ideal HEATING

INSTALLATION & SERVICING

ECOMOD 290HT HEAT PUMP
AHP-70-65
65 kW

When replacing any part on this appliance, use only spare parts that you can be assured conform to the safety and performance specification that we require. Do not use reconditioned or copy parts that have not been clearly authorised by Ideal Heating.

For the very latest copy of literature for specification and maintenance practices visit our website idealheating.com where you can download the relevant information in PDF format.

00U08138950-C
29-01-2026

CONTENTS

Symbols used in this document

	INFORMATION:	This symbol draws attention to comments.
	CAUTION:	Failure to comply with these instructions may cause damage to the installation or to other objects.
	DANGER:	Failure to comply with these instructions may cause electrocution.
	DANGER:	Failure to comply with these instructions may cause injury and serious damage to property.

The purpose of this manual and how to use it

The purpose of this manual is to provide the information required for the transport, handling, storage, installation and use of the monobloc R290 Heat Pump (HP) to which it refers. Anyone using the appliance should first familiarise themselves with the contents of this document.

Caution: any operation performed on the appliance may only be carried out by personnel duly trained and qualified for said operation.

After installation or maintenance operations, the qualified operator must inform the end operator/user of future maintenance to be carried out on the appliance.

This manual describes the appliance in its condition at the time of its sale. It therefore complies with latest developments in terms of safety and functionality.

The Ideal Heating is not obliged to perform an update of the appliance following developments that may arise after the sale of this appliance.

This manual must always be present and kept with the appliance to which it refers. It should be kept in a safe, clean, dry place that can be easily accessed by any operator required to work on the appliance.

1. REGULATIONS, RECOMMENDATIONS AND WARNINGS

1.1. Regulatory compliance

This outdoor unit has been designed in compliance with the regulations in force, and must be used within the framework of those regulations. In particular, it complies with the Machinery Directive, the Pressure Equipment Directive, and the Electromagnetic Compatibility Directive. It has also been designed in accordance with the Directives relating to eco-design and energy labelling.
This device and its R290 refrigerant fluid must be handled in compliance with the application orders of the Decree 2007/737. Caution, this is type A3 fluid Suitable measures must be taken, some of which are mentioned later on in this chapter.
It must be installed in compliance with local or national regulations, and in accordance with standard EN 378-3 relating to the installation of heat pumps.
The electrical installation must be conducted in accordance with the prevailing regulations in the country of installation. In particular, in France: standard NF C 15-100.
The hydraulic connection must be made in compliance with the national or local regulation.
The instructions given below apply to any person working on the appliance.

- The product is classed as category III under the Pressure Equipment Directive (2014/68/EU)

CAUTION: **This appliance requires the intervention of qualified personnel, possessing a certificate of capacity for the handling of refrigerant fluids as well as training in the specificities and precautions to be taken related to products equipped with R290 refrigerant fluid.**

1/2 00U08109610/A

[1] ideal HEATING

DECLARATION UE DE CONFORMITE
UE DECLARATION OF CONFORMITY

CE

[2] Pompe à chaleur Air/Eau Monobloc
Monoblock Air to Water heat pump

[3]	Modèle	Unit Model	**ECOMOD 290 HT AHP70-65**
[4]	Type	Type	**AHP70-65**
[5]	Catégorie DESP	Category PED	**III**
[6]	Côté basse pression	Low pressure side	**PS : -1...18 bar - Tsmax : 55°C - Tsmin : -30°C**
[7]	Côté haute pression	High pressure side	**PS : -1...29.5 bar - Tsmax : 130°C - Tsmin : -30°C**

[8]	Fluide frigorigène	Refrigerant	**R290**
[9]	Groupe de Fluide	Fluid group	**PED Group 1**
[10]	Classe de sécurité	Safety Class	**EN 378-1 category A3**

[11] Le fabricant, GUILLOT INDUSTRIE SAS - 124 route de Fleurville, 01190 Pont-de-Vaux France,
déclare sous sa seule responsabilité que la machine est conforme aux directives CEE suivantes, et à la législation nationale d'accueil
The Manufacturer, GUILLOT INDUSTRIE SAS - 124 route de Fleurville, 01190 Pont-de-Vaux France,
declares under its sole responsability that the machine complies with the following EEC directives, and the relevant national regulations

[12]	**2014/68/UE**	concernant la mise à disposition sur le marché des équipements sous pression relating to the marking available on the market of pressure equipment	[13]	Normes harmonisées Harmonised standard	EN 378-2:2016, EN 14276-1:2020, EN 14276-2:2020

[14] Par référence à l'organisme notifié / Reference to Notified Body
BUREAU VERITAS Service SAS - 4 Place des Saisons - 92400 - Courbevoie
Module B : CE-0062-PED-B3.2-GLO 001-24-FRA Rev-B
Module D : CE-0062-PED-D-GLO 001-24-FRA Rev-A

[15] Module d'évaluation de la conformité des composants pour la directive 2014/68/UE
Components directive 2014/68/UE conformity evaluation modules

[16]	Compresseurs / Compressors	Cat. III (B+C2)	Tuyauterie / Piping	Cat. I (A)	[23]
[17]	Condenseur / Heat Exchanger	Cat. II (B+D)	Tuyauterie / Piping	Cat. II (D1)	[23]
[18]	Evaporateur / Evaporator	Cat. I	Pressostats / Pressure switches	Cat. IV (B+D)	[24]
[19]	Bouteille Liquide/ Separator	Cat. II (D1)	Soupape / Pressure relief valve	art 4.3	[25]
[20]	Filtres / Filters	art 4.3	Circulateur / Circulation pump	art 4.3	[26]
[21]	Vanne 4 voies / 4 way Valve	Cat. II (D1)	Purgeur / Air Vent	art 4.3	[27]
[22]	Détendeur / Expansion valve	art 4.3	Débimètre / Flow Meter	art 4.3	[28]

[29]	**2006/42/UE**	Relative aux machines On machinery	[13]	Normes harmonisées Harmonised standard	EN 378-2:2016, EN 60204-1:2018
[30]	**2014/35/UE**	Relative aux matériels electriques employés dans certaines limites de tension Relating to electrical equipment for usage within certain voltain limits	[13]	Normes harmonisées Harmonised standard	EN 60204-1:2018
[31]	**2014/30/UE**	Relative à la compatibilité électromagnétique Relating to electromagnetic comtatibility	[13]	Normes harmonisées Harmonised standard	NF EN IEC 61000-6-1:2019 NF EN IEC 61000-6-8:2020 NF EN 61000-3-12:2012 NF EN 61000-3-11:2019
[32]	**2009/125/CE**	Relative à l'éco-conception applicables aux produits liés à l'énergie Relating to ecodesign requirements for energy-related products	[13]	En conformité avec le règlement In conformity with regulation	N°813/2013
[33]	**2011/65/UE**	Relative à la limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques Relating to the restriction of the use of certain hazardous substances in electrical and electronic equipment	[13]	Normes harmonisées Harmonised standard	

[34] Le représéntant Légal et la personne autorisée à constituer le dossier technique
The Legal Representative and the person authorized to compile the technical file

1.2. Recommendations and warnings

CAUTION:

Before any operation, and upon delivery of the unit, check its condition. If the appliance or its packaging has been damaged, or if it is evident that the appliance has been tilted, check for an R290 fluid leak using a suitable device.

1.2.1. Transport and storage

Storage

Store the appliance in a vertical position in a place where the temperature is between -10°C and +50 °C and the relative humidity is between 5 and 95%.

Do not stack.

Protect from humidity.

The R290 in Ecomod heat pumps is contained in a sealed circuit. These monobloc HPs are charged at the factory and are subject to numerous normative requirements (traceability of components, numerous functional and leak tests, etc.). However, in exceptional cases, handling damage may occur and the refrigerant fluid may then be released.

Risk prevention

We recommend the presence of a person trained in the risks related to R290. As this gas is odourless, it is necessary to keep a portable propane detector (with a sensitivity of 3g/year of refrigerant fluid or better) on any site where our Ecomod HPs are stored.

Indoor storage is allowed, however we recommend storage in warehouses where the following two conditions are met:

- the warehouse has at least two diametrically opposed openings (windows/doors, etc.) that can be used as natural ventilation in the event of an incident,
- it is possible to cut off all electrical sources in an area of 6 metres in the event of an incident (from the ground up to a height of 1.4m).

Otherwise, forced ventilation of the storage area is recommended.

In all cases, there must be no potential sources of ignition within a 6-metre radius of the stored products (from the ground up to a height of 1.4m).

If there is a gutter or a wastewater manhole near a leak, there is a risk that the propane will accumulate and stagnate despite ventilation.

Do not remove the packaging and sheet metal panels from the unit.

Transport and handling

In Europe, the transport of dangerous goods is regulated by the ADR (Agreement on the Transport of Dangerous Goods by Roads). These provisions also apply within borders. The Ecomod appliances are not subject to the ADR due to their R290 charge (less than 12kg per machine).

In order to minimise the risk of accident, it is necessary to respect the transport recommendations provided on the product leaflet.

We recommend the presence of a suitable ATEX zone 2 lamp (in case the load in the trailer needs to be checked).

The unit must not be in a horizontal position during transport or handling. Transport in a horizontal position may damage the appliance by moving the refrigerant fluid and/or damaging the compressor's suspensions.

When handling and transporting this appliance, care must be taken to handle it carefully, avoiding any impact or friction with surrounding objects. Damage caused by transportation in a horizontal position is not covered by the warranty.

1.2.2. Unpacking the appliance

With the carrier present, carefully check the general appearance of the packaging and the appliances. Check that the outdoor unit has not been placed in a horizontal position.

In the event of a dispute, write to the carrier within 48 hours mentioning all reserves and send a copy of this letter to the ADV department of the Ideal Heating.

Before unpacking the appliance, check that there are no refrigerant fluid leaks using a suitable detector. Check that there are no ignition sources near the unit.

Smoking is forbidden near to the unit.

If it is dropped or knocked, make the area safe and inspect it for a leak.

1.2.3. R290 refrigerant fluid safety data sheet (Class A3)

The handling and installation of this outdoor appliance must only be performed by personnel that are duly trained, qualified and authorised to carry out these operations, according to the laws, directives and standards applicable in each country.

CAUTION:

In the absence of local building codes or safety standards, the installation and maintenance of the machine may follow the elements outlined in this EN 378 standard; in particular, it is the responsibility of the installer or the operator carrying out operations on this machine to perform a risk analysis prior to any installation and any work on the machine.

The elements indicated below are not exhaustive given the diversity of the possible installations and interventions; they cannot be considered as an undertaking as to the responsibility of the Ideal Heating. These elements cannot replace a risk analysis, which remains the responsibility of the installer and the personnel working on the machines.

Designation	R290
INDICATION OF DANGERS	
Main dangers:	**Highly flammable and explosive class A3 fluid.** R290 vapours are heavier than air and can cause asphyxiation due to an oxygen concentration level reduced to a level at which the fluid can stagnate.
Specific dangers	Contact with R290 fluid in liquid form can cause frostbite.
FIRST AID MEASURES	
General information	In case of a high concentration, the fluid can cause asphyxiation. Loss of mobility and/or consciousness are characteristic symptoms. A narcotic effect may be observed at a lower concentration level.
Inhalation	Wear a self-contained breathing apparatus, and transport the victim to an uncontaminated location. Use oxygen or artificial respiration if required. Keep victim in a prone position and warm. Call a doctor.
Contact with the eyes	Rinse thoroughly with water for at least 15 minutes and seek medical attention.
Contact with the skin	Rinse thoroughly with water for at least 15 minutes. Apply a sterile gauze. Remove contaminated clothing immediately.
FIRE PREVENTION MEASURES	
Means of extinction	Water spray, dry powder.
Specific dangers	Rupture or explosion of the recipient
Specific methods	Cool down the recipients by spraying with water from a safe position. If possible, stop the product from leaking. If possible, use a water spray to hose down the smoke. Move the recipients well clear of the fire zone if possible without taking risks.
MEASURES IN THE EVENT OF AN ACCIDENTAL LEAK	
Individual precautions	Use specific personal protection equipment. Evacuate the personnel to vigilance zones. Eliminate any source of ignition such as cigarettes, electronic devices (computer, mobile phone, electronic cigarette), tools, including non-electric tools and clothing, that are not compatible with the risk of formation of an explosive atmosphere (ATEX) or are composed of less than 80% cotton. Ensure adequate ventilation, whether natural or from an ATEX ventilator. Do not enter manholes, basement window wells, excavations, or any other surrounding area where the risk of dangerous accumulation of fluid exists.
Environmental precautions	If the situation allows, try to stop the leak
Decontamination methods	Ventilate the area.
HANDLING AND STORAGE	
Handling: technical measures/precautions	Ensure that the premises have adequate air renewal/extraction. Do not smoke. Keep clear of any sources of ignition, including electrostatic discharge. Use only equipment that is suitable for the product and ATEX

Recommendations for safe use	Do not inhale the fluid in gaseous form
Storage	Close tightly and store in a cool, dry, well-ventilated place. Keep in original recipients. Storage containers should be checked periodically. Do not store with other oxidising elements or other combustible materials. All electrical/electronic equipment located in the storage area must be compatible with the risk of the formation of an explosive atmosphere (ATEX).
CONTROLLED EXPOSURE/INDIVIDUAL PROTECTION	
Control parameters	OEL: No data available DNEL: No data available PNEC: No data available
Respiratory protection	Filter masks may be used where ambient conditions or duration of use are known.
Protection of the eyes	Safety glasses
Hand protection	Rubber work gloves
Hygiene measures	Do not smoke
PHYSICAL AND CHEMICAL PROPERTIES	
Colour	Colourless.
Odour	Odourless
Boiling point	-42.1°C at atmospheric pressure
Flash point	470 °C
Relative density in gaseous form (air = 1)	1.5
Relative density in liquid form (water=1)	0.58
Solubility in water	75 mg/l
STABILITY AND REACTIVITY	
Stability	Stable in normal conditions.
Materials to be avoided and Hazardous products resulting from decomposition	Air, oxidising agents. Keep away from any source of heat/sparks/open flames/hot surfaces. Under normal conditions of storage and use, no hazardous product resulting from decomposition should be generated.
TOXICOLOGICAL INFORMATION	
High toxicity	CL50 / inhalation / 4 hours / test on a rat = 20000 ppm.
Local effects	No known effects
Long term toxicity	No known effects
ENVIRONMENTAL INFORMATION	
Global warming potential (GWP – R744=1)	0.02
Ozone damage potential (ODP– R11=1)	0
Disposal	Comply with the supplier’s gas collection programme. Avoid direct emission into the atmosphere. Do not drain in an area where the accumulation of fluid is dangerous. Ensure that emission limits required by local regulations are strictly adhered to.

Warning specific to the R290 refrigerant fluid

CAUTION:

Install the unit outdoors in compliance with the prescribed technical spaces and exclusion zones indicated in this manual.

DANGER OF DEATH or serious injury: the safety instructions listed below must be followed.

Ensure that the installation area is well-ventilated.

Do not puncture or burn the refrigeration circuit.

R290 refrigerant gas
• is odourless
• is highly inflammable (class A3 refrigerant), only in the presence of a source of ignition (spark and hot spot);
• can cause an explosion, but only if a certain level of concentration in the air is reached.

It is essential to comply with the following instructions:
• do not smoke near the appliance;
• put up a non smoking sign near the appliance;
• put up a sign prohibiting any naked flame near the appliance;
• do not inhale the gas;
• do not pierce or burn the appliance;
• do not place the appliance near sources of ignition, such as naked flames, electric radiators, switches, electrical sockets, lamps or other permanent sources of ignition;
• any special work or repairs to the appliance must be carried out by qualified technicians or personnel, who have had suitable training and possess specific skills relating to the handling of inflammable refrigerant gases, in compliance with local laws;
• after installing the machine and before any maintenance work, ensure, by way of a leak detection test, that no concentration of R290 gas can be measured in the exclusion zone.

Precautions related to the installation of the refrigerant

If local construction codes or safety standards do not exist, the information shown below, which is taken from standard EN 378:2016, may be used for information purposes only; it can be used as a guide for the safe use of machines that use a refrigerant.

It is not recommended to install this appliance in a place that the general public or untrained, unqualified or unauthorised persons can access.

IMPORTANT: **The installation of ECOMOD in high rise building shall follow the local or national regulation**

This unit must be installed in such a way that no refrigerant fluid leaks can be introduced into the building and/or endanger people and property. Therefore:

It must not be possible for the refrigerant fluid to spill into a ventilation duct, under a door, hatch or similar opening in case of a leak. For this reason, the installer must follow the recommendations given in paragraph 3.1.4.

1.2.4. General safety rules

Before starting any work on the units, each operator must be thoroughly familiar with how the machine operates and its controls and must have read and understood all the information contained in this manual.

	The removal and/or handling of any safety device is strictly prohibited.
	Unaccompanied children and persons with disabilities are not allowed to use the appliance.
	Touching the appliance with bare feet or with wet or damp body parts is prohibited.
	Cleaning is prohibited when the appliance is powered on.
	Pulling, disconnecting or twisting the electrical cables coming out of the appliance, even if the appliance is disconnected from the power supply, is prohibited.
	Do not stand on the appliance, sit on it and/or place objects of any kind on it.
	Do not disperse, put down or leave within the reach of children the packing material (cardboard, staples, plastic bags, etc.) as it can be a potential source of danger.
	All routine or extraordinary maintenance must be performed with the unit at a standstill without power supply.
	Do not put your hands or insert screwdrivers, wrenches or other tools into the moving parts.
	The person responsible for the machine and the maintenance technician must receive the appropriate training and instruction to perform their tasks in safety.
	Operators must be familiar with the personal protective equipment and the accident prevention rules prescribed by national and international laws and standards.
	For installations in environments where outdoor temperatures may be below 0°C, some components may freeze if the appliance is not in operation. Ensure that in the event of a risk of freezing, the heating system is running continuously and all parts are sufficiently heated. If operation cannot be guaranteed, have the heating system drained by a qualified technician.

The company declines all contractual and extra-contractual liability for damage to persons, animals or property caused by errors in installation, adjustment and maintenance, misuse or partial or superficial reading of the information contained in this manual.
These appliances are designed for heating, domestic hot water, and for outdoor use only in residential and commercial applications. Any other application, not expressly authorised by the manufacturer, must be considered inappropriate and is therefore not permitted. The coolant to be used is exclusively water.

1.2.5. *Personal protective equipment*

When cleaning and maintaining the units, personal protective equipment must be used, such as:

	Leak detector: When approaching the unit and before any operation, check that there are no gas leaks on the unit.
	Clothing: Persons performing maintenance or working on the system should wear clothing that does not leave any parts of the body uncovered, as during maintenance there is the possibility of coming into contact with hot or sharp surfaces. Clothing that can get caught or be sucked in by the air flow should be avoided.
	Avoid clothing that can catch on protruding surfaces or be sucked into an airflow.
	Safety shoes with non-slip soles, especially in environments with a slippery floor.
	Use footwear that is certified as antistatic (ESD).
	Gloves: Protective gloves must be worn during cleaning and maintenance.
 	Mask and glasses: Safety glasses and a respiratory protection mask should be used during cleaning operations.
	Explosimeter for R290 gas: During maintenance operations, each operator must be equipped with an explosimeter for R290 refrigerant fluid to check for its presence in the air. The explosimeter must not be a possible source of ignition and its sensitivity must trigger an alarm for a concentration 20% lower than the lower flammability limit (LEL or LFL).
	Tools: The use of ATEX tools is recommended for the maintenance of products containing flammable refrigerant fluids.

Personal protective equipment must be checked periodically and compatible with R290 refrigerant gas.

2. DESCRIPTION OF THE EQUIPMENT

2.1. Technical data

2.1.1. Technical specifications

This product is designed to be installed at a maximum altitude of 2000m

TECHNICAL CHARACTERISTICS		Unit	AHP70-65
Heating (temperature of water input/output 30/35°C)	Rated heat output (1)	kW	40.9
	Maximum heat output (1)	kW	63.9
	Rated absorbed power (1)	kW	8.9
	COP (1)		4.60
	SCOP (3)		4.08*
	Seasonal efficiency (3)	%	160*
	Energy efficiency (3)		A++*
	Pdesignh (3)		59.6*
Heating (temperature of water input/output 47/55°C)	Rated heat output (1)	kW	38.3
	Maximum heat output (1)	kW	72.8
	Rated absorbed power (1)	kW	11.9
	COP (1)		3.23
	SCOP (3)		3.32*
	Seasonal efficiency (3)	%	130*
	Energy efficiency (3)	kW	A++*
	Pdesignh (3)	kW	56.6*
Compressor	Compressor type		Scroll
	Number of compressors		2
	Power stage	%	0/50/100
	Oil type		PAG
	Quantity of oil per compressor	L	3.6
Refrigerant	Name		R290
	Class		3
	Number of refrigeration circuits		1
	Refrigerant charge	kg	4.35
Fans	Type		EC axial
	Number of fans		1
	Nominal air flow rate (1)	m3/h	16000
	Maximum air flow rate	m3/h	24100
Heat exchanger user side	Type		Brazed plate exchanger

*These values are provided as a guide only, they have been obtained under standard conditions and serve as a basis for comparison. Obtaining them is conditional on the operating conditions

Hydraulic circuit	Nominal water flow rate (1)	m3/h	7.0
	Maximum water flow rate	m3/h	12.9
	Maximum water flow rate	m3/h	5.0
	Manometric head available (including the degasser and the non-return valve) (1)	mCE	18
	Maximum temperature supplied by the heat pump	°C	70
	Hydraulic connection	inch	G2”
	Max. pressure on water side	bar	6
	Type of circulation pump		AC
	Maximum absorbed power of the circulation pump	kW	1.6
	Maximum absorbed current of the circulation pump	A	3.2
	Hydraulic circuit water capacity	L	18
	Minimum volume of HP circuit	L	850
Noise data	Noise power level partial load Lw (4)	dB (A)	75.1
	Noise pressure at a distance of 10 m partial load Lp1 (5)	dB (A)	47.1
	Noise power level full load	dB (A)	86.4
	Noise pressure at a distance of 10 m full load Lp1	dB (A)	58.4
Electrical data (This data is to be found in the electrical section 3.6)	Power supply		400V/3P+T/50Hz
	Maximum absorbed power	kW	42.7
		kVA	48.5
	Maximum absorbed current	A	70
Dimensions and weight	Length	mm	2300
	Width	mm	1200
	Height	mm	1500
	Weight for shipping	kg	770
	Weight in service	kg	735

(1) The performances in heating mode are given in accordance with standard EN 14511:2022, external air temperature 7°C dry temperature (dT) 6°C humid temperature (hT); inlet/outlet water temperature 30/35°C.

(2) The performances in heating mode are given in accordance with standard EN 14511:2022, external air temperature 7°C dry temperature (dT) 6°C humid temperature (hT); inlet/outlet water temperature 47/55°C.

(3) Performances are given in accordance with standard EN 14825:2022, average weather conditions

(4) Noise level: heating mode under partial load as per Appendix A of EN 12102:2017; value determined based on measurements taken as per standard EN ISO 9614-1, in accordance with the requirements of HP Keymark certification.

(5) Acoustic pressure: value calculated from the original acoustic pressure level (6) as per ISO 3744:2010 with directivity 2.

The unit is a dual service monobloc air/water heat pump, operating with R290 propane, with staged power equipped with a tandem of symmetrical compressors, which allows heating, the production of domestic hot water.

This unit is suitable for producing hot water to supply primary heating networks or domestic hot water that will be stored in a tank downstream of the heat pump, or cold water to irrigate the primary cooling networks. In this manual, the heat pump is sometimes referred to as an outdoor unit.

The primary circuit is the water circuit directly connected to the heat pump, comprising the internal circuit of the unit, a cylinder or a tank, and connecting pipes between the two. The primary circuit must comply with a minimum volume as indicated in this manual to ensure the correct operation of the unit and its protection against short cycles and frost.

This unit includes, amongst other elements:
- a symmetrical tandem compressor
- a 4-way valve
- a fan
- an electronic expansion valve
- a variable speed circulation pump
- an electromechanical safety pressure switch that interrupts the supply to the compressors in the event of the maximum working pressure being exceeded (see SAFETY CONTROL wiring diagram, folio 11, in chapter 6.2 of this manual)

2.2. Designations, definitions and scope

Ecomod AHP70-65:
Monobloc heat pump operating with R290 refrigerant fluid. This unit is suitable for producing hot water to irrigate heating networks, or domestic hot water separated by a heat exchanger.

Air/Water:
The outdoor air is the energy source. This energy is transmitted to the primary water circuit by the heat pump.

COP (Coefficient Of Performance):
This is the ratio between the (instant) power transmitted to the heating circuit and the (instant) electrical power consumed.

Primary water or primary circuit:
This is the water circuit directly connected to the heat pump, comprising the internal circuit of the unit, a cylinder or a tank, and connecting pipes between the two. The primary circuit must comply with a minimum volume as indicated in table § 2.1.1 to ensure the correct operation of the unit and its protection against short cycles and frost, and the smooth running of the defrosting cycles.

DHW:
Domestic Hot Water. Under no circumstances must DHW circulate in the hydraulic circuit of the heat pump. A heat exchange device MUST separate the primary water from the DHW.

2.3. Packaging

This package contains:
- A monobloc outdoor unit or heat pump:

Model	Product code
ECOMOD AHP70-65	090 986

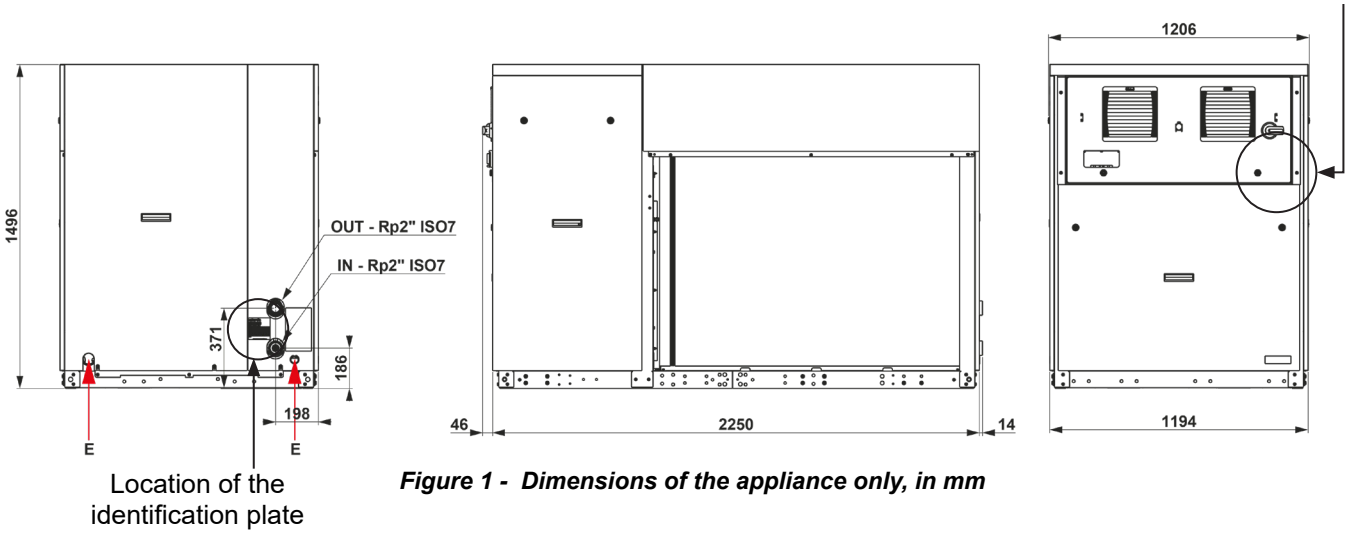
- a non-return valve
- An external propane degasser to be installed (not glycol compatible)

2.4. Description

2.4.1. Dimensions

INPUT/OUTPUT: 2“ female
E: electrical supply input

Location of the identification plate inside the box



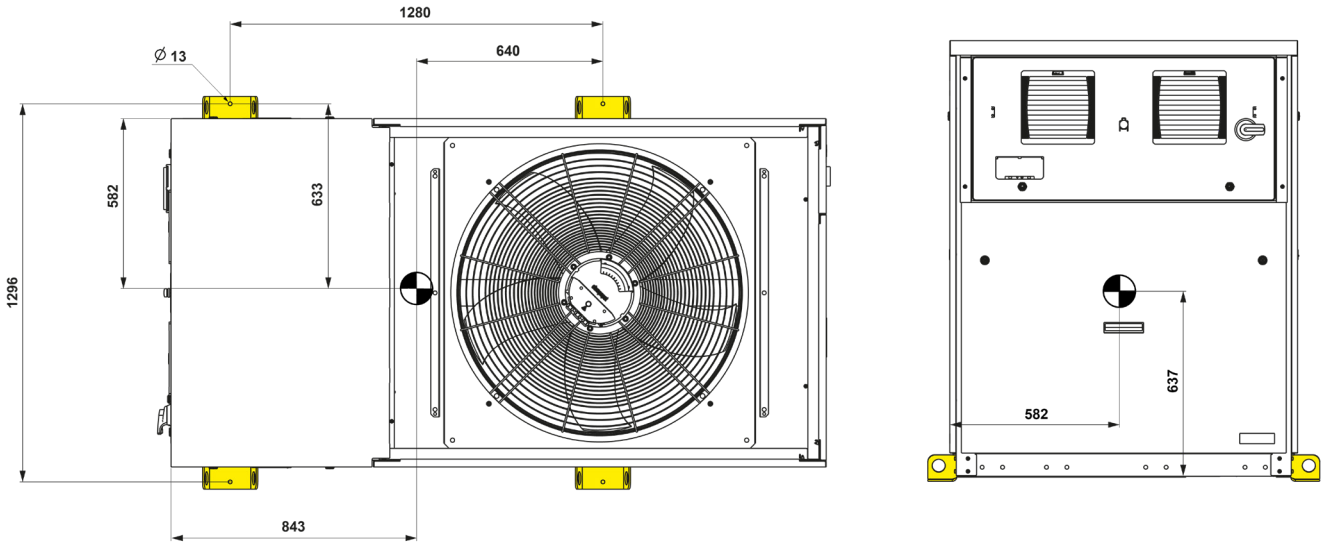
Location of the identification plate

Figure 1 - Dimensions of the appliance only, in mm

2.4.2. Position of the barycentre and the anti-vibration elements

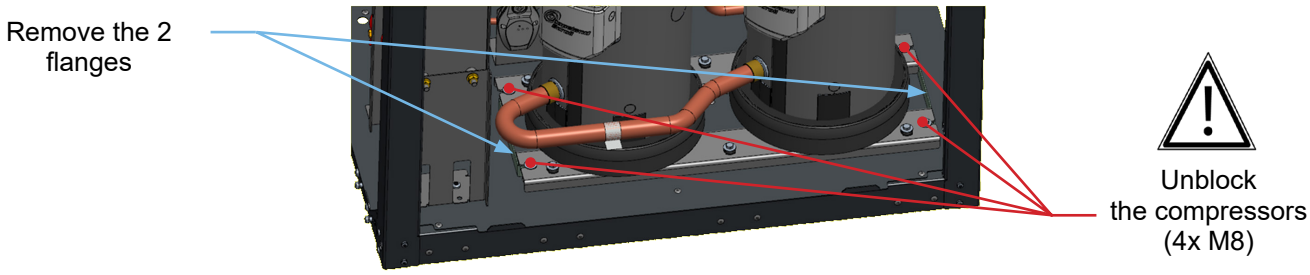
The position of the centre of gravity of the machine is indicated in the table, with reference to the dimensions indicated on the image.
The “lifting parts”, in yellow, can be removed in the event of installation on a roof to comply with the Local Regulations on roof waterproofing.

For installation on the floor using the anti-vibration leg kit, the “lifting parts” must remain in place.



Shipping weight (kg)	Working order weight (kg)	W (mm)	L (mm)	H (mm)
770	735	2250	1194	1496

2.4.3. Checks before commissioning



CAUTION: **There is a risk of compressor damage if they are not unblocked.**

3. INSTALLATION

3.1. Lifting and handling

3.1.1. Precautions

Handling must be carried out by qualified personnel, using appropriate equipment for the weight and size of the unit, in compliance with the accident prevention and fluid risk safety rules.
Notes:
1) Check the weight on the data label on the unit or in the technical data table.
2) Check by moving the unit that there are no paths, ramps, steps or disconnected doors that could affect movement and damage the unit;
3) Make sure that the unit remains horizontal while it is being moved;
4) When handling, avoid making any sudden movements so as not to destabilise the unit;
5) Before handling the unit, check that the equipment is suitable for lifting it and for preserving the integrity of the unit;
6) Only lift using one of the listed procedures;
7) Before any handling is started, ensure that the unit is balanced and stable.
8) Do not walk on the unit

Note that the weight of the unit is mostly concentrated on the refrigerant circuit side and is not evenly distributed, refer to the diagram above: take the weight distribution of the machine into consideration when manually transporting it with ropes, to avoid lifting excessive loads and causing damage or injury.
It is recommended to remove the packaging only after having placed the machine in the actual installation location. Dispose of the various packing materials in accordance with national regulations.

3.1.2. Lifting method

The authorised lifting methods are:
- fork lift truck,
- straps on lifting tabs with a lifting beam

Be sure to lift the straps gradually and check that they are in the correct position.

INFORMATION: **Transport with a fork lift truck or pallet loader is only possible using the openings in the transport pallet. The minimum length of the forks depends on the lifting side of the unit. The forks must have a minimum length of 1.20m for lifting from the length of the unit and a minimum length of 1.50m for lifting from the width of the unit. For further information, refer to the diagram below.**

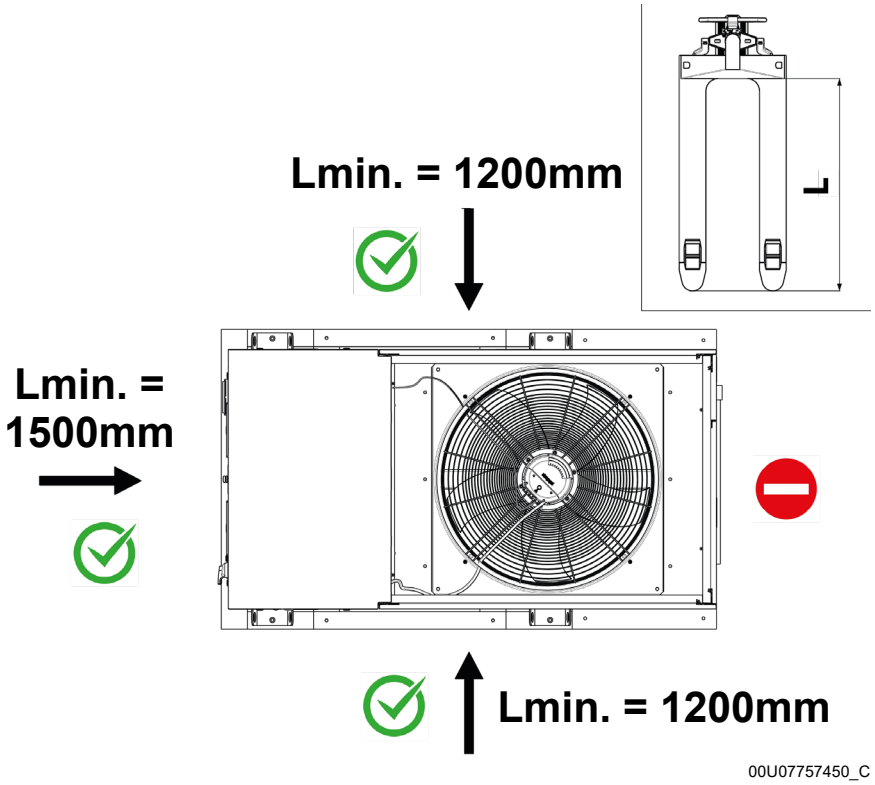


Figure 2 - Instructions for handling with forks

INFORMATION:

Using straps or chains directly attached to a hook to lift is prohibited as this may damage the unit's casing. Use a lifting beam greater than 1.30m wide to ensure that the straps do not crush the unit's casing. For further information, refer to the diagram below.

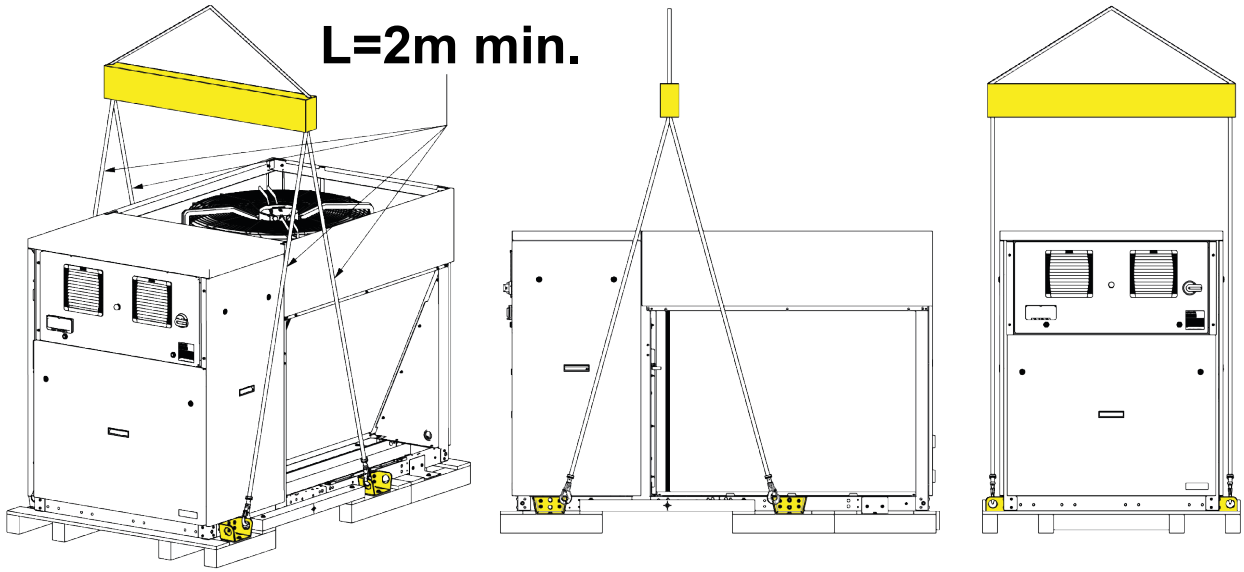
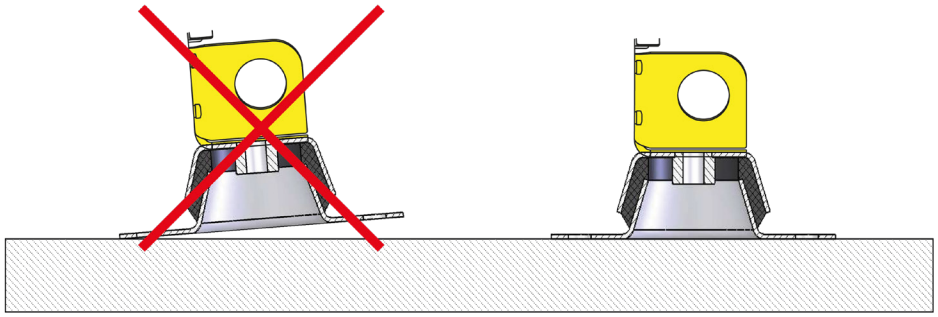
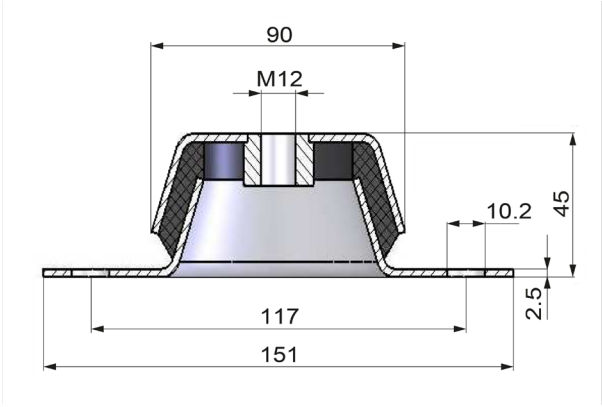


Figure 3 - Instructions for lifting with a lifting beam



CAUTION: **Take care to ensure that the support is parallel to the floor when depositing the product on the floor**

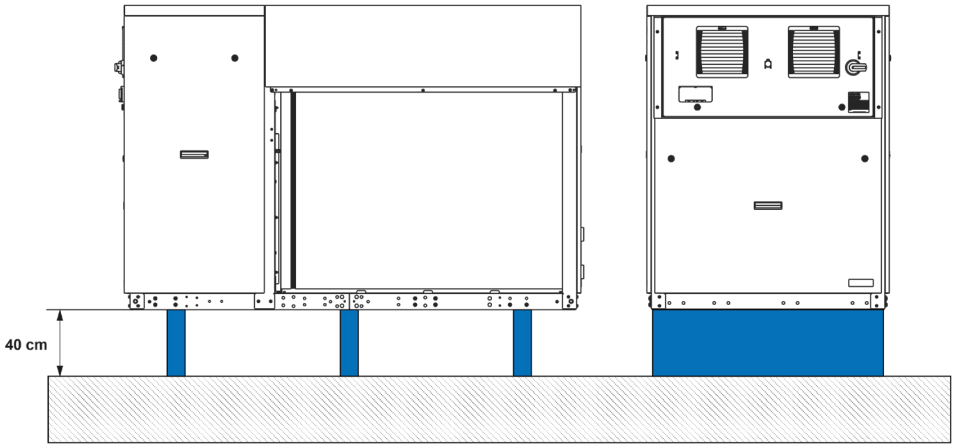
Anti-vibration pads



EPC 03-60 M12 - Max load (kg): 350

3.1.3. Roof/terrace installation and lifting

The lifting elements must be positioned under the frame. To respect the width of < 1.2m and therefore a lift of 40cm it is essential to remove the anti-vibration pad supports. The product installation on roof shall respect local regulation.



