.71	1.63	
	Input power (kW)	29.6	31.8	34.3	37.1	40.2	43.6	47.5	51.7	56.2	
3	Heat output (kW)	93.8	92.8	91.9	91.2	90.6	90.2	91.5	96.4	96.6	75˚C
	Efficiency COP	3.16	2.9	2.67	2.45	2.24	2.06	1.93	1.88	1.72	
	Input power (kW)	29.7	32	34.4	37.2	40.4	43.8	47.4	51.4	56.2	
4	Heat output (kW)	96.3	95.3	94.3	93.5	94.4	98.5	98.1	98	98.2	75˚C
	Efficiency COP	3.24	2.98	2.73	2.51	2.34	2.27	2.08	1.9	1.74	
	Input power (kW)	29.7	32	34.5	37.3	40.3	43.3	47.2	51.5	56.3	
5	Heat output (kW)	99	97.8	99.4	102	101	100	100	99.7	99.9	75˚C
	Efficiency COP	3.32	3.05	2.9	2.78	2.53	2.3	2.11	1.93	1.77	
	Input power (kW)	29.8	32.1	34.3	36.7	39.9	43.4	47.4	51.7	56.5	
6	Heat output (kW)	106	107	106	104	103	103	102	102	102	75˚C
	Efficiency COP	3.62	3.41	3.12	2.82	2.57	2.36	2.15	1.97	1.81	
	Input power (kW)	29.3	31.4	34	36.9	40.1	43.6	47.5	51.9	56.5	
7	Heat output (kW)	111	109	108	107	106	105	104	103	103	75˚C
	Efficiency COP	3.80	3.45	3.16	2.88	2.63	2.4	2.18	1.98	1.82	
	Input power (kW)	29.20	31.6	34.2	37.1	40.3	43.8	47.6	51.9	56.6	
20	Heat output (kW)	147	144	141	139	136	133	131	129	127	75˚C
	Efficiency COP	4.8	4.35	3.95	3.6	3.25	2.93	2.66	2.41	2.18	
	Input power (kW)	30.6	33.1	35.7	38.6	41.9	45.4	49.3	53.6	58.3	
21	Heat output (kW)	150	147	144	141	138	136	133	131	129	75˚C
	Efficiency COP	4.87	4.43	4.01	3.63	3.29	2.98	2.69	2.43	2.21	
	Input power (kW)	30.8	33.2	35.9	38.8	42	45.6	49.5	53.8	58.4	
22	Heat output (kW)	152	149	146	144	141	138	135	133	131	75˚C
	Efficiency COP	4.9	4.46	4.04	3.69	3.34	3.01	2.72	2.46	2.24	
	Input power (kW)	31	33.4	36.1	39	42.2	45.8	49.7	54	58.6	
23	Heat output (kW)	155	152	149	146	143	140	138	135	133	75˚C
	Efficiency COP	5	4.52	4.1	3.72	3.37	3.04	2.77	2.5	2.26	
	Input power (kW)	31	33.6	36.3	39.2	42.4	46	49.9	54.1	58.8	
24	Heat output (kW)	158	155	152	148	145	142	140	137	135	75˚C
	Efficiency COP	5.08	4.6	4.16	3.76	3.4	3.07	2.79	2.52	2.29	
	Input power (kW)	31.1	33.7	36.5	39.4	42.6	46.2	50.1	54.3	59	
25	Heat output (kW)	161	157	154	151	148	145	142	139	137	75˚C
	Efficiency COP	5.16	4.64	4.2	3.81	3.46	3.12	2.82	2.55	2.31	
	Input power (kW)	31.2	33.8	36.7	39.6	42.8	46.4	50.3	54.6	59.2	

Sizing and selection

Lochinvar has a dedicated team of experts waiting to help you plan, size and select a suitable heat pump system to suit your requirements. Careful planning is required to ensure the system is not oversized as the capital cost of heat pump systems is much higher than traditional gas fired equipment. Lochinvar can supply a full package of equipment including heat pumps, thermal stores, DHW equipment including plates and/or indirect storage vessels and matched pumps. Contact your local area sales manager for further information and to start a conversation.

Installation planning

Our dedicated heat pump team can help with installation planning right through to project management to assist contractors working on the project. The list below shows the general planning points to consider before undertaking your design. Speak to your local area sales manager for further help.

Handling

How will the heat pumps be delivered to the installation site? Most commercial models are to heavy and large for a forklift to move so specialist handling equipment such as a crane will be required. Standard Lochinvar delivery is by a curtain side truck but more specialist delivery vehicles are available at extra cost.

Plinth

If fitted on the ground a suitable plinth should be supplied which can be support the weight of the unit and is just large enough to fit the unit on.

Position on site

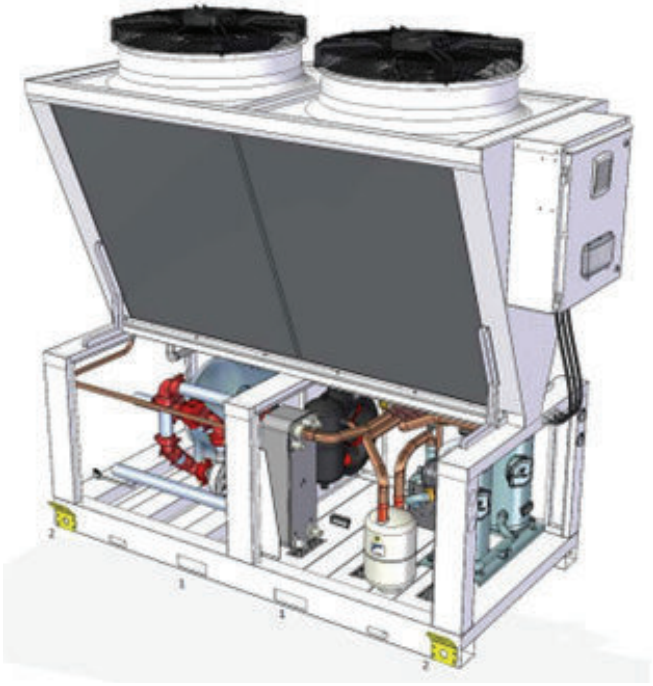
The Amicus Altus air source heat pump should be sited in an area which:

