

STREBEL S-ASX-LQ

Air Source Heat Pump

Models 55 – 65 – 75 – 85 – 95

Installation, Operating & Maintenance Manual



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

DECLARATION OF CONFIRMITY

The manufacturer declares that the present equipment complies with the requirements of the following directives:

- Machinery directive
(MD)2006/42/EC
- Pressure equipment directive
(PED)2014/68/EU
- Electromagnetic compatibility directive
(EMC)2014/30/EU
- Low voltage directive
(LVD)2014/35/EU
- Energy efficiency directive
(EED)2012/27/EU

ORIGINAL INSTRUCTIONS

The manufacturer disclaims any liability arising from the incorrect use of this manual.
The manufacturer reserves the right to make modifications and/or improvements to this manual
and to the products due to any reason, in any time, and without prior notice.
This manual is the exclusive property of the manufacturer. Any reproduction, even partial, is forbidden.

TABLE OF CONTENTS

General information	4
General warnings	4
Unit data plate	4
Description.....	5
Description of components.....	5
Options.....	5
Identification code.....	6
Technical data.....	7
Nominal performances	8
Performances in Heating Mode	10
Performances in Cooling Mode.....	13
Heating and cooling performances - parametric curves.....	14
Operating range	15
Hydraulic performances.....	16
Acoustic performances	17
Overall dimensions.....	17
Electrical data.....	18
Weights	18
Receiving and positioning.....	19
Connections	20
Hydraulic connections.....	20
Electrical connections	21
Start up	22
Control system.....	23
User interface.....	23
Temperature sensors	24
Outdoor air temperature sensor	24
Navigation menu	25
Complete parameter list	26
Main functions	27
Alarms	30
Alarms table	31
Inputs and outputs.....	33
Operating diagram	36
Cascade management	37
Cascade Wiring	37
Master Unit Wiring	38
Slave Unit Wiring	39
Maintenance.....	40
Safety	41
Refrigerant safety card	44

GENERAL INFORMATION

GENERAL WARNING

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 authorized by the owner of the unit and recognized 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 centre recognized 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 authorized by the manufacturer, **MAKES THE WARRANTY NULL**. 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		 	
Matricola S/N	B		
Modello Model	C		
Codice Code	D		
Alimentazione elettrica Power supply	E		
Corrente max Max input current [A]	F		
Normativa Standard	G	Riscaldamento Heating A7W35	Raffrescamento Cooling A35W7
Potenza resa Capacity [kW]	H	J	
Potenza assorbita Power input [kW]	I	K	
Pressione max Max pressure [bar]	Alta / High L	Bassa / Low M	
Refrigerante Refrigerant [kg]	N	P	
[tCO ₂ eq]	O	Q	
Massa Weight [kg]	R		
Pressione sonora a 1m Sound pressure at 1m [dB(A)]		S	
Grado di protezione Protection degree	T	U	
Categoria PED PED category	V	Costruttore / 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 [bar]
- M Maximum pressure on the low-pressure side [bar]
- 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 meter [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 galvanised 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 compressors are mounted on damper supports and is protected against overtemperatures and overcurrent. 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 an electronic expansion valve for liquid injection management, controlled according to compressor outlet hot gas temperature in order to guarantee the unit to work inside its whole operating range. The heat exchanger on the plant side is a brazed stainless steel plates heat exchanger, properly insulated to avoid condensate generation and to minimize 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 aluminium fins with waved profile to increase the heat exchange coefficient. Under the coil, 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 superheating. 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 minimize thermal losses. The axial fans are equipped with a 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 minimize 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.

Standard Supply		
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 (Optional)	
Soft starter		Reduces the compressor start current
Components supplied with the unit		
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.	

IDENTIFICATION CODES

S-ASX-LQ	95	R	2	S	F	N	S	0
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	
	SF	Scroll compressors - Fixed speed
6	Power supply	
	M	230V - 1 - 50Hz
	N	400V - 3N - 50Hz
	T	400V - 3 - 50Hz
7	Acoustic setting up	
	B	Base version
	S	Low noise (Standard supply)
8	Refrigerant	
	0	R410A

TECHNICAL DATA

EU reg 811/2013			55	65	75	85	95	
Efficiency class	AVERAGE climate MEDIUM temperature application		A++	A++	A++	A++	A++	-
	AVERAGE climate LOW temperature application		A++	A++	A++	A++	A++	-
Seasonal efficiency _s	AVERAGE climate MEDIUM temperature application		131	131	130	131	130	%
	AVERAGE climate LOW temperature applications		166	168	165	167	166	%
SCOP	AVERAGE climate MEDIUM temperature application		3,35	3,36	3,32	3,35	3,32	-
	AVERAGE climate LOW temperature application		4,23	4,26	4,21	4,24	4,21	-
P design	COLDER climate MEDIUM temperature application		42	48	54	62	70	kW
	AVERAGE climate MEDIUM temperature application		53	60	68	78	87	kW
	WARMER climate MEDIUM temperature application		58	67	76	86	97	kW
	COLDER climate LOW temperature application		44	51	58	65	74	kW
	AVERAGE climate LOW temperature application		55	63	71	81	91	kW
	WARMER climate LOW temperature application		61	69	79	89	101	kW

			55	65	75	85	95	
Refrigerant			R410A					-
Refrigerant charge			12,0	16,0	16,0	20,0	20,0	kg
Compressors	Type		high temperature Scroll with liquid injection					-
	n° of compressors		2					-
	oil charge		3,3	3,3	3,3	3,3	3,6	kg
Refrigerant circuits			n° of circuits					-
Power steps			0 - 50 - 100					%
Plant side heat exchangers	Type		stainless steel brazed plates					-
	n°		1					-
	Water volume		6,4	8,0	9,8	9,8	11,8	l
Source side heat exchangers	Type		finned coil with copper pipes and hydrophilic aluminium fins					-
	n°		1					-
	Frontal surface		1,63	2,46	2,46	3,28	3,28	m²
Nominal total air flow rate	Type		Axial EC					-
	n°		2	3	3	4	4	-
			17200	20000	21400	26800	28400	m³/h
Hydraulic circuit	Max pressure		6					bar
	Min pressure *		0.3					bar
	Min pressure with integrated circulation pump *		1.5					bar

* 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).

NOMINAL PERFORMANCES

HEATING		A	W	55	65	75	85	95	
A7W35	Heating capacity	7	35	57,7	65,8	74,8	85,1	95,8	kW
	Power input			12,9	14,6	16,8	19,0	21,5	kW
	COP			4,47	4,51	4,45	4,48	4,46	-
	Plant side water flow rate			9944	11348	12910	14677	16532	l/h
	Plant side pressure drops			29	25	23	29	27	kPa
A7W45	Heating capacity	7	45	56,5	64,5	73,3	83,4	93,9	kW
	Power input			15,7	17,7	20,4	23,1	26,1	kW
	COP			3,60	3,64	3,59	3,61	3,60	-
	Plant side water flow rate			9778	11159	12696	14433	16256	l/h
	Plant side pressure drops			28	25	22	28	26	kPa
A7W55	Heating capacity	7	55	55,3	63,0	71,7	81,5	91,8	kW
	Power input			17,9	20,4	23,5	26,5	30,0	kW
	COP			3,09	3,09	3,05	3,08	3,06	-
	Plant side water flow rate			6010	6859	7803	8870	9991	l/h
	Plant side pressure drops			11	10	9	12	11	kPa
A7W65	Heating capacity	7	65	53,8	61,4	69,8	79,4	89,4	kW
	Power input			20,7	23,5	27,1	30,6	34,7	kW
	COP			2,60	2,61	2,58	2,59	2,58	-
	Plant side water flow rate			4702	5366	6104	6939	7816	l/h
	Plant side pressure drops			7	6	6	7	7	kPa
A2W35	Heating capacity	2	35	47,8	54,5	62,0	70,5	79,3	kW
	Power input			12,6	14,3	16,4	18,6	21,0	kW
	COP			3,79	3,81	3,78	3,79	3,78	-
	Plant side water flow rate			8239	9402	10697	12160	13697	l/h
	Plant side pressure drops			21	18	16	21	19	kPa
A2W45	Heating capacity	2	45	46,6	53,2	60,5	68,8	77,4	kW
	Power input			15,4	17,4	20,1	22,7	25,7	kW
	COP			3,03	3,06	3,01	3,03	3,01	-
	Plant side water flow rate			8067	9207	10474	11907	13412	l/h
	Plant side pressure drops			20	17	16	20	18	kPa
A2W55	Heating capacity	2	55	45,3	51,7	58,8	66,9	75,4	kW
	Power input			17,7	20,1	23,2	26,2	29,7	kW
	COP			2,56	2,57	2,53	2,55	2,54	-
	Plant side water flow rate			4933	5630	6404	7281	8201	l/h
	Plant side pressure drops			8	7	6	8	8	kPa
A2W65	Heating capacity	2	65	43,9	50,1	57,0	64,8	72,9	kW
	Power input			20,5	23,3	26,9	30,3	34,4	kW
	COP			2,14	2,15	2,12	2,14	2,12	-
	Plant side water flow rate			3835	4376	4979	5660	6375	l/h
	Plant side pressure drops			5	4	4	5	5	kPa
A-2W35	Heating capacity	-2	35	43,9	50,1	57,0	64,8	72,9	kW
	Power input			12,4	14,0	16,2	18,3	20,7	kW
	COP			3,54	3,58	3,52	3,54	3,52	-
	Plant side water flow rate			7574	8644	9834	11179	12592	l/h
	Plant side pressure drops			18	15	14	18	16	kPa
A-2W45	Heating capacity	-2	45	42,7	48,8	55,4	63,1	71,0	kW
	Power input			15,2	17,2	19,8	22,4	25,4	kW
	COP			2,81	2,84	2,80	2,82	2,80	-
	Plant side water flow rate			7400	8446	9608	10923	12303	l/h
	Plant side pressure drops			17	15	13	17	16	kPa
A-2W55	Heating capacity	-2	55	41,5	47,3	53,8	61,2	68,9	kW
	Power input			17,5	19,9	23,0	25,9	29,4	kW
	COP			2,37	2,38	2,34	2,36	2,34	-
	Plant side water flow rate			4513	5150	5859	6661	7503	l/h
	Plant side pressure drops			7	6	6	7	6	kPa
A-2W65	Heating capacity	-2	65	40,0	45,6	51,9	59,0	66,5	kW
	Power input			20,4	23,1	26,6	30,0	34,1	kW
	COP			1,96	1,97	1,95	1,97	1,95	-
	Plant side water flow rate			3497	3991	4540	5161	5813	l/h
	Plant side pressure drops			4	4	3	4	4	kPa

NOMINAL PERFORMANCES

HEATING		A	W	55	65	75	85	95	
A-7W35	Heating capacity	-7	35	38,7	44,2	50,2	57,1	64,3	kW
	Power input			12,1	13,7	15,8	17,9	20,2	kW
	COP			3,20	3,23	3,18	3,19	3,18	-
	Plant side water flow rate			6684	7628	8678	9865	11111	l/h
	Plant side pressure drops			14	12	11	14	13	kPa
A-7W45	Heating capacity	-7	45	37,6	42,8	48,7	55,4	62,4	kW
	Power input			14,9	16,9	19,5	22,0	24,9	kW
	COP			2,52	2,53	2,50	2,52	2,51	-
	Plant side water flow rate			6507	7426	8448	9603	10817	l/h
	Plant side pressure drops			13	12	11	13	12	kPa
A-7W55	Heating capacity	-7	55	36,3	41,4	47,1	53,6	60,3	kW
	Power input			17,3	19,6	22,6	25,5	28,9	kW
	COP			2,10	2,11	2,08	2,10	2,09	-
	Plant side water flow rate			3950	4508	5129	5831	6568	l/h
	Plant side pressure drops			5	5	4	5	5	kPa
A-7W65	Heating capacity	-7	65	34,8	39,7	45,2	51,4	57,9	kW
	Power input			20,1	22,8	26,3	29,7	33,7	kW
	COP			1,73	1,74	1,72	1,73	1,72	-
	Plant side water flow rate			3044	3474	3952	4493	5060	l/h
	Plant side pressure drops			3	3	3	3	3	kPa

COOLING		A	W	55	65	75	85	95	
A35W7	Cooling capacity	35	7	48,6	55,5	63,2	71,7	80,8	kW
	Power input			15,6	17,6	20,3	23,0	26,0	kW
	EER			3,12	3,15	3,11	3,12	3,11	-
	Plant side water flow rate			8375	9559	10880	12356	13918	l/h
	Plant side pressure drops			21	19	17	21	20	kPa
A35W18	Cooling capacity	35	18	64,2	73,3	83,5	94,7	107,0	kW
	Power input			16,9	19,1	22,0	24,9	28,1	kW
	EER			3,80	3,84	3,80	3,80	3,81	-
	Plant side water flow rate			11124	12697	14453	16413	18487	l/h
	Plant side pressure drops			36	31	28	36	33	kPa
A25W7	Cooling capacity	25	7	54,5	62,2	70,8	80,4	90,6	kW
	Power input			13,3	15,0	17,3	19,6	22,2	kW
	EER			4,10	4,15	4,09	4,10	4,08	-
	Plant side water flow rate			9390	10718	12200	13855	15606	l/h
	Plant side pressure drops			26	23	21	26	24	kPa
A25W18	Cooling capacity	25	18	70,5	80,6	91,8	104	117	kW
	Power input			14,7	16,5	19,0	21,5	24,3	kW
	EER			4,80	4,88	4,83	4,84	4,81	-
	Plant side water flow rate			12232	13962	15892	18048	20329	l/h
	Plant side pressure drops			43	37	34	42	39	kPa

Data declared according to EN 14511. The data are related to units without options or accessories.