3.1.4. Dimensions of the zones around the HP

The appliances contain R290 refrigerant fluid. Since the density of this gas is higher than that of air, it tends, in the event of a leak, to disperse and stratify, accumulating in recesses or on the ground.

When installing the appliances, it is imperative to respect the exclusion zone indicated in this manual.

These zones have been established in accordance with EN 60079-10-1, with the estimation of an appropriate refrigerant fluid loss, to ensure the safety of the units in the installation area.

INFORMATION: **It is not recommended to install this appliance in a place that the general public or untrained, unqualified or unauthorised persons can access. In the case where the product is installed in a place that is accessible to the public, physical means of protection (e.g. grid, fences, etc.) must be put in place to ensure that the exclusion zone is respected and guarantee personal safety.**

It is mandatory to display these symbols in suitable HP access locations:

	**No smoking**
	**No naked flames**
	**Inflammable materials**

An exclusion zone (X) is defined as an area circled in red around the machine in which, in the event of a refrigerant fluid leak, a flammable atmosphere is formed for a short time, and in which it is necessary to implement all the precautions described in the manual. In the absence of specific standards or regulations, when using the unit in an industrial or working environment, it is advisable to classify the places that have a risk of explosion, taking into account the ATEX Directive (Directive 2014/34/UE).

There must be NO ignition sources in the exclusion zone, including:
- flammable gases and aerosols, powders that ignite themselves;
- electrical equipment that is not suitable for use in potentially explosive areas (Atex zone 2);
- open flames, heated surfaces (maximum surface temperature of 360°C) and heat treatment; smoking is prohibited, even with electronic cigarettes;
- sparks, electrostatic charges, the direct and indirect effects of lightning, eddy currents and cathodic protection;
- ignition sources due to remote processes (ionising and non-ionising radiation);
- permanent electrical sources (switches, lights, etc.) or other possible triggers;

In addition, the exclusion zone must NOT:
- include potentially hazardous areas or features such as wells, manholes, openings to the sewer system and other openings to underground places and premises (e.g. oil wells,

manholes, garages), waterway drains, uninsulated power lines, flammable deposits, electrical installations, air vents, etc.;
- include doors and windows, to prevent the possible return of gas to the interior of the building;
- extend towards nearby residential properties, parking areas, public access sites, roads or railways.

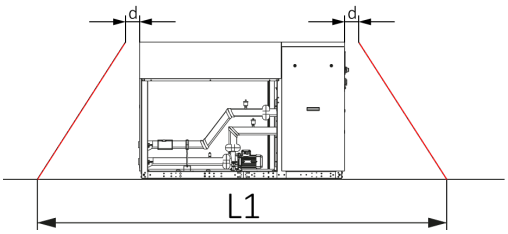
Around the exclusion zone, R290 can reach up to 25% of the LEL in the event of a leak within 3 metres of the heat pump.
This must be taken into account when analysing the risks to the installation (stagnation of the fluid, penetration into a building, sources of ignition, etc.). We would remind you that it is the responsibility of the operator and installer to carry out this analysis of the risks associated with the installation and use of this product in relation to the specific features of the installation. We also advise against the use of unsuitable equipment in this zone and recommend that safety procedures (explosimeter, ATEX clothing, etc.) are followed from this zone.

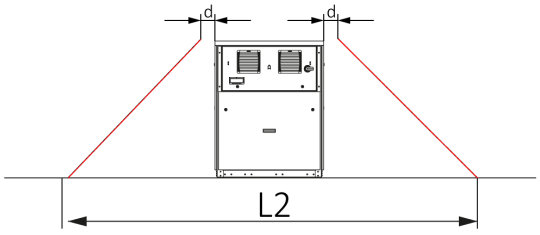
In all cases, national and local regulations relating to the installation of machinery (where applicable) must be observed to avoid the formation of fire hazards and to prevent gases from entering the atmosphere, floor openings or lower floors.
In this manual, different types of outdoor installations are envisaged, as indicated in the following paragraphs.

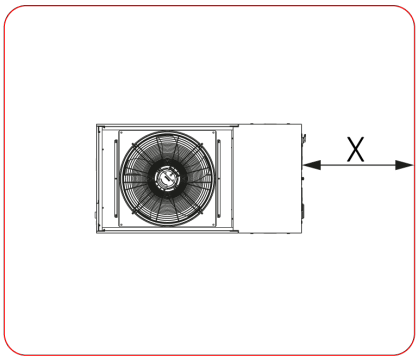
CAUTION: **It is also strictly forbidden to alter, remove or compromise, even partially, the functionality of appliances, protective equipment and the requirements that ensure the safety of property and persons.**

Open field installation

For units installed in open field, the exclusion zone (solid red line) is shown in the diagrams below:



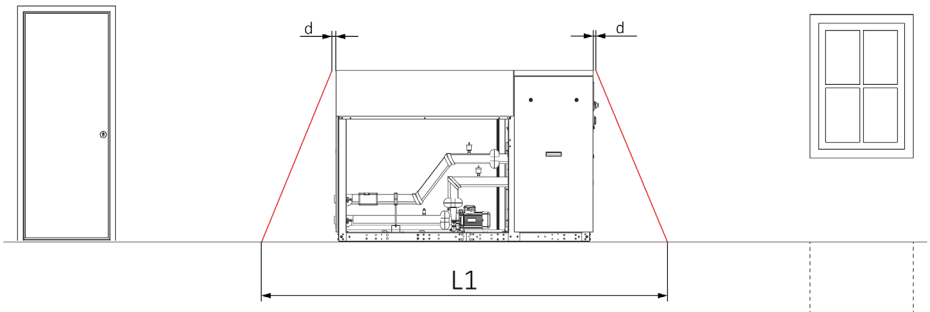


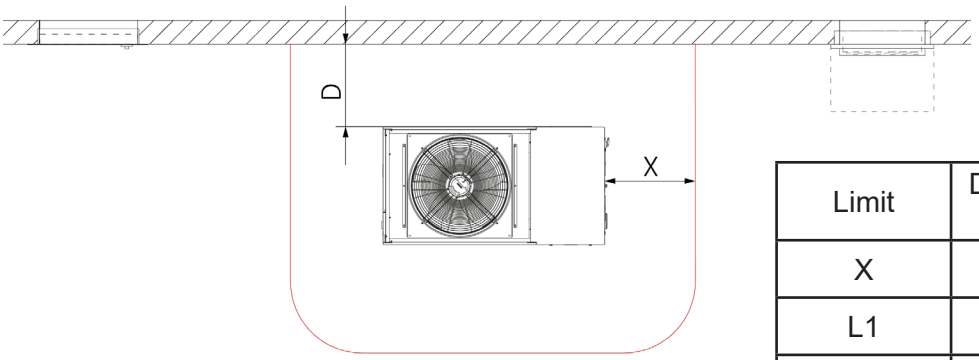


Limit	Dimension (mm)
X	1500
L1	5250
L2	4194
d	250

Installation against a wall (near a door, window, low point, etc.)

In the case of units installed on the ground in front of a wall, the exclusion zone (solid red line) is shown in the diagrams below:

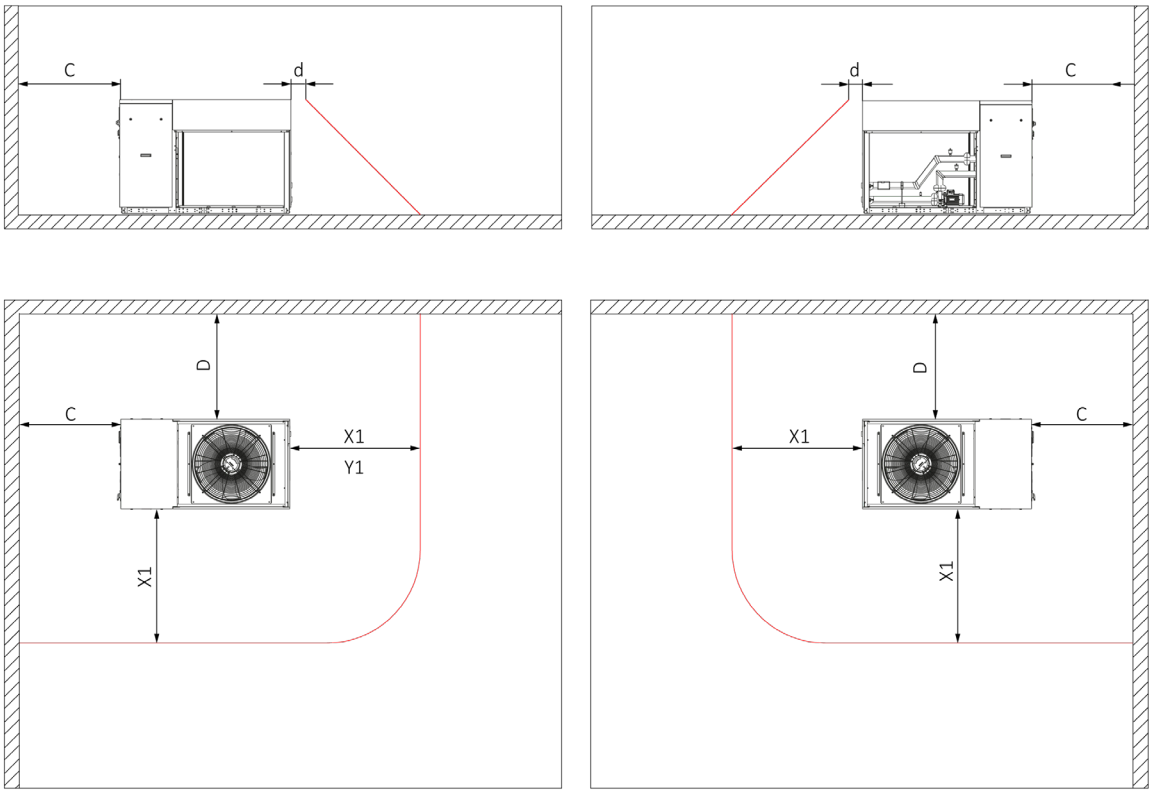




Limit	Dimension (mm)
X	1500
L1	5250
D	1500
d	800

Installation in a corner

For units installed on the ground in a corner, the exclusion zone (solid red line) is shown in the diagrams below:



Limit	Dimension (mm)
X1	2750

Limit	Dimension (mm)
C	800
D	800
d	250

Installation on a flat roof

Installation on a flat roof is similar to that on open ground, but there are some additional aspects to consider:

If there is a solid wall or railing preventing R290 from flowing outside the exclusion zone, the rules for installation against a wall or in a corner apply.

If the edge of the building (terrace, roof, balcony, etc.) is located in the exclusion zone, there is a risk of propane leaking into the building or stagnating on the lower level (e.g. via windows, terraces, balconies, etc.).

We remind you that it is the responsibility of the installer and the operator of the product to carry out a risk analysis with regard to the specific features of the installation, in particular for the risks of stagnation and penetration of R290 into the building, and to deal with these risks.

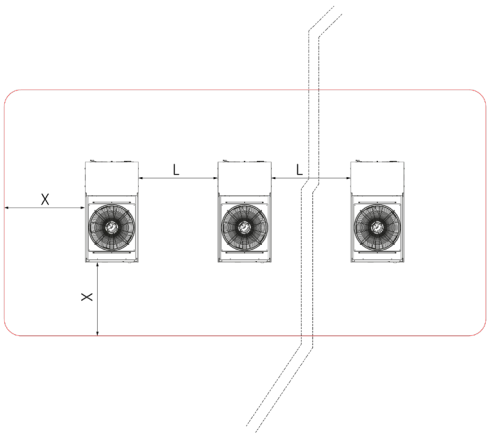
Ensure that the roof and building are structurally sound; choose a location where snow, dust or foliage will not accumulate.

Pay attention to noise emissions and keep a sufficient distance from surrounding buildings.

If high air speeds are encountered, install protection to break the wind speed (see Chapter 3. Installation).

HP cascade in open field

When several machines are installed next to one another, the diagram below must be respected, making sure to the minimum distance L between two machines. The exclusion zone to be respected in the case of installation in open field of “n” number of machines is shown below:

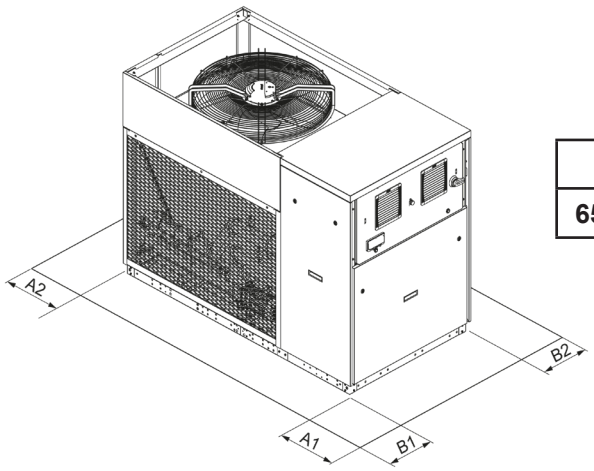


AHP70 MODEL		X	L
65 kW	mm	1500	1500

- For other types of installation not covered by this manual, contact the pre-sales service. In all cases, analysis of the risk of an R290 leak should be carried out in relation to the specificities of each installation.

3.1.5. Minimum technical clearances

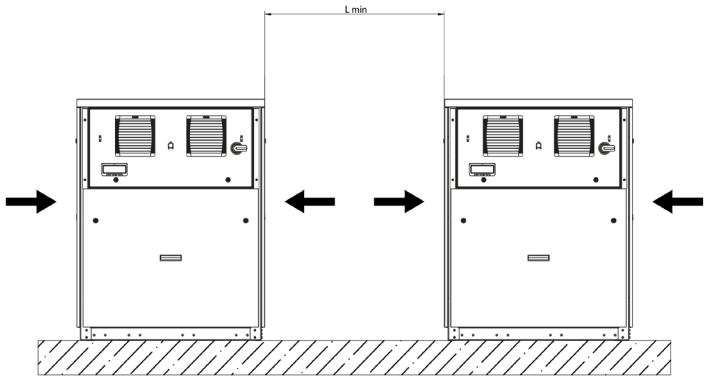
- By following the installation precautions, it is absolutely essential to ensure the following minimum service clearances are respected. The distances B1 and B2 are required for the maintenance of the unit. The other distances are required for the unit to operate correctly.



Model		A1	A2	B1	B2
65 kW	mm	1000	800	1000	800

Figure 4 - Minimum installation clearances around the outdoor unit

CAUTION: **Do not obstruct or cover the ventilation ventilation openings on the top cover.**



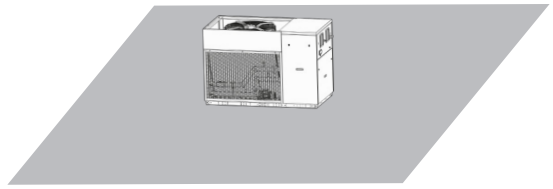
- If units are positioned side by side, the minimum distance Lmin to be respected between them is 1.5 m.
- The minimum clearances (figure 4 above) must be respected regardless of the installation to guarantee the performances and safety of the unit.
- It is designed to be installed outdoors, in open air. If installed in a shelter or alcove, at least one of the longest walls must be open to the outside air by louvres having a free area of 75% and covering at least 80% of the wall (or the equivalent if more than one wall is open to the outside air), for it to be considered to be open to the outside air.
- In general, any recycling of the air should be avoided as this will have an impact on the performance and reliability of the heat pump.
- In the event of an accidental leak, it must be possible to evacuate the refrigerant.
- The unit is designed to be installed outdoors. If installation under an alcove cannot be avoided, be sure to follow the instructions below in order to limit a drop in performance and air recycling.
- Installation under a shelter or an alcove causes the unit's performances to drop. To limit this drop, an alcove must have 2 open opposite faces in the axis of the fan. If due to location, the open sides cannot comply with this rule, provide a removable enclosure around the unit to separate the air inlet and outlet. A gutter or drain should be installed to drain condensation water **beyond the exclusion zone.**
- If grilles are installed on the open sides of the alcove, they must have an effective (open) surface area limiting the pressure drop to <5Pa to allow all installed heat pumps to discharge the required flow rate (see flow rate in the table in paragraph 2.4.1).
- Ideal Heating cannot be held responsible for any drop in performances of the unit if these recommendations are not respected.

3.1.5.1. Principle of emitted noise reflection

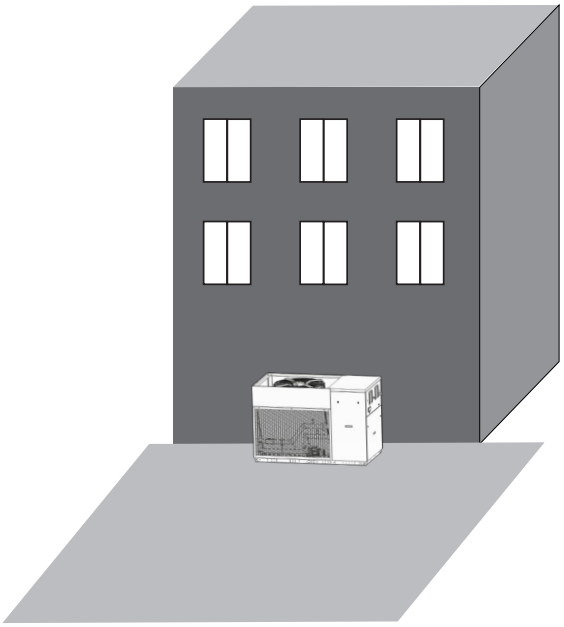
It is recommended that you conduct a noise pollution risk assessment.
This should take into account the residual noise without the heat pump, the machine data, the place of installation, the distance to the point of measurement, without this list being exhaustive.
The levels of normative requirements may be different for day and night.
In order to reduce the risks, it is advisable to study the transmission of vibrations from the machine to the building, as well as the pipes, the reverberation, etc.

The unit is only to be installed outside the building (on a terrace (in open field, order 1 directivity), close to a partition (+3dB(A)) etc... The installation type has a strong influence on the perception of noise emitted by the machine (see figure below). Regulatory requirements differ according to the installation zone type (urban residential, rural residential, etc.), and occurrence during the day or the night.
For this reason, special vigilance should given to the unit's type of location and the noise disturbance inherent to it.

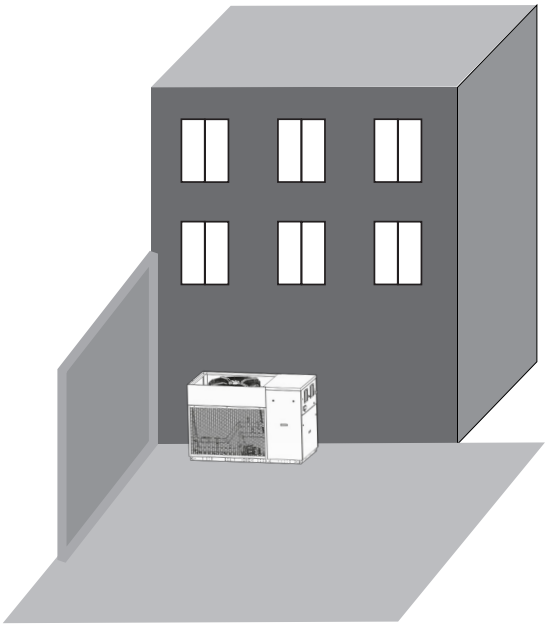
Inner courtyards and closed corners should be avoided where possible.
The volume also has an impact, for example a small inner courtyard leads to greater reflection.



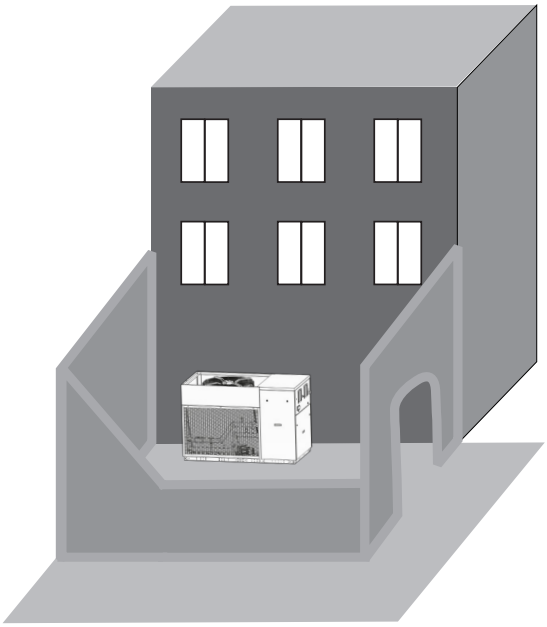
Heat pump on the ground or on a terrace
(free field with no obstacle)



Heat pump placed close to a wall
perception of noise doubled



Heat pump placed in the corner of a wall
perception of noise quadrupled



Heat pump placed in an inner courtyard
perception of noise x 8

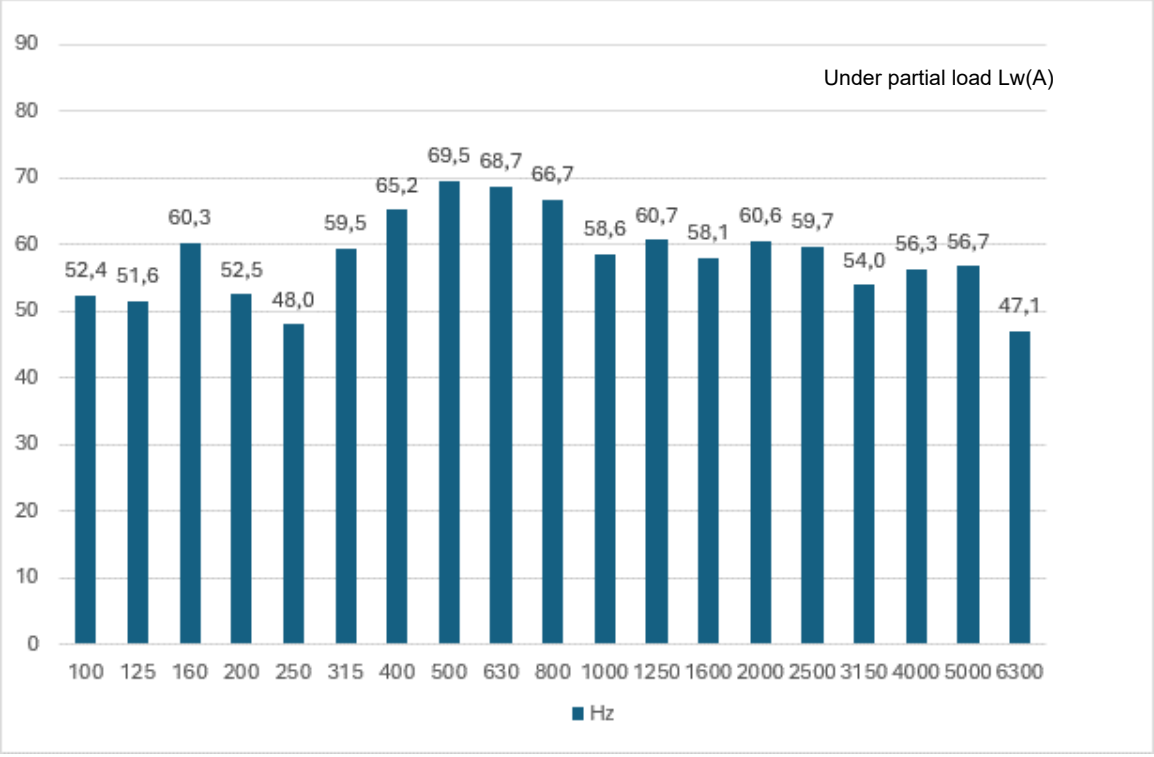
3.1.6. Noise emissions according to EN 12102-1:2022

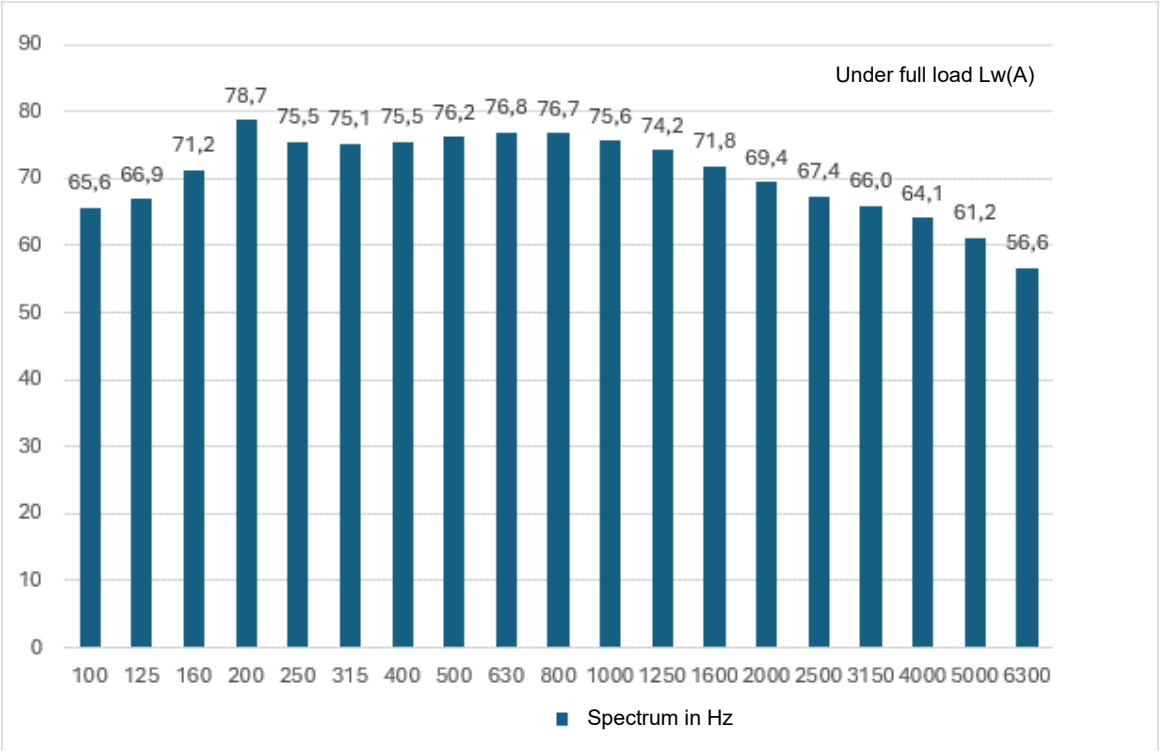
Noise levels are measured according to Appendix A of NF EN 12102-1: 2022:
Test condition set at A7W55, with a machine setting that allows attainment of the heat output declared in point C in accordance with EN 14825, as per the provisions of EU regulation 813/2013 (dry temperature (humid temperature) of the outside air = 7°C (6°C), input-output water temperature = 47-55°C).
The tolerance on the value of the total acoustic power level is 2 dB (A). The value is determined in compliance with NF EN 12102-1: 2022, used together with NF EN ISO 9614-1 which describes the test methods with the intensimetric method.

Model	Conditions	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	Lw* in dB(A)	Lp** in dB(A)@10m
Ecomod AHP70-65	Under partial load	61.4	60.5	72.9	68.2	64.4	60.6	75.1	47.1
	Under full load	73.4	81.5	81.0	80.4	74.7	69.0	86.4	58.4

*Acoustic power: measured in heating mode under partial load as per Appendix A of NF EN 12102-1:2022; value determined based on measurements made as per NF EN ISO 9614-1, in accordance with the requirements of HP Keymark certification.
**Acoustic pressure: value calculated from the original acoustic power level* as per NF EN ISO 3744:2012.

These values are for 0 Pa of available pressure at the fan discharge. For the value under full load with available pressure at the discharge, see chapter 3.3.7.1.





3.2. Hydraulic connections

3.2.1. Recommendations for hydraulic circuits

CAUTION:

A refrigerant fluid degassing device is supplied with this appliance. Its installation is mandatory to limit the propagation of fluid in case the plate exchanger breaks. It must be immediately connected to the water outlet of the appliance. The installation of a non-return valve (supplied) at the water inlet is mandatory for the same reasons.

DANGER:

DANGER: The introduction of R290 fluid into the building may generate a highly flammable or explosive atmosphere and is STRICTLY PROHIBITED.

Hydraulic connections

CAUTION:

Connecting the domestic hot water circuit directly to the heat pump is absolutely FORBIDDEN, only a primary circuit isolated from the domestic circuit by a heat exchange device can be connected. The installation of an automatic water top-up is prohibited. The water that passes through the machine is not drinkable.

The connection must comply with good engineering practices according to the regulations in force.
Reminder: Make the assembly seals according to good engineering practices in force for plumbing work:
Use suitable seals (fibre seals, O rings).
Use Teflon or hemp tape.
Use sealant (synthetic as required).

3.2.2. Accessories to be connected to the outdoor unit

The hydraulic connections must comply with good engineering practices according to the regulations in force.
Before making the hydraulic connections, the supply pipes must be cleaned to avoid contaminating the tank with metal or other types of particles.

The following must be installed:
- a sieve filter on the HP water inlet.
- a filter (installed on the inlet of each HP) with metallic mesh not exceeding 1mm.
- a non-return valve (SUPPLIED) on the water inlet pipe of the HP in the immediate vicinity.
- a gas separator (SUPPLIED) on the water outlet pipe of the HP in the immediate vicinity.

Plumbing must be done according to national or local regulation.
The pipes must not transmit axial or radial forces to the exchangers or generate vibrations.
Check when hot that the pressure does not exceed the service pressure.
Recommendations: for regions where the water is hard, the use of a water softener does not imply any change in our Guarantee, provided that the softener is adjusted in line with trade standards, and is checked and maintained regularly. It is recommended to have a tap before the automatic mixer valve.
The presence of a CB type disconnection function on the installation is required to prevent heating water from returning into the drinking water in accordance with Articles 16.7 and 16.8 of the Standard Departmental Sanitation Rules.

CAUTION: **All the units are supplied with an integrated flow meter. If the flow meter is altered or removed, the guarantee will be cancelled.**

Characteristics of the water for the appliance

To ensure that the appliance is working correctly, the water must be filtered correctly (see the indications at the beginning of this section) and the quantity of dissolved must be minimised. Refer to chapter 6.2.6 for further recommendations.
The properties of the water used for filling the primary circuit must comply with the following limits:

MAXIMUM AUTHORISED PHYSICAL-CHEMICAL CHARACTERISTICS AUTHORISED FOR THE INSTALLATION WATER	
pH	7.5 - 9
Electrical conductivity	100 – 500 µS/cm
Particle size	≤ 1000 um
Total hardness	8.0 - 15.1 °f
Ammonia NH3	≤ 0.5 ppm
Alkalinity (HCO3-)	60– 200 ppm
Free Chlorine	≤ 1 ppm
Chlorine (Cl-)	≤ 50 ppm
Oxygen content (O2)	≤ 0.1 ppm
Sulphate (SO42-)	≤ 50 ppm
Phosphates (PO4)	≤ 2 ppm
Manganese (Mn)	≤ 0.05 ppm
Silica (SiO2)	≤ 30 ppm
(HCO3-)/(SO42-) ratio	> 1.5
(Ca + Mg)/(HCO3-) ratio	> 0.5

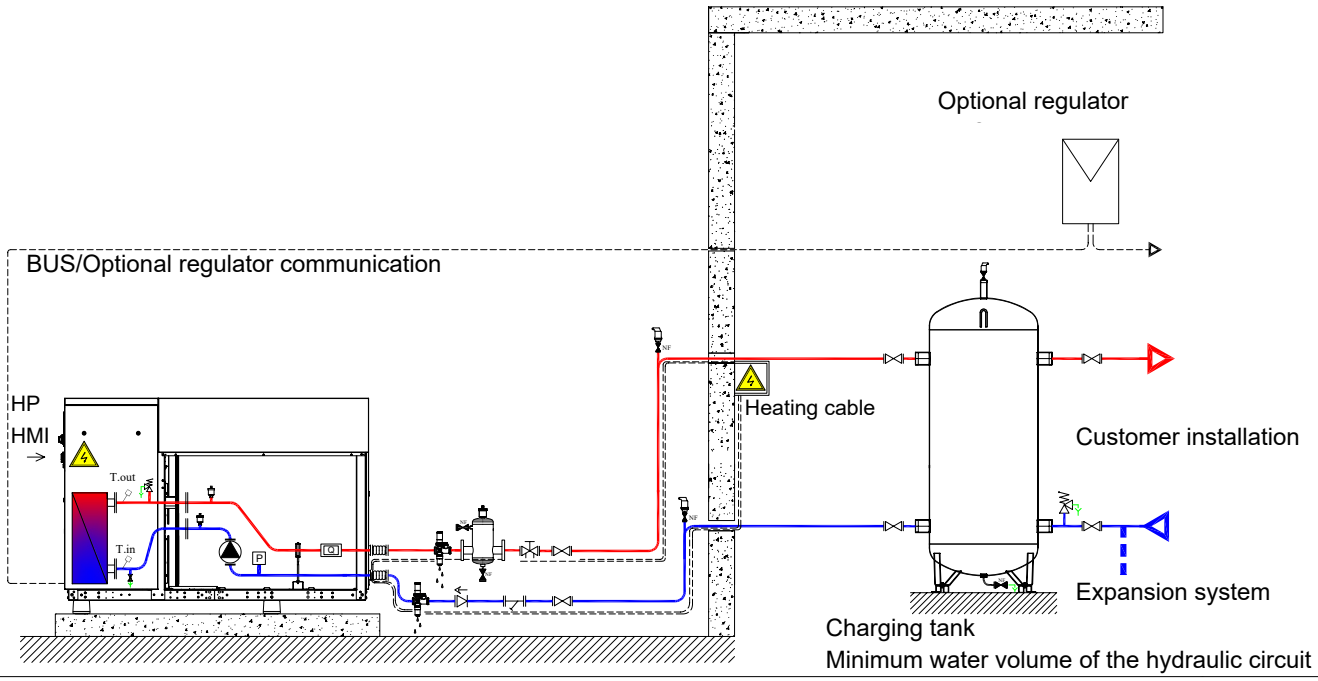


Figure 5 - Example of a recommended connection diagram (non-exhaustive) - HP only

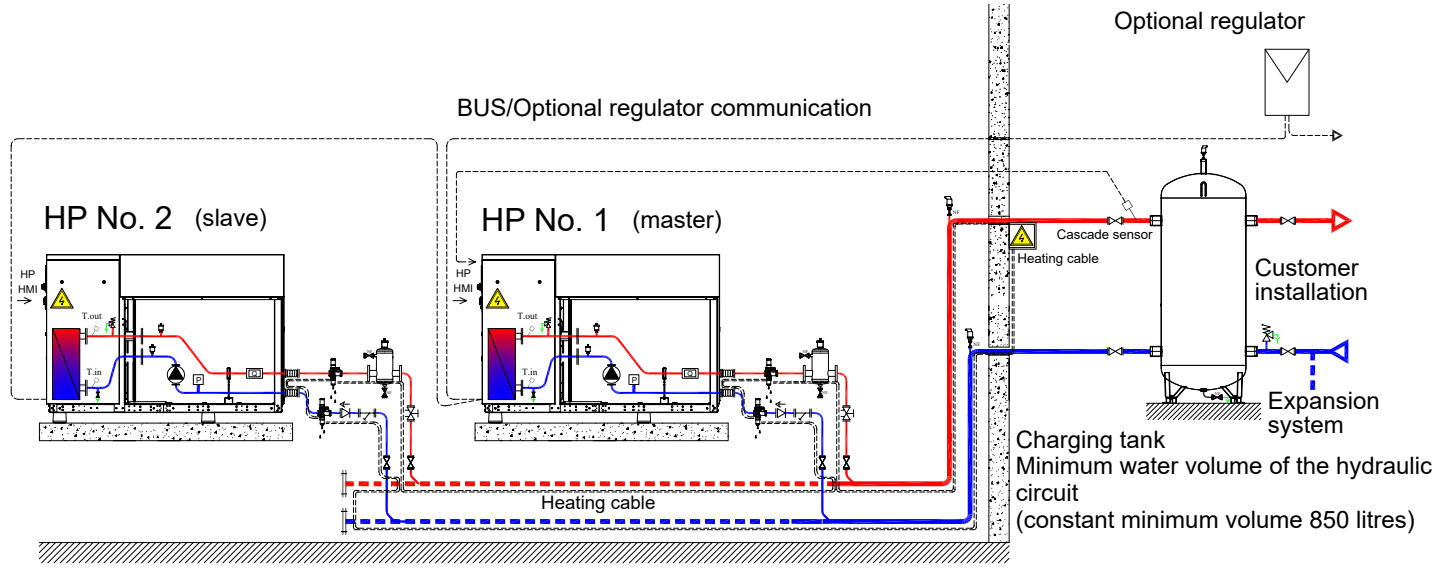


Figure 6 - Example of a recommended connection diagram (non-exhaustive) - Cascade

KEY

- Isolating valve open
- Isolating valve closed (NF)
- Lack of water pressure switch (P)
- Degasser/ separator microbubbles (R290)
- Air vent
- Flow meter (Q)
- Hydraulic balancing valve
- Anti-vibration sleeve
- Safety valve
- Temperature sensor
- Non-return valve Direction of flow
- Expansion system
- Safety unit (GS)
- Circulation pump
- Filter
- Sediment trap
- Pressure gauge (P)

3.2.3. General

The hydraulic connections must comply with the national or local regulations; the pipes may be made or steel or galvanised steel. Flexible hoses may be used if their diameter is larger. The dimensions of the pipes must be chosen carefully to suit the nominal water flow rate of the appliance and the pressure drops in the hydraulic circuit. All of the hydraulic connections must be insulated with closed-cell insulation of adequate thickness. The unit must be connected to the pipes with new flexible hoses, not ones that have already been used. We recommend fitting the following components in the hydraulic circuit:

- **Thermometer with sensor for reading the temperature in the circuit.**
- **Manual valves at inlet and outlet to isolate the heat pump from the hydraulic circuit.**
- **Taps for hydraulic pressure measurement in the circuit.**
- **Add drainage connections at all low points to allow full drainage of the circuit.**
- **Install manual or automatic drain valves on the high points of the circuit.**
- **Charging unit and/or discharge valve if required.**
- **An expansion tank. It is the installer's responsibility to check that the expansion system is suitable for the actual capacity of the system.**
- **Anti-vibration sleeve to prevent the transmission of noise pollution via the pipes.**
- **A mechanical system for collecting the sediment of the installation (ideally by decanting and magnetisation).**

CAUTION:

When choosing the size of the pipes, make sure that the maximum pressure drop of the system as stated in the technical data in paragraph 2.1.1 is not exceeded (see useful head).
Make a suitable drain for the safety valve.
It is the installer's responsibility to check that the expansion vessel is suitable for the actual capacity of the system.
The system's return pipe must be on the "Water inlet" label, otherwise the evaporator may freeze.