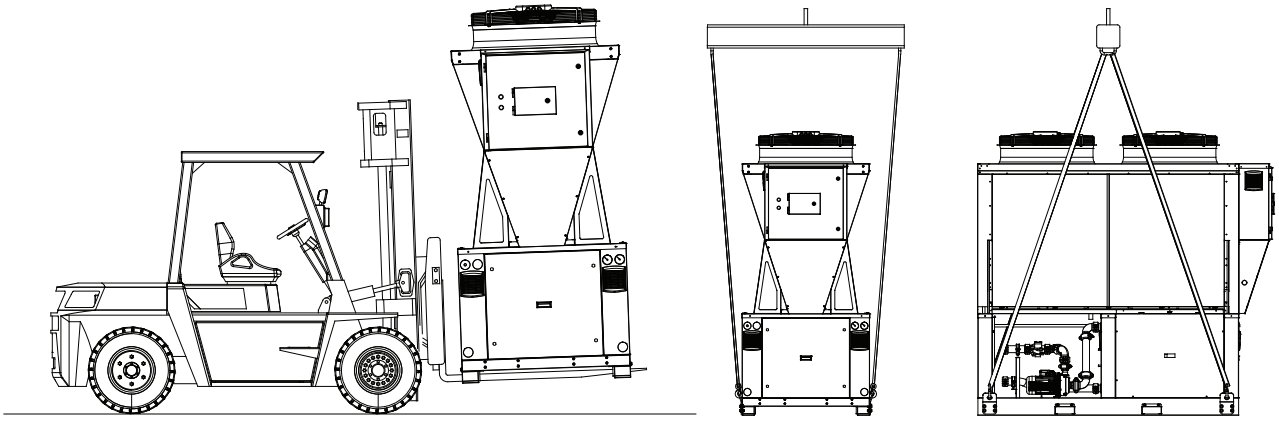
- Can bear the weight of the unit
- Has enough space around the unit to allow the correct airflow across the source heat exchanger.
- Is not too windy.
- Does not present a noise nuisance to users of the building and neighbours.

The unit should be transported as close as possible to the location it is to be fitted with its packaging still on to prevent accidental damage to the frame or evaporators which are particularly vulnerable to impact damage.

The Amicus Altus range can be moved into position using either a suitable forklift truck or crane, using the points in the unit.

1. Forklift lifting points
2. Crane lifting points





Tips for moving or lifting

Use a distributor beam if harness straps or ropes are used, making sure there is no pressure on the top edges of the unit or on the packaging.

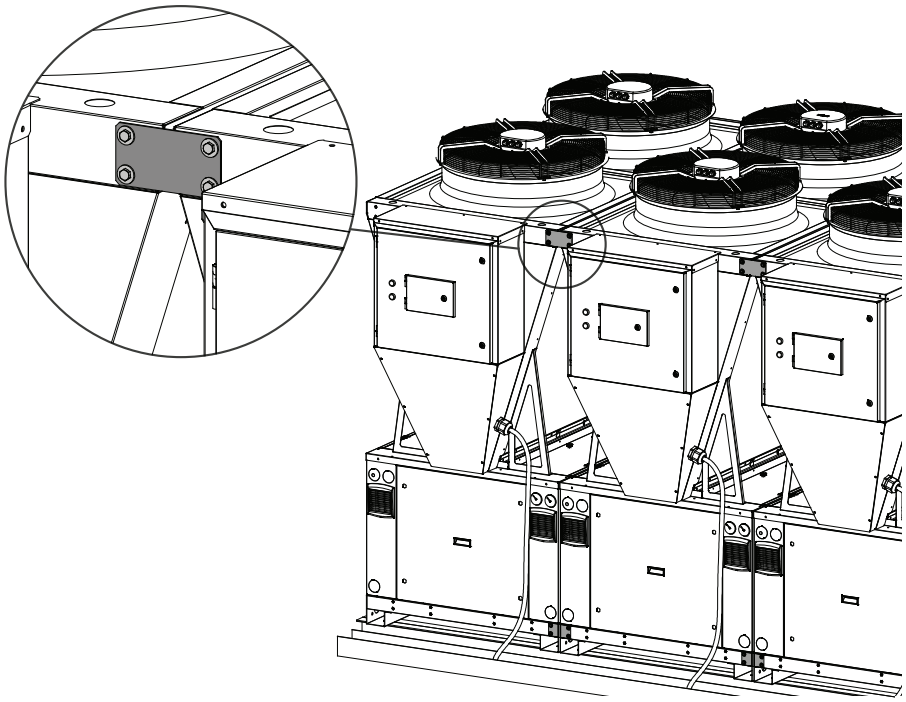
When handling or lifting, the following must be performed:

- Make sure that the vehicle being used has sufficient load capacity
- Make sure that the forks cross the entire width of the unit
- Provide any protection to avoid damaging the unit
- Avoid abrupt or violent manoeuvres
- Make sure all the panels are closed
- Use a distributor beam in case of lifting by means of belts to avoid pressures on the carpentry of the unit
- Use means and/or devices in accordance with the law
- Keep the unit horizontal; the maximum inclination must not exceed 5°
- Comply with the current regulations and standards

Before any lifting or moving of the unit a thorough risk assessment must be carried out by a suitable qualified person.

