

STREBEL ***S-ASX-VP Air Source*** ***Heat Pumps***

Installation Planning Guide



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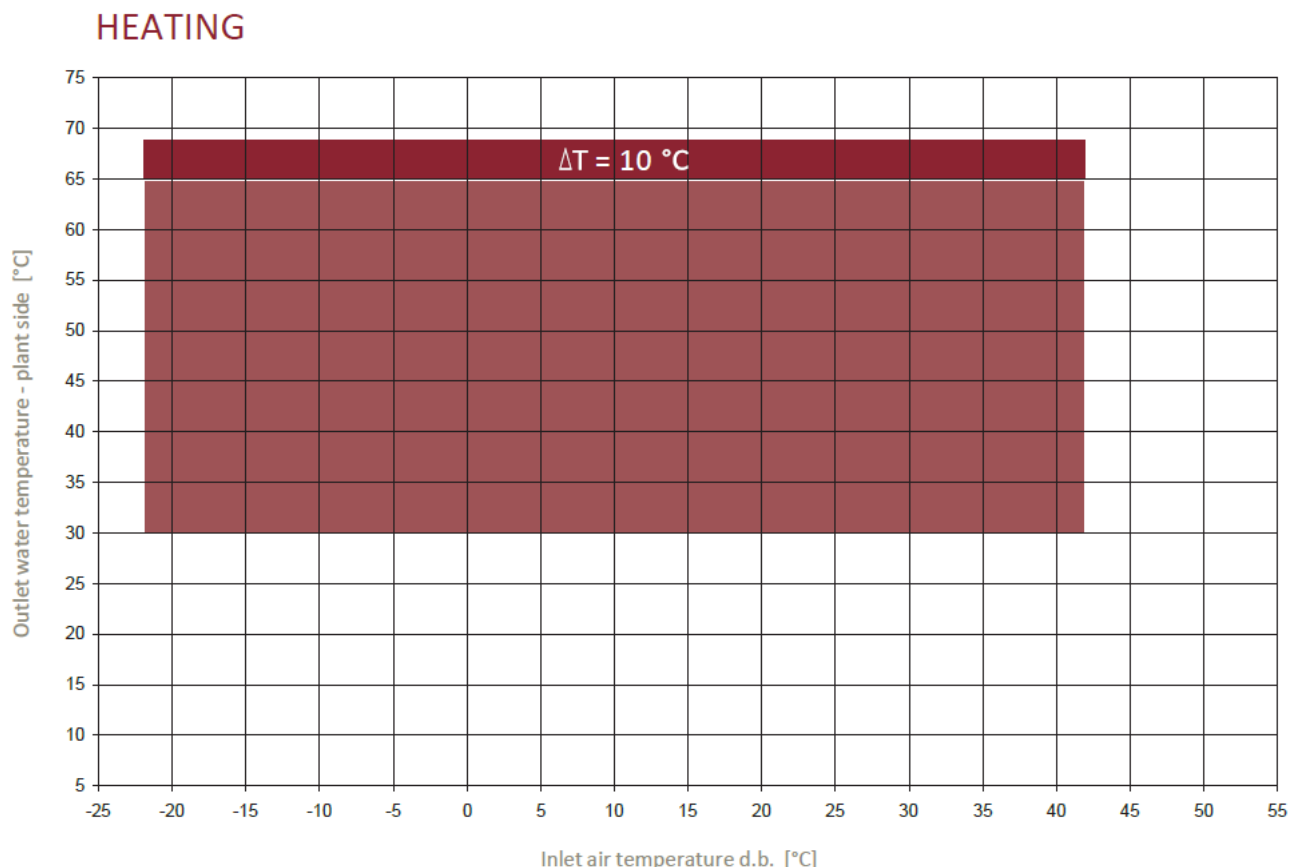
INTRODUCTION

This document has been put together to include information required for a design team to use for all stages of a project installation with our S-ASX VP air source heat pumps.

The S-ASX-VP range comprises of 5 models offering LTHW in 60, 70, 80, 90 and 100 kW.

The units are a monobloc design suitable for outdoor installation only.

All models can generate up to a flow temperature of 68°C down to a very low ambient air temperature of -22°C:



Each heat pump comes with the following internal components:

- Two vapour injection scroll compressors.
- An arrangement of axial fans equipped with EC motors – which can be adjusted to reduce noise at night.
- Source side finned coil heat exchanger with grooved copper pipes & hydrophilic aluminium fins.
- Plant side brazed stainless steel heat exchanger.
- Modulating shunt pump – to circulate the system water through the heat pump to the thermal store(s).
- Low noise setup.

Additional to the above, each heat pump comes with the following features:

- A Siemens QAA74 wired remote controller – to be installed within the plantroom.
- Outside air temperature sensor.
- Two 10k NTC temperature sensors – for thermal store, DHW cylinder & cascade sensor.
- Vibration damper feet kit – to be installed on site to reduce sound caused by vibration through the floor.
- Cascade software – can be activated onsite and cascades up to 16 heat pumps.
- Modbus interface – allows communication by Modbus RS 485 software.
- Webserver – to be connected to a data point onsite to allow remote monitoring.

1 HEAT PUMP SIZING

When sizing up the air source heat pump(s) to match the kW power required for the onsite system, consideration needs to be taken of the outside air temperature because the output from the heat pump will be lower at -4°C Tdb (-5°C Twb) compared to the standard rated conditions of 7°C.

1.1 Heating Capacity of S-ASX-VP Heat Pumps

The following tables shows the peak load of each model at set flow temperatures leaving the heat pump at various outside air temperatures.

1.1.1 S-ASX-VP 60

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
68°C (Only on 10°C dT)	Heating Capacity (kW)		45.6	47.9	49.2	50.5	51.9	60.6	65.1	70.7
	Power Input (kW)		25.7	25.7	25.7	25.7	25.7	25.7	25.6	25.6
	COP		1.77	1.86	1.91	1.96	2.02	2.36	2.54	2.76

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
65°C	Heating Capacity (kW)		44.9	47.2	48.5	49.8	51.2	59.9	64.5	70.1
	Power Input (kW)		25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
	COP		1.76	1.85	1.90	1.95	2.01	2.35	2.53	2.75
SCOP			3.11							

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
55°C	Heating Capacity (kW)		43.3	45.7	47.0	48.4	49.9	58.7	63.4	69.0
	Power Input (kW)		19.9	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	COP		2.16	2.28	2.35	2.42	2.50	2.94	3.17	3.45
SCOP			3.52							

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
45°C	Heating Capacity (kW)		42.2	44.6	46.0	47.4	49.0	57.9	62.6	68.3
	Power Input (kW)		15.7	15.7	15.7	15.6	15.6	15.6	15.6	15.6
	COP		2.69	2.84	2.93	3.04	3.14	3.71	4.01	4.38
SCOP			3.81							

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
35°C	Heating Capacity (kW)		41.2	43.7	45.2	46.6	48.2	57.2	62.0	67.8
	Power Input (kW)		12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.2
	COP		3.35	3.55	3.67	3.79	3.92	4.65	5.04	5.56
SCOP			4.41							

1.1.2 S-ASX-VP 70

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
68°C (Only on 10°C dT)	Heating Capacity (kW)		53.7	56.5	58.0	59.5	61.2	71.4	76.8	83.3
	Power Input (kW)		30.7	30.7	30.6	30.6	30.6	30.6	30.5	30.5
	COP		1.75	1.84	1.90	1.94	2.00	2.33	2.52	2.73

Outside Air Temperature		Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
Flow Temperature										
65°C	Heating Capacity (kW)		52.9	55.6	57.1	58.6	60.4	70.6	76.0	82.6
	Power Input (kW)		30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.3
	COP		1.74	1.83	1.88	1.93	1.99	2.32	2.50	2.73
SCOP			3.09							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
55°C	Heating Capacity (kW)	51.0	53.9	55.4	57.0	58.8	69.1	74.7	81.3
	Power Input (kW)	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.7
	COP	2.14	2.26	2.33	2.39	2.47	2.90	3.14	3.43
SCOP		3.49							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
45°C	Heating Capacity (kW)	49.7	52.6	54.2	55.9	57.7	68.1	73.7	80.5
	Power Input (kW)	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6
	COP	2.67	2.83	2.91	3.01	3.10	3.66	3.96	4.33
SCOP		3.77							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
35°C	Heating Capacity (kW)	48.5	51.5	53.2	54.9	56.8	67.3	73.0	79.9
	Power Input (kW)	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.5
	COP	3.32	3.53	3.64	3.76	3.89	4.61	5.00	5.51
SCOP		4.37							

1.1.3 S-ASX-VP 80

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
68°C (Only on 10°C dT)	Heating Capacity (kW)	60.0	63.0	64.7	66.4	68.3	79.7	85.7	93.0
	Power Input (kW)	34.4	34.4	34.4	34.4	34.4	34.3	34.2	34.2
	COP	1.74	1.83	1.88	1.93	1.99	2.32	2.51	2.72

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
65°C	Heating Capacity (kW)	59.0	62.0	63.7	65.4	67.4	78.8	84.8	92.1
	Power Input (kW)	34.1	34.1	34.1	34.1	34.0	34.0	34.0	34.0
	COP	1.73	1.82	1.87	1.92	1.98	2.32	2.49	2.71
SCOP		3.07							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
55°C	Heating Capacity (kW)	56.9	60.1	61.8	63.6	65.6	77.1	83.3	90.7
	Power Input (kW)	26.7	26.7	26.7	26.7	26.7	26.6	26.6	26.6
	COP	2.13	2.25	2.31	2.38	2.46	2.90	3.13	3.41
SCOP		3.47							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
45°C	Heating Capacity (kW)	55.4	58.7	60.5	62.3	64.4	76.0	82.3	89.8
	Power Input (kW)	20.9	20.9	20.9	20.9	20.9	20.8	20.8	20.8
	COP	2.65	2.81	2.89	2.98	3.08	3.65	3.96	4.32
SCOP		3.75							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
35°C	Heating Capacity (kW)	54.1	57.5	59.4	61.3	63.4	75.1	81.5	89.1
	Power Input (kW)	16.4	16.4	16.4	16.4	16.3	16.3	16.3	16.3
	COP	3.30	3.51	3.62	3.74	3.89	4.61	5.00	5.47
SCOP		4.35							

