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WRA

Original instructions
Liquid chiller

Index **i32**
Version **06.2025**

WRA

Liquid chiller made in Italy

Dear Customer,

Thank you for purchasing a Cosmotec chiller.
It is the result of many years of research and design studies, as well as a fine matching of materials and technologies to obtain a high quality chiller.

The CE mark guarantees that the Cosmotec products fulfil the requirements of the European Machinery Directive for safety.

The level of quality is permanently checked at every phase, from design to production and makes Cosmotec products synonymous of SAFETY, QUALITY and RELIABILITY.

Table of contents

1. Introduction

1.1. Introduction

These operating instructions contain basic information which is to be complied with for installation, operation and maintenance. They must therefore be read and complied with by the fitter and the responsible trained staff/operators before assembly and commissioning. All procedures detailed in the manual, including tasks for installation, commissioning and maintenance must only be performed by suitable trained and qualified personnel. They must be permanently available at the place where the system is used.

The manufacturer will not be liable for any injury or damage caused by incorrect installation, commissioning, operation or maintenance resulting from a failure to follow the procedures and instructions detailed in the manual.

1.2. Warranty

The warranty is limited to free replacement and shipping of any faulty part, or sub-assembly which has failed due to poor quality or manufacturing errors. All claims must be supported by evidence that the failure has occurred within the warranty period, and that the chiller has been operated within the designed parameters specified.

All warranty claims must specify the model and serial number of the chiller. This information is printed on the name plate, fitted on front panel.
The warranty will be invalid in case of any modification on the chiller which is not written approved from Cosmotec.

To claim any warranty purpose the following conditions need to be satisfied:
The initial startup of the chiller has to be carried out by trained personnel authorized from Cosmotec.
Only Cosmotec approved spare parts and liquids are allowed to be used.
All scheduled maintenance operations described in this manual must be performed accordingly by trained and qualified personnel.
Not fulfilling at least one these conditions will automatically void the warranty.

1.3. Safety

1.3.1 Symbols used in the manual

DANGER	Risk of death or injury to the operator
WARNING	Risk of damage to the unit
INFORMATION	Important information, use the notes
ESD CAUTION	Risk of damage to electronic components

1.3.2 Labels

Tank filling.

Hydraulic circuit discharge
Location: in the frontal lower side of the unit

Entrance of the hydraulic circuit of the chiller (inlet of the chiller).
Location: next to the inlet fitting of the hydraulic circuit.

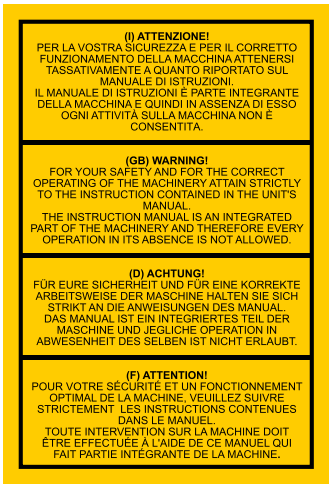
Exit of the hydraulic circuit of the chiller (outlet of the chiller).
Location: next to the outlet fitting of the hydraulic circuit.

Hot surface.
Location: in the proximity of the input / output pipes of condensers (under the protective casing) and on the compressor. With equipped antifreeze option, even in the proximity of the heaters around the evaporator and the steel hydraulic piping.

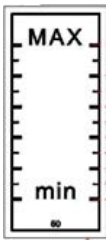
Danger high voltage.

Lifting point.
Location: near the lifting points, on the top of the unit.

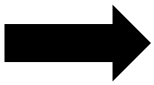
Moving parts
Location: near the fans, compressors vane.



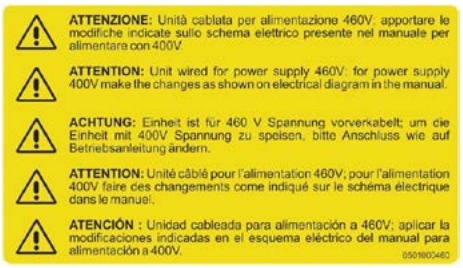
Label recalling the instruction manual.
Location: on the side of the unit.



Tank level.



Direction of rotation of motors.



Label on the door of the electrical box.
Only for units with power supply 400-460V/3ph/50-60Hz

The chiller is identified by the nameplate shown below.
The identification nameplate also shows the serial number of the unit; it is important to know the label as it is essential to get assistance or any information concerning the unit described in this manual.
Location: on the frontal panel of the unit.

COSMOTEC
Manufactured by STULZ S.p.A.
Via E. Torricelli, 3 37067 Valeggio sul Mincio (VR)

REFRIGERATORE DI LIQUIDO - LIQUID COOLER - KUHLANGE - REFROIDISSEUR DE LIQUIDE

MODELLO - MODEL - TYP - MODELE	WRA- - - - - - - - - - _1Z
SERIE - SERIES - SERIE - SERIE	N°
ORDINE - ORDER - ORDER - COMMANDER	OP:
DATA - DATE - DATUM - DATE	- -/- -/- - - -
Alimentazione principale - Main power supply - Netzstromversorgung - Alimentation principale F.L.A.	400/460V 3 ~ 50/60Hz - - -/- - A
Resa nom. - Cooling cap. - Kaelteleistung- Puissance nom.	- - - kW (W0L32)
Refrigerante tipo - Refrigerant type - Kaeltemittel - Refrigerant type	- - - - - - - - - kg
Min/Max temp. Stoccaggio - Min/Max temp. Storage - Min/Max temp. Lagerung - Min/Max temp. Stockage	/ 50,0 °C
PS HP/PS LP	- - - bar / - - - bar
TS Min/TS Max	-10 °C / 85 °C
CAT PED	I
Modulo di valutazione - Evaluation Module - Bewertungsklause - Module d'évaluation	A
Peso a vuoto - Unladen weight - Leergewicht - poids à vide	- - - kg

CO2 Eq.= 3,37 Tonn. MADE IN ITALY

Contiene gas fluorurati a effetto serra - Contains fluorinated greenhouse gases - Enthalt fluorierte Treibhausgase - Contient des gaz a effet de serre fluores

GWP: R134a=1430, R407C=1774, R410A=2088, R1234ze=7, R513A=631 | Gas added kg

Symbol	Description
CE	Units built in accord to the EC directives
0496	Reference number of the Technical File notified to Approval Authority
EAC	Units comply with EurAsian Conformity directives
Double Power Supply	Double power supply (only if this option is present)
Rated Voltage	Voltage - Phases - Frequency of the power supply
F.L.A.	Maximum Absorbed current of the Main Power Supply considering the toughest condition at the operating limit of the unit
Auxiliary Power Supply	Voltage - Phases - Frequency of the auxiliary power supply
F.L.A. (Auxiliary Power Supply)	Maximum Absorbed current of the Auxiliary power supply considering the toughest condition at the operating limit of the unit
Cooling Cap.	Rated Cooling Capacity with water temperature 12 - 30°C
Refrigerant Type	Refrigerant type used
Kg	Refrigerant gas charge
Min/Max temp. Storage	Maximum and minimum storage temperature (unit not powered)
PS HP/PS LP	Maximum working pressure permitted on the high pressure side and minimum working pressure permitted on the low pressure side.
TS Max. / TS Min.	Maximum and minimum temperature reached by the operating components of the refrigerant circuit
CAT PED	Category complying with the Pressure Equipment Directives
Evaluation module	Conformity evaluation module according to the Pressure Equipment Directives
Weight	Unladen mass of the unit (without packing, but with the refrigerant charge
CO2 Eq.	Tons of Equivalent CO2 according to the F-Gas directives (517/2014)
According to Kyoto Protocol	According to Kyoto Protocol
Empty Space	Empty for additional refrigerant charge added on the installation site

1.3.3 Safety Instructions

INFORMATION

This cooling unit contains fluorinated greenhouse gas covered by the Kyoto protocol

In these Cosmotec chillers the refrigerants R410A and R134a are used. Refrigerants are volatile or highly volatile fluorinated hydrocarbons which are liquefied under pressure. They are incombustible and not hazardous to health when used as intended.

DANGER

- Works have to be carried out by competent staff only
- Observance of the regulations for accident prevention
- Stay out of danger when lifting and setting off the unit
- Secure the unit to avoid the risk of overturning
- Safety devices may not be bypassed
- Respect the corresponding EN- and IEC standards for the electrical connection of the unit and observe the conditions of the power supply companies
- Switch off the voltage from the unit when working on it
- The unit must be earthed

WARNING

- The unit may only be used to cool water according to the Cosmotec specification.
- Observe the national regulations of the country where the unit will be installed
- The refrigerant circuit contains refrigerant and refrigerating plant oil, observe professional disposal for maintenance and when setting the unit out of service
- Cooling water additives have an acidic effect on skin and eyes, wear safety glasses and safety gloves
- Observe personal protective equipment when working on the refrigerant circuit

INFORMATION

- Respect material compatibility in the whole hydraulic circuit
- The male triangular wrench is to be placed in a visible location in the immediate vicinity of the unit

1.3.4 Handling refrigerants

According to EN 378, refrigerants are divided in groups in respect of health and safety.

- Adherence to the regulations by law and guide-lines
- Execution only by competent staff
- Responsibility for correct disposal of refrigerant and system parts is incumbent on the operator
- Refrigerants have a narcotic effect when inhaled in high concentrations.
- The room is to be evacuated immediately if high concentrations of refrigerant suddenly occur. The room may only be entered again after adequate ventilation.
- If unavoidable work is required in the presence of a high concentration of refrigerant, breathing apparatus must be worn. This does not mean simple filter masks. Comply with breathing protection data sheet.
- Safety glasses and safety gloves are to be worn.
- Do not eat, drink or smoke at work.
- Liquid refrigerant must not get onto the skin (risk of burns).
- Only use in well ventilated areas.

- Do not inhale refrigerant vapours.
- Warn against intentional misuse.
- It is absolutely essential to comply with the first aid measures if accidents occur.
- Refrigerants containing FCs contribute to the global warming and with this to climate changes. The FCs must therefore be disposed of in accordance with the regulations, i.e. only by companies specially qualified and licensed as recognised disposal companies for refrigerants.

1.3.5 Safety and environmental requirement

The following requirements relate to the operation of refrigerating plants within the European Community.

- The used components must correspond to the pressure equipment guide-line 2014/68/EC and EN 378 part 1-4.
- Independent of the design, the equipment and inspection before the delivery, also the operator of such plants has duties according to EN 378 and national regulations.
- This concerns the installation, the operation and the repeated inspection:
- Installation: according to EN 378
- Operation: Determination of emergency measures (accidents, malfunctions).
  Creation of an abbreviated instruction and notification (template page)
  1. A unit protocol must be kept.
  2. To be stored in the proximity of the unit
  3. Access for competent staff in case of repairs and repeated inspection must be ensured.
- Repeated inspection: according to EN 378. The operator is responsible for the execution.

The operator must ensure that all maintenance, inspection and assembly work is carried out by authorised and qualified specialist staff who have made an in-depth study of the operating instructions. It is absolutely essential to comply with the procedure for shutting down the system described in the operating instructions. Before maintenance work, the unit must be switched off at the main switch and a warning sign displayed to prevent unintentional switching-on.

First aid measures

- If health problems occur during or after handling fluorinated hydrocarbons, a doctor is to be consulted immediately.
- The doctor is to be informed that the work involved the use of fluorinated hydrocarbons.
- In the case of acute effects, the casualty is to be brought into the fresh air as quickly as possible.
- Splashes of fluorinated hydrocarbons in the eyes can be blown out or fanned out by an assistant. Then rinse with water.

Independent conversion and manufacture of replacement parts

The system may only be converted or modified after consultation with Cosmotec. Original replacement parts and replacement parts/accessories authorised by Cosmotec are an aid to safety.

Unacceptable operating methods

The operating safety of the system is only guaranteed when it is used as intended. The limit values stipulated in the technical data must not be exceeded under any circumstances..

2. Residual risk

2.1. Transport and installation

Area	Danger	Risk	Preventative measures
Under the unit	Faulty lifting system of the unit causing its fall.	Contusions, trauma.	Keep away from the danger area while handling the unit.
Near the unit	Support of the unit unstable or inadequate causing its tipping.	Contusions, trauma.	Make sure the unit support is adequate to its weight, is stable and level. Wear protective equipments (helmet, gloves, safety shoes).
In the lower part of the unit	Sharp edges, built-in parts.	Cut, contusions, sunburns, formation of acid vapours	Keep away from the danger area while handling the unit Wear protective equipments (helmet, gloves, safety shoes).
Beside the unit	Accidental collision with damages to the refrigerant circuit and leakage of refrigerant at high pressure.	Burns, formation of acid vapours.	Keep away from the danger area while handling the unit. Wear PPE.
Electrical box	Connection cable under voltage.	Electric shock, cable damage at positioning.	Check and make sure the unit is de-energized state. Stand on isolated ground. Stay electrically insulated form the ground. Wear protective equipments (helmet, gloves, safety shoes).
Refrigerant circuit in the left side of the unit	Safety valve intervention	Discharge of refrigerant under high pressure, Burn in case of contact to the skin, formation of acid vapours with open flames.	Do not exceed maximum admitted ambient temperature (showed in paragraph 5.2). Convey the safety valves. Wear PPE.
Inside the unit	Damaged compressor crankcase resistor insulation (where present), live component even with machine off if powered and with disconnect switch closed.	Electric shock	Check and ensure that the unit is de-energized. Stay on insulated surfaces. Remain electrically isolated from the ground. Wear protective equipment (helmet, gloves, safety shoes)

2.2. Start-up and operation

Area	Danger	Risk	Preventative measures
Beside the unit	Launch of tools and various hardware (screws, nuts, washers, etc.) that can accidentally fall on the fans blades.	Contusions, trauma.	In the installation phase, be sure to remove tools and other installation materials. Wear PPE.
Beside the unit	Aspiration and following expulsion from the fans of objects, dusts and substances present on the installation site.	Contusions, trauma.	Clean installation area. Wear PPE.
In contact with the unit	Incorrect electrical connection and missing earth connection.	Electric shock.	Stay electrically insulated form the ground. Wear PPE.
Refrigerant piping in the left part of the unit	Leakages in the refrigerant line, defective safety valves	Discharge of refrigerant under high pressure, Burn in case of contact to the skin, formation of acid vapours with open flames	Wear safety glasses and gloves.
Water pipes inside the unit	Losses in water circuit.	Discharge of water under high pressure, contact with the skin of ethylene glycol, irritation of eyes and respiratory system by glycol vapours, increased risk of electric shock in combination with electricity, risk of slipping.	Wear rubber gloves, ethylene glycol is adsorbed by the skin. Avoid swallowing water with glycol additives.
Near water piping	Shut off valves closed (if present); losses in the hydraulic pipes. Consequent leakage of water and additives.	Irritation of skin and eyes caused by the contact with ethylene glycol. Skin irritation and irritation of respiratory system for glycol vapours. Electric shock. Slipping.	Open shut off valves of the hydraulic circuit. Wear PPE.

Area	Danger	Risk	Preventative measures
Beside the unit	With unit ON: losses in the cooling circuit; safety valve or high pressure switch defective; fire; shut off valves closed in the cooling circuit (if present) after maintenance; fault on gas charge line. Consequent explosive rupture of the refrigerant circuit.	Burns, formation of acid vapours with flames.	For the installation inside buildings: convey the discharge of the safety valves to open areas. Open shut off valves of the cooling circuit. Wear PPE. In case of fire, wear fireproof mask.
Electrical box	Short circuit	Electric arc, acid vapours	Re-tighten terminal connections. Wear protective gloves.
Electrical box	Contusions, crushing, lacerations.	Frame door open when there is strong wind	Wear PPE, personnel trained and specialized, positioning the unit in a place sheltered from the wind as indicated in chapter 6 of this manual.
Refrigerant piping in the left part of the unit	Losses in the refrigerant piping, defective safety valves/high pressure switch defective, flames	Discharge of refrigerant under high pressure, piping explosion, formation of acid vapours with open flame	Personnel trained and specialized. In case of fire, wear PPE (fire-fighting masks, helmet, gloves, safety shoes). Do not use materials that can create environments with risk of explosion.
Hot gas pipes	The line can reach a temperature up to 70°C	Burn in case of contact to the skin.	Wear protective gloves. Cover lower arms with clothing.
Near water piping	Formation of condensation in presence of the dew point with consequent drip of the non-insulated pipes.	Electric shock, slipping.	Wear PPE.
Beside the unit (Electrical box, supply cables)	Short circuit; wrong dimensioning of the cables or of the general breaker.	Electric shock, fire, formation of acid vapours.	Check the fixing of the cables in the terminals; select properly supply cables and main switch. Wear PPE. In case of fire, wear fireproof mask.
Beside the unit	Noise emission	Accident to the auditive apparatus.	Wear PPE.
Plastic tank inside the unit	Electrical heating (optional) ON with empty tank	Burns, asphyxiation, smoke production, melted plastic dripping.	In case of general alarm intervention due to electrical level alarm "LE" (see chapter 9), disconnect the unit from power supply and move the main switch to "0" position. Verify losses from the hydraulic circuit, verify the proper operation of the electrical heating contactor. Refill the tank. Wear PPE.
Refrigerant circuit in the left side of the unit	Safety valve intervention	Discharge of refrigerant under high pressure, Burn in case of contact to the skin, formation of acid vapours with open flames.	Do not exceed maximum admitted ambient temperature (showed in paragraph 5.2). Convey the safety valves. Wear PPE.
Inside the unit	Damaged compressor crankcase resistor insulation (where present), live component even with machine off if powered and with disconnect switch closed.	Electric shock	Check and ensure that the unit is de-energized. Stay on insulated surfaces. Remain electrically isolated from the ground. Wear protective equipment (helmet, gloves, safety shoes)

2.3. Maintenance

Area	Danger	Risk	Preventative measures
Beside the unit	Losses in the cooling circuit; safety valve or high pressure switch defective; fire; fault on gas charge line. Consequent explosive rupture of the refrigerant circuit.	Burns, formation of acid vapours with flames	Wear PPE. In case of fire, wear fireproof mask.
Components of the unit: compressor, inlet pipes of the compressor, condenser	Contact with hot surfaces.	Burns.	Avoid the contact. Wear PPE.
Condenser	Contact with cutting surface (fins)	Cuts, abrasions	Wear PPE.
Electrical box	Powered line even if the switch of the machine is on OFF.	Electric shock.	Check the insulation of the power supply from the electrical panel. Be sure that the main switch will not re-activated during maintenance.
Electrical box	Contusions, crushing, lacerations.	Frame door open when there is strong wind	Wear PPE, personnel trained and specialized, positioning the unit in a place sheltered from the wind as indicated in chapter 6 of this manual.
Plastic tank inside the unit	Electrical heating (optional) ON with empty tank	Burns, asphyxiation, smoke production, melted plastic dripping.	Disconnect the unit from power supply and move the main switch to "0" position. Verify losses from the hydraulic circuit, verify the proper operation of the electrical heating contactor. Refill the tank. Wear PPE.
Refrigerant circuit in the left side of the unit	Safety valve intervention	Discharge of refrigerant under high pressure, Burn in case of contact to the skin, formation of acid vapours with open flames.	Do not exceed maximum admitted ambient temperature (showed in paragraph 5.2). Convey the safety valves. Wear PPE.
Inside the unit	Damaged compressor crankcase resistor insulation (where present), live component even with machine off if powered and with disconnect switch closed.	Electric shock	Check and ensure that the unit is de-energized. Stay on insulated surfaces. Remain electrically isolated from the ground. Wear protective equipment (helmet, gloves, safety shoes)

2.4. Dismantling

Area	Danger	Risk	Preventative measures
Beside the unit	Losses in the cooling circuit; the system of refrigerant recovery is defective. Consequent explosive rupture of the refrigerant circuit.	Burns, formation of acid vapours with flames	Wear PPE.
Beside the unit	Leakages of oil during recovery.	Contact of oil with skin or eyes	Wear PPE.
Refrigerant piping	Soldering off or cutting the refrigerant pipes still under pressure	Discharge of refrigerant under high pressure, burns in case of contact to the skin	De-pressurize pipes before disconnecting them. Wear safety glasses and gloves.
Near water piping	Unscrewing the water pipes still under pressure.	Irritation of skin and eyes caused by the contact with ethylene glycol. Electric shock. Slipping.	De-pressurize hydraulic circuit before disconnecting it. Wear PPE.
Electrical box	Powered line even if the switch of the machine is on OFF.	Electric shock.	Check the insulation of the power supply from the electrical panel. Be sure that the main switch will not re-activated during maintenance.

2.5. Safety Data

Safety data of the refrigerant R410A		
1. Product identification	Preparation identification	REFRIGERANT R410A
	Recommended use	Refrigerant
2. Composition / information on ingredients	Difluoromethane (R32)	CAS No. 75-10-5. Weight: 50%
	Pentafluoromethane (R125)	CAS No. 354-33-6. Weight: 50%
3. Hazard identification	Most important hazards	Not hazardous according to Directive 67/548/EEC or 1999/45/EC Not dangerous according to Directive 67/548/EEC
4. First aid measures	Inhalation	Remove from exposure, lie down. Move to fresh air. Artificial respiration and/or oxygen may be necessary. Consult a physician.
	Contact with skin	Take off all contaminated clothing immediately if not stuck to the skin. Flush area with lukewarm water, do not use hot water. If frostbite has occurred, call a physician.
	Contact with eyes	Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention.
	Notes for the doctor	Do not give adrenaline or similar drugs. Burns pack should be available on the premises.
5. Fire fighting measures	Extinguishing media	Use extinguishing measures that are appropriate to local and surrounding environment. Cool cylinders/tanks with water spray.
	Specific hazard	Possibility of hazardous reactions during a fire due to the presence of fluorine and chlorine groups. Pressure build-up in cylinders/tanks may cause violent rupture of packages. This product can ignite when mixed with air under pressure and exposed to strong ignition sources.
	Advice for fire-fighters	Wear self-contained breathing apparatus and neoprene gloves during cleaning work after a fire.
6. Accidental release measures	Personal precautions	Evacuate personnel to safe areas. Ventilate the area especially low or enclosed places where heavy vapour might collect.
	Environmental precautions	Should not be released into the atmosphere.
7. Handling and storage	Handling requirements	Avoid breathing vapours or mist, avoid liquid contact with skin and clothing. Provide sufficient air exchange / exhaust in work rooms.
	Cylinder handling	Do not drag, slide or roll cylinders. Never attempt to lift cylinder by its valve or cap. Use a check valve or trap in the discharge line to prevent back flow into the cylinder.
	Storage conditions	Store in cool, dry well-ventilated place. Temperature not exceed 50°C. Keep valves tightly closed.
	Suitable packaging	Store in original cylinder only. Protect from contamination.
8. Stability and reactivity	Conditions to avoid	The mixture may become flammable or reactive when pressurized with oxygen. Avoid heat, hot surfaces and open flames. Do not expose to temperatures exceeding 52°C. Do not store in confined space of basement, store in well ventilated place.
	Hazardous decomposition products	Thermal decomposition yields hazardous, toxic products which can be corrosive in the presence of moisture. These may include hydrogen fluoride, carbon oxides, fluorocarbons and carbonyl fluoride.
	Further information	The product is not flammable in air under ambient conditions of temperature and pressure.
9. Exposure controls / personal protection	Workers exposure routes	Pentafluoroethane=16444 mg/m^3 - Difluoromethane=7035 mg/m^3
	Engineering measures	Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released.
	Respiratory protection	For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
	Hand protection	Leather gloves
	Eye protection	Wear safety glasses or coverall chemical splash goggles. Eye protection complying with EN166 or ANSI Z87.1. Wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
	Skin protection	Wear clothing that covers legs, arms and impervious clothing.
	Protective measures	Self-contained breathing apparatus (SCBA) is required if a large release occurs.
	Environmental	Gas escapes to be kept to the minimum by engineering processes and operating methods.
10. Toxicological information	Acute toxicity - Inhalation Irritation and sensitisation	Pentafluoroethane: LC50/4 h rat > 800 000 ppm. Difluoromethane: LC50/4 h rat > 520 000 ppm. No skin / eye irritation and no skin sensitisation, bases on expert review of the properties of the mixture
	Repeated dose toxicity	Inhalation rat: no toxicological significant effects were found.
	Carcinogenicity	Not classifiable as a human carcinogen.
	Toxicity to reproduction	No toxicity to reproduction.
	Mutagen assessment	Animal testing and tests on bacterial or mammalian cell cultures did not show any mutagen effects
	Assessment teratogenicity	No tetratoginic effects in animal experiments.
11. Disposal considerations	Disposal of product	Do not allow product to be released into the environment.
12. Transport information	UN number	3163
	Proper shipping name	LIQUIFIED GAS N.O.S. (Pentafluoroethane, Difluoromethane)
	Transport hazard class	2 (ADR) - 2.2 (IMDG) - 2.2 (IATA_C)
	Tunnel code	C/E
	ImS Code	F-C, S-V

13. Regulatory information	Regulation	Directive 98/24/EC on protection of the health and safety of workers from the risks related to chemical agents at work
	Special labelling of certain mixtures	Contains fluorinated greenhouse gases covered by the Kyoto Protocol
	Chemical safety assessment	It has been carried out by the supplier of this mixture

Refrigerant safety data R134a		
1. Identification of the substance/ preparation	Identification of the preparation	STAR COLD 134a
	Recommended uses	Refrigerant
2. Composition / information on the ingredients	Tetrafluoroethane (C2H2F4)	N° CAS: 811-97-2 N° CE: 212-377-0 Concentration: 100%
3. Identification of the hazards	Possible Hazards	Not dangerous according to Directive 1999/45/EC. Consequences on the environment: not readily biodegradable. Physical and chemical hazards: thermal decomposition in toxic and corrosive products.
4. First aid measures	Inhalation	Move the victim to a non-contaminated area wearing breathing equipment. Keep the patient warm and at rest. Call a doctor. Apply artificial respiration if breathing has stopped.
	Contact with skin	In case of frostbite, spray with water for at least 15 minutes. Apply a sterile gauze. And obtain medical assistance.
	Contact with eyes	Immediately wash the eyes with water for at least 15 minutes.
	Ingestion	Ingestion is not considered a potential route of exposure.
	Protection for first-aiders	Wear suitable respiratory equipment in case of interventions in saturated atmosphere.
	Notes for the doctor	Do not administer catecholamines (due to the cardiac effects of the product)
5. Fire-fighting measures	Suitable extinguishing medium	Adopt extinguishing measures in fire area.
	Special risks from the substance or mixture	The product is not flammable in ambient pressure and temperature. Any mixtures, under pressure with air, can be flammable. At high temperature: There is thermal decomposition into toxic and corrosive products as hydrofluoric acid and carbon oxides.
	Advice for fire-fighters	Cool containers/tanks with spraying water. Provide a rapid container evacuation system. In case of fire nearby, keep away containers exposed to fire. In case of fire, wear a self-contained breathing apparatus and a complete protection suit against chemical agents.
6. Accidental release measures	Individual measures	Try to stop the leakage. Evacuate the area. Ensure suitable ventilation. Use the respiratory equipment to access the involved area unless atmosphere is proved to be unbreathable. Avoid accessing sewers, basements, or any place where its accumulation could be dangerous.
	Environmental precautions.	Try to stop the leakage.
	Methods and materials for containment and recovery	Ventilate the area.
7. Handling and storage	Precaution for safe handling	Storage and handling dispositions applied for the following products: under pressure gas and liquefied gas. Provide adequate ventilation and extraction near equipment. Provide showers, eye fountains. Provide nearby points of water delivery. Well ventilate cisterns and tanks, before intervening inside. Prohibit sources of ignition and the contact with hot surfaces. DON'T SMOKE. Avoid the contact with skin, eyes and inhalation of vapours. Don't drink and don't eat during use. Clean hand after manipulation. Remove contaminating clothing and protective clothing before entering food catering areas.
	Condition for secure storage, including any incompatibilities	Keep in a fresh and well ventilated place. Keep away from free flames, hot surfaces and ignition sources. Don't smoke. Protect full containers from heat sources to avoid over pressures. Protect from lights. Avoid direct lights.
	Storage temperature	<45°C
	Incompatible products	Alkaline hydroxides. Alkaline earth metals. Strong oxidizing agents. Finely divided metals.
	Packaging material	Recommended: Ordinary steel, stainless steel. To avoid: alloy containing more than 2% magnesium. Plastic materials.
	Storage conditions	Keep in a fresh, dry and well ventilated place. The temperature cannot be higher than 50°C. Maintain the valves well closed.
	Suitable packaging	Storage in original cylinder. Protect from contaminations.
8 . Exposure/ personal protection checks	Exposition	Norflurane = 13936 mg/m^3 in case of inhalation for workers. Norflurane = 2476 mg/m^3 in case of inhalation for consumers.
	General protection measures	Ensure an adequate air change and/or aspiration in working environments
	Protection for respiratory tracts	In case of not enough ventilation, use a suitable air breathing apparatus.
	Hand protections	Leather glove
	Eyes/face protection	Protection glasses with side-shields
	Skin/body protection	Wear protection suit (cotton) that covers legs and arms.
	Ambient	Should not be released into the environment.

9. Physical and chemical properties	Aspect	Physical state (20°C): gaseous; Physical state: liquefied gas; Colour: without colour
	Odour	Slightly similar to air
	Fusion interval / point	-108 °C
	Boiling interval / point	-26 °C
	Flammability (solids,gas)	Non-flammable substance. Vapour pressure: 0,574 MPa a 20 °C. Vapour density: 4,24 kg/m^3. Density: 1,206 kg/m^3 a 25°C, 1,102 kg/m^3 a 50°C, 996 kg/m^3. Relative density (Water): 1,21 a 20°C, 1,1 a 50°C
	Solubility in water	1 g/l a 25 °C
	Auto-ignition temperature	743 °C a 1 bar
	Decomposition temperature	>370 °C
	Other information	Henry constant: 155E+03 PA.m^3/mol. Molecular weight: 102 g/mol Critical pressure: 4,07 MPa. Critical temperature: 101 °C
10. Stability and reactivity	Chemical stability and reactivity	Stable at ambient temperature. The product, in presence of air, can create a flammable mix, under certain conditions of temperature and pressure.
	Conditions to be avoided	Keep far from eat sources and other causes of fire. Avoid the contact with flames and incandescent metallic surfaces.
	Incompatible materials	Alkaline hydroxides. Alkaline earth metals. Strong oxidizing agents. Finely divided metals.
	Thermal decomposition	Decomposition temperature: > 370 °C
	Hazardous decomposition products	At high temperature there is the thermal decomposition into toxic and harmful products: Gaseous hydrogen fluoride and carbon oxides.
11. Toxicological information	Inhalation	Reduced harm for inhalation. As the others volatile aliphatic halogenated compounds, trough vapours accumulation and/or inhalation of huge quantities, the substance can cause: loss of consciousness and heart disease, aggravated by stress and lack of oxygen: mortal risk.
	Local effects	Possible frostbite for liquefied gas sketches on skin and eyes.
	Respiratory or skin sensitization	No genotoxic effects.
	Carcinogenicity	No carcinogenic or mutagen effects in animal experiments.
	Toxicity for reproduction	No toxicity to reproduction. No toxic effects for developing foetus, at no toxic concentration for mothers.
	Specific target organ toxicity	Studies of long inhalation on animals didn't highlighted any chronic toxic effect.
12. Ecological information	Acute toxicity	Low harmful for fishes. Low harmful for alga.
	Persistence and degradability	Not readily biodegradable
	Potential for bioaccumulation	Considered to be not bioaccumulative
13. Considera-tions on disposal	Waste disposal methods	Elimination of the product, recycle or incinerate. According to local and national Norms.
14. Transport information	UN number	3159
	Suitable shipment name	LIQUIFIED GAS N.O.S. (Tetrafluoroetano)
	Transport danger class	2 (ADR) - 2 (ADN) - 2.2 (IATA_Cargo) - 2.2 (IATA - Passenger) - 2.2 (IMDG)
	ImS code	F-C, S-V

⚠ WARNING

Please, refer to the specific "Safety Data Sheet" of refrigerant gas.

Safety data of the oil		
1. Identification of the substance / preparation	Identification of preparation	EMKARATE (TM) RL 32-3MAF
	Intended use	Synthetic refrigeration compressor oil
	Company Name	CPI Engineering Services, 2300 James Savage Rd. Midland, MI 48642

⚠ WARNING

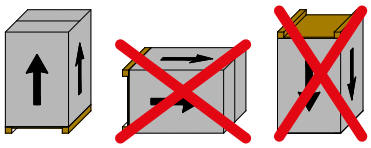
Please, refer to the specific "Safety Data Sheet" of lubricant oil.

3. Transport/ Storage

3.1. Delivery of units

To assure a persistent quality and reliability, all chillers are tested and inspected before leaving the factory. The chillers are completely assembled when shipped and contain refrigerant under pressure. It is also possible to ship the chillers without refrigerant gas. In this case the refrigerant is substituted be nitrogen.

The chiller units must always be transported upright.

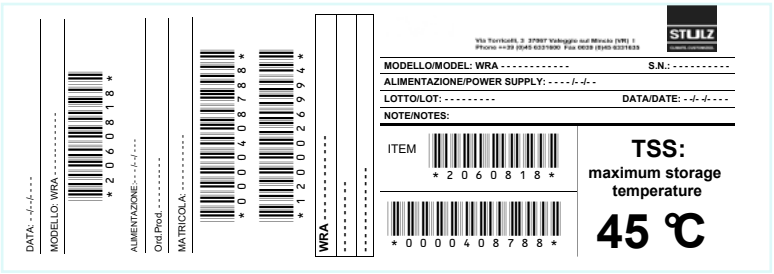


INFORMATION

The refrigerant circuit is filled with refrigerant gas R410A or R134a ready to use.

The chiller is labelled as follows:

- Cosmotec Logo
- Cosmotec order number
- Type of unit
- Packing piece – content
- Warning symbols



INFORMATION

- Due to the pre-filled refrigerant, the unit is marked as transport of dangerous goods
- The refrigerant is non-toxic and non-flammable
- For special shipping indication, please contact the corresponding sales department
- Special transport regulations must be checked country specifically

INFORMATION

When delivery is accepted, the unit is to be checked against consignment papers for completeness and checked for external damage which is to be recorded on the consignment papers in the presence of the freight forwarder.

- You receive the consignment papers with the delivery of the chiller
- The shipment is made ex works, in case of shipment damages, please assert your claim directly towards the carrier.

3.2. Storage

If you put the unit into intermediate storage before the installation, the following measures have to be carried out to protect the unit from damage and corrosion:

- Make sure that the water connections are provided with protective hoods. If the intermediate storage exceeds 2 months, we recommend filling the pipes with nitrogen.
- The temperature at the storage point should not be higher than 45°C and not lower than –10°C, and the site should not be exposed to direct sunlight.
- The storage point must be indoor.
- The unit should be packaged before the storage to avoid the risk of damage and corrosion.
- The unit should be stored in a location with minimum activity to reduce the risk of accidental physical damage.
- A periodic inspection is highly recommended. If your chiller contains refrigerant gas during the storage period you also have to consider the current F-Gas regulations and EN 378.

3.3. Transport

Cosmotec WRA chillers can be moved with forklift by pallet and with lifting devices with ropes or belts. The units WRA90 and WRA5A can be swivelled using the holes in the base of the unit. The drawings on the following pages show how to transport the chiller and the position of the centre of gravity.

INFORMATION

The rope forces are higher than the weight forces according to the geometry. Due to the risk of scratching the side planking we advise not to use chains.

WARNING

All the chillers are designed to be lifted and moved with empty hydraulic circuit

3.3.1 Transport protection

The standard packaging of the chiller is plastic bubble wrap around the chiller and pallet under the unit.

WARNING

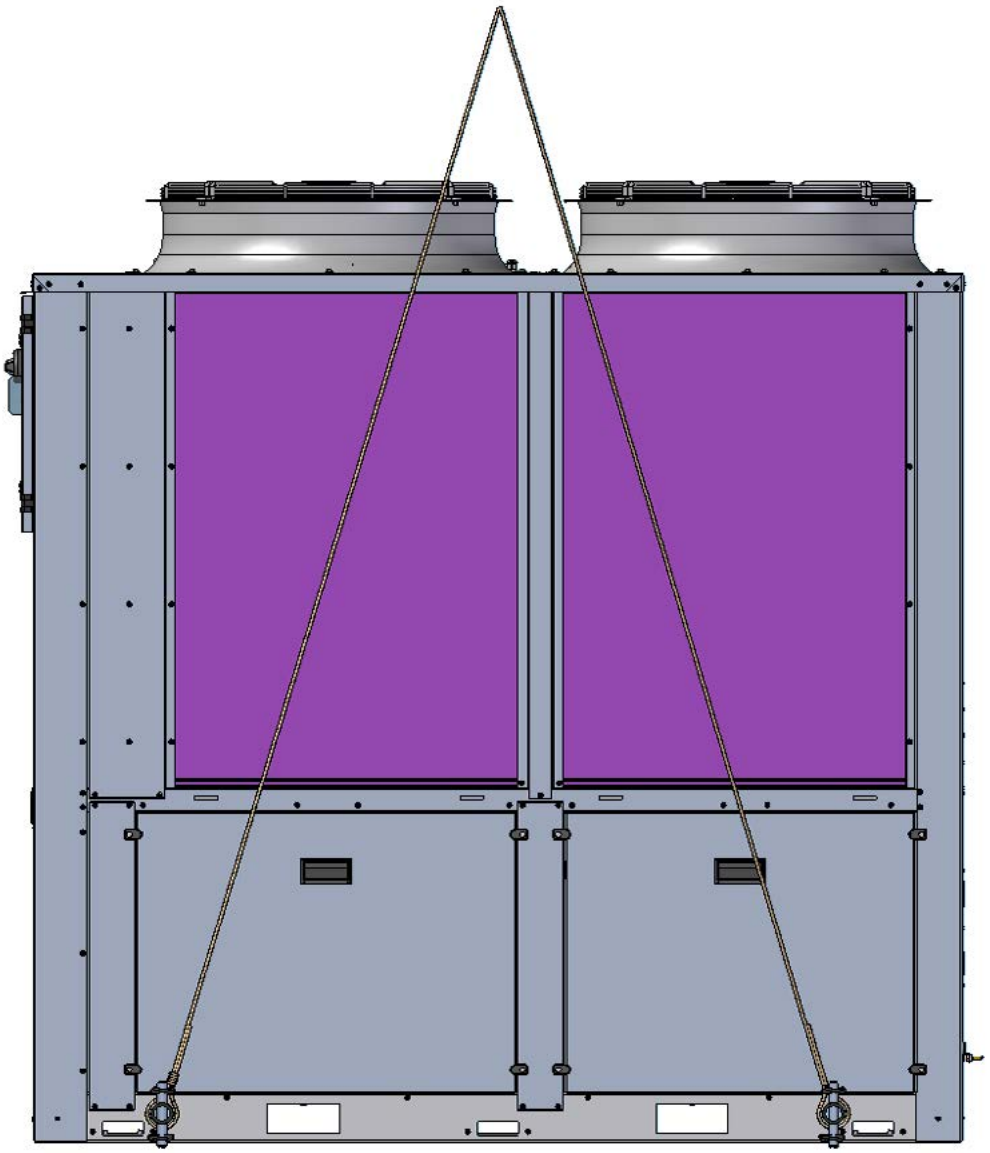
The standard packaging is not suitable for transport by sea or by air

The packaging must be removed when the chiller is placed on the floor, without damaging the chiller.
If packing disposal is necessary, we remind to dispose different materials suitably, as described at chapter “10. Decommissioning and disposal of the unit”.

Lifting with forklift

Lifting with ropes (up to size WRA90)

Lifting with pipes (WRA 0A-5A)



4. Description

4.1. Code

The type code represents the variant of your chiller unit and can be found on the nameplate. You can decode the type code by the following table.

INFORMATION

Please be aware that not every combination of these values is possible.

1°digit	W	**Water chiller**
2°digit	R	
3°digit	A	**Configuration** **A** ON/OFF Compressor
4°digit	1	**Cooling Capacity** See table of technical data
5°digit	3	
6°digit	1	**Version** **1** Atmospheric hydraulic circuit version **2** Pressured hydraulic circuit version **X** Special
7°digit	S	**Liquid operating range** **S** Standard **L** BRINE version - low outlet water temperature **X** Special
8°digit	S	**Air operating range** **S** Standard **X** Special **L** LT version for low ambient temperature
9°digit	A	**Power Supply** **A** 400V/3ph/50Hz **B** 400V/3ph/50Hz - 460V/3ph/60Hz **X** Special
10°digit	Z	**Hydraulic circuit** **0** No pump **5** P3 pump with tank **1** P3 pump **6** P4 pump with tank **2** P4 pump **7** P6 pump with tank **3** P6 pump **8** P5 inverter pump with tank **4** P5 inverter pump **X** Special
11°digit	0	**Customization** **00** Standard, absolute regulation **01** Standard, differential regulation
12°digit	0	
13°digit	0	**Options** **1** "Heating resistance" **9** "Automatic filling" **2** "Polyurethane air filter" **10** "Multi-pole electrical connector" **3** "Aluminium air filter" **11** "Remote ambient temperature probe" 10 m **4** "Gas valve for safety valve" **12** "Eyebolts" **5** "Flow switch" circuit 1 **13** "Higher insulation of the hydraulic circuit" **7** "Under-beam kit" circuit 1 **14** Controller with "RS485"
14°digit	0	
15°digit	0	

4.2. Intended and non-intended use

Intended use
This chiller is intended for the chilled water production and control, in the industrial environment, protected from heat sources, according to indications and limits of the technical nameplate. Cosmotec is not liable for any damage resulting from such misuse. The operator alone bears the risk. The chiller must not be used for the warming of water.