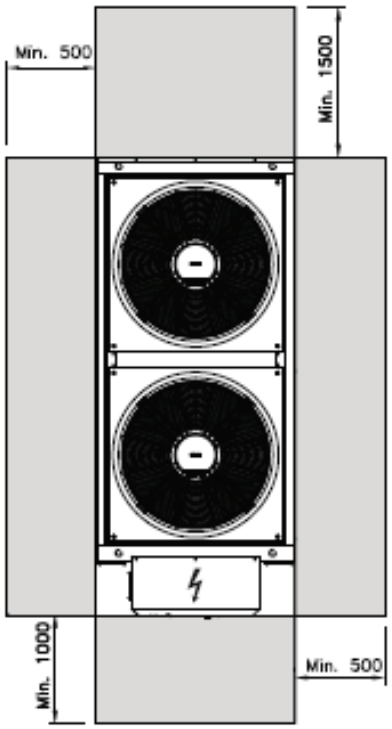
The unit should be bolted down to the floor to prevent movement due to high winds for example and fitted with suitable anti-vibration feet which are supplied with every unit. This is especially important when installing the units on the roof of the building.

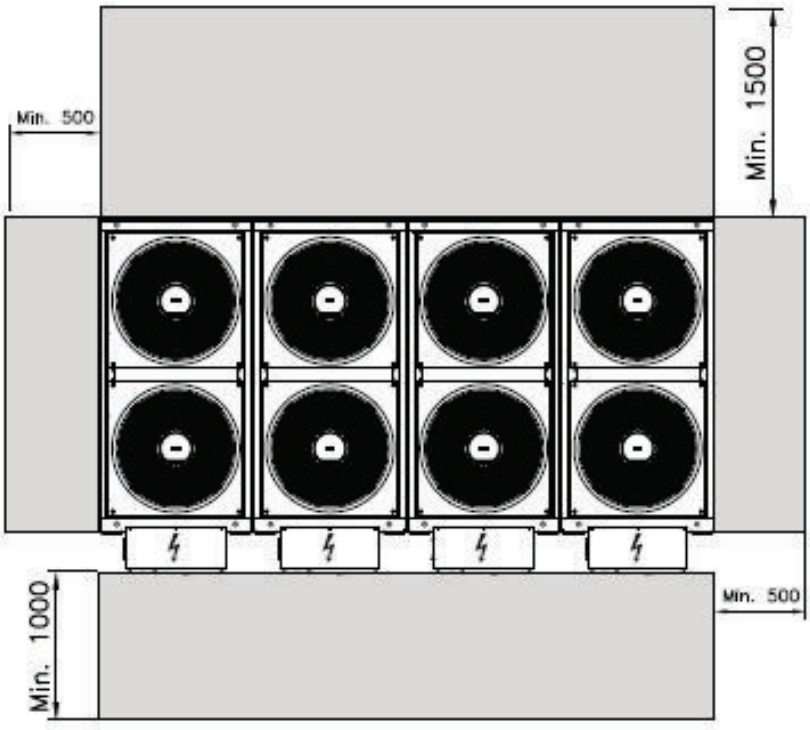
Each unit is supplied with a bracket to fasten more than one unit together, this should be fitted near the top of the unit as show in the drawing below.