1.1.4 S-ASX-VP 90

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
68°C (Only on 10°C dT)	Heating Capacity (kW)	67.6	71.0	72.9	74.8	77.0	89.8	96.6	105.0
	Power Input (kW)	38.6	38.6	38.6	38.6	38.5	38.5	38.4	38.3
	COP	1.75	1.84	1.89	1.94	2.00	2.33	2.52	2.74

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
65°C	Heating Capacity (kW)	66.5	69.9	71.8	73.7	75.9	88.8	95.6	104.0
	Power Input (kW)	38.3	38.3	38.2	38.2	38.2	38.2	38.2	38.2
	COP	1.74	1.83	1.88	1.93	1.99	2.32	2.50	2.72
SCOP		3.09							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
55°C	Heating Capacity (kW)	64.2	67.7	69.7	71.7	74.0	86.9	93.9	102.0
	Power Input (kW)	30.0	30.0	30.0	29.9	29.9	29.9	29.9	29.9
	COP	2.14	2.26	2.32	2.40	2.47	2.91	3.14	3.89
SCOP		3.48							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
45°C	Heating Capacity (kW)	62.5	66.1	68.2	70.2	72.6	85.7	92.7	101.0
	Power Input (kW)	23.5	23.5	23.4	23.4	23.4	23.4	23.4	23.4
	COP	2.66	2.81	2.91	3.00	3.10	3.66	3.96	4.32
SCOP		3.77							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
35°C	Heating Capacity (kW)	61.0	64.8	66.9	69.0	71.4	84.7	91.8	100.0
	Power Input (kW)	18.4	18.4	18.4	18.4	18.4	18.4	18.3	18.3
	COP	3.32	3.52	3.64	3.75	3.88	4.60	5.02	5.46
SCOP		4.37							

1.1.5 S-ASX-VP 100

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
68°C (Only on 10°C dT)	Heating Capacity (kW)	79.0	83.0	85.2	87.4	89.9	105.0	113.0	122.0
	Power Input (kW)	45.4	45.4	45.4	45.4	45.3	45.3	45.2	45.1
	COP	1.74	1.83	1.88	1.96	1.98	2.32	2.50	2.71

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
65°C	Heating Capacity (kW)	77.7	81.7	83.9	86.2	88.7	104.0	112.0	121.0
	Power Input (kW)	45.0	45.0	45.0	45.0	44.9	45.0	44.9	44.9
	COP	1.73	1.82	1.86	1.92	1.98	2.31	2.49	2.69
SCOP		3.06							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
55°C	Heating Capacity (kW)	75.0	79.1	81.4	83.8	86.4	102.0	110.0	119.0
	Power Input (kW)	35.3	35.2	35.2	35.2	35.2	35.2	35.2	35.1
	COP	2.12	2.25	2.31	2.38	2.45	2.90	3.12	3.39
SCOP		3.46							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
45°C	Heating Capacity (kW)	73.0	77.3	79.6	82.1	84.8	100.0	108.0	118.0
	Power Input (kW)	27.6	27.6	27.6	27.6	27.5	27.5	27.5	27.4
	COP	2.64	2.80	2.88	2.97	3.08	3.64	3.93	4.31
SCOP		3.75							

Outside Air Temperature									
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C
35°C	Heating Capacity (kW)	71.3	75.7	78.2	80.7	83.4	99.0	107.0	117.0
	Power Input (kW)	21.7	21.6	21.6	21.6	21.6	21.6	21.5	21.5
	COP	3.29	3.50	3.62	3.74	3.86	4.58	4.98	5.44
SCOP		4.34							

➤ Data declared applying corrections according to EN 14511.

Heating capacities at other outside air temperatures are available upon request – please contact Strebel technical department either by phone on 01276 685422 or email to technical@strebel.co.uk

1.2 Heat Pump Arrangement

There are two main heat pump arrangements as listed below.

1 - Heat Pump Selection Matching the Full Load

The selection of heat pumps matches the complete load of the heating system and/or the DHW system.

2 - N+1 Setup

The selection of heat pumps is oversized by the capacity of one heat pump which will have one heat pump be in standby and will only be brought into operation if one of the heat pumps fail.

As standard our quotations will be as per option 1.

For N+1 setups our sales area managers will need to be advised of this request at quotation stage.

1.3 Heat Pump Selection for Heating

When it comes to selecting the heat pumps, it is essential that the selection is able to produce the peak load of the heating installation at the required flow temperature in sub-zero temperatures. This can be split into three sections:

1.3.1 HEATING CAPACITY

The required heating capacity on the onsite heating system will need to be calculated at design stage by the appropriate specialist.

1.3.2 REQUIRED FLOW TEMPERATURE

This is the flow temperature required from the heat pumps.

If a flow temperature is not known at this stage, then we will provisionally size the heat pumps to achieve a flow temperature of 55°C in line with chapter 5.10 of the Approved Document Part L issued on 15th June 2022.

1.3.3 OUTSIDE TEMPERATURE

With the outside temperature setpoint, within the UK the sub-zero temperature varies in different places. For example the coldest temperature in the southeast of England will be warmer than the coldest temperature in the Scottish Highlands.

If an outside temperature is not known at this stage, then we will provisionally size the heat pumps to maintain the heating capacity at -4°C Tdb (-5°C Twb).

Example - With a heating capacity requirement of 120 kW with a required flow temperature of 55°C:

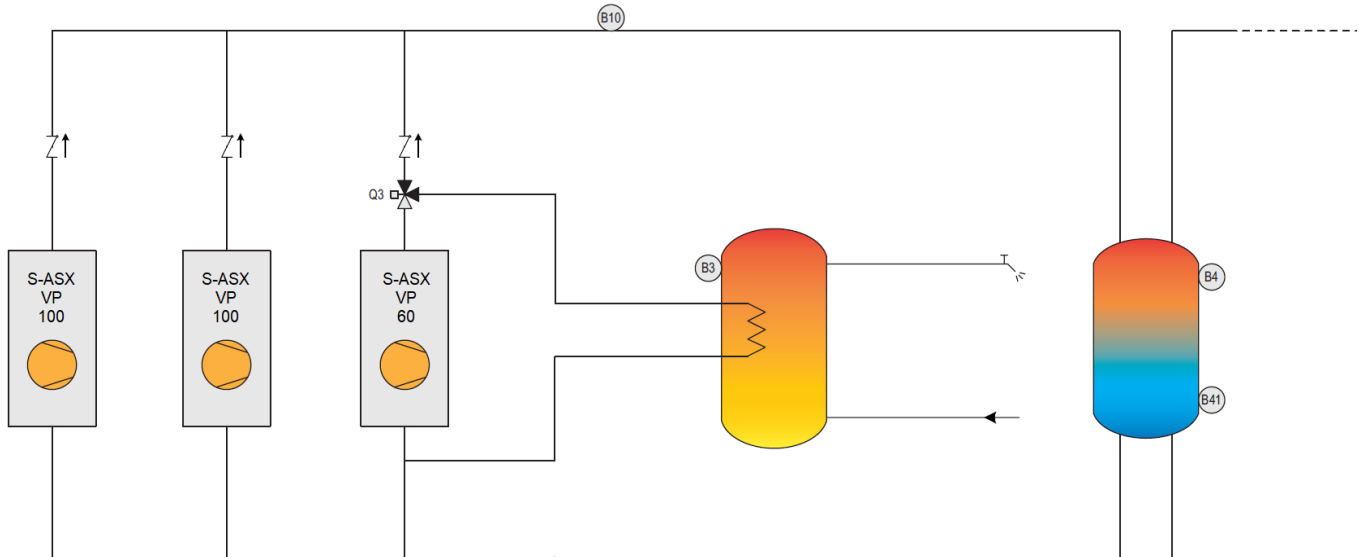
- As no outside temperature has been provided, we will use -4°C.
- Using the heat pump capacity information under 1.1 – 1 x S-ASX-VP 80 = 60.1 kW
- **Heat Pump Selection is 2 x S-ASX-VP 80 = 120.2 kW @ A-4 W55.**

1.4 Heat Pump Selection for DHW

The maximum DHW temperature the S-ASX-VP can generate within a DHW storage cylinder is 57°C. For higher DHW temperatures and legionella protection, either an immersion heater or an alternative heat source will be required to lift the DHW storage water > 60°C.

The S-ASX-VP air source heat pump can supply a maximum primary return temperature of 60°C, with the primary flow temperatures be adjustable by changing the dT on the internal controls. The main reason of being able to adjust the primary flow temperatures is to compensate for any thermal losses within the primary pipework:

- 5°C dT = 65°C maximum primary flow temperature.
- 8°C dT = 68°C maximum primary flow temperature.



Slightly different to chapter 1.2, the selection of heat pump sizing for DHW can be split into the following sections:

1.4.1 DHW CAPACITY

The onsite DHW capacity will need to be calculated by the appropriate specialist based on a DHW storage temperature of 57°C.

Our technical department can assist and provide an estimated capacity with the following information provided:

- Type of building.
- Approximately the number of people within the building.
- The number of DHW outlets.
- The type of DHW outlets (showers, kitchen sinks, wash hand basins etc.)
- The flow rate of each DHW outlet.

Once the capacity is known, a combination of either the below can be sized:

- S-ASX-VP heat pumps with an indirect cylinder; or
- S-ASX-VP heat pumps with a PHE and buffer vessel arrangement.

1.4.2 OUTSIDE TEMPERATURE

With the outside temperature setpoint, similar to chapter 1.2.3, the heat pumps will need to be sized to maintain the required power capacity at the coldest temperature. In addition, with sizing the DHW indirect cylinder or PHE with a buffer vessel, the summer temperatures will also need to be taken into account to take advantage of the additional power.

See chapter 5 for further information.