Non-intended use
The chiller cannot be installed on movable, vibrating, oscillating, tilted (non-levelled) parts. Generally, the chiller cannot be installed in the following areas:

- With strong heat radiation;
- With strong magnetic fields;
- With free flames;
- With fire risk;
- With inflammable products;
- With explosive atmosphere;
- With saline atmosphere;
- With aggressive atmosphere;
- With atmosphere that contains dusts (without air filter);
- With atmosphere that contains oil mist (without air filter).

For any doubt, please consult the manufacturer.

4.3. Chiller Design

4.3.1 General

The chiller consists of refrigerant circuit with air condensation, plate evaporator, hydraulic circuit, non ferrous atmospheric tank, scroll compressors, mechanic valve for the models WRA13-18, thermostatic electronic valve for the other models.
After assembling the chiller, each unit is pressure tested, evacuated and fully factory charged with R410A / R134a. The end of line test also includes an operational test with water flowing through the evaporator, to ensure that each refrigerant and hydraulic circuits operates correctly.

4.3.2 Versions

The following versions are available.

Brine version for water outlet low temperatures
This version includes a dedicate software. This version includes higher insulation of the hydraulic circuit and pumps with stronger engine, suitable to work with higher glycol % and low fluid temperature.

Version for low ambient temperature

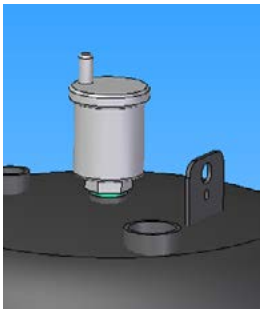
In order to allow the operation at low ambient temperatures, this version includes the electronic regulation of fan speed and a dedicate regulation software. This version has pumps with stronger engine suitable to work with higher glycol %.

Version of the hydraulic circuit with atmospheric tank

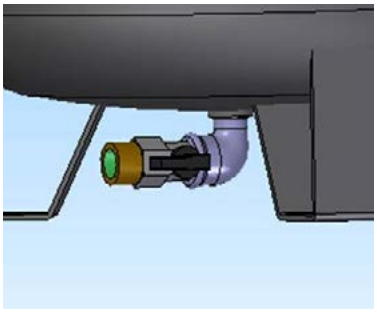
The tank is made of polyethylene or stainless steel, insulated with a thickness of 10 mm and dust-tight (IP54). In this version, filling is carried out using a cap with filter and vent. It also includes the visual level in transparency and the electrical level.

Hydraulic circuit version with pressure accumulation (up to WRA90)

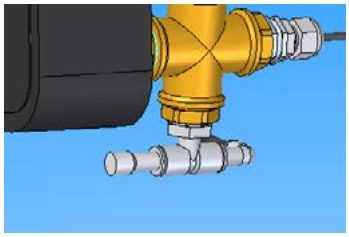
The pressure circuit has an insulated painted steel tank, 10 mm thick. It also includes: an expansion vessel with a pre-charge of 1 bar (sized according to the volume of the chiller's hydraulic circuit), a safety valve set at 4 bar, an automatic venting device, a vacuum breaker valve, a tap for filling and draining.
To drain the evaporator's hydraulic circuit, an automatic plug is provided at the evaporator outlet "TP" (see an example in the picture below).



Automatic vent valve



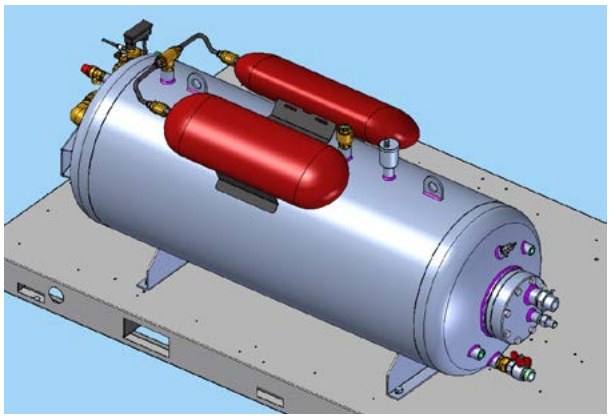
Filling/draining tap



Automatic plug-in cap at evaporator outlet

Hydraulic circuit version with pressure tank (WRA0A-5A)

This version has a shell and tube evaporator integrated in a 250l steel tank.
The storage tank is equipped with two expansion vessels with a precharge of 1 bar (sized according to the volume of the chiller's hydraulic circuit), a safety valve set at 4 bar, an automatic venting device, a vacuum breaker valve, a tap for filling and draining.
See below a picture of the shell and tube heat exchanger.



4.4. Refrigerant circuit

The compressor compresses the refrigerant gas, bring it to higher temperature and pressure. Through the condenser, the hot gas is cooled and liquefied, releasing hot to the external air. Pushed through the electronic expansion thermostatic valve, the liquid refrigerant lose pressure and its prepares for the evaporation. This takes place in the evaporator, where the refrigerant absorbs the heat of the warm water or of the mixture to treated, which is therefore cooled.

4.4.1 Safety devices

High pressure switch (PSH)

A high pressure switch is installed in each cooling circuit. It will be activated when the pressure inside the cooling circuit exceeds a prefixed value (shows in the table below). The compressor of the circuit will be turned off and an alarm signal is shown on the electronic control display (see chapter 9). The pressure switch has automatic reset with 4 attempts, in less that 3 hours, so it's automatically deactivated for 4 times, then it has to be manually deactivated from the display, after removing the cause of his intervention (please refer to chapter „Malfunction"). The automatic reset respects stopping and starting compressor times.

Low pressure switch (PSL)

A low pressure switch is installed in the cooling circuit and it will be activated when the pressure inside the cooling circuit drops down to a prefixed value (shows in the table below). The compressor of the circuit will be turned off and an alarm signal is shown on the electronic control display. The pressure switch has automatic reset with 4 attempts, in less that 3 hours, so it's automatically deactivated for 4 times, then it has to be manually deactivated from the display, after removing the cause of his intervention (please refer to chapter „Malfunction"). The automatic reset respects stopping and starting compressor times.

	WRA13÷18	WRA20÷5A
PSH OFF [bar(g)]	25	43
PSH ON [bar(g)]	20	33,5
PSL OFF [bar(g)]	0,5	2,4
PSL ON [bar(g)]	1,5	3,4

Safety valve at high pressure side (VSC2)

A safety valve is positioned on the high pressure side of the compressor. It will be activated when the pressure in the cooling circuit exceeds values shows in the hydraulic schemes at paragraph 4.5 (whether the chiller is operating or not). In this case the safety valve opens and the refrigerant will exit.

Safety valve at low pressure side (VSC1)

A safety valve is positioned in the low pressure side. It will be activated when the pressure exceeds values shows in the hydraulic schemes at paragraph 4.5 (whether the chiller is operating or not). In this case the safety valve opens and the refrigerant will exit.

4.4.2 Compressor (CO)

The chillers have an hermetic Scroll compressors, installed on anti-vibration supports.

4.4.3 Evaporator (EV)

The chiller has a brazed plate evaporator, it's thermally insulated with 10 mm of thermal insulator material that resist to atmospheric agents and UV radiations. It's also protected from freezing by an antifreeze temperature probe and a differential pressure switch.

In the pressure tank version of the WRA0A-5A, the shell and tube evaporator is integrated in the tank, which is thermally insulated with 20 mm thick, weatherproof and UV-resistant insulation and has a scratch-resistant surface coating. Frost protection is ensured by an antifreeze temperature probe and a differential pressure switch.

4.4.4 Condenser

The condenser is with copper mini-pipes and aluminium fins.

4.4.5 Electrical box

The electrical box is located in the front side of the chiller.
In the entrance door of the electrical box there is a main switch with door block function when the unit is ON. In the front door there is also the display of the electronic controller and the protection panel for outdoor use.
On the left side of the electrical box there are signal and power connectors PG for customer cable entry. The protection degree of the electrical box is IP54.

4.4.6 Sensors

The following sensors are installed in the chiller as standard for each refrigerant circuit:

Cooling circuit:
- High pressure switch (PSH) ⇨ to guarantee safety
- Low pressure switch (PSL) ⇨ to guarantee safety
- High pressure transducer (DT1) ⇨ to manage the fan
- Low pressure transducer (DT2)(for units with electronic thermostat) ⇨ to manage the electronic thermostat
- Overheating probe (PR5)(for units with electronic thermostat) ⇨ Management of electronic thermostat

Chilled water circuit:
- Differential pressure switch on the evaporator (PD) ⇨ to manage the safety of the unit
- Pressure transducer (DT3)(for units with inverter pump) ⇨ for the regulation at constant pressure of the pump
- Sensor for freezing temperature (PR2) ⇨ to manage the safety of the unit

- Regulation probe (PR1) ⇨ to manage the regulation set point and to visualize the temperature

Air Temperature:

- Sensor for ambient temperature (PR3) ⇨ to visualize the temperature and manage chiller regulation

4.4.7 Electronic controller ELWLCH

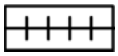
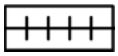
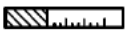
The electronic controller has a display positioned in the front door of the electrical cabinet. It's able to show the information about the operation conditions, the status of the unit and all the alarms. It is accessible from the outside. There are three levels of access, 0 (password is not necessary), 1 and 2 (both with password).

INFORMATION

To get more information about the controller, please refer to the separate controller manual

4.5. Hydro-cooling circuit

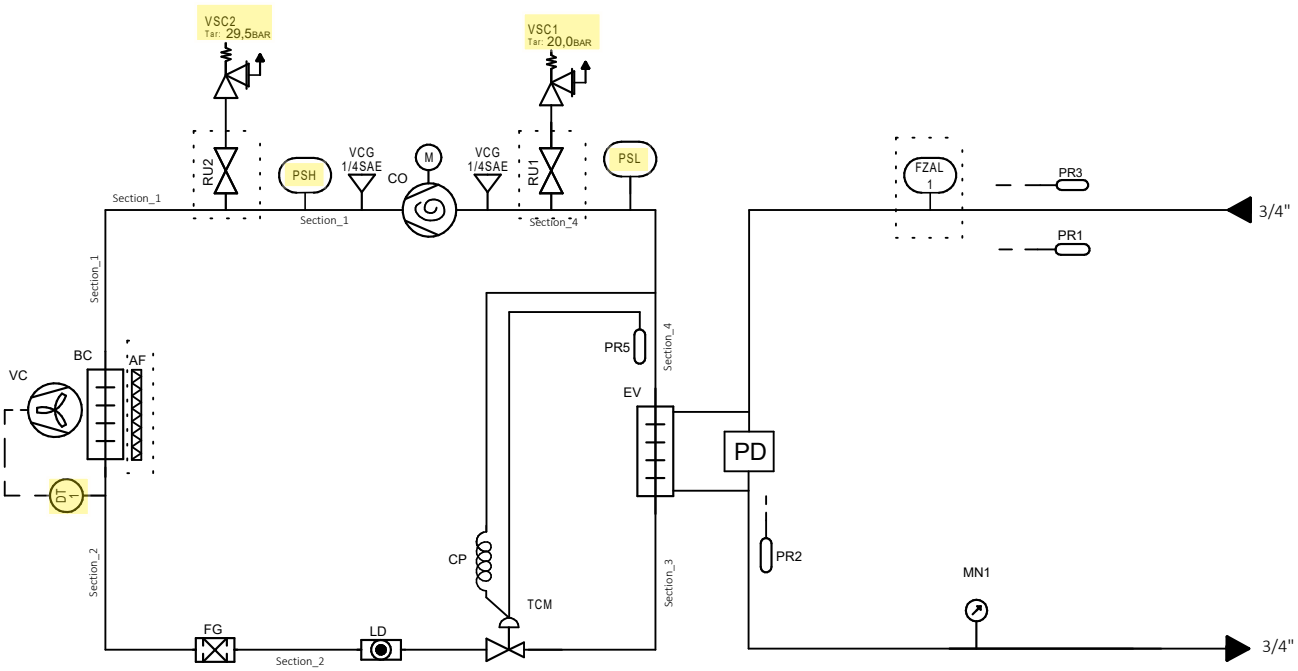
4.5.1 Legend

Nomenc.	Symbol	Meaning	Nomenc.	Symbol	Meaning
ABV		Automatic vent valve	**PSV**		Vacuum pressure switch
AF		Condenser air filter	**PW**		Water pump
BPA		Automatic by-pass	**RA**		Automatic filling
BC		Condenser	**RE**		Compressor carter resistance
CO		Compressor	**RE-I**		Resistance
DT		Pressure transducer	**RI**		Filling cap
EL		Electrical level	**RU**		Gas valve
EV		Evaporator	**SV**		Tank discharge
EV-ST		Shell and tube evaporator	**TCE**		Electronic thermostatic valve
FG		Refrigerant filter	**TCM**		Mechanical thermostatic valve
FW		Pressure switch	**TP**		Cap
FZAL		Flow switch	**TS**		Limit thermostat
LD		Gas injector	**VA**		Tank
LV		Visual level	**VAP**		Pressurized accumulation tank
M		Motor	**VC**		Condenser fan
MBV		Ball valve for air vent	**VCG**		Charge gas valve
MN		Manometer	**VSC**		Safety valve with spring return
PD		Differential pressure switch	**VNR**		Non-return valve
PR		Probe	**VSW - DV**		Membrane solenoid valve
PSH		High pressure switch	**VX**		Expansion vessel
PSL		Low pressure switch			Refrigerant line

Versions:

- V1 = Version 1, atmospheric circuit
- V2 = Version 2, under pressure circuit

WRA 13 - 18; Version 1. Hydraulic circuit 0.



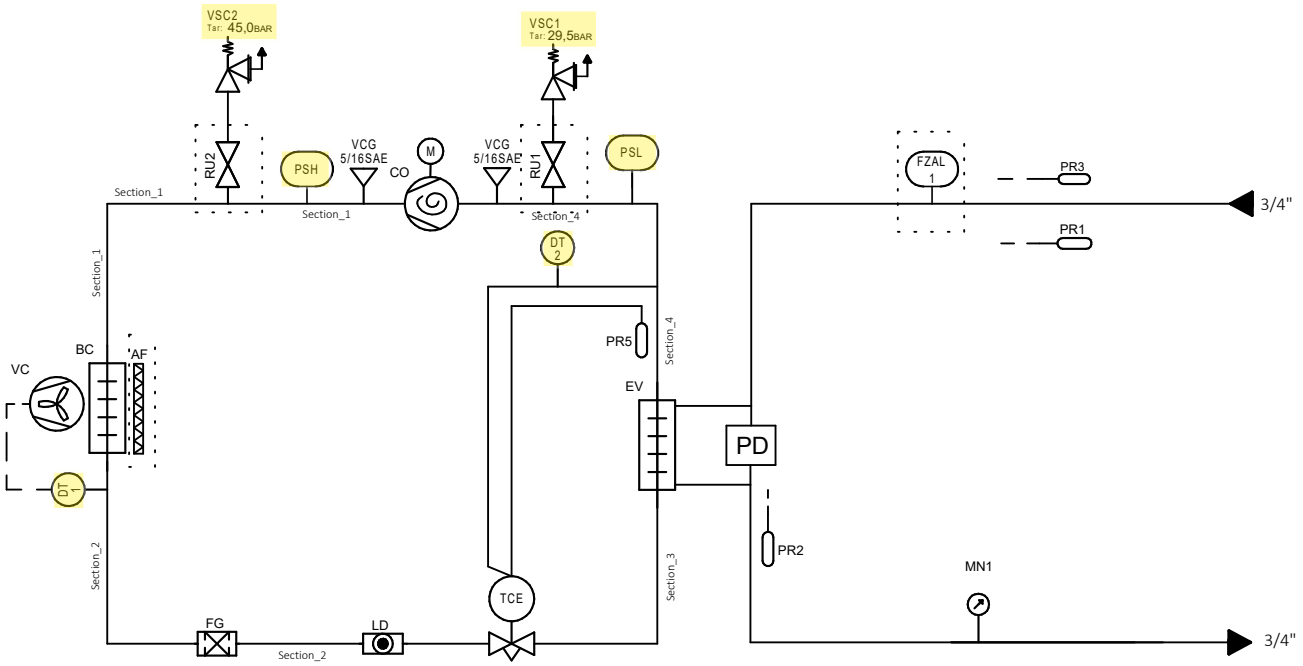
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 20 - 25; Version 1. Hydraulic circuit 0.



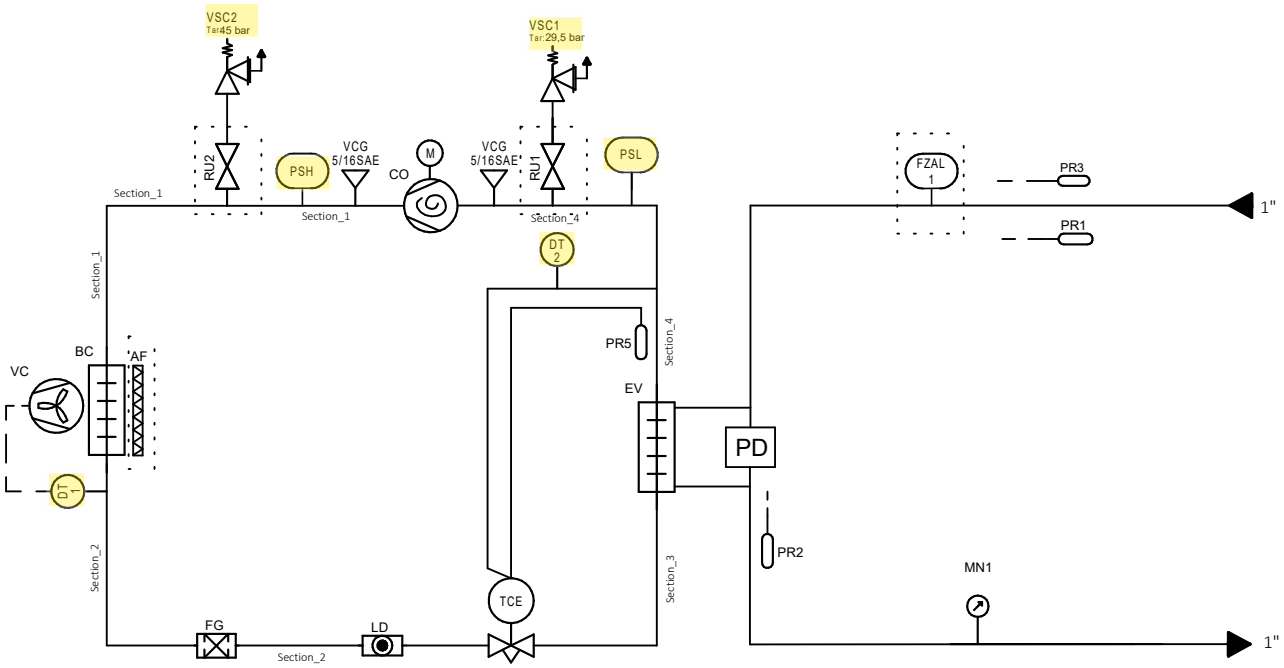
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 30 - 35 - 50; Version 1. Hydraulic circuit 0.



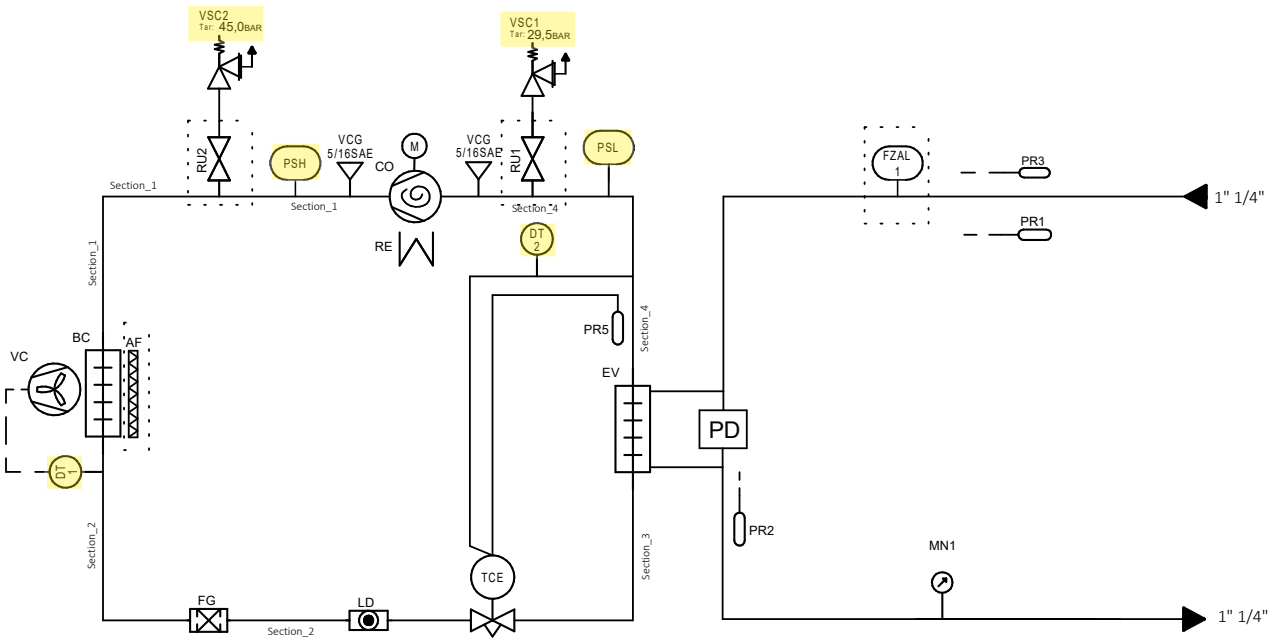
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 14	ø 12	ø 12	ø 18

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 55 - 65; Version 1. Hydraulic circuit 0.



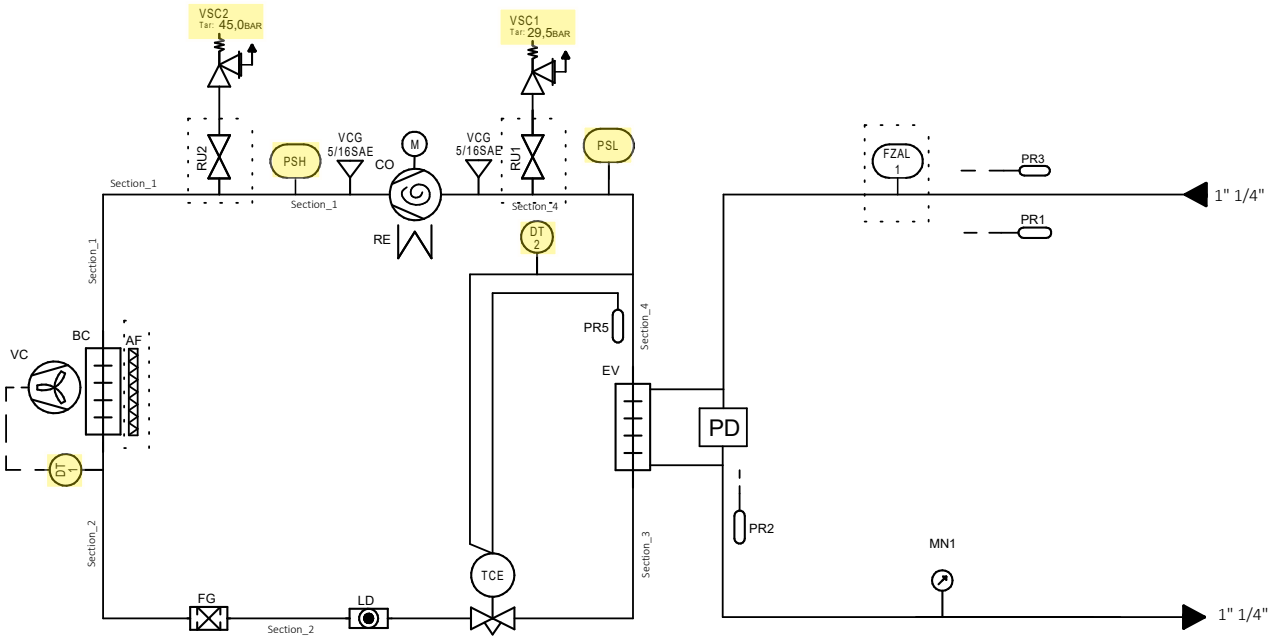
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 18	ø 16	ø 12	ø 22

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 80-90; Version 1. Hydraulic circuit 0.



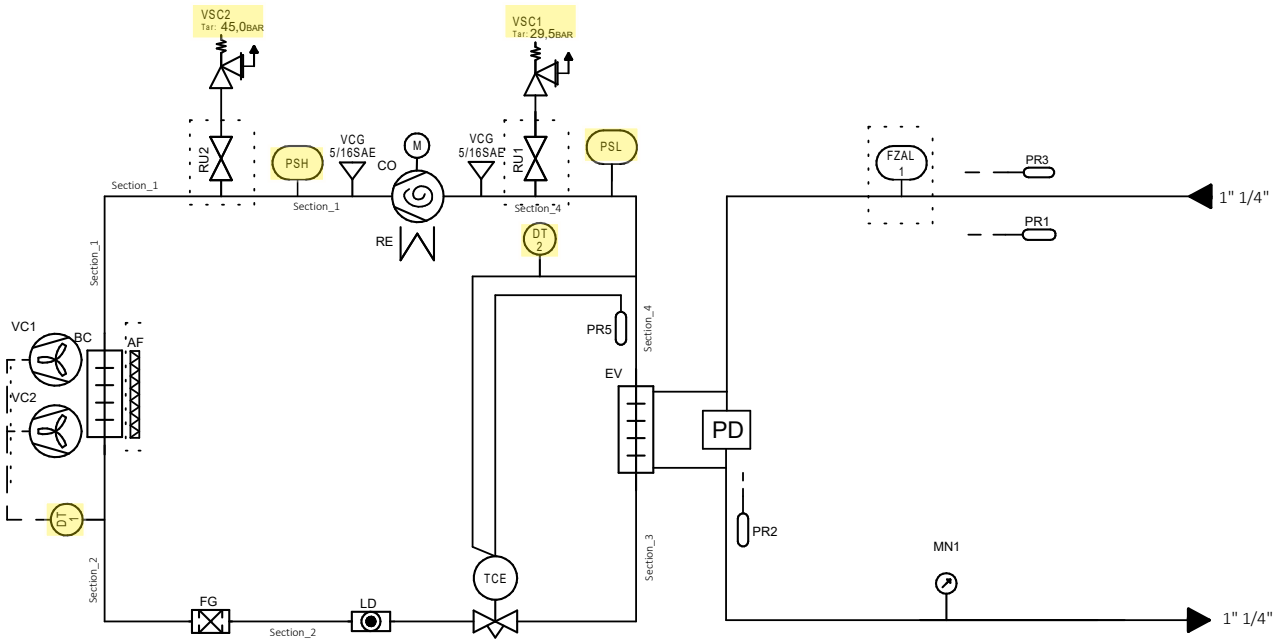
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 18	ø 16	ø 12	ø 22

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

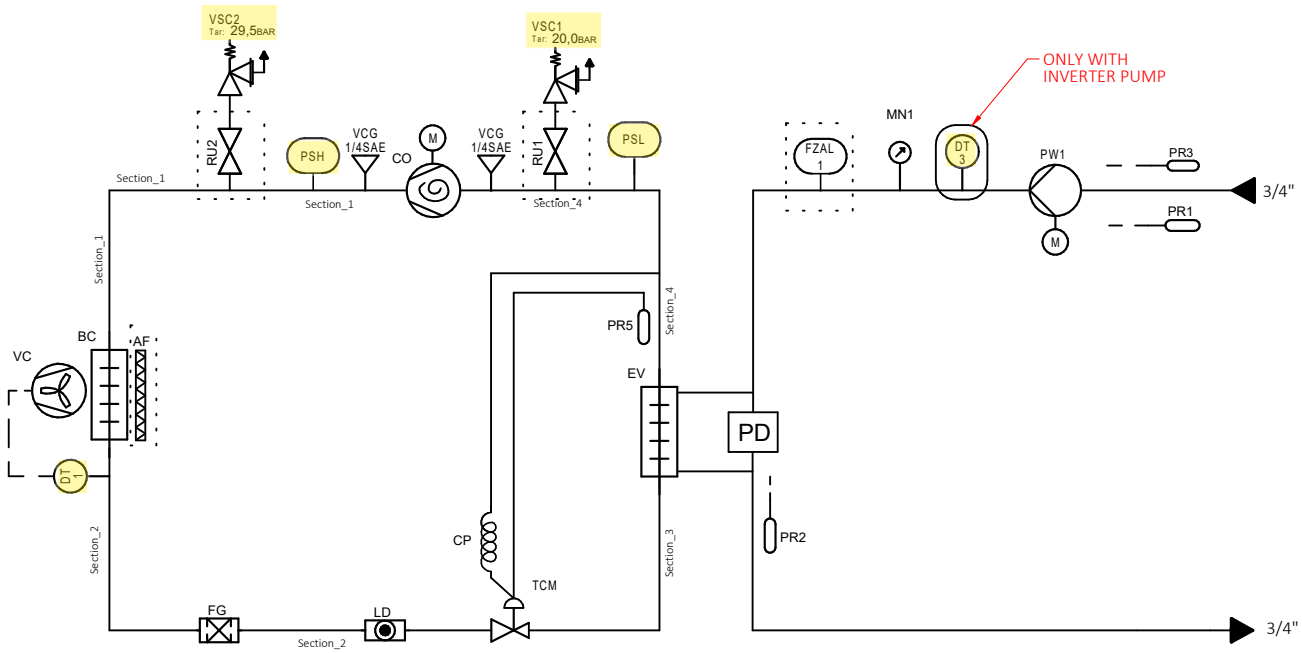
WRA 0A - 5A; Version 1. Hydraulic circuit 0.



ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 18	ø 16	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 13 - 18; Version 1: Hydraulic circuit 1, 2, 3, 4



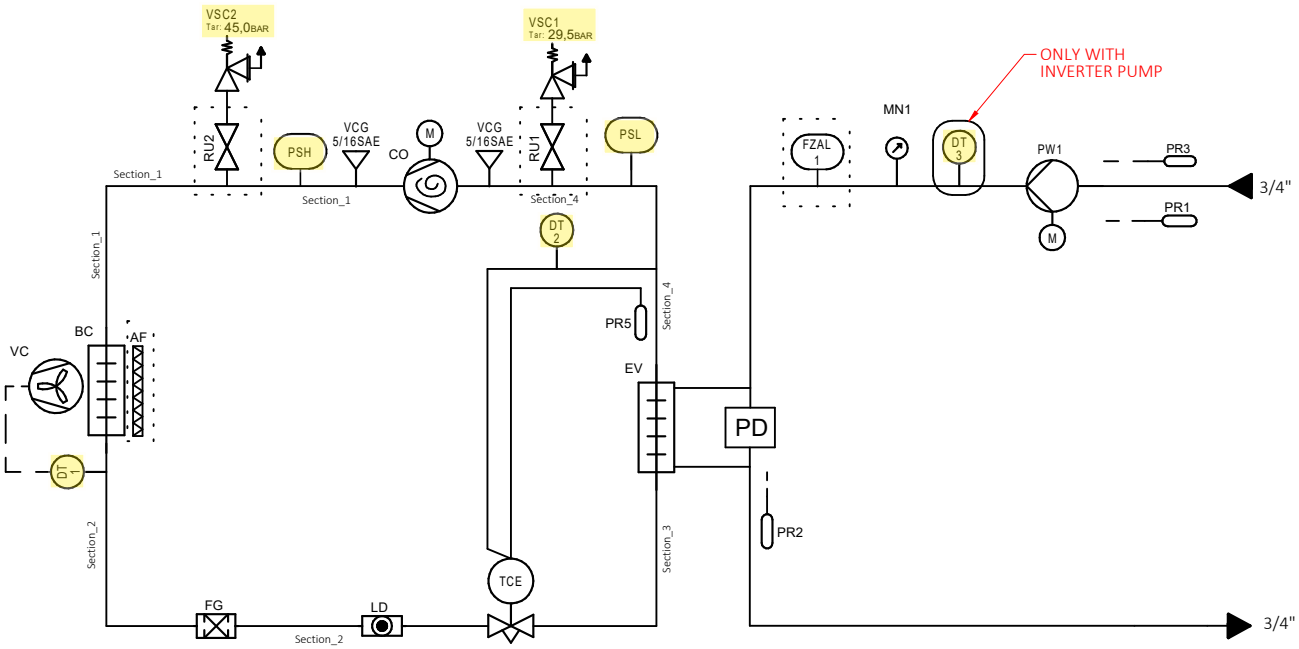
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 20 - 25; Version 1: Hydraulic circuit 1, 2, 3, 4



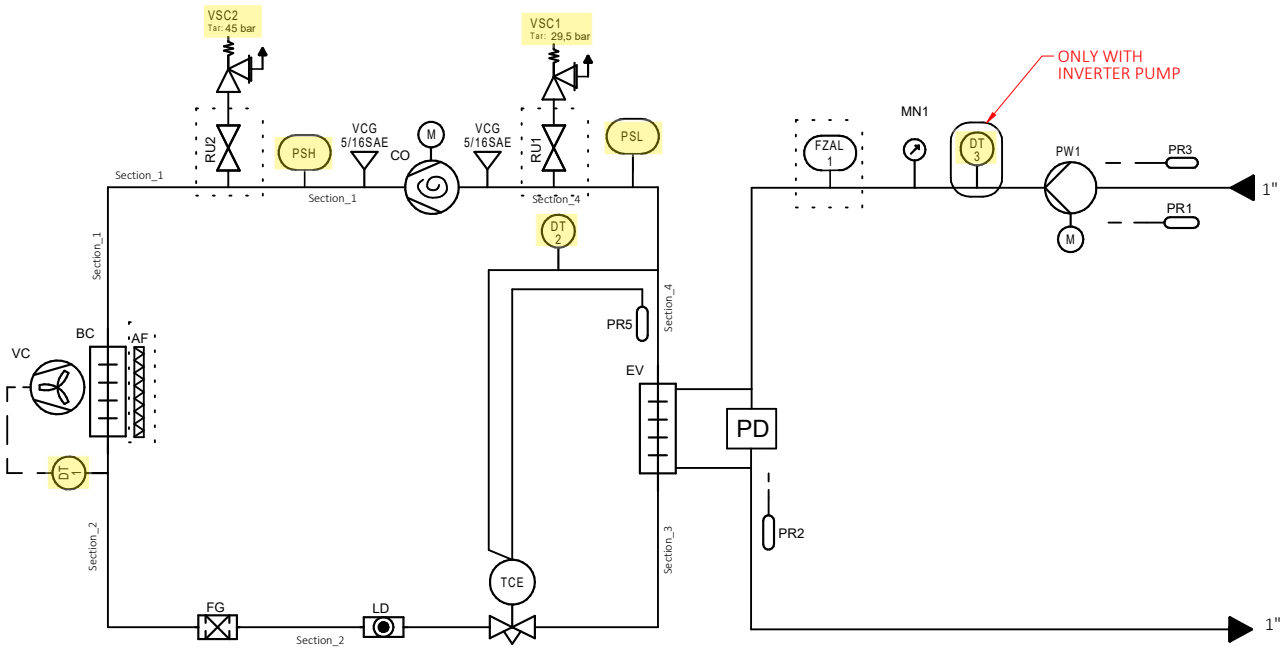
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 30 - 35 - 50; Version 1: Hydraulic circuit 1, 2, 3, 4



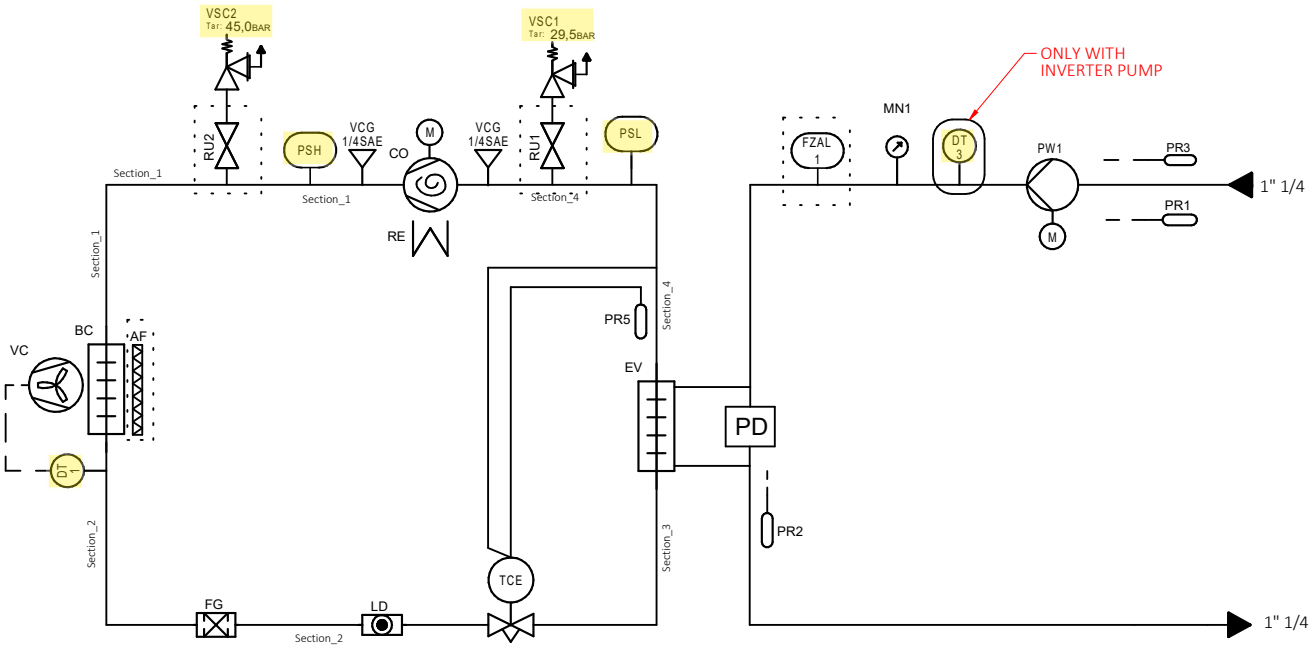
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 14	ø 12	ø 12	ø 18

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 55 - 65; Version 1: Hydraulic circuit 1, 2, 3, 4



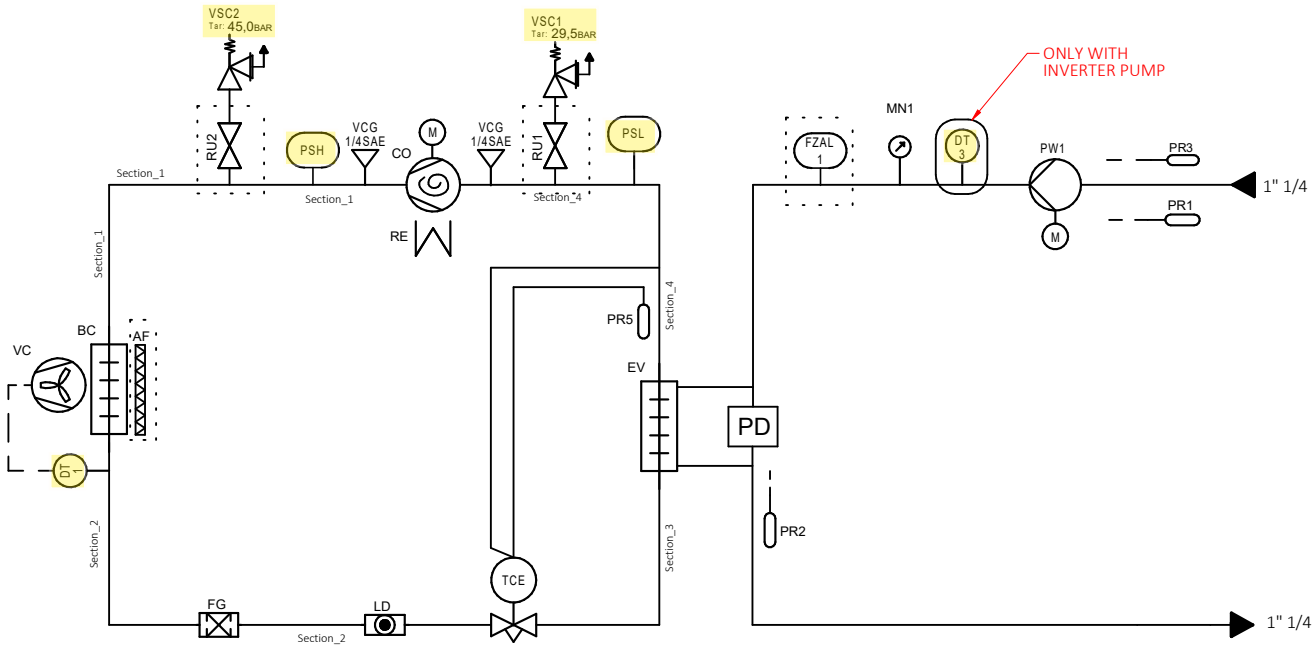
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 18	ø 16	ø 12	ø 22