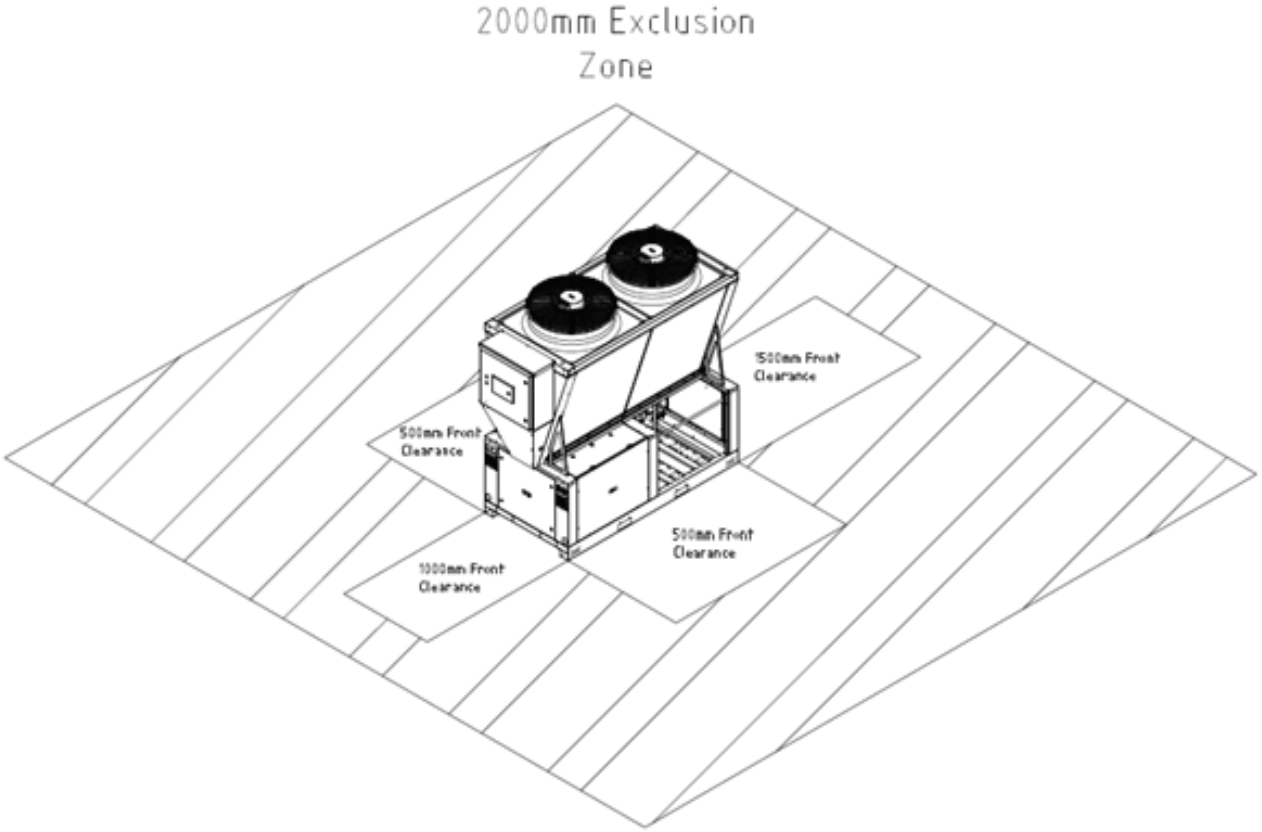
Clearances

The Amicus Altus air source heat pump range require minimum technical 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 both sides of the unit. Clearances also prevent exhaust air recirculation which can create operational problems for the units.





Clearances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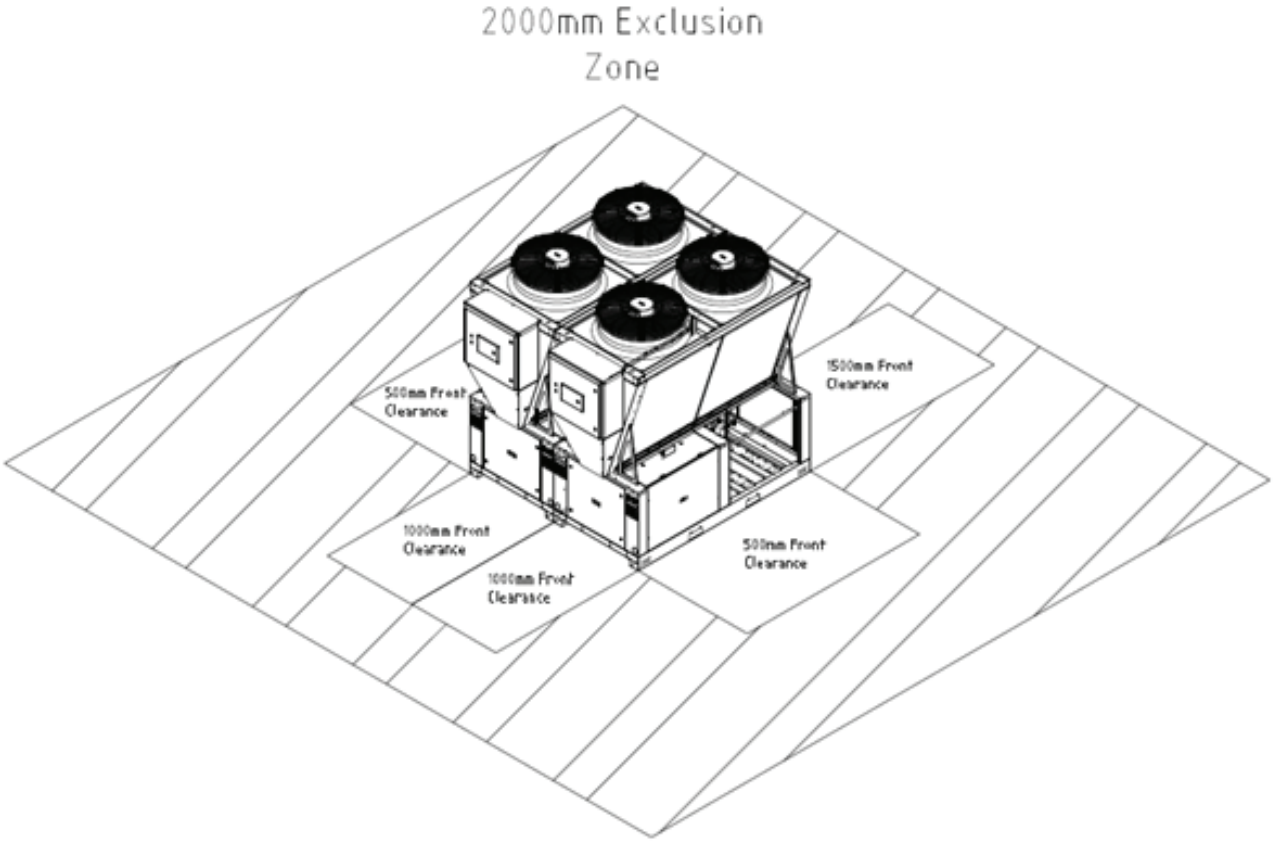
Zone
1500mm Front
Clearance
500mm Front
Clearance
500mm Front
Clearance
1000mm Front
Clearance

