SERVICE AND INSTALLATION MANUAL

STHERM by sinclair +

SPLIT
AIR TO WATER HEAT PUMPS

SHP-140IRC+SHP-140ERC
SHP-180IRC+SHP-180ERC

sinclair
HEAT PUMPS

Contents

General information

Welcome in the world of air source heat pump. Your decision to purchase heat pump will reward you for many years. This is your assurance that you have purchased quality heat pump system, which is manufactured based on the latest level of knowledge and innovation.

We are pleased to introduce new powerful high temperature heat pump S-THERM+ series, which has been tested based on EHPA and EN 14511 standards and reached excellent results in energy-efficiency; these results are indicated in submitted protocols.

Control units of existing air-water heat pumps adjust refrigerant quantity through thermostatic or electric expansion valve to set temperature based on temperature and pressure of refrigerant without taking into consideration status of additional nodes of heat pump system.

Control unit of SINCLAIR S-THERM+ heat pump optimizes the control process of heat pump comprehensively, which means that control unit uses several additional data sources, gathered in important nodes of the whole system. Control process is thus expanded with the data of outdoor temperature, compressor temperature, refrigerant temperature and pressure, position of control valves, heating water temperature and flow, air flow through evaporator etc.

This comprehensive way of heat pump controlling can react more quickly and precisely to the changes of physical quantities, which have influence on the efficiency of the whole system. Next advantage brings the fact, that monitoring these important physical quantities gives the control unit the possibility to foresee expected changes and react in advance. As a result of this, control process becomes smoother without fluctuations and overshooting, which is typical for existing less sophisticated or versatile control units. Operation of SINCLAIR S-THERM+ heat pump system is thus much more stable.

High temperature heat pump SINCLAIR S-THERM+ and its control unit was designed as a complex system providing efficient management of thermal energy to guarantee balanced and efficient operation of a house, inclusive integration of solar cells as a additional source of thermal energy and a possibility for swimming pool heating. But the system is of course for its operation dependent on continuous supply of necessary amount of electric energy from distribution network. For the case of power supply failure, there is the possibility to add a special optional battery operated GSM module, which can in the case of power failure send SMS message to given telephone numbers informing about this event; in case of fatal failure of the system, message defining current status can be sent to the user, giving him a chance to take necessary steps for system operation recovery or to take necessary measures.

Standard equipment includes also LAN module, which gives the possibility of remote control and monitoring via internet network.

Read before use

The following instructions will guide you through the whole documentation. Besides this operation manual there are also other manuals to be respected.
Manufacturer takes no responsibility for any damage, caused by not following operation instructions.

During heat pump installation follow strictly instructions, given in all manuals for sub-systems and components of heating system. These manuals are attached to all parts of heating system and supplementary components. Follow also instructions in all operation manuals, supplied with components of heating system.

Please hand over the service manual and all related documentation or necessary tools to the provider of the equipment. He will keep these stored in a safe place, so that manuals and tools are at hand in case of need.

Used symbols

Icon	Meaning
	Prohibition. Subject of prohibition is indicated next to the icon.
	Mandatory action. Indicated action must be done.
	**CAUTION** (incl. **WARNING**) Follow given instructions.

CE marking

CE marking confirms that heat pump complies with basic requirements of the following European Council regulations:

- Directive 2004/108/EG of the European Council related to „Electromagnetic compatibility“ with limitation class B
- Directive 2006/95/EG of the European Council related to „Electrical equipment designed for use within certain voltage limits“ (Directive for low voltage)

Heat pumps comply with the following standards:

EN 60335-1 ed.2; EN 60335-2-40 ed.2:2004; EN 62233:2008; EN 55014-1 ed.3:2007; EN 55014-2:1998; EN 61000-3-2 ed.3:2006; EN 61000-3-3 ed.2:2009; EN 61000-6-3 ed.2:2007; EN ISO 13857:2008; EN 378-2+A1:2009; EN 378-4:2008; EN ISO 13732-1:2009; EN 953+A1:2009; EN 14511-2:2012; EN 14511-3:2012; EN 14511-4:2012; EN ISO 12100:2011; ČSN 06 0310:2006; ČSN 06 0320:2006; ČSN 06 0830:2006; ČSN 06 1008:1997; ČSN ISO 9614-2:1997; ČSN EN 60335-1 ed.2:2003; ČSN EN 60335-2-40 ed.2:2004; ČSN EN 62233:2008

Declaration of Conformity CE is in attachment.

Mark of Quality

This product has CE mark of European Union.

This product was tested by state accredited laboratory.

Safety precautions and instructions

During the installation of S-THERM+ heat pump respect the following safety precautions and regulations:

- Read carefully this service manual.
- Execute only activities, described in this service manual.

Qualified persons

Product positioning, its installation and commissioning can be done only by trained person, working in compliance with all actual standards and regulations and in accordance with all instructions in operation and service manual.

 Signal word!	Kind and source of danger!

Explanation to the kind and source of danger.

- Measures to avert the danger.

1) Prevention of explosion and fire

Some parts of heat pump (indoor unit) can become very hot.

- Do not touch any pipes of heating system which have no thermal insulation.

2) Prevention of frostbites

Supplied heat pump (indoor unit) is charged with refrigerant R407c. This refrigerant contains no chlorine and thus represents no damage for ozone layer of the Earth. Refrigerant R407c is not inflammable and forms no risk of explosion. But leaking refrigerant can cause frostbites on affected areas.

- In case of refrigerant leak do not touch any part of heat pump.
- Do not inhale fumes or gases, which come out from leaks.
- Prevent contact refrigerant with skin or intrusion into your eyes.
- When there is a refrigerant contact with a skin or intrusion into eyes, search for medical assistance.

3) Prevention of injuries

The air coming out from the outdoor unit is colder than outdoor temperature. By temperatures below 5 °C can come to ice forming in this area. This ice represents a danger of slipping.

- Do not forget possible ice forming under the outdoor unit.
- Take necessary measures to prevent possible danger to persons near the outdoor unit.

4) Prevent electric shock

- Before starting work on electrical installations and maintenance, disconnect all poles of power supply.
- Ensure there is no voltage present.
- Take necessary measures to prevent unintentional power supply switch on.

5) Prevent possible damages

Improper protection against frost and corrosion can damage sealings and other parts of the heating system and thus cause water leak.

- Add recommended corrosion protection substance into the water of heating system.

6) Prevent environment damage

Heat pump (indoor unit) contains refrigerant R407c. This refrigerant must never escape into the atmosphere. Refrigerant R407C is a fluorinated greenhouse gas with GWP 1653 (GWP = Global Warming Potential) covered by the Kyoto Protocol. If this refrigerant escapes into the atmosphere, its effect is 1653 times stronger than the natural greenhouse gas CO_2.

Before disposal of the heat pump, refrigerant must be completely drained out through maintenance valves into a suitable container. During maintenance work charge new refrigerant only through maintenance valves. If system is charged with an alternative approved refrigerant different from R407 C, which is recommended by the manufacturer, this will void the warranty, and safe operation of the unit cannot be granted.

- Before disposal of the heat pump, refrigerant in the system must be completely sucked up into a suitable container in order to have later the possibility to recycle or to dispose the refrigerant according to the valid rules and regulations.
- Please ensure all maintenance work connected with access to the refrigerant circuit is made only by officially certified qualified persons and using corresponding protection tools and equipment.

Please let the refrigerant in the heat pump system to be recycled or disposed by a qualified person in accordance with valid rules and regulations.

Installation	Meaning
 Must be done by a professional.	Heat pump installation must be done by a qualified person, so that there no danger of water leak, danger of electric shock or fire as a result of unprofessionally done work.
 Good earthing necessary.	Ensure there is a good earthing of the unit and power supply, otherwise there is a risk of electric shock.

Operation	Meaning
 PROHIBITION	DO NOT INSERT your fingers or other objects into fans and evaporator, otherwise it can cause injury.
 Switch off power supply	If the unit does not run properly or you can feel a strange smell, it is necessary to switch the unit off and disconnect the power supply. Otherwise there is a risk of electric shock or fire.

Transport and repairs	Meaning
 Ask for help	If it is necessary to move the unit or to make a new installation, ask for help by your supplier or by a qualified person. Wrong installation can cause water leak or a risk of electric shock or fire.
 Ask for help	If it is necessary to repair the unit, ask for help by your supplier or by a qualified person. Wrong repair can cause water leak or a risk of electric shock or fire.
 Prohibition	It is prohibited to make repairs by yourself, because this could cause a risk of electric shock or fire.

Installation	Meaning
 Place of installation	The unit MUST NOT be installed near flammable gases. If there comes to a gas leak, there is a danger of fire.
 Unit safe positioning	Ensure the installation place is strong enough, otherwise the unit can tilt or fall down.
 Circuit breaker of power supply	Ensure the power supply is equipped with a circuit breaker, otherwise there is a risk of electric shock or fire.

Operation	Meaning
 Place of installation	Please make a regular check (once per month) of the installation place, in order to see, if there is no tilt or damage to the base, which could lead to injury of persons or unit damage.
 Switch off power supply	Switch off power supply when cleaning or providing maintenance of the unit.
 PROHIBITION	It is strongly prohibited to replace a fuse by a piece of wire. Correct value of fuse must be determined by a qualified specialist.
 PROHIBITION	It is prohibited to work with flammable gases near the heat pump, because this could cause a fire.

For your information

Pictures and drawings in this manual are for your information only. The manufacturer reserves the right to make a change or improvement to the product when necessary, without prior notification of the users of this device.

Quality check upon receiving product

Upon the unit delivery, please check if there is any damage due to transport. If any damage is found on the unit, please inform the transport company or the manufacturer in written form immediately.

Basic information

Introduction

♦ Thank you for the confidence in S-therm+ products and for your decision to choose and buy the heat pump S-therm+.
♦ This manuals contains necessary information related to the installation, adjustment, operation and maintenance of this unit. Please read the manual before you start installation and operation of the unit.
♦ During the installation of S-therm+ heat pump, when connecting water and electric circuits follow exactly instructions given in this manual. Switch the unit on only after finishing of installation and after all checks are made.
♦ Manufacturer of S-therm+ heat pump reserves the right to change specification and product design, which are not yet included in this version of manual.

Product presentation

Air-water heat pump S-therm+ is designed for cold climate areas and for places with demand of hot water. Heat pumps can be used for heating of houses or commercial buildings, for cooling and for hot water supply for different purposes. Thanks to its design and construction, this product has overcome several technical obstacles, which is not the case on common products, as for example safe operation with high efficiency at outdoor temperature of -20°C, or supply of very hot water and similar.
air source heat pump extracts heat from outdoor air and transfers it into water.
Heat pump systems consist of separated circuits, where heat is transferred from its source to the heating system using liquids or gases. As these circuits use different media (air, refrigerant and heating water), circuits are connected through heat exchangers. These heat exchangers provide transfer of thermal energy.

Heat pump is used to heat buildings using accumulating hot water into heat water tank (using the tank is not a condition for heat pump operation), where water tank must have a volume appropriate to the building size. Size of accumulated water tank must be determined by a designer, based on the thermal loss of the building. Effective heating of the building is reached by circulation of this heated water. When using underfloor heating, the heat pump can reach COP value up to 4,6 at A10/W35. Normal water temperature for underfloor heating is 35 °C, temperature 40 °C to 50 °C is used for heating with fan coils (heat exchangers with fan), temperature 35 °C to 65 °C is used for radiators, or other temperature can be used based on the request of the user.
If necessary, the unit can also work in reverse mode and heat pump can be used for cooling. When used for cooling, water is cooled down to the temperature of 12 °C.
Compared with oil boiler, gas boiler and electric heater represents the heat pump the best solution thanks to its efficiency, safety and environment protection.
This high temperature air-water heat pump uses advanced technologies for heating and intelligent control system to produce water warmer than 65 °C. Heat pump can therefore supply hot water for underfloor heating, heat exchanger (fan coil) or radiator and thus directly replace water boiler.
Heat pump can be furthermore used for production of high temperature water for sanitary purposes, as for example for use in kitchen, for showers and so on.
Any other purpose of using can be considered as utilization, which is not in compliance with its determination. Manufacturer/supplier takes therefore no responsibility for any damage thus incurred. The risk is on the side of user.
System consists of two units (indoor and outdoor), which are connected with a copper refrigerant piping. Other components and parts of the heating system are delivered and installed by installation company or other subcontractor and it is necessary to use components, according to the purpose and utilization of the system.
Connection between heat pump and accumulation tank should be as short as possible, as simple as possible any with minimal bends. In case it is necessary to make a bend, it is recommended to make an elbow rather than a bend. Size of the connection between heat pump and accumulation tank should be at least DN25, so that sufficient flow of 2,0-2,8 m^3/h can be guaranteed.
Heat pump is equipped with one auxiliary electric heater, which can be used:

- To support heating and hot water supply when there is an insufficient heat supply from heat source.
- For an emergency mode, when there are faults with permanent heat pump switch off.
- To keep emergency protection against frost during these faults.

Auxiliary electric heater can be used for heating and/or hot water supply. Qualified specialist can set the heat pump operation in such a way, that auxiliary electric heater works in these cases automatically either for heating or for hot water supply (with support), or is switched on only in emergency mode and emergency protection against frost.

Heat pump characteristic includes:

- Pleasant and clean appearance
- Embedded high efficiency circulation pump for heat circuit
- EVI scroll compressor
- Cooling function
- 5 years warranty for heat pump set (indoor and outdoor unit)
- Bivalent source of electric energy
- LCD display with rotary selector (JOG)
- Closed control box
- Remote controlling and monitoring
- Safety elements (sensors and probes)
- Slant evaporator with hydrophilic layer
- Automatic evaporator defrost
- Refrigerant R407c
- Integrated start current limiter (soft starter)
- 10 years warranty for spare parts supply
- Intelligent heat pump control
- Simple operation
- Connections from top
- Possibility to establish a wide range of heating systems

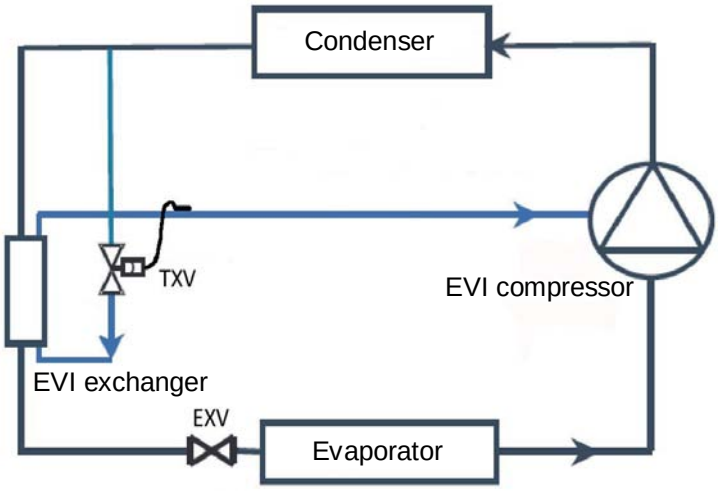
Principle of operation

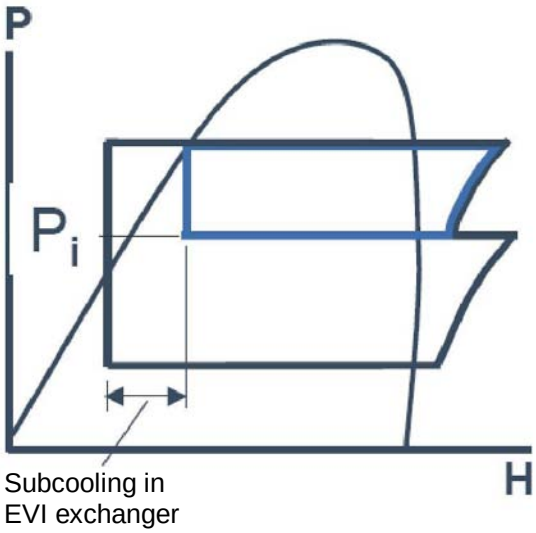
Operation cycle of main branch (black color):

1) Compressor sucks refrigerant vapors from evaporator and compresses these to the condensation pressure. During this cycle vapors become warm.
2) Pressurized refrigerant vapors pass into a condenser, where they condensate (they transfer the heat into the water circuit). Liquid refrigerant is additionally cooled down in EVI exchanger and flows to the expansion valve of evaporator (EXV).
3) Expansion valve injects a certain amount of refrigerant into evaporator. Due to its construction, this valve creates a pressure border between condensation and evaporation pressure.
4) Refrigerant evaporates under lower pressure in evaporator (it absorbs heat from the air blowing in the evaporator). Refrigerant vapours are again sucked by the compressor.

Operation cycle of EVI branch (blue color):

1) Compressor sucks refrigerant vapors from EVI exchanger and compresses these to a condensation pressure. During this cycle vapors become warm.
2) Pressurized refrigerant vapors pass into a condenser, where they condensate (they transfer the heat into the water circuit). Liquid refrigerant flows to the expansion valve (TXV) of EVI exchanger.
3) Expansion valve injects a certain amount of refrigerant into exchanger. Due to its construction, this valve creates a pressure border between condensation and intermediate pressure.
4) In EVI exchanger refrigerant of intermediate pressure evaporates (it absorbs heat from refrigerant flowing through the main branch and cools it down). Refrigerant vapours are again sucked by the compressor.





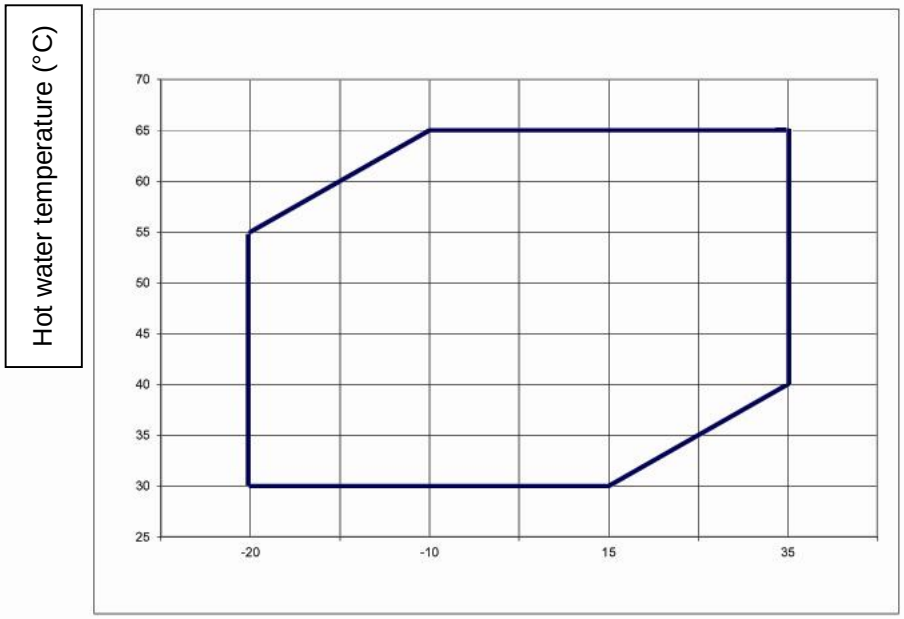
Cycle of EVI scroll compressor with vapor injection

Operation range

Compared with systems with standard compressors, using EVI scroll compressor of equivalent performance brings the following advantages:

- ♦ Increase of performance
  Thanks to the additional cooling down, higher evaporation efficiency is reached and required performance of compressor can be decreased proportionally to the evaporator gain increase.
- ♦ Higher COP value
  Operation efficiency of scroll compressor with gas injection is higher than with standard one-step compressor of the same performance, as performance with cooling down is reached with lower energy consumption; vapor obtained in cool down process comes from high pressure section and not from low pressure suction.
- ♦ Lower costs
  Decrease of costs is a result of the fact, that smaller compressor than used by standard configuration can be used to reach the same performance.
- ♦ Heating at lower outdoor temperature
  This heat pump works reliably even at the outdoor temperature of -20^{0}C. (See Operation range graph below)
- ♦ High temperature of output water
  This heat pump is capable to supply hot water with the temperature up to 65^{0}C. (See Operation range graph below)

Operation range graph



Basic functions

In order to reach the efficient operation of the heat pump, it is necessary to know how to operate and set the heating system and also the behaviour of users. Next chapter explains all the functions of the heat pump. Setting of all functions of the heat pump is described in **Operation manual**. There are 3 basic modes available for the heating system.

Heating mode

Based on the settings, heat pump can in heating mode prepare hot water for two circuits of heating (HW), domestic hot water (DHW) or water for swimming pool (SPW).

Cooling mode

Based on the settings, heat pump can in cooling mode cool down water for two circuits of heating (HW), domestic hot water (DHW) or water for swimming pool (SPW).

Evaporator defrosting

Due to very low temperature of refrigerant on evaporator input, ice is forming gradually during the operation on evaporator fins and this causes decrease of heat exchange between evaporator surface and the air. This function of heat pump enables manual start of evaporator defrosting, even in the situation when not all conditions for automatic evaporator defrosting were met.

Service settings of heat pump

This function gives the possibility to adjust those parameters of heat pump, which have a key influence on heat pump operation and the function is protected by a password. Adjustments depend on the design of the heating system. Adjustment procedures are described in **Operation manual**.
In this mode it is possible to adjust the following:

- Regulation temperature corrections (time constants, temperatures, equithermal control)
- Programming (timer setting)
- Priorities
- Rate utilization
- Emergency mode

Automatic modes

Automatic defrosting

Protection against freezing

Heat pump system is equipped with two functions of protection against freezing. Activation of protection against freezing is controlled by compressor (controlled protection against freezing for the equipment, for heating circuit and for hot water tank), unless heat pump system is permanently switched off as a result of fault. If heat pump system is permanently switched off as a result of fault, auxiliary (backup) heater will switch on, even it is not used for normal heating mode or hot water supply (emergency protection against freezing according to equipment settings, protection of heating circuit and/or hot water tank).

Restriction of auxiliary water heating (bivalent source)

 Attention!	Danger of material damage as a result of freezing!

This function is not activated, when the temperature for blocking of electric heater operation is set in heat pump adjustments! If the set temperature is lower than temperature for heat system water freezing (under 0°C), there is a danger of system freezing. In this case, there is neither the possibility of electric heater support, nor support of electric heater mode under low temperatures, nor emergency mode when heat pump system is permanently switched off as a result of fault, nor the function of emergency protection against freezing!

Snow removing function

Snow removing function is activated in winter period, at temperatures below 5°C (or set temperature). If fan of the outdoor unit does not run for more than one hour (or set time value), the fan starts operation for 15 seconds after reaching this time and thus removes snow from its blades.

Emergency mode

This mode gives the possibility to provide emergency heating and domestic hot water heating with the help of auxiliary electric heater.

 Attention!	Danger of freezing as a result of auxiliary electric heater fault!