A7W35 = source:	air in 7°C db 6°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
A7W45 = source:	air in 7°C db 6°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
A7W55 = source:	air in 7°C db 6°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
A7W65 = source:	air in 7°C db 6°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
A2W35 = source:	air in 2°C db 1°C wb	plant:	water in 30°C out 35°C	A35W7 = source:	air in 35°C db	plant:	water in 12°C out 7°C
A2W45 = source:	air in 2°C db 1°C wb	plant:	water in 40°C out 45°C	A35W18 = source:	air in 35°C db	plant:	water in 23°C out 18°C
A2W55 = source:	air in 2°C db 1°C wb	plant:	water in 47°C out 55°C	A25W7 = source:	air in 25°C db	plant:	water in 12°C out 7°C
A2W65 = source:	air in 2°C db 1°C wb	plant:	water in 55°C out 65°C	A25W18 = source:	air in 25°C db	plant:	water in 23°C out 18°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				

PERFORMANCES IN HEATING MODE

Model	Water outlet temperature	Tdb	Outdoor air temperature												°C
			-20	-15	-7	-4	-2	0	2	7	12	20	35	42	
		Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	28	
55	68 (ΔT 10°C)	Heating capacity	17,8	24,0	34,3	37,6	39,5	41,4	43,4	53,3	58,8	65,5	77,1	82,0	kW
		Power input	20,4	20,7	21,2	21,3	21,4	21,5	21,6	21,8	21,9	22,1	22,3	22,3	kW
		COP	0,87	1,16	1,62	1,77	1,85	1,93	2,01	2,44	2,68	2,96	3,46	3,68	-
	65	Heating capacity	18,2	24,4	34,7	38,0	39,8	41,7	43,7	53,6	59,2	65,9	77,5	82,4	kW
		Power input	20,5	20,9	21,4	21,6	21,7	21,8	21,9	22,2	22,4	22,6	22,9	23,0	kW
		COP	0,89	1,17	1,62	1,76	1,83	1,91	2,00	2,41	2,64	2,92	3,38	3,58	-
	60	Heating capacity	19,0	25,2	35,5	38,8	40,7	42,5	44,5	54,4	60,0	66,7	78,3	83,2	kW
		Power input	18,8	19,1	19,6	19,8	19,9	20,0	20,1	20,4	20,6	20,8	21,1	21,2	kW
		COP	1,01	1,32	1,81	1,96	2,05	2,12	2,21	2,67	2,91	3,21	3,71	3,92	-
	55	Heating capacity	19,7	25,9	36,2	39,5	41,4	43,3	45,3	55,2	60,7	67,4	79,0	83,9	kW
		Power input	17,1	17,4	18,0	18,1	18,3	18,4	18,5	18,7	18,9	19,1	19,4	19,6	kW
		COP	1,15	1,49	2,01	2,18	2,26	2,35	2,45	2,95	3,21	3,53	4,07	4,28	-
	50	Heating capacity	20,4	26,6	36,9	40,2	42,1	44,0	46,0	55,9	61,4	68,1	79,7	84,6	kW
		Power input	15,5	15,9	16,4	16,6	16,7	16,8	16,9	17,2	17,3	17,5	17,9	18,0	kW
		COP	1,32	1,67	2,25	2,42	2,52	2,62	2,72	3,25	3,55	3,89	4,45	4,70	-
	45	Heating capacity	21,1	27,3	37,6	40,9	42,7	44,6	46,6	56,5	62,1	68,8	80,4	85,3	kW
		Power input	14,0	14,4	14,9	15,1	15,2	15,3	15,4	15,7	15,8	16,0	16,4	16,5	kW
		COP	1,51	1,90	2,52	2,71	2,81	2,92	3,03	3,60	3,93	4,30	4,90	5,17	-
	40	Heating capacity	21,7	27,9	38,2	41,5	43,3	45,2	47,2	57,1	62,7	69,4	81,0	85,9	kW
		Power input	12,6	12,9	13,5	13,6	13,7	13,9	14,0	14,2	14,4	14,6	14,9	15,1	kW
		COP	1,72	2,16	2,83	3,05	3,16	3,25	3,37	4,02	4,35	4,75	5,44	5,69	-
	35	Heating capacity	22,2	28,4	38,7	42,0	43,9	45,8	47,8	57,7	63,2	69,9	81,5	86,4	kW
		Power input	11,2	11,6	12,1	12,3	12,4	12,5	12,6	12,9	13,1	13,3	13,6	13,7	kW
		COP	1,98	2,45	3,20	3,41	3,54	3,66	3,79	4,47	4,82	5,26	5,99	6,31	-
	30	Heating capacity	22,8	29,0	39,3	42,6	44,4	46,3	48,3	58,2	63,8	70,5	82,1	87,0	kW
		Power input	9,92	10,3	10,8	11,0	11,1	11,2	11,3	11,6	11,8	12,0	12,3	12,4	kW
		COP	2,30	2,82	3,64	3,87	4,00	4,13	4,27	5,02	5,41	5,88	6,67	7,02	-

Model	Water outlet temperature	Tdb	Outdoor air temperature												°C
			-20	-15	-7	-4	-2	0	2	7	12	20	35	42	
		Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	28	
65	68 (ΔT 10°C)	Heating capacity	20,3	27,4	39,1	42,9	45,1	47,2	49,5	60,8	67,1	74,7	88,0	93,5	kW
		Power input	23,1	23,5	24,0	24,2	24,3	24,4	24,5	24,7	24,9	25,0	25,3	25,3	kW
		COP	0,88	1,17	1,63	1,77	1,86	1,93	2,02	2,46	2,69	2,99	3,48	3,70	-
	65	Heating capacity	20,8	27,8	39,6	43,3	45,5	47,6	49,9	61,2	67,5	75,1	88,3	93,9	kW
		Power input	23,3	23,7	24,3	24,5	24,6	24,7	24,8	25,1	25,3	25,6	25,9	26,0	kW
		COP	0,89	1,17	1,63	1,77	1,85	1,93	2,01	2,44	2,67	2,93	3,41	3,61	-
	60	Heating capacity	21,7	28,7	40,5	44,2	46,4	48,5	50,8	62,1	68,4	76,0	89,3	94,8	kW
		Power input	21,3	21,7	22,3	22,5	22,6	22,7	22,8	23,1	23,3	23,6	23,9	24,0	kW
		COP	1,02	1,32	1,82	1,96	2,05	2,14	2,23	2,69	2,94	3,22	3,74	3,95	-
	55	Heating capacity	22,5	29,6	41,3	45,1	47,2	49,4	51,6	63,0	69,2	76,9	90,1	95,7	kW
		Power input	19,4	19,8	20,4	20,6	20,7	20,8	20,9	21,2	21,4	21,7	22,0	22,1	kW
		COP	1,16	1,49	2,02	2,19	2,28	2,38	2,47	2,97	3,23	3,54	4,10	4,33	-
	50	Heating capacity	23,3	30,4	42,1	45,9	48,0	50,1	52,4	63,7	70,0	77,7	90,9	96,5	kW
		Power input	17,6	18,0	18,6	18,8	18,9	19,0	19,1	19,4	19,6	19,9	20,2	20,3	kW
		COP	1,32	1,69	2,26	2,44	2,54	2,64	2,74	3,28	3,57	3,90	4,50	4,75	-
	45	Heating capacity	24,1	31,1	42,8	46,6	48,8	50,9	53,2	64,5	70,8	78,4	91,6	97,2	kW
		Power input	15,9	16,3	16,9	17,1	17,2	17,3	17,4	17,7	17,9	18,2	18,5	18,6	kW
		COP	1,52	1,91	2,53	2,73	2,84	2,94	3,06	3,64	3,96	4,31	4,95	5,23	-
	40	Heating capacity	24,7	31,8	43,5	47,3	49,4	51,6	53,8	65,2	71,5	79,1	92,3	97,9	kW
		Power input	14,3	14,7	15,3	15,5	15,6	15,7	15,8	16,1	16,3	16,5	16,9	17,0	kW
		COP	1,73	2,16	2,84	3,05	3,17	3,29	3,41	4,05	4,39	4,79	5,46	5,76	-
	35	Heating capacity	25,4	32,4	44,2	47,9	50,1	52,2	54,5	65,8	72,1	79,7	93,0	98,6	kW
		Power input	12,7	13,1	13,7	13,9	14,0	14,2	14,3	14,6	14,8	15,0	15,3	15,5	kW
		COP	2,00	2,47	3,23	3,45	3,58	3,68	3,81	4,51	4,87	5,31	6,08	6,36	-
	30	Heating capacity	26,0	33,0	44,8	48,6	50,7	52,8	55,1	66,4	72,7	80,3	93,6	99,2	kW
		Power input	11,3	11,7	12,3	12,5	12,6	12,7	12,8	13,1	13,3	13,5	13,9	14,0	kW
		COP	2,30	2,82	3,64	3,89	4,02	4,16	4,30	5,07	5,47	5,95	6,73	7,09	-

PERFORMANCES IN HEATING MODE

Model	Water outlet temperature	Tdb	Outdoor air temperature												°C
			-20	-15	-7	-4	-2	0	2	7	12	20	35	42	
			Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	
75	68 (ΔT 10°C)	Heating capacity	23,1	31,1	44,5	48,8	51,3	53,7	56,3	69,2	76,3	85,0	100	106	kW
		Power input	26,7	27,1	27,7	27,9	28,0	28,1	28,2	28,5	28,7	28,9	29,1	29,2	kW
		COP	0,87	1,15	1,61	1,75	1,83	1,91	2,00	2,43	2,66	2,94	3,44	3,63	-
	65	Heating capacity	23,6	31,6	45,0	49,3	51,7	54,1	56,7	69,6	76,7	85,4	100	107	kW
		Power input	26,9	27,3	28,0	28,2	28,4	28,5	28,6	29,0	29,2	29,4	29,8	29,9	kW
		COP	0,88	1,16	1,61	1,75	1,82	1,90	1,98	2,40	2,63	2,90	3,36	3,58	-
	60	Heating capacity	24,7	32,7	46,0	50,3	52,7	55,2	57,8	70,6	77,8	86,4	101	108	kW
		Power input	24,6	25,0	25,7	25,9	26,1	26,2	26,3	26,7	26,9	27,1	27,5	27,6	kW
		COP	1,00	1,31	1,79	1,94	2,02	2,11	2,20	2,64	2,89	3,19	3,67	3,91	-
	55	Heating capacity	25,6	33,7	47,0	51,3	53,7	56,1	58,7	71,6	78,7	87,4	102	109	kW
		Power input	22,4	22,8	23,5	23,7	23,9	24,0	24,1	24,5	24,7	24,9	25,3	25,4	kW
		COP	1,14	1,48	2,00	2,16	2,25	2,34	2,44	2,92	3,19	3,51	4,03	4,29	-
	50	Heating capacity	26,5	34,6	47,9	52,2	54,6	57,0	59,6	72,5	79,6	88,3	103	110	kW
		Power input	20,3	20,8	21,4	21,7	21,8	21,9	22,1	22,4	22,6	22,9	23,2	23,4	kW
		COP	1,31	1,66	2,24	2,41	2,50	2,60	2,70	3,24	3,52	3,86	4,44	4,70	-
	45	Heating capacity	27,4	35,4	48,7	53,0	55,4	57,9	60,5	73,3	80,5	89,2	104	111	kW
		Power input	18,3	18,8	19,5	19,7	19,8	20,0	20,1	20,4	20,6	20,9	21,3	21,4	kW
		COP	1,50	1,88	2,50	2,69	2,80	2,90	3,01	3,59	3,91	4,27	4,88	5,19	-
	40	Heating capacity	28,1	36,2	49,5	53,8	56,2	58,6	61,2	74,1	81,3	89,9	105	111	kW
		Power input	16,4	16,9	17,6	17,8	18,0	18,1	18,2	18,6	18,8	19,0	19,4	19,5	kW
		COP	1,71	2,14	2,81	3,02	3,12	3,24	3,36	3,98	4,32	4,73	5,41	5,69	-
	35	Heating capacity	28,9	36,9	50,2	54,5	57,0	59,4	62,0	74,8	82,0	90,7	106	112	kW
		Power input	14,7	15,1	15,8	16,0	16,2	16,3	16,4	16,8	17,0	17,3	17,6	17,8	kW
		COP	1,97	2,44	3,18	3,41	3,52	3,64	3,78	4,45	4,82	5,24	6,02	6,29	-
	30	Heating capacity	29,6	37,6	50,9	55,2	57,6	60,1	62,7	75,5	82,7	91,4	106	113	kW
		Power input	13,0	13,5	14,1	14,4	14,5	14,6	14,8	15,1	15,3	15,6	15,9	16,1	kW
		COP	2,28	2,79	3,61	3,83	3,97	4,12	4,24	5,00	5,41	5,86	6,67	7,02	-
Model	Water outlet temperature	Tdb	Outdoor air temperature												°C
			-20	-15	-7	-4	-2	0	2	7	12	20	35	42	
			Twb	-21	-16	-8	-5	-3	-1	1	6	10	15	24	
85	68 (ΔT 10°C)	Heating capacity	26,2	35,4	50,6	55,5	58,3	61,0	64,0	78,6	86,8	96,7	114	121	kW
		Power input	30,1	30,6	31,2	31,5	31,6	31,7	31,8	32,1	32,3	32,6	32,8	32,9	kW
		COP	0,87	1,16	1,62	1,76	1,84	1,92	2,01	2,45	2,69	2,97	3,48	3,68	-
	65	Heating capacity	26,9	36,0	51,2	56,0	58,8	61,5	64,5	79,1	87,3	97,1	114	121	kW
		Power input	30,3	30,8	31,6	31,9	32,0	32,2	32,3	32,7	33,0	33,2	33,7	33,8	kW
		COP	0,89	1,17	1,62	1,76	1,84	1,91	2,00	2,42	2,65	2,92	3,38	3,58	-
	60	Heating capacity	28,0	37,2	52,3	57,2	60,0	62,7	65,7	80,3	88,5	98,3	115	123	kW
		Power input	27,7	28,2	29,0	29,2	29,4	29,6	29,7	30,1	30,3	30,6	31,1	31,2	kW
		COP	1,01	1,32	1,80	1,96	2,04	2,12	2,21	2,67	2,92	3,21	3,70	3,94	-
	55	Heating capacity	29,1	38,3	53,5	58,3	61,1	63,8	66,8	81,4	89,6	99,4	117	124	kW
		Power input	25,2	25,7	26,5	26,8	26,9	27,1	27,2	27,6	27,9	28,2	28,6	28,8	kW
		COP	1,15	1,49	2,02	2,18	2,27	2,35	2,46	2,95	3,21	3,52	4,09	4,31	-
	50	Heating capacity	30,2	39,3	54,5	59,3	62,1	64,9	67,8	82,4	90,6	100	118	125	kW
		Power input	22,9	23,4	24,2	24,4	24,6	24,7	24,9	25,3	25,5	25,8	26,3	26,4	kW
		COP	1,32	1,68	2,25	2,43	2,52	2,63	2,72	3,26	3,55	3,88	4,49	4,73	-
	45	Heating capacity	31,1	40,2	55,4	60,3	63,1	65,8	68,8	83,4	91,5	101	119	126	kW
		Power input	20,6	21,2	22,0	22,2	22,4	22,5	22,7	23,1	23,3	23,6	24,1	24,2	kW
		COP	1,51	1,90	2,52	2,72	2,82	2,92	3,03	3,61	3,93	4,28	4,94	5,21	-
	40	Heating capacity	32,0	41,1	56,3	61,2	63,9	66,7	69,6	84,3	92,4	102	119	127	kW
		Power input	18,5	19,1	19,9	20,1	20,3	20,4	20,6	21,0	21,2	21,5	21,9	22,1	kW
		COP	1,73	2,15	2,83	3,04	3,15	3,27	3,38	4,01	4,36	4,74	5,43	5,75	-
	35	Heating capacity	32,8	41,9	57,1	62,0	64,8	67,5	70,5	85,1	93,3	103	120	127	kW
		Power input	16,5	17,1	17,9	18,1	18,3	18,4	18,6	19,0	19,2	19,5	20,0	20,1	kW
		COP	1,99	2,45	3,19	3,43	3,54	3,67	3,79	4,48	4,86	5,28	6,00	6,32	-
	30	Heating capacity	33,6	42,7	57,9	62,8	65,6	68,3	71,3	85,9	94,0	104	121	128	kW
		Power input	14,6	15,2	16,0	16,2	16,4	16,5	16,7	17,1	17,3	17,6	18,1	18,2	kW
		COP	2,30	2,81	3,62	3,88	4,00	4,14	4,27	5,02	5,43	5,91	6,69	7,03	-