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 80 - 90; Version 1: Hydraulic circuit 1, 2, 3, 4



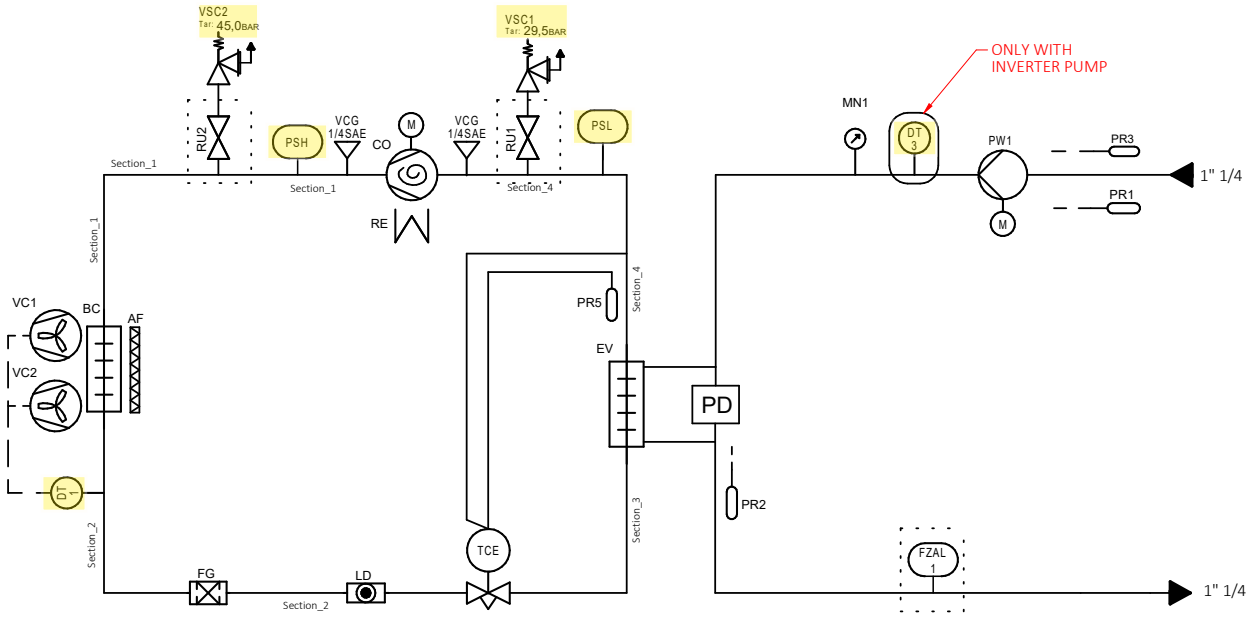
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 16	ø 12	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 0A - 5A; Version 1: Hydraulic circuit 1, 2, 3, 4



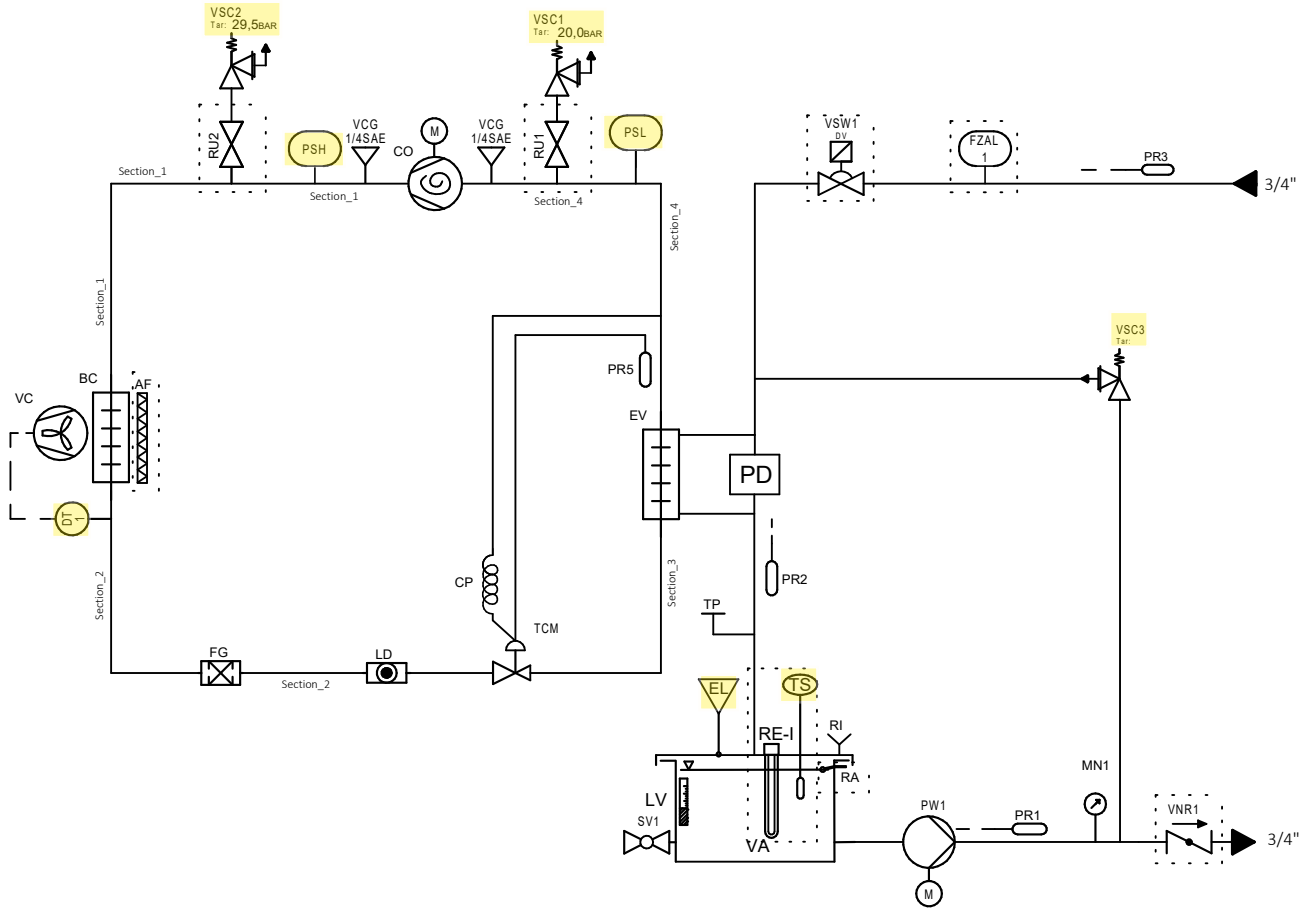
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 18	ø 16	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 13 - 18; Version 1: Hydraulic circuit 5, 6, 7



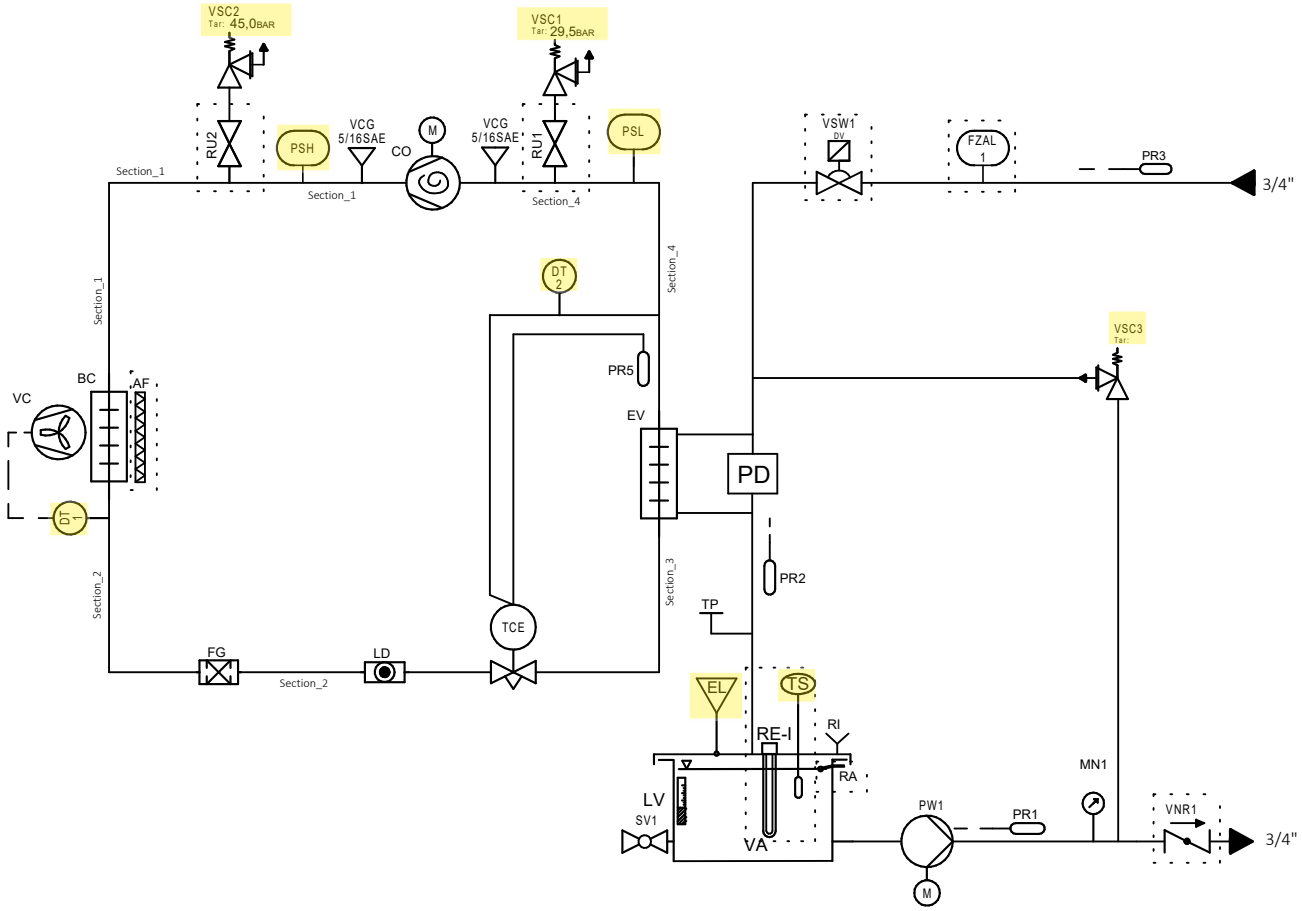
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 20 - 25; Version 1: Hydraulic circuit 5, 6, 7



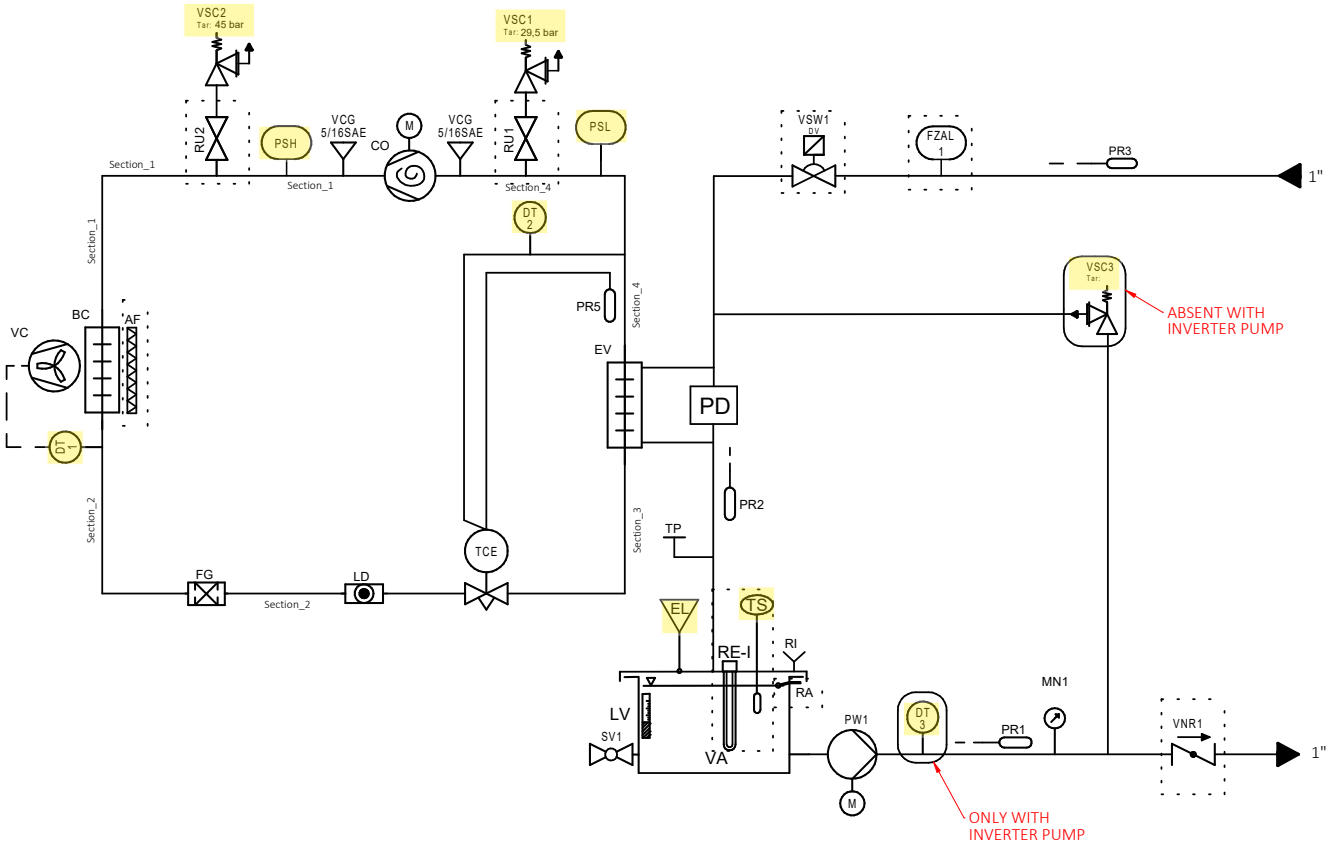
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 30 - 35 - 50; Version 1: Hydraulic circuit 5, 6, 7, 8



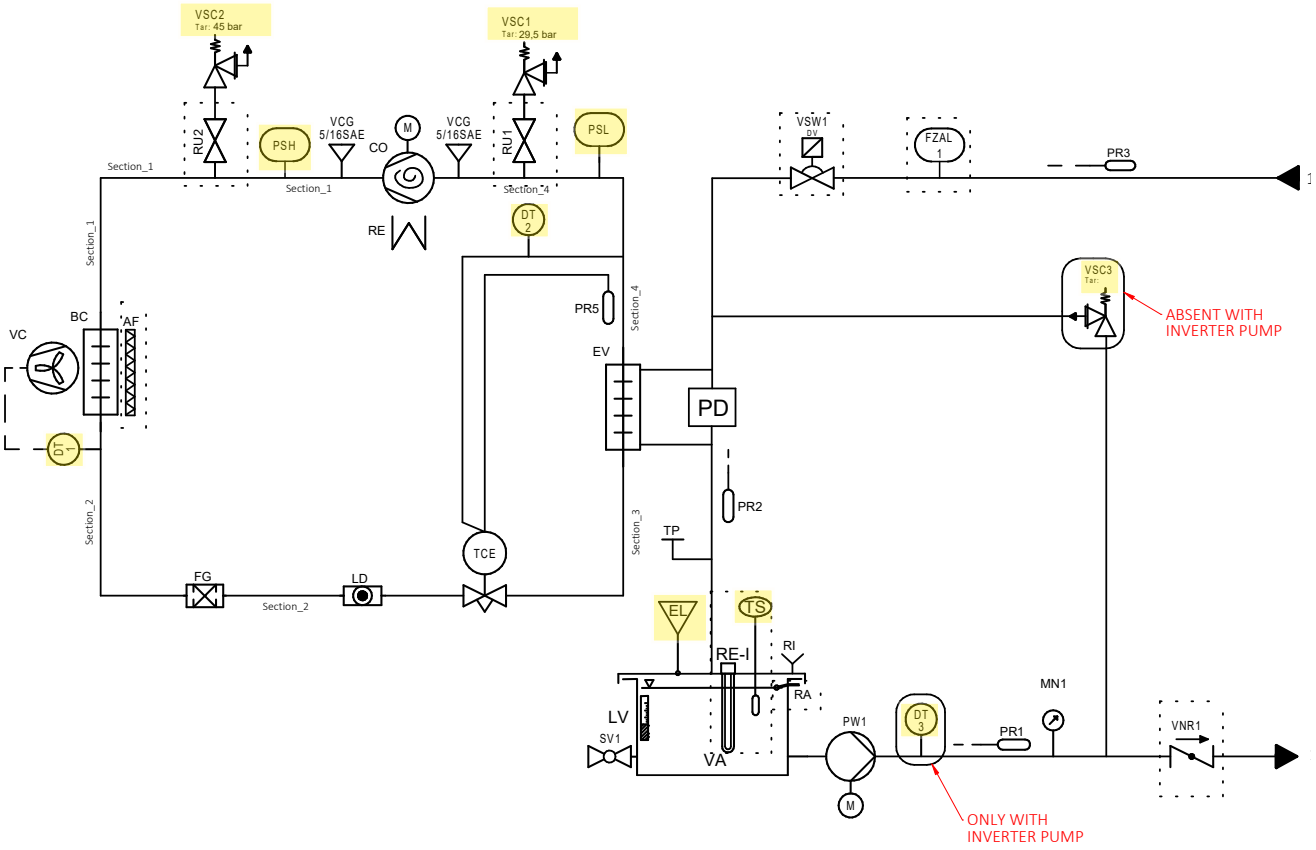
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 14	ø 12	ø 12	ø 18

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 55 - 65; Version 1: Hydraulic circuit 5, 6, 7, 8



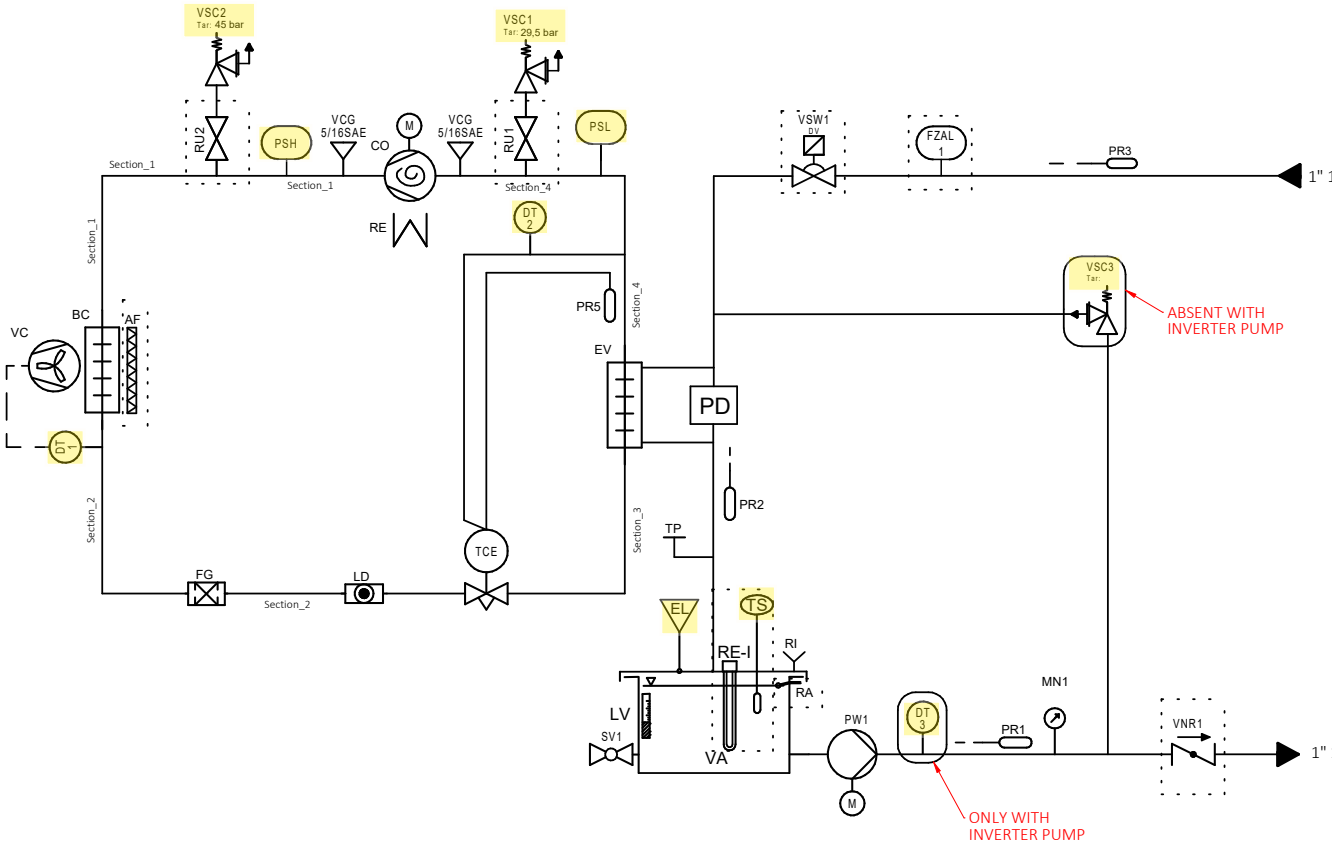
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 18	ø 16	ø 12	ø 22

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 80 -90; Version 1: Hydraulic circuit 5, 6, 7, 8



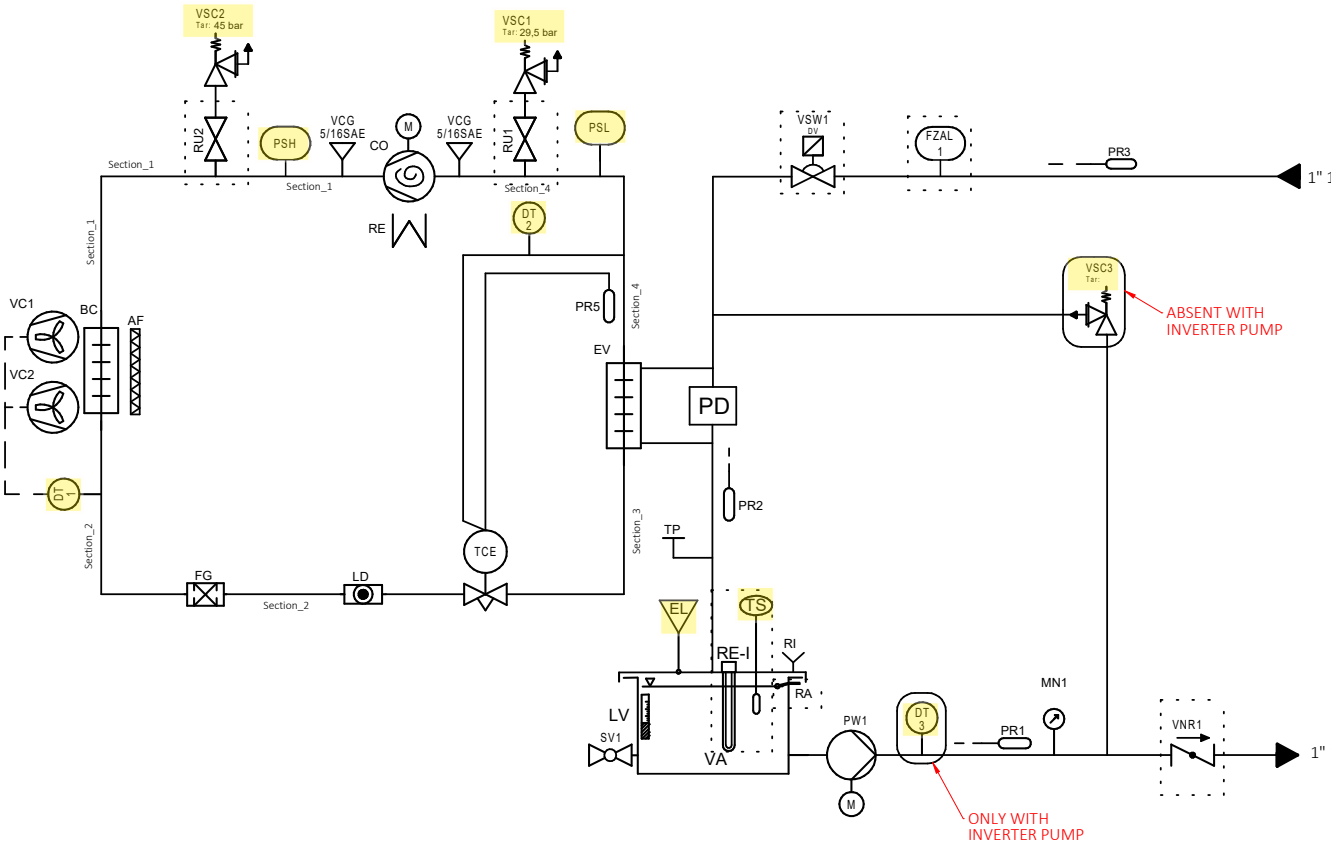
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 16	ø 12	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 0A - 5A; Version 1: Hydraulic circuit 5, 6, 7, 8



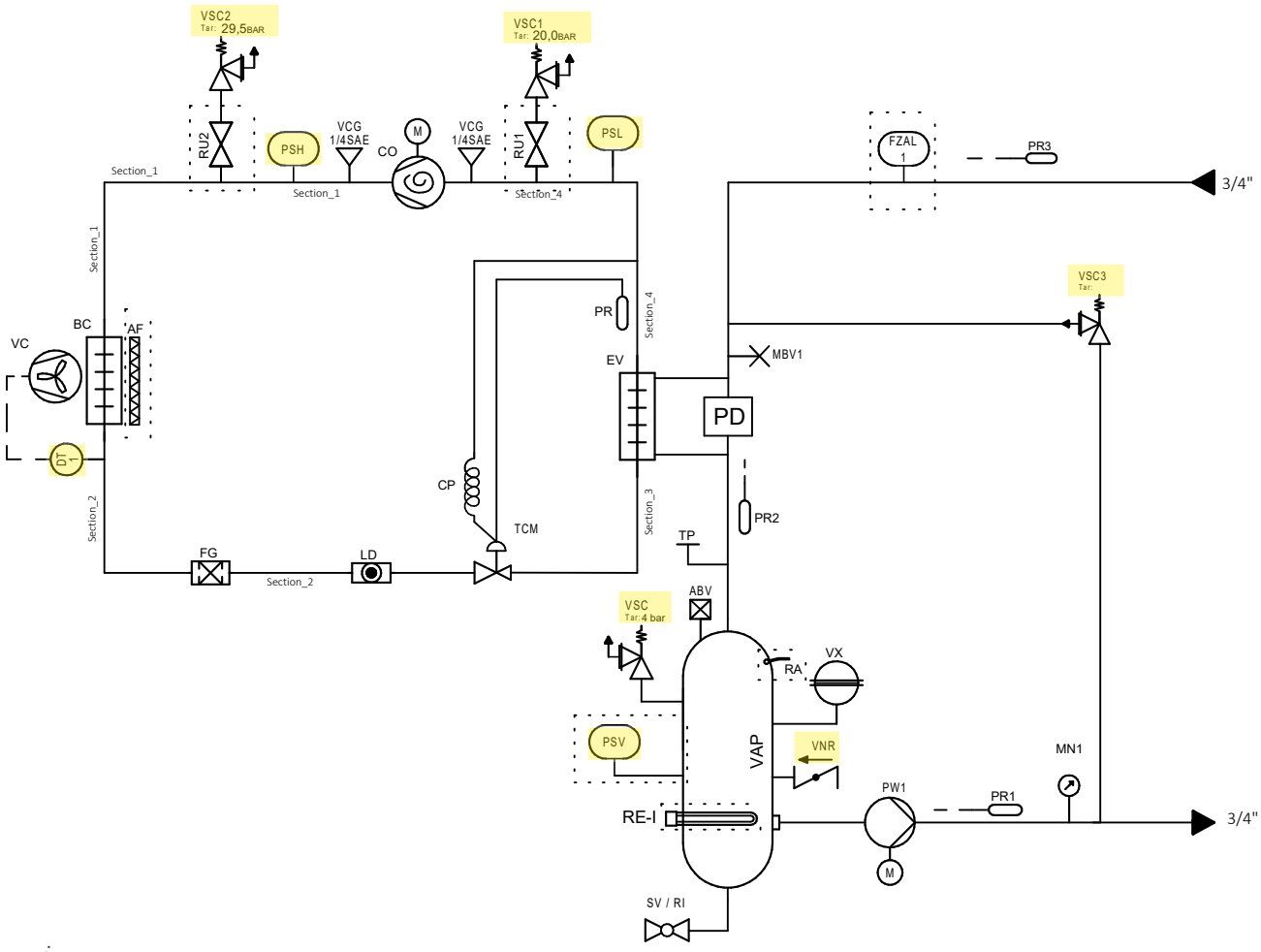
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 18	ø 16	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 13 - 18; Version 2: Hydraulic circuit 5, 6, 7



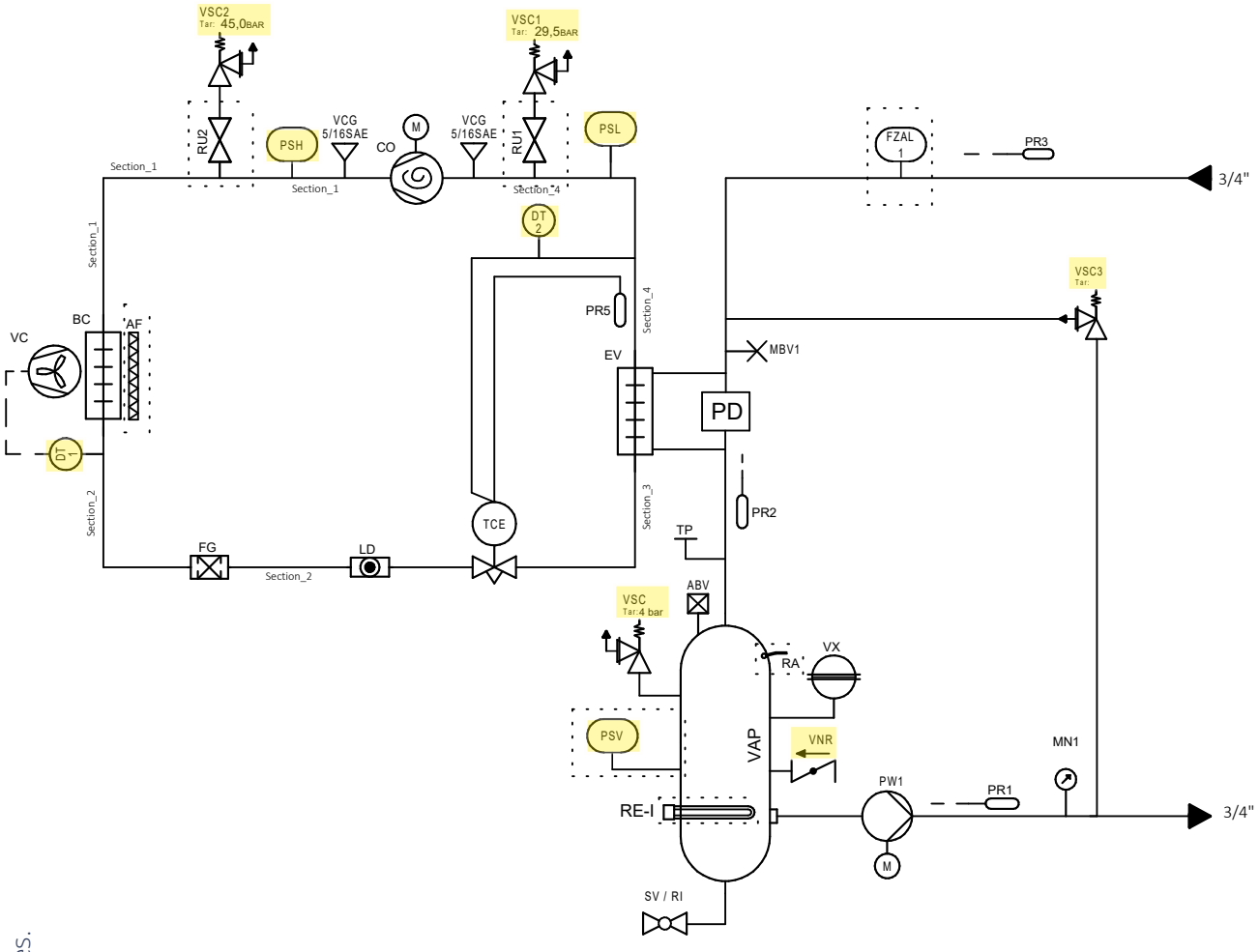
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 20 - 25; Version 2: Hydraulic circuit 5, 6, 7



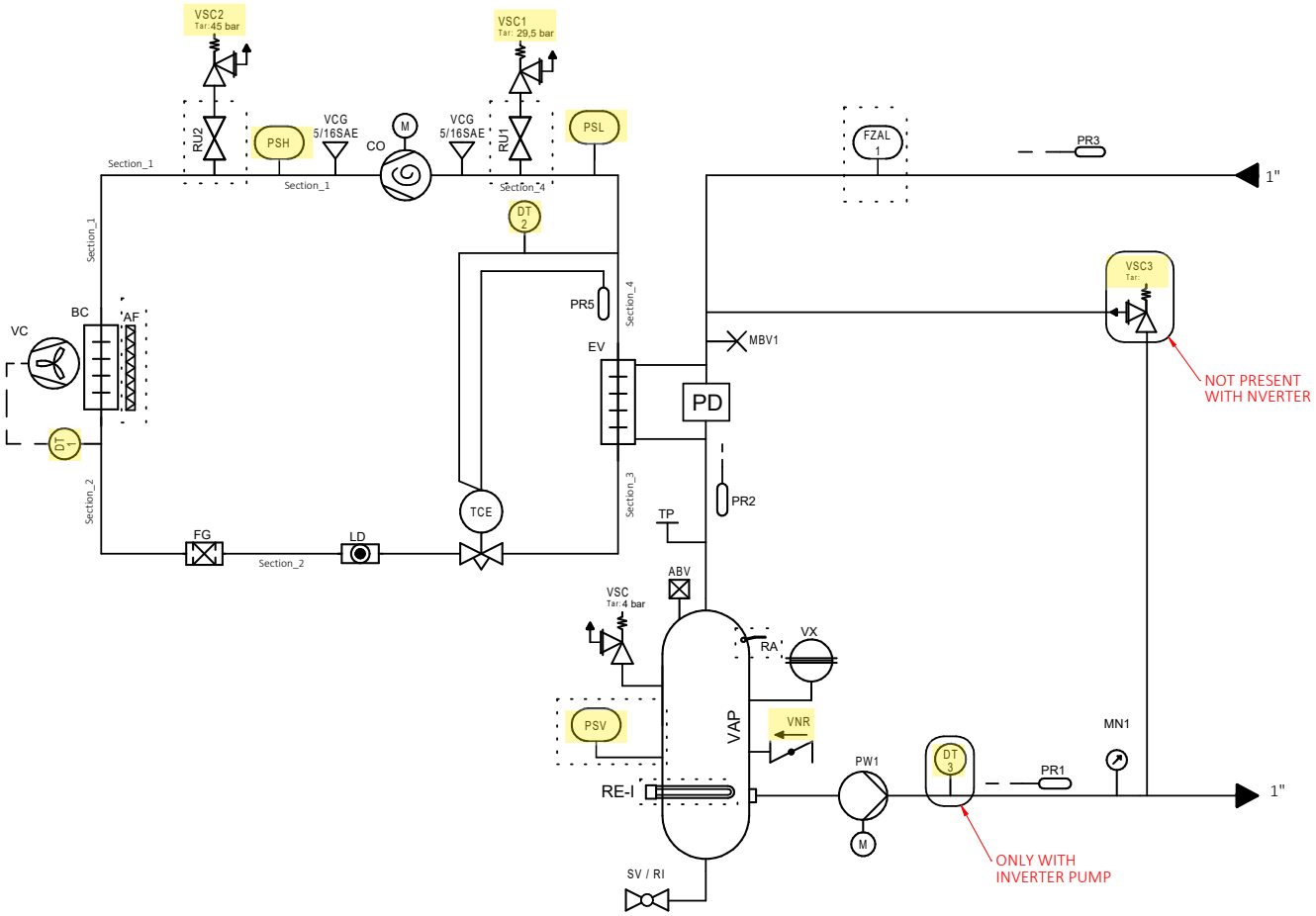
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 12	ø 10	ø 12	ø 16

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 30 - 35 - 50; Version 2: Hydraulic circuit 5, 6, 7, 8



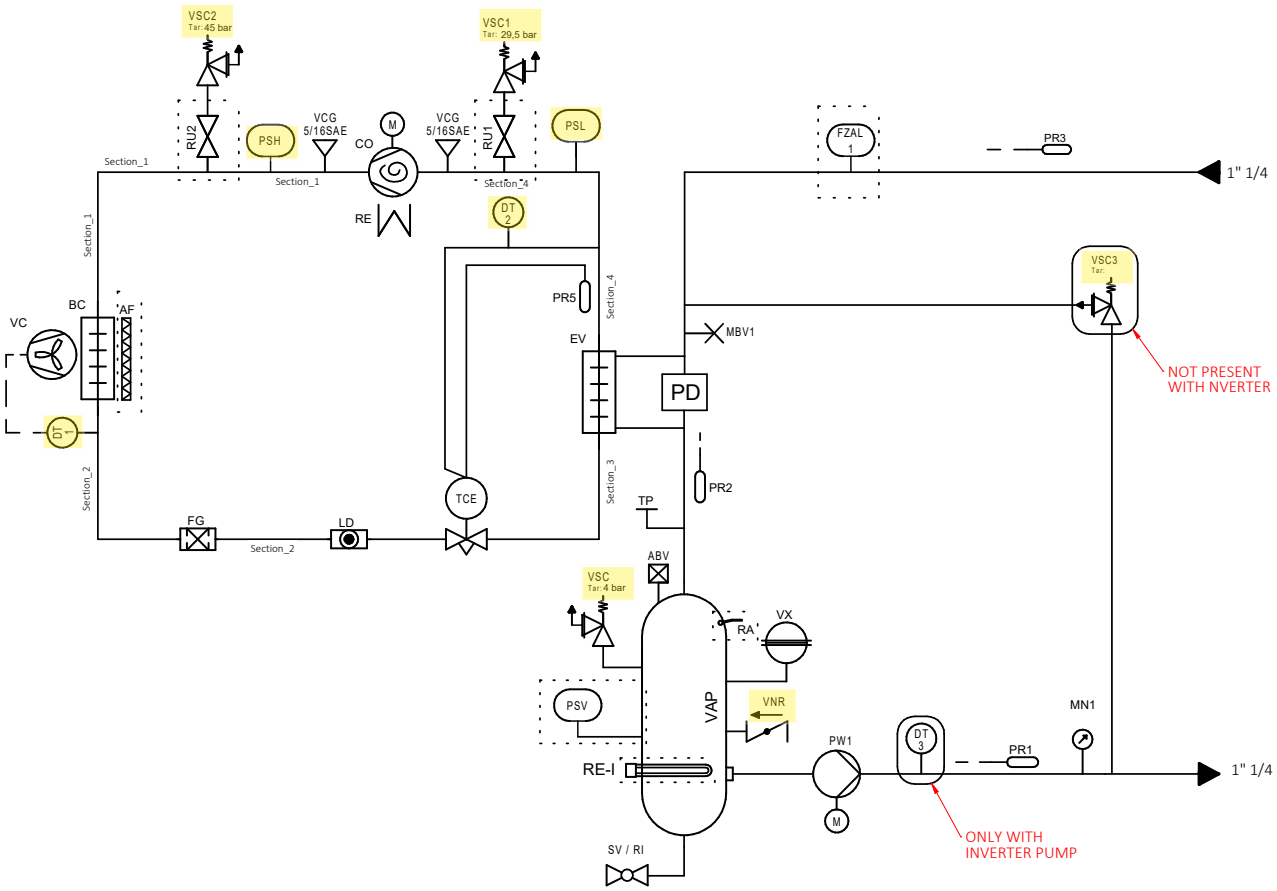
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 14	ø 12	ø 12	ø 18

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 55 - 65; Version 2: Hydraulic circuit 5, 6, 7



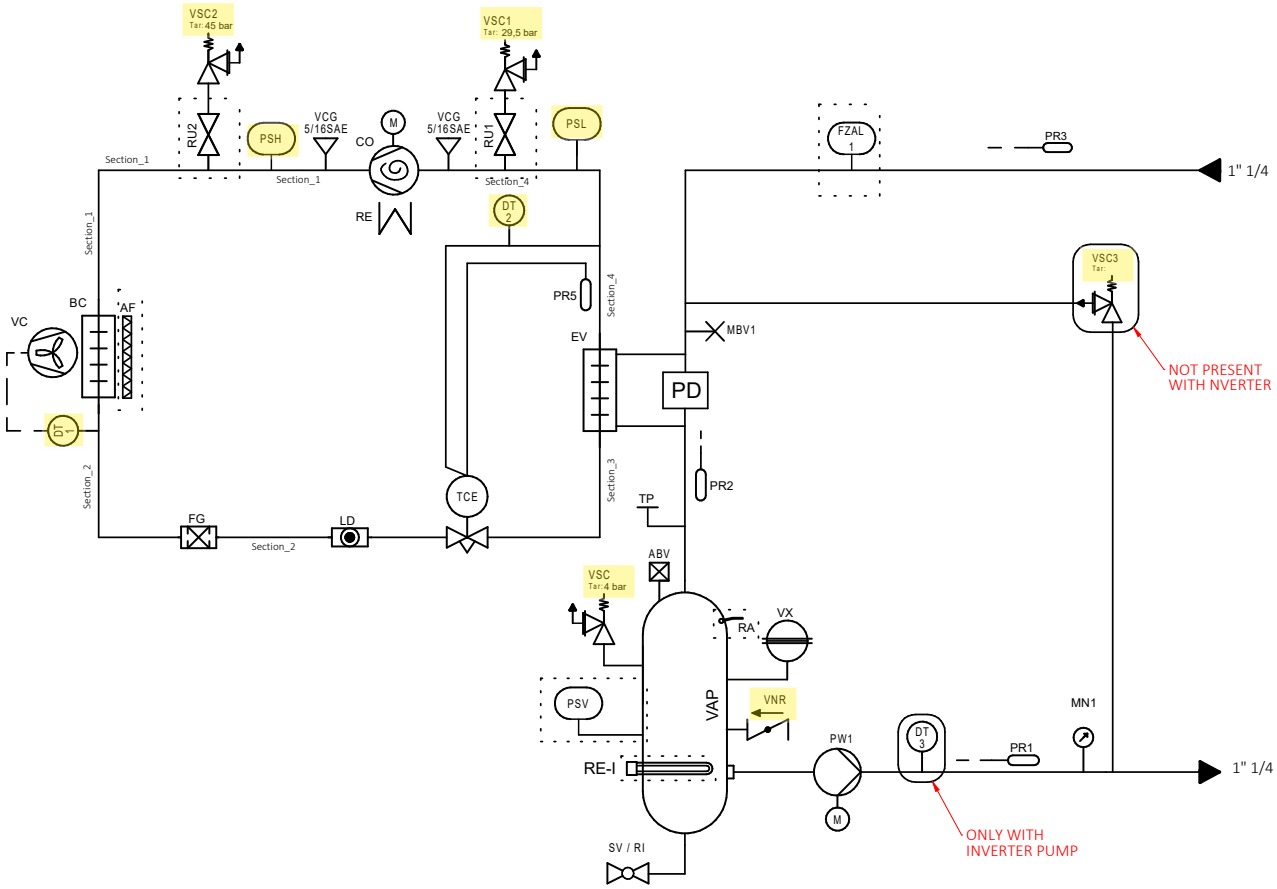
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 18	ø 16	ø 12	ø 22

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 80 - 90; Version 2: Hydraulic circuit 5, 6, 7, 8



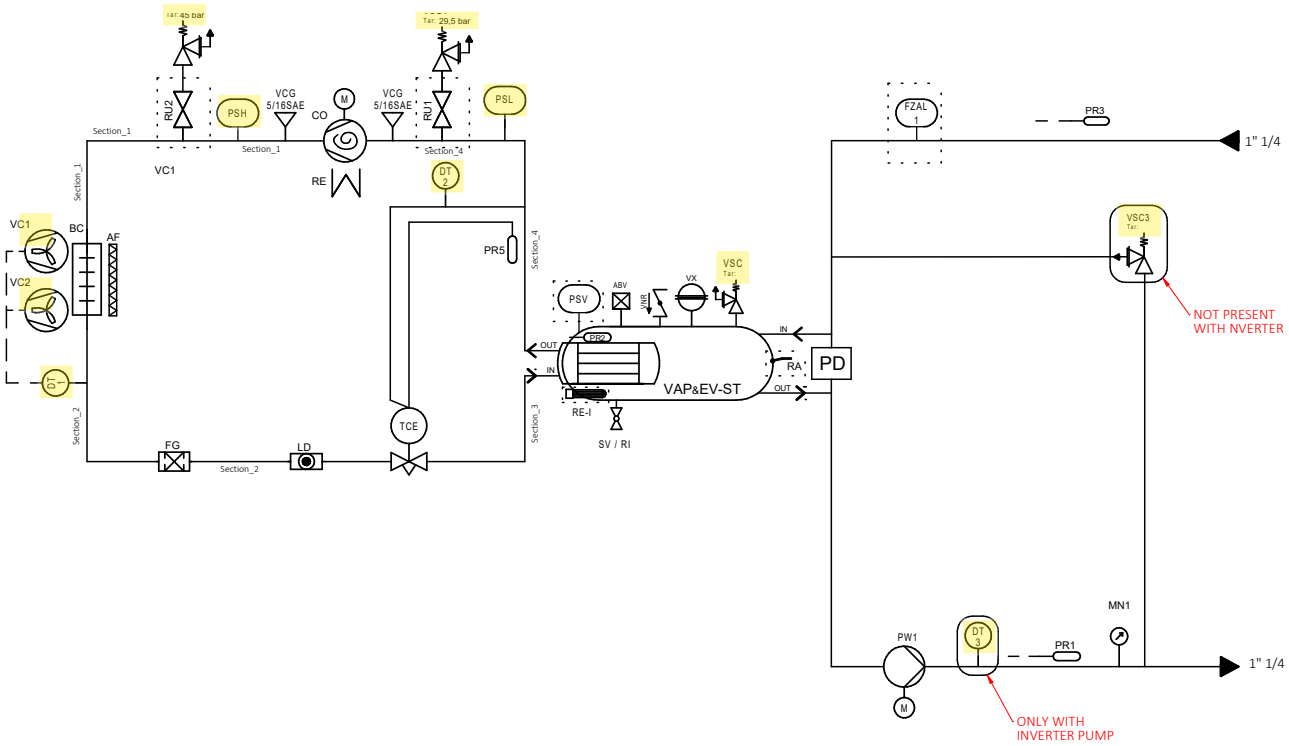
Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 16	ø 12	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

WRA 0A - 5A; Version 2: Hydraulic circuit 5, 6, 7, 8



Option

Labelled components

ø_TUBE			
Section_1 : Discharge line	Section_2 : Liquid line	Section_3 : expansion device	Section_4 : suction line
ø 22	ø 18	ø 16	ø 28

Standard circuit diagram. Check **MANUAL PART IIa** for any changes.

5. Technical Data

5.1. Application limits

Cosmotec units are provided for operations within the following ranges:

Type of network		TT; TN-S ; TN-C-S
Voltage		400V/3ph/50Hz; 460V/3ph/60Hz; PE
Voltage Tolerance		± 10 %
Frequency Tolerance		± 1 %
Rated ultimate short- circuit breaking capacity		1,5 kA
Max. glycol content	ethylenic	40 %
	propilenic	40 %

Setting of the safety devices	
High pressure limiter	See table on paragraph 4.4.1.
Low pressure limiter	
High pressure safety valve (for units with refrigerant R134a)	29,5 barg
High pressure safety valve (for units with refrigerant R410A)	45 barg
Low pressure safety valve (for units with refrigerant R134a)	20 barg
Low pressure safety valve (for units with refrigerant R410A)	29,5 barg

DANGER

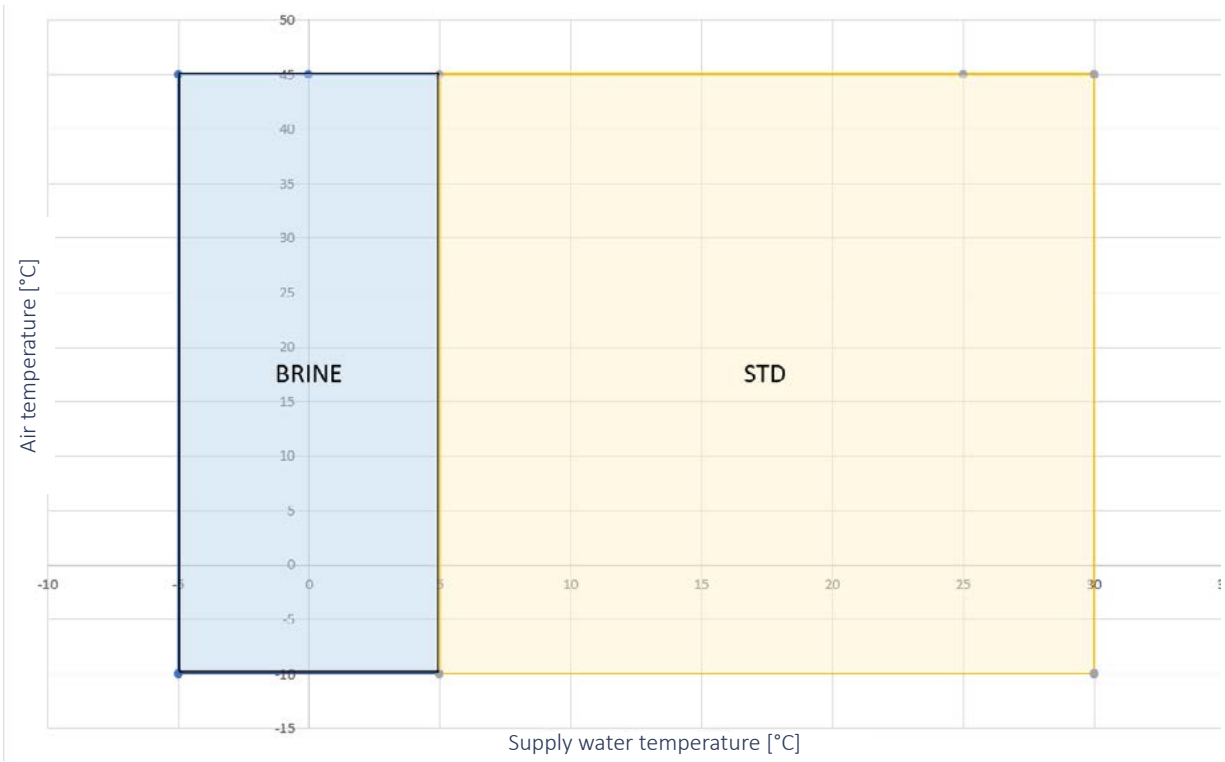
Install upstream of the chiller adequate protection against indirect contact, respecting the requirements of CEI 64-8, unless other specification by local regulations.

5.1.1 Storage and transport conditions

Temperature	-10°C ÷ +45°C (WRA20-5A)
	-10°C ÷ +60°C (WRA13-18)
Humidity	5 ÷ 95 % rel. h.

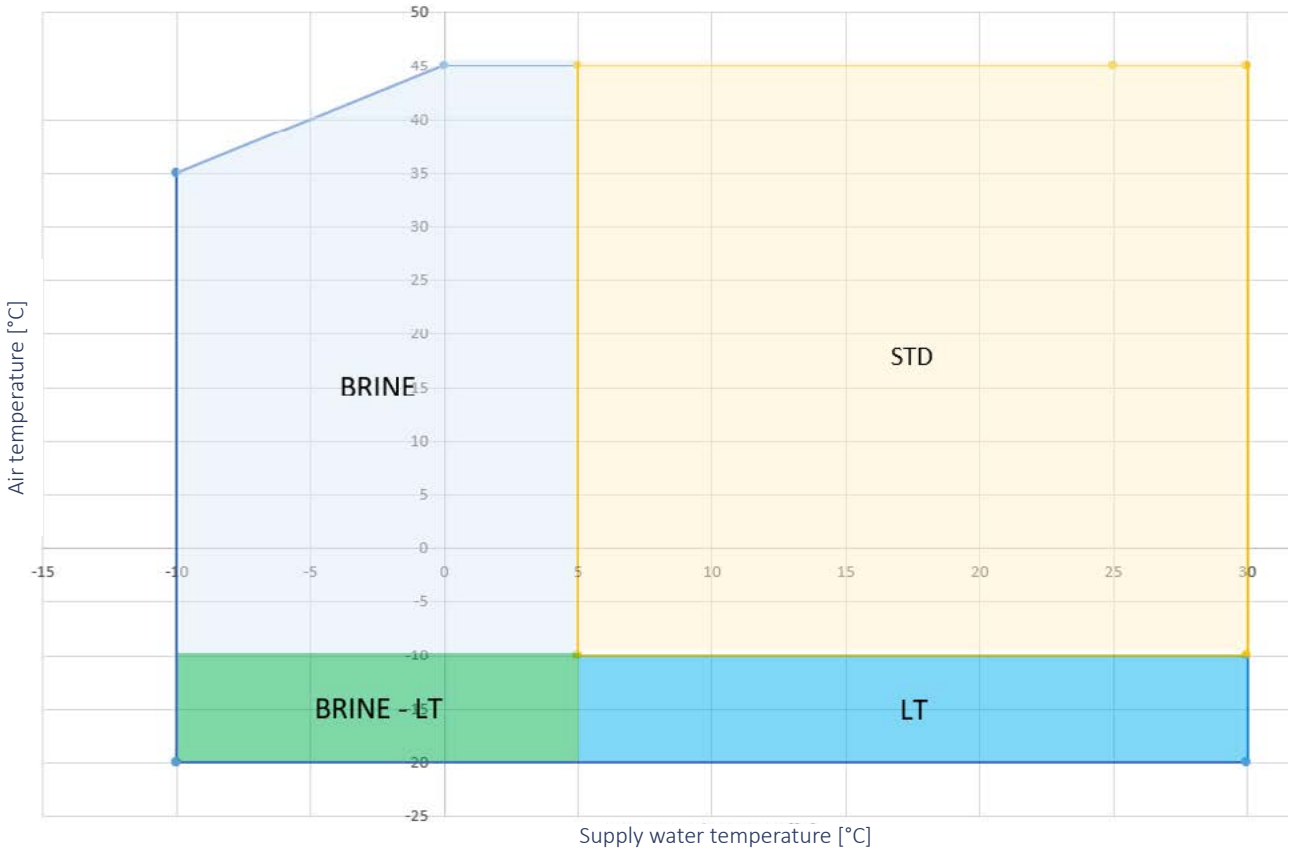
5.2. Operating range

WRA 13-18, 50/60 Hz



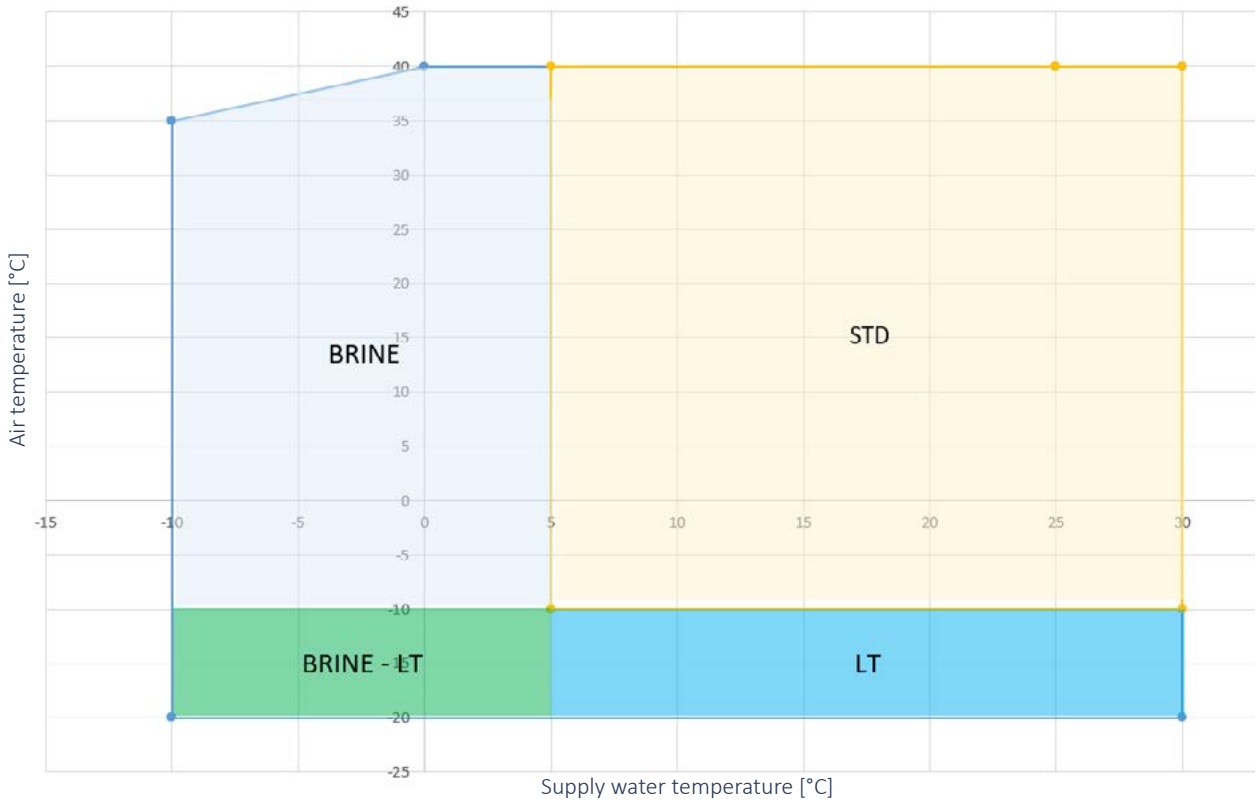
Min outdoor temperature	-10°C
Max outdoor temperature	+45°C
Min supply water temperature	5 °C (-5°C with brine option)
Max supply water temperature	+30°C (max inlet temperature 35°C)

WRA 20-25, 50 Hz



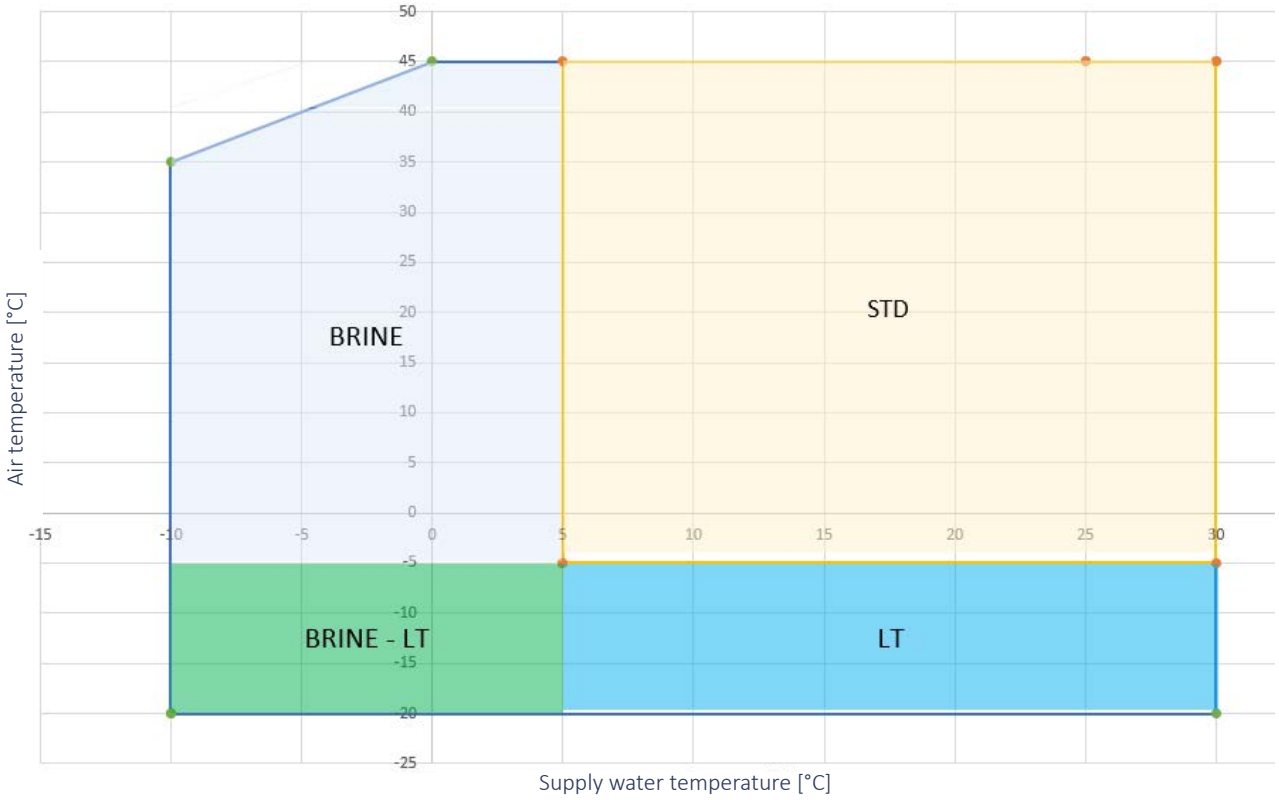
Min outdoor temperature	-10°C (-20°C with LT version)
Max outdoor temperature	+45°C
Min supply water temperature	5°C (-10°C with brine version)
Max supply water temperature	+30°C (max inlet temperature 35°C)

WRA 20-25, 60 Hz



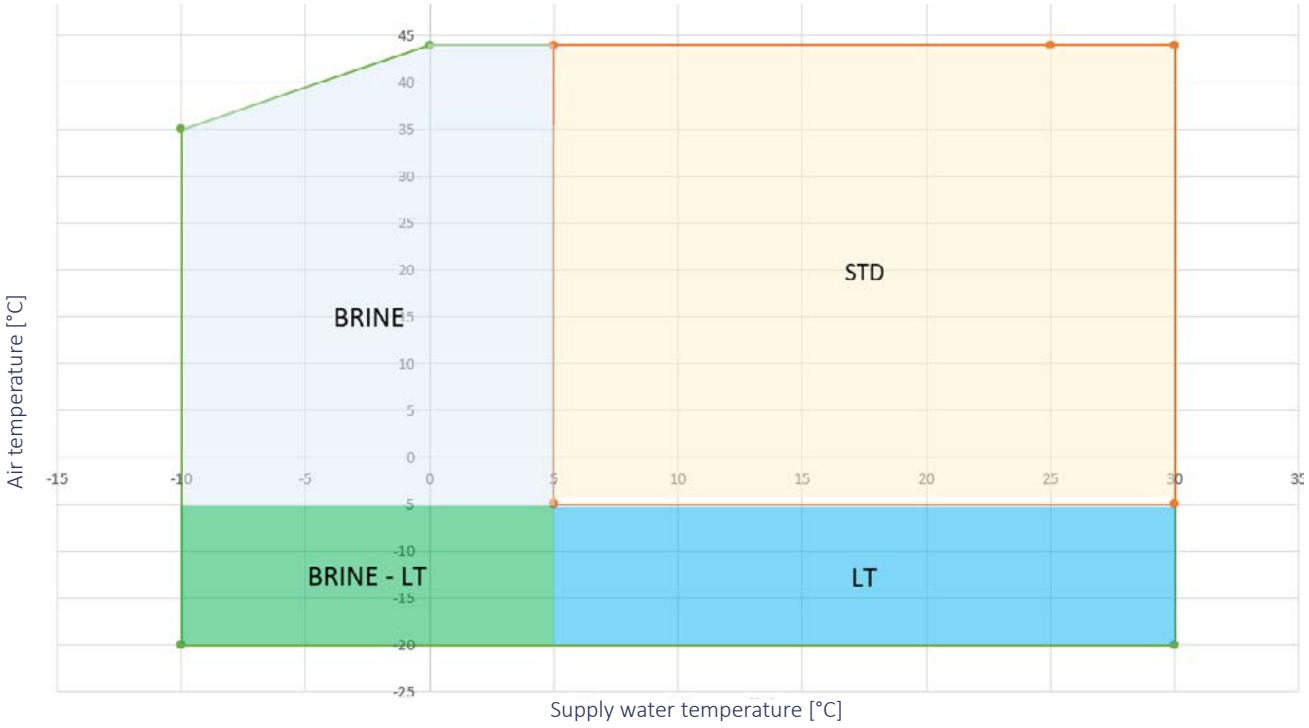
Min outdoor temperature	-10°C (-20°C with LT version)
Max outdoor temperature	+40°C
Min supply water temperature	5°C (-10°C with brine version)
Max supply water temperature	+30°C (max inlet temperature 35°C)

WRA30-35-50, 50Hz
WRA30-35, 60Hz



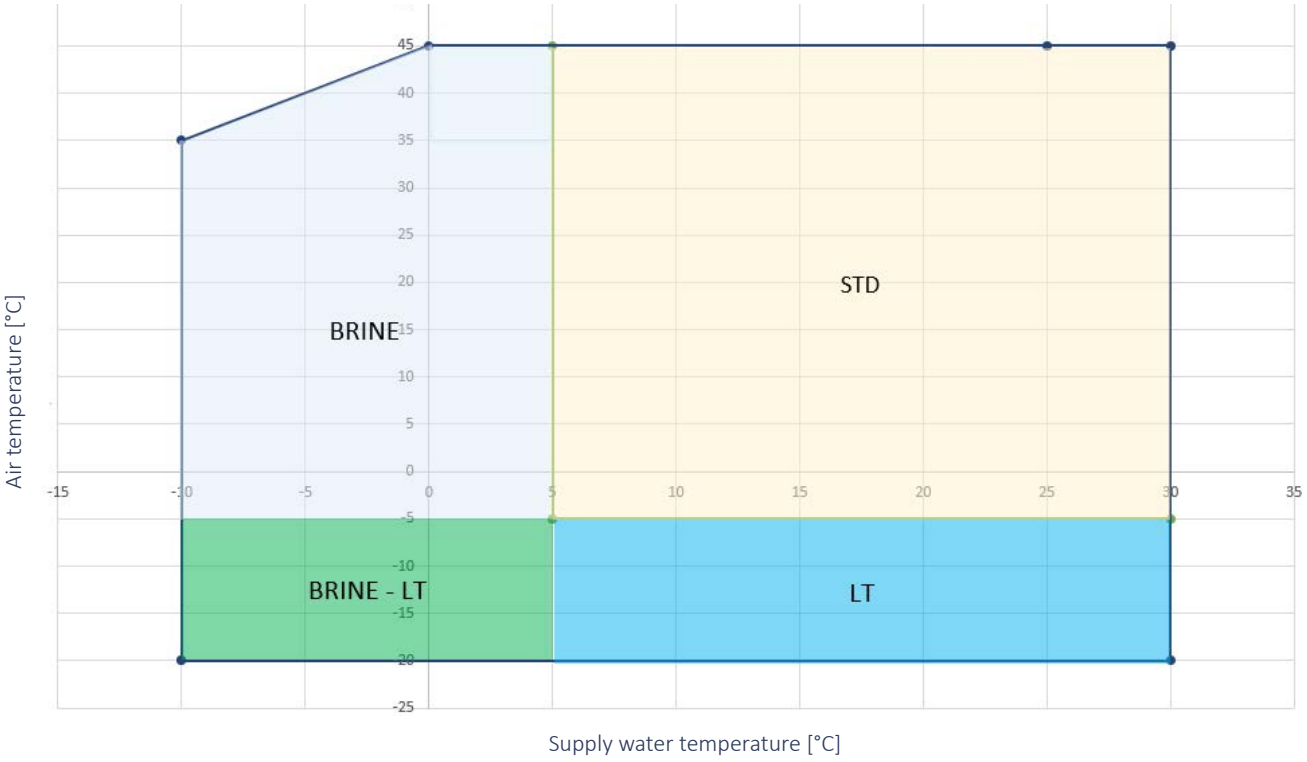
Min outdoor temperature	-5°C (-20°C with LT version)
Max outdoor temperature	+45°C
Min supply water temperature	5°C (-10°C with brine version)
Max supply water temperature	+30°C (max inlet temperature 35°C)

WRA50, 60Hz



Min outdoor temperature	-5°C (-20°C with LT version)
Max outdoor temperature	+44°C
Min supply water temperature	5°C (-10°C with brine version)
Max supply water temperature	+30°C (max inlet temperature 35°C)

WRA55-65-80-90-0A-5A, 50-60Hz



Min outdoor temperature	-5°C (-20°C with LT version)
Max outdoor temperature	+45°C
Min supply water temperature	5°C (-10°C with brine version)
Max supply water temperature	+30°C (max inlet temperature 35°C)

5.3. Chilled water quality

INFORMATION

COSMOTEC recommend the use of Clariant Antifrogen N or Clariant Antifrogen L, respecting the concentrations recommended in the data sheet of the product.

INFORMATION

The following limits for the water circuit may not be exceeded.

DANGER

For outlet water temperatures lower or equal to +5°C and environments with temperatures lower than 2,5°C, use non freezing mixture approved by Cosmotec

Feature		Minimum value	Maximum value
pH(*)		7,0	8,0
Total hardness(*)	°F	13	35
Conductivity(*)	µS/cm	200	350
Alkalinity (HCO3)(*)	mg/l	200	300
(*) Considering water at temperature +20°C			

DANGER

The chiller must not be used in conditions outside the limits specified in the nameplate

5.3.1 Glycol correction factors

INFORMATION

In the case of addition of glycol in the fluid to be cooled, the technical data contained in this paragraph shall be adjusted according to the coefficients shown in the following table.

		Percentage of ethylene glycol			Percentage of propylene glycol	
		20%	30%	40%	30%	40%
Freezing temperature	[°C]	-8.9	-15.6	-23.4	-12.2	-20.6
Cooling capacity	Correction factors on the technical data sheets	0.990	0.984	0.977	0.974	0.962
Power consumption		0.997	0.996	0.994	0.993	0.989
Flow of fluid to be cooled		1.033	1.068	1.117	1.017	1.040
Pressure drop on the fluid to be cooled side		1.16	1.30	1.48	1.23	1.37

5.4. Technical data

1.Nominal conditions

Model	Base
Temperature of the fluid to be cooled at the evaporator inlet [°C]	20
Temperature of the fluid to be cooled at the evaporator outlet [°C]	15
External air temperature to the condenser [°C]	32
Fluid to be cooled (composition referred to the weight)	Water 100%

2.Inrush current = Compressor inrush current + max working current of the fan + max current of working pump

Notes on technical data:

(1) To the evaporator, according to EN14511-2018

(2) Pump excluded

(3) Data considered with water

(4) W20-15L32

(5) W12-7L35

(6) At max speed

(7) Sound power level measured according to Normative EN ISO 9614. The data refers to the standard unit (without options), at full load and at nominal conditions described in this manual.

(8) Sound pressure level (non-binding datum) obtained by sound power level, according to Normative EN ISO 3744 and declared at the following conditions: at 10 m distance from the unit, in free field, with the unit on a reflecting base, with the unit working in nominal conditions and at full load, for standard unit (no options).

(9) LT version for low ambient temperature (Code's digit 8 = L)

INFORMATION

In the sound pressure level declared is considered the contribution of standard circulation pump.

Version 400/3/50 Hz (Code's digit 9 = A)

		WRA13	WRA18	WRA20	WRA25	WRA30	WRA35	WRA50
Cooling capacity W20-15L32[1]	[kW]	4,67	5,87	7,34	8,66	11,78	13,66	16,66
Power consumption W20-15L32[2]	[kW]	1,10	1,49	1,93	2,33	2,82	3,31	4,45
EER W20-15L32		4,2	3,9	3,8	3,7	4,18	4,13	3,74
Cooling capacity W12-7L35[1]	[kW]	3,4	4,35	5,63	6,58	9,01	10,3	12,66
Power consumption W12-7L35[2]	[kW]	1,13	1,5	1,95	2,41	2,92	3,395	4,42
EER W12-7L35		3,0	2,9	2,9	2,7	3,09	3,03	2,86
SEPR HT according (EU) 2016/2281		5,38	5,42	5,45	5,18	5,52	5,54	5,37
Sound power level[7]	[dB(A)]	68,8	68,8	71,7	71,7	78,3	79,7	81,6
Sound pressure level at 10 m[8]	[dB(A)]	37,5	37,5	40,4	40,4	46,9	48,3	50,2
Refrigerant		R134a	R134a	R410A	R410A	R410A	R410A	R410A
N° cooling circuits					1			
Nominal voltage	[V/ph/Hz]				400/3/50			
Nominal auxiliary voltage					24 VAC			
Maximum power consumption with standard pump P3	[kW]	2,74	3,21	3,323	3,853	5,14	5,81	6,95
Maximum current consumption with standard pump P3	[A]	6,16	7,06	7,07	8,27	9,9	10,9	13,2
Inrush current with standard pump	[A]	25,96	32,96	30,27	40,27	48,9	43,9	54,9
Dimensions and weight								
Weight for transport (no tank, no pump, no accessories)	[kg]	118	125	128	130	185	185	188
Weight for transport (tank, P3 pump, no accessories)	[kg]	133	140	143	145	201	201	204
Weight during operation (tank, P3 pump, no accessories)	[kg]	178	185	188	190	311	311	314
Transport Weight pressurized circuit (P3 pump, no accessories)	[kg]	160	167	170	172	237	241	241
Operation Weight pressurized circuit (P3 pump, no accessories)	[kg]	205	212	215	217	347	341	341
Height	[mm]	1290	1290	1310	1310	1550	1550	1550
Width	[mm]	560	560	560	560	740	740	740
Depth	[mm]	720	720	720	720	930	930	930
Hydraulic connection diameter	["]	3/4	3/4	3/4	3/4	1	1	1
Compressor								
N°					1			
Compressor type					Scroll			
Maximum power consumption	[kW]	2,1	2,57	2,61	3,14	3,91	4,58	5,72
Maximum current consumption	[A]	4,2	5,1	4,8	6	7	8	10,3
Inrush current	[A]	24	31	28	38	46	41	52
Axial fan								
N°					1			
Fan diameter	[mm]	350	350	400	400	450	450	450
Air flow freeblowing	[m3/h]	3197	3197	3460	3460	5935	5935	5935
Power consumption	[kW]	0,175	0,175	0,253	0,253	0,54	0,54	0,54
Current absorbed	[A]	0,8	0,8	1,11	1,11	1,3	1,3	1,3
Evaporator								
Flow rate of fluid to be cooled[4]	[l/min]	13,4	16,8	21,0	24,8	33,8	39,2	47,8
Pressure loss on the fluid side to be cooled[4]	[kPa]	10	14	19	24,7	22	24	30

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

		WRA13	WRA18	WRA20	WRA25	WRA30	WRA35	WRA50
Flow rate of fluid to be cooled[5]	[l/min]	9,7	12,5	16,1	18,9	25,8	29,5	36,3
Pressure loss on the fluid side to be cooled[5]	[kPa]	6	9	12	15	13	14	18
Accumulation tank								
Atmospheric tank capacity	[dm³]	40	40	40	40	98	98	98
Capacity of pressure accumulation	[dm³]	29	29	29	29	95	95	95
Standard pump P3[3]								
Maximum power consumption W	[kW]	0,46	0,46	0,46	0,46	0,69	0,69	0,69
Maximum current consumption A	[A]	1,16	1,16	1,16	1,16	1,6	1,6	1,6
Min/max fluid flow	[l/min]	10/40	10/40	10/40	10/40	20/70	20/70	20/70
Min/max useful head	[kPa]	68/321	82/323	73/322	85/323	95/398	108/399	118/400
Medium pump P4[3]								
Maximum power consumption	[kW]	0,69	0,69	0,69	0,69	0,92	0,92	0,92
Maximum current consumption	[A]	1,58	1,58	1,58	1,58	1,87	1,87	1,87
Min/max fluid flow	[l/min]	10/40	10/40	10/40	10/40	20/70	20/70	20/70
Min/max useful head	[kPa]	145/456	159/457	151/457	162/457	177/497	190/499	199/500
High pump P6[3]								
Maximum power consumption	[kW]	0,92	0,92	0,92	0,92	1,31	1,31	1,31
Maximum current consumption	[A]	1,87	1,87	1,87	1,87	2,63	2,63	2,63
Min/max fluid flow	[l/min]	10/40	10/40	10/40	10/40	20/70	20/70	20/70
Min/max useful head	[kPa]	232/675	246/676	238/675	249/676	290/716	303/718	313/719
Inverter pump[3]								
Maximum power consumption	[kW]	0,766	0,766	0,766	0,766	1,15	1,15	1,15
Maximum current consumption	[A]	2,2	2,2	2,2	2,2	2,2	2,2	2,2
Min/max fluid flow[6]	[l/min]	10/50	10/50	10/50	10/50	20/85	20/85	20/85
Min/max head[6]	[kPa]	125/625	146/625	133/625	150/625	192/632	211/633	231/634

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

		WRA55	WRA65	WRA80	WRA90	WRA0A1	WRA5A1	WRA0A2	WRA5A2
Cooling capacity W20-15L32[1]	[kW]	19,49	22,26	27,05	31,82	38,51	46,96	37,94	46,61
Power consumption W20-15L32[2]	[kW]	4,59	5,25	6,73	7,79	8,78	11,66	8,69	11,38
EER W20-15L32		4,25	4,24	4,02	4,09	4,39	4,03	4,37	4,10
Cooling capacity W12-7L35[1]	[kW]	14,9	17,1	20,96	24,65	29,66	36,4	28,79	35,61
Power consumption W12-7L35[2]	[kW]	4,65	5,3	6,65	7,68	8,71	11,47	8,66	11,18
EER W12-7L35		3,20	3,2	3,2	3,21	3,41	3,17	3,32	3,19
SEPR HT according (EU) 2016/2281		6,37	5,76	5,69	5,53	5,69	5,38	5,55	5,36
Sound power level[7]	[dB(A)]	73,5	74,2	75,9	75,3	77,2	77,5	77,2	77,50
Sound pressure level at 10 m[8]	[dB(A)]	41,9	42,5	44,3	43,9	45,4	47	45,4	47,00
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
N° cooling circuits		1							
Nominal voltage	[V/ph/Hz]	400/3/50							
Nominal auxiliary voltage		24 VAC							
Maximum power consumption with standard pump P3	[kW]	8,3	8,9	10,6	12,0	14,6	17,7	14,6	17,7
Maximum current consumption with standard pump P3	[A]	14,3	18,3	20,2	22,2	27,5	36,9	27,5	36,9
Inrush current with standard pump	[A]	70,4	78,3	105,0	132,0	144,9	145,9	144,9	145,9
Dimensions and weight									
Weight for transport (no tank, no pump, no accessories)	[kg]	351	363	362	370	570	590	NA	NA
Weight for transport (tank, P3 pump, no accessories)	[kg]	400	412	412	420	610	630	NA	NA
Weight during operation (tank, P3 pump, no accessories)	[kg]	560	572	572	580	890	910	NA	NA
Transport Weight pressurized circuit (P3 pump, no accessories)	[kg]	396	410	414	428	NA	NA	761	777
Operation Weight pressurized circuit (P3 pump, no accessories)	[kg]	556	570	574	588	NA	NA	952	968
Height	[mm]	1992	1992	1992	1992	20748	20748	20748	20748
Width	[mm]	895	895	895	895	1140	1140	1140	1140
Depth	[mm]	1175	1175	1175	1175	2084	2084	2084	2084
Hydraulic connection diameter	["]	1"1/4	1"1/4	1"1/4	1"1/4	1"1/2	1"1/2	1"1/2	1"1/2
Compressor									
N°		1							
Compressor type		Scroll							
Maximum power consumption	[kW]	6,70	7,31	8,57	9,96	11,6	14,7	11,6	14,7
Maximum current consumption	[A]	11	15	16,2	18,2	21,6	31	21,6	31
Inrush current	[A]	67,1	75	101	128	139	140	139	140
Axial fan									
N°		1					2		
Fan diameter	[mm]	630							
Air flow freeblowing	[m3/h]	10150	9570	9570	9073	16200	16200	16200	16200
Power consumption	[kW]	0,545	0,545	0,545	0,545	1,09	1,09	1,09	1,09
Current absorbed	[A]	1,2	1,2	1,2	1,2	2,4	2,4	2,4	2,4
Evaporator									
Flow rate of fluid to be cooled[4]	[l/min]	55,9	63,8	77,5	91,2	110,4	134,6	108,8	133,6

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

		WRA55	WRA65	WRA80	WRA90	WRA0A1	WRA5A1	WRA0A2	WRA5A2
Pressure loss on the fluid side to be cooled[4]	[kPa]	16,3	19,1	20,8	24,1	25,7	29	25,7	23,6
Flow rate of fluid to be cooled[5]	[l/min]	42,7	49,0	60,1	70,7	85,0	104,3	82,5	102,1
Pressure loss on the fluid side to be cooled[5]	[kPa]	9	11,1	12,2	14,2	15,2	18,5	15,1	15,7
Accumulation tank									
Tank capacity	[l]		180				300		250
Standard pump P3[3]									
Maximum power consumption W	[kW]	0,92	0,92	1,31	1,31	1,76	1,76	1,76	1,76
Maximum current consumption A	[A]	1,7	1,7	2,39	2,39	3,17	3,17	3,17	3,17
Min/max fluid flow	[l/min]	40/130	40/130	40/142	40/142	83/162	83/162	83/193	83/193
Min/max useful head	[kPa]	64/340	77/341	72/417	81/417	263/408	276/412	178/408	195/412
Medium pump P4[3]									
Maximum power consumption	[kW]	1,76	1,76	1,76	1,76	2,38	2,38	2,38	2,38
Maximum current consumption	[A]	3,17	3,17	3,17	3,17	4,56	4,56	4,56	4,56
Min/max fluid flow	[l/min]	40/130	40/130	40/142	40/142	83/162	83/162	83/193	83/193
Min/max useful head	[kPa]	178/550	191/551	123/553	132/554	359/521	372/525	261/521	278/525
High pump P6[3]									
Maximum power consumption	[kW]	1,76	1,76	1,76	1,76	3,4	3,4	3,4	3,4
Maximum current consumption	[A]	3,17	3,17	3,17	3,17	6,33	6,33	6,33	6,33
Min/max fluid flow	[l/min]	40/130	40/130	40/142	40/142	83/162	83/162	83/193	83/193
Min/max useful head	[kPa]	263/693	277/695	198/696	207/697	442/624	454/628	332/624	349/628
Inverter pump[3]									
Maximum power consumption	[kW]		2,39				4,205		
Maximum current consumption	[A]		4,15				7,6		
Min/max fluid flow[6]	[l/min]	26/125	26/125	26/125	30/125	60/162	60/162	67/193	67/193
Min/max head[6]	[kPa]	267/660	280/660	296/660	303/660	426/661	443/663	426/661	443/663

Version 400/3/50 Hz (Code's digit 9 = A) With EC FAN[9]

		WRA55	WRA65	WRA80	WRA90	WRA0A1	WRA5A1	WRA0A2	WRA5A2
Cooling capacity W20-15L32[1]	[kW]	19,93	22,81	27,71	33,02	39,48	48,67	38,93	48,26
Power consumption W20-15L32[2]	[kW]	4,74	5,43	6,74	7,75	9,35	11,89	9,31	11,82
EER W20-15L32		4,21	4,20	4,11	4,26	4,22	4,09	4,18	4,08
Cooling capacity W12-7L35[1]	[kW]	15,21	17,49	21,89	25,45	30,3	37,51	29,41	36,63
Power consumption W12-7L35[2]	[kW]	4,81	5,47	6,81	7,7	9,32	11,69	9,28	11,62
EER W12-7L35		3,16	3,2	3,2	3,31	3,25	3,21	3,17	3,15
SEPR HT according (EU) 2016/2281		6,28	5,73	5,69	5,49	5,58	5,39	5,44	5,29
Sound power level[7]	[dB(A)]	80,85	80,36	80,84	80,40	83,72	84,14	83,72	84,14
Sound pressure level at 10 m[8]	[dB(A)]	49,2	48,7	49,2	48,8	51,9	52,3	51,9	52,3
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
N° cooling circuits		1							
Nominal voltage	[V/ph/Hz]	400/3/50							
Nominal auxiliary voltage		24 VAC							
Maximum power consumption with standard pump P3	[kW]	8,9	9,5	11,2	12,6	15,8	18,9	15,8	18,9
Maximum current consumption with standard pump P3	[A]	14,9	18,9	20,8	22,8	28,7	38,1	28,7	38,1
Inrush current with standard pump	[A]	71,0	78,9	105,6	132,6	146,1	147,1	146,1	147,1
Dimensions and weight									
Weight for transport (no tank, no pump, no accessories)	[kg]	351	363	362	370	570	590	NA	NA
Weight for transport (tank, P3 pump, no accessories)	[kg]	400	412	412	420	610	630	NA	NA
Weight during operation (tank, P3 pump, no accessories)	[kg]	560	572	572	580	890	910	NA	NA
Transport Weight pressurized circuit (P3 pump, no accessories)	[kg]	396	410	414	428	NA	NA	761	777
Operation Weight pressurized circuit (P3 pump, no accessories)	[kg]	556	570	574	588	NA	NA	952	968
Height	[mm]	2068	2068	2068	2068	2150	2150	2150	2150
Width	[mm]	895	895	895	895	1140	1140	1140	1140
Depth	[mm]	1175	1175	1175	1175	2084	2084	2084	2084
Hydraulic connection diameter	["]	1"1/4	1"1/4	1"1/4	1"1/4	1"1/2	1"1/2	1"1/2	1"1/2
Compressor									
N°		1							
Compressor type		Scroll							
Maximum power consumption	[kW]	6,70	7,31	8,57	9,96	11,6	14,7	11,6	14,7
Maximum current consumption	[A]	11	15	16,2	18,2	21,6	31	21,6	31
Inrush current	[A]	67,1	75	101	128	139	140	139	140
Axial fan									
N°		1				2			
Fan diameter	[mm]	630							
Air flow freeblowing	[m3/h]	13360	12762	12762	9073	16200	16200	16200	16200
Power consumption	[kW]	1,15	1,15	1,15	1,15	2,3	2,3	2,3	2,3
Current absorbed	[A]	1,8	1,8	1,8	1,8	3,6	3,6	3,6	3,6
Evaporator									

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

		WRA55	WRA65	WRA80	WRA90	WRA0A1	WRA5A1	WRA0A2	WRA5A2
Flow rate of fluid to be cooled[4]	[l/min]	57,1	65,4	79,4	94,7	117,2	142,5	115,9	140,2
Pressure loss on the fluid side to be cooled[4]	[kPa]	16,3	19,1	20,8	24,1	29	32,5	27	26
Flow rate of fluid to be cooled[5]	[l/min]	43,6	50,1	62,8	73,0	89,7	109,7	87,5	106,1
Pressure loss on the fluid side to be cooled[5]	[kPa]	9	11,1	12,2	14,2	16,9	19,3	17	16
Accumulation tank									
Tank capacity	[l]	180				300		250	
Standard pump P3[3]									
Maximum power consumption W	[kW]	0,92	0,92	1,31	1,31	1,76	1,76	1,76	1,76
Maximum current consumption A	[A]	1,7	1,7	2,39	2,39	3,17	3,17	3,17	3,17
Min/max fluid flow	[l/min]	40/130	40/130	40/142	40/142	83/162	83/162	83/193	83/193
Min/max useful head	[kPa]	64/340	77/341	72/417	81/417	263/408	276/412	178/408	195/412
Medium pump P4[3]									
Maximum power consumption	[kW]	1,76	1,76	1,76	1,76	2,38	2,38	2,38	2,38
Maximum current consumption	[A]	3,17	3,17	3,17	3,17	4,56	4,56	4,56	4,56
Min/max fluid flow	[l/min]	40/130	40/130	40/142	40/142	83/162	83/162	83/193	83/193
Min/max useful head	[kPa]	178/550	191/551	123/553	132/554	359/521	372/525	261/521	278/525
High pump P6[3]									
Maximum power consumption	[kW]	1,76	1,76	1,76	1,76	3,4	3,4	3,4	3,4
Maximum current consumption	[A]	3,17	3,17	3,17	3,17	6,33	6,33	6,33	6,33
Min/max fluid flow	[l/min]	40/130	40/130	40/142	40/142	83/162	83/162	83/193	83/193
Min/max useful head	[kPa]	263/693	277/695	198/696	207/697	442/624	454/628	332/624	349/628
Inverter pump[3]									
Maximum power consumption	[kW]	2,39				4,205			
Maximum current consumption	[A]	4,15				7,6			
Min/max fluid flow[6]	[l/min]	26/125	26/125	26/125	30/125	60/162	60/162	67/193	67/193
Min/max head[6]	[kPa]	267/660	280/660	296/660	303/660	426/661	443/663	426/661	443/663

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

Version 460/3/60 Hz at 60Hz (Code's digit 9 = B)

		WRA13	WRA18	WRA20	WRA25	WRA30	WRA35	WRA50
Cooling capacity W20-15L32[1]	[kW]	5,44	6,81	8,68	10,12	14,13	16,31	19,77
Power consumption W20-15L32[2]	[kW]	1,37	1,86	2,32	2,94	3,55	4,12	5,52
EER W20-15L32		4,0	3,7	3,7	3,4	3,98	3,96	3,58
Cooling capacity W12-7L35[1]	[kW]	3,98	5,06	6,62	7,76	10,78	12,31	15,25
Power consumption W12-7L35[2]	[kW]	1,41	1,87	2,35	2,95	3,64	4,23	5,47
EER W12-7L35		2,8	2,7	2,8	2,6	2,96	2,91	2,79
Sound power level[7]	[dB(A)]	71,1	71,1	71,8	71,8	82,4	83,7	84
Sound pressure level at 10 m[8]	[dB(A)]	39,8	39,8	41,6	41,6	51	52,3	52,6
Refrigerant		R134a	R134a	R410A	R410A	R410A	R410A	R410A
N° cooling circuits					1			
Nominal voltage	[V/ph/Hz]				460/3/60			
Maximum power consumption with standard pump P3	[kW]	3,43	4,00	4,06	4,66	6,11	7,00	8,19
Maximum current consumption with standard pump P3	[A]	6,64	7,54	7,39	8,59	9,79	10,79	13,09
Inrush current with standard pump P3	[A]	24,84	33,44	30,59	40,59	48,79	43,79	54,79
Dimensions and weight								
"Weight for transport (no tank, no pump, no accessories)"	[kg]	118	125	128	130	185	185	188
Weight for transport (tank, P3 pump, no accessories)	[kg]	133	140	143	145	201	201	204
Weight during operation (tank, P3 pump, no accessories)	[kg]	178	185	188	190	311	311	314
Transport Weight pressurized circuit (P3 pump, no accessories)	[kg]	160	167	170	172	237	241	241
Operation Weight pressurized circuit (P3 pump, no accessories)	[kg]	205	212	215	217	347	341	341
Height	[mm]	1290	1290	1310	1310	1550	1550	1550
Width	[mm]	560	560	560	560	740	740	740
Depth	[mm]	720	720	720	720	930	930	930
Compressor								
N°					1			
Compressor type					Scroll			
Maximum power consumption	[kW]	2,51	3,08	3,23	3,83	4,58	5,47	6,66
Maximum current consumption	[A]	4,2	5,1	4,8	6	7	8	10,3
Inrush current	[A]	22,4	31	28	38	46	41	52
Axial fan								
N°					1			
Fan diameter	[mm]	350	350	400	400	450	450	450
Air flow freeblowing	[m3/h]	2898	2898	4200	4200	7063	7063	7063
Power consumption	[kW]	0,255	0,255	0,165	0,165	0,865	0,865	0,865
Current absorbed	[A]	1,15	1,15	1,3	1,3	1,5	1,5	1,5
Evaporator								
Flow rate of fluid to be cooled[4]	[l/min]	15,6	19,5	25,1	29,3	40,5	46,8	56,7
Pressure loss on the fluid side to be cooled[4]	[kPa]	13,4	18,8	26,1	33,9	30	37	42
Flow rate of fluid to be cooled[5]	[l/min]	11,4	14,5	19,1	22,4	30,9	35,3	43,7

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

		WRA13	WRA18	WRA20	WRA25	WRA30	WRA35	WRA50
Pressure loss on the fluid side to be cooled[5]	[kPa]	7,5	10,8	15,9	20,4	18	22	26
Accumulation tank								
Atmospheric tank capacity	[dm³]	40	40	40	40	98	98	98
Pressurized tank capacity	[dm³]	29	29	29	29	95	95	95
Standard pump P3[3]								
Maximum power consumption W	[kW]	0,66	0,66	0,66	0,66	0,66	0,66	0,66
Maximum current consumption A	[A]	1,29	1,29	1,29	1,29	1,29	1,29	1,29
Min/max fluid flow	[l/min]	10/40	10/40	10/40	10/40	20/70	20/70	20/70
Min/max head	[kPa]	192/396	206/397	197/396	209/397	149/376	162/377	172/378
Medium pump P4[3]								
Maximum power consumption	[kW]	0,9	0,9	0,9	0,9	0,9	0,9	0,9
Maximum current consumption	[A]	1,51	1,51	1,51	1,51	1,51	1,51	1,51
Min/max fluid flow	[l/min]	10/40	10/40	10/40	10/40	20/70	20/70	20/70
Min/max head	[kPa]	371/590	385/592	376/591	388/592	288/516	301/518	310/519
High pump P6[3]								
Maximum power consumption	[kW]	1,3	1,3	1,3	1,3	1,3	1,3	1,3
Maximum current consumption	[A]	2,12	2,12	2,12	2,12	2,12	2,12	2,12
Min/max fluid flow	[l/min]	10/40	10/40	10/40	10/40	20/70	20/70	20/70
Min/max head	[kPa]	493/762	507/763	499/762	510/763	439/731	452/732	461/733
Inverter pump[3]								
Maximum power consumption	[kW]	0,766	0,766	0,766	0,766	1,15	1,15	1,15
Maximum current consumption	[A]	1,9	1,9	1,9	1,9	1,9	1,9	1,9
Min/max fluid flow[6]	[l/min]	10/50	10/50	10/50	10/50	20/85	20/85	20/85
Min/max head[6]	[kPa]	125/625	146/625	133/625	150/625	192/632	211/633	231/634
Sound levels[7]								
Power sound	[dBA]	71,1	71,1	71,8	71,8	82,4	82,4	83,4
Sound pressure at 10m	[dBA]	39,8	39,8	40,5	40,5	51	52,3	52,6

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

		WRA55	WRA65	WRA80	WRA90	WRA0A1	WRA5A1	WRA0A2	WRA5A2
Cooling capacity W20-15L32[1]	[kW]	22,85	26,33	32,36	38,05	45,98	55,95	45,42	55,56
Power consumption W20-15L32[2]	[kW]	6,59	6,73	8,47	9,69	11,30	14,77	11,25	14,67
EER W20-15L32		3,47	3,91	3,82	3,93	4,07	3,79	4,04	3,79
Cooling capacity W12-7L35[1]	[kW]	17,55	20,27	25,11	29,53	35,59	43,44	34,55	41,37
Power consumption W12-7L35[2]	[kW]	5,64	6,65	8,38	9,49	11,17	14,45	11,09	14,29
EER W12-7L35		3,11	3,05	3,00	3,11	3,19	3,01	3,11	2,90
Sound power level[7]	[dB(A)]	81,3	81,4	81,4	81,7	84,3	84,3	84,3	84,3
Sound pressure level at 10 m[8]	[dB(A)]	49,7	49,8	49,8	50,1	52,5	53,3	52,5	53,3
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
N° cooling circuits		1							
Nominal voltage	[V/ph/Hz]	460/3/60							
Maximum power consumption with standard pump P3	[kW]	10,50	11,80	13,38	14,78	18,63	22,43	18,63	22,43
Maximum current consumption with standard pump P3	[A]	15,92	19,92	21,12	23,12	29,57	38,97	29,57	38,97
Inrush current with standard pump P3	[A]	71,02	79,92	104,92	134,92	147,97	157,97	147,97	157,97
Dimensions and weight									
"Weight for transport (no tank, no pump, no accessories)"	[kg]	351	363	362	370	570	590	NA	NA
Weight for transport (tank, P3 pump, no accessories)	[kg]	400	412	412	420	610	630	710	730
Weight during operation (tank, P3 pump, no accessories)	[kg]	560	572	572	580	890	910	950	970
Transport Weight pressurized circuit (P3 pump, no accessories)	[kg]	396	410	414	428	NA	NA	761	777
Operation Weight pressurized circuit (P3 pump, no accessories)	[kg]	556	570	574	588	NA	NA	952	968
Height	[mm]	2068	2068	2068	2068	2150	2150	2150	2150
Width	[mm]	895	895	895	895	1140	1140	1140	1140
Depth	[mm]	1175	1175	1175	1175	2084	2084	2084	2084
Compressor									
N°		1							
Compressor type		Scroll							
Maximum power consumption	[kW]	7,47	8,77	10,35	11,75	13,8	17,6	13,8	17,6
Maximum current consumption	[A]	11	15	16,2	18,2	21,6	31	21,6	31
Inrush current	[A]	66,1	75	100	130	140	150	140	150
Axial fan									
N°		1				2			
Fan diameter	[mm]	630							
Air flow freeblowing	[m3/h]	13360	12762	12762	9073	16200	16200	16200	16200
Power consumption	[kW]	1,15	1,15	1,15	1,15	2,3	2,3	2,3	2,3
Current absorbed	[A]	1,8	1,8	1,8	1,8	3,6	3,6	3,6	3,6
Evaporator									
Flow rate of fluid to be cooled[4]	[l/min]	65,5	75,5	92,8	109,1	131,8	160,4	130,2	159,3
Pressure loss on the fluid side to be cooled[4]	[kPa]	23,7	26,8	29,5	34	38,7	42,7	39,6	37,9
Flow rate of fluid to be cooled[5]	[l/min]	50,3	58,1	72,0	84,7	102,0	124,5	99,1	118,6

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

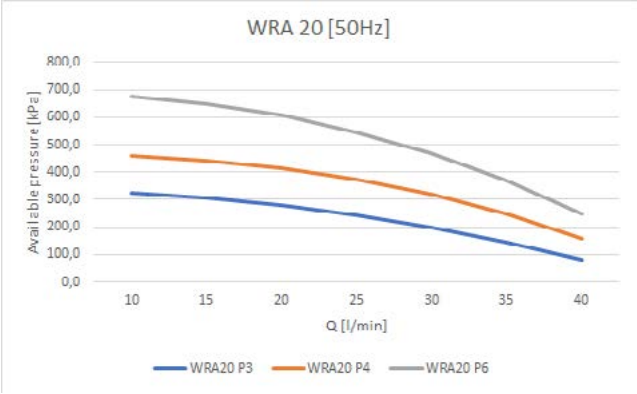
		WRA55	WRA65	WRA80	WRA90	WRA0A1	WRA5A1	WRA0A2	WRA5A2
Pressure loss on the fluid side to be cooled[5]	[kPa]	14	15,9	17,8	20,6	23,5	26,1	24,2	22,5
Accumulation tank									
Tank capacity	[l]	180	180	180	180	300	300	250	250
Standard pump P3[3]									
Maximum power consumption W	[kW]	1,73	1,73	1,73	1,73	2,38	2,38	2,38	2,38
Maximum current consumption A	[A]	2,79	2,79	2,79	2,79	4,04	4,04	4,04	4,04
Min/max fluid flow	[l/min]	40/142	40/142	40/142	40/142	83/162	83/162	83/193	83/193
Min/max head	[kPa]	189/507	205/508	226/510	235/511	329/446	341/450	258/446	275/450
Medium pump P4[3]									
Maximum power consumption	[kW]	2,38	2,38	2,38	2,38	3,4	3,4	3,4	3,4
Maximum current consumption	[A]	4,04	4,04	4,04	4,04	5,56	5,56	5,56	5,56
Min/max fluid flow	[l/min]	40/142	40/142	40/142	40/142	83/162	83/162	83/193	83/193
Min/max head	[kPa]	255/609	270/610	291/612	300/613	467/606	480/609	386/606	404/609
High pump P6[3]									
Maximum power consumption	[kW]	3,4	3,4	3,4	3,4	4,4	4,4	4,4	4,4
Maximum current consumption	[A]	5,56	5,56	5,56	5,56	6,78	6,78	6,78	6,78
Min/max fluid flow	[l/min]	40/142	40/142	40/142	40/142	83/162	83/162	83/193	83/193
Min/max head	[kPa]	459/921	475/922	495/924	504/925	617/768	629/772	525/768	542/772
Inverter pump[3]									
Maximum power consumption	[kW]	2,39				4,205			
Maximum current consumption	[A]	4,15				7,6			
Min/max fluid flow[6]	[l/min]	26/125	26/125	26/125	30/125	60/162	60/162	67/193	67/193
Min/max head[6]	[kPa]	267/660	280/660	296/660	303/660	426/661	443/663	426/661	443/663

Standard technical data sheet. Verify on **MANUAL PART 2** possible modifications

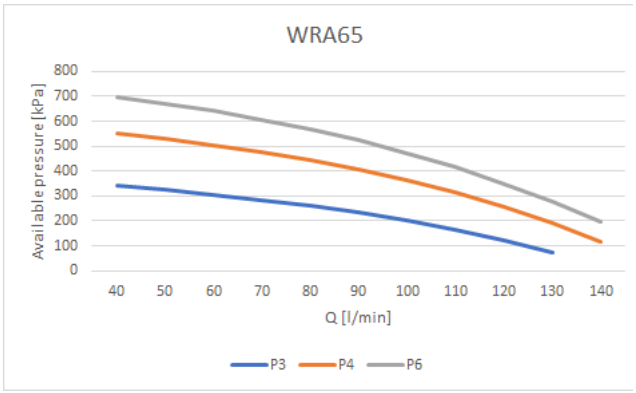
5.5. Available pressure

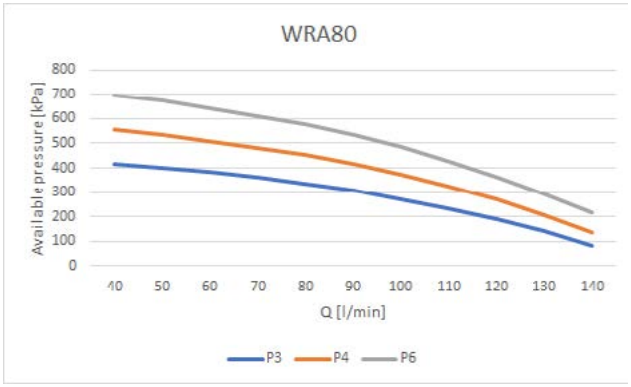
5.5.1 Available pressure for pumps at 50Hz.

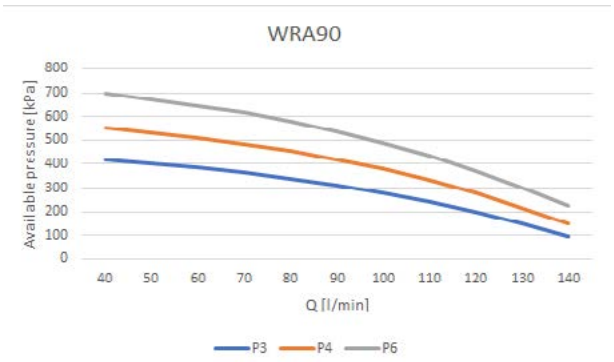
WRA 30÷50 graphs with Q from 20 to 70 l/min - WRA 13÷25 from 10 to 40 l/min.

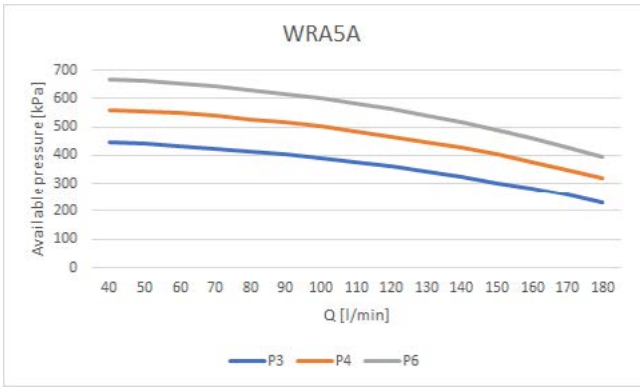


WRA 55÷90 graphs with Q from 40 to 140 l/min - WRA 0A-5A from 80 to 180 l/min.



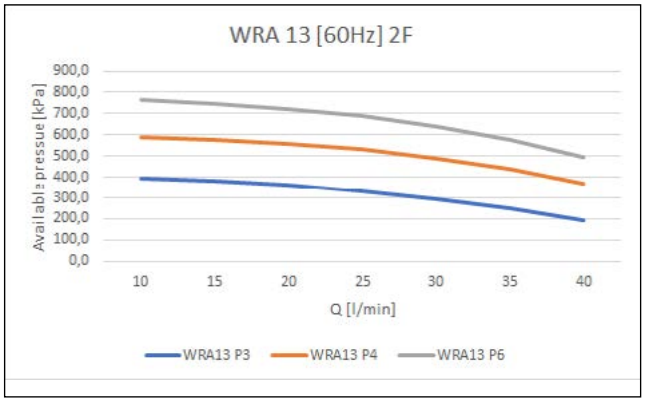


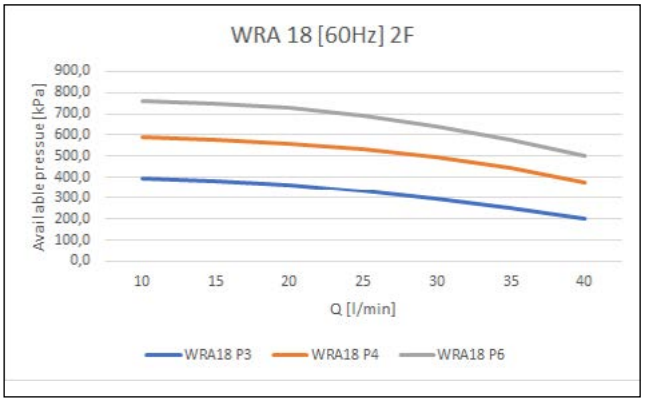


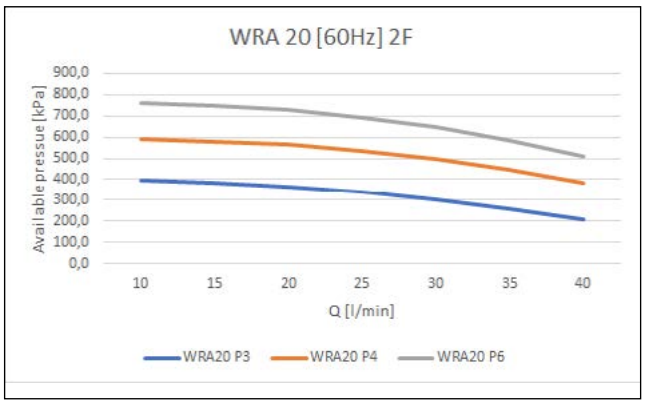


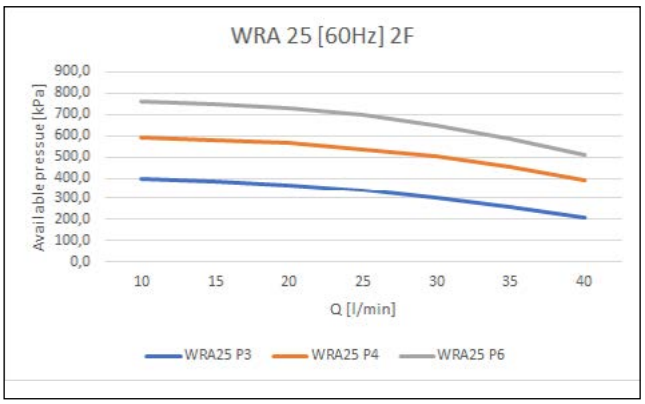
5.5.2 Available pressure for bi-frequency pumps at 60Hz

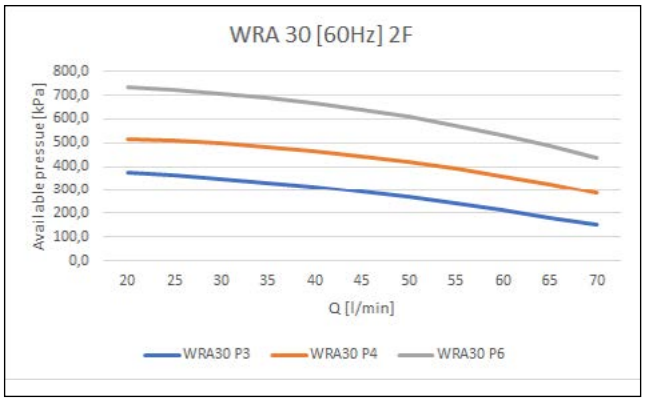
WRA 30÷50 graphs with Q from 20 to 70 l/min - WRA 13÷25 from 10 to 40 l/min.

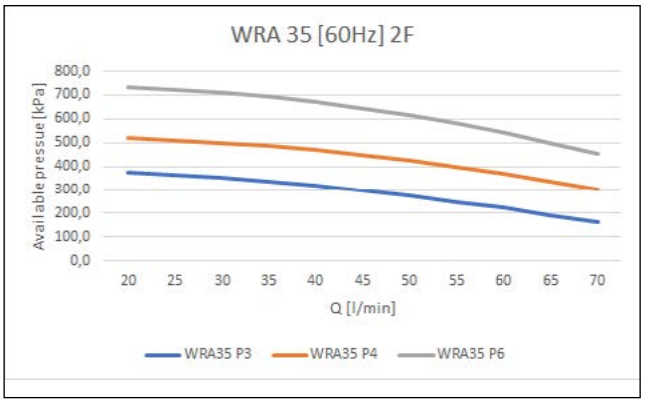


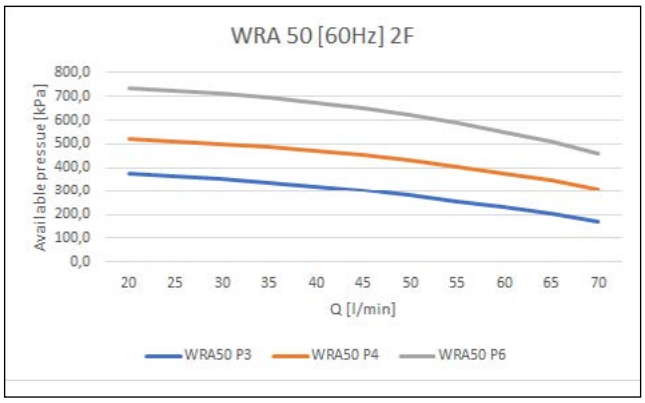




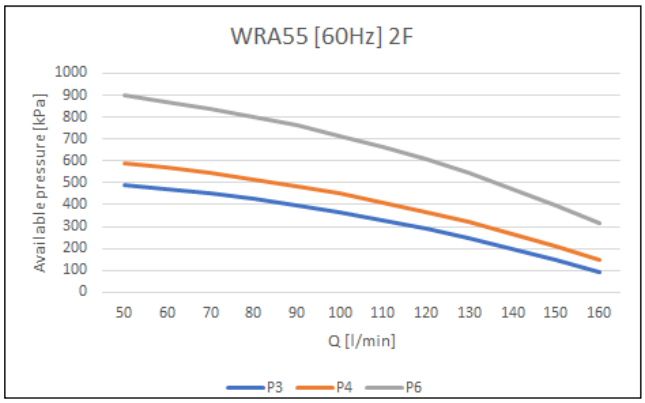


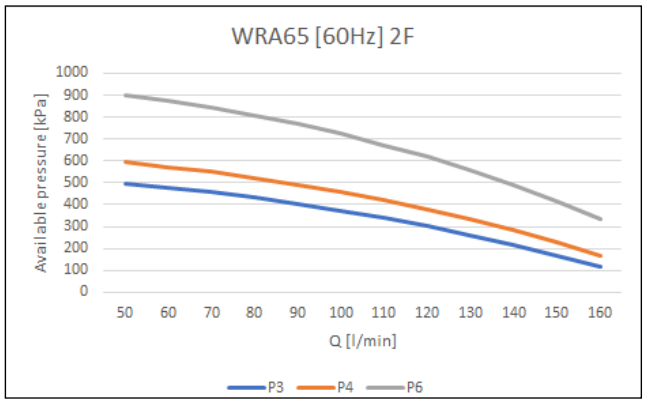


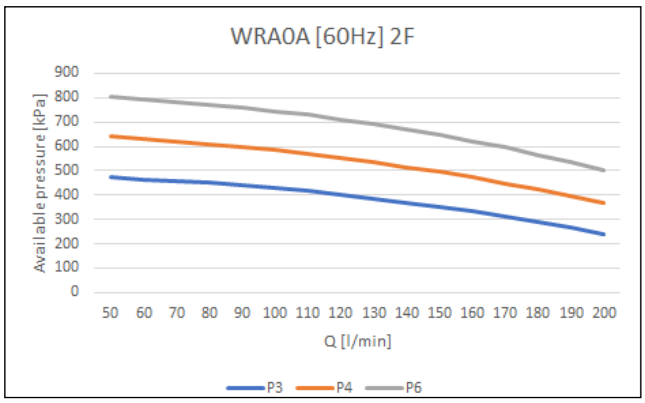


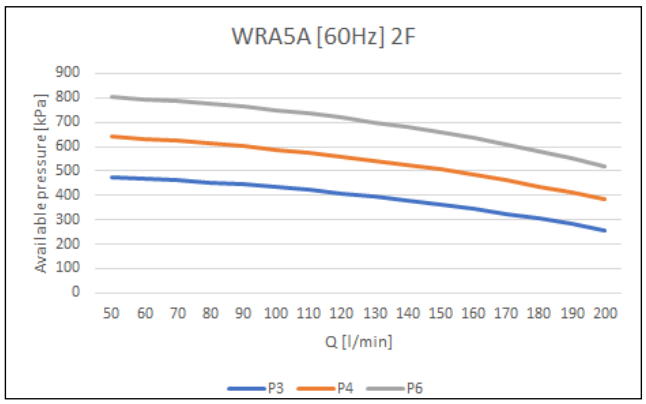


WRA 55÷90 graphs with Q from 50 to 160 l/min - WRA 0A-5A from 80 to 180 l/min.



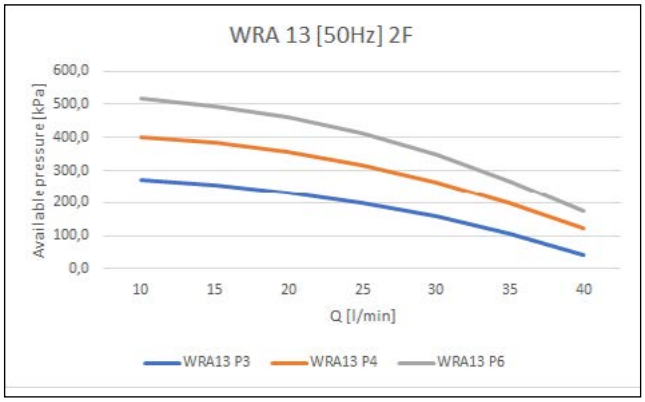


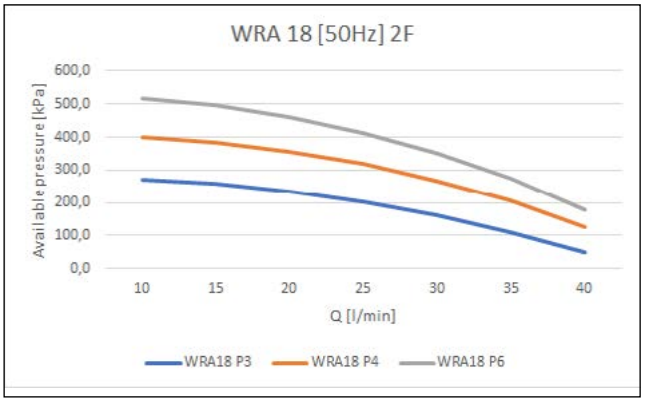


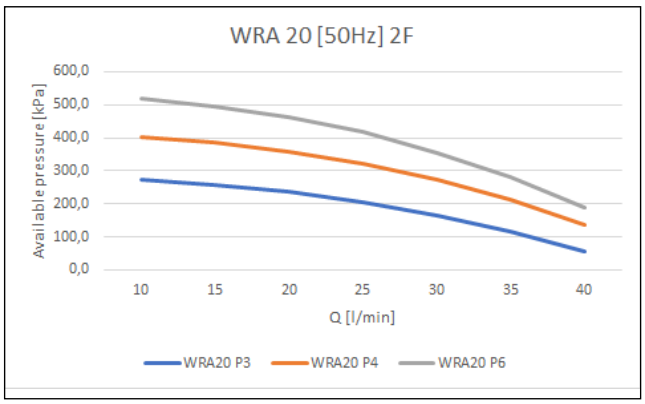


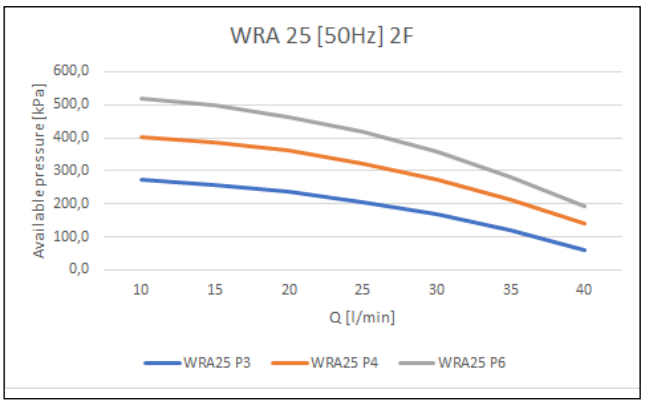
5.5.3 Available pressure for bi-frequency pumps at 50Hz

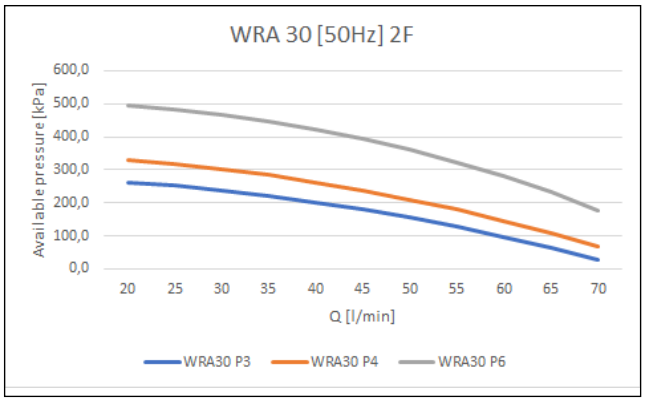
WRA 30÷50 graphs with Q from 20 to 70 l/min - WRA 13÷25 from 10 to 40 l/min.

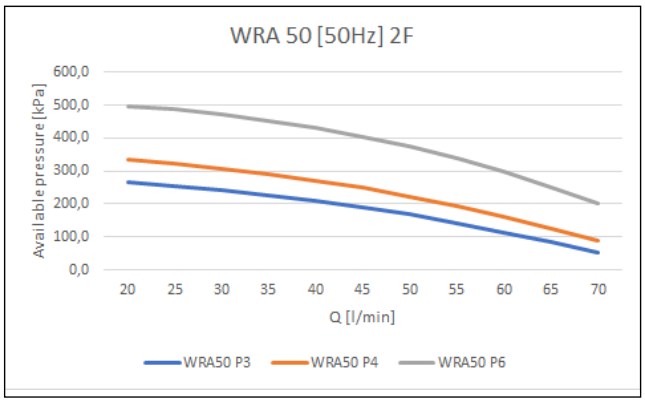




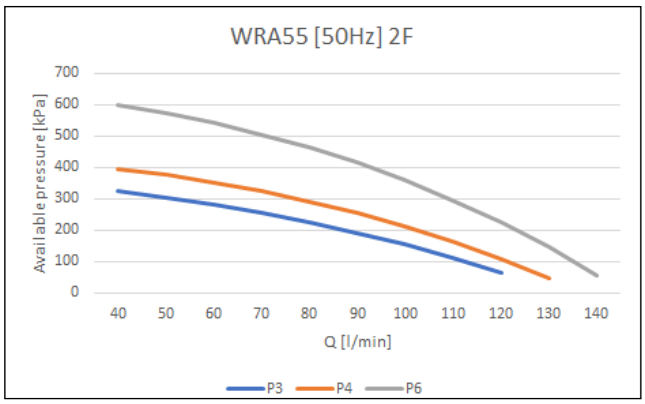


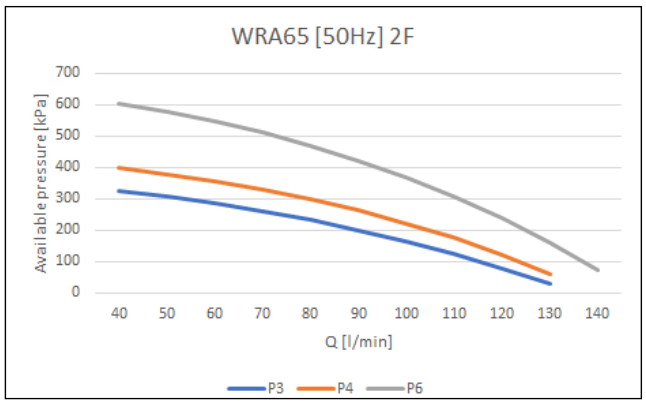


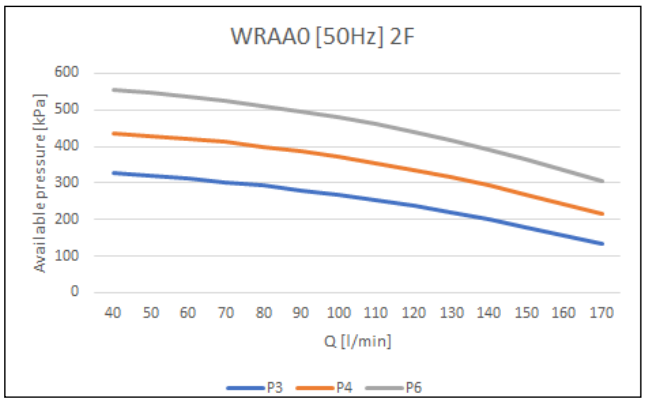


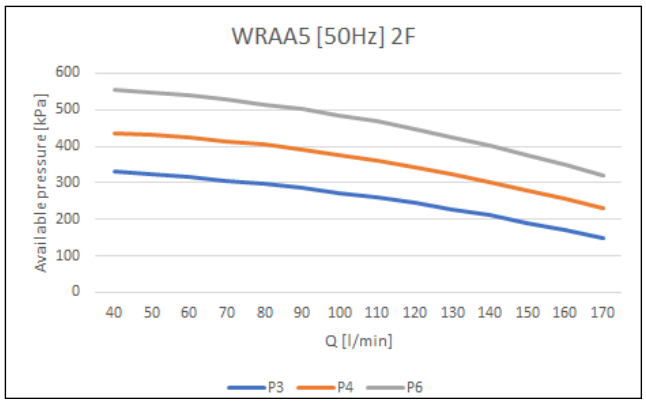


WRA 55÷90 graphs with Q from 50 to 150 l/min - WRA 0A÷5A from 80 to 180 l/min.



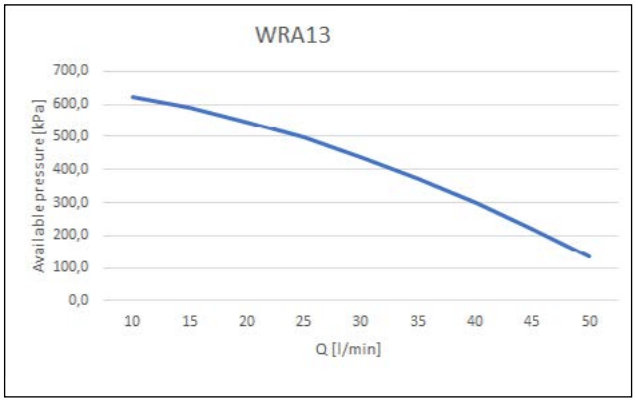


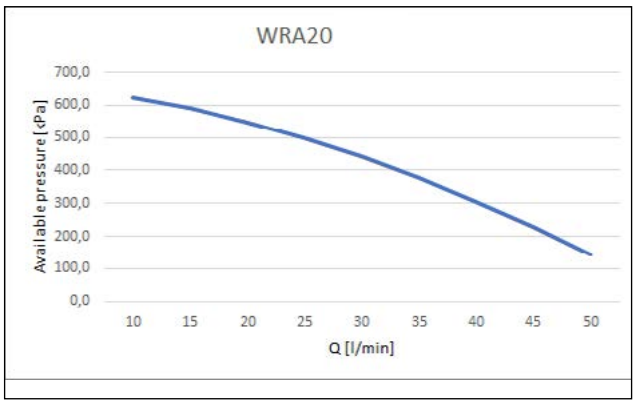


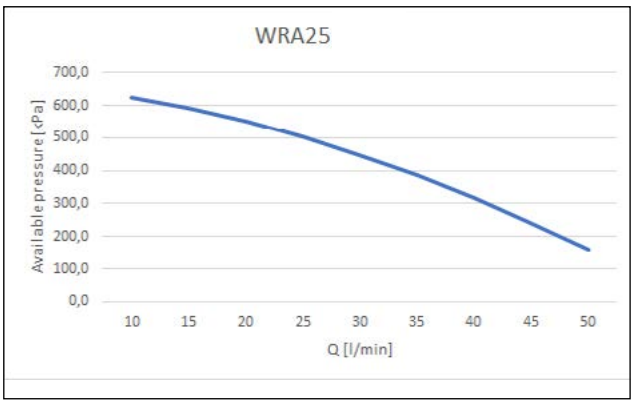


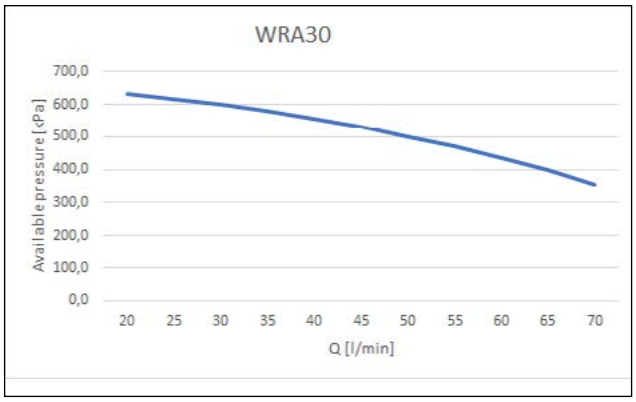
5.5.4 Available pressure for inverter pumps

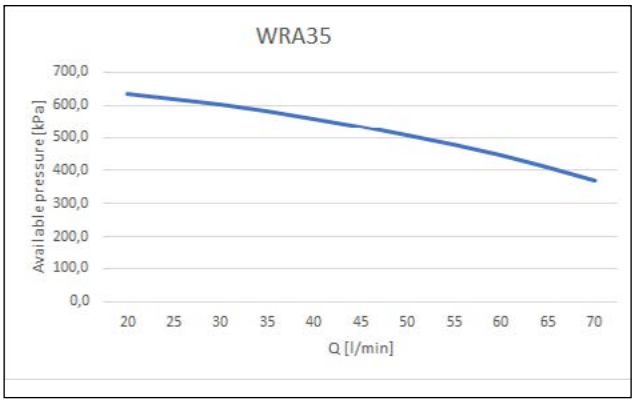
WRA 30÷50 graphs with Q from 20 to 70 l/min - WRA 13÷25 from 10 to 50 l/min.

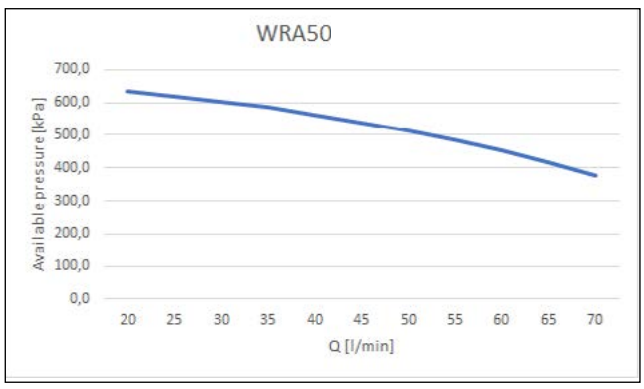




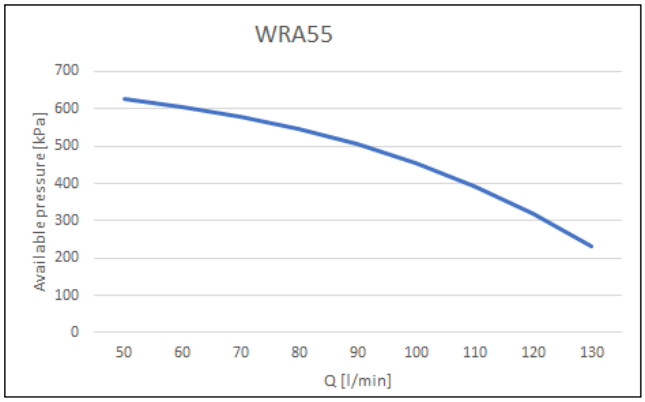


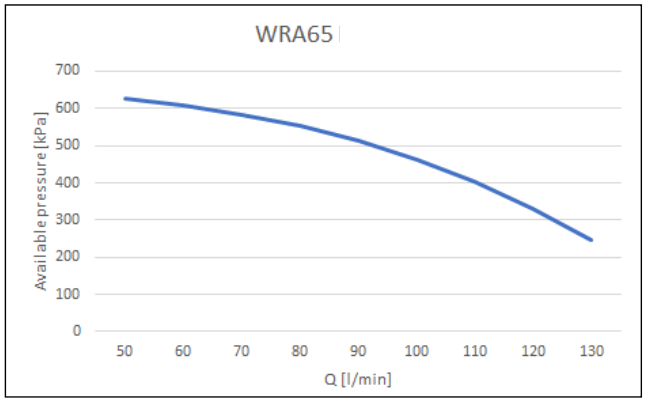


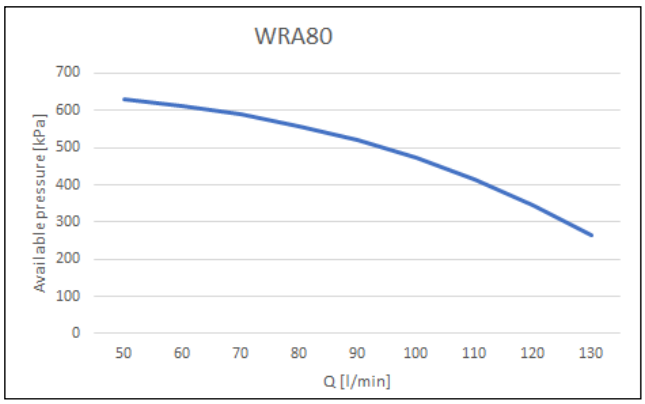


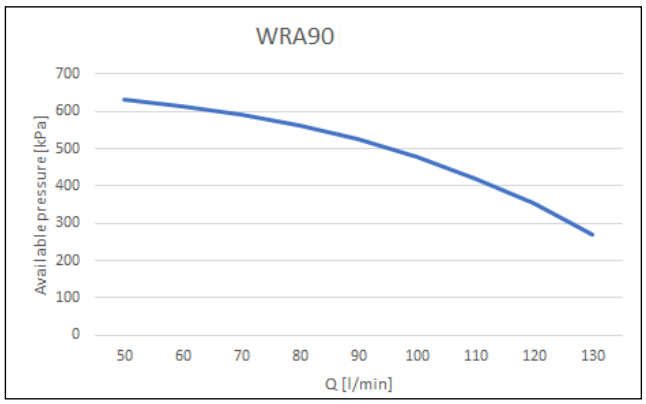


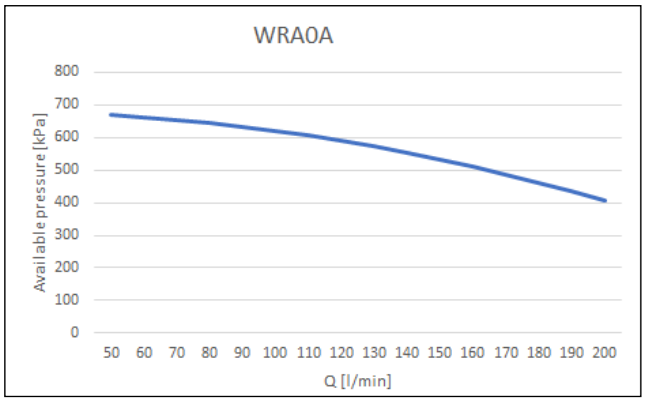
WRA 55÷90 graphs with Q from 50 to 130 l/min - WRA 0A÷5A from 80 to 180 l/min.

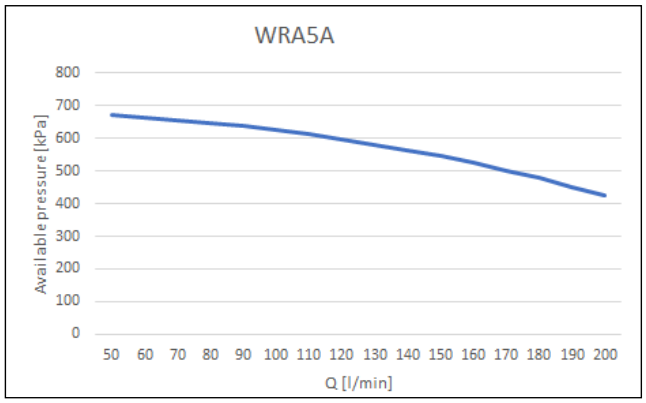






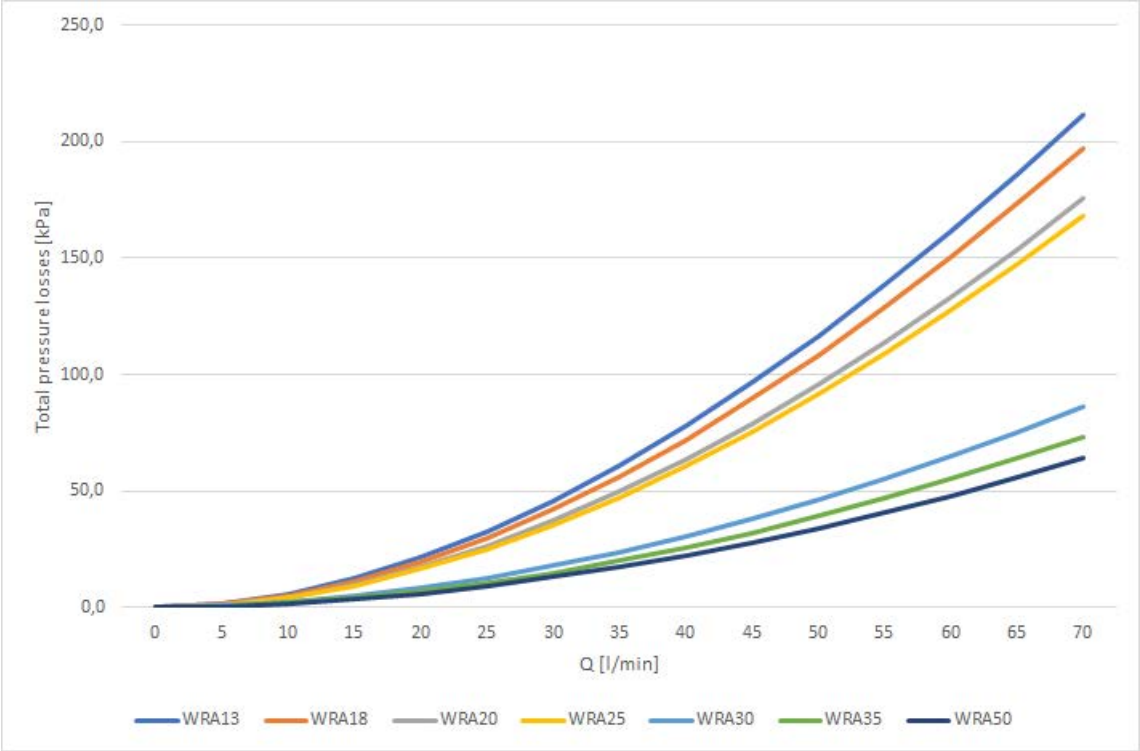


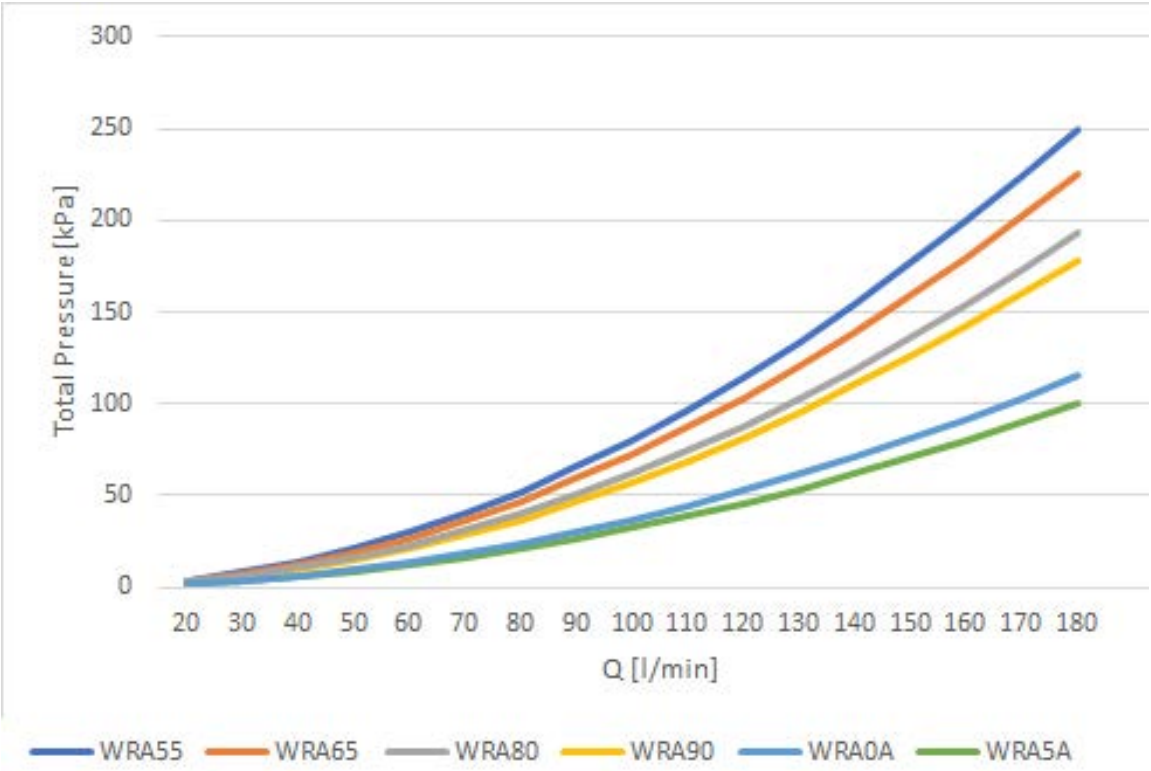




5.6. Pressure losses

5.6.1 Total pressure losses of the hydraulic circuit

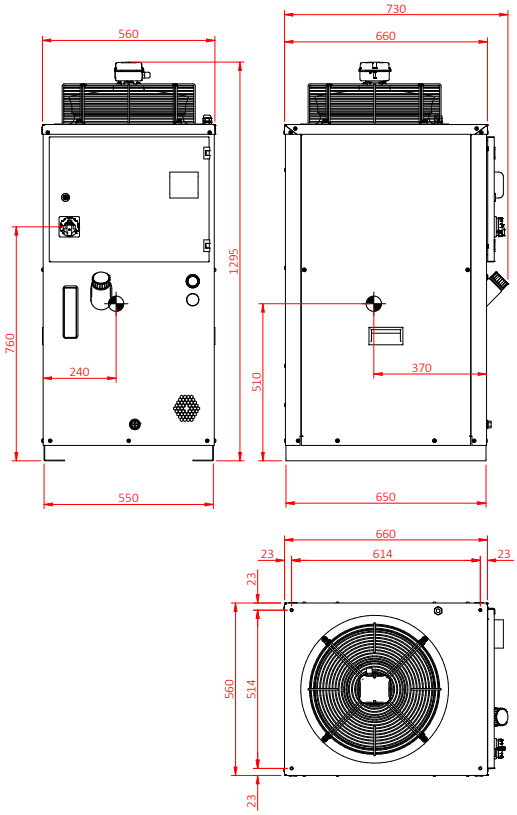


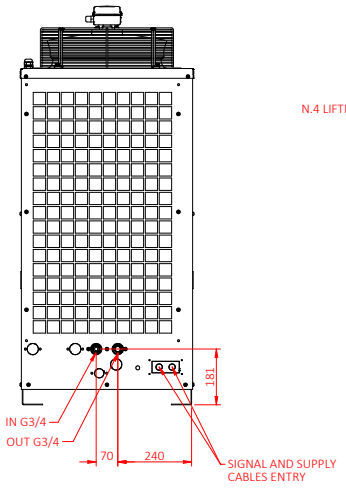


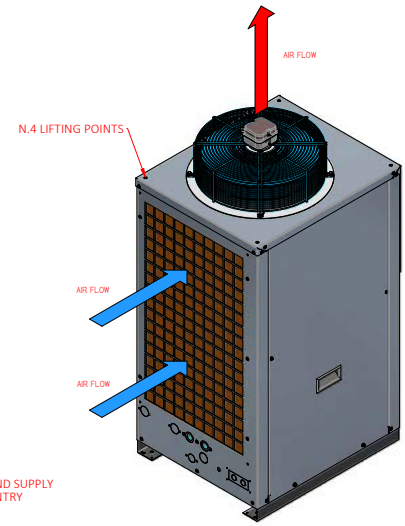
5.7. Dimensional drawings

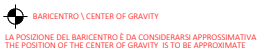
Centre of gravity
The position of the centre of gravity is approximate

WRA 13, 18 - V1

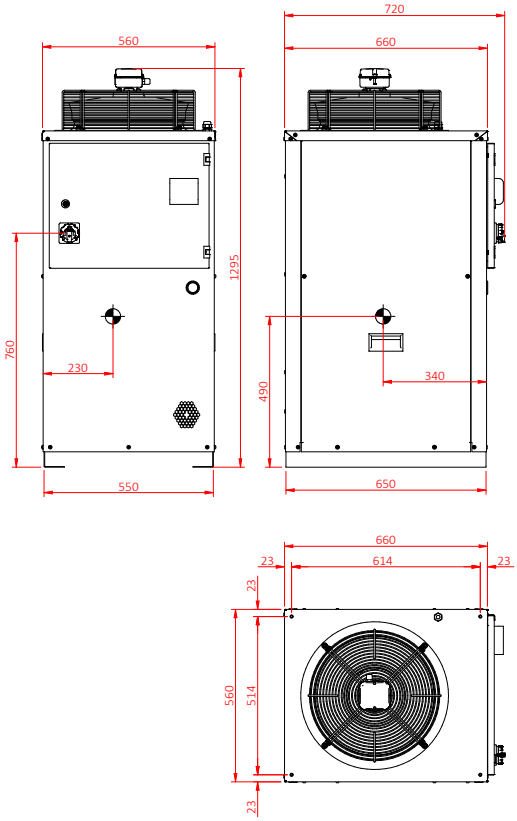


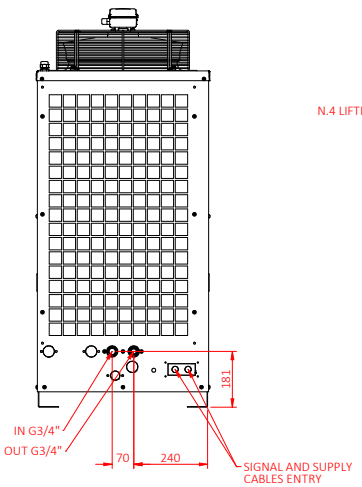


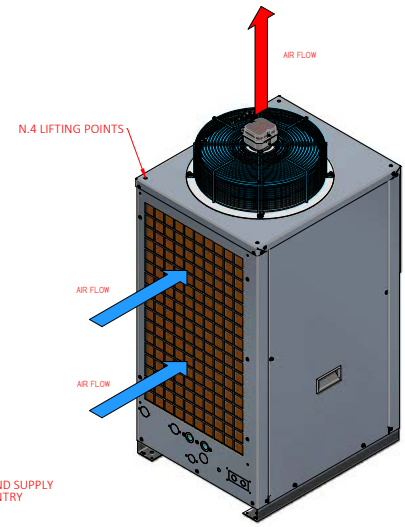


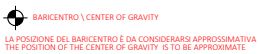


WRA 13, 18 - V2

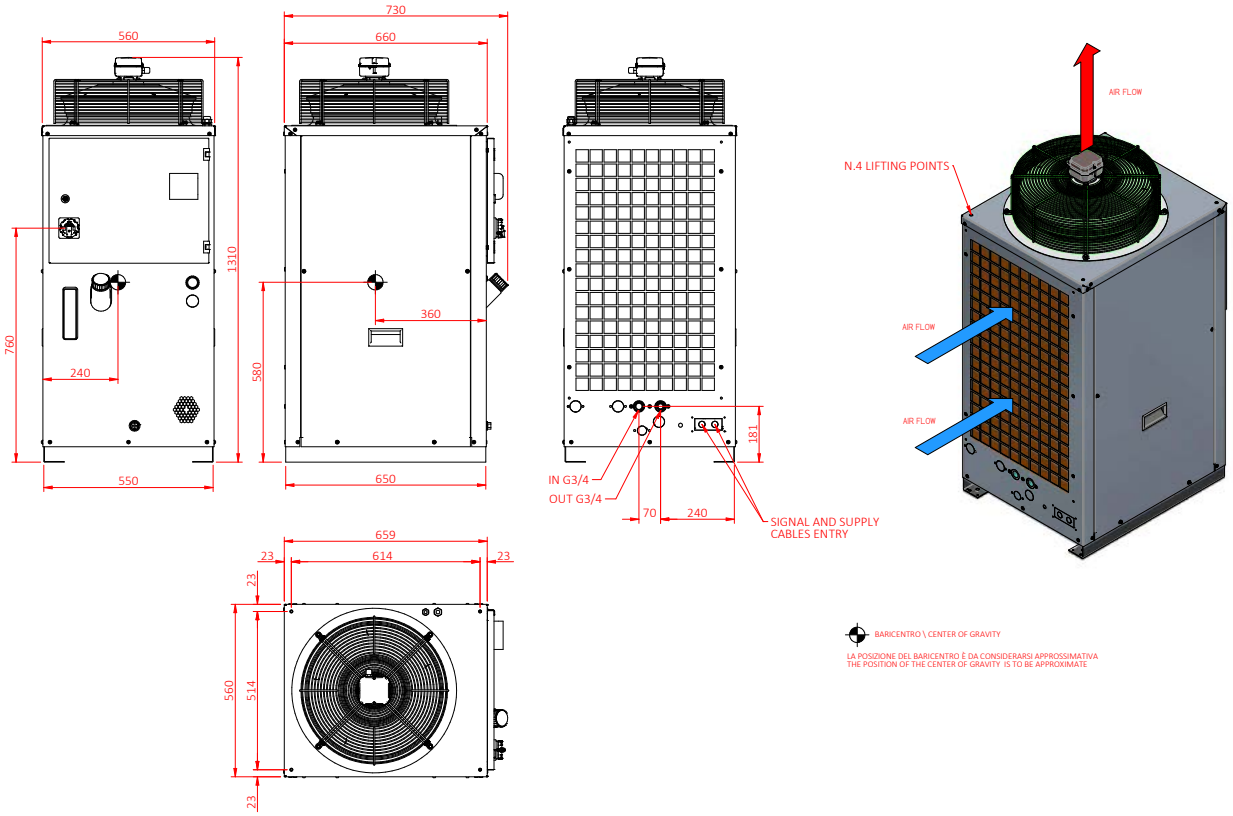




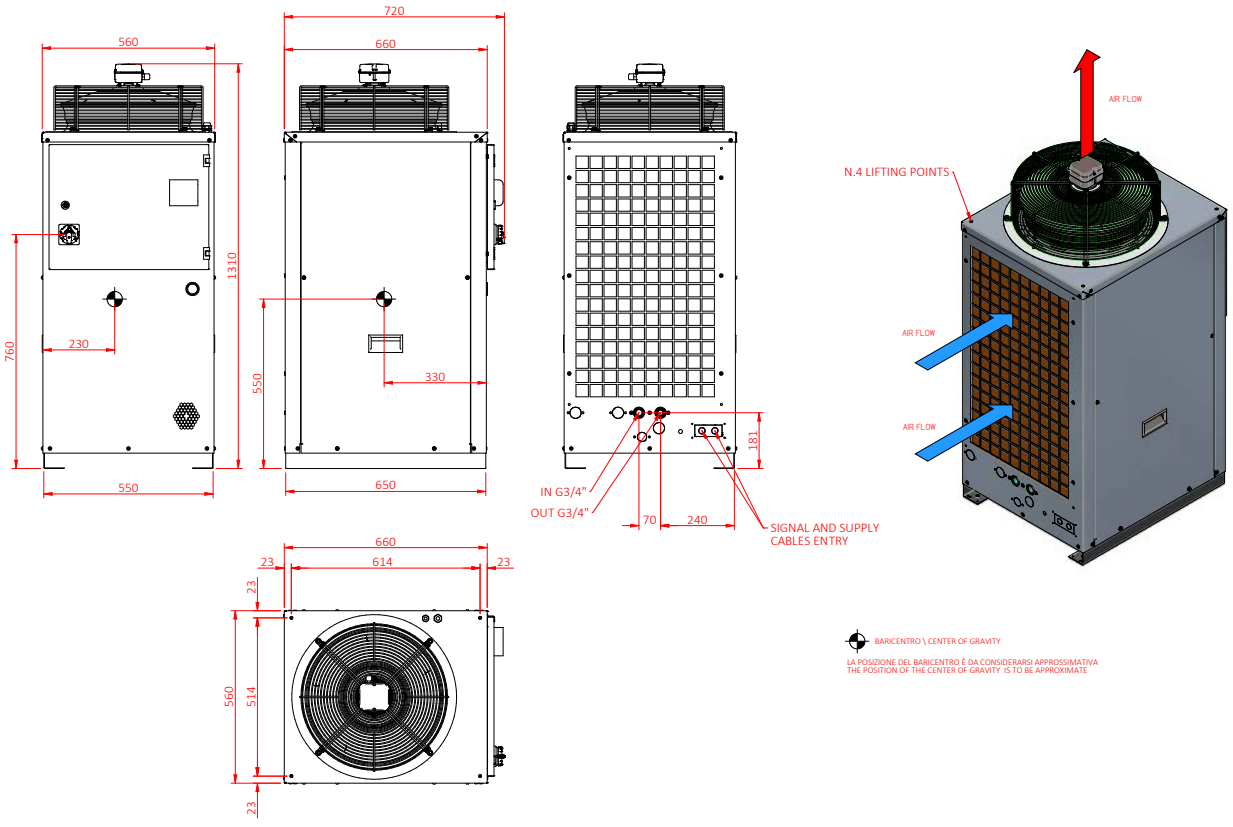




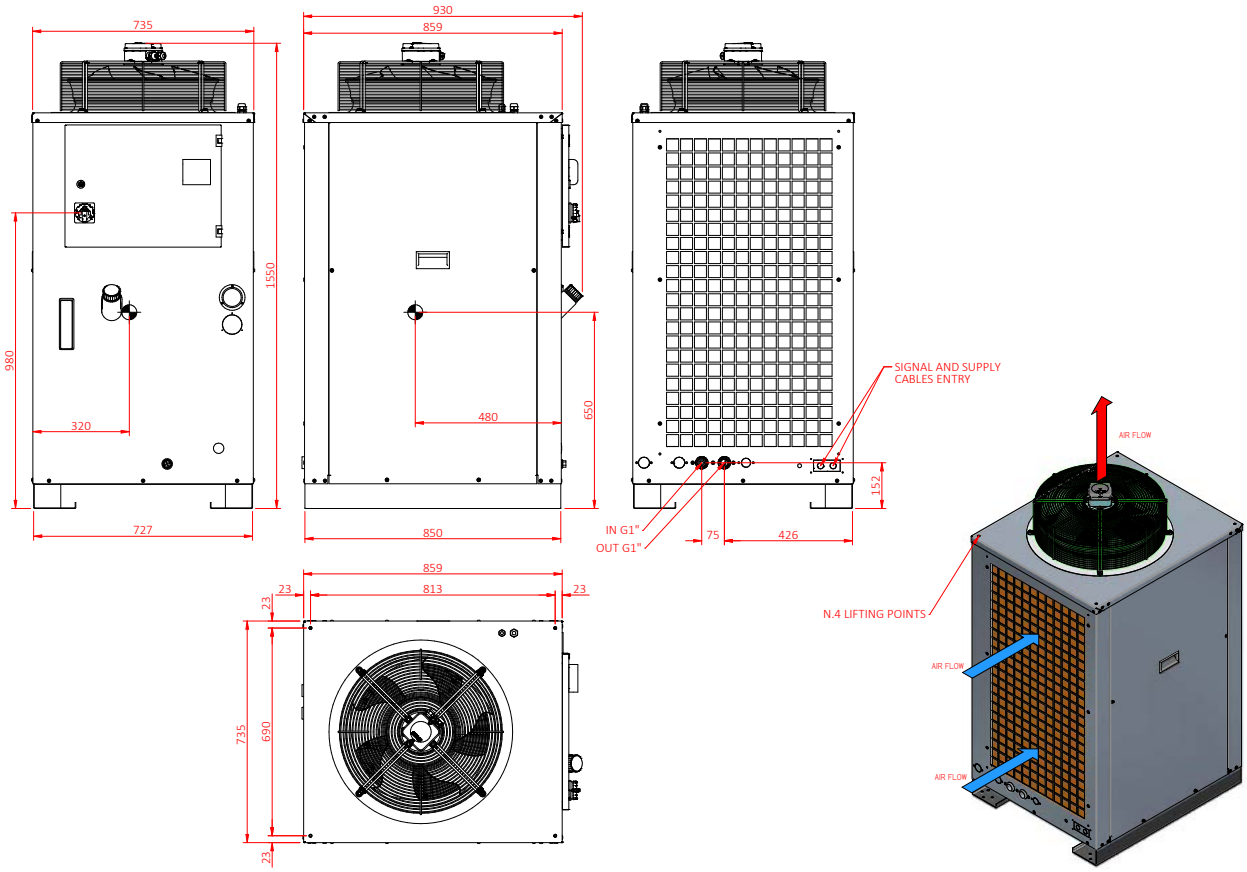
WRA 20, 25 - V1



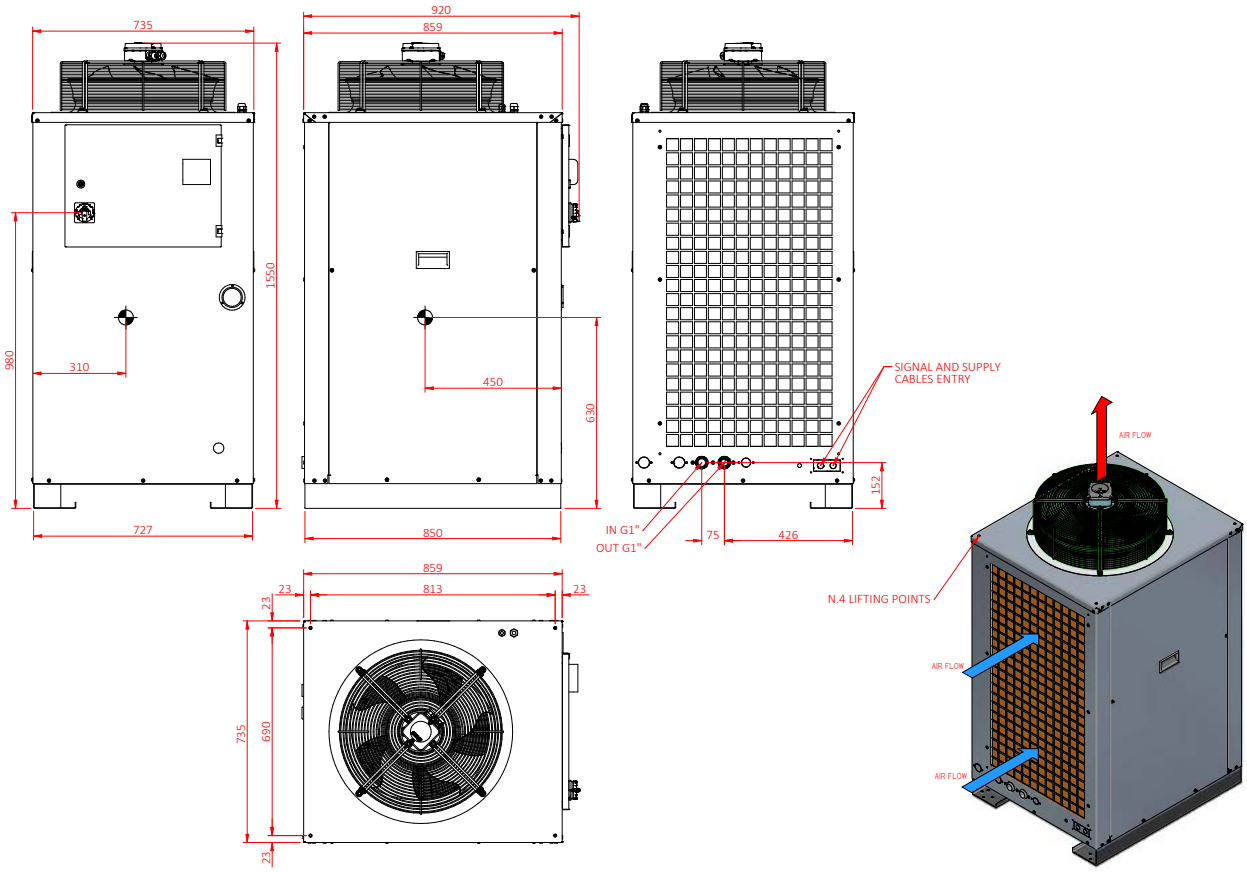
WRA 20, 25 - V2



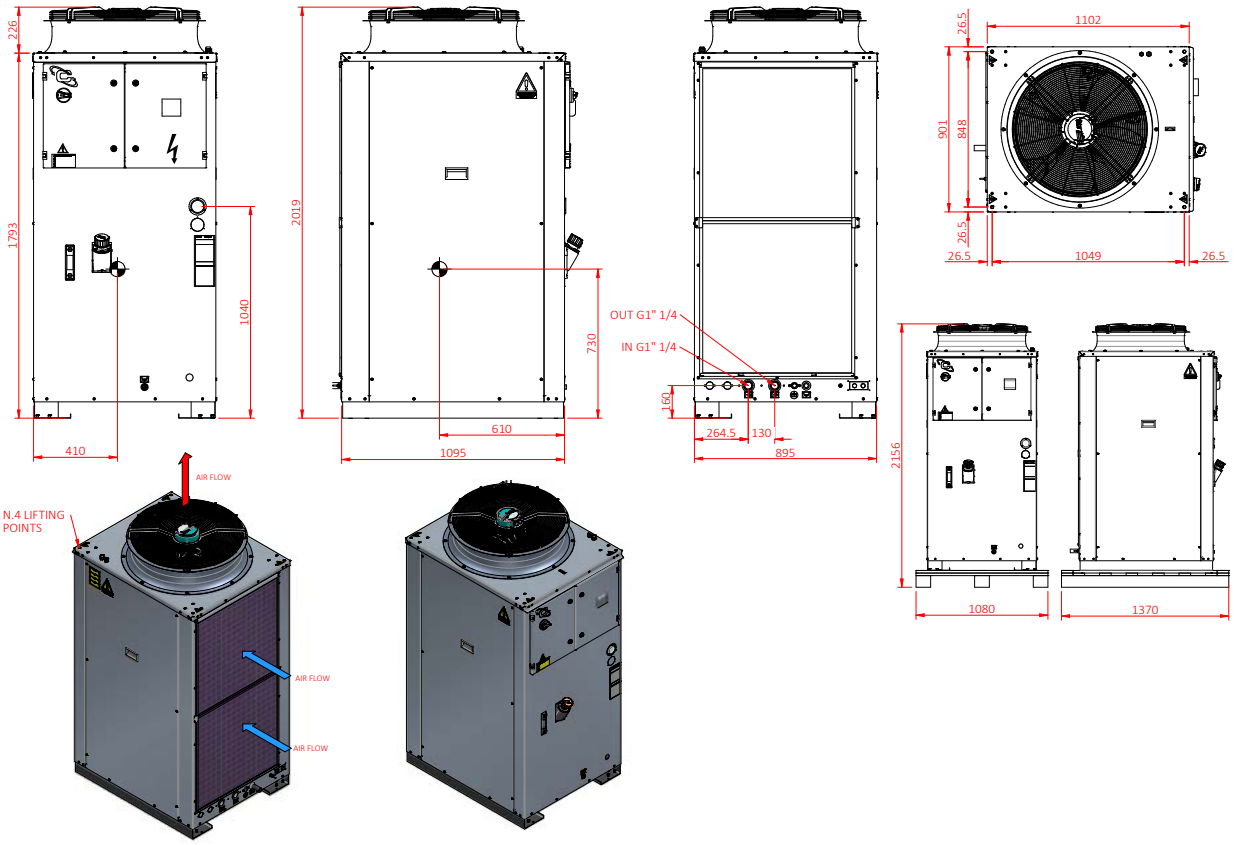
WRA 30, 35, 50 - V1



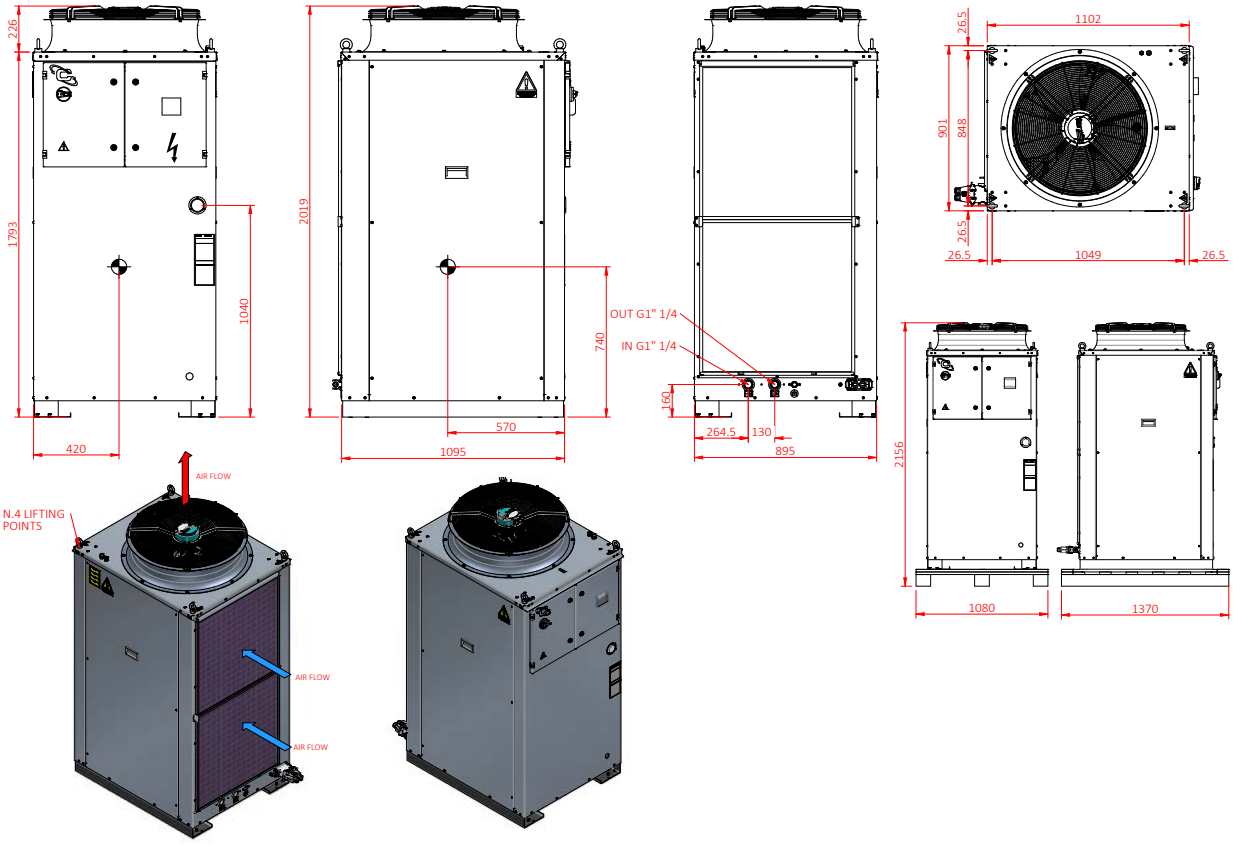
WRA 30, 35, 50 - V2



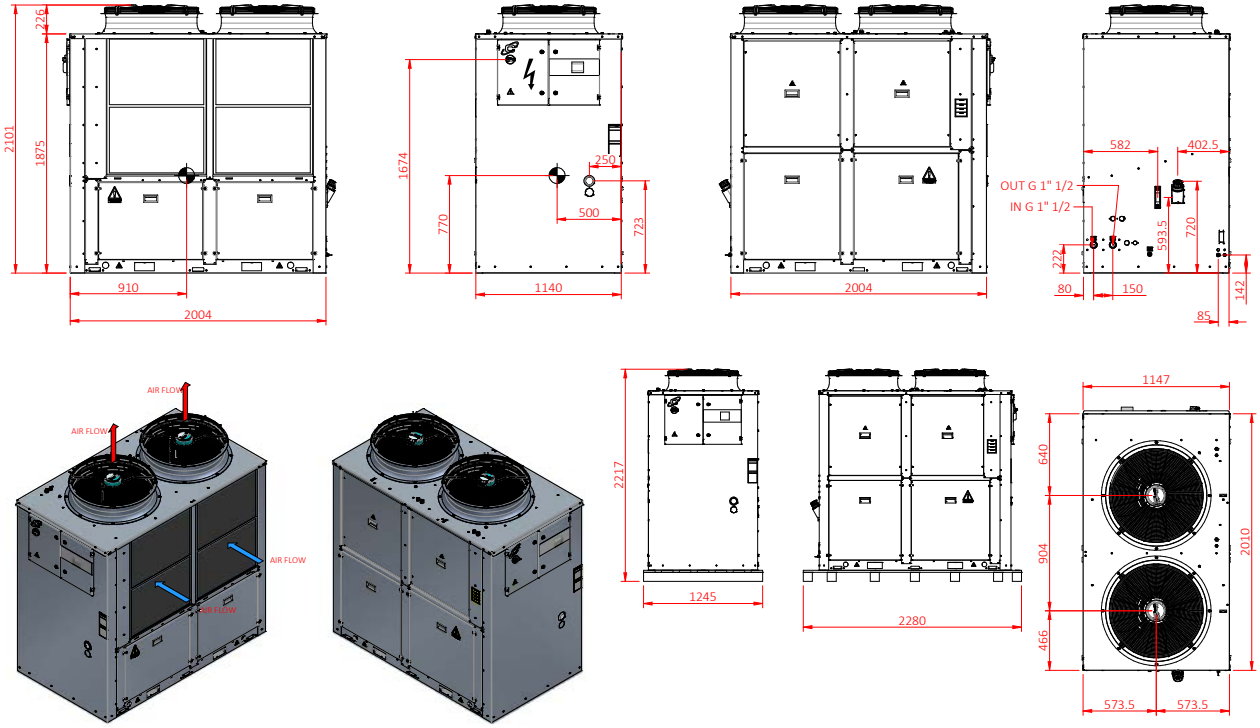
WRA 55, 65, 80, 90 - V1



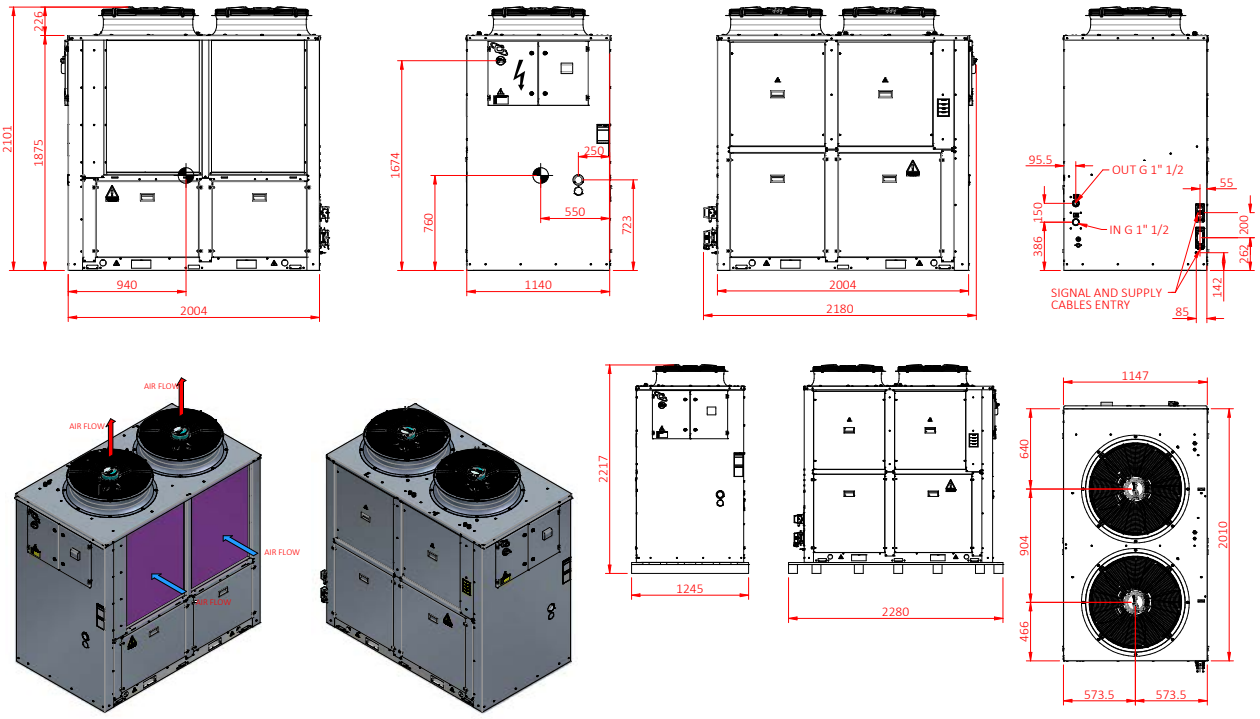
WRA 55, 65, 80, 90 - V2



WRA 0A, 5A - V1



WRA 0A, 5A - V2



6. Installation

6.1. Positioning

INFORMATION

Respect the relevant requirements for installation according to national regulations and EN 378.

Check that the installation site is appropriated for the unit weight, which you can read in the technical data.
Pay attention to the following factors to identify the chiller installation site.

- The unit should not be positioned downstream heat sources or dirt, in relation to the wind direction. Particles of grease and dust in the air would deposit on the condenser fins, reducing the heat transmission efficiency.
- Sites subject to heavy snow or sand accumulation, as well as flooding, are not suitable for installation. To prevent snow or sand accumulation, you can install protection devices provided that they do not obstruct free maintenance spaces or fan and/or condenser air flow.
- Moreover, make sure that the site does not favour air short-circuits between discharge and condenser recovery.
- If the unit is installed on the ground, the soil must not be soft or crumbly.
- Above the fans a clearance of 5 m is required.
- If the unit is positioned in an area which is accessible to unauthorized persons, it is recommended to take steps for preventing vandalism and accidental damage.
- If the chiller is installed in external environment, it's necessary to avoid that the condensing coil of the unit is subjected to wind, with speed higher than 0,2 m/s. If this is not possible, set up anti-wind barriers.
- The installation site must not contain any materials that may cause a fire and/or explosion hazard..

According to the drawings below, check the compliance with the free spaces for maintenance and air circulation, by means of the condenser, suction, and expulsion. Moreover, check the minimum distance from obstacles or other chillers.

The support surface must be perfectly horizontal and capable to withstand the weight of the chiller, filled with water, during operation (data indicated in the technical sheets, paragraph 5.4) safely. The dimensions of the support base must be larger compared to the plan dimensions of the chiller.

6.1.1 Minimum distance from obstacles or other chillers

Free space is required to allow correct access to the unit for ordinary and extra-ordinary maintenance, as shown in the following drawing.

6.2. Refrigerant circuit

As a protection against over pressure the refrigerant circuit is equipped with a safety valve on the high pressure and low pressure side of the refrigerant circuit. When attaching any pipework to a relief valve the pipes must be of a sufficient diameter so as not to cause resistance to the operation of the valve. For critical or complex installations refer to EN 378, unless it is not specified by local regulations, the internal diameter can be calculated using the following formula:

$$D^5 = 1{,}447 \times L$$

D: Minimum pipe internal diameter in centimetres
L: Length of pipe in meters

6.3. Hydraulic connection

The minimum equipment required for the external hydraulic circuit is:

- The operations of hydraulic connection must be performed by a qualified installer.
- Verify that the hydraulic connections "INLET" and "OUTLET" are respected.
- Pipes must have diameter equal to the diameter of the circuit connections, indicated in the hydraulic diagrams in paragraph 4.5. For units with pump without tank (digit 10 of the code with value 1-2-3-4) is necessary to provide a suction pipe of diameter equal to 1", also for WRA unit size II, making sure that it results as short as possible in order to avoid cavitation phenomena.
- Two shut-off valves to isolate the chiller from the system, in correspondence of the inlet and

outlet hydraulic connections.
- System draining valves in its lowest points.
- In case of pressured system, provide vents in the higher points of the plant and an expansion vessel appropriately dimensioned in order to protect the plant (the expansion vessel inside the chiller is dimensioned only to protect the internal volume of the chiller).
- Flexible couplings to join the chiller external hydraulic circuit.
- A filter on the chiller inlet return pipe, with mesh of 50 ÷ 100 µm.
- Suitable insulation on the pipes to prevent condensation and reduce heat transfers on the circuit.
- If the chiller is equipped with an inverter pump and the hydraulic circuit can be sectioned, e.g. with a solenoid valve, a bypass branch must be provided to short-circuit the flow of water between the outlet and the return to the chiller to prevent it from going into alarm due to a lack of flow (versions with an inverter pump do not have a hydraulic bypass inside the chiller).

Before connecting definitively the chiller to the utility, make sure that the pipes used do not contain dirt or processing residues; if in doubt, perform one or more washing cycles.

INFORMATION

To avoid any misunderstandings: the designation “water inlet” and “water outlet” are chosen, seen from the chiller. At the water outlet, the chilled water is provided from the chiller.

The position of the hydraulic connections is shown in the dimensional drawings in paragraph 5.7.

Remove the protective plugs from the connections and connect the pipes of the external hydraulic circuit complying with the inlet and outlet direction of the chiller. The inlet and outlet of the hydraulic circuit are marked with the labels shown in paragraph 1.3.

6.4. Electrical connection

DANGER

Before performing any operation on electrical parts, make sure that there is no voltage.
Make sure that the earthing system of the unit is efficient.

WARNING

The electric cables must be only connected by an authorized specialist.
The connection terminals are designed for copper cables.

- The units in the factory are fully wired, therefore they only need to be connected to the mains power supply, downstream of a main switch, according to the regulations in force in the country of installation.
- Make sure that the power supply matches with that indicated in the data plate of the chiller (voltage, phase number, frequency) and that the values are not out of the range indicated in paragraph 5.1.
- The asymmetry of phase between the conductors may amount to 2% maximal.
- To determine the asymmetry of phase, measure the voltage difference between the phase conductors (L1-L2, L2- L3, L1-L3) and calculate the average value of the measured voltages. With a voltage supply of 400V/3Ph/50 Hz, the maximum deviation to the average value of the voltages may not exceed 8 V .
- Select the power cables according to the nominal current of the unit, which is indicated in the

technical sheets in paragraph 5.4.

- It's mandatory:
  - The use of an omnipolar thermal magnetic circuit breaker, in compliance with the regulations in force (contact opening of at least 3mm), with adequate breaking power and differential protection according to the data sheets shown in paragraph 5.4, installed as close as possible to the unit.
  - Make an effective earth connection. The manufacturer cannot be held responsible for any damage caused by failure to earth the unit.
- Ensure that the electric cables are de-energized and the unit is turned off.
- Ensure an appropriate isolation of all sources of supply to the unit.
- These units are provided for 400V/three-phase/50Hz or 460V/three-phase/60Hz
- No additional controls should be installed in the control panel.
- According to EN 60204 the operator is responsible to install current protection devices between the supply conductors and the power supply connection of the unit.

⚠ WARNING

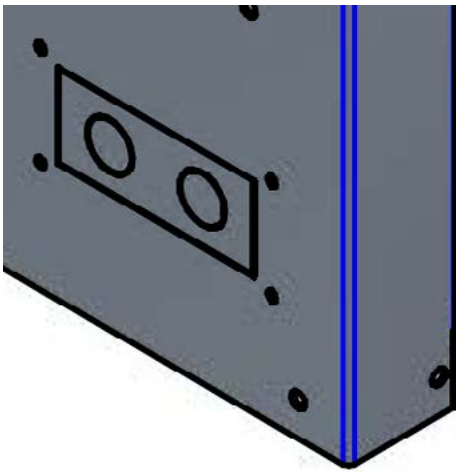
Do not touch electronic components, without taking care of protective ESD measures.

6.5. Opening the electrical box

The switched ON main switch prevents opening the door of the power section. Only, if the main switch is in position "0" you can open the doors of the power section. The door of the electric cabinet can be opened by the key which is delivered with the chiller.

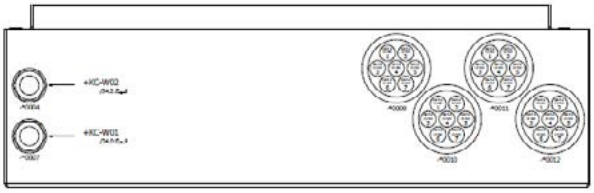
6.6. Position of the electrical connections

The connectors for signal and power electrical connection are positioned in the lower part of the electrical box.



One of the two available cable glands must be opened. A grommet or cable gland must be placed in order to avoid any risk of the cable being cut or damaged during the life of the machine.

The connectors for signal and power electrical connection are positioned in the lower part of the electrical box. The electrical connections must be done opening the left panel of the unit (seeing the unit form the font) and the connections must be done in the lower part of the electrical box.



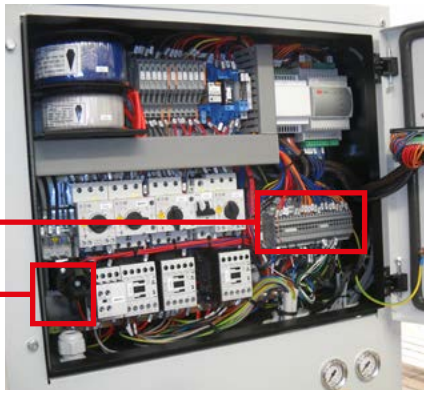
Lower part of the electrical box

Cables connection

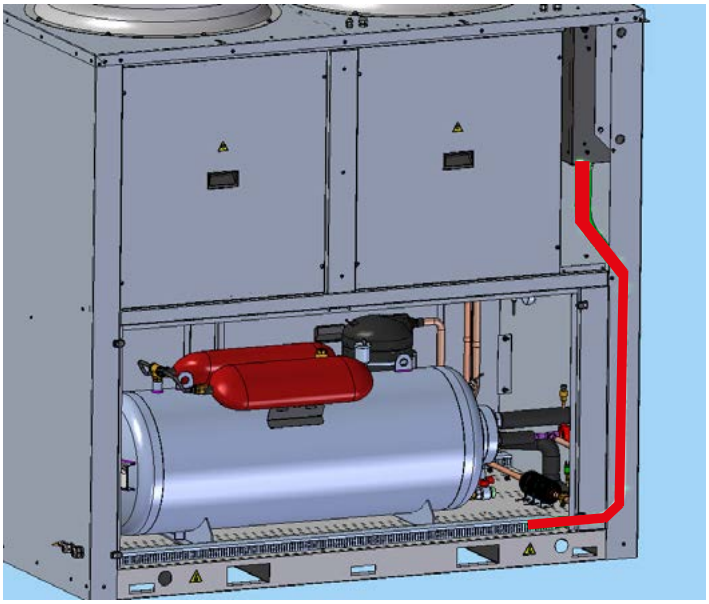
The unit has a phase control module, that recognizes an eventual error in phase rotation, preventing unit start and showing on the display an alarm symbol (see alarm table on paragraph 9.1).

The electronic control board provides digital outputs for alarm signals and status of the unit.

Inside the electrical box, connect to the connectors as shown in the picture (WRA25 shown as an example). The default configuration is shown in the specific wiring diagram of the unit, supplied with unit documentation available in the App ADAM.



Electrical connection of the unit WRA0A-5A



Electrical connections must be made by opening the panel on the lower left-hand side (looking at the unit from the electrical panel). The cables must be plugged in and the connections made at the bottom of the electrical panel, as shown in the image opposite.

6.6.1 Secondary transformer wiring for bi-frequency units (50/60Hz)

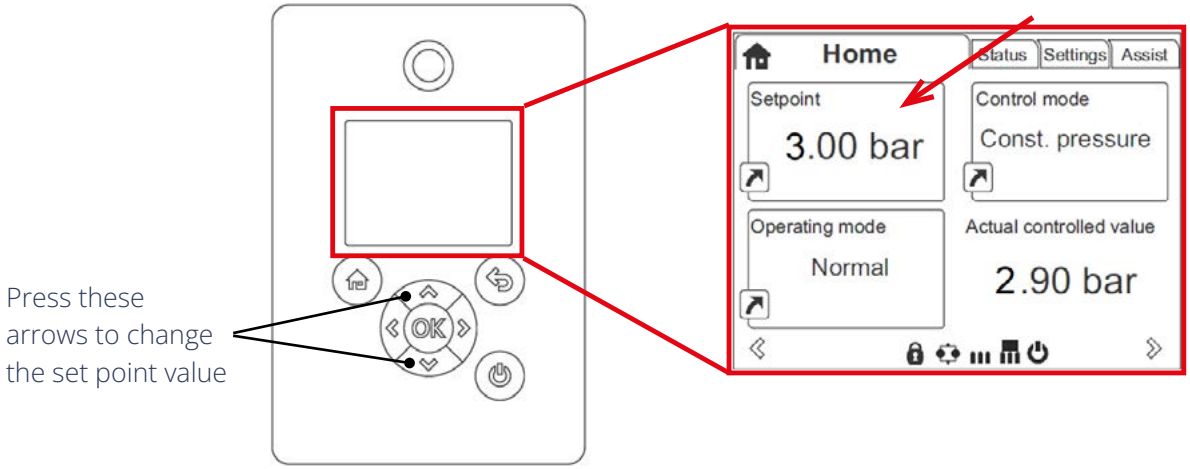
For units with 400/3/50-460/3/60 power supply (Power supply = "B", refer to paragraph), the transformer of the secondary is wired at 460V on the primary at the factory. If the unit has to work with 400/3/50power supply, it's necessary to modify the primary connection by wiring it to 400V. To do this, refer to the instructions in the wiring diagram supplied with the unit.

6.7. Pump control

The unit's microprocessor activates the internal pump.

6.7.1 Regulation of the inverter pump

The inverter pump has constant pressure control, regardless of the flow rate of the system. This control mode uses a factory-fitted pressure sensor, with a factory setting 3 bar, which measures the delivery pressure of the pump. The customer at start-up has to set the set point (the working pressure) on the pump display. The set point value can be set from the start page (shown in the picture below) by using the two arrows indicated and pressing ok. Enter the set point value by referring to the pump curve. The pump can run from a minimum speed of 25% to a maximum of 100%. By setting very low pressure values (below 25% curve) the pump will run at 25% while for values above the maximum the pump will run at 100% and the head will be the maximum attainable (no alarms or warnings are displayed). For further information please refer to the pump manual, supplied with the unit.



7. Commissioning

⚠ WARNING

- The unit must be installed and connected in accordance with chapter “6. Installation”, before initial commissioning.
- Only authorized personnel must commission the unit

7.1. Preliminary operations

⚠ WARNING

- Power supply of the customer must be switched off.
- Check that the unit main-switch is in off position.

The operations to be performed before commissioning must be carried out by the installers according to their field of expertise. The commissioning preliminary operations must be performed maximum two days before commissioning.

Inspect for visible damages which can affect proper operation of the chiller, and in particular:

- Check for transport/handling/installation damages
- Check that all components are installed in a proper way and are correctly fixed
- Check if the insulations are correctly installed and without damages
- Check that the plastic plugs are present on the outlets of the HP safety valves and in particular LP, otherwise it’s likely that the valve has tripped during transport due to the intervention pressure being exceeded (for R410A gas the LP valve intervenes at a temperature of approximately 50°C). In case of valve intervention, the system will be unloaded.
- Corrosions
- Verify that all documents are available (manual part I°, part II° and electronic controller manual)

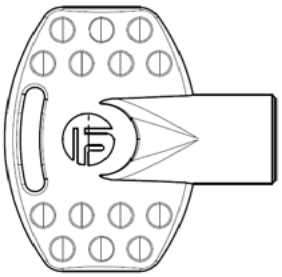
Check the refrigerant circuit: connect your own gauges and check the tightness of the refrigerant circuit according to the outside temperature of the refrigerant pressure. In case of leakage please contact the manufacturer.

Check correct power connection cabling. Be sure that all the connections are correctly installed and fixed (see „Electrical connection“). Verify the earth connection (see „Position of the electrical connections“).

Check water system. Verify the flow direction is according the IN/OUT connections on the refrigerator (see „Dimensional drawings“).

- Make sure of proper hydraulic connections and complying to inlet and outlet circuit indications, positioned near chiller connectors
- Check if the water system is filled up with water/glycol and if the glycol concentration is compliant.
- Ensure that all valves are open

When the main switch is open (position 0), access to the electrical panel using the key supplied with the unit, showed in the picture below.



- Make sure that the power supply and earthing cables are connected firmly to the respective terminals.
- Check that the contactors can move freely.
- Switch on power switches of fan, compressor, pump (if present) and electrical heating (if present).
- Make sure that the power supply voltage falls within the values allowed for the unit and stated in chapter 5.
- Close the protection panel of the electrical box with its key at move the main switch of the unit to position I.

7.1.1 Low temperature operation

As indicated in paragraph 5.3, for chiller water supply temperatures lower than 5°C and external air temperatures lower than 2.5°C, it is necessary to add an antifreeze liquid (ethylene glycol) to the water to be cooled. The percentage of antifreeze liquid must be established according to the project values for the unit outlet water minimum temperature and for the external air minimum temperature, in compliance with the provisions supplied by the manufacturer of the antifreeze liquid.

⚠ WARNING

In any case, the water supply and external temperature and minimum values must be complied with, as well as the maximum percentage of glycol. These values are stated in paragraph 5.1.

The corrective coefficients of the technical data according to the percentage of glycol used are indicated at paragraph 5.3.

7.1.2 Weathering

The unit is designed to operate in a foreign environment. In case of significant weathering, check that the chiller has not suffered any damage that may compromise its correct operation.
Specifically check:

- Fan and protection grid;
- Condenser.

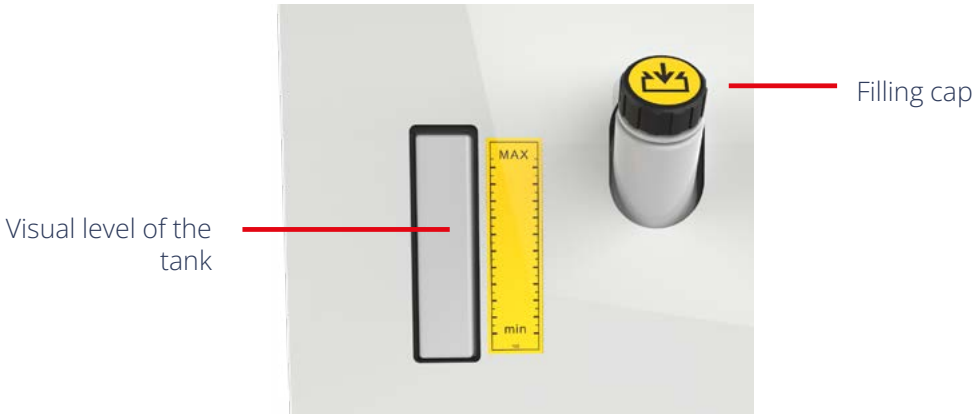
7.2. Check phases sequence

Close the main switch and move in I position. If the phases sequence is not correct, if a phase is missing or there is a too low voltage, on the display appears the alarm “LEPH”, the alarm led lights up and the alarm symbol ⚠ is visualized in the upper left part of the screen.
Check the linked voltage on all the supply phases. If it’s not correct, phase sequence has to be modified. For this purpose, after removing power supply to the unit from the distribution panel, exchange the connections of two phases of the power supply on the terminals of the unit.
At the end of this operation, after given again power supply to the unit closing the breaker in the distribution panel, check on the display that the unit is in OFF state and no alarms are visualized.

7.3. Filling the hydraulic circuit

Version with atmospheric tank

- Verify that the unit is not powered and is case is powered, disconnect power from the distribution panel.
- Remove lateral right panel of the unit, in order to access to the pump.
- Fill the circuit completely with the filling cap, identified with RI in the hydraulic circuit (see hydraulic circuits at paragraph 4.5) and shown in the following picture. For the symbols, refer to paragraph "1.3.2 Labels". The requirements of the liquid to be cooled are described in paragraph 5.1. Fill the tank until and no more than the maximum visual level (see picture below).



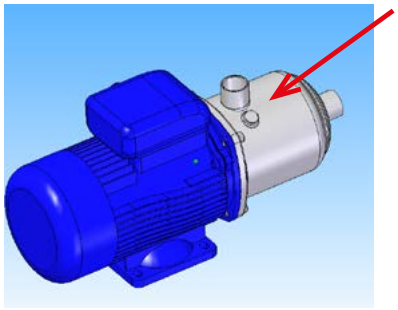
- Do not contaminate the filling liquid with liquids or additives other than those indicated. Do not mix products and/or additives of different brands.

Version with pump without tank

- Verify that the unit is not powered and is case is powered, disconnect power from the distribution panel.
- Remove lateral right panel of the unit, in order to access to the pump.
- Completely fill the circuit taking care to foresee 0,5 – 1 m headroom compared to the support level of the pump and higher that the higher point reached by the suction piping of the pump (to avoid siphons). The suction piping of the pump should be the as short as possible and preferably have a diameter of at least 1".
- Do not contaminate the filling liquid with liquids or additives other than those indicated. Do not mix products and/or additives of different brands.

To fill the pump correctly:

- Bleed the air from the pump body (where provided). With the unit off, open the specific cap on the top of the pump body and bleed the air.



- Before starting the pump, make sure that the impeller rotates freely. If not, use a flat-headed screwdriver on the slot placed on the pump shaft on the fan side, to rotate the impeller in both directions until it is released. If necessary, use for this operation the apposite hole on the frontal

panel, at the height of the pump motor shaft.
- The pump must never run dry to prevent the mechanical and hydraulic seal from permanent damage.
- The pump must not run with the supply inlet closed to prevent the pumped liquid and motor from the risk of overheating.
- Finally check that all the valves on the hydraulic circuit are open.
- Once the circuit is filled, check that the circulation pumps are powered with the cut-out switches on their power supply in the ON position. Moreover, make sure that the consent signal from the chiller is correctly connected to the pumps. Lastly check that the valves of all pumps are open.

At the end of filling and bleeding operation, close the lateral panels of the unit.

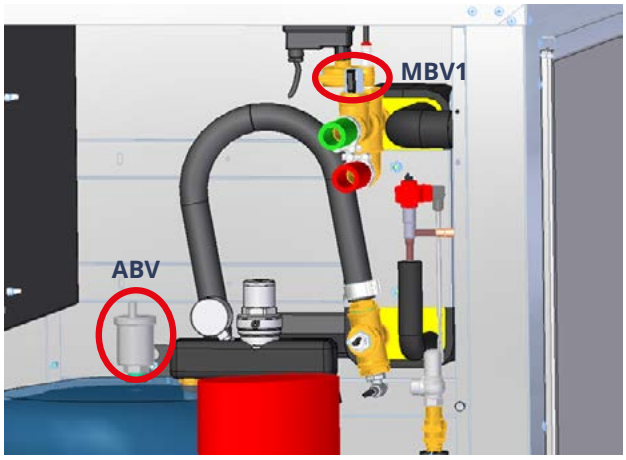
7.3.1 Manual start-up procedure of the pump from thermostat

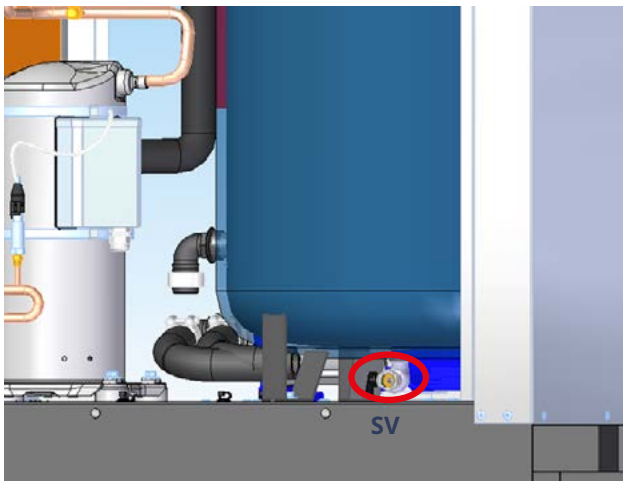
The pump can be switched on from the thermostat by switching to manual control with the following procedure, by logging in with first level password.

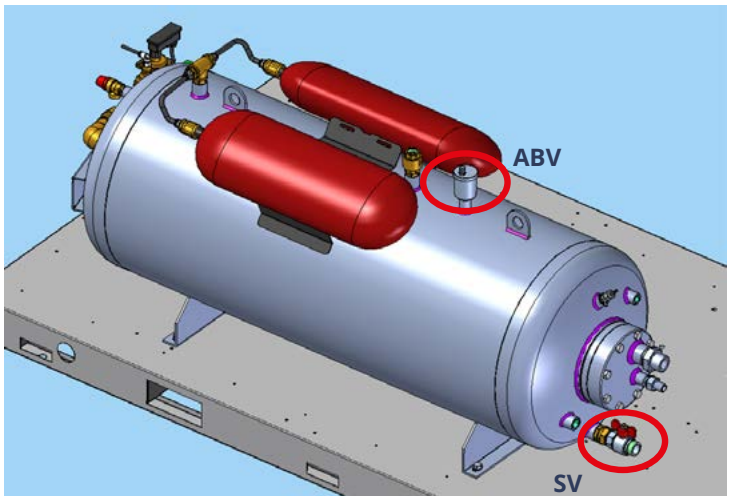
- Press the thermostat keys “set+esc” together to access to the main menu “Par”.
- Set the password by pressing “arrow up” and selecting the “pass” menu. Then confirm with “set” and set the password to 13. Finally press “esc”.
- From the “Par” menu, scroll through the submenus until you reach the “MAN” menu, then press “Set” to access it. Scroll down to select parameter “MP1E” and set it to “ON” (manual pump enable). Then select parameter “MP1” and set it to “on”, enabling the pump.
- Once the filling and venting operation has been completed, it’s necessary to restore the automatic control of the pump by selecting the “MAN” menu again. Then set parameter “MP2” = “OFF” (the pump switches off), and finally select parameter “MP1E” and set it.

7.4. Filling the circuit under pressure

For units with pressurised storage, the circuit must be filled at water minimum temperature and with a pre-charge pressure of 1 bar. Filling must be carried out by means of the special tap located at the bottom of the storage tank (SV/RI), which can be accessed by removing the left panel and opening the special venting tap (MBV1), located in the highest part of the system (see picture below).
Once the machine pump is switched on, the air still present in the system will be expelled through the automatic air vent valve (ABV), located at the top of the storage tank. To do this, it’s necessary to let the pump run for as long as necessary, leaving the filling pump connected, in order to maintain the correct pre-charge pressure.







WRA0A-5A

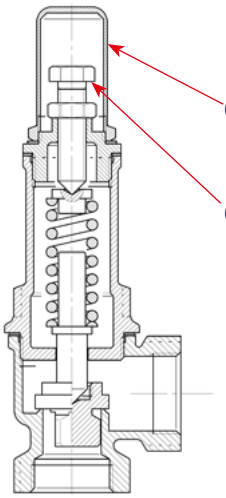
7.5. Calibration of automatic bypass

The automatic by-pass (VSC3) is located on the right side of the chiller, and is accessible by removing the right panel.

The factory setting of the by-pass is for operation with pumps 50 Hz.

INFORMATION

For the correct operation with a power supply frequency of 60 Hz it is necessary to change the calibration of the automatic by-pass according to the table below.



To calibrate the bypass:

- Remove the right side panel of the chiller.
- Close the valves on the external flow pipe.
- Activate the pump in manual operation (see paragraph 7.3.1) and on the pressure gauge display the working point.
- Remove the top cap of the valve by-pass. Pay attention that you might have a small leakage of liquid through the adjusting screw since it's not tight
- Act on the calibration screw until bringing the pump within the range of correct operation.
- Put the top cap, paying attention to also restore the relevant gasket so as to ensure its tightness.
- Open the taps on the external flow pipe.
- Restore automatic pump operation (see paragraph 7.3.1).

Below the setting values (with water) of the automatic by-pass recommended by the manufacturer:

	WRA 13÷25	WRA 30÷50	WRA 55÷90	WRA 0A÷5A
	50 Hz	50 Hz	50 Hz	50 Hz
P3 Pump [bar]	3,3	4,1	3,5 (WRA55-65) 4,3 (WRA80-90)	4,4
P4 Pump [bar]	4,6	5,1	5,6	5,5
P6 Pump [bar]	6.8	7,2	7,0	6,5

	WRA 13÷25		WRA 30÷50		WRA 55÷90		WRA 0A÷5A	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
P3 Pump double frequency [bar]	2,8	4,0	2,7	3,9	3,5	5,2	3,2	4,7
P4 Pump double frequency [bar]	4,1	6,0	3,4	5,3	4,3	6,2	4,3	6,3
P6 Pump double frequency [bar]	5,2	7,7	5,0	7,4	6,4	9,3	5,5	7,9

WARNING

Caution, the hydraulic bypass is not intended as a flow rate regulating device, but only as a device to protect the pump from running out of curve; observe only the factory setting values indicated in the manual.

7.6. Start-up

Only support centres authorised by the manufacturer are allowed to commission the unit.
For information and quotations, contact the manufacturer technical support service.
The preliminary checks described in paragraph 7.1 are not included in the commissioning operations.

⚠ WARNING

The chiller is already adjusted and calibrated at the factory.
The adjustments that can be modified during the start-up stage are the user level and service access parameters.
When the commissioning operations are complete, the only settings that can changed by the operator are the user access parameters

i INFORMATION

The instructions to modify user level access parameters are found in the electronic controller manual, user version, give together with product documentation.

⚠ WARNING

If there is a calibratable flow switch, the factory setting is with water. Provide corrections for different fluids.

- Verify that the unit is powered and, after moved the main switch in I position, verify that on display no alarms are visualized.
- Select the water temperature value required. As default setting, the electronic controller adjusts the temperature:
  - Supply temperature for units with tank and pump;
  - Return temperature for units without tank and pump.
- To start up the unit, move the main switch in I position and push the ON-OFF button for 3 seconds to change the state of the unit from OFF to ON and wait for the starting of the pump (delayed of 5 seconds) and subsequently the staring of fan and compressor.
- If an external consent signal is provided, the electronic controller places the unit in stand-by until the consent signal is sent.

7.6.1 Oil preheating (WRA55÷5A)

To preheat the oil, the chiller must be supplied with voltage, the circuit breakers of the compressors must be switched off for safety reasons. In normal operation of the chiller, the oil heater is always in operation when the compressor is switched off. The control (Start/Stop key on the controller) should also remain switched off during the oil preheating.

According to the specification of the compressor manufacturer the oil must have a minimum temperature of 20°C and be at least 20 K above the outdoor temperature. Above an outside temperature of 10°C the oil preheating should be launched 8 hours before the first start of the compressor.
Below an outside temperature of 10°C, the chiller requires an oil preheating time of 24 hours. During the oil preheating time the compressor cabinet should be kept closed.

7.6.2 Commissioning of the refrigerant circuit

Connect gauges at the high pressure and low pressure side and verify by reading the pressures, that the saturation temperatures for evaporation (low pressure side) and condensation (high pressure side) which correspond to the measured pressures, are within the following tolerances during the operation.

High pressure side: max. 20°C (with water temperature 20-15°C) above the air intake temperature of the condenser
Low pressure side: 2 to 5 K with water ,below the chilled water flow temperature
The pressure gauges feature a scale on the innermost ring indicating the saturation temperatures correspondent to the pressures.

Example:
Measured on the high pressure side: 31,5 bar (rel.) (= 32,5 bar abs.) corresponding saturation temperature at the dew point according to scale for R410A: 52,5°C measured air intake temperature at the condenser: 35°C

$$t_{cond} - t_{air} = 52{,}5°C - 35°C = 17{,}5\ K \Rightarrow ok$$

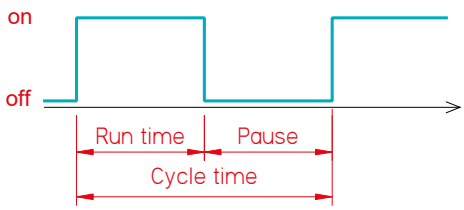
Measured on the low pressure side: 8,4 bar (rel.) (= 9,4 bar abs.) corresponding saturation temperature at the dew point according to scale for R410A: 5.0°C measured flow water temperature at the evaporator outlet: 8°C

$$t_{flow} - t_{evap} = 8°C - 5{,}0°C = 3\ K \Rightarrow ok$$

If the tolerances (18 K at the condenser, 3 K at the evaporator) are exceeded, there is a problem of heat transmission. The probable cause is the pollution of the heat exchange surfaces. Also the super-heating may be set too high.

Compressor operation
According to the compressor manufacturer specifications the following present parameters must be kept:

Value description	Time
Minimum runtime of compressor:	60s
Minimum cycle time of compressor	360s
Maximum start / hour	10 start / h



7.7. Checks after start-up

- Make sure no alarms are displayed. In case of alarms please refers to chapter "9. Malfunction".
- Make sure that the fan runs correctly and guarantees correct air flow to the condenser without recirculation.
- Make sure that the power supply voltage remains within the limits allowed when the unit is running.
- Make sure that the water temperature is close to the value set on the electronic controller.
- After 30 minutes of compressor operation, check the refrigerant circuit liquid level sight glass. The presence of bubbles may be a sign of a low amount of refrigerant, due to a leak on the refrigerant circuit. Therefore check for any leaks and top-up the refrigerant.
- Make sure that the current consumed by the electrical components (compressor, fan, and eventual pumps) falls within the maximum values indicated in the technical data sheets.
- If the unit has a tank, make sure that the tank liquid level is beyond the "min" limit but not beyond the "max" limit indicated on the level indicator. If liquid level is not enough, refill the tank.
- Make sure that the work pressure detected on the pressure gauge matches with the characteristic curve of the pump installed at the power supply frequency (see paragraph 5.5).
- If required, adjust the automatic by-pass in order to take the pressure back to the pump operation field.
- In the event of low pressure drops in the unit, close the taps downstream of the pump to bring it back within the working range.
- In the presence of reduced load loss of the unit external hydraulic circuit, if not already done, install a shutter on the supply pipe to take the pressure within the pump operation field. Lock the shutter until the required value is reached, that must complies with permissible work range (see paragraph 5.5).

7.8. Switch-off

Switch off for maintenance

To switch the unit off:

- Press ON-OFF on the display to stop the chiller;
- Once the chiller is OFF, disconnect the power supply from the unit setting the main disconnection switch to 0 (OFF).

⚠ WARNING

The ON-OFF button on the display is not a safety device to disconnect the power supply before start-up or maintenance operations.

Emergency Plan

Disconnect the power supply from the unit using the main disconnection switch (0=OFF).

Stopping the system

In case of long periods of non-use during winter, we recommend checking the minimum ambient temperature that can be reached. If this is lower than the freezing point of the liquid introduced in the hydraulic circuit, discharge and drain the circuit completely.

8. Maintenance

8.1. Safety instructions

All maintenance work is to be carried out under strict compliance with the country-specific accident prevention regulations. In particular we refer to the accident prevention regulations for electrical installations, refrigerating machines and equipment. Non-compliance with the safety instructions can endanger people and the environment.
Maintenance work is only to be carried out on the units by authorized and qualified specialist staff.

⚠ WARNING

Work on the system must always only be carried out when it is shut down. To do this, the unit must be switched off at the controller and at the master switch. A "DO NOT SWITCH ON" warning sign must be displayed.

Live electrical components and power factor corrections are to be switched to de-energized and checked to ensure that they are in the de-energized state.
Some verifications must be effected with the unit in operation (measuring the current, pressures, temperatures). In such a case the unit must only be switched on at the master switch after all mechanical connections have been carried out.

8.1.1 Warning notes

- When the master switch is turned ON and the controller is stopped the power contactors are live, even if the components are not operating.
- At the fan contactors, dangerous voltages occur. Do not open the unit within the first 5 minutes after disconnection of all phases. Be sure that the unit is being isolated.
- The electronics housing of the fan motor can get hot.
- The fans have an overrun time after the unit is stopped. (Risk of injury)

8.2. Maintenance intervals

Description	1 month	6 months	1 year	5 years
Refrigerant circuit				
Check the sigh glass		●		
Check for leaks		●		
Check for losses of the refrigerant circuit		●		
Check the safety high pressure switch			●	
Check the pressure transducer			●	
Check low pressure switch		●		
Check the safety valve			●	●
Check the hot gas solenoid valve			●	
Substitute the pressure relief valve (Directive 2014/68/EC)				●
Operation of heaters on compressor carter		●		
Check the cleanliness of the upper compartment (for WRA5A units)	●			
Aeraulic circuit				
Clean the condenser		●		
Check the mounting, operation and balancing of fans		●		
Check the air filter (in normal environments. In particular dirty environments, clean/substitute the filter when necessary)	●			
Water circuit				
Drain the tank			●	
Check the level of the fluid to be cooled		●		
Check the presence of air		●		
Check and repair any leaks		●		
Check and repair the fault insulation of pipes		●		
Check the connections		●		
Check the efficiency of the differential pressure switch		●		
Check the cleanliness of the evaporator water side		●		
Check the working of the electrical heatings			●	
Electric circuit				
Check for abnormal consumption		●		
Check the tightness of all terminals		●		
Check the cleanliness and integrity of the contactors		●		
Check the connections of the pressure switches		●		
Check that the contactors can move freely		●		
Unit in general				
Check the absence of abnormal vibration		●		
Check the absence of abnormal noise		●		

⚠ DANGER

Very little routine maintenance is necessary to keep the unit in reliable operating order and protect its moving parts. This maintenance, however, must be performed at the prescribed maintenance intervals. Failure to perform due maintenance both decreases the intended life and efficiency of the unit and also invalidates guarantee coverage. If the unit works in particularly dirty environment, like an ambient with conductive dust, it's necessary to increase maintenance frequency. Product intended life time is variable and dependent on the application (eg. On/Off cycling due to load variability, annual working hours, cleaning of exchange fluids, operating temperatures, etc.).

8.3. Refrigerant Circuit

8.3.1 Refrigerant charge

To be checked: sight glass, low pressure switch
An insufficient charge causes the formation of bubbles in the sight glass (at full load) or in extreme cases the triggering of the PSL switch. An operation with an insufficient refrigerant quantity over a longer period leads to a reduction of cooling capacity and to high super-heating temperatures, which have a disadvantageous effect on the compressor lifetime.
If a leak is detected:

- Evacuate all the refrigerant gas and dispose it according to the national regulation;
- Repair the leak;
- Do a pressure test by nitrogen;
- Extract the nitrogen by the vacuum pump (not by the compressor!) to approximately 0 barg;
- Fill with refrigerant gas according to name plate of the chiller for type and weight.

INFORMATION

The refrigerant must be charged in a liquid state.

8.3.2 Quantity

To be checked: charge of refrigerant
An overfilling of the circuit makes the condensation pressure rise and by that the power consumption of the compressor increases. In the extreme case the PSH-switch triggers.

8.3.3 Tightness of refrigerant circuit

To be checked: pipes, connections, valves
According to article 3 of the EC regulation No. 517/2014 the operator must check the refrigerant circuit of the chiller every 6 months for leaks.
After repairing a leak, the refrigeration circuit must be checked on tightness within one month.
The following information must be recorded by the operator in writing:

- Quantity and type of the used refrigerant.
- Refilled refrigerant quantity.
- Recycled refrigerant quantity.
- Companies or persons which have carried out maintenance.
- Dates and results of inspections.

8.3.4 Purity

To be checked: sight glass, filter drier
Bubbles in the sight glass indicate that the charge is insufficient or that the filter drier is clogged. A pollution of the filter drier, whose origin task is to clear the refrigerant from impurities and humidity, can be detected by a temperature difference upstream and downstream the filter drier.

Compare the colour indicator in the centre of the sight glass with the outer ring scale.

- Green or purple to blue ⇨ OK
- Yellow or rose to red ⇨ humidity critical

With too much humidity in the circuit, the expansion valve can freeze. In addition to this the compressor oil, which comes in touch with the refrigerant, takes up humidity and loses its ability to lubricate.
Take an oil sample, determine the humidity content and exchange the oil in case of excessive humidity content.
In this case the refrigerant must be completely evacuated and recharged by new refrigerant according to the above described evacuation instruction.

8.3.5 Exchange of filter drier

To be checked: filter drier.
To exchange the filter drier is necessary to completely evacuated all the plant as described in the previous point,

8.3.6 PSH switch

To be checked: high pressure switch.
When the **"High Pressure"** limiter triggers, the compressor is switched off without delay. Before the re-starting and after the clearing of the error, the pressure switch has automatic reset with 4 attempts in 3 hours, so it's automatically deactivated for 4 times, if this number of interventions is exceeded it has to be manually deactivated from the display, after removing the cause of his intervention (please refer to chapter „Malfunction"). The automatic reset respects stopping and starting compressor times.

8.3.7 Safety valve

The evaluations of the safety valves must be done in accordance with the national regulations. Where there are no criteria in national regulations, please refers to the following information inside EN 378-4:

- The safety valves are checked in accordance with EN 378-2: 2016 paragraphs 6.3.4.3.1, 6.3.4.3.4 e 6.3.4.3.5 and submitted tightness test every year.
- The safety valves are recalibrated or substituted every five years.

⚠ DANGER

The safety valve must be replaced by trained and skilled personnel. To replace the safety valve, isolate the section with the tap upstream of it. A small volume of gas remains under pressure and must be vented by slowly unscrewing the safety valve.
The taps serving the safety valve have a leakage rate according to EN12284 or similar. During replacement of the safety valves, a leakage of gas may occur: if the time is consistent with a normal operation, the leakage will not create operating problems for the machine.
If there is no shut-off valve, isolate a part of the refrigeration system and extract the gas before replacement.

⚠ WARNING

If the machine is equipped with exchange taps upstream of the safety valves, i.e. taps that can only activate one valve (ACTIVE) and leave the other VALVE disconnected (NOT ACTIVE), the following rules must be followed:

1. Each tap must ALWAYS have two valves fitted, one ACTIVE in the non-isolated branch and the other NON-ACTIVE in the isolated branch
2. It is not possible to connect valves, even in the isolated branch, that are broken or not working.

Before replacement, it is MANDATORY to get the valves to be changed to avoid leaving taps with free holes

If a tap is left without an isolated safety valve (NOT ACTIVATED) for longer than a normal replacement, gas may be released into the atmosphere with partial or complete loss of machine functionality.

8.3.8 Expansion valve

The refrigerant circuit is equipped with a electronic or mechanical expansion valve, which controls the super-heating in the evaporator.
For the electronic expansion valve, the super-heating is adjusted to 5 K at the factory and may not be modified. Check the super-heating set-point. Check the super-heating by the electronic controller. If the super-heating is for a longer time below 3 K or above 8 K (with water temperature lower than 15°C), the function of the expansion valve is faulty.
Also for the mechanical expansion valve, the super-heating is adjusted at the factory and may not be modified. If the super-heating is for a longer time below 3 K or above 10 K (with water temperature lower than 15°C), the function of the expansion valve is faulty.
Compare the suction gas temperature measured by the valve sensor, with the value of a reference sensor at the suction line. If the super-heating still diverges significantly from the set-point and you can find no deviation at the verifications, probably the control module of the valve is defective and must be replaced. The expansion valve can freeze, if the humidity in the refrigerant circuit is excessive. Check the sight glass.

⚠ WARNING

Do not thaw by soldering flame, danger of explosion! Thaw with moist warm cloth. Check the sight glass.

8.3.9 Compressor

To be checked: compressor.
In the compressor there is an ester oil charge, which does not have to be renewed under normal operation conditions and holds out for the unit's lifetime. However, it is possible that the ester oil, as it reacts hygroscopically, has taken up humidity of the air after repeated recharging of the refrigerant circuit due to repair works. The interaction between ester oil and water results in the formation of acid. Owing to a hyper-acidity, corrosive processes take place inside the compressor. In this case the ester oil should be exchanged.
The oil level can be checked by looking at the sight glass of the

compressor or in the oil balance pipe.

Oil level

Check the oil level at the oil sight glass (if present). During unit idleness the oil level should not be below the lower quarter (bottom line) and not rise above the upper line during operation.

Carter heating resistance

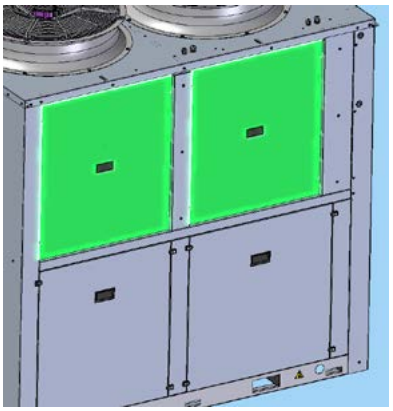
Check the resistance of the compressor crankcase by measuring the current absorbed with current clamp, between the resistor supply terminals in the electrical cabinet (refer to the wiring diagram). The reference values are: 0,25-0,35 A.

8.3.10 Condenser

To be checked: condenser coil

The air-cooled condenser consists of coil with mini copper pipes and aluminium fins. Through the coil flows outside air which is eventually polluted. Particles of polluted air may settle at the fins and reduce the heat transmission the same as raise the air resistance. This could probably identified by a increase of fan current consumption.

The heat exchanger can be cleaned by pressurized air or steam blasting (maximum 2 bar) which has to be blown to the normal air flow direction along the fins.



⚠ WARNING

- Do not bend the fins during such an operation, in order not to limit the exchange efficiency and increase the pressure drop on the air side.
- Do not use chemicals, these could cause corrosion at the coils.

For the WRA0A-5A unit, the condenser must be cleaned as follows:

- Switch off the unit.
- Open the upper panels on the left-hand side (as seen from the electrical panel) of the unit (see picture), using a suitable tool (M6 Torx screw). These panels give access to the condenser compartment.
- Clean the exchanger with pressurised air or steamed water (maximum 2 bar) and clean the condenser compartment where debris may accumulate over time.

8.3.11 Condenser Fan

To be checked: fan

The bearings of the fans are lifetime lubricated and do not need maintenance. Check the operation current. An increased operation current indicates either a higher air resistance by a clogged condenser coil or a winding short circuit in the fan motor.

8.3.12 Filter

To be checked: air filter

One filter is made of aluminium, it can be washed with water, once removed from its seat.
If the filter is made of polyurethane, it can be cleaned using compressed air.

8.4. Hydraulic circuit

- Be sure that the cooling medium respect the limits and specifications required (see „Chilled water quality").
- Check the cleanliness and wash with water if deemed necessary.
- Check for any leaks and for proper tightening of fittings.

8.4.1 Tightness

Check the water circuit visually for tightness. Beyond that a level indication at the storage tank, if existent, can give information about changes of the water quantity. A lack of water in the circuit is replaced by air, which reduces the heat capacity of the chilled water circuit and is detrimental to the pump.

8.4.2 Evaporator

To be checked: evaporator, inlet/outlet/antifreeze probes
Check the water side pollution of the evaporator by comparing the chilled water inlet temperature to the chilled water outlet temperature. If the difference is less than 3 K, it indicates a limited heat transmission and thus pollution.
Another possibility to verify this consists in the comparison of the chilled water outlet temperature with the saturated evaporation temperature (by measuring the suction pressure at the low pressure side of the compressor). If this difference exceeds 5 K, the evaporator is probably polluted
In this case the evaporator has to be cleaned chemically by authorized staff.

8.4.3 Differential pressure switch

To be checked: differential pressure switch
Check the correct function of the differential pressure switch by checking the electrical connections.

8.5. Electric circuit

To be checked: electrical box, electric components, motors

- Verify the proper working of the main switch.
- Check the earthing system.
- Check for any faults in the current consumption of the engines.
- Verify possible overheating of the motors.
- Check that the contactors can move freely.

8.6. Unit in general

To be checked: whole the chiller

- Clean the unit's inside with a vacuum cleaner. Clean pipes simplify the search for leaks.
- Check the pipes, the compressor and the condenser for a tight seat. Vibrations of pipes and circuit components can result in leaks.
- Check also the insulation of the water piping, if present. Condensing air humidity on cold water pipes means a loss of cooling capacity.
- Check for loose parts that cause an increase in noise and vibration.

9. Malfunction

Problem	Possible cause	Recommended actions
General		
The chiller does not start up and the electronic control is off	No power supply	Restore power supply
	Main switch open	Move the main switch to position I
	No power supply to the electronic control	Check the voltage of the power cables to the control. Restore or repair the wiring
	Electric control faulty	Contact Cosmotec service centre
	For bi-frequency units, the primary of the transformer of the secondary is not wired at the correct voltage	Use the wiring diagram of the unit to check the wiring
The control works but the display is off	Cable between control and display disconnected	Reconnect the cable
	Cable between control and display broken	Replace the cable
	Faulty display	Contact Cosmotec service centre
The control works but the chiller does not start up	Missing external enabling signal (stand-by state displayed)	Restore the signal wiring. Provide the external enabling signal
	Failures prevent the unit from working	Check any alarms on the display (see below). Contact Cosmotec service centre
	Electric control faulty	Contact Cosmotec service centre
	For bi-frequency units, the primary of the transformer of the secondary is not wired at the correct voltage	Use the wiring diagram of the unit to check the wiring
Display alarms		
tHOA	Compressor fault	Replace the compressor
	Failure of the power supply circuit of the compressor (cables, contactor ...)	Replace the faulty component
	Failure of the power supply circuit of the compressor (cables, contactor ...)	Replace the protection device
	Fan failure	Replace the fan
	Failure of fan supply circuit (cables, contactor ...)	Replace the faulty component
	Fan thermal switch failure	Replace the protection device
	Pump failure	Replace the pump
	Failure of the power supply circuit of the pump (cables, contactor ...)	Replace the faulty component
	Inverter pump fault: thermal protector tripping in the electrical panel; absence of a pump supply phase, broken or disconnected pressure transducer with alarm relay opening on the pump.	Circuit breaker trip: measure the pump's absorption, check the calibration and correct operation of the circuit breaker, if faulty replace it. If necessary replace the pump. Opening of the alarm relay on the pump: on the display on the pump check the cause of the alarm, possible causes are: • Absence of a power supply phase: restore it; • Faulty pressure transducer or detached transducer cable (analogue input 1): restore the cable, replace the transducer. For other causes refer to the pump's operation and maintenance manual and contact Cosmotec Service if necessary.
	Failure or the electrical heating RE-I (optional)	Replace the resistance
	Failure of the supply circuit of the electrical heating RE-I (cables, contactor ...)	Replace the faulty component
	Failure of electrical heating RE-I thermal switch	Replace the protection device
	Pump thermal switch failure	Replace the protection device
	Failure of the control driver of the electronic expansion valve (optional)	Replace the component. Contact Cosmotec service centre
	Electronic expansion valve motor winding fault (optional)	Replace the component. Contact Cosmotec service centre
	Communication problems between the electronic control device and the expansion valve	Contact Cosmotec service centre
	Low pressure transducer failure (DT2)	Verify the operation and connection of the transducer DT2
	Failure of the overheating control probe (PR5)	Verify the operation and connection of the transducer PR5

Problem	Possible cause	Recommended actions
HP (high pressure with automatic reset)	Power supply failure / failure of condenser fan	Repair the power supply to the fan / Replace the fan
	Failure of the control device of condenser fan speed	Lack of signal from electronic control: restore wirings from electronic control. Wrong signal from the electronic control. Contact Cosmotec service centre
	Dirty condenser / air filter (optional)	Clean the condenser / air filter (optional)
	Air recirculation on the condenser	Remove the obstacles near the condenser. Respect spaces indicated at paragraph 6.1.1.
	Failure of high pressure switch	Contact Cosmotec service centre
	Clogged filter dryer	From the circuit fluid level inspection slide, check the presence of humidity or bubbles in the refrigerant. Contact Cosmotec service centre
	Excessive amount of refrigerant gas resulting from topping up the circuit after repair	Contact Cosmotec service centre
	External air temperature higher than admitted limits	Contact Cosmotec service centre
HPM (high pressure with manual reset)	In case of four intervention of HP alarm in less of 3 hours	See alarm HP. To reset, it's necessary to hold the button ESC for more than 3 seconds.
LP (low pressure)	Refrigerant losses in the circuit	Contact Cosmotec service centre
	Failure of low pressure switch	Contact Cosmotec service centre
	Clogged filter dryer	From the circuit fluid level inspection slide, check the presence of humidity or bubbles in the refrigerant. Contact Cosmotec service centre
	Failure of the expansion valve of the circuit	Contact Cosmotec service centre
	Freezing of the expansion valve of the circuit	Check the humidity of the sight glass of fluid level of the circuit. Contact Cosmotec service centre
	Low flow of the fluid to be cooled	Check the fluid level in the storage tank and top up if necessary. Check any problems in the hydraulic circuit (failure/priming of the pumps, clogged taps...). Repair if necessary.
LPM (low pressure with manual reset)	In case of four intervention of LP alarm in less of 3 hours	See alarm LP. To reset, it's necessary to hold the button ESC for more than 3 seconds.
HT (high temperature)	Cooling capacity lower compared to the thermal load	Decrease the heating load or increase the number of chillers
	The filter of the fluid to be cooled is dirty	Clean the filter
	Evaporator dirty	Contact Cosmotec service centre
	Low calibration of the water flow temperature probe	Check with a reference thermometer. Contact Cosmotec service centre for calibration
	Losses of refrigerant in the circuit	Contact Cosmotec service centre
	Compressor fault	Check if there are alarms on the display. Contact Cosmotec service centre
	Thermostatic valve failure	Contact Cosmotec service centre
	Low quantity of the fluid to be cooled	Check the fluid level in the storage tank and, if necessary refill
LT (low temperature)	Low flow of the fluid to be cooled	Check problems at the hydraulic circuit (pump failures, blocked valves..). If necessary repair
	Low calibration of the water flow temperature probe	Check with a reference thermometer. Contact Cosmotec service centre for calibration
	Fluid to be cooled is not suitable to the minimum external temperature	Contact Cosmotec service centre to defrost the evaporator. Add glycol to the fluid to be cooled in proper proportion of the external temperature
	Malfunctioning of the electrical heating (optional)	Check and eventually repair or substitute
FF (evaporator flow alarm with automatic reset)	Low flow of the fluid to be cooled	Check problems at the hydraulic circuit (failure of pumps, closed valves..). If necessary repair
	Air in the hydraulic circuit	Repair the losses and vent the circuit
	Failure of the differential pressure switch or flow switch (optional)	Verify and eventually repair the wiring or replace the component
FFM (evaporator flow alarm with manual reset)	In case of four intervention of FF alarm in less of 3 hours	See alarm FF. To reset, it's necessary to hold the button ESC for more than 3 seconds.

Problem	Possible cause	Recommended actions
LEPH (tank level)	Low level of the fluid to be cooled in the tank (for versions with atmospheric circuit)	Disconnect power supply to the unit, to avoid accidental dry functioning of the pump and of the electrical heating (optional). Verify the level of fluid in the tank (with visual level indicator LV), if it's lower than minimum, refill with its filling cap. Check for eventual losses in the hydraulic circuit. If present, repair and refill the tank. If there is the electrical heating, verify the right working of its contactor before reboot.
	Fault control relay trip and phase sequence for: wrong sequence of power supply phases (at start), lack or unbalance of one or more supply phases	Verify the correct connection of the supply cables, verify phase-to-phase voltage on each phase of the power supply, verify the right sequence of power supply phases
	Failure of the level switch	Verify and eventually repair the wiring or replace the component
AF (antifreeze)	Low flow of the fluid to be cooled	Check problems at the hydraulic circuit (pump failures, valves closed..). If necessary repair
	Fluid to be cooled not suitable for minimum external temperatures and/or regulation temperature	Contact Cosmotec service centre to defrost the evaporator. Add glycol to the fluid to be cooled, in a percentage suitable with the external temperature.
RTPB	Failure of the return temperature probe of the fluid to be cooled (PR4) (optional)	Verify and eventually repair the wiring or replace the component
LTPB	Failure of the supply probe/temperature adjustment of the fluid to be cooled (PR1)	Verify and eventually repair the wiring or replace the component
EtPb	Ambient temperature probe failure (PR3)	Verify and eventually repair the wiring or replace the component
PTPB	High pressure transducer failure (DT1)	Verify and eventually repair the wiring or replace the component
ERR	Alarm of system error of the electronic controller	Replace the electronic controller. Contact Cosmotec service centre

9.1. Abbreviations for faults and malfunctions

Abbreviations	Description
HP	HP alarm with automatic reset
HPM	HP alarm with manual reset
LP	LP alarm with automatic reset
LPM	LP alarm with manual reset
FF	Flow alarm with automatic reset
FFM	Flow alarm with manual reset
LEPH	Tank level alarm
tHOA	Compressor thermal alarm
P2TH	Pump thermal alarm 2
Ht	High temperature alarm outlet fluid
LT	Low temperature alarm outlet fluid
AF	Antifreeze alarm
RTPB	Alarm return temperature probe broken
LTPB	Alarm supply temperature probe broken
PTPB	Alarm of pressure transducer broken
EtPb	Alarm ambient temperature probe broken
CTPB	Alarm of condensing temperature probe broken
ERR	System error alarm
HtrL	High differential temperature alarm
LtrL	Low differential temperature alarm
AfPB	Alarm of temperature antifreeze probe broken

10. Decommissioning and disposal of the unit

The decommissioning of the chillers must be carried out by experienced and qualified personnel.

DANGER

This unit contains refrigerant and a small quantity of lubricant (ester) inside its compressor. These substances are dangerous for the environment and must not be dispersed in it. Refrigerants containing fluorocarbons contribute to global warming and consequently to climate changes. They must be disposed of in accordance with disposal standards or they must be delivered to firms qualified as specialized waste disposal firms.

WARNING

Cut off power supply. Switch off power conducting cables to the unit and secure them against being switched on again. Disconnect the A/C unit from the de-energized network.

Move the unit as described in paragraph "Transport/ Storage", with a lifting device of suitable capacity. The following are the instructions for proper disposal of the unit during the various phases of its life. For further clarification or additional information, please contact info@stulz.it.

INFORMATION

To ensure proper and safe disposal activities, operator must equip themselves with the necessary PPE including: anti-cut gloves, oil resistant gloves, heat resistant gloves, safety footwear, safety eyewear against liquid and gas splashes.
The context in which the unit is located may require the use of additional PPE, thus it is mandatory to inquire with the relevant staff of the area before starting operation.

Once the materials have been separated as shown below, they should be assigned EWC codes and then sent for disposal in accordance with the national legislation.
Disposal related to the unit purchased occurs in three stages:

1. Disposal of packaging

The packaging of the unit must be disposed of ensuring separation of the following materials:

- Paper and Cardboard
- Wood Packing–Packing materials are not chemically treated unless they are declared to be "fumigate"
- Plastic pallets- high- density polyethylene HDPE
- Plastic Film– polyethylene PE
- Polystyrene –expanded polystyrene EPS 6

2.Disposal of substances during maintenance operations

During the life cycle of the unit, if it becomes necessary to drain the cooling system, the refrigerant must be recovered. This operation must be performed by qualified personnel in accordance with EC Regulation 517/2014. The types of gases used are shown in the following table.
If the compressor oil needs to be replaced, it must be disposed of according to the instructions below.
The air filters should be disposed of depending on the substances they contain from the environment in which the units operate
The gas filters must be disposed of as contaminated materials from the oils of the type shown below

3. Disposal at the end of life of the unit

The unit must be disposed of ensuring separation of the following materials:

- Refrigerant - The refrigerant must therefore be recovered before dismantling the unit. The types of refrigerants used are the following:

Code	CAS Number
R-410A	75-10-5 / 354-33-6
R-134a	811-97-2

- Metals
- Copper pipes– may contain traces of oil
- Insulation and sound-absorbing materials
- Electric and electronic components- (pumps, fans, oil-free compressors, electronic circuit boards, servomotors, electrical heating resistances, electrical panel components)
- Cables and wiring
- Oil content within the compressors–is polyester based (POE). Refer to the label on the compressor
- Plastic Parts - Plastic parts that are important in terms of weight are the following:

Identified Substance	CAS Number
acrylonitrile butadiene styrene terpolymer	9003-56-9
polystyrene homopolymer	9003-53-6
polycarbonatefrom bisphenol A	103598-77-2

11. Options

Are defined as 'Options' those components that must be installed directly by the manufacturer. These are:

- Multi-pole electrical connector
- Gas valve for safety valves
- Heating resistance
- Under-beam kit
- Aluminium air filter
- Polyurethane air filter
- Flow switch
- Automatic filling
- Remote ambient temperature probe
- Eyebolts
- Higher insulation for the hydraulic circuit
- RS485

11.1. Multi-pole electrical connector

It's made of 1 male connector installed on the rear part of the chiller and of 1 female connector to be installed on the customer's utility. They allow the rapid connection of the power supply and of the signals (general alarm, remote on/off, etc...) to the chiller. Currently we have: general alarm, remote ON/OFF, double set point and flow switch.
The male connector pins are directly wired by the manufacturer. The specific indication of the connection is indicated in chiller electric diagram, attached to the Manual Part II, specific for every chiller.

WRA13-18-20-25-30-35-50

		Fixed connector Power supply and signals	Mobile connector Power supply and signals
Type		Female	Male
Material (insert)		Polycarbonate	
Size		16 B	
Number of contacts	N°	6	
Additional contacts	N°	+ 12	
PE contact		Yes	
Rated voltage	V	690	
Rated current	A	40	
Material (contacts)		Copper alloy	
Surface (contacts)		Silver plated	
Pollution degree		3	
Conductor cross-section	mm^2	$^{2.5}$ ... ^{8} mm^2 $^{0.2}$ ... $^{2.5}$ mm^2 Signal	
Termination method		Screw connection M5	
Operating temperature	°C	-40 ÷ + 125	

WRA55-65-80-90-0A-5A

		Fixed connector Power supply and signals	Mobile connector Power supply and signals
Type		Female	Male
Material (insert)		Polycarbonate	
Size		16 B	
Number of contacts	N°	4	
Additional contacts	N°	12	
PE contact		Yes	
Rated voltage	V	Power: 1000A Signal: 250A	
Rated current	A	Power: 70A Signal: 10A	
Material (contacts)		Copper alloy	
Surface (contacts)		Silver plated	
Pollution degree		3	
Conductor cross-section	mm^2	Power: 6 ... 16 mm^2 Signal: 0.25 ... 1.5 mm^2	
Termination method		Power: Axial screw termination Signal: Han-Quick Lock	
Operating temperature	°C	-40 ÷ + 125	

The code includes the components required to install the male connector on chiller rear side.

⚠ WARNING

Put the main switch in OFF position before proceeding with connector release.

11.2. Shut-off valves for gas safety valves

When this option is ordered, a shut-off ball valve is used to shut off safety valves in the event of their maintenance or replacement. It's necessary to remove the closing cap of the tab, under the cap there is a screw that is used to close it. The valve can be unscrewed, in this way it's possible to remove it, and there isn't oil and gas leakage. Each time the tap is closed, the seal must be hardened, and then the tap must be opened again and another seal must be made, putting the personal seal. This operation must be done exclusively by specialized personnel.

11.3. Heating resistance

Installation of a three-phase armoured heating element immersed in the tank.

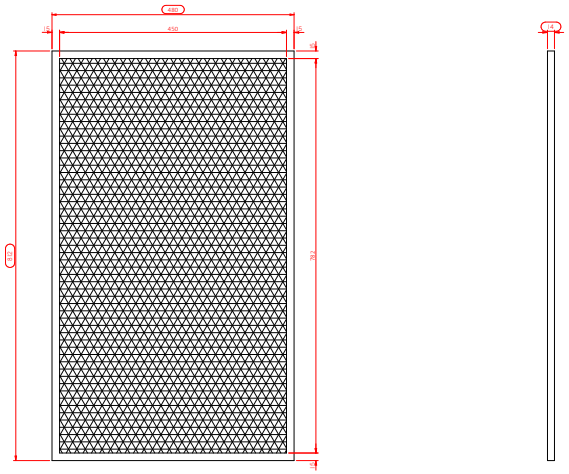
	WRA 13÷25	WRA 30÷50	WRA 55÷5A
Power supply - Power	230/400 V - 2000 W 265/460 V - 2650 W	230/400 V - 5000 W 265/460 V - 6600 W	230/400 V - 7000 W 266/460V - 9360W
Electrical connection	Star	Star	Star
Material	Incoloy 800	Incoloy 800	Incoloy 800

11.4. Under-beam kit

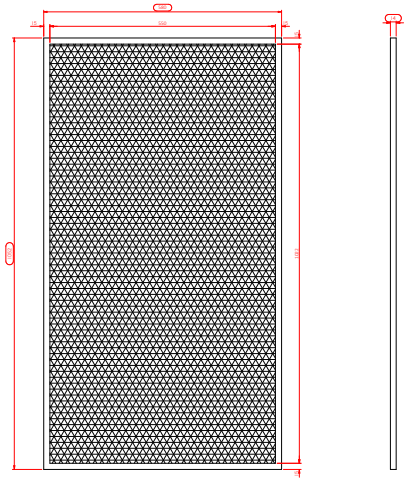
Installation of a solenoid valve on hydraulic return in the tank and a non-return valve on the supply line.
It allows the installation of the chiller with free water level tank under application level, avoiding the overflowing of the tank when the pump is stopped.

11.5. Aluminium air filter

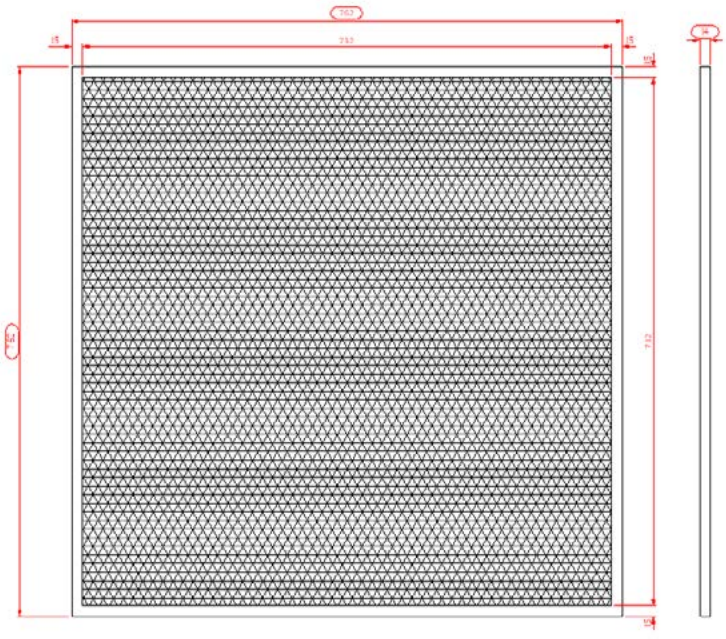
When this option is ordered, an aluminium air filter is mounted on the unit. It has a frame in galvanized sheet 0,6 mm thick and aluminium net on each side.



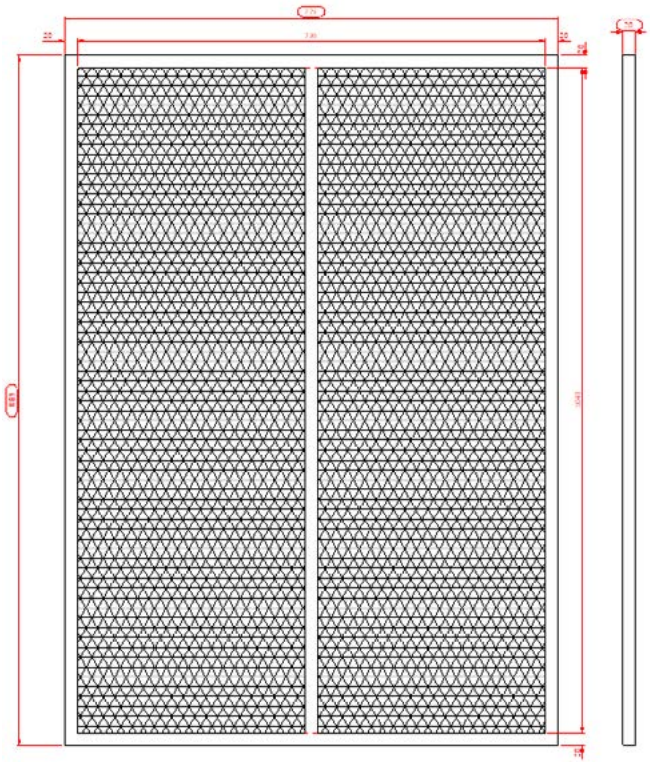
Air Filter for WRA 13÷25



Air Filter for WRA 30÷50



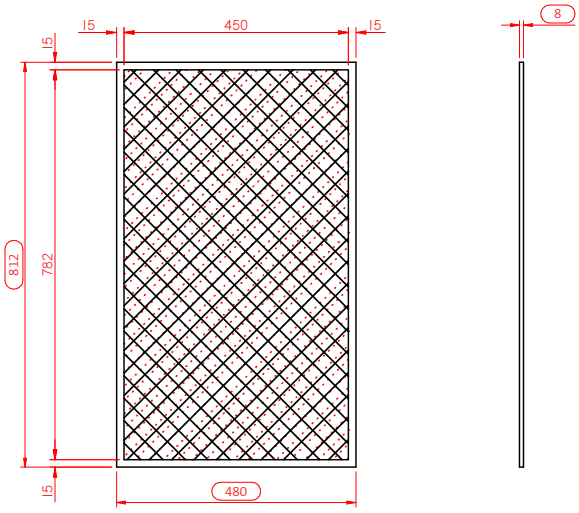
Air filter for WRA 55÷90 (2 pieces)



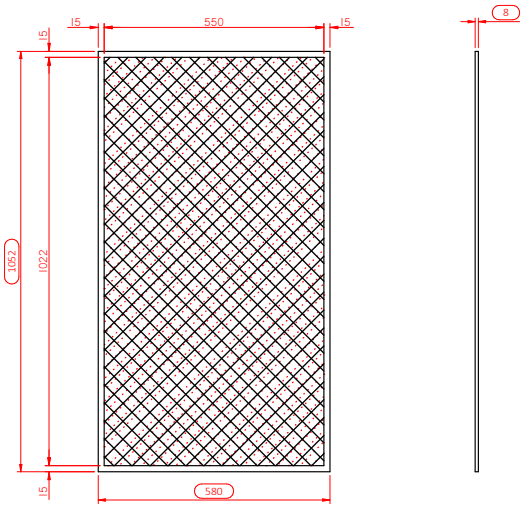
Air filter for WRA 0A÷5A (2 pieces)

11.6. Polyurethane air filter

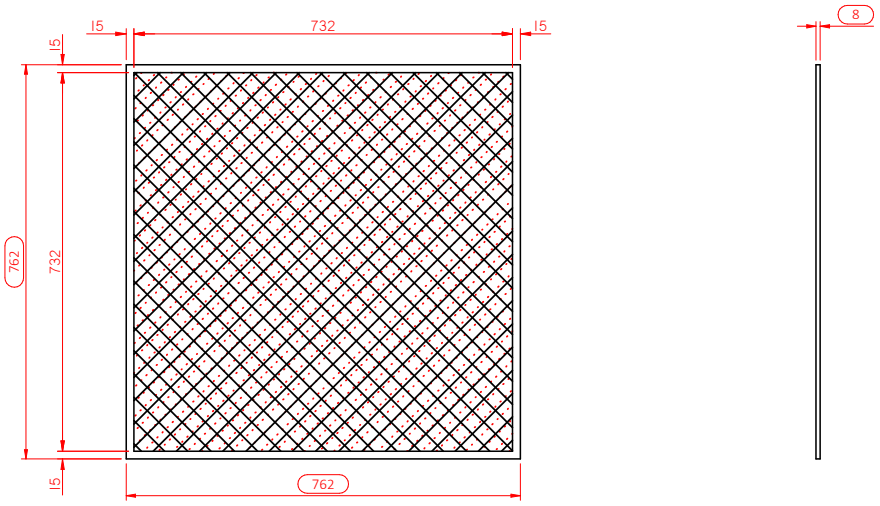
When this option is ordered, a polyurethane air filter is mounted on the unit. It has a frame in galvanized sheet 0,6 mm thick, filter made with soft polyurethane M6/20 and aluminium net on each side.



Air Filter for WRA 13÷25



Air Filter for WRA 30÷50



Air Filter for WRA 55÷90

11.7. Flow switch

It allows the constant monitoring of the fluid circulation in the chiller and cooling water circuits. It reports an eventual absence of fluid circulation, to avoid the freezing of the evaporator. As standard, the flow switch alarm is available as dry contact in the terminal block for customer use, but it can be configured as block alarm modifying the cabling as shown in the wiring diagram. It's not possible to have the terminal block signal and the unit block alarm together.

	WRA 13÷25	WRA 30÷50	WRA 55÷90	WRA 0A÷5A
Operating range	3 - 24 l/min	6 - 35 l/min	15 - 60 l/min	20-1500 l/min
Gas diameter	G 1/2"	G 3/4"	G 1"	G 1"
Material	Nickel-plated brass			
Weight	0,485 kg	0,750 kg	1,570 kg	0,640 kg

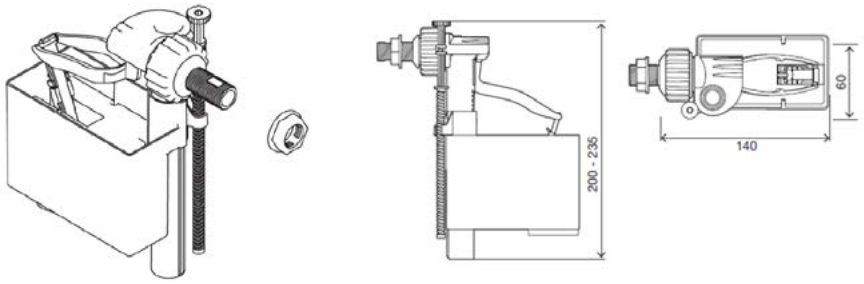
11.8. Automatic filling

Kit for the automatic filling of the tank, installed on water adduction piping and it's main function is to maintain stable the pressure of the plant, to a pre-fixed value, automatically providing water in-taking.
Two models are available, one for version with atmospheric tank and one for version with pressure tank.

- The first model is a floating valve, 3/8" connection, no backflow function, piston closing system, dynamic pressure 0,5-10 bar, static pressure 16 bar. On the rear panel of the unit there is a 3/4 "G sleeve to connect the filling pipe, and there is an overflow pipe about 2 metres long, to allow water to be drained in case the filling system jams.

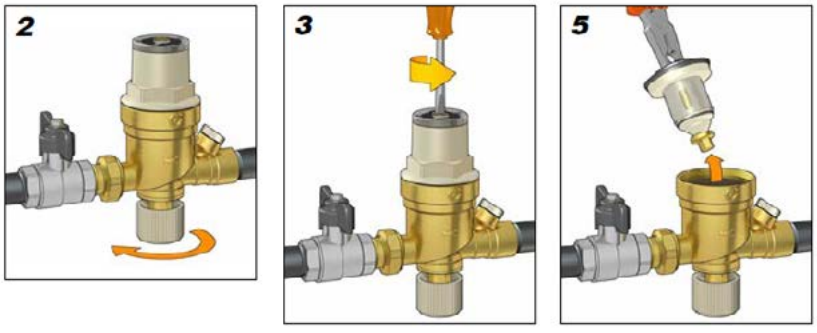
1	Overflow pipe connection
2	Hydraulic connection

- The second model is made in brass with manometer 0-4bar, calibration indicator, non-return valve, stainless steel filter, PN16 bar, calibration field 0,2-4 bar, max temperature 65°C. For the hydraulic connection there is a 3/4 "G sleeve on the rear panel of the chiller.



Maintenance

1) Intercept the kit.
2) Open the lower knob.
3) Unscrew calibration screw.
4) Disassemble the upper cover.
5) Extract the cartridge using a clamp.
6) The whole kit, after inspection and eventual cleaning, can be assembled again or substitute, using a replacing cartridge.

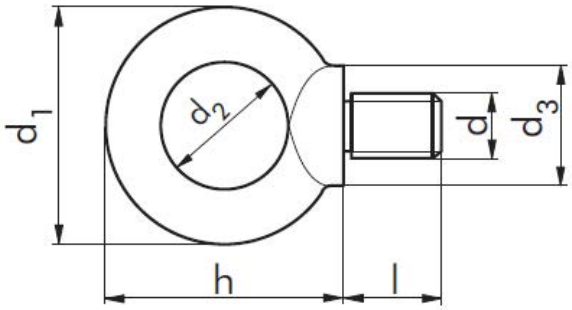


11.9. Remote ambient temperature probe

When this option is ordered a remote ambient temperature is supplied with the unit, with cable length of 10 meters out of the unit. The temperature range of the probe is -50 ÷ +120°C and its protection degree is IP68.

11.10. Eyebolts (from WRