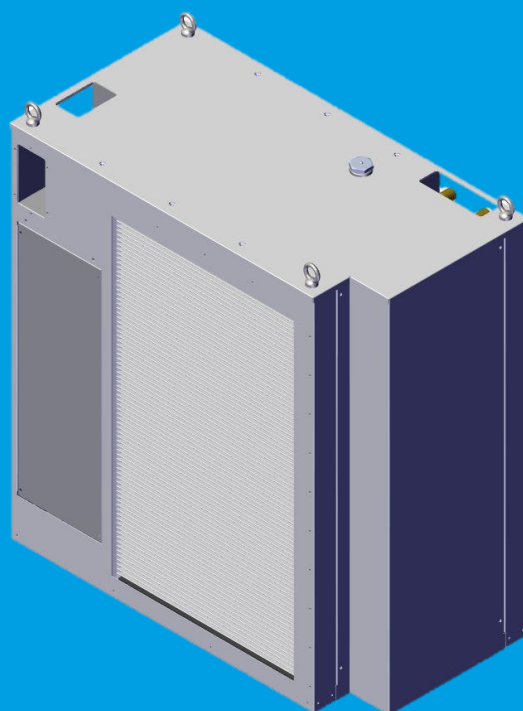


Operating and Maintenance Instructions

Water chiller VLV 4/VLV 12



EN

Operating and Maintenance Instructions

Chiller VLV 4/VLV 12

Preface

The skills and information provided in the ORIGINAL OPERATING MANUAL are required for assembly and safe operation of Pfannenberg chillers.

The information is presented in a brief, clearly arranged format. The chapters are numbered throughout.

Various unit types may be documented in this operating manual.

Pfannenberg chillers are subject to continuous improvement. Please understand that we must reserve the right to changes in design, equipment and technology. For this reason, no claims to specific features of the unit can be derived from the content of this operating manual.

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1. General

1.1 Scope

This documentation contains all the relevant information necessary for the installation, connection, commissioning and maintenance of the chiller.

Prior to any work on the chiller, careful reading and observance of this documentation is mandatory.



NOTICE

Hereby, the manufacturer declares that any form of liability will be refused if it can be attributed to improper use, unauthorized modifications or disregard of the instructions given in this manual.

The warranty expires as soon as one of the above conditions applies.

The customer / operator is obliged to provide this manual and all related documents to those responsible for installation, operation, maintenance and repair.

1.2 The chiller [VLV 4 – VLV 12]

The chiller is a cooling unit that extracts heat from a liquid by means of a vapor compression refrigeration cycle.

The cooled liquid is referred to as a coolant and is used for heat removal of liquid-cooled components.

The heat absorbed by the customer application of the components is discharged to the environment on the warm side of the refrigeration cycle.

The chillers described in this manual are intended to cool mixtures of water and glycol [Dowcal 100].

1.3 Proper/Improper operation

The specified application and storage limits must not be exceeded or fallen below.

Information on this can be found on the rating plate and in the Technical data.

Improper operation

Installation / operation:

- on moving units
- in areas with high heat radiation
- in areas with strong magnetic fields
- in areas with open flames
- in potentially explosive atmospheres
- near flammable products
- in areas with a salty atmosphere
- in areas with an aggressive atmosphere
- in excessively dusty areas

1.4 Symbols in use

Safety instructions and markings



DANGER

Identifies an exceptionally hazardous situation. Severe, irreversible injuries or death will occur if this notice is not observed



DANGER

Identifies an exceptionally hazardous situation in connection with electrical voltage. Severe, irreversible injuries or death will occur if this notice is not observed



WARNING

Identifies an exceptionally hazardous situation. Severe, irreversible or deadly injuries could occur if this notice is not observed.



CAUTION

Identifies a hazardous situation. Minor or moderate injuries could occur if this notice is not observed.



NOTICE

Notice is used to address practices not related to physical injury.

☒ Before explanations

* Legend notice

⇒ *Placed before results of actions*

2. Safety

The chiller instructions must be read by the installer and personnel in charge for operation, before starting the chiller.

All safety and security instructions given in this manual must be observed!

Only qualified personnel are allowed to install, operate and do the maintenance work.

Non-observance of the instructions may cause injuries and will cancel the manufacturer's liability for subsequent damage.

National regulations on accident prevention, regulations of the local power supply authorities as well as any specific safety instructions for chiller must be observed.

The safety of the unit is only guaranteed, if it is used as intended.

The following points must be observed before commissioning and while operating the chiller:

- Familiarize yourself with all operating controls.
- Make sure that all working limits indicated within unit label are observed.
- Use protective devices to check electrical insulation. Do not carry out any work on any part of the equipment that are live with wet clothing, hands and feet.
- Never spill or pour any cooling medium into the environment as this may cause health hazard.
- The components of the chiller must not be modified in any way.
- Disconnect the power supply and release pressure from any pressurized component before carrying out any service work on the Chiller.
- A qualified commissioning engineer must ensure that the chiller has been connected to the electrical mains in accordance with the standard EN 60204 and all other applicable national regulations.
- Ensure adequate ventilation.
- Hand protection: Safety gloves.
- Eye protection: Safety goggles.
- Body protection: Wear safety shoes

It is also mandatory to comply with Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on certain fluorinated greenhouse gases.

The above mentioned Regulation lays down specific measures and restrictions to be considered while commissioning, operating, maintaining and disposing any equipment containing greenhouse gases, such as HFCs, as specified in Annex I. It also specifies mandatory leakage-check frequency to be performed by certified personnel and mandatory records providing the evidence of exact fluorinated gas charge and subsequent added and/or recovered quantities (e.g. Article 3).



CAUTION

Compliance with legal requirements

In accordance to the F-GAS regulation (EU) No 517/2014, every year the operator (the owner of the equipment) is responsible to ensure a gas leakage test, the recording of the gas quantity change inside the unit and the communication to the responsible agency of the state in the European community where the unit is in operation.

If you need any consultancy in terms of a maintenance and leakage check according (EU) No. 517/2014 please contact our Pfannenberg Service Team (see chapter [Contact](#)).



WARNING

Spare parts from third-party manufacturers can damage the unit

Only original parts are subject to the manufacturer's quality control.

Only use specially agreed harmonized manufacturer parts for safe and reliable operation.

- For Pfannenberg spare part numbers, please contact our Pfannenberg Service Team (see chapter [Contact](#)).

2.1 Safety instructions for the operator and personnel

For Health and Safety reasons, please find below a list of potential risks that the operator is exposed to while commissioning and/or operating and/or dismantling the unit:

	 CAUTION Sharp edges Heat exchanger fins and internal metal plates live edges have sharp edges. Avoid contact or wear safety equipment such as gloves and protective clothes.
	 CAUTION Hot surface To avoid possible skin burns, do not touch parts such as electric motor body of pump or compressor and refrigeration copper pipes. Wear safety equipment such as gloves and protective clothes.
	 CAUTION Pressurized device Refrigerant under pressure within refrigeration circuit (PS indicated on chiller data label). Always verify functionality of High Pressure Switch. Release pressure before maintaining or servicing the refrigeration circuit. Due to toxicity of refrigerant and oil still inside circuit, it is recommended to use suitable gloves and mask while servicing refrigerant equipment.
	 CAUTION Pressurized device Cooling water/glycol mixture under pressure within hydraulic circuits (max pressure indicated on chiller data label). Release pressure (use purge system and refill ball valve) before sectioning, maintaining or servicing the hydraulic equipment. Due to toxicity of refrigerant and oil still inside circuit, it is recommended to use suitable gloves and mask while servicing refrigerant equipment.
	 DANGER Electrical shock hazard Always unplug or disconnect power supply before opening the unit. Post a 'MAINTENANCE WORK IN PROGRESS' sign on a visible position next to the main switch during service.
	 WARNING Rotating fan blades Can cause serious injury or cut. Keep hands clear. Always disconnect power supply and make sure all mechanical equipment is stopped before service.

**DANGER****Toxic hazard**

Toxicity of refrigerant and cooling liquid.

Avoid contact, inhalation or swallowing.

It is recommended to use suitable protection equipment (such as gloves, glasses, mask)

**NOTICE**

For environmental reasons never discharge refrigerant into atmosphere (follow local regulations to properly dispose of refrigerant). It is recommended to familiarize with all technical documentation provided with the unit (such as **Controller manual**, **Hydraulic & Electric diagrams**) to avoid improper operation of this unit.

2.2 Safety instructions for auxiliary and operating materials**2.2.1 Glycol**

Get familiar with the MSDS of the glycol in use and follow all relevant safety instruction.

2.3 Residual risk

There are some residual risks after the installation of the unit that must be considered:

Residual risks according to 2006/42/CE Directive:

- The condenser has fins on his external surface, so there is the possibility for the operator to touch sharp edges during service of the unit.
- Although the unit is designed with all the possible safety requirements, in case of external fire there is the possibility that the internal pressure and temperature of the unit will increase in a dangerous and uncontrollable way; in that case use the extinguishing tools suitable for that conditions.
- For units without emergency switch-disconnector: chiller user must install the emergency switch-disconnector installation close to the chiller, in an accessible and clearly visible place, to allow emergency stop of the unit and safety for the operator.
- Even if the instructions contained in this manual are enough explanatory for safety, high pressure switches are mounted, to guarantee intervention in case of wrong filing, or in case of malfunction due to not controlled increase of pressure and temperature.
- Even if in this manual is clearly indicated to switch off the unit before doing any maintenance or control operation, protection elements of the unit, as fixed panels, are not provided with safety devices that block the operation of the unit if they are not mounted, in that case the operator could be exposed to contact with internal rotating parts.
- In case of damage of fans protection grids, possible risk for the rotating part should be considered by the utilizer; in this situation the unit should be immediately switched off and repaired.

Residual risks according to 2014/68/UE Directive:

- Although the unit is designed with all the possible safety requirements, in case of external fire there is the possibility that the internal pressure and temperature of the unit will increase in a dangerous and uncontrollable way; in that case use the extinguishing tools suitable for that conditions.
- For the series production of the standard units of category I, the pressure resistance test (typically the hydrostatic pressure test) is made on a statistic base, not on all units.
- This can be accepted, also considering all the safety devices mounted on the units.
- For units without emergency switch-disconnector: chiller user must install the emergency switch-disconnector installation close to the chiller, in an accessible and clearly visible place, to allow emergency stop of the unit and safety for the operator.

3. Description of the chiller

Pfannenberg chillers are intended to cool down liquid for industrial applications. The frigorific circuit removes the heat from the water and rejects the condensing power to the ambient through the air ventilation circuit. The unit is complete of a hydraulic circuit with pump and atmospheric tank to pump the cold water to the user's device and back to the cooling circuit.

Refrigerant circuit

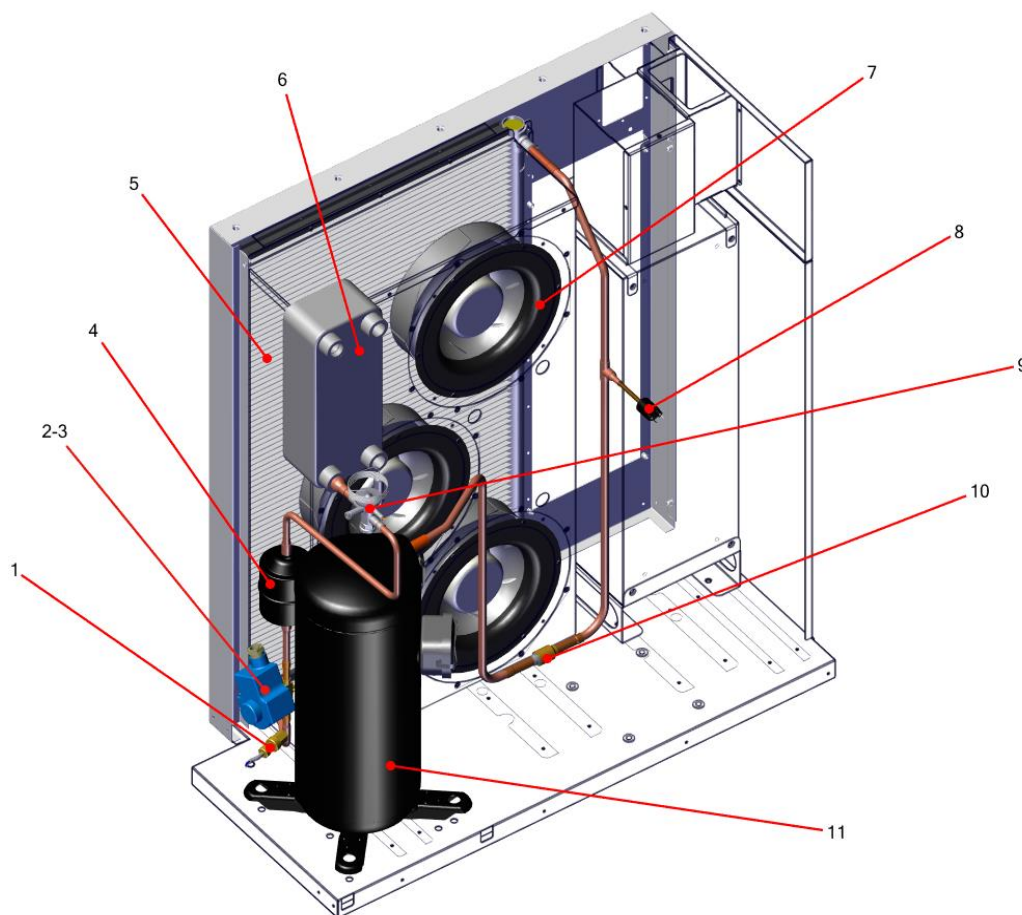
The compressor compresses the refrigerant under high pressure. The temperature increases.