CAUTION:

A metal filter must be fitted (with a mesh size not exceeding 1000 µm) on the return pipe of the system labelled "Water IN" (water inlet).
All units are fitted with a flow meter (factory-fitted). If the flow meter is modified or removed, or if the water filter and separator filter are not fitted on the unit, the warranty is immediately void. You must ensure that it is always clean and check them periodically.
The heating system connected to this unit must be installed in compliance with the standard EN-12828.

3.2.3.1. Degasser and automatic air vent

DANGER:

This unit is equipped with a high-efficiency refrigerant degassing device in case of the plate exchanger breaking.

DANGER: The introduction of R290 fluid into the building may generate a highly flammable or explosive atmosphere and is STRICTLY PROHIBITED. For this reason, the gas separator and the specific non-return valve are mandatory.

The unit is supplied with a gas separator that removes any gases that may be in the hydraulic circuit.
The presence of gases that can accumulate in the circuit can cause, among other things, malfunctions of the flow meter, the circulation pump, premature corrosion and wear, and a loss of heat exchange efficiency in the exchangers.

The device also performs a safety function, so that if the condenser breaks, it allows the refrigerant gas to be evacuated into the outside air and prevents it from being transported to the internal terminals.

CAUTION:

It is essential to install the gas separator (SUPPLIED) with the unit on the outlet piping labelled 'water outlet'. If the gas separator is missing from the installation, the warranty will be immediately cancelled. The gas separator must be installed near the unit, in the vigilance zone as defined in this manual.

CAUTION:

It is essential to install the non-return valve (SUPPLIED) with the unit on the return piping labelled 'water inlet'. If the non-return valve is missing from the installation, the warranty will be immediately cancelled. The non-return valve must be installed near the unit, in the vigilance zone as defined in this manual.

It is essential to keep the gas separator in good condition after installation of the unit (see diagram §3.2.2)

CAUTION:

The gas separator is supplied with a plug (above). It is mandatory to keep this plug open so that it can evacuate any gases that may be in the hydraulic circuit.

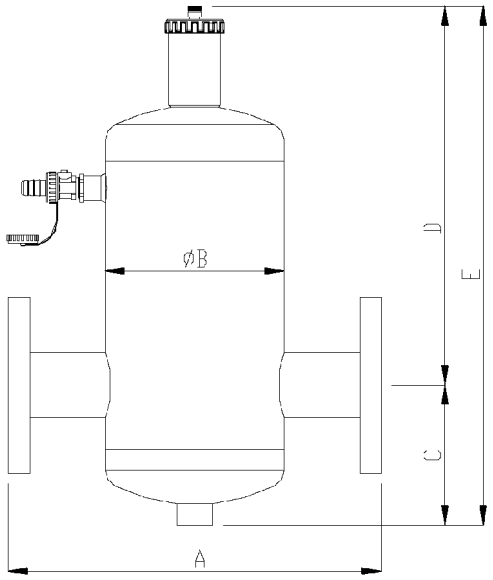
INFORMATION: **Injecting additives into the hydraulic circuit that tend to foam, even slightly, can reduce the efficiency of the gas separator, or even cancel its action and consequently damage the system. For example, a glycol concentration greater than 10% cancels the degassing effect, which is why this product is prohibited.**

It is advisable to periodically check the condition of the gas separator, especially if very high temperature differences are noted between the inlet and the outlet on the water side, as the presence of air bubbles in the circuit reduces the available water flow, which changes the flow meter reading.

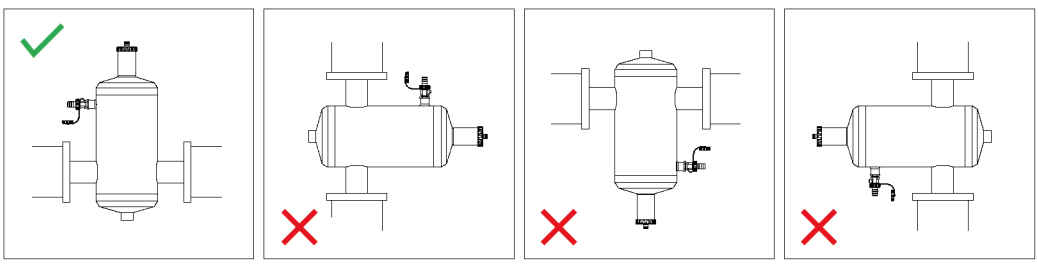
To clean the gas separator, drain the impurities using the plug (supplied) located at the bottom as shown in the diagram below.

- The degasser

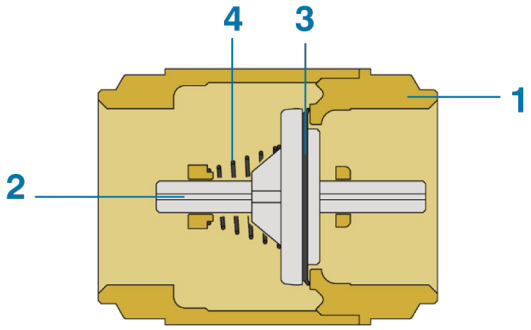
TECHNICAL SPECIFICATIONS		
Equipment	**PN16 Flanged body**	Painted steel on the exterior part
	Spring	AISI 302 stainless steel
	Elastomers	EPDM PEROX and NBR
	Float	with lever in polypropylene resin
	Operating environment	Superheated water
	Maximum operating pressure	10 bar
	Maximum discharge pressure	10 bar
	Maximum operating temperature	110 °C
	DN of the degasser (flange)	DN 80



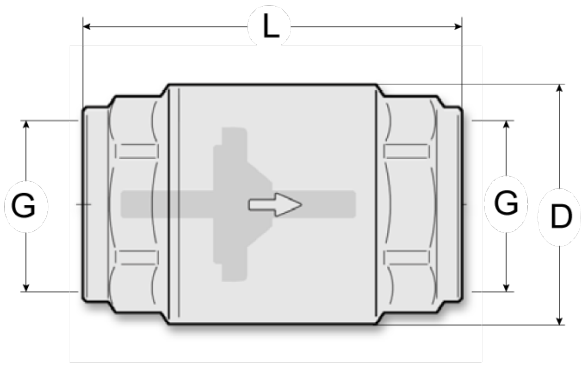
Dimensions [mm]	
A	470
B	273
C	200
D	425
E	625
Weight [kg]	26



- The non-return valve



TECHNICAL SPECIFICATIONS		
Equipment	**Body (1)**	Brass EN 12165 CW617N
	Stopper (2)	Brass EN 12165 CW614N (G 1/4–G 1/2) Brass EN 12165 CW617N(G 3/–G 4)
	Seal (3)	Viton
	Spring (4)	AISI 302 stainless steel
	Operating temperature range (peaks)	-20 (see suitable fluids) à 175 °C
	Operating temperature range	0 (sans gel) à 150 °C
	Opening pressure	0,02 bar
	Maximum operating pressure	35 bar
	Compatible fluids	Water for heating systems, glycol solutions
	Connectors	ISO 228-1 threaded fittings



Dimensions [mm]	
P (bar)	35
G	G2
D	83
L	94
Weight [kg]	1,149

3.2.3.2. Minimum water content and volumes of the hydraulic circuits

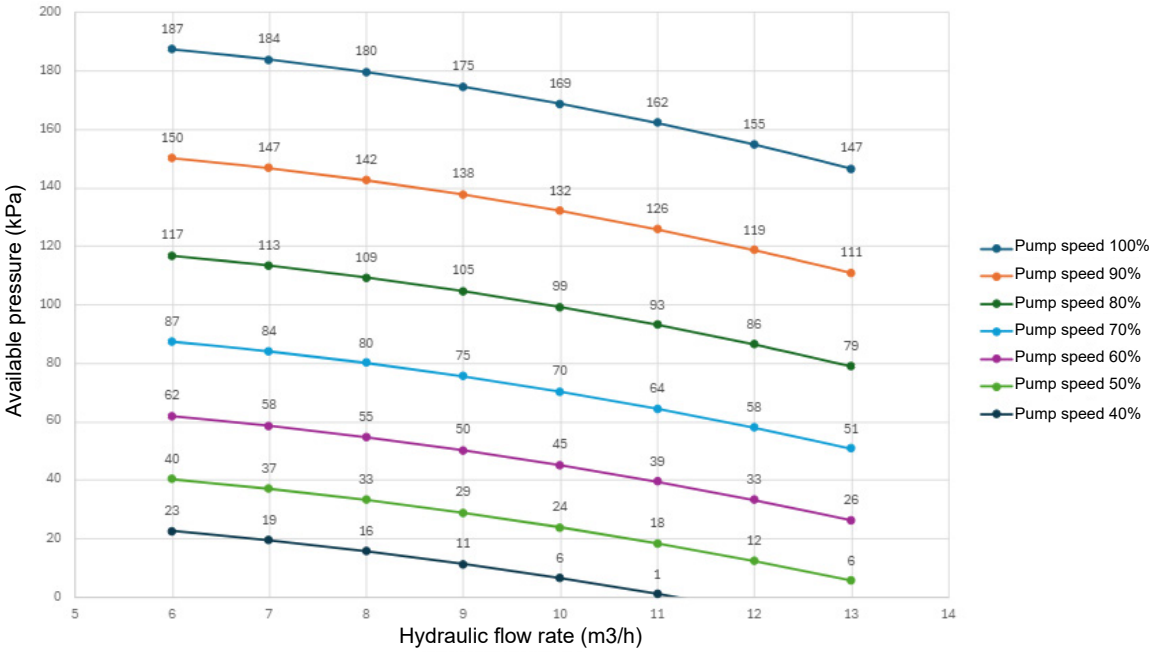
The table shows the minimum water content of the system that is recommended for the unit. The volume of the hydraulic circuit is also shown. Ensure the proper operation of the heat pump, this minimum content must be observed. Take into account the water volume of the primary circuit piping, size the heat flywheel to attain the volume shown.
A minimum volume of water is required to allow stable operation of the heat pump and to guarantee that the product will retain its reliability in the long term.

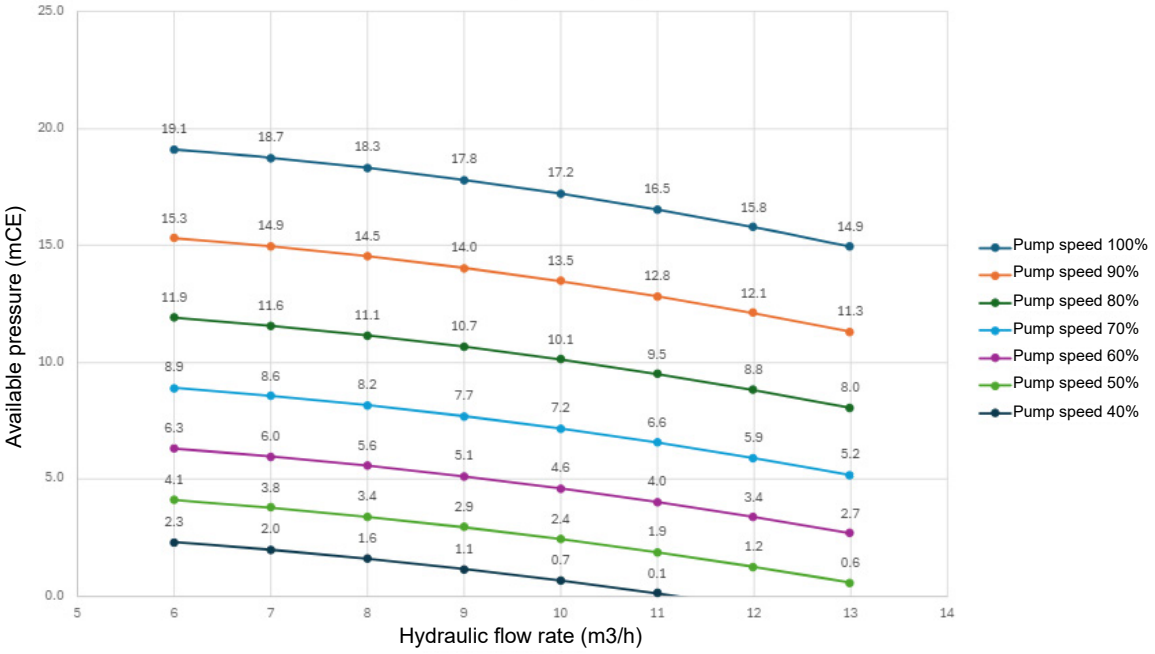
R290 model	ECOMOD AHP70-65
Minimum water volume of the HP-primary tank loop (L)	850
Volume of the hydraulic circuit (L)	18

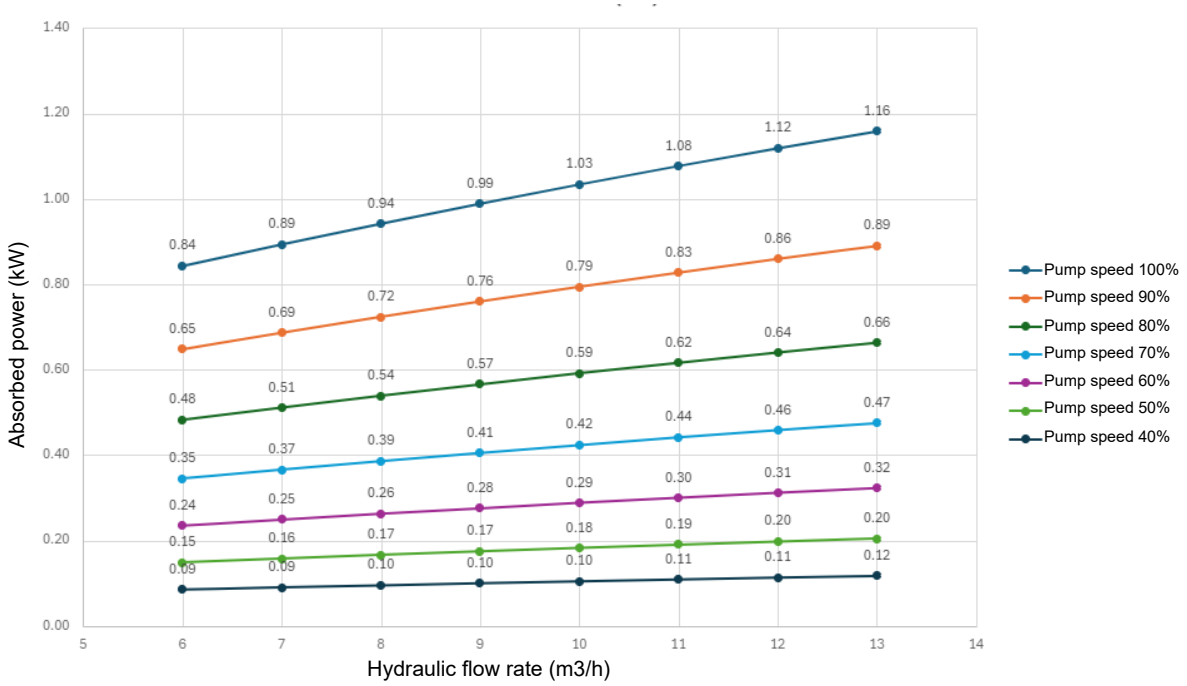
3.2.4. Available manometric head

The circulation pump is built into the heat pump. The hydraulic pressure available at the outlet of the outdoor unit is shown in the graph below.
The system must be designed to guarantee the nominal output in relation to the operating points indicated below.

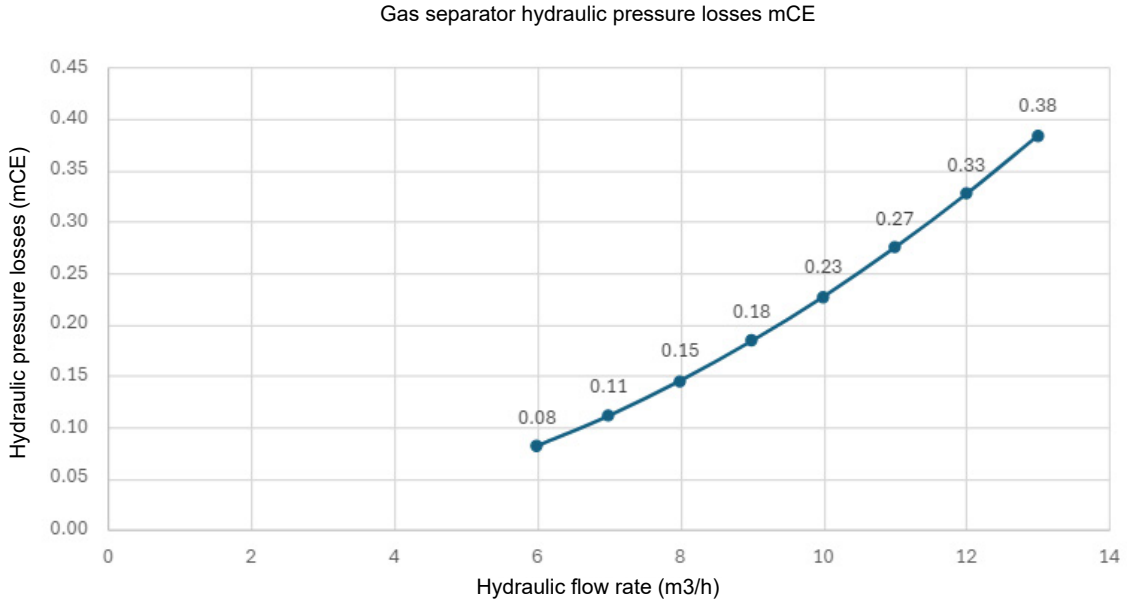
- **Available pressure**

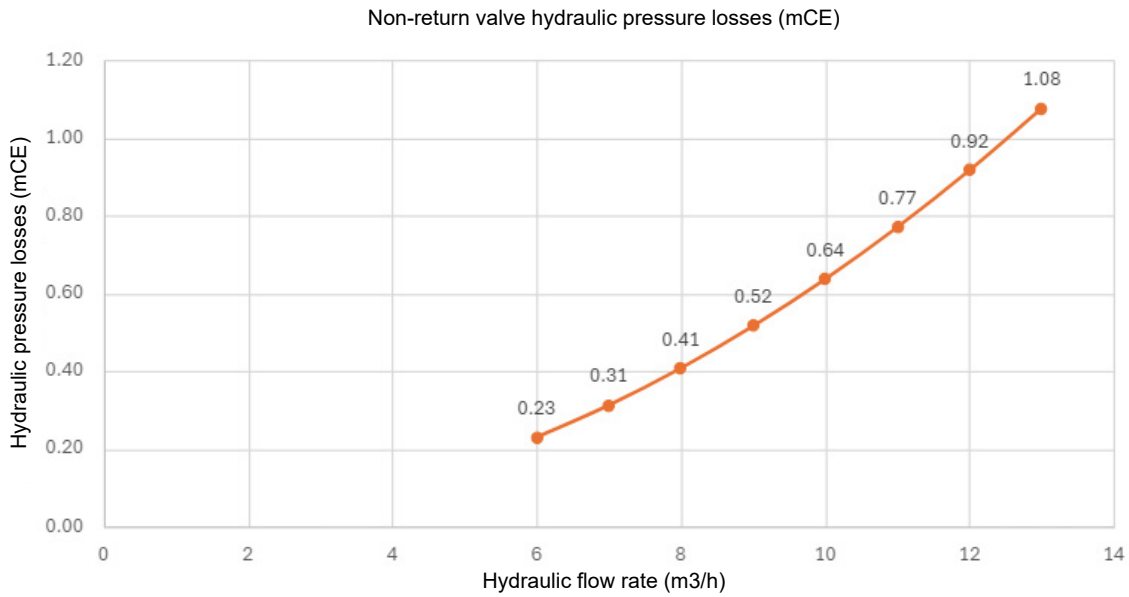






- **Pressure losses**





3.2.5. Primary circuit flow rate control

CAUTION: **Managing the primary circuit flow rate is essential to ensure product performance and service life. The flow setting value must be adapted to suit the application.**

It is imperative to install regulating valves on the HP outlet tubing (not supplied), refer to the diagram. IF the sizing of the hydraulic circuit is done according to best practice, no balancing valve is required thanks to the variable-speed pump.
When a cascade installation is used, the flow must be balanced between all units. We recommend performing this balancing using balancing valves so that individual flow levels can be measured over time.

CAUTION: **Flow adjustment and checking are the responsibility of the installer/ operator and will not be performed by Ideal Heating. When the system is commissioned, a balance check will be required by Ideal Heating. If no check is performed, commissioning may be refused.**

Minimum water flow rate

For an application with a fixed flow rate, the nominal water flow rate is determined to ensure a heat variation between 3°C and 10°C between the water inlet and outlet of the plate exchanger.
For an application with a variable flow rate, the maximum authorised water flow rate is the one presenting a temperature variation of 5°C under nominal conditions and the minimum flow rate is used to ensure the correct operation of the evaporating device.

For more detailed information, the table below indicates the maximum and minimum nominal flow rates and the disconnection and restart flow rates of the appliance depending on the flow rate.

CAUTION: **Insufficient water flows can cause condensation temperatures that are too high in heating mode, causing the intervention of the safety devices and the switching off of the unit and, in some extreme cases, severe refrigeration circuit failures.**

Model	ECOMOD 65
Recommended nominal flow rate in heating mode	8.0m3/h
Maximum flow rate in m3/h	12.9m3/h
Minimum flow rate in m3/h	6.0m3/h
Disconnection threshold in m3/h	5.8m3/h
Restart threshold in m3/h	5.9m3/h

CAUTION: **All the units are supplied with an integrated flow meter. If the flow meter is altered, removed, the guarantee will be cancelled.**

Too low hydraulic pressures can:
- Compromise the unit’s flow rate reading and trigger unplanned alarms
- Compromise the circulation pump's lifetime

It is recommended to regularly check the system’s hydraulic pressure.

Static pressure must be maintained at pump suction to ensure the lifetime of the mechanical seal on the circulation pump.

CAUTION: **Pay attention to the hydraulic system pressure levels: values that are too low can cause unit malfunctions.**

If the hydraulic system pressure is very low, the flow meter may display an unstable reading.
It is advisable to periodically check the condition of the sieve filter at the HP inlet or even that of the R290 degasser at the HP outlet, especially if very high temperature differences are noted between the inlet and the outlet on the water side.

3.3. Electrical connections

DANGER:

Ensure that the main electrical power supply has been switched off before starting any work.

CAUTION:

The protective earth conductor must be longer than the phase conductors. Furthermore, the main earth conductor and the power supply conductors must have a double attachment very close to their connections.

The electrical panel is located under the cover. The minimum spaces indicated in paragraph 3.1.5 must be respected for the electrical connections.

The installer must fit a dedicated circuit breaker upstream of the electrical connections of the appliance (main circuit breaker).

The supply voltage must be definitive and must not vary, in which case contact the power supplier. The power supply must respect the mentioned limits, otherwise the warranty is immediately void.

If the power cable is damaged, it must be replaced by qualified personnel, in order to prevent any risk.

Any appliances located nearby may cause/suffer electromagnetic disturbances to/from the unit. Be aware of this risk on the installation site. We recommend powering the unit electrically with an adequate line and protections and to use independent cable trays.

The flow meter must ALWAYS be connected as indicated in the wiring diagram. Never shunt the flow meter connections in the terminal block. The warranty will be void if the flow meter connections have been modified or connected incorrectly.

All electrical components are designed to operate in an environment where R290 gas is present. Any damage, alteration or modification may result in a fire hazard.

Do not touch the cable attachment. Do not disconnect the connectors from the electrical cabinet.

Recommendations for opening the electrical cabinet: Wipe the door before opening it so that no water runs in upon opening.

When it is raining, use an umbrella to protect the box.

Maintenance of the box: every year, change the filters of the fans in the box.

3.3.1. Recommendations for electrical circuits

Electrical connections

CAUTION:

Ensure that the general electrical power supply has been cut off before starting any repair work.

The electrical installation must be conducted in accordance with the prevailing regulations in the country of installation.

Never use a socket for the power supply.

The electrical installation must be equipped with a differential protection. This appliance is designed to operate under a nominal voltage of 400 V +/- 10%, 50 Hz. Details on the protective measures to be put in place are included in this chapter 3.3.

The electrical connections will only be made when all of the other assembly operations (attachment, assembly,...) have been carried out.

INFORMATION:

The contract with the energy supplier must cover the maximum electrical requirement of the installation.

The outdoor unit must be supplied directly by a dedicated line, protected on the outgoing side by a type B differential protection, and with a proximity switch allowing the contacts to be separated in all poles (see paragraph "3.3.3. Current source").

CAUTION:

It is absolutely FORBIDDEN to braze/weld/grind, etc. within 3m of the appliance without taking all the necessary measures related to an intervention on an R290 appliance (detection, ventilation, explosimeter).

3.3.2. General remarks on electrical connections

Check that the electrical power supply complies with the nominal characteristics of the appliance (voltage, phases, frequency) as stated on the data plate located on the side panel of the appliance.
The electrical connection must comply with the electrical wiring diagram of the appliance and local and international regulations (fit a main circuit breaker, and differential circuit breakers for each line, and earth installation adequately, etc.).
The electrical installation must be made in accordance with national regulation.
The leakage current of the product is greater than 10 mA.

CAUTION:

All of the installation operations must be carried out when the heat pump is stopped, and after disconnecting the electrical power supply.

These operations must only be carried out by QUALIFIED PERSONNEL.

When the work is complete, refit all of the covers removed with their screws and seals (if present).

HP MODEL	AHP70-65
Supply voltage	400V 3-phase
Max absorbed electrical power (kW)	42.7
Max. in-rush current (A)	70
Maximum intensity at start-up (A)	70
Soft starter	Yes
Power stages (%)	50/100
Circuit breaker amperage	3x400V 50Hz Neutral TN ICC<20kA Upstream electrical network protected by a 300mA type D differential circuit breaker 4G25 cable
Supply cross-section by phase	16 mm² flexible if length less than 60 metres 25 mm² flexible if length less than 140 metres
Number of conductors	3 Phases + Earth. TN neutral system

We recommend keeping power and bus cables at least 20 cm apart to avoid any interference, or failing that, shielding the bus cable.

3.3.3. Current source

CAUTION:

Electrical connections must only be carried out by QUALIFIED PERSONNEL, in compliance with the legislation in force.

Ensure that a compliant earth connection is installed, as inadequate earthing can cause electrical shocks. The manufacturer cannot be held responsible for damage caused by ineffective or absence of earthing.

Do not use a temporary power supply or construction kit.

The ratings and dimensions of the power cables, electrical protections and line fuses must comply with the indications of the unit's wiring diagram and the electrical data of the technical specifications table (see paragraph 2.1.1).

Use a dedicated power line, do not power the appliance via a line to which other users are connected. Securely fasten the power cables and make sure they do not come into contact with sharp corners or cutting edges. Use double-insulated cables with copper wires.

The earth connection should be made first during the connection phase and vice versa, it should be removed last when the unit is disconnected. If the power cable comes loose, make sure that the active conductors are powered before the earth wire.

A proximity switch with adequate breaking capacity must be installed on the supply line, with contact separation for all poles.

This switch must be close to the HP but outside the exclusion zone.

A dedicated differential circuit breaker must be installed at the start of the line in the electrical panel (see the recommendation in the wiring diagram).

This circuit breaker must be rated higher than the maximum current allowed by the outdoor unit, and have a breaking capacity greater than the maximum short-circuit current from the upstream power supply (main low voltage distribution panel or other).

Electrical power supply	Models	Recommended cable cross-section (copper)	Max. absorbed current (A)	Recommended tightening torque:
50Hz 400V/3ph + PE	ECOMOD 65 kW	4G25 mm² (1)(2)	70	L1/L2/L3: min.: 5 Nm max.: 6 Nm PE: 20 Nm

(1) cable based on a fixed position in the air at 30°C
(2) 16mm² if length less than 60 metres
25 mm² if length less than 140 metres
If you use a 16mm² cable cross-section, it is mandatory to fit a cable gland adapted to the cable. To allow you to install this new cable gland, it is possible to use reducers such as, for example, reference 52104539 by LAPP (M63x1.5 to M40x1.5 reducer)

The units comply with electromagnetic compatibility specifications, but the electrical installation designer must still make the appropriate assessments to ensure there is no interference.

- **Electrical cable sizing**

The supply cable cross-section will be sized by the customer in accordance with national regulation. The power of the HP, the cable length and the cable type (flexible or rigid) should be taken into consideration. The Q1 circuit breaker can accept cable cross-sections between 16mm² and 70mm².

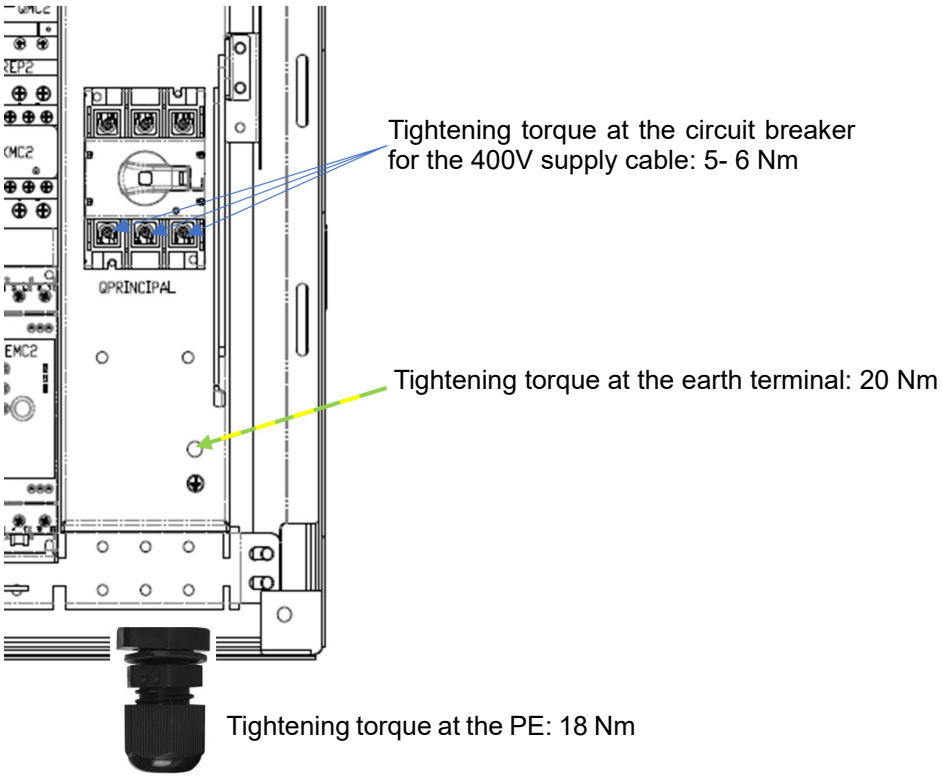
- **Protection sizing**

The sizing of the protection at the head of the HP will be carried out according to national regulation. The component will protect the installation against short-circuits, overheating and insulation to earth faults.

In the case of a cascade, each machine must have its own protection.

- **Tightening torque**

1. Power cable



- **Cable routing**

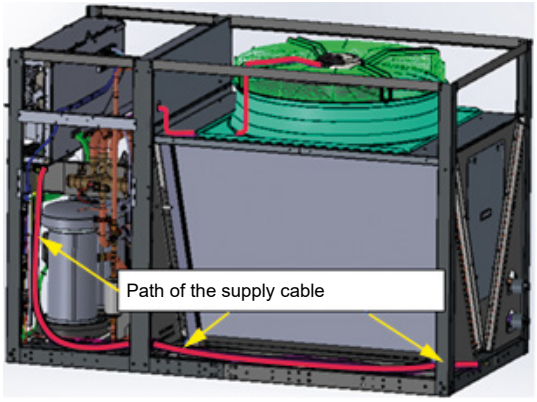


Figure 7 - Path of the supply cable

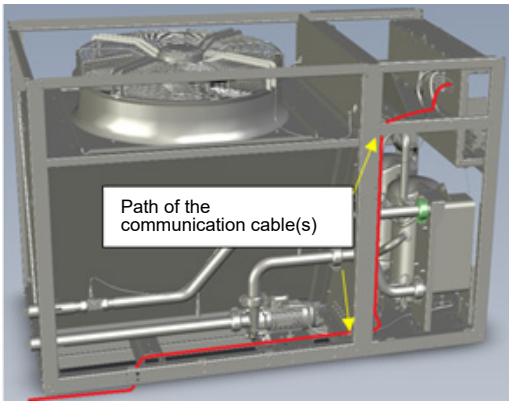


Figure 8 - Path of the communication cables

3.3.4. Control relay status

A relay present in the electrical cabinet ensures that the HP is well supplied with 3 phases and that these are in the correct order.

Flashing green light:
Electrical power supply
non compliant

In case these are not in the correct order, switch 2 phases over.

Green light
Electrical power supply
compliant

3.3.5. Use of the gland plate

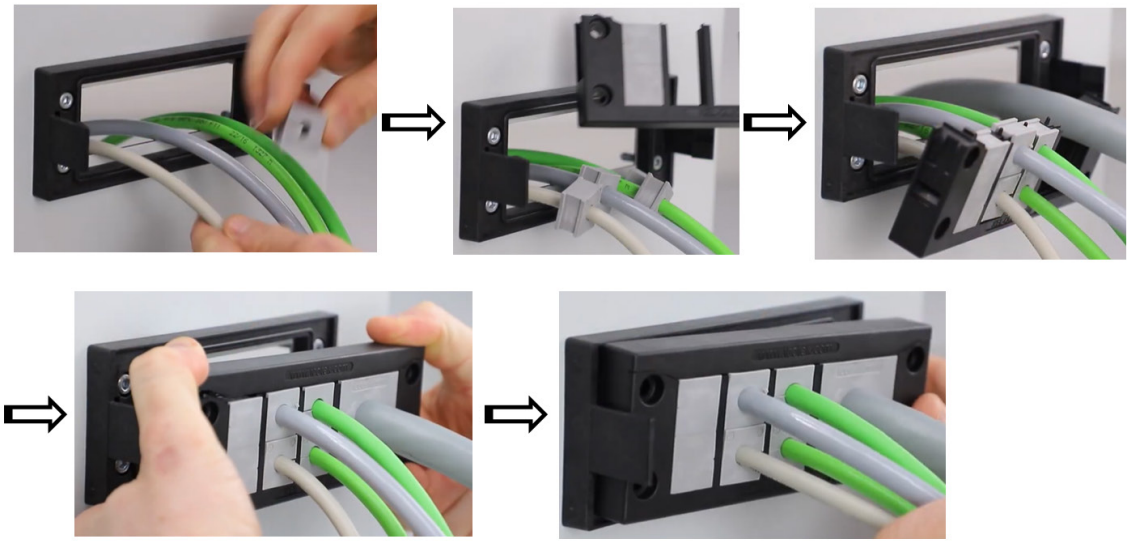


Figure 9 - Procedure for using the gland plate

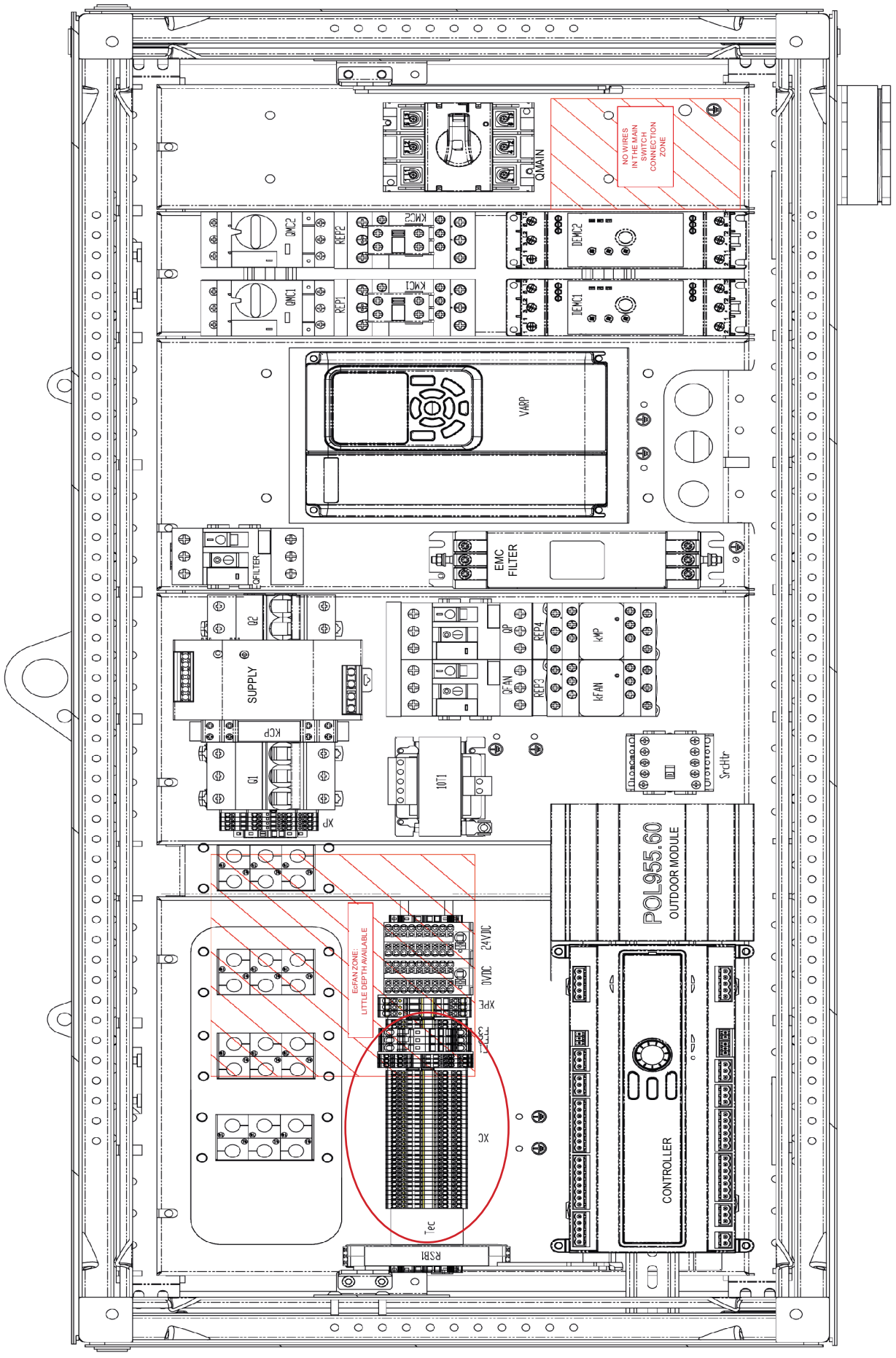
3.3.6. Ancillary electrical data

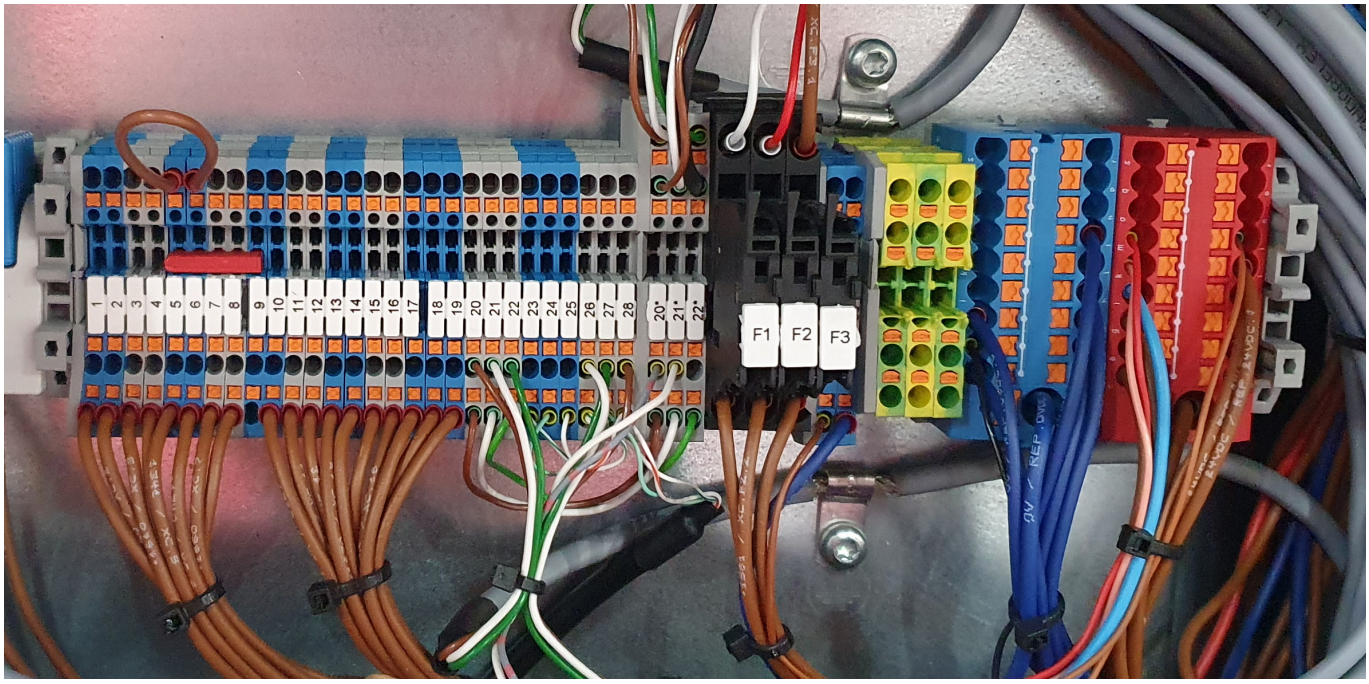
V/~/Hz unit power supply	400/3PH+PE/50
V/~/Hz Human Machine Interface circuit	24Vcc
V/~/Hz fan power supply	400/3PH+PE/50

* Acceptable variations: +/- 10%

REMARK: The electrical data may be modified. You must consequently refer to the data label on the RH side panel of the appliance.

3.3.7. User terminal





XC					
1	0-10V	0-10V	Temperature setpoint by 0-10V signal	Input	Shielded stranded cable 2 x 0,5 mm²
2	GND				
3	Signal		Heat pump cascade flow sensor QAZ 36 type	Input	Temperature sensor cable
4	GND				
5	COM		Immediate shutdown of heat pump, Safety shutdown. Generates an alarm	Input	Cable 2 x 0.5 mm²
6	IN				
7	COM		Heat pump start request (contact closed) or stop request (contact open)*	Input	Cable 2 x 0.5 mm²
8	IN				
9	COM		Heat pump heating mode request (contact open)**	Input	Cable 2 x 0.5 mm²
10	IN				
11	NO		Heat pump status feedback: defrosting in progress	Output	Cable 2 x 0.5 mm²
12	COM				
13	0-10V	0-10V	Heat pump status feedback: fan speed (0-10V signal for 0% to 100%)	Output	Shielded stranded cable 2 x 0.5 mm²
14	GND				
15	NO		HP circulation pump status feedback: hydraulic pump operating status (contact closed = pump ON/ contact open = pump OFF)	Output	Cable 2 x 0.5 mm²
16	COM				
17	NC		HP alarm report: NO contact closed or NC contact open => Alarm in progress	Output	Cable 3 x 0.5 mm²
18	COM				
19	NO				
20	A1		Modbus (master) port: see details below	Bus	Shielded stranded cable 3 x 0.5 mm²
21	B1				
22	REF				
23	A2		Modbus (slave) port: see details below	Bus	Shielded stranded cable 3 x 0.5 mm²
24	B2				
25	REF				
26	A2		Copy of slave port to link the slave heat pumps: see details below	Bus	Shielded stranded cable 3 x 0.5 mm²
27	B2				
28	REF				

*: depending on the control mode and P118 and P119 settings
**: priority contact or P116 and P117 settings
***: depending on P140 settings

Signals from the customer

Terminals 1_2: 0-10V analogue input / PAC control
- 15 metres of cable maximum
- The PLC input has a resistance of 100 KOhms
- Accuracy varies with voltage (input resolution 1mV)
  - at 0V: 2mV
  - at 5V: 25mV
  - at 10V: 50mV

Terminals 3_4: NTC10K analogue input / Cascade probe
- With 0.5mm² cable 40 metres
- NTC10K compatible probe type B25/85 = 3977
- Current through probe 140 microA

Terminals 5_6: Digital input / Stop generator
7_8 : ON/OFF PAC
9_10: Hot/cold
- If 0.5mm² cable: 100 metres max.
- voltage/current across contact: 24Vdc/8mA
- The controller considers the input to be Active if the sum of the resistances of the components connected to this input (cable + contact + connectors ....) <200 ohms. With a 0.5mm² cable 200 metres
- The controller considers the input as Not Active if the sum of the resistances of the components connected to this input (cable + contact + connectors ....) > 50 KOhms.

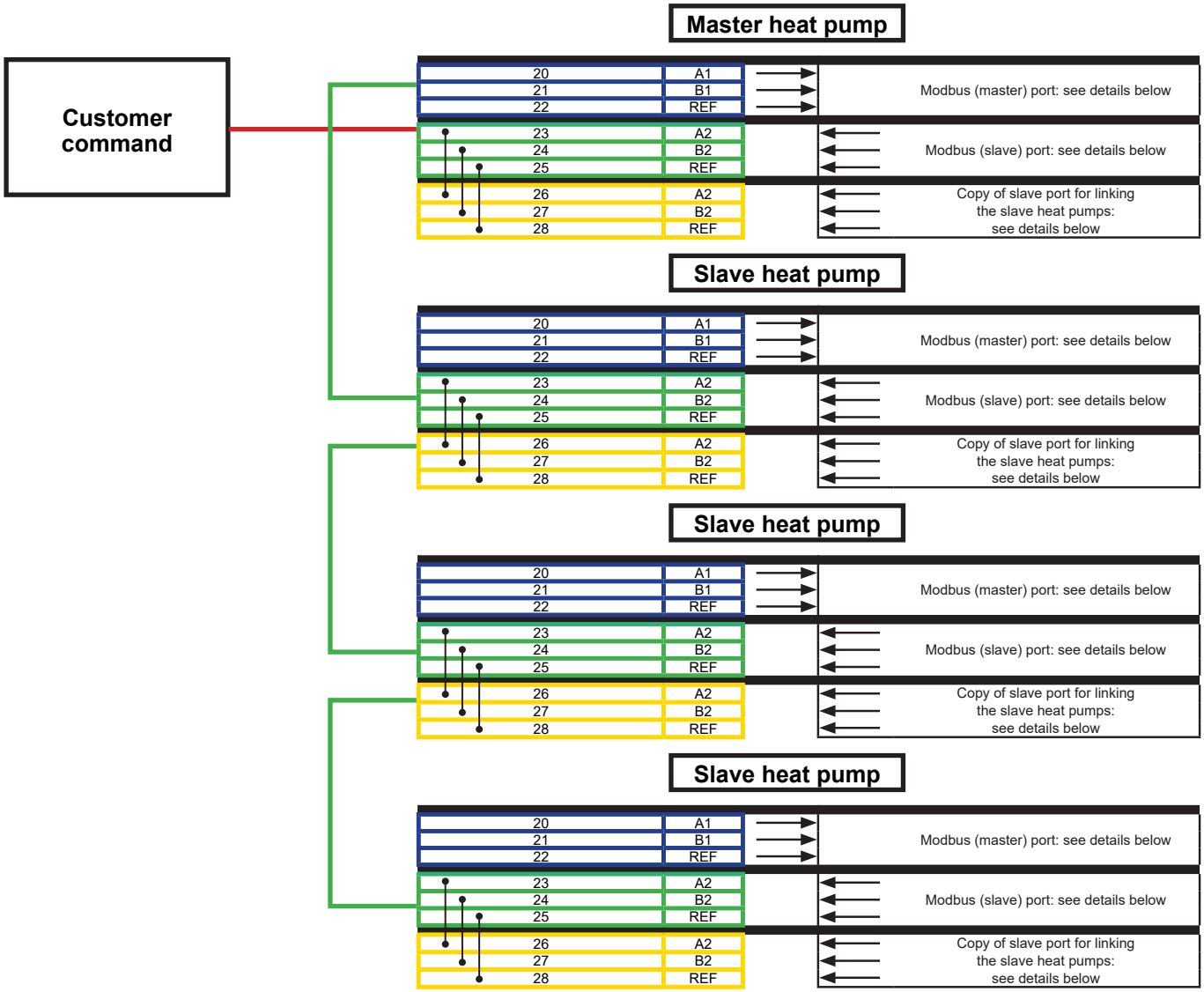
Signals available to the customer

Terminals 11_12: Digital output / Defrost in progress
15_16: Pump running
- Switching voltage: AC 24 to 230V
- Contact load: AC 1 to 4A (cos Phi>0.6)
- Maximum inrush current: maximum 80A (<=100 microseconds)
- Minimum breaking load: 30mA at 19V or 10mA at 200V

Terminals 13/14: Analogue output 0-10V / Fan speed 0-10V
- Maximum cable length 15 metres
- Current limited to 1mA against short circuits and overloads
- Accuracy varies with voltage (output resolution 11mV)
  - at 0V: 66mV
  - 5V: 95mV
  - at 10V: 124mV

Terminals 17/18/19: Digital output / PAC alarm
- Switching current
  - NO contact: AC/DC from 0.01 to 4A
  - NC contact: AC/DC from 0.01 to 2A
- Contact load
  - NO contact: AC(250V) 4A / DC(30V) 3A
  - NC contact: AC(250V) 2A / DC(30V) 1A
- Maximum inrush current
  - NO contact: 10A (<1second)
  - NC contact: 3A (<1second)
- Minimum load for reliable switching
  - NO and NC contacts: 10mA at 30V AC/DC or 1mA at 230Vac

Modbus and/or Cascade connection details



3.3.7.1. Ducted installation

The unit can be ducted, as long as the available static pressure indicated by the manufacturer is not exceeded (see table below). Otherwise, the announced performances are not guaranteed.
The ducting casing will not be supplied with the product, the installer is responsible for adapting their own assembly.
However, manufacturers' recommendations can be shared.

For the settings, refer to the regulation instructions.

Unit	Additional pressure losses for a flow rate @24100m3/h	LwA under full load (total)
AHP70-65	0 Pa	86.4
	20 Pa	87.2
	40 Pa	87.9
	60 Pa	88.6
	80 Pa	89.2
	100 Pa	89.6

Acoustic power depending on the pressure loss

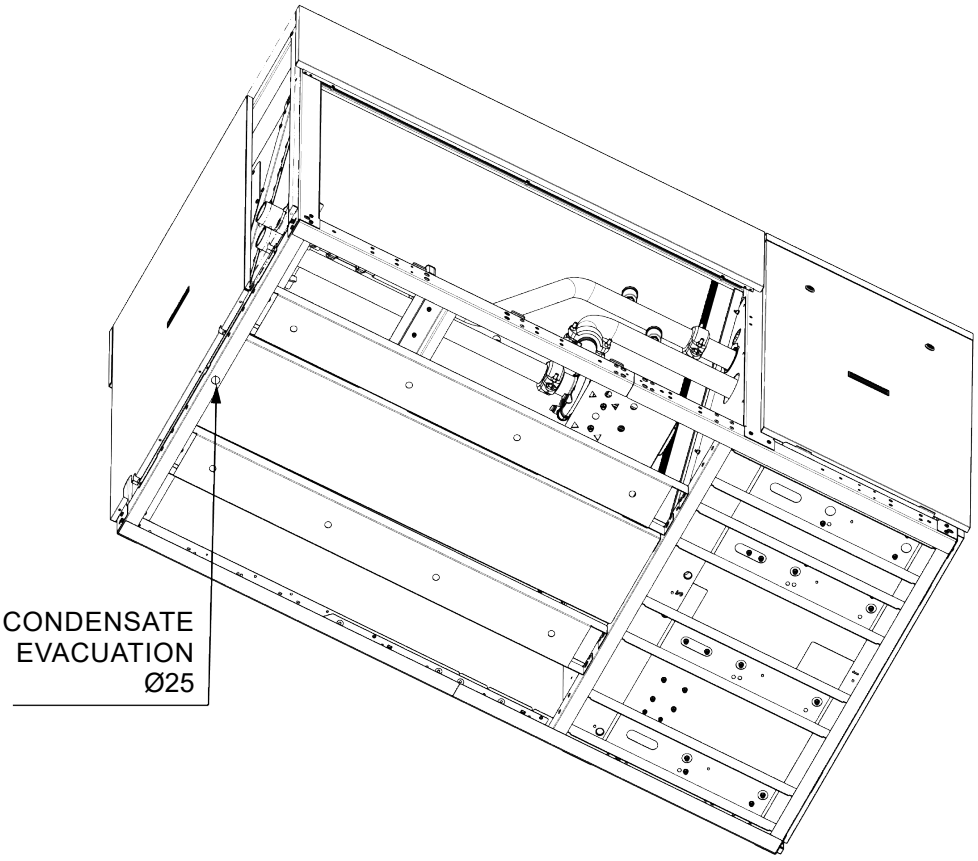
IMPORTANT:	**A straight length at the fan output is strongly recommended to avoid an excessive dynamic drop in pressure.**
CAUTION:	**WARNING: the conduits connected to the appliance must not contain any potential source of ignition**
CAUTION:	**it is essential to ensure that the weight of the conduits connected to the appliance do not damage the unit.**

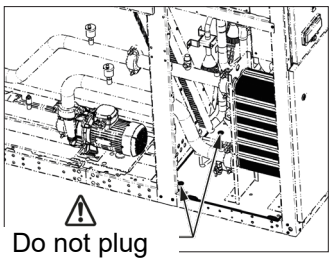
Condensation may form in and around the conduits, we therefore recommend insulating them.

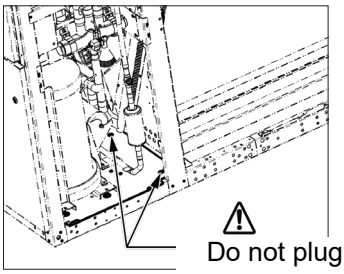
3.3.8. Condensate evacuation system

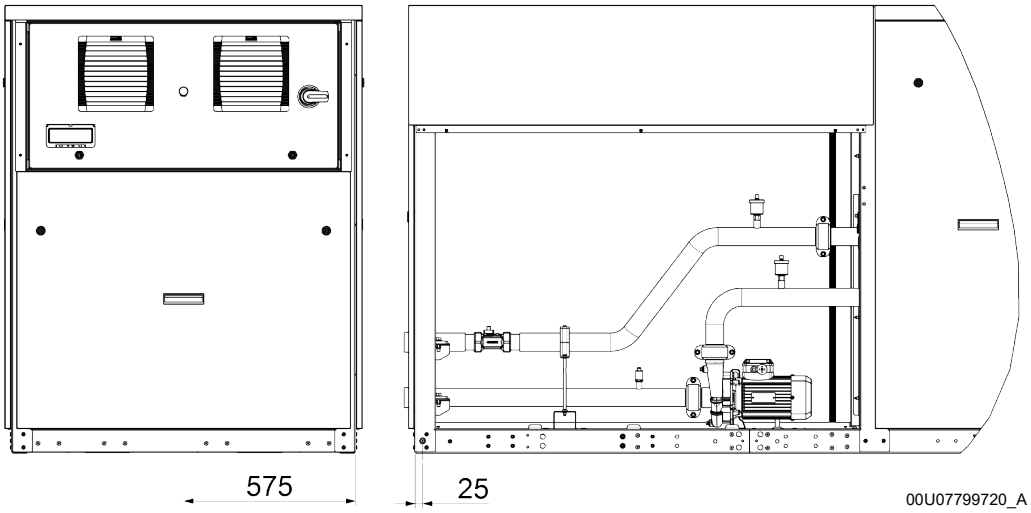
Each unit is equipped with an orifice for the evacuation of condensation beneath the condensate drain pan. A connector (NOT SUPPLIED) can be installed at this orifice to connect a hose to channel the condensation water.

CAUTION:	**Condensate can also run underneath the unit from points other than this drain.**









CAUTION:

More especially in the coldest regions, we recommend installing supports to raise the unit to prevent ice from forming under the unit and damaging it.

In the event of a leak, refrigerant gas can escape from the unit through the lower panel of the compressor compartment. It is therefore recommended that condensate drainage be directed to an open area near the machine. If the appliance is installed on the ground, it is also possible to channel the condensates into a bed of rubble or gravel for drainage. For a typical open field installation, please refer to the images below:

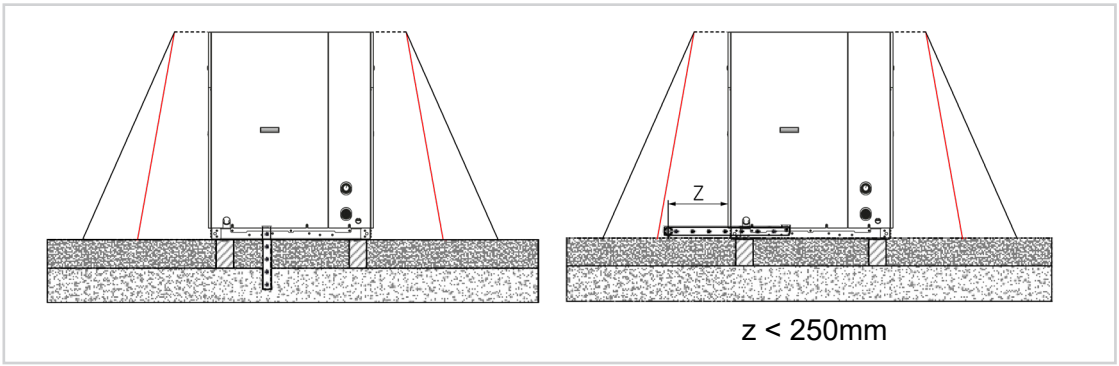


Figure 10 - Evacuation into a bed of rubble or gravel

CAUTION:

Do not block the lower panel of the compressor compartment for condensate drainage.

Do not block the hole in the drain pan for condensate drainage.

CAUTION:

For geographical areas where the outside air temperature can be below 0°C, a heating element may be installed to prevent the condensed water from re-freezing. In this case, the heating element must be ATEX or outside the exclusion zone.

3.4. Operating principle

3.4.1. Operating ranges: heating mode

When the heat pump is operating in heat production mode, other than in the start-up and transition phases, the output water temperature must not fall below 30°C for the whole season. Similarly, the output water temperature must not exceed 70°C.

Outside this temperature range, the appliance can fail to operate correctly, causing the triggering of safety devices and, in the most critical cases, damage to the unit, its exchangers and its compressors.

This unit is designed to operate within an external air temperature range of between -20°C and +40°C. The output water temperature depends on the external air temperature, within the limits given in the diagram below.

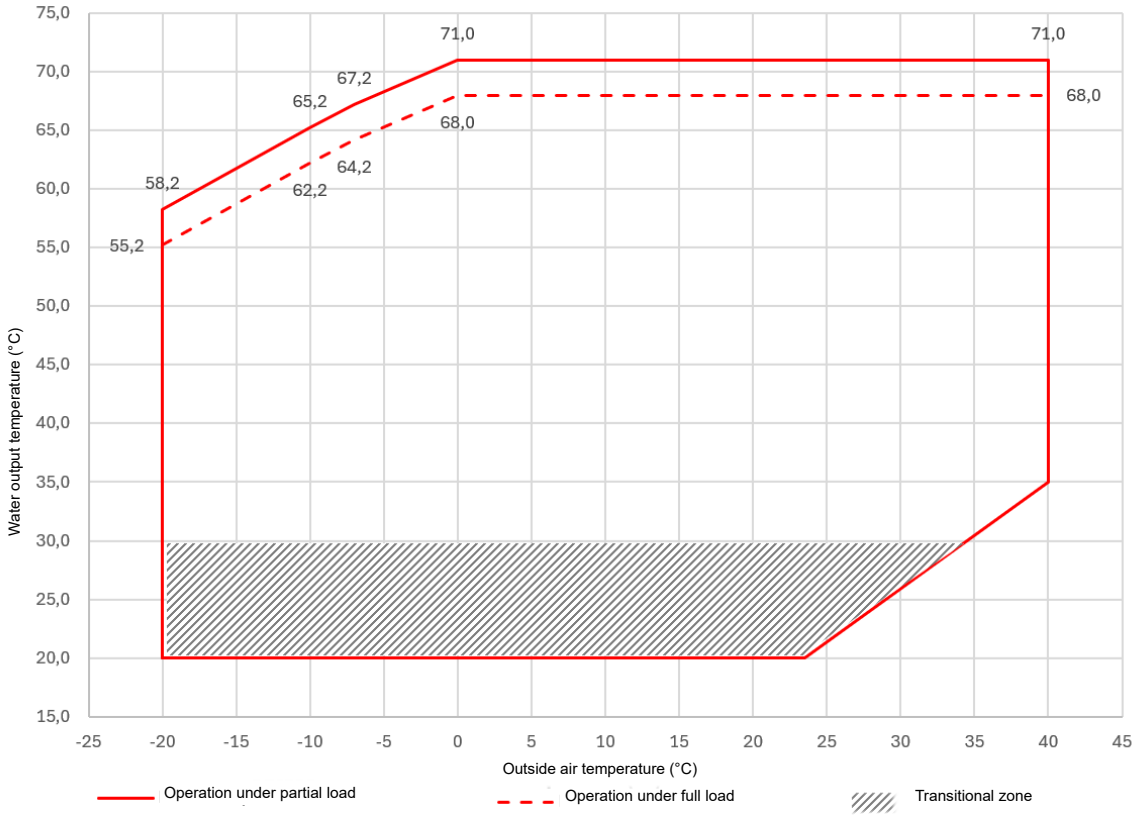


Figure 11 - Temperature limits of the water supplied by the unit in heating mode depending on the temperature of the outside air.

3.5. Installing the heat pump

The choice of the position for installation is particularly important insofar as any later movement is a delicate operation requiring the intervention of a qualified person. Comply with the maximum and minimum distances for the outdoor unit (see next paragraph), the safety, performance and service life guarantees depend on this.

3.6. Installing the outdoor unit

3.6.1. Installation precautions

All ECOMOD series models have been designed for outdoor installation (see paragraph 3.1.5 for further details). For other installations, perform a risk analysis, a study of the impact of the ventilation of the machine and the acoustic impact.

- Choose a site that is sheltered from strong cold prevailing winds (Mistral, Tramontane, etc.).
- The outdoor unit is made of metal elements that can be subject to corrosion when exposed to particularly aggressive environments, especially the evaporator, which is directly exposed to an external air flow forced by the fan. 3 particularly aggressive environments may be mentioned.

CAUTION:

Marine environment: the marine environment is characterised by a high concentration of sodium chloride (salt). It is transported by the sea spray in the immediate vicinity of the coasts, by the fog, or by the sea breeze which can carry particles of salt water far from the coasts, up to several kilometres in the continent.

CAUTION:

Industrial environment: industries use or transform chemical elements in their processes: cleaning or surface treatment agents, various combustions (hydrocarbons, coal, incinerations), salting, etc.

CAUTION:

Rural environment: agricultural processes include the spreading of chemical fertilisers, and emissions of potentially aggressive pollutants such as animal waste in livestock farms or gas emissions from agricultural machinery.

Local environments can be affected by various contaminants, in particular from road traffic, airports, maritime traffic, power stations, chemicals and cleaning plants, landfills or incinerators and other combustions, water treatment plants, cruise ships, chemical treatment installations, paper and wood industries, mining operations, salt extractions, swimming pools, farms and fertiliser manufacturing industries, etc.

Determining which corrosive elements are present in the environment of an installation is a necessary preliminary step but is not sufficient to define how to protect the unit. It is also necessary to establish if it will be directly and continuously or frequently exposed to aggressive agents.

An observation of the climate and the surrounding terrain will help to define the main wind directions in the area and the distance to which the sea spray or fertilisers will be transported.

A study of the configuration of the buildings is to be carried out to highlight the zones of air recirculation, and the zones exposed to the emissions of pollutants (chimneys, nearby agricultural fields), in particular in the case of installation on a roof. Positioning the heat pump behind a building may be sufficient to protect it from aggressive agents.

Attention, installation behind a wall or under an alcove is not a guarantee of protection against corrosive elements, the shelter must allow ventilation in fresh uncontaminated air to constitute an effective protection against corrosion.

It is impossible to define this precisely because each installation is unique. However, by taking into account the above-mentioned elements, it is possible to estimate whether the appliance will be installed in exposed conditions or not.

- Do not install the appliance in a passageway.

- For correct operation and an optimal life span of your equipment, it is necessary to have a quality of water that complies with the general conditions of sale.
- **The appliance must be easily accessible for future installation and maintenance work. If the outdoor unit is installed at a height, arrangements must be made to ensure the safety of the workers (platform with guardrail accessible via available means and in accordance with regulations).**
- Make sure that the passage of hydraulic connections is possible and easy, especially in the case of several heat pumps.
- Take into account free access to the panels and their removal, as well as the elements to be removed from the HP if a part is to be replaced.
- The outdoor unit is weatherproof, but avoid installing it in a place where it may be exposed to dirt or heavy water run-off (under a leaking gutter, under a roof, etc.). Avoid installing the unit in places where water is likely to stagnate or fall, for example from gutters
- The outdoor unit must be raised by at least 50 mm from the ground. Avoid places where snow can accumulate (e.g. corners of buildings with sloping roofs). If the unit is to be installed in areas prone to snowfall, it should be raised by at least 20 cm and at most 150 cm (depending on the average snowfall in the area) to prevent snow from accumulating around the machine.
- During operation, water (due to the condensation of the water contained in the air) is discharged from the outdoor unit. If the unit is installed on a terrace where there is a risk of frost, a means of condensate drainage is required.
  If the appliance is installed in a region where the temperature may fall below 0 °C for long periods, fit the condensate drain hose with a trace heater to prevent it from icing over (see Figure 8 page 38).
- If a water retention pan is installed, check the efficiency of the condensate drain and provide an ATEX trace of the pan, and take into account the potential migration of the R290 via this drain and therefore a remote exclusion zone.
- Nothing should obstruct the air from circulating through the evaporator and out of the fan.
- The site where the unit is installed must be free of foliage, dust, etc., which could obstruct or cover the heat exchanger.
- Ensure that the appliance does not disturb neighbours or users (noise level, draughts caused, low temperature of the air blown causing a risk of freezing plants in its path).
- It is advisable to create a support slab of suitable size for the unit. However, it is advisable to install anti-vibration mounts between the base frame and the supporting surface, to avoid the transmission of vibrations throughout the building.
- The surface on which the HP unit is installed must not be level, to avoid water/ice deposits, which can be dangerous.
- Do not leave the pallet under the heat pump when it is operating, to avoid condensate drainage problems in particular.
- Condensate can also run from points other than the drain pan connection under the evaporator (with regards to the lack of insulation on the BP line of the cooling circuit).
- Provide a gutter or condensate drain **outside the exclusion zone.**
- **Observe the exclusion zone to separate the unit from any cavities such as pits, manholes, building entrances or sloping roofs, in which refrigerant might accumulate in the event of a leak.**
- It is very important to avoid recirculation between suction and discharge, otherwise the performance of the unit will deteriorate or even interrupt normal operation.
- For the positions provided for the installation of the vibration shock absorbers, refer to paragraph "2.4.2. Position of the barycentre and the anti-vibration elements".

4. PRE-REQUISITES BEFORE COMMISSIONING

Before commissioning, carefully inspect the unit and the packaging for any damage or refrigerant fluid leak.
Do not proceed with starting up the unit if damage has been observed during transport and refer to paragraph 3.1 above.

4.1. Verification before switching on

- Check that there are no leaks. Each operator must be equipped with a personal explosimeter for R290 gas and an R290 leak detector.
- Remove the shipping bolts (or compressor blocking) before starting up.
- Check that the electrical and hydraulic diagrams of the installation the machine is connected to are available.
- Check that there are safety valves, filters and the expansion system.
- Ensure that the isolation valves and the automatic drain valves on the hydraulic circuits are open.
- Ensure that the hydraulic circuit is filled, pressurised and bled.
- Check that all of the hydraulic connectors are fitted correctly and that all of the instructions on the labels have been followed.
- Ensure that arrangements have been made to drain the condensation from the finned battery.
- Be sure to open the unit's air vents and degasser.
- Check if the electrical connections comply with the regulations in force, including the earth. Check the order of the phases, the voltages between each phase, then between each phase and the earth.
- Ensure that the voltage is definitive and within the tolerance limits (±10%) indicated on the information plate of the appliance.
- Check if the electrical resistors of the compressor housings are powered correctly.
- Check for electrical personal protective equipment (differential circuit breaker, differential switch, etc.).
- Before switching on, check if all of the cover panels have been fitted and attached with the appropriate screws.
- Check that the weight of the pipes is not resting on the machine structure.

CAUTION:

- **Power up the unit (see § 4.2) for at least 12 hours before switching it on, in order to enable the crankcase heaters to heat the compressor casing resistance sufficiently (the heaters are automatically supplied when the switch is On and the compressors are not in operation). The heating elements are operating correctly if after a few minutes the temperature of the compressor crankcase heater is 10 to 15°C hotter than the ambient temperature. Check that there are no errors on the phase controller (flashing green) that may indicate a missing phase or incorrect phase order.**

4.1.1. Connecting the water supply

CAUTION:

The connection of the system to the water supply must only be carried out if powering on is possible during the process, so that the frost-free management system is active in case negative temperatures are present.

Check that the system is stopped, with the main switch in position 0.
Add water until the pressure of the hydraulic circuit reaches 2 bar. Power on again. The internal drain valve is automatic, run the pump to readjust the pressure.
For further details, refer to the regulation instructions.

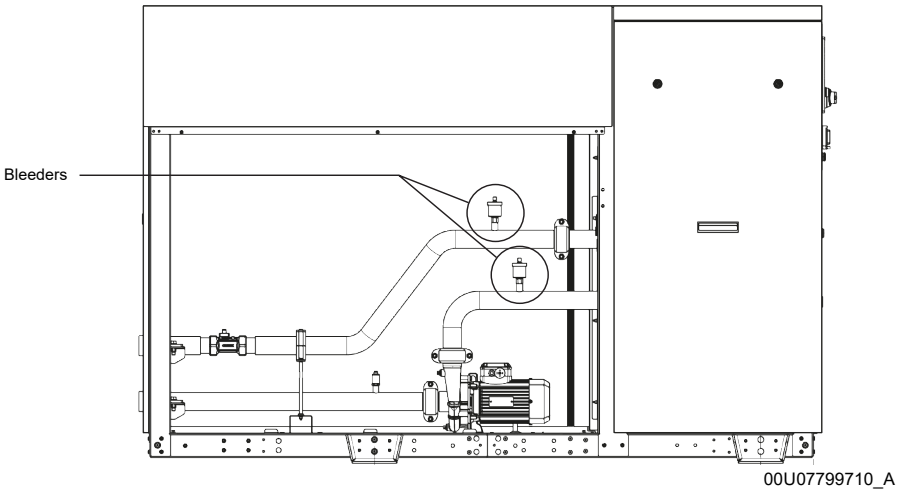


Figure 13 - Hydraulic circuit

The unit is equipped with vents that automatically remove the air that has accumulated inside the circuit. Removing the air from the system allows the avoidance of undesirable effects, such as corrosion, premature wear and lower output. When the air vent remains in the open position, the air is evacuated automatically.

CAUTION: **When connecting water supply, the flow meter and pressure controller alarms are deactivated; the maintenance technician must guarantee the water volume inside the installation. Dry operation must be prohibited to guarantee the best lifetime of the circulation pump's mechanical seal. Consequently, it is important to follow the filling procedures described in this manual.**

CAUTION: **The supplied air vents are closed in the factory. They are to be opened so that they can release air.**

- **Mechanical seal of the centrifugal pump**

The heat pump has a factory-installed centrifugal pump. On a centrifugal pump, the mechanical seal is intended to ensure the seal between a rotating part (shaft) and fixed part (body of the pump).
Micro-leaks in the seal can be observed at commissioning. In fact, parallelism between the friction surfaces needs to form during the running in period (< 50 hours). The time taken depends on the operating conditions.

4.1.1.1. Precautions when connecting the water supply

- Supervise all of the operations for connecting the water supply and filling.
- Before connecting the water supply and filling the system, disconnect the electrical power supply to the units.
- The connection of the water supply and filling of the installation must always be carried out in controlled pressure conditions (max. 3 bar). Ensure that a pressure reducer and a safety valve have been fitted on the loading/reintegration line.
- The water in the supply/filling line must be filtered properly beforehand to remove all impurities and suspended particles. Ensure that a removable screen filter and filter-settler are installed.
- Periodically check and evacuate the air that accumulates in the system.
- Fit an automatic air vent at the highest points of the installation.
- Check that the cap on the air vent of the degasser always remains open.
- **Once the system has been filled with water, it must be powered on to ensure the anti-frost strategy.**

CAUTION: **Check that the water temperature in the circuit is higher than the minimum permitted at start-up, as indicated on the heat pump's operating envelopes.**

Isolating the secondary circuit to load the volume can make it easier.

CAUTION:

- **To temporarily stop the appliance, never switch off the power supply using the main isolator switch; this operation must only be used to switch off the electrical power supply to the appliance for prolonged stoppages (for example, seasonal shutdowns, heavy maintenance, etc.). Furthermore, the absence of voltage means that the crankcase resistors are no longer powered and that there is a risk of compressor failure when the unit is switched back on. The summer/winter mode must be selected at the start of the corresponding season. To avoid damage to the compressors, avoid frequent and abrupt changes of mode.**
- **Do not modify the electrical connections of the appliance, otherwise this will nullify the warranty immediately.**
- **During installation and commissioning, ensure that the machine is operating correctly in heating mode and in cooling mode.**
- **When starting up the machine, check that defrosting is not activated during the first 35 minutes of operation. Defrosting can indicate incorrect sizing of the unit in relation to the heat capacity required by the application. To do this, it is possible to isolate the secondary circuit.**

	Done	Comment
Check that there are no gas leaks. Each operator must be equipped with a personal explosimeter for R290 gas.		
Check that there are no ignition sources near the unit.		
Ensure that the operator has read the information contained in this manual to familiarise him-/herself with the machine's operation and its controls.		
Ensure that the operator possesses a certificate of capacity for the handling of refrigerant fluids as well as training in the specificities and precautions to be taken related to products equipped with R290 refrigerant fluid.		
Check that the diagrams and manuals of the installed machine are available.		
Check that the electrical and hydraulic diagrams of the installation the machine is connected to are available.		
Check that the hydraulic installation is conform to the instruction of this manual.		
Ensure that the unit has been carefully inspected at reception as per the instructions contained in this manual.		
Ensure that the unit has been transported and store in a vertical position in a place where the temperature is between -10°C and +50 °C and the relative humidity is between 5 and 95% as per the instructions contained in this manual.		
Check that the unit is installed outdoors and that the exclusion zone mentioned in this manual is observed.		
Check that the unit is installed outdoors and that the technical spaces mentioned in this manual are observed.		
Ensure that protected documentation can be easily read near the operating site of the refrigeration system.		

	Done	Comment
Check that the unit's support is not tilted and is sufficiently robust to bear the weight of the unit.		
Ensure that arrangements have been made to evacuate the condensation.		
Ensure that a study of the vibration and acoustic impact has been conducted to determine whether an anti-vibration support is required.		
Ensure that the volume of water in the primary circuit conforms to the minimum volume indicated in this manual.		
Check the hydraulic circuit pressure at pump suction meets the recommendations indicated in this manual.		
Ensure that the hydraulic connections conform to the instructions contained in this manual and that the seals have been checked.		
Ensure that the hydraulic circuit has been scrupulously cleaned.		
Ensure that the water quality conforms to the physical and chemical characteristics indicated in this manual.		
Check that electrical tracing of the outdoor pipes is provided to ensure that the water temperature is maintained at or above 4°C.		
Check that the sieve filter (NOT SUPPLIED) is installed on the heat pump return.		
Check that the non-return valve supplied with the unit is installed on the heat pump return.		
Check that the gas separator supplied with the unit is installed on the heat pump return with its cap open.		
Ensure that the isolation valves of the hydraulic circuits are open.		
Check that there are safety valves, filters and expansion systems.		
Ensure that the hydraulic circuit is filled, pressurised and bled.		
Check that all of the hydraulic connectors are fitted correctly and that all of the instructions on the labels have been followed.		
Check that the terminals are connected and attached correctly.		
Check that a differential circuit breaker has been installed.		
Check if the electrical connections comply with the regulations in force, including the earth.		
Check the order of the phases, the voltages between each phase, then between each phase and the earth. The voltage must be the same as that stated on the appliance's rating plate.		
Ensure that the voltage is definitive and within the tolerance limits (±5%).		
Check if all of the cover panels have been fitted and attached with the appropriate screws.		

4.2. Powering on

IMPORTANT: **Switching on with an incorrect power supply will result in the immediate destruction of some electronic components.**

For switching on, refer to the regulation instructions.

4.3. HP hydraulic flow adjustment

You are responsible for carrying out the hydraulic flow adjustment service on the ECOMOD. Management of the hydraulic flow rate is essential to ensure the performance and durability of the product. (Please refer to the tables on page 39 for the min. flow rates.
When the system is commissioned, a balance check will be required by Ideal Heating. If no check is performed, commissioning may be refused.

We recommend installing balancing valves (not supplied) to adjust the hydraulic flow rate. Refer to the installation's diagrams.

- **Case of an adjustment on fixed speed:**

- Fully open the balancing valves.
- The hydraulic flow rate is adjusted by starting the circulation pump in forced running mode.
- Check the hydraulic flow rate value. The unit has a flow meter. The flow rate value is available on the user interface. In case of doubt use an adjustment kit on the balancing valve.
- If the flow rate obtained is higher than the target flow rate, reduce the speed setpoint of the circulation pump. If the pump is adjusted to the minimum setting, gradually close the balancing valve until the target value for hydraulic flow rate is obtained.
- If the flow rate obtained is lower than the target flow rate, increase the speed setpoint of the circulation pump. If the pump is adjusted to the maximum setting, the pressure losses in the installation will be too high and the target flow rate cannot be obtained by adjusting the circulation pump settings. Check the valve openings, any clogging of the sieve filter and the separator filter, and repeat the procedure.

- **Case of an adjustment for cascade installation:**

- The adjustment of the hydraulic flow rates in a cascade has to be done in the same way as an adjustment on fixed speed.
- Open all the individual balancing valves.
- Start up the pumps of each heat pump at maximum speed via forced running mode.
- Reduce the pump speed to the recommended speed.
- Close the balancing valves one by one to have the same flow rate on each heat pump to achieve the nominal flow rate on the unit, starting with the unit with the most resistive network (the longest pipes) and ending with the unit with the least resistive network (the shortest pipes).
- Adjusting the flow rate on the Nth HP can have an effect on the preceding HP. Always ensure that the Nth HP being adjusted has the same flow rate as the preceding HP, even if the target value is not obtained to ensure the balancing of pressure losses between the circuits.
- Once the circuits have been balanced, if the obtained flow rate is not satisfactory, repeat the procedure until the desired flow rate is obtained in each heat pump.
- If the flow rate obtained with the valves fully open is too weak, check that all the valves are open, the filters are clean, the air vents are functioning, and the water pressure is sufficient. It may be that the primary circuit is too resistive (see paragraph 3.2.4).

