

STREBEL

S-ASX-LPi Range

Air Source Heat Pump

Models 55 - 75 - 100

Installation, Operating & Maintenance Manual



Please read and understand before commencing installation and leave the manual with the customer for future reference.

Declaration of Conformity

EU DECLARATION OF CONFORMITY

THE MANUFACTURER:

Strebel Ltd

Unit 10, Invincible Road, Farnborough, Hampshire, GU14 7QU.

HEREBY DECLARES:

Under its sole responsibility, that the equipment indicated below, bearing CE marking and supplied with this declaration, has been manufactured and tested in compliance with the directives:

Manufacturer	Strebel Ltd
Models	S-ASX-LPi 55R Air to Water Heat Pump S-ASX-LPi 75R Air to Water Heat Pump S-ASX-LPi 100R Air to Water Heat Pump
Serial Number	22MMLLXXXX
Product Description	Air to Water Heat Pump
Machines Directive	2006/42/CE
PED Directive	2014/68/EU
EMC Directive	2014/30/EU
Low Voltage Directive	2014/35/EU
Energy Efficiency Directive	2012/27/EU
Ecodesign Directive	2009/125/CE
Conformity Assessment Procedure	Module A2

This declaration relates exclusively to the machinery in the state in which it was placed on the market and excludes components which are added and/or operation carried out subsequently by the final user.

The following harmonised standards have been applied to the EMC Directive 2014/30/EU:

- EN IEC 61000-3-11:2017: Electromagnetic Compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – equipment with input current > 16A up to and including 75A.
- EN IEC 61000-3-12:2011: Electromagnetic Compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16A up to and including 75A.
- EN IEC 61000-6-2:2019: Electromagnetic Compatibility (EMC) – Part 6-2: Generic standards – Immunity of industrial environments.
- EN IEC 61000-6-3:2021: Electromagnetic Compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial, and light industrial environments.
- EN IEC 61000-6-4:2019: Electromagnetic Compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments.

This Declaration of Conformity replaces all previous ones of the above models.

Date of Issue: 17th April 2026.

Place of Issue: 10 Invincible Road, Farnborough, Hampshire, GU14 7QU.

Signed by the manufacturer:



Print: Andy Parker

Position: Managing Director

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General Information

General Warnings

MANUAL AND DOCUMENTATION - This manual provides all the information necessary for a correct installation and for a correct use and maintenance of the equipment. Before proceeding with the installation, carefully read this manual and follow the instructions contained therein.

The manufacturer declines all responsibility for any direct or indirect damage to persons or property deriving from failure to observe the information provided in this manual.

This manual and the wiring diagram supplied with the machine must be properly stored to be readily available for future reference in case of need.

ACCESS TO THE UNIT - Access to the unit must be allowed only to personnel trained in this type of unit and equipped with the necessary accident prevention protections. Furthermore, this personnel must be authorised by the owner of the unit and recognised by the manufacturer to operate.

The equipment may not be used by children under the age of 8 and by persons with reduced physical, sensory or mental abilities or lack of experience and skills unless they are supervised or instructed to use the equipment safely and they understand the related dangers. Children must not play with the equipment. Cleaning and maintenance by the user must not be carried out by the categories previously listed without supervision.

INSTALLATION - The equipment must be installed only and exclusively by qualified personnel, in compliance with all current and applicable safety regulations in accordance with the national legislation of the country of installation.

USE - The appliance must be connected to a hydronic heating and/or cooling system. Any use other than that permitted or outside the operating limits mentioned in this manual is forbidden (unless previously agreed with the manufacturer).

FAILURES OR MALFUNCTIONS - Switch off the equipment in case of failure or malfunction. If the equipment needs to be repaired, please contact a specialized service center recognised by the manufacturer and use original spare parts.

The manufacturer declines all responsibility deriving from electrical or mechanical tampering of the equipment which, if not authorised by the manufacturer, **THE WARRANTY IS VOID.**

The unit must be serviced by qualified personnel in compliance with all applicable and applicable safety regulations in accordance with the national legislation of the country of installation.

IDENTIFICATION OF THE UNIT - All units are supplied with the identification plate described below. The serial number uniquely identifies the machine. In the event of a request for assistance, the user must always specify the model of the unit, the serial number and the year of manufacture, so as to trace the specific characteristics of the product and the assembled components and to correctly supply any spare parts.

Unit Data Plate

A				CE	
S/N	B				
Model	C				
Code	D				
Power supply	E				
Max Current Input [A]	F				
Standard	G	Heating A7W35		Cooling A35W7	
Capacity	[kW]	H	J		
Power input	[kW]	I	K		
Max pressure	[bar]	High	L	Low	M
		Refrigerant	[kg]	N	P
	[tCO ₂ eq]	O	Q		
Weight	[kg]	R			
Sound pressure at 1m	[dB(A)]	S			
Protection degree		T	U		
PED category	V	Manufactured by			
	W	X			

- A Trademark
- B Serial number
- C Model
- D Code
- E Power supply
- F Maximum input current [A]
- G Reference standard
- H Capacity in heating mode at nominal condition * [kW]
- I Power input in heating mode at nominal condition * [kW]
- J Capacity in cooling mode at nominal condition * [kW]
- K Power input in cooling mode at nominal condition * [kW]
- L Maximum pressure on the high pressure side [barg]
- M Maximum pressure on the low pressure side [barg]
- N Quantity of refrigerant [kg]
- O Tonnes of equivalent CO₂ [tCO₂eq]
- P Type of refrigerant
- Q Refrigerant GWP
- R Weight [kg]
- S Sound pressure level at 1 metre [dB(A)]
- T Type of protection
- U Protection level
- V PED category
- W PED certification body
- X Manufacturer

Nominal conditions *	Air - Water
Heating	A7W35
Cooling	A35W7

Description

Description of Components

External Structure

Basement, supporting structure and panels are made of galvanized and painted sheet steel to ensure good resistance to atmospheric agents. Accessibility to internal parts is possible removing frontal and lateral panels. In the units with low noise acoustic setting basement, main structure and panels are completely insulated in order to minimize noise emissions in the surroundings.

Refrigerant Circuit

The hermetic **scroll inverter** compressors are mounted on damper supports and is protected against over-temperatures and over-currents. Each compressor is equipped with an electrical heater, that keep the compressor crankcase oil temperature high enough to prevent migration of refrigerant during winter stops and to evaporate any liquid present in the crankcase, in order to prevent possible liquid rushes on starting. Each compressor is equipped with vapour and liquid injection and is placed on an economized refrigerant circuit with plate heat exchanger and electronic expansion valve dedicated to the injection.

The heat exchanger on the plant side is a brazed stainless steel plates heat exchanger, properly insulated to avoid condensate generation and to minimise thermal losses, and protected by a differential pressure switch that detects whatever water flow lack. The heat exchanger on the source side is a finned coil with grooved copper pipes and hydrophilic aluminum fins with waved profile to increase the heat exchange coefficient. Under the coil a tray is installed that collect the condensate generated by the coil in heating mode.

The expansion device, an electronic expansion valve, allows the unit to adjust itself to the different operating conditions keeping steady the set super-heating. The refrigerant circuit of each unit contains moreover solid core hermetic filter dryer to restrain

impurity and moisture residuals that could be present in the circuit, high pressure switch and pressure sensors in order to assure the compressor to operate inside the permitted limits, 4 way reverse cycle valve to allow operating mode change reversing the refrigerant flow, liquid receiver to compensate the different refrigerant charge required in heating and in cooling mode, pressure connections equipped with pin, gasket and blind nut. All the pipes of the refrigerant circuit are properly insulated to avoid condensate generation and to minimise thermal losses.

The Axial Fans

Equipped with an high efficiency electronically commutated (EC) motor and guarantee high efficiencies in all the operating conditions. The speed of the fans can be adjusted in order to reduce the noise during the night.

Hydraulic Circuit

The hydraulic circuit is equipped with safety valve and manual air vents in order to assure deaeration of the hydraulic circuit inside the unit. All the pipes are thermally insulated to avoid condensate generation and minimise thermal losses. The hydraulic circuit can be equipped with a circulation pump with the possibility to choose different pump types as an option.

Electrical Panel

It contains all the power, control and safety components necessary to guarantee the unit to work properly. The unit is managed by a microprocessor controller to which all the electrical loads and the control devices are connected. The remote user interface, to be installed indoor, allows to view and to modify, if necessary, all the parameters of the unit.

Options

Standard Supply & Additional Options		
Acoustic setting up	Low noise acoustic setting up (Standard Supply)	Allows to reduce the noise emitted by the unit by means of the refrigerant circuit vane acoustic insulation.
Plant Side Flow Rate Management	Modulating Pump (Standard Supply)	Allows the circulation of the water on the plant side. With the modulating pump is possible to adjust the water flow rate in order to keep constant the temperature difference between inlet and outlet.
	High Head Pump (Additional Supply)	

Components Supplied with the Unit – Mandatory Installation	
Remote User Interface	Mandatory installation: According to indications reported in “Control system” paragraph.
Outdoor Air Sensor	Mandatory installation: According to indications reported in “Control system” paragraph.
6mm Temp Sensors	Mandatory Installation: To be installed to Thermal Store(s) & DHW Cylinder(s) in addition to any BMS sensors.

Description

Safety Features Description

The unit contains a **flammable refrigerant** that requires specific precautions to ensure the safety of the unit itself. Indeed, even though the unit is designed to minimise the risk of refrigerant leaks, it is not possible to exclude the possibility that a refrigerant leak may occur during the entire life of the unit. In such circumstances, to ensure the safety of the unit, it is necessary to ensure that the potentially flammable atmosphere that may be generated inside the unit does not come into contact with hot surfaces or ignition sources, and that such atmosphere is expelled from the unit and diluted into the external air. The potential formation of a potentially flammable atmosphere outside the unit is a risk that must be assessed by the installer in order to apply all necessary precautions to make the installation site safe while complying with all applicable regulations.

Inside the unit, three zones can be identified:

- **Technical Compartment:** Contains the refrigeration circuits (excluding the finned coil) and hydraulic circuit.
- **Ventilation Compartment:** Contains the fans and the finned coil.
- **Electrical Compartment:** Contains the electrical panel.

Technical Compartment

The concentration of refrigerant inside the technical compartment is constantly monitored by a **refrigerant leakage detector**, appropriately calibrated to intervene before the refrigerant concentration can generate a potentially flammable atmosphere within the technical compartment. The sensor must be checked and eventually re-calibrated periodically to ensure adequate protection of the unit.

Ventilation Compartment

The ventilation compartment is directly in contact with the outside air. Therefore, any potential refrigerant leakage from the finned coil cannot generate a flammable atmosphere inside the unit. If the unit is operating, the airflow generated by the fans disperses and dilutes the refrigerant before its concentration can reach hazardous levels. If the unit is not operating, the refrigerant (which is heavier than air) tends to disperse downward around the unit or along the condensate drainage line generated by the coil.

Electrical Compartment

The electrical compartment is separated from the technical compartment and the ventilation compartment, creating a barrier that, although not airtight, strongly limits the diffusion of refrigerant from the technical compartment to the electrical compartment and makes the presence of a potentially flammable atmosphere around the electrical panel very unlikely.

The **safety management logic** dictates that if, during normal operation of the unit, the refrigerant leakage sensor detects a potentially flammable atmosphere, the unit enters in a fault state that prevents the refrigerant circuit to operate. The installation supervisor must evaluate if an external indication of the faulty state is necessary.

Identification Code

S-ASX-LPi	75	R	1	S	V	N	B	9
1	2	3	4	5	6	7	8	

1	Product range	
2	Model	
3	Operating Mode	
	R	Heating and cooling (reversible on the refrigerant side)
4	Number of Compressors	
5	Type of Compressors	
	SV	Scroll Compressors - Variable speed
6	Power Supply	
	M	230V - 1 - 50Hz
	N	400V - 3N - 50Hz
	T	400V - 3 - 50Hz
7	Acoustic Setting Up	
	B	Base
	S	Low noise (Standard Supply)
8	Refrigerant	
	9	R454B

Technical Data - S-ASX-LPi 55

EU reg 811/2013		55	
Efficiency class	AVERAGE climate Low temperature application - 35°C	A++	-
	AVERAGE climate High temperature application - 55°C	A++	-
Seasonal efficiency η_s	AVERAGE climate Low temperature application - 35°C	168	%
	AVERAGE climate High temperature application - 55°C	136	%
P design	AVERAGE climate Low temperature application - 35°C	53	kW
	AVERAGE climate Mid temperature application - 45°C	54	kW
	AVERAGE climate High temperature application - 55°C	55	kW
	AVERAGE climate Very High temperature application - 65°C	56	kW
SCOP	AVERAGE climate Low temperature application - 35°C	4.27	-
	AVERAGE climate Mid temperature application - 45°C	3.71	-
	AVERAGE climate High temperature application - 55°C	3.48	-
	AVERAGE climate Very High temperature application - 65°C	3.13	-

		55	
Refrigerant (GWP)		R454B - (467 GWP)	-
Refrigerant charge & access category - EN378-1 **		7.0 - No Limits	kg
Compressors	Type	high temperature scroll inverter BLDC with vapour and liquid injection	-
	n° of compressors	1	-
	oil charge	2.30	kg
Refrigerant circuits	n° of circuits	1	-
Compressor modulation		30 - 100	%
Plant side heat exchangers	Type	stainless steel brazed plates	-
	n°	1	-
	Water volume	5.89	l
Source side heat exchangers	Type	finned coil with copper pipes and hydrophilic aluminum fins	-
	n°	1	-
	Frontal surface	1.63	m²
Fans	Type	axial EC	-
	n°	2	-
Nominal total air flow rate		13300	m³/h
Hydraulic circuit	Max pressure	6	bar
	Min pressure *	0.3	bar
	Min pressure with integrated circulation pump *	1.5	bar

** The refrigerant charge indicated in the table is only indicative. The exact refrigerant charge, to be considered for the risk assessment and the installation conformity declaration, is indicated in the dataplate attached to the unit.

* Pressure should be measured at unit inlet, downstream of water filter. In the units with integrated circulation pump the minimum pressure indicated is necessary to guarantee at pump suction a pressure higher than the minimum value required in order to avoid cavitation problems (NPSH).

Technical Data - S-ASX-LPi 75 - 100

EU reg 811/2013		75	100	
Efficiency class	AVERAGE climate Low temperature application - 35°C	A++	A++	-
	AVERAGE climate High temperature application - 55°C	A++	A++	-
Seasonal efficiency η_s	AVERAGE climate Low temperature application - 35°C	170	168	%
	AVERAGE climate High temperature application - 55°C	138	136	%
P design	AVERAGE climate Low temperature application - 35°C	85	106	kW
	AVERAGE climate Mid temperature application - 45°C	87	108	kW
	AVERAGE climate High temperature application - 55°C	88	110	kW
	AVERAGE climate Very High temperature application - 65°C	90	113	kW
SCOP	AVERAGE climate Low temperature application - 35°C	4.33	4.28	-
	AVERAGE climate Mid temperature application - 45°C	3.76	3.72	-
	AVERAGE climate High temperature application - 55°C	3.52	3.49	-
	AVERAGE climate Very High temperature application - 65°C	3.17	3.13	-

		75	100	
Refrigerant (GWP)		R454B - (467 GWP)		-
Refrigerant charge & access category - EN378-1 **		9.5 - No Limits	12.0 - No Limits	kg
Compressors	Type	high temperature scroll inverter BLDC with vapour and liquid injection		-
	n° of compressors	2		-
	oil charge	2.30		kg
Refrigerant circuits	n° of circuits	1		-
Compressor modulation		30 - 100		%
Plant side heat exchangers	Type	stainless steel brazed plates		-
	n°	1		-
	Water volume	9.8	11.8	l
Source side heat exchangers	Type	finned coil with copper pipes and hydrophilic aluminum fins		-
	n°	1		-
	Frontal surface	2.46	3.28	m²
Fans	Type	axial EC		-
	n°	3	4	-
Nominal total air flow rate		21400	28400	m³/h
Hydraulic circuit	Max pressure	6		bar
	Min pressure *	0.3		bar
	Min pressure with integrated circulation pump *	1.5		bar

** The refrigerant charge indicated in the table is only indicative. The exact refrigerant charge, to be considered for the risk assessment and the installation conformity declaration, is indicated in the dataplate attached to the unit.

* Pressure should be measured at unit inlet, downstream of water filter. In the units with integrated circulation pump the minimum pressure indicated is necessary to guarantee at pump suction a pressure higher than the minimum value required in order to avoid cavitation problems (NPSH).

S-ASX-LPi 55 - Nominal Performance

HEATING		A	W	Nominal	
A7W35	Heating capacity	7	35	46.2	kW
	Power input			10.3	kW
	COP			4.49	-
	Plant side water flow rate			7966	l/h
	Plant side pressure drop			26	kPa
A7W45	Heating capacity	7	45	46.8	kW
	Power input			12.8	kW
	COP			3.66	-
	Plant side water flow rate			8089	l/h
	Plant side pressure drop			27	kPa
A7W55	Heating capacity	7	55	47.5	kW
	Power input			15.3	kW
	COP			3.10	-
	Plant side water flow rate			5165	l/h
	Plant side pressure drop			11	kPa
A7W65	Heating capacity	7	65	48.6	kW
	Power input			18.9	kW
	COP			2.57	-
	Plant side water flow rate			4244	l/h
	Plant side pressure drop			8	kPa
A2W35	Heating capacity	2	35	39.0	kW
	Power input			10.3	kW
	COP			3.79	-
	Plant side water flow rate			6721	l/h
	Plant side pressure drop			19	kPa
A2W45	Heating capacity	2	45	39.6	kW
	Power input			12.8	kW
	COP			3.09	-
	Plant side water flow rate			6852	l/h
	Plant side pressure drop			20	kPa
A2W55	Heating capacity	2	55	40.4	kW
	Power input			15.4	kW
	COP			2.62	-
	Plant side water flow rate			4396	l/h
	Plant side pressure drop			8	kPa
A2W65	Heating capacity	2	65	41.6	kW
	Power input			18.9	kW
	COP			2.20	-
	Plant side water flow rate			3633	l/h
	Plant side pressure drop			6	kPa
A-2W35	Heating capacity	-2	35	36.5	kW
	Power input			10.3	kW
	COP			3.54	-
	Plant side water flow rate			6297	l/h
	Plant side pressure drop			17	kPa
A-2W45	Heating capacity	-2	45	37.2	kW
	Power input			12.8	kW
	COP			2.91	-
	Plant side water flow rate			6439	l/h
	Plant side pressure drop			17	kPa
A-2W55	Heating capacity	-2	55	38.1	kW
	Power input			15.4	kW
	COP			2.47	-
	Plant side water flow rate			4144	l/h
	Plant side pressure drop			8	kPa
A-2W65	Heating capacity	-2	65	39.3	kW
	Power input			19.0	kW
	COP			2.07	-
	Plant side water flow rate			3436	l/h
	Plant side pressure drop			5	kPa

S-ASX-LPi 55 - Nominal Performance

HEATING		A	W	Nominal	
A-4W35	Heating capacity	-4	35	35.4	kW
	Power input			10.3	kW
	COP			3.44	-
	Plant side water flow rate			6100	l/h
	Plant side pressure drop			16	kPa
A-4W45	Heating capacity	-4	45	36.1	kW
	Power input			12.8	kW
	COP			2.82	-
	Plant side water flow rate			6248	l/h
	Plant side pressure drop			16	kPa
A-4W55	Heating capacity	-4	55	37.0	kW
	Power input			15.4	kW
	COP			2.40	-
	Plant side water flow rate			4027	l/h
	Plant side pressure drop			7	kPa
A-4W65	Heating capacity	-4	65	38.3	kW
	Power input			19.0	kW
	COP			2.02	-
	Plant side water flow rate			3346	l/h
	Plant side pressure drop			5	kPa
A-7W35	Heating capacity	-7	35	33.3	kW
	Power input			10.3	kW
	COP			3.23	-
	Plant side water flow rate			5745	l/h
	Plant side pressure drop			14	kPa
A-7W45	Heating capacity	-7	45	34.1	kW
	Power input			12.8	kW
	COP			2.66	-
	Plant side water flow rate			5901	l/h
	Plant side pressure drop			15	kPa
A-7W55	Heating capacity	-7	55	35.1	kW
	Power input			15.4	kW
	COP			2.28	-
	Plant side water flow rate			3816	l/h
	Plant side pressure drop			6	kPa
A-7W65	Heating capacity	-7	65	36.4	kW
	Power input			19.0	kW
	COP			1.92	-
	Plant side water flow rate			3181	l/h
	Plant side pressure drop			5	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A7W35 = source :	air in 7°C db 6°C wb	plant :	water in 30°C out 35°C	A-4W35 = source :	air in -4°C db -5°C wb	plant :	water in 30°C out 35°C
A7W45 = source :	air in 7°C db 6°C wb	plant :	water in 40°C out 45°C	A-4W45 = source :	air in -4°C db -5°C wb	plant :	water in 40°C out 45°C
A7W55 = source :	air in 7°C db 6°C wb	plant :	water in 47°C out 55°C	A-4W55 = source :	air in -4°C db -5°C wb	plant :	water in 47°C out 55°C
A7W65 = source :	air in 7°C db 6°C wb	plant :	water in 55°C out 65°C	A-4W65 = source :	air in -4°C db -5°C wb	plant :	water in 55°C out 65°C
A2W35 = source :	air in 2°C db 1°C wb	plant :	water in 30°C out 35°C	A-7W35 = source :	air in -7°C db -8°C wb	plant :	water in 30°C out 35°C
A2W45 = source :	air in 2°C db 1°C wb	plant :	water in 40°C out 45°C	A-7W45 = source :	air in -7°C db -8°C wb	plant :	water in 40°C out 45°C
A2W55 = source :	air in 2°C db 1°C wb	plant :	water in 47°C out 55°C	A-7W55 = source :	air in -7°C db -8°C wb	plant :	water in 47°C out 55°C
A2W65 = source :	air in 2°C db 1°C wb	plant :	water in 55°C out 65°C	A-7W65 = source :	air in -7°C db -8°C wb	plant :	water in 55°C out 65°C
A-2W35 = source :	air in -2°C db -3°C wb	plant :	water in 30°C out 35°C				
A-2W45 = source :	air in -2°C db -3°C wb	plant :	water in 40°C out 45°C				
A-2W55 = source :	air in -2°C db -3°C wb	plant :	water in 47°C out 55°C				
A-2W65 = source :	air in -2°C db -3°C wb	plant :	water in 55°C out 65°C				

S-ASX-LPi 75 - Nominal Performance

HEATING		A	W	Nominal	
A7W35	Heating capacity	7	35	73.9	kW
	Power input			16.2	kW
	COP			4.56	-
	Plant side water flow rate			12753	l/h
	Plant side pressure drop			22	kPa
A7W45	Heating capacity	7	45	74.8	kW
	Power input			20.2	kW
	COP			3.70	-
	Plant side water flow rate			12949	l/h
	Plant side pressure drop			23	kPa
A7W55	Heating capacity	7	55	76.0	kW
	Power input			24.2	kW
	COP			3.14	-
	Plant side water flow rate			8269	l/h
	Plant side pressure drop			10	kPa
A7W65	Heating capacity	7	65	77.7	kW
	Power input			29.9	kW
	COP			2.60	-
	Plant side water flow rate			6795	l/h
	Plant side pressure drop			7	kPa
A2W35	Heating capacity	2	35	62.3	kW
	Power input			16.3	kW
	COP			3.82	-
	Plant side water flow rate			10759	l/h
	Plant side pressure drop			17	kPa
A2W45	Heating capacity	2	45	63.3	kW
	Power input			20.2	kW
	COP			3.13	-
	Plant side water flow rate			10970	l/h
	Plant side pressure drop			17	kPa
A2W55	Heating capacity	2	55	64.7	kW
	Power input			24.3	kW
	COP			2.66	-
	Plant side water flow rate			7037	l/h
	Plant side pressure drop			8	kPa
A2W65	Heating capacity	2	65	66.5	kW
	Power input			30.0	kW
	COP			2.22	-
	Plant side water flow rate			5815	l/h
	Plant side pressure drop			5	kPa
A-2W35	Heating capacity	-2	35	58.4	kW
	Power input			16.3	kW
	COP			3.58	-
	Plant side water flow rate			10081	l/h
	Plant side pressure drop			15	kPa
A-2W45	Heating capacity	-2	45	59.5	kW
	Power input			20.3	kW
	COP			2.93	-
	Plant side water flow rate			10309	l/h
	Plant side pressure drop			15	kPa
A-2W55	Heating capacity	-2	55	61.0	kW
	Power input			24.3	kW
	COP			2.51	-
	Plant side water flow rate			6633	l/h
	Plant side pressure drop			7	kPa
A-2W65	Heating capacity	-2	65	62.9	kW
	Power input			30.0	kW
	COP			2.10	-
	Plant side water flow rate			5501	l/h
	Plant side pressure drop			5	kPa

S-ASX-LPi 75 - Nominal Performance

HEATING		A	W	Nominal	
A-4W35	Heating capacity	-4	35	56.6	kW
	Power input			16.3	kW
	COP			3.47	-
	Plant side water flow rate			9765	l/h
	Plant side pressure drop			14	kPa
A-4W45	Heating capacity	-4	45	57.7	kW
	Power input			20.3	kW
	COP			2.84	-
	Plant side water flow rate			10002	l/h
	Plant side pressure drop			14	kPa
A-4W55	Heating capacity	-4	55	59.2	kW
	Power input			24.3	kW
	COP			2.44	-
	Plant side water flow rate			6447	l/h
	Plant side pressure drop			7	kPa
A-4W65	Heating capacity	-4	65	61.3	kW
	Power input			30.0	kW
	COP			2.04	-
	Plant side water flow rate			5357	l/h
	Plant side pressure drop			5	kPa
A-7W35	Heating capacity	-7	35	53.3	kW
	Power input			16.3	kW
	COP			3.27	-
	Plant side water flow rate			9197	l/h
	Plant side pressure drop			12	kPa
A-7W45	Heating capacity	-7	45	54.5	kW
	Power input			20.3	kW
	COP			2.68	-
	Plant side water flow rate			9447	l/h
	Plant side pressure drop			13	kPa
A-7W55	Heating capacity	-7	55	56.1	kW
	Power input			24.4	kW
	COP			2.30	-
	Plant side water flow rate			6109	l/h
	Plant side pressure drop			6	kPa
A-7W65	Heating capacity	-7	65	58.3	kW
	Power input			30.0	kW
	COP			1.94	-
	Plant side water flow rate			5093	l/h
	Plant side pressure drop			4	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A7W35	= source :	air in 7°C db 6°C wb	plant :	water in 30°C out 35°C	A-4W35	= source :	air in -4°C db -5°C wb	plant :	water in 30°C out 35°C
A7W45	= source :	air in 7°C db 6°C wb	plant :	water in 40°C out 45°C	A-4W45	= source :	air in -4°C db -5°C wb	plant :	water in 40°C out 45°C
A7W55	= source :	air in 7°C db 6°C wb	plant :	water in 47°C out 55°C	A-4W55	= source :	air in -4°C db -5°C wb	plant :	water in 47°C out 55°C
A7W65	= source :	air in 7°C db 6°C wb	plant :	water in 55°C out 65°C	A-4W65	= source :	air in -4°C db -5°C wb	plant :	water in 55°C out 65°C
A2W35	= source :	air in 2°C db 1°C wb	plant :	water in 30°C out 35°C	A-7W35	= source :	air in -7°C db -8°C wb	plant :	water in 30°C out 35°C
A2W45	= source :	air in 2°C db 1°C wb	plant :	water in 40°C out 45°C	A-7W45	= source :	air in -7°C db -8°C wb	plant :	water in 40°C out 45°C
A2W55	= source :	air in 2°C db 1°C wb	plant :	water in 47°C out 55°C	A-7W55	= source :	air in -7°C db -8°C wb	plant :	water in 47°C out 55°C
A2W65	= source :	air in 2°C db 1°C wb	plant :	water in 55°C out 65°C	A-7W65	= source :	air in -7°C db -8°C wb	plant :	water in 55°C out 65°C
A-2W35	= source :	air in -2°C db -3°C wb	plant :	water in 30°C out 35°C					
A-2W45	= source :	air in -2°C db -3°C wb	plant :	water in 40°C out 45°C					
A-2W55	= source :	air in -2°C db -3°C wb	plant :	water in 47°C out 55°C					
A-2W65	= source :	air in -2°C db -3°C wb	plant :	water in 55°C out 65°C					

S-ASX-LPi 100 - Nominal Performance

HEATING		A	W	Nominal	
A7W35	Heating capacity	7	35	92.5	kW
	Power input			20.5	kW
	COP			4.51	-
	Plant side water flow rate			15951	l/h
	Plant side pressure drop			25	kPa
A7W45	Heating capacity	7	45	93.6	kW
	Power input			25.6	kW
	COP			3.66	-
	Plant side water flow rate			16197	l/h
	Plant side pressure drop			26	kPa
A7W55	Heating capacity	7	55	95.1	kW
	Power input			30.7	kW
	COP			3.10	-
	Plant side water flow rate			10343	l/h
	Plant side pressure drop			11	kPa
A7W65	Heating capacity	7	65	97.3	kW
	Power input			37.8	kW
	COP			2.57	-
	Plant side water flow rate			8499	l/h
	Plant side pressure drop			8	kPa
A2W35	Heating capacity	2	35	78.0	kW
	Power input			20.6	kW
	COP			3.79	-
	Plant side water flow rate			13458	l/h
	Plant side pressure drop			18	kPa
A2W45	Heating capacity	2	45	79.2	kW
	Power input			25.6	kW
	COP			3.09	-
	Plant side water flow rate			13721	l/h
	Plant side pressure drop			19	kPa
A2W55	Heating capacity	2	55	80.9	kW
	Power input			30.7	kW
	COP			2.64	-
	Plant side water flow rate			8802	l/h
	Plant side pressure drop			9	kPa
A2W65	Heating capacity	2	65	83.2	kW
	Power input			37.9	kW
	COP			2.20	-
	Plant side water flow rate			7274	l/h
	Plant side pressure drop			6	kPa
A-2W35	Heating capacity	-2	35	73.0	kW
	Power input			20.6	kW
	COP			3.54	-
	Plant side water flow rate			12610	l/h
	Plant side pressure drop			16	kPa
A-2W45	Heating capacity	-2	45	74.4	kW
	Power input			25.6	kW
	COP			2.91	-
	Plant side water flow rate			12894	l/h
	Plant side pressure drop			17	kPa
A-2W55	Heating capacity	-2	55	76.2	kW
	Power input			30.8	kW
	COP			2.47	-
	Plant side water flow rate			8297	l/h
	Plant side pressure drop			8	kPa
A-2W65	Heating capacity	-2	65	78.7	kW
	Power input			37.9	kW
	COP			2.08	-
	Plant side water flow rate			6881	l/h
	Plant side pressure drop			5	kPa

S-ASX-LPi 100 - Nominal Performance

HEATING		A	W	Nominal	
A-4W35	Heating capacity	-4	35	70.7	kW
	Power input			20.6	kW
	COP			3.43	-
	Plant side water flow rate			12215	l/h
	Plant side pressure drop			15	kPa
A-4W45	Heating capacity	-4	45	72.2	kW
	Power input			25.6	kW
	COP			2.82	-
	Plant side water flow rate			12510	l/h
	Plant side pressure drop			16	kPa
A-4W55	Heating capacity	-4	55	74.1	kW
	Power input			30.8	kW
	COP			2.41	-
	Plant side water flow rate			8064	l/h
	Plant side pressure drop			7	kPa
A-4W65	Heating capacity	-4	65	76.6	kW
	Power input			38.0	kW
	COP			2.02	-
	Plant side water flow rate			6700	l/h
	Plant side pressure drop			5	kPa
A-7W35	Heating capacity	-7	35	66.6	kW
	Power input			20.6	kW
	COP			3.23	-
	Plant side water flow rate			11503	l/h
	Plant side pressure drop			14	kPa
A-7W45	Heating capacity	-7	45	68.2	kW
	Power input			25.7	kW
	COP			2.65	-
	Plant side water flow rate			11817	l/h
	Plant side pressure drop			15	kPa
A-7W55	Heating capacity	-7	55	70.2	kW
	Power input			30.8	kW
	COP			2.28	-
	Plant side water flow rate			7641	l/h
	Plant side pressure drop			7	kPa
A-7W65	Heating capacity	-7	65	72.9	kW
	Power input			38.0	kW
	COP			1.92	-
	Plant side water flow rate			6370	l/h
	Plant side pressure drop			5	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A7W35	= source :	air in 7°C db 6°C wb	plant :	water in 30°C out 35°C	A-4W35	= source :	air in -4°C db -5°C wb	plant :	water in 30°C out 35°C
A7W45	= source :	air in 7°C db 6°C wb	plant :	water in 40°C out 45°C	A-4W45	= source :	air in -4°C db -5°C wb	plant :	water in 40°C out 45°C
A7W55	= source :	air in 7°C db 6°C wb	plant :	water in 47°C out 55°C	A-4W55	= source :	air in -4°C db -5°C wb	plant :	water in 47°C out 55°C
A7W65	= source :	air in 7°C db 6°C wb	plant :	water in 55°C out 65°C	A-4W65	= source :	air in -4°C db -5°C wb	plant :	water in 55°C out 65°C
A2W35	= source :	air in 2°C db 1°C wb	plant :	water in 30°C out 35°C	A-7W35	= source :	air in -7°C db -8°C wb	plant :	water in 30°C out 35°C
A2W45	= source :	air in 2°C db 1°C wb	plant :	water in 40°C out 45°C	A-7W45	= source :	air in -7°C db -8°C wb	plant :	water in 40°C out 45°C
A2W55	= source :	air in 2°C db 1°C wb	plant :	water in 47°C out 55°C	A-7W55	= source :	air in -7°C db -8°C wb	plant :	water in 47°C out 55°C
A2W65	= source :	air in 2°C db 1°C wb	plant :	water in 55°C out 65°C	A-7W65	= source :	air in -7°C db -8°C wb	plant :	water in 55°C out 65°C
A-2W35	= source :	air in -2°C db -3°C wb	plant :	water in 30°C out 35°C					
A-2W45	= source :	air in -2°C db -3°C wb	plant :	water in 40°C out 45°C					
A-2W55	= source :	air in -2°C db -3°C wb	plant :	water in 47°C out 55°C					
A-2W65	= source :	air in -2°C db -3°C wb	plant :	water in 55°C out 65°C					

S-ASX-LPi - Cooling Performances

	COOLING	A	W	55	
A35W7	Cooling capacity	35	7	36,2	kW
	Power input			11,3	kW
	EER			3,20	-
	Plant side water flow rate			6230	l/h
	Plant side pressure drops			16	kPa
A35W18	Cooling capacity	35	18	47,8	kW
	Power input			12,3	kW
	EER			3,89	-
	Plant side water flow rate			8275	l/h
	Plant side pressure drops			28	kPa
A25W7	Cooling capacity	25	7	40,5	kW
	Power input			9,7	kW
	EER			4,18	-
	Plant side water flow rate			6985	l/h
	Plant side pressure drops			20	kPa
A25W18	Cooling capacity	25	18	52,5	kW
	Power input			10,6	kW
	EER			4,95	-
	Plant side water flow rate			9099	l/h
	Plant side pressure drops			34	kPa

	COOLING	A	W	75	100	
A35W7	Cooling capacity	35	7	58,0	72,6	kW
	Power input			18,2	23,0	kW
	EER			3,19	3,16	-
	Plant side water flow rate			9988	12493	l/h
	Plant side pressure drops			15	16	kPa
A35W18	Cooling capacity	35	18	76,7	95,9	kW
	Power input			19,7	24,9	kW
	EER			3,89	3,85	-
	Plant side water flow rate			13267	16595	l/h
	Plant side pressure drops			24	27	kPa
A25W7	Cooling capacity	25	7	65,0	81,4	kW
	Power input			15,5	19,6	kW
	EER			4,19	4,15	-
	Plant side water flow rate			11199	14009	l/h
	Plant side pressure drops			18	20	kPa
A25W18	Cooling capacity	25	18	84,3	105	kW
	Power input			17	22	kW
	EER			4,96	4,88	-
	Plant side water flow rate			14589	18248	l/h
	Plant side pressure drops			29	32	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A35W7	=	source :	air in 35°C db	plant :	water in 12°C out 7°C
A35W18	=	source :	air in 35°C db	plant :	water in 23°C out 18°C
A25W7	=	source :	air in 25°C db	plant :	water in 12°C out 7°C
A25W18	=	source :	air in 25°C db	plant :	water in 23°C out 18°C

S-ASX-LPi 55 - NOMINAL Heating & Cooling Performances

Model	Water outlet temperature	Outdoor Air Temperature													
		Tdb	-20	-15	-7	-4	-2	0	2	7	12	20	35	42	°C
		Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	28	°C
55	65 (ΔT 10°C)	Heating capacity	27,7	30,7	36,4	38,3	39,3	40,4	41,6	48,6	52,3	56,8	64,4	67,4	kW
		Power input	19,0	19,0	19,0	19,0	19,0	19,0	18,9	18,9	18,9	18,8	18,8	18,7	kW
		COP	1,46	1,62	1,92	2,02	2,07	2,13	2,20	2,57	2,77	3,02	3,43	3,60	-
	60	Heating capacity	26,7	29,8	35,6	37,5	38,6	39,6	40,8	47,9	51,7	56,2	63,8	66,9	kW
		Power input	17,9	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	17,9	kW
		COP	1,49	1,66	1,98	2,08	2,14	2,20	2,27	2,66	2,87	3,12	3,54	3,74	-
	55	Heating capacity	26,0	29,1	35,0	37,0	38,0	39,1	40,4	47,5	51,2	55,8	63,5	66,6	kW
		Power input	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0	kW
		COP	1,62	1,82	2,19	2,31	2,38	2,44	2,52	2,97	3,20	3,49	3,97	4,16	-
	50	Heating capacity	25,4	28,5	34,5	36,5	37,6	38,7	39,9	47,1	50,9	55,5	63,2	66,3	kW
		Power input	14,3	14,3	14,3	14,3	14,3	14,3	14,3	14,3	14,3	14,3	14,3	14,3	kW
		COP	1,78	1,99	2,41	2,55	2,63	2,71	2,79	3,29	3,56	3,88	4,42	4,64	-
	45	Heating capacity	24,8	28,0	34,1	36,1	37,2	38,3	39,6	46,8	50,6	55,2	63,0	66,1	kW
		Power input	12,8	12,8	12,8	12,8	12,8	12,8	12,8	12,8	12,8	12,8	12,8	12,8	kW
		COP	1,94	2,19	2,66	2,82	2,91	2,99	3,09	3,66	3,95	4,31	4,92	5,16	-
	40	Heating capacity	24,2	27,5	33,7	35,7	36,8	38,0	39,3	46,5	50,4	55,0	62,9	65,9	kW
		Power input	11,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5	kW
		COP	2,10	2,39	2,93	3,10	3,20	3,30	3,42	4,04	4,38	4,78	5,47	5,73	-
	35	Heating capacity	23,7	27,0	33,3	35,4	36,5	37,7	39,0	46,2	50,1	54,8	62,7	65,8	kW
		Power input	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3	kW
		COP	2,30	2,62	3,23	3,44	3,54	3,66	3,79	4,49	4,86	5,32	6,09	6,39	-
	30	Heating capacity	23,1	26,5	32,9	35,0	36,1	37,3	38,6	45,9	49,9	54,6	62,5	65,6	kW
		Power input	9,17	9,20	9,21	9,2	9,20	9,19	9,18	9,19	9,18	9,17	9,15	9,14	kW
		COP	2,52	2,88	3,57	3,80	3,92	4,06	4,20	4,99	5,44	5,95	6,83	7,18	-

Model	Water outlet temperature	Outdoor Air Temperature									
		Tdb	15	20	25	30	35	40	45	50	°C
		Twb	-	-	-	-	-	-	-	-	°C
55	18	Cooling capacity	55,1	54,0	52,5	50,4	47,8	44,4	40,2	35,2	kW
		Power input	9,5	10,0	10,6	11,4	12,3	13,3	14,5	15,8	kW
		EER	5,81	5,40	4,95	4,42	3,89	3,34	2,77	2,23	-
	12	Cooling capacity	49,6	48,5	47,1	45,1	42,5	39,2	35,2	30,3	kW
		Power input	9,02	9,5	10,2	10,9	11,8	12,8	14,0	15,3	kW
		EER	5,50	5,09	4,62	4,14	3,60	3,06	2,51	1,98	-
	7	Cooling capacity	42,9	41,9	40,5	38,6	36,2	33,0	29,1	24,4	kW
		Power input	8,52	9,04	9,7	10,4	11,3	12,4	13,5	14,9	kW
		EER	5,04	4,63	4,18	3,71	3,20	2,66	2,16	1,64	-

Data declared applying corrections according to EN 14511 and considering a ΔT of 5°C between water inlet and outlet **at the ASHP model**.
The data are related to units working at the **nominal frequency**, without options or accessories.