This heat is released to the ambient air in the condenser. The refrigerant liquefies.

The condenser fan draws ambient air through the condenser and releases it to the environment.

A pressure drop occurs when the refrigerant passes through the expansion valve.

Inside the evaporator, the refrigerant absorbs heat from the coolant and evaporates.



NUMBERS	DESCRIPTIONS
1	Pressure Transducer
2-3	Valve body / Solenoid
4	Filter drier
5	Condenser
6	Evaporator
7	Fans
8	High pressure switch
9	Thermostatic Valve
10	One-way valve
11	Compressor

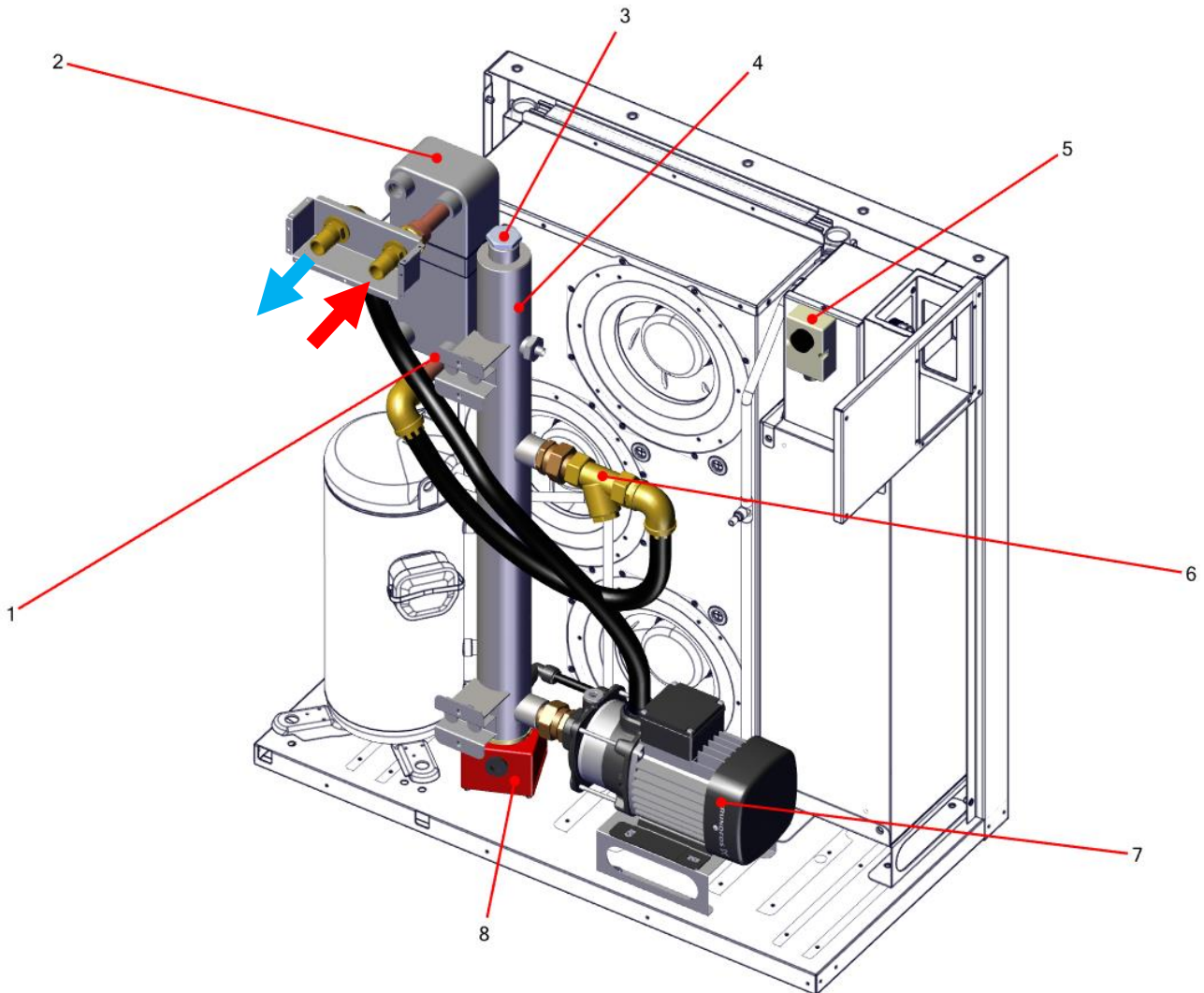
Hydraulic circuit

The pump supplies chilled coolant to liquid cooled components on the customer application.

The coolant absorbs heat and runs back into the chiller.

While passing the evaporator, the coolant dissipates heat to the refrigerant.

The chilled coolant runs back into the tank where the hydraulic circulation starts again.



NUMBERS	DESCRIPTIONS
1	Outlet pipe (heat-exchanger)
2	Evaporator
3	Cap
4	Stainless steel tank
5	Safety Thermostat [for heater]
6	Y-strainer filter
7	Pump
8	Heater

3.1 The Chiller: Overview

3.1.1 Refrigeration circuit – main components

Compressor [10]

The choice of the compressor used depends on the cooling capacity of the chiller. Depending on the capacity, reciprocating, rotary or scroll compressors are used. Each compressor is equipped with a thermal overload protection.

Condenser [4]

As a heat exchanger so-called Microchannel condenser are used, which consist of aluminum tubes and aluminum fins.



NOTICE

The chiller is not intended to be installed or operated in an aggressive atmosphere, as this may damage the condenser.

Fan [6]

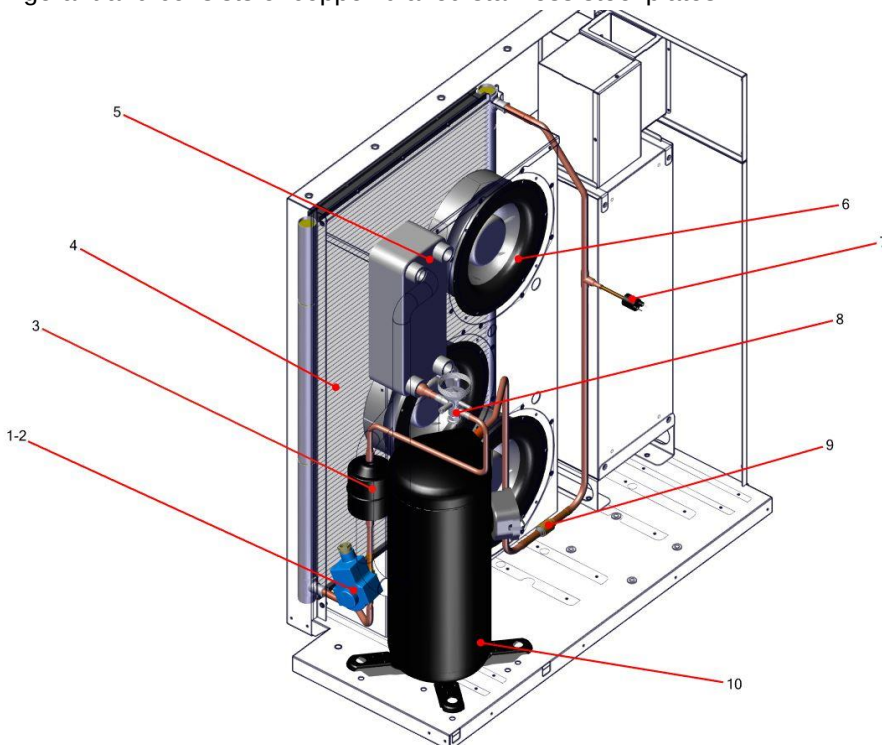
The fan is mounted on the top of the chiller and blows warm air upwards into the environment. A protective grid prevents direct contact with any rotating parts.

Expansion valve [8]

The valve is responsible for the optimum refrigerant charge of the evaporator and is factory set for each unit. A change in the setting is only to be carried out by appropriate specialist personnel.

Evaporator [5]

The evaporator used is a plate heat exchanger. This ensures the heat exchange between the coolant and the refrigerant and consists of copper-brazed stainless steel plates.



3.1.2 Hydraulic circuit – main components

Pump [9]

As standard, peripheral pumps are used which have different delivery rates depending on the device performance. The flow rate is always assigned to a specific pressure which is directly dependent on the design of the pump used and thus on the characteristic curve.

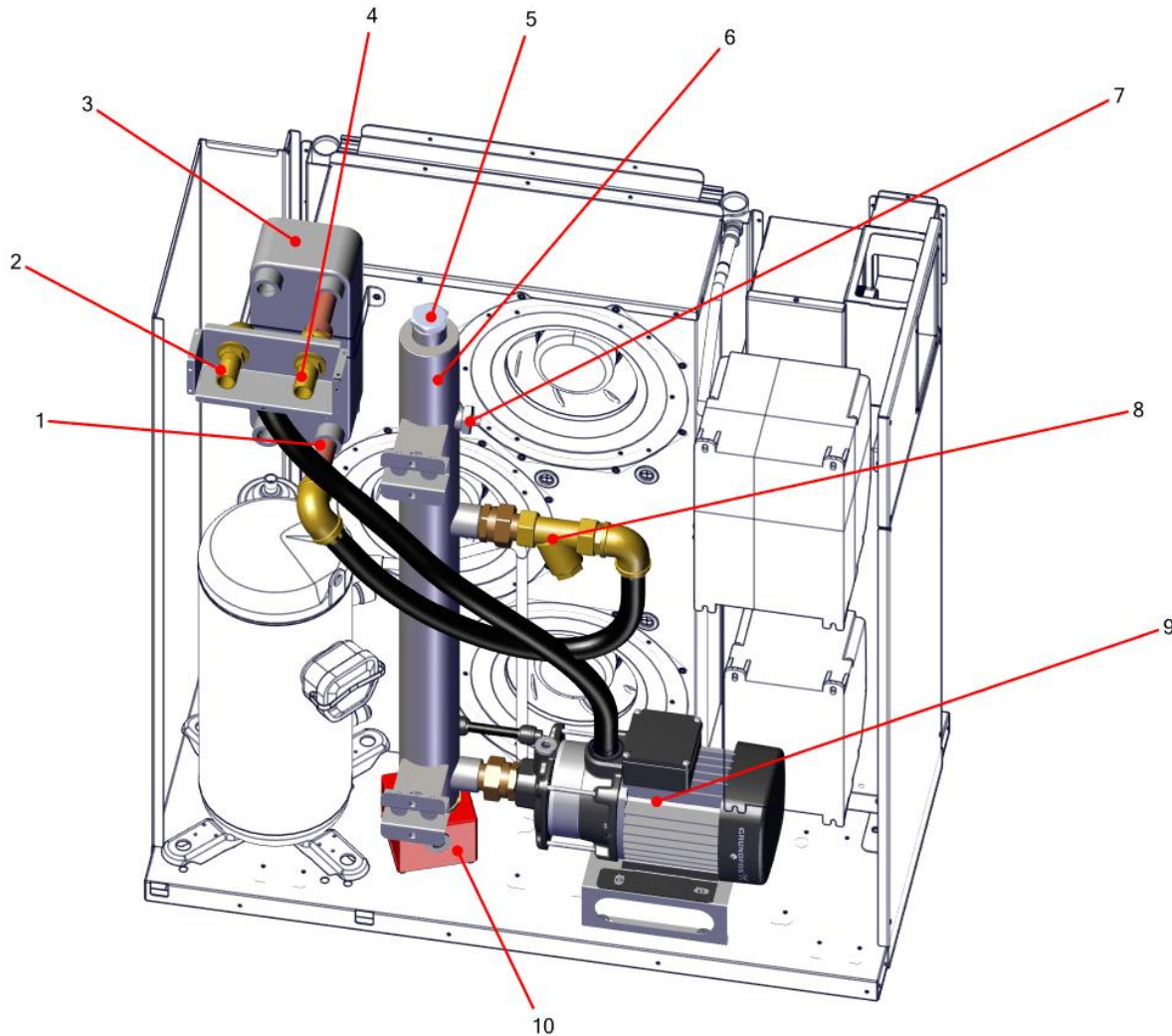
The information on the pump output always considers the internal pressure losses of the chiller.

In addition to the standard pump, more powerful pumps are available for higher pressure losses.

Stainless Steel Tank [6]

The Stainless Steel Tank serves as a buffer for the cool brine to always provide enough liquid ready and reduces the number of ON-OFF cycles of the compressor.

The tank size is matched to the device performance.



3.1.3 Safety and protection devices

Refrigerant circuit

High pressure switch

To avoid excessive pressure of the refrigeration system, the high-pressure switch switches off the compressor and the condenser fan and triggers a common alarm message.

After checking the cooling circuit, it must be reset manually by pressing the appropriate button on the machine display.

Antifreeze protection

The antifreeze protection device prevents the evaporator from freezing.

It verifies that the temperature of the coolant in the evaporator does not reach critical values and switches off the refrigerant circuit when a preset minimum temperature value is reached. At the same time, a common alarm message is triggered.

Refrigerant filter/dryer

To prevent a malfunction of the refrigerant circuit, a filter dryer is installed which binds dirt particles and moisture.

3.1.4 Control unit / Display

The built-in controller takes over all relevant functions to ensure the operation of the chiller.