Ensure the electric heater, circulation pump and heat exchanger work properly, otherwise heat pump will not work in emergency mode correctly.

Heat pump switch off

If it is necessary to switch the heat pump off, you must disconnect power supply completely.

Product appearance

SHP-180IRC

Indoor unit appearance

SHP-180ERC

Outdoor unit appearance

Specifications

Below given values are only informative. Actual specifications can be found on nameplate of the unit.
Heat pump system can be operated under all rates of electric energy consumption.

Model	**Outdoor unit**		**SHP-140ERC**	**SHP-180ERC**
	Indoor unit		**SHP-140IRC**	**SHP-180IRC**
Capacity / Power input / Current / COP		kW/kW/A/-	14,70/3,28/11,0/4,49	16,79/3,94/11,0/4,26
Range of operation temperatures	Heating	°C	-20~40	-20~40
	Cooling	°C	18~40	18~40
	DHW (domestic hot water)	°C	-20~40	-20~40
Range of output water temperature		°C	12~65	12~65
Energy class		-	A	A
Indoor unit power supply		V/Ph/Hz	380/3/50	380/3/50
Starting current		A	59	59
Electric heater	Number	pcs	1	1
	Power input	kW	3,0	3,0
	Operation current	A	4,6	4,6
Compressor	Model	-	ZH13KVE-TFD	ZW61KSE-TFP-542
	Brand	-	Copeland EVI	Copeland EVI
	Type		SCROLL	SCROLL
	Number	pcs	1	1
	Power input	W	3480	4900
	Rated current (RLA)	A	8,7	9,8
	Starting current (LRA)	A	64	59
Water pump	Model		STRATOS PARA 25/1-8	STRATOS PARA 25/1-8
	Power input	W	140	140
	Min/max discharge	m	1/8	1/8
Refrigerant	Type	-	R407c	R407c
	Refrigerant charge	kg	8,0	8,0
Fan	Motor	type	M3G084-GF	M3G084-GF
	Power input	W	182,0	182,0
	Speed	r/min	655,0	655,0
	Max. pressure	Pa	45,0	45,0
	Air flow	m^3/h	4995,0	4995,0

Model	Outdoor unit		SHP-140ERC	SHP-180ERC
	Indoor unit		SHP-140IRC	SHP-180IRC
Outdoor unit dimensions (w/d/h)		mm	1168*1063*1102	1168*1063*1102
Indoor unit dimensions (w/h/d)		mm	602*638*1035	602*638*1035
Outdoor unit weight		kg	94	94
Indoor unit weight		kg	159	150
Max. noise level outdoor unit in 1 m		dB(A)	58	58
Max. noise level indoor unit in 1 m		dB(A)	51	51
Max. temperature of heating water		°C	65°C	65°C
Electrical protection		A	20	20
Refrigerant pipe	Liquid / Gas	mm	12/22	12/22
	Pipe max. length	m	8	8
	Pipe max. height difference	m	3	3
Operation pressure		Mpa	4,2/2,6	4,2/2,6
Water pipe	Diameter	mm	DN25 (1")	DN25 (1")
	Height difference (accumulation tank/indoor unit)	m	1	1
	Optimal flow	m^3/h	2,8	2,8
	Minimum flow	m^3/h	2,0	2,0
	Pressure drop	kPa	246,0	19,9

Packing

Dimensions	Balení	Obsah	Rozměry (mm)	Weight brutto (kg)
Indoor unit SHP-140IRC	1 wooden casing on palette	Whole unit	w 710 x d 710 x h 1220	175
Indoor unit SHP-180IRC				165
Venkovní jednotka	1 cardboard on palette	Evaporator	w 1220 x d 1040 x h 760	86
	1 cardboard	Fan	w 815 x d 815 x h 260	17

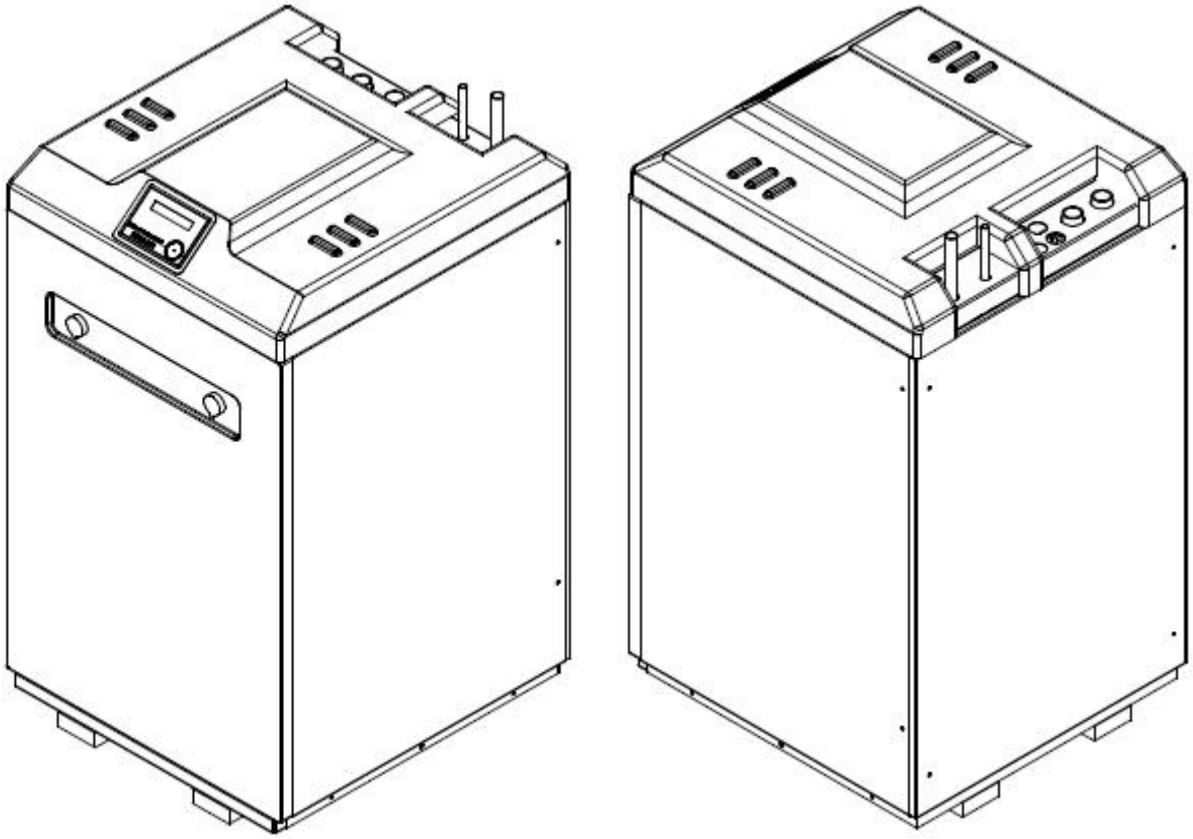
CAPACITY SPECIFICATIONS

CAPACITY SPECIFICATIONS			
Ambient temperature (A) / Output water temperature (W) (°C) *			
Model		**SHP-140**	**SHP-180**
A20/W35	Corrected heating capacity (kW)	18,28	22,32
	Effective electric power input (kW)	3,28	3,83
	Heating COP (-)	5,58	5,82
A12/W35	Corrected heating capacity (kW)	16,19	19,19
	Effective electric power input (kW)	3,26	3,91
	Heating COP (-)	4,97	4,91
A10/W35	Corrected heating capacity (kW)	15,55	17,88
	Effective electric power input (kW)	3,28	3,90
	Heating COP (-)	4,75	4,58
A7/W35	Corrected heating capacity (kW)	14,70	16,79
	Effective electric power input (kW)	3,28	3,94
	Heating COP (-)	4,49	4,26
A2/W35	Corrected heating capacity (kW)	11,38	13,27
	Effective electric power input (kW)	3,06	3,77
	Heating COP (-)	3,72	3,52
A-7/W35	Corrected heating capacity (kW)	10,30	11,09
	Effective electric power input (kW)	3,17	3,85
	Heating COP (-)	3,25	2,88
A-15/W35	Corrected heating capacity (kW)	8,43	9,82
	Effective electric power input (kW)	3,08	3,94
	Heating COP (-)	2,73	2,49
A12/W45	Corrected heating capacity (kW)	15,34	19,29
	Effective electric power input (kW)	3,88	5,09
	Heating COP (-)	3,95	3,79
A7/W45	Corrected heating capacity (kW)	13,93	16,76
	Effective electric power input (kW)	3,86	5,16
	Heating COP (-)	3,61	3,25
A2/W45	Corrected heating capacity (kW)	11,56	13,55
	Effective electric power input (kW)	3,94	4,91
	Heating COP (-)	2,94	2,76
A-7/W45	Corrected heating capacity (kW)	10,41	12,23
	Effective electric power input (kW)	3,87	5,04
	Heating COP (-)	2,69	2,43
A-15/W45	Corrected heating capacity (kW)	8,81	10,43
	Effective electric power input (kW)	4,09	4,95
	Heating COP (-)	2,16	2,11

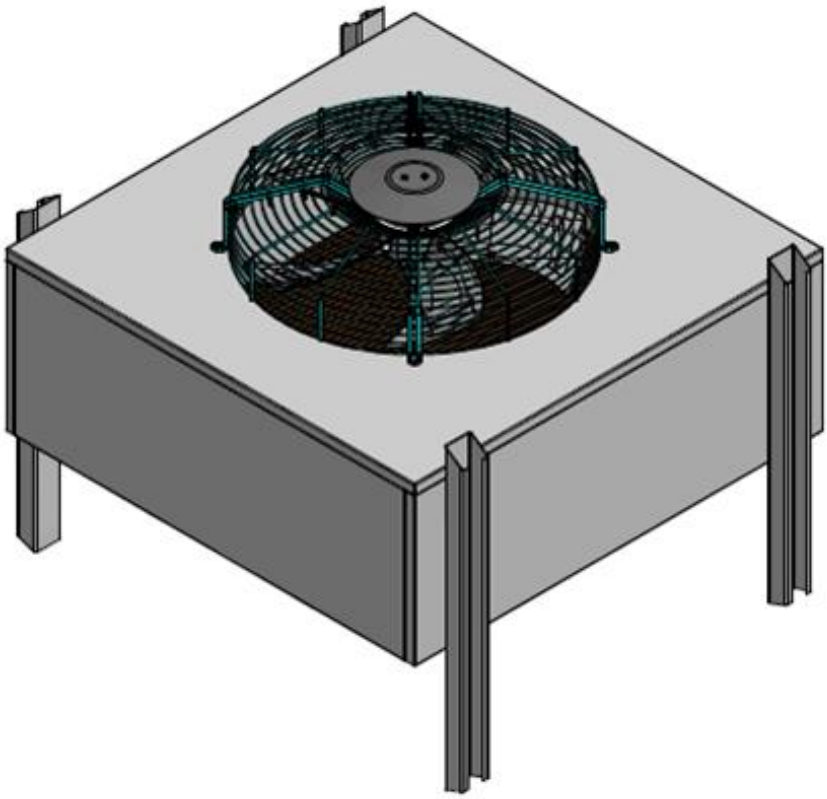
CAPACITY SPECIFICATIONS			
Ambient temperature (A) / Output water temperature (W) (°C) *			
Model		**SHP-140**	**SHP-180**
A12/W55	Corrected heating capacity (kW)	16,40	19,53
	Effective electric power input (kW)	4,73	6,32
	Heating COP (-)	3,47	3,09
A7/W55	Corrected heating capacity (kW)	14,89	17,29
	Effective electric power input (kW)	4,70	6,48
	Heating COP (-)	3,17	2,67
A2/W55	Corrected heating capacity (kW)	11,85	14,11
	Effective electric power input (kW)	4,79	6,15
	Heating COP (-)	2,47	2,29
A-7/W55	Corrected heating capacity (kW)	10,74	12,74
	Effective electric power input (kW)	4,56	6,31
	Heating COP (-)	2,36	2,02
A-15/W55	Corrected heating capacity (kW)	9,04	11,02
	Effective electric power input (kW)	4,71	6,32
	Heating COP (-)	1,92	1,74
A12/W65	Corrected heating capacity (kW)	16,85	16,45
	Effective electric power input (kW)	5,54	6,04
	Heating COP (-)	3,04	2,72
A7/W65	Corrected heating capacity (kW)	15,27	15,07
	Effective electric power input (kW)	5,59	5,95
	Heating COP (-)	2,73	2,53
A2/W65	Corrected heating capacity (kW)	12,31	12,06
	Effective electric power input (kW)	5,47	6,06
	Heating COP (-)	2,25	1,99
A-7/W65	Corrected heating capacity (kW)	11,20	10,94
	Effective electric power input (kW)	5,56	5,89
	Heating COP (-)	2,01	1,86
* Values measured according to the Standard EN 14511-2:2012 / EHPA. Measurement contains also defrosting cycle.			

Views

Indoor unit

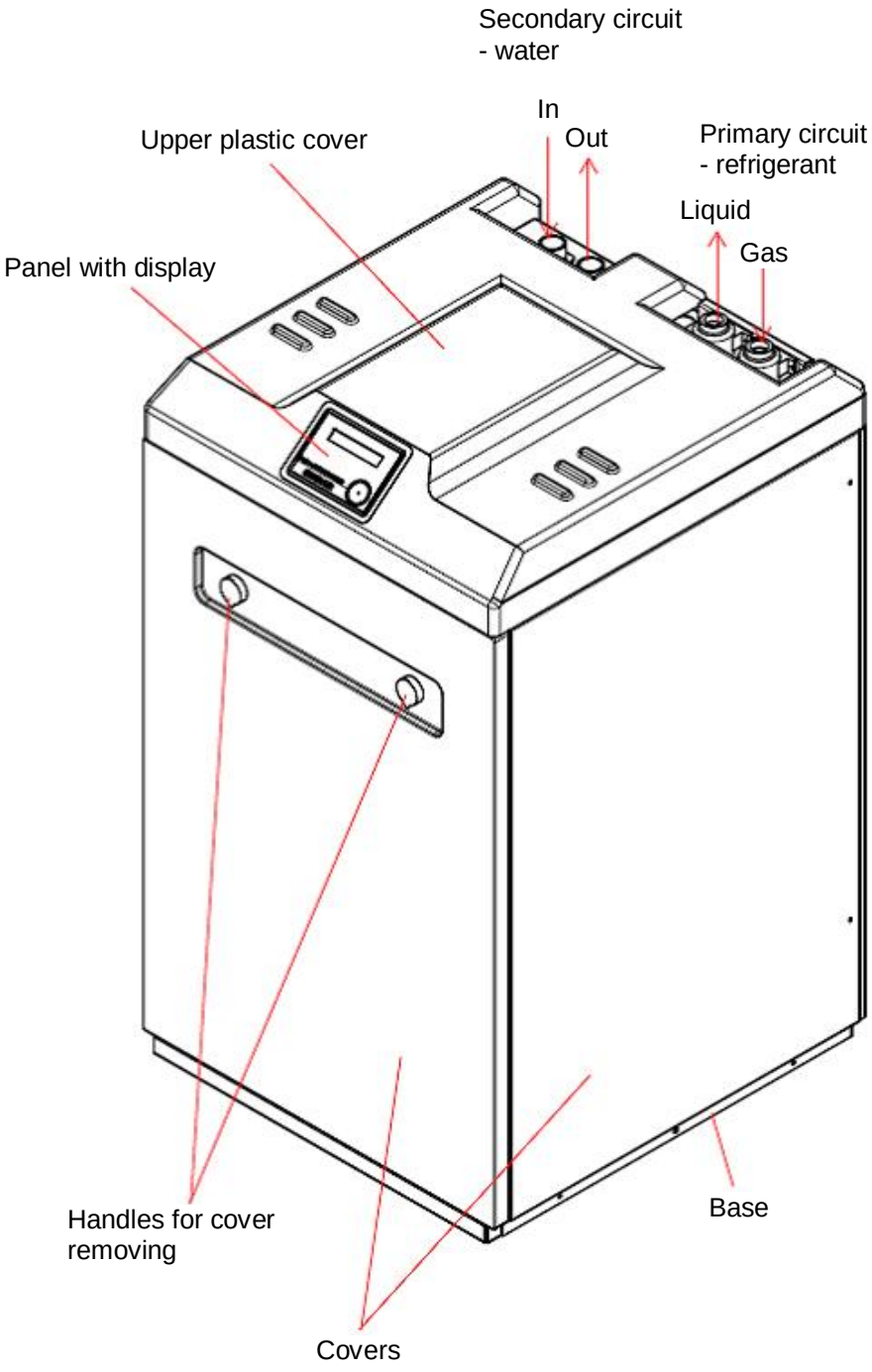


Outdoor unit

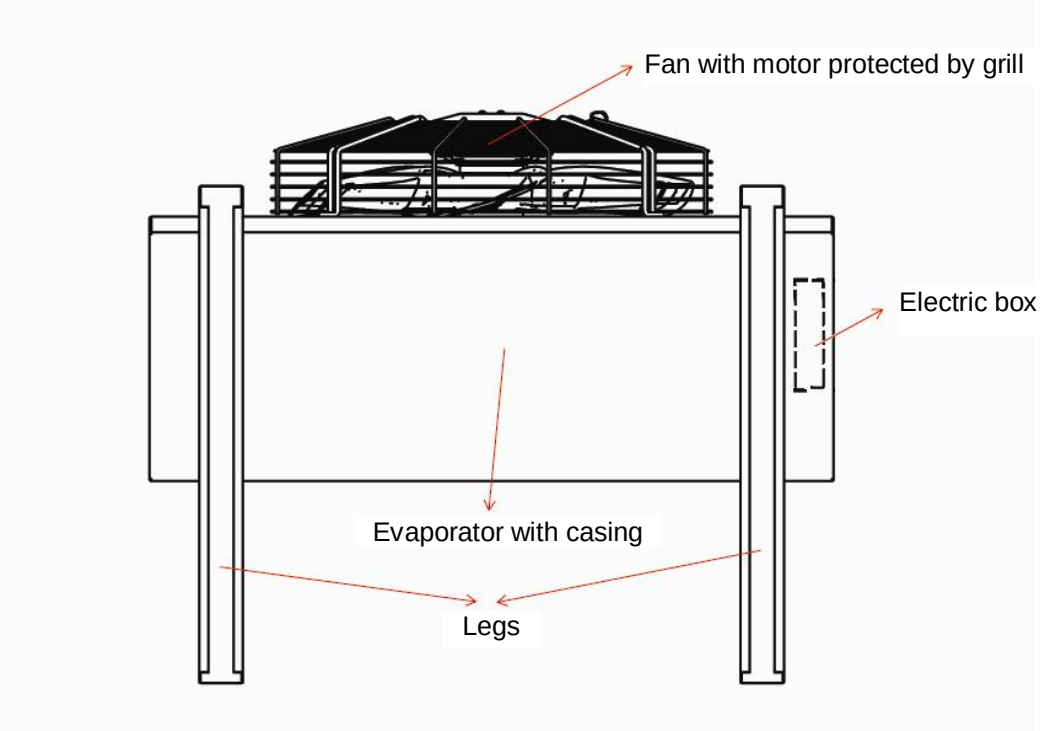


Unit description

Indoor unit

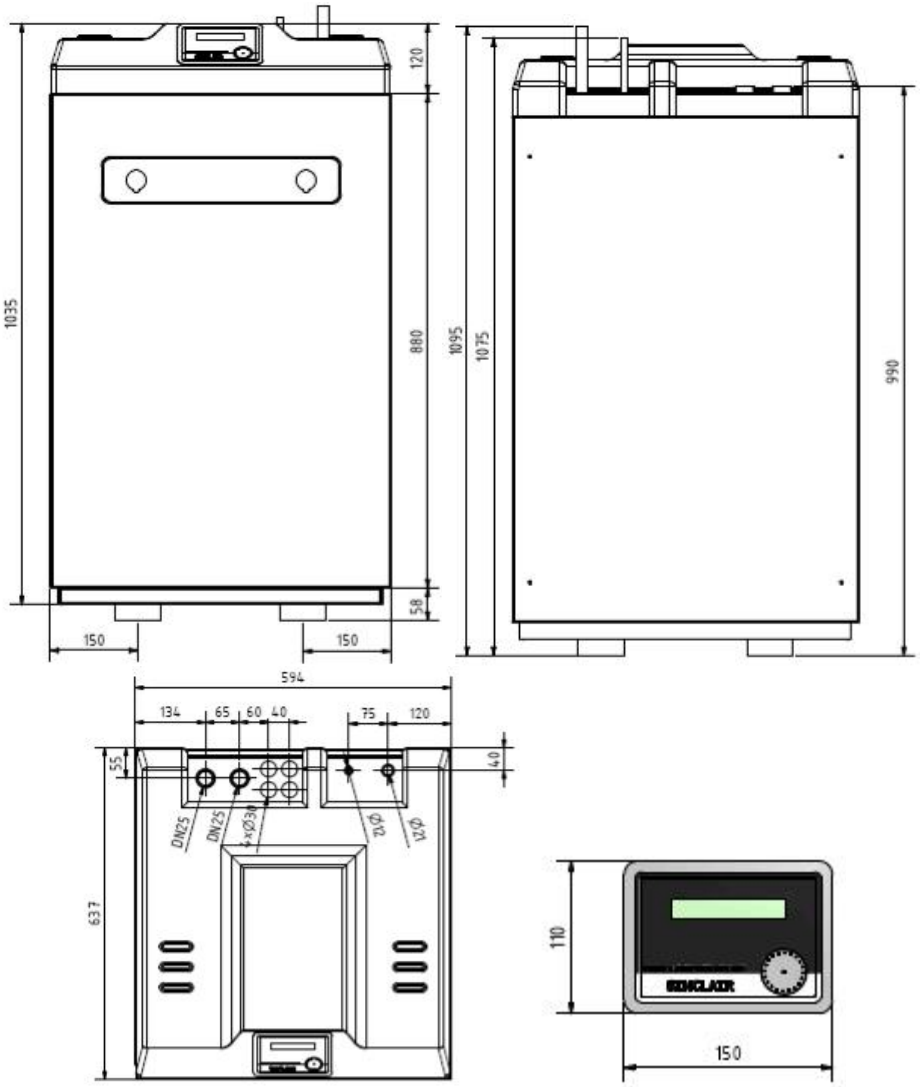


Outdoor unit



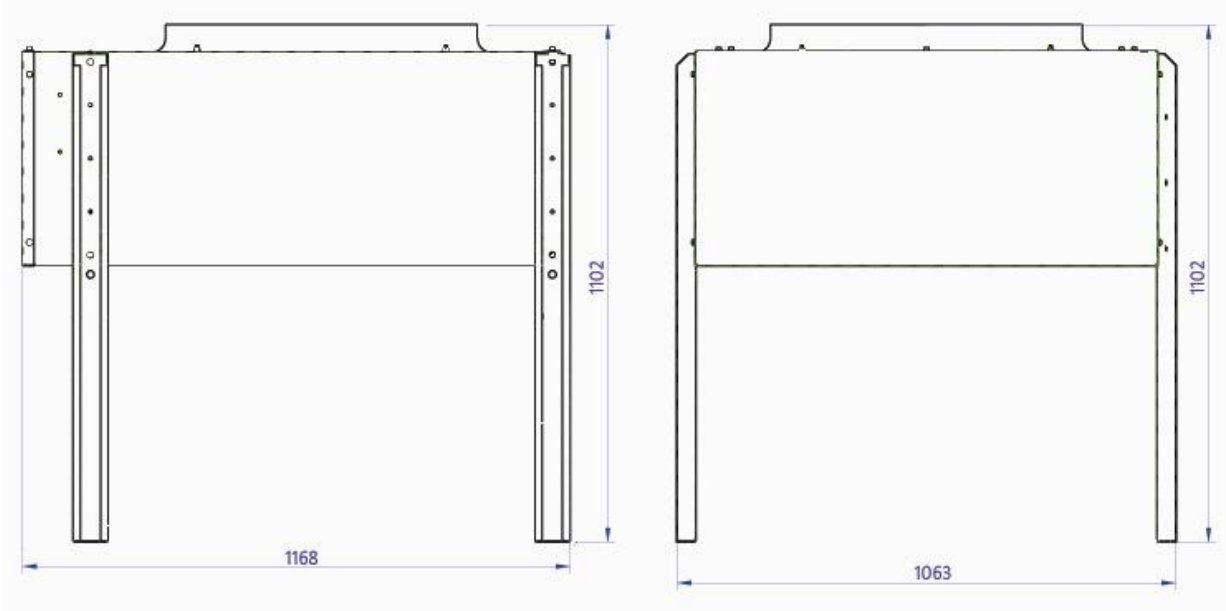
Dimensions

Indoor unit: SHP-140IRC, SHP-180IRC



(Units: mm)