4.3.1. Technical specifications

PUMP MOTOR SPECIFICATIONS	
Number of poles	2
Operating conditions: Max. altitude	2000 m
Max. ambient temperature	60°C
Min. ambient temperature	-20°C
Phase	3

OPERATING DATA	
Network frequency *f*	50 Hz
Nominal voltage *U*	400V
Voltage tolerance	+- 10 %
Nominal power of the motor P_2	1.5 kW
Nominal current I_N	3.22 A
Efficiency N_M	84.2%
Power factor *cos*	0.84
Nominal speed *n*	2855 1/min

5. TROUBLESHOOTING

5.1. Problem-solving without error code

Problems encountered	Cause
The appliance does not start up	Electrical power supply absent No request from the external PLC No control setpoint from the HMI, an operating authorisation contact open
	Electronic board damaged Compressor faulty
Screen does not turn on	Missing power or incorrect power phase order or waiting for the propane sensor to warm up. Or no prog. in the Climatix.

6. MAINTENANCE OF THE OUTDOOR UNIT

Requirements concerning skilled persons.
- Maintenance and repair work that require the assistance of other qualified individuals should be carried out under the supervision of the person who is skilled in the use of inflammable refrigerant fluids. Any person carrying out cleaning or maintenance work on a system or on associated parts of the equipment must possess the required skills in accordance with EN 13313.
Anyone working on refrigeration systems containing flammable refrigerant fluids must possess skills in the safety aspects linked to the handling of flammable refrigerant fluids, and be able to show evidence of relevant training.

CAUTION:

For installations that can reach air temperatures lower than 0°C, there is a risk of the hydraulic circuit freezing if the uni is not powered on. It is mandatory to ensure that the system is kept free of frost during maintenance periods. If this cannot be guaranteed, have the heating system drained by a qualified technician. An internal valve in the HP allows the nearest low point of the plate exchanger to be drained. This should be used in addition to the others in the installation.

We recommend carrying out checks and periodic maintenance operations by specialised personnel. EU Regulation 2024/573 stipulates that users must have regular checks carried out on the installations, Check their tightness and eliminate leaks as soon as possible. Check the mandatory nature and necessary documentation of Regulation 2024/573 and its subsequent amendments or repeals.

INFORMATION:

During all maintenance operations, it is strictly forbidden to climb onto the product.

CAUTION:

The use of components, consumables or spare parts other than those recommended by the manufacturer and/or mentioned in this manual may constitute a danger to the operators and/or damage the machine.

6.1. Gas detector (R290)

6.1.1. Warnings and recommendations

CAUTION:	**For safety reasons, this heat pump is equipped with a leak detection system. For the leak to be effective, the unit must be continuously supplied with electricity after the installation, except during maintenance operations.**

CAUTION:	**The device must not be opened. If it is opened, the warranty expires immediately!** **The device must never be manually held when it is in use.** **• Do not drop the detector and do not apply a heavy impact to it.** **• Do not use a sharp object on the filter membrane. A broken filter will damage the water protection function and the precision of detection.** **• Do not cover the filter membrane.** **• Do not apply any air flow or high pressure liquid.** **• Do not place the detector where the temperature is above 120°C, the plastic casing could be deformed.** **• Do not spray agents on the detector.** **• Do not clean the device with corrosive chemical products, solvents or aggressive detergents.**

This detector detects and accurately quantifies A3 refrigerant fluid and inflammable gas leaks.

It has been calibrated in the factory, no recalibration process is necessary.

In case of replacement, this appliance must be installed by a duly qualified technician who will install this appliance in accordance with these instructions and the standards of their particular industry/country. The installer and the operator are responsible for ensuring that all the propane detectors are installed and used in accordance with all national and local regulations and requirements. Those operating the unit must be up to date on the regulations and standards of their industry/country related to the way this unit functions. These notes are only provided as a guide, and the manufacturer shall not be held liable in the case of incorrect use, installation and functioning of this product. The appliance must be checked by a qualified technician to ensure that the installation and its functioning are correct before starting the measurements operation. Not installing and using the appliance according to these instructions and industry directives can lead to serious injury, including death, and the manufacturer cannot be held liable in this respect.

6.1.2. Cleaning

Even if the detector does not need calibrating during its lifetime, regular cleaning must be carried out while checking that it is functioning correctly. Do not clean the device with corrosive chemical products, solvents or aggressive detergents. Do not spray the device with cleaning or polishing aerosols.

IMPORTANT: **Pass a damp cloth over the detector's casing before cleaning it: risk of electrostatic sparks**

IMPORTANT: **Testing the correct functioning of the detector every 5 years is recommended.**

6.1.3. Operating principle of the detector

During the reset phase, the green LED flashes slowly (1 Hz) to indicate that it is starting up, and the red LEDs are on.

Once the reset is complete, the green LED remains stable and the red LEDs are off.

In normal 'monitoring mode' operation, there are no indications of error, the concentration of gas at the sensor is constantly checked and measured.

The sensor is again in full monitoring mode. When the high concentration threshold has been reached, the 1st and 2nd red LEDs come on and the relays are triggered.

The high concentration relay will remain triggered until a manual reset is performed via the HP user interface.

When the gas is no longer detected, the green LED will flash slowly and after 15 seconds will be on and stable. The second red LED will go off once the error has been cleared.

IMPORTANT: **It is only after checking that there is no more gas present that it is possible to reset the pending alarm.**

6.1.4. HP behaviour

Every time the electrical cabinet is powered on, the sensor becomes operational 120 seconds later. It then indicates whether or not A3 gas is present within its zone. If A3 gas is detected, the red light on the door of the electrical cabinet flashes.

It is only after this time period that the HP authorises the powering on of its components that are supplied with 400VAC.

6.1.5. Sensor test procedure

Before testing the operation of the sensor, you must check that the zone is clear of any A3 gas and any inflammable gas. The test must be performed by a trained individual.

Once the check has been made, power on the HP.

Wait until the reset procedure is complete. (Once the reset is complete, the green LED remains stable and the red LEDs are off).

Apply the limit gas to the sensitive element. The sensor should switch to error status, 2 red LEDs are on.

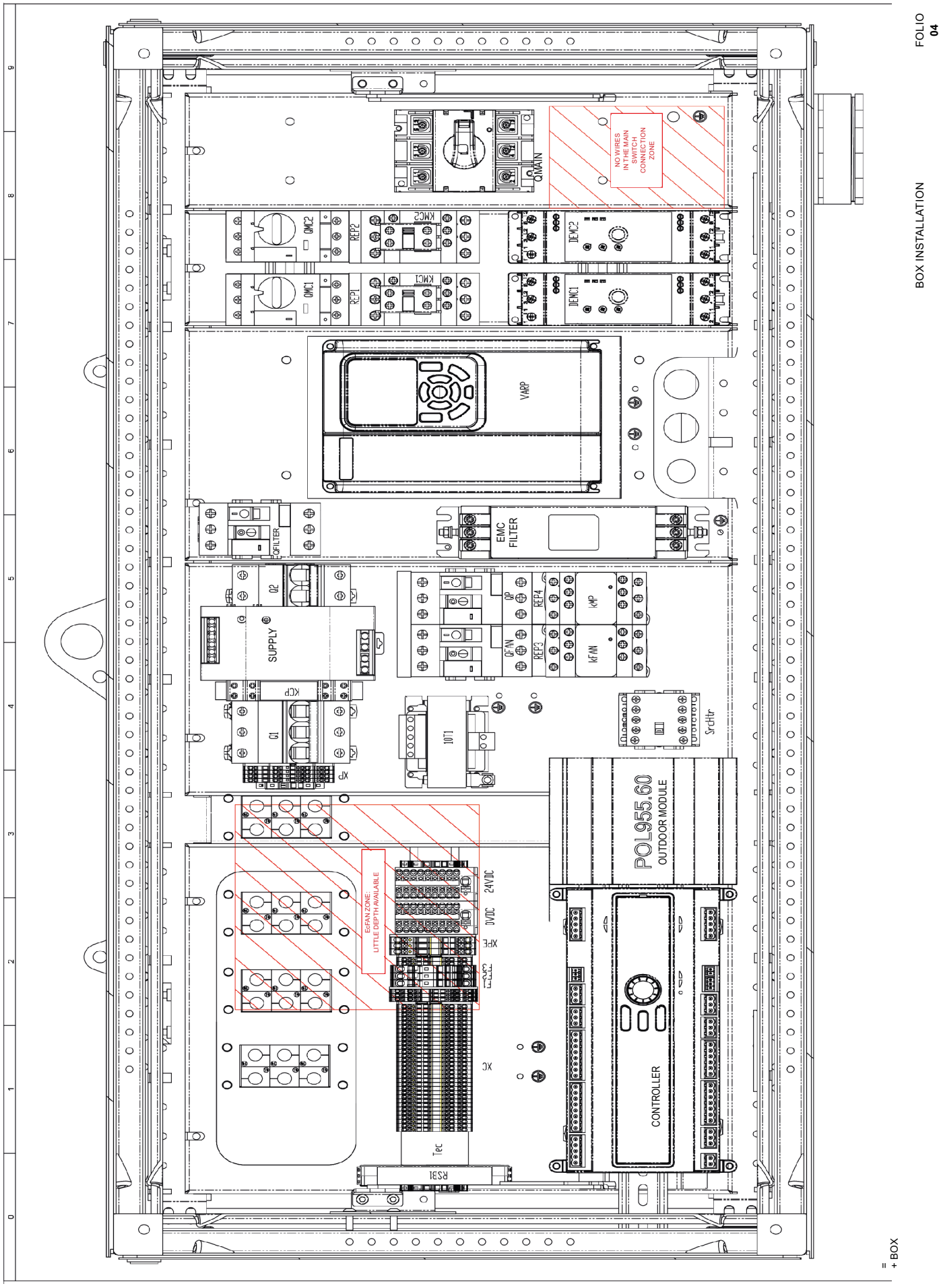
You have to use a bottle of propane with a 25 % LFL concentration and the test kit which is sold separately (cone with flexible hose to spray the propane directly onto the sensitive part of the sensor).

Ventilate the zone so that no limit gas residue remains.

Clear the error on the HMI.

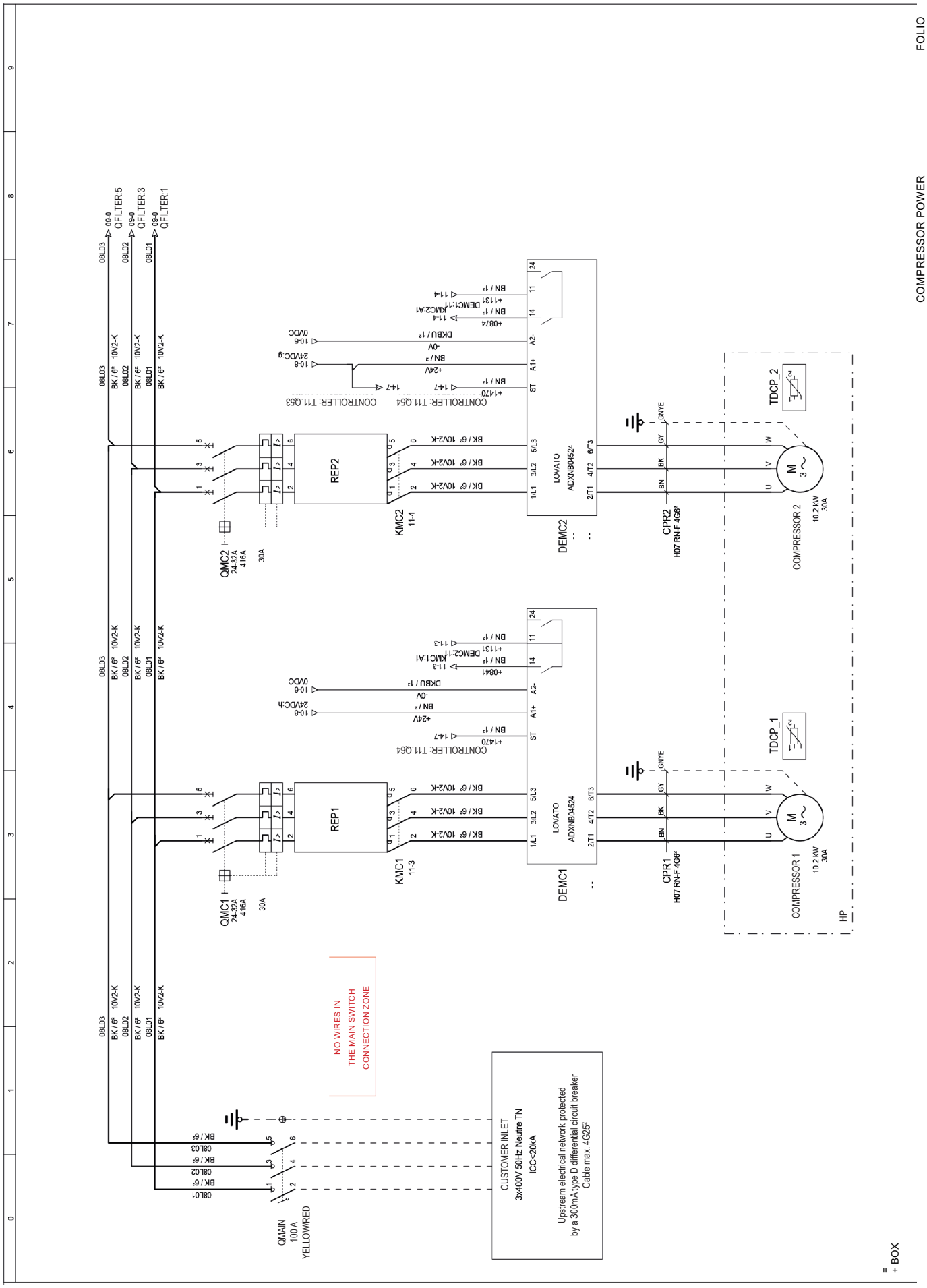
The sensor should return to this status, with only the green light on.

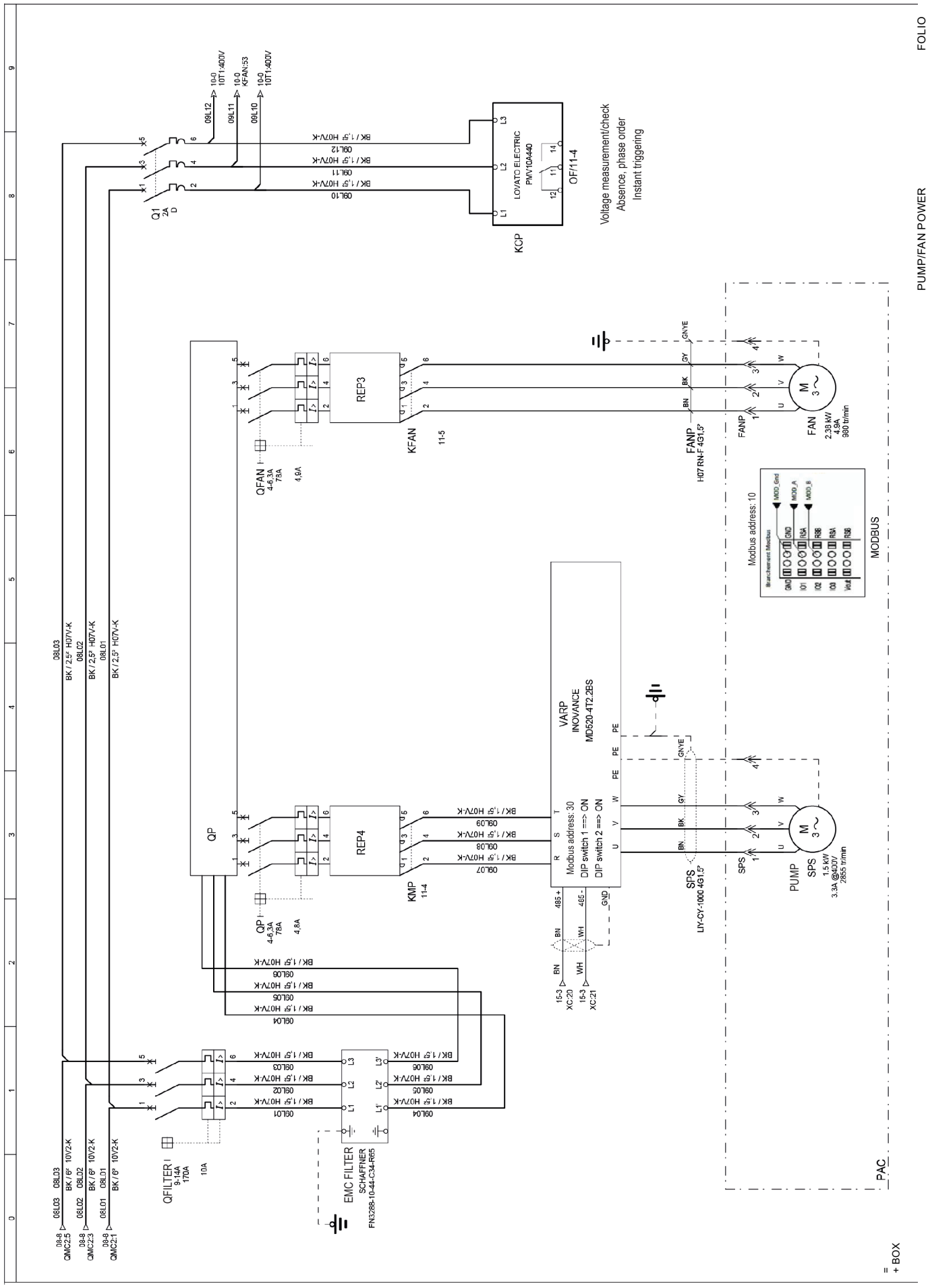
6.2. Wiring diagrams

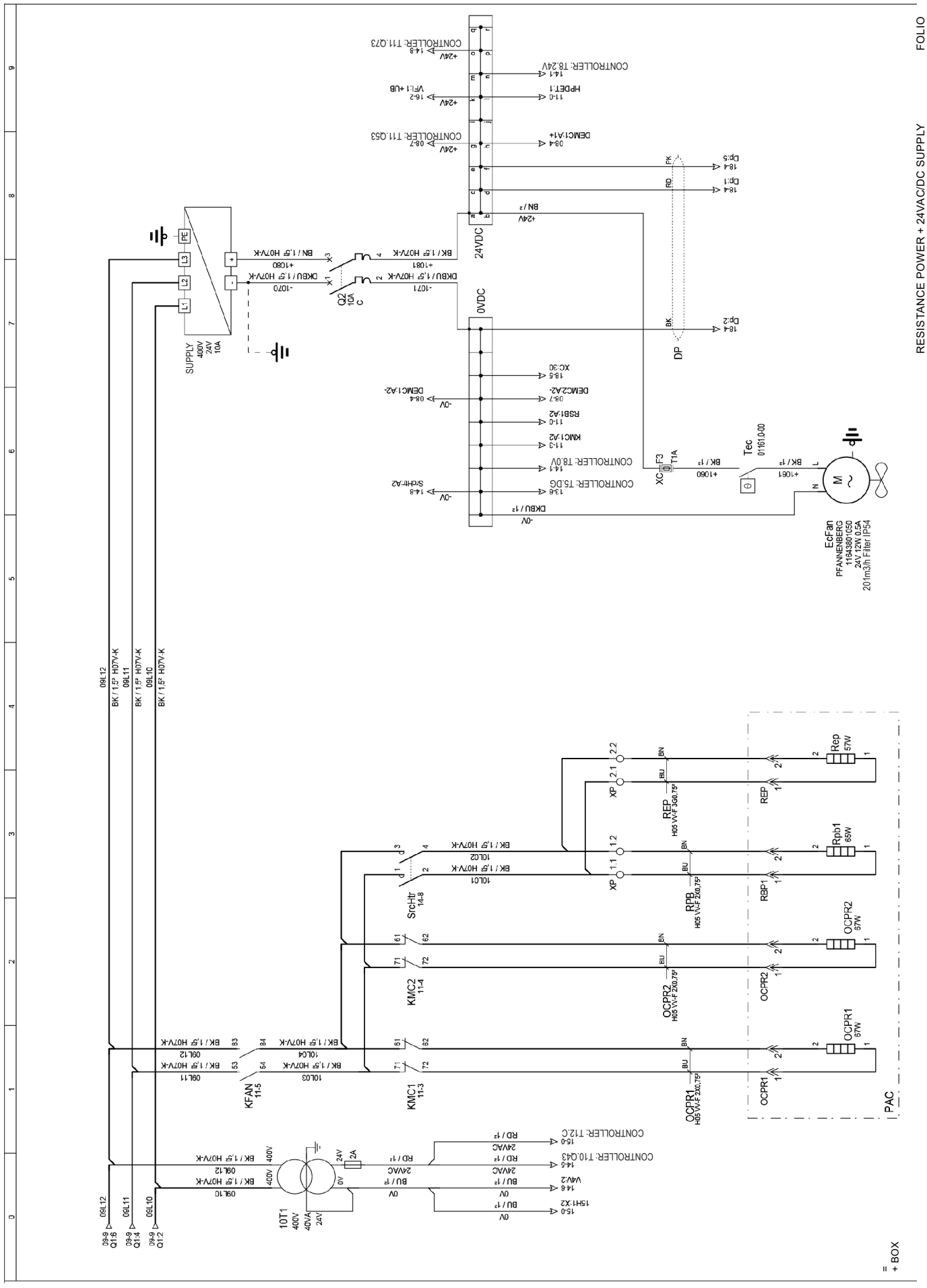


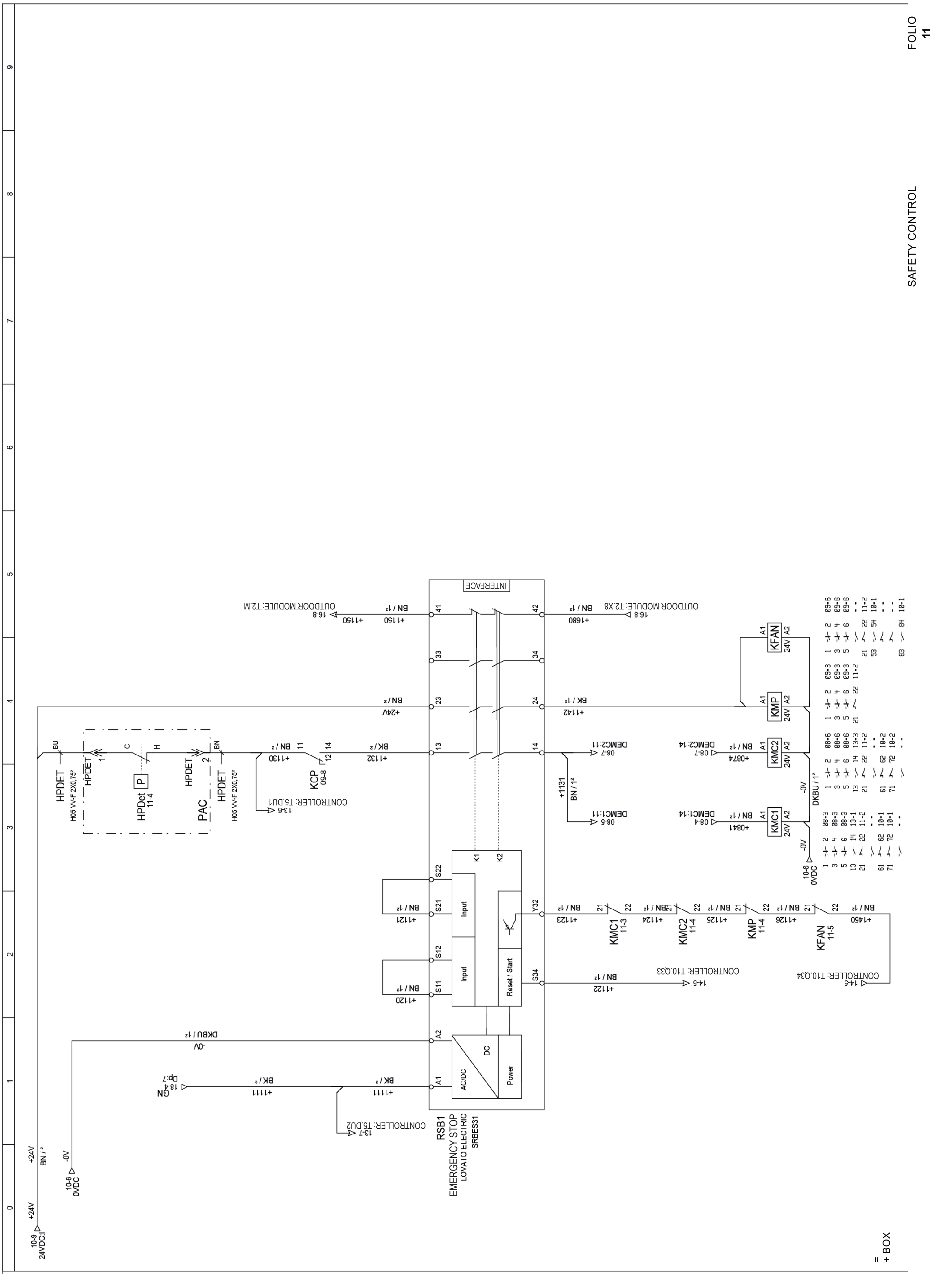
ITEM	FOLIO	DESCRIPTION	REFERENCE	MANUFACTURER	QTY
BOX	03	Adhesive PVC warning label	AT-49/05	CATU	1
DEMC1	08	BASIC SOFT STARTER 208...600VAC, 45A CDE	ADXNB04524	LOVATO	1
DEMC2	08	BASIC SOFT STARTER 208...600VAC, 45A CDE	ADXNB04524	LOVATO	1
QMC1	08	THERMAL MAGNETIC MOTOR SWITCH 24-32A	GV2P32	SCHNEIDER ELECTRIC	1
QMC2	08	THERMAL MAGNETIC MOTOR SWITCH 24-32A	GV2P32	SCHNEIDER ELECTRIC	1
QMAIN	08	DISCONNECTOR SWITCH, 3P, 100A CDE FRON	GA100ARY	LOVATO	1
QMAIN	08	7MM SQUARE AXIS ADAPTOR GA063A...GA160A	GAX60B	LOVATO ELECTRIC	1
QMAIN	08	RED/YELLOW EXTERNAL HANDLE ON DOOR A	GAX66N	LOVATO ELECTRIC	1
QMAIN	08	7MM SQUARE AXIS EXTENSION LENGTH 200MM	GAX7200AN	LOVATO ELECTRIC	1
REP1	08	CONNECTION BLOCK - BETWEEN GV2 AND SWITCH	GV2AF3	SCHNEIDER ELECTRIC	1
REP2	08	CONNECTION BLOCK - BETWEEN GV2 AND SWITCH	GV2AF3	SCHNEIDER ELECTRIC	1
EMC FILTER	09	EMC LINE FILTER 3x 530-305VAC 10A CAT III	FN3288-10-44-C34-R65	SCHAFFNER	1
KCP	09	Voltage measurement/check relay, starter	PMV10A440	LOVATO ELECTRIC	1
Q1	09	SWITCH IC60N 3-P 2A, 440VAC/25KA 133VDC	A9F75302	SCHNEIDER ELECTRIC	1
QFAN	09	MAGNETIC MOTOR SWITCH 4-6,3	GV2ME10	SCHNEIDER ELECTRIC	1
QFILTER	09	MAGNETIC MOTOR SWITCH 9- 14A	GV2P16	TELEMECANIQUE	1
QP	09	3-POLE BUSBAR - 63 A - 2 BYPASSES	GV2G245	SCHNEIDER ELECTRIC	1
QP	09	MAGNETIC MOTOR SWITCH 4-6,3	GV2ME10	SCHNEIDER ELECTRIC	1
REP3	09	CONNECTION BLOCK - BETWEEN GV2 AND SWITCH	GV2AF3	SCHNEIDER ELECTRIC	1
REP4	09	CONNECTION BLOCK - BETWEEN LS1 D32 OR GV2	GV2AF01	SCHNEIDER ELECTRIC	1
VARP	09	MODBUS OPTION CARD RS485	MD38TX1	INNOVANCE	1
VARP	09	3-P FREQUENCY CONVERTERH 380-480V 2.2KW	MD520-4T2.2BS	INOVANCE	1
0VDC	10	6/18X2.5-NS35 BU - DISTRIBUTION BLOCK	3273112	PHOENIX CONTACT	1
10T1	10	Primary safety transformer 230V with	EIBF40-400.24	RAH INDEL	1
24VDC	10	PTFIX 6/18X2,5-NS35 RD - DISTRIBUTION BLOCK	3273114	PHOENIX CONTACT	1
ALIM	10	Power supply on rail DIN 240W 24V 10A 3-P	TDR-240-24	MEANWELL	1
EcFan	10	PF 43.000 EMC FAN MOTOR 233-265 M3/H 24VDC	11643801050	PFANNENBERG	1
EcFan	10	PFA 40.000 BLACK GRILLE RAL9011 OUTLET 223X	11740001050	PFANNENBERG	1
Q2	10	SWITCH IC60N 2-P 10A, 440VAC/6KA 133VDC	A9F77210	SCHNEIDER ELECTRIC	1
Tec	10	THERMOSTAT 1NO CLOSED +50° OPEN +40°C	01161.0-00	STEGO	1
KFAN	11	FRONT AUXILIARY CONTACT BLOCK 2NO+2NC	LADN22R	SCHNEIDER ELECTRIC	1
KFAN	11	POWER CONTACTOR 9A 1NO+1NC 24VDC LP	LC1D09BD	SCHNEIDER ELECTRIC	1
KMC1	11	FRONT AUXILIARY CONTACT BLOCK 2NO+2NC	LADN22R	SCHNEIDER ELECTRIC	1
KMC1	11	POWER CONTACTOR 32A 1NO+1NC 24VDC L	LC1D32BD	SCHNEIDER ELECTRIC	1
KMC2	11	FRONT AUXILIARY CONTACT BLOCK 2NO+2NC	LADN22R	SCHNEIDER ELECTRIC	1
KMC2	11	POWER CONTACTOR 32A 1NO+1NC 24VDC L	LC1D32BD	SCHNEIDER ELECTRIC	1
KMP	11	TESYS LP1K - CONTACTOR - 3P - AC-3 440V 9A	LP1K0901BD	SCHNEIDER ELECTRIC	1
RSB1	11	SRB series safety relay..., single-function	SRBES31	LOVATO ELECTRIC	1
SrcHtr	14	TESYS LP1K - CONTACTOR - 3P - AC-3 440V -	LP1K0601BD	SCHNEIDER ELECTRIC	1
15H1	15	ROUND LIGHT Ø22MM, IP66, RED, INTEGRATED LED	XB4BVB4	SCHNEIDER ELECTRIC	1
15H1	15	LABEL HOLDER	ZBZ33	SCHNEIDER ELECTRIC	1
XC	20	TIME DELAY cartridge fuses 5X20 1A 500VAC	0477001.MXP	LITTLEFUSE	3
XC	20	END BRACKET TO CLICK ONTO PROFILE	3022276	PHOENIX CONTACT	2
XC	20	SPRING TERMINAL BLOCK, FUSE HOLDER 4	3036369	PHOENIX CONTACT	3
XC	20	SINGLE GREY TB, PUSH-IN CONN., CROSS-SECTION	3208155	PHOENIX CONTACT	14
XC	20	SINGLE BLUE TB, PUSH-IN CONN., CROSS-SECTION	3208168	PHOENIX CONTACT	16
XC	20	END COVER - D-PT 1.5/S-TWIN, LONG	3208184	PHOENIX CONTACT	2
XC	20	SINGLE TB, PUSH-IN CONN., CROSS-SECTION: 0	3208197	PHOENIX CONTACT	3
XC	20	END COVER, LENGTH: 63.2mm, WIDTH	3208375	PHOENIX CONTACT	1

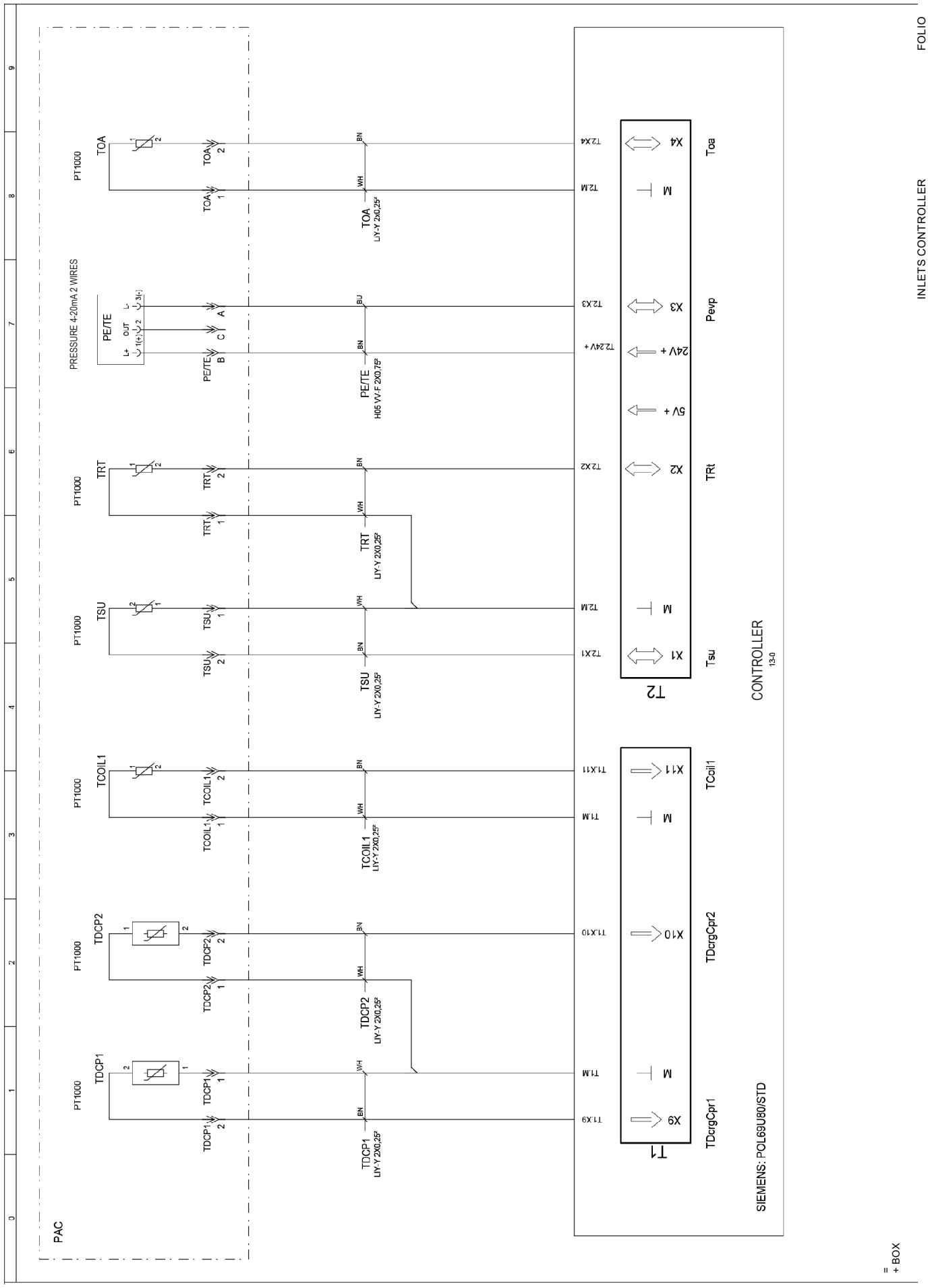
ITEM	FOLIO	DESCRIPTION	REFERENCE	MANUFACTURER	QTY
XP	21	END BRACKET TO CLICK ONTO PROFILE	3022276	PHOENIX CONTACT	2
XP	21	DOUBLE-LEVEL TERMINAL BLOCK, CROSS-SECTION: 0.14mm2 - 1.5mm	3208511	PHOENIX CONTACT	2
XP	21	END COVER, LENGTH: 65.4mm, WIDTH	3208579	PHOENIX CONTACT	1
XPE-	22	END BRACKET TO CLICK ONTO PROFILE	3022276	PHOENIX CONTACT	2
XPE-	22	END COVER, GREY	3030417	PHOENIX CONTACT	1
XPE-1	22	GREEN/YELLOW TB PT 2.5/S-QUATTRO-PE	3211025	PHOENIX CONTACT	1
XPE-2	22	GREEN/YELLOW TB PT 2.5/S-QUATTRO-PE	3211025	PHOENIX CONTACT	1
XPE-3	22	GREEN/YELLOW TB PT 2.5/S-QUATTRO-PE	3211025	PHOENIX CONTACT	1

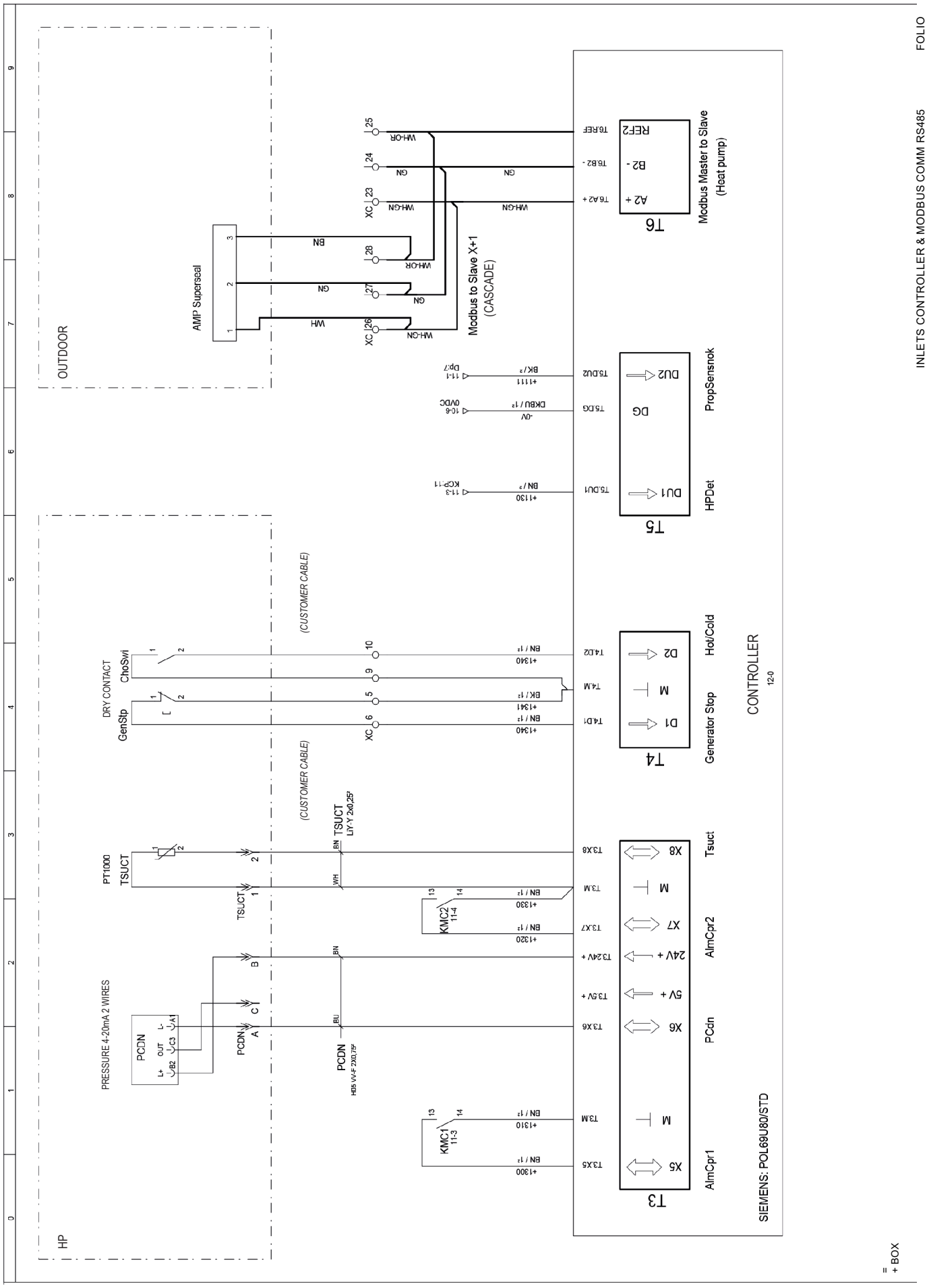

FOLIO
08
COMPRESSOR POWER
QMAIN
100 A
YELLOW/RED
CUSTOMER INLET
3x400V 50Hz Neutre TN
ICC<20kA
Upstream electrical network protected
by a 300mA type D differential circuit breaker
Cable max. 4G25²
NO WIRES IN
THE MAIN SWITCH
CONNECTION ZONE
QMC1
24-32A
416A
30A
KMC1
11-3
REP1
DEMC1
LOVATO
ADXNB04524
CONTROLLER: T11.G64
CPR1
H07 RN-F 4G6²
TDCP_1
COMPRESSOR 1
10.2 kW
30A
QMC2
24-32A
416A
30A
KMC2
11-4
REP2
DEMC2
LOVATO
ADXNB04524
CONTROLLER: T11.G54
CONTROLLER: T11.G53
CPR2
H07 RN-F 4G6²
TDCP_2
COMPRESSOR 2
10.2 kW
30A
HP
= + BOX

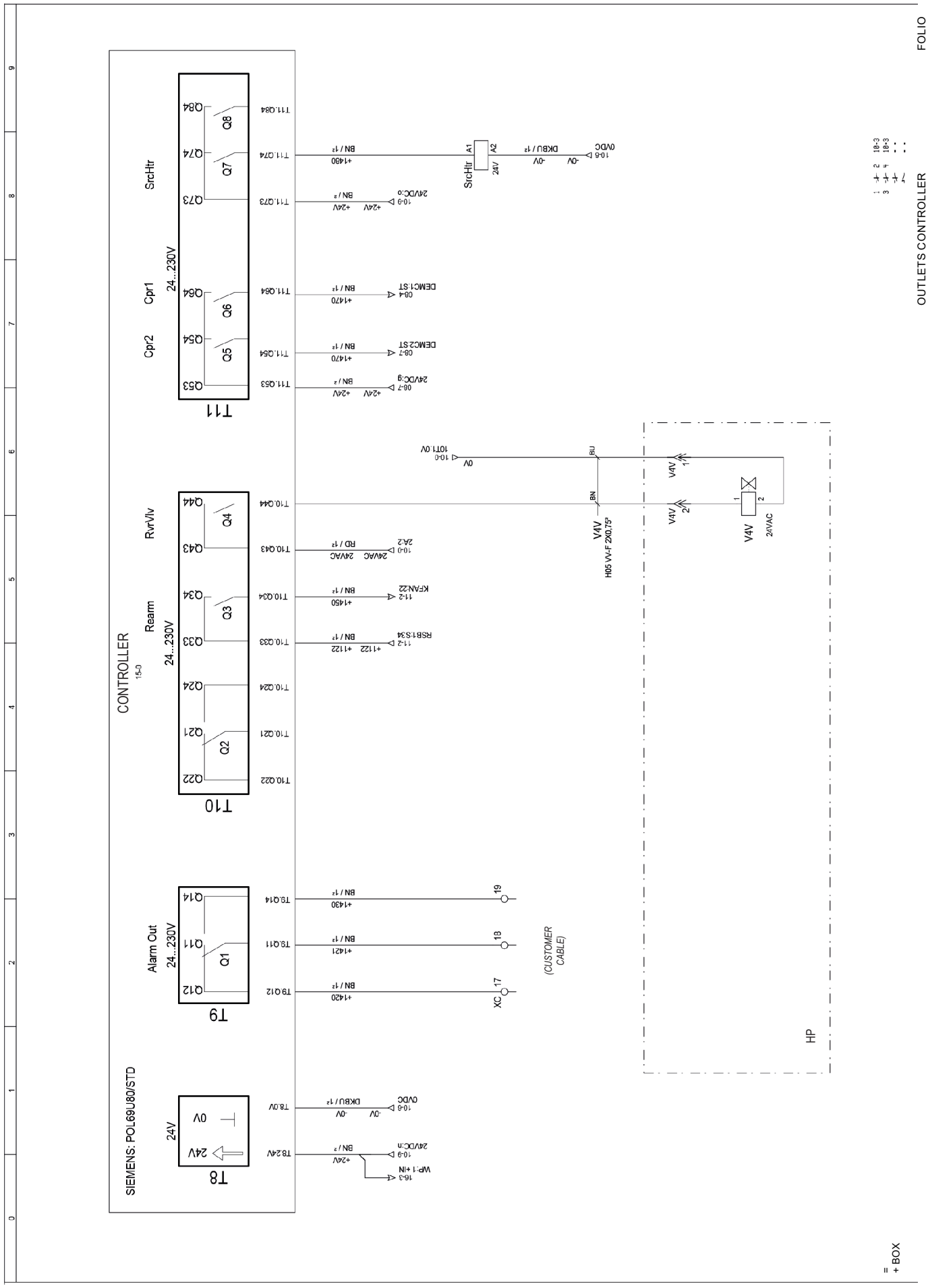

FOLIO
09
PUMP/FAN POWER
KCP
OF/11-4
Voltage measurement/check
Absence, phase order
Instant triggering
Q1
2A
D
KFAN
11-5
REP3
QFAN
4-6,3A
7,9A
4,6A
FANP
H07 RN-F 4G1,5"
FAN
2,38 kW/
4,9A
980 tr/min
KMP
11-4
REP4
QP
4,8A
VARP
INOVANCE
MD520-4T2.2BS
Modbus address: 30
DIP switch 1 ==> ON
DIP switch 2 ==> ON
Modbus address: 10
MODBUS
SPS
LIY-CY-1000 4G1,5"
PUMP
SPS
1,5 kW/
3,3A @400V/
2855 tr/min
QFILTER I
9-14A
17DA
10A
EMC FILTER
SCHAFFNER
FN3288-10-44-C34-R65
PAC
= + BOX

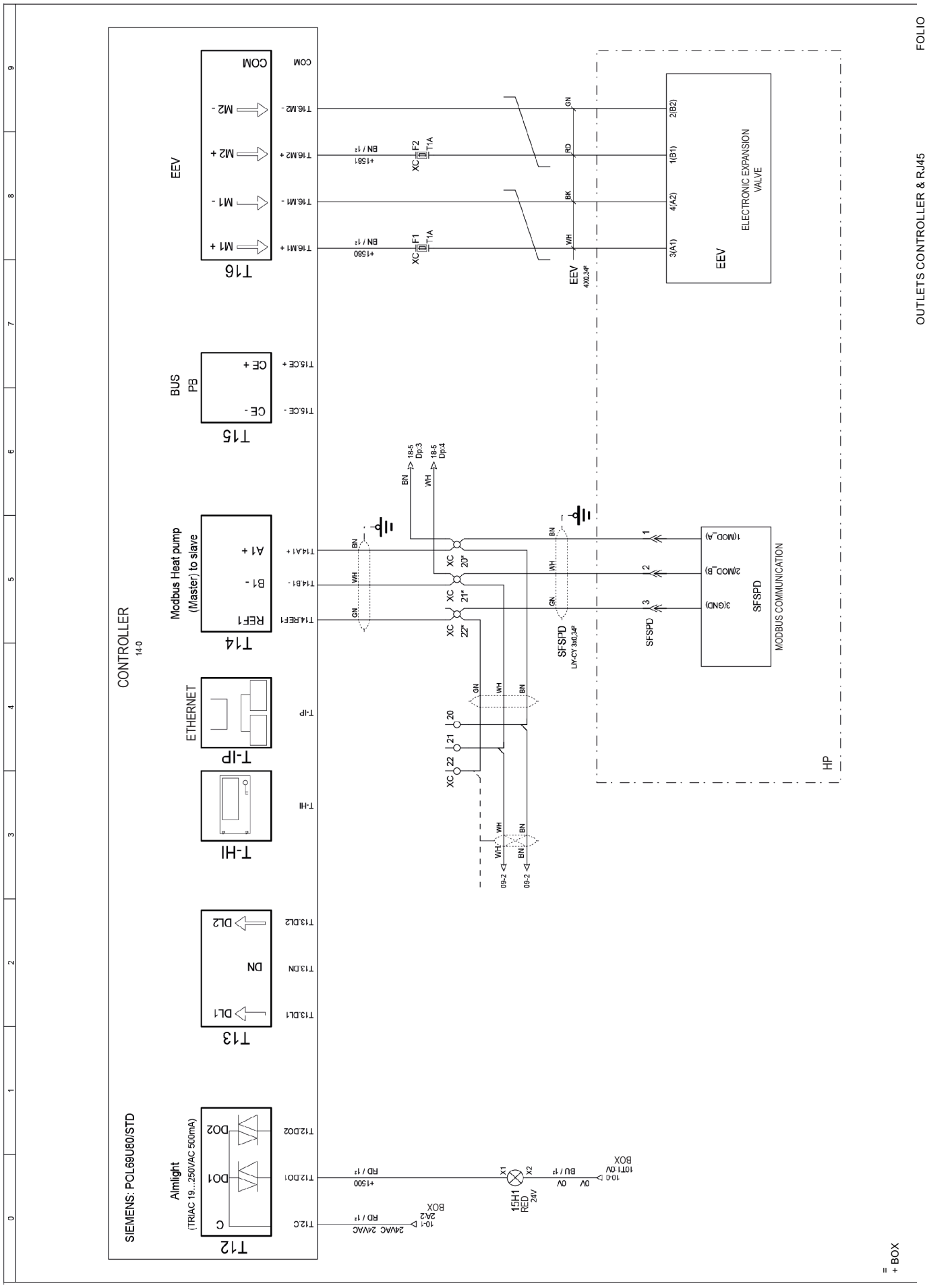

FOLIO
10
RESISTANCE POWER + 24VAC/DC SUPPLY
SUPPLY
400V
24V
10A
24VDC
0VDC
DP
EcFan
PFANNENBERG
11643801C50
24V 12W 0.5A
201m3/h Filter IP54
Tec
01161-0-00
Rep
57W
Rbb1
65W
OCPR2
57W
OCPR1
57W
REP
RBP1
OCPR2
OCPR1
PAC
KFAN
11-5
KMC1
11-3
KMC2
11-4
SrcHtr
14-8
10T1
400V
40VA
24V
= + BOX

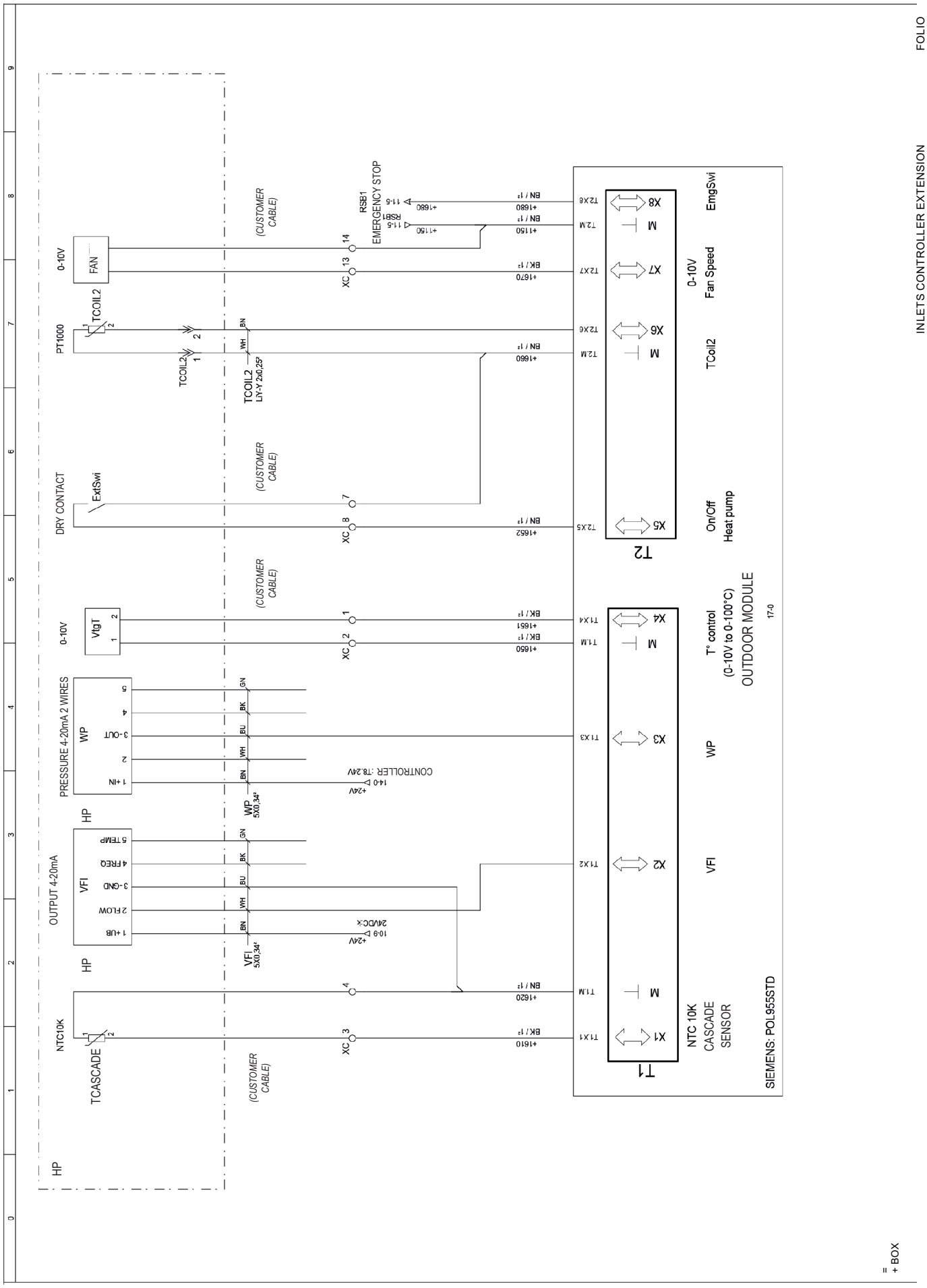

FOLIO
11
SAFETY CONTROL
INTERFACE
RSB1
EMERGENCY STOP
LOVATO ELECTRIC
SRBES31
OUTDOOR MODULE: T2.M
OUTDOOR MODULE: T2.X8
CONTROLLER: T5.DU1
CONTROLLER: T5.DU2
CONTROLLER: T10.Q33
CONTROLLER: T10.Q34
HPDET
HPDet
PAC
KCP
KMC1
KMC2
KMP
KFAN
DEMC1:11
DEMC1:14
DEMC2:11
DEMC2:14
AC/DC
DC
Power
Input
Reset / Start
10-9
24VDC.I
10-6
0VDC
= BOX

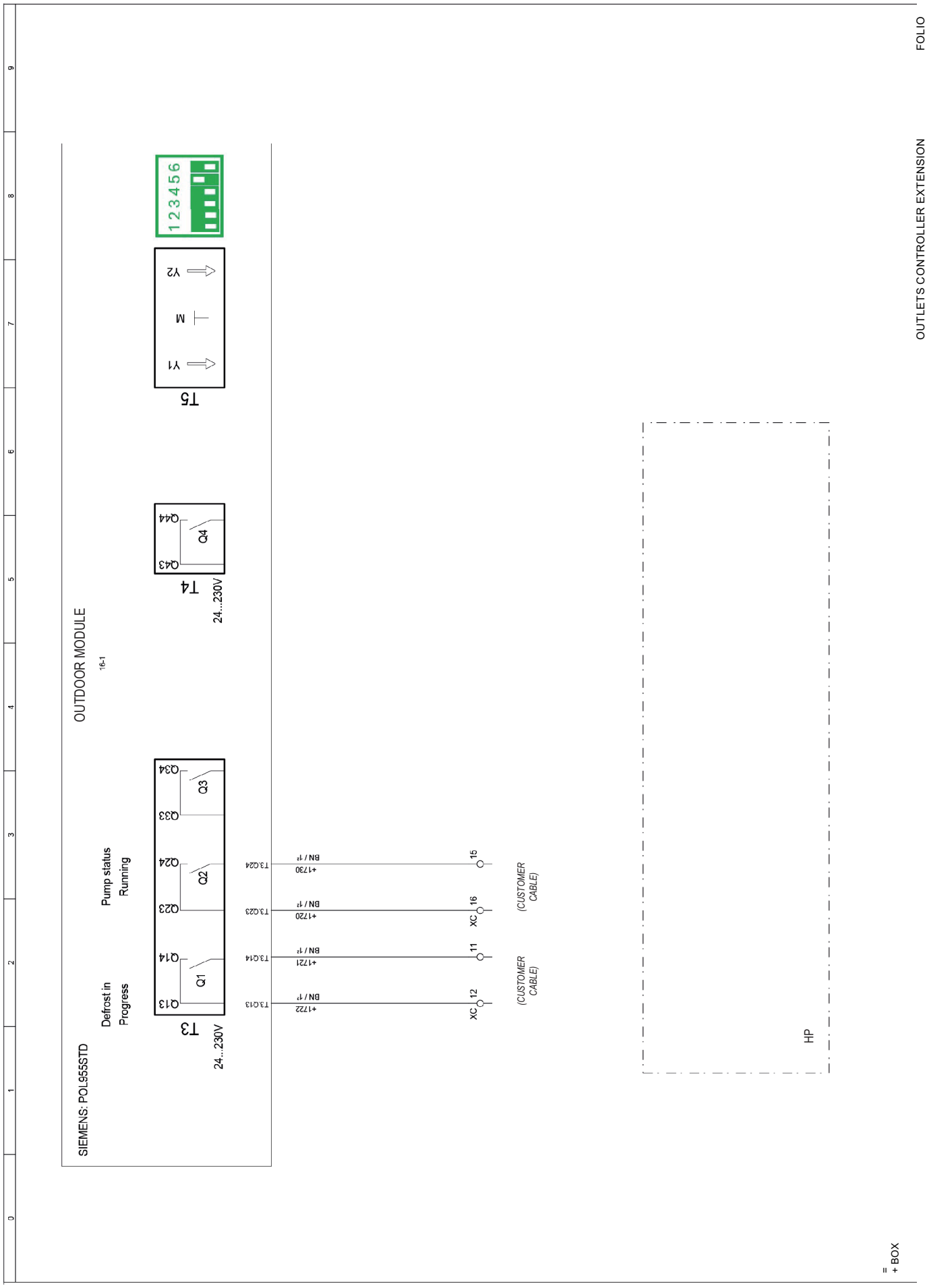

FOLIO
12
INLETS CONTROLLER
PAC
PRESSURE 4-20mA 2 WIRES
PE/TE
PT1000
TOA
TRT
TSU
TCOIL1
TDCP2
TDCP1
T2
T1
CONTROLLER
13-0
SIEMENS: POL69U80/STD
Toa
TRt
Tsu
Pevp
TCoil1
TDcrgCpr2
TDcrgCpr1
X4
X2
X1
X3
X11
X10
X9
M
24V +
5V +
= + BOX


FOLIO
13
INLETS CONTROLLER & MODBUS COMM RS485
OUTDOOR
AMP Superseal
Modbus to Slave X+1
(CASCADE)
T6
Modbus Master to Slave
(Heat pump)
T5
PropSensnok
HPDet
T4
Hot/Cold
Generator Stop
CONTROLLER
12-0
T3
Tsuct
AlmCpr2
PCdn
AlmCpr1
SIEMENS: POL69U80/STD
HP
DRY CONTACT
ChoSwi
GenStp
(CUSTOMER CABLE)
PT1000
TSUCT
TSUCT
LiY-Y 2x0,25²
PRESSURE 4-20mA 2 WIRES
PCDN
PCDN
H05 VV-F 2X0,75²
KMC2
11-4
KMC1
11-3
= + BOX


FOLIO
14
OUTLETS CONTROLLER
CONTROLLER
SIEMENS: POL69U80/STD
SrcHtr
Cpr1
Cpr2
24...230V
T11
Q84
Q74
Q73
Q64
Q54
Q53
Q8
Q7
Q6
Q5
RvrVlv
Reamr
T10
Q44
Q43
Q34
Q33
Q24
Q21
Q22
Q4
Q3
Q2
Alarm Out
T9
Q14
Q11
Q12
Q1
T8
24V
0V
SrcHtr
A1
A2
24V
DEMC1:ST
DEMC2:ST
KFAN:22
RSB1:S34
V4V
H05 VV-F 2X0,75²
24VAC
XC
19
18
17
(CUSTOMER CABLE)
HP
= + BOX


FOLIO
15
OUTLETS CONTROLLER & RJ45
CONTROLLER
14-0
SIEMENS: POL69U80/STD
EEV
COM
M2 -
M2 +
M1 -
M1 +
T16
BUS
PB
CE +
CE -
T15
Modbus Heat pump
(Master) to slave
A1 +
B1 -
REF1
T14
ETHERNET
T-IP
T-HI
DL2
DN
DL1
T13
Almlight
(TRIAC 19...250VAC 500mA)
DO2
DO1
C
T12
ELECTRONIC EXPANSION
VALVE
EEV
SFSPD
MODBUS COMMUNICATION
HP
= + BOX

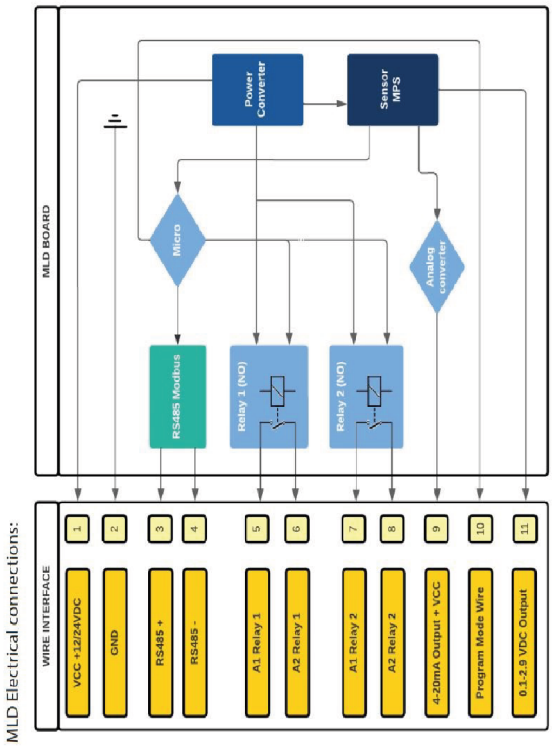

FOLIO
16
INLETS CONTROLLER EXTENSION
= + BOX
HP
TCASCADE
NTC10K
NTC 10K
CASCADE
SENSOR
T1
T1.X1
T1.M
T1.X2
T1.X3
T1.X4
VFI
WP
T° control
(0-10V to 0-100°C)
OUTDOOR MODULE
SIEMENS: POL955STD
T2
T2.X5
T2.M
T2.X6
T2.X7
T2.X8
On/Off
Heat pump
TCoil2
0-10V
Fan Speed
EmgSwi
(CUSTOMER CABLE)
OUTPUT 4-20mA
PRESSURE 4-20mA 2 WIRES
DRY CONTACT
ExtSwi
PT1000
TCOIL2
FAN
VtgT
RSB1
EMERGENCY STOP
CONTROLLER :T8.24V
24VDC:x

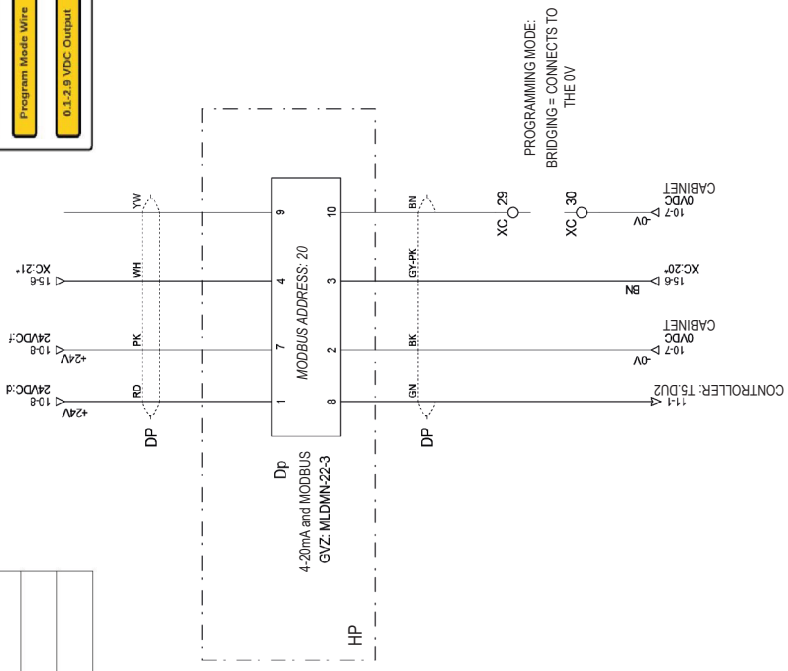

FOLIO
17
OUTLETS CONTROLLER EXTENSION
= + BOX
SIEMENS: POL955STD
OUTDOOR MODULE
16-1
Defrost in Progress
Pump status Running
T3
24...230V
Q13
Q14
Q23
Q24
Q33
Q34
Q1
Q2
Q3
T4
24...230V
Q43
Q44
Q4
T5
Y1
M
Y2
1 2 3 4 5 6
T3.Q13
T3.Q14
T3.Q23
T3.Q24
+1722
+1721
+1720
+1730
BN / 1²
XC 12
XC 11
XC 16
15
(CUSTOMER CABLE)
HP

MLD Color wiring table:

N°	Color	Connection
1	RED	V+ 12VDC or 24VDC
2	BLACK	GND
3	GREY&PINK	+ TX/RX Non inverting Modbus Signal
4	WHITE	- TX/RX Inverting Modbus Signal
5	BLUE	Relay Alarm 1 – A1
6	VIOLET	Relay Alarm 1 – A2
7	PINK	Relay Alarm 2 & Fault – A1
8	GREEN	Relay Alarm 2 & Fault – A2
9	YELLOW	Current output (4-20mA)
10	BROWN	Program Mode Wire (to be connected to GND only for programming)
11	RED&BLUE	Volt output (0.1-2.9V)
12	GREY	DO NOT USE (leave or cut)

MLD Electrical connections:

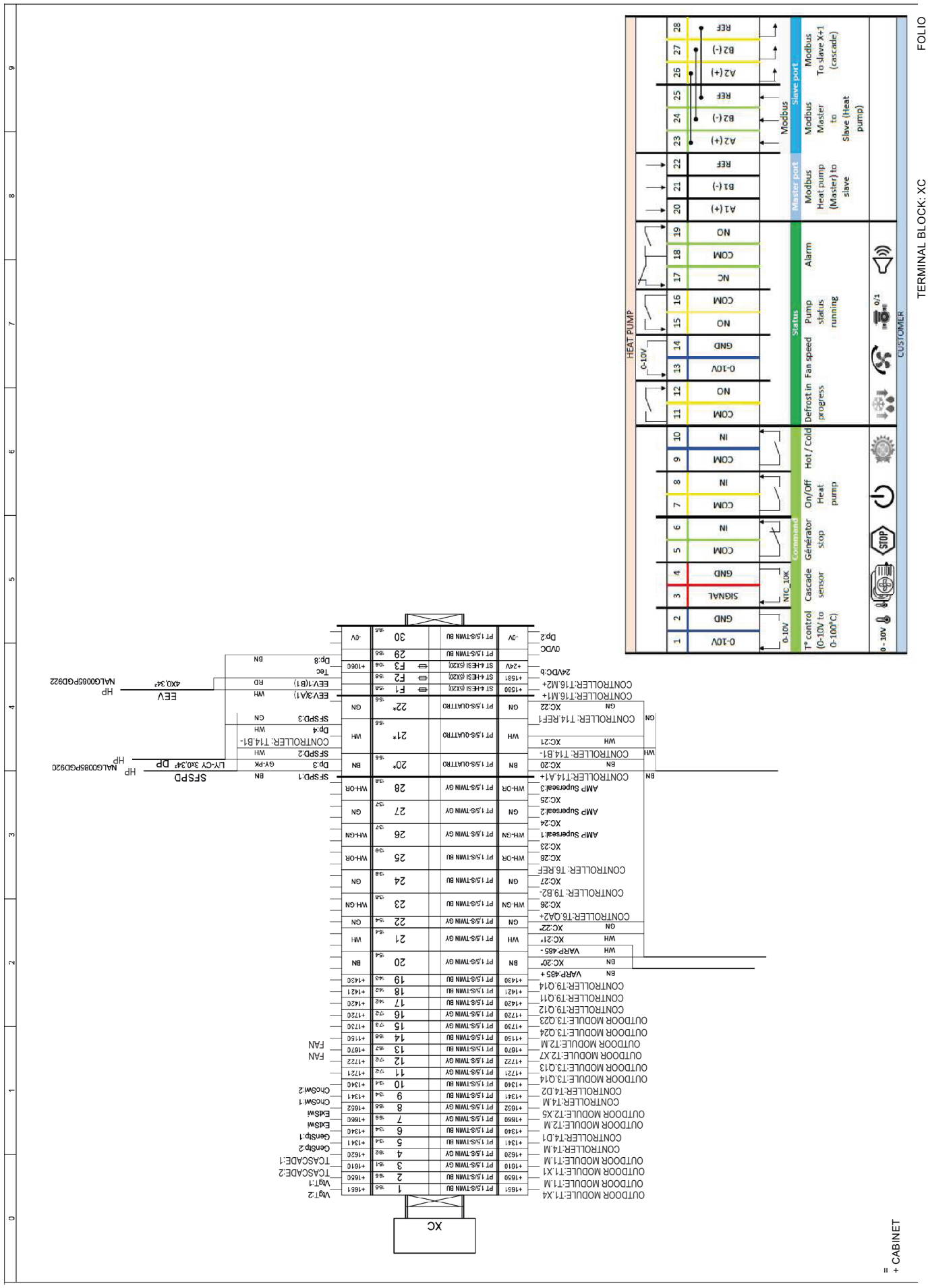


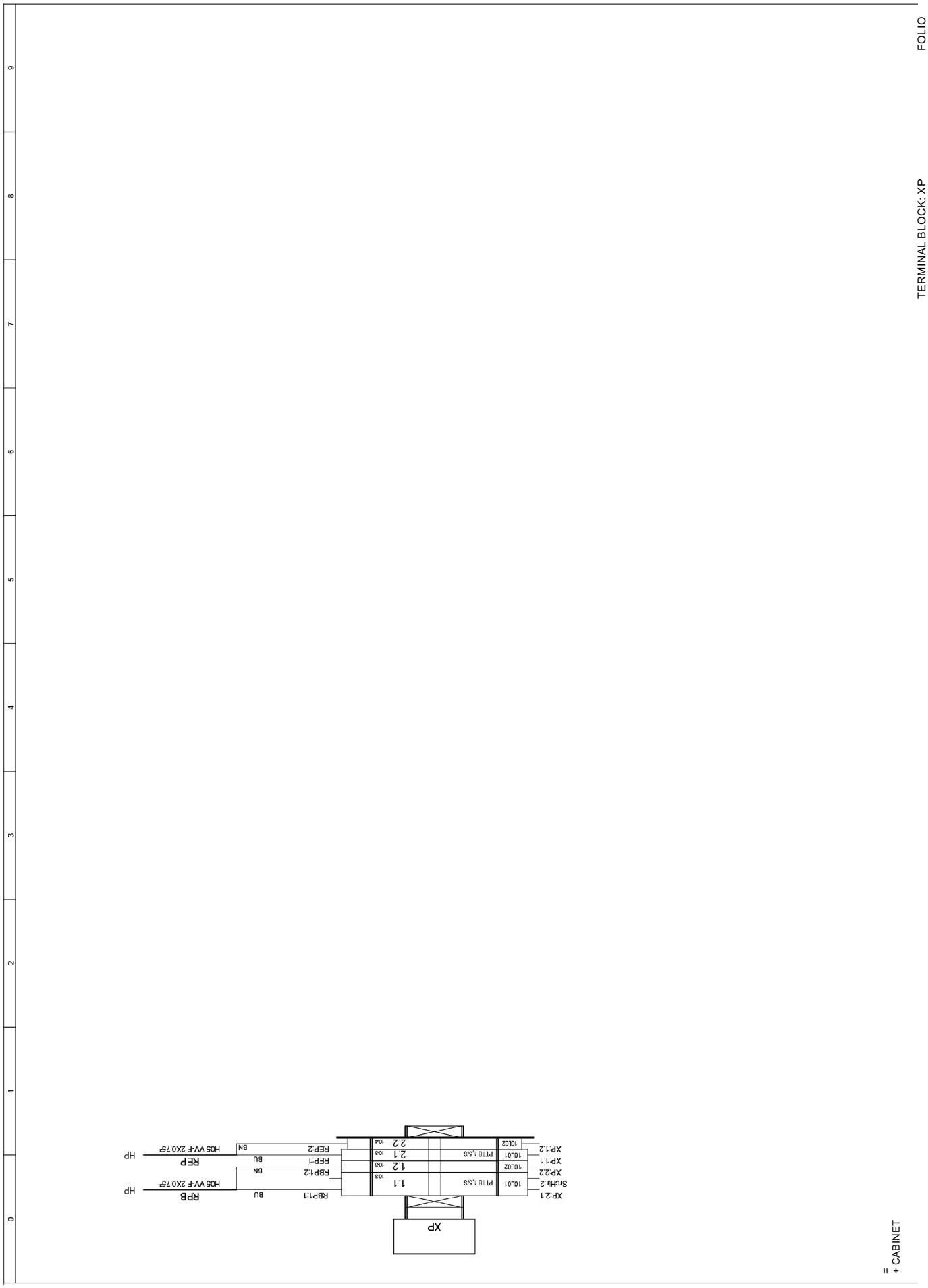


PROPANE GAS DETECTOR

FOLIO 18

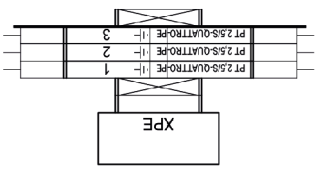
= + CABINET


FOLIO
20
TERMINAL BLOCK: XC
XC - 1/1
= + CABINET
HEAT PUMP
CUSTOMER
Command
Status
Master port
Slave port
Modbus
0-10V
NTC_10K
T° control (0-10V to 0-100°C)
Cascade sensor
GND
SIGNAL
Générator stop
On/Off Heat pump
Hot / Cold
Defrost in progress
Fan speed
Pump status running
Alarm
Heat pump (Master) to slave
Master to Slave (Heat pump)
To slave X+1 (cascade)
A1 (+)
B1 (-)
A2 (+)
B2 (-)
REF
NO
COM
NC
IN
0 - 10V
0/1
XC
SFSPD
LiY-CY 3x0,34²
NALG0085PGD920
EEV
4x0,34²
NALG0065PGD922
24VDC:b
0VDC
CONTROLLER.T16.M2+
CONTROLLER.T16.M1+
CONTROLLER.T14.B1-
CONTROLLER.T14.A1+
CONTROLLER.T14.REF1
CONTROLLER.T16.REF
CONTROLLER.T9.B2-
CONTROLLER.T6.A2+
CONTROLLER.T9.A2+
VARP.485+
VARP.485-
OUTDOOR MODULE.T1.X4
OUTDOOR MODULE.T1.M
OUTDOOR MODULE.T1.X1
OUTDOOR MODULE.T1.M
CONTROLLER.T4.D1
OUTDOOR MODULE.T2.M
OUTDOOR MODULE.T2.X5
CONTROLLER.T4.M
CONTROLLER.T4.D2
OUTDOOR MODULE.T3.Q13
OUTDOOR MODULE.T3.Q14
OUTDOOR MODULE.T2.X7
OUTDOOR MODULE.T2.M
OUTDOOR MODULE.T3.Q24
OUTDOOR MODULE.T3.Q23
CONTROLLER.T9.Q12
CONTROLLER.T9.Q11
CONTROLLER.T9.Q14
FAN
FAN
ChcSwi.1
ChcSwi.2
ExtSwi
ExtSwi
GenStp.1
GenStp.2
TCASCADE.1
TCASCADE.2
Vig1.1
Vig1.2
Dp.2
Dp.8
Tec
EEV.1(B1)
EEV.3(A1)
SFSPD.1
Dp.3
SFSPD.2
CONTROLLER.T14.B1-
Dp.4
SFSPD.3
CONTROLLER.T14.REF1
CONTROLLER.T14.A1+
AMP Superseal.3
AMP Superseal.2
AMP Superseal.1
CONTROLLER.T6.REF
CONTROLLER.T9.B2-
CONTROLLER.T6.A2+
CONTROLLER.T9.A2+
VARP.485-
VARP.485+
OUTDOOR MODULE.T1.X4
OUTDOOR MODULE.T1.M
OUTDOOR MODULE.T1.X1
OUTDOOR MODULE.T1.M
CONTROLLER.T4.D1
OUTDOOR MODULE.T2.M
OUTDOOR MODULE.T2.X5
CONTROLLER.T4.M
CONTROLLER.T4.D2
OUTDOOR MODULE.T3.Q13
OUTDOOR MODULE.T3.Q14
OUTDOOR MODULE.T2.X7
OUTDOOR MODULE.T2.M
OUTDOOR MODULE.T3.Q24
OUTDOOR MODULE.T3.Q23
CONTROLLER.T9.Q12
CONTROLLER.T9.Q11
CONTROLLER.T9.Q14


FOLIO
21
TERMINAL BLOCK: XP
XP - 1/1
= + CABINET
XP
XP-2.1
SrcHtr.2
XP2.2
XP-1.1
XP-1.2
1OLO1
1OLO2
PTTB 1,5/S
1.1
1.2
2.1
2.2
RBP1:1
RBP1:2
REP-1
REP-2
BU
BN
RPB
REP
H05VV-F 2X0,75²
HP

FOLIO
22

TERMINAL BLOCK: XPE
XPE - 1/1



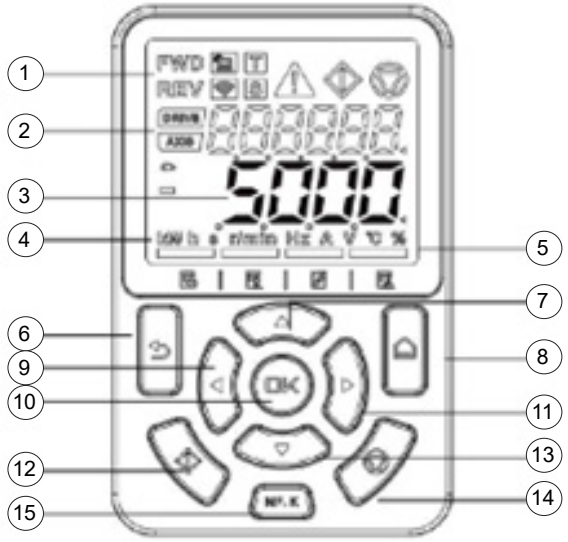
= + CABINET

Q MAIN	COMPONENT NAME	BETWEEN 5 and 6 Nm
QMC1 / QMC2 / QP / QFAN	- QMC1: Thermal magnetic motor switch 24-32A - QMC2: Thermal magnetic motor switch 24-32A - QP: Magnetic motor switch 4-6.3A - QFAN: Magnetic motor switch 4-6.3A	1.7 Nm
KFAN	Front auxiliary contact block 2NO+2NC	1.7 Nm
KMC1/KMC2	Power contactor 32A 1NO+1NC 24VDC	2.5 Nm
DMC1 / DMC2	Soft starter compressor 1 and compressor 2	L1/L2/L3: 2 Nm T1/T2/T3: 2 Nm A1/A2/ST/11/14/24: 0.4 Nm
KMP	Contactor - 3P - AC-3 440V 9A	0.8 to 1.3 Nm
Q1	Circuit breaker iC60N 3P 2A, 440VAC/25kA 133VDC/6kA 133VDC	2 Nm

Tightening torques of the low voltage components located in the electrical cabinet

6.2.1. Using the frequency converter

FREQUENCY CONVERTER CONSOLE

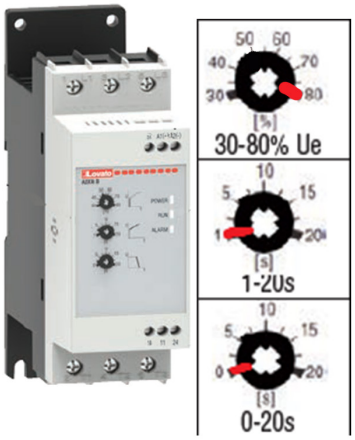


No.	Description	No.	Description
1	Status indicator	9	Key for moving to the left
2	Upper area	10	Confirm key
3	Central area	11	Key for moving to the right
4	Unit indicator	12	Working order key
5	Menus indicator	13	Decreasing key
6	Back key	14	Stop key
7	Increasing key	15	Multi-function key
8	Menu key		

Symbol	Description	Meaning	
	Fwd is Stable	Forward movement	Operating direction used on the product
	Rev is Stable	Reverse movement	Not used on the product
	Fwd and Rev Flashing	Current rotation direction reversed	Not used on the product
	The symbol is Off	Control from the console	Not used on the product
	The symbol is On Stable	Control from the Terminal block	Not used on the product
	The symbol flashes slowly	Control through Communication	Control mode used on the product
	The symbol flashes rapidly	Control through the Customisation mode	Not used on the product
	The symbol is Stable	Torque control	Not used on the product
	The symbol is Stable	Speed control	Control mode used on the product
	The symbol is Stable	Converter error	
	The symbol is Stable	The converter is under torque	
	The symbol is Stable	The converter is off	
	The symbol is Stable	Displayed in the upper area, represents the converter number	

6.2.2. Compressor soft starter settings

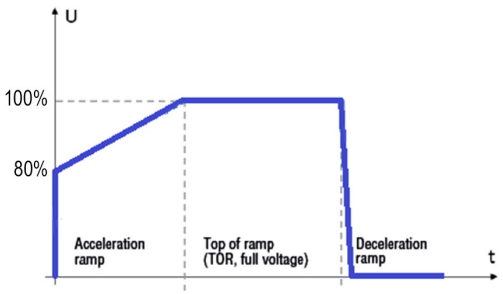
Each compressor is controlled by its soft starter. This element is used to limit in-rush current at start-up.
CAUTION: The settings on the front are the following and must not be changed as this will damage the compressors.