S-ASX-LPi 75 - NOMINAL Heating & Cooling Performances

Model	Water outlet temperature	Outdoor Air Temperature													
		Tdb	-20	-15	-7	-4	-2	0	2	7	12	20	35	42	°C
		Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	28	°C
75	65 (ΔT 10°C)	Heating capacity	44,3	49,1	58,3	61,3	62,9	64,6	66,5	77,7	83,7	90,9	103,0	108,0	kW
		Power input	30,0	30,0	30,0	30,0	30,0	30,0	30,0	29,9	29,9	29,8	29,7	29,6	kW
		COP	1,48	1,64	1,94	2,04	2,10	2,15	2,22	2,60	2,80	3,05	3,47	3,65	-
	60	Heating capacity	42,8	47,6	56,9	60,0	61,7	63,4	65,3	76,6	82,6	89,8	102,0	107,0	kW
		Power input	28,3	28,4	28,4	28,4	28,4	28,4	28,4	28,4	28,4	28,3	28,3	28,2	kW
		COP	1,51	1,68	2,00	2,11	2,17	2,23	2,30	2,70	2,91	3,17	3,60	3,79	-
	55	Heating capacity	41,6	46,5	56,0	59,1	60,8	62,6	64,5	75,9	81,9	89,2	102,0	106,0	kW
		Power input	25,3	25,3	25,3	25,3	25,3	25,3	25,3	25,3	25,2	25,2	25,2	25,1	kW
		COP	1,64	1,84	2,21	2,34	2,40	2,47	2,55	3,00	3,25	3,54	4,05	4,22	-
	50	Heating capacity	40,6	45,6	55,2	58,4	60,1	61,9	63,9	75,3	81,4	88,7	101,0	106,0	kW
		Power input	22,6	22,6	22,6	22,6	22,6	22,6	22,6	22,6	22,6	22,5	22,5	22,4	kW
		COP	1,80	2,02	2,44	2,58	2,66	2,74	2,83	3,33	3,60	3,94	4,49	4,73	-
	45	Heating capacity	39,6	44,8	54,5	57,7	59,5	61,3	63,3	74,8	80,9	88,3	101,0	106,0	kW
		Power input	20,2	20,3	20,3	20,3	20,3	20,2	20,2	20,2	20,2	20,2	20,1	20,1	kW
		COP	1,96	2,21	2,68	2,84	2,93	3,03	3,13	3,70	4,00	4,37	5,02	5,27	-
	40	Heating capacity	38,7	44,0	53,9	57,1	58,9	60,8	62,8	74,3	80,5	88,0	100,0	105,0	kW
		Power input	18,1	18,2	18,2	18,2	18,2	18,2	18,1	18,1	18,1	18,1	18,0	18,0	kW
		COP	2,14	2,42	2,96	3,14	3,24	3,34	3,47	4,10	4,45	4,86	5,56	5,83	-
	35	Heating capacity	37,9	43,2	53,3	56,6	58,4	60,3	62,3	73,9	80,1	87,6	100,0	105,0	kW
		Power input	16,3	16,3	16,3	16,3	16,3	16,3	16,3	16,2	16,2	16,2	16,1	16,1	kW
		COP	2,33	2,65	3,27	3,47	3,58	3,70	3,82	4,56	4,94	5,41	6,21	6,52	-
	30	Heating capacity	37,0	42,4	52,6	56,0	57,8	59,7	61,8	73,5	79,7	87,3	99,9	105,0	kW
		Power input	14,50	14,5	14,5	14,5	14,5	14,5	14,5	14,5	14,4	14,4	14,3	14,3	kW
		COP	2,55	2,92	3,63	3,86	3,99	4,12	4,26	5,07	5,53	6,06	6,99	7,34	-

Model	Water outlet temperature	Outdoor Air Temperature									
		Tdb	15	20	25	30	35	40	45	50	°C
		Twb	-	-	-	-	-	-	-	-	°C
75	18	Cooling capacity	88,5	86,7	84,3	80,9	76,7	71,2	64,6	56,5	kW
		Power input	15,1	16,0	17,0	18,2	19,7	21,3	23,2	25,3	kW
		EER	5,86	5,42	4,96	4,45	3,89	3,34	2,78	2,23	-
	12	Cooling capacity	79,6	77,9	75,5	72,3	68,2	62,9	56,5	48,6	kW
		Power input	14,4	15,2	16,3	17,5	18,9	20,6	22,5	24,6	kW
		EER	5,53	5,13	4,63	4,13	3,61	3,05	2,51	1,98	-
	7	Cooling capacity	68,8	67,3	65,0	62,0	58,0	53,0	46,7	39,1	kW
		Power input	13,6	14,5	15,5	16,7	18,2	19,8	21,7	23,9	kW
		EER	5,06	4,64	4,19	3,71	3,19	2,68	2,15	1,64	-

Data declared applying corrections according to EN 14511 and considering a ΔT of 5°C between water inlet and outlet **at the ASHP model**.
The data are related to units working at the **nominal frequency**, without options or accessories.

S-ASX-LPi 100 - NOMINAL Heating & Cooling Performances

Model	Water outlet temperature	Outdoor Air Temperature													
		Tdb	-20	-15	-7	-4	-2	0	2	7	12	20	35	42	°C
		Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	28	°C
100	65 (ΔT 10°C)	Heating capacity	55,5	61,4	72,9	76,6	78,7	80,8	83,2	97,3	105,0	114,0	129,0	135,0	kW
		Power input	37,9	38,0	38,0	38,0	37,9	37,9	37,9	37,8	37,8	37,7	37,5	37,5	kW
		COP	1,46	1,62	1,92	2,02	2,08	2,13	2,20	2,57	2,78	3,02	3,44	3,60	-
	60	Heating capacity	53,5	59,5	71,2	75,0	77,1	79,3	81,7	95,8	103,0	112,0	128,0	134,0	kW
		Power input	35,8	35,9	35,9	35,9	35,9	35,9	35,9	35,9	35,9	35,8	35,7	35,7	kW
		COP	1,49	1,66	1,98	2,09	2,15	2,21	2,28	2,67	2,87	3,13	3,59	3,75	-
	55	Heating capacity	52,0	58,2	70,1	73,9	76,1	78,3	80,7	94,9	102,0	112,0	127,0	133,0	kW
		Power input	31,9	32,0	32,0	32,0	32,0	32,0	32,0	31,9	31,9	31,9	31,8	31,8	kW
		COP	1,63	1,82	2,19	2,31	2,38	2,45	2,52	2,97	3,20	3,51	3,99	4,18	-
	50	Heating capacity	50,7	57,0	69,1	73,0	75,2	77,4	79,9	94,2	102,0	111,0	126,0	133,0	kW
		Power input	28,5	28,6	28,6	28,6	28,6	28,6	28,6	28,6	28,5	28,5	28,4	28,4	kW
		COP	1,78	1,99	2,42	2,55	2,63	2,71	2,79	3,29	3,58	3,89	4,44	4,68	-
	45	Heating capacity	49,6	56,0	68,2	72,2	74,4	76,7	79,2	93,6	101,0	110,0	126,0	132,0	kW
		Power input	25,6	25,6	25,7	25,6	25,6	25,6	25,6	25,6	25,5	25,5	25,4	25,4	kW
		COP	1,94	2,19	2,65	2,82	2,91	3,00	3,09	3,66	3,96	4,31	4,96	5,20	-
	40	Heating capacity	48,5	55,0	67,4	71,5	73,7	76,0	78,6	93,0	101,0	110,0	126,0	132,0	kW
		Power input	23,0	23,0	23,0	23,0	23,0	23,0	22,9	22,9	22,9	22,8	22,8	22,7	kW
		COP	2,11	2,39	2,93	3,11	3,20	3,30	3,43	4,06	4,41	4,82	5,53	5,81	-
	35	Heating capacity	47,4	54,1	66,6	70,7	73,0	75,4	78,0	92,5	100,0	110,0	125,0	132,0	kW
		Power input	20,6	20,6	20,6	20,6	20,6	20,6	20,6	20,5	20,5	20,5	20,4	20,3	kW
		COP	2,30	2,63	3,23	3,43	3,54	3,66	3,79	4,51	4,88	5,37	6,13	6,50	-
	30	Heating capacity	46,3	53,1	65,8	70,0	72,3	74,7	77,3	91,9	99,7	109,0	125,0	131,0	kW
		Power input	18,3	18,4	18,4	18,4	18,4	18,3	18,3	18,3	18,3	18,2	18,1	18,1	kW
		COP	2,53	2,89	3,58	3,80	3,93	4,08	4,22	5,02	5,45	5,99	6,91	7,24	-

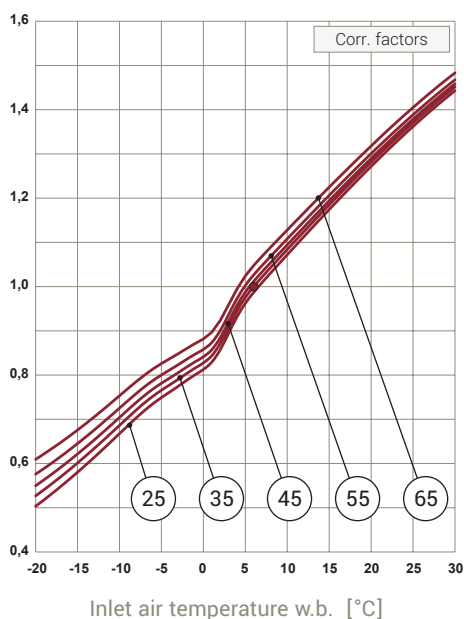
Model	Water outlet temperature	Outdoor Air Temperature									
		Tdb	15	20	25	30	35	40	45	50	°C
		Twb	-	-	-	-	-	-	-	-	°C
100	18	Cooling capacity	111,0	108,0	105,0	101,0	95,9	89,1	80,8	70,7	kW
		Power input	19,2	20,2	21,5	23,1	24,9	27,0	29,4	32,1	kW
		EER	5,78	5,35	4,88	4,37	3,85	3,30	2,75	2,20	-
	12	Cooling capacity	99,6	97,5	94,5	90,5	85,3	78,7	70,6	60,8	kW
		Power input	18,2	19,3	20,6	22,1	24,0	26,1	28,5	31,2	kW
		EER	5,47	5,05	4,59	4,10	3,55	3,02	2,48	1,95	-
	7	Cooling capacity	86,1	84,2	81,4	77,6	72,6	66,3	58,4	48,9	kW
		Power input	17,3	18,3	19,6	21,2	23,0	25,1	27,5	30,2	kW
		EER	4,98	4,60	4,15	3,66	3,16	2,64	2,12	1,62	-

Data declared applying corrections according to EN 14511 and considering a ΔT of 5°C between water inlet and outlet at the ASHP model.
The data are related to units working at the **nominal frequency**, without options or accessories.

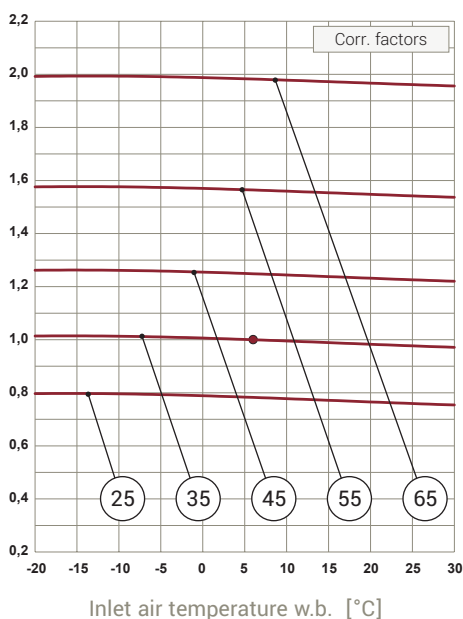
Heating and Cooling Performances

HEATING Performances

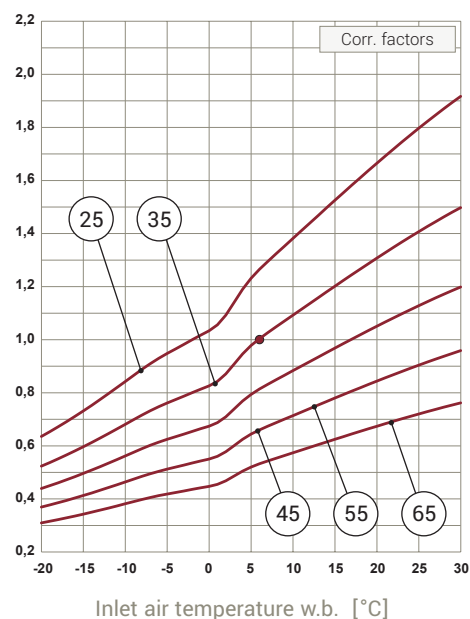
Heating capacity



Power input

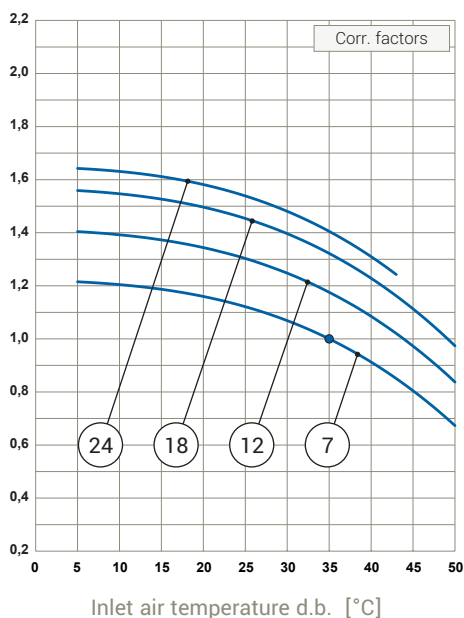


Efficiency - COP

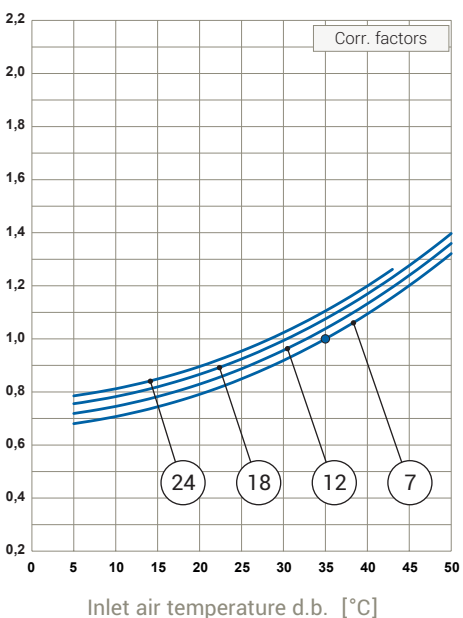


COOLING Performances

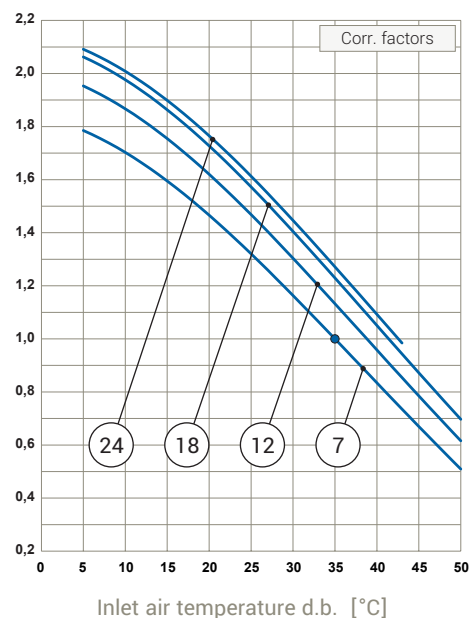
Cooling capacity



Power input



Efficiency - EER



The graphs provide the **corrective factors** to be applied to the **NOMINAL** performances in order to obtain the performances in the selected operating conditions. The curves are parameterized according to the outlet water temperature on the plant sidewith a ΔT equal to 5°C.

Nominal reference conditions :

heating :
A7W35

cooling :
A35W7

source : air in 7°C db 6°C wb
plant : water in 30°C out 35°C

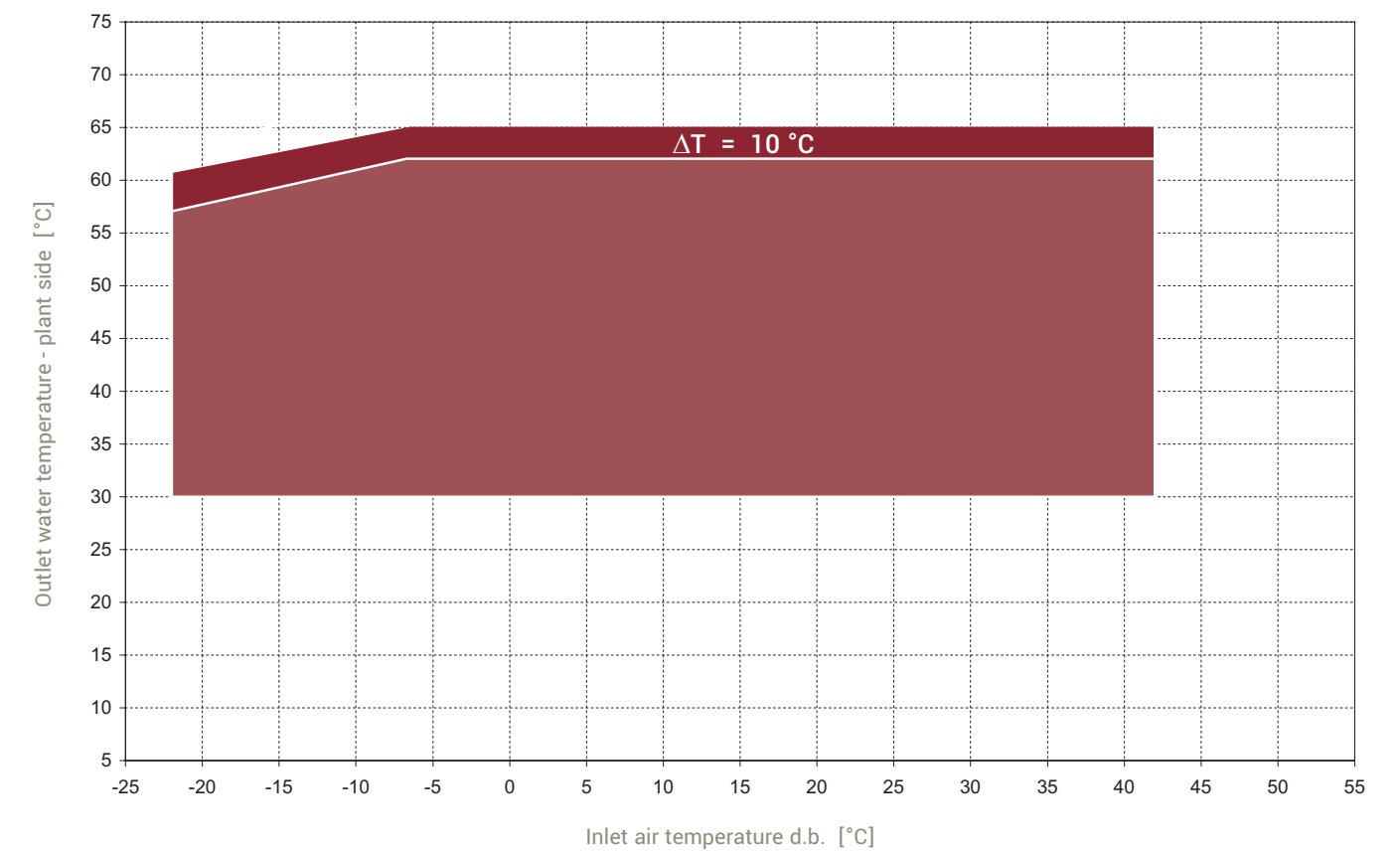
source : air in 35°C db
plant : water in 12°C out 7°C

Operating Range

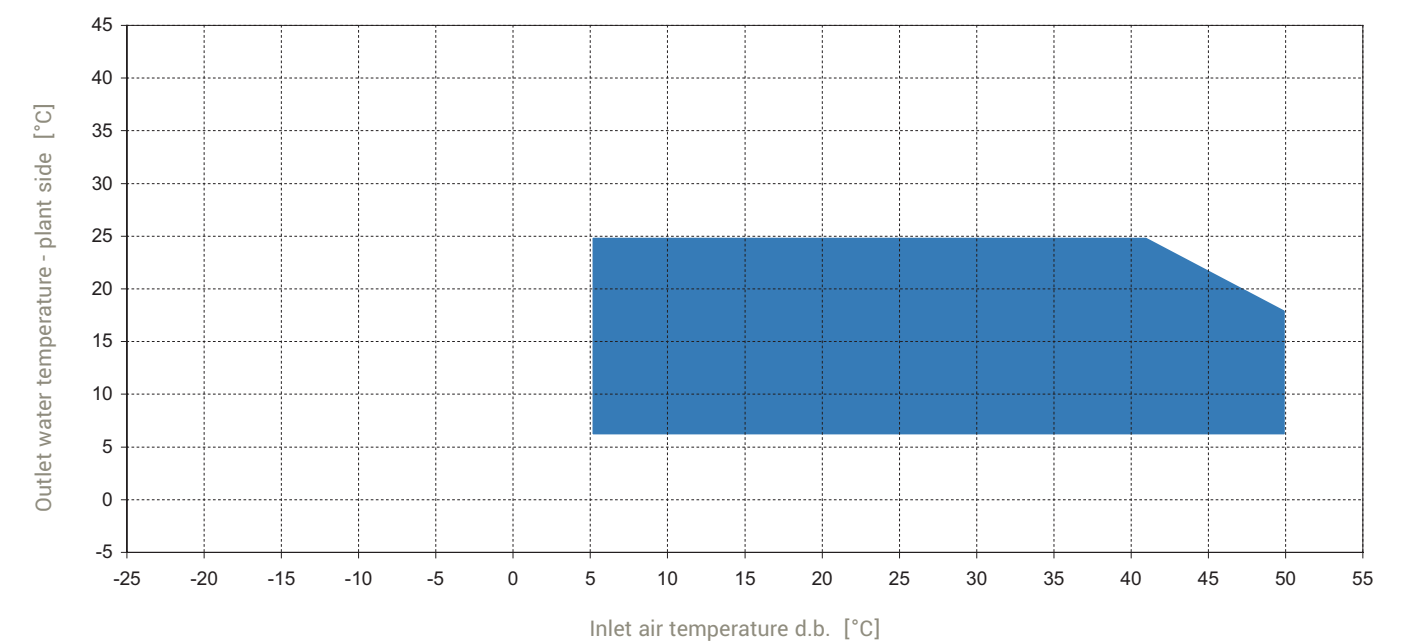
The graphs reported below show the operating area inside which the correct working of the unit is guaranteed. The darker area is allowed only with a ΔT of 10°C between water inlet and water outlet on the plant side.

The absolute maximum return temperature back to the S-ASX-LPi ASHP range is 57°C.

HEATING



COOLING

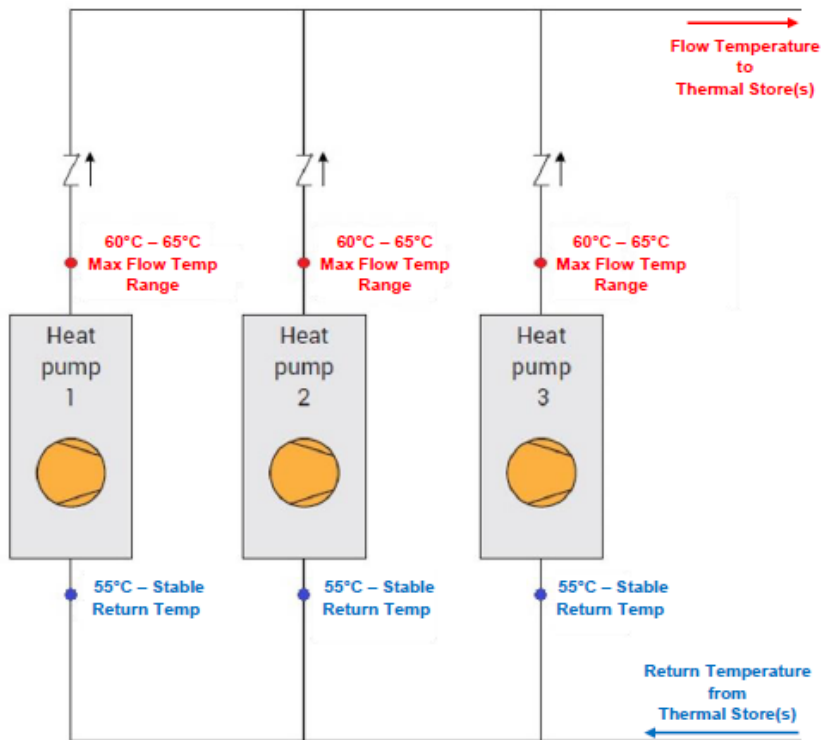


Temperature difference between water inlet and outlet		Plant side	Source side	
ΔT max	Maximum value	10	-	°C
ΔT min	Minimum value	3	-	°C

S-ASX-LPi ASHP - Expected Maximum Flow Temperatures

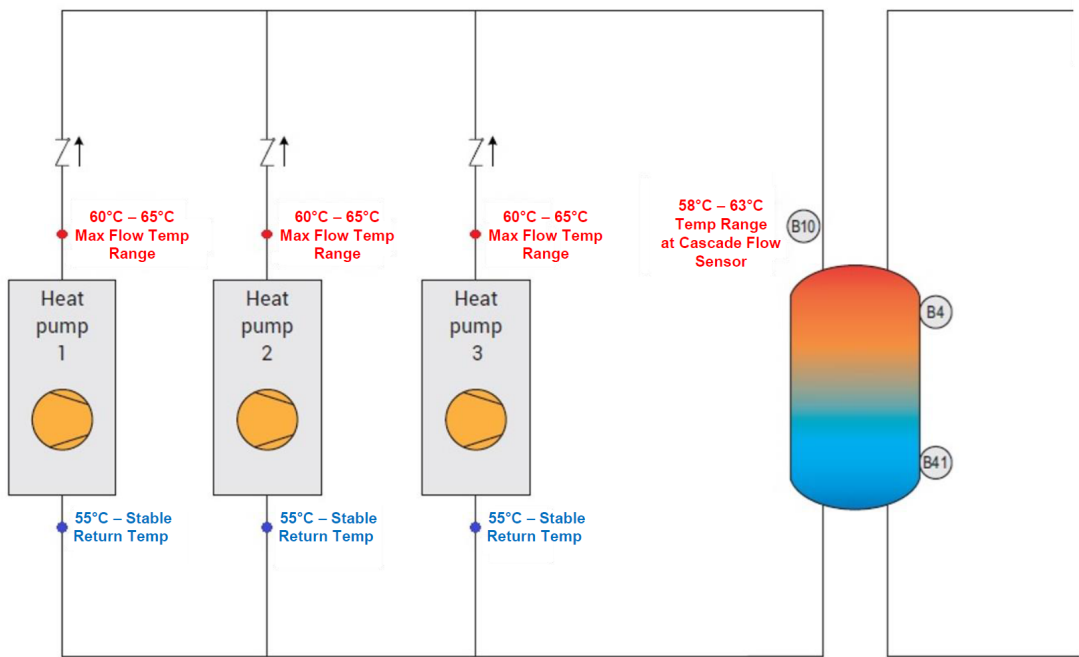
S-ASX-LPi - ASHP Maximum Flow & Return Temperatures

The nominal heating performances as shown on pages 17 to 19 is based on the flow and return temperature at the S-ASX-LPi ASHP. The below drawing shows the stable maximum return temperature that can return back to the ASHP, along with the maximum flow temperature range. The flow temperature will range between these temperatures based on the compressor power meaning the flow temperature will be at the upper limit whilst the compressor is in high power and at the lower limit once the compressor modulates down to low power.



S-ASX-LPi ASHP - Flow Temperature at the Cascade Flow Sensor (B10)

The ASHP cascade flow temperature sensor is to be installed on the common flow pipework as near as possible to the thermal store(s) within the plant room. An expected temperature difference of up to a 2°C between the ASHP flow temperature and the cascade flow sensor.

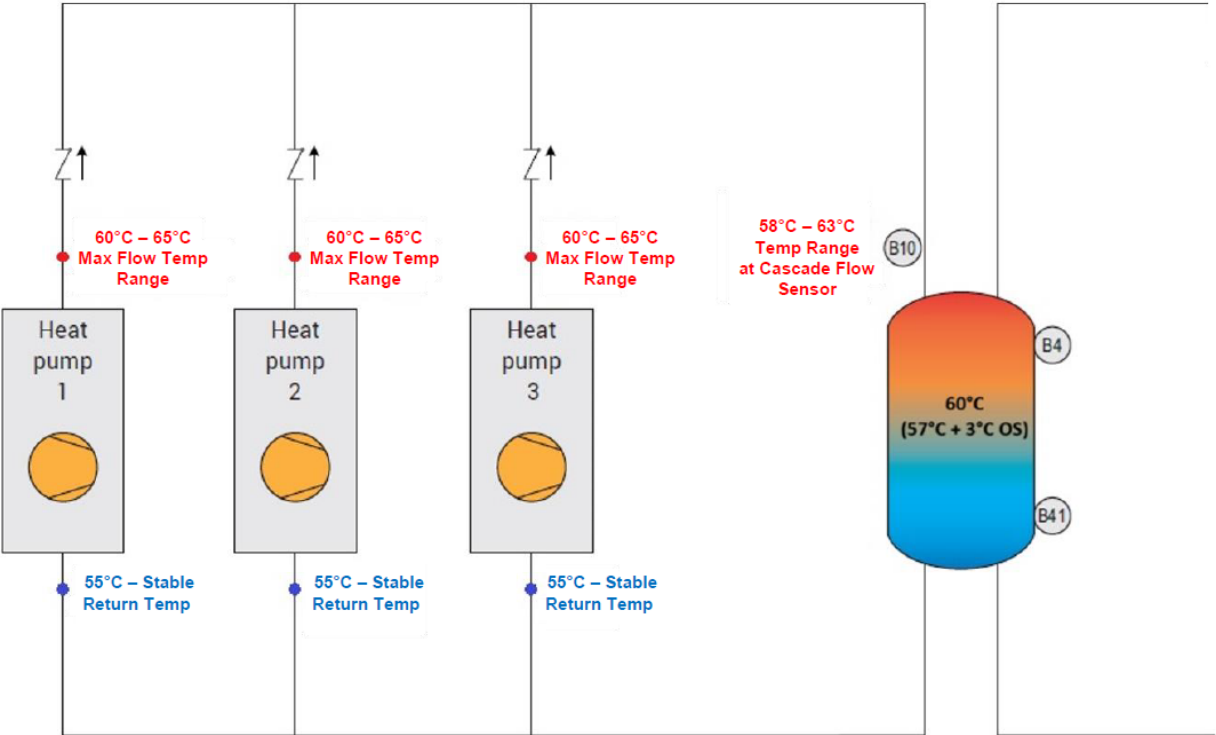


Depending on various factors such as pipework distance between the ASHP's to the cascade sensor, the overall resistance within the primary pipework, the efficiency of the pipework insulation and if trace heating has been installed, the temperature difference could either be reduced to less than 2°C or increased to more than 2°C.