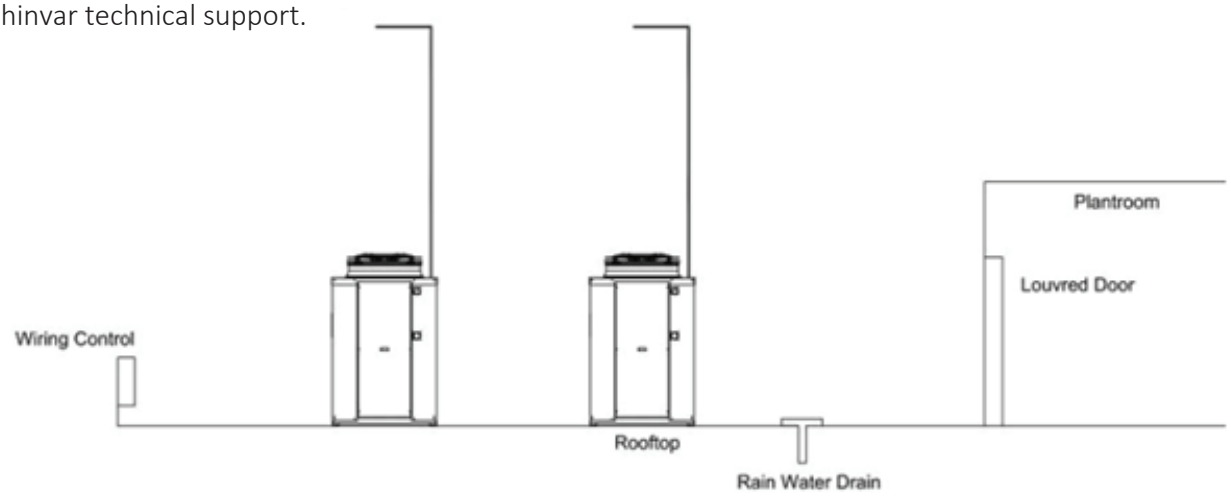

2000mm Exclusion
Zone
1500mm Front
Clearance
500mm Front
Clearance
1000mm Front
Clearance
1000mm Front
Clearance
500mm Front
Clearance

Exclusion zone

Any heat pump using R290 refrigerant must be installed in accordance with EN378-3, this will ensure the installation is safe and that in the unlikely event of a refrigerant leak no hazardous situation can occur. There must be nothing within the 2-meter exclusion zone that could create a hazardous situation should a leak occur. The drawing below gives some examples of what cannot be within the exclusion zone:

1. Wiring box – there must be nothing within the exclusion zone that could create a spark, contactors or switches are some examples. Only the wiring within the heat pumps is allowed.
2. Rainwater drain – this could allow a refrigerant leak which is heavier than air to sink into the building.
3. Access points into the building – louvred doors or openable windows are some examples which are not allowed, however the building itself could be closer than 2 meters if there are no access points into the building.

The above list is not exhaustive but should give an indication of what is allowed, for further advise contact Lochinvar technical support.



Security

If the units are to be installed in an area with open access a suitable and hit and miss security fence should be erected around the unit to prevent unauthorised access.

When using fencing or an acoustic shield sufficient clearances must be maintained to allow access to all of the panels for service and maintenance work on all sides (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.

Installation assistance

If commissioning is ordered and conducted by Lochinvar then we offer the support of one of our project engineers. This helps ensure the units are installed correctly and are functioning to the best performance possible. 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.
   - 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.
   - This visit will review the progress and check everything is 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 date.
4. Commissioning visit

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

Heat Pump Commissioning

Benefit from trusted commissioning for your new heat pump system directly from the manufacturer and enjoy enhanced warranty terms and a commissioning certificate.

HYDRAULIC SYSTEMS

Lochinvar commissioning of the heat pump hydraulic systems ensures reliable operation, optimum heat transfer, and maximum energy efficiency from day one.

- **Monitoring and recording of the hydraulic flow and return T at the heat pump controller**
- **Recording of hydraulic system water pressure and visual checks for leaks**
- **Testing and inspection of hydraulic pump operation (if applicable)**
- **Inspection and cleaning of all heat pump strainers and dirt/air separator**

FGAS REGULATIONS & REFRIGERATION CIRCUITS

Our FGAS-compliant commissioning safeguards both performance and environmental responsibility.

- **Inspection and testing of refrigerant safety devices for correct operation and auto resetting (including alarm output test)**
- **Visual inspection of the refrigerant sight glass for refrigerant charge, stability and dryness**
- **Recording of suction and discharge pressures and related sensor readings**
- **Recording of the liquid line, suction temperatures and related sensor readings**
- **Calculate and report on refrigerant cycle sub-cooling and superheat**
- **Visual check of all compressor oil level(s)**
- **Electronic leak detection of all refrigerant circuit for leaks (per FGAS regulations**
- **Recording of FGAS electronic leak testing (log sheets for each unit)**

ELECTRICAL, MOTOR TESTS & INSPECTIONS

Our comprehensive electrical and motor commissioning ensures the safe, reliable, and efficient operation of your heat pump from the moment it goes live

- **Test and inspection of heat pump controller and user interface**
- **Operational testing of any flow switches and their alarm outputs**
- **Inspecting correct operation of all condenser fan motors, mountings and impellers**
- **Undertake electrical wiring tightness tests**
- **Testing of all contactors, relays and motors for sound operation**
- **Testing of the crank-case heater operation**
- **Testing and recording of voltages at the heat pump**
- **Recording compressor current draw when in operation**

	Externaly commissioned	Lochinvar comissioned	
	All HP's	Altus	Other Amicus
Parts	1 year	2 years	3 years
Labour	No	2 years	3 years

Service & Maintenance Packages

Talk to us about our dedicated service and maintenance packages for your new heat pump system.