Setting: 80%

Setting: 1s

Setting: 0s



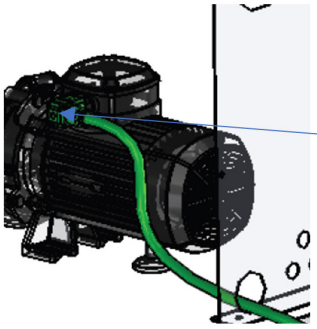
Status of the LEDs: **POWER - RUN - ALARM**

LED	Status	Description
POWER	OFF	Auxiliary power supply (A1 - A2) absent
		Presence of an auxiliary power supply (A1 - A2)
RUN	OFF	Motor off
		Ramp in progress
		Full voltage (TOR, top of ramp)
ALARM	OFF	No active alarm
		Alarm active. The number of flashes indicates the type of alarm in progress (see below).

Alarm codes: to identify the error code number, you have to count the number of successive flashes between each pause.

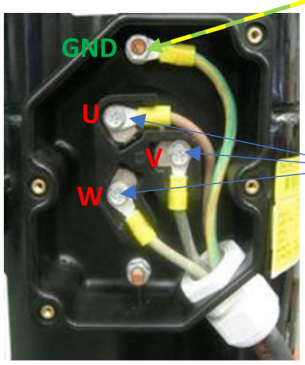
Number of flashes	Errors	Possible cause
1	Voltage absent	No 400VAC supply at the starter terminals Check the voltages Check the tightness at the terminals Check the condition of the cables
2	Phase absent	One of the 3 phases is absent Check the voltages Check the tightness at the terminals
4	Non-compliant power supply frequency	Check the frequency of the main electricity supply It must be 400VAC +/- 10%
5	Non-compliant power supply voltage	Check the voltage of the main 400VAC electricity supply
6	Thermal protection error	Abnormal heating of the electrical power supply line Check the voltages Check the tightness at the terminals Check the condition of the cables
7	Temperature sensor error	Sensor internal to the product is defective Replace the sensor
8	Bypass relay internal to the product in error	The internal relay has not opened or closed Check the voltages Check the tightness at the terminals
9	System error	Internal error Contact Ideal Heating

2. Hydraulic circulation pump



Tightening torque of the connector on the hydraulic pump's terminal box: 50-60 Ncm

3. Compressors' connection



Earth conductor screw, tightening torque: 4- 4.4 Nm

Screw on conductor cables U/V/W, tightening torque: 1.4- 1.7 Nm

6.2.3. Access to internal components

CAUTION:

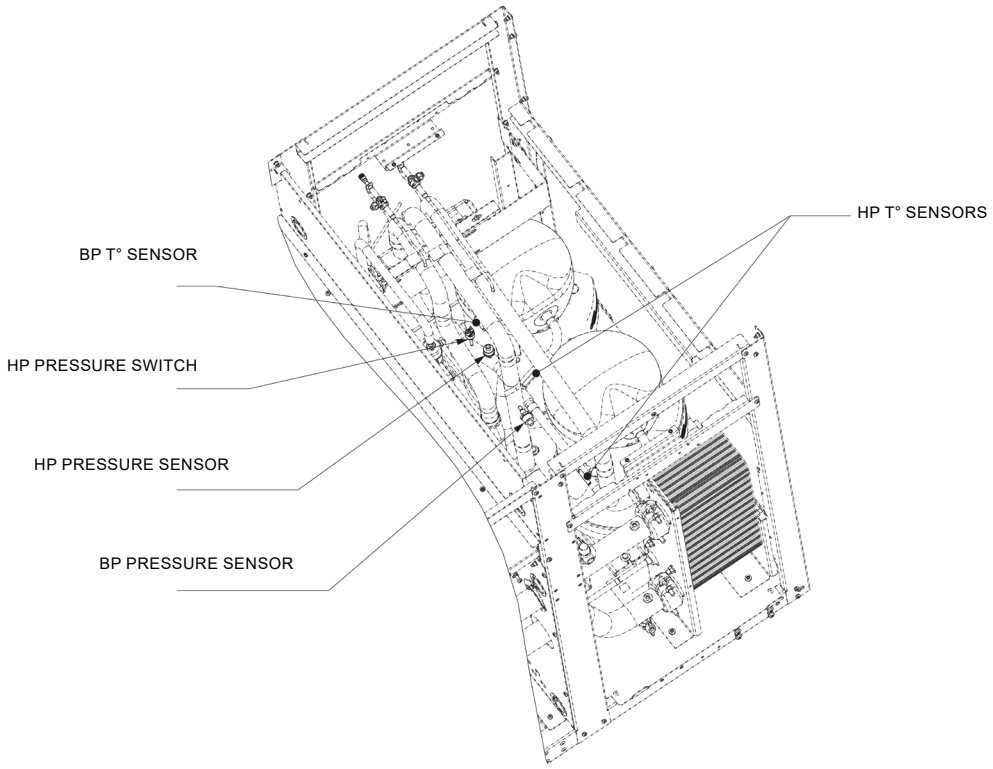
All operations requiring access to the internal parts and the electrical panel must only be carried out with the machine switched off and disconnected from the power supply.
These operations must be carried out by qualified personnel.

In the case of maintenance and/or checking of the components in the heat pump's hydraulic circuit, it is necessary to access the inside of the unit by removing the panels.
In the case of maintenance and/or checking of the heat pump's electrical components, it is necessary to access the inside of the unit by removing the panels.

CAUTION:

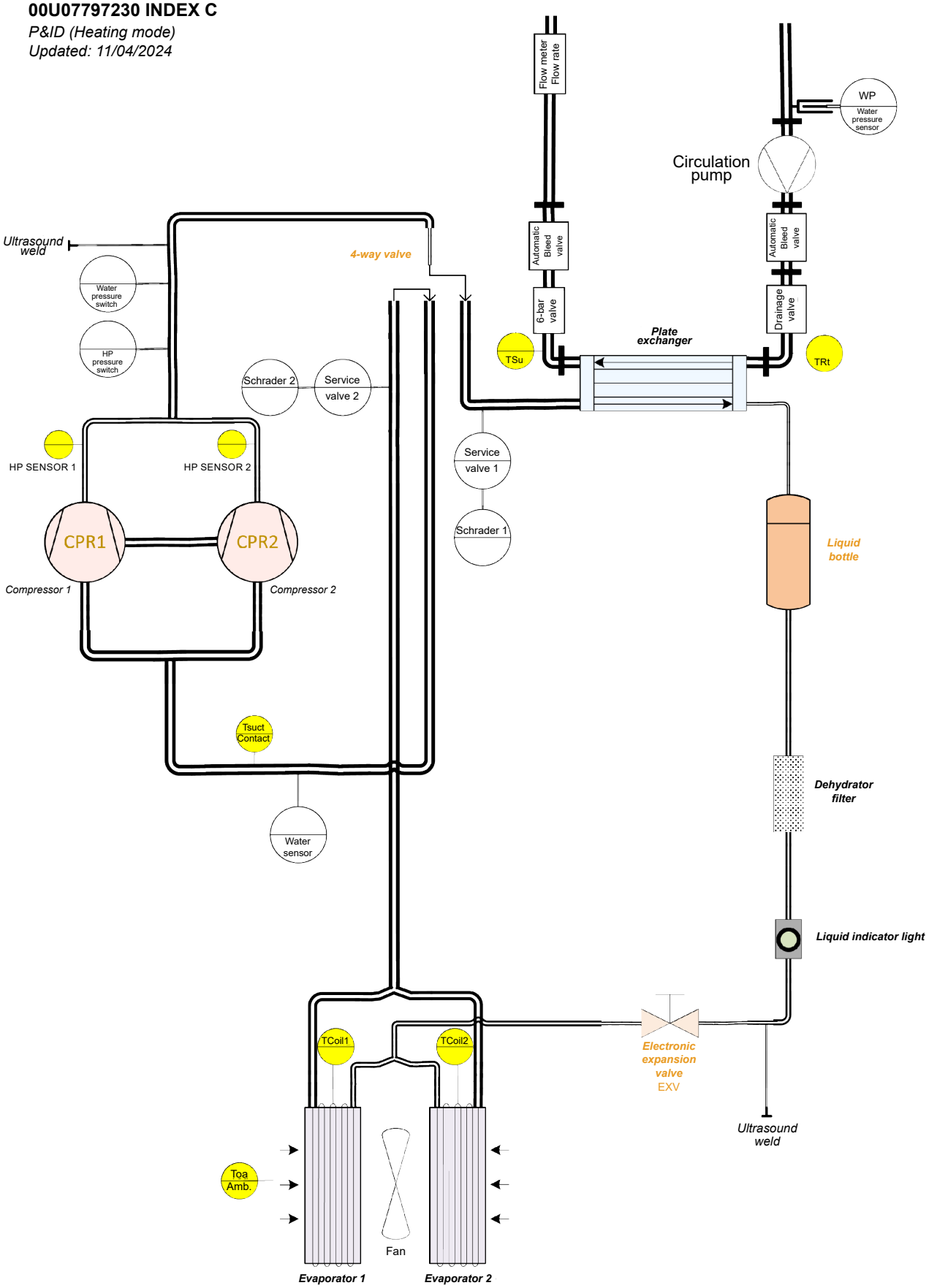
When the work is complete, close the door and attach it using the screws provided (where applicable).

6.2.4. Position of the thermostat and the temperature sensors



6.2.5. Operating diagram: heating mode

00U07797230 INDEX C
P&ID (Heating mode)
Updated: 11/04/2024



6.2.6. Water quality

- **Preparing the water system before putting the heat pump into service**

For any installation (new or renovation), the water pipes must be thoroughly cleaned. The purpose of this initial cleaning is to eliminate germs and residue that can cause deposits to form.
In new installations in particular, residue from grease, oxidised metal, and even copper micro-deposits must be scrupulously removed.
In renovated installations, cleaning should focus on removing sludge and the products of corrosion formed when the unit was last in operation.
There are two types of methods for cleaning and removing sludge: a high intensity approach that takes a few hours, and a slower, more gradual approach that takes several weeks. In the first case, it is essential to clean before connecting the new heat pump. In the second case, fitting a filter on the heat pump return will capture any loose deposits.
The cleaning performed prior to installation improves performance, reduces energy consumption, and resists scaling and corrosion on the unit. A professional (water treatment) should carry out the cleaning.

- **Protecting the unit against scaling**

Water naturally contains dissolved calcium ions and carbonates that cause scaling (calcium carbonate) to form. To prevent excessive deposits, take precautions with regard to the water used to fill the unit: 8°f < TH < 15.1°f.
When the installation contains softener, the equipment must be inspected frequently to check it does not discharge any chlorine-rich water into the network: the chlorine concentration must always remain below 50 ppm.
To prevent the build-up of calcium deposits (such as on exchange surfaces), the unit should be brought into service slowly, starting by operating at a low power with high primary water flow.
Water must be added during the life of the heat pump. The new water adds scaling to the water system. To avoid this, it is important to check that the hardness of the water added does not exceed 8. The amount of fill water plus the amount of make-up water added during the life of the unit should not be more than three times the water capacity of the heating system. If this guideline is not followed, complete cleaning (descaling and cleaning) is necessary.
If it has excessive scaling, the unit's settings for operation and for water treatment must be adjusted.
Adding a large amount of untreated water always contributes a significant amount of scaling. To monitor this and to detect problems, **a system water meter must be installed.**
When carrying out work on the installation, do not drain it completely. Only the sections of the circuit concerned need to be drained.

- **Protecting the heat pumps against corrosion**

Corrosion can affect the iron components used in heat pumps and heating systems, directly related to the presence of oxygen in the water heater's water. Dissolved oxygen that enters the unit when it is being filled for the first time reacts with the equipment materials and quickly disappears. Without refreshing the oxygen through significant contributions of water, the unit might not experience any damage whatsoever. However, it is important to follow the sizing rules and installation guidelines in order to prevent oxygen from continuously flowing into the heating water. From these rules, we have:

- Preferably an expansion vessel with a membrane rather than an open expansion vessel that allows direct passage.

- Internal pressure with the unit of more than 1 bar cold.

- Remove leaky (permeable) components that are letting out more gas than as if they were sealed. If the guidelines above are followed, the unit's system water has the proper characteristics to last a long time: between 8 and 15.1 and dissolved oxygen concentration < 0.1 ppm.

If there is a chance that oxygen could enter the unit, you must take additional precautions. Adding an oxygen scavenger (ex. sodium sulphite) is highly recommended. We recommend directing any water treatment questions to specialists, which can provide the appropriate treatment based on the characteristics of the installation, and a monitoring agreement with a guarantee as to the results.

In the case of a unit where the water is in contact with heterogeneous materials, for example, if there is any copper or aluminium, appropriate treatment is recommended to guarantee a long lifetime for the unit. In most cases, this treatment involves adding chemical solution corrosion inhibitors to the installation. We recommend contacting water treatment specialists.

If the guidelines above are followed, the unit's system water has the proper characteristics to last a long time.

If the recommendations listed above cannot be met, you can set up a plate exchanger to separate the primary system from the secondary system, which protects the heat pump from undesirable effects.

- **Unit monitoring**

If the recommendations listed above (new installation or renovation) have been followed, the unit monitoring is limited to:

- checking the amount of make-up water (fill water volume + make-up water volume < 3 times the volume of the unit).

- checking the pH level (stable or slightly increasing),

- checking the total hardness of the water (TH stable or slightly decreasing)

We recommend monitoring these parameters two to three times a year. It should be noted that the "make up water quantity" parameter is vital for a long lifetime for the unit.

If any of these three above parameters deviates from the above recommendations, refer to a water treatment specialist to correct the problem.

- **Setting up a filtration system**

A filtration system on the back of the heat pump is obligatory in order to remove suspended particles from the unit.

- **Implementation of a sludge collection system for the installation**

(ideally by decantation and magnetisation)

6.3. Procedure for charging the machine

The unit is delivered already filled with refrigerant fluid. If it is necessary to recharge it, after maintenance or after a leak, follow the steps below in the order indicated:

• Before undertaking any work, a risk analysis should be performed and the work area should be delimited. Check that there are no potential ignition sources in the appliance.

• Switch off the electrical supply and lockout the circuit breaker before each intervention.

The minimum space around the unit, which must not include manholes, drains or other low points where refrigerant fluid can settle, must be greater than the exclusion zone (> 3m see Chapter 3.1.4);

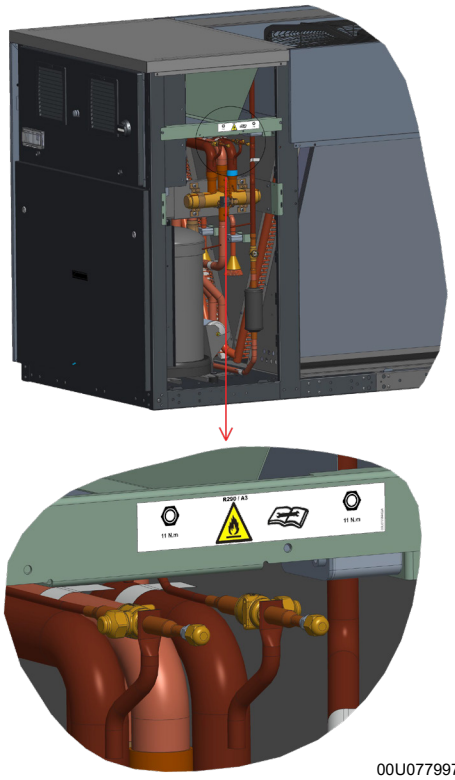
• Display warning signs and prevent access by unauthorised personnel;

• Use the PPE indicated in this manual and the appropriate personal equipment for the work to be carried out.

This equipment includes:

- Explosimeter, to check for the presence of hydrocarbons in the environment (to be used before and during work on the system).
- Equipment for dealing with the risks related to components and possible stagnation zones inside the vigilance zones.
- Hoses and pressure gauges suitable for R290 and free of parasitic oil (see § 2.1.1)
- Approved non-sparking equipment.
- ATEX retractor if necessary.
- Shoes (ESD).
- Portable R290 detector.
- Refrigeration valve fittings for minimum emissions.
- Extinguisher
- ATEX fan
- ATEX scale

• Remove the Schrader valve caps using a backup wrench.



00U07799770_A

• Connect two hoses to the pressure sockets of the circuit and recover the totality of the refrigerant fluid. It is necessary to pump down the manifold to empty it and then pump down the part between the service valve and the Schrader. Use a suitable recovery machine (ATEX). In order not to contaminate the recovered gas, retrieve the equipment by vacuuming the pipes and the recipient. Check the condition of seals and filters frequently. We recommend removing the core using a core removal tool to significantly reduce system suction and charging times;

• Flush the circuit by introducing nitrogen and raising the pressure to 4-5 bar. Expel the nitrogen from the appliance keeping it away from heat sources, ignition points, wells and other possible stagnation points;

• Create a vacuum in the system by reaching an absolute de-pressurisation value not exceeding 200 Pa. At this point, use a fan (ATEX) to avoid stagnation of refrigerant fluid in the working environment. Ensure that the air flow is directed to an area free of ignition sources;
• Perform this rinse and pump down cycle at least three times;
• Evacuate the circuit. The pump down cycle shall consist of an evacuation phase followed by a rising phase, during which the system is allowed to reach equilibrium. The absolute pressure at the end of this process must not exceed 150 Pa. To ensure the best performance of the machine, the evacuation process must be carried out with care and precision;
• Before performing the pump down, ensure that the pump oil used to create the vacuum is clear and free of bubbles to prevent non-condensable gases or other particles from entering the system's circuit. Use an ATEX vacuum pump;
• Connect a hose to the charging socket of the circuit and charge the refrigerant fluid carefully and slowly. Do not charge more gas than necessary: the R290 gas charge must be equal to that indicated in the data sheets. Use calibrated scales (ATEX) with a reading sensitivity of at least one tenth of a gram. If available, the use of heating blankets (ATEX) for bottles is also recommended to speed up the filling of the circuit;
• Once the desired charge has been completed, do not forget to reinsert the new dedicated R290 core into the Schrader valve, tighten the Schrader cap according to the recommended tightening torque (see label) using a backup wrench and disconnect the device used;
• Check the system for leaks by checking for refrigerant fluid leaks using a suitable detector.
• Once charging is complete, observe the pressure/temperature relationship to ensure that there are no non-condensable gases.

Failure to comply with the rules set forth in this manual may result in:
• machine malfunctions and loss of performance;
• leaks of refrigerant fluid, which may form an explosion-risk area;
• damage to components or pipes (e.g. freezing).

CAUTION: **All charging/discharging of the machine must be carried out by QUALIFIED PERSONNEL (IEC 60335-2-40 Annex HH).**

CAUTION: **During charging/discharging operations, there is always a risk of refrigerant fluid leaking and thus of flammable atmospheres forming. Extreme care must be taken to ensure that no refrigerant fluids are present in the environment before and during work.**

6.4. Corrective maintenance

Here is the unit's identifying information to be provided to the help centre when a visit is requested. The identification plate affixed to the machine contains all the technical and performance data relating to the appliance. In the case of handling, removal or deterioration, ask the Technical Assistance Service for a copy. Handling, removal or deterioration of the identification plate can complicate installation, maintenance and spare parts requests. We recommend that you keep track of interventions made on the unit in order to make any troubleshooting easier. In the event of a breakdown or malfunction:

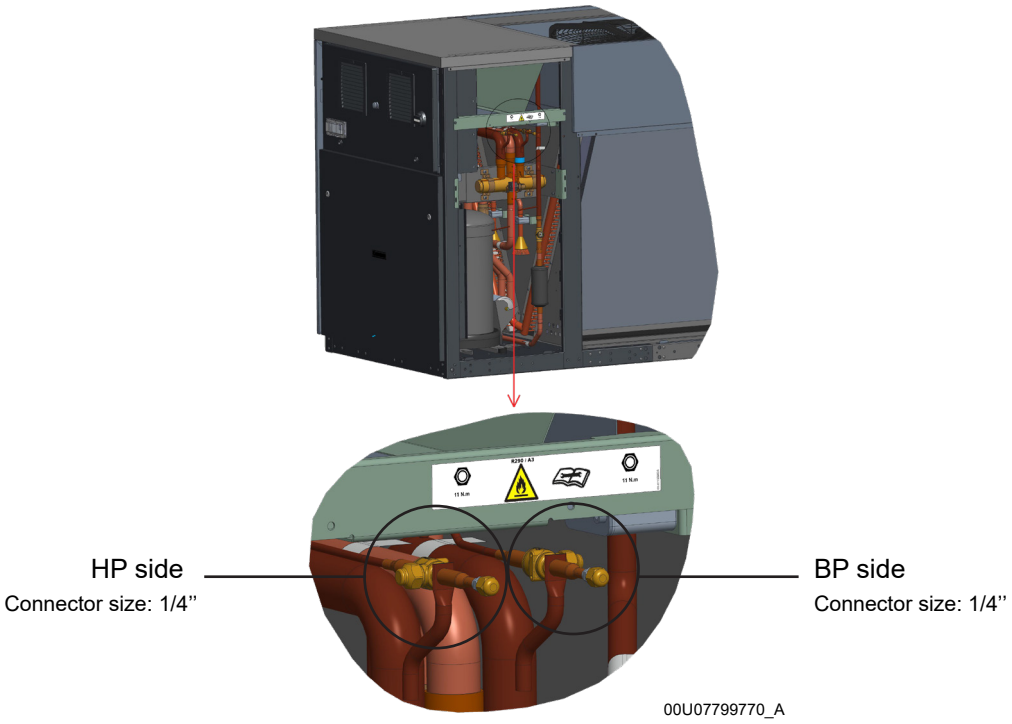
- Check the type of alarm that has been triggered so that you can inform the help centre.
- Contact an authorised help centre.
- If requested to do so by the help centre, immediately deactivate the unit without resetting the alarm.
- Demand the use of original spare parts.

Pump down and refrigerant fluid charge

Refrigerant pump down, charging and recovery procedures may only be performed by specialised technicians or qualified personnel who have received adequate training in the handling of flammable gas, have specific skills, and comply with local laws.
The refrigerant fluid charging procedure is described in paragraph 6.3 of this document.
Below is a list of safety precautions that is not necessarily exhaustive:
Ensure that no other substance is contaminating the R290 fluid.
To recover the refrigerant fluid, use bottles with a left-hand fitting and a suitable screw thread.
The maximum filling capacity must be 0.42kg/l.
Before charging the refrigerant fluid, perform three flushing cycles with pressurised nitrogen, followed by an appropriate pump down procedure.
Before charging, perform a leak check procedure. This operation has two purposes, to control the quantity of refrigerant charged and to check the circuit for leaks,
Keep the replacement bottle in a vertical position when charging.
Put a suitable label on the unit after charging.
Use work equipment that is suitable for flammable gases (see Chapter 1.2.5 for more information). Always ensure that the work area is well ventilated and use R290 detection devices.
Do not load more refrigerant fluid than needed.
After charging is complete, perform leak detection operations prior to operational testing.
After the functional test, we recommend carrying out another leak test.

CAUTION:

Each unit is equipped with two charging connectors (high-pressure side and low-pressure side (in heating mode)) for charging and discharging the refrigerant circuit. The maximum tightening torque of the charging connectors is 0.5 Nm. Use a backup wrench



CAUTION:

The appliance is delivered already charged with the refrigerant fluid necessary for its proper operation. If it is necessary to recharge it, after maintenance or after a leak, follow the procedures described in Chapter 6.3.


CAUTION:

When performing the charging and recovery procedure on the unit, be aware of possible refrigerant fluid leaks that could cause a fire. A risk assessment must always be carried out and the necessary preventive measures applied.

R290 fluid removal

Follow the standardised procedures for collecting refrigerants, which may only be carried out by specialised technicians or qualified personnel, and return it to the supplier.
Do not discharge the gas into areas where there is a risk of the formation of an explosive mixture with air.
Use only equipment that has been approved for use with R290 and ATEX refrigerant fluid.
When removing and disposing of refrigerant fluid, make sure that air does not enter the places where refrigerant fluid is present.

CAUTION:

During the refrigerant removal procedure, be aware of possible gas leaks that could cause a fire.

Once the unit has reached the end of its life cycle and has to be replaced, the following operations are recommended:
- The refrigerant fluid must be recovered by trained personnel and sent to the appropriate collection centres; as per the conditions indicated in Regulation No. 2024/573 on fluorinated greenhouse gases;
- Any frost-proof additives present in the water circuit must be recovered and eliminated in an appropriate way;
- The lubricating oil in the compressors must be collected and sent to the appropriate collection centres;
- The electronic components, such as the regulators, control boards and inverters, must be dismantled and sent to the appropriate collection centres;
- The structure and the various elements, if they can no longer be used, must be scrapped and sorted according to their type; above all, there is a good quantity of copper and aluminium in the machine.

These operations facilitate the reuse of materials and the recycling process, thus reducing the environmental impact in accordance with the provisions of Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).
The user is responsible for the appropriate disposal of this product, in accordance with the national regulations of the destination country of the appliance.

For further information, you should contact the installation company or the competent local authorities.

Incorrect decommissioning of the appliance may cause serious environmental damage and endanger people's safety.
Consequently, we recommend that the appliance should only be disposed of by authorised persons with technical training who have completed training courses recognised by the competent authorities.
The same precautions described in the previous paragraphs must be followed.
Pay particular attention when disposing of the refrigerant gas.
Illegal disposal of the product by the end user will result in the application of the penalties provided for by the law in the country where the disposal takes place.
The crossed-out wheeled bin symbol on the appliance indicates that the product, at the end of its useful life, should be collected separately from other solid/municipal waste.
The appliances are manufactured in accordance with the EC directive on waste electrical and electronic equipment and toxic substances. The effects of incorrect disposal are provided in the user/installer manual.

The manufacturing company or its importer/retail dealer is available to answer any request for further information.

6.5. Draining water from the outdoor unit

If the unit has to be completely drained, first close the manual inlet and outlet valves (not supplied) and then disconnect the pipes provided on the outside of the water inlet and outlet so that the liquid contained in the unit can be evacuated.

Unscrew the cap from the service valve and connect a 14 or 12 mm (internal diameter) pipe.

Drainage points are present on the unit.

- Unscrew the service valve to drain the unit
- If necessary, unscrew the drainage screw from the circulation pump to drain the unit

- **Procedure for cleaning the sieve filter**

It is imperative to regularly check for clogging of the sieve filter.

Clogging of the hydraulic circuit can lead to an increase in hydraulic pressure losses and a reduced flow rate. When the flow rate falls below the limit indicated, the flow meter triggers an alarm, which may only be reset when the flow meter switch-on threshold has been exceeded.

If the unit's sieve filter has to be cleaned, follow the instructions below.

6.6. Filling the outdoor unit with water

Refer to paragraph 4.1.1.

- **Maintenance procedure for the brazed plate exchanger**

It is imperative to ensure that the plate exchanger is kept in a clean condition in order to guarantee the heat pump's performance.

Descaling or cleaning the plate exchanger prevents overpressure and the associated risks and also prevents flow errors and reduced performance of the unit.

To monitor the level of scale or dirt on the exchanger, please follow the instructions below:

- check the flow rate and compare it with the reading taken at the time of commissioning (after checking and cleaning the filter)
- check the Delta T water inlet/outlet
- check the pump speed (confirm whether or not a change has taken place)

If a change is observed, descaling or cleaning will be necessary.

Descaling procedure with product level and time to be determined.

6.7. Prolonged shutdown

The methods for powering down depend on the application site and the shutdown period corresponding to the installation. The appliance has a frost-free system, even when the appliance is in "shutdown mode".

Any shutdown longer than eight hours is considered to be a long period.

CAUTION: **The frost-free protection function remains active only if the appliance is left connected to the electrical power supply.**

If inactivity of the unit is planned for a long period, introduce nitrogen into the drained circuit to avoid any risk of corrosion.

To switch off the appliance completely after draining the installation:

- Switch off the appliances using the “OFF” switch on each one.
- Close the water taps.
- Switch the circuit breaker to “OFF”.

CAUTION:

If the temperature drops below zero, there is a serious risk of freezing: drain the heat pump’s system and hydraulic circuits. To protect the pipes or the HP from ice, a heating cable can be used and frost-proof valves in the event of a prolonged shutdown.

CAUTION:

Before switching the appliance back on after prolonged stoppage, ensure that the temperature of the water is within the operating range (see Chapter 3.4) and purge the air again.

CAUTION:

This unit is equipped with electrically-powered safety mechanisms. For the safety mechanisms to be effective, the unit must be continuously supplied with electricity after the installation, except during maintenance operations.

CAUTION:

To ensure the protection of the unit’s hydraulic circuit by tracing, never power down the unit to ensure that the internal tracers are supplied with electricity.

INFORMATION:

For your information, when powered down, the protection of the plate exchanger by a heated plate will not be active.

For your information, with a heating circuit at 30°C at the time of powering off, the unit’s thermal insulation protects the unit’s plate exchanger for a limited period.

CAUTION:

If the unit is kept powered off for a longer period than given here, the system must be drained.

DANGER: The destruction of the exchanger due to freezing can lead to the introduction of R290 fluid into the building, which may generate a highly flammable or explosive atmosphere and is STRICTLY PROHIBITED.

CAUTION:

Check that the water temperature in the circuit is higher than the minimum permitted at start-up, as indicated on the heat pump’s operating envelopes.

CAUTION:

Even transitional operation, with water temperatures below +5°C, is not guaranteed on the basis of the limits established in this manual. Before switching the appliance on again after a long period of inactivity, ensure that the temperature of the water mixture is above or at least equal to +5°C and that the consumer components are deactivated in order to reduce the time of the 1st refill of the tank.

	**All of the operations described in this chapter MUST ALWAYS BE CARRIED OUT BY QUALIFIED PERSONNEL. Before carrying out any work on the appliance or accessing internal components, make sure that the electrical power supply has been disconnected.**
	**Before starting work, safety checks must be carried out to ensure that there is the least risk of combustion possible. Work should be carried out to a controlled procedure, to minimise the risk of the presence of flammable gases or vapours during the work. The area must be checked using a suitable refrigerant gas detector before and during the work.**
	Maintenance must only be carried out in weather conditions that are suitable for the operations envisaged.
	It is possible that a certain quantity of compressor oil be may be deposited in the refrigeration circuit pipes, especially in the bends. For maintenance operations that need pipes to be where it is necessary to desolder the pipes, we strongly recommend cutting the pipes and not desoldering them with a torch, as the flame may trigger the combustion of any oil present..
	**When working on the machine, the operator must always carry a personal R290 refrigerant fluid detection explosimeter, calibrated to a maximum threshold of 20%LFL (this device must be compliant for use in fire risk areas and not be an ignition source).**
	**It is forbidden to fill the refrigeration circuits with a refrigerant other than the one indicated on the rating plate. The use of another refrigerant may seriously damage the compressor.**
	It is forbidden to use any other oils than those listed in this manual. The use of a different oil may seriously damage the compressor
	**Compressor heads and discharge lines are generally at fairly high temperatures.**
	**Be very careful when working next to the batteries. The aluminium fins are very sharp and can cause serious injury*. Always wear the appropriate personal protective equipment (PPE).**
	**After finishing the maintenance operations, replace the panels and fasten them using the attachment screws. Pay special attention to closing the electrical component housing correctly.**
	After finishing the maintenance operations, ensure that the electrical power supply cable gland is tightened correctly.
	Before working on the appliance, make sure that you have the appropriate work equipment, which is compatible with the use of flammable gases.
	**During the winter months when the weather is particularly cold and humid, ice can form on the protective grilles on the front of the appliances. To allow proper air circulation, check for such ice deposits and remove them if necessary.**
	After maintenance work, make sure that the power supply cables are correctly positioned in the respective eyelets of the user board housing.
	When working near the appliance, it is advisable to examine whether it is necessary to switch off the appliance, empty it of its refrigerant, or protect it with appropriate protective devices. If the product must be placed in an area in which vehicles perform manoeuvres, fit appropriate collision protection.

6.8. Initial checks

The table below shows the additional checks to be made on the product after commissioning to ensure that the latter was carried out correctly.

	Measurement	Done	Comment
1	Refrigerant fluid leak detection		
2	Ensure that the compressors have been released		
3	Absence of air bubbles in the water circuit		
4	Check the pressure of the hydraulic circuit		
5	Check for water leaks in the hydraulic circuit		
6	Verify that the flow rate of each HP is greater than or equal to the minimum allowable flow rate		
7	Clean the metal filters on the hydraulic circuit		
8	Gas separator cleaning		
9	Check that the pump is operating correctly		
10	Check that there are no vibrations		
11	Verification of the service, overheating and under-cooling pressures		
12	Check the structures/supports		
13	Visual check of the air exchangers		

6.9. Periodic checks

The actions that are recommended and obligatory for the proper operation of the unit are described in the table below. The compulsory activities must be performed by an authorised customer service in order for the corresponding certificate to be issued. Failure to respect these activities will make the warranty void and could considerably shorten the life of your product.

OPERATIONS	1 month	4 months	6 months	12 months
Fill the water circuit			X	
Presence of air bubbles in the water circuit			X	
Check the command and safety devices are working correctly			X	
Check for oil leaks from the compressor			X	
Check for water leaks in the hydraulic circuit			X	
Check that the flow controller is operating correctly			X	
Check if the housing resistors are powered and operating			X	
Clean the metal filters on the hydraulic circuit	X			
Use compressed air to clean the finned coil and air vents.		X		
Check if the electrical terminals inside the electrical cabinet and on the compressor terminals are attached correctly			X	
Tightening the hydraulic connectors			X	
Factory tightening torque				X
Check that the fan is attached and balanced			X	
Clean the air filters in the electrical cabinet or replace them if necessary (when present)			X	
Check that the condensates are running off correctly			X	
Check the electrical voltage and phase balance (no load and load)			X	
Check that there are no vibrations			X	
Verification of the refrigerant fluid charge as per the regulations in force				X
Verification of the service, overheating and under-cooling pressures			X	
Check that the pump is operating correctly			X	
If the appliance has to be switched off for a prolonged period of time, drain the water from the pipes and the heat exchanger. This operation is necessary if, during the shut-down period, the expected ambient temperatures are below the freezing point of the fluid used			X	
Check for the presence of corrosion/oxidation				X
Check the panel is attached				X
Check the water quality (refer to the chapter on System water characteristics)			X	
Check that there is no expansion at any dehydrator filter on the liquid line			X	
Check the safety valve on the hydraulic side			X	
Cleaning the deaerator			X	

CAUTION:

It is recommended that the R290 detector be tested every 5 years to ensure that it is working properly.

CAUTION:

The electromechanical pressure switch on the cooling circuit does not require periodic replacement during the life cycle of the product. However, as indicated in the periodic checks table, to ensure that the pressure switch is working correctly it is obligatory to carry out a verification procedure via a "HP test" in regulation test mode (see the procedure in the regulation manual). In case of pressure switch failure, putting the unit back into service before carrying out maintenance work to replace it is prohibited. This procedure is essential.

6.9.1. Cleaning the evaporator

It is imperative to ensure that the battery is kept in a clean condition in order to guarantee the heat pump's performance.

Cleaning the battery also prevents overpressure and the associated risks (reduced performance of the machine).

CAUTION: **Do not use any means other than those recommended by the manufacturer to accelerate the defrosting process or to clean the appliance.**

CAUTION: **The internal part of the evaporators is accessed via the hatch at the rear of the unit. For further information, refer to the diagram below.**

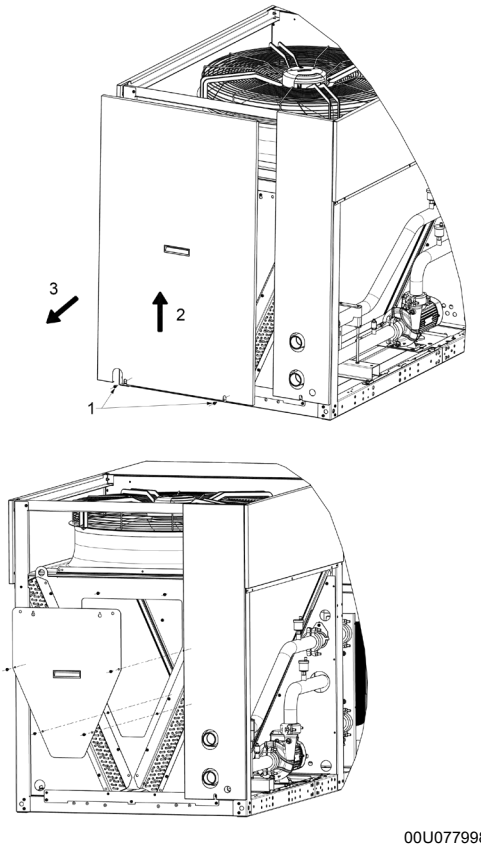
CAUTION: **All operations requiring access to the internal parts must only be carried out with the machine switched off and disconnected from the power supply.**

These operations must be carried out by qualified personnel.

Follow the instructions below to clean correctly:

a) Remove any surface dirt. Deposits such as leaves, fibres... etc., must be used with a vacuum cleaner (use a brush or a spray, carefully avoiding rubbing with metal parts or abrasives). If compressed air is to be used, ensure that the air stream is kept pointing perpendicularly to the surface of the battery to avoid bending the aluminium fins. Take care not to bend the fins with the nozzle of the compressed air gun.

b) Rinse with water. Chemicals may be used (specific products for finned batteries). Rinse it by running water through each of the finned passages until they are completely clean. Ensure that the water stream is kept pointing perpendicularly to the surface of the battery to avoid bending the aluminium fins. Do not touch the evaporator with the end of the water inflow hose. It is recommended to limit the pressure of the jet so as not to damage the fins by putting your finger on the end of the water inflow hose.



00U07799810_A

The frequency of cleaning depends on the environmental conditions and is left to the common sense of the cleaning personnel. When oxidation of dust particles or grease is observed on the surface of the battery, we recommend cleaning it. Generally, in a low pollution atmosphere, we recommend cleaning it every three months.

It should be washed with warm water preferably (40-60°C) and a detergent with a neutral pH, while rinsing should be carried out with plenty of fresh water (50 l/m2).

If the maintenance personnel notices that the edge of the fins is not fully protected, you must contact the nearest service centre for a reapplication of the coating and complete restoration of the anti-corrosion protection.

CAUTION: **When the work is complete, close the door and attach it using the screws provided (where applicable).**

Do not use a high pressure cleaner to clean the evaporator, as excessive pressure can cause irreparable damage. Damage caused by cleaning with unsuitable chemicals or excessive water pressure will not be covered by the warranty.
The aluminium fins are thin and sharp. Take care to use suitable PPE to avoid cuts and abrasions. Protect eyes and face properly to avoid splashing water and dirt during cleaning. Wear waterproof shoes or boots and clothing that cover all parts of the body.
For units installed in an aggressive atmosphere with a high degree of soiling, cleaning the evaporator should be part of the routine maintenance programme. On this type of installation, all dust and particles deposited on the batteries must be removed as soon as possible through periodic cleaning as described above.

6.10. Cleaning the external surfaces

The outer panels must be properly cleaned in order to avoid the accumulation of dust/dirt that can lead to the appearance of corrosion. The paint protects against atmospheric agents, but we recommend cleaning these surfaces as frequently as possible with a neutral detergent and water, especially if the unit is installed in an aggressive atmosphere (high pollution level, salt, etc.).

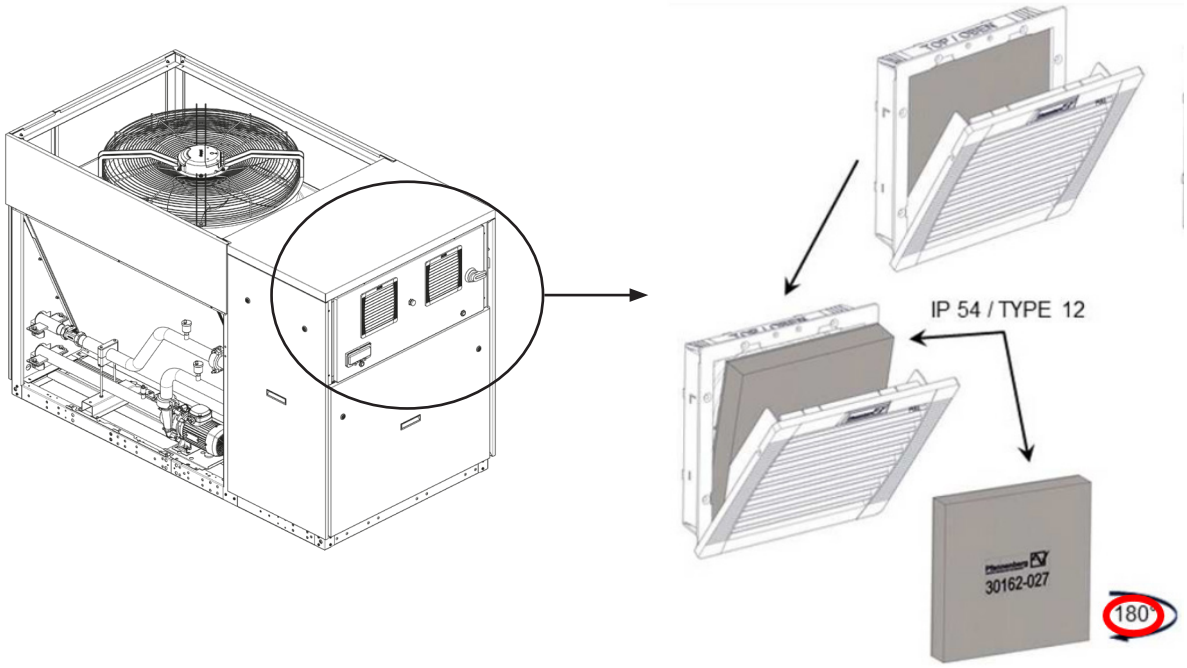
6.11. Maintenance of the outdoor unit

All extraordinary maintenance operations must be carried out by persons trained in the handling of R290.

6.11.1.Filter maintenance

Check that the 3 lugs on the ventilation grille and the fan are fully clipped into place.
If necessary, apply pressure to the 4 corners of the grille/fan, with the front cover open.

Be sure to position the foam filters correctly (Pfannenberg logo on the inside).
We recommend that you replace the filters every 6 months.



For areas with a high degree of exposure to dust, this replacement frequency should be adapted on a case-by-case basis.

6.12. Heavy maintenance work

Some maintenance work may involve the replacement of broken components, which can be heavy.

Below is a list of components and the approximate weight of each part (take into account that residual oil, liquid gas or water can increase the weight).

Refer to the table before the maintenance phase (or refer to the label on the component itself) and choose the equipment/posture that is most suitable for the work to be performed taking into account the load limits imposed by the technical standards and the state of health and capacity of the person carrying out the work.

Weight [kg]	**Unit model ECOMOD AHP70-65**
Component	**65 kW**
Compressor	70 kg
Brazed exchanger/condenser	28 kg / 36 kg filled
Evaporator	45 kg
Fluid tank	3 kg
Pump	19 kg
Fan	45 kg

6.13. Residual safety risks

The residual risks associated with the handling, installation and normal operation of the appliance are listed below. Failure by the user and the installer to comply with the instructions/indications in the manual (the references of which are given in the table) leads to the persistence of these risks, which cannot be eliminated by the manufacturer, which has already taken all necessary design measures to ensure that each risk is minimised.

Danger	Indications/Instructions	Residual risk	User / Activity				
			Operator			User	
			Transport phase	Installation phase	Maintenance phase	Interactions with the unit	Normal operation of the unit
Mechanical: crushing caused by possible instability of the unit while it is being handled.	Chapter 3 of the User-Installer manual contains instructions on how to properly handle and install the unit, indicating the centre of gravity, lifting points and the equipment to be used. It is also recommended to use the protective equipment required by current regulations.	Failure by the installation technician to observe the installation procedures.	X	X			
Mechanical: crushing caused by possible instability of the unit.	Chapter 3 of the User-Installer manual contains instructions on how to correctly install the unit.	Failure by the installation technician to observe the installation procedures.		X	X		
Mechanical: cutting/sectioning/shearing caused by the fact that the fan is not protected against accidental contact.	Chapter 6 of the User-Installer Manual contains specific cautions also concerning the ordinary maintenance phases.	Removal of the protective grille by the user or the maintenance technician.			X	X	
Entanglement caused by the fact that the fan is not protected against accidental contact.	Chapter 6 of the User-Installer Manual contains specific cautions also concerning the ordinary maintenance phases.	Removal of the protective grille by the user or the maintenance technician.			X	X	
Mechanical: cut/abrasion due to contact with the heat exchanger coil.	Chapter 6 of the User-Installer manual contains specific warnings to be taken into account when working near the battery.	Failure to observe the warnings in the manual and in label form.			X	X	
Mechanical: slip/fall caused by ice/water in the vicinity of the unit due to water leaks, broken pipes or seals, or draining of the safety valve on the water side in the event of overpressure and water supply failure.	Paragraph 3.2.3 of the User-Installer manual provides recommendations for the verification and installation of the water circuit safety valve, and paragraph 3.1.4 provides guidance on the plane on which the unit rests. During maintenance, the use of PPE is recommended, as well as the possible removal of all water residues near the machine after the work.	Failure to observe the instructions in the manual.			X	X	

Danger	Indications/Instructions	Residual risk	User / Activity				
			Operator			User	
			Transport phase	Installation phase	Maintenance phase	Interactions with the unit	Normal operation of the unit
Mechanical: cut/abrasion caused by sharp edges on the outer casing of the machine and/or screws protruding on the outside and inside of the unit.	Chapter 6 of the User-Installer manual indicates the correct maintenance procedures. Paragraph 1.2.5 recommends the use of appropriate personal protective equipment.	Failure by the maintenance technician to observe the procedures and/or to use PPE.			X	X	
Mechanical: projection of parts or fluids caused by operating pressure limits being exceeded.	Chapter 6 of the User-Installer manual indicates the correct maintenance procedures. Paragraph 1.2.5 recommends the use of appropriate personal protective equipment.	Simultaneous damage to both types of protective equipment.			X	X	
Mechanical: entrapment due to the closing of the access panel with someone inside.	The unit has a square footprint and the interior is clearly visible.	No check at closing, but this is unlikely to occur given the footprint and size of the unit.			X		
Mechanical: push or impact due to the open door accidentally moving.	Paragraph 1.2.5 recommends the use of appropriate personal protection equipment. And paragraph 1.2.6 highlights the risk to the operator.	Failure by the maintenance technician to follow procedures or behaviour.			X		
Mechanical: cut/abrasion caused by the fins of the inverter heat sinks.	Paragraph 1.2.5 recommends the use of appropriate personal protection equipment.	Failure by the maintenance technician to use PPE.			X		
Electrical: electric shock/ bumps/burns caused by contact with live parts.	Chapter 6 of the User-Installer manual contains the safety measures to be taken when maintaining, cleaning or checking the unit. All work must be carried out by qualified personnel only and with the machine switched off.	Failure by the maintenance technician to follow procedures or irresponsible behaviour on the part of the User.			X	X	

Danger	Indications/Instructions	Residual risk	User / Activity				
			Operator			User	
			Transport phase	Installation phase	Maintenance phase	Interactions with the unit	Normal operation of the unit
Electrical: fire caused by short circuits or electrical arcing.	Chapter 3 of the User-Installer manual describes how to perform a proper installation. In case of maintenance, the use of appropriate personal protective equipment is recommended.	The possibility of a fire starting cannot be eliminated, but its probability of occurrence is reduced. The measures taken reduce the spread of fire.			X	X	
Electrical: projection of particles and emission of harmful chemicals as a result of an electrical overload.	Chapter 6 of the User-Installer manual states that maintenance must be carried out with the machine switched off.	Failure to comply with the instructions in the manual.			X	X	
Thermal: burns from contact with hot surfaces.	Chapter 6 of the User-Installer manual provides the safety measures to be taken when maintaining, cleaning or checking the unit and the personal protective equipment to be worn.	Failure by the maintenance technician to observe the procedures and/or to use PPE.			X	X	
Generated by noise: discomfort caused by the noise of the unit during operation.	Chapter 3 of the User-Installer manual states that an environmental impact assessment must be carried out based on the area of installation of the unit, including installation near workers.	Failure to comply with the actions recommended in the manual and the environmental impact assessment.					X
Generated by vibration: discomfort caused by vibrations of the unit during operation.	In Chapter 3 of the User-Installer manual, the use of anti-vibration mounts is recommended.	Failure to comply with the actions recommended in the manual and the environmental impact assessment.					X
Generated by radiation: electromagnetic radiation that the unit generates during operation.	-	None.					X
Generated by materials/substances: breathing difficulties and/or damage to eyes and skin caused by possible leakage of refrigerant fluid gas.	In the User-Installer manual, paragraph 1.2.5, the use of personal protective equipment is recommended. The refrigerant fluid's safety data sheet (paragraph 1.2.3) and the specific warnings (paragraph 1.2.3) are also provided.	Failure by the maintenance technician to follow procedures.			X	X	
Generated by materials/substances: fire/explosion creates a gas classified as flammable.	Chapter 3 of the User-Installer manual contains specific information on the place of installation of the machine and protective devices.	Failure to comply with instructions regarding the place of installation and the appropriate maintenance procedures.			X		X

Danger	Indications/Instructions	Residual risk	User / Activity				
			Operator			User	
			Transport phase	Installation phase	Maintenance phase	Interactions with the unit	Normal operation of the unit
Generated by materials/ substances: infections caused by bacteria potentially present in the carrier fluid (technical water).	The permitted uses of the unit are listed in Chapter 2 of the User-Installer manual.	Failure to comply with the instructions in the manual.			X		X
Generated by materials/ substances: burns caused by the presence of R290 dissolved in the oil inside the cooling circuit, triggered by the flame of a torch.	In the User-Installer manual, paragraph 1.2.5, the use of personal protective equipment is recommended. In Chapter 6, it is recommended that, in case of maintenance involving the de-soldering of pipes, the pipes themselves should be cut, as the flame of the de-soldering torch will ignite any oil that may be present.	Failure to comply with the instructions in the manual.			X		
Generated by materials/ substances: burns due to refrigerant fluid leakage.	Chapter 6 of the User-Installer manual provides the safety measures to be taken when maintaining, cleaning or checking the unit and the personal protective equipment to be worn.	Failure to comply with the instructions in the manual.			X		X
Generated by materials/ substances: pollution due to improper disposal.	Chapter 7 of the User-Installer manual contains information on proper disposal.	Failure to comply with the instructions in the manual.					
Ergonomic: fatigue/musculoskeletal disorders caused by the effort exerted during maintenance/installation.	Paragraph 1.2.5 of the User-Installer manual recommends compliance with the applicable regulations (international and local) concerning the health and safety of workers. During maintenance, it is advisable to maintain a posture that does not cause fatigue, and to check the weight of a component before handling it.	Failure to comply with the instructions in the manual.		X	X		
Generated by the operating environment of the machine: Slip/fall caused by ice/water near the unit due to condensate drainage/defrosting.	In the User-Installer manual, paragraph 3.3.8 deals with the condensate drainage system and recommends paying attention to the risk of slipping.	Failure to comply with the instructions in the manual.			X	X	

Danger	Indications/Instructions	Residual risk	User / Activity				
			Operator			User	
			Transport phase	Installation phase	Maintenance phase	Interactions with the unit	Normal operation of the unit
Generated by the operating environment of the machine: unforeseen events following malfunctions due to water/snow/ humidity.	In chapter 6 of the User-Installer manual, it is recommended to pay attention to the correct positioning of the power supply cables in their respective eyelets of the user board housing and to the reassembly of all sheet metal panels, especially those belonging to the electrical panel, in order to maintain the declared degree of protection.	Failure by the maintenance technician to follow procedures.			X	X	
Generated by the operating environment of the machine: lightning that can potentially strike the unit.	In Chapter 6 of the User-Installer manual, it is recommended to only carry out maintenance under weather conditions that are appropriate for the intended operations. It is also stated that the place of installation must be sufficiently far away from lightning conductors or objects likely to attract the discharge (§ 3.1.4). The unit must be electrically connected to a system that complies with applicable regulations.	Failure to comply with the instructions in the manual.			X	X	
Generated by the environment in which the machine is used: electromagnetic disturbances caused by interference between equipment in the vicinity of the machine and the machine in question.	Paragraph 3.7.3 of the User-Installer manual recommends that power should be supplied to the unit via a dedicated line and with protective devices. It is also advisable to use an independent cable to eliminate any possibility of interaction with other appliances	Failure to comply with the recommendations concerning the electrical installation.					X
Generated by the operating environment of the machine: possible breakage of components/ supports caused by corrosion and oxidation.	Chapter 6 of the User-Installer manual contains specific instructions on the maintenance and cleaning to be performed on the surfaces of the heat exchanger plates and coils. The data sheet provides guidance on the treatments to be chosen depending on the environmental conditions.	Lack of cleanliness and maintenance and/or incorrect assessment of the atmospheric agents that characterise the installation location.			X	X	
Generated by the environment in which the machine is used: slip/ fall caused by ice/snow on the base of the unit.	In the User-Installer manual, paragraph 1.2.5, the use of personal protective equipment is recommended. In Chapter 6 of the User-Installer manual, it is recommended to only carry out maintenance under weather conditions that are appropriate for the intended operations.	Non-compliance with cleaning and maintenance rules and/or poor assessment of atmospheric agents characterising the site of installation.			X		
Generated by the environment in which the machine is used: Heat stroke due to high temperatures inside the machine if the weather is hot, the unit is working in the cooler and is located in a particularly sunny area.	In the User-Installer manual, paragraph 1.2.5, the use of personal protective equipment is recommended. In Chapter 6 of the User-Installer manual, it is recommended to only carry out maintenance under weather conditions that are appropriate for the intended operations.	Non-compliance with cleaning and maintenance rules and/or poor assessment of atmospheric agents characterising the site of installation.			X		

6.14. “Maintenance” check list

■ For any work on equipment containing flammable refrigerant fluid, safety checks must be performed to minimise the risk of ignition. Take the following steps before working on the cooling system:

	Measure	Done	Comment
1	**General working environment** ■ Inform all of the following persons of the type of work to be carried out: – All of the maintenance personnel. – All persons near to the installation. ■ Prohibit access to the heat pump. ■ Check for flammable materials and ignition sources in the immediate vicinity of the heat pump: remove all flammable materials and ignition sources.		
2	**Check that the refrigerant is present** ■ To detect a flammable atmosphere in good time: check for refrigerant leaks in the environment before, during and after the work using an explosion-proof refrigerant detector suitable for R290. ■ This refrigerant fluid detector must not be a potential source of ignition.		
3	**Extinguisher** A CO2 or powder extinguisher must be available for the following situations: ■ When welding or brazing**.**		
4	**Sources of ignition** ■ When working on a refrigeration circuit containing or having contained flammable refrigerant, it is forbidden to use ignition sources that could cause the refrigerant to ignite. Remove all sources of ignition from the environment where the installation, repair, disassembly or disposal work is being performed, where the risk of refrigerant fluid leaks cannot be excluded. ■ Check for the presence of flammable materials and ignition sources in the immediate vicinity of the heat pump before proceeding with the work: Remove all flammable materials and ignition sources.		
5	**Ventilation of the work site** ■ Perform repairs outdoors or ventilate the work area sufficiently using an ATEX fan before working on the refrigeration circuit or before welding or brazing. ■ Ventilation must be maintained throughout the work. The ventilation must dilute the refrigerant that may escape to the outside.		

	Measure	Done	Comment
6	**Checking the refrigeration installation** ■ Replacement electrical components must be suitable for the application and meet the manufacturer's specifications. Only replace defective components with original parts. ■ Replace the components according to the instructions in the manual. Where necessary, call on the Ideal Heating's technical department. Carry out the following checks: ■ The refrigerant load must not exceed that allowed for the installation room. ■ The ventilation openings must not be obstructed or blocked. ■ Check there is refrigerant present in the secondary circuit if a hydraulic decoupling system is used. ■ The inscriptions and symbols must always be clearly visible and legible. Replace illegible information. ■ Refrigerant lines or components must be installed in such a way as to avoid contact with substances that may cause corrosion. Exception: refrigerant lines must be made of corrosion-resistant materials or be sufficiently protected against corrosion.		
7	**Checking the electrical components** ■ The following safety checks must be carried out during maintenance and repair work on the electrical components: see below. ■ In the event of a safety-related fault, the system must not be connected until the fault has been rectified. If immediate rectification of the fault is not possible, a suitable temporary solution must be found to allow the system to operate. Inform the user. **Carry out the following safety checks:** ■ When filling or sucking out refrigerant and when flushing the refrigeration circuit, do not place electrical components or live cables in the immediate vicinity of the appliance.. ■ Check the earth connection.		
8	**Repairs to sealed units** ■ When working on the sealed components, switch off the appliance completely, even before removing the sealed covers. ■ If a power supply is absolutely necessary during the work: to prevent a potentially dangerous situation, a permanently operating refrigerant detector should be installed at the most critical locations. The use of an ATEX retractor is advisable.		

	Measure	Done	Comment
8	■ In particular, care must be taken to ensure that, when working on electrical components, the units are not modified to such an extent that the protection they offer is affected. Such modifications include damage to cables, too many connections on a single terminal block, connections that do not comply with the manufacturer's specifications, damage to seals and incorrect installation of cable glands. ■ Ensure that the device is installed correctly. ■ Check that the seals are fully inserted. This ensures that the seals provide reliable protection against the penetration of a flammable atmosphere. Change if defective. **Warning** The use of silicone as a sealant may affect the operation of the leak detectors. Do not use silicone as a sealant. ■ Replacement parts must meet the manufacturer's specifications. ■ Work on components suitable for flammable atmospheres: these components do not have to be powered down.		
9	**Repair work on components suitable for use in flammable atmospheres** ■ While we cannot completely rule out exceeding the permissible voltages and currents, permanent capacitive or inductive loads must not be connected to the device. ■ Only components suitable for a flammable atmosphere may be powered up in the vicinity of such an atmosphere. ■ Use only suitable original parts or components approved by the Ideal Heating. Other components may cause the refrigerant to ignite if leaked.		
10	**Wiring** ■ Check if the wiring is subject to wear, corrosion, traction, vibrations, sharp edges or other unfavourable surrounding influences. ■ When checking, also take into account the effects of ageing or constant vibrations at the compressor and fans.		
11	**Refrigerant detectors** ■ Do not use potential ignition sources to detect refrigerant fluid and leaks. ■ Flame detectors or detectors with naked flames are prohibited.		
12	**Leak detection** The following leak detection methods are suitable for installations with flammable refrigerants: **Leak detection using electronic refrigerant detectors:** ■ If necessary, electronic refrigerant detectors do not have the necessary sensitivity or must be calibrated to the corresponding range. Calibrate in a refrigerant-free environment.		

	Measure	Done	Comment
12	■ The refrigerant detector must be suitable for the R290 refrigerant to be detected. ■ The refrigerant detector must not contain any potential source of ignition. ■ Calibrate the refrigerant detector to suit the refrigerant used. Set the response threshold to < 3 g/a, suitable for R290. **Leak detection using leak detection liquids:** ■ Leak detector liquids associated with most refrigerants are suitable. **Warning** Liquid leak detectors containing chlorine react with the refrigerant, causing corrosion. ■ Do not use liquid leak detectors containing chlorine. **Measures to be taken when there is a leak in the refrigeration circuit:** ■ Immediately extinguish any open flame in the vicinity of the heat pump. ■ Always recover all refrigerant from the refrigeration circuit if brazing work is required to eliminate the leak. Flush the area to be brazed with oxygen-free nitrogen before and during brazing.		
13	**Recovering the refrigerant fluid** **Recovering and draining the refrigerant fluid** If any work is to be done in the refrigerant fluid circuit for repair or other reasons, it should be done according to standard procedures. In general, special care must be taken with regard to the flammability of the refrigerant fluid. The following procedure should be followed in all cases: - do not fill a recovery bottle to more than 40% of its capacity because the R290 has a density of 0.42kg/l. - recover the refrigerant fluid; - purge the refrigerant fluid circuit with dry nitrogen; drain; - purge again with inert gas; - open up the refrigerant fluid circuit by cutting or brazing it. The refrigerant fluid charge must be recovered in an appropriate recycling bottle. The refrigerant fluid circuit must be purged with nitrogen to ensure safety. This process must be repeated several times if necessary. Under no circumstances should compressed air or oxygen be used. The purging process must be carried out by bringing oxygen-free nitrogen into the vacuum and raising the pressure to the operating pressure level.		
	Then the excess pressure must be lowered and evacuated. This process must be repeated until no refrigerant fluid remains in the system. Once the last purging process is completed, the pressure in the system must be reduced to the atmospheric pressure level. This is particularly important if brazing must be carried out on the refrigerant fluid circuit. Ensure that the outlet of the vacuum pump leads to a well ventilated area and that there are no flammable sources in the vicinity.		

	Measure	Done	Comment
14	**Topping up the refrigerant fluid** **Filling with refrigerant fluid** In addition to the usual filling procedure, the following requirements must be satisfied: - you must make sure that the filling valve is not used for different refrigerant fluids. The pipes should be as short as possible to minimise the amount of refrigerant fluid contained in them. - the refrigerant fluid bottles must remain in a vertical position. - make sure the refrigerant fluid circuit is earthed before filling it. - the appliance may be marked (if not already marked) when the filling process is complete. - take special care not to overfill the appliance. Before the appliance is filled, a pressure test with nitrogen must be carried out. The leak test can be performed on the filled appliance, but it must be done before commissioning. A final leak test must be performed before leaving the facility.		
15	**Disposal** For disposal, it is especially important that the technician is familiar with all details of the drainage equipment. We recommend that all of the refrigerant fluid is recovered. Before draining, you must take samples of the oil and refrigerant fluid if the refrigerant fluid needs to be treated. The important factor is that there is a power supply available where the work is to be carried out. a) Familiarise yourself with the appliance and how it operates. b) The system must not be powered. c) Before starting the draining, ensure that: - equipment is available (where required) to transport the bottles of refrigerant fluid; - PPE are available and that they are used correctly; - the suction process is constantly monitored by a qualified person; - the draining station and refrigerant fluid bottles comply with the relevant guidelines. d) Carry out a pumping cycle, if possible. e) If a vacuum cannot be created, suck with a manifold hose so that the refrigerant fluid can be removed from all parts of the system. f) Make sure that the refrigerant fluid bottle is on the scale before starting the suction. g) Turn on the draining appliance and follow the manufacturer’s instructions. h) Make sure that the recycling bottles are not overfilled (maximum filling capacity: 0.42kg/l). i) Never exceed the permissible operating overpressure of the recycling bottle, even for a short period. j) If the recycling bottles are filled as required and the process is completed, ensure that the bottles and equipment are immediately removed from the facility and that all shut-off valves are closed. k) Recovered refrigerant fluid must not be used to fill other systems until it has been purified and examined.		

	Measure	Done	Comment
16	**Marking (on the heat pump)** If the heat pump has been taken out of service, affix the following marking, along with the date and signature, prominently on the heat pump: ■ The refrigerant is inflammable. ■ The installation is not in service. ■ The refrigerant has been removed.		
17	**Recovering the refrigerant fluid and the compressor oil** **Recovery** If the refrigerant fluid has to be recovered for repair or decommissioning, care must be taken to ensure that this is done safely. If the refrigerant fluid is put into bottles, make sure that only appropriate refrigerant fluid bottles are used for this purpose. Make sure that there are enough refrigerant fluid bottles ready to receive the full volume in the installation. All refrigerant fluid bottles used must be suitable for the refrigerant fluid to be recovered and labelled accordingly (i.e., special recycling bottles for refrigerant recovery). The refrigerant fluid bottles must contain a safety valve and shut-off valves that are firmly attached and in good condition. Empty recycling bottles are evacuated and must be cooled down before the suction process, if possible. The draining devices must be in good condition and suitable for the recovery of flammable refrigerant fluid. Instructions for each step of the recovery procedure are to be found near to the device. In addition, calibrated scales must be available and in good condition. The hoses must be equipped with hermetic fittings and in good condition. Before using the draining device, you must check that it is in good condition, that it has been maintained correctly and that the electrical devices belonging to it have been waterproofed to avoid ignition in case of a refrigerant fluid leak. In case of doubt, contact the manufacturer. The refrigerant fluid recovered must be returned to the supplier in a proper recycling bottle. Do not mix refrigerant fluids in the refrigerant fluid bottles. When compressors or compressor oil are to be drained, care must be taken to ensure that they are drained at a pressure level that is sufficiently low to ensure that there is no refrigerant fluid left in the oil. Before returning the compressor to the manufacturer, it must be evacuated. This process should only be accelerated by electrically heating the compressor housing. If the oil has to be removed from an installation, it must be done with appropriate caution.		

7. END OF PRODUCT LIFE

The regular elimination and appropriate recycling of this product will help prevent environmental damage and health risks.

This crossed-out wheeled bin symbol on the equipment indicates that the product, at the end of its useful life, should be collected separately, and not disposed of with other solid/urban waste.

The equipment is manufactured in accordance with the European Directive on Waste Electrical/Electronic Equipment and the adverse effects of improper disposal are indicated in the user/installation manual. The manufacturer or its importer/distributor is available to answer any request for further information.

Ideal Heating has signed up to the Eco-systems service which collects, recycles and cleans our used electrical equipment, according to the highest environmental requirements.

Eco-systems is an eco-organisation which is approved by the public authorities for the WEEE (Waste Electrical and Electronic Equipment) sector.

The appliances which have the symbol above must not be put with domestic waste and must be collected separately.

When the appliance has reached the end of its life cycle and needs to be replaced, a number of recommendations must be followed:

- the refrigerant must be recovered by specialised personnel and sent to a collection centre;
- the lubricating oil of the compressors must also be recovered and sent to a collection centre;
- electronic components such as controllers, pilot boards and inverters must be removed and sent to a collection centre;
- if the structure and various components cannot be used, they must be dismantled and separated according to their nature, in particular copper and aluminium present in significant quantities in the device.

These operations facilitate the recovery and recycling of substances, thus reducing the environmental impact.

The user is responsible for the disposing of the product correctly in compliance with the national regulations in force in the country of destination. For further information, we recommend you to contact the installation company or the competent local authorities.

	Incorrect disposal of the appliance may cause serious environmental damage and endanger people. We therefore recommend that you contact authorised persons with appropriate technical training obtained through courses recognised by the competent authorities.
	The same precautions described in the previous paragraphs must be followed.
	Special attention must be paid to the disposal of the refrigerant fluid.
	Illegal disposal of the product by the end user will result in the application of the penalties provided for by the law in the country where the disposal takes place.

8. APPENDIX A - *PRODUCT DATA ≤ 70KW*

8.1. Performance table: heating mode

Table 6: Grid of performance in heating mode under full load (100%)

Heating capacity (kW)															
AirT (°C) / WaterT (°C)	-20	-15	-10	-7	-2	2	7	12	15	20	25	30	35	40	45
20	39.8	45.1	51.1	54.4	51.4	56.0	62.9	79.7	82.6	87.4					
25	39.6	45.1	50.6	53.9	51.5	56.2	63.4	79.1	82.0	87.1	90.8				
30	39.2	44.6	50.0	53.5	51.7	56.3	63.8	78.7	81.6	86.6	90.3	94.1			
35	38.6	44.0	49.5	53.0	52.0	56.7	63.9	78.4	81.2	85.8	89.6	93.4	96.9		
40	37.9	43.4	48.9	52.6	51.5	56.1	66.4	77.9	80.5	85.0	88.6	92.5	96.1	99.4	
45	37.4	42.9	48.4	52.1	50.9	55.4	69.0	77.6	80.2	84.5	88.1	91.8	95.1	98.4	
50	37.2	42.5	47.9	51.8	50.3	54.7	71.1	76.9	79.5	83.8	87.4	91.2	94.5	97.5	
55	36.9	42.3	47.3	51.2	49.8	54.2	72.7	76.4	78.8	83.0	86.5	90.5	93.6	96.4	
60			46.8	50.8	50.9	55.4	72.0	75.6	77.8	81.6	85.6	89.6	92.5	95.5	
65					51.6	56.6	71.2	75.0	77.0	80.5	84.3	88.4	91.4	94.9	
70						57.4	70.5	74.6	76.4	79.4	82.8	86.8	90.3	94.3	

Power at inlet (kW)															
AirT (°C) / WaterT (°C)	-20	-15	-10	-7	-2	2	7	12	15	20	25	30	35	40	45
20	13.1	13.4	13.6	13.7	13.5	13.5	13.5	14.1	14.1	14.0					
25	13.8	14.2	14.5	14.8	14.8	14.7	14.8	15.7	15.7	15.4	15.0				
30	14.8	15.3	15.8	16.1	16.0	16.0	16.2	17.3	17.4	16.9	16.6	16.2			
35	15.8	16.4	17.1	17.4	17.2	17.2	17.7	18.9	18.9	18.6	18.4	18.2	17.7		
40	16.9	17.6	18.3	18.7	18.3	18.4	19.3	20.4	20.4	20.3	20.1	19.9	19.4	19.0	
45	18.2	18.9	19.6	20.0	19.7	19.5	21.1	21.8	21.9	21.9	21.8	21.7	21.6	21.4	
50	19.8	20.3	20.8	21.2	20.9	20.7	22.8	23.4	23.5	23.7	23.9	24.1	23.8	23.5	
55	21.3	21.6	22.1	22.6	22.1	21.9	24.5	25.1	25.2	25.4	25.8	26.2	26.0	25.7	
60			23.3	23.8	23.8	23.5	26.3	27.1	27.4	27.5	27.9	28.3	28.4	28.5	
65					25.6	25.8	28.1	29.0	29.5	29.8	30.3	30.8	31.2	31.5	
70						28.7	29.8	31.1	31.7	32.1	32.6	33.1	33.4	33.7	

Performance coefficient (-)															
AirT (°C) / WaterT (°C)	-20	-15	-10	-7	-2	2	7	12	15	20	25	30	35	40	45
20	3.03	3.38	3.76	3.98	3.80	4.15	4.68	5.65	5.86	6.25					
25	2.87	3.18	3.48	3.63	3.49	3.81	4.27	5.03	5.21	5.66	6.05				
30	2.65	2.92	3.17	3.31	3.24	3.53	3.94	4.56	4.70	5.11	5.45	5.80			
35	2.44	2.68	2.90	3.04	3.03	3.29	3.60	4.14	4.29	4.62	4.87	5.13	5.47		
40	2.24	2.47	2.67	2.82	2.82	3.05	3.43	3.82	3.94	4.18	4.40	4.64	4.94	5.24	
45	2.06	2.27	2.47	2.61	2.58	2.84	3.28	3.55	3.66	3.86	4.04	4.22	4.41	4.60	
50	1.88	2.09	2.30	2.44	2.40	2.64	3.12	3.29	3.38	3.53	3.65	3.79	3.97	4.14	
55	1.73	1.96	2.14	2.27	2.25	2.48	2.97	3.04	3.12	3.26	3.35	3.45	3.60	3.75	
60			2.00	2.14	2.14	2.36	2.74	2.79	2.84	2.96	3.07	3.16	3.25	3.35	
65					2.01	2.20	2.54	2.59	2.61	2.70	2.78	2.87	2.93	3.01	
70						2.00	2.36	2.40	2.41	2.47	2.54	2.62	2.70	2.80	

Table 7: Grid of performance in heating mode under partial load (50%)

Heating capacity (kW)															
AirT (°C) / WaterT (°C)	-20	-15	-10	-7	-2	2	7	12	15	20	25	30	35	40	45
20	20.6	23.9	27.2	29.5	30.6	34.4	42.7	49.5	50.7	52.8					
25	20.2	23.3	26.4	28.6	30.0	34.0	42.0	48.5	49.9	52.2	54.5				
30	19.9	23.1	26.3	28.5	29.7	33.5	41.4	47.7	49.1	51.3	53.7	56.0			
35	19.8	22.9	26.0	28.3	29.4	33.2	40.9	46.8	48.1	50.4	52.8	55.2	58.3		
40	19.2	22.4	25.5	27.6	28.8	32.6	39.9	45.7	47.0	49.2	51.9	54.2	57.0	60.5	
45	18.7	21.9	25.0	26.9	28.3	32.0	38.9	44.6	45.8	48.0	50.8	53.2	56.0	59.3	
50	18.2	21.2	24.1	26.3	27.6	31.4	38.6	43.4	44.6	46.8	49.6	52.0	54.8	58.2	
55	17.8	20.7	23.6	25.6	27.0	30.7	38.3	42.0	43.4	45.7	48.4	51.1	53.9	56.6	
60		20.5	23.3	25.2	27.5	31.2	37.5	41.1	42.3	44.3	47.0	50.1	52.4	55.3	
65				25.0	28.1	31.8	36.7	40.2	41.1	42.7	45.5	48.3	50.6	53.2	
70						32.4	36.1	39.3	40.0	41.3	43.9	46.5	48.7	51.1	

Power at inlet (kW)															
AirT (°C) / WaterT (°C)	-20	-15	-10	-7	-2	2	7	12	15	20	25	30	35	40	45
20	6.4	6.6	6.7	6.8	6.8	6.7	7.0	7.1	7.0	6.8					
25	7.0	7.2	7.4	7.5	7.4	7.3	7.7	8.0	7.9	7.7	7.5				
30	7.6	7.8	8.0	8.2	8.1	8.0	8.4	8.7	8.7	8.5	8.4	8.2			
35	8.1	8.4	8.7	8.7	8.7	8.7	8.9	9.4	9.4	9.3	9.2	9.1	9.0		
40	8.7	8.9	9.2	9.4	9.4	9.3	9.7	10.2	10.3	10.2	10.2	10.2	10.1	10.1	
45	9.2	9.5	9.7	10.0	10.0	10.0	10.4	11.0	11.1	11.0	11.1	11.2	11.2	11.2	
50	9.9	10.1	10.3	10.6	10.7	10.7	11.2	11.9	12.0	12.0	12.0	12.1	12.3	12.4	
55	10.8	10.9	11.1	11.3	11.4	11.4	11.9	12.7	12.8	12.8	12.9	13.0	13.3	13.4	
60		11.8	11.9	12.2	12.4	12.4	12.9	13.7	13.8	13.9	14.0	14.1	14.3	14.5	
65				13.6	13.5	13.5	13.8	14.7	14.9	15.0	15.1	15.2	15.5	15.7	
70						14.5	14.9	15.6	15.8	16.0	16.2	16.4	16.6	16.8	

Performance coefficient (-)															
AirT (°C) / WaterT (°C)	-20	-15	-10	-7	-2	2	7	12	15	20	25	30	35	40	45
20	3.19	3.63	4.04	4.33	4.53	5.14	6.08	6.95	7.24	7.75					
25	2.88	3.23	3.56	3.80	4.03	4.63	5.43	6.08	6.30	6.78	7.29				
30	2.62	2.95	3.27	3.49	3.67	4.18	4.94	5.51	5.67	6.02	6.38	6.80			
35	2.43	2.73	3.01	3.20	3.37	3.83	4.60	4.99	5.09	5.44	5.76	6.05	6.45		
40	2.22	2.51	2.78	2.94	3.08	3.50	4.13	4.50	4.59	4.82	5.09	5.34	5.63	5.99	
45	2.03	2.31	2.57	2.71	2.84	3.21	3.73	4.05	4.13	4.35	4.58	4.76	5.02	5.28	
50	1.84	2.09	2.33	2.47	2.58	2.92	3.46	3.65	3.73	3.91	4.13	4.28	4.47	4.71	
55	1.66	1.90	2.12	2.26	2.38	2.69	3.23	3.31	3.39	3.56	3.75	3.92	4.06	4.21	
60		1.74	1.95	2.07	2.22	2.51	2.92	3.00	3.05	3.18	3.36	3.54	3.65	3.81	
65				1.84	2.08	2.36	2.65	2.73	2.76	2.84	3.01	3.17	3.26	3.39	
70						2.24	2.42	2.52	2.53	2.58	2.70	2.84	2.93	3.04	

WEEE DIRECTIVE 2012/19/EU
Waste Electrical and Electronic Equipment Directive

- At the end of the product life, dispose of the packaging and product in a corresponding recycle centre.
- Do not dispose of the unit with the usual domestic refuse.
- Do not burn the product.
- Remove the batteries.
- Dispose of the batteries according to the local statutory requirements and not with the usual domestic refuse.

benchmark
COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

The code of practice for the installation, commissioning & servicing of central heating systems

UK CA

CE

bsi ISO 9001 Quality Management Systems CERTIFIED

At Ideal Heating we take our environmental impact seriously, therefore when installing any Ideal Heating product please make sure to dispose of any previous appliance in an environmentally conscious manner. Households can contact their local authority to find out how.
See https://www.gov.uk/managing-your-waste-an-overview for guidance on how to efficiently recycle your business waste.

Technical Training

Our Expert Academy offer a range of training options designed and delivered by our experts in heating.
For details please contact: expert-academy.co.uk

Ideal Boilers Ltd., pursues a policy of continuing improvement in the design and performance of its products.
The right is therefore reserved to vary specification without notice.

Registered Office

Ideal Boilers Ltd., National Avenue, Hull, East Yorkshire, HU5 4JB
Tel 01482 492251 Fax 01482 448858

Registration No. London 322 137

EU Authorised Representative:
Atlantic SFDT
44 Boulevard des Etats-Unis, 85 000 La Roche-Sur-Yon, France
+33 (0)2 51 44 34 34

Ideal Technical Helpline: 01482 498663
Ideal Consumer Helpline: 01482 498660
Ideal Parts: 01482 498665

idealheating.com

ideal HEATING