S-ASX-LPi ASHP - Expected Maximum Flow Temperatures

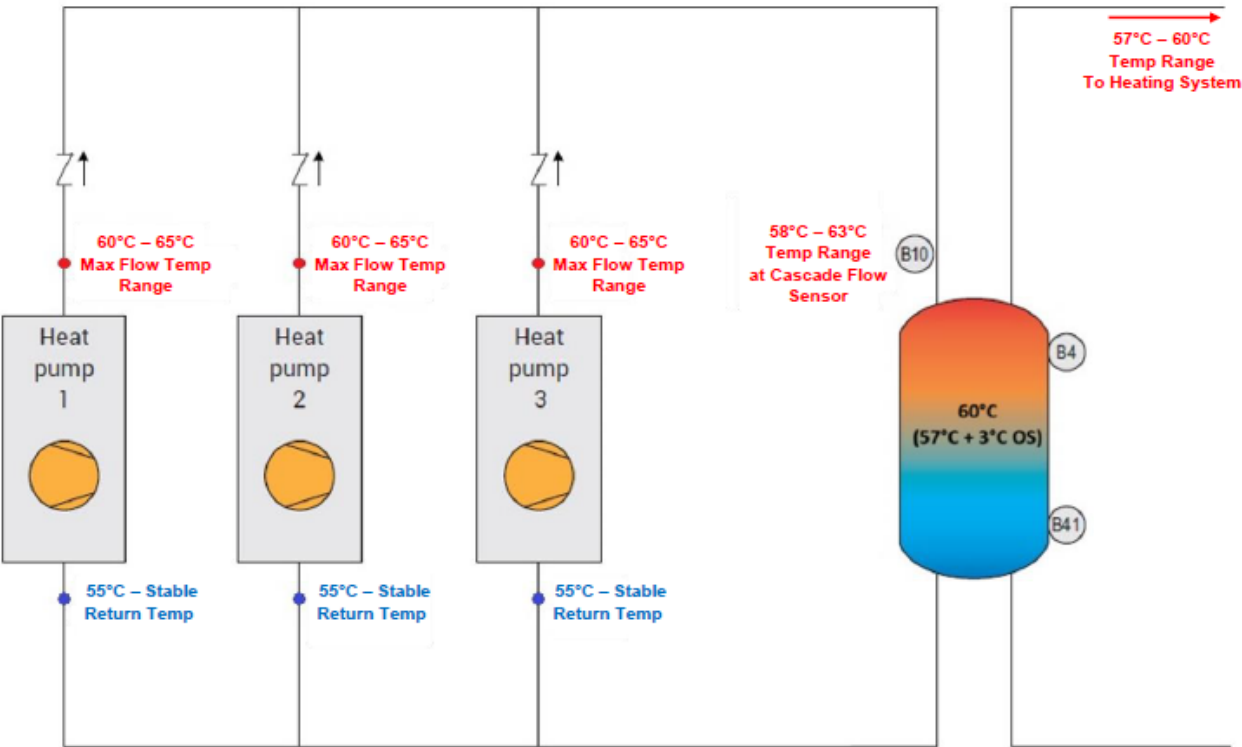
S-ASX-LPi - Temperatures within the Thermal Store

Taking into the consideration the mean temperature of the flow temperature range at the cascade flow sensor (B10) as shown on the previous page, the expected highest temperature within the top third of the thermal store(s) will be 60°C. In cases where the thermal store is up to temperature and the ASHP's are in standby, the temperature within the thermal store must drop by 3°C before the ASHP's reactivate. Therefore there will be a short period where the temperature within the thermal store is 57°C hence the range shown within the thermal store.



S-ASX-LPi ASHP - Flow Temperatures from Thermal Store(s) to Heating System

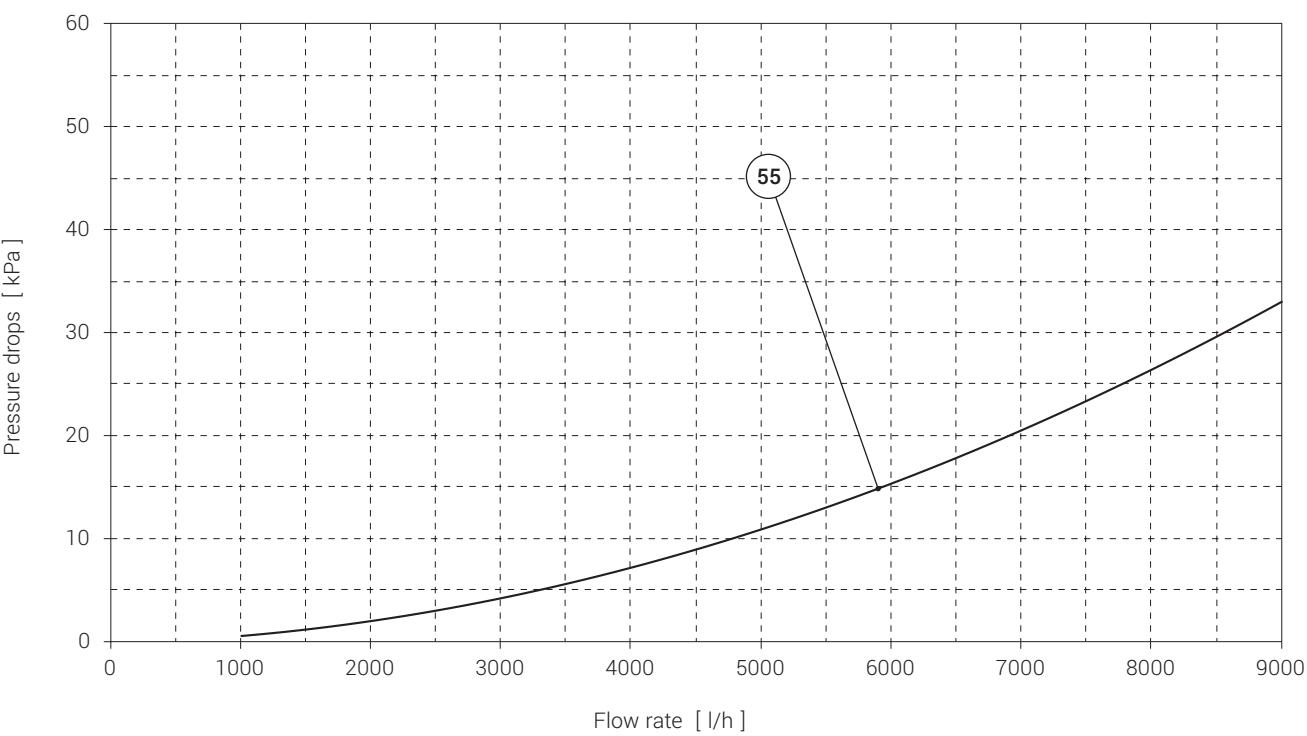
The temperature of the flow from the thermal store to the heating system will match the temperature within the thermal store.



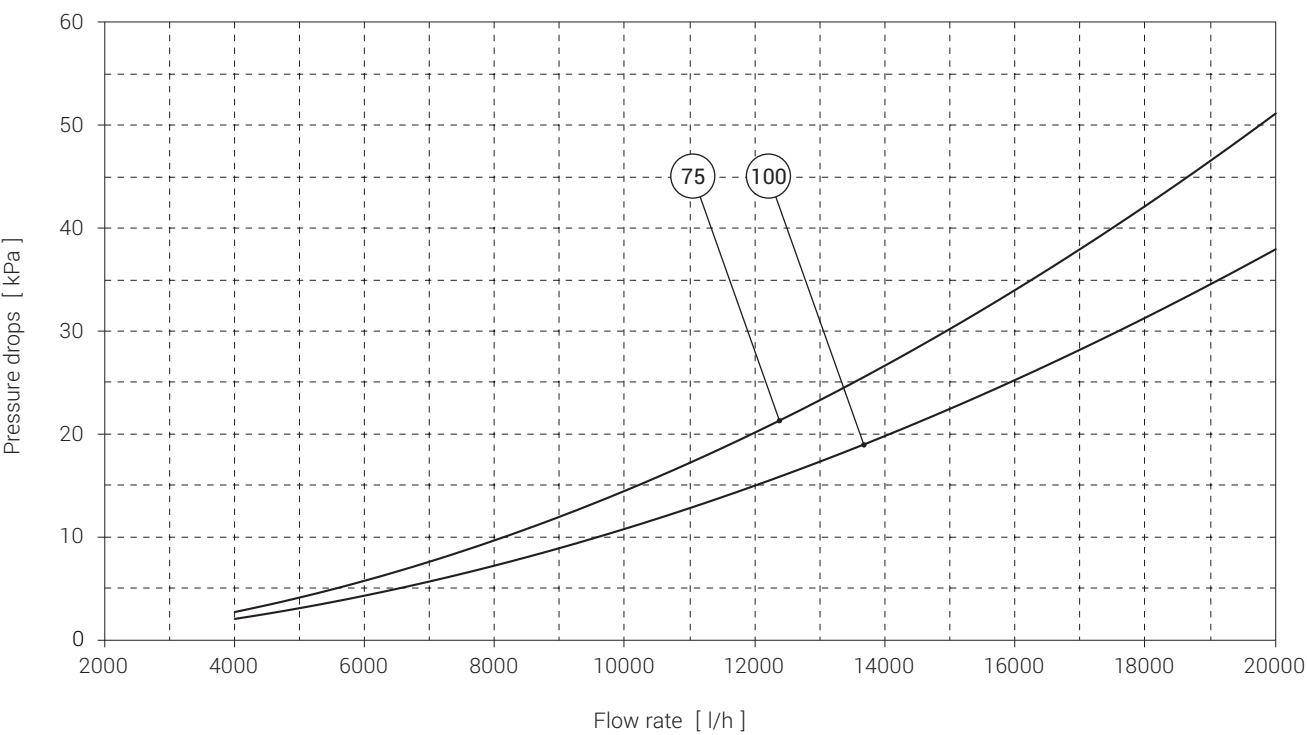
The temperatures listed within this page and the previous page after the ASHP's are expected temperatures. These can differ (either be increased or reduced) pending the installation such as pipework distance between the ASHP's to the thermal store(s), the overall resistance within the primary pipework, the efficiency of the pipework insulation and if trace heating has been installed.

HYDRAULIC Performances

Plant Side Pressure Drop - Through S-ASX-LPi 55 ASHP



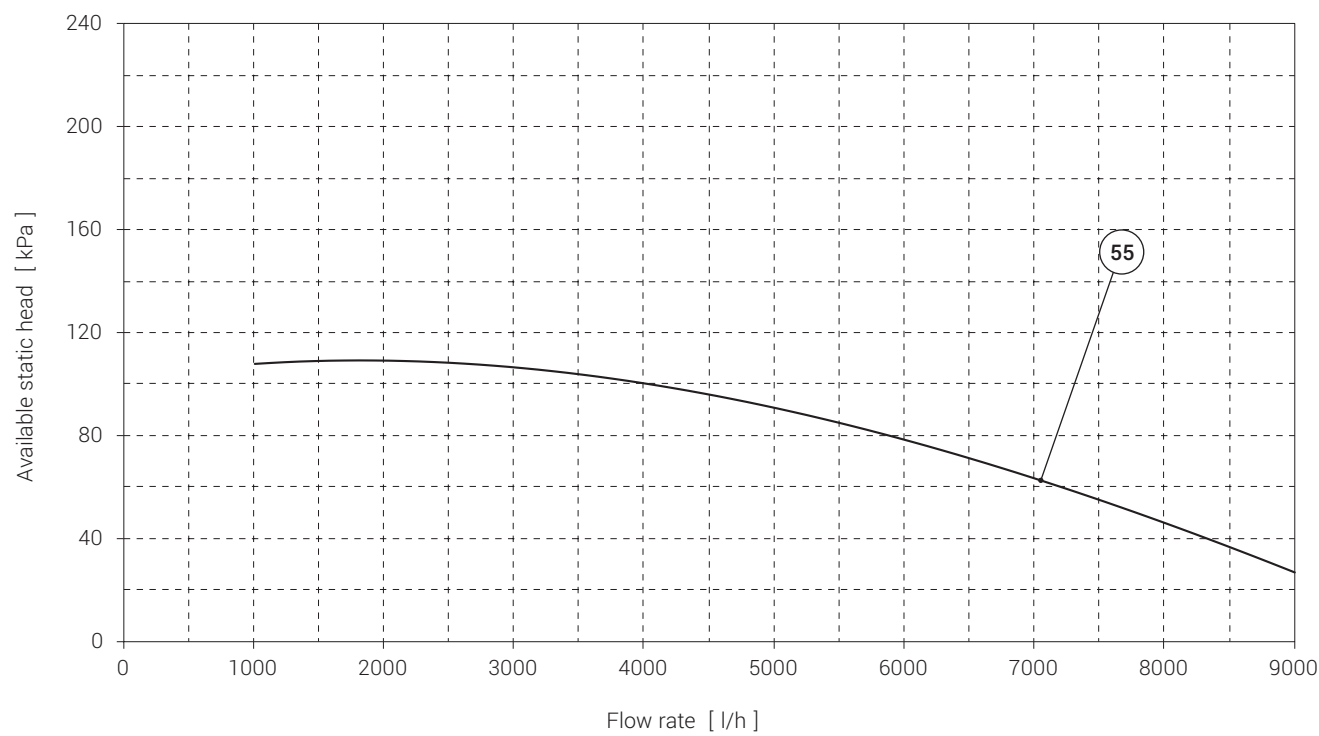
Plant Side Pressure Drop - Through S-ASX-LPi 75 & 100 ASHP



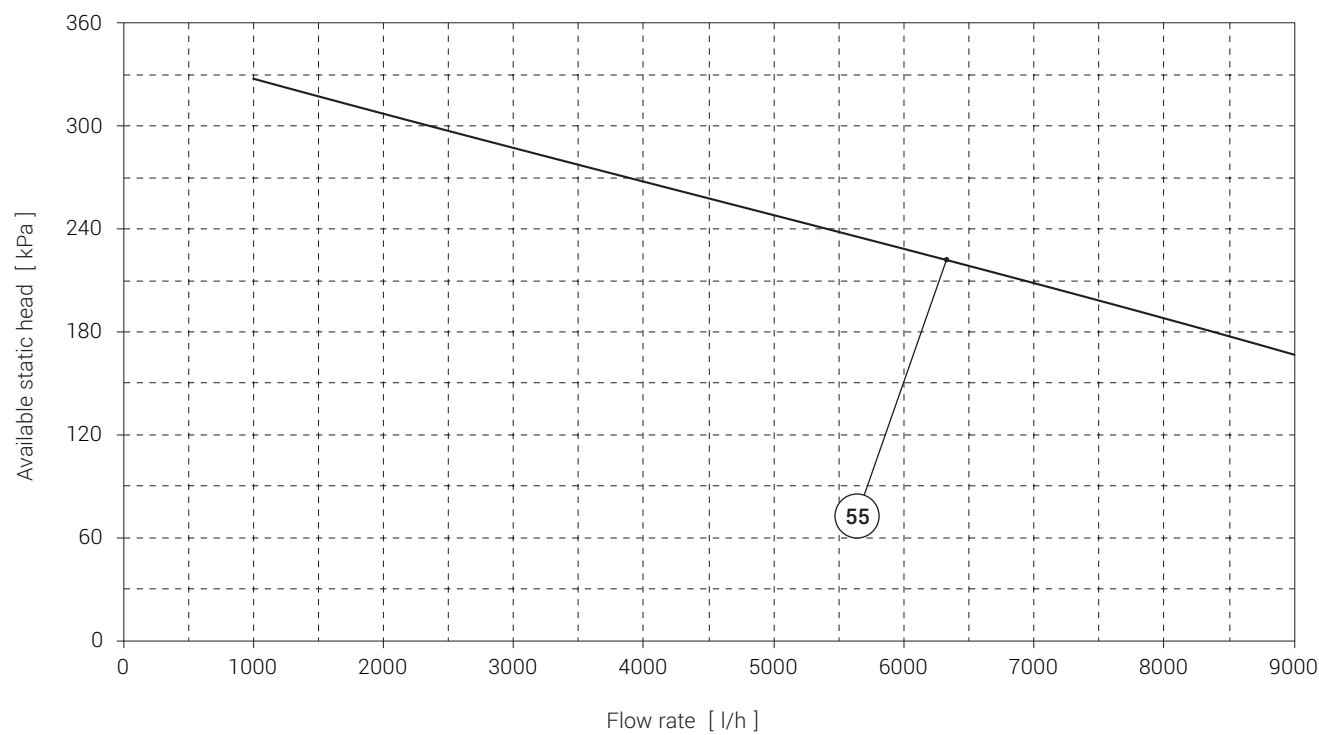
The graphs are referred to units operating with water at 10°C (density 1000 kg/m³).
In the graphs the water filter pressure drops are not taken into consideration.

HYDRAULIC Performances

S-ASX-LPi 55: Available Static Head - Modulating Pump (Standard Supply)



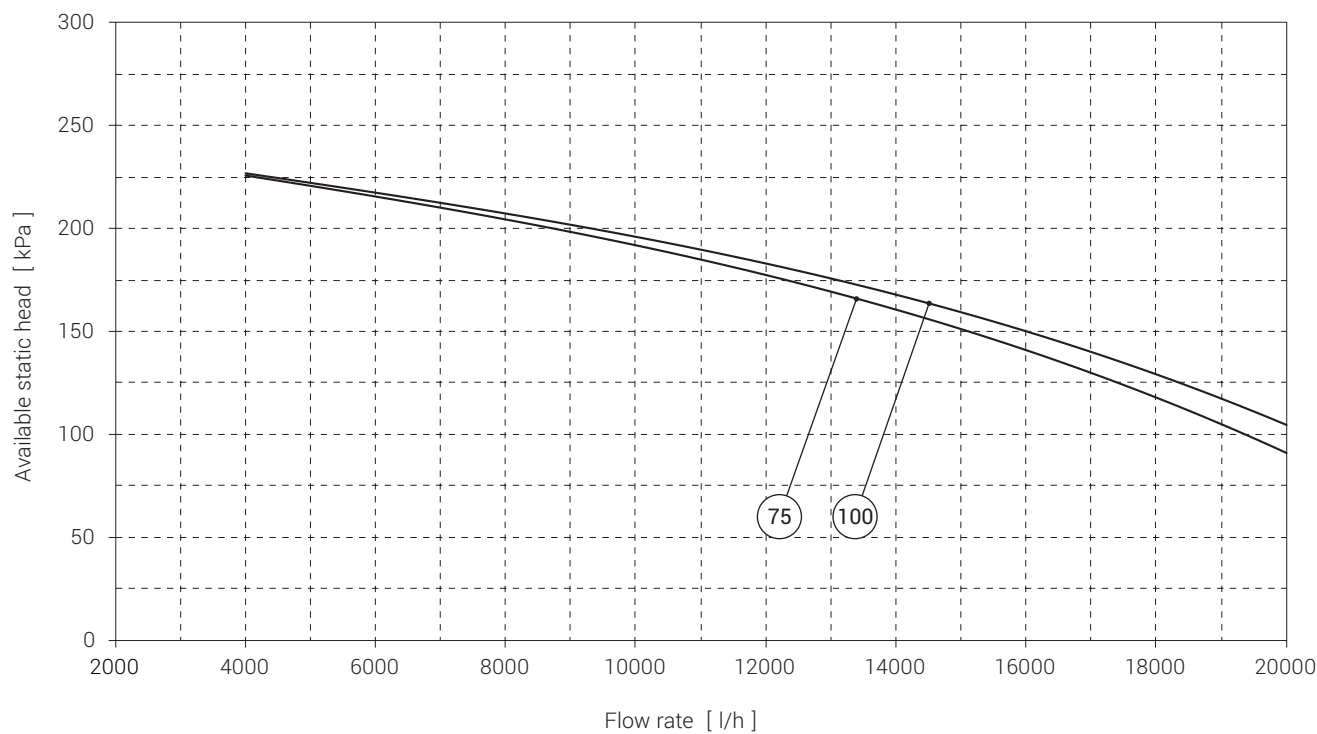
S-ASX-LPi 55: Available Static Head - High Head Pump (Additional Option)



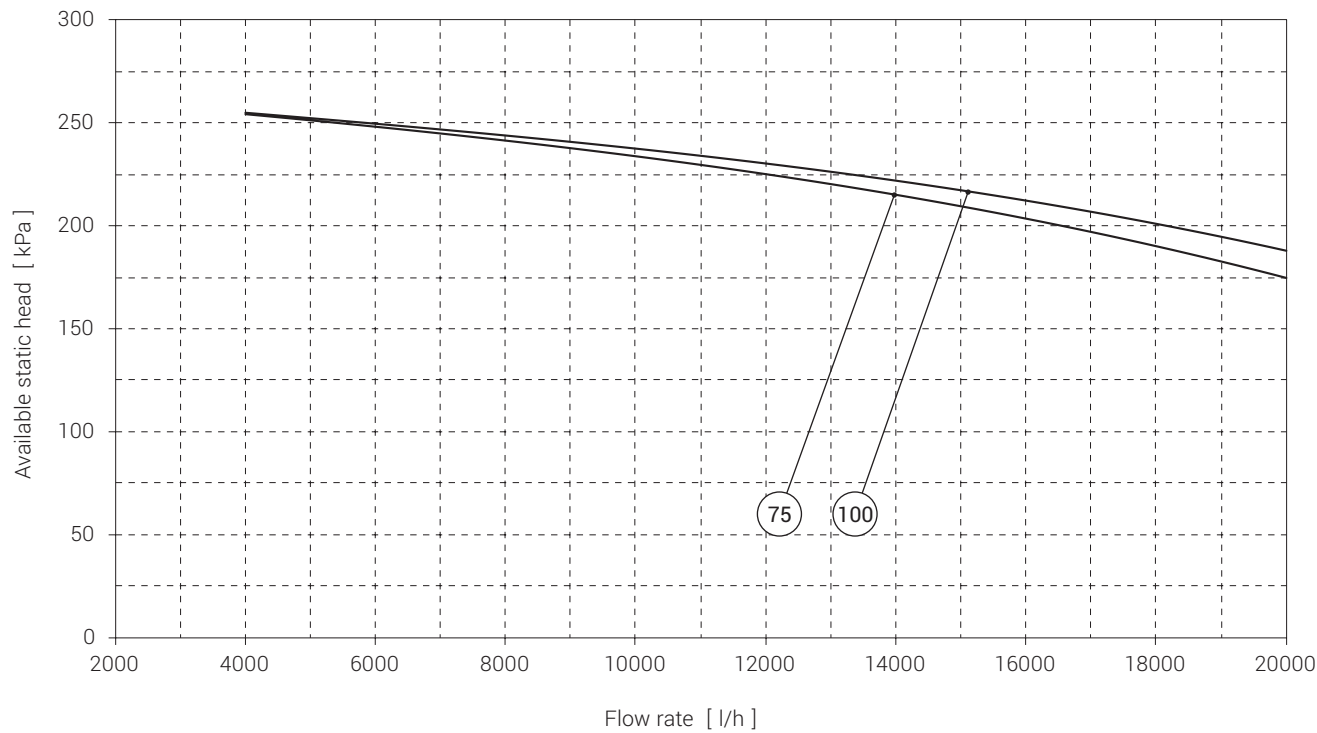
Recommended water filter	55	
DN	40 (1"1/2)	-
Kvs	25	m³/h

HYDRAULIC Performances

S-ASX-LPi 75-100: Available Static Head - Modulating Pump (Standard Supply)



S-ASX-LPi 75-100: Available Static Head - High Head Pump (Additional Option)



Recommended water filter		75	100	
DN		50 (2")	50 (2")	-
Kvs		37	37	m³/h

Other Technical Data - S-ASX-LPi 55

Acoustic Performances

	Mod	Sound power levels [dB] by octave bands [Hz]								Sound power level		Sound pressure level		
		63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
Low noise	55	81,7	79,6	77,9	74,2	70,7	66,5	60,8	53,3	85	76	59	50	45

Reference Conditions

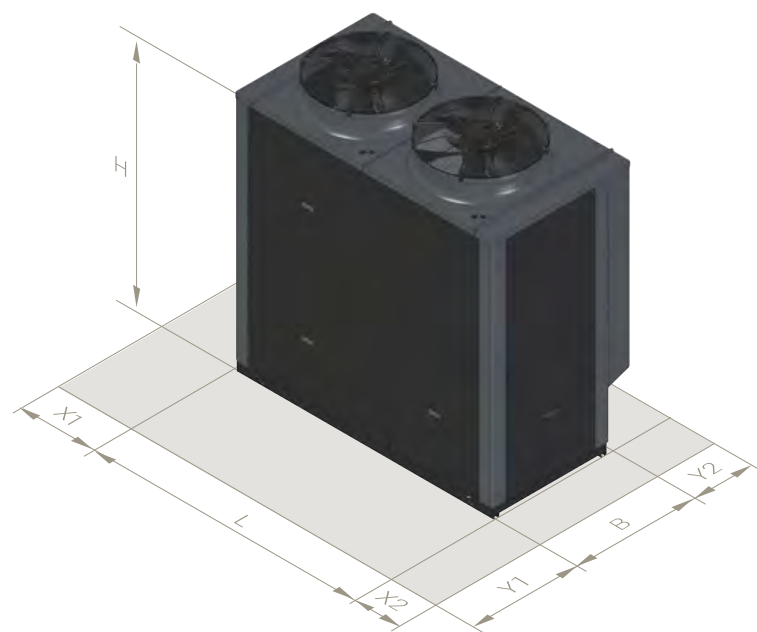
Performances related to units operating in heating mode at nominal conditions A7W35.

Unit placed in free field on reflecting surface (directional factor equal to 2).

The sound power level is measured according to ISO 3744 standard.

The sound pressure level is calculated according to ISO 3744 at various distances from the external surface of the unit.

Overall Dimensions & Maintenance Clearances



	Overall Dimensions	
	55	
L	1730	mm
B	930	mm
H	1830	mm
X1	500	mm
X2	500	mm
Y1	800	mm
Y2	500	mm

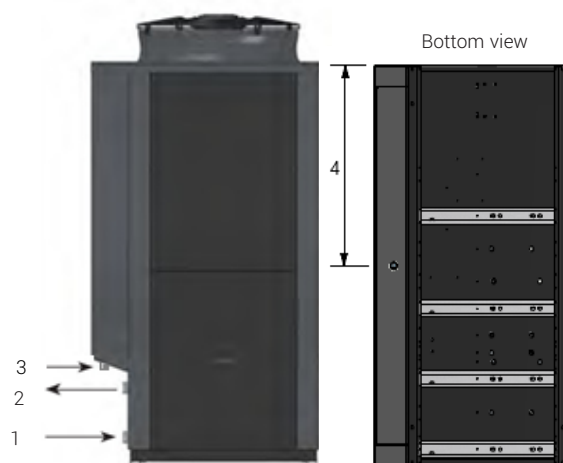
X1, X2, Y1, Y2 : maintenance operating area

	Transport Dimensions	
	55	
L	1800	mm
B	1000	mm
H	2000	mm

WARNING: The X1, X2, Y1 & Y2 maintenance operating area does not cover the required safety area clearances. This clearance is to ensure correct operation and allow for the appliance to be maintained.

For the required safety area clearances, see pages 27 & 28, and see point 7 on page 32 under the "Open Air Installation."

Hydraulic fittings		55
1	Plant side INLET	G 1"1/2 M
2	Plant side OUTLET	G 1"1/2 M
3	1x Condensate waste outlet	G 1" M
4	To centre of condensate waste	865 mm



Other Technical Data - S-ASX-LPi 75 - 100

Acoustic Performances

	Mod	Sound power levels [dB] by octave bands [Hz]								Sound power level		Sound pressure level		
		63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
Low noise	75	82,3	80,2	78,5	74,8	71,3	67,1	61,4	53,9	86	77	60	50	45
	100	83,8	81,7	80,0	76,3	72,8	68,6	62,9	55,4	87	78	61	52	47

Reference conditions

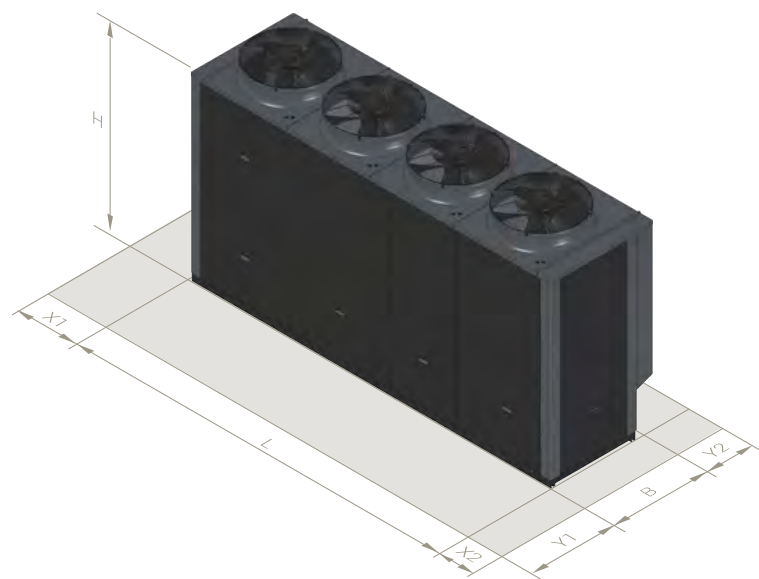
Performances related to units operating in heating mode at nominal conditions A7W35.

Unit placed in free field on reflecting surface (directional factor equal to 2).

The sound power level is measured according to ISO 3744 standard.

The sound pressure level is calculated according to ISO 3744 at various distances from the external surface of the unit.

Overall Dimensions & Maintenance Clearances



	Overall Dimensions		
	75	100	
L	2480	3230	mm
B	930	930	mm
H	1830	1830	mm
X1	500	500	mm
X2	500	500	mm
Y1	800	800	mm
Y2	500	500	mm

X1, X2, Y1, Y2 : Maintenance Operating Area

	Transport Dimensions		
	75	100	
L	2550	3300	mm
B	1000	1000	mm
H	2000	2000	mm

WARNING: The X1, X2, Y1 & Y2 maintenance operating area does not cover the required safety area clearances. This clearance is to ensure correct operation and allow for the appliance to be maintained.

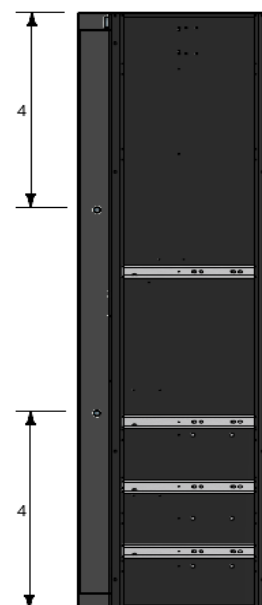
For the required safety area clearances, see pages 29 & 30, and see point 7 on page 34 under the "Open Air Installation."

Hydraulic Fittings		75	100
1	Plant side INLET		G 2" M
2	Plant side OUTLET		G 2" M
3	2x Condensate waste outlet		G 1" M
4	To centre of condensate waste		1065mm

3
2
1



Bottom view



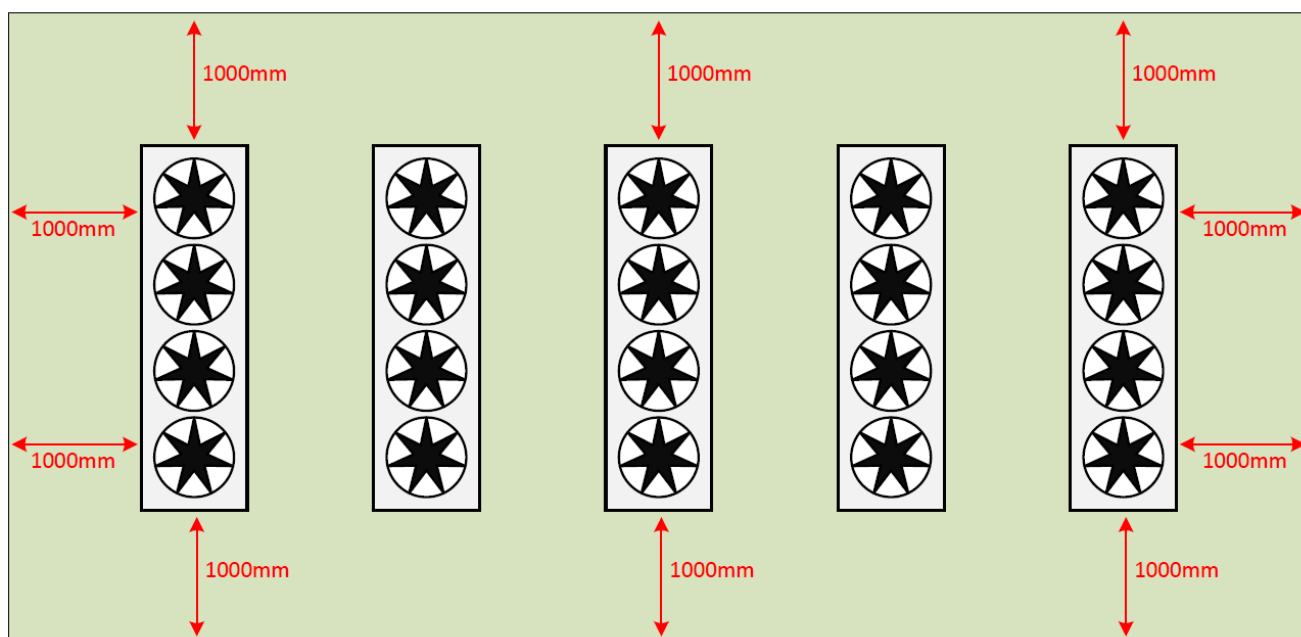
Other Technical Data - Safety Zone Clearance

Safety Zone Clearance - For S-ASX-LPi ASHPs

Within the safety zone, there **must not be** sources of ignition and all possible stagnations of refrigerant must be prevented. In addition to no ignition sources, the following must not be within this zone:

- Drains.
- Water harvesting systems.
- Any type of entries into buildings.
- Air Intakes.
- Other electrical mechanical equipment.

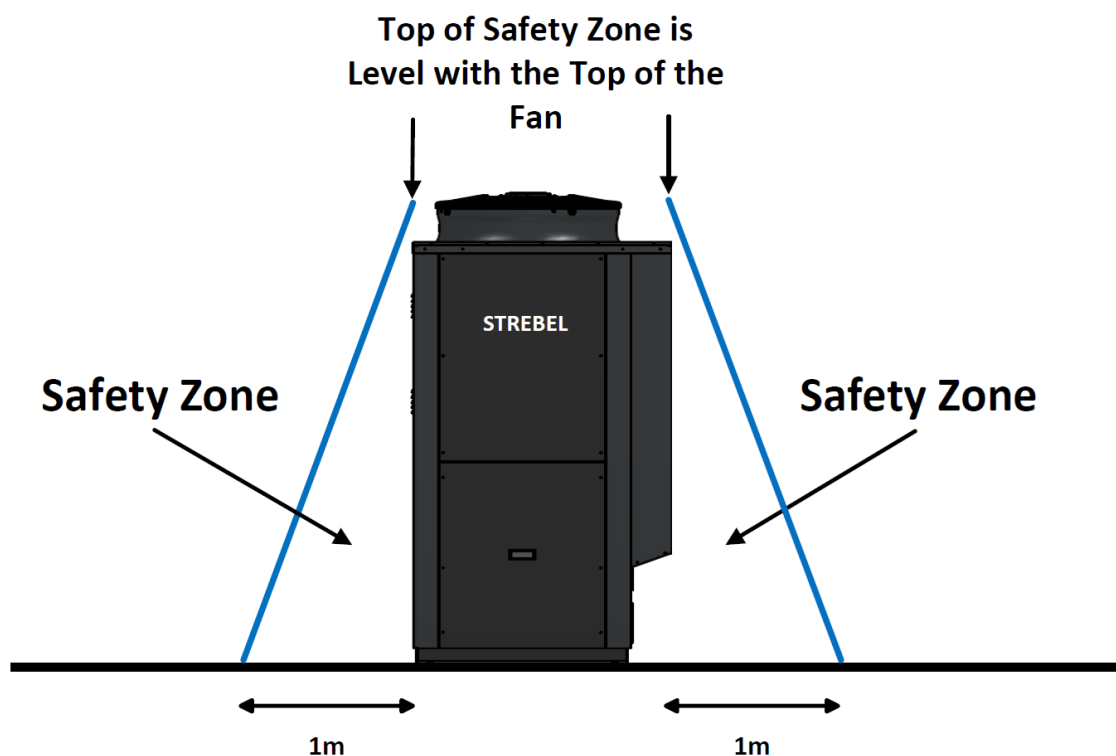
The below drawing is a birds eye view showing the required safety zone clearances around the S-ASX-LPi ASHPs.



The below drawing is a side on view showing the required clearances for the safety zone.

The safety zone is required around the S-ASX-LPi ASHP - highlighted by the blue lines.

Due to the characteristics of R454B being heavier than air, the safety zone slopes away from the ASHP to ground level.



Other Technical Data - Safety Zone & ASHP to ASHP Clearance

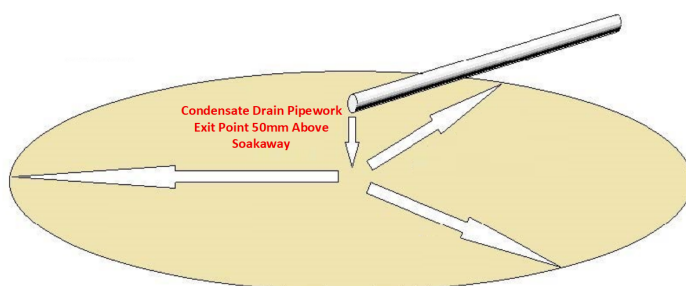
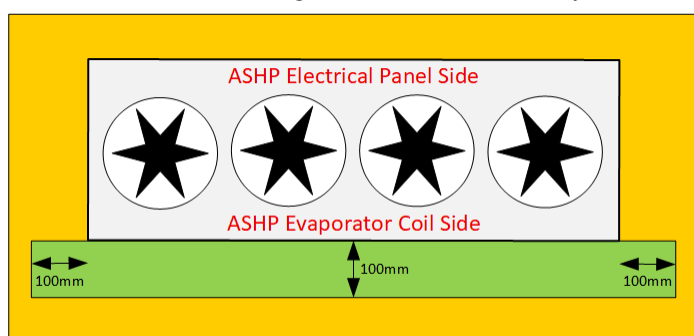
Safety Zone Clearance - Exit Point at Condensate Drain Pipework

Each S-ASX-LPi ASHP comes with drain connection(s) located underneath the evaporator coil.

As described under "**Condensate Drain Tapping(s) and Condense Drain Pipework**" section on page 36, the exit point of the condensate drain pipework must **NOT** be more than 100mm away from the ASHP on the evaporator coil side to comply with the existing safety zone clearance around the S-ASX-LPi ASHP as shown on the previous page.

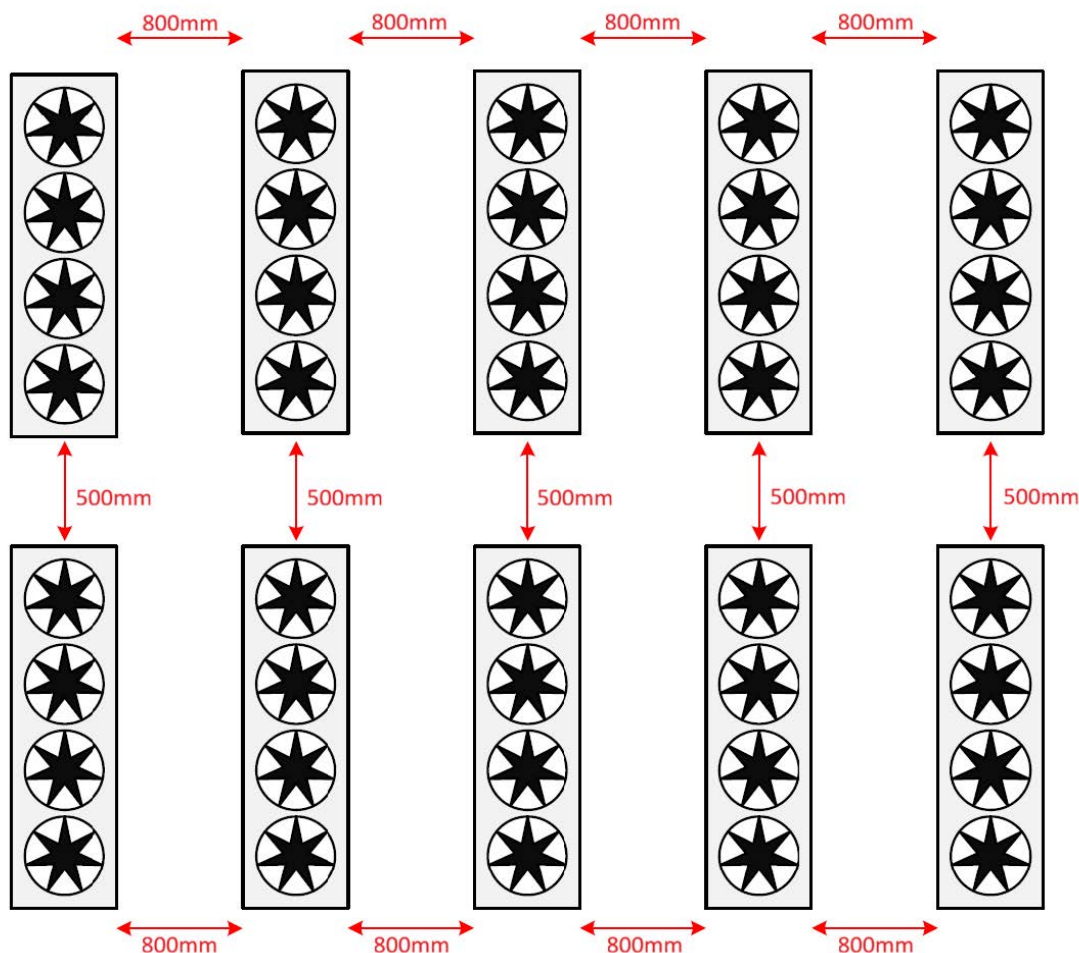
The below drawings show:

1. A birds eye view showing the acceptable area (in green) around the ASHP where the exit point of the condensate drain pipework must be located to comply with the existing safety zone clearance.
2. If a condense soakaway is to be installed, the exit point of the condensate drain must be installed at least 50mm above the soakaway. This will allow for any possible refrigerant to disperse into the atmosphere in all directions and prevents accumulation of refrigerant within the soakaway.



Minimum Clearances - S-ASX-LPi ASHP to S-ASX-LPi ASHP

The below drawing is a birds eye view showing the required minimum clearances between the S-ASX-LPi ASHP's.



Other Technical Data

Electrical Data

	ASHP - Without Internal Shunt Pump	55	75	100	
	Power supply	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	-
	FLA Maximum total current input	53.3	84.9	106.5	A
	FLI Maximum total power input	24.5	39.0	49.0	kW

Standard Supply - With Internal Modulating Shunt Pump

The below measurements are based on what is supplied as standard within each S-ASX-LPi ASHP, which includes the internal modulating primary shunt pump.

	ASHP with Modulating Pump (Standard Supply)	55	75	100	
	Power supply	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	-
	FLA Maximum total current input	54.7	88.7	110.3	A
	FLI Maximum total power input	24.81	40.72	50.72	kW

Additional Option - High Head Non Modulating Pump

The only additional option available that will alter the electrical data is replacing the internal modulating shunt pump with a "high head" non modulating pump to overcome the resistance within the primary circuit which the standard modulating pump is unable to.

	ASHP with High Head Non Modulating Pump	55	75	100	
	Power supply	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	-
	FLA Maximum total current input	55.83	91.30	112.90	A
	FLI Maximum total power input	25.84	42.44	52.44	kW

The main power supply to each S-ASX-LPi ASHP **MUST** be protected with a breaker external to the ASHP and rated to cover the above requirements (commonly rated to the next size up).

For example, with a S-ASX LPi 55 with the standard modulating pump, the maximum draw off is 54.7A therefore the next size up for the breaker size would be 63A.

We would also recommend the type of breaker to be either a type C or D because of the type of electrical components used within air source heat pumps. Please see the "Electrical Connections" chapter for recommended cabling size.

Weights

	Components Weight	55	75	100	
	ASHP without Options R - Heating and cooling	425	648	785	kg
Options	Acoustic Setting Up S - Low noise acoustic setting up	18	55	67	kg
	Internal Shunt Modulating shunt pump - Standard	6	34	36	kg
	Pump Option High head shunt pump - Additional	13	25	26	kg

	Transport Weight	55	75	100	
	ASHP without Options R - Heating and cooling	440	666	805	kg
Options	Acoustic Setting Up S - Low noise acoustic setting up	18	55	67	kg
	Internal Shunt Modulating shunt pump - Standard	6	34	36	kg
	Pump Option High head shunt pump - Additional	13	25	26	kg

	Operating Weight	55	75	100	
	ASHP without Options R - Heating and cooling	435	665	785	kg
Options	Acoustic Setting Up S - Low noise acoustic setting up	18	55	67	kg
	Internal Shunt Modulating shunt pump - Standard	7	36	39	kg
	Pump Option High head shunt pump - Additional	16	27	29	kg

Transport

Transport of the ASHP

General Information

This paragraph provides some general information about the main transport regulation that must be applied when transport of the present equipment is carried out.

The manufacturer is in no way liable for incorrect, imprecise, or missing information in this paragraph, nor it is for damages, harms or incidents, even when serious, experienced by persons or property in connection with information that may be implicit in or inferred from this. Please refer to the applicable regulations for the complete list of provisions that must be applied.

The present equipment is a refrigerating machine whose transport must be carried out ensuring compliance with all National and local regulations on transport, existing in all the countries through which the units are going to transit.

Main Directives and regulations that can be applied in Europe are :

- **ADR** (Accord européen relatif au transport international des marchandises Dangereuses par Route): the European Agreement concerning the International Carriage of Dangerous Goods by Road.
- **IMDG Code** (International Maritime Dangerous Goods) for transport by sea.
- **IATA** (International Air Transport Association) for air carriage As these Directives and Regulations are updated periodically, a check must be made when the carriage is performed to guaran-tee the conformity to the currently applicable version.

The manufacturer shall notify the quantity and type of refrigerant filled in the unit(s) to the people in charge of organising the shipment in order for them to manage transport operations in conformity with the regulations above.

Transport by road : ADR directive

According to ADR, refrigerants are classified into Class 2 of dangerous goods, that includes :

- **Class 2.1** : Flammable gases (**A2L, A2, A3** refrigerants) which are considered all as flammable with no distinction between mild (2L), medium (2) or high (3) flammability.

- **Class 2.2** : Non flammable, non toxic gases (**A1** refrigerants) According to the class of refrigerant filled in, the refrigerating machines can be classified in :

- **UN 3358** : Refrigerating machines containing flammable, non-toxic, liquefied gas, for 2.1 class refrigerants.

- **UN 2857** : Refrigerating machines containing non flammable, non-toxic gases, for 2.2 class refrigerants.

The present equipment is a refrigerating machine filled with flammable refrigerants (A2L), so classified as :

UN 3358: Refrigerating machines containing flammable, non-toxic, liquefied gas, for 2.1 class refrigerants

ADR Directive specifies some **special conditions** when its provisions can be totally or partially exempted, that can be considered to meet less stringent requirements when the hauled units contain refrigerants.

- Full exemption related to quantities

Refrigerating machines are not subject to the provisions of ADR if they contain less than 12 kg of refrigerant of class 2.2 per unit (special provision 119) or if they contain less than 12 kg of refrigerant of class 2.1 per unit (special provision 291). Anyway the total amount of refrigerant carried out on a single transport unit must not exceed the same limit (1000 units) as calculated for the partial exemption conditions.

- Partial exemption related to quantities (ADR Directive 1.1.3.6)

If the amount of refrigerant filled in each refrigerating unit exceeds 12 kg, if the total quantity of refrigerant carried out on a transport unit does not exceed the values of 1000 units calculated in accordance to 1.1.3.6.4 of ADR Directive, ADR provisions can be fulfilled under partial exemption conditions.

The total quantity of refrigerant expressed in units is a weighted calculation of the quantity of refrigerant contained in each unit, where class 2.2 refrigerants (A1) weight 1, and class 2.1 refrigerants (A2L, A3) weight 3.

Example : if a single transport unit includes 100kg of A1 refrigerant and 50kg of A3 refrigerant, the calculation bring to $100 \times 1 + 50 \times 3 = 250$ units below the limit of 1000 units, and a partial exemption ADR transport can be carried out.

Please refer to ADR Directive for a complete description of all ADR requirements, and information that must be included in transport documents.

Transport by sea : IMDG Code

IMDG Code uses the same classification of ADR for refrigerants and refrigerating units.

Refrigerating machines containing less than 12 kg of refrigerant of class 2.2 or class 2.1 per unit are exempt from IMDG code.

No partial exemption of IMDG provisions can be applied if the refrigerating units containing more that 12kg of refrigerant per unit, and IMO Declaration must be issued.

If the goods are hauled either totally or partially via ocean/sea freight, the Multimodal Dangerous Goods Form must be filled out.

Please refer to IMDG for a complete description of all requirements, and information that must be included in transport documents.



Receiving and Storing

Receiving

Receiving operations must be carried out in specifically identified, duly ventilated areas, in conformity with the existing regulations, in which no flammable material and possible sources of ignition are present.

Check on receiving

As soon as the unit is received verify accurately the correspondance of the load to what was ordered to make sure that all the material has been delivered. Check carefully that the load has not been damaged. In case of goods with visible damages inform promptly the haulage contractor reporting on the delivery note the phrase **“Collected with reserves owing to evident damages”**. Delivery ex works implies reimbursement of any damage on charge of the insurance company as established by law.

If refrigerant leaks are identified, the event must promptly be reported to the designated safety manager who shall take all necessary actions, as specified in the existing regulations, to secu-re the unit and shall provide for proper ventilation in addition to removing any sources of ignition if still present.

Safety instructions

Observe the safety regulations in force concerning the equipment to be used for unit handling or the operating formalities to follow.

Handling

Before handling the unit, check the weight of the unit, reported both on the dataplate and on the technical documentation. Make sure the unit to be handled with care avoiding any kind of collision that could damage the operating parts of the unit. On the packaging of the unit are reported all the instructions necessary for a correct handling during storing and installation. The unit is supplied on pallet or wood supports suitable for the transport. It is advisable to place protective material between the truck and the unit to avoid damages to the unit. Prevent the unit or parts of it from falling down.

Storing

The units must be stored under safe conditions in conformity with the applicable regulations in force (some requirements may depend on the quantity of refrigerant contained in the unit). If requested suitable fire prevention measures must also be implemented.

The manufacturer shall in no way be liable for events resulting from storage and siting against applicable local standards and regulations.

All possible sources of ignition in the stocking area must be removed. Naked flames and heat sources must not be used near the stocked units.

Periodically check for refrigerant leaks in the stored unit. This inspection must be carried out by duly trained and authorised staff. Where leaks are identified, the event must promptly be reported to the designated safety manager who shall take all necessary actions to secure the area, as specified in the existing regulations. The leak testing process must be performed before starting any type of work on the unit.

The units must be stored in a dry place, repaired from sun, rain, sand or wind.

Do not stack the units.

Maximum temperature	=	47 °C
Minimum temperature	=	-22 °C
Humidity	=	90 %

Packaging removal

Before removing the packaging a leak testing process must be performed.

Remove the packaging taking care not to damage the unit. Check for any visible damage.

Get rid of the packaging material sending them to specialised recycling centres (observe the regulations in force).

Installation Site

IMPORTANT

The unit must be installed according to the requirements of local regulations in force in the place of installation, in particular taking into account the category of occupation of the premises and the safety class of the refrigerant.

The following indications refers to the european standard EN378-1. Local regulations in force must also be considered and applied.

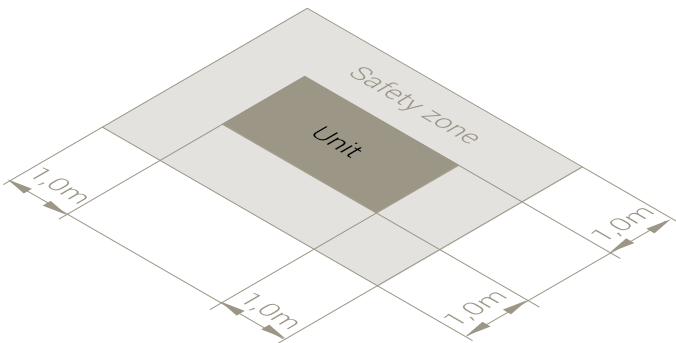
The units are designed for **outdoor installation in open air** (Class III installation according to EN378-1) where safety distances are guaranteed and natural ventilation is not hindered. EN378-1 defines specific access category that must be respected according to the safety class of the refrigerant and the refrigerant charge.
For A2L refrigerant there are no limitations.

Refrigerant charge	Access category
no limits	(a) General Access : rooms, parts of buildings, building where sleeping facilities are provided, people are restricted in their movement, an uncontrolled number of people are present, any person has access without been personally acquainted with the necessary safety precautions.
no limits	(b) Supervised Access : rooms, parts of buildings, buildings, where only a limited number of people may be assembled, some being necessarily acquainted with the general safety precautions of the establishment.
no limits	(c) Authorised Access : rooms, parts of buildings, buildings where only authorized persons have access, who are acquainted with general and special safety precautions of the establishment and where manufacturing processing or storage of material or products take place.

Open Air Installation

The installation supervisor (customer, installer, consultant ...) must evaluate the features of the installation site in order to guarantee it can be classified as an open air installation site (class III according to EN 378-1).
In particular the following factors must be evaluated to guarantee hazardous situations cannot arise in the event of a gas leak age.

- 1 - The positioning must guarantee that, in case of **refrigerant leaks** from the unit, the refrigerant must not be able to flow into enclosed spaces or other places where it could stagnate and create a flammable atmosphere or harming persons or property. Particular attention must be paid to ventilation fresh air openings, entires into a building, drains, rainwater harvesting systems, technical room intakes...
- 2 - No sources of ignition must be present in the installation area.
- 3 - For open air installations where **stagnation** of refrigerant leakages may occur (for example installation in areas below the prevailing ground level or in the presence of parapets in roofs) an accurate risk assessment must be carried out applying all the precautions necessary to guarantee the safety of the installation.
- 4 - Where the unit is installed in the open air, but under a **shelter**, ventilation and a minimum clearance of 3m above the unit must be guaranteed.
- 5 - Installation is considered to be open air type if the installed unit is **inside a room** where at least one of the long walls is open to the outside air for at least 80% of the wall area (or equivalent if more than one wall must be outside) and it is covered with louvres/grids providing for a free area of at least 75%. Stagnation of refrigerant must be in any case evaluated and prevented.
- 6 - If **acoustic fences** or other enclosures are installed around the unit, they must not create areas where leaks can stagnate and permit refrigerant dilution in the surroundings.
- 7 - A **safety area** of 1 metre all around the unit must be respected. Inside this area no ignition sources are allowed and all possible stagnations must be prevented. The following elements must NOT be present : drains, rainwater harvesting systems, air intakes, entires into building technical room intakes, other electric mechanical equipment ... Refer to national or local regulations on this issue, where applicable.



Positioning / Water Quality / Glycol

Before positioning the unit a **risk analysis of the installation area** must be carried out by the installation supervisor, considering the features of the installation site, the features of the unit and applying all the regulations in force.

If necessary, a safety plan must be implemented to protect the safety of the people directly involved considering in particular local regulations about temporary worksites.

Location

Verify that the support surface can bear the weight of the selected unit and that it is perfectly horizontal.

Respect the minimum operating area and verify that the installation site is not subject to flooding.

In any case it is not advisable to place the unit near private offices, bedrooms or zones where very low noise levels are required.

Vibration dampers

In order to limit the vibrations transmitted by the unit it is possible to place, between the unit base and the support surface, a strip of hard rubber or, if a higher level of insulation is required, vibration dampers (available as accessory).

Moreover in order to guarantee to avoid vibration propagation along the hydraulic pipes flexible pipes are suggested.

Installation in saline environments

The unit is NOT suitable for installation in saline environments despite having hydrophilic aluminum coils that provide greater resistance to corrosion than natural aluminum coils.

To increase the protection in such environments, special surface protection treatments are required on the coil (contact pre-sales service for further information).

Installation in areas subject to snow

In case of heavy snow, the coil may become clogged and require manual cleaning to restore normal operation.

In environments with frequent snowfalls, consider protecting the coil from snow accumulation by raising the heat pump from the ground and/or installing protective caps.

Frost protection

In case of outdoor installation or in an environment where the air temperature can drop below 0°C, it is necessary to protect the fluid contained in the hydraulic circuit from the risk of freezing.

The control system of the unit includes a series of algorithms that ensure the protection of the unit.

If the unit is not electrically powered for long periods of time and with external temperatures below 0°C, it is however necessary to empty the hydraulic circuit to prevent it from freezing.

Alternatively, it is possible to use a mixture of water and glycol with an adequate concentration according to the minimum expected outdoor air temperature.

Reference Values for the System Water

The characteristics of the water used in the system must comply with the values indicated in the table.

Otherwise warranty rights will be lost.

Reference values		
pH	7,5 ... 9,0	-
Total hardness	0,5 ... 15	°f
Electric conductivity	< 800	µS/cm
Cl ⁻	< 50	ppm
Fe ³⁺	< 0,5	ppm
Other components	< 0,1	ppm

Use of Water and Glycol Solutions

The unit can work with solutions of water and ethylene or propylene glycol up to 30% concentration by volume.

Using water and glycol solutions the performance of the unit compared to operation with water will be reduced. It is therefore recommended to use the percentage of glycol strictly necessary to protect the unit down to the minimum expected outdoor air temperature.

Glycol

Based against a selection of Glycol in the 30% mix will have the following impacts compared to water:

- Specific heat capacity: 3.85 kJ/kg·K (vs 4.18 for water) = 0.92 factor
- Density: 1.025 kg/L (vs 1.00) = 1.025 factor
- Viscosity: 2.5 mPa·s (vs 0.65) = 3.8× increase

Design Implications

1. Design Implications

1. Pump selection: Increases head by 15-20%* for viscosity.
2. Heat exchanger: De-rates capacity by 8-12%*
3. Buffer vessel: Increases volume by 15 - 25%* from the minimum water content to maintain thermal inertia.
4. Expansion vessel: Size for 6%* expansion (vs 4% for water)

**EN14511 performance figures are published based on testing using water in the primary heating system. Therefore where glycol is introduced, EN14511 performance figures published in this manual are no longer applicable. Any guidance given on reduction of performance due to the introduction of glycol is NOT based on EN14511 standards, and is intended purely as indicative guidance.*

Connections

Hydraulic Connections

To design properly the hydraulic system respect the local safety regulations in force.

The hydraulic circuit (on the plant side) must be equipped with a safety valve. To maintain the circuit under pressure a self-filling group, that automatically fills the circuit, can be installed.

It is MANDATORY to install a water FILTER on each ASHP inlet in order to avoid the entrance of foreign substances, otherwise warranty rights are lost. The filter must guarantee a degree of protection at least equal to the one of a mesh filter with hole diameter of 1 mm.

Calibration of Water Flow Rate

It is always necessary to guarantee a proper water flow rate through the plate heat exchanger of the unit.

Each appliance comes with an internal modulating shunt pump sized to overcome the resistance of ASHP PHE and flow to a hydraulic separator, such as a thermal store or direct to an indirect DHW cylinder - there is no requirement for a commissioning valve. The modulating pump minimum and maximum speeds can be adjusted, as well as the dT within the ASHP controller (see paragraph "Control system").

To protect the ASHP, each appliance is installed with a differential water pressure switch that locks the unit if the water flow is too low. The water flow rate values at which the differential pressure switch trips are indicated in the table below (with clean heat exchanger).

It is MANDATORY to install non return valve on each ASHP inlet (return pipework).

Suggestions for the Hydraulic Plant

Prepare the pipes with the minimum possible number of bends in order to minimize pressure losses, and suitably support them to prevent excessive stresses at the connections of the unit. Install shut-off valves near the components that need maintenance, to allow their replacement without having to drain the system. Install automatic air vents in the highest part of the circuit to vent the air. Make sure there are no leaks before insulating the pipes and filling the system.

In order to avoid condensate generation in cooling mode insulate all the pipes using steam barrier type material.

In closed vessel systems, the installation of an adequate expansion vessel is recommended to compensate for the thermal expansion of the water.

It is MANDATORY for a multiple ASHP installation they they must be installed on a reverse return setup on the primary circuit.

Internal 6 Bar Pressure Relief Valve - Termination

On the water hydraulic side of the condenser PHE, internal to the ASHP housing, there is a pressure relief valve rated to 6.0 bar installed to the flow pipe. From factory, there is no discharge pipework connected to the pressure relief valve therefore this is required to be installed and taken outside of the ASHP housing by the installation contractor.

The discharge pipework can be terminated either directly below the ASHP (if installed on a unistrut / bigfoot system) or out to the side within 100mm of the ASHP casing. These methods will not require the safety zone criteria to be applied as this will be covered by the 1 metre safety zone around the ASHP.

A 1 metre safety zone at the point of the pressure relief valve termination will only have be applied if the exit point is more that 100mm away from the side of the ASHP.

Condensate Drain Tapping(s) and Condense Drain Pipework

All the units are equipped with a drain for the condensate generated by the finned coil during normal heating operation. The connection of the drain(s) is mandatory to avoid the accumulation of water around the unit and the possible formation of ice sheets.

Since refrigerant leaks from the finned coils may flow out through condensate pipework, do not duct the drainage pipe into pits or downpipes or other openings.

If the exit point of the drain pipework is located within 100mm of the ASHP on to a gravel area, no extension of the 1 metre safety zone is required. It is also possible to install the condensate drain pipework to an external soak away, terminating approximately 50mm above. - see drawing on the top of page 30.

It is recommended all condense drain pipework is at least 32mm in diameter, is insulated and is designed with a continuous fall to prevent condense from blocking & freezing.

Please note: It is possible to locate the exit point of the condensate drain pipework over 100mm away from the evaporator side of the ASHP. However in this circumstance, a 1 metre safety zone must be applied around condense drain exit point.

Degassing / Deaerator Valve (As Supplied) - MANDATORY

The installation must take additional precautions to prevent **refrigerant leakages** into the hydraulic circuit via the heat exchanger from reaching occupied spaces (as requested for open air installation - class III). The degassing valve must be installed on the flow pipe from each S-ASX-LPi ASHP before any isolation valve to discharge the refrigerant safely into the atmosphere. It is recommended to install the device as near as possible to the S-ASX-LPi ASHP.

Please note: The clearance around the degassing / deaerator valve must match the S-ASX-LPi safety zone = 1000mm.

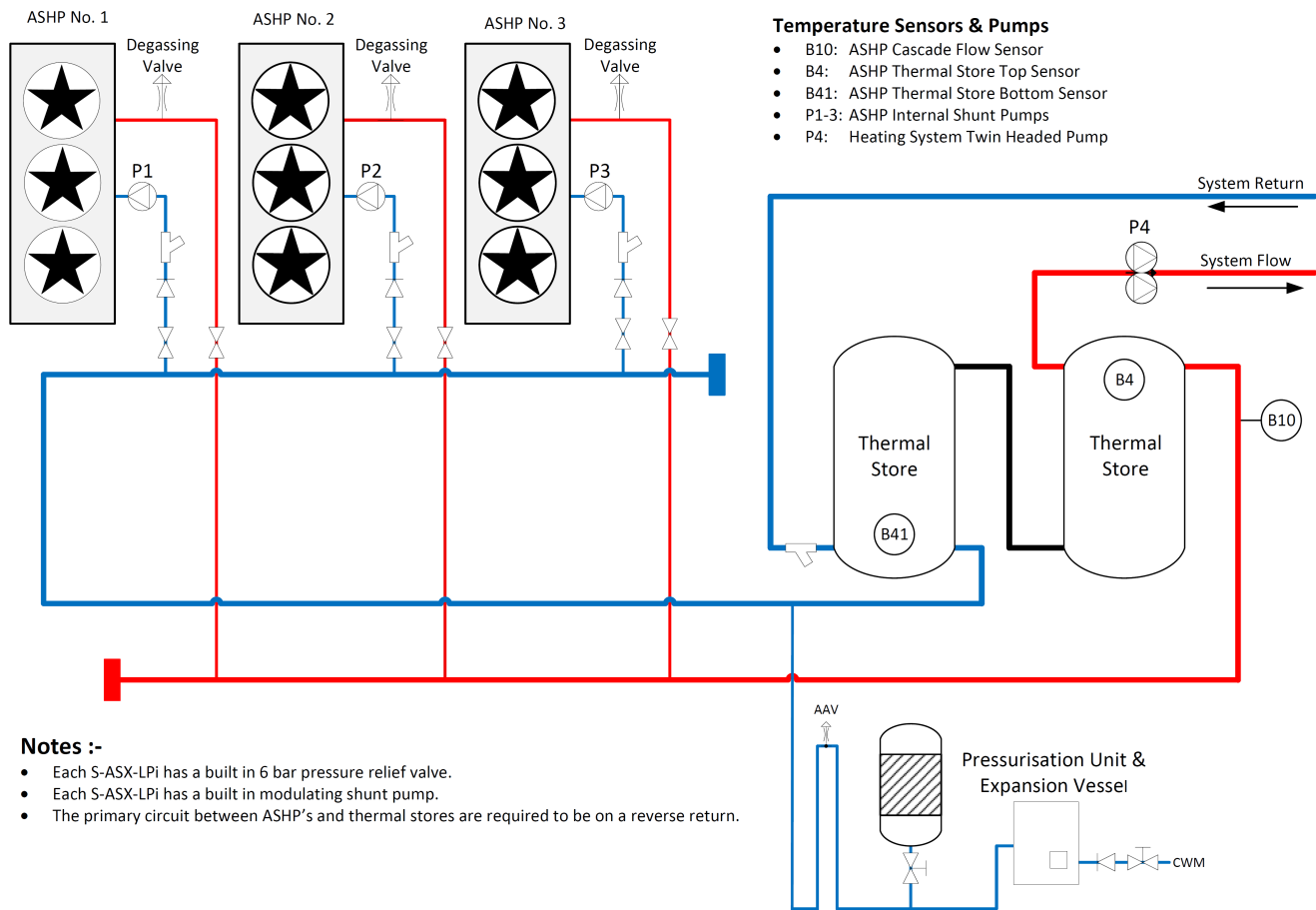
MINIMUM Water Volume of the System

It is recommended to check that the minimum amount of water available for the unit operation, regardless of the state of the system (closing/opening of the distribution circuits) does not fall in any operating condition below **10 litres per kW of nominal heating capacity**. In this way it is possible to guarantee a sufficient stability of the water temperature and avoid to generate situations that are potentially dangerous for the unit or in any case not very comfortable for the user.

Differential pressure switch threshold	55	75	100	
Water flow rate	2600	4300	5000	l/h

Connections

ASHP Basic Schematic - Example of CH Operation



Primary Circuit

The primary circuit is known as the circuit starting from the S-ASX-LPi air source heat pumps to the thermal store.

With each S-ASX-LPi ASHP having an internal modulating shunt pump, there is no requirement to install any components to influence the primary flow rate such as commissioning sets within the primary circuit. This will prevent the correct operation of the modulating pumps leading to the incorrect flow rate being achieved through the ASHP's and possible non warranty failures.

Primary Pipework Sizing

The primary pipework as mandatory requires to be sized to a 5°C dT flow rate based on the ASHP(s) **maximum** output at the required flow temperature with the outside air temperature at 7°C, and it is recommended to follow the guidance of CIBSE for selecting pipework sizes which is currently as follows:

1. Pipework velocities to be 0.75 to 1.15 m/sec for 15 – 50mm diameter pipework.
2. Pipework velocities to be 1.25 to 3.0m/sec for 50mm+ diameter pipework.
3. Pipework pressure drop to be 360 pa/m maximum.
4. End of system component pressure drop of 28kPa maximum (thermal store).

Multiple Thermal Stores

Where multiple thermal stores are installed, the requirement is to install the thermal stores in series as shown in the above schematic.

The total volume of the thermal stores as a minimum must be sized to the total ASHP's **nominal** output (based on the required flow temperature with the outside air temperature at 7°C) multiplied by 10 litres. For example, the nominal output of 2 x S-ASX-LPi 75's at A7W45 is 149.6kW (74.8kW each) multiplied by 10 is 1496 litres = Nearest match is 1,500 litres.

The thermal store with the flow pipework installed (primary and secondary system) must have the B4 temperature sensor fitted and the thermal store with the return pipework installed (primary and secondary system) must have the B41 temperature sensor fitted.

Connections

Electrical Connections

The electrical wirings must be carried out by qualified personnel according to the regulations in force at the installation time in the country of installation.



Before starting any work on the electrical circuit make sure that the unit power supply line is disconnected at the start.
N.B. Refer to the electrical diagram enclosed in the unit

Power supply system

The power cables of the unit power supply line must be connected to :

- For **single phase** power supply : **230V - 1 - 50Hz**
from a single phase voltage system provided with neutral conductor and separated earth wire :
 $V = 230\text{ V} \pm 10\%$ $f = 50\text{ Hz}$
- For **three phase** power supply : **400V - 3N - 50Hz**
from a symmetrical three phase voltage system with neutral conductor and separated earth wire :
 $V = 400\text{ V} \pm 10\%$ $f = 50\text{ Hz}$
- For **three phase** power supply : **400V - 3 - 50Hz**
from a symmetrical three phase voltage system with separated earth wire :
 $V = 400\text{ V} \pm 10\%$ $f = 50\text{ Hz}$

The units are shipped completely factory wired and arranged for the connection to the power supply.

The power cables must enter the unit through the holes on the lateral structure of the unit and must be connected to the power supply terminals of the unit.

Unit power supply

The power supply cables must have an adequate section for the power absorbed by the unit and must be chosen in conformity with the regulations in force. **Design the power supply line always referring to the total FLI and FLA values of the unit, taking into account the selected options and the installed accessories.**

It is necessary to provide an adequate earth connection. The manufacturer cannot be considered responsible for any damage caused by inadequate or faulty grounding.

It is recommended to use cables with a section NOT LOWER than that shown in the table, in any case respecting the regulations in force.

It is recommended to keep the supply line as short as possible.

Upstream protection

An automatic switch suitable for ensuring protection against overcurrents and indirect contacts must be installed upstream each power supply line.

Coordination between line switch must be carried out observing the regulations in force on electrical safety, regarding the type of installation and the installation ambient conditions.

Connections available for the user

The electrical board of the unit contains some terminals dedicated to the connection of external switches or probes. Carry out all the necessary connections in order to realize the desired plant following the instructions reported in the section "Inputs and outputs".

ATTENTION

Carry out all the connections outside the unit avoiding the power cables and the probe cables to be coupled.

ASHP without Options		55	75	100	
Three phase	Power Supply	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	-
	MINIMUM Required Section	16.0	16.0	25.0	mm ²

Start Up

Preliminary Checks

The following operations must be carried out only by properly qualified and trained personnel with the help of suitable equipment (see "Maintenance" paragraph). To make the contractual warranty effective, start up must be carried out by authorised service centers.

Before calling the service centre it is advisable to make sure that all the installation steps have been completed (positioning, electrical connections, hydraulic connections...) and the risk assessment of the installation (if needed) has been completed by the installation supervisor.

Preliminary checks before turning on

1. Verify that :
 - The unit has not suffered visible damages due to transport or positioning
 - The unit is placed on an horizontal surface able to bear its weight.
 - The minimum operating area is respected.
 - The ambient conditions comply with the provided operating limits.
 - The hydraulic and electrical connections has been carried out correctly.
 - The hydraulic circuit has been charged and vented.
 - No leakage are present around the unit inside the defined safety area.
2. Disconnect the power supply line at the start and verify that :
 - The unit power supply line complies with the regulations in force.
 - The screws fastening the electrical cables to the components inside the electrical panel of the unit are well tightened (vibrations during transport phases could have caused some loosening).
3. Connect the unit power supply line and verify that :
 - The voltage of the power supply line complies with the nominal one of the unit.
 - For three phase power supply units, the unbalance between the phases is lower than 2% (a higher value produces an excessive current input on one or more phases causing possible damages to the electrical components of the unit).

NOTE : Example of phase unbalance calculation

- Read the value of the three line voltages using a voltmeter :
line voltage between phases L_1 and L_2 : $V_{1-2} = 390$ V
line voltage between phases L_2 and L_3 : $V_{2-3} = 397$ V
line voltage between phases L_3 and L_1 : $V_{3-1} = 395$ V
- Calculate the difference between the maximum and minimum value of the measured line voltages :
$$\Delta V_{\max} = \max (V_{1-2} ; V_{2-3} ; V_{3-1}) - \min (V_{1-2} ; V_{2-3} ; V_{3-1}) =$$
$$= V_{2-3} - V_{1-2} = 397 - 390 = 7 \text{ V}$$
- Calculate the average line voltage value :
$$\Delta_{\text{average}} = (V_{1-2} + V_{2-3} + V_{3-1}) / 3 = (390 + 397 + 395) / 3 = 394 \text{ V}$$
- Calculate the percentage unbalance value :
$$\Delta V_{\max} / V_{\text{average}} \times 100 = 7 / 394 \times 100 = 1,78 \% < 2 \%$$

Unit Start Up

Set date and time :

- Select menu "Service" ()
- Select "Regional settings"
- Modify "Time" and "Date"

To activate the unit in heating or cooling mode enable one of the available digital contacts in order to require the unit to work :

- **VK1 : Heating request**
- **VK2 : Cooling request**

In order to set the set point associated to each request see paragraph "Main functions".

In order to trigger domestic hot water tank charging, select menu "Domestic hot water" () and set operating mode as "On".

Verify that the nominal set point is lower than the temperature read by the control system.

Verify if an active request is present for the heat pump :

- Select menu "Info" ()
- Select page "Heat pump"
- Verify the "Setpoint" value :
 - If no numeric value is displayed ($--^{\circ}\text{C}$) means that no request is present that require the heat pump to work. Verify again the set point selected for the active request.
 - If a numeric value is displayed means that a request is active and the heat pump is going to start.

Wait the unit and the compressor to start (symbol  on the status bar). Verify that the water temperature on the outlet and inlet of the unit are correct for the active request. Wait that the active request is satisfied and verify that no alarms are tripped (indicated by the symbol  on the status bar).

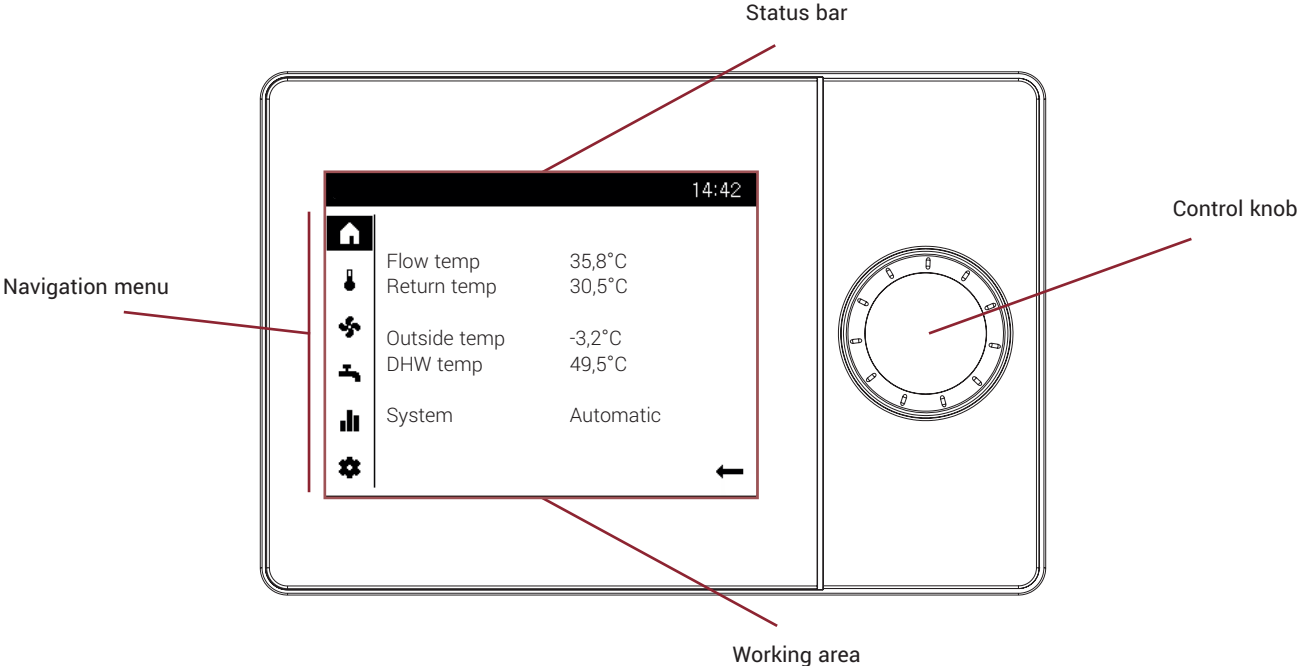


Compressor carter electrical heater

The heat pump control system manages the activation of an electrical heater placed around the compressor that is activated in order to keep the temperature of the oil contained in the compressor carter high enough to avoid any liquid strokes or poor lubrication at start-up.

In the case of startups with outdoor air temperature below 0°C , it is recommended to power up the unit at least 8 hours before starting the compressor.

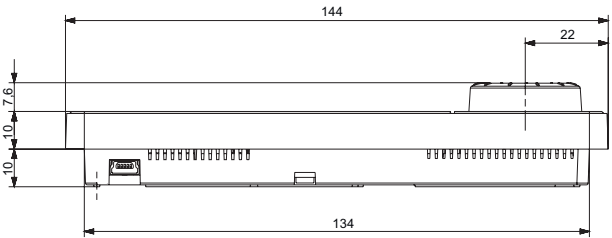
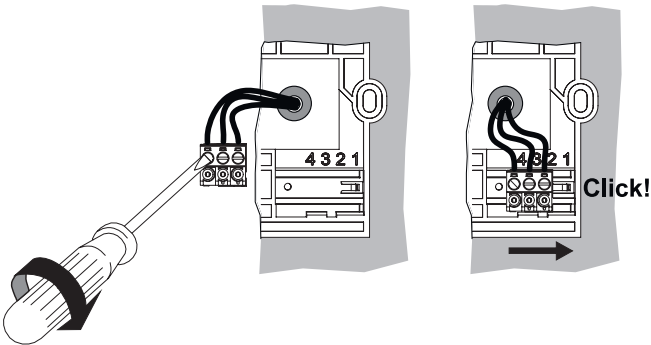
Control System



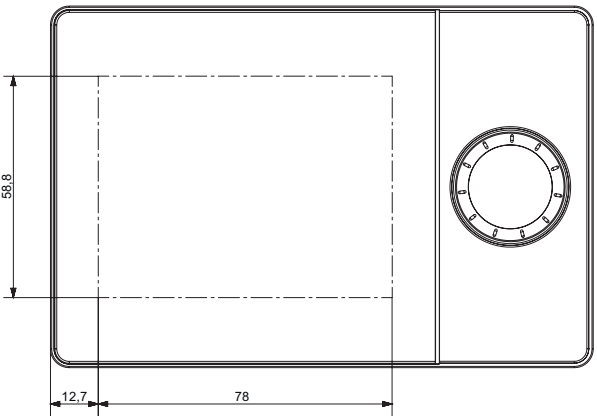
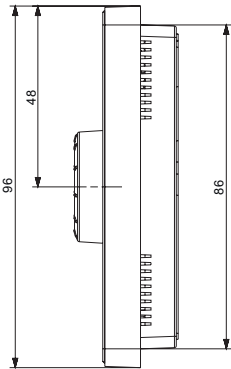
User Interface

The unit can be managed by means of the remote user interface, equipped with a “push and roll” control knob that allows to navigate inside the different menus and to visualize and modify all the parameters.

Mandatory - Each ASHP user interface must be connected to its own ASHP and be installed within the installation plant room.



1	G+ (DC +12V)
2	CL- (GND)
3	CL+ (BSB)



Connect the remote user interface to the unit controller using a 3-wire cable with a minimum section of 0,5 mm² and a maximum length of 200 metres. The remote user interface communicates with the unit controller via the BSB communication bus (see paragraph “Inputs and Outputs” for details on the connection).

Control System

Temperature Sensors

Each unit can be equipped with temperature sensors to be placed outside the unit to monitor the temperature of the various points of the system necessary to enable the management of these components.

It is recommended to install these sensors in such a way that the detected temperature is as correct as possible, possibly using immersion wells, conductive paste or insulating tapes.

The characteristic curve of the temperature sensors used is shown in the table.

To check if the probe is working properly, check the correspondence between the actual temperature and the electrical resistance value (measured by a multimeter).

T [°C]	R [Ω]	T [°C]	R [Ω]	T [°C]	R [Ω]
-30	175203	50	3605	130	298
-25	129289	55	2989	135	262
-20	96360	60	2490	140	232
-15	72502	65	2084	145	206
-10	55047	70	1753	150	183
-5	42158	75	1481	155	163
0	32555	80	1256	160	145
5	25339	85	1070	165	130
10	19873	90	915	170	117
15	15699	95	786	175	105
20	12488	100	677	180	95
25	10000	105	586	185	85
30	8059	110	508	190	77
35	6535	115	443	195	70
40	5330	120	387	200	64
45	4372	125	339		

If it is necessary to lengthen the probe, use a copper cable with a minimum section not less than that shown in the table.

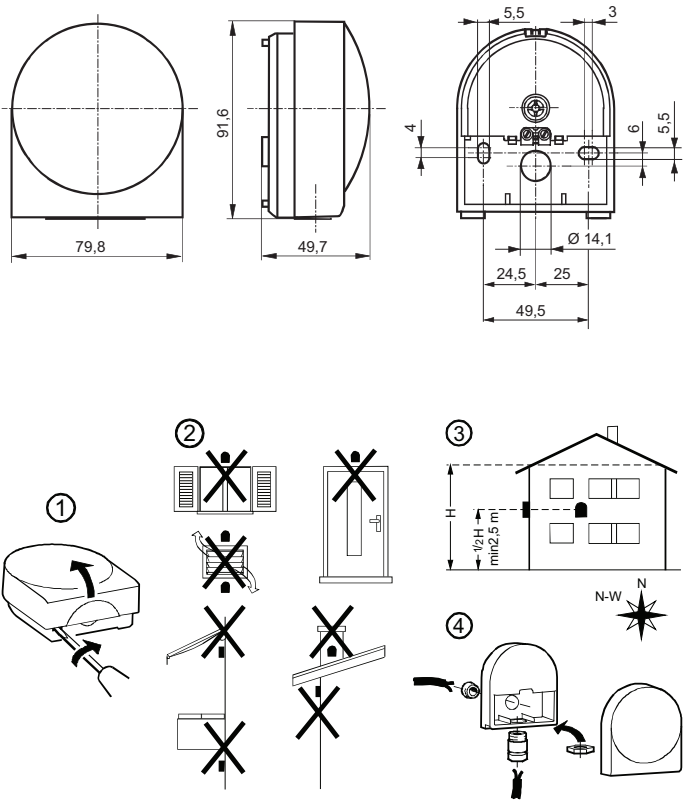
Maximum length	40	60	80	120
Minimum section	0,5	0,75	1,0	1,5

Outdoor Air Sensor

Each unit is supplied with an outdoor air temperature sensor that must be installed outdoor and connected to the heat pump controller (input B9).

The sensor is used to enable the antifreeze protection function and to calculate the flow temperature set point according to the climatic curves set for the heating and cooling circuits.

Follow the instructions reported below to install properly the sensor.



Control System

Navigation Menu

The navigation menu consists of a series of icons arranged vertically on the left side of the display. Navigation within the menu is done by moving the cursor, represented by a frame that wraps the icon above the selected element, by turning the control knob. The information shown on the display updates according to the selected menu. By pressing the knob, the cursor enters the selected menu by positioning itself on the editable items displayed in the work area.

Menu “End User”

The menu visible when the control is started is the menu dedicated to the end user. It is always possible to return the display to this menu by keeping the knob pressed for a few seconds. However, after 8 minutes of inactivity, the device automatically returns to the home page. Only menus associated with enabled functions are displayed.

	Home	Plant status
	Heating Cooling zones	Heating and cooling circuits status
	Domestic hot water	Domestic hot water status
	Info	Messagges : errors / events Heat pump status Operating plant status
	Settings	Settings : date, time, language Special operations Login to “Expert” menu

Menu “Expert”

Besides the “Enduser” menu, an “Expert” menu is available which allows access to a greater number of information and settings. To access this menu, from the “Enduser” menu, enter the Settings menu  and select the “Expert” item in the working area. A menu appears prompting you to select a user type and set a password if required.

User	Password
Enduser	-
Commissioning	-
Engineer	-
OEM	Reserved

Once logged into the “Expert” menu, the navigation menu is updated and new menus are displayed.

	Diagnostics	Diagnostics and tests for the plant
	Maintenance	Control and regulation functions through access to the complete parameter list
	Info	Messagges : errors / events Heat pump status Operating plant status
	Settings	Settings : date, time, language Special operations Login to “Expert” menu

Status Bar

The status bar shows the following informations :

-	Date
-	Time
	Active alarm
	Active compressor / Active supplementary source
	Active maintenance

Control System



Menu “Expert” - Diagnostics

The following functions are available in the “Diagnostics” menu :

- **Test Input/Output**
It allows to force the activation of the controller outputs and view the status of all the inputs.
To activate the digital outputs (QX) use parameter 7700 and select the output corresponding to the load to be activated (see table “Inputs and Outputs”).
To activate the analog outputs (UX) use the parameter corresponding to the analog output corresponding to the load to be activated (see table “Inputs and Outputs”).
To activate the electronic valves directly managed by the controller (WX), use the parameter corresponding to the output corresponding to the valve to be activated (see table “Inputs and Outputs”).
- **Communication**
Allows to view the parameters relating to communication on the LPB bus (communication with other controllers in cascade).
- **Simulation**
Allows to simulate the value read by the outdoor air sensor.
- **Source**
Allows to view all the available information on the operating status of the heat generators managed by the controller (heat pump, solar panels, additional generators ...).
- **Consumer**
It allows to view all the information available on the operating status of the system (distribution circuits, accumulations, DHW, external air temperature ...).
- **Error history**
Allows you to view the history of the last 10 alarms.
- **Version**
Allows to view the firmware version of the controller and of the remote user interface.

- **Commissioning Wizard**
Provides a guide to the user interface configuration and to the system configuration (NOT necessary).
- **Refresh Operator Unit**
Allows to update the main screens of the end user menu to adapt them to the new configuration set in the parameters menu. This line appears automatically only if a refresh is required.

Complete Parameter List

All the parameters of the controller can be visualized and modified within the complete parameter list, accessible via the “Expert

- Maintenance” Menu.

The parameters are grouped into different submenus and are all identified by a numerical code. Each submenu can consist of several pages indicated at the top right under the status bar. The menus that are not relevant depending on the configuration of the heat pump and the system are automatically hidden.

Menu	Parameters
Time of day and date	1 - 6
Operator section	20 - 70
Time program heating circuit 1	500 - 516
Time program cooling circuit 2	520 - 536
Time program 4 / ACS	560 - 576
Heating circuit 1	700 - 900
Cooling circuit 2	1201 - 1269
Domestic hot water	1600 - 1680
Consumer circuit 1 (VK1)	1854 - 1880
Consumer circuit 2 (VK2)	1904 - 1930
Heat pump	2776 - 3080
Supplementary source	3690 - 3755
Buffer	4705 - 4831
Domestic hot water tank	5007 - 5179
Configuration	5700 - 6298
LPB system	6600 - 6650
Fault (Alarms)	6710 - 6820
Service / Special operations	7070 - 7226
Configuration extension modules	7300 - 7512
Input / output test	7700 - 7952
State	8000 - 8070
Diagnostics hest generation	8395 - 8586
Diagnostics consumers	8700 - 9058



Menu “Expert” - Maintenance

The following functions are available in the “Maintenance” menu:

- **Complete Parameter List**
Provides access to the list of all the parameters of the controller. The visibility of the parameters depends on the type of user with whom the menu was accessed.
After a change in the configuration of the unit, it is necessary to exit and re-enter the complete parameter list to allow it to be updated and to display or hide the menus relevant to the new configuration. During this operation, which may last a few minutes, the message “Operator unit being refreshed” appears on the display.

Control System

Main Functions

Management by means of Digital Inputs

The unit can be managed by means of digital inputs :

- **VK1 : Heating Request (fixed set point)**
When the input is active the heat pump is activated in heating mode with a fixed set point on the water outlet (par 1859).
- **VK2 : Cooling Request (fixed set point)**
When the input is active the heat pump is activated in cooling mode with a fixed set point on the water outlet (par 1909).

NB. Each digital input generates an independent request. If several digital inputs are active at the same time, the requests are combined each other to obtain a single request to be forwarded to the heat pump. Heating requests always have priority over cooling ones.



Heating and cooling circuits

The heat pump controller can manage heating and cooling distribution circuits with the possibility to define :

- Climatic curves
- Daily and weekly time tables

HEATING

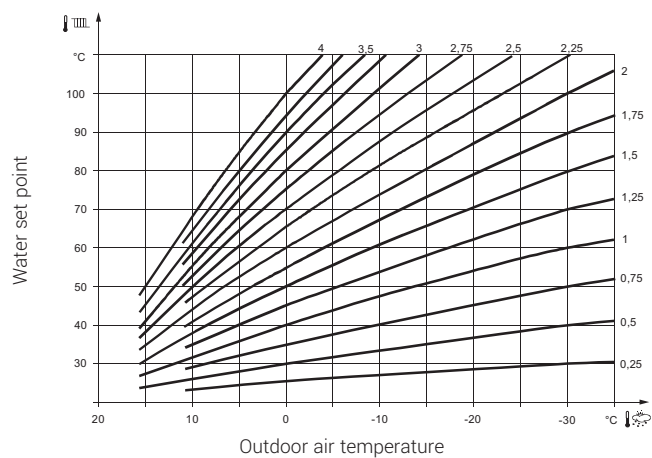
The temperature set point of the water to be sent to the **heating circuit** terminals is calculated as a function of the outdoor air temperature through a parameterisable climatic curve.

The climatic curve is defined by two parameters :

- **Slope** (par 720) : defines the shape of the climatic curve as indicated in the graph.
- **Displacement** (par 721) : allows you to vertically translate the curve defined by the selected slope.

The climatic curve is defined for an ambient set point of 20°C. If this set point is changed, the set point of the water to be sent to the terminals is changed accordingly.

The set point calculated by the climatic curve is however limited between a minimum (par 740) and a maximum (par 741) value.



Par	Description	Default value
720	Heating curve slope	0,80
721	Heating curve displacement	0,0 °C
740	Flow temp setpoint min	25 °C
741	Flow temp setpoint max	70 °C

Control System

COOLING

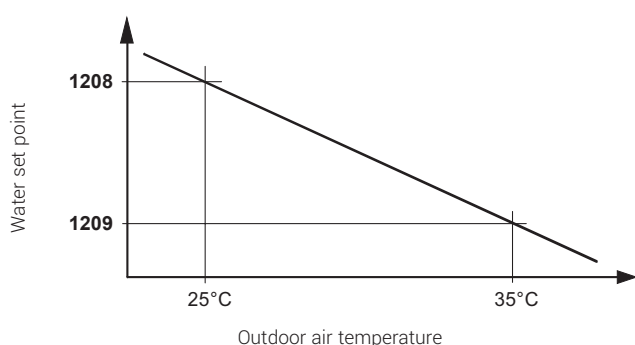
The temperature set point of the water to be sent to the **cooling circuit** terminals is calculated as a function of the outdoor air temperature through a parameterisable climatic curve.

The climatic curve is defined by two parameters :

- **Set point at 25°C** (par 1208) : Defines the water set point at an outdoor air temperature of 25°C.
- **Set point at 35°C** (par 1209) : Defines the water set point at an outdoor air temperature of 35°C.

The climatic curve is defined for an ambient set point of 25°C. If this set point is changed, the set point of the water to be sent to the terminals is changed accordingly.

The minimum value of the set point calculated by the climatic curve is however limited (par 1223 and par 1224).



Par	Description	Default value
1208	Flow temp setp at 25°C	16 °C
1209	Flow temp setp at 35°C	16 °C
1223	Flow temp setp min at 25°C	6 °C
1224	Flow temp setp min at 35°C	6 °C

SPACE HEATING/COOLING BUFFER WATER TANK

The controller of the unit allows to manage the temperature of an inertial storage tank that acts as a hydraulic circuit breaker between the distribution circuits (heating and cooling) and the heat generators (heat pump and possible boiler) by means of two temperature probes to be positioned in the upper (**B4**) and lower (**B41**) part of the storage tank.

All the heating and cooling requests are combined and generate a set point for the buffer storage tank. If this set point is not satisfied, a heating or cooling request is sent to the available generators.

Both probes are considered to evaluate the achievement of the set point. For the lower probe it is possible to consider a different set point by setting a differential (parameter 4735) compared to the set point calculated for the upper probe in order to take advantage of any stratification within the tank.

Par	Description	Default value
4735	Setpoint reduction B42/B41	0 °C



Supplementary Source

The heat pump controller can manage the integration of a supplementary heat generator (boiler) for both heating and domestic hot water production.

If the heat pump is not able to satisfy the requests autonomously, a digital output (**K32**) is activated which can be used to enable a supplementary heat generator.

Par	Description	Default value
2910	Release above outside temp	---
3700	Release below outside temp	---

It is possible to limit the enabling of the supplementary generator and also of the heat pump, depending on the outdoor air temperature in order to create a **bivalent system**.

The supplementary source can be enabled below a settable outdoor air temperature (parameter 3700) while the heat pump can be enabled above a settable outdoor air temperature (parameter 2910). In the temperature range in which both generators are enabled, the heat pump has priority and the supplementary source is activated only in integration, if necessary.



Condensate Coil Tray Electrical Heater

The heat pump controller can manage the activation of an electrical heater or a heating cable to be placed on the condensate tray or in the drain pipe to prevent ice formations from obstructing the draining during winter.

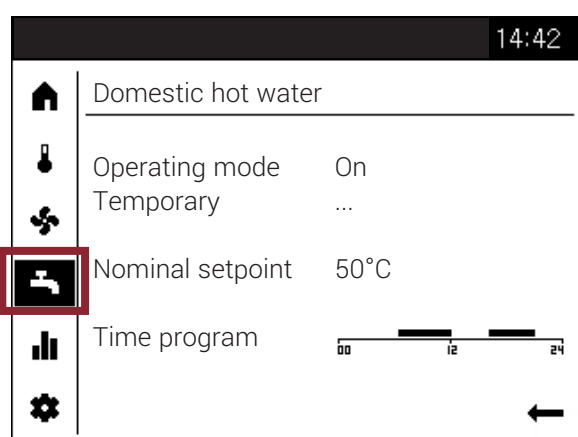
When the outdoor air temperature falls below 2°C, a digital output (**K41**) is activated during the defrost cycles and remains active for up to 3 minutes after the end of the cycle.

Control System



Domestic Hot Water

The heat pump controller can manage domestic hot water production. To enable this function, a temperature sensor (B3) must be placed on the domestic hot water storage tank and connected to the unit controller (see paragraph "Inputs and outputs"). When the function is enabled in the "Enduser" navigation menu, the associated icon appears which allows to directly set the operating mode, the nominal set point and, if needed, the time program for domestic hot water. All the other parameters about domestic hot water function can be modified by entering the complete parameter list in the "Domestic hot water" menu.



By setting the operating mode to "On" the heat pump will keep the storage tank temperature close to the nominal set point activating a three way valve (Q3) to divert the flow of the heat pump from the heating / cooling circuits towards the domestic hot water storage tank.

Par	Description	Default value
1600	Operating mode	Off
1610	Nominal set point	50 °C
1612	Reduced set point	40 °C
1620	Release	24 h/day

Usually the domestic hot water function is enabled 24 hours a day with nominal set point. It is possible to alternate the storage tank set point between the nominal and the reduced one setting a daily and weekly time program dedicated to the domestic hot water function. To enable this function, set parameter 1620 to "Time program 4 / DHW".

After a refresh of the operator unit, the line related to the domestic hot water time program will become selectable and editable.

It is possible to manage the **anti legionella function** to periodically perform heating cycles of the domestic hot water storage tank up to a higher temperature than the nominal set point.

Before enabling this function, it is recommended to check that the heat pump, possibly with the integration of the additional heat generator, can reach the set point temperature set for the cycle.

All the parameters about anti-legionella function can be modified by entering the complete parameter list in the "Domestic hot water" menu.

Par	Description	Default value
1640	Legionella funct	Off
1641	Legionella funct periodcally	3 days
1642	Legionella funct weekday	Monday
1644	Legionella funct time	05.00
1645	Legionella funct setpoint	65 °C
1646	Legionella funct duration	30 min

To enable the function, set parameter 1640 to the value :

- **Periodically** : the cycle is performed at fixed intervals of days. The interval is defined by parameter 1641.
- **Fixed weekday** : the cycle is performed on the day of the week defined by parameter 1642.

The anti-legionella cycle begins, on the scheduled day, at the time indicated by parameter 1644. The temperature of the domestic hot water storage tank is increased up to the required set point (parameter 1645) and maintained for the required period (parameter 1646).

DISCHARGING PROTECTION VALVE

The controller of the unit allows to manage, besides the three way valve (Q3) which diverts the flow of hot water between heating and domestic hot water storage tank, also another three way valve (Q33) to be installed downstream of the first one to avoid to send water inside the storage tank that is not hot enough to heat the storage tank.

Use of the digital output Q33

The three way valve Q33 can be controlled via a digital output (two position valve). The controller opens the three way valve only when the heat pump flow temperature (B21) is higher than the storage temperature (B3).

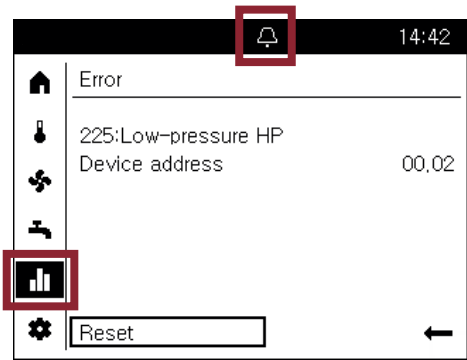
Use of the analog output Q33 and sensor B36

The three way valve Q33 can be controlled via an analog output (modulating valve). The controller adjusts the opening of the three way valve in order to keep the storage tank charging temperature (B36) higher than the storage tank temperature (B3).

Control System

Alarms

When an alarm is active the alarm symbol appears on the status bar. The details of the alarm are visible in the INFO menu.



- To reset the alarm :
- Select "Reset" with the control knob.
 - Press the control knob and the text changes to "Confirm."
 - Press the control knob again to reset the alarm.

Alarm Output

When an alarm is active, a digital output of the controller of the unit (**K10 / K46**) is activated which can be used to communicate to an external device the presence of an active alarm (see paragraph "Inputs and outputs"). The alarm output is deactivated when the alarm is reset. It is possible to deactivate only the alarm output (without resetting the alarm) via parameter 6710 (accessible from the complete parameter list).

Alarms Log

To see the Alarm log enter the "Fault" menu (parameters 6800-6819). The controller stores the last 10 events. The last event is stored deleting the oldest one. As soon as an alarm is triggered, the Alarm log stores the event with the following informations :

1	Alarm number (history)
2	Time and date of the alarm
3	Alarm code
4	Alarm description

Alarm Reset

- There are three groups of alarms according to the type of reset :
- **Manual reset (M)** : when the alarm is no more active it is necessary to reset it manually. It is advisable to verify accurately the cause that originated the alarm and to make sure that the problem has been solved before restarting the unit.
 - **Automatic reset (A)** : as soon as the alarm is no more active, the unit is automatically reset.
 - **Automatic reset with events (R)** : the alarm is automatically reset only if the number of events in an hour is less than a fixed threshold. Otherwise a manual reset is required.

Control System

Alarms Table

Code	Description	Reset	Input	Unit locked	Solution
10	Outdoor air temperature sensor	A	B9	No	Verify sensor connection
33	User side heat pump outlet temperature sensor	A	B21	No	Verify sensor connection
35	Source side heat pump inlet temperature sensor	A	B91	Yes	Verify sensor connection
36	Compressor 1 outlet temperature sensor	A	B81	No	Verify sensor connection
37	Compressor 2 outlet temperature sensor x ⁽¹⁾	A	B82	No	Verify sensor connection
39	Evaporator temperature sensor (coil)	A	B84	Yes	Verify sensor connection
44	User side heat pump inlet temperature sensor	A	B71	No	Verify sensor connection
50	DHW tank sensor 1 sensor	A	B3	No	Verify sensor connection
70	Buffer tank sensor 1 sensor	A	B4	No	Verify sensor connection
71	Buffer tank sensor 2 sensor	A	B41	No	Verify sensor connection
83	BSB short circuit	A	-	No	Verify connection cable with remote user interface and extension modules
84	BSB address collision	A	-	No	Verify configuration of remote user interface and extension modules
106	Source temperature too low	M	-	Yes	Verify sensor B91 connection Verify if the outdoor air temperature is inside the operating range
107	High temperature compressor 1 outlet	R	-	Yes	Verify sensor B81 connection Verify refrigerant leaks
134	Phase sequence controller alarm	R	E20	Yes	Verify presence and sequence of power supply phases
	Refrigerant leak alarm	R	E20	Yes	Verify the presence of refrigerant leaks Verify the refrigerant leak sensor status
138	Heat pump control sensor missing	A	-	Yes	Verify if all the sensor are connected and that the value read is reasonable Verify the configuration of all the inputs (see table "Inputs/Outputs")
146	Configuration error	A	-	No	Verify configuration parameters
201	Frost protection alarm	M	B21	Yes	Verify sensor B21 connection Verify that the unit can work on a water volume high enough to guarantee a proper unit working (see paragraph "Hydraulic connections")
204	Fans thermal protection	R	E14	Yes	Verify fans connection and their thermal protection inside the electrical panel of the unit
222	High pressure	R	H83	Yes	Verify the setting of the maximum water outlet temperature (according to the ΔT value adopted) Verify expansion valve connection (V81) Verify high pressure sensor connection (H83)
223	High pressure on start heating circuit	M	H83	Yes	
224	High pressure on start DHW	M	H83	Yes	
225	Low pressure	R	H82	Yes	Verify refrigerant leaks with a refrigerant leak detector If the alarm appears in cooling mode verify the water temperature, the set point adopted and that the unit can work on a water volume high enough to guarantee a proper unit working (see paragraph "Hydraulic connections")

x ⁽¹⁾ : Temperature sensor only installed within S-ASX-LPi 75 & 100 models for compressor number 2.

Control System

Code	Description	Reset	Input	Unit locked	Solution
247	Defrost alarm	R	-	Yes	Verify coil status and, if frozen, force a defrost cycle (parameter 7153) Verify refrigerant leaks with a refrigerant leak detector
320	DHW charging temperature sensor	A	B36	Yes	Verify sensor connection
324	Bx sensors with the same function	A	-	No	Two inputs are configured in the same way Verify Bx inputs configuration
325	Bx sensors with the same function on extension modules	A	-	No	
330	BX1 no function	A	-	No	Sensor connected but not configured Verify input configuration
331	BX2 no function	A	-	No	
332	BX3 no function	A	-	No	
333	BX4 no function	A	-	No	
335	BX21 no function	A	-	No	
336	BX22 no function	A	-	No	
356	User side flow switch	R	E24	Yes	Flow lack on the user side heat exchanger Verify that the system is well vented Verify pump connection Verify if the water filter is clean
361	Sensor B91 missing	A	-	No	Verify sensor connection
363	Sensor B84 missing	A	-	No	Verify sensor connection
373	Extension module 3	A	-	No	Verify connection between main controller and extension modules
441	BX31 no function	A	-	No	Sensor connected but not configured Verify input configuration
442	BX32 no function	A	-	No	
443	BX33 no function	A	-	No	
444	BX34 no function	A	-	No	
452	H1 no function	A	-	No	Input connected but not configured Verify input configuration
453	H3 no function	A	-	No	
454	H31 no function	A	-	No	
455	H32 no function	A	-	No	
456	H33 no function	A	-	No	
469	HX21 no function	A	-	No	
470	HX22 no function	A	-	No	
476	Compressor inlet temperature sensor	A	B85	Yes	Verify sensor connection
477	Evaporating pressure sensor	A	H82	Yes	Verify sensor connection
480	EVI inlet temperature sensor	A	B86	Yes	Verify sensor connection
481	Evaporating EVI pressure sensor	A	H86	Yes	Verify sensor connection
488	Condensing pressure sensor	A	H83	Yes	Verify sensor connection
491	Maximum evaporating temperature	R	-	Yes	In heating mode : verify if the outdoor air temperature is inside the allowed operating range In cooling mode : verify if the water temperature is inside the allowed operating range
495	Modbus no communication	A	-	No	Verify Modbus port configuration
500	Modbus configuration error	A	-	No	
505	Expansion valve	M	-	Yes	Verify expansion valve connection (V81)

Control System

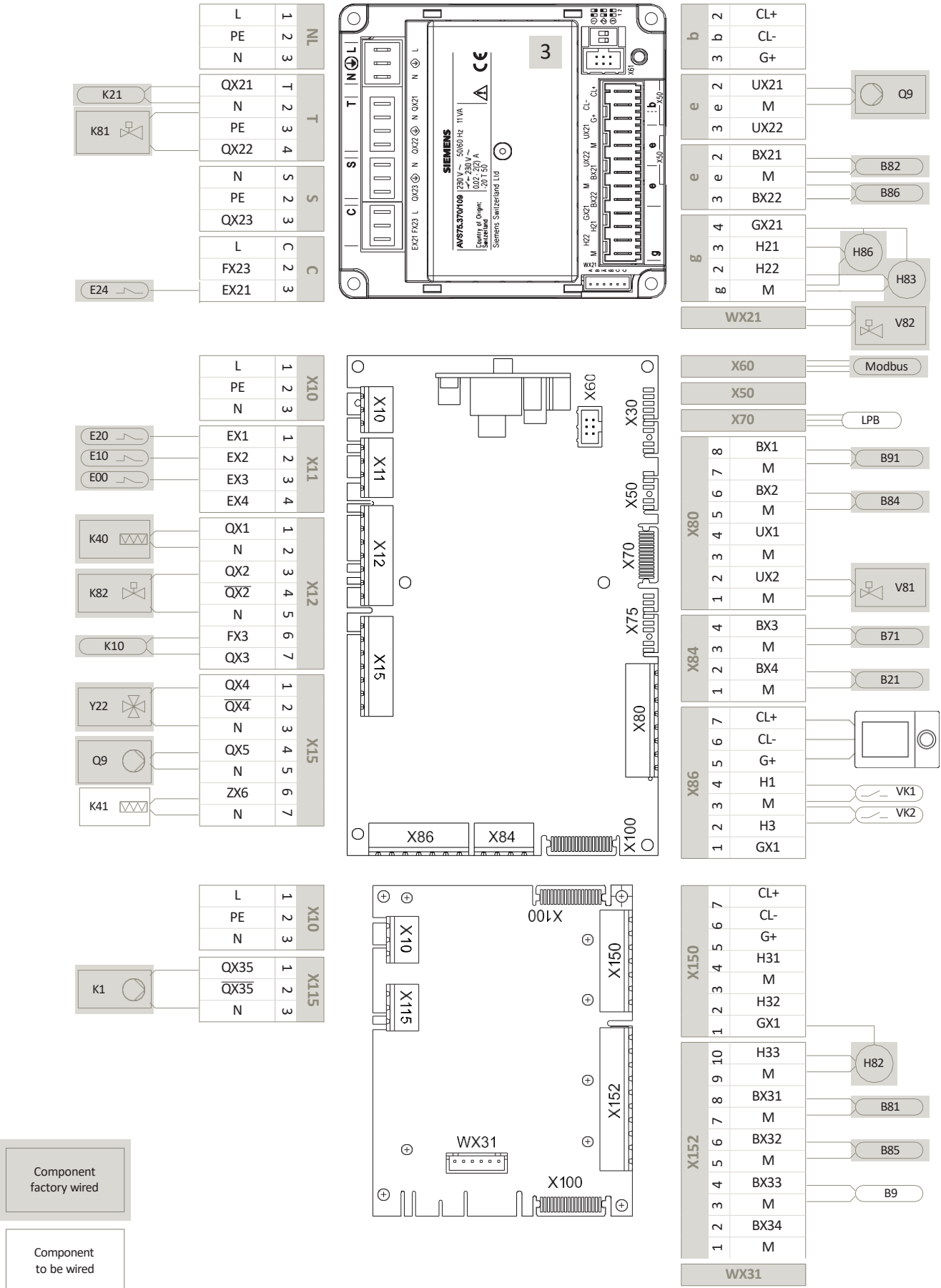
Inputs and outputs table

	ID	Use	Description	Features	To be wired
Analog inputs	BX1	B91	Source side air inlet temperature	NTC	-
	BX2	B84	Coil temperature	NTC	-
	BX3	B71	User side water inlet temperature	NTC	-
	BX4	B21	User side water outlet temperature	NTC	-
	BX31	B81	Compressor outlet temperature	NTC	-
	BX32	B85	Compressor inlet temperature	NTC	-
	BX33	B9	Outdoor air temperature	NTC	x
	BX34	-	-	NTC	-
	BX21 mod3	B82	Compressor 2 outlet temperature	NTC x ⁽²⁾	-
	BX22 mod3	B86	Injection inlet temperature	NTC	-
	H31	-	-	voltage free digital input	-
	H32	-	-	voltage free digital input	-
	H33	H82	Compressor inlet pressure	ratiometric sensor 0-5 V	-
	H21 mod3	H86	Injection inlet pressure	ratiometric sensor 0-5 V	-
	H22 mod3	H83	Compressor outlet pressure	ratiometric sensor 0-5 V	-
Digital inputs	EX1	E20	Phase sequence controller alarm	230 Vac digital input	-
	EX2	E10	High pressure switch	230 Vac digital input	-
	EX3	E00	Refrigerant leak sensor	230 Vac digital input	-
	EX4	-	-	230 Vac digital input	-
	EX21 mod 3	E24	User side flow switch	230 Vac digital input	-
	H1	VK1	Heating request	voltage free digital input	x
	H3	VK2	Cooling request	voltage free digital input	x
Analog outputs	UX1	-	-	0-10 Vdc	x ⁽¹⁾
	UX2	V81	Electronic expansion valve	0-10 Vdc	-
	UX21 mod3	Q9	User side pump	0-10 Vdc	-
	UX22 mod3	-	-	0-10 Vdc	-
	WX31	-	-	unipolar EEV	-
	WX21 mod3	V82	EVI electronic expansion valve (injection)	unipolar EEV	-
Digital outputs	QX1	K40	Compressor carter electrical heater	2A - 230 Vac	-
	QX2	K82	Injection valve	2A - 230 Vac	-
	QX3	K10	General Alarm	voltage free digital output	-
	QX4	Y22	Cycle reversing valve	2A - 230 Vac	-
	QX5	Q9	User side pump	2A - 230 Vac	x ⁽¹⁾
	ZX6	K41	Condensate tray electrical heater	2A - 230 Vac	x
	QX35	K1	Compressors	2A - 230 Vac	-
	QX21 mod3	K21	Delta T Controller	2A - 230 Vac	-
	QX22 mod3	K81	Evaporator Valve Controller	2A - 230 Vac	-
	QX23 mod3	-	-	voltage free digital output	-

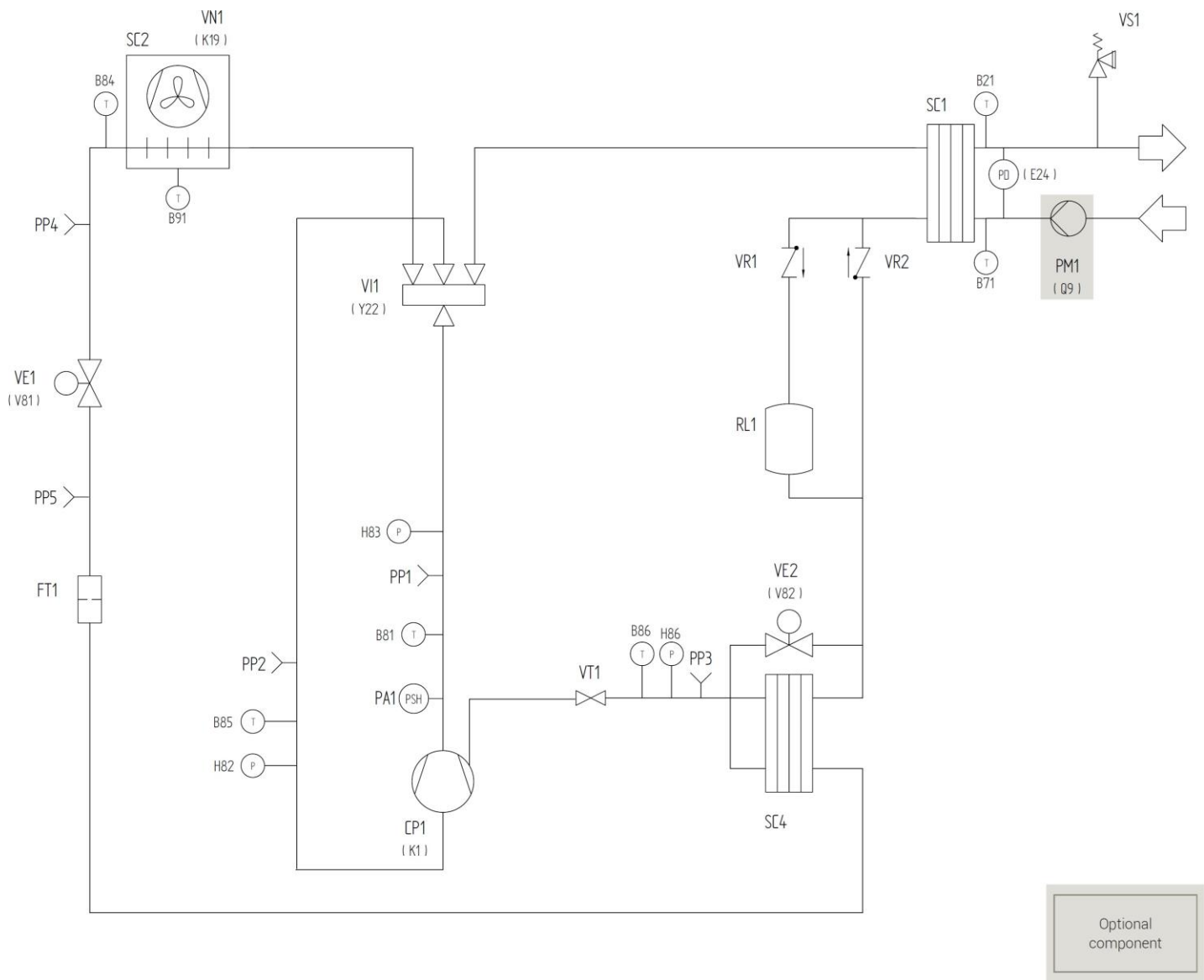
x ⁽¹⁾ : If not integrated within the unit.

x ⁽²⁾: Temperature sensor only installed within S-ASX-LPi 75 & 100 models for compressor number 2.

Control System



Operating Diagram - S-ASX-LPi 55

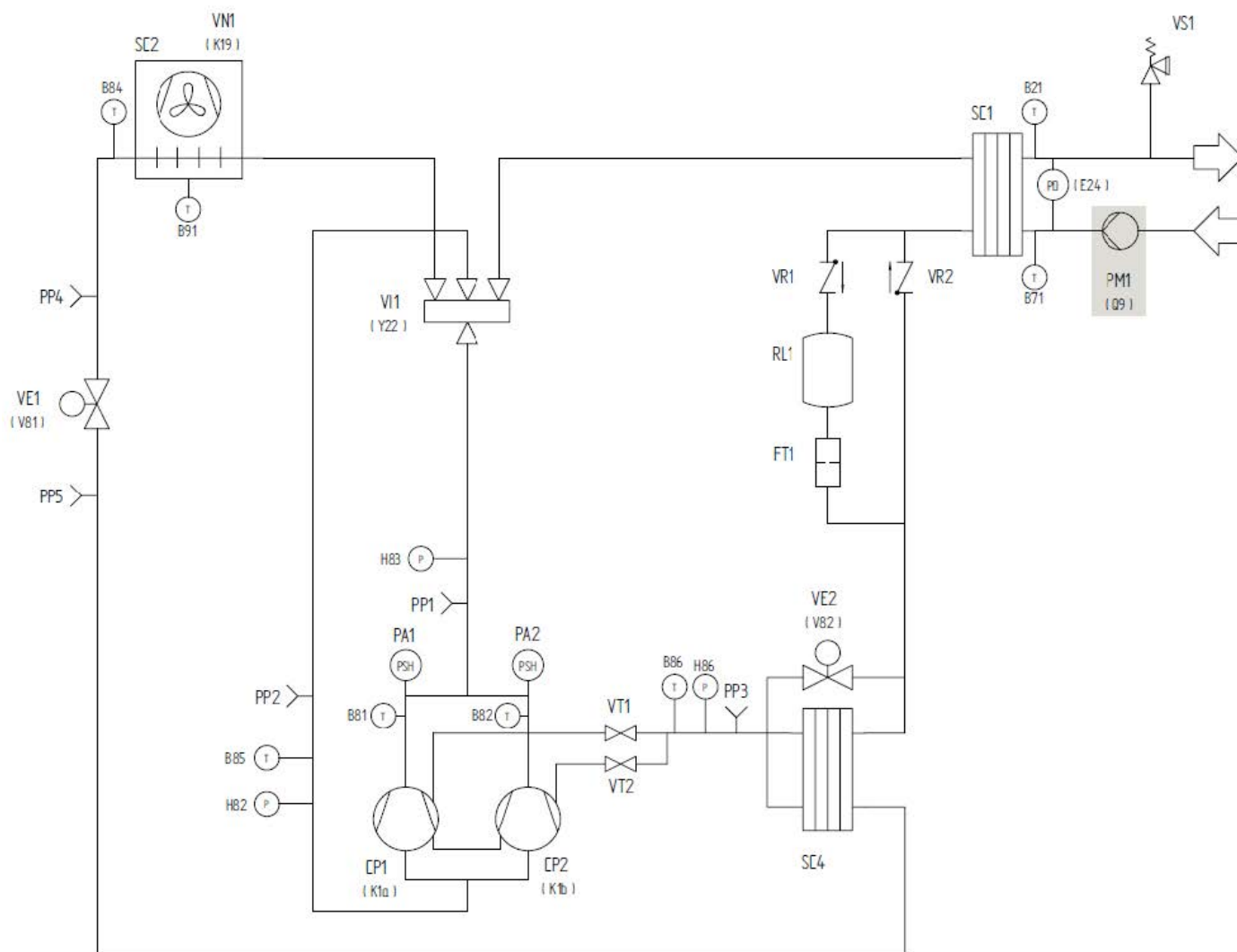


Optional component

CP	Compressor
SC1	User side heat exchanger
SC2	Source side heat exchanger
SC4	Economizer heat exchanger
RL	Liquid receiver
VE	Expansion valve
VI	Cycle reversing valve
VR	Non return valve

VT	Shut off valve
FT	Filter
VN	Fan
PM	Pump
PA	High pressure pressostat
PD	Differential pressure pressostat
PP	Pressure intake
Hx	Pressure sensor
Bx	Temperature sensor

Operating Diagram - S-ASX-LPi 75 - 100



Optional
component

CP	Compressor
SC1	User side heat exchanger
SC2	Source side heat exchanger
SC4	Economizer heat exchanger
RL	Liquid receiver
VE	Expansion valve
VI	Cycle reversing valve
VR	Non return valve

VT	Shut off valve
FT	Filter
VN	Fan
PM	Pump
PA	High pressure switch
PD	Differential pressure switch
PP	Pressure intake
Hx	Pressure sensor
Bx	Temperature sensor

Cascade Management

If multiple heat pumps are installed in a system, then **STREBEL** recommends installing them utilising the built-in cascade management system in order to optimise the efficiency of the heat pumps along with the complete system. When using the integrated cascade control, a maximum of 16 heat pumps can be controlled. When using the cascade control, the demand signal, temperature sensors, DHW three-way valve and any immersion heaters need to wire back to the 'Master' heat pump.

Cascade management is a function already embedded in the controller of each heat pump and allows to coordinate the operating mode of more units (up to 16) in heating, cooling, and domestic hot water production. It is possible to use inside the same cascade heat pumps of different capacity.

The heat pumps are activated in a sequence according to the thermal requests coming from the plant with a logic which integrate during the time the difference between the required set point and the temperature actually reached. A common flow temperature sensor (B10) is required for an optimized cascade management.

The heat pump activation sequence changes automatically according to the operating hours of each heat pump in order to guarantee a balanced use of all the units. As an alternative it is possible to define a fixed activation sequence or exclude from the automatic rotation the first or the last heat pump to be used.

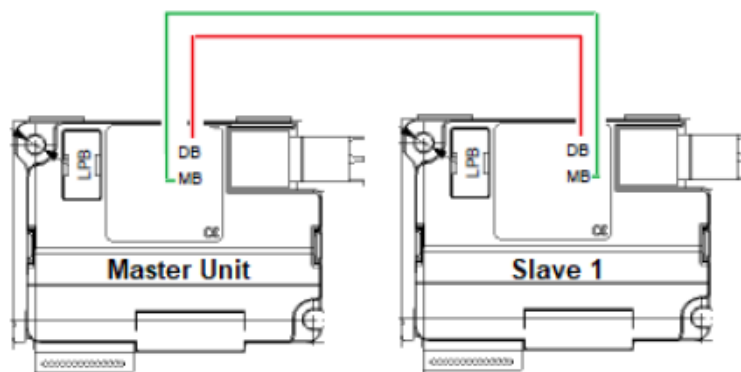
If double compressor units are used in the cascade, the first compressor of each heat pump is activated in sequence, and after that, if necessary, also the second compressor is activated, in order to optimize the part load efficiency of each unit.

The defrost cycles of the heat pumps are moreover managed in order to avoid more units to defrost at the same time. All the heat pumps share the same outdoor air temperature sensor that can be connected to any of the heat pumps of the cascade.

The heat pumps in cascade communicate by means of a 2-wire bus (LPB bus). Each heat pump has its own address on the bus. The heat pump with address 1 is conventionally called "master" even if in reality each heat pump becomes master in rotation.

Cascade Wiring

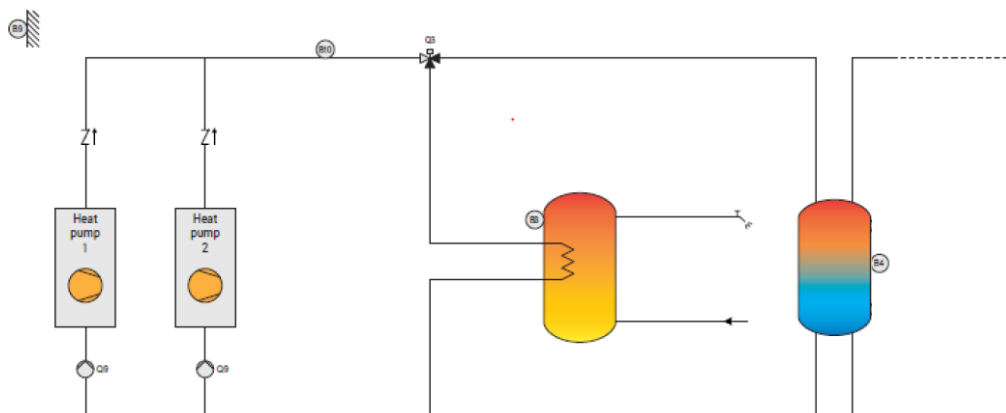
The cascade wiring needs to be completed by a qualified electrician. Using terminals MB & DB on each heat pump LPB interface, daisy chain the units together as shown below.



If a third heat pump is to be added, daisy chain the same terminals from "slave 1" and so on.

Cascade Management

The following setup is for a 2 x S-ASX-LPi cascade setup:

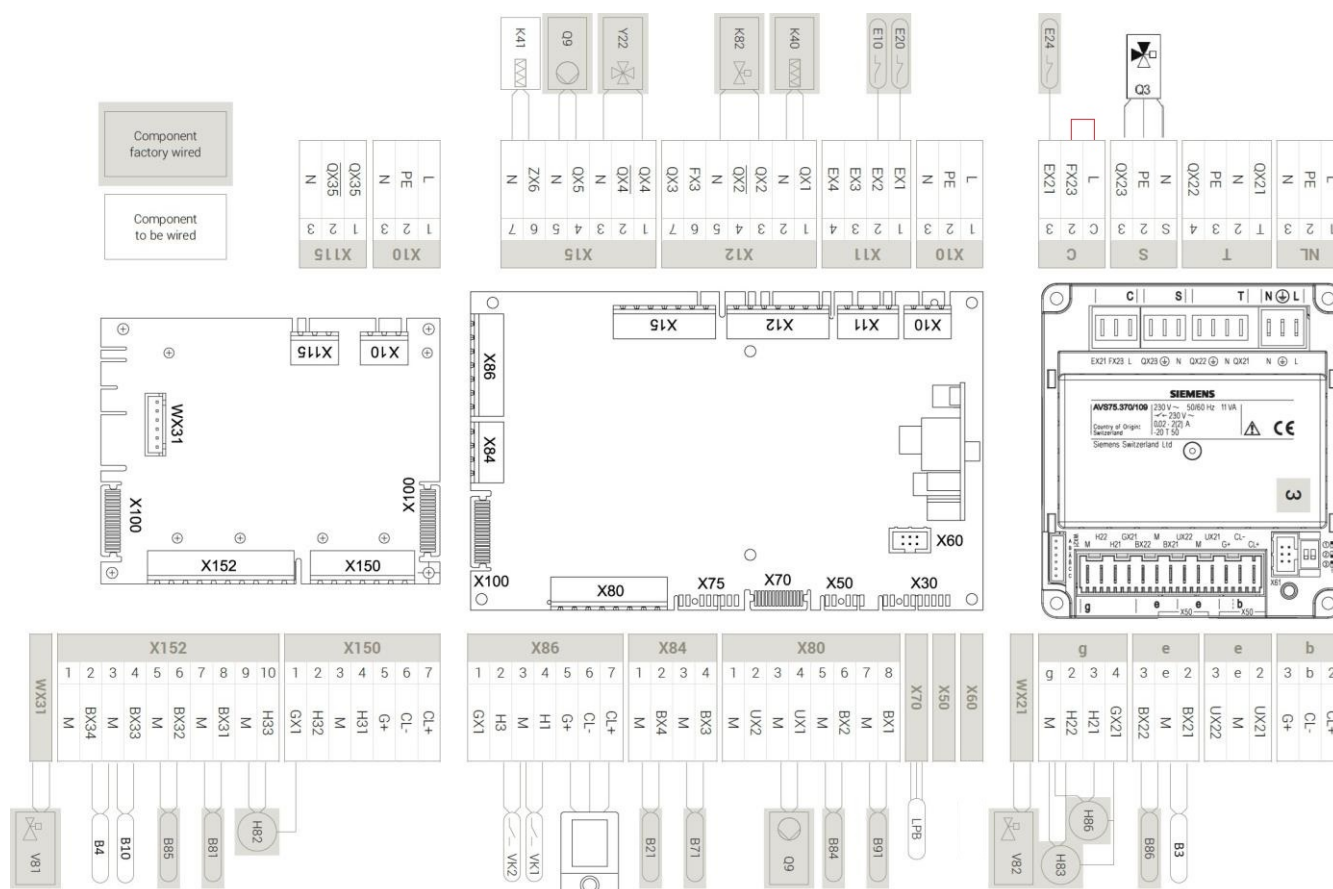


Drawing Number	Part Description
B9	Outside Air Temperature Sensor
B10	Common Flow Temperature Sensor
Q3	DHW Three Way Valve
B3	DHW Tank Temperature Sensor
B4	Thermal Store / Buffer Vessel Flow Temperature Sensor

Master Heat Pump Wiring

The following two wiring diagram shows the required wiring to the “master” heat pump to the sensors (B3, B4 & B10) and the DHW three-way valve shown in the above setup. The B9 outside air temperature sensor to be connected to ASHP Slave 1.

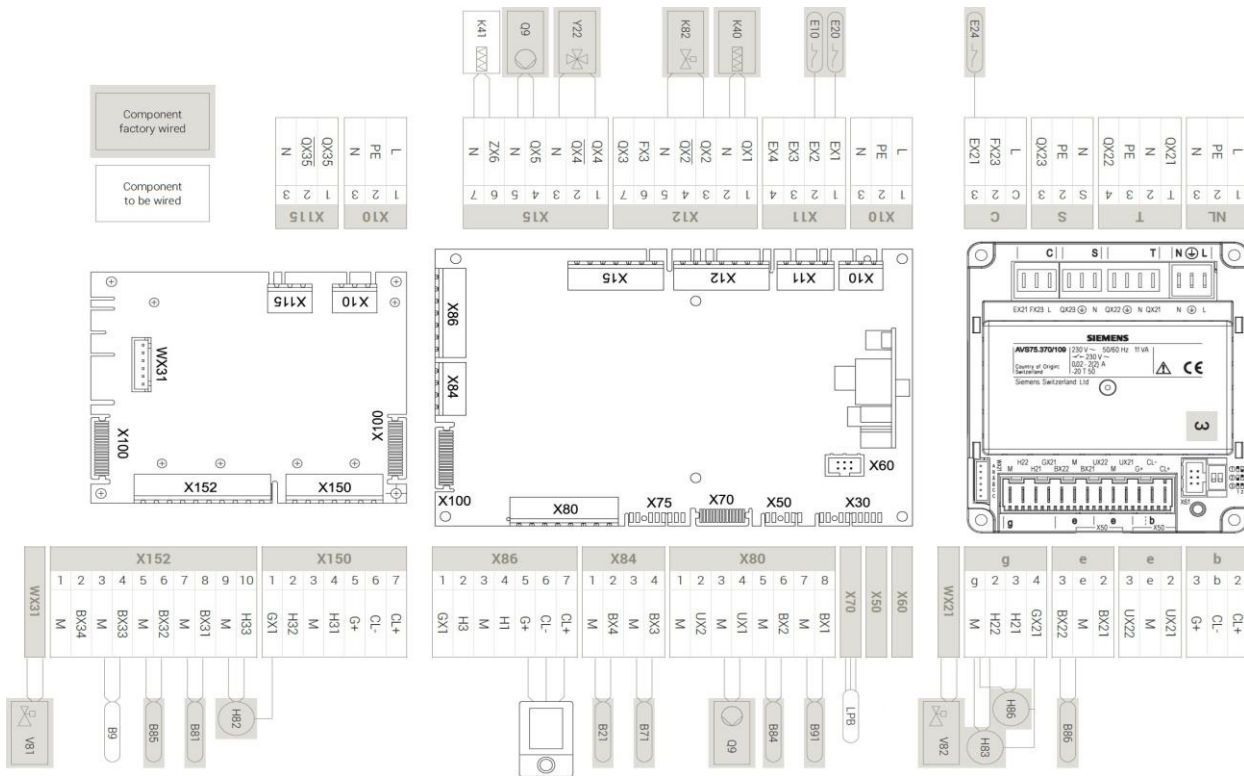
Diagram 1: Main Controller within Master ASHP



Cascade Management

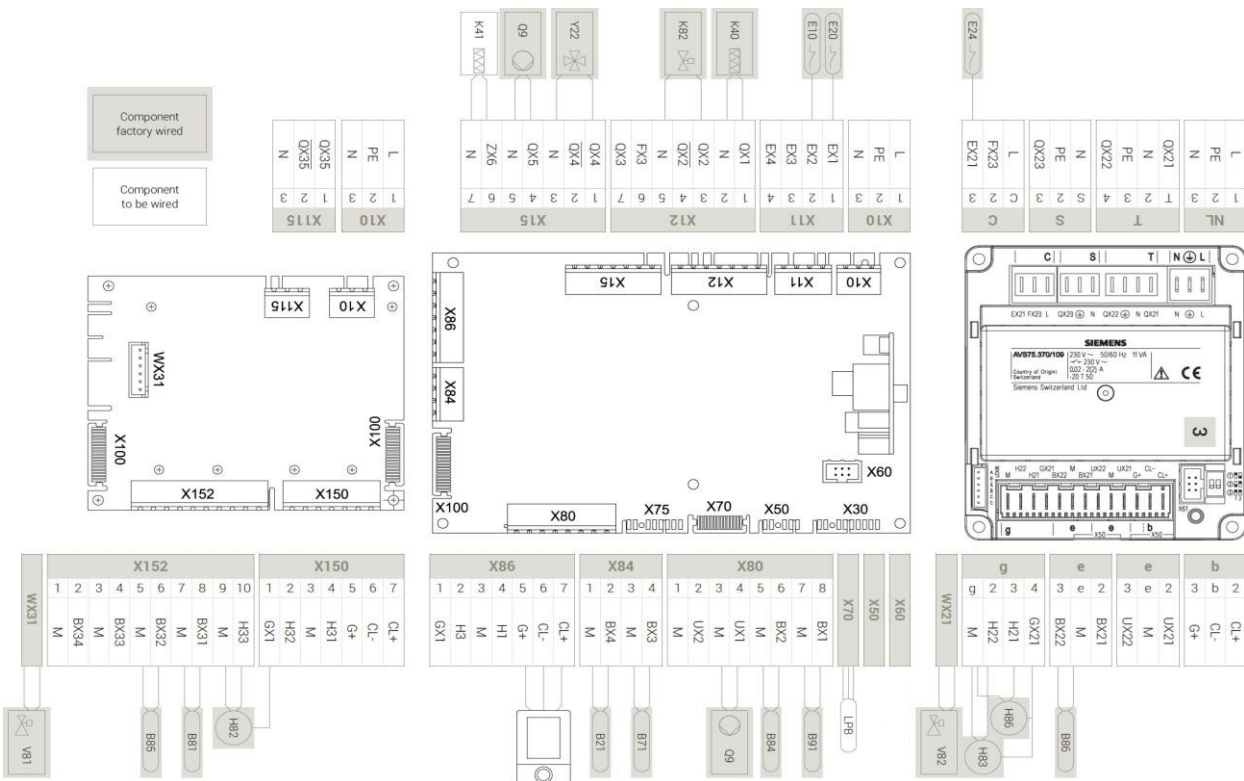
Slave 1 Heat Pump Wiring

The below diagram shows the required wiring for the ASHP addressed as Slave 1 which includes the wiring for the B9 outside air temperature sensor. No requirement for a demand signal to be connected (VK1 & VK2).



Remaining Slaves (2 to 15) Heat Pump Wiring

No requirement for additional sensors or demand signal to be connected (VK1 & VK2).



Maintenance

IMPORTANT

BEFORE CARRYING OUT MAINTENANCE OR CLEANING OPERATIONS MAKE SURE THE UNIT POWER SUPPLY IS DISCONNECTED. ANY ORDINARY OR EXTRAORDINARY MAINTENANCE OPERATION MUST BE CARRIED OUT BY SPECIALIZED AND AUTHORIZED PERSONNEL IN ORDER TO ENSURE COMPLIANCE WITH THE SAFETY REGULATIONS IN FORCE.

This section is extremely important for the efficient operation of the unit during the years. A few operations carried out periodically can avoid the need to call specialized personnel. The operations to be carried out do not require particular technical knowledge and consist of simple checks of the components of the unit. Contact an authorized service center if maintenance is required.

Requirements - Risk Analysis

Before starting work, a risk analysis of the maintenance and repair activities must be carried out, with the involvement of the installation safety manager, to identify the work area and to define the safety procedures to be implemented, based on the work type in order to prevent risks of damage to property or harm to persons.

The responsibility for the procedures above shall be vested on staff that carry out the risk analysis who must be qualified, competent and trained.

The manufacturer shall not be liable for damages or incidents experienced by persons or properties due to a wrong or missing risk analysis.

The safety procedures should consider by way of non exhaustive example the following points.

- All safety instructions provided in the instruction manuals for unit operation and maintenance must be respected.
- Before starting a work on the unit, no potentially flammable atmospheres must be present.
- Provision must be made for suitable fire extinguishers with the type of flammable agent to be extinguished.
- The working area should be defined for each individual installation, taking into account the Atex 2 zone and the safety zone around the machine (as already identified during installation of the equipment).
- The working area should be properly ventilated and monitored by suitable leak detectors.
- The work area must be clearly fenced off and provided with appropriate signs.
- No flammable materials and ignition sources should be present in the working area.
- Make sure that no flammable atmosphere can be created as a consequence of any maintenance activity.
- Make sure that leaking refrigerant don't flow into pits, downpipes, directly on people or near openings that are used for the ventilation of enclosed spaces, near fresh air inlets, doors or similar openings, or close to ignition sources.

Operators

Staff involved in maintenance operation on the present equipment must :

- Be compliant with all the applicable Regulations in terms of certification of individuals and companies.
- Conform Regulations regarding the competence of technical operators, the safety requirements for managing flammable refrigerants and units including flammable refrigerants.
- Be compliant also with national and/or local regulations.
- Follow manufacturer instructions and safety guidelines provided in the operation and maintenance instruction manual.
- Be duly and specifically trained according to the work activity to be carried out on the present equipment.
- Be compliant with PED Directive in case of brazing.
- Be correctly equipped with all necessary PPE (Personal Protective Equipment) selected depending on the work activity to be carried out.
- Wear anti-static clothing, suitable with the type of activity you need to perform.

Equipment and Tools

Personal protective equipment must be worn at all times, as required by the relevant operations. Proper equipment and tools must be used in order to perform all the maintenance and repair tasks safely and effectively.

Before carrying out any maintenance or repair work the following point should be considered.

- Make sure that the staff is equipped with the complete equipment suitable to work with flammable refrigerants (A2L or A3) and in flammable / explosive atmospheres.
- Make sure that the equipment is completely matching the provisions of general, national, and local regulations in use.
- Make sure that technicians are trained in the proper use of these tools and follow all safety precautions during maintenance and repair activities and all prescription provided by general, national, and local regulations in use.
- Ensure that all equipment and tools are in good working condition and properly calibrated before use. The competent manager is responsible for keeping the equipment in good condition and for verifying that it is in proper working order, as instructed by the equipment manufacturer.
- Follow manufacturer instructions and safety guidelines when using any equipment or tools.

To prevent the formation of electrostatic discharges resulting from differences in potential, the operator must make sure that all pieces of equipment and the instruments connected to the unit have the same potential as the unit.

It is strictly prohibited to use tools or instruments or perform operations that could give rise to ignition sources, for example, the use of drills, powered screwdrivers, saws or similar tools.

Such devices may only be used outside the working zone and at a safe distance from the unit, and from cylinders or other containers used to store flammable refrigerants, or when the refrigerating circuit has been completely drained of refrigerant and purged and there are no refrigerant containers or leaks near the working area.

Maintenance

F-Gas Integrity Test - Mandatory Requirement

For safe operation of the S-ASX-LPi ASHP, each ASHP will require a F-Gas integrity test once every 12 months.

This test will need to be completed using a certified refrigerant leak detector suitable for R454B and have a sensitivity rating of no more than 3g/year.

If a leak is found, the ASHP must be isolated hydraulically and the refrigerant recovered.

S-ASX-LPi Gas Leak Detector Sensor & Inlet / Extract Fan Test - Mandatory Requirement

For safe operation of the S-ASX-LPi ASHP, each ASHP will require a gas leak detector sensor & extract fan test once every 12 months.

This test will need to be completed by spraying a small amount of a tracer gas around the internal gas leak sensor whilst the ASHP is in standby. The extract fan within the refrigeration circuit should activate simulating the removal of the R454B from the refrigeration compartment and the air inlet fan within the electrical compartment will deactivate to prevent any R454B from being drawn in.

If either the sensor does not detect the leak or either fans operate as required, the ASHP must be isolated until rectified.

Routine Maintenance - Mandatory Requirement

For a good, safe and long-time operation of the S-ASX-LPi ASHP, the requirement is to carry out maintenance / servicing of the ASHP once every 12 months..

Structure

To prevent noises and strange vibrations to rise make sure that the various steel parts are well fastened together and that the inspection panels are properly fixed to the unit.

In case of oxidation, treat the parts of the unit affected with paints, suitable to avoid or reduce the problem.

Hydraulic Plant

Visually check that the hydraulic plant is leak free and is pressurized. Verify that there is no air in the circuit (acting on the air vents). Verify that the filters in the plant are clean.

Electrical Plant

Verify that the power supply cable that connects the unit to the distribution panel is not affected by cuts, cracks or alterations that could compromise the insulation. Contact an authorized service center if maintenance is required. After a first period of time from the first start up and at every stop or seasonal start up carefully check that each electrical connection is well fixed.

Fans

Verify that the fans are well fixed to the protective grilles and to the structure of the unit. Check any unbalance of the fans pointed out by anomalous vibrations and noise.

Finned Coil

Verify that the surface of the coil is clean. Remove all the impurities (leaves, dirt, dust..) using a brush or a compressed air jet. If the aluminum fins are damaged comb the coil with a special tool until the damage is completely eliminated. Verify that during the defrosting cycles the drainage of the water from the coil occurs properly and that the drainage fitting is not clogged. If the flow is not correct, with low outdoor temperature, a layer of ice could be generated and the operating of the unit could be compromised.

Service and Repair

Not ordinary maintenance, service and repair activities must be carried out only by highly qualified operators who have specific knowledge on the unit.

Before performing repair operations power to the unit must be cut out and all the panels of the unit should be open. Tests during unit operation must be carried out with all the safety devices active.