Electrical Connections

Electrical Data		LAHP-88HTR290	LAHP-88HTR290-LNF	LAHP-112HTR290	LAHP-112HTR290-LNF
Nominal voltage supply	Ph/V/Hz	3/400/50	3/400/50	3/400/50	3/400/50
Maximum voltage supply	V	440	440	440	440
Minimum voltage supply	V	360	360	360	360
Maximum input power	kW	44	44	66.9	66.9
Maximum input current	A	79.2	79.2	113	113
Maximum peak current	A	231	231	276	276
Input power in stand-by-mode	kW	0.80	0.80	0.100	0.100

Amicus Altus combined modules										
88HTR290	n	2	3	4	5	6	7	8	9	10
Line section	mm	70	120	150	2x120	2x150	2x150	2x185	3x150	3x185
PE section	mm	50	70	95	2x70	2x95	2x95	2x120	2x120	2x150

Amicus Altus combined modules										
112HTR290	n	2	3	4	5	6	7	8	9	10
Line section	mm	120	2x120	2x150	2x185	3x185	3x185	3x240	3x300	3x300
PE section	mm	70	2x70	2x95	2x120	2x150	2x150	2x185	2x185	2x185

Cable sizes are shown for general planning only, a qualified electrical engineer must check and size the cable required before work commences on site.
Each unit within the cascade must have its own dedicated power source and safety features.

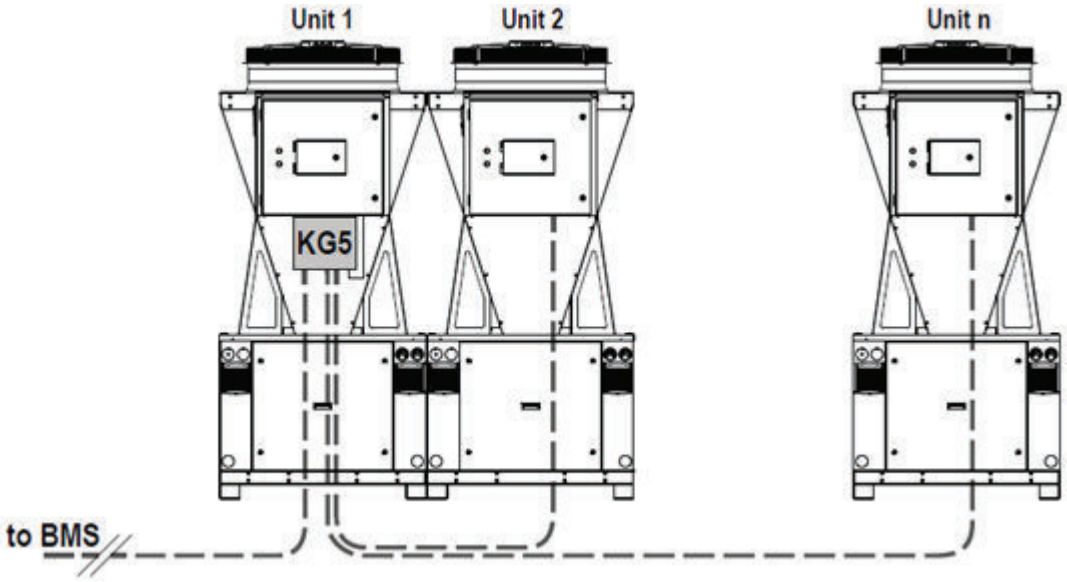
Provision should be made for local isolation with a lockable isolator fitted on or very close to the heat pump. If the heat pump is to be sited some way from the plantroom a single weatherproof 230v plug socket should also be fitted to aid commissioning and future maintenance of the unit.

Standard electrical connections available

Electrical ancillaries available

1. Cascade control is fitted as standard on all models where an Imperium system has not been used, in order to wire the cascade together the cascade wiring centre is required, this will be supplied as standard on projects with more than one heat pump.

The cascade control wiring between each unit must be of good quality ethernet cables and not be run in the same trunking as the power supply wiring.