These include the function of the cooling circuit, the function of the hydraulic circuit and the transmission of error messages.

Depending on the device configuration, the controller may differ in design and functionality.

A detailed description of the function and parameterization can be found in a separate document available online using the machine's serial number or model.

3.1.5 Connections

Electric connection

The electrical panel is equipped with a cable gland for the input of the power cables and a multiple cable gland for any other wiring, such as signals and alarms. Cable entry is provided on the side of the machine, in correspondence with the front area where the electrical panel is located. Removing the side panel makes it easy to route the cables inside the unit and then enter the electrical panel.

(see picture p.)

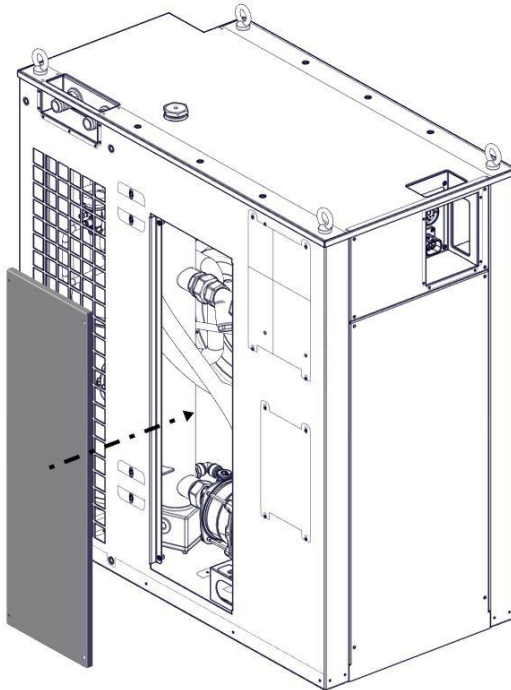
Hydraulic connection

The hydraulic connections are located on the back of the unit. These are not flat sealing and must therefore be sealed during commissioning. The size depends on the chiller type.

(see picture p.)

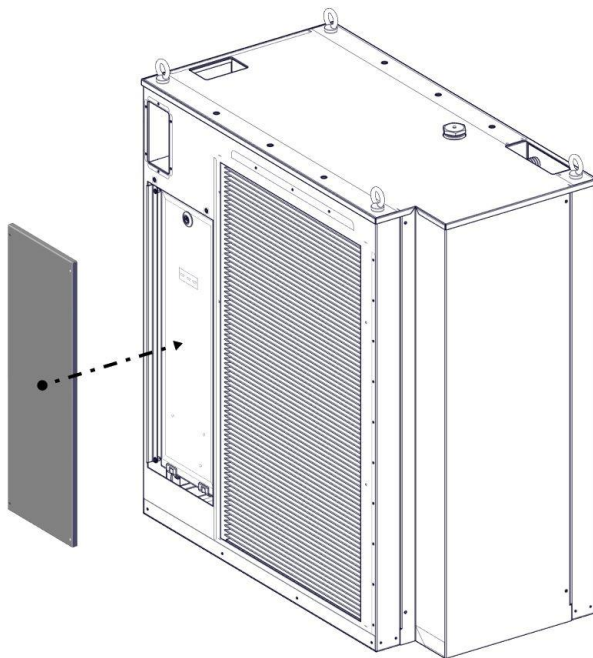
3.2 Electrical and mechanical components

Refrigeration and hydraulic circuits are accessible by removing the follow service panels.



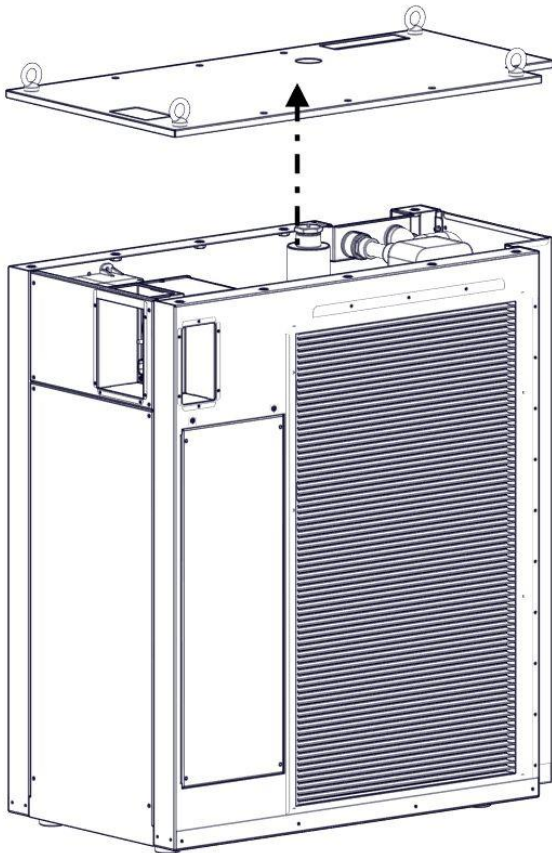
Removing this service panel you have access to:

- Pump
- Y-strainer filter



Removing this service panel you have access to:

- Electrical Box



Removing this service panel you have access to:

- Thermostatic valve
- High temperature thermostat for heater protection
- Fuse
- Contactor (Compressor/Heater)
- DC/DC conv. For fans.
- Fans fuse

4. Technical data

4.1 Application limits

4.1.1 Ambient temperature limitation

Chiller is designed to operate in the ambient temperature range of -25 + 45. When ambient temperatures are out of that range, manufacturer must be consulted.

4.1.2 Voltage limitations

According to CEI EN 60204-1.

Please refer to the type label to see the nominal operating conditions of the unit.

Nominal conditions	V min [VDC]	V max [VDC]
570 – 800 VDC	570	800

4.2 Type label

This is an example of a type label.

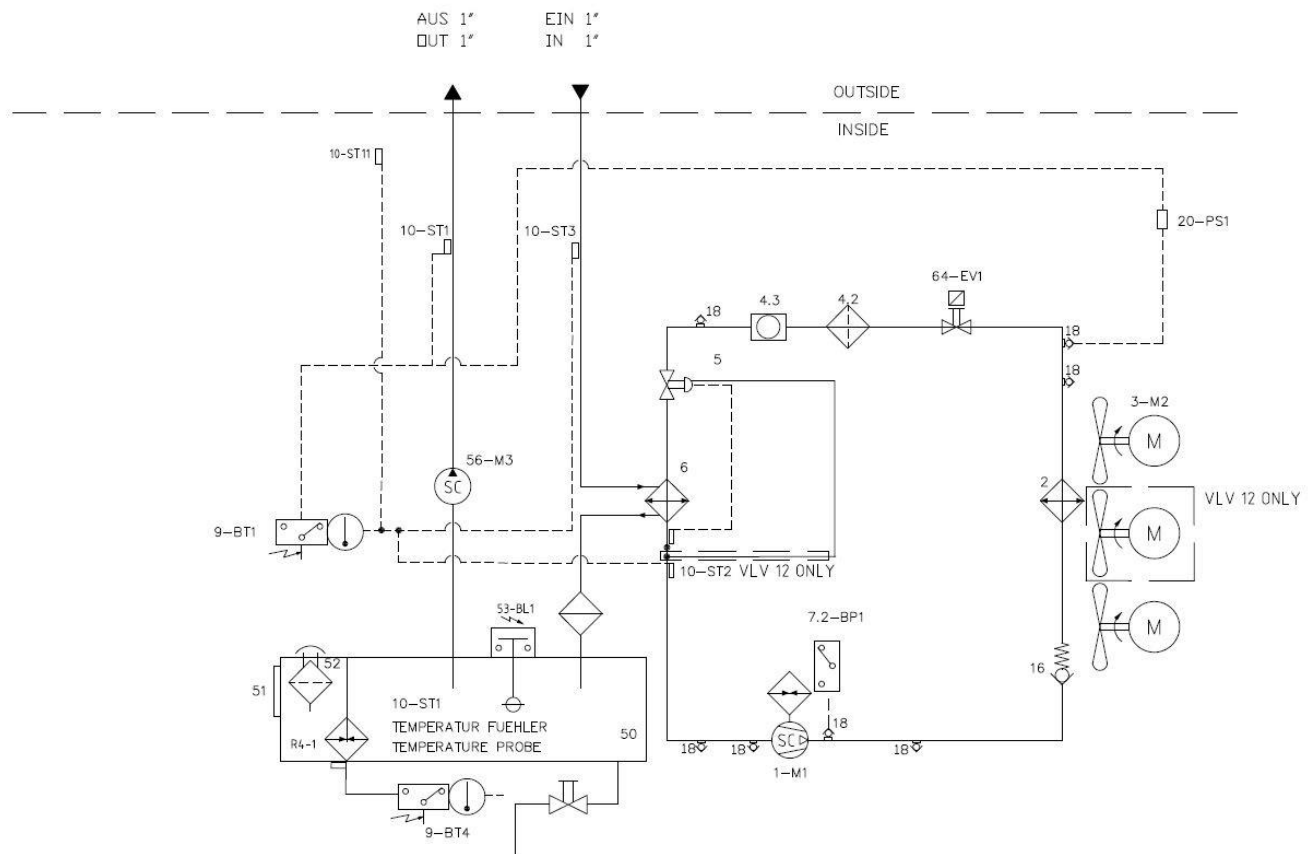
Important is the information of the chiller serial number, which is needed for all technical questions.

Pfannenberg		ELECTRO-TECHNOLOGY FOR INDUSTRY		CE		EAC	
INDUSTRIAL CHILLER		REFRIGERATORE INDUSTRIALE					
SERIAL NUMBER	MATRICOLA	Sxxxxxxx	xxxxxxx	SERIAL NUMBER MATRICOLA Sxxxxxxx			
ARTICLE NUMBER	CODICE MACCH.	42xxxxxxx	xxxxxxx				
YEAR	ANNO	2018					
CAPACITY	POTENZA FRIGORIFERA	xxx kW					
COOLING GAS	TIPO GAS	R4xxx					
FLUID GROUP	GRUPPO FLUIDO	x					
GAS FILLING	CARICA GAS	x kg	/ xxx t CO2-eq				
MAX PRESSURE PS	MAX PRESSIONE PS						
MIN PRESSURE TS	MIN PRESSIONE TS						
ROOM TEMPERAT.	TEMPERATURA AMBIENTE						
HUMIDITY MAX	UMIDITA' MAX						
RATED VOLTAGE	ALIMENTAZIONE	4xx / x / xxx	xxx / x / xxx				
TOT. ASS. CURREN	CORRENTE ASSORBITA	xxx A	xxx A				
TOT. ASS. POWER	POTENZA ASSORBITA	xxx kW	xxx kW				
SCOR	FLUIDO RAFFREDDAM.						
COOLING FLUID	TEMPERATURA FLUIDO						
FLUID TEMPER.	PORTATA						
FLOW RATE	PRESSIONE NOMINALE						
NOM PRESSURE	MASSA	xxx kg					
WEIGHT	PRESSIONE SONORA	xxx (1M-80Hz) dB(A)					
SOUND PRESSURE	SCHEMA ELETTRICO	xxx					
ELECTRIC WIRING	COLORE	xxx					
COLOR							
Contains fluorinated greenhouse gases covered by the Kyoto Protocol / Contiene gas fluorurati ad effetto serra disciplinati dal protocollo di Kyoto							
MANUFACTURED BY DAGSI SRL Via La Bionda Nr.13 - 43036 FIDENZA (PR) ITALY Tel. +39 0524 516711 Fax. +39 0524 516790 info@pfannenberg.it							