If components in the refrigerant circuit need to be repaired or replaced, the operation must be carried out in compliance with the relevant PED category and with standard EN378-2. It is forbidden to carry out braze welding, repairs, replacements, drilling, installation procedures..., on units containing flammable refrigerants if the work is to be carried out within the ATEX 2 zone defined for the unit or within the working area.

No flammable agents and ignition sources should be present in the working area. Flammable refrigerant must be recovered from all the circuits if the required operations may cause the presence of naked flames, sparks and other sources of ignition. The work area should be monitored by refrigerant detecting systems before, during and after use of naked flames, which are admitted for repair work to be performed after exhausting the machine.

Strebel Service Offer

Our Service department can be contacted either by phone on 01276 685422 or email to technical@strebel.co.uk to arrange the service of the S-ASX-LPi's to our manufacturer instructions, complete F-Gas integrity test, a gas leak detector and fan inlet / extract test as a combined package

Safety

Accessing the Unit

The access to the unit must be granted exclusively to qualified personnel trained to operate on this type of units and provided with the necessary protection equipment. Moreover such personnel, to operate, must be authorized by the owner of the unit and recognized by the manufacturer.

Residual Risks

The units are designed and manufactured in such a way as to minimize the risks for people and the place where the units are installed. The residual risks, which are impossible to eliminate during the design process and which are beyond the manufacturer's control, are described below together with the indications necessary for their neutralization. The residual risks are a potential source of danger for people, so the given indications must be scrupulously adopted.

Unit Disposal

To dispose of the unit it is necessary to contact qualified personnel.

The unit contains refrigerant gas and lubricating oil. During the scrapping, such fluids must be recovered as well as any other part of the machine, and disposed of according to the national and local regulations in force in the country where the unit is installed. The unit must not be abandoned when scrapped.

The unit contains electrical and electronic equipment that can not be disposed of through normal urban collection channels. These appliances must also be disposed of separately according to the national and local regulations in force in the country where the unit is installed.

The unit packaging must also be disposed / recycled according to the national and local regulations in force in the country in which the unit is installed



Residual risk	Precautions	
GENERAL RISKS The unit contains components that can cause damage to people or property in the event of contact. The compressor can create burns in the event of contact. The pipes of the refrigeration circuit can cause burns or frost burns in case of contact or refrigerant leakage. Contact with live parts of the electrical circuit can cause burns and / or electric shock. Contact with the finned batteries can cause cutting injuries. The unit has moving parts such as fans that can cause damage to people or property in the event of contact.	Make the area where the unit is installed accessible only to authorized personnel. Verify that any intervention on the unit is carried out by qualified technical personnel, respecting all current and applicable safety regulations in accordance with the national legislation of the country of installation. Always wear the personal protective equipment required by current and applicable safety regulations in accordance with the national legislation of the country of installation. Use protective gloves to avoid contact with the compressor, parts of the cooling circuit and finned batteries. Switch OFF the power supply line to the unit before performing any operation inside the unit Do not remove the guards for moving parts before checking them for shutdown and taking precautions to prevent them from operating. Check that all the protections provided on the equipment are correctly fitted before starting the unit	
HANDLING Handling of the unit, if not carried out with all the necessary protections and with the necessary caution, could cause the unit to fall or overturn, with consequent potential serious damages to people or things, and / or to the equipment itself.	Handle the equipment according to the instructions in this manual, and in accordance with local regulations.	
INSTALLATION An incorrect installation can cause damage due to people or things.	Make sure that the installation is carried out by qualified technical personnel, respecting all the safety regulations in force and applicable in accordance with the national legislation of the country of installation to avoid malfunctions and damage to the equipment, people or things. Check that the unit is installed in a place suitable for the use for which it was intended, indicated in this manual. Comply with all applicable and applicable regulations for the place of installation of the unit, in accordance with the national legislation of the country of installation. The assessment of the fire risk relative to the place of installation and the relative assessment that any fire protection systems near the unit are suitable is the responsibility of the user. Check the positioning and anchoring of the unit. The installation site must be adequate to support the weight of the equipment. Anchoring must be carried out in such a way as to prevent falls and overturning. Make the installation area accessible only to authorized personnel. Check that all the closing and protection panels of the unit are always properly mounted and fixed.	

Safety

Residual risk	Precautions	
ELECTRIC CONNECTIONS The connection of the unit to the electrical network carried out incorrectly may result in electric shocks, electric shocks, burns, intoxication, fires.	Verify that the installation is carried out by qualified technical personnel, respecting all current and applicable safety regulations in accordance with the national legislation of the country of installation and the indications provided in this manual for the electrical connection. Verify that the sizing of cables and protections is adequate to the characteristics of the equipment. Check the ground connection. Check the correct installation of the protections on the unit to avoid contact with live parts. Disconnect the power supply line and verify that no potentially live parts are present before removing shields and guards from the equipment, in case of maintenance or before performing any operation inside the unit.	 
REFRIGERANT The unit contains FLAMMABLE refrigerant gas under pressure as indicated in this manual. Refrigerant leakage may occur due, as an example not exhaustive, to the intervention of adequately prepared safety guards, incorrect installation or movement ... The refrigerant leakage could stagnate and create a flammable atmosphere inside or outside the unit.	Any operation on the parts under pressure must be performed by qualified technical personnel properly trained on the use of flammable refrigerants. Check that the unit is installed in a place suitable for the use for which it was intended, indicated in this manual. Comply with all applicable and in force regulations for the place of installation of the unit, in accordance with the national legislation of the country of installation. Do not place flammable substances or materials in or near the unit. Near the unit it is forbidden to use naked flames and smoke. In case of refrigerant leakage, consult the "safety data sheet" of the refrigerant given in this manual. In case of need of intervention on the refrigeration circuit, carry out the disposal and / or recovery of the refrigerant as indicated by the regulations in force in accordance with the national legislation of the country of installation. Only carry out brazing or welding activities on clean or empty pipes, without lubricant oil residues. Do not bring flames or other sources of heat near pipes containing refrigerating liquid. When the rules in force require the installation of fire-fighting systems near the machine, check that these are suitable for extinguishing fires on electrical equipment and on the lubricating oil of the compressor and the coolant, as specified on the safety data sheets of these fluids (for example, a CO2 extinguisher). The installation supervisor is responsible for preparing the risk assessment of the installation taking into account all the possible risks including the risk of fire at the place of installation (for example, calculating the fire load) considering the whole life cycle of the unit and all the possible situations (lack of power supply, maintenance, repair activities...)	 
HYDRAULIC PARTS Improper installation of hydraulic connections can result in water leaks with damage to people or property, and short circuits in the electrical parts of the unit.	Verify that the installation is carried out respecting the instructions provided in this manual for the hydraulic connection, and respecting all current and applicable safety regulations in accordance with the national legislation of the country of installation. Do not exceed the maximum allowable pressure (PS) of the hydraulic circuit shown in this manual.	
TRANSPORT AND STORAGE The unit is loaded with refrigerant gas under pressure. Improper transport can cause damage to the unit and damage to the refrigerant circuit with loss of refrigerant.	During transport and storage check that the unit is kept within the temperature limits specified in this manual. Comply with regulations for transporting equipment under pressure. During the installation of the unit, check for leaks in the circuit.	

Refrigerant Safety Card

1 IDENTIFICATION OF THE SUBSTANCE/MIXTURE

Product **R 454 B**
SDS identcode 130000143545
Use of the Substance/Mixture : refrigerant
Recommended restrictions on use : for professional and industrial installation and use only. Do not use product for anything outside of the above specified uses.

2 HAZARDS IDENTIFICATION

- 2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No. 1272/2008 [CLP]
Flammable gases, Category 1B : H221 : Flammable gas.
Gases under pressure, Liquefied gas : H280 : Contains gas under pressure; may explode if heated.
- 2.2 Label elements
Labelling according to Regulation (EC) No. 1272/2008 [CLP]
Hazard pictograms (CLP) : GHS02 - GHS04
Signal word (CLP) : Danger
Hazard statements (CLP) : H221 - Flammable gas
H280 Contains gas under pressure; may explode if heated
Precautionary statements (CLP) : Prevention: P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
No smoking.
Response : P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - In case of leakage, eliminate all ignition sources.
Storage : P410 + P403 - Protect from sunlight. Store in a well-ventilated place.
Contains fluorinated greenhouse gases. (HFC-32)
- 2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Rapid evaporation of the product may cause frostbite.
May displace oxygen and cause rapid suffocation.
- 3 COMPOSITION/INFORMATION ON INGREDIENTS
- 3.2 Mixtures
- | | | |
|----------------------------|--|--------------|
| Difluoromethane (R32) | 68,9 % in weight
H221 - Flam. gas 1
H280 - Press. gas (liq.) | CAS 75-10-5 |
| 2,3,3,3-Tetrafluoropropene | 31,1 % in weight
H221 - Flam. gas 1
H280 - Press. gas (liq.) | CAS 754-12-1 |

4 FIRST AID MEASURES

- 4.1 Description of first aid measures
General advice : In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.
Protection of first-aiders : No special precautions are necessary for first aid responders.
If inhaled : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
In case of skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area. Get medical attention immediately.
In case of eye contact : Get medical attention immediately.
If swallowed : Ingestion is not considered a potential route of exposure.
- 4.2 Most important symptoms and effects, both acute and delayed :
Symptoms : May cause cardiac arrhythmia. Other symptoms potentially related to misuse or inhalation abuse are : Cardiac sensitisation, Anaesthetic effects, light-headedness, dizziness, confusion, lack of coordination, drowsiness, unconsciousness.
Risks : Gas reduces oxygen available for breathing. Contact with liquid or refrigerated gas can cause cold burns and frostbite.
- 4.3 Indication of any immediate medical attention and special treatment needed :
Treatment : Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

5 FIREFIGHTING MEASURES

- 5.1 Extinguishing media
Suitable extinguishing media : Water spray, alcohol-resistant foam, carbon dioxide (CO₂), dry chemical
Unsuitable extinguishing media : None known
- 5.2 Special hazards arising from the substance or mixture
Specific hazards during firefighting : Vapours may form flammable mixture with air. Exposure to combustion products may be a hazard to health. If the temperature rises there is danger of the vessels bursting due to the high vapor pressure.
Hazardous combustion products : hydrogen fluoride, carbonyl fluoride, carbon oxides, fluorine compounds
- 5.3 Advice for firefighters
Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Fight fire remotely due to the risk of explosion. Use water spray to cool unopened containers. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

6 ACCIDENTAL RELEASE MEASURES

- 6.1 Personal precautions, protective equipment and emergency procedures
Personal precautions : Evacuate personnel to safe areas. Only trained personnel should re-enter the area. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).
- 6.2 Environmental precautions : avoid release to the environment. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water.
- 6.3 Methods and material for containment and cleaning up
Methods for cleaning up : ventilate the area. Non-sparking tools should be used. Suppress (knock down) gases/vapours/mists with a water spray jet. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.
- 6.4 Reference to other sections : See sections: 7, 8, 11, 12 and 13.

7 HANDLING AND STORAGE

- 7.1 Precautions for safe handling
Technical measures : use equipment rated for cylinder pressure. Use a backflow preventative device in piping. Close valve after each use and when empty.
Local/Total ventilation : If sufficient ventilation is unavailable, use with local exhaust ventilation. If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.
Advice on safe handling : Avoid breathing gas. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment. Keep container tightly closed. Wear cold insulating gloves/ face shield/ eye protection. Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Prevent backflow into the gas tank. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Close valve after each use and when empty. Do NOT change or force fit connections. Prevent the intrusion of water into the gas tank. Never attempt to lift cylinder by its cap. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize release to the environment.
- Hygiene measures : if exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.
- 7.2 Conditions for safe storage, including any incompatibilities
Requirements for storage areas and containers : Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present. Keep in properly labelled containers. Keep tightly closed. Keep in a cool, well-ventilated place. Keep away from direct sunlight. Store in accordance with the particular national regulations. Keep away from heat and sources of ignition.
- Advice on common storage : do not store with the following product types : self-reactive substances and mixtures, organic peroxides, oxidizing agents, flammable liquids, flammable solids, pyrophoric liquids, pyrophoric solids, self-heating substances and mixtures, substances and mixtures, which in contact with water, emit flammable gases, explosives, very acutely toxic substances and mixtures, acutely toxic substances and mixtures, substances and mixtures with chronic toxicity.

Storage period : > 10 yr

Recommended storage temperature : < 52 °C

Further information on storage stability : the product has an indefinite shelf life when stored properly.

- 7.3 Specific end use(s) : No data available.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

- 8.1 Control parameters

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL) according to Reg (CE) Num. 1907/2006:

Substance name : **Difluoromethane**

End use : Workers - Exposure routes : Inhalation
Potential health effects : Long-term systemic effects
Value : 7035 mg/m³

End use : Consumers - Exposure routes : Inhalation
Potential health effects : Long-term systemic effects
Value : 750 mg/m³

Substance name : **2,3,3,3-Tetrafluoropropene**

End use : Workers - Exposure routes : Inhalation
Potential health effects : Long-term systemic effects
Value : 950 mg/m³

Predicted No Effect Concentration (PNEC) according to Reg (CE) Num. 1907/2006:

Substance name : **Difluoromethane**

Fresh water : 0,142 mg/l
Intermittent use/release : 1,42 mg/l
Fresh water sediment : 0,534 mg/kg dry weight (d.w.)

Refrigerant Safety Card

Substance name : **2,3,3,3-Tetrafluoropropene**

Fresh water : 0.1 mg/l

Intermittent use/release : 1 mg/l

Fresh water sediment : 1.77 mg/kg dry weight (d.w.)

Soil : 1.54 mg/kg dry weight (d.w.)

Marine water : 0.01 mg/l

Marine sediment : 0.178 mg/kg dry weight (d.w.)

8.2 Exposure controls

Engineering measures

Minimize workplace exposure concentrations. If sufficient ventilation is unavailable, use with local exhaust ventilation. If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Personal protective equipment

Eye/face protection : Wear the following personal protective equipment : chemical resistant goggles must be worn. Face-shield. Equipment should conform to BS EN 166

Hand protection. Material : Impervious gloves. Remarks : choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Skin and body protection : wear the following personal protective equipment : if assessment demonstrates that there is a risk of explosive atmospheres or flash fires, use flame retardant antistatic protective clothing.

Respiratory protection : If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection. Equipment should conform to BS EN 14387. Filter type : Organic gas and low boiling vapour type (AX).

Protective measures : Wear cold insulating gloves/ face shield/ eye protection.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance :	Liquefied gas
Colour :	colourless
Odour :	slight, ether-like
Odour Threshold :	No data available
pH :	No data available
Melting point/freezing point :	No data available
Initial boiling point and boiling range :	-50.9 °C
Flash point :	Not applicable
Evaporation rate :	> 1 (CCL4=1.0)
Flammability (solid, gas) :	Flammable
Upper explosion limit / Upper flammability limit :	
Upper flammability limit 22 %(V) Method: ASTM E681	
Lower explosion limit / Lower flammability limit :	
Lower flammability limit 11.25 %(V) Method: ASTM E681	
Vapour pressure :	15,856 hPa (25 °C)
Relative vapour density :	2.2 (Air = 1.0)
Relative density :	0.98 (25 °C)
Density :	0.98 g/cm ³ (25 °C) (as liquid)
Solubility(ies)	
Water solubility :	No data available
Partition coefficient: octanol/ water :	Not applicable
Auto-ignition temperature :	496 °C
Decomposition temperature :	No data available
Viscosity	
Viscosity, kinematic :	Not applicable
Explosive properties :	Not explosive
Oxidizing properties :	The substance or mixture is not classified as oxidizing.

9.2 Other information

Particle size :	Not applicable
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10 STABILITY AND REACTIVITY

10.1 Reactivity : not classified as a reactivity hazard.

10.2 Chemical stability : stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.

10.3 Possibility of hazardous reactions : vapours may form flammable mixture with air. Can react with strong oxidizing agents. Flammable gas.

10.4 Conditions to avoid : heat, flames and sparks.

10.5 Incompatible materials : Materials to avoid : avoid impurities (e.g. rust, dust, ash), risk of decomposition. Incompatible with acids and bases. Incompatible with oxidizing agents. Oxygen. Peroxides. Peroxide compounds. Powdered metals.

10.6 Hazardous decomposition products : no hazardous decomposition products are known.

11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Information on likely routes of exposure : Inhalation. Skin contact. Eye contact.

Acute toxicity : Not classified based on available information.

Components :

Difluoromethane

Acute oral toxicity. Assessment : The substance or mixture has no acute oral toxicity

Acute inhalation toxicity

LC50 (Rat) : > 520000 ppm. Exposure time: 4 h. Test atmosphere: gas. Method: OECD.

Test Guideline 403

No observed adverse effect concentration (Dog): 350000 ppm. Test atmosphere: gas

Remarks: Cardiac sensitisation.

Lowest observed adverse effect concentration (Dog): >350000 ppm. Test atmosphere: gas. Remarks: Cardiac sensitisation

Cardiac sensitisation threshold limit (Dog): > 735,000 mg/m³. Test atmosphere: gas. Remarks: Cardiac sensitisation

Acute dermal toxicity : Assessment: The substance or mixture has no acute dermal toxicity

2,3,3,3-Tetrafluoropropene

Acute inhalation toxicity

LC50 (Rat) : > 405800 ppm. Exposure time: 4 h. Test atmosphere: gas. Method: OECD

Test Guideline 403

No observed adverse effect concentration (Dog): 120000 ppm. Test atmosphere: gas. Remarks: Cardiac sensitisation.

Lowest observed adverse effect concentration (Dog): >120000 ppm. Test atmosphere: gas. Remarks: Cardiac sensitisation.

Cardiac sensitisation threshold limit (Dog): > 559,509 mg/m³. Test atmosphere: gas. Remarks: Cardiac sensitisation

Skin corrosion/irritation : Not classified based on available information.

Components :

Difluoromethane Result : No skin irritation

2,3,3,3-Tetrafluoropropene Result : No skin irritation

Serious eye damage/eye irritation : Not classified based on available information.

Components :

Difluoromethane Result : No eye irritation

2,3,3,3-Tetrafluoropropene Result : No eye irritation

Skin sensitisation : Not classified based on available information.

Respiratory sensitisation : Not classified based on available information.

Components :

Difluoromethane

Exposure routes : Skin contact. Result : negative

Exposure routes : Inhalation. Result : negative

2,3,3,3-Tetrafluoropropene

Exposure routes : Skin contact. Result : negative

Germ cell mutagenicity : Not classified based on available information.

Components :

Difluoromethane

Genotoxicity in vitro

Test Type: Bacterial reverse mutation assay (AMES). Method: OECD Test Guideline 471. Result: negative

Test Type: Chromosome aberration test in vitro. Method: OECD Test Guideline 473. Result: negative

Genotoxicity in vivo

Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay). Species: Mouse. Application Route: inhalation (gas). Method: OECD Test Guideline 474. Result: negative

Germ cell mutagenicity- Assessment : Weight of evidence does not support classification as a germ cell mutagen.

2,3,3,3-Tetrafluoropropene

Genotoxicity in vitro

Test Type: Bacterial reverse mutation assay (AMES). Method: OECD Test Guideline 471. Result: positive

Test Type: Chromosome aberration test in vitro. Method: OECD Test Guideline 473

Result: negative

Genotoxicity in vivo

Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay). Species: Mouse. Application Route: inhalation (gas). Method: OECD Test Guideline 474. Result: negative

Test Type: In vivo mammalian alkaline comet assay. Species: Rat. Application Route: inhalation (gas). Method: OECD Test Guideline 489. Result: negative

Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay). Species: Rat. Application Route: inhalation (gas). Method: OECD Test Guideline 474. Result: negative

Germ cell mutagenicity- Assessment : Weight of evidence does not support classification as a germ cell mutagen.

Carcinogenicity : Not classified based on available information.

Components :

Difluoromethane

Carcinogenicity - Assessment : Weight of evidence does not support classification as a carcinogen

2,3,3,3-Tetrafluoropropene Result : negative

Carcinogenicity - Assessment : Weight of evidence does not support classification as a carcinogen

Reproductive toxicity : Not classified based on available information.

Components :

Difluoromethane

Effects on fertility : Species: Mouse. Application Route: Inhalation. Result: negative. Remarks: Based on data from similar materials

Effects on foetal development

Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test. Species: Rat. Application Route: inhalation (gas). Method: OECD Test Guideline 414. Result: negative

Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test. Species: Rabbit. Application Route: inhalation (gas). Method:

Refrigerant Safety Card

- OECD Test Guideline 414. Result: negative
Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity
2,3,3,3-Tetrafluoropropene
Effects on fertility : Test Type: Two-generation reproduction toxicity study. Species: Rat.
Application Route: inhalation (gas). Method: OECD Test Guideline 416. Result: negative
Effects on foetal development
Test Type: Prenatal development toxicity study (teratogenicity). Species: Rat. Application Route: inhalation (gas). Method: OECD Test Guideline 414. Result: negative
Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity, No effects on or via lactation
STOT - single exposure : Not classified based on available information.
Components :
Difluoromethane
Exposure routes : inhalation (gas). Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less
2,3,3,3-Tetrafluoropropene
Exposure routes : inhalation (gas). Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less
STOT - repeated exposure : Not classified based on available information.
Components :
Difluoromethane
Exposure routes : inhalation (gas). Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.
2,3,3,3-Tetrafluoropropene
Exposure routes : inhalation (gas). Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.
Repeated dose toxicity
Components :
Difluoromethane
Species : Rat, male and female. NOAEL : 49100 ppm. LOAEL : > 49100 ppm. Application Route : inhalation (gas). Exposure time : 13 Weeks. Method : OECD Test Guideline 413
2,3,3,3-Tetrafluoropropene
Species : Rat, male and female. NOAEL : 50000 ppm. LOAEL : >50000 ppm. Application Route : inhalation (gas). Exposure time : 13 Weeks. Method : OECD Test Guideline 413
Aspiration toxicity : Not classified based on available information.
Components :
Difluoromethane : No aspiration toxicity classification
2,3,3,3-Tetrafluoropropene : No aspiration toxicity classification
- 12 ECOLOGICAL INFORMATION**
- 12.1 Toxicity
Components
Difluoromethane:
Toxicity to fish : LC50 (Fish): 1,507 mg/l. Exposure time: 96 h. Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia (water flea)): 652 mg/l. Exposure time: 48 h. Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to algae/aquatic plants : EC50 (green algae): 142 mg/l. Exposure time: 96 h. Method: ECOSAR (Ecological Structure Activity Relationships)
2,3,3,3-Tetrafluoropropene
Toxicity to fish : LC50 (Cyprinus carpio (Carp)): > 197 mg/l. Exposure time: 96 h. Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l. Exposure time: 48 h. Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants : EC50 (Selenastrum capricornutum (green algae)): > 100 mg/l. Exposure time: 72 h. Method: OECD Test Guideline 201. NOEC (Selenastrum capricornutum (green algae)): > 75 mg/l. Exposure time: 3 d. Method: OECD Test Guideline 201
2,3,3,3-Tetrafluoropropene
Toxicity to fish : LC50 (Cyprinus carpio (Carp)): > 197 mg/l. Exposure time: 96 h. Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l. Exposure time: 48 h. Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants : EC50 (Selenastrum capricornutum (green algae)): > 100 mg/l. Exposure time: 72 h. Method: OECD Test Guideline 201. NOEC (Selenastrum capricornutum (green algae)): > 75 mg/l. Exposure time: 3 d. Method: OECD Test Guideline 201
- 12.2 Persistence and degradability
Components
Difluoromethane Biodegradability : Result: Not readily biodegradable. Method: OECD Test Guideline 301D
2,3,3,3-Tetrafluoropropene Biodegradability : Result: Not readily biodegradable. Method: OECD Test Guideline 301F
- 12.3 Bioaccumulative potential
Components
Difluoromethane Partition coefficient: noctanol/water : log Pow: 0.714
2,3,3,3-Tetrafluoropropene Bioaccumulation : Remarks: Bioaccumulation is unlikely.
Partition coefficient: noctanol/water : log Pow: 2 (25 °C)
- 12.4 Mobility in soil : No data available
- 12.5 Results of PBT and vPvB assessment
Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
- 12.6 Endocrine disrupting properties
Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
- 12.7 Other adverse effects
Global warming potential. Regulation (EU) No 517/2014 on fluorinated greenhouse gases
Product: 100-year global warming potential: 466

- 13 DISPOSAL CONSIDERATIONS**
- 13.1 Waste treatment methods
Product : Dispose of in accordance with local regulations. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.
Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal. Empty pressure vessels should be returned to the supplier. Empty containers retain residue and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death. If not otherwise specified: Dispose of as unused product.
- 14 TRANSPORT INFORMATION**
- 14.1 UN number
ADN : UN 3161
ADR : UN 3161
RID : UN 3161
IMDG : UN 3161
IATA (Cargo) : UN 3161
IATA (Passenger) : UN 3161 Not permitted for transport
- 14.2 UN proper shipping name
ADN : LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
ADR : LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
RID : LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IMDG : LIQUEFIED GAS, FLAMMABLE, N.O.S (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IATA (Cargo) : Liquefied gas, flammable, n.o.s. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IATA (Passenger) : LIQUEFIED GAS, FLAMMABLE, N.O.S. Not permitted for transport
- 14.3 Transport hazard class(es)
ADN : 2
ADR : 2
RID : 2
IMDG : 2.1
IATA (Cargo) : 2.1
IATA (Passenger) : Not permitted for transport
- 14.4 Packing group
ADN
Packing group : Not assigned by regulation
Classification Code : 2F
Hazard Identification Number : 23
Labels : 2.1
ADR
Packing group : Not assigned by regulation
Classification Code : 2F
Hazard Identification Number : 23
Labels : 2.1
Tunnel restriction code : (B/D)
RID
Packing group : Not assigned by regulation
Classification Code : 2F
Hazard Identification Number : 23
Labels : 2.1 ((13))
IMDG
Packing group : Not assigned by regulation
Labels : 2.1
EmS Code : F-D, S-U
IATA (Cargo)
Packing instruction (cargo aircraft) : 200
Packing group : Not assigned by regulation
Labels : Flammable Gas
IATA (Passenger) : Not permitted for transport
- 14.5 Environmental hazards
ADN - Environmentally hazardous : no
ADR - Environmentally hazardous : no
RID - Environmentally hazardous : no
IMDG - Marine pollutant : no
- 14.6 Special precautions for user
The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations
- 14.7 Transport in bulk according to Annex II of Marpol and the IBC Code
Remarks : Not applicable for product as supplied.
- 15 REGULATORY INFORMATION**
- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
Relevant EU provisions transposed through retained EU law
UK REACH List of restrictions (Annex 17) : Not applicable
UK REACH Candidate list of substances of very high concern (SVHC) for Authorisation : Not applicable

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The Persistent Organic Pollutants Regulations (retained Regulation (EU) 2019/1021 as amended for Great Britain) : Not applicable

Regulation (EC) No 1005/2009 on substances that deplete the ozone layer : Not applicable

UK REACH List of substances subject to authorisation (Annex XIV) : Not applicable

GB Export and import of hazardous chemicals - Prior Informed Consent (PIC) Regulation : Not applicable

Control of Major Accident Hazards Regulations 2015 (COMAH)

P2 - FLAMMABLE GASES : Quantity 1 : 10 t - Quantity 2 : 50 t

15.2 Chemical safety assessment

Chemical Safety Assessments have been carried out for these substances.

16 OTHER INFORMATION

Full text of H-Statements

H221 : Flammable gas.

H280 : Contains gas under pressure; may explode if heated.

Full text of other abbreviations

Flam. Gas : Flammable gases

Press. Gas : Gases under pressure

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration as associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UN-RTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

Sources of key data used to compile the Safety Data Sheet : Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, <http://echa.europa.eu/>

Classification of the mixture: Classification procedure:

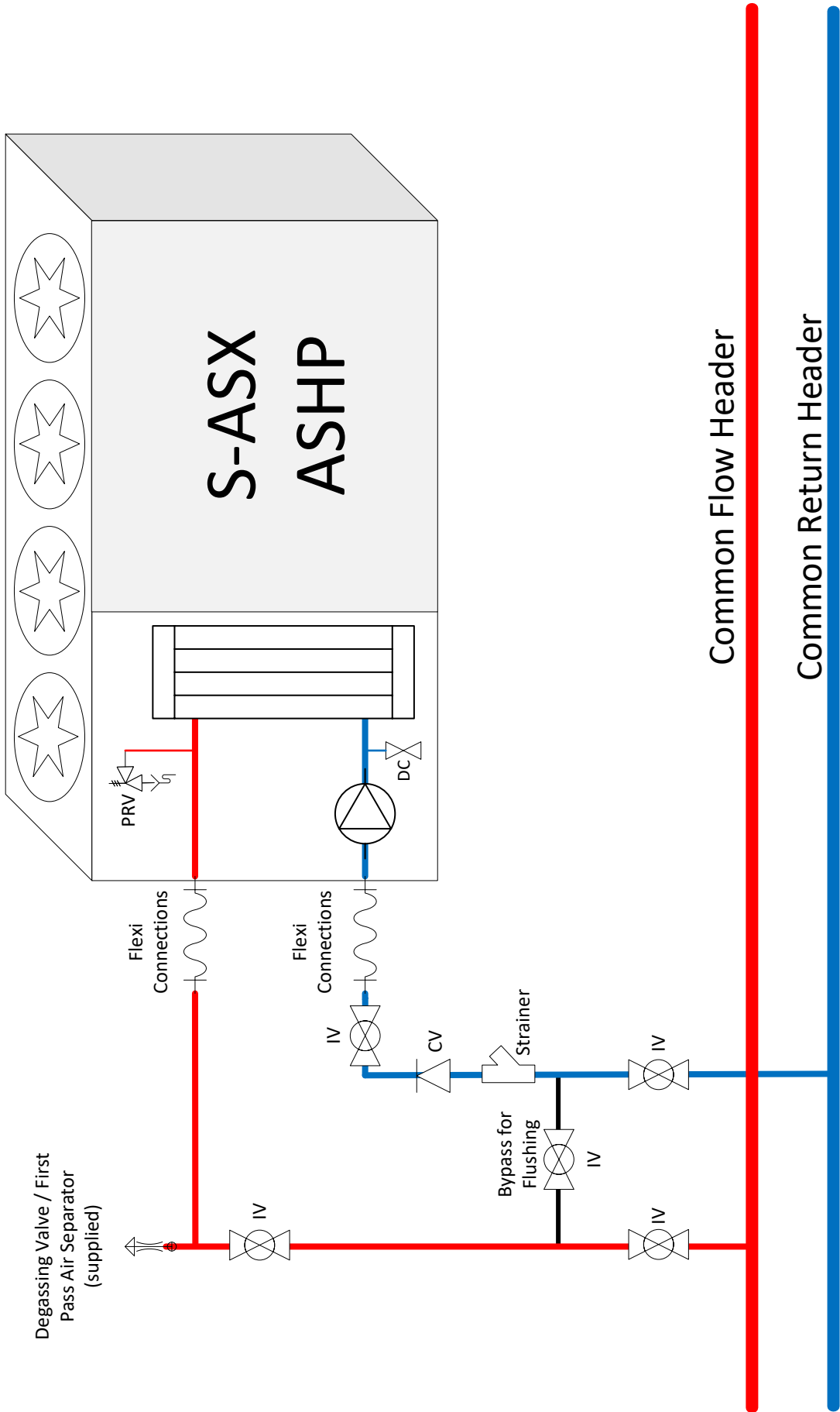
Flam. Gas 1B H221 Based on product data or assessment

Press. Gas Liquefied gas H280 Based on product data or assessment

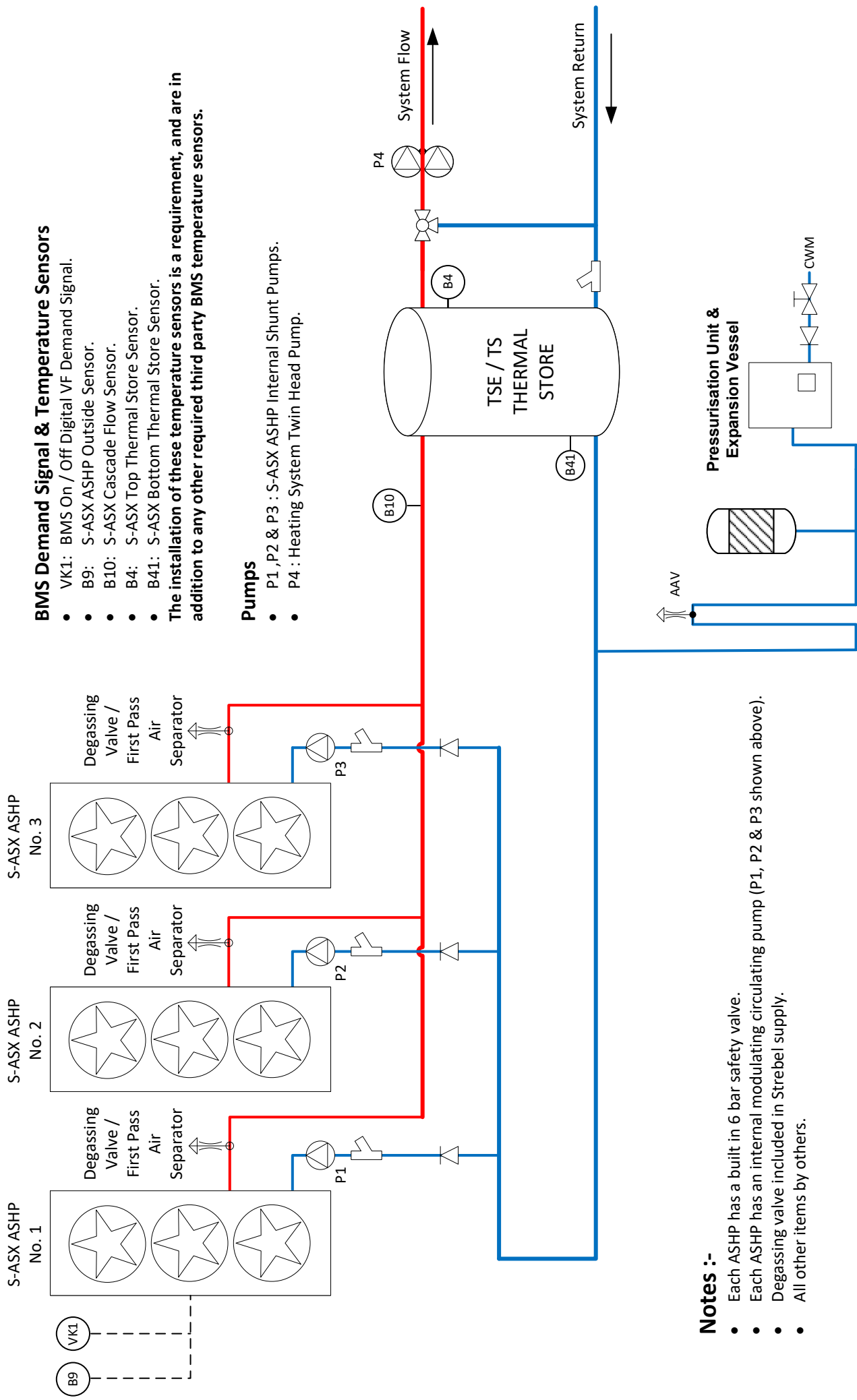
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

S-ASX R290 & R454B ASHP – Recommended Individual Pipework Setup

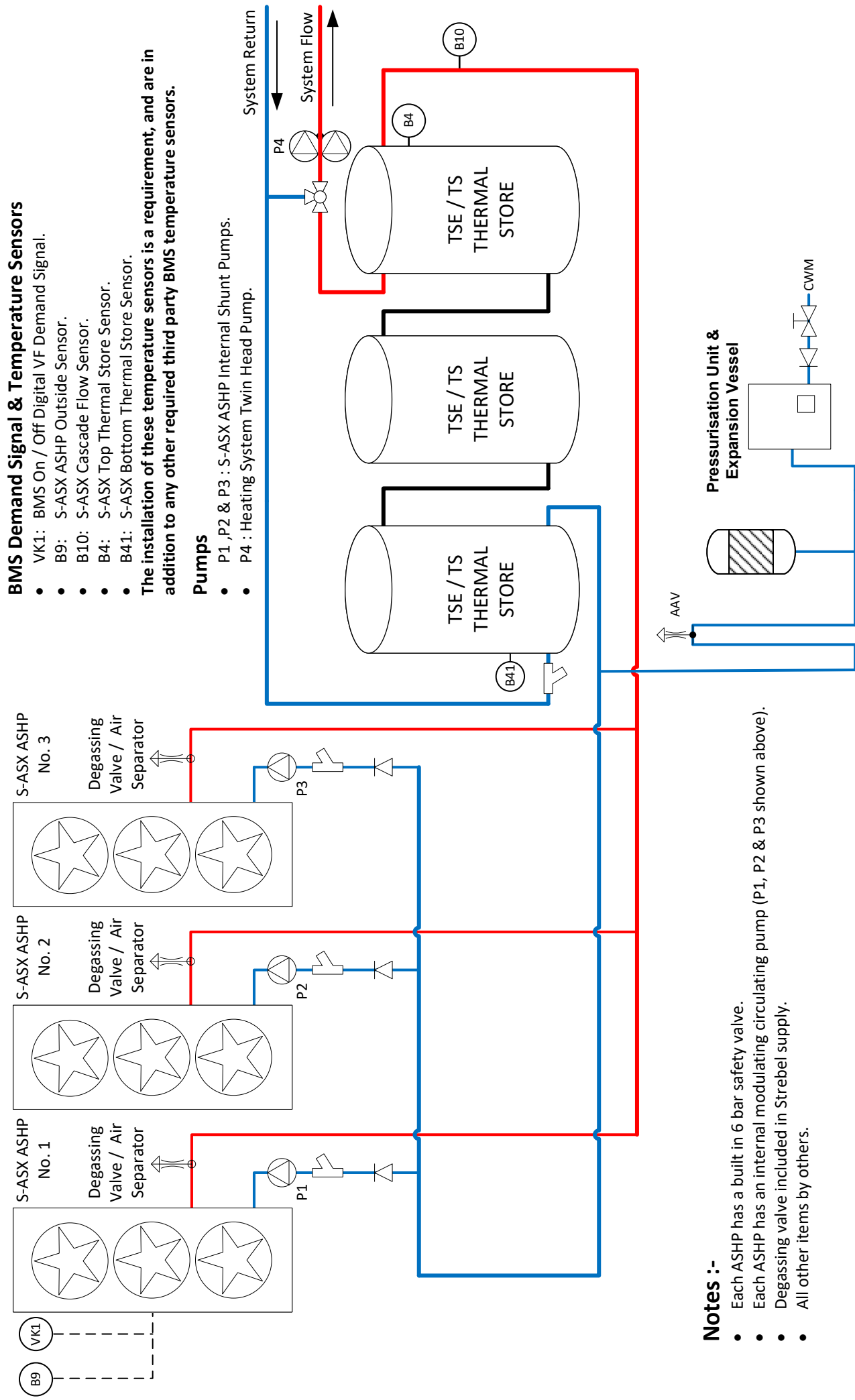
Note: Degassing valve and all internal ASHP components shown are included in Strebel supply. All other items by others.



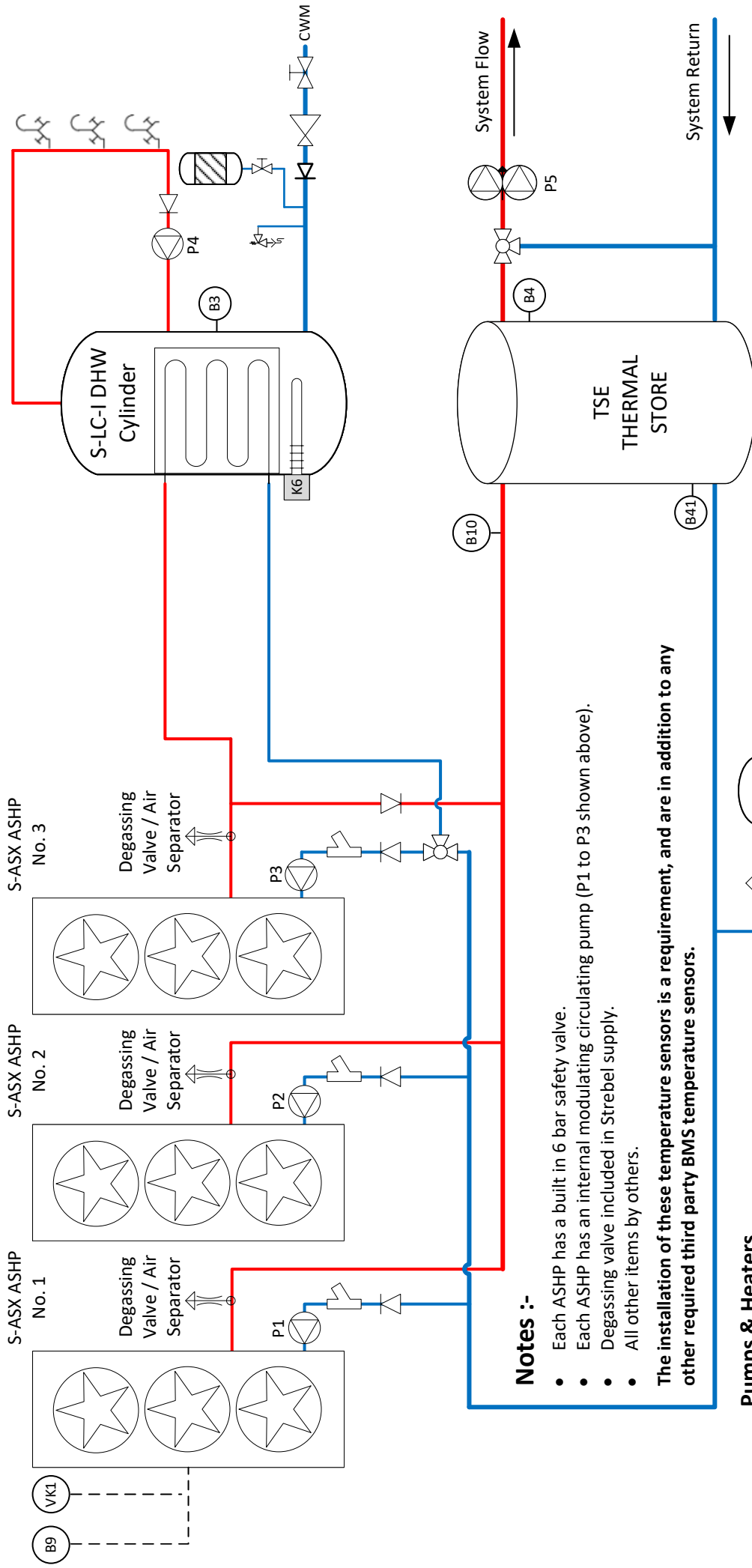
3 x S-ASX ASHP (R290 & R454B) in Cascade – 1 x Thermal Stores in Series



3 x S-ASX ASHP (R290 & R454B) in Cascade – 3 x Thermal Stores in Series



3 x S-ASX ASHP (R290 & R454B) in Cascade – 1 x TS & Dedicated DHW



Notes :-

- Each ASHP has a built in 6 bar safety valve.
- Each ASHP has an internal modulating circulating pump (P1 to P3 shown above).
- Degassing valve included in Strebel supply.
- All other items by others.

The installation of these temperature sensors is a requirement, and are in addition to any other required third party BMS temperature sensors.

Pumps & Heaters

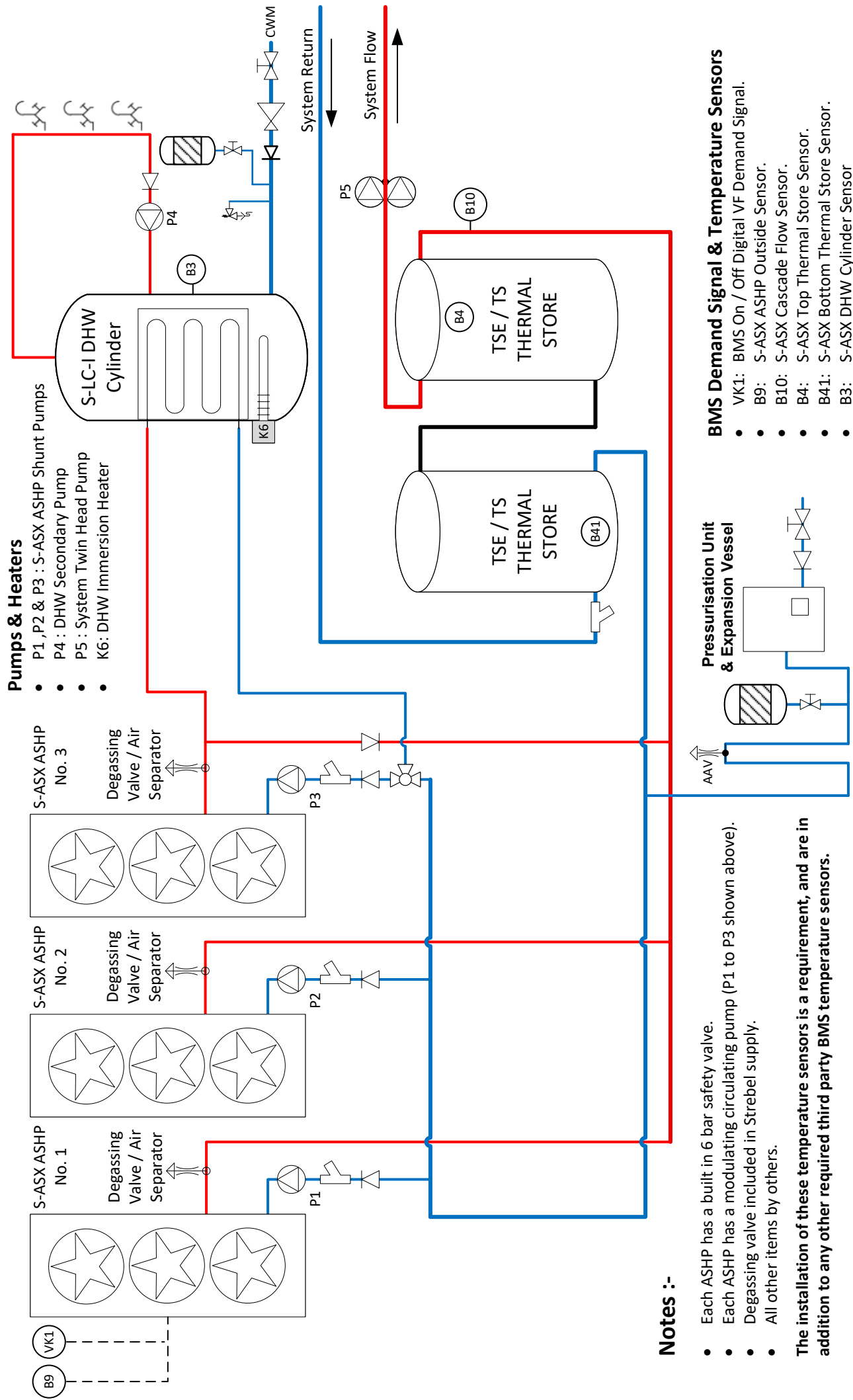
- P1, P2 & P3 : S-ASX ASHP Internal Shunt Pumps
- P4 : DHW Secondary Pump
- P5 : System Twin Head Pump
- K6: DHW Immersion Heater

Pressurisation Unit & Expansion Vessel

BMS Demand Signal & Temperature Sensors

- VK1: BMS On / Off Digital VF Demand Signal.
- B9: S-ASX ASHP Outside Sensor.
- B10: S-ASX Cascade Flow Sensor.
- B4: S-ASX Top Thermal Store Sensor.
- B41: S-ASX Bottom Thermal Store Sensor.
- B3: S-ASX DHW Cylinder Sensor

3 x S-ASX ASHP (R290 & R454B) in Cascade – Multiple TS & Dedicated DHW



S-ASX-LPi 55 - Min / Nominal / Max Performance

Only use the nominal output to size ASHP - the minimum / maximum output is for performance information.

HEATING		A	W	Min	Nominal	Max	
A7W35	Heating capacity	7	35	20.5	46.2	53.8	kW
	Power input			4.16	10.3	13.1	kW
	COP			4.93	4.49	4.11	-
	Plant side water flow rate			3549	7966	9263	l/h
	Plant side pressure drop			6	26	35	kPa
A7W45	Heating capacity	7	45	20.8	46.8	54.4	kW
	Power input			5.18	12.8	16.3	kW
	COP			4.02	3.66	3.34	-
	Plant side water flow rate			3604	8089	9406	l/h
	Plant side pressure drop			6	27	36	kPa
A7W55	Heating capacity	7	55	21.1	47.5	55.2	kW
	Power input			6.23	15.3	19.5	kW
	COP			3.39	3.10	2.83	-
	Plant side water flow rate			2301	5165	6006	l/h
	Plant side pressure drop			3	11	15	kPa
A7W65	Heating capacity	7	65	21.6	48.6	56.5	kW
	Power input			7.70	18.9	24.0	kW
	COP			2.81	2.57	2.31	-
	Plant side water flow rate			1891	4244	4936	l/h
	Plant side pressure drop			2	8	10	kPa
A2W35	Heating capacity	2	35	17.3	39.0	45.3	kW
	Power input			4.17	10.3	13.1	kW
	COP			4.15	3.79	3.46	-
	Plant side water flow rate			2994	6721	7815	l/h
	Plant side pressure drop			4	19	25	kPa
A2W45	Heating capacity	2	45	17.6	39.6	46.1	kW
	Power input			5.19	12.8	16.3	kW
	COP			3.39	3.09	2.83	-
	Plant side water flow rate			3053	6852	7968	l/h
	Plant side pressure drop			4	20	26	kPa
A2W55	Heating capacity	2	55	18.0	40.4	47.0	kW
	Power input			6.25	15.4	19.5	kW
	COP			2.88	2.62	2.41	-
	Plant side water flow rate			1958	4396	5112	l/h
	Plant side pressure drop			2	8	11	kPa
A2W65	Heating capacity	2	65	18.5	41.6	48.3	kW
	Power input			7.71	18.9	24.0	kW
	COP			2.40	2.20	2.01	-
	Plant side water flow rate			1618	3633	4224	l/h
	Plant side pressure drop			1	6	8	kPa
A-2W35	Heating capacity	-2	35	16.2	36.5	42.5	kW
	Power input			4.18	10.3	13.1	kW
	COP			3.88	3.54	3.24	-
	Plant side water flow rate			2805	6297	7323	l/h
	Plant side pressure drop			4	17	22	kPa
A-2W45	Heating capacity	-2	45	16.5	37.2	43.3	kW
	Power input			5.20	12.8	16.3	kW
	COP			3.17	2.91	2.66	-
	Plant side water flow rate			2869	6439	7488	l/h
	Plant side pressure drop			4	17	23	kPa
A-2W55	Heating capacity	-2	55	17.0	38.1	44.3	kW
	Power input			6.26	15.4	19.5	kW
	COP			2.72	2.47	2.27	-
	Plant side water flow rate			1846	4144	4818	l/h
	Plant side pressure drop			2	8	10	kPa
A-2W65	Heating capacity	-2	65	17.5	39.3	45.7	kW
	Power input			7.72	19.0	24.1	kW
	COP			2.27	2.07	1.90	-
	Plant side water flow rate			1531	3436	3996	l/h
	Plant side pressure drop			1	5	7	kPa

S-ASX-LPi 55 - Min / Nominal / Max Performance

Only use the nominal output to size ASHP - the minimum / maximum output is for performance information.

HEATING		A	W	Min	Nominal	Max	
A-4W35	Heating capacity	-4	35	15.7	35.4	41.1	kW
	Power input			4.18	10.3	13.1	kW
	COP			3.76	3.44	3.14	-
	Plant side water flow rate			2718	6100	7093	l/h
	Plant side pressure drop			3	16	21	kPa
A-4W45	Heating capacity	-4	45	16.0	36.1	42.0	kW
	Power input			5.21	12.8	16.3	kW
	COP			3.07	2.82	2.58	-
	Plant side water flow rate			2783	6248	7265	l/h
	Plant side pressure drop			4	16	22	kPa
A-4W55	Heating capacity	-4	55	16.5	37.0	43.1	kW
	Power input			6.26	15.4	19.5	kW
	COP			2.64	2.40	2.21	-
	Plant side water flow rate			1794	4027	4683	l/h
	Plant side pressure drop			2	7	10	kPa
A-4W65	Heating capacity	-4	65	17.0	38.3	44.5	kW
	Power input			7.73	19.0	24.1	kW
	COP			2.20	2.02	1.85	-
	Plant side water flow rate			1491	3346	3891	l/h
	Plant side pressure drop			1	5	7	kPa
A-7W35	Heating capacity	-7	35	14.8	33.3	38.7	kW
	Power input			4.19	10.3	13.1	kW
	COP			3.53	3.23	2.95	-
	Plant side water flow rate			2559	5745	6680	l/h
	Plant side pressure drop			3	14	19	kPa
A-7W45	Heating capacity	-7	45	15.2	34.1	39.6	kW
	Power input			5.21	12.8	16.3	kW
	COP			2.92	2.66	2.43	-
	Plant side water flow rate			2629	5901	6862	l/h
	Plant side pressure drop			3	15	20	kPa
A-7W55	Heating capacity	-7	55	15.6	35.1	40.8	kW
	Power input			6.27	15.4	19.5	kW
	COP			2.49	2.28	2.09	-
	Plant side water flow rate			1700	3816	4437	l/h
	Plant side pressure drop			1	6	9	kPa
A-7W65	Heating capacity	-7	65	16.2	36.4	42.3	kW
	Power input			7.73	19.0	24.1	kW
	COP			2.10	1.92	1.76	-
	Plant side water flow rate			1417	3181	3699	l/h
	Plant side pressure drop			1	5	6	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A7W35 = source : air in 7°C db 6°C wb
A7W45 = source : air in 7°C db 6°C wb
A7W55 = source : air in 7°C db 6°C wb
A7W65 = source : air in 7°C db 6°C wb

plant : water in 30°C out 35°C
plant : water in 40°C out 45°C
plant : water in 47°C out 55°C
plant : water in 55°C out 65°C

A-4W35 = source : air in -4°C db -5°C wb
A-4W45 = source : air in -4°C db -5°C wb
A-4W55 = source : air in -4°C db -5°C wb
A-4W65 = source : air in -4°C db -5°C wb

plant : water in 30°C out 35°C
plant : water in 40°C out 45°C
plant : water in 47°C out 55°C
plant : water in 55°C out 65°C

A2W35 = source : air in 2°C db 1°C wb
A2W45 = source : air in 2°C db 1°C wb
A2W55 = source : air in 2°C db 1°C wb
A2W65 = source : air in 2°C db 1°C wb

plant : water in 30°C out 35°C
plant : water in 40°C out 45°C
plant : water in 47°C out 55°C
plant : water in 55°C out 65°C

A-7W35 = source : air in -7°C db -8°C wb
A-7W45 = source : air in -7°C db -8°C wb
A-7W55 = source : air in -7°C db -8°C wb
A-7W65 = source : air in -7°C db -8°C wb

plant : water in 30°C out 35°C
plant : water in 40°C out 45°C
plant : water in 47°C out 55°C
plant : water in 55°C out 65°C

A-2W35 = source : air in -2°C db -3°C wb
A-2W45 = source : air in -2°C db -3°C wb
A-2W55 = source : air in -2°C db -3°C wb
A-2W65 = source : air in -2°C db -3°C wb

plant : water in 30°C out 35°C
plant : water in 40°C out 45°C
plant : water in 47°C out 55°C
plant : water in 55°C out 65°C

S-ASX-LPi 75 - Min / Nominal / Max Performance

Only use the nominal output to size ASHP - the minimum / maximum output is for performance information.

HEATING		A	W	Min	Nominal	Max	
A7W35	Heating capacity	7	35	32.9	73.9	86.0	kW
	Power input			6.57	16.2	20.6	kW
	COP			5.01	4.56	4.17	-
	Plant side water flow rate			5681	12753	14830	l/h
	Plant side pressure drop			5	22	30	kPa
A7W45	Heating capacity	7	45	33.3	74.8	87.0	kW
	Power input			8.19	20.2	25.7	kW
	COP			4.07	3.70	3.39	-
	Plant side water flow rate			5769	12949	15058	l/h
	Plant side pressure drop			5	23	30	kPa
A7W55	Heating capacity	7	55	33.8	76.0	88.4	kW
	Power input			9.86	24.2	30.7	kW
	COP			3.43	3.14	2.88	-
	Plant side water flow rate			3684	8269	9615	l/h
	Plant side pressure drop			2	10	13	kPa
A7W65	Heating capacity	7	65	34.6	77.7	90.4	kW
	Power input			12.2	29.9	37.9	kW
	COP			2.84	2.60	2.39	-
	Plant side water flow rate			3027	6795	7901	l/h
	Plant side pressure drop			2	7	9	kPa
A2W35	Heating capacity	2	35	27.7	62.3	72.5	kW
	Power input			6.59	16.3	20.6	kW
	COP			4.20	3.82	3.52	-
	Plant side water flow rate			4793	10759	12511	l/h
	Plant side pressure drop			4	17	22	kPa
A2W45	Heating capacity	2	45	28.2	63.3	73.7	kW
	Power input			8.21	20.2	25.7	kW
	COP			3.43	3.13	2.87	-
	Plant side water flow rate			4887	10970	12756	l/h
	Plant side pressure drop			4	17	22	kPa
A2W55	Heating capacity	2	55	28.8	64.7	75.2	kW
	Power input			9.88	24.3	30.8	kW
	COP			2.91	2.66	2.44	-
	Plant side water flow rate			3135	7037	8183	l/h
	Plant side pressure drop			2	8	10	kPa
A2W65	Heating capacity	2	65	29.6	66.5	77.4	kW
	Power input			12.2	30.0	38.0	kW
	COP			2.43	2.22	2.04	-
	Plant side water flow rate			2591	5815	6762	l/h
	Plant side pressure drop			1	5	7	kPa
A-2W35	Heating capacity	-2	35	26.0	58.4	67.9	kW
	Power input			6.61	16.3	20.7	kW
	COP			3.93	3.58	3.28	-
	Plant side water flow rate			4491	10081	11723	l/h
	Plant side pressure drop			3	15	19	kPa
A-2W45	Heating capacity	-2	45	26.5	59.5	69.2	kW
	Power input			8.23	20.3	25.7	kW
	COP			3.22	2.93	2.69	-
	Plant side water flow rate			4593	10309	11987	l/h
	Plant side pressure drop			4	15	20	kPa
A-2W55	Heating capacity	-2	55	27.1	61.0	70.9	kW
	Power input			9.90	24.3	30.9	kW
	COP			2.74	2.51	2.29	-
	Plant side water flow rate			2955	6633	7714	l/h
	Plant side pressure drop			2	7	9	kPa
A-2W65	Heating capacity	-2	65	28.0	62.9	73.2	kW
	Power input			12.2	30.0	38.1	kW
	COP			2.30	2.10	1.92	-
	Plant side water flow rate			2451	5501	6397	l/h
	Plant side pressure drop			1	5	6	kPa

S-ASX-LPi 75 - Min / Nominal / Max Performance

Only use the nominal output to size ASHP - the minimum / maximum output is for performance information.

HEATING		A	W	Min	Nominal	Max	
A-4W35	Heating capacity	-4	35	25.2	56.6	65.8	kW
	Power input			6.62	16.3	20.7	kW
	COP			3.81	3.47	3.18	-
	Plant side water flow rate			4350	9765	11356	l/h
	Plant side pressure drop			3	14	18	kPa
A-4W45	Heating capacity	-4	45	25.7	57.7	67.2	kW
	Power input			8.23	20.3	25.7	kW
	COP			3.12	2.84	2.61	-
	Plant side water flow rate			4456	10002	11631	l/h
	Plant side pressure drop			3	14	19	kPa
A-4W55	Heating capacity	-4	55	26.4	59.2	68.9	kW
	Power input			9.91	24.3	30.9	kW
	COP			2.66	2.44	2.23	-
	Plant side water flow rate			2872	6447	7497	l/h
	Plant side pressure drop			1	7	9	kPa
A-4W65	Heating capacity	-4	65	27.3	61.3	71.3	kW
	Power input			12.2	30.0	38.1	kW
	COP			2.24	2.04	1.87	-
	Plant side water flow rate			2386	5357	6229	l/h
	Plant side pressure drop			1	5	6	kPa
A-7W35	Heating capacity	-7	35	23.7	53.3	61.9	kW
	Power input			6.62	16.3	20.7	kW
	COP			3.58	3.27	2.99	-
	Plant side water flow rate			4097	9197	10694	l/h
	Plant side pressure drop			3	12	16	kPa
A-7W45	Heating capacity	-7	45	24.2	54.5	63.4	kW
	Power input			8.24	20.3	25.7	kW
	COP			2.94	2.68	2.47	-
	Plant side water flow rate			4209	9447	10986	l/h
	Plant side pressure drop			3	13	17	kPa
A-7W55	Heating capacity	-7	55	25.0	56.1	65.3	kW
	Power input			9.92	24.4	30.9	kW
	COP			2.52	2.30	2.11	-
	Plant side water flow rate			2721	6109	7103	l/h
	Plant side pressure drop			1	6	8	kPa
A-7W65	Heating capacity	-7	65	25.9	58.3	67.8	kW
	Power input			12.2	30.0	38.1	kW
	COP			2.12	1.94	1.78	-
	Plant side water flow rate			2269	5093	5922	l/h
	Plant side pressure drop			1	4	6	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A7W35 = source : air in 7°C db 6°C wb	plant : water in 30°C out 35°C	A-4W35 = source : air in -4°C db -5°C wb	plant : water in 30°C out 35°C
A7W45 = source : air in 7°C db 6°C wb	plant : water in 40°C out 45°C	A-4W45 = source : air in -4°C db -5°C wb	plant : water in 40°C out 45°C
A7W55 = source : air in 7°C db 6°C wb	plant : water in 47°C out 55°C	A-4W55 = source : air in -4°C db -5°C wb	plant : water in 47°C out 55°C
A7W65 = source : air in 7°C db 6°C wb	plant : water in 55°C out 65°C	A-4W65 = source : air in -4°C db -5°C wb	plant : water in 55°C out 65°C
A2W35 = source : air in 2°C db 1°C wb	plant : water in 30°C out 35°C	A-7W35 = source : air in -7°C db -8°C wb	plant : water in 30°C out 35°C
A2W45 = source : air in 2°C db 1°C wb	plant : water in 40°C out 45°C	A-7W45 = source : air in -7°C db -8°C wb	plant : water in 40°C out 45°C
A2W55 = source : air in 2°C db 1°C wb	plant : water in 47°C out 55°C	A-7W55 = source : air in -7°C db -8°C wb	plant : water in 47°C out 55°C
A2W65 = source : air in 2°C db 1°C wb	plant : water in 55°C out 65°C	A-7W65 = source : air in -7°C db -8°C wb	plant : water in 55°C out 65°C
A-2W35 = source : air in -2°C db -3°C wb	plant : water in 30°C out 35°C		
A-2W45 = source : air in -2°C db -3°C wb	plant : water in 40°C out 45°C		
A-2W55 = source : air in -2°C db -3°C wb	plant : water in 47°C out 55°C		
A-2W65 = source : air in -2°C db -3°C wb	plant : water in 55°C out 65°C		

S-ASX-LPi 100 - Min / Nominal / Max Performance

Only use the nominal output to size ASHP - the minimum / maximum output is for performance information.

HEATING		A	W	Min	Nominal	Max	
A7W35	Heating capacity	7	35	41.1	92.5	108.0	kW
	Power input			8.31	20.5	26.1	kW
	COP			4.95	4.51	4.14	-
	Plant side water flow rate			7106	15951	18549	l/h
	Plant side pressure drop			6	25	33	kPa
A7W45	Heating capacity	7	45	41.6	93.6	109.0	kW
	Power input			10.4	25.6	32.5	kW
	COP			4.00	3.66	3.35	-
	Plant side water flow rate			7216	16197	18835	l/h
	Plant side pressure drop			6	26	34	kPa
A7W55	Heating capacity	7	55	42.3	95.1	111.0	kW
	Power input			12.5	30.7	38.9	kW
	COP			3.38	3.10	2.85	-
	Plant side water flow rate			4608	10343	12027	l/h
	Plant side pressure drop			3	11	15	kPa
A7W65	Heating capacity	7	65	43.3	97.3	113.0	kW
	Power input			15.4	37.8	48.0	kW
	COP			3.38	2.57	2.35	-
	Plant side water flow rate			4608	8499	9883	l/h
	Plant side pressure drop			3	8	10	kPa
A2W35	Heating capacity	2	35	34.7	78.0	90.7	kW
	Power input			8.33	20.6	26.1	kW
	COP			4.17	3.79	3.48	-
	Plant side water flow rate			5995	13458	15649	l/h
	Plant side pressure drop			4	18	24	kPa
A2W45	Heating capacity	2	45	35.2	79.2	92.2	kW
	Power input			10.4	25.6	32.5	kW
	COP			3.38	3.09	2.84	-
	Plant side water flow rate			6113	13721	15956	l/h
	Plant side pressure drop			4	19	25	kPa
A2W55	Heating capacity	2	55	36.0	80.9	94.1	kW
	Power input			12.5	30.7	39.0	kW
	COP			2.88	2.64	2.41	-
	Plant side water flow rate			3921	8802	10235	l/h
	Plant side pressure drop			2	9	11	kPa
A2W65	Heating capacity	2	65	37.1	83.2	96.8	kW
	Power input			15.4	37.9	48.1	kW
	COP			2.41	2.20	2.01	-
	Plant side water flow rate			3240	7274	8458	l/h
	Plant side pressure drop			1	6	8	kPa
A-2W35	Heating capacity	-2	35	32.5	73.0	85.0	kW
	Power input			8.36	20.6	26.1	kW
	COP			3.89	3.54	3.26	-
	Plant side water flow rate			5618	12610	14663	l/h
	Plant side pressure drop			4	16	22	kPa
A-2W45	Heating capacity	-2	45	33.1	74.4	86.6	kW
	Power input			10.4	25.6	32.5	kW
	COP			3.18	2.91	2.66	-
	Plant side water flow rate			5744	12894	14994	l/h
	Plant side pressure drop			4	17	22	kPa
A-2W55	Heating capacity	-2	55	33.9	76.2	88.7	kW
	Power input			12.5	30.8	39.0	kW
	COP			2.71	2.47	2.27	-
	Plant side water flow rate			3696	8297	9648	l/h
	Plant side pressure drop			2	8	10	kPa
A-2W65	Heating capacity	-2	65	35.1	78.7	91.5	kW
	Power input			15.5	37.9	48.1	kW
	COP			2.26	2.08	1.90	-
	Plant side water flow rate			3065	6881	8001	l/h
	Plant side pressure drop			1	5	7	kPa

S-ASX-LPi 100 - Min / Nominal / Max Performance

Only use the nominal output to size ASHP - the minimum / maximum output is for performance information.

HEATING		A	W	Min	Nominal	Max	
A-4W35	Heating capacity	-4	35	31.5	70.7	82.3	kW
	Power input			8.37	20.6	26.2	kW
	COP			3.76	3.43	3.14	-
	Plant side water flow rate			5442	12215	14204	l/h
	Plant side pressure drop			4	15	20	kPa
A-4W45	Heating capacity	-4	45	32.1	72.2	84.0	kW
	Power input			10.4	25.6	32.5	kW
	COP			3.09	2.82	2.58	-
	Plant side water flow rate			5573	12510	14548	l/h
	Plant side pressure drop			4	16	21	kPa
A-4W55	Heating capacity	-4	55	33.0	74.1	86.2	kW
	Power input			12.5	30.8	39.1	kW
	COP			2.64	2.41	2.20	-
	Plant side water flow rate			3593	8064	9377	l/h
	Plant side pressure drop			2	7	10	kPa
A-4W65	Heating capacity	-4	65	34.1	76.6	89.1	kW
	Power input			15.5	38.0	48.2	kW
	COP			2.20	2.02	1.85	-
	Plant side water flow rate			2985	6700	7791	l/h
	Plant side pressure drop			1	5	7	kPa
A-7W35	Heating capacity	-7	35	29.6	66.6	77.5	kW
	Power input			8.38	20.6	26.2	kW
	COP			3.53	3.23	2.96	-
	Plant side water flow rate			5125	11503	13376	l/h
	Plant side pressure drop			3	14	18	kPa
A-7W45	Heating capacity	-7	45	30.3	68.2	79.3	kW
	Power input			10.4	25.7	32.6	kW
	COP			2.91	2.65	2.43	-
	Plant side water flow rate			5264	11817	13741	l/h
	Plant side pressure drop			3	15	19	kPa
A-7W55	Heating capacity	-7	55	31.3	70.2	81.7	kW
	Power input			12.5	30.8	39.1	kW
	COP			2.50	2.28	2.09	-
	Plant side water flow rate			3404	7641	8885	l/h
	Plant side pressure drop			2	7	9	kPa
A-7W65	Heating capacity	-7	65	32.5	72.9	84.8	kW
	Power input			15.5	38.0	48.2	kW
	COP			2.10	1.92	1.76	-
	Plant side water flow rate			2838	6370	7408	l/h
	Plant side pressure drop			1	5	6	kPa

Data declared according to EN 14511. The data are related to units working at the **nominal frequency**, without options or accessories.

A7W35	= source :	air in 7°C db 6°C wb	plant :	water in 30°C out 35°C	A-4W35	= source :	air in -4°C db -5°C wb	plant :	water in 30°C out 35°C
A7W45	= source :	air in 7°C db 6°C wb	plant :	water in 40°C out 45°C	A-4W45	= source :	air in -4°C db -5°C wb	plant :	water in 40°C out 45°C
A7W55	= source :	air in 7°C db 6°C wb	plant :	water in 47°C out 55°C	A-4W55	= source :	air in -4°C db -5°C wb	plant :	water in 47°C out 55°C
A7W65	= source :	air in 7°C db 6°C wb	plant :	water in 55°C out 65°C	A-4W65	= source :	air in -4°C db -5°C wb	plant :	water in 55°C out 65°C
A2W35	= source :	air in 2°C db 1°C wb	plant :	water in 30°C out 35°C	A-7W35	= source :	air in -7°C db -8°C wb	plant :	water in 30°C out 35°C
A2W45	= source :	air in 2°C db 1°C wb	plant :	water in 40°C out 45°C	A-7W45	= source :	air in -7°C db -8°C wb	plant :	water in 40°C out 45°C
A2W55	= source :	air in 2°C db 1°C wb	plant :	water in 47°C out 55°C	A-7W55	= source :	air in -7°C db -8°C wb	plant :	water in 47°C out 55°C
A2W65	= source :	air in 2°C db 1°C wb	plant :	water in 55°C out 65°C	A-7W65	= source :	air in -7°C db -8°C wb	plant :	water in 55°C out 65°C
A-2W35	= source :	air in -2°C db -3°C wb	plant :	water in 30°C out 35°C					
A-2W45	= source :	air in -2°C db -3°C wb	plant :	water in 40°C out 45°C					
A-2W55	= source :	air in -2°C db -3°C wb	plant :	water in 47°C out 55°C					
A-2W65	= source :	air in -2°C db -3°C wb	plant :	water in 55°C out 65°C					

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