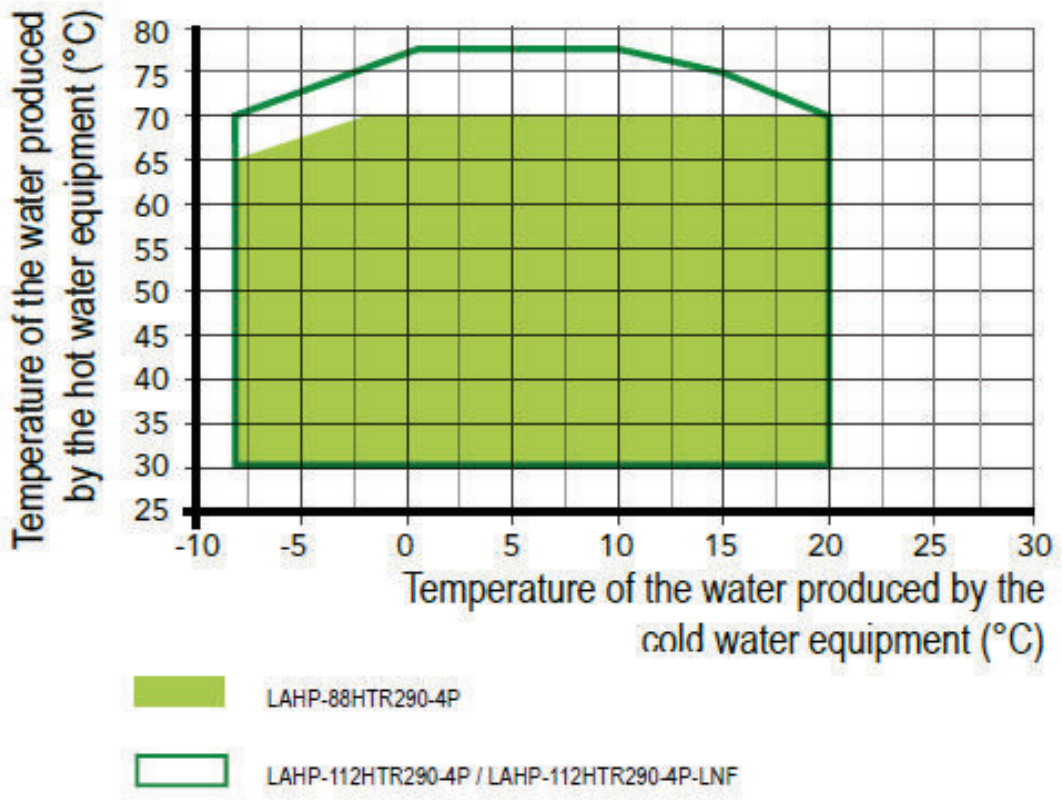


It is advisable to install the Cascade controller kit on one of the two units outside the modular system. In this case, the removal of one of them from the system does not involve the rebuilding of the network cables of the other units present.
All power supply cables, and the data cables must be physically divided from each other using separate cable trays to prevent disruption of the data between units and the cascade control.

Cooling

The Amicus Altus range can be provided in four pipe units which can produce heating and cooling simultaneously or cooling and domestic hot water using heat reclaim at a very high COP.
Physical dimensions do not change.

3.5.3 LAHP P4



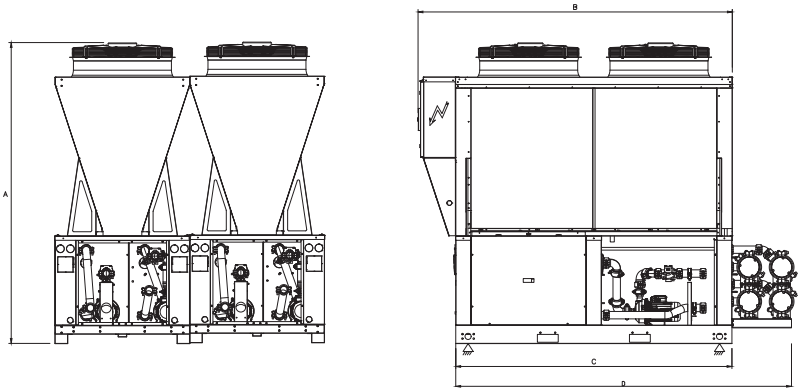
Technical data table 4 pipe unit

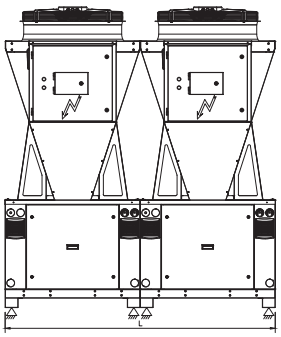
		Model			
		LAHP-88HTR290-4P	LAHP-88HTR290-4P-LNF	LAHP-112HTR290-4P	LAHP-112HTR290-4P-LNF
Heating data					
Heating capacity (EN14511)[1]	kW	86.7	86.7	116	111
Total power input (EN14511)[1]	kW	22.2	22.2	32.8	29
COP (EN14511)[1]	W/W	3.91	3.91	3.54	3.83
Cooling data					
Cooling capacity (EN14511)[3]	kW	72.1	72.1	99.1	93.1
Total power input (EN14511)[3]	kW	26.6	26.6	43.1	43.3
TER (EN14511)[3]	W/W	2.71	2.71	2.3	2.15
Cooling with Heating					
Cooling capacity (EN14511)[3]	kW	79.5	79.5	110	109
Heating capacity (EN14511)[1]	kW	101	101	139	138
Total power input (EN14511)	kW	21.5	21.5	28.7	28.6
TER	W/W	8.4	8.4	8.68	8.64
General data					
Refrigerant type		R290	R290	R290	R290
Refrigerant charge	Kg	6.1	6.1	8.1	8.1
Compressor type		Scroll	Scroll	Scroll	Scroll
Number of compressors		2	2	3	3
Number of circuits		1	1	1	1
Capacity steps		2	2	3	3
Sound power level	dB(A)	86.5	81.5	89.5	82.3
Sound pressure level (10m)	dB(A)	54.6	49.5	58	50
Minimum water content in the user circuit	litre	900	900	1200	1200
Shipping weight	Kg	920	920	1075	1075
Electrical data					
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50
Maximum input power	kW	44	44	66.9	66.9
Maximum input current standard unit	A (per phase)	79.2	79.2	113	113
Peak input current standard unit	A (per phase)	231	231	276	276

1) external air +7C 30/35 flow
2) average conditions according to EU/811/2013
3) Cooling external air +35˚C 12/7 flow