4.3 Technical data sheet (example)

 PRODUCT TECHNICAL DATASHEET (SCHEDA TECNICA PRODOTTO)		rev. 1.0	
		15/09/2020	
		DATASHEET CODE (CODICE SCHEDA)	
		44071205001	
TYPE OF UNIT		UNIT PART NR (CODICE MACCHINA)	
VLV12 WT CE CUS		44071205001	
WEIGHT WITHOUT FLUID (MASSA SENZA FLUIDO) [Kg]	NOISE LEVEL (RUMORE) [Db]	COLOUR (COLORE)	PED CATEGORY (CATEGORIA PED)
150	66,2	RAL 7035	I
AMBIENT CONDITIONS (CONDIZIONI AMBIENTE)			
MIN AMBIENT TEMPERATURE (MIN TEMPERATURA AMBIENTE) [°C]	MAX AMBIENT TEMPERATURE (MAX TEMPERATURA AMBIENTE) [°C]	MAX RELATIVE HUMIDITY (MAX UMITA' RELATIVA) [%]	
-25	+45	0...100 %	
REFRIGERATION CIRCUIT (CIRCUITO FRIGORIFERO)			
COOLING CAPACITY (POTENZA DISSIPATA) [Kw]	REFRIGERANT GROUP (GRUPPO REFRIGERANTE)	REFRIGERANT TYPE (TIPO GAS)	REFRIGERANT CHARGE (CARICA GAS) [Kg]
12	2	R134A	1,650
MIN PRESSURE P8 (MIN PRESSIONE P8) [bar]	MAX PRESSURE P8 (MAX PRESSIONE P8) [bar]	MIN TEMPERATURE T8 (MIN TEMPERATURA T8) [°C]	MAX TEMPERATURE T8 (MAX TEMPERATURA T8) [°C]
1,7	29	-14	68
HYDRAULIC CIRCUIT (CIRCUITO IDRAULICO)			
COOLING FLUID TYPE (TIPO FLUIDO USATO)	COOLING FLUID SET POINT RANGE RANGE DEL SET POINT IMPOSTABILE [°C]	TANK VOLUME CAPACITA' SERBATOIO [Lt]	STD FACTORY SET POINT STD SET POINT DI FABBRICA [°C]
WATER + DOWCAL 100 50%	20 ... 40	5	37
TYPE OF PUMP (TIPO DI POMPA)	NOMINAL FLOW RATE (PORTATA NOMINALE) [L/min]	NOMINAL PRESSURE (PRESSIONE NOMINALE) [bar]	
CENTRIFUGAL/CENTRIFUGA	60	2	
ELECTRICAL CIRCUIT (IMPIANTO ELETTRICO)			
POWER SUPPLY (ALIMENTAZIONE) [V]	CONTROL CIRCUIT (CIRCUITO DI COMANDO)	ELECTRIC HEATER (RESISTENZA) [W]	SCCR [kA]
570 - 800 V//DC	24V DC	3000	5
MAX POWER INPUT [kW] - CURRENT INPUT [A] (ASSORBIMENTI MASSIMI)			
5,60 [kW] (DC)			
11,50 [A] (DC)			
SCHEMES (SCHEMI)		HYDRAULIC DIAGRAM	ELECTRICAL DIAGRAM
		70006-312	70010-626
INSTALLED FEATURES (OPZIONI INSTALLATE)			
-			
ACCESSORIES (EXTERNAL TO THE CHILLER, INSTALLATION BY CUSTOMER) ACCESSORI (INSTALLAZIONE ESTERNAMENTE AL CHILLER A CURA DEL CLIENTE)		INSTALLED FEATURES (OPZIONI INSTALLATE)	
ACRONYM (ACRONIMO)	DESCRIPTION (DESCRIZIONE)	ELECTRICAL DIAGRAM	DESCRIPTION (DESCRIZIONE)
		CP	1 connector power+alarm
		FC	Fan control ON-OFF
		LTA-D	antivibration damper
		LTA-E	lifting eyebolt
		OD	Outdoor installation
		R	hydraulic circuit pre-heater
		SST	Stainless Steel Tank

4.3.1 Diagram

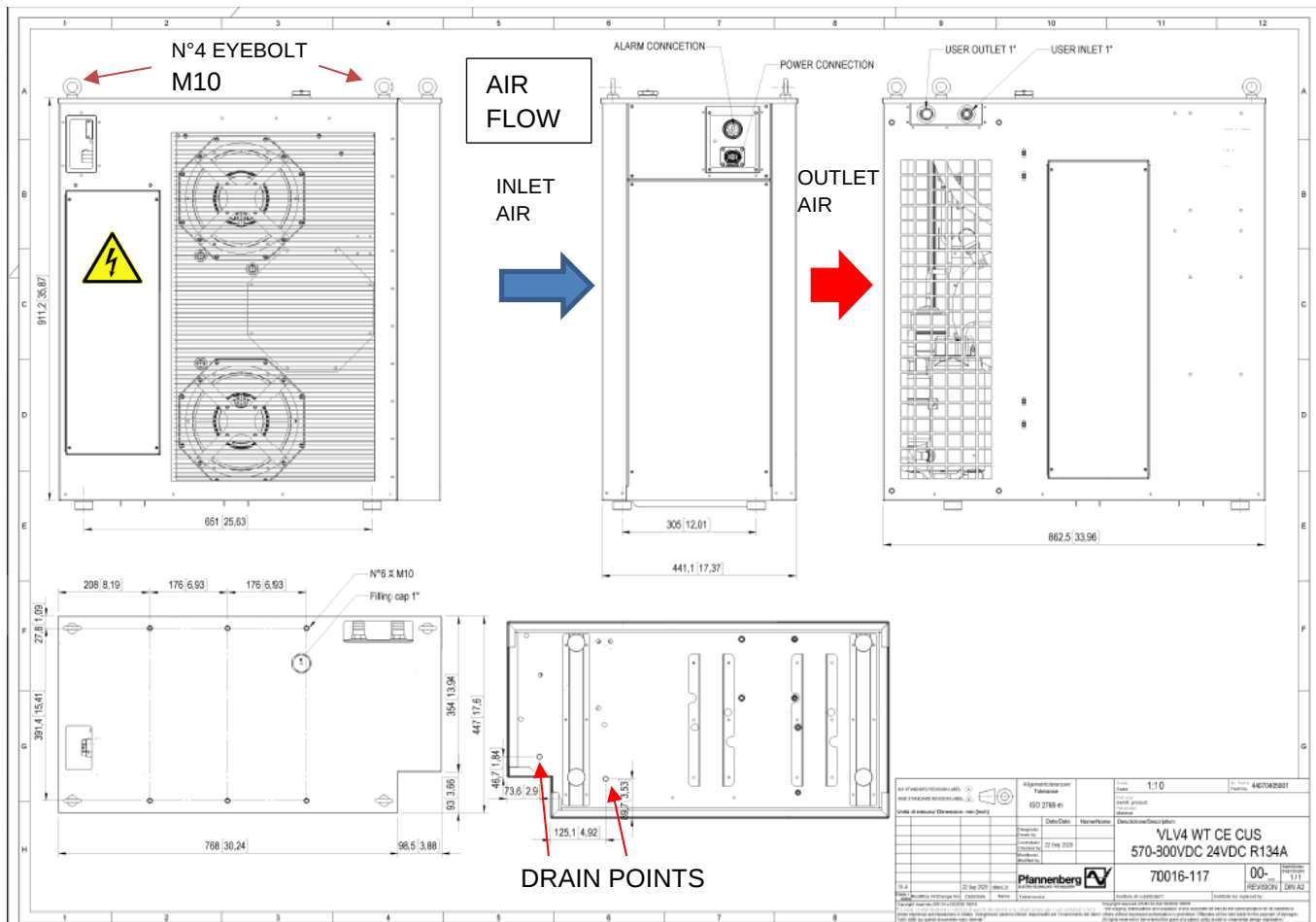


4.3.2 Key

	Pos	Description	VLV 4 – VLV 12
components / devices	1 – M1	Compressor	X
	2	Condenser (pipes/fins)	X
	3 – M2	Fan	X
	4.2	Filter/Dryer	X
	4.3	Sight glass	X
	64 – EV1	Expansion valve (thermostatic)	X
	6	Evaporator (plate hx)	X
	9 – BT4	Anti-freeze thermostat	X
	56 – M3	Pump	X
	10	Manometer	X
	52	Tank cap (vented)	X
	51	Level indicator	X
	50	Tank	X
	10 – ST1	Temperature probe (coolant supply temperature)	X
	Controller	Digital controller	X
	7.2 – BP1	High pressure switch	X
	20 – PS1	Pressure sensor	X
	53 – BL1	Electric level	X
	R4 - 1	Tank heater	X

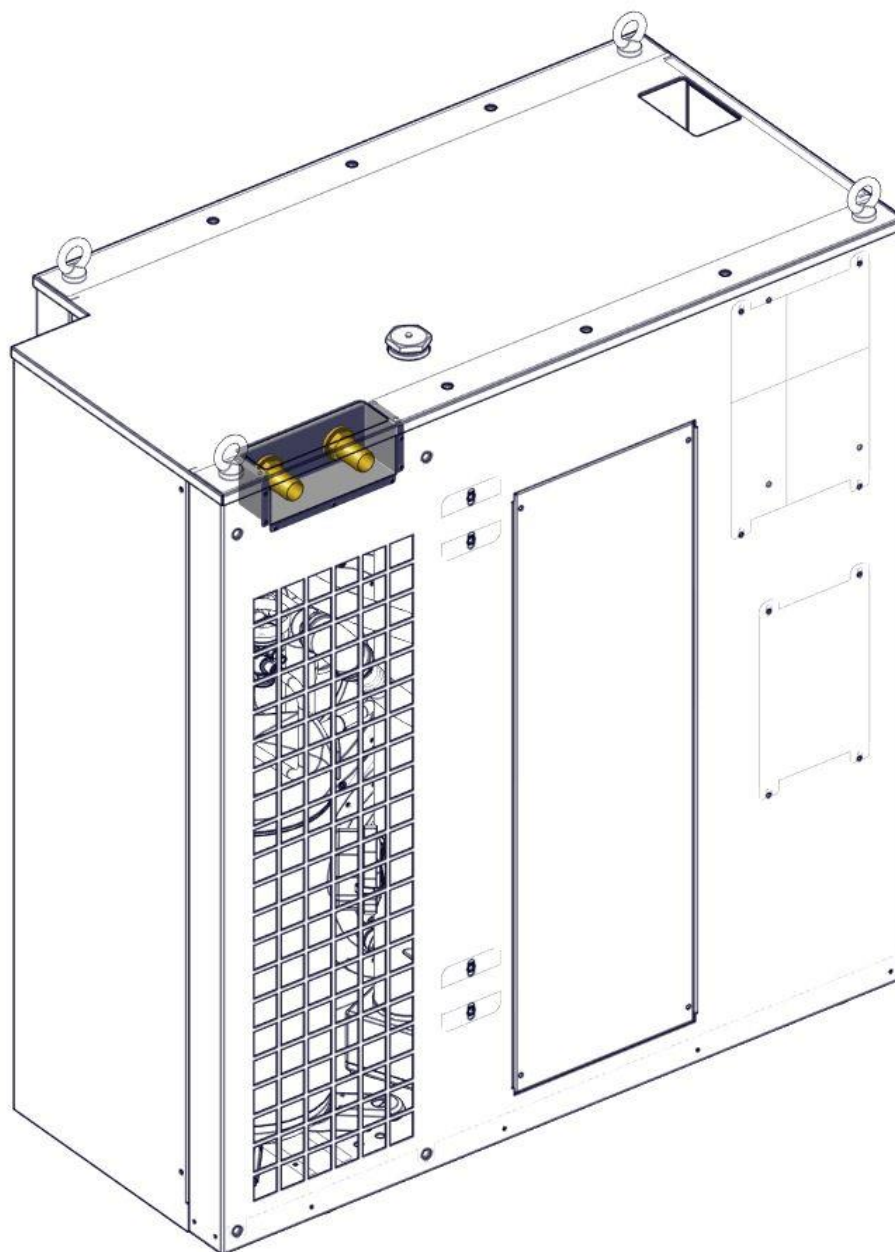
4.4 Dimensional drawing

4.4.1 VLV 4 VLV 12



4.4.2 VLV 4 VLV 12 – Hydraulic connections

Chiller Model	Hydraulic connection
VLV 4 VLV 12	No.2 1"x 25 mm



5. Installation

5.1 Transport



WARNING

Danger due to uncontrolled movements

Improper securing of the unit can result in severe accidents.
Loading must only be carried out by trained, qualified personnel.
Maintain the packaged unit in vertical position.
Lash the unit correctly for transport on a truck or trailer.
Only use lashing straps with an adequate rated strength.
Use slip-resistant materials for securing, e.g. anti-slip mats.
When loading by crane, do not walk or stand under the raised units.



CAUTION

Danger of component damage during transport

The chiller must be transported and moved without liquid in the tank.



NOTICE

Danger of material damage during transport and setting down of the unit

Improper device-securing or uncontrolled movements can cause damage.
Exercise maximum caution during movement and transport of the unit.
Always transport the unit in the position of use.
Always transport the unit using the packaging provided by the factory.
The packaged chillers are not suitable for piling up on top of each other.

5.2 Unpack the chiller



WARNING

Danger of accidents due to the heavy weight of the units

Uncontrolled movements of the unit during assembly can cause accidents.
Use suitable lifting equipment and secure unit to prevent accidents.
Also, secure assembled components.



CAUTION

Danger of injury due to sharp edges

For manufacturing reasons, the metal edges of the unit may have burrs.
Wear gloves during service and assembly work.

- Perform a visual inspection for transport damage when unpacking the chiller. Take note of any loose parts, dents, scratches, visible loss of liquid etc.
- Inspect and secure the packaging material for any loose functional parts before disposal.

External visual damages:

- Report any damages to the freight carrier immediately and accept the material with reserve. Observe the "Terms for Cases of Damage".
- Precise information about defects, including possible photos must be provided for the handling of warranty claims. Always specify the type designation and serial number.

Internal not visible damages:

- If the package is damaged report any damages to the freight carrier immediately and accept the material with reserve. Observe the "Terms for Cases of Damage".
- Internal damages should be notified within 8 days from the incoming date.
- The "General Terms for Deliveries and Services" of ZVEI (Zentralverband der Elektrotechnischen Industrie; Central Association of the Electrical Engineering and Electronics Industry in Germany) according to the latest revision apply.

Each chiller is supplied on a wooden pallet, wrapped with protective film, strapped, and protected on lateral sides, rain film protection.

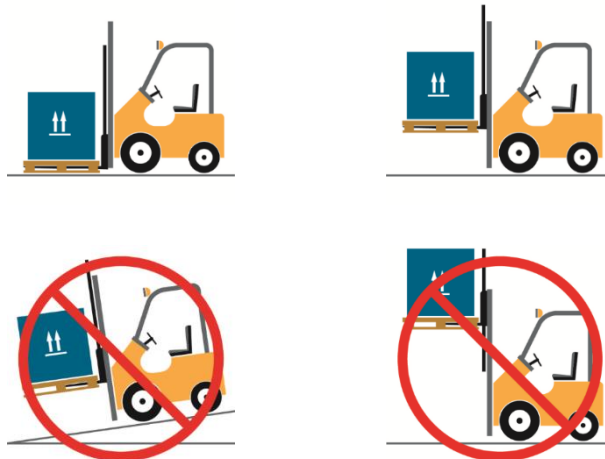
Store the chiller in a dry place, away from heat sources. All waste materials should be recycled in the appropriate manner.


DANGER

For the operation of movement and lifting the ambient temperature must be higher than -20°C!
 Don't stay under the chiller during the operation on movement and lifting!

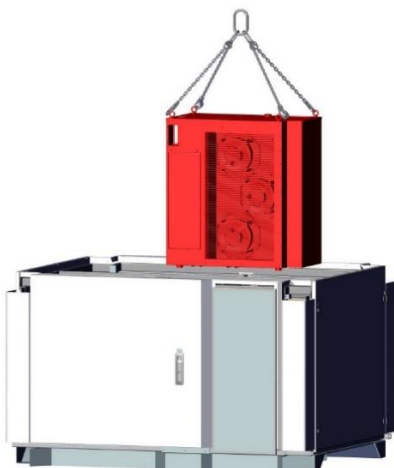
For the operations of lifting and movement it is necessary to use

- a) a fork lift truck with proper load capacity and with forks longer than the base of the chiller. Avoid sudden movements which can damage the framework and the internal components.


DANGER

Do not stand under the unit while the unit is lifted.

- b) For the operations of lifting is necessary a 4 leg chain lifting sling (provided by the customer). The 4 leg chain lifting sling must have the right size in order to lift the chiller's weight (the weight is indicated on the type label).




NOTICE
Leakage or improper function due to loosen parts/junctions

Check after the final positioning of the chiller the internal connections to avoid damage during operation.

5.3 Set up the chiller

Chillers are designed for outdoor installation.

For proper operation of the unit the following points must be observed:

- Place the chiller in an area shielded from any possible manufacturing residuals (shavings, dust, etc.) and well-ventilated, away from heat sources and direct influence of sun light.
- Chillers should be placed in an area without chemical and corrosive substances, flammable gas, hot air and liquid coming from nearby processes.
- Use the adjustable feet to level off the unit.
- Provide enough space for access and air circulation.

5.4 Connect the chiller to the hydraulic pipes

For proper operation of the unit the following minimum requirements for the hydraulic circuit must be observed.

The chiller has been cleaned by means of specific cleaning products. Make sure that the pipes used do not contain dirt or processing residues; if in doubt, perform one or more cleaning cycles.

- Install a filter on the chiller inlet return pipe, with metal mesh of 100 µm.
- Flush the system with FUCHS "Maintain professional washer LI" (Pfannenberg part number: 46783000135 – 25 kg Tank) at least for 10 minutes.
 Dilution percentage:
 2 % Professional Washer
 98 % Water (it is recommended to use demineralized water)
- Clean the filter if necessary and remove it after finishing the cleaning procedure.

Use pipes with same diameter of the circuit connections (connection size see chapter **Technical data**).


NOTICE
Malfunction due to incorrect hydraulic connection

For the hydraulic connection please refer to the chapter **Technical data** or the enclosed **hydraulic diagram**.

The flow rate and the fluid circulation direction must be respected during connection in accordance with INLET-OUTLET identification plates.

5.5 Fill the tank and the hydraulic circuit

- 1-Turn off the main switch of the user (the chiller has not the main switch), then wait at least 3 minutes.
- 2-Disconnect the control supply and the power supply
- 3-Unscrew the cap
- 4-Fill the tank till the cap with Dowcal 100 [50 % Vol.].
- 5-Close the cap
- 6-Reconnect the control supply and the power supply
- 7-Turn on the main switch
- 8-If the electrical level switch-off the unit repeat this procedure from point 1.

5.5.1 Process Water / Fluids

PFANNENBERG chillers should be filled to the proper level with an **inhibited glycol** designed for Industrial chiller systems. **Do not use automotive antifreeze!** The inhibitors used in automotive antifreeze can break down quickly and accelerate the degradation of the coolant base (glycol); as well as promote corrosion in a system. Silicates used in automotive antifreeze coat heat exchangers, resulting in reduced heat transfer. Also, silicates can gel causing fouling and plugging of a system.

The ratio of inhibited glycol to water should be adequate to prevent freezing at the lowest ambient temperature.

Check the level with all lines filled. **The glycol mixture should be checked periodically (3 to 6 months) for proper concentration.** When filling the system, always use a pre-mixed solution in the proper ratio to maintain freeze and corrosion protection. Demineralized/deionized water is **recommended** because many municipal water supplies contain large amounts of chlorine, which can react unfavorably with glycol.

When using water to create or dilute the mixture, please consider the following:

It's recommended to use demineralized/deionized water (DM/DI) but not distilled water.

If pure water is used, do not exceed these properties:

Fresh water free of contamination

pH-level: 7-9

Hardness: <8 °dH

Conductivity: <300 µS/cm

Chloride: <50 mg/l

Do not allow mechanical contamination to get in the water. Use water filters if this could be an issue.

Watch for chemical contamination. If this is to become an issue, treat the water with passivators and/or inhibitors.

Do not allow biological, slime bacteria and algae contamination. If this does happen, treat the water with biocides.

5.6 Connecting the chiller to the power supply



DANGER

Life-threatening danger due to electric shock

Live units and exposed connection cables can generate an electric shock and cause severe accidents.

Work on electrical connections must be carried out exclusively by trained, qualified electricians.

Before assembly, de-energize all supply lines to the separate fuse or a main switch, disconnect the system and secure to prevent re-connection.

Test to ensure the absence of voltage on the unit and on all power supply cables.

Lightning protection of the unit (outdoor installation) must be carried out by qualified engineers.



NOTICE

Additional information

Electrical installation must respect all valid safety standards.

Make sure the system is adequately earthed.

In case of outdoor installation it is strictly recommended to follow the local regulation for the proper protection of the system (unit + piping) against lightnings.

6. Commissioning



CAUTION

Additional protection against earth-fault (differential) current

Install a (customer-side) earth-fault (differential) current protection (description on the circuit diagram enclosed with the unit) to reduce damage to the equipment caused by earth-fault currents below the detection level of the overcurrent protection device



DANGER

Life-threatening danger due to electric shock

Live units and exposed connection cables can generate an electric shock and cause severe accidents.

Work on electrical connections must be carried out exclusively by trained, qualified electricians.

Before assembly, de-energize all supply lines to the separate fuse or a main switch, disconnect the system and secure to prevent re-connection.

Test to ensure the absence of voltage on the unit.



DANGER

Life-threatening danger due to refrigerant under pressure or high/low refrigerant temperature

Work on refrigerant circuits must be carried out exclusively by trained, qualified personnel.

The unit should be close before switching on the chiller



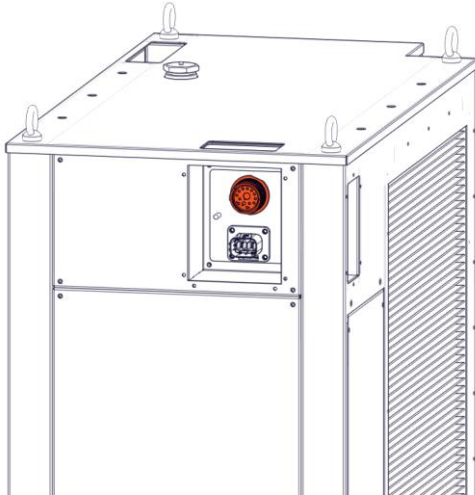
CAUTION

Coolant under pressure

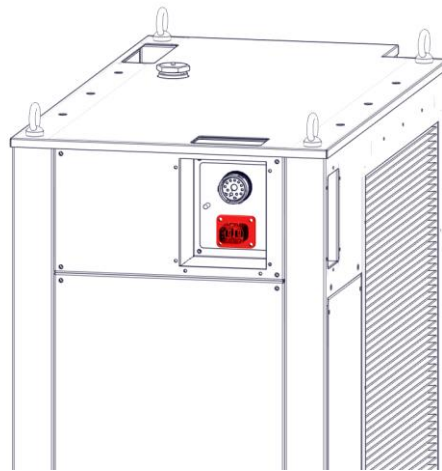
Work on hydraulic circuits must be carried out exclusively by trained, qualified personnel.

The following instruction will guide you through the start-up procedure in detailed steps.

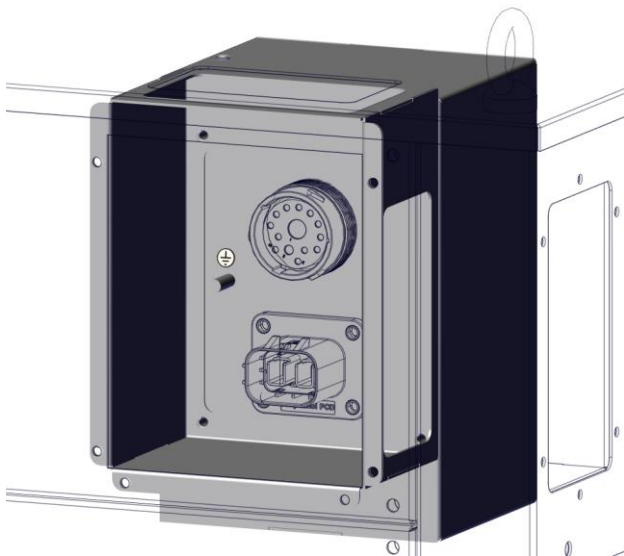
ALARM CONNECTION



POWER CONNECTION



EARTH CONNECTION (M6 x 16)



Alarm connection, Power connection, earth connection

- Turn main switch of the user (the chiller has not the main switch) to the - 0 - (OFF) position.



DANGER

Electrical shock hazard due to incorrect connector handling

Always turn the main switch (user the chiller has not the main switch) to the - 0 - (OFF) position before connecting or disconnecting the alarm connection or power connection+ .

- Connect main power and alarm cable

At this time the chiller is ready to operate automatically according to the controller's "set point values". If necessary, set controller according to customer's temperature requirements. (Please refer to the manual of the thermostat delivered with the unit).


CAUTION
Malfunction due to incorrect parameter settings

Any adjustment on settings of the thermostat(s), pressure switch(es) or other components of the refrigerating circuit, must be performed by qualified personnel of the PFANNENBERG Service only.

For further information on chiller installation, start-up or troubleshooting please contact the PFANNENBERG Sales Support.


NOTICE
Quick commissioning

For a quick commissioning instruction please see appendix [Step by step instruction](#).

6.1 Preparation before switching on the chiller

Yes/No	Start-up Check list
	Chiller is correctly placed and fixed with N°6 M10 Bolts
	Hydraulic circuit has been cleaned up (pipes and final devices to be cooled)
	Pipes cap has been removed before hydraulic connections
	Water filter (if present) is clean and the the package of filter cartridge has been removed
	Tank is filled to max level
	Tank cap is present and tightened
	Hydraulic pipes are installed at the right position in accordance with INLET-OUTLET identification plates and connections are tightened
	Power supply cable, Earth conductors and alarm cable have been connected and tightened
	All the fuse are switched in ON position
	Electrical box is closed
	All panels are assembled

6.2 Switch on chiller

Use the main switch of the user (the chiller has not the main switch) to turn the chiller **ON**. Depending on the chiller configuration, some units do have a functional delay of app. 10 seconds. In this time the controller is running a boot sequence to check all functions. After this the controller will start the chiller operation automatically.



CAUTION

Start-up behavior of common alarm for chillers with Eliwell controller

After the main power supply is turned **ON**, the common alarm contact (dry contact) is open as long as the controller is running the boot sequence.

If after the boot sequence no error occurs, the common alarm contact will switch to close position and the chiller will operate automatically.

6.3 Stop and switch off chiller

Use the main switch of the user (the chiller has not the main switch) to turn the chiller **OFF**.

7. Operating

7.1 Carry out settings

If other settings are needed, e.g. lower or higher supply temperature or different operating mode, this can be done by changing the corresponding parameters.

For detailed description of how to change parameters please check the enclosed [Controller manual](#).

7.2 Starting the chiller after an interruption



CAUTION

Undefined operating status

To avoid an undefined operating status, a functional restriction or a device fault, after switching **OFF** the chiller, wait for about 30 seconds before turning it **ON** again.

7.3 Stop chiller and switch it OFF

Use the main switch of the user (the chiller has not the main switch) to turn the chiller **OFF**.

8. Troubleshooting



DANGER

Life-threatening danger due to electric shock

Live units and exposed connection cables can generate an electric shock and cause severe accidents.

Work on electrical connections must be carried out exclusively by trained, qualified electricians.

Before assembly, de-energize all supply lines to the separate fuse or a main switch, disconnect the system and secure to prevent re-connection.

Test to ensure the absence of voltage on the unit.



DANGER

Life-threatening danger due to refrigerant under pressure or high/low refrigerant temperature

Work on refrigerant circuits must be carried out exclusively by trained, qualified personnel.



DANGER

Life-threatening danger due to toxicity of refrigerant, coolant and oil

Work on refrigerant circuits must be carried out exclusively by trained, qualified personnel.

Work on hydraulic circuits must be carried out exclusively by trained, qualified personnel.



CAUTION

Coolant under pressure

Work on hydraulic circuits must be carried out exclusively by trained, qualified personnel.



CAUTION

Follow all electrical legislation when working on the unit based on valid laws of the countries where the unit is placed.

Troubleshooting tips		
Symtoms	Possible cause	Proposed remedy
The unit does not start	No supply voltage	Check the supply main voltage line
	Broken controller	Inspect the connection, verify the auxiliary circuit fuses (user side) and, if there is no fault, replace the controller
	Fuse FU2	Check fuse FU2
	No auxiliary voltage	Check the supply of auxiliary vltage
Unit works, but does not cool	Lack of refrigerant	Service by a refrigeration engineer
	Faulty thermostatic valve	Service by a refrigeration engineer
	Too much heat load or too high ambient temperature	Possible wrong application, to be checked with our staff
	Controller malfunction	Check and correct the parameter settings
	Inverter doesn't work	Check the inverter
Fluid temperature too low	Broken controller (contact blocked)	Replace the controller
	Wrong set-point	Change cooling setpoint (Controller manual)
Fluid temperature too high	Broken controller	Replace the controller
	Wrong set-point	Change cooling setpoint (Controller manual)
	Lack of refrigerant	Please ask for the service by a refrigeration engineer
	TD function active (set-point temperature follows the external set point)	Deactivate the TD function if not required (Controller manual)
	Too much heat load	Possible wrong application, to be checked with our staff
Compressor does not start	The compressor protection (KLIXON, inverter managed) has switched off: overheating due to an inadequate cooling of the compressor motor. Blocked compressor due to high temperature of the motor or high current Loose connections which may cause high currents	Important: After the shut-down of the compressor, the resetting time will very much depend on the environment of the compressor. In a hot closed environment, it will be 2 hours, in ventilated 1 hour <i>Note: The compressors are protected against high temperatures and currents with an internal or external device (Inverter).</i>
Unit works for short period then stops and starts again after a while	Switching of low pressure switch: Low gas level in the equipment •Outlet line of the compressor is blocked due to saturated filter or blocked thermostatic valve	Service by a refrigeration engineer

Troubleshooting tips		
Symptoms	Possible cause	Proposed remedy
Unit stops and does not start again due to switching of high pressure switch	Dirty condenser	Clean the condenser with a) a soft bristle (not wire!) brush b) compressed air blown from the inside out c) water rinse from inside out and top to bottom Do not use any chemicals or a pressure washer!
	Broken fans	Replace the fans
	Ambient temperature too high	Provide adequate ventilation with air at max or lower temperature as specified Set up the chiller in a colder place
	Water setpoint too high (in combination with high ambient temperature)	Reduce the water temperature set-point
No coolant circulation	Pump is down	Verify the connection on the terminal board of the electrical box
	Reversed pump rotating direction	Check the right rotation of the electrical motor
	Pressure loss of application too high	Verify the regulation of hydraulic bypass where installed Verify circuit pressure drop to reach the nominal flow rate
Low Flow Rate	Y-strainer filter clogged	Replace filter cartridge
Fans does not start	Condenser clogged	Clean the condenser
	Fuse FU1	Check fuse FU1
	Pressure sensor (PS1)	Check pressure sensor (PS1)
The heater does not work	Inverter	Check the inverter
	Set Point	Check the set point
	Safety thermostat BT2	Check the thermostat BT2
	External signal	Check the external signal (RCU)


NOTICE
High pressure switch reset

After the high pressure switch has switched off the refrigerating cycle, it needs a manual reset to start the cooling cycle again by

9. Maintenance

9.1 Maintenance instructions for your safety



WARNING

Danger of accidents due to unlocked main switch

Before carrying out any maintenance work that does not require the unit to be operated, disconnect the power supply and secure the main switch against reconnection (lock). In addition, the sign "**MAINTENANCE IN PROGRESS**" should be affixed next to the main switch.



CAUTION

Legal problems due to improper operation of the unit

It is of utmost importance to comply with Regulation (EU) No 517/2014, regarding mandatory regular leakage-check program, as described in chapter 2 **Safety** of this document.



NOTICE

Early breakdown due to missing maintenance activities

Carrying out the tests and check program listed below will extend the lifespan of the equipment and avoid possible breakdowns.

Check mechanical working of the compressor. Control the absence of metallic vibrations and not too high noises and temperatures on the compressor head during running to verify its regular working.

Check the operation of the fan.

Check the electrical alarm systems and controls.

Check the filling of the tank (visual level). If the system is filled with a glycol-mix, refill only with the same mix. Only water will reduce the concentration of glycol.

Check that pressure, flow rate and temperature values of the hydraulic circuit are in the limits indicated on the type label or in chapter **Technical data**.

If the chiller is equipped with an air filter, the filter has to be changed/cleaned monthly, or, if required in a shorter time interval.

Do a visual inspection of the condenser monthly on the external side, to see whether it is clean or not. The fins of the condenser must not have any dust deposits or residual products or sludges on their surface.

The condenser must be cleaned in monthly intervals, or, if required in shorter time intervals.

If the chiller is equipped with a filter on the hydraulic side, the filter has to be checked/cleaned monthly, or if required, in a shorter time interval.

To allow best operating conditions it's recommended to change the coolant mixture depending on the glycol concentration in the following intervals:

- every year for a glycol concentration of 20 %
- every 2 years for a glycol concentration of 30 % or 50 %

Longer standstill of the unit requires draining of the tank and the entire hydraulic circuit. Open the ball valve (or the plug) at the end of the draining hose to drain the circuit. When the drain operation is finished close again.

For a new installation, it is recommended to empty the hydraulic circuit. Please, refer to chapters **Installation** and **Commissioning** for the lifting of the unit, the connection and the start up.

It is recommended to check safety discharge valve (in the refrigerant circuit, where installed) every 24/36 months. Leakages and/or visible scale may suggest potential malfunction.

Please familiarize with chapter **Electrical and mechanical components** to identify the main components of the unit.

No device with internal volume greater than 25 l is installed on the refrigeration circuit, thus no further inspection from notified bodies is required according to D.M. nr.309 – December the 1st 2004.

The customer is obliged to comply with all additional local requirements.


NOTICE
Safety discharge valve

It is necessary to replace safety discharge valve after it has triggered. The safety discharge valve is no longer covered by the warranty after the first activation.

9.2 Ordinary maintenance and replacement

DANGER

Turn off the main switch of the user (the chiller has not the main switch), wait at least 3 minutes and disconnect the power and control cable before ANY KIND OF MAINTENANCE OR WORK on the chiller!


DANGER

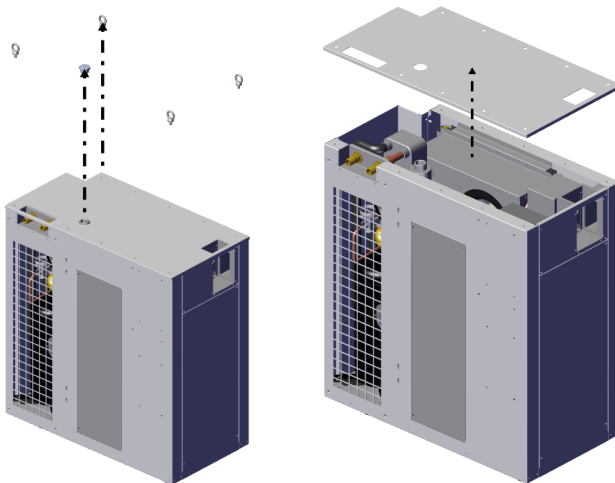
Before work for ANY KIND OF MAINTENANCE OR WORK on the refrigerant circuit empty the circuit from the refrigerant!


WARNING

Wear safety gloves, safety goggles and safety shoes before ANY KIND OF MAINTENANCE OR WORK on the chiller!

9.2.1 Y-Strainer filter cartridge replacement

- 1) Remove the eyebolts (M10) and the tank cap then remove the top panel

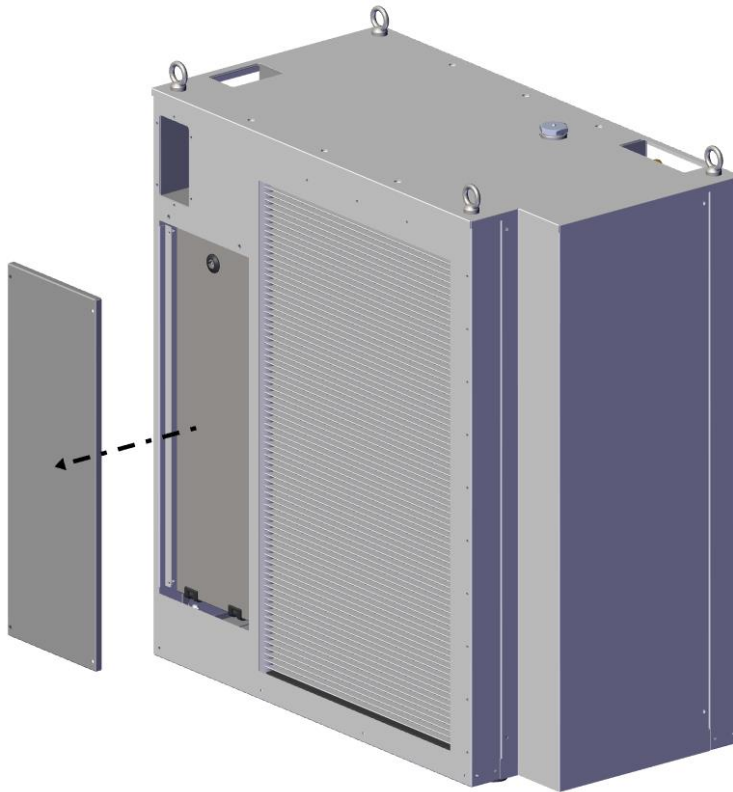


- 2) Unscrew the filter using a wrench then remove the filter and replace it with a new one

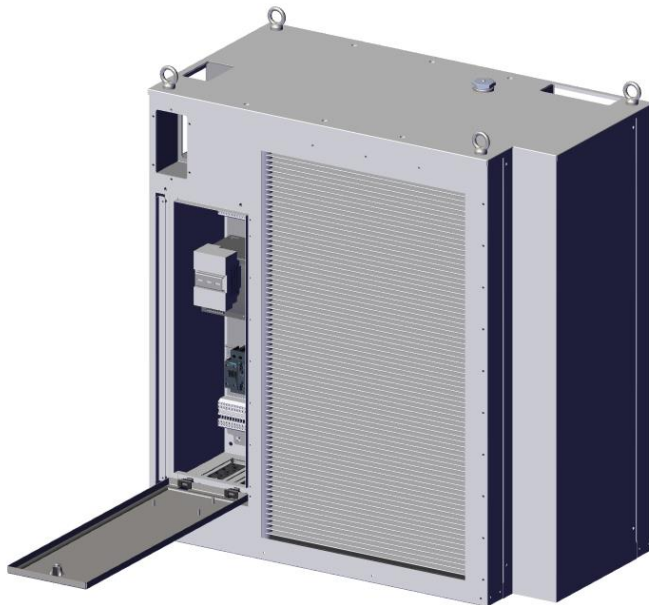


9.2.2 Access to E.Box components

- 1) Remove the front service panel (use a flat screwdriver to remove the 4 poeliers screw M5 X 25)



- 2) Open the E.box with the key and remove the replace the fuse



**DANGER**

Turn off the main switch of the user (the chiller has not the main switch), wait at least 3 minutes and disconnect the power and control cable before ANY KIND OF MAINTENANCE OR WORK on the chiller!

9.3 Extraordinary maintenance**9.3.1 Remove/replace the Inverters**

- 1) Removing back service panel
- 2) Using a flat screwdriver to unscrew the 4 poeliers screw



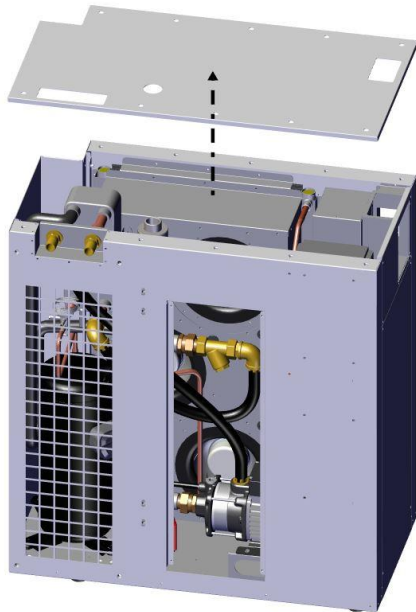
N°4 POELIERS M5 X 25



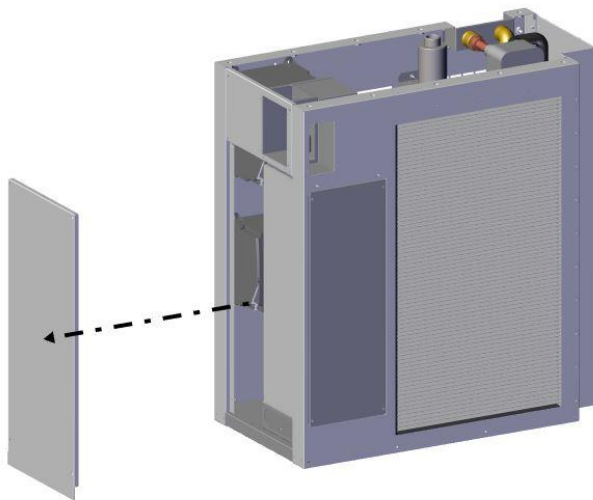
- 3) Remove the filling cap and the 4 eyebolts (M10)



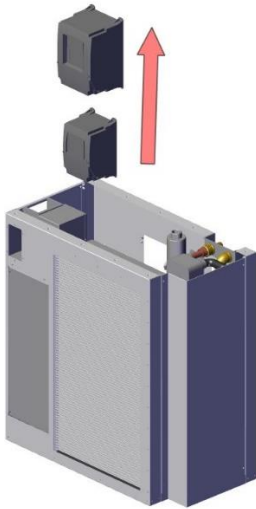
- 4) Remove the top panel



- 5) Remove the rivets (4X12) then remove the side panel



- 6) Disconnect and remove the Inverter (unscrew the inverter bolts M5X25)

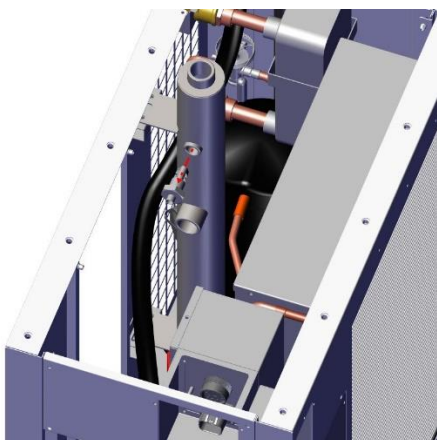


9.3.2 Remove/Replace Tank and heater

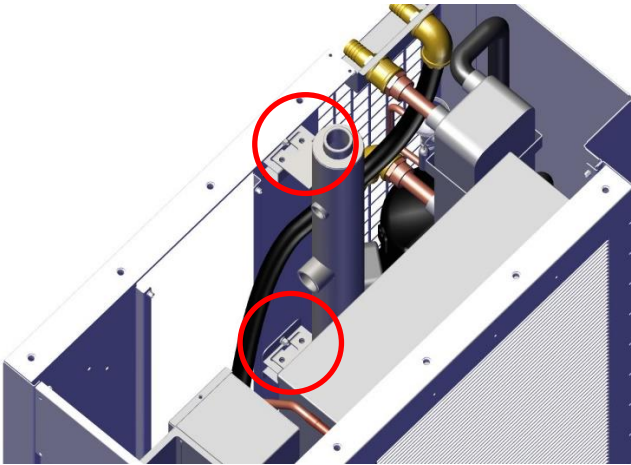
- 1) Remove the inverter, see chapter 3.4.1
- 2) Unscrew the hydraulic strap and remove the pipe which is connect to the tank and the Heat exchanger.
- 3) Unscrew the adjustable fittings



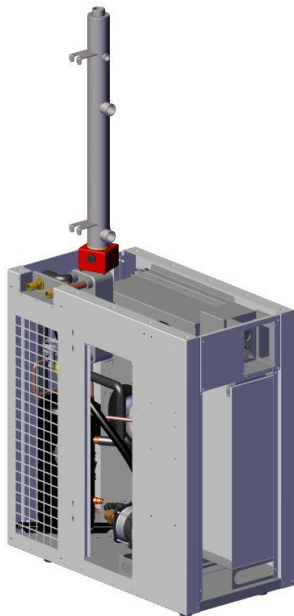
- 4) Disconnect the electrical level



- 5) Unscrew the bolts of the tank (M6x16)



- 6) Disconnect the heater
7) Remove the tank and the heater from the top

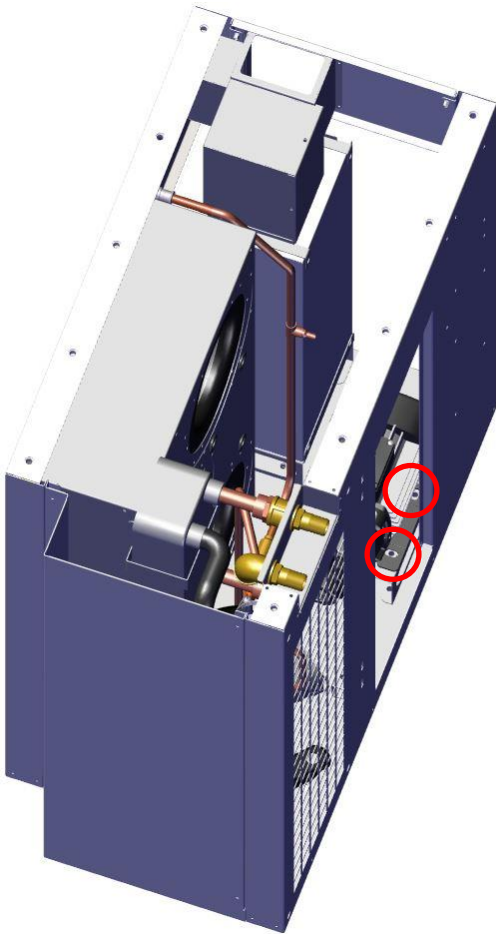


- 8) Unscrew the heater from the tank

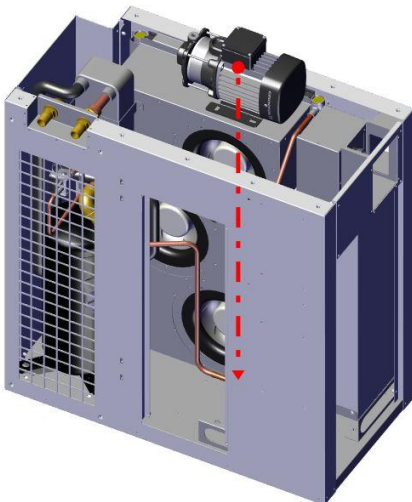


9.3.3 Remove/replace the pump

- 1) Remove Inverter (see chapter 3.4.1) and remove Heater/Tank (see chapter 3.4.2)
- 2) Unscrew the fittings of the pump then disconnect the pipe.
- 3) Unscrew the bolts of the pump (M6x16)

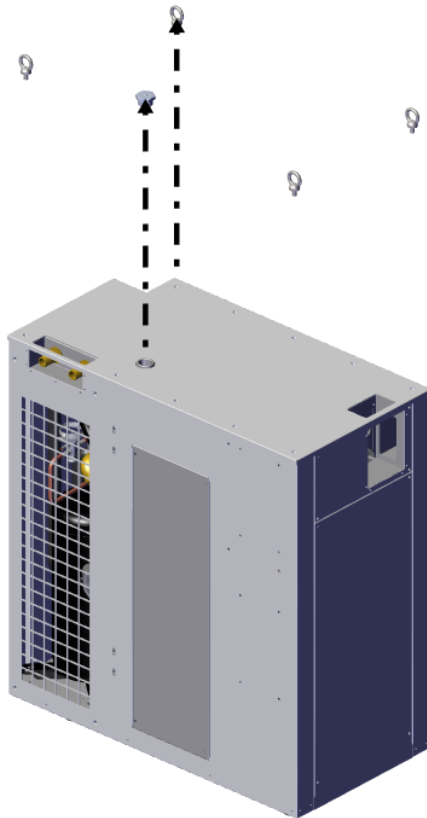


- 4) Remove the pump from the top

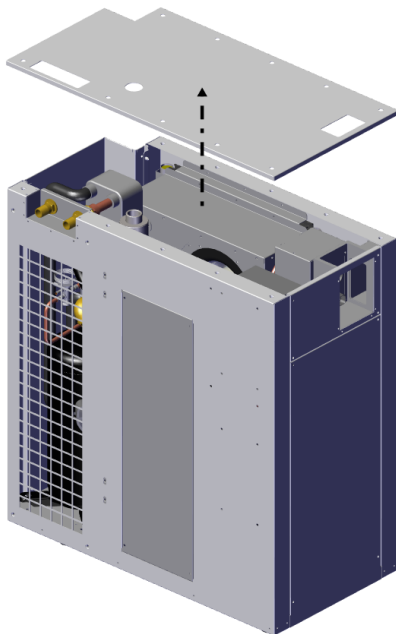


9.3.4 Remove/Replace the fans

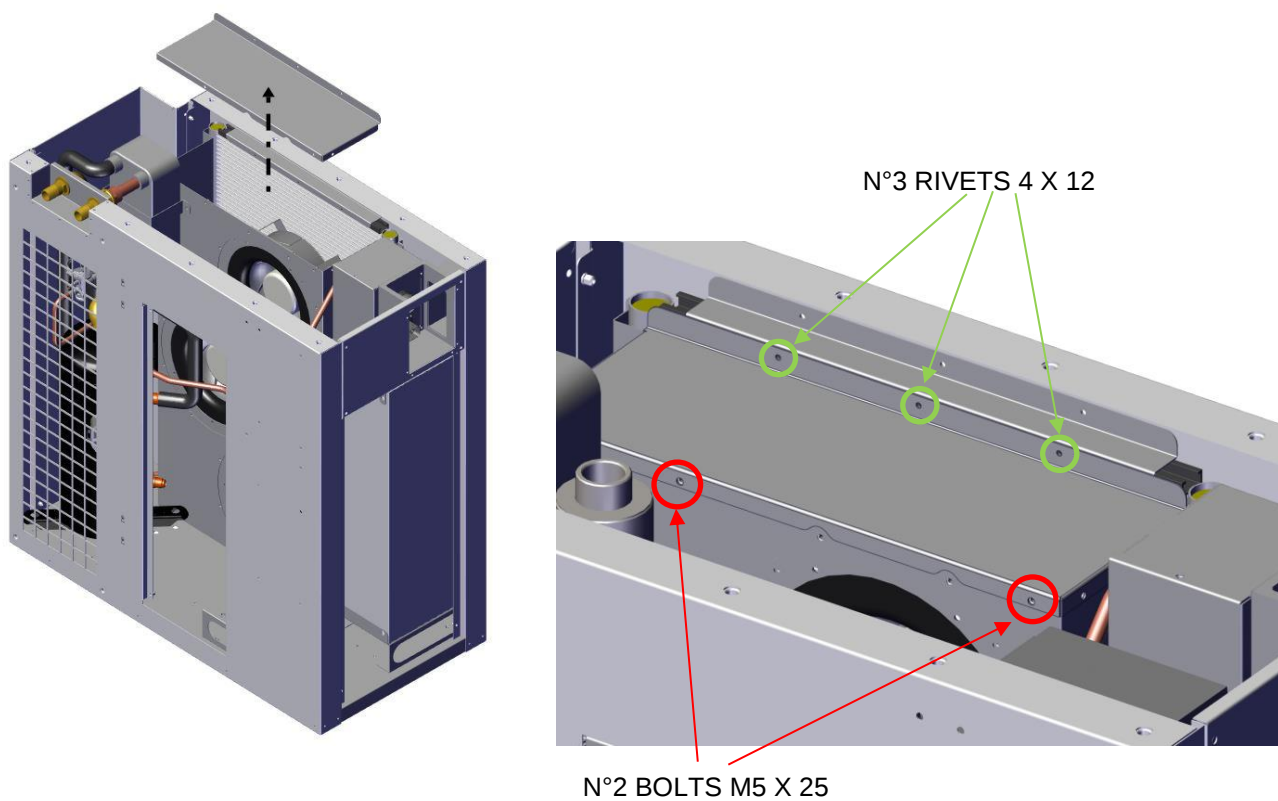
- 1) Remove the eyebolts (M10) and the tank cap



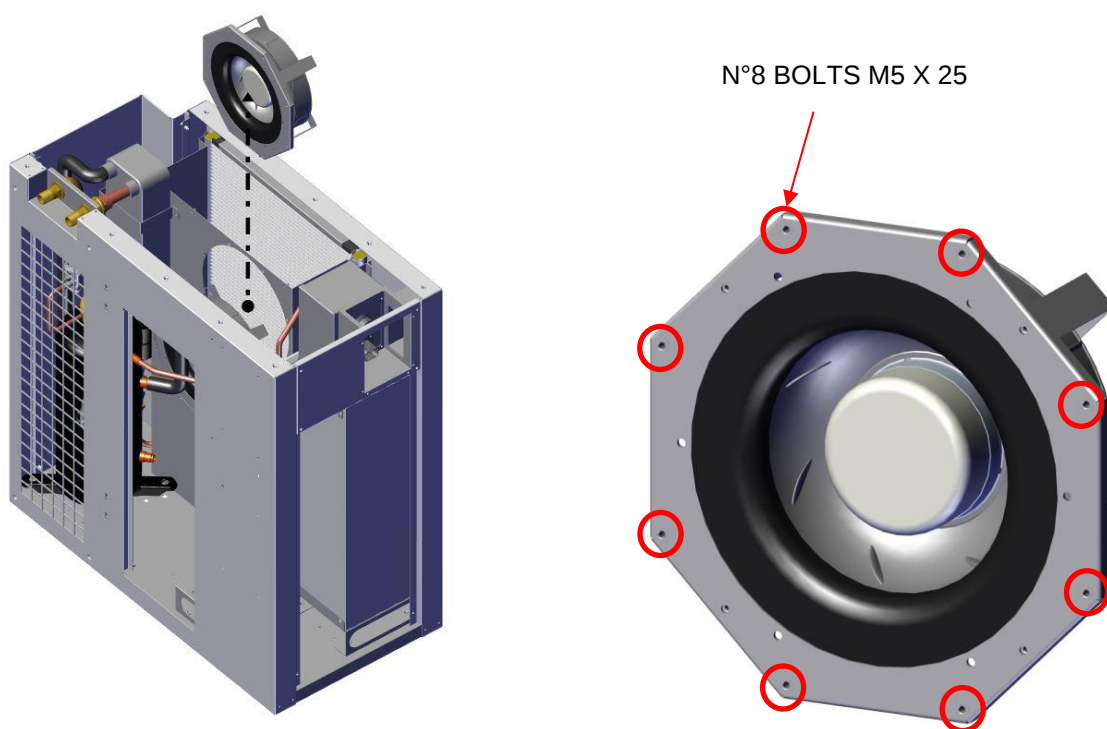
- 2) Remove the top panel



3) Remove the cover of the plenum



4) Unscrew the bolts of the fan/s and remove it/there from the top



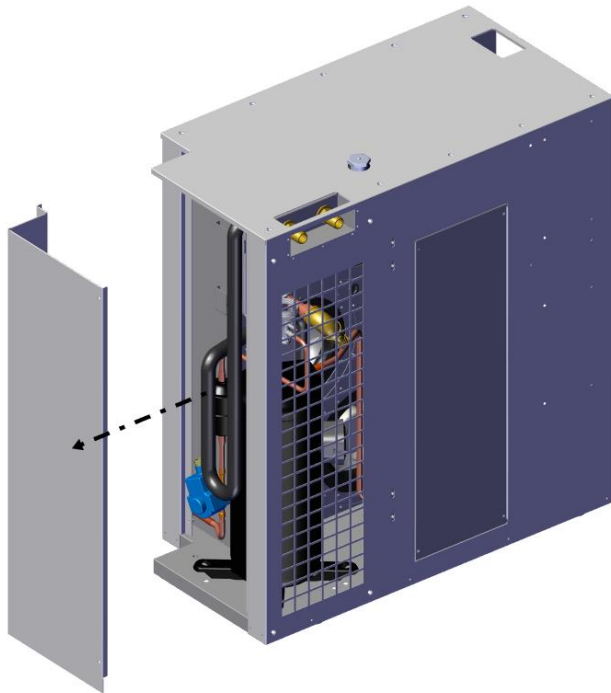
9.3.5 Remove/replace the solenoid valve/valve coil/filter drier



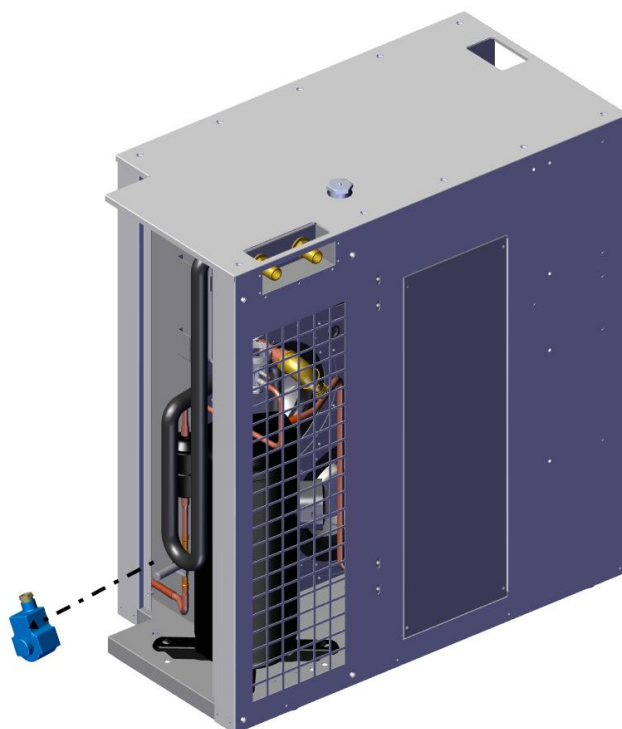
DANGER

Before work for ANY KIND OF MAINTENANCE OR WORK on the refrigerant circuit empty the circuit from the refrigerant, In accordance to the F-GAS regulation (EU) No 517/2014

- 1) Remove the rivets then remove the side panel



- 2) Disconnect and remove the valve coil
To remove the filter and/or solenoid valve unsolder the pipe and remove it



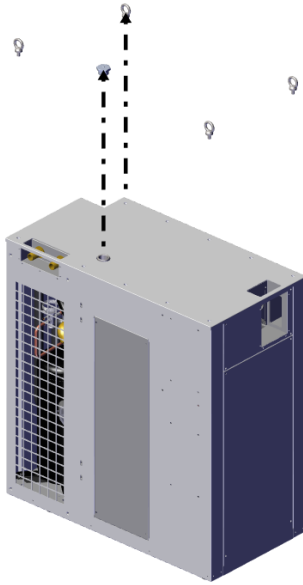
9.3.6 Remove/Replace the compressor



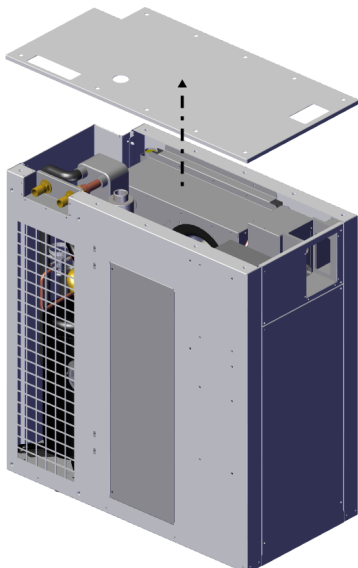
DANGER

Before work for ANY KIND OF MAINTENANCE OR WORK on the refrigerant circuit empty the circuit from the refrigerant, In accordance to the F-GAS regulation (EU) No 517/2014

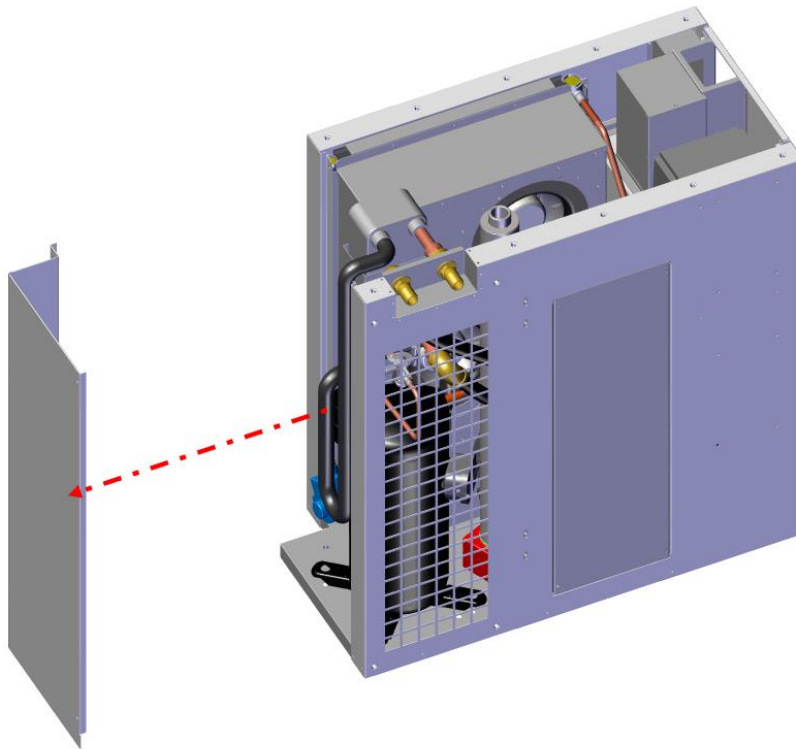
- 1) Remove the eyebolts and the tank cap



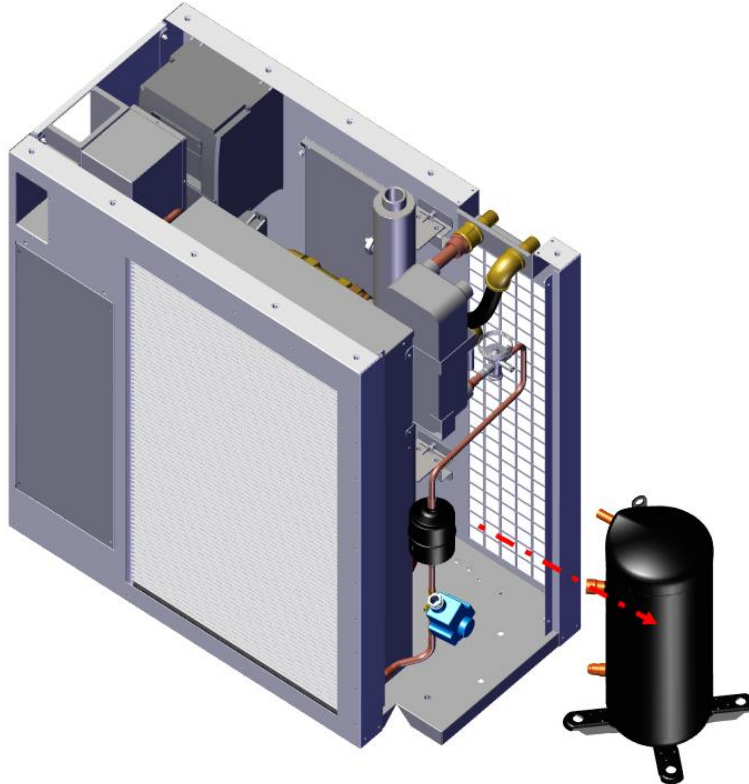
- 2) Remove the top panel



- 3) Remove the side service panel



- 4) Unsolder the copper pipe which are connect to the compressor then remove the compressor



10. Decommissioning, disposal

10.1 Decommissioning and storage



WARNING

Danger of injury due to materials and substances

Improper work on the unit or opening of the refrigerant circuit can be damaging to health.

Always ensure that the unit is de-energized before working on the unit.

The unit must only be disposed of by qualified personnel and in accordance with applicable environmental regulations.

If the unit is no longer needed for a longer period, it must be disconnected from the voltage supply.

☒ Ensure that improper start-up by third parties is not possible.

10.2 Final decommissioning or disposal



WARNING

Danger of accidents due to the heavy weight of the units

Uncontrolled movements of the unit during decommissioning can cause accidents.

Use suitable lifting equipment and secure unit to prevent accidents.

Also, secure assembled components.



CAUTION

Danger of injury due to sharp edges

For manufacturing reasons, the metal edges of the unit may have burrs.

Wear safety gloves during service and assembly work.

If units are to be definitively decommissioned or disposed of, the following must be observed:

Applicable statutory regulations of the user country and environmental protection regulations must be observed.

Refrigerant must be professionally extracted from the refrigerant system. Avoid refrigerant emissions.

The unit must only be disposed of by authorized, qualified personnel.

Waste equipment must also be disposed of correctly by Pfannenberg. Freight charges for delivery to one of our manufacturing facilities must be pre-paid.

11. Warranty

For information about warranty please visit Pfannenberg website:

<http://www.pfannenberg.com/en/company/general-conditions/>



Contact
MANUFACTURER

DASSI S.r.l. – Member of the Pfannenberg Group

Via La Bionda, 13 I-43036 Fidenza (PR)

Tel. +39 0524-516711 Fax. +39 0524-516790

 E-mail: info@pfannenberg.it

Pfannenberg Service Contact

Europe, Middle East, Africa Pfannenberg Europe GmbH Werner-Witt-Straße 1 21035 Hamburg ☎ +49 40 73412200 ☎ +49 40 73412101 ✉ service@pfannenberg.com 🌐 www.pfannenberg.com	North America Pfannenberg Sales America LLC 68 Ward Road 14086 Lancaster ☎ +1 716-685-6866 ☎ +1 716-206-2089 ✉ service@pfannenbergusa.com 🌐 www.pfannenbergusa.com	Asia-Pacific Pfannenberg Electro-Technology (Suzhou) Co., Ltd. No.108 Xinglin Road 215021 Suzhou, Jiangsu ☎ +86 512 6790 1163 ☎ +86 512 6287 1077 ✉ service@pfannenberg.cn 🌐 www.pfannenberg.cn
Italy Pfannenberg Italia S.R.L. Via la Bionda, 13 43036 Fidenza ☎ +39 0524 516711 ☎ +39 0524 516790 ✉ service@pfannenberg.it 🌐 www.pfannenberg.it	United Kingdom Pfannenberg UK Ltd. Unit 6C Aspen Court, Bessemer Way, Centurion Business Park S60 1FB Templeborough ☎ +44 1709 364844 ☎ +44 1709 364211 ✉ service@pfannenberg.co.uk 🌐 www.pfannenberg.co.uk	France Pfannenberg Italia Srl Branch Office France ☎ +33 1 47 08 47 47 ✉ service@pfannenberg.fr 🌐 www.pfannenberg.fr
Singapore Pfannenberg Asia Pacific Pte Ltd 12 Lorong Bakar Batu #06-07 348745 Singapore ☎ +65 6501 2931 ☎ +65 6299 3184 ✉ service@pfannenberg.com.sg 🌐 www.pfannenberg.com.sg	Brazil Pfannenberg do Brasil Ind. Com. Ltda Alameda Júpter, 579 SP 13.347-653 Indaiatuba ☎ +55 19 3935-7187 ☎ +55 19 3935-7187 ✉ service@pfannenberg.com.br 🌐 www.pfannenberg.com.br	Russia Pfannenberg OOO ulitsa Novoroshchinskaya, 4 196084 St Petersburg ☎ +7 495 228-83-53 ✉ service@pfannenberg.ru 🌐 www.pfannenberg.ru
Austria Pfannenberg Europe GmbH, Branch Office Austria ☎ +43 720 778894 ✉ info.austria@pfannenberg.com 🌐 www.pfannenberg.de	Polonia Pfannenberg Europe GmbH, Branch Office Poland Piotrkowska 148/150 90-063 Łódź ☎ +48 22 890 72 46 ✉ info@pfannenberg.pl 🌐 www.pfannenberg.pl	

For Service, please contact the nearest Pfannenberg Service Company