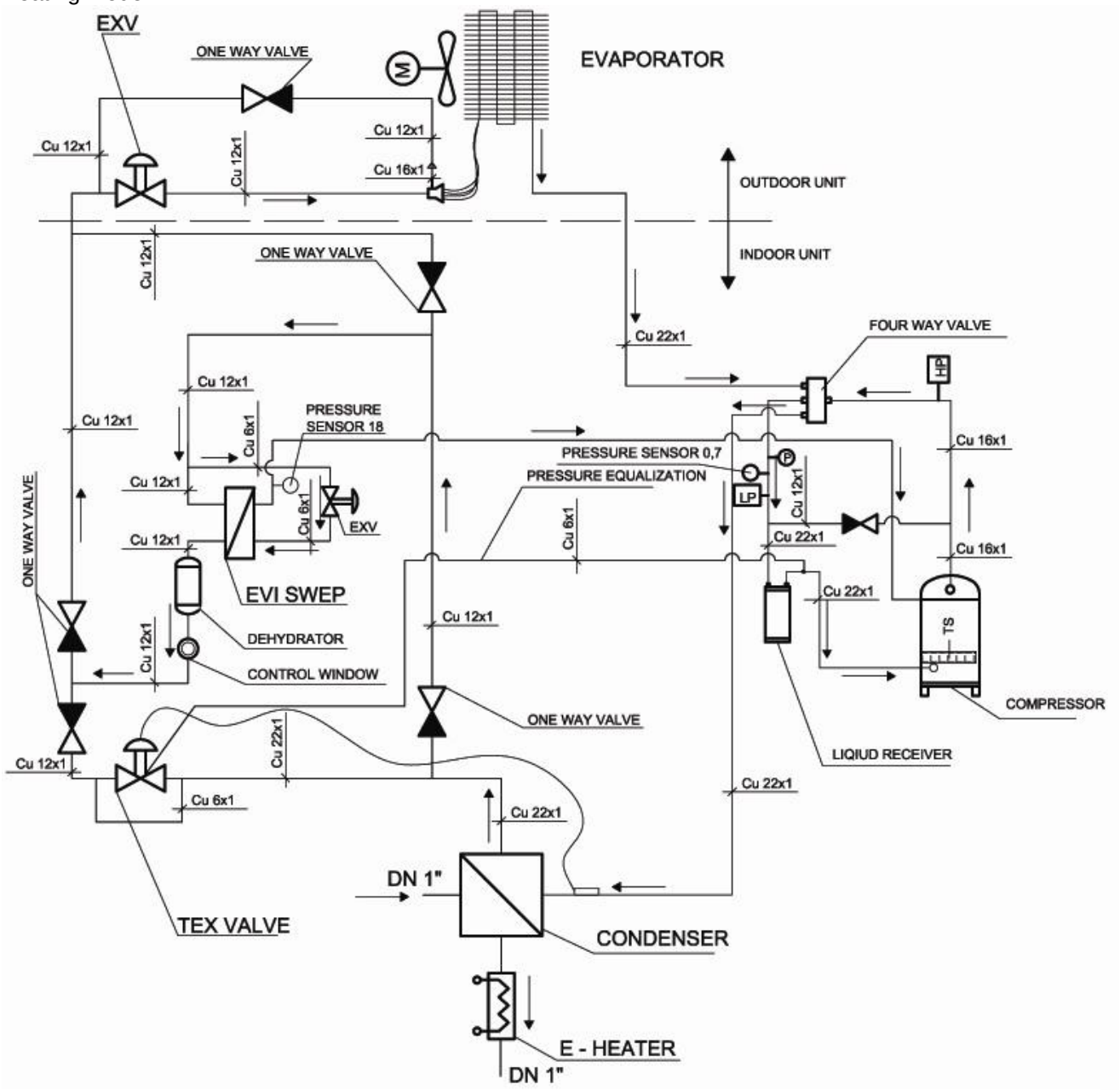
Outdoor unit: SHP-140IRC SHP-180ERC



(Units: mm)

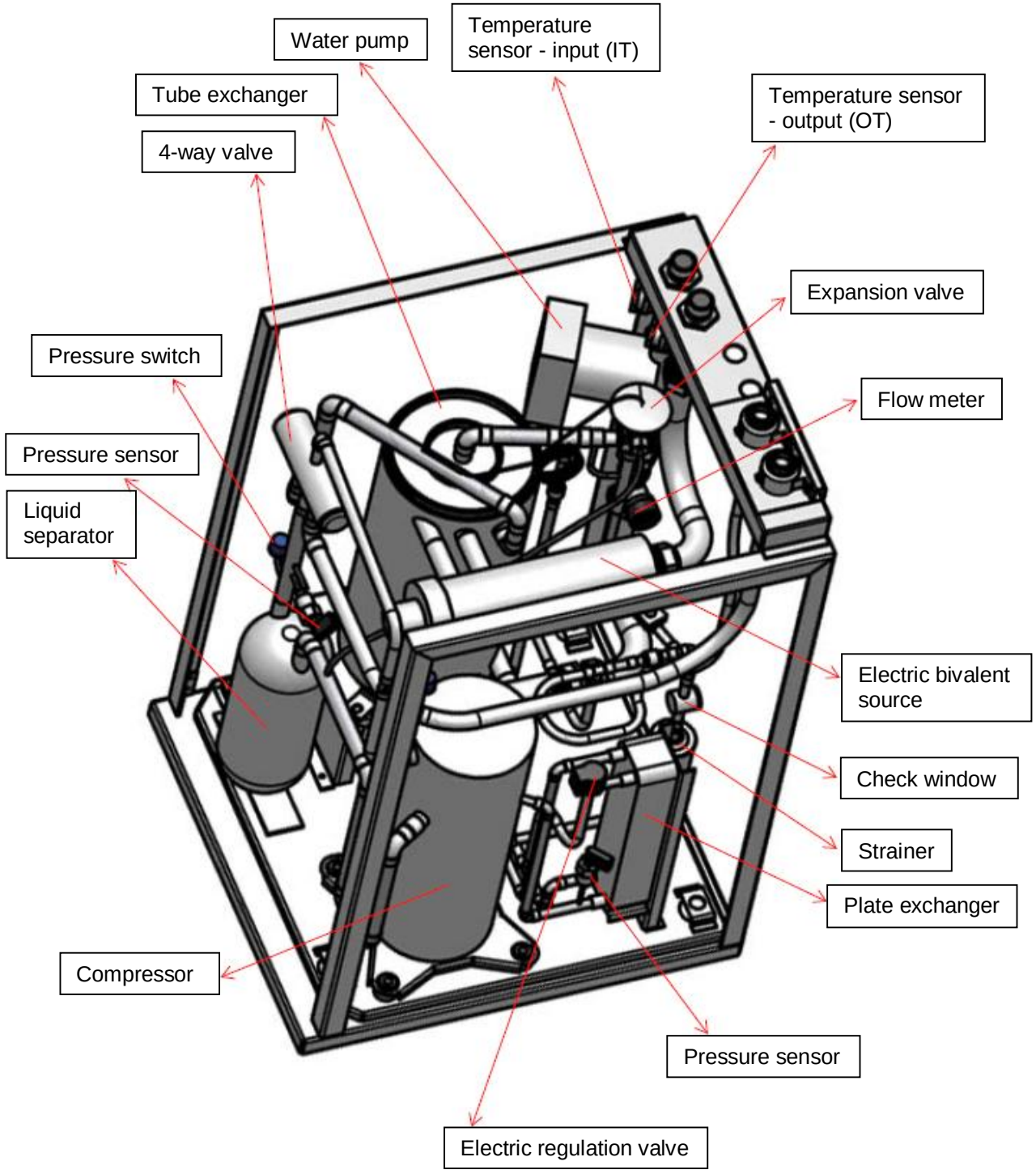
Refrigerant circuit diagram

Heating mode



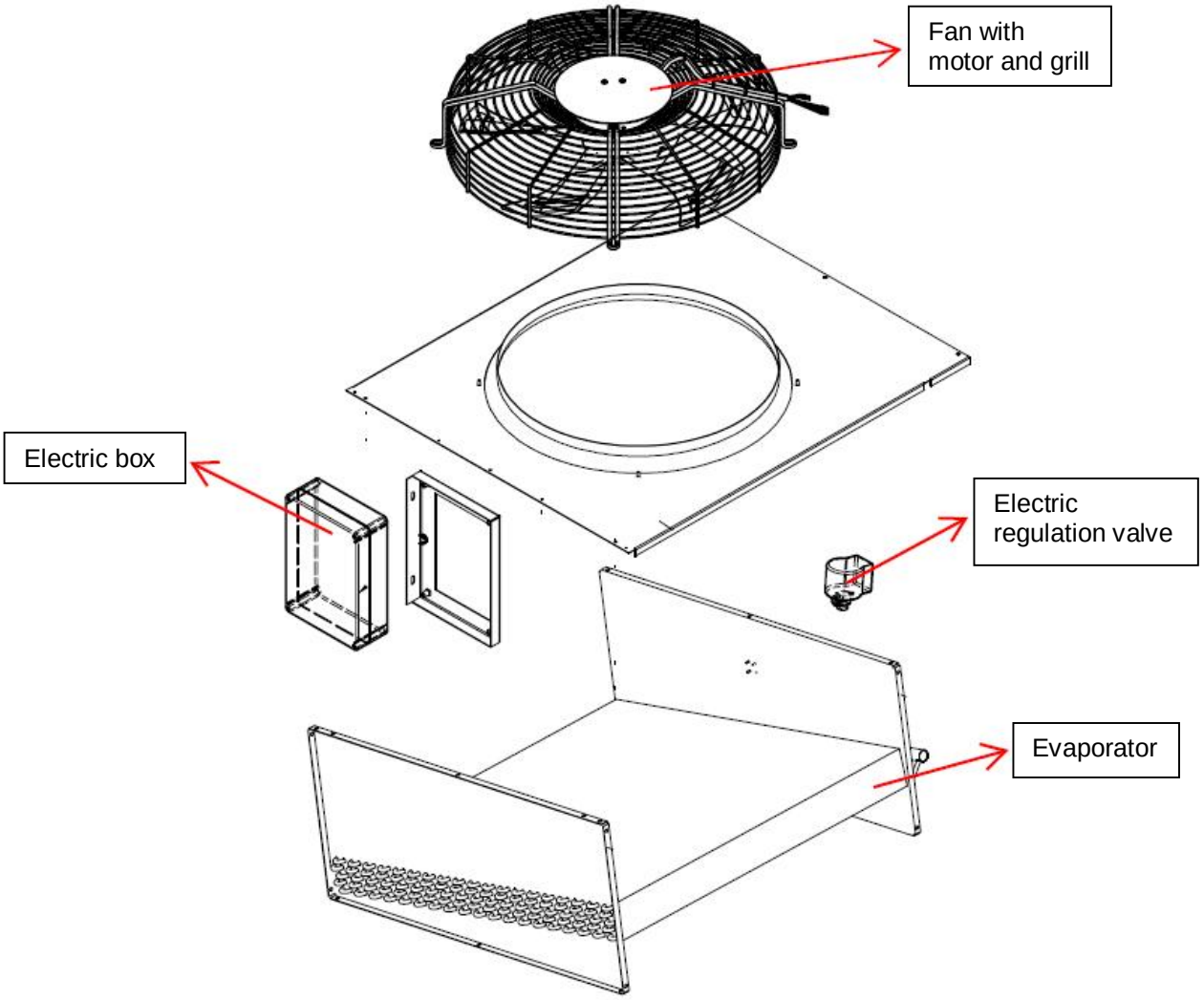
Basic components

SHP-140IRC, SHP-180IRC



Accessories: 5 pcs temperature sensor

SHP-140ERC, SHP-180ERC



Parts of the unit (components)

Parts list

Indoor unit	Type	Details
Compressor (SHP-180IRC)	ZW61KSE-TFP-542	380V~, 50 Hz, R407C
Compressor (SHP-140IRC)	ZH13KVE-TFD (3 phase)	380V~, 50 Hz, R407C
4-way valve	SHF-20A-46	AC220-240V, 50/60Hz, 4,5/3,5W
Plate exchanger (condenser)	GAL10-CMF	(liquid nozzle 25 mm)
Liquid separator	SHP-05/S22	
Electric bivalence	E-02	230V, 3kW
Contactor	MEC GMC-18	380/440 V,18 A
Contactor	MEC GMC-9	
Terminal block	RS9211 and RS9102	450V, 4 mm^2 and 600VAC,10 mm^2
	HF105F-4/JQX-105F-4	30A, 240VAC, -55°C- +85°C,
Thermal relay	MEC GTH-22	12A/15A/18A
Exchanger	BX8THx20/1P-SC-S 4x3/4"&16	
Valve for cooling	67B3277 head TEZ 5	
	67B2790 jet TE5 no.2	
	67B4012 valve body TE5	
Soft starter	MCI-12CH	
Electric regulation valve (step motor)	EXM 125	
	EXL-B1G	
Control board	TC01012 (software version 44_5)	
Operation display		
Pressure sensor	PT5-07M	
Pressure sensor	PT5-18M	
Cable for pressure sensors	PT4M15	Connector + sensor cable 1,5 m
Temperature sensor 10kΩ	NTC015WP00	(5 or 6 pcs)
Temperature sensor 50kΩ	NTC015HT	
Strainer	FDB-084S	
Flow meter	HUBA 200	DN25
Water pump	Stratos Para 25/ 1-8	
Non-return valve	NRV12	
Pressure switch - low pressure	H20PS	
Pressure switch - high pressure	H20PS	
Check window	MIA M12	
Indoor unit		
Fan (with motor)	S3G650-AD05-50	
Electric expansion valve	EXL 125	
	EXM-B0B	
Electric box	214 ECO	
Non-return valve	NRV12	
Accessories		
Temperature sensor 10kΩ	NTC015WP00	

1) Compressor

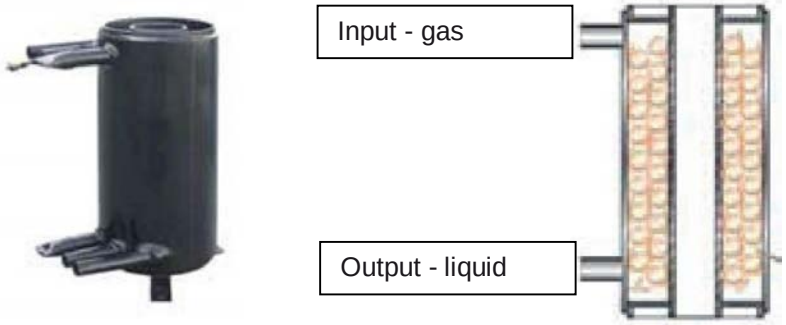
In order to have more efficient operation, EVI scroll compressors are equipped with input for gas injection. Higher efficiency can be reached by using cooling circuit. Thus can the performance and efficiency of system be increased. As a result, we get higher compress ratio.

Heat pump model	SHP-180IRC	SHP-140IRC
Compressor model	COPELAND ZW61KSE-TFP-542	COPELAND ZH13KVE-TFD
Power supply (V-Ph-Hz)	380/420-3-50	380/420-3-50
Refrigerant	R407c	R407c
Performance (kW)	11,8	11,9
Power input (kW)	4,9	3,5
Current (A)	8,4	6,4
Evaporation temperature (°C)	-15°C	-7
Condensation temperature (°C)	60°C	50
Starting current (LRA) (A)	59	64
Nominal current (RLA) (A)	9,8	9,6

2) Heat exchangers

a) Tube heat exchanger

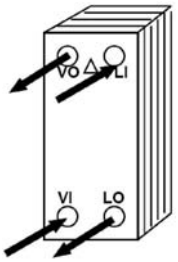
Independent cylindrical high efficient heat exchanger.



b) Plate soldered heat exchanger

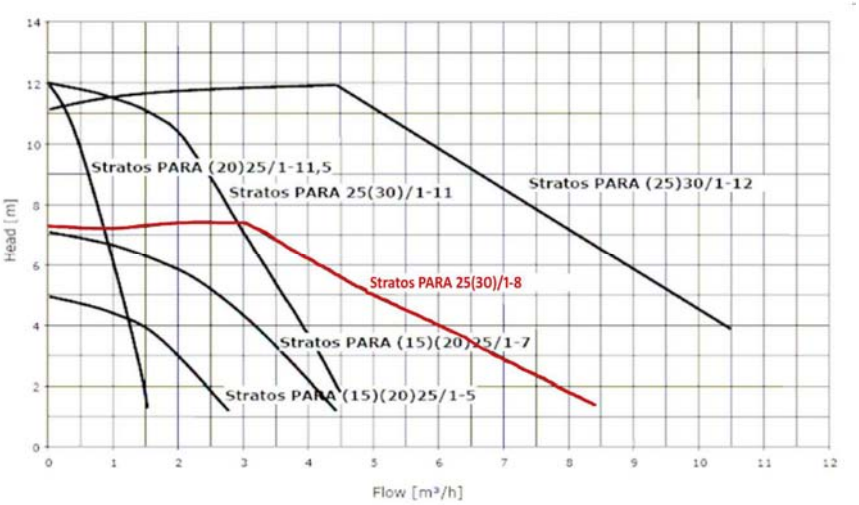
Plate soldered heat exchanger serves to obtain higher efficiency. Exchanger is used for additional cooling of refrigerant before entering into evaporator. This process of cooling down brings also increase of system performance. During cooling process some quantity of refrigerant evaporate. This evaporated refrigerant is injected into the compressor and provides additional cooling by higher compression ratios, similar as when injecting liquid.

VO = Vapor output from heat exchanger
VI = Vapor input into heat exchanger
LI = Liquid input into heat exchanger
LO = Cooled liquid output from heat exchanger

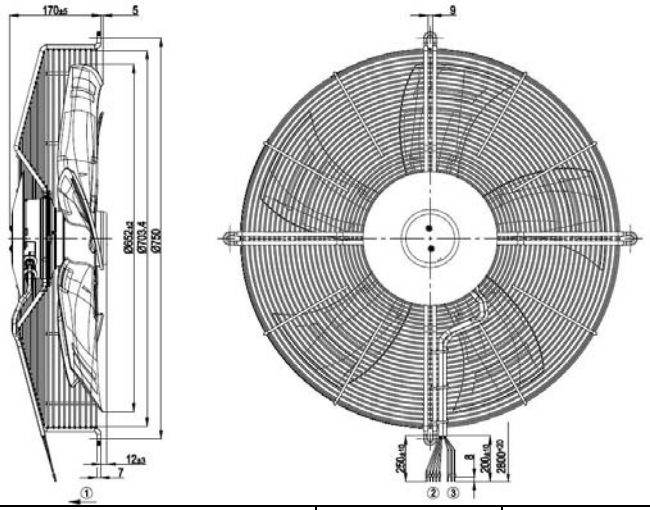


3) Circulation pump

Wet-motor circulation pump with thread or flange connection, EC motor and automatic performance adaptation.
Seal less type circulation pump, electronic
Type: STRATOS Para 25/1-8
Maximum discharge: 8 m
Max. flow: 7,5 m^3/h
Max. operation pressure: 6 bar
Nominal capacity: 100 W
Speed: 1400-3700 rev/min
Consumption: 8-140 W
Current at 1~230 V: 0,09-1,30 A



4) Fan

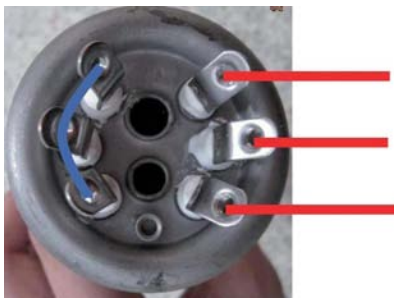


Motor	Type	M3G084-GF
Power input	W	182,0
Speed	rev/min	655,0
Maximum pressure	Pa	45,0
Air flow	m^3/h	4995,0

5) Electric heater

Electric heater 3 kW used in all models.

Electrical connection
Two thermal fuses located in the holes.
3-phase power supply: 380V/3P/50Hz



6) Liquid separator

Liquid separator located on the compressor suction side prevents liquid refrigerant entering into compressor crankcase from suction pipe and formation of liquid shock. Liquid separator is suitable for heat pumps, for systems with hot vapors defrost. It is suitable for the cases, when sudden and short time flooding of evaporator by refrigerant can occur.

Model: SHP-05/S22

7) Strainer

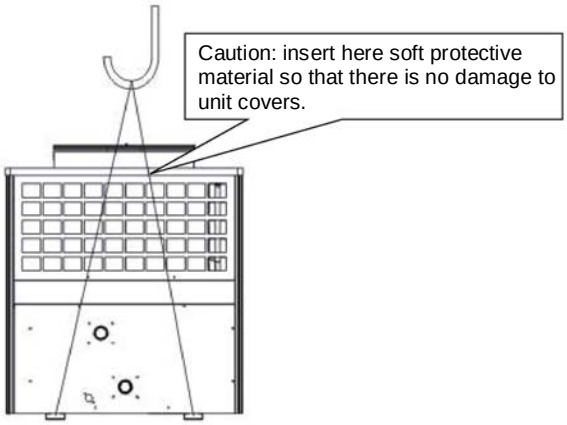
Main purpose of strainer (drier) is to keep refrigerant circuit clean, without humidity, without acidic components and without mechanical dirt. In case of circuit pollution, corrosion of internal parts can occur or ice forming in the circuit and subsequently compressor fault.