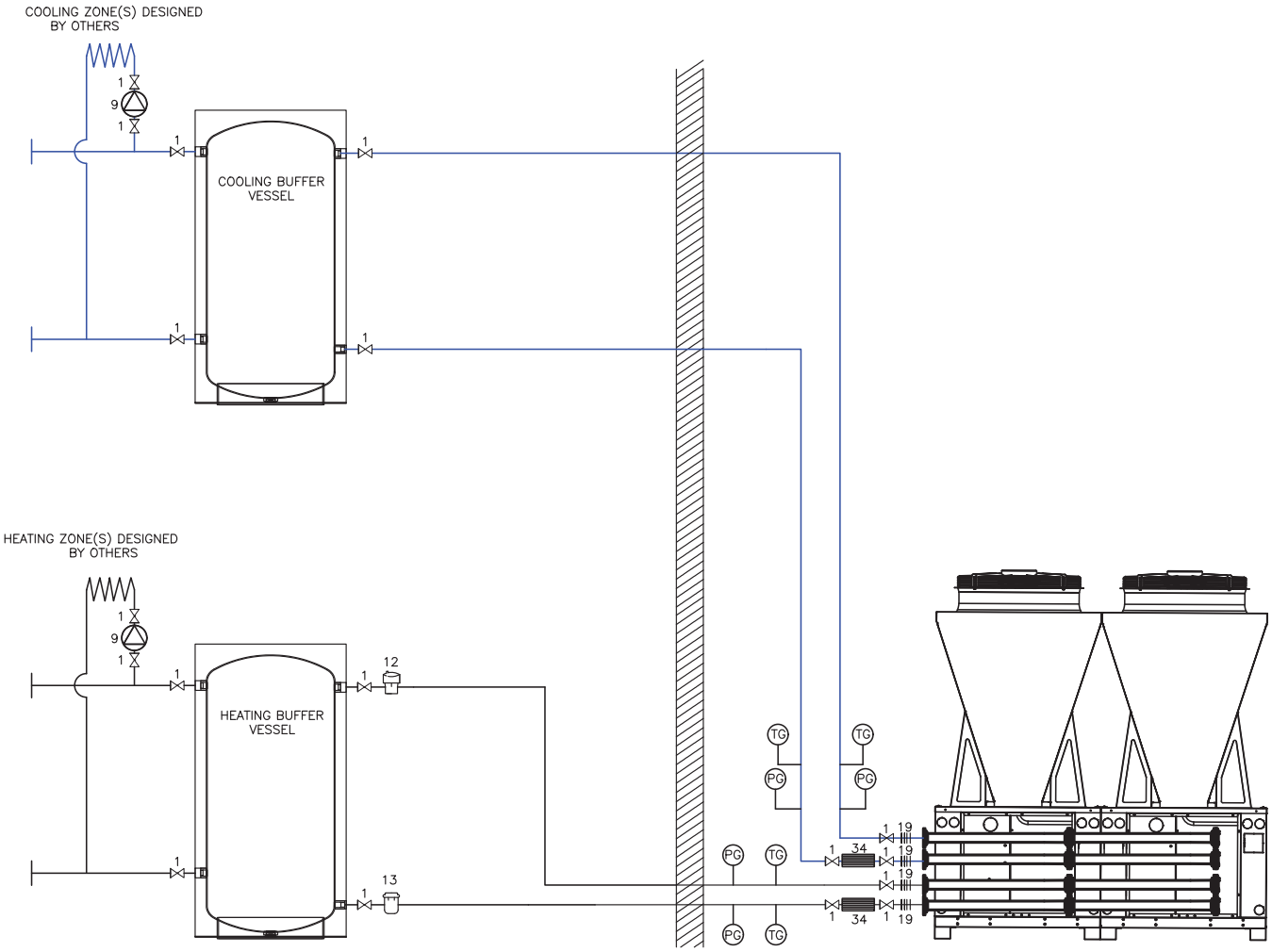
Dimensions 4 pipe units

Item	Description	Unit	LAHP-88HTR290 (4 Pipe unit)	LAHP-112HTR290 (4 Pipe unit)
A	Height	mm	2450	2450
B	Length including control box	mm	2560	2560
C	Length of base	mm	2250	2250
D	Length of base including pipework header		2515	2515
E	Width	mm	1100	1100
L	Width of multiple umits	mm	-E* number of units in the cascade	-E* number of units in the cascade
-	Operating width	Kg	840	1035





Standard installation schematic 4 pipe units



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Find your local Area Sales Manager

Lochinvar Solutions

Lochinvar are a specialist provider of heating and cooling systems and unlike other manufacturers, all Altus installations benefit from specialist project support with project engineer site visits and commissioning as standard. Talk to our expert team today for more information about our sustainable heating and cooling systems.

Heat Pump Project Support

As a specialist provider of heat pump systems, Lochinvar technical experts and project managers support clients throughout the entire journey, working closely with your contractors and installers. Every heat pump project benefits from dedicated project support to ensure everything is being executed to specification. We do this to ensure any potential issues are remedied before commissioning to ensure systems are ready to go when they're required.

Commissioning

For complete peace of mind, Lochinvar offer commissioning of new systems to ensure installation has been completed to specification and complies with regulations and requirements. All heat pump systems benefit from this service as standard.

Technical Support

Boasting a nationwide network of in-house field engineers supported by a highly experienced team of technical specialists at our headquarters in Banbury, we support clients with the most challenging issues in the rare event an issue can't be resolved by site managers and contractors.

Nationwide Expertise

Our expert team is supported by area sales managers who look after projects in specific postcodes. Contact one of our Regional Sales Managers who will be able to get you through to the right specialist or get in touch with our Renewables Manager for technical sales support.

Energy label, product fiche and ErP data table are available at www.lochinvar.ltd.uk
For further information on the Amicus Altus heat pumps, including ICM & user instructions and our full warranty terms and conditions, please visit our website: www.lochinvar.ltd.uk

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