PERFORMANCES IN HEATING MODE

Model	Water outlet temperature	Tdb Twb	Outdoor air temperature												°C
			-20	-15	-7	-4	-2	0	2	7	12	20	35	42	
			-21	-16	-8	-5	-3	-1	1	6	10	15	24	28	
95	68 (ΔT 10°C)	Heating capacity	29,6	39,9	57,0	62,5	65,6	68,7	72,1	88,6	97,7	109	128	136	kW
		Power input	34,1	34,7	35,4	35,7	35,8	36,0	36,1	36,5	36,7	36,9	37,2	37,3	kW
		COP	0,87	1,15	1,61	1,75	1,83	1,91	2,00	2,43	2,66	2,95	3,44	3,65	-
	65	Heating capacity	30,2	40,5	57,6	63,1	66,2	69,3	72,6	89,1	98,2	109	129	137	kW
		Power input	34,4	35,0	35,8	36,1	36,3	36,5	36,6	37,1	37,3	37,7	38,1	38,3	kW
		COP	0,88	1,16	1,61	1,75	1,82	1,90	1,98	2,40	2,63	2,89	3,39	3,58	-
	60	Heating capacity	31,6	41,9	59,0	64,4	67,5	70,6	74,0	90,4	99,6	111	130	138	kW
		Power input	31,4	32,0	32,9	33,2	33,3	33,5	33,7	34,1	34,4	34,7	35,2	35,3	kW
		COP	1,01	1,31	1,79	1,94	2,03	2,11	2,20	2,65	2,90	3,20	3,69	3,91	-
	55	Heating capacity	32,8	43,1	60,2	65,7	68,8	71,9	75,2	91,7	101	112	131	139	kW
		Power input	28,6	29,2	30,1	30,4	30,5	30,7	30,9	31,3	31,6	31,9	32,4	32,5	kW
		COP	1,15	1,48	2,00	2,16	2,26	2,34	2,43	2,93	3,20	3,51	4,04	4,28	-
	50	Heating capacity	34,0	44,2	61,3	66,8	69,9	73,0	76,3	92,8	102	113	132	140	kW
		Power input	25,9	26,5	27,4	27,7	27,9	28,0	28,2	28,6	28,9	29,2	29,7	29,9	kW
		COP	1,31	1,67	2,24	2,41	2,51	2,61	2,71	3,24	3,53	3,87	4,44	4,68	-
	45	Heating capacity	35,0	45,3	62,4	67,9	71,0	74,1	77,4	93,9	103	114	133	142	kW
		Power input	23,4	24,0	24,9	25,2	25,4	25,5	25,7	26,1	26,4	26,7	27,2	27,4	kW
		COP	1,50	1,89	2,51	2,69	2,80	2,91	3,01	3,60	3,90	4,27	4,89	5,18	-
	40	Heating capacity	36,0	46,3	63,4	68,9	72,0	75,1	78,4	94,9	104	115	134	143	kW
		Power input	21,0	21,6	22,5	22,8	23,0	23,1	23,3	23,7	24,0	24,3	24,8	25,0	kW
		COP	1,71	2,14	2,82	3,02	3,13	3,25	3,36	4,00	4,33	4,73	5,40	5,72	-
	35	Heating capacity	37,0	47,2	64,3	69,8	72,9	76,0	79,3	95,8	105	116	135	143	kW
		Power input	18,8	19,4	20,2	20,5	20,7	20,9	21,0	21,5	21,8	22,1	22,6	22,7	kW
		COP	1,97	2,43	3,18	3,40	3,52	3,64	3,78	4,46	4,82	5,25	5,97	6,30	-
	30	Heating capacity	37,8	48,1	65,2	70,7	73,8	76,9	80,2	96,7	106	117	136	144	kW
		Power input	16,6	17,2	18,1	18,4	18,5	18,7	18,9	19,3	19,6	19,9	20,4	20,6	kW
		COP	2,28	2,80	3,60	3,84	3,99	4,11	4,24	5,01	5,41	5,88	6,67	6,99	-

- ❖ Data declared applying corrections according to EN 14511 and considering a ΔT of 5°C between water inlet and outlet of the unit. The data are related to units without options or accessories.

PERFORMANCES IN COOLING MODE

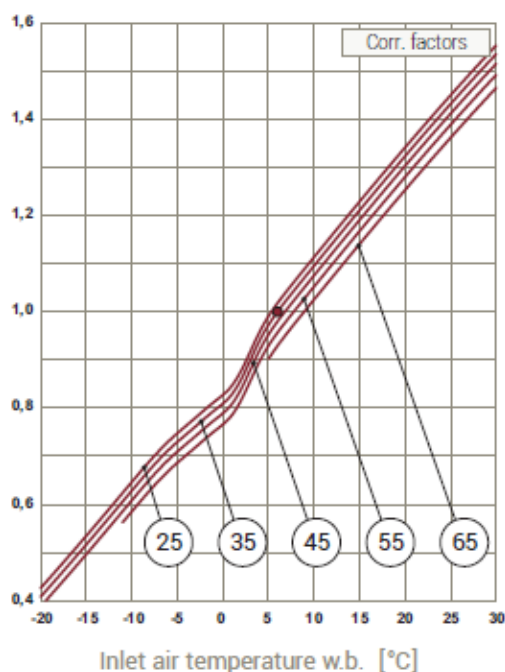
Model	Water outlet temperature	Tdb Twb	Outdoor air Temperature								°C °C
			15 -	20 -	25 -	30 -	35 -	40 -	45 -	50 -	
55	18	Cooling capacity	74,0	72,6	70,5	67,8	64,2	59,6	54,1	47,3	kW
		Power input	13,1	13,8	14,7	15,7	16,9	18,3	19,9	21,7	kW
		EER	5,65	5,26	4,80	4,32	3,80	3,26	2,72	2,18	-
	12	Cooling capacity	66,6	65,2	63,2	60,6	57,1	52,7	47,3	40,7	kW
		Power input	12,4	13,1	14,0	15,0	16,3	17,7	19,3	21,1	kW
		EER	5,37	4,98	4,51	4,04	3,50	2,98	2,45	1,93	-
	7	Cooling capacity	57,6	56,3	54,5	51,9	48,6	44,4	39,1	32,8	kW
		Power input	11,7	12,4	13,3	14,4	15,6	17,0	18,6	20,4	kW
		EER	4,92	4,54	4,10	3,60	3,12	2,61	2,10	1,61	-
65	18	Cooling capacity	84,6	82,9	80,6	77,4	73,3	68,1	61,8	54,1	kW
		Power input	14,7	15,5	16,5	17,7	19,1	20,6	22,5	24,5	kW
		EER	5,76	5,35	4,88	4,37	3,84	3,31	2,75	2,21	-
	12	Cooling capacity	76,1	74,5	72,2	69,2	65,2	60,2	54,0	46,5	kW
		Power input	14,0	14,8	15,8	17,0	18,3	19,9	21,8	23,8	kW
		EER	5,44	5,03	4,57	4,07	3,56	3,03	2,48	1,95	-
	7	Cooling capacity	65,8	64,3	62,2	59,3	55,5	50,7	44,7	37,4	kW
		Power input	13,2	14,0	15,0	16,2	17,6	19,2	21,0	23,1	kW
		EER	4,98	4,59	4,15	3,66	3,15	2,64	2,13	1,62	-
75	18	Cooling capacity	96,3	94,4	91,8	88,1	83,5	77,6	70,3	61,5	kW
		Power input	16,9	17,9	19,0	20,4	22,0	23,8	25,9	28,3	kW
		EER	5,70	5,27	4,83	4,32	3,80	3,26	2,71	2,17	-
	12	Cooling capacity	86,7	84,8	82,3	78,8	74,3	68,5	61,5	52,9	kW
		Power input	16,1	17,0	18,2	19,5	21,1	23,0	25,1	27,5	kW
		EER	5,39	4,99	4,52	4,04	3,52	2,98	2,45	1,92	-
	7	Cooling capacity	75,0	73,3	70,8	67,5	63,2	57,7	50,9	42,6	kW
		Power input	15,2	16,2	17,3	18,7	20,3	22,2	24,3	26,7	kW
		EER	4,93	4,52	4,09	3,61	3,11	2,60	2,09	1,60	-
85	18	Cooling capacity	109	107	104	100	94,7	88,1	79,8	69,9	kW
		Power input	19,2	20,2	21,5	23,1	24,9	26,9	29,3	32,0	kW
		EER	5,68	5,30	4,84	4,33	3,80	3,28	2,72	2,18	-
	12	Cooling capacity	98,4	96,3	93,4	89,4	84,3	77,8	69,8	60,1	kW
		Power input	18,2	19,3	20,6	22,1	23,9	26,0	28,4	31,0	kW
		EER	5,41	4,99	4,53	4,05	3,53	2,99	2,46	1,94	-
	7	Cooling capacity	85,1	83,2	80,4	76,7	71,7	65,5	57,8	48,3	kW
		Power input	17,3	18,3	19,6	21,1	23,0	25,0	27,4	30,1	kW
		EER	4,92	4,55	4,10	3,64	3,12	2,62	2,11	1,60	-
95	18	Cooling capacity	123	121	117	113	107	99,2	89,9	78,7	kW
		Power input	21,7	22,8	24,3	26,0	28,1	30,4	33,1	36,2	kW
		EER	5,67	5,31	4,81	4,35	3,81	3,26	2,72	2,17	-
	12	Cooling capacity	111	109	105	101	95,0	87,7	78,7	67,7	kW
		Power input	20,6	21,8	23,2	25,0	27,0	29,4	32,1	35,1	kW
		EER	5,39	5,00	4,53	4,04	3,52	2,98	2,45	1,93	-
	7	Cooling capacity	95,9	93,7	90,6	86,4	80,8	73,8	65,1	54,5	kW
		Power input	19,5	20,7	22,2	23,9	26,0	28,3	31,0	34,1	kW
		EER	4,92	4,53	4,08	3,62	3,11	2,61	2,10	1,60	-

- ❖ Data declared applying corrections according to EN 14511 and considering a ΔT of 5°C between water inlet and outlet of the unit. The data are related to units without options or accessories.

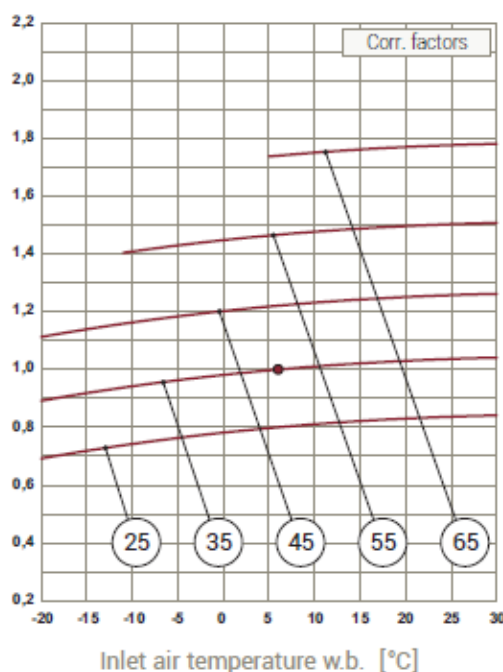
HEATING & COOLING PERFORMANCES – PARAMETRIC CURVES

HEATING PERFORMANCE

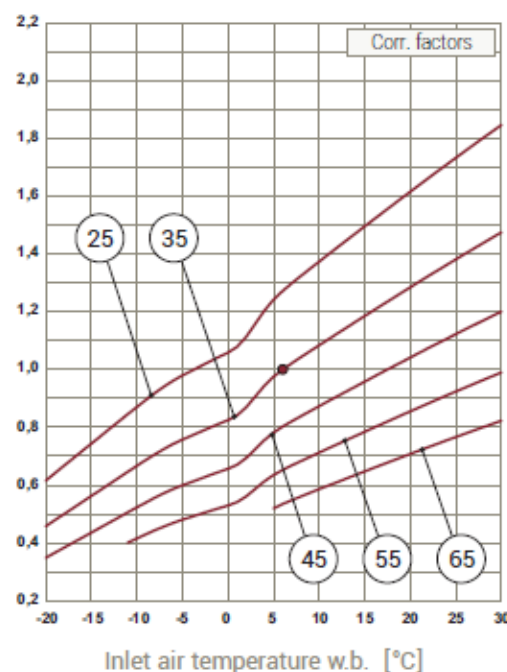
Heating capacity



Power input

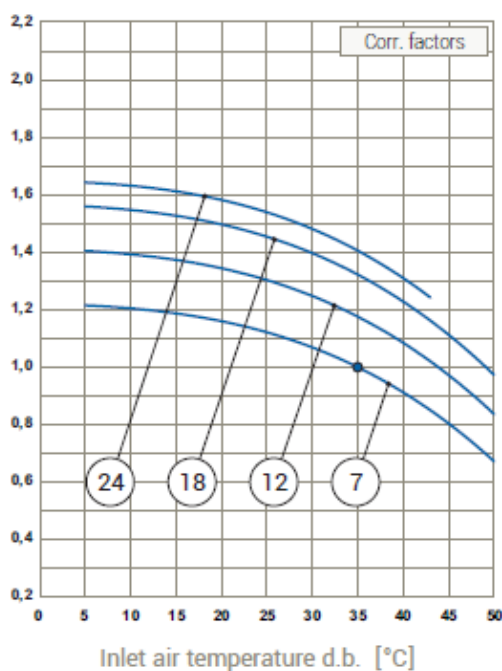


Efficiency - COP

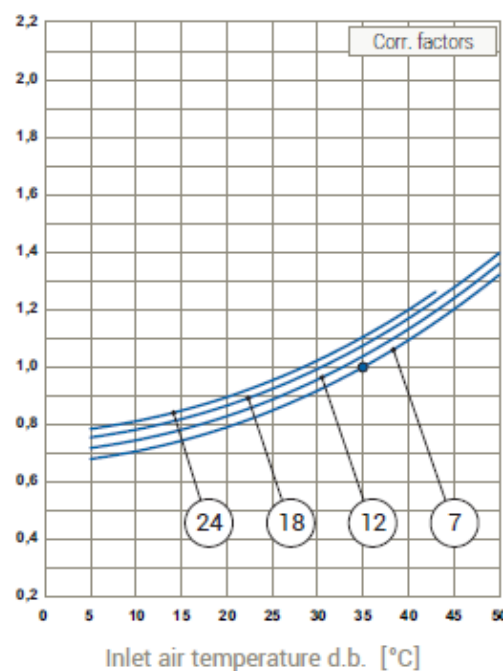


COOLING PERFORMANCE

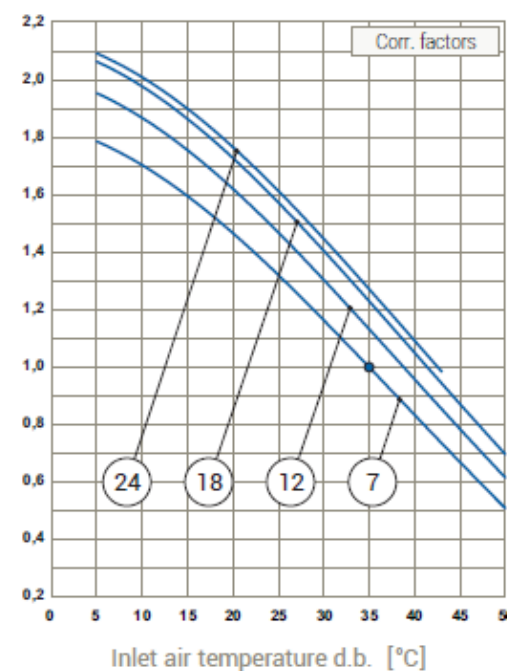
Cooling capacity



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 side with a ΔT equal to 5°C.