Strainer has a solid compact design with steel casing with smooth flow without turbulences during refrigerant flow. It has a high capability of humidity absorption and excellent absorption of acidic substances.
Strainer has a high efficiency of filtering mechanical impurities larger than 20 micron.

Model: FBD-084S
Temperature range: -40 to +65°C
Connection type and size: 1/2" ODF

Transportation

1) Heat pump is delivered on a palette in upright position and in 3 cardboards.
   a) Indoor unit on palette in wooden casing and packed in a protective foil.
   b) Evaporator in cardboard.
   c) Outdoor unit fan in cardboard on palette.
2) It is recommended to transport the indoor unit on a suitable cart.
3) Please check the path of transportation and ensure there are no obstacles preventing transport of the unit inclusive packing. Do not remove packing before delivery to the final place of installation.
4) During the transportation keep the unit in upright position. Do not tilt more than 15^0, otherwise the unit can tilt and fall down.
5) If it is necessary to hang the unit, please use ropes capable to carry the triple weight of the unit. Ensure the unit is correctly fixed and the angle of carrying ropes is more than 60^0. Caution: after lifting, do not enter the area under the unit.
6) Put some soft protective material between ropes and unit itself, so that there is no damage to unit covers.
7) Check heat pump and control panel, if there is no damage caused during transportation.
8) Remove carefully packing and protective material without damaging unit parts.



Caution!	Danger of material damage due to unqualified transportation!

Regardless the way of transportation, indoor unit must never be tilted more than 15°. Otherwise faults in refrigerant circuit can occur later during the operation. In the worst case this could cause a fault of the whole system.

- During the transportation tilt the indoor unit not more than 15°.

Danger!	Danger of injury as a result of big unit weight during lifting!

Indoor unit is heavier than 150 kg.

- If lifting of indoor unit cannot be avoided, then this must be done by several persons in order to prevent possible injuries.

Caution!	Danger of material damage when using improper way of transport!

Ensure you use transport instrument of sufficient size and capability.

- The weight of heat pump can be found in specifications.

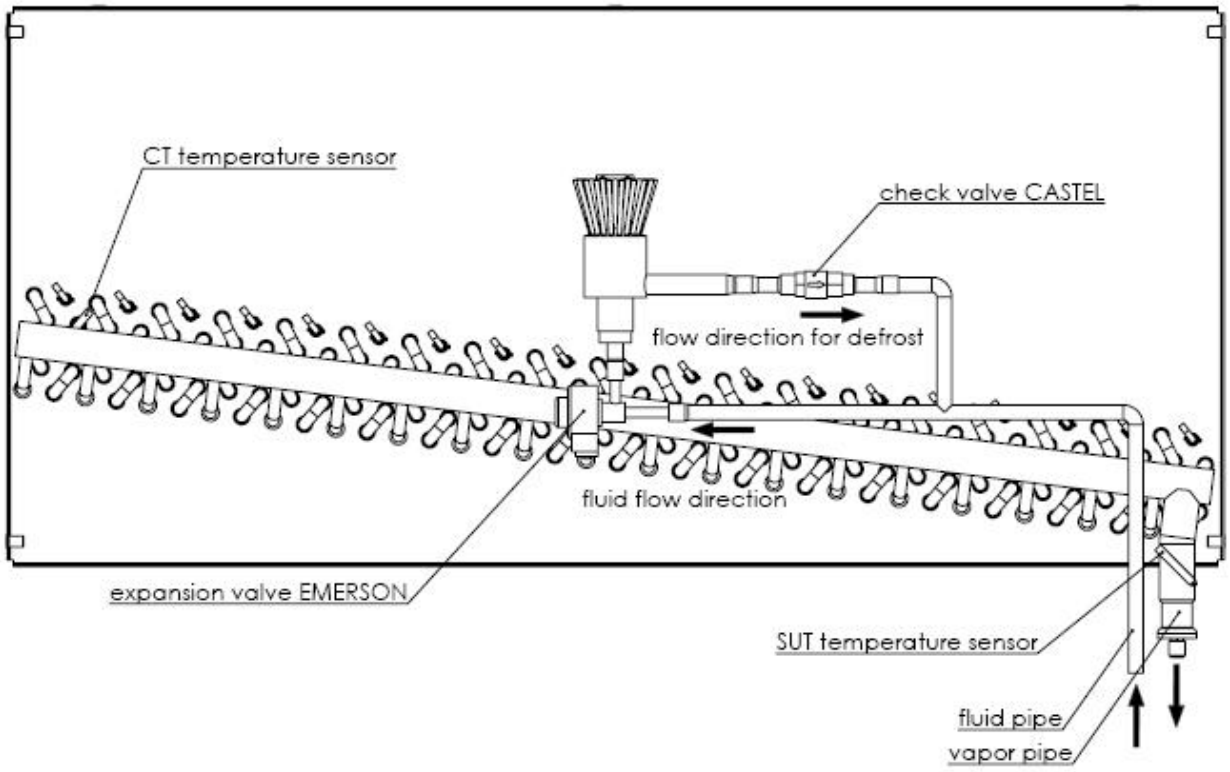
When transporting on a cart, please respect the following:

- Put the cart under the backside of indoor unit; in this case is the layout of weight most favourlable.
- Fix the indoor unit using a clamping strap.
- For moving from palette use a ramp, e.g. beam and a stable board.

Assembling of outdoor unit

Outdoor unit is packed in two cardboards.
Assembling sequence:

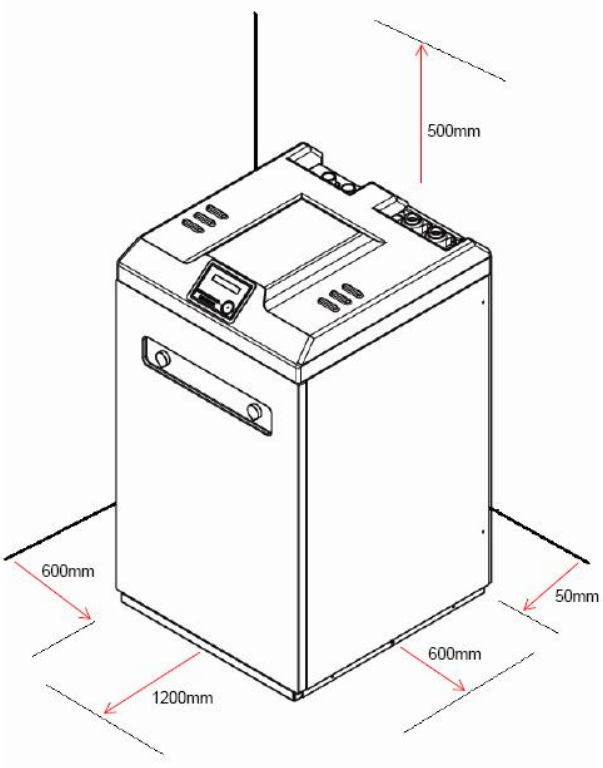
1) Take evaporator out from the cardboard.
2) Fix the feet with screws.
3) Take out fan and place it on the outdoor unit in correct position.
4) Fix the fan with screws.
5) Solder expansion valve Emerson and non-return valve as indicated on the diagram below. (isolate the main body of the check valve and expansion valve agains heat from soldering)
6) Put CT and SUT temperature sensors to the mounts (small pipes) if there is not good contact between mount and sensor put some heat sink compound to the sensor to ensure good contact, after that cover sensor and mount with heat isolation tape
7) Connect electric wires.
8) Insert ambient temperature sensor to the box, box should be on the leg of outdoor unit an should not be on direct sunlight..



Place of installation

Indoor unit

1) Unit can be installed in the interior on a dry place, where it is permanently protected against frost and where the temperature range is from 7°C to 25°C (e.g. veranda, cellar, service or technical room), or on any other place which is clean, bright and has a good ventilation.
2) Place of installation should have a minimum space volume (V_{min}) according to the standard EN 378 T1. V_{min}=G/c, where G is a refrigerant charge in kg and c is an applicable limit value in kg/m^3 (for refrigerant R407c the value of c is 0,31kg/m^3). Minimum volume for the unit SHP-180IRC is 25,8m^3.
3) Unit should not be installed on places exposed to direct sunlight, on places close to objects emitting heat, or close to exhalations of cooking.
4) If the unit is installed on a free accessible place, it is necessary to protect the unit by a suitable securing covers.
5) As an installation place is recommended to select a place, where unit will not disturb surroundings by its operation noise or by hot air.
6) The unit should be installed close to electric power supply.
7) Base on the installation place must be strong enough, must have a sufficient carrying capabilities and must be resistant against emitting of vibrations and noise.
8) Ensure the reasonable layout of piping.
9) Leave around the unit space enough for maintenance work, inspections and repairs - see dimensions below; there must not be any obstacle close to the heat exchanger.



Minimum space around the unit

Outdoor unit

Caution!	Danger of corrosion damage!

Etching vapors (e.g. methane) can cause the corrosion of outdoor unit.

- Do not install the outdoor unit close to stables and liquid manure sinks.

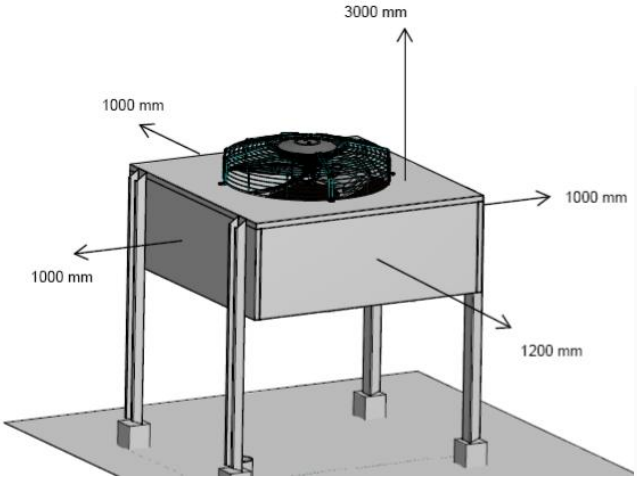
Danger!	Danger of injury due to ice formation!

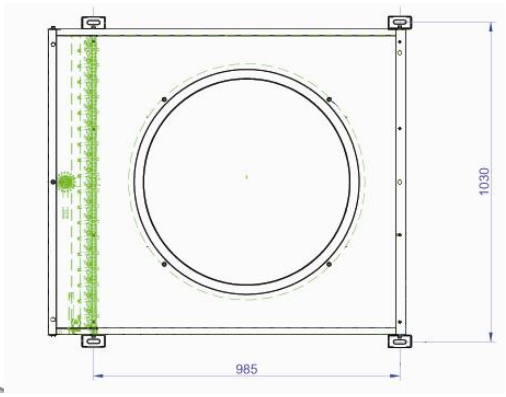
The air coming out from the outdoor unit is colder than outdoor temperature. Therefore ice can be formed by temperatures below 5 °C. This ice represents a danger of slipping.

Danger!	Danger of damage or malfunction due to a blown snow!

Areas of air input and output must be without obstacles in order to guarantee sufficient air circulation.

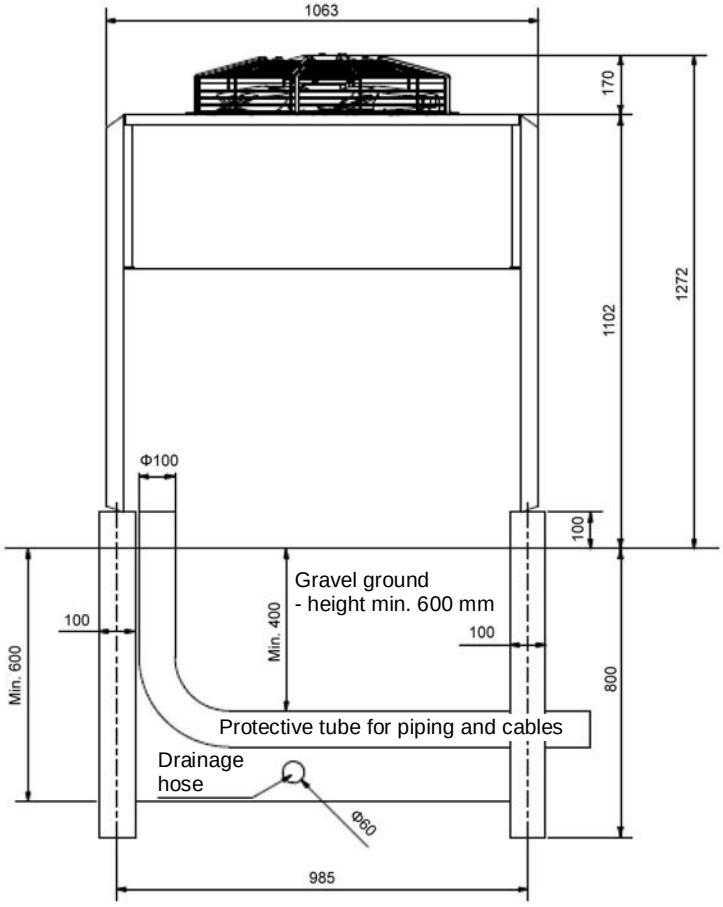
1) Ensure the foundation is horizontal and strong enough, frost resistant and built in accordance with local requirements and standards of construction technology.
2) If you install several units parallel side by side, please ensure the minimum distance between two neighbouring units of 200 mm.
3) Heat pump must be protected against rain and snow in winter time. Distance between the unit and protecting cover must be at least 2 m.
4) Outdoor unit must be installed at a distance at least 3 m from public roads.
   - Please ensure locally common and by law determined minimum distances are kept to the following objects: vegetation, canvas, walls, open fire and heat radiation, places where children can play.
   - Please keep air input and output of outdoor unit(s) free of frost.
   - Operation of outdoor unit emits a certain level of noise, which can become stronger on hard surfaces; therefore place of installation must be chosen very carefully. (These value are dependent on heat pump performance).
5) It is necessary to build a draining channel or a gravel layer with drainage hose for condensated water blow the unit.
6) When choosing the place of installation take into consideration the full load operation of the unit in winter time the outdoor unit can emit a certain level of noise (up to 60 dB(A) of acoustic power), which can become more intense on hard surfaces. Install in accordance with local requirements and standards.
7) Choose such an installation place, where all outdoor noise emissions are in accordance with law and local regulations without the necessity to use the function for heat pump noise reduction.
8) Install the unit as close as possible to the indoor unit. Maximal acceptable pipe length between indoor and outdoor unit is 8 m.
9) Place of installation must be protected against strong air blowing.
10) There must be space enough left around the unit for maintenance and service work.

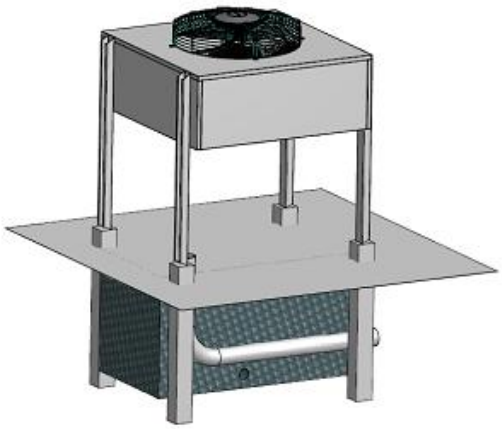




Outdoor unit foundation

1) Prepare a foundation for outdoor unit installation.
2) Build concrete pillars, where feet of the outdoor unit will stand. Respect all principles for construction work and security.
3) Lay a drainage hose for condensate drainage and cover with gravel to the height of about 200 mm.
4) Lay copper piping and communication cables in a protective tube into the requested place and positioning.
5) Put additional gravel up to the top of the hole and align with terrain.
6) Fix feet of outdoor unit to the foundation using suitable screws.





Water connection

- Heat pump is determined to be connected to a closed system of central heating. In order to guarantee fault-free operation, central heating installation must be made by authorized specialized persons and in accordance with corresponding standards and rules.
- In order to prevent too rigid connection, do not install wall clamps for pipes of heating system and refrigerant pipes fixing too close to the heat pump. Minimum distance from the first clamp to the heat pump should be at least 50 cm.
- As a protection against energy loss and pipe freezing, all connecting pipes must be insulated with thermal insulation.
- Pipes must be clean and without any dirt and obstructions. If necessary, flash the pipes thoroughly before filling.
- Piping pressure test must be done separately. DO NOT MAKE the test, when the heat pump is connected.
- Close to water input connection it is necessary to install filter type Y.
- It is convenient to connect heat pump through a bypass-valve, so that there is a possibility to clean the water pipe. Input of heat pump can be closed without any influence on the operation of remaining equipment.
- For easy inspection during the operation, it is convenient to install temperature and pressure gauge to the water input and output (not supplied by manufacturer).

- Water flow direction must correspond with the marking on the label close to water input connection.
- Before heat pump connection it is necessary to clean water pipe system. Ensure there is no dirt inside.
- For proper operation of water system install an expansion tank.
- Install a drain outlet to the lowest part of pipe and a filling valve to the upper part of pipe.

Caution!	Danger of damage when using improper protective agents against frost and corrosion!

Improper agents against frost and corrosion can damage sealings and other parts and cause water leak.

- Please add suitable agents for protection against frost and corrosion into heating water.
- Comply with rules for filling.

Caution!	Danger of damage as a result of magnetite sediments.

Heating systems with steel pipes, with static heating plates or with compensatory tanks with huge amounts of water can have a tendency for forming magnetite sediments. Therefore we recommend to use magnetite filter as a protection for the pump, which is inside the equipment.

- Install the filter unconditionally directly to the part of return pipe of the heat pump.

Heating systems, equipped mainly with thermostatic or electric controlled valves must have a permanent and sufficient water flow through the heat pump. Nominal volume of heating water flow must be guaranteed independently on the heating system.

Caution!	Danger of damage by residues in output and return pipe of the heating!

Residues like rests from welding, scaling, cannabis, cement, rust, coarse dirt and similar coming from the pipe can accumulate in the heat pump and cause faults.

- Before heat pump connection wash the heating system carefully in order to remove possible residues!

Caution!	Possible impact on function due to the air in the heat system!

Presence of air in the heat system causes faults and reduces the heat performance.

- Install venting valves on suitable points of the heat system.

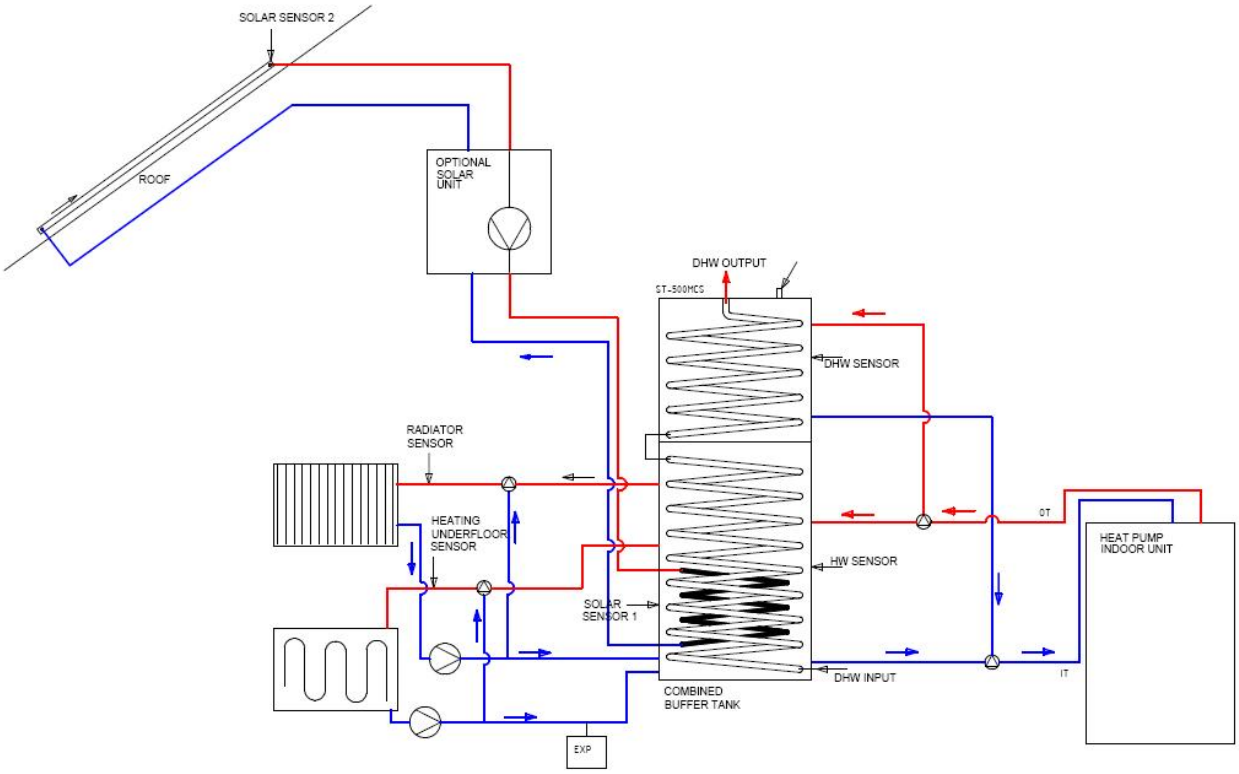
Ensure the minimal quantity of circulating water is guaranteed (minimal 30% of normal water flow).

Caution!	Danger of equipment and system damage due to the use of water with high content of calcium and magnesium!

Basic diagrams of water connections

Install hydraulic components according to the local requirements analogically to the following examples of hydraulic diagram. (This example of hydraulic diagram does not contain all closing and safety parts, necessary for professional installation.)