1.5 Chapter 1 Checklist

Full understanding of the heating capacity of the S-ASX-VP heat pumps	Yes ☐	No ☐
The arrangement of the heat pumps have been confirmed	Yes ☐	No ☐
The selection of the heat pumps has been sized to meet the onsite heating capacity	Yes ☐	No ☐
The selection of the heat pumps has been sized to meet the onsite DHW capacity	Yes ☐	No ☐

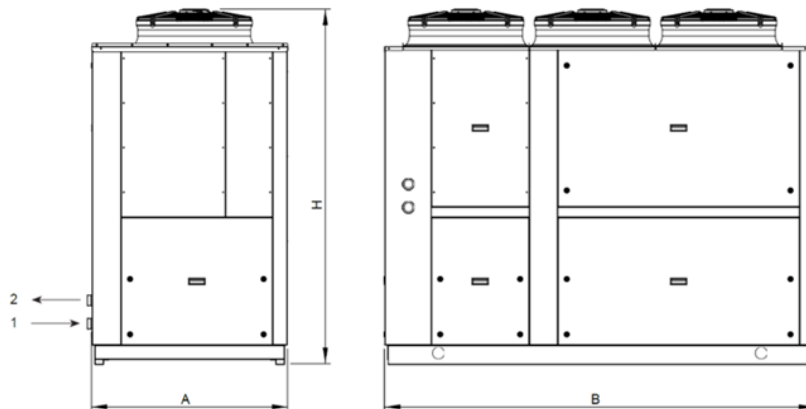
If the answers to the above are all "yes" then move on to chapter 2.

2 S-ASX-VP HEAT PUMP POSITIONING ONSITE

The S-ASX-VP heat pumps are designed for outdoor installation only and should be sited in an area which:

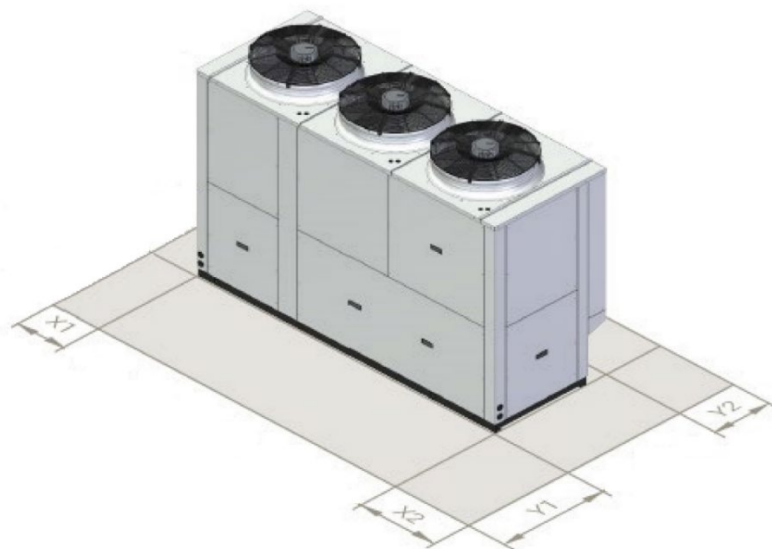
- The floor / plinth / structure the heat pumps are installed on can bear the full weight of the unit.
- The clearance around the heat pumps allows for future maintenance on the unit.
- The clearance around the heat pumps allows for the correct amount of air flow through the unit.
- The location of the heat pumps position will not cause a noise nuisance for either the users of the building or any residential buildings nearby.
- If the heat pumps are required to be installed inside any wooden or metal fence for the protection of equipment from any external damage or vandalism then the free spacing within the fence should be at least equal to total surface area of the aluminium fins (evaporator) of the total heat pumps for the correct airflow required for the operation (please see Installation & operational manual for further details).

2.1 Dimensions & Weight



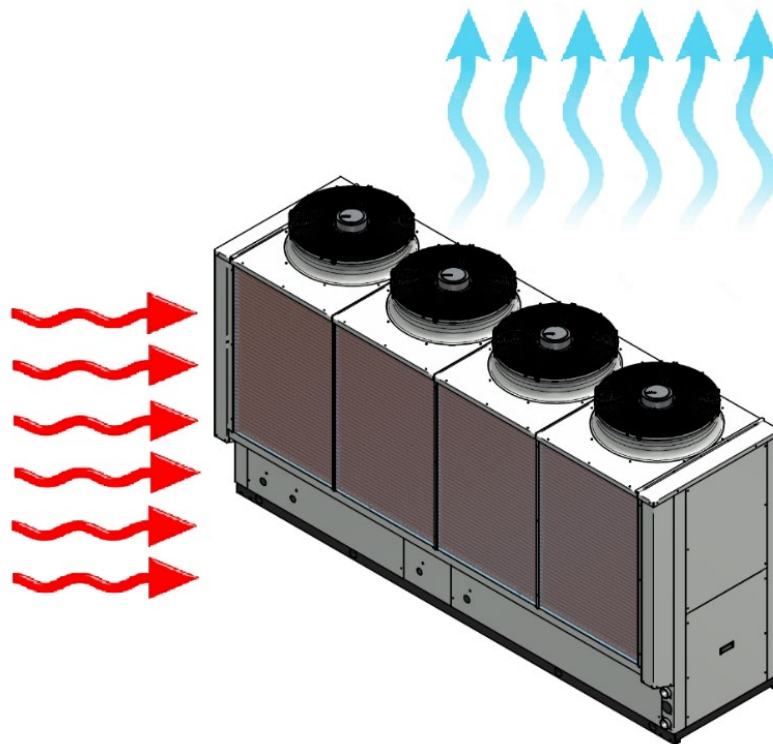
	S-ASX-VP 60	S-ASX-VP 70	S-ASX-VP 80	S-ASX-VP 90	S-ASX-VP 100
A	930 mm	930 mm	930 mm	930 mm	930 mm
B	2480 mm	2480 mm	2480 mm	3230 mm	3230 mm
H	1830 mm	1830 mm	1830 mm	1830 mm	1830 mm
Full Operational Weight					
kg	725	738	746	895	908

2.2 Minimum Clearances Around S-ASX-VP Heat Pumps



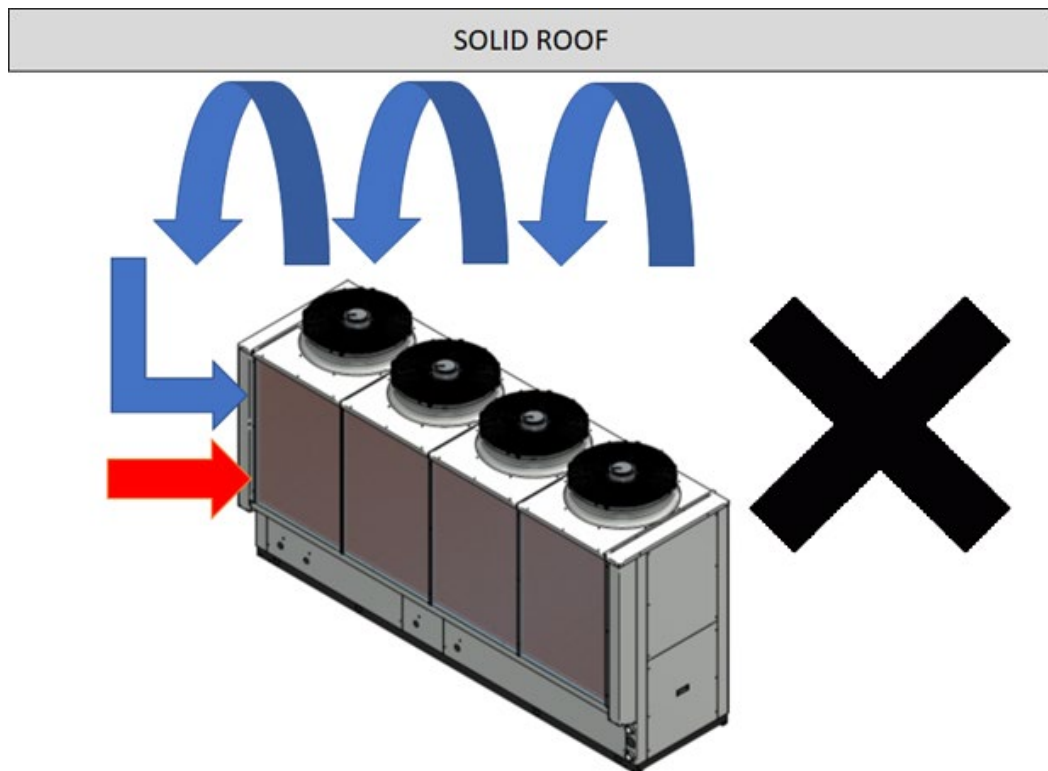
	S-ASX-VP 60	S-ASX-VP 70	S-ASX-VP 80	S-ASX-VP 90	S-ASX-VP 100
X1	200 mm	200 mm	200 mm	200 mm	200 mm
X2	500 mm	500 mm	500 mm	500 mm	500 mm
Y1	1000 mm	1000 mm	1000 mm	1000 mm	1000 mm
Y2	500 mm	500 mm	500 mm	500 mm	500 mm

The minimum clearances shown on the previous page is not only to allow enough space around the unit for maintenance purposes, it also for the axial fans installed to the top to draw the correct amount of air flow through the evaporator.



2.3 *Minimum Clearances Above the S-ASX-VP Heat Pumps*

The area above the S-ASX-VP heat pump where the fans are installed should be left free. This is because it will prevent the recirculation of the cooler exhaust air being drawn back into the evaporator thus reducing the performance of the unit.



2.4 S-ASX VP Heat Pumps Within Acoustic Enclosures

Each S-ASX-VP heat pump comes with low noise setup and a full set of anti-vibration feet as standard, however it may still be a requirement to reduce the noise further by installing the heat pump within an acoustic enclosure or fencing.

2.4.1 THE CURRENT NOISE LEVELS OF THE S-ASX-VP

Model	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)]	At 1 Metre	At 5 Metres	At 10 Metres
											[dB(A)]	[dB(A)]	[dB(A)]
VP 60	81.4	79.3	77.6	73.9	70.4	66.2	60.5	53.0	85	76	59	49	44
VP 70	81.9	79.8	78.1	74.4	70.9	66.7	61.0	53.5	86	77	59	50	45
VP 80	82.3	80.2	78.5	74.8	71.3	67.1	61.4	53.9	86	77	60	50	45
VP 90	82.9	80.8	79.1	75.4	71.9	67.7	62.0	54.5	87	78	60	51	46
VP 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 referred to units operating in heating mode at nominal conditions A7 W35.

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 distance from the external surface of the unit.

2.4.2 REQUIRED AIR FLOW RATE AND MAXIMUM PRESSURE DROP OF THE ACOUSTIC ENCLOSURE

The below table shows the nominal air flow rate through each unit and the maximum resistance the scroll fans can overcome after flowing through the heat pump coil (evaporator).