Nominal reference conditions:

heating:
A7W35

cooling:
A35W7

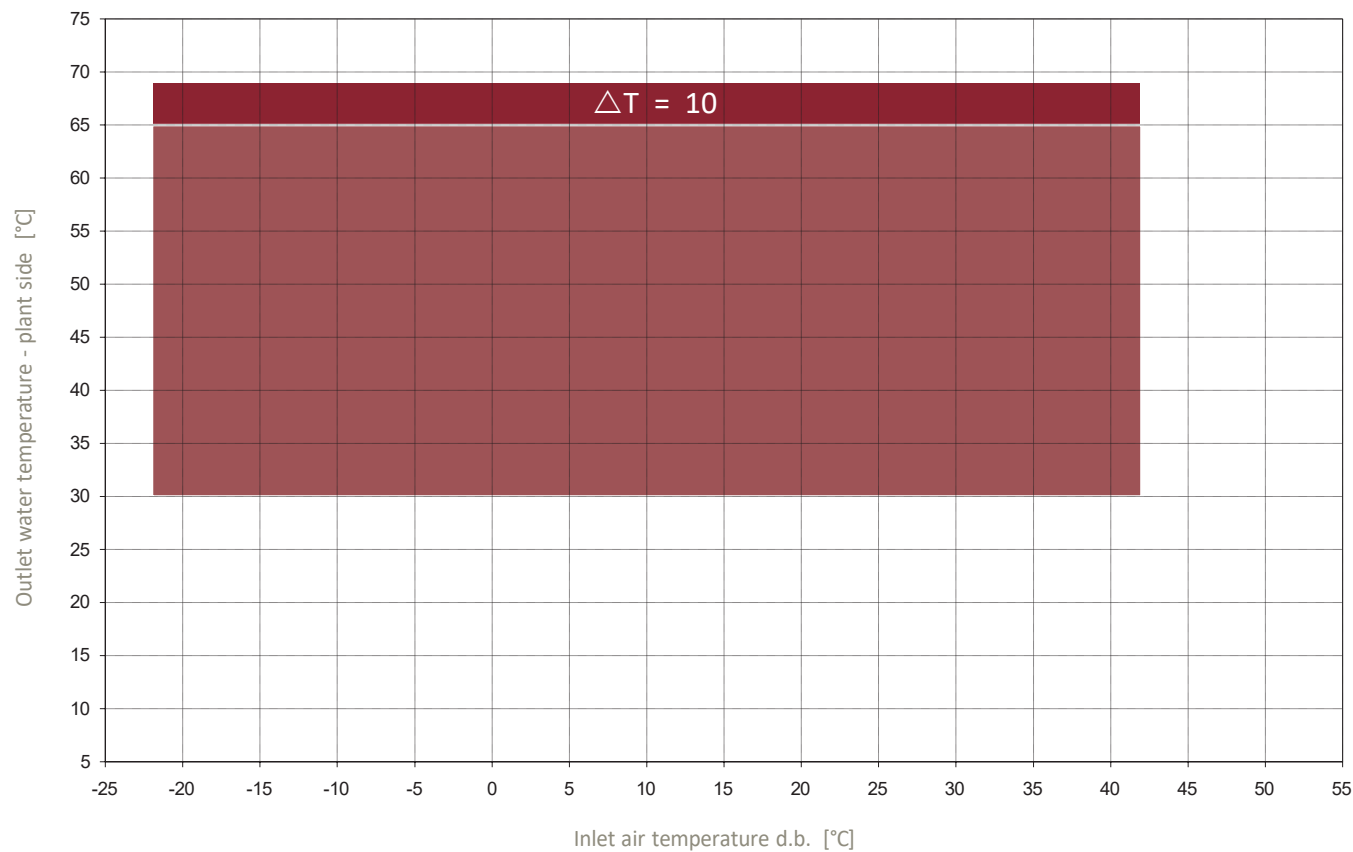
source: air in 7°C db 6°C wb
plant: water in 30°C out 35°C

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

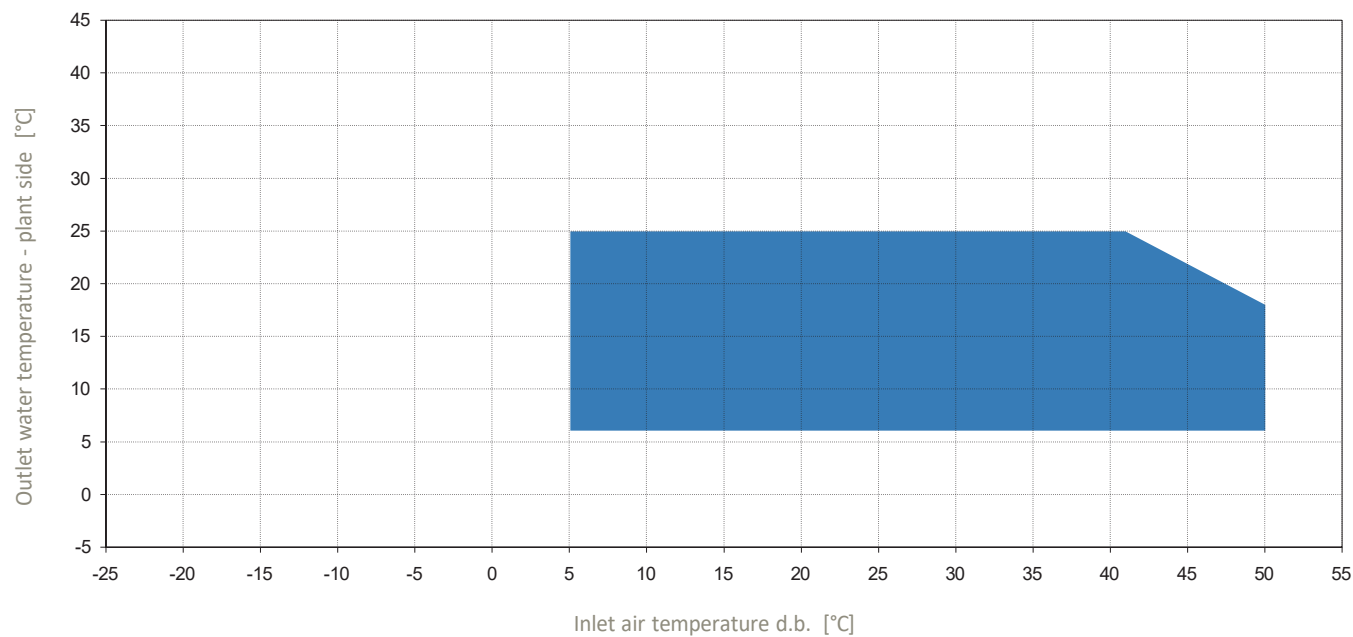
OPERATING RANGE

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.

HEATING



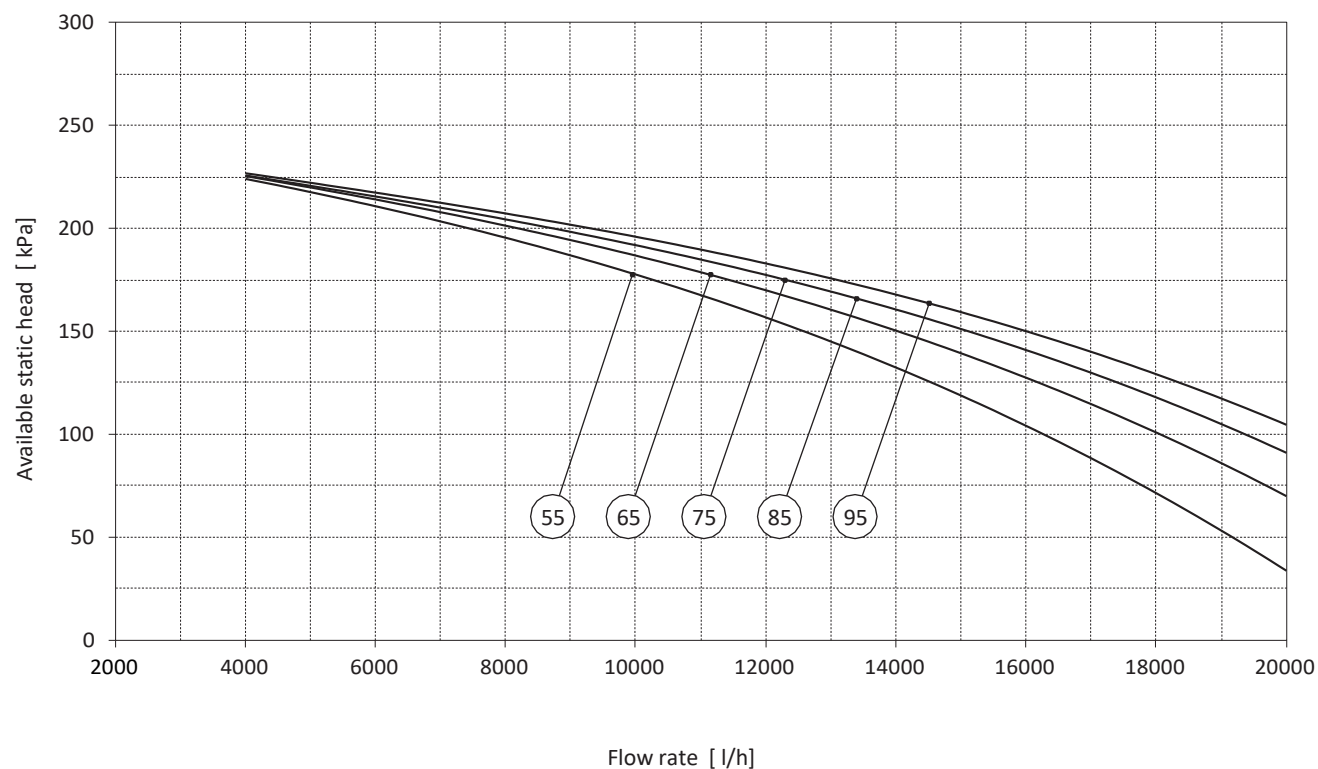
COOLING



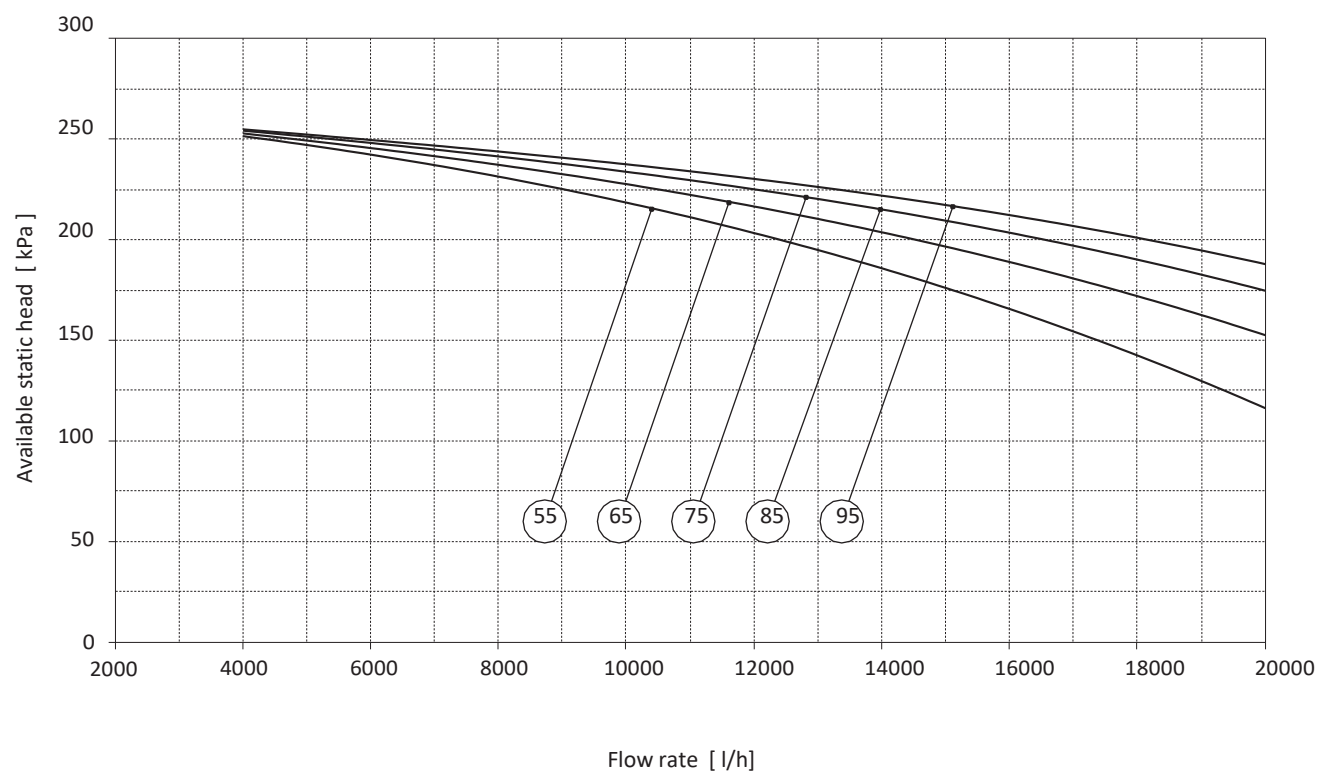
Temperature difference between water inlet and outlet		Plant side	Source side	
ΔT max	Maximum value	11	-	°C
ΔT min	Minimum value	3	-	°C

HYDRAULIC PERFORMANCES

Plant side available static head - Modulating Pump (Standard Supply)



Plant side available static head – High-Head Pump (Optional)



Recommended water filter	55	65	75	85	95	
DN	50 (2")	50 (2")	50 (2")	50 (2")	50 (2")	-
Kvs	37	37	37	37	37	m³/h

ACOUSTIC PERFORMANCE & DIMENSIONS

	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	81,4	79,3	77,6	73,9	70,4	66,2	60,5	53,0	85	76	59	50	44
	65	81,9	79,8	78,1	74,4	70,9	66,7	61,0	53,5	86	77	59	50	45
	75	82,3	80,2	78,5	74,8	71,3	67,1	61,4	53,9	86	77	60	50	45
	85	82,9	80,8	79,1	75,4	71,9	67,7	62,0	54,5	87	78	60	51	46
	95	83,8	81,7	80,0	76,3	72,8	68,6	62,9	55,4	87	78	61	52	47

Reference conditions

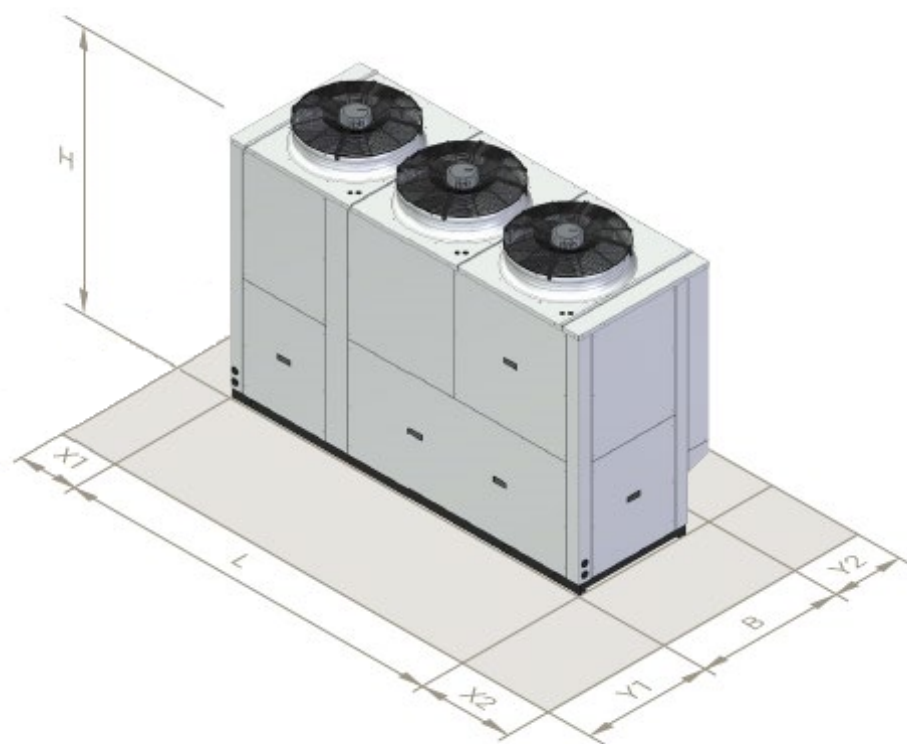
Performances related to units operating in heating mode at nominal conditions A7W35.

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.

DIMENSIONS:

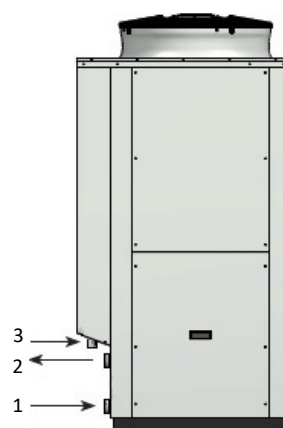


Overall dimensions						
	55	65	75	85	95	
L	1730	2480	2480	3230	3230	mm
B	930	930	930	930	930	mm
H	1830	1830	1830	1830	1830	mm
X1	200	200	200	200	200	mm
X2	500	500	500	500	500	mm
Y1	1000	1000	1000	1000	1000	mm
Y2	500	500	500	500	500	mm

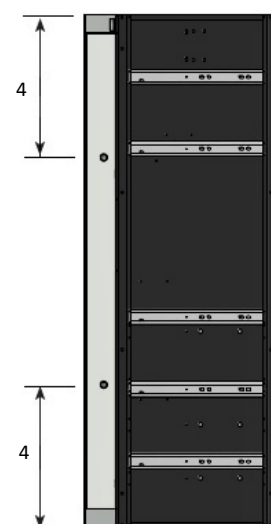
X1, X2, Y1, Y2 : maintenance operating area

Transport dimensions						
	55	65	75	85	95	
L	1800	2550	2550	3300	3300	mm
B	1000	1000	1000	1000	1000	mm
H	2000	2000	2000	2000	2000	mm

Hydraulic fittings		55	65	75	85	95
1	Plant side INLET			G 2" M		
2	Plant side OUTLET			G 2" M		
3	Condensate waste outlet			G 1" M		
4	To centre of condensate waste			690mm		



Bottom view



ELECTRICAL DATA

Unit without options			55	65	75	85	95	
	Power supply		400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	-
	FLA	Maximum total current input	43,1	49,5	54,3	60,9	69,9	A
	FLI	Maximum total power input	25,2	29,4	32,4	37,2	41,6	kW
	MIC	Maximum total start current, with soft starter (standard supply)	94	104	109	120	147	A

Modulating pump (Standard supply)			55	65	75	85	95	
	Power supply		400V - 3 - 50Hz	400V - 3 - 50Hz	400V - 3 - 50Hz	400V - 3 - 50Hz	400V - 3 - 50Hz	-
	FLA	Maximum total current input	3,80	3,80	3,80	3,80	3,80	A
	FLI	Maximum total power input	1,72	1,72	1,72	1,72	1,72	kW

High-head pump (Optional)			55	65	75	85	95	
	Power supply		400V - 3 - 50Hz	400V - 3 - 50Hz	400V - 3 - 50Hz	400V - 3 - 50Hz	400V - 3 - 50Hz	-
	FLA	Maximum total current input	6,40	6,40	6,40	6,40	6,40	A
	FLI	Maximum total power input	3,44	3,44	3,44	3,44	3,44	kW

WEIGHTS

Component's weight			55	65	75	85	95	
Options	Unit without options R - Heating and cooling		515	628	640	758	770	kg
	Anti-Vibration Kit (Standard supply)		4	4	4	4	4	kg
	Acoustic setting up	S - Low noise acoustic setting up (Standard supply)	43	55	55	67	67	kg
	flow rate management	Modulating pump (Standard supply)	34	34	34	36	36	kg
		High Head pump (Optional)	25	25	25	26	26	kg

Transport weight			55	65	75	85	95	
Options	Unit without options R - Heating and cooling		530	646	658	778	790	kg
	Anti-Vibration Kit (Standard supply)		4	4	4	4	4	kg
	Acoustic setting up	S - Low noise acoustic setting up (Standard supply)	43	55	55	67	67	kg
	Plant side flow rate management	Modulating pump (standard supply)	34	34	34	36	36	kg
		High Head pump (Optional)	25	25	25	26	26	kg

Operating weight			55	65	75	85	95	
Options	Unit without options R - Heating and cooling		525	643	657	783	797	kg
	Anti-Vibration Kit		4	4	4	4	4	kg
	Acoustic setting up	S - Low noise acoustic setting up	43	55	55	67	67	kg
	Plant side flow rate management	Modulating pump (standard supply)	36	36	36	39	39	kg
		High Head pump (Optional)	27	27	27	29	29	kg

RECEIVING AND POSITIONING

RECEIVING

Check on receiving

As soon as the unit is received verify accurately the correspondence 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 damage". Delivery ex works implies reimbursement of any damage on charge of the insurance company as established by law.

Safety instructions

Observe the safety regulations enforce 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 data plate 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 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

Remove the packaging taking care not to damage the unit.

Check for any visible damage.

Get rid of the packaging material sending them to specialise recycling centres (observe the regulations enforce).

POSITIONING

Installation site

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 kit will be supplied as standard. 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 aluminium coils that provide greater resistance to corrosion than natural aluminium coils.

To increase the protection in such environments, special surface protection treatments are required on the coil (contact pre-sales department 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 (see paragraph "Hydraulic connections").

CONNECTIONS

HYDRAULIC CONNECTION

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 the unit 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 even if a differential pressure switch is installed 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).

To calibrate the water flow rate through the heat exchanger, modify the pump speed or install a balancing valve on the output of each circuit. If the unit is equipped with a modulating pump (standard supply) the water flow rate can be calibrated modifying the speed of the pump (see paragraph "Control system").

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.

Provide manual or automatic valves 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.

Condensate drains

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 is mandatory, to avoid the accumulation of water around the unit and the possible formation of ice sheets.

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 35% 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.

Minimum water volume of the system

We recommend sizing the buffer vessel to 15 litres per KW output of the heat pump and 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 generating situations that are potentially dangerous for the unit or in any case not very comfortable for the user.

Differential pressure switch threshold	55	65	75	85	95	
Water flow rate	3000	3600	4300	4300	5000	l/h

ELECTRICAL CONNECTION

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, considering 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 overcurrent 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.

Unit without options		55	65	75	85	95	
Three phase	Power supply	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	400V - 3N - 50Hz	-
	MINIMUM recommended section	16,0	16,0	16,0	25,0	25,0	mm ²

START UP

PRELIMINARY CHECKS

The following operations must be carried out only by properly trained personnel. To make the contractual warranty effective, start-up must be carried out by authorized service centres.

Before calling the service centre it is advisable to make sure that all the installation steps have been completed (positioning, electrical connections, hydraulic connections...).

Preliminary checks before turning on

1. Verify that:
 - The unit has not suffered visible damages due to transportor positioning.
 - The unit is placed on a 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 have been carried out correctly.
 - the hydraulic circuit has been charged and vented.
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 L1 and L2: V1-2 = 390 V
- line voltage between phases L2 and L3: V2-3 = 397 V
- line voltage between phases L3 and L1: V3-1 = 395 V
- Calculate the difference between the maximum and minimum value of the measured line voltages:
 - $\blacktriangle \text{max} = \max (V1-2; V2-3; V3-1) - \min (V1-2; V2-3; V3-1) =$
 $= V2-3 - V1-2 = 397 - 390 = 7 \text{ V}$

Calculate the average line voltage value:

$$\blacktriangle \text{average} = (V1-2 + V2-3 + V3-1) / 3 = (390+397+395) / 3 = 394 \text{ V}$$

- Calculate the percentage unbalance value:

$$= \blacktriangle V_{\text{max}} / \blacktriangle \text{average} \times 100 =$$

$$= 7 / 394 \times 100 = 1,78 \% < 2 \%$$

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 (--°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).

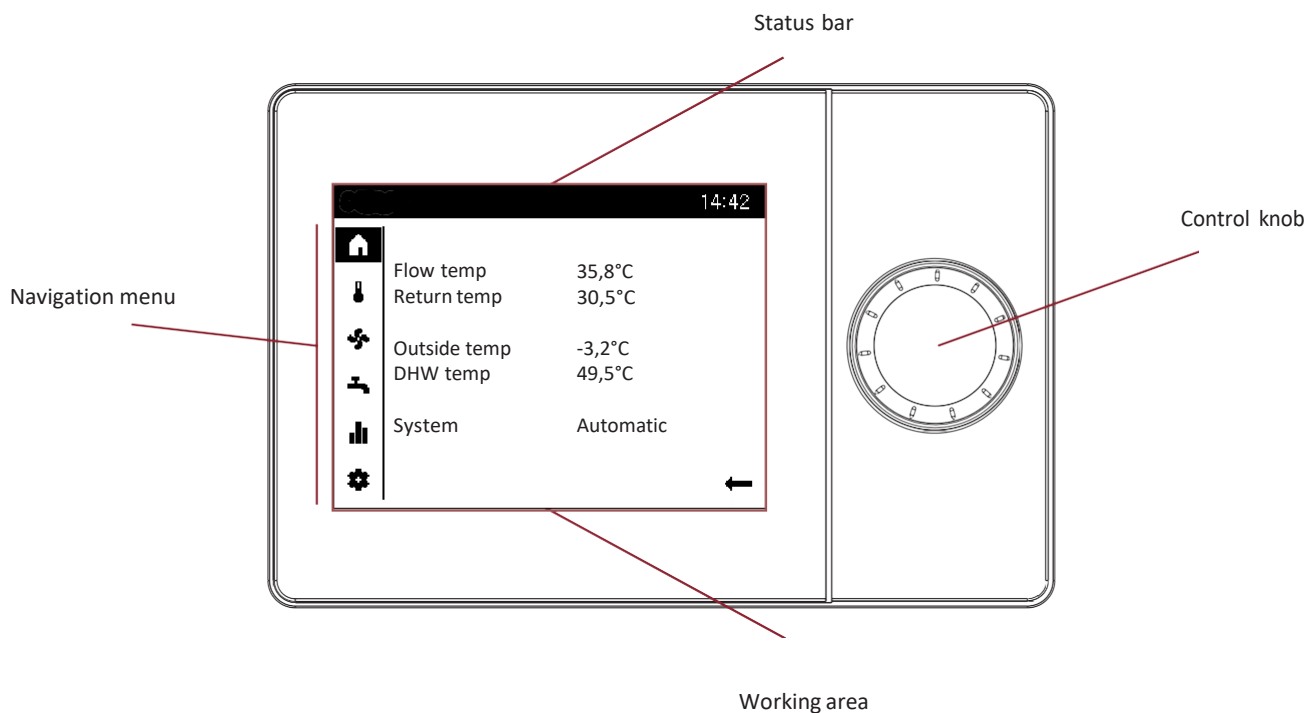


COMPRESSOR CARTER ELECTRICAL HEATER

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 start-ups with outdoor air temperature below 0°C, it is recommended to power up the unit at least 8 hours before starting the compressor.

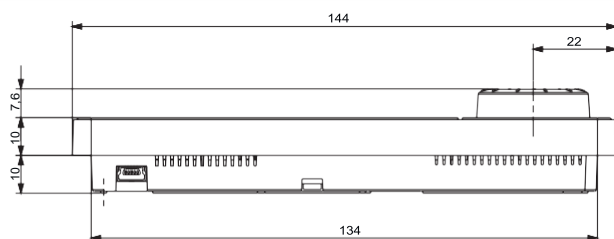
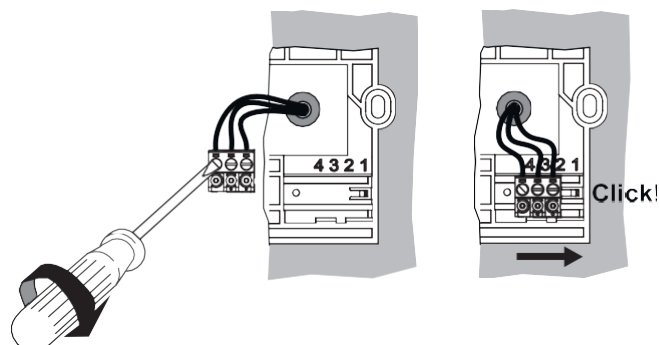
CONTROL SYSTEM



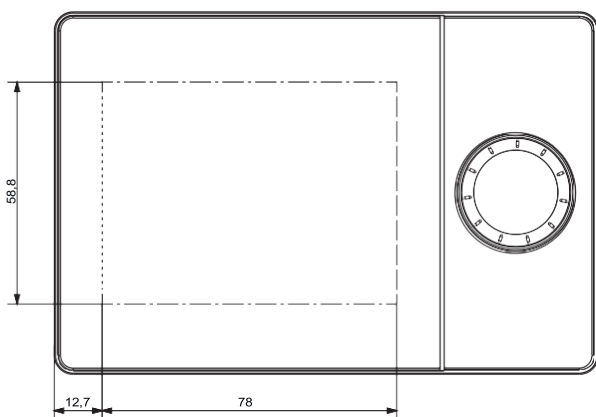
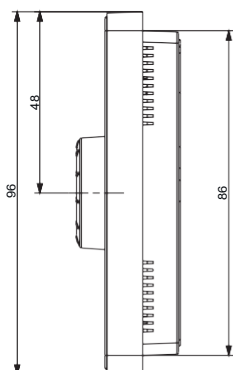
USER INTERFACE

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.

The remote user interface is suitable for wall installation.



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 meters.

The remote user interface communicates with the unit controller via the BSBcommunication bus (see paragraph “Inputs and Outputs” for details on the connection).

CONTROL SYSTEM

TEMPERATURE SENSOR

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 Multimetre).

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.

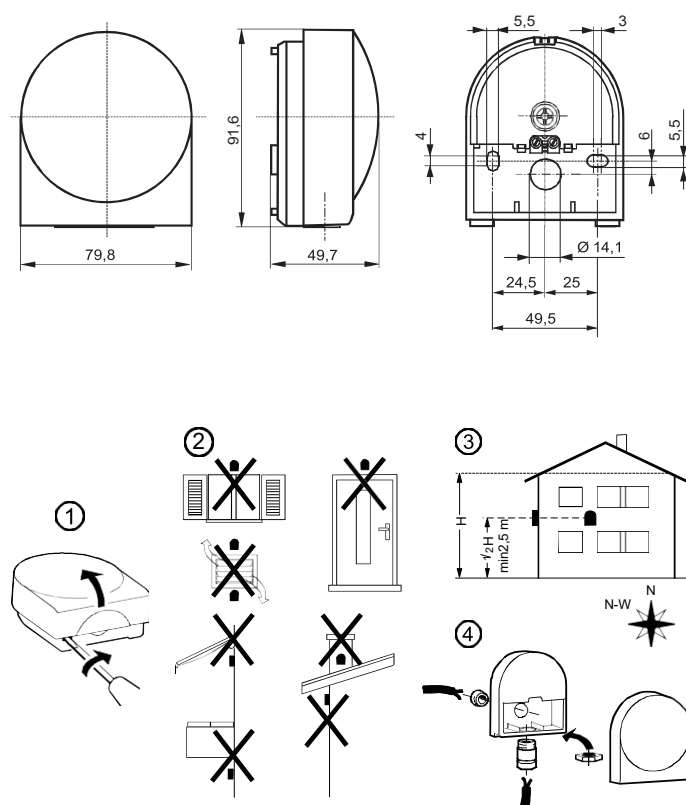
Maximum length	40	60	80	120
Minimum section	0.5	0.75	1.0	1.5

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	Messages: errors / events Heat pump status Operating plant status
	Settings	Settings: date, time, language Special operations Login to “Expert” menu

MENU “EXPERT”

Besides the “End user” menu, an “Expert” menu is available which allows access to a greater number of information and settings.



To access this menu from the “End user” 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
End user	-
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	Messages: 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 information:

-	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 analogue outputs (UX) use the parameter corresponding to the analogue 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



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.

- 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 parameter's 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 sub menus 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
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 heat generation	8395 - 8586
Diagnostics consumers	8700 - 9058

CONTROL SYSTEM

MAIN FUNCTION

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 (para. 1909).

NB. Each digital input generates an independent request. If several digital inputs are active at the same time, the requests have 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 timetables

HEATING

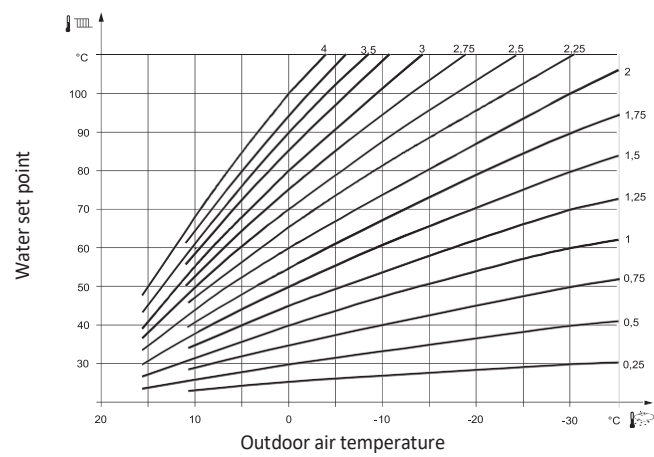
The temperature set point of the water to be sent to the heating circuit terminals is calculated as a function of the outdoor air temperature through a parameterizable climatic curve.

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

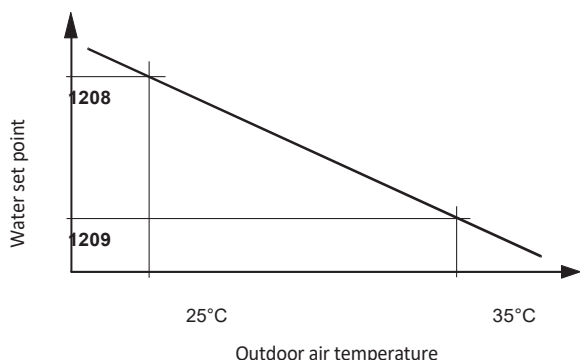
The temperature set point of the water to be sent to the cooling circuit terminals is calculated as a function of the outdoor air temperature through a parameterizable climatic curve.

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 setpoint at 25°C	16 °C
1209	Flow temp setpoint at 35°C	16 °C
1223	Flow temp setpoint min at 25°C	6 °C
1224	Flow temp setpoint 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 drainpipe 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.

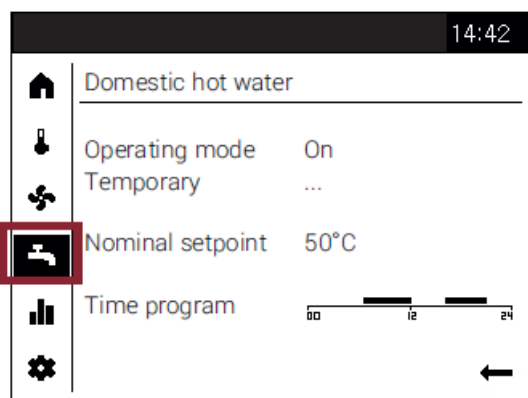
CONTROL SYSTEM



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 “End user” 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

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 periodically	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 sending water inside the storage tank that is not hot enough to heat the storage tank.

Use of the digital output Q33

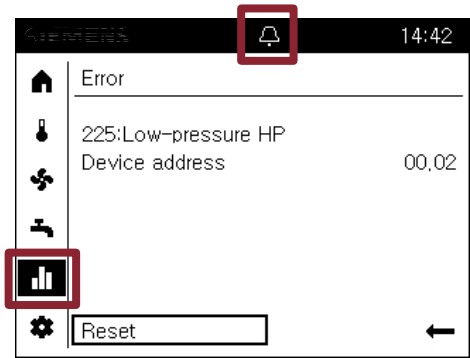
The three-way valve Q33 can be controlled via a digital output (two position valve). The controller opens the three-way valve only when the heat pump flow temperature (B21) is higher than the storage temperature (B3).

Use of the analogue output Q33 and sensor B36

The three-way valve Q33 can be controlled via an analogue 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

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) 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 information:

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

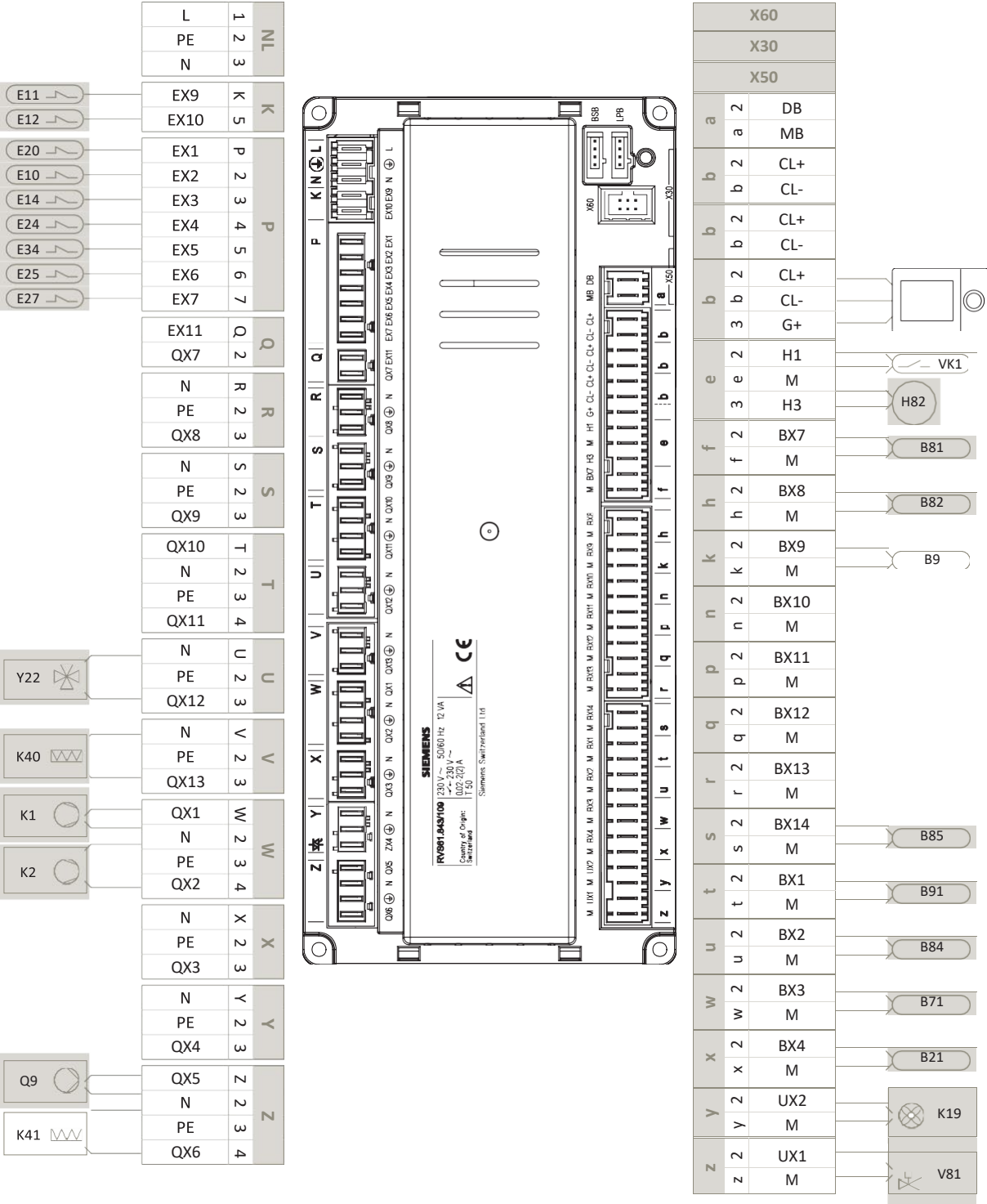
Code	Description	Reset	Input	Unit locked	Solution
10	Outdoor air temperature sensor	A	B9	No	Verify sensor connection
33	User side heat pump outlet temperature sensor	A	B21	No	Verify sensor connection
35	Source side heat pump inlet temperature sensor	A	B91	Yes	Verify sensor connection
36	Compressor 1 outlet temperature sensor	A	B81	No	Verify sensor connection
37	Compressor 2 outlet temperature sensor	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
108	High temperature compressor 2 outlet	R	-	Yes	Verify sensor B82 connection Verify refrigerant leaks
134	Phase sequence controller alarm	R	E20	Yes	Verify presence and sequence of power supply phases
138	Heat pump control sensor missing	A	-	Yes	Verify if all the sensors 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 setpoint adopted and that the unit can work on a water volume high enough to guarantee a proper unit working (see paragraph "Hydraulic connections")

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
358	Soft starter compressor 1 alarm	R	E25	Yes	Verify soft starter status Verify that the power supply voltage is inside the recommended limits (see paragraph "Electrical connections"). The alarm trips also to indicate a too low voltage power supply.
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
447	BX6 no function	A	-	No	Sensor connected but not configured Verify input configuration
452	H1 no function	A	-	No	Input connected but not configured Verify input configuration
453	H3 no function	A	-	No	
457	BX7 no function	A	-	No	Sensor connected but not configured Verify input configuration
462	BX8 no function	A	-	No	
463	BX9 no function	A	-	No	
464	BX10 no function	A	-	No	
465	BX11 no function	A	-	No	
466	BX12 no function	A	-	No	
467	BX13 no function	A	-	No	
468	BX14 no function	A	-	No	
469	HX21 no function	A	-	No	Input connected but not configured Verify input configuration
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
483	Soft starter compressor 2 alarm	R	E27	Yes	Verify soft starter status
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

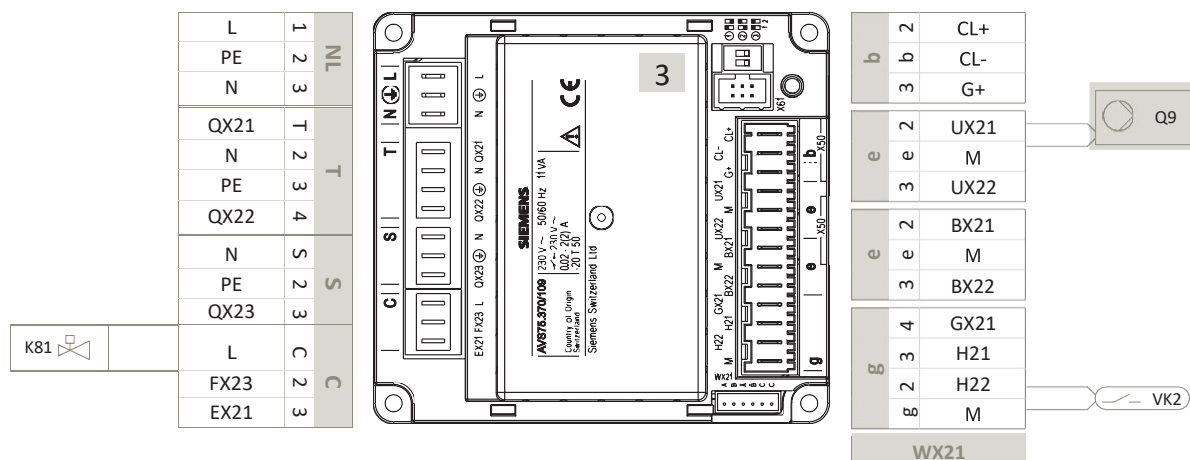
INPUTS AND OUTPUTS



Component
factory wired

Component
to be wired

CONTROL SYSTEM



Component
factory wired

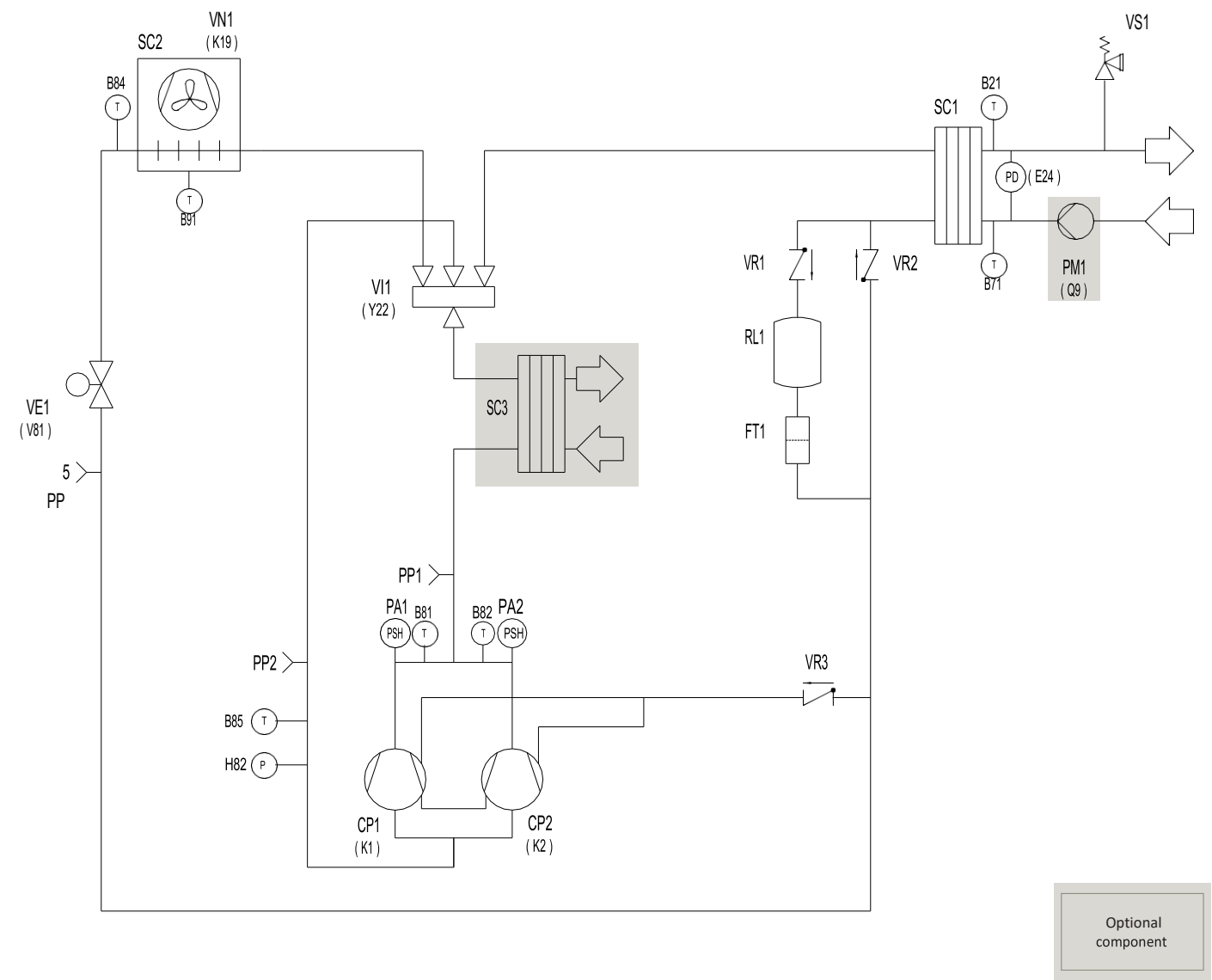
Component
to be wired

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	-
	BX7	B81	Compressor 1 outlet temperature	NTC	-
	BX8	B82	Compressor 2 outlet temperature	NTC	-
	BX9	B9	Outdoor air temperature	NTC	x
	BX10	-	-	NTC	-
	BX11	-	-	NTC	-
	BX12	-	-	NTC	-
	BX13	-	-	NTC	-
	BX14	B85	Compressor inlet temperature	NTC	-
	BX21 mod3	-	-	NTC	-
	BX22 mod3	-	-	NTC	-
Analog / digital inputs	H1	VK1	Heating request	voltage free digital input	x
	H3	H82	Compressor inlet pressure	Ratio metric sensor 0-5 V	-
	H21 mod3	-	-	voltage free digital input	-
	H22 mod3	VK2	Cooling request	voltage free digital input	x
Digital inputs	EX1	E20	Phase sequence controller alarm	230 Vac digital input	-
	EX2	E10	High pressure switch	230 Vac digital input	-
	EX3	E14	Fans thermal protection	230 Vac digital input	-
	EX4	E24	User side flow switch	230 Vac digital input	-
	EX5	E34	Electronic expansion valve driver alarm	230 Vac digital input	-
	EX6	E25	Soft starter compressor 1 alarm	230 Vac digital input	-
	EX7	E27	Soft starter compressor 2 alarm	230 Vac digital input	-
	EX9	E11	Compressor 1 alarm	230 Vac digital input	-
	EX10	E12	Compressor 2 alarm	230 Vac digital input	-
	EX11	-	-	230 Vac digital input	-
	EX21 mod 3	-	-	230 Vac digital input	-
Analog outputs	UX1	V81	Electronic expansion valve	0-10 Vdc	-
	UX2	K19	Fans	0-10 Vdc	-
	UX21 mod3	Q9	User side pump	0-10 Vdc	-
	UX22 mod3	-	-	0-10 Vdc	-
	WX21 mod3	-	-	unipolar EEV	-
Digital outputs	QX1	K1	Compressor 1	2A - 230 Vac	-
	QX2	K2	Compressor 2	2A - 230 Vac	-
	QX3	-	-	2A - 230 Vac	-
	ZX4	-	-	2A - 230 Vac	-
	QX5	Q9	User side pump	2A - 230 Vac	-
	QX6	K41	Condensate tray electrical heater	2A - 230 Vac	x
	QX7	-	-	2A - 230 Vac	-
	QX8	-	-	2A - 230 Vac	-
	QX9	-	-	2A - 230 Vac	-
	QX10	-	-	2A - 230 Vac	-
	QX11	-	-	2A - 230 Vac	-
	QX12	Y22	Cycle reversing valve	2A - 230 Vac	-
	QX13	K40	Compressor carter electrical heater	2A - 230 Vac	-
	QX21 mod3	-	-	2A - 230 Vac	-
	QX22 mod3	-	-	2A - 230 Vac	-
	QX23 mod3	K81	Electronic expansion valve driver enables	voltage free digital output	-

OPEARTING DIAGRAM



CP	Compressor
SC1	User side heat exchanger
SC2	Source side 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 stat
PD	Differential pressure stat
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.

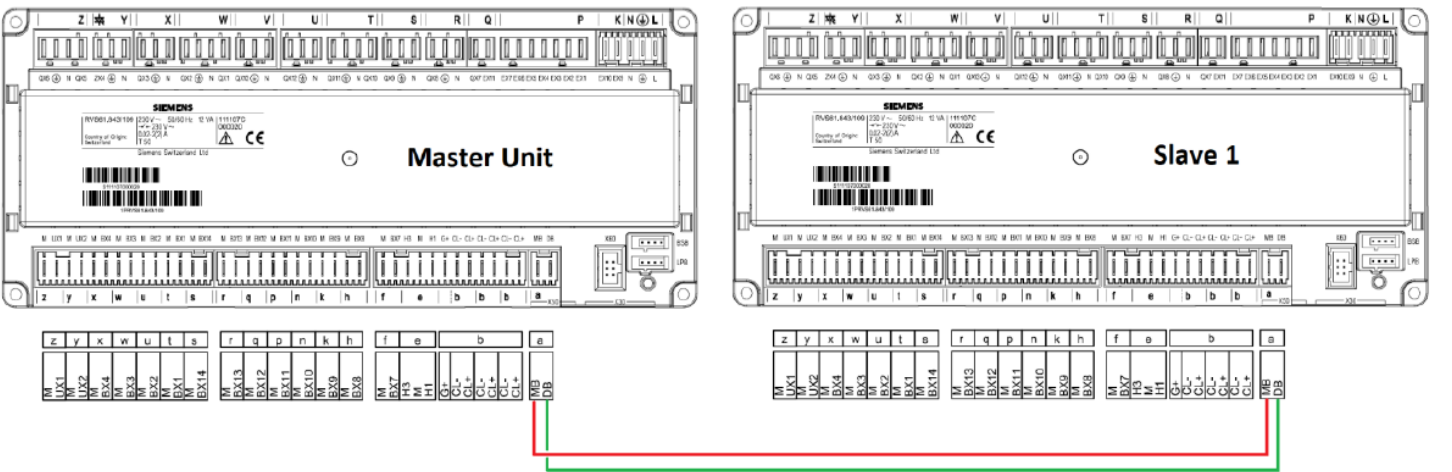
The defrost cycles of the heat pumps are moreover managed in order to avoid more units to defrost at the same time.

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.

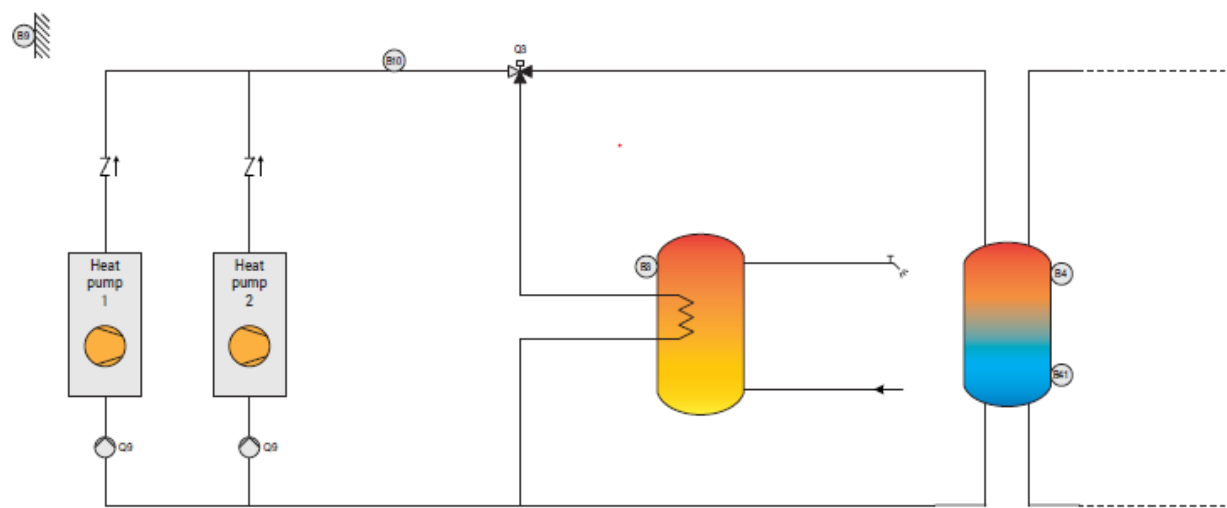
CASCADE WIRING

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

CASCADING S-ASX.21 60-100 HEAT PUMPS TOGETHER



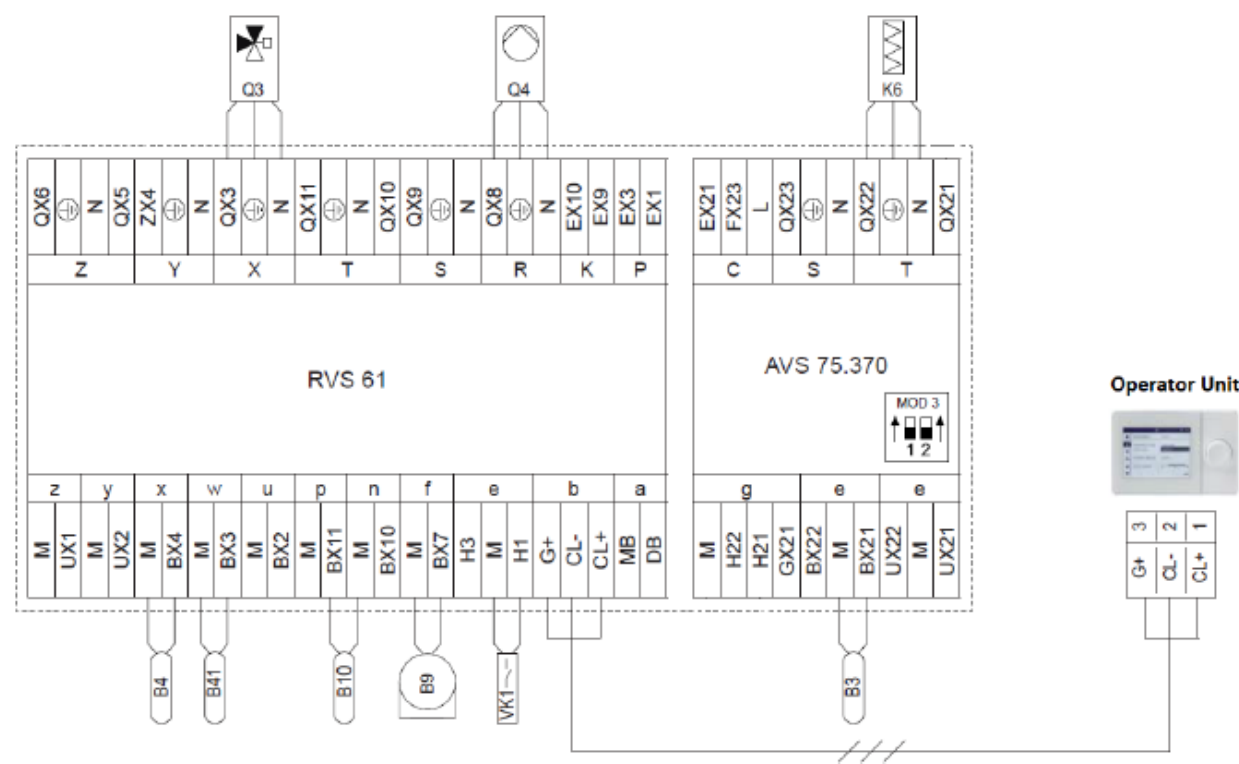
The following setup example is for a 2 x S-ASX.21 60-100 cascade setup:



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
B41	Thermal Store / Buffer Vessel Return Temperature Sensor

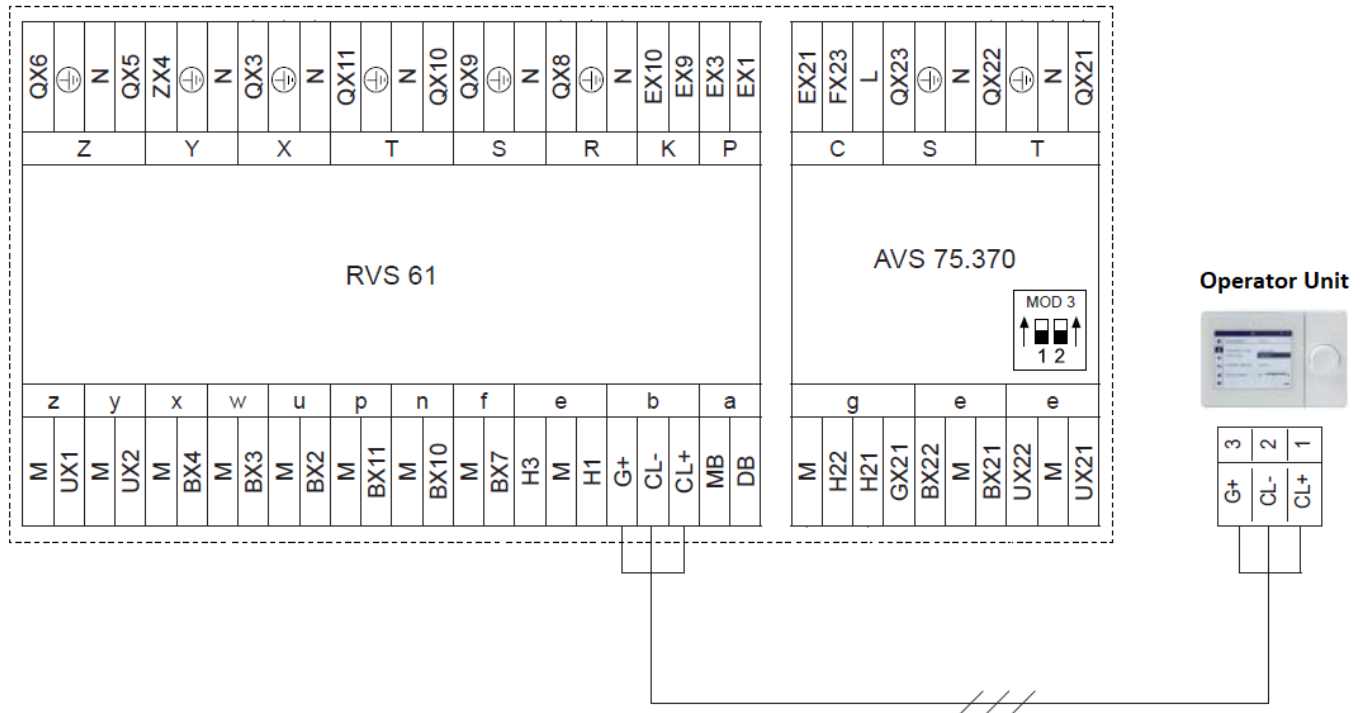
MASTER UNIT WIRING

The below wiring shows the wiring of the demand signal, temperature sensors, DHW three-way valve and Immersion heater.



SLAVE UNIT WIRING

Apart from the communication wire between terminals MB & DB as shown earlier, the only optional external wiring is to install a second operator unit.



Any operator unit installed within a slave heat pump is for information only. Such as showing current flow temperatures, return temperatures and any fault codes with this slave heat pump.

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 centre if maintenance is required.

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 leaks 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 centre 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 aluminium 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.

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 cannot 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 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 ...	Any operation on the parts under pressure must be performed by qualified technical personnel. 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. 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.	
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 410 A
Relevant identified uses Industrial and professional use.
Use as refrigerant.

2 HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]
Physical hazards Gases under pressure: Liquefied gas H280

2.2 Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]
Hazard pictograms (CLP): GHS04
Signal word (CLP): Warning
Hazard statements (CLP): H280 Contains gas under pressure; may explode if heated
Precautionary statements (CLP): Storage: P403 – Store in a well-ventilated place

3 COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Difluoromethane (R32)	50 % in weight H220 - Flam. gas 1 H280 - Press. gas (liq.)	CAS 354-33-6
Pentafluoro ethane	50 % in weight H280 - Press. gas (liq.)	CAS 75-10-5

4 FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation: Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.

Skin contact: For liquid spillage - flush with water for at least 15 minutes.

Eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: Refer to section 11.

4.3 Indication of any immediate medical attention and special treatment needed: Obtain medical assistance.

5 FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Water spray or fog
Unsuitable extinguishing media: Do not use water jet to extinguish

5.2 Special hazards arising from the substance or mixture

Specific hazards: Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Carbonyl fluoride, Hydrogen fluoride, Carbon monoxide.

5.3 Advice for firefighters

Specific methods: Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. Move containers away from the fire area if this can be done without risk.

Special protective equipment for fire fighters: Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment, and emergency procedures

Try to stop release. Evacuate area. Monitor concentration of released product. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous. Act in accordance with local emergency plan. Stay upwind.

6.2 Environmental precautions: Try to stop release.

6.3 Methods and material for containment and cleaning up: Ventilate area.

6.4 Reference to other sections: See also sections 8 and 13.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

Safe use of the product: Do not breathe gas. Avoid release of product into atmosphere. The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularly) checked for leaks before use. Do not smoke while handling product. Avoid exposure, obtain special instructions before use. Protect eyes, face, and skin from liquid splashes. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Installation of a cross purge assembly between the cylinder and the regulator is recommended. Purge system with dry inert gas (e.g., helium or nitrogen) before gas is introduced and when system is placed out of service.

Safe handling of the gas receptacle: Refer to supplier's container handling instructions. Do not allow back feed into the container. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Never at-

tempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. Containers should be stored in the vertical position and properly secured to prevent them from falling over.

7.2 Conditions for safe storage, including any incompatibilities

Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

7.3 Specific end use(s): None

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

OEL (Occupational Exposure Limits): No data available
Difluoromethane (R32) (75-10-5)
DNEL: Derived no effect level (Workers)
Long-term - systemic effects, inhalation: 7035 mg/m³
PNEC: Predicted no effect concentration
Aqua (freshwater): 0,142 mg/l
Aquatic, intermittent releases: 1,42 mg/l
Sediment, freshwater: 0,534 mg/kg dw

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Product to be handled in a closed system and under strictly controlled conditions. Provide adequate general and local exhaust ventilation. Preferably use permanent leak-tight installations (e.g., welded pipes). Systems under pressure should be regularly checked for leakages. Ensure exposure is below occupational exposure limits (where available). Gas detectors should be used when toxic gases may be released. Consider the use of a work permit system e.g., for maintenance activities.

8.2.2 Individual protection measures, e.g., personal protective equipment

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered: PPE compliant to the recommended EN/ISO standards should be selected.

Eye/face protection: Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166 - Personal eye-protection – specifications.

Skin protection

Hand protection: Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risk.

Other: Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

Respiratory protection. Gas filters may be used if all surrounding conditions e.g., type and concentration of the contaminant(s) and duration of use are known. Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g., connecting or disconnecting containers. Consult respiratory device supplier's product information for the selection of the appropriate device. Gas filters do not protect against oxygen deficiency. Standard EN 14387 - Gas filter(s), combined filter(s) and full-face mask - EN 136. Keep self-contained breathing apparatus readily available for emergency use. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Self-contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.

Thermal hazards: Wear cold insulating gloves when transfilling or breaking transfer connections. Standard EN 511 - Cold insulating gloves.

8.2.3 Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	
Physical state at 20°C / 101.3kPa:	Gas
Colour:	Colourless
Odour:	There may be no odour warning properties, odour is subjective and inadequate to warn of overexposure. Mixture contains one or more component(s) which have the following odour(s): Ethereal.
Odour threshold:	Odour threshold is subjective and inadequate to warn of overexposure.
pH value:	Not applicable.
Molar mass:	Not applicable for gas mixtures.
Melting point:	Not applicable for gas mixtures.
Boiling point:	Not applicable for gas mixtures.
Flash point:	Not applicable for gas mixtures.

REFRIGERANT SAFETY CARD

Evaporation rate (ether=1):	Not applicable for gas mixtures.	Class:	2
Flammability range:	Non-flammable.	Classification code:	2A
Vapour pressure [20°C]:	No reliable data available.	Hazard identification number:	20
Vapour pressure [50°C]:	No reliable data available.	Tunnel Restriction:	C/E - Tank carriage: Passage forbidden through tunnels of category C, D and E. Other carriage: Passage forbidden through tunnels of category E
Relative density, gas (air=1):	Heavier than air.	Transport by air (ICAO-TI / IATA-DGR)	
Solubility in water:	No data available.	Class / Div. (Sub. risk(s)):	2.2
Partition coefficient n-octanol/water [log Kow]:	Not applicable for gas mixtures.	Transport by sea (IMDG)	
Auto-ignition temperature:	Non inflammable.	Class / Div. (Sub. risk(s)):	2.2
Viscosity [20°C]:	Not applicable.	Emergency Schedule (EmS) – Fire:	F-C
Explosive Properties:	Not applicable.	Emergency Schedule (EmS) – Spillage:	S-V
Oxidising Properties:	Not applicable.		
9.2 Other information	Other data: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.	14.4 Packing group	
10 STABILITY AND REACTIVITY		Transport by road/rail (ADR/RID):	Not applicable
10.1 Reactivity: No reactivity hazard other than the effects described in sub-sections below.		Transport by air (ICAO-TI / IATA-DGR):	Not applicable
10.2 Chemical stability: Stable under normal conditions.		Transport by sea (IMDG):	Not applicable
10.3 Possibility of hazardous reactions: None.		14.5 Environmental hazards	
10.4 Conditions to avoid: Keep away from heat/sparks/open flames/hot surfaces. – No smoking.		Transport by road/rail (ADR/RID):	None.
10.5 Incompatible materials: None.		Transport by air (ICAO-TI / IATA-DGR):	None.
10.6 Hazardous decomposition products: under normal conditions of storage and use, hazardous decomposition products should not be produced.		Transport by sea (IMDG):	None.
11 TOXICOLOGICAL INFORMATION		14.6 Special precautions for user	
11.1 Information on toxicological effects		Packing Instruction(s)	
Acute toxicity: Toxic by inhalation.		Transport by road/rail (ADR/RID)	P200
Difluoromethane (R32) (75-10-5)		Transport by air (ICAO-TI / IATA-DGR)	
LC50 inhalation rat (ppm)	No data available.	Passenger and Cargo Aircraft:	200
Pentafluoro ethane (354-33-6)		Cargo Aircraft only:	200
LC50 inhalation rat (ppm)	805 ppm/4h	Transport by sea (IMDG):	P200
Skin corrosion/irritation: No known effects from this product.		Special transport precautions: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.	
Serious eye damage/irritation: No known effects from this product.		Before transporting product containers:	
Respiratory or skin sensitisation: No known effects from this product.		- Ensure there is adequate ventilation.	
Germ cell mutagenicity: No known effects from this product.		- Ensure that containers are firmly secured.	
Carcinogenicity: No known effects from this product.		- Ensure cylinder valve is closed and not leaking.	
Toxic for reproduction: Fertility: No known effects from this product.		- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.	
Toxic for reproduction: unborn child: No known effects from this product.		- Ensure valve protection device (where provided) is correctly fitted.	
STOT-single exposure: No known effects from this product.		14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable.	
STOT-repeated exposure: No known effects from this product.		15 REGULATORY INFORMATION	
Aspiration hazard: Not applicable for gases and gas mixtures.		15.1 Safety, health, and environmental regulations/legislation specific for the substance or mixture	
12 ECOLOGICAL INFORMATION		EU-Regulations	Seveso Directive: 2012/18/EU (Seveso III): Covered.
12.1 Toxicity		National regulations	
Assessment:	Classification criteria are not met.	National legislation: Ensure all national/local regulations are observed.	
EC50 48h - Daphnia magna [mg/l]	No data available.	Water hazard class (WGK) (WGK):	-
EC50 72h - Algae [mg/l]	No data available.	15.2 Chemical safety assessment: A CSA does not need to be carried out for this product.	
LC50 96h - Fish [mg/l]	No data available.	16 OTHER INFORMATION	
Difluoromethane (R32) (75-10-5)		Indication of changes: Revised safety data sheet in accordance with commission regulation (EU) No 2015/830.	
EC50 48h - Daphnia magna [mg/l]	142 mg/l	Training advice: Users of breathing apparatus must be trained. Ensure operators understand the toxicity hazard. Receptacle under pressure.	
EC50 72h - Algae [mg/l]	652 mg/l	Further information: This Safety Data Sheet has been established in accordance with the applicable European Union legislation. Classification in accordance with the calculation methods of Regulation (EC) 1272/2008 CLP.	
LC50 96h - Fish [mg/l]	1507 mg/l	Full text of H- and EUH-statements	
Pentafluoro ethane (354-33-6)		Acute toxicity (inhalation: gas) Not classified	
EC50 48h - Daphnia magna [mg/l]	> 100 mg/l	Flam. Gas 1 Flammable gases, Category 1	
EC50 72h - Algae [mg/l]	142 mg/l	Press. Gas (Liq.) Gases under pressure: Liquefied gas	
LC50 96h - Fish [mg/l]	109 mg/l	H220 Extremely flammable gas	
12.2 Persistence and degradability Assessment:	No data available.	H280 Contains gas under pressure; may explode if heated	
12.3 Bio accumulative potential Assessment:	No data available.		
12.4 Mobility in soil Assessment:	No data available.		
12.5 Results of PBT and vPvB assessment			
Assessment:	Not classified as PBT or vPvB.		
12.6 Other adverse effects			
Effect on the ozone layer:	None.		
Effect on global warming:	Contains fluorinated greenhouse gases. Calculated GWP of mixture: 2646.03 For quantities refer to cylinder label.		
13 DISPOSAL CONSIDERATIONS			
13.1 Waste treatment methods: Contact supplier if guidance is required. Must not be discharged to atmosphere. Ensure that the emission levels from local regulations or operating permits are not exceeded. Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org for more guidance on suitable disposal methods.			
List of hazardous waste codes: 16 05 04*: Gases in pressure containers (including halons) containing dangerous substances.			
13.2 Additional information	None.		
14 TRANSPORT INFORMATION			
14.1 UN number	1078		
14.2 UN proper shipping name			
Transport by road/rail (ADR/RID):			
REFRIGERANT GAS, N.O.S. (Difluoromethane (R32), Pentafluoro ethane)Transport by air (ICAO-TI / IATA-DGR):			
REFRIGERANT GAS, N.O.S. (Difluoromethane (R32), Pentafluoro ethane)Transport by sea (IMDG):			
REFRIGERANT GAS, N.O.S. (Difluoromethane (R32), Pentafluoro ethane)			
14.3 Transport hazard class(es)			
Labelling:	2.2: Non-flammable, non-toxic gases		
Transport by road/rail (ADR/RID)			

DISCLAIMER OF LIABILITY. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Strebel Ltd

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

T	01276 685422
F	01276 685405
E	info@strebel.co.uk
I	www.strebel.co.uk



STREBEL LTD RESERVE THE RIGHT TO CHANGE ANY SPECIFICATIONS OF THIS HEAT PUMP RANGE WITHOUT NOTICE

Further information on our complete product range is available from our website.

CAST IRON – CONDENSING – STEEL SHELL – WATER HEATERS – RENEWABLES

FLUES – ACCESSORIES.