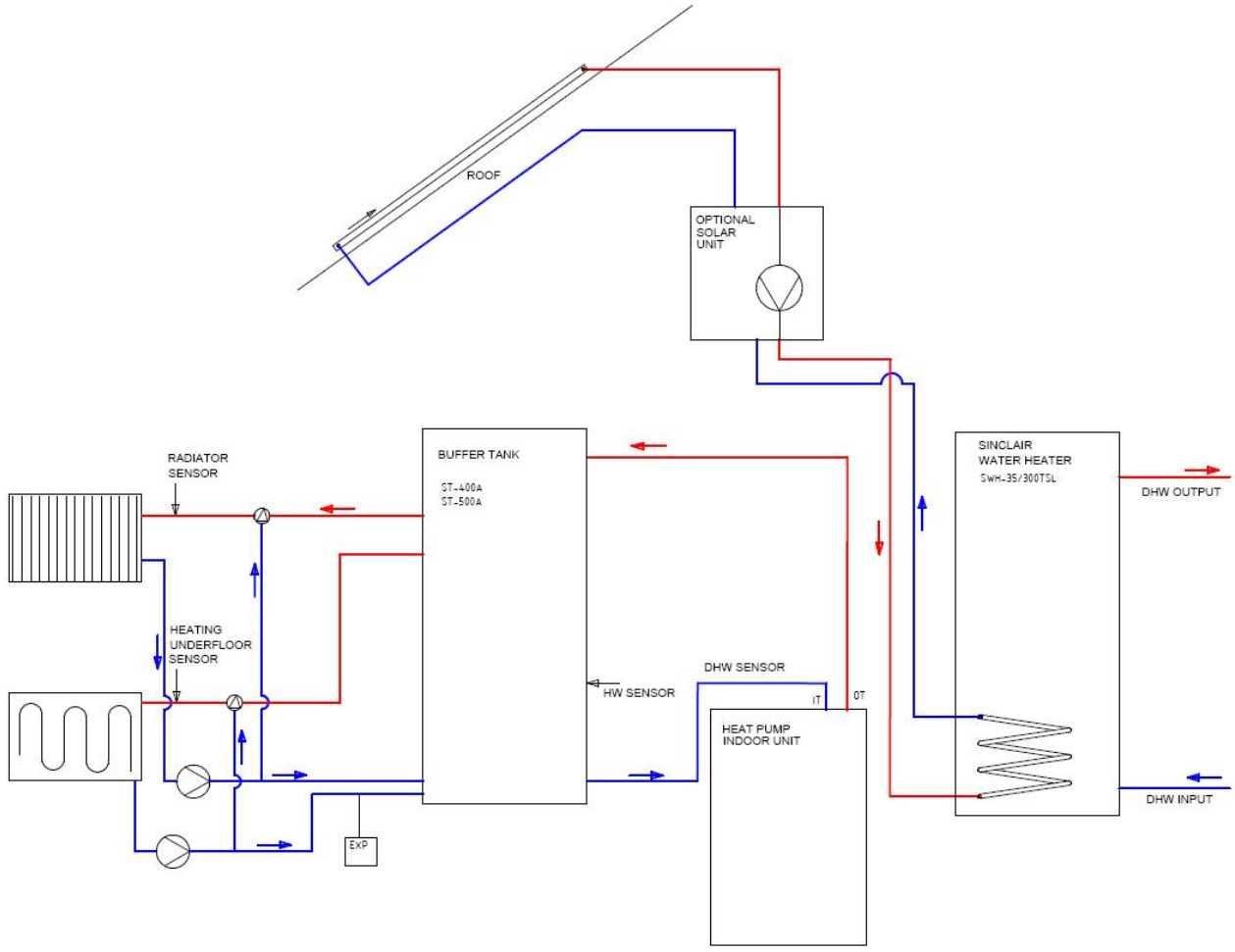
Version 1: Heat Pump with a Combined stainless flow water heater for DHW located in buffer tank for water for heating circuit.
This is the most complex solution - system consists of combined multipurpose free flow accumulation tank, which serves for heating of domestic hot water (DHW) and accumulation of hot water for heating and heating system, which consists of radiators and underfloor heating. Optional part can be heating using solar collector.



a) Simple buffer tank for heat pump for heating water circuit with the volume of 400, 500, 600L in PU foam insulation - very compact (we will deliver). The possibility to connect a solar exchanger. This buffer tank contains also stainless exchanger for DHW heating. Upper 1/3 of the tank provides DHW heating. Lower part of the tank provides DHW preheating.
b) 2 pcs of 3-way valve for switching between the upper 1/3 of the tank for DHW heating and between the lower 2/3 of the tank for heating circuit: ESBE series VRG 131/132 DN size of connection will be specified later.
c) Electronic control of 3-way valves for tank switching: ESBE series 641 (operation time 30 seconds).
d) Pump Grundfos for water circulation in radiators (if heating with radiators is installed).
e) 3-way valve for equitherm regulation of water temperature in radiators (if radiators are installed): ESBE series VRG 131/132 DN size of connection will be specified later.
f) Pump Grundfos for water circulation in underfloor heating (if underfloor heating is installed).
g) 3-way valve for equitherm regulation of water temperature in underfloor heating (if underfloor heating is installed). ESBE series VRG 131/132 DN size of connection will be specified later.

3-way valves for equitherm regulation of water temperature in radiators and in underfloor heating will be controlled exclusively by electronic control of the type: ESBE series 671 (operation time 240 seconds).
ATTENTION: this configuration cannot be used for cooling mode.

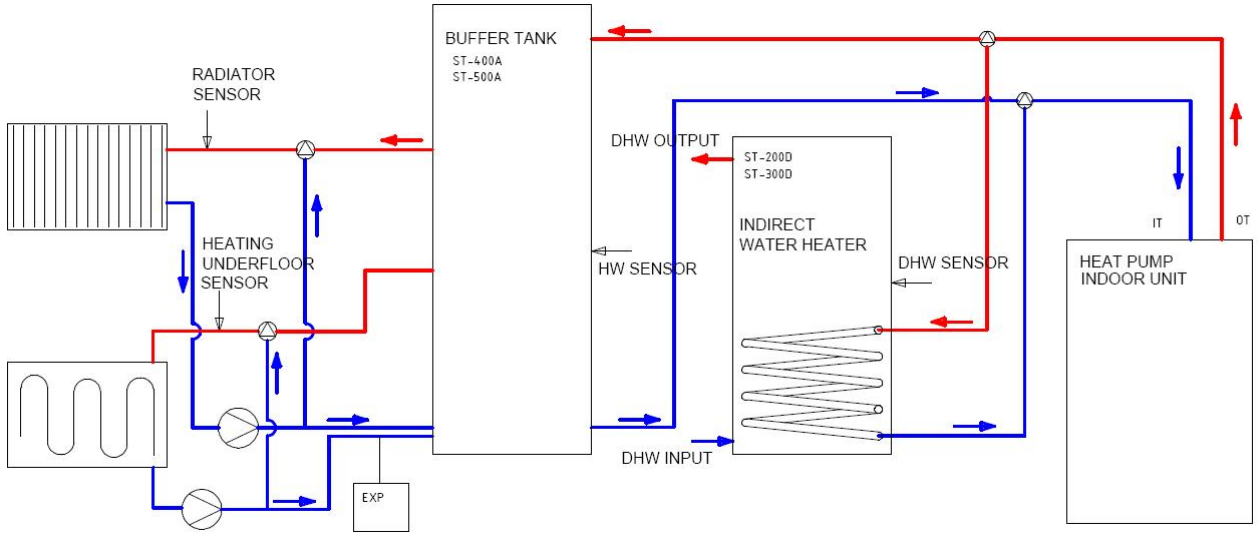
Version 2: Heat Pump + Sinclair water heater
System consists of accumulation tank for heating system (radiators and underfloor heating); optional solar heating can be also connected. Domestic hot water (DHW) can be then heated by a separate heater (e.g. SWH-15/190T or SWH-35/300TL) without solar heating or SWH-35/300TSL with the possibility of solar heating connection.



a) Simple buffer tank for heat pump for heating water circuit with the volume of 400, 500, 600L in PU foam insulation - very compact (we will deliver). The possibility to connect a solar exchanger.
b) Small Sinclair heat pump for independent DHW heating either with solar heating or without this.
c) Pump Grundfos for water circulation in radiators (if heating with radiators is installed).
d) 3-way valve for equitherm regulation of water temperature in radiators (if radiators are installed): ESBE series VRG 131/132 DN size of connection will be specified later.
e) Pump Grundfos for water circulation in underfloor heating (if underfloor heating is installed).
f) 3-way valve for equitherm regulation of water temperature in underfloor heating (if underfloor heating is installed). ESBE series VRG 131/132 DN size of connection will be specified later.

3-way valves for equitherm regulation of water temperature in radiators and in underfloor heating will be controlled exclusively by electronic control of the type: ESBE series 671 (operation time 240 seconds). This configuration can be used also for cooling mode. Different types of fan coils can be used as cooling units.

Version 3: Heat Pump with two Separate tanks
System consists of accumulation tank for heating system without the possibility of connecting to a solar heating connected with DHW tank with or without the possibility of connecting to a solar water heating.



a) Simple buffer tank for heat pump for heating water circuit with the volume of 400, 500, 600L in PU foam insulation - very compact (we will deliver). The possibility to connect a solar exchanger.
b) Separate DHW tank (supplier not known at this moment). Tank will have a capacity of 200 and 300 liters with the possibility of solar exchanger.
c) 2 pcs of 3-way valve for switching between DHW tank and tank for heating circuit. ESBE series VRG 131/132 DN size of connection will be specified later.
d) Electronic control of 3-way valves for tank switching. ESBE series 641 (operation time 30 seconds).
e) Pump Grundfos for water circulation in radiators (if heating with radiators is installed).
f) 3-way valve for equitherm regulation of water temperature in radiators (if radiators are installed): ESBE series VRG 131/132 DN size of connection will be specified later.
g) Pump Grundfos for water circulation in underfloor heating (if underfloor heating is installed).
h) 3-way valve for equitherm regulation of water temperature in underfloor heating (if underfloor heating is installed). ESBE series VRG 131/132 DN size of connection will be specified later.

3-way valves for equitherm regulation of water temperature in radiators and in underfloor heating will be controlled exclusively by electronic control of the type: ESBE series 671 (operation time 240 seconds). This configuration can be used also for cooling mode. Different types of fan coils can be used as cooling units.

 Caution!	Danger of damage caused by overpressure in heating circuit!

Overpressure can be created in heating circuit during operation.
Standard EN 12828 requires the installation of the following components to the heating system:

- Filling valve for filling and draining water to/from heating system (installed in the equipment during manufacturing).
- Diaphragm expansion tank in return pipe of heating circuit.
- Safety overpressure valve (minimum DN 20, opening pressure 3 bar) with pressure gauge (safety group) in the output from the heating circuit, directly behind the heat pump.
- Air/pollution separator in return pipe of the heating circuit.

 Danger!	Danger of injury caused by hot water or vapor!

Outlet pipe of safety valve serves for vapor and/or hot water release by overpressure.

- Install the outlet pipe to the safety valve output in such a way, so that persons are not in danger when vapor and/or hot water is released.

Install the outlet pipe to the frost-free environment and to the place, where it is all the time free accessible and in sight.

Refrigerant pipe connection

Installation can be done only by a qualified specialist!

1) During refrigerant pipe connection follow dimensions and connections drawings
2) Work in compliance with valid standards and regulations.
3) In order to prevent noise transfer, follow these instructions:
   - To prevent too rigid connection, do not install wall clamps for refrigerant pipe fixing too close to the heat pump.

Caution!	Danger of damage as a result of leaking!

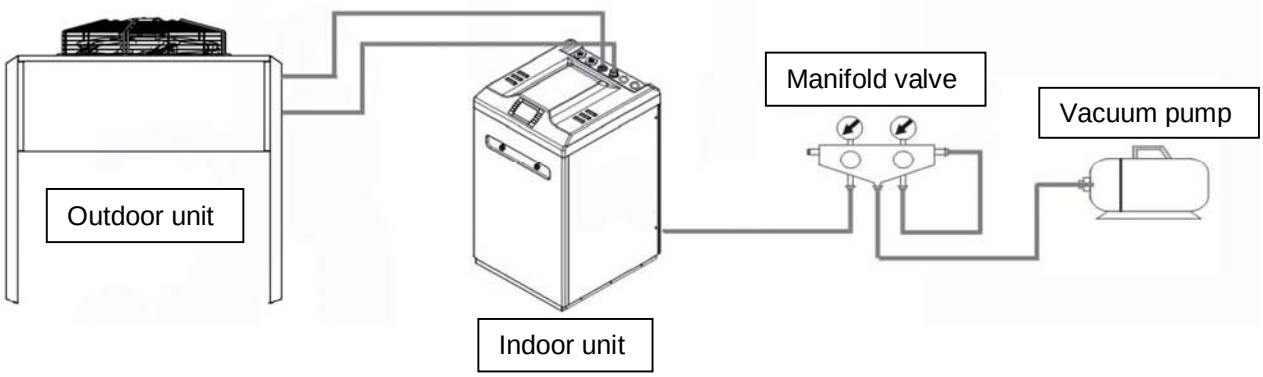
4) Copper pipe connection:

Try to keep the shortest distance between outdoor and indoor unit and use a minimum number of elbows and bends, as each of these components has impact on pressure decrease and thus lower efficiency.

a) Take off covers from gas/liquid outputs of the heat pump, make a flare end of the connecting pipe and connect to the heat pump.
b) Establish soldered connection of the 12/22 mm pipe between outdoor and indoor unit.

Attention: pipe length between outdoor and indoor unit must be shorter than 8 m and height difference must not be more than 3 m.

5) Leak check: after finishing installation and pipe connections, make a leak check. Using high pressure valve fill in nitrogen up to the pressure of 16 bar and leave inside the system for 20 hours. Then check the pressure which should not decrease.
6) Vacuum: unit is charged with refrigerant during manufacturing; after installing pipes between outdoor and indoor unit it is necessary to create vacuum.
   a) Take off cup from high pressure valve of the outdoor unit and connect manifold valve to the service valve.
   b) Connect vacuum pump to the manifold valve and then open to create vacuum in the heat pump. Ensure the absolute pressure is less than 30 Pa and remains for the period of 60 minutes.
   c) After finishing vacuuming open check valve and let refrigerant flow into outdoor unit.

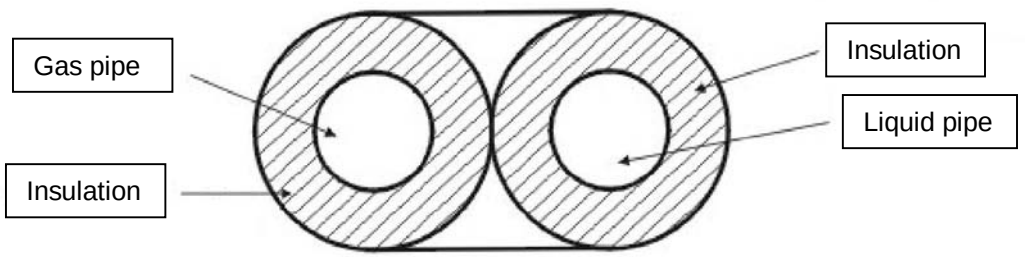


9) Pipe insulation

Illustration below shows how to make an insulation of connecting pipe with the material of 15 - 20 mm thickness.

In order to make manipulation easier, at first make the insulation of separate pipes and only then bind them not so strongly together; this insulation prevents forming frost by the effect of cold air.

10) Adding refrigerant: 115 g per 1 meter of pipe.



Electric components

General information

 Danger!	Danger of electric shock!

- Before starting electric installation work, disconnect always power supply for all circuits.
- Check there is no voltage present.
- Ensure the power supply is protected against unintentional switch on.

 Danger!	Danger of death by electric shock!

As a result of some electrostatic discharge processes on the fan motor of outdoor unit, touching some parts inside the equipment under certain operation conditions may cause electric shock.

- Take off the cover of outdoor unit electric box only after five minutes after switching off all poles of power supply.
- Take off the grill of outdoor unit only after five minutes after switching off all poles of power supply. Before that time never try to touch the fan.

 Caution!	Danger of damage due to unprofessional electrical installation!

Electrical installation can be done only by a qualified electrical specialist.

- Make the work related to the installation only in qualified and professional way.

 Caution!	Danger of short circuit!

If the insulation of indoor unit wires is stripped in the length of more than 30 mm and wires are not correctly fixed in connectors, this can cause short circuit on the printed circuit board.

- For safety reasons strip the insulation in the length of not more than 30 mm and ensure correct connection into terminals and connectors.

 Caution!	Danger of malfunction due to wrong power supply line!

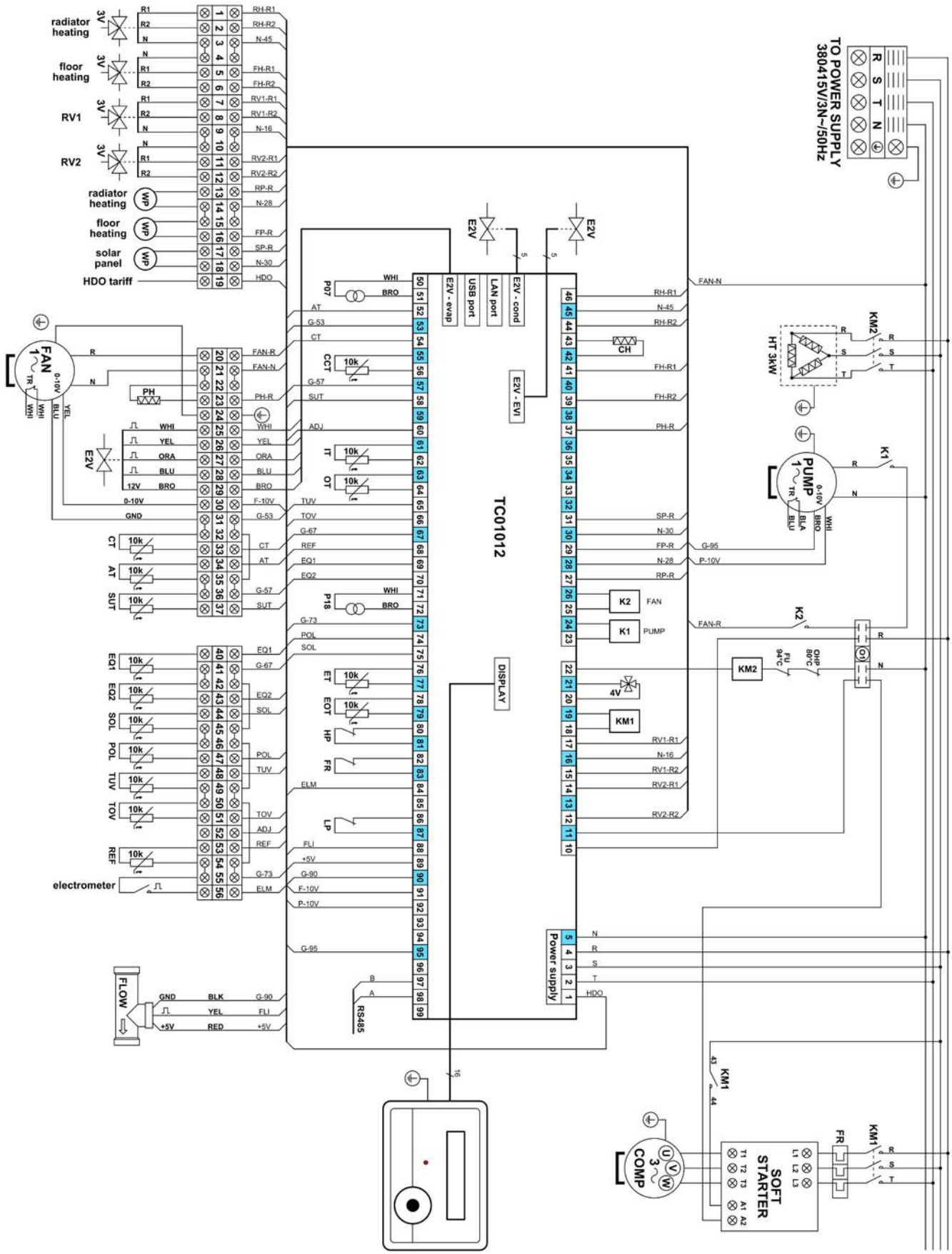
Wires of the outdoor temperature sensor and of other temperature sensors transfer only low voltage signals. Surrounding interference can get induced into sensor wires and consequently supply wrong information to the heat pump control unit.

- For that reason install low voltage lines, e.g. sensor wires in sufficient distance from power lines. If signal lines and power supply lines are laid in parallel, for the length of 10 m there must be a minimal distance between them at least 25 cm.

Installation instructions

- Necessary cross-sections of wires must be determined according to the values given in specification for maximal rated performance.
- In any case take into consideration real conditions on the installation place.
- Heat pump system must be connected with fixed power supply line.
- Disconnecting device must be installed in a close distance of the heat pump (indoor unit).
- Make the power supply of the unit with a separate 3-phase power supply line of 400 V with one neutral wire and one earthing wire.
- Power supply line must be protected with fuse of the value given in the specification.
- If local electric energy supplier prescribes to control the heat pump by a blocking signal, install corresponding switch prescribed by the electric energy supplier.
- Ensure the maximal length of sensor wires is not more than 10 m.
- If the length of connections is more than 10 m, it is necessary to lead power supply line and sensor lines, or bus-bar lines separately. If this is not possible, use shielded wires. Connect one side of the shielding to the body of heat pump electrical box.
- Free terminal boards of the heat pump must not be used as support terminals for other cables.
- Wiring diagram gives a comprehensive survey of all electrical connections of indoor and outdoor unit.
- Before starting the work on electrical connections check the rated voltage, indicated on nameplate is correct and then work exactly according to the wiring diagram.
- As a protection against danger of electric shock, it is necessary to make correct earthing of the unit.
- All connections must be done exactly in conformity with the electric wiring diagram. Wrong connection can cause malfunction or unit damage.
- Ensure no wires touch the refrigerant pipe, compressor, or any moving part of the fan.
- Any unauthorized modifications of internal connections can be rather dangerous. Manufacturer refuses the responsibility for any material damage or malfunctions, resulting from these modifications.
- Voltage range of 1-phase power supply is 207-253 V, voltage range of 3-phase power supply is 342-418 V. Voltage of power supply different from these values can damage the unit.
- Prescribed cross-sections of power supply wires differ country from country. Work in accordance with regulations and standards valid in your region. All electrical installation work must be done in conformity with valid standards and regulations.
- In order to avoid heat pump malfunction caused by electromagnetic disturbance, it is necessary to follow these recommendations:
- Signal lines between units must not be laid close to the power supply line.
- If units are installed in the area of close electric or electromagnetic disturbance, it is recommended to use shielded wires or twisted-pair wires as signal lines between the units.