Model:	VP 60	VP 70	VP 80	VP 90	VP 100	Unit
Nominal Air Flow Rate:	19,000	20,000	21,400	26,800	28,400	m ³ /hr
Available Head of Fans After Heat Pump Coil	20	20	20	20	20	Pa

The acoustic enclosure must not restrict the nominal air flow rate through each unit and have a pressure drop not greater than 20pa with all fans operating at full speed.

With an enclosure, the roof should remain open or at the very least have large openings to allow the cooler exhaust air to expel upwards to prevent recirculation as shown in chapter 2.3.

2.5 Chapter 2 Checklist

The dimensions of the selected S-ASX-VP heat pumps is clear?	Yes ☐	No ☐
The floor / plinth / structure of where the S-ASX-VP heat pumps are installed can bear the filled weight?	Yes ☐	No ☐
The clearance around the S-ASX-VP heat pumps meets the minimum requirements?	Yes ☐	No ☐
The clearance above the S-ASX-VP is clear with no obstruction that can cause the recirculation of the cooler exhaust air?	Yes ☐	No ☐
If an acoustic enclosure has been installed, this has been sized to allow the correct air flow through the heat pump without exceeded the available head of the fans?	Yes ☐	No ☐

If the answers to the above are all "yes" then move on to chapter 3.

3 ELECTRICAL DATA

With the model of the S-ASX-VP selected, the next step is to make sure that either the site has the correct electrical load or can be upgraded to match the electrical requirements of the heat pumps.

3.1 Electrical Loads

All models within the S-ASX-VP range require a 3-phase supply (400V-3-50Hz).

3.1.1 STANDARD SUPPLY:

S-ASX-VP With Modulating Pump	VP 60	VP 70	VP 80	VP 90	VP 100	Unit
FLA – Maximum Total Current Input	51.50	60.50	72.30	77.50	84.90	A
FLI – Maximum Total Power Input	30.72	36.12	40.32	44.12	49.12	kW
MIC – Maximum Total Start Current	86.00	104.00	127.00	132.00	140.00	A

3.1.2 ADDITIONAL OPTION WITH HIGH HEAD MODULATING PUMP:

S-ASX-VP With High Head Pump	VP 60	VP 70	VP 80	VP 90	VP 100	Unit
FLA – Maximum Total Current Input	54.10	63.10	74.90	80.10	87.50	A
FLI – Maximum Total Power Input	32.44	37.84	42.04	45.84	50.84	kW
MIC – Maximum Total Start Current	86.00	104.00	127.00	132.00	140.00	A

3.2 Other Electrical Connections

The internal main heat pump controller allows for other electrical connections which will differ on a project by project basis. The below table shows a full list of these connections:

Connections	Description
QAA74 Remote Controller	Compulsory – To be installed within plant room.
Outside Sensor (B9)	Compulsory – To monitor the outside temperature.
Thermal Store Sensor 1 (B4)	Compulsory – To monitor the temperature within the thermal store.
Thermal Store Sensor 2 (B41)	Compulsory – To monitor the temperature within the thermal store.
DHW Temperature Sensor (B3)	Compulsory (if DHW is onsite) – To monitor the DHW temperature within the DHW indirect cylinder / buffer vessel.
DHW Three Way Valve (Q3) – Not supplied by Strebel.	Compulsory (if DHW is onsite) – To switch between heating and DHW pending the DHW temperature read from B3 sensor. Please note: The output from the heat pump controller is 1 x 230v supply when DHW is required. The 230v signal will disappear when the DHW is up to temperature.
Cascade Temperature Sensor (B10)	Compulsory on a multiple heat pump installation - Two core cable to connect the sensor to the ASHP addressed as master.
ASHP Cascade Wiring (DB & MB)	Compulsory on a multiple heat pump installation - Two core cable to daisy chain terminals DB & MB within each ASHP.
Remote On / Off Input (VK1)	Compulsory – Heat demand digital input to turn on/off the heat pumps.

Apart from the DHW 3 way valve, all other items listed above are supplied loose with the S-ASX-VP heat pumps. These items will need to be installed at installation stage and wired back to the heat pumps so that the Strebel commissioning engineer can make the final wiring connection within the heat pump and address the input / output.

3.3 Optional Electrical Connections

The internal main heat pump controller allows for optional electrical add-ons to be connected:

Connections	Description
General Alarm	1 x 230v output to be supplied to the onsite BMS / Trend system.
DHW Primary Pump (Q33)	1 x 230v output to be supplied for the DHW primary pump in between the DHW PHE and the DHW buffer vessel.
Modbus (Supplied loose with S-ASX-VP)	Three core cable to each heat pump.
Webserver (Supplied loose with S-ASX-VP)	Two core cable to one heat pump to terminals DB & MB. The remaining heat pumps will need to be daisy chained together using the same terminals.

Similar to chapter 3.2, these items will need to be installed at installation stage and wired back to the heat pumps so that the Strebel commissioning engineer can make the final wiring connection.

3.4 Chapter 3 Checklist

The site either has the correct electrical load or will be upgraded to match the electrical requirements for the selected S-ASX-VP heat pumps?	Yes ☐	No ☐
It is understood of the other electrical connections which are compulsory, and need to be installed at the installation stage before the Strebel commissioning engineer attends site?	Yes ☐	No ☐
With any optional electrical connections, similar to chapter 3.2, it is understood that these need to be installed at the installation stage before the Strebel commissioning engineer attends site?	Yes ☐	No ☐

If the answers to the above are all “yes” then move on to chapter 4.

4 THERMAL STORE(S)

The S-ASX-VP 60 to 100 heat pumps require a minimum water content within the primary circuit to guarantee correct operation. The correct water content within the primary circuit will:

1. Reduce the number of stop and start (hunting) of the internal compressors which will extend their life.
2. Prevents a reduction of the hot water temperature during the defrost cycle.

4.1 Thermal Store Sizing

The recommended water content for the S-ASX-VP is 15 litres per kW output, with the kW output based on the maximum output at 7°C outside temperature:

Model:	VP 60	VP 70	VP 80	VP 90	VP 100	Unit
Minimum Water Content of Thermal Store(s):	900	1050	1200	1350	1500	Litres
Recommended Strebel Model:	TSE 1000/3	TSE 1000/3	TSE 1500/3	TSE 1500/3	TSE 1500/3	-

Strebel offer assorted sizes of thermal stores and will quote suitably sized thermal store(s) based on the selection of the S-ASX-VP heat pumps.

4.2 Thermal Store Temperature Monitoring & Control

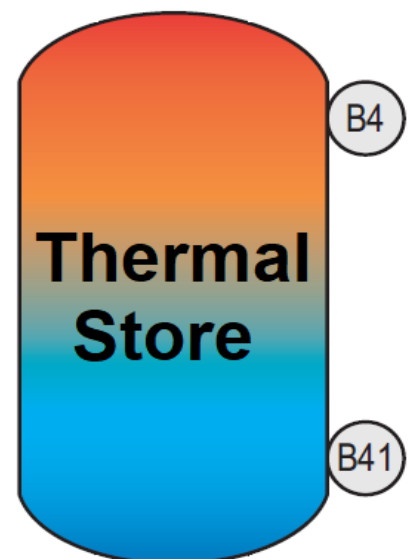
As per chapter 3.2, the temperatures sensors for the thermal stores are supplied loose with each heat pump and are required to be installed.

These sensors will be addressed as:

- B4 = Thermal Store Sensor 1 (Top sensor).
- B41 = Thermal Store Sensor 2 (Bottom Sensor).

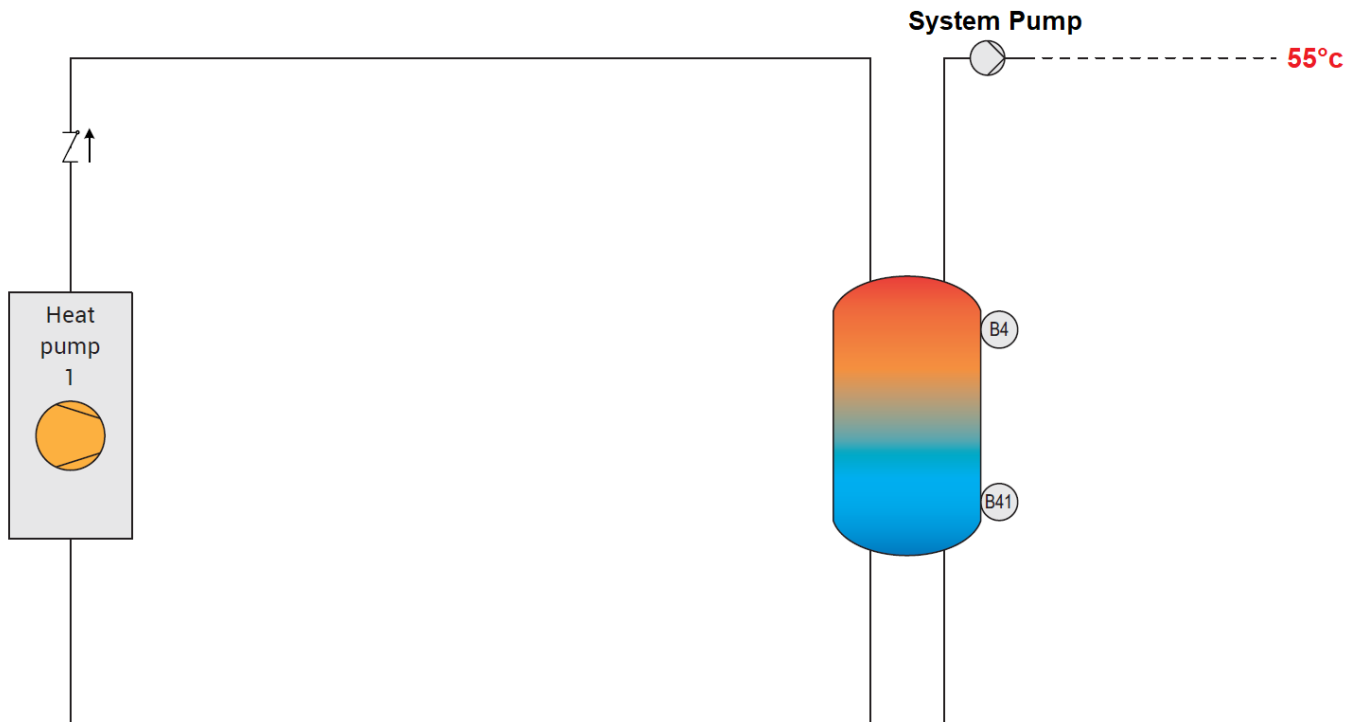
The two temperature sensors work together for optimal operation of the compressors within the heat pumps whereas:

1. Even with a heat demand signal being received by the onsite management system, with the thermal store up to temperature, the compressors will not activate.
2. The compressors will only activate once the temperature at **both** sensors drop below the temperature setpoint. This allows for the energy stored within the thermal stores to be used before the heat pumps are activated.
3. A primary to secondary control staggering system can be setup where before the secondary system pumps are activated, the heat pumps can heat up the thermal stores to temperature. Once the secondary system pumps are put into operation, the system will instantly receive heat.



 WARNING	Without the B4 & B41 thermal store temperature sensors, the S-ASX-VP heat pumps will modulate on their own flow and return sensors. Please take into consideration that the heat pumps are installed outside, therefore in sub-zero weather the temperatures at these sensors will drop quicker than the stored temperature within the thermal stores thus starting up the compressors more regularly.
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4.2.1 EXAMPLE OF TEMPERATURE CONTROL WITH B4 & B41



With a required flow temperature for the heating system of 55°C, a common setting for the B4 & B41 sensor would be:

Compressor off temperature at both B4 & B41 sensors	57°C (This is equal to setpoint of 55°C + 2°C offset)
Compressor on temperature at both B4 & B41 sensors	55°C

*** These setpoints are adjustable.

4.2.2 DESCRIPTION OF TEMPERATURE CONTROL WITH B4 & B41

The below is a brief description of the temperature control with B4 & B41 with an active heat demand signal.

- With the thermal store temperature at 57°C = **Compressors off.**
- As the system pump draws heat from the thermal store, the B41 temperature sensor will decrease first however with the temperature at B4 sensor above 55°C = **Compressors off.**
- When the temperature at B4 drops below 55°C = **Compressors on.**
- With the building up to temperature, the system pump shuts off, the heat pumps will charge the thermal store = **Compressors on.**
- When both B4 & B41 sensors within the thermal store reach 57°C = **Compressors off.**

4.3 Chapter 4 Checklist

Has the correct size of thermal store(s) been selected?	Yes ☐	No ☐
Confirmation of the B4 & B41 temperature sensors will be installed?	Yes ☐	No ☐
It is understood how the B4 & B41 sensors work together?	Yes ☐	No ☐

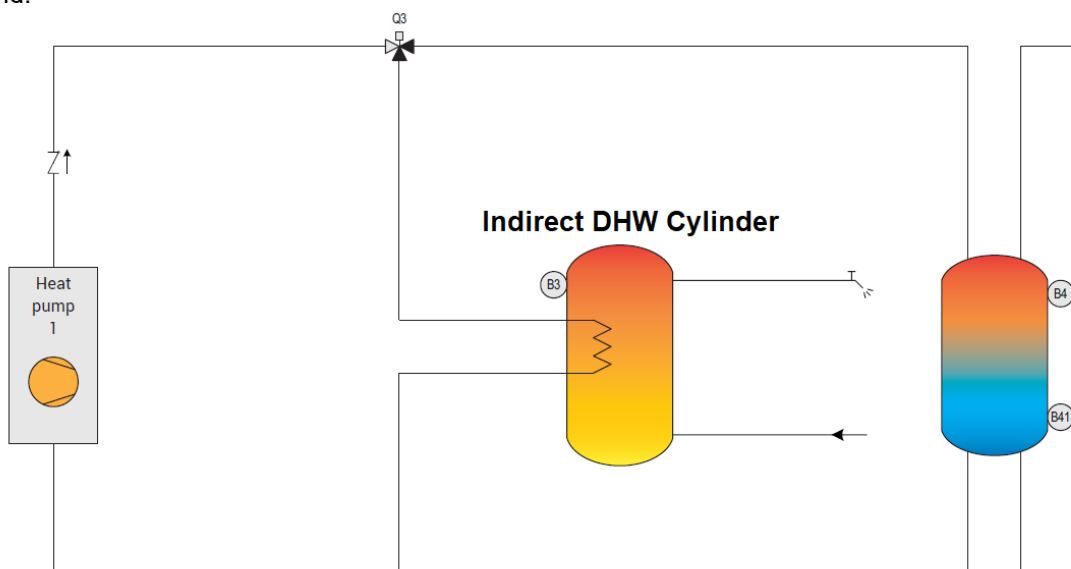
If the answers to the above are all “yes” then move on to chapter 5.

5 DHW INDIRECT CYLINDERS / DHW PHE WITH BUFFER VESSEL

There are multiple options available with reference to using our S-ASX-VP range for DHW. Either by an indirect cylinder with a high-performance coil to absorb as much power as possible at lower primary temperatures or a DHW plate heat exchanger with a buffer vessel arrangement.

5.1 DHW Indirect Cylinders

For smaller DHW systems, an ideal solution would be an indirect storage cylinder designed to cover the onsite DHW demand.



5.1.1 RECOMMENDED DHW INDIRECT CYLINDERS

Our recommended DHW indirect cylinders with high absorption at high primary flow rates and low primary temperatures are:

Tank in Tank S-DW-I Cylinders -				
Cylinder Model	DHW Storage	Coil Surface Area	*** kW Absorption	Immersion Heater
S-DW-I 600	433 Litres	2.8 m ²	35 kW	6KW 1PH / 12kW 3PH
S-DW-I 1000	712 Litres	4.0 m ²	48 kW	6KW 1PH / 12kW 3PH
High Performance Coil				
Cylinder Model	DHW Storage	Coil Surface Area	*** kW Absorption	Immersion Heater
S-LC-I 500	500 Litres	4.8 m ²	76 kW	7.5 kW 3PH
S-LC-I 800	800 Litres	5.7 m ²	107 kW	12 kW 3PH
S-LC-I 1000	1000 Litres	6.4 m ²	110 kW	12 kW 3PH
S-LC-I 1500	1500 Litres	4.2 m ²	85 kW	25 kW 3PH

*** The kW absorption is based on a primary flow temperature of 70°C with a high flow rate of a DHW continuous flow of 10 - 60°C.

5.1.2 RECOMMENDED S-ASX-VP HEAT PUMPS FOR DHW PRODUCTION

In line with the performances of the DHW cylinders within chapter 5.1.1, the best matched S-ASX-VP model is the **S-ASX-VP 60**.

Outside Air Temperature										
Flow Temperature	Tdb	-7°C	-4°C	-2°C	0°C	2°C	7°C	12°C	20°C	35°C
60°C	Heating Capacity (kW)	44.0	46.4	47.7	49.0	50.5	59.2	63.9	69.5	79.0
65°C		44.9	47.2	48.5	49.8	51.2	59.9	64.5	70.1	79.5
68°C (8°C dT)		45.6	47.9	49.2	50.5	51.9	60.6	65.1	70.7	80.0

The S-ASX-VP 60 will switch between one or two operating compressors to maintain the temperatures within the primary circuit to allow the DHW cylinders to absorb as much power as possible and heat up the DHW storage to a maximum temperature of 57°C.

5.1.3 DHW PERFORMANCE OF INDIRECT DHW CYLINDERS WITH THE S-ASX-VP 60 AT -4°C OUTSIDE TEMP

The below performance figures with the table are based on:

- Primary flow temperature of 68°C on a 8°C dT flow rate.
- DHW indirect cylinder storage temperature = 57°C.
- Cold water inlet temperature = 10 C.

Tank in Tank S-DW-I Cylinders			
	S-DW-I 600	S-DW-I 1000	Unit
Continuous Output at 45°C	984	1152	Litres per hour
1st Hour Draw off at 45°C with full tank @ 57°C	1128	1393	Litres
Continuous Output at 55°C	534	665	Litres per hour
1st Hour Draw off at 55°C with full tank @ 57°C	553	699	Litres
Recovery Time from 10°C to 57°C	57	74	Minutes

High Performance Coil S-LC-I Cylinders					
	S-LC-I 500	S-LC-I 800	S-LC-I 1000	S-LC-I 1500	Unit
Continuous Output at 45°C	1152	1152	1152	1152	Litres per hour
1st Hour Draw Off at 45°C with full tank @ 57°C	1322	1423	1490	1658	Litres
Continuous Output at 55°C	900	900	900	900	Litres per hour
1st Hour Draw Off at 55°C with full tank @ 57°C	919	932	941	963	Litres
Recovery Time from 10°C to 57°C	39	62	78	117	Minutes

5.1.4 DHW PERFORMANCE OF INDIRECT DHW CYLINDERS WITH THE S-ASX-VP 60 AT 20°C OUTSIDE TEMP

The below performance figures with the table are based on:

- Primary flow temperature of 68°C on a 8°C dT flow rate.
- DHW indirect cylinder storage temperature = 57°C.
- Cold water inlet temperature = 10° C.

Tank in Tank S-DW-I Cylinders			
	S-DW-I 600	S-DW-I 1000	Unit
Continuous Output at 45°C	1032	1152	Litres per hour
1st Hour Draw off at 45°C with full tank @ 57°C	1177	1393	Litres
Continuous Output at 55°C	665	822	Litres per hour
1st Hour Draw off at 55°C with full tank @ 57°C	687	852	Litres
Recovery Time from 10°C to 57°C	45	61	Minutes

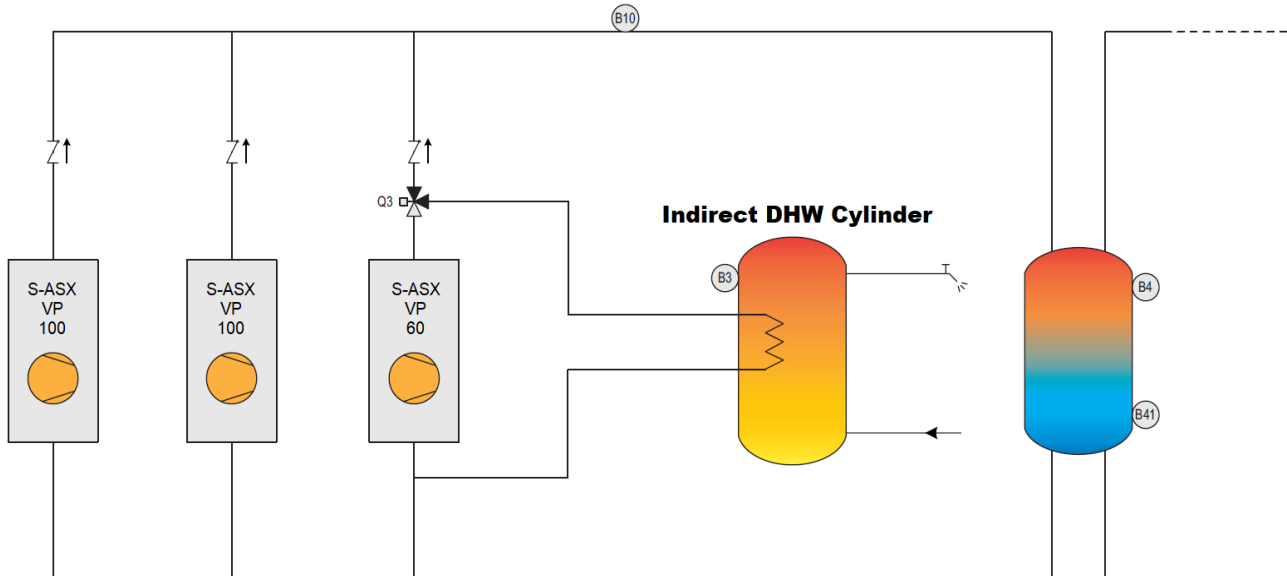
High Performance Coil S-LC-I Cylinders					
	S-LC-I 500	S-LC-I 800	S-LC-I 1000	S-LC-I 1500	Unit
Continuous Output at 45°C	1722	1722	1722	1722	Litres per hour
1st Hour Draw Off at 45°C with full tank @ 57°C	1887	1988	2055	2223	Litres
Continuous Output at 55°C	1338	1338	1338	1338	Litres per hour
1st Hour Draw Off at 55°C with full tank @ 57°C	1359	1372	1381	1402	Litres
Recovery Time from 10°C to 57°C	26	42	52	78	Minutes

The performance of these DHW cylinders improve with warmer outside temperature because the S-ASX-VP 60 heat pump output increases.

5.2 DHW Indirect Cylinder with a Multiple S-ASX-VP Installation

The best solution when using a DHW indirect cylinder on a multiple S-ASX-VP installation would be to add a S-ASX-VP 60 to the combination, with its own three-way valve installed on the individual pipework before the common flow / return header and set the DHW primary as a separate circuit.

The below example shows 2 x S-ASX-VP 100 & 1 x S-ASX-VP 60 in cascade.



As described later in chapter 5.4, once the DHW cylinder requires to be heated, the three-way valve (Q3) will divert the flow of water from the S-ASX-VP 60 to the cylinder. The two S-ASX-VP 100 will continue to operate in heating mode whilst the S-ASX-VP 60 is in DHW mode.

Once the DHW cylinder has reached its storage setpoint, if additional power is required for heating, then the three-way valve will divert the flow of water from the S-ASX-VP 60 to the thermal store.

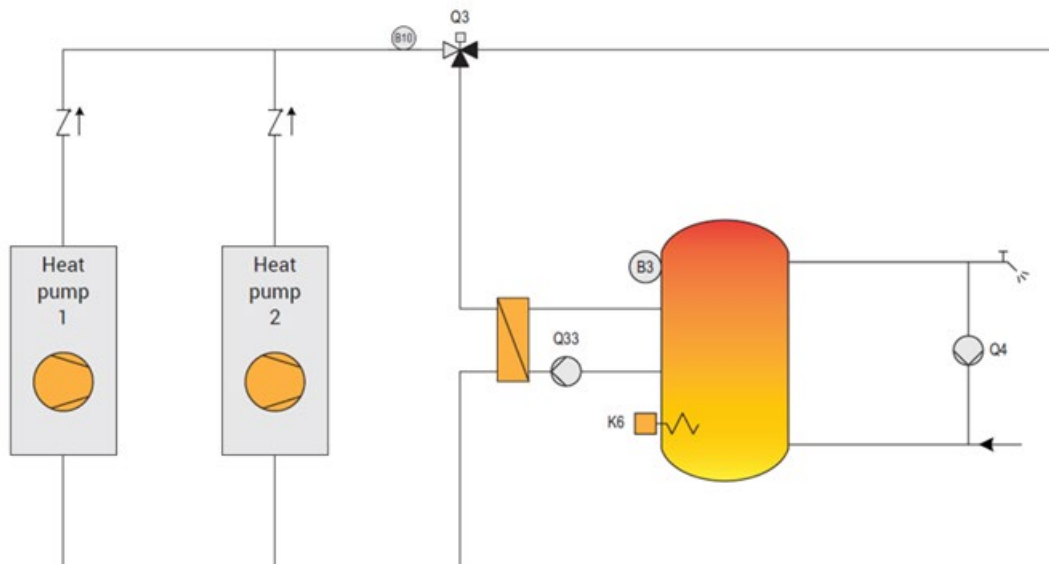
5.3 DHW Using a Plate Heat Exchanger

For larger DHW systems onsite, the best solution would be to use a PHE specifically designed to cover the onsite DHW flow rate at peak load.

5.3.1 DHW PLATE HEAT EXCHANGER INTO A BUFFER VESSEL

With this option the DHW PHE will feed into a buffer vessel for storage to a maximum DHW temperature of 57°C.

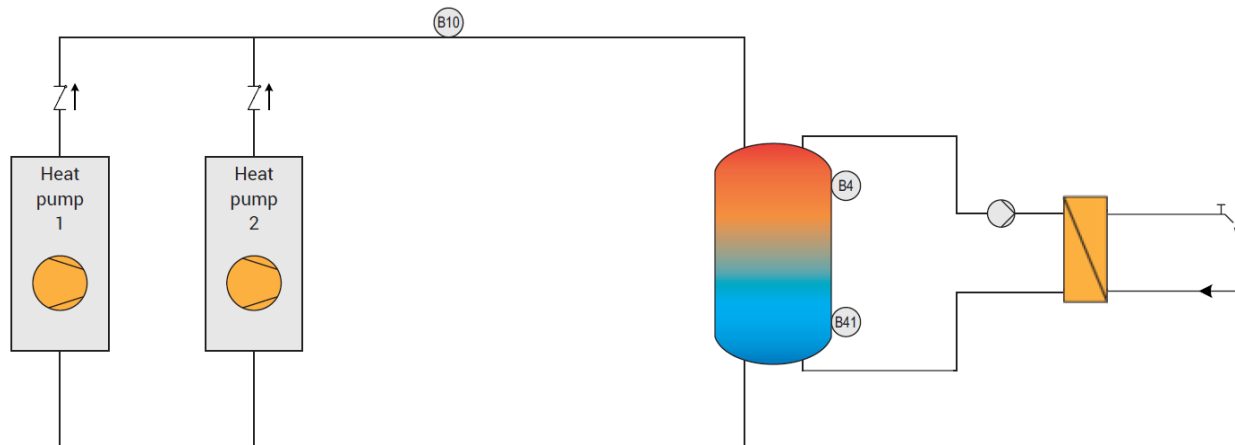
For DHW temperature to be stored above 60°C or for pasteurisation once a day, this will need to be boosted by either an immersion heater fitted to the cylinder / buffer vessel or an alternative heat source.



For assistance with sizing an DHW PHE with buffer vessel, please contact Strebel technical department either by phone on 01276 685422 or email to technical@strebel.co.uk

5.3.2 THERMAL STORE TO A DHW PLATE HEAT EXCHANGER

With this option the DHW PHE is fed from the thermal store with no buffer vessel for DHW storage. As there is no DHW storage, there is no requirement for a pasteurisation system to be in place for legionella protection. This type of DHW setup would need to be completely separate from the space heating system.



For assistance with sizing the thermal store and DHW PHE, please contact Strebel technical department either by phone on 01276 685422 or email to technical@strebel.co.uk

5.4 DHW Temperature Monitoring & Control

As per chapter 3.2, the temperature sensor for the DHW indirect cylinder supplied loose with each heat pump and are required to be installed.

A 3 way valve (not supplied by Strebel) will be required to be installed on the primary flow pipework before any thermal store to divert the flow of water between heating and DHW.

The DHW sensor and the three way valve will be addressed as:

- B3 = DHW temperature sensor.
- Q3 = DHW 3 way valve.

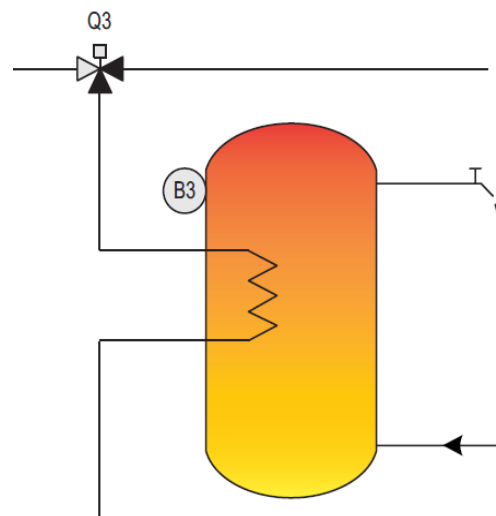
These two components combined with the heat pump(s) monitor the DHW temperature within the cylinder / buffer vessel and will heat up the DHW once the temperature drops below the DHW setpoint – switching diff.

Once a DHW demand is created from B3, the primary flow temperature setpoint from the heat pump will instantly increase to its maximum temperature.

The common setpoints for the DHW are:

- DHW temperature setpoint = 57°C.
- Switching diff = 10°C.

*** These setpoints are adjustable.



For DHW temperature to be stored above 60°C or for pasteurisation once a day, this will need to be boosted by either an immersion heater fitted to the cylinder / buffer vessel or an alternative heat source.



WARNING

Without the B3 sensor & Q3 three way valve connected to the S-ASX-VP heat pump, the heat pump will be unable to switch temperatures from heating to DHW.

This means if the heating setpoint is set to 55°C primary flow temperature, this temperature will remain the same in DHW mode thus preventing the DHW reaching temperature.

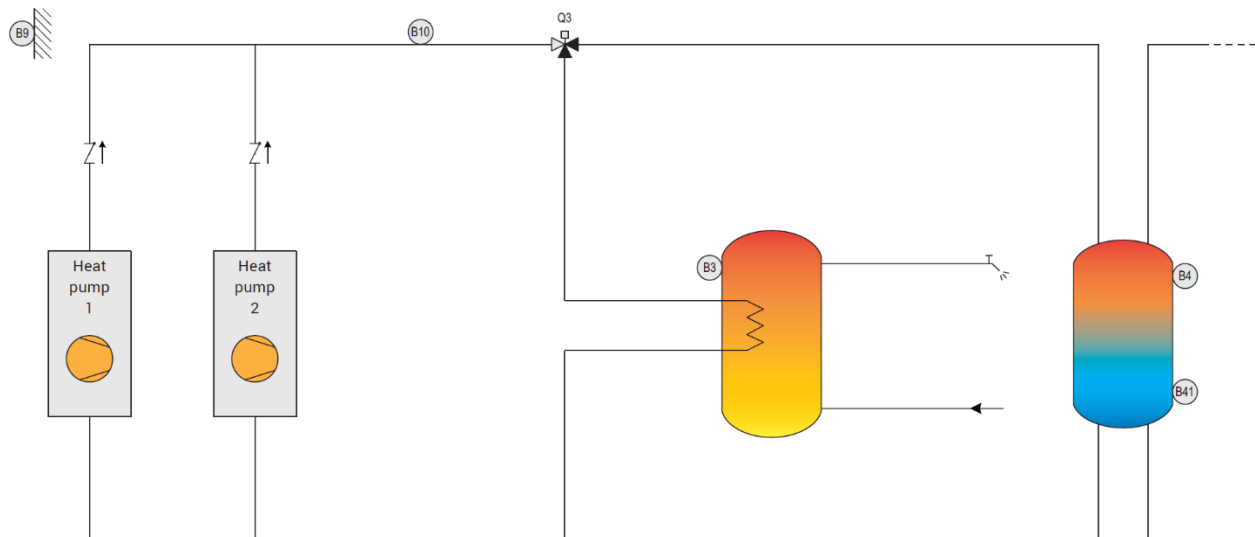
5.5 Chapter 5 Checklist

Has the correct type of DHW indirect cylinder or DHW PHE been selected?	Yes ☐	No ☐
Confirmation of the B3 temperature sensors & Q3 three way valve will be installed?	Yes ☐	No ☐
It is understood how the B3 sensor & Q3 valve work together?	Yes ☐	No ☐

If the answers to the above are all "yes" then move on to chapter 6.

6 PRIMARY CIRCUIT

The primary circuit is known as the circuit starting from the heat pumps to the thermal store, which also includes the DHW primary circuit as shown in the below schematic.



6.1 Primary Pipework Sizing

The primary pipework requires to be sized to a 5°C dT flow rate and it is recommended to follow the guidance of CIBSE for selecting pipework sizes which are 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 (buffer vessel).

6.2 Multiple Heat Pump Installation – Cascade Control

On a multiple heat pump installation with the S-ASX-VP range the cascade system should be activated – a maximum of 16 heat pumps can be controlled in cascade.

6.2.1 REQUIRED SENSORS FOR CASCADE CONTROL

As per the above schematic the below sensors will be required:

Sensor Number	Sensor Description
B3	DHW Temperature Sensor
B4	Thermal Store Temperature Sensor 1 - Top
B9	Outside Air Temperature Sensor
B10	Cascade Flow Temperature Sensor
B41	Thermal Store Temperature Sensor 2 - Bottom

*All sensors are supplied with S-ASX heat pumps as standard.

6.2.2 ADVANTAGES OF THE CASCADE SYSTEM

1. The cascade algorithm activates the compressors step by step pending the flow temperature reading at the B10 sensor. The step by step procedure with two heat pumps installed are:
 - a. Heat pump 1 compressor 1
 - b. Heat pump 2 compressor 1
 - c. Heat pump 1 compressor 2
 - d. Heat pump 2 compressor 2

This step by step sequence is reversed when the temperature at B10 is near to the setpoint.

2. Automatic compressor sequence changeover to equal out the operating hours.
3. Prevents all heat pumps entering their defrost cycle at the same time thus preventing the cooler temperatures flowing into the heating system.

For installation instructions of the cascade system, please read the S-ASX-VP installation manual.

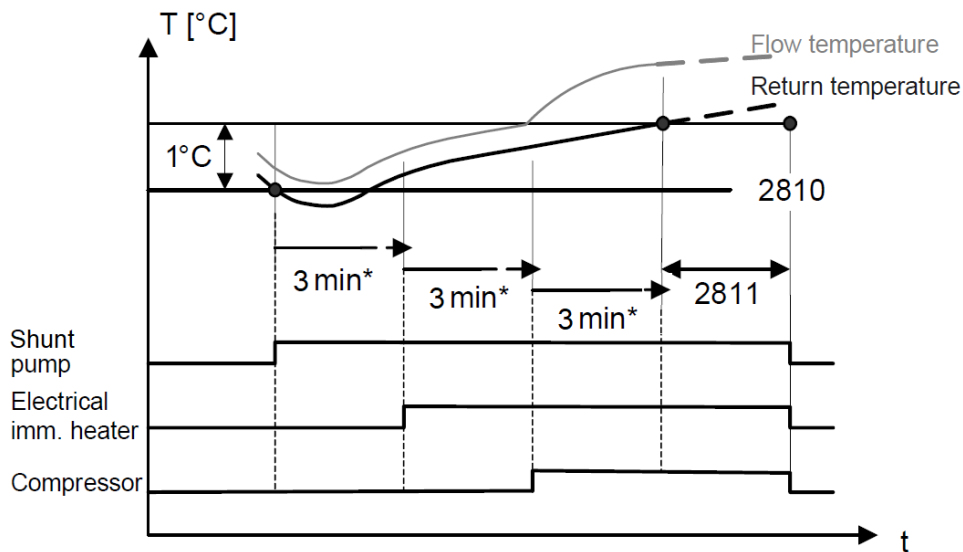
6.3 Frost Protection on Primary Circuit

Each S-ASX-VP come with a dual 2 stage frost protection to protect the system water within the heat pump(s) and the primary pipework from freezing up.

6.3.1 HEAT PUMP FLOW & RETURN TEMPERATURE SENSORS

Each heat pump comes with their own individual flow & return temperature sensors which constantly monitors the temperature of the water within the unit.

Frost Protection Operation Graph



Parameter	Sensor Description
2810	Frost Protection Temperature = 5 $^{\circ}\text{C}$
2811	Frost Protection Overrun Phase = 3 Minutes

Stage 1

When either the flow or the return temperature reads less than 5 $^{\circ}\text{C}$, the internal shunt pump within the heat pump will activate for 3 minutes. With the pump circulating water through the heat pump, this will allow for the flow & return sensors to record a true temperature reading of the system water. This process will also draw warm water from the thermal store through the primary pipework and the heat pump.

After 3 minutes, if the flow and return temperature sensors see an increase in temperature by more than 1 $^{\circ}\text{C}$ then the frost protection cycle is completed. On completion, the internal shunt pump will enter its overrun phase where it will operate for a further 3 minutes before switching off.

Stage 2

If after the first 3 minutes the flow or return temperature sensors do not see a temperature rise of 1 $^{\circ}\text{C}$, the next stage will be for the heat pump to activate an immersion heater within the thermal store (if connected) for 3 minutes. The immersion heater will warm up the system water within the thermal store and circulate through the primary pipework and heat pump.

After 3 minutes, if the flow and return temperature sensors see an increase in temperature by more than 1 $^{\circ}\text{C}$ then the frost protection cycle is completed. On completion, the immersion heater and internal shunt pump will enter its overrun phase where they will both operate for a further 3 minutes before switching off.

Stage 3

After the completion of stage 1 & 2, if the flow or return temperature sensors do not see a temperature rise of 1 $^{\circ}\text{C}$, the next stage will be for the heat pump to activate the compressor within the heat pump for 3 minutes. The

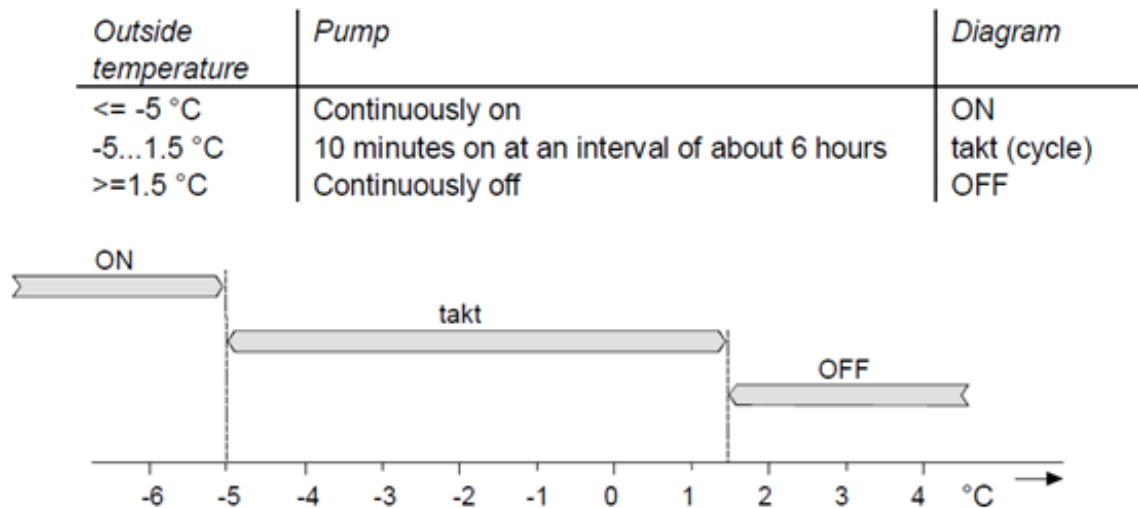
compressor will warm up the system water within the heat pump and circulate through the primary pipework and thermal store.

After 3 minutes within stage 3, the flow and return temperature sensors will see an increase in temperature by 1°C thus completing the frost protection cycle. On completion, the compressor, the immersion heater (if fitted) and the internal shunt pump will enter its overrun phase where it will operate for a further 3 minutes before switching off.

6.3.2 OUTSIDE AIR TEMPERATURE SENSOR

Independent of the flow and return sensor protection as described in the previous chapter, the second feature of frost protection is the S-ASX-VP outside air temperature sensor. This will also operate the internal shunt pump of the heat pump(s) depending on the outside temperature.

Pump Operation Against Outside Air Temperature



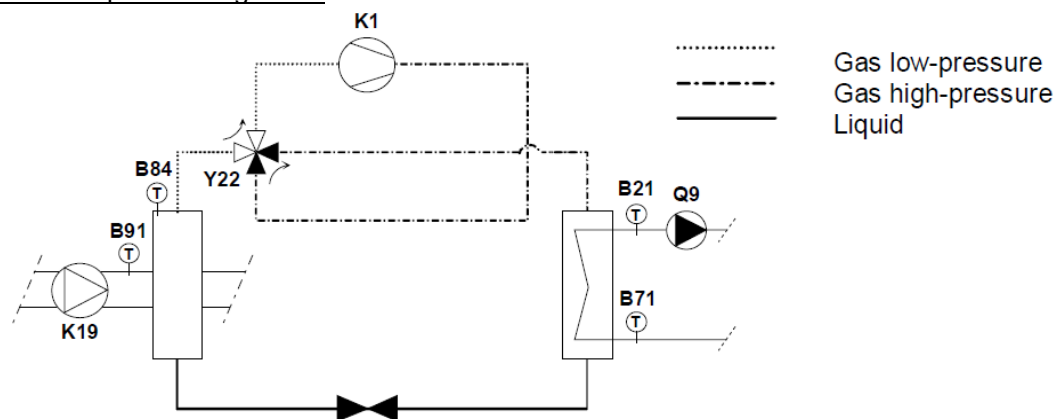
With the internal shunt pump operating within the S-ASX-VP heat pumps as shown in the above table to circulate the water around the primary circuit and absorbing any heated water from the thermal store(s), this will prevent the primary circuit from freezing up.

6.4 Defrost Cycle

With the S-ASX-VP in operation, condensation will occur on the outside of the finned coil at low temperatures which due to the sub-zero temperature of the refrigerant gas as it passes through the coil will start to freeze up.

To prevent the finned evaporator coil from freezing, the defrost cycle of the S-ASX-VP heat pump activate heating up the evaporator coil melting any frozen droplets either by defrosting with the fan or defrosting through process reversal.

S-ASX-VP Heat Pump in Heating Mode



Sensor Number	Description
B91	Source / Air Inlet Temperature Sensor
B84	Evaporator Temperature Sensor
Y22	4 Way Process Reversing Valve

K1	Compressor
K19	Fan
B21	Flow Temperature Sensor
B71	Return Temperature Sensor
Q9	S-ASX-VP Internal Shunt Pump

The two temperature sensors B91 & B84 are used to activate and lock the defrost cycle.

6.4.1 DEFROST CYCLE LOCKED

If the B91 sensor reads an outside temperature at the fins of more than 10°C, the defrost is locked and will not be activated because the temperature within the air is warm enough to prevent any condense on the coil from freezing.

The defrost cycle is also locked when:

- The heat pump is not in operation because both the B91 and B84 sensors will be reading similar temperatures.
- For 30 minutes after completion of a successful defrost cycle.

6.4.2 DEFROST CYCLE UNLOCKED

The defrost cycle becomes unlocked once the B91 sensor reads an outside temperature of less than 10°C whilst the heat pump is in operation for more than 30 minutes.

6.4.3 DEFROST CYCLE ACTIVATED

The defrost cycle is activated once the temperature difference between the B91 temperature sensor and B84 temperature sensor has increased by 3.5°C whilst the heat pump is in operation.

There are two different types of defrost cycle which depends on the outside temperature read by B91 at the time this cycle is activated.

Defrosting With Fan

With the B91 sensor reading an outside temperature of less than 10°C and more than 4°C, the defrost cycle will only activate the fan to melt away any ice from the evaporator.

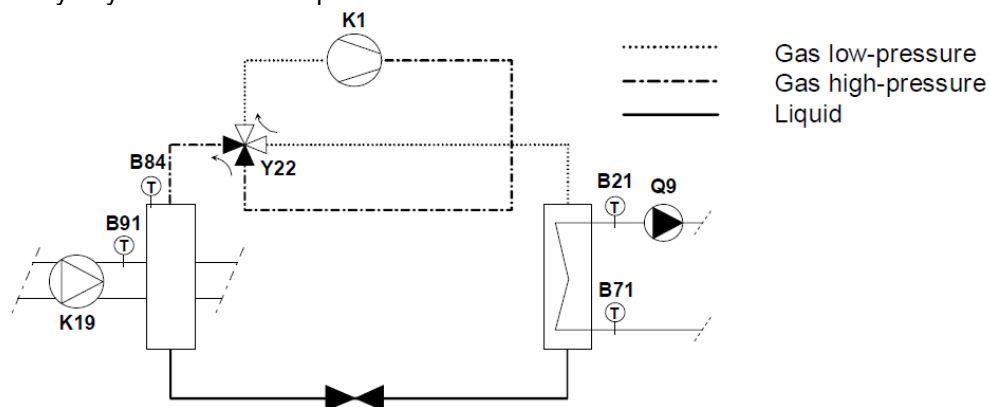
Whilst this cycle is in operation, both the compressor (K1) and the internal shunt pump are deactivated.

The defrosting with the fan is completed when either:

- The temperature difference between B91 & B84 is 1°C.
- The fan has operated to its maximum allowed time of 10 minutes.

Defrosting Through Process Reversal

With the B91 sensor reading an outside temperature of less than 4°C, the defrost cycle is completed by process reversal to melt away any ice from the evaporator.



The fans (K19) are deactivated whilst this cycle is in operation, and both the compressor (K1) & the internal shunt pump (Q9) are activated.

The flow direction of the refrigerant is changed by the 4 way process reversing valve (Y22) so that instead of the hot refrigerant gas flowing from the outlet of the compressor to the condenser, it flows through the evaporator heating up the coil and melting away any ice formed within the evaporator.

Please note: Due to the change of flow direction, the temperature within the condenser will decrease due to the refrigerant absorbing the heat as it passes through therefore cooler temperatures will flow to the thermal store. However, with the thermal stores being sized to 15 litres per kW, the affect with the temperatures within the heating system will be unaffected.

The defrosting through process reversal is completed when the B84 temperature sensor reads a temperature of 15°C.

6.4.4 DEFROST CYCLE COMPLETION

On completion of the defrost cycle, the defrost cycle is locked for 30 minutes and the S-ASX-VP is put back into normal operation.

After the 30 minutes have passed, the controller records the temperatures at both the B91 and B84 temperature sensors to use as a setpoint for the temperature differential.

Once the temperature differential at this setpoint has increased by 3.5°C whilst the heat pump is in operation, the defrost cycle is activated as per chapter 6.4.3.

6.5 Chapter 6 Checklist

It is understood that the primary pipework between the heat pumps and the thermal store is to be sized to a 5°C dT flow rate at full output?	Yes ☐	No ☐
It is understood with multiple S-ASX-VP heat pumps installed on a system that the heat pumps are cascaded together using the S-ASX cascade software?	Yes ☐	No ☐
Full understanding of the two types of frost protection within the S-ASX heat pumps?	Yes ☐	No ☐
Full understanding of how the defrost cycle operates within the S-ASX heat pumps?	Yes ☐	No ☐

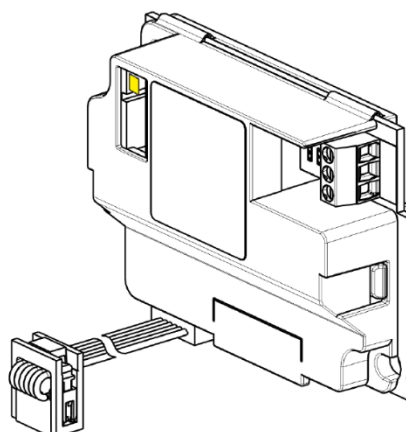
If the answers to the above are all "yes" then move on to chapter 7.

7 REMOTE MONITORING OPTIONS

On supplying the S-ASX-VP units to each project, the following remote monitoring devices are supplied as standard.

7.1 Siemens Modbus OCI350.01/101 Module

Each S-ASX-VP heat pump will come with this module supplied loose, along with a ribbon cable that will need to be inserted to the main heat pump controller.



Terminating resistor with DIP switches
☐ Position "ON"
☐ Position "OFF"

☐ LED (yellow): Indication of communication

Pin	Description	Connector Type
A+	TxD+ 8 RxD+ (Non inverting pin)	Connection Modbus: 3 Pole Screw Terminal
B-	TxD- / RxD+ (Inverting Pin)	
REF	Reference Pin	

The Modbus protocol description is as follows:

Modbus Properties	Albatros Controller
Connection Type	RS485
Modbus Role	Depending on the controller – Master / Slave
Slave Address	1 247
Baud Rate	9600 / 19200 / 38400 / 57600 – Adjustable
Start Bit	1

Data Bit	8
Modbus Function Codes	0x03 Read Holding Registers 0x06 Write Single Register (Not for structured data types) 0x10 Write Multiple Registers
Response Timeout	Default: 300 ms Adjustable from 100 10000ms

To obtain the complete Modbus parameter list, please contact Strebel technical department either by phone on 01276 685422 or email to technical@strebel.co.uk



7.2 Siemens Web Server OZW672

There are three different models of the web server which are sized on a project-by-project basis to suit the number of the S-ASX-VP heat pumps installer

Web Server Model	Number of S-ASX-VP's that can be Connected
OZW672.01	Web server up to 1 x S-ASX-VP ASHP
OZW672.04	Web server up to 4 x S-ASX-VP ASHP's
OZW672.16	Web server up to 16 x S-ASX-VP ASHP's

The benefits of this type of remote monitoring device are:

- Siemens dedicated IP dashboard, perpetual access with no fees.
- Setpoint access to all parameters.
- Remote view of all working parameters and alarms.
- Notification of any fault / alarm sent by email.
- Remote support from Strebel Technical Department .
- Access from all devices such as laptops, iPad, smart phone etc,

The webserver will need to be installed within the plantroom and the following will need to be completed at the installation stage:

1. A 230v 1ph power supply to be connected to the webserver.
2. A datapoint connection available within the plantroom for the webserver to connect to via a LAN cable.
3. Two core cable (min cross sectional area = 1.5mm²) to connect the webserver to the onsite S-ASX-VP heat pump(s) via the LPB terminals (MB / DB).

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