Wiring diagram

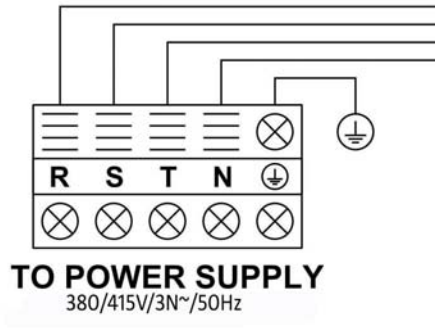


Complete electric wiring diagram

Power supply

- This is the heat pump wiring diagram at the time of delivery.
- Connect this power supply to the main power supply.
- Protection - 20A type C

Power supply terminal board

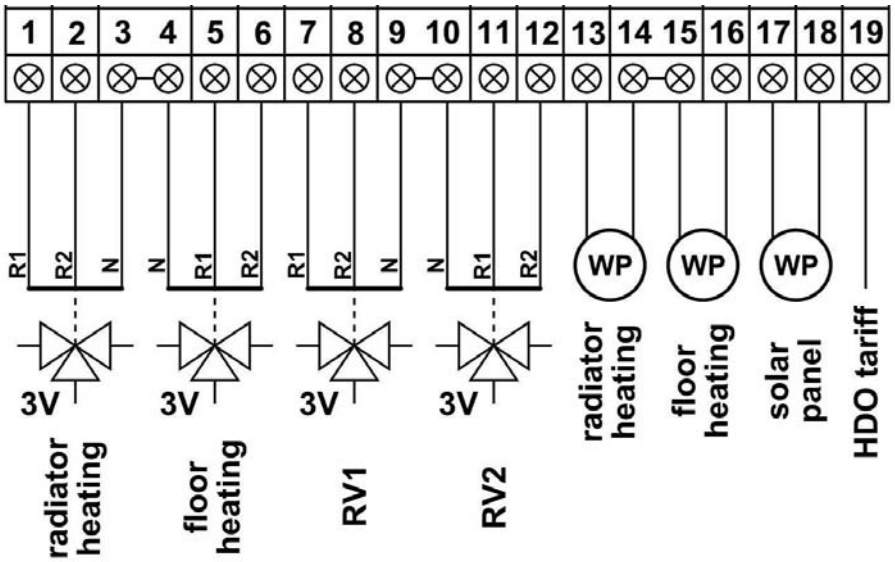


Communication cables

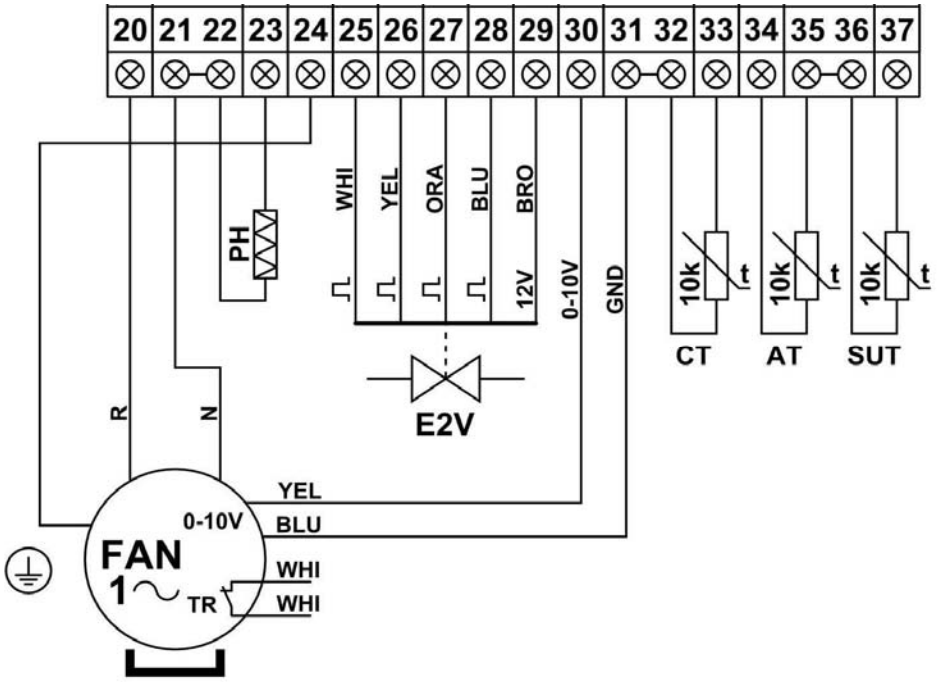
Recommendation for indoor and outdoor connections:
Input connections indoor/outdoor unit - RG-CYKY 4x1,5 mm^2
Communication connections indoor/outdoor unit -

- Step motor of expansion valve - KV J-Y/St/Y 4x2x0,8 mm2
- Control voltage for the fan and temperature sensors CT and AT - KV J-Y/St/Y 4x2x0,8 mm2

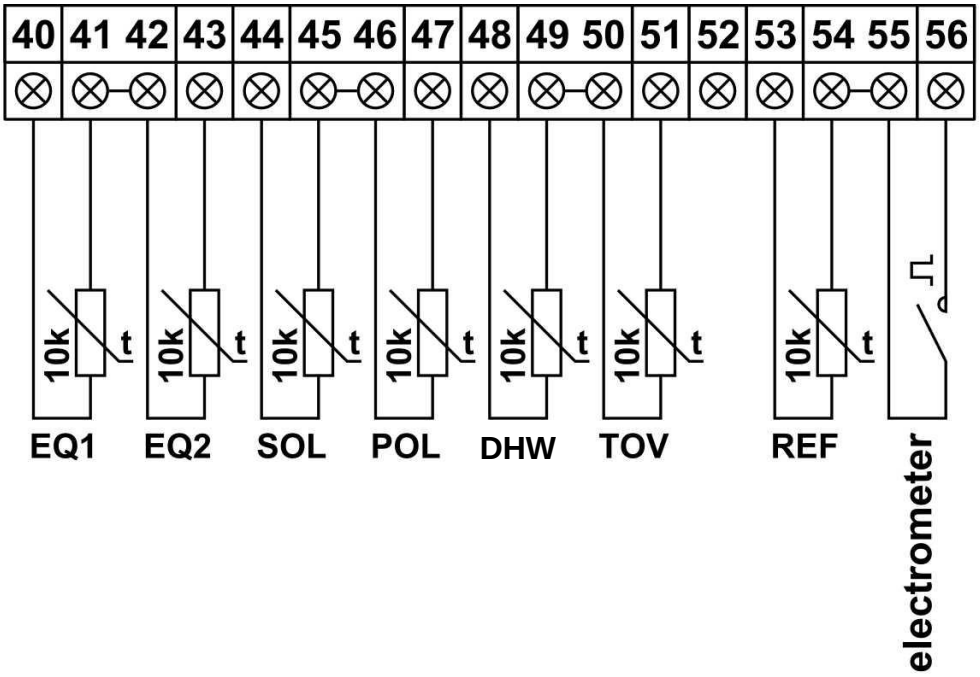
Recommended cable for indoor unit power supply - RG-CYKY 5x2,5 mm^2



Terminal board for connecting heating system components



(PH is not used)
Terminal board for connecting outdoor unit



Terminal board for connecting temperature sensors

Commissioning

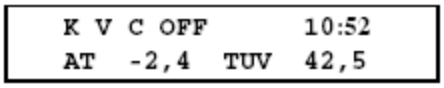
Danger!	Danger of injury when touching hot and cold parts of the unit!

Heat pump system can be put into operation only after assembling all parts of casing and after completing the heating circuit with all its components necessary for operation.

Before putting into operation, fill in the protocol related to putting into operation.
Heat pump system can be put into operation only after all points stated in protocol are implemented.
Putting into operation assumes the knowledge of heat pump operation as described in the Operation manual.

First operation start

Switch on fuse for the power supply of indoor and outdoor unit.
After switching heat pump on the unit runs a self test and after some 10 seconds there is a welcome message on the operation panel display. If real time clock was setup before and heat pump is not in an error state, after welcome message display the status of heat pump main parts is displayed in the upper row of the display together with a current time, the lower row displays selected temperatures. This is so called starting status of standby before any action by the operator.



All setting entries can be changed later.

Control

See also **Operation manual** S-therm+.

Automatic protection functions

External sensor check
Sensors for unit control are defined during commissioning based on the design of hydraulic connections. Heat pump makes a continuous automatic check if the sensors are installed and work properly.

Protection against lack of heating water
Analogue pressure sensor checks the amount of heating water and switches the heat pump off when water pressure on pressure gauge falls below 0,5 bar and switches the heat pump on, when water pressure on pressure gauge increases to 0,7 bar.

Protection against pumps and valve blocking
In order to prevent blocking of external pumps, as for example the circulation pump or switch-over valve for heating/tank warming, they are protected as follows: if the pump or valve are not in operation during the last 24 hours, they are successively switched on for 20 seconds every day.

Protection against too high water temperature in the heating system

Caution!	Danger of material damage due to a too high water temperature in underfloor heating!

Underfloor heating can be damaged by too high temperature of water in the heating.

- Set the temperature of water for underfloor heating to the value, which cannot cause any damage to the heated floor.

Phase check
Sequence and presence of all phases (right-turning field) of 400 V power supply are checked during the first operation start and continuously also during the operation. If the sequence is not correct or some phase fails, there comes to an emergency stop of the heat pump so that the compressor is protected against damage. To eliminate this error message by power distribution switch off by provider (blocking time), the contact of receiving control signal must be connected to the terminal 13 (wiring diagram 2 and 3).

Adjustable functions

With the help of control panel it is possible to set the following additional functions and to adjust the heating system to the conditions on the installation place, or to the demands from the side of provider.
User interface and heat pump adjustments are divide into three levels:

- Operator level - for the operator
- Service level - for the service engineer of installation company
- Manufacturer level - for the service engineer of heat pump manufacturer

For more details and procedures of adjustment see **Operation manual**

Vacuum check

On the first heat pump operation start make venting of the heating system using venting valves (they are not a part of heat pump delivery), installed by a specialist.
If warm water tank is also connected, make also venting of this tank.

- Open all outputs of warm water supply in the system and when warm water flows from all taps, system is vented and outputs can be closed.

Heat system hand over to provider

The operator of the equipment must be instructed about the operation and functions of the heat pump and about components of the system.
Hand over all manuals to the provided and inform that all documents related to the heat pump and remaining components should be kept on a safe place.
Operation manuals should be stored close to the heat pump. Highlight the necessity of regular inspections of the heat system and of the domestic hot water system.

 Caution!	Danger of material damage when deactivating parts for anti-freeze protection!

Inform the provider about the presumptions for the emergency mode and the automatic anti-freezing protection.
Fill in „Commissioning protocol“ - see appendix, undersign together with the provider/user and send to the manufacturer.

Service and maintenance

Checks

In order to guarantee safe and reliable operation, we strongly recommend to provide a qualified servicing of your heat pump.

 Danger!	Danger of injury and material damage as a result of ignored and unqualified inspections and maintenance!

Inspection and maintenance can be done only by qualified service engineers.

- Provide regularly inspection and maintenance work.

Inspection procedure

The following work must be done during annual inspection.

Indoor unit

 Danger!	Risk of electric shock!

- Before starting work on electrical installation and starting maintenance work switch off always all power supplies to the indoor and outdoor unit(s).
- Check the voltage in not present.
- Take necessary measures to prevent unintentional power supply switch on.

1) When cleaning the heat pump, do not use thinner, benzene or other aggressive cleaning solutions or powder, do not use water warmer than 40°C.
2) Cleaning can be done with a neutral soap or any non-aggressive common cleaner for the use in the kitchen. If you are not sure, ask service engineer to make the preventive maintenance.
3) Do not pour water on the control panel of the indoor unit, clean only with a dry and soft cloth.
4) Check regularly water supply and venting, so that there is no lack of water in the system. In some intervals check also the water filter, so that water of good quality is guaranteed. Shortage of water or dirt in the water can damage the unit.
5) Clean the heat exchanger.
6) Check individual parts of the unit and the pressure in the system. If some parts are defective, replace these and add the refrigerant as needed.
7) Check electric supply and electric system, check if individual electrical parts have no defects, if wire connections are correct. If any part does not work correctly or emits some smell, replace it in time.
8) Activate manually safety modules of the heating circuit.
9) Check the pressure in the heating circuit.
10) If the heat pump was over flooded, do not use it. Contact immediately a qualified specialist and let the heat pump be checked and repaired if necessary. Condensation can be formed during the heat pump operation. This condensation can be drained out through drainage holes on the lower part of the heat pump. If the air humidity is high, the amount of condensated water can increase. Remove any dirt, which could block condensate draining. Bigger volume of condensation water can be formed even during the unit operation. This amount of condensation is not a reason for possible claim. Condesated water can look like the water leaking from a swimming pool. You can simply confirm it is not the water from swimming pool by testing it with any tester for swimming pool water quality. Tested sample must not contain any presence of free Cl.

Outdoor unit

In order to guarantee all functions of S-THERM+ heat pump and unmodified state of approved serial product, only original spare parts can be used for maintenance and service work! List of original spare parts can be found in appendix.

a) Check if there is no dirt in heat exchanger air/refrigerant and clean if necessary.
b) Check if air input and output of the outdoor unit is free of obstacles and if necessary, ask the provider to remove coatings and similar obstacles (minimal distances).

As a result of temperature and air humidity changes it is normal that frost or ice is formed on the heat exchanger of the outdoor unit. Outdoor unit starts in normal mode the process of defrosting automatically.

1) Ensure the service panel is easy accessible.
2) Clean the casing with a soft sponge and warm water (max. 50 °C) and commercially available cleaning agents for household (without sharp particles) in form of water solutions up to the concentration of max. 2 %. Do not use any sanitary cleaning agents containing chlorine or ammonia!
3) Keep the area around the heat pump clean without any organic waste.
4) Remove plants near the heat pump so that there is enough free space available.
5) Take away any water sprayers which are near the heat pump. They could damage the heat pump.
6) Protect heat pump against rain water and snow to fall from the roof directly to the heat pump. Install proper draining of rainwater.
7) Removing the frost from the evaporator must not be done with a sharp object, otherwise the evaporator could be damaged. Frost can be removed using a flow of hot air with a maximum temperature of 50°C or with a mild flow of warm water with a maximum temperature of 50°C.
8) Cleaning of the outdoor unit can be done only with all casing mounted.
9) Outdoor unit is protected against splashing water and can be therefore cleaned with a soft stream of water.

 Danger!	Danger of death by electric shock!

As a result of some electrostatic discharge processes on the fan motor of outdoor unit, touching some parts inside the equipment under certain operation conditions may cause electric shock.

- Take off the cover of outdoor unit electric box only after five minutes after switching off all poles of power supply.
- Before that time never try to touch the fan.
- Take necessary measures to prevent unintentional power supply switch on.

Summary

The heat pump was so designed that it requires a minimal maintenance. This maintenance must be done once a year or as a result of inspection.

- Check and clean strainers in the heating circuit.
- Check the function of expansion valve in the heating circuit.
- By too low pressure in the heating circuit and water for heating.
- Check if provider removes in winter time regularly the snow from the air input and output side of the outdoor unit.

 Caution!	Danger of material damage as a result of unqualified cleaning!

1) After finishing inspection and revision of indoor and outdoor unit: put the heat pump again in the operation and check its fault-free operation.
2) When exchanging some sensor, it is necessary to replace it by the same type.

Troubleshooting

 Danger!	Danger of injury and material damage as a result of unqualified problem solving and troubleshooting!

System diagnostics and troubleshooting can be done only by a service engineer.

- Provide these tasks in a professional way.

In case of heat pump fault which cannot be solved immediately, it is necessary to know the message (error code) which is on the display; this message is helpful for the problem analysis and solving. **Operation manual** gives a survey of different types of problems and also instructions for the solution.

Common faults and troubleshooting

Localize exactly the fault and solve with the help of instructions below.
Problem solution should be done by a qualified service engineer.

Problem	Possible cause	Solution
Heat pump cannot be started	1 Fault in power supply 2 Loose power cable 3 Circuit breaker tripping	1 Switch the unit off and check power supply 2 Check the power cable and its connection 3 Find the reason of tripping and replace the fuse or switch the circuit breaker on
Operation of water pump is noisy and water is not circulating	1 Lack of water in the system 2 Air in the system 3 Water valves are closed 4 Water filter is dirty and water flow is blocked	1 Check water quantity and replenish 2 Make venting of water distribution 3 Open water valves 4 Clean water filter
Low capacity of heat pump, compressor runs continuously	1 Lack of refrigerant 2 Wrong insulation of water pipe 3 Low heat exchange ratio on the air exchange side 4 Insufficient water flow	1 Check there is no refrigerant leak and refill 2 Make a good pipe insulation 3 Clean heat exchanger on the air side 4 Clean water filter
High pumping of compressor	1 Too much refrigerant 2 Low heat exchange ratio on the air exchange side	1 Remove some refrigerant 2 Clean heat exchanger on the air side
Low pressure in the system	1 Insufficient water flow	1 Clean water filter and make venting of water distribution
Compressor is not running	1 Fault in power supply 2 Faulty compressor contactor 3 Loose power cable 4 Tripping of compressor protection 5 Wrong setting of return water temperature 6 Insufficient water flow	1 Check power supply 2 Replace compressor contactor 3 Make cable connection tight 4 Check compressor temperature 5 Make reset of return water temperature 6 Clean water filter and make venting of water distribution
Compressor too noisy	1 Liquid refrigerant does not come into the compressor 2 Faulty compressor	1 Wrong evaporation, find the reason of wrong evaporation and solve 2 Use a new compressor
Fan is not running	1 Faulty fan relay 2 Faulty fan motor	1 Replace fan relay 2 Replace fan motor
Compressor is running, but unit cannot reach heating or cooling capacity	1 Lack of refrigerant 2 Faulty heat exchanger 3 Faulty compressor	1 Check there is no refrigerant leak and refill 2 Find the reason and replace the heat exchanger 3 Use a new compressor
Low temperature of output water	1 Insufficient water flow 2 Low setting of water temperature demand	1 Clean water filter and make venting of water distribution 2 Make reset of water temperature demand
Low flow protection	1 Lack of water in the system 2 Faulty flow switch	1 Clean water filter and make venting of water distribution 2 Replace flow switch

Recycling and disposal

Heat pump system and all parts of accessories and transport packing are made mostly from materials which can be recycled and should not be disposed as a domestic waste.

Caution!	Danger to environment in case of unqualified disposal!

Unqualified disposal of refrigerant can cause environment pollution.

- Please secure the refrigerant is disposed only by qualified specialists.

Respect all valid national laws and regulations.

Icon on the product or in the accompanying documentation means that used electric or electronic products must not be disposed together with domestic waste. For the correct disposal of the product hand it over to a place for take-back, where it is collected free of charge. By correct disposal of the product you can help to preserve valuable natural resources and help in preventing potential negative impacts to environment and human health, which could be consequence of incorrect disposal of waste. Ask for more details from local authorities, nearest collection point, in Waste Acts of respective country, in the Czech Republic in Act no. 185/2001 Coll., in the wording of later regulations. In case of incorrect disposal of this waste, a fine can be imposed according to national regulations.

Packing disposal

Ensure the packing material for transport is disposed in accordance with local national regulations.

Disposal of refrigerant

Heat pump S-THERM+ (indoor unit) uses the refrigerant R 407 C.
Refrigerant must be disposed separated from the heat pump.
Refrigerant can be recycled or disposed only by qualified persons.

Danger!	Danger of injury caused by contact with refrigerant!

Leaking refrigerant can cause frostbites on affected areas.

- In case of refrigerant leak do not touch any part of the heat pump (indoor unit).
- Do not inhale fumes or gases, which come out from leaks in the refrigerant circuit.
- Prevent refrigerant contact with skin or intrusion into your eyes.
- When there is a refrigerant contact with a skin or intrusion into eyes, search for medical assistance.

Caution!	Danger of environmental hazard!

This heat pump contains refrigerant R 407 C. This refrigerant must never escape into the atmosphere. Refrigerant R407C is a fluorinated greenhouse gas with GWP 1653 (GWP = Global Warming Potential) covered by the Kyoto Protocol.

- Refrigerant can be disposed only by qualified persons.
- Before disposal of the heat pump, refrigerant in the system must be completely sucked up into a suitable container in order to have later the possibility to recycle or to dispose the refrigerant according to the valid standards and regulations.

Warranty terms and conditions:

Manufacturer provides product warranty under terms and conditions, which are stated in the Warranty certificate. Warranty certificate forms an integral part of product delivery and is valid under the condition that all data are filled in.

Warranty time is 5 years for indoor and outdoor unit from the date of the heat pump first installation. Manufacturer guarantees the delivery of spare parts for 10 years from the first installation of heat pump. All warranty repairs will be made by installation company or by the company, which is authorized by the manufacturer.

Service

Service and maintenance work can be done only by contracted service company, having the appropriate authorization. List of authorized companies is included with the product or can be found on a separate sheet, in the operational log book or in Warranty certificate.

The provider has the duty to keep track in the operational log book and provide cooling circuit leakage test (sample of registration book), provide maintenance and service of the whole equipment by inspection engineer once a year, as is compulsory for the air conditioning equipment containing more than 3 kg of F-gas in the section 29 paragraph 6 of the Act No. 86/2002 Coll. on air protection in the wording of later regulations and maintain a record on inspection (sample of inspection report find as appendix), which should be a part of Operational log book. Operational log book must be stored at the provider, in the best case in the machine room of the air conditioning equipment. It is recommended to keep copies of all sheets of operational log book.
Refrigerant quantity and service company or service engineer contacts are given in the technical specification of the unit, on the nameplate of the manufacturer or on a supplementary sheet.
Regular maintenance work, pre-seasonal putting into operation, filter replacement, coolers disinfection and adding of refrigerant will be done by the service company which made the installation.
Air conditioning equipment must not be filled with the refrigerant, which does not correspond with the data on compressor nameplate, nor the manufacturer´s technical conditions. In case of cooling equipment, refrigerant type should correspond with the nominal data on the nameplate. Mixing of different types of refrigerant inside the refrigerant circuit is not permitted under any circumstances. In case of equipment re-build for the usage of different refrigerant, see more details in Para 5.4. of the EN 378-4:2008 standard.

Operational log book (registration book)

Operational log book must contain the following data:

- Date of record
- Name, address
- Type and quantity of refrigerant in the equipment
- Date of maintenance work and name and address of company, which made the maintenance
- Survey of refrigerant quantity added into equipment during the last two years before the last inspection

Operational log book should contain these records:

- Type of work on the equipment (inspection, maintenance, repair)
- Faults and alarms related to the equipment
- Quantity, type and origin of added refrigerant
- Results of leak tests and all periodic test
- Change and replacement of equipment components
- Significantly long periods when the equipment was not in operation
- Name of the person who made given action
- Official stamp

Equipment must have a nameplate and must have operation instructions and documentation:

- Name of supplier or installing company
- Type of refrigeration system
- Identification number
- Type of refrigerant and charged quantity
- Date of inspection
- Date of commissioning

WARNING

Before starting heat pump installation ensure the power supply complies with the technical conditions of your heat pump. You can find more details on the nameplate on the equipment or in this manual.
Install recommended electrical protective devices in accordance with local regulations.
The heat pump must have a good earth connection so that you are protected against electric shock in case of possible short circuit inside the equipment.
This manual contains the complete wiring diagram.
For safety reasons do not make any non-approved heat pump modifications and do not make any repairs by yourself.
Do not insert any objects into the heat pump when in operation. These object can touch and damage the fan or cause some accident (mainly in presence of children).
Never operate heat pump without grill or protective covers, because this could cause an accident or abnormal unit operation.
If water enters inside the equipment, contact specialized service immediately.

Manufacturer:

Sinclair Corporation Ltd.
1-4 Argyll Street
London W1F 7LD, UK

Supplier, service and technical support:

Nepa, spol.s.r.o.
Purkyňova 45
612 00 Brno
Czech Republic
www.nepa.cz

Toll-free info line:
+420 800 100 285

APPENDIX:

Refrigerant material safety data sheet

R 407C

Safety data sheet reworked according to the ANNEX I of Commission Regulation (EU) No 453/2010.

SECTION 1: Identification of the substance/mixture

Chemical name / Synonym:	R 407C / Klea 66 / AC 9000
Trade name:	R 407C
Usage:	Refrigeration
Emergency telephone number:	Toxicological information center +420 224 919 293; +420 224 915 402

SECTION 2: Hazards identification

Classification according to the criteria in Regulation (EC) No 1272/2008 of the European Parliament and of the Council [CLP/GHS]

Hazard classes and categories	Standard phrases about the hazards	Classification process
Gas under pressure	H 280	Based on checked values

Standard phrases about the hazards:

a) Physical hazards: H 280: Contains gas under pressure; may explode if heated.

Additional remark: According to Dangerous Substances Directive (67/548/EEC) is not the substance classified as dangerous.

GHS04

Signal word: **WARNING**

Precautionary statements:

Storage: P 410 + P403: Protect from sunlight. Store in a well-ventilated place.

Additional information about the hazards (EU):

Characteristics related to the environment: Substance contains fluorinated greenhouse gases not covered by the Kyoto Protocol.

Cautions to human health and symptoms: Liquid contact could cause frostbites/burns. In high concentrations may cause asphyxiation. Warning: Vessel under pressure!

Specific hazards for humans and environment: Gas and its vapors are heavier than air. Danger of gas/vapors accumulation in cramped space, possibly also in hollows and spaces, which are located lower then neighboring surroundings (e.g. cellars).

SECTION 3: Composition/information on ingredients

Name of 1. component:	1,1,1,2-tetrafluorethan (R 134a)
CAS Registry Number:	811-97-2
EC Number (EINECS):	212-377-0
REACH Registry Number:	01-2119459374-33
Concentration:	50 - 54 %, resp. 500 - 540 g in 1 kg of product
Name of 2. component:	Pentafluorethane (R 125)
CAS Registry Number:	354-33-6
EC Number (EINECS):	206-557-8
Concentration:	23 - 27 %, resp. 230 - 270 g in 1 kg of product
Name of 3. component:	Difluormethane (R 32)
CAS Registry Number:	75-10-5
EC Number (EINECS):	200-839-4
Concentration:	21 - 25 %, resp. 210 - 250 g in 1 kg of product
Classification according to 67/548/EC:	F+; R 12

Classification of components according to the criteria in Regulation (EC) No 1272/2008 [CLP/GHS]:

CAS Registry Number	EC Number (EINECS)	Component name	Concentration [% hm.]	Classification according to the criteria in Regulation (EC) No 1272/2008 [CLP/GHS]
811-97-2	213-377-0	1,1,1,2-tetrafluorethane (R 134a)	50 - 54	Gas under pressure, H 280
354-33-6	206-557-8	Pentafluorethane (R125)	23 - 27	Gas under pressure, H 280
75-10-5	200-839-4	Difluormethane (R 32)	21 - 25	Gas under pressure, H 280 Extremely flammable gas, category 1, H 220

REMARK: According to the criteria in Regulation (EC), product requires no labeling.

SECTION 4: First aid measures

General measures: Take off all contaminated clothing.
Ensure protection and security of the person, providing first aid.
Seek medical advice immediately.

Inhalation: Immediately move to fresh air and place in recovery position. Seek medical advice.
If breathing is stopped: administer artificial respiration with respiration bags (Ambu-bag) or with help of equipment for artificial respiration. Seek medical advice.

Eye contact: Flush eyes with large amounts of water for several minutes.
Remove contact lenses, if present and easy to do. In case there is contact only with one eye, protect non-injured eye during flushing appropriately. Continue rinsing. Seek medical advice.

Skin contact: In case of skin contact wash immediately with large amounts of warm water and if possible, take off contaminated clothing. Possible frostbites wash with lukewarm water at least 15 minutes – do not take off clothing. Apply a sterile bandage and call a physician.

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

Advice for a physician: In case of breathing smoke/fume during fire with leak of this product, or in case of breathing products of decomposition, always give at first a dose of corticoid spray, e.g. Ventolair or Pulmicort (Ventolair and Pulmicort are registered trademarks).

SECTION 5: Firefighting measures

Suitable extinguishing media: Product itself is not flammable, choose the one most appropriate for type of surrounding fire.

Unsuitable extinguishing media: Strong water spray

Specific hazard of the substance or mixture:
If involved in a fire the following toxic fumes may be produced by thermal decomposition. Forming of explosive mixtures with air.
Example: Carbon oxides (CO)
Hydrogen fluoride (HF)
Carbonyl fluoride

Special protective equipment for firefighters:
Wear self-contained breathing apparatus.
Use personal protective equipment protecting the whole body.

Further information: Cool down the containers/equipment exposed to heat with water spray. Fire or intense heat may cause violent rupture of packages.

SECTION 6: Accidental release measures

Personal precautions: Evacuate personnel from place of release and prevent entry of unauthorized persons.
Keep persons in a safe distance and stay on the near side of wind (outside air blow direction). Inform the nearest surroundings.

Personal protective equipment: Protective clothing covering the whole body, leather gloves, respiration equipment.

Chemical and physical measures: Keep pressure vessel outside sources of heat/open fire, on a good ventilated a cold place.

Environmental precautions:	If possible, stop product release. Prohibit release into the environment - drainage, surface water and soil. Using appropriate method enclose the place of release and prohibit expansion (e.g. floating barrages etc.). Leaking gas/vapor/fog spray with water stream.
Disposal instructions:	Provide sufficient ventilation. After spraying with water stream collect created „mixture“ by a suitable sorbent (e.g. sand, sawdust, universal binder, silica). Affected place and rests wash with water; finally dispose in accordance with local regulations.
Supplementary precautions:	For details to personal protective equipment see Section 8. For details to disposal see Section 13.

SECTION 7: Handling and storage

Precautions for safe handling:	Ensure adequate ventilation and local exhaust on the workplace, and also in floor area (refrigerant R 407C is heavier than air). Protect pressure vessels from falling/tipping over. Open valves slowly, in order to minimize output pressure. Prohibit penetration of substance from system back into pressure vessel. Keep reducing valves free off grease and oil, protect against humidity. Use the substance only in closed systems. Ensure all equipment of the system is connected correctly and tightly.
Basic principles for work:	When working with the substance, always use personal protective equipment described in Section 8. Do not eat, drink and smoke on the workplace.
Measures for protection against fire and explosion:	Product is not flammable.
Conditions for safe storage:	Store separately from other substances in original and closed packing. Warehouse must have a good ventilation (inclusive emergency ventilation), must be dry with a temperature up to max. + 50 °C; it must be equipped with first aid kit, personal protective equipment and must be protected against access of unauthorized persons. Store pressure vessel in upright position. Protect from heat.
Usable materials:	Standardized steel, carbon steel, hardened steel, aluminum alloy, stainless steel.
Precautions for common storage:	Do not store together with flammable materials. Do not store together with food. Do not store together with feed.
Stability during storing:	When maintaining all conditions for storage and handling is the product stability unlimited.
Specific final usage:	Product can be used in accordance with Regulation (EC) No 842/2006 related to some fluorinated greenhouse gases.

SECTION 8: Exposure controls/personal protection

Products components, which are necessary to monitor - limits of exposure: *none*

Engineering measures:	Ensure adequate ventilation and local exhaust on the workplace, and also in floor area (refrigerant R 407C is heavier than air).
Personal protective equipment:	
a) Respiratory protection:	Self-contained breathing apparatus in case of high concentration. For the case of emergency use, have mask of self-contained breathing apparatus always in ready position. In case of rescue action or during maintenance work in a warehouse, always use self-contained breathing apparatus, as there is a hazard of suffocation, because oxygen can be squeezed out from air by refrigerant.
b) Eyes protection:	Additionally wear a face shield where the possibility of increased hazard exists.
c) Hands protection:	Wear chemically resistant protective gloves, leather gloves, possibly also gloves of PVA type.
d) Skin protection:	Protective clothing, safe work shoes.

Exposure limitation:

Persons:	When working with refrigerant, have always breathing mask with proper filter in ready position. Use self-contained breathing apparatus always when entering area with stored refrigerant and do not take off, until you are sure the air in the area is clean. Always use personal protective equipment and respect general rules for work with chemical substances. Do not breath gases/fumes/aerosol.
Environment:	Prohibit release of substance into environment - drainage, surface water and soil. Product contains fluorinated greenhouse gas, covered by Kyoto protocol.
Hygienic measures:	Do not eat, drink, smoke and blow your nose on the workplace. Wash your hands before the break and after finishing the work.

SECTION 9: Physical and chemical properties

Appearance:	liquefied gas	
Color:	colorless	
Odour /smell:	ether-like	
Value of pH:	not applicable	
Melting point:	- 100 °C	
Boiling point:	- 43,6 °C	*(at pressure of 1013 hPa)*
Ignition temperature:	685 °C	
Evaporation rate:	not available	
Flammability:	non flammable	
Upper/lower explosive limits:	non explosive	
Vapour pressure:	10350 hPa at 20 °C	
Vapour density:	3,59	*(relative; air = 1)*
Relative density:	1,133 g/cm^3 at 25 °C	*(liquid phase)*
Solubility(ies):	in water less soluble	*(in solvents not available)*
Partition coefficient n-octanol/water:	cca. 0,97	
Auto-ignition temperature:	704 °C	
Decomposition temperature:	not available	
Viscosity:	0,1516 mPa.s	*(dynamic, at 25 °C)*
Explosive properties:	non explosive	
Oxidizing properties:	not oxidizing	
Other information:	Gas/vapours are heavier than air.	

SECTION 10: Stability and reactivity

Reactivity:	Decomposes hazardous gases if close to fire.
Chemical stability:	Under normal conditions the product is chemically stable.
Hazardous reactions:	Reaction with alkali metals. Reaction with alkaline earth metals.
Conditions to avoid:	Avoid open flames and high temperatures - danger of explosion (or rupture of packaging as a result of increasing pressure inside the vessel). Prohibit access of moisture.
Hazardous decomposition products:	Carbon oxides Fluorofosgene by contact with open fire or glowing objects. Hydrogen fluoride
Thermal decomposition:	No decomposition when respecting handling conditions.

SECTION 11: Toxicological information

Acute inhalation toxicity:	LC50: > 2085 mg/l, exposure 4 hours (rat) (*value for 1. component of refrigerant - gas R 134a*)
Skin corrosion/irritation:	Slight eye irritation - no special labeling required (rabbit) (*value for 1. component of refrigerant - gas R 134a*) No skin irritation; by contact danger of frostbites.
Sensitization:	Does not cause respiratory system sensitization (laboratory animals) Does not cause skin sensitization (laboratory animals).
Germ cell mutagenicity:	Tests on mammalian cell cultures did not show mutagenic effects.
Carcinogenicity:	Not classifiable as a human carcinogen even after long exposure.
Reproductive toxicity:	No toxicity to reproduction.
STOT - single exposure:	not determined
STOT - repeated exposure:	not determined
Known issues:	Gas has stifling effect.

SECTION 12: Ecological information

Toxicity: Acute toxicity for aquatic organism*

LC50, fish:	450 mg/l	exposure 96 hours	*(Oncorhynchus mykiss)*
EC50, daphnia:	980 mg/l	exposure 48 hours	*(Daphnia magna)*
EC50, algae:	not available		
EC10, bacteria:	> 730 mg/l	exposure 6 hours	*(increase Ps. Putida)*

* *value for 1. component of refrigerant - gas R 134a*

Persistence and degradability: Prohibit emission into atmosphere. ODP: not available GWP: not available

Bioaccumulative potential: not available

Mobility in soil: not available

Bioaccumulation of oxygen: not available

Chemical accumulation of oxygen: not available

Other adverse effects: Use in accordance with Regulation (EC) No 842/2006 related to some fluorinated greenhouse gases.

SECTION 13: Disposal considerations

Waste treatment methods: When used in refrigeration, no hazardous waste created. Empty pressure vessels should be returned to the supplier for refilling.

Method of deactivation: Secure sufficient ventilation. Disposal - see Section 6.

Method of deactivation of contaminated package:
Pressure vessels not in compliance with actual legislative requirement can be considered as contaminated metal packages. After deactivation of rests of substance in manufacturing base and afterwards washing out with huge quantity of water can be metal packages classified as secondary raw material - scrap-iron.

Waste catalogue:

Waste key	Waste name
14 06 01*	chlorofluorocarbons, HCFC, HFC

Waste marked with * are considered to be hazardous waste as declared in Council Directive 91/689/EEC on hazardous waste.

Recommendation to the product: Dispose as hazardous waste. Product disposal must be carried out in compliance with Act no. 185/2001 Coll., in the wording of later regulations.

SECTION 14: Transport information

UN number: UN 3340

UN proper shipping name: REFRIGERANT GAS R 407C (difluoromethane, pentafluoroethane and 1,1,1,2 - tetrafluoroethane, zeotrope mixture with cca 23 % difluoromethane and 25 % pentafluoroethane)

Road transport ADR/RID:

Transport hazard class(es):	2.2	
Classification number:	2A	
Hazard Identification Number:	20	(Kemler Code)
Packing group:	-	
Limitations:	(C/E)	
Name/description:	REFRIGERANT GAS R 407C	
UN number:	3340	

Maritime/river transport IMDG:

Transport hazard class(es):	2.2
Pollution category:	No (No Marine Pollutant - substance is not considered to be water pollutant)
Ems regulation:	F-C, S-V
Name/description:	REFRIGERANT GAS R 407C
UN number:	3340

Air transport ICAO/IATA-DGR:

Transport hazard class(es):	2.2
Name/description:	REFRIGERANT GAS R 407C
UN number:	3340

SECTION 15: Regulatory information

Related regulations:	Act no. 356/2003 Coll., in the wording of later regulations and on an amendment to certain other acts Act no. 258/2000 Coll., in the wording of later regulations and on amendments to other acts Act no. 185/2001 Coll., in the wording of later regulations Regulation (EC) No 1907/2006 of the European Parliament and of the Council [REACH] Regulation (EC) No 1272/2008 of the European Parliament and of the Council [CLP/GHS] Regulation (EC) No 453/2010
Chemical Safety Assessment:	Made by substance manufacturer
Other information - summary:	Product contains fluorinated greenhouse gas, covered by Kyoto protocol.

VOC standard product specification (content of volatile organic substances):

≥ 99%, at temperature of 20 °C and pressure of 10350 hPa

SECTION 16: Other information

Recommended usage and limitations:	It is necessary to comply with valid national and local laws related to the usage of chemical substances. Product can be used in accordance with Regulation (EC) No 842/2006 related to some fluorinated greenhouse gases.
Other information:	All data in Material Safety Data Sheet are valid for pure substance. Become acquainted with Usage Guide on etiquette or leaflet, supplied with the delivery. The information provided in this Safety Data Sheet is correct to the best of our knowledge and belief at the date of its publication. The information given is designed only as a guide and is not to be considered a warranty or quality specification. Real conditions of product processing at subsequent/final user is out of reach of our supervision and inspection. Subsequent/final user takes the responsibility for keeping all laws regulations.
Technical information supply:	Distributor ´s address
Reason for revision:	Rework of Safety Data Sheet according to Regulation (EC) No 453/2010 in accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council [CLP/GHS].

R-phrase related to the substance mentioned in Section 3:

R 12: Extremely flammable.

S-phrase related to hazards of the substance mentioned in Section 3:

H 220: Extremely flammable gas.

H 280: Gas under pressure; may explode when heated.

Resistance table of temperature sensors

Table temperature/resistance for NTC CAREL sensors 10kΩ

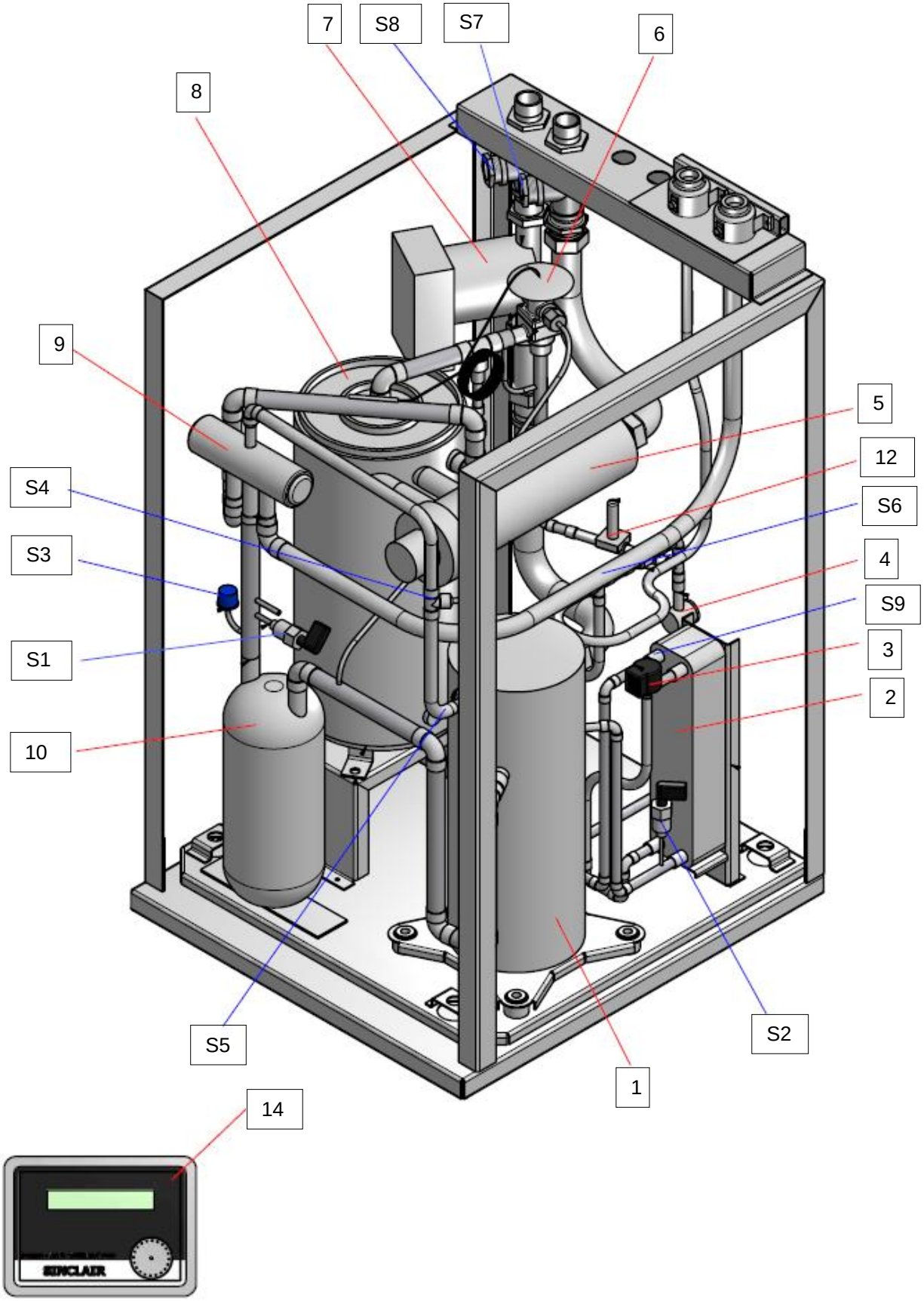
Temp.	Resistance			Temp.	Resistance			Temp.	Resistance		
	Max.	Std.	Min.		Max.	Std.	Min.		Max.	Std.	Min.
°C	kΩ	kΩ	kΩ	°C	kΩ	kΩ	kΩ	°C	kΩ	kΩ	kΩ
-50	344,40	329,20	314,70	1	26,64	26,13	25,52	56	3,49	3,42	3,35
-49	324,70	310,70	297,20	2	25,51	25,03	24,55	57	3,39	3,31	3,24
-48	306,40	293,30	280,70	3	24,24	23,99	23,54	58	3,28	3,21	3,14
-47	289,20	277,00	265,30	4	23,42	22,99	22,57	59	3,18	3,11	3,04
-46	273,20	261,80	250,60	5	22,45	22,05	21,66	60	3,09	3,02	2,95
-45	258,10	247,50	237,20	6	21,52	21,15	20,78	61	2,99	2,92	2,86
-44	244,00	234,10	244,60	7	20,64	20,29	19,95	62	2,90	2,83	2,77
-43	230,80	221,60	212,70	8	19,80	19,40	19,15	63	2,81	2,75	2,69
-42	218,50	209,80	201,50	9	19,00	18,70	18,40	64	2,73	2,66	2,60
-41	206,80	198,70	191,00	10	18,24	17,96	17,67	65	2,65	2,58	2,52
-40	195,90	188,40	181,10	11	17,51	17,24	16,97	66	2,57	2,51	2,45
-39	185,40	178,30	171,59	12	16,80	16,55	16,31	67	2,49	2,43	2,37
-38	175,50	168,90	162,00	13	16,13	15,90	15,87	68	2,42	2,36	2,30
-37	166,20	160,10	154,10	14	15,50	15,28	15,06	69	2,35	2,29	2,24
-36	157,50	151,80	140,20	15	14,89	14,68	14,48	70	2,28	2,22	2,17
-35	149,30	144,00	138,80	16	14,31	14,12	13,93	71	2,21	2,16	2,10
-34	141,60	136,60	131,80	17	13,75	13,57	13,40	72	2,15	2,10	2,04
-33	134,40	129,70	125,20	18	13,22	13,06	12,89	73	2,09	2,04	1,98
-32	127,60	123,20	118,90	19	12,72	12,56	12,41	74	2,03	1,98	1,93
-31	121,20	117,10	113,10	20	12,23	12,09	11,95	75	1,97	1,92	1,87
-30	115,10	111,30	107,50	21	11,77	11,63	11,57	76	1,92	1,87	1,82
-29	109,30	105,70	102,20	22	11,32	11,20	11,07	77	1,86	1,81	1,78
-28	103,80	100,40	97,16	23	10,90	10,78	10,60	78	1,81	1,76	1,71
-27	98,63	95,47	92,41	24	10,49	10,38	10,27	79	1,76	1,71	1,68
-26	93,75	90,80	87,93	25	10,10	10,00	9,90	80	1,71	1,66	1,62
-25	89,15	86,39	83,70	26	9,73	9,63	9,52	81	1,66	1,62	1,57
-24	84,82	82,22	79,71	27	9,38	9,28	9,18	82	1,62	1,57	1,53
-23	80,72	78,29	75,93	28	9,04	8,94	8,84	83	1,57	1,53	1,49
-22	76,85	74,58	72,36	29	8,72	8,62	8,52	84	1,53	1,49	1,44
-21	73,20	71,07	68,99	30	8,41	8,31	8,21	85	1,49	1,45	1,40
-20	69,74	67,74	65,80	31	8,11	8,01	7,91	86	1,45	1,41	1,37
-19	66,42	64,54	62,72	32	7,82	7,72	7,62	87	1,41	1,37	1,33
-18	63,27	61,52	59,81	33	7,55	7,45	7,35	88	1,37	1,33	1,29
-17	60,30	58,66	57,05	34	7,28	7,19	7,09	89	1,34	1,30	1,26
-16	57,49	53,39	51,97	35	7,03	6,94	6,84	90	1,30	1,26	1,22
-15	54,83	53,39	51,97	36	6,79	6,69	6,60	91	1,27	1,23	1,19
-14	52,31	50,96	49,83	37	6,56	6,46	6,37	92	1,23	1,20	1,16
-13	49,93	48,65	47,12	38	6,33	6,24	6,15	93	1,20	1,16	1,13
-12	47,67	46,48	45,31	39	6,12	6,03	5,94	94	1,17	1,13	1,10
-11	45,53	44,41	43,32	40	5,92	5,82	5,73	95	1,14	1,10	1,07
-10	43,50	42,25	41,43	41	5,72	5,63	5,54	96	1,11	1,08	1,04
-9	41,54	40,56	39,59	42	5,53	5,43	5,35	97	1,08	1,05	1,01
-8	39,68	38,76	37,85	43	5,34	5,25	5,17	98	1,05	1,02	0,99
-7	37,91	37,05	36,20	44	5,16	5,08	4,99	99	1,03	0,99	0,96
-6	36,24	35,43	34,02	45	4,99	4,91	4,82	100	1,00	0,97	0,94
-5	34,65	33,89	33,14	46	4,83	4,74	4,66	101	0,98	0,94	0,91
-4	33,14	32,43	31,73	47	4,67	4,59	4,51	102	0,95	0,92	0,89
-3	31,71	31,04	30,39	48	4,52	4,44	4,36	103	0,93	0,90	0,87
-2	30,35	29,72	29,11	49	4,38	4,30	4,22	104	0,91	0,87	0,84
-1	30,00	28,47	27,89	50	4,24	4,16	4,08	105	0,88	0,85	0,82
0	27,83	27,28	26,74	51	4,10	4,02	3,95	106	0,86	0,83	0,80
				52	3,97	3,90	3,82	107	0,84	0,81	0,78
				53	3,84	3,77	3,69	108	0,82	0,79	0,76
				54	3,72	3,65	3,57	109	0,80	0,77	0,74
				55	3,61	3,53	3,46	110	0,78	0,75	0,73

Table temperature/resistance for NTC CAREL sensors 50kΩ

Temperature	Typical resistance	Min. resistance	Max. resistance	% Tolerance		°C Tolerance	
°C	kΩ	kΩ	kΩ	Min.	Max.	Min.	Max.
-40	1630,77	1559,17	1705,49	-4,39	4,58	0,66	-0,69
-35	1178,11	1130,05	1228,08	-4,08	4,24	0,64	-0,66
-30	860,97	828,44	894,68	-3,78	3,92	0,61	-0,64
-25	636,08	613,91	658,99	-3,49	3,6	0,59	-0,61
-20	474,78	459,57	490,44	-3,2	3,3	0,56	-0,57
-15	357,83	347,35	368,59	-2,93	3,01	0,53	-0,54
-10	272,18	264,93	279,59	-2,66	2,73	0,49	-0,51
-5	208,83	203,81	213,96	-2,41	2,45	0,46	-0,47
0	161,56	158,08	165,1	-2,15	2,19	0,43	-0,43
5	125,97	123,56	128,41	-1,91	1,94	0,39	-0,4
10	98,96	97,3	100,63	-1,67	1,69	0,35	-0,36
15	78,29	77,16	79,43	-1,44	1,45	0,31	-0,31
20	62,37	61,61	63,13	-1,22	1,22	0,27	-0,27
25	50	49,5	50,5	-1	1	0,23	-0,23
30	40,34	39,85	40,83	-1,21	1,22	0,29	-0,29
35	32,73	32,27	33,2	-1,42	1,43	0,34	-0,35
40	26,71	26,28	27,15	-1,62	1,64	0,4	-0,41
45	21,92	21,52	22,32	-1,81	1,84	0,46	-0,47
50	18,08	17,72	18,45	-2	2,03	0,53	-0,53
55	14,99	14,66	15,32	-2,19	2,22	0,59	-0,6
60	12,48	12,19	12,78	-2,36	2,41	0,65	-0,67
65	10,44	10,18	10,72	-2,54	2,59	0,72	-0,74
70	8,78	8,54	9,02	-2,71	2,77	0,79	-0,81
75	7,41	7,2	7,63	-2,87	2,95	0,86	-0,88
80	6,28	6,09	6,48	-3,03	3,12	0,93	-0,95
85	5,34	5,17	5,52	-3,19	3,28	1	-1,03
90	4,56	4,41	4,72	-3,34	3,45	1,07	-1,11
95	3,91	3,78	4,05	-3,49	3,61	1,15	-1,18
100	3,37	3,24	3,49	-3,64	3,76	1,22	-1,26
105	2,91	2,8	3,02	-3,78	3,92	1,3	-1,35
110	2,52	2,42	2,62	-3,92	4,06	1,38	-1,43
115	2,19	2,1	2,28	-4,05	4,21	1,46	-1,51
120	1,91	1,83	1,99	-4,18	4,35	1,54	-1,6
125	1,67	1,59	1,74	-4,31	4,5	1,62	-1,69
130	1,46	1,4	1,53	-4,44	4,63	1,7	-1,78
135	1,28	1,22	1,34	-4,56	4,77	1,79	-1,87
140	1,13	1,08	1,19	-4,68	4,9	1,87	-1,96
145	1	0,95	1,05	-4,8	5,03	1,96	-2,06
150	0,89	0,84	0,93	-4,91	5,16	2,05	-2,15

Exploded views and Parts list

Indoor unit - list of spare parts			
Name	Position	Quantity	Parts code
Compressor	1	1	
Exchanger (economizer)	2	1	
Electric expansion valve	3	1	
Check window	4	1	
Electric heater (bivalent source)	5	1	
Thermostatic expansion valve	6	1	
Water (circulation) pump	7	1	
Tube heat exchanger	8	1	
4-way valve	9	1	
Liquid separator	10	1	
Strainer	11	1	
Non-return valve	12	3	
Flow meter	13	1	
Display	14	1	
Pressure gauge	S1	1	
Pressure gauge	S2	1	
Pressure switch	S3	1	
Pressure switch	S4	1	
Temperature sensor	S5, S6, S7, S8, S9	5	
Control board	15	1	
Relay	16	1	
Contactor	17	1	
Thermal relay	18	1	
Soft starter	19	1	
Terminal board	20	3	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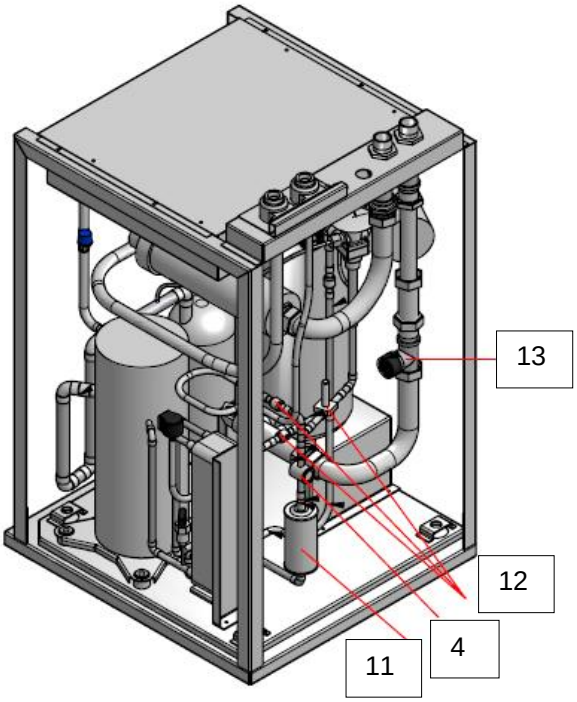
S5
S2
1
14
SINCLAIR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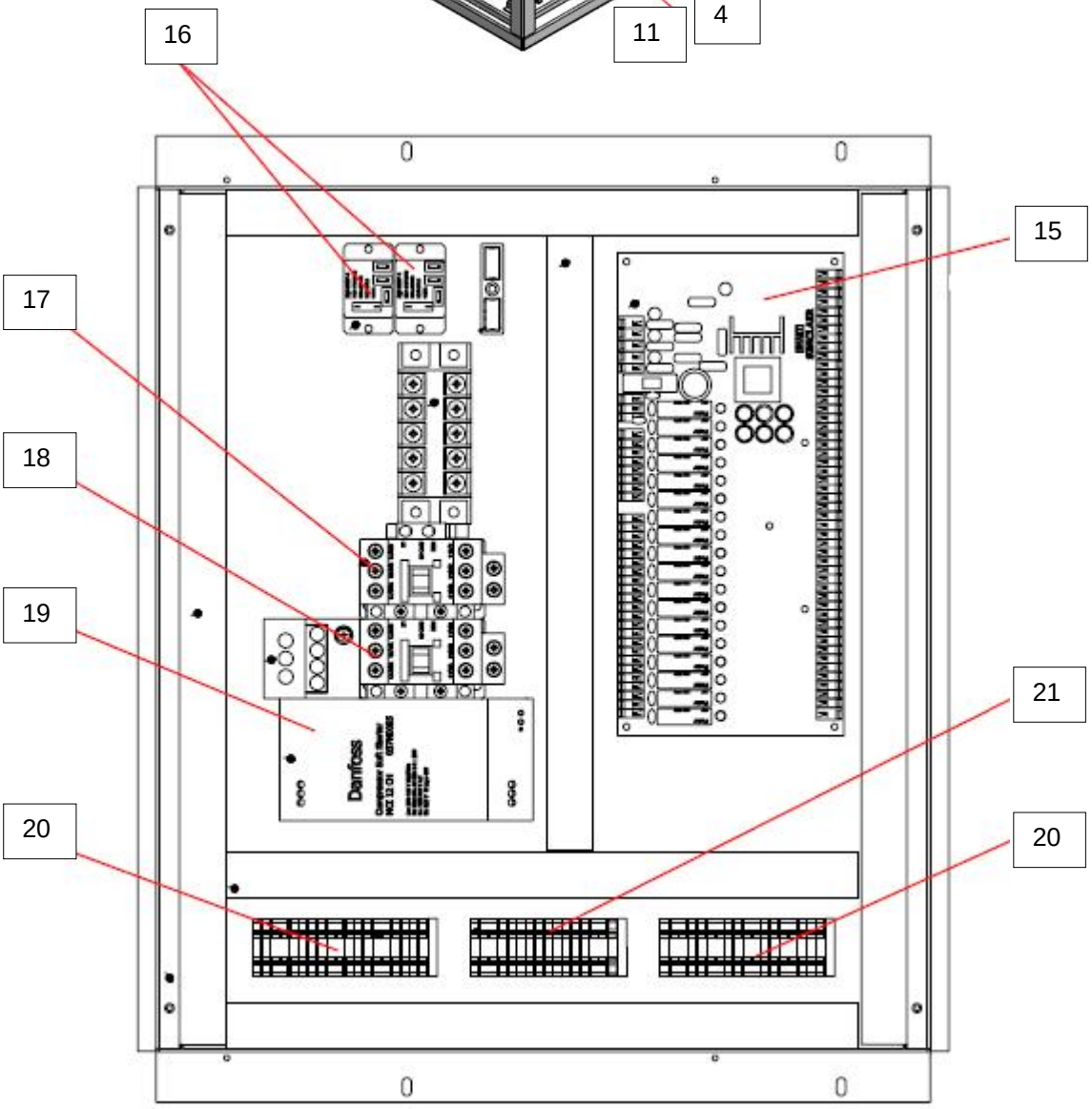
16
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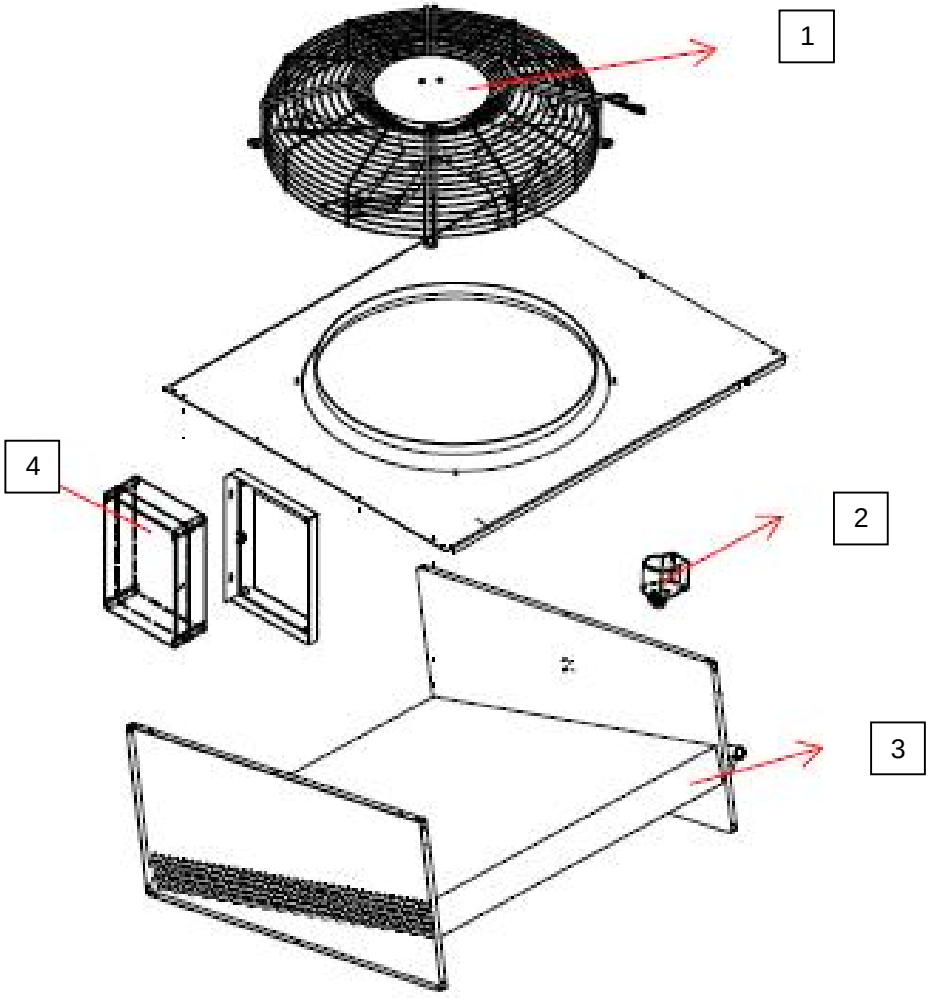
Danfoss

Outdoor unit - list of spare parts			
Name	Position	Quantity	Parts code
Fan	1	1	
Electric expansion valve	2	1	
Evaporator	3	1	
Terminal board	4	1	
Check valve	5	1	



NEPA, SPOL. S R.O., PURKYŇOVA 45, 612 00 BRNO
TEL: +420 800 100 285, FAX: +420 541 590 124
www.nepa.cz, tepelnacerpadla@nepa.cz

COMMISSIONING PROTOCOL - HANDOVER PROTOCOL

After Heat Pump installation please fill in this protocol and send latest within 14 days
to the address: Nepa spol. s r.o., Purkyňova 45, 61200, Brno

Model and Heat pump serial number:	**Date of handover:**
Customer/provider of equipment:	**Contractor:**
Surname, name:	Contact person:
Street, No.:	Street, No., ZIP:
ZIP code:	Telephone, fax:
Telephone, fax:	Email:

System details and equipment inspection: (add the value or check the box)

Location:

Ventilation (type, number, area m^2):

Refrigerant circuit:		**Heating circuit:**	
Pipe installation:	☐	Pipe installation:	☐
Leak check:	☐	Component installation:	☐
Vacuuming:	☐	System flushing:	☐
Charged:	☐	Charging:	☐
Added…….kg, total……kg:	☐	Leak check:	☐
Pipe insulation:	☐	Venting:	☐
	☐	Insulation:	☐

Component installation:

(recommendation - usage of heat system components depends on the system design)

Charging valve:	☐	Filter:	☐
Safety valve for cold water…….bar:	☐	Expansion tank…….liters:	☐
Safety valve of expansion tank…..bar:	☐		☐

Electrical installation:

Circuit breaker nameplate check:	☐	Earthing:	☐
Power supply:	☐	Revision made:	☐
Indoor and outdoor unit communication:	☐		☐

Provider/user got explanations about functions of Heat Pump and its controlling: ☐

User obtained Warranty certificate: ☐

I hereby declare, I made Heat Pump settings according to provider/user demand.
I declare the Heat Pump was installed correctly according to technical documentation.
I truthfully checked and marked items in the protocol.

Date:

---------- ----------

Provider/user signature Service engineer signature

Declaration of Conformity

pursuant to Act 22/1997 Coll., Section 13 (2), as amended,
and pursuant to Government Regulation 163/2002 Coll., Section 13, as amended

Manufacturer: SINCLAIR Corporation Ltd
London W1F 7LD, United Kingdom

Product identification data:
Air/water heat pump, SINCLAIR
S-THERM+
SHP-180ERC + SHP-180IRC
SHP-140ERC + SHP-140IRC

Product description and identification:
The **SINCLAIR S-THERM+ heat pump,** specially designed for operation of air/water system, is a so-called "split" unit consisting of an outdoor and an indoor unit and utilising R-407C refrigerant. The outdoor unit is placed on a base frame outdoors and the indoor unit is a stand-alone type for indoors. The units are connected by el. cabling and copper piping. The heat pump is used for heating/cooling of water.

Description of method applied for conformity assessment:
The assessment of the appliance sample has been conducted in accordance with Section 7 of Government Regulation163/2002 Coll.

List of technical regulations and harmonized Czech technical standards applied in the conformity assessment:

- STO-30-00685-12 of 2012-11-05, Act 22/1997 Coll. on technical requirements for products and on amendments to certain Acts, ČSN EN ISO 13857:2008, ČSN EN 378-2+A1:2009, ČSN EN 378-4:2008, ČSN EN ISO 13732-1:2009, ČSN EN 953+A1:2009, ČSN EN 14511-2:2012, ČSN EN 14511-3:2012, ČSN EN 14511-4:2012, ČSN EN ISO 12100:2011, ČSN 06 0310:2006, ČSN 06 0320:2006, ČSN 06 0830:2006, ČSN 06 1008:1997, ČSN ISO 9614-2:1997, ČSN EN 60335-1 ed.2:2003, ČSN EN 60335-2-40 ed.2:2004, ČSN EN 62233:2008, Government Regulation 163/2002 Coll., Government Regulation 272/2011 Coll., Act 22/1997 Coll. as amended, Act 185/2001 Coll. on waste, Act 477/2001 Coll. on packaging, Act 634/1992 Coll. as amended, and Act 258/2000 Coll. on protection of public health and amendments to some related Acts.

Data concerning the Authorized Body involved in conformity assessment:
Strojírenský zkušební ústav, s.p (Engineering Test Institute, Public Enterprise), Authorized Body 202, Hudcova 424/56b, 621 00 Brno, Czech Republic, ID No. 00001490, which issued Final Report 30-11691 of 2012-11-15 and Certificate B-30-00692-12 of 2012-11-15.

Manufacturer's certification:
The Manufacturer, SINCLAIR Corporation Ltd, hereby confirms that the characteristics of the products comply with the essential requirements of Government Regulation 163/2002 Coll. as amended, and of the technical standards and regulations specified above. The products are safe under the conditions of standard use determined by the Manufacturer. The Manufacturer has adopted measures to assure conformity of the marketed products with technical documentation and essential requirements. The Manufacturer has adopted all the necessary measures to ensure that the manufacturing process, including final inspections and testing of finished product, assures uniformity of production and conformity of the products with the types described in the Certificate and with the applicable essential requirements.

Issued in Brno on 25.2.2013

sinclair
SINCLAIR CORPORATION Ltd.
1-4 Argyll Street, London W1F 7LD
United Kingdom

Name and position of the Manufacturer's authorized representative, and signature

EC Declaration of Conformity

Pursuant to Directive 2006/95/EC of the European Parliament and of the Council (Government Regulation 17/2003 Coll. that lays down technical requirements for low voltage electrical equipment) and pursuant to Directive 2004/108/EC of the European Parliament and of the Council (Government Regulation 616/2006 Coll. that lays down technical requirements for products with regard to their electromagnetic compatibility)

Manufacturer:
SINCLAIR Corporation Ltd
London W1F 7LD
United Kingdom

Authorized representative:
Fill in the identification data if an authorized representative has been appointed

Product:
Air/water heat pump, SINCLAIR
S-THERM+
SHP-180ERC + SHP-180IRC
SHP-140ERC + SHP-140IRC

Description:
The SINCLAIR S-THERM+ heat pump is designed for operation of air/water system. It is a so-called "split" unit consisting of an outdoor and an indoor unit and utilising R-407C refrigerant. The units are connected by el. cabling and copper piping. The heat pump is used for heating/cooling of water.

The equipment conforms to all relevant provisions of the following regulations:
- Directive 2006/95/EC of the European Parliament and of the Council (Government Regulation 17/2003 Coll.)
- Directive 2004/108/EC of the European Parliament and of the Council (Government Regulation 616/2006 Coll.)

List of harmonized standards applied in the conformity assessment:
- ČSN EN 60335-1 ed.2:2003 - Electrical appliances for domestic use and similar purposes - Safety - Part 1: General requirements
- ČSN EN 60335-2-40 ed.2:2004 - Household and similar electrical appliances - Safety - Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers
- ČSN EN 62233:2008 Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure
- ČSN EN 55014-1 ed.3:2007 - Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission
- ČSN EN 55014-2:1998 - Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity – Product family standard
- ČSN EN 61000-3-2 ed.3:2006 Electromagnetic compatibility (EMC) - Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
- ČSN EN 61000-3-3 ed.2:2009 - Electromagnetic compatibility (EMC) - Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
- ČSN EN 61000-6-3 ed.2:2007 - Electromagnetic compatibility (EMC) - Part 6-3: Generic standards – Emissions – Residential, commercial and light industry environment

The last two digits of the year in which the CE marking was affixed to the product: 12

In Brno, date 25.2.2013

sinclair
SINCLAIR CORPORATION Ltd.
1-4 Argyll Street, London W1F 7LD
United Kingdom

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Name, position and signature of the person authorized by the Manufacturer
or
Name, position and signature of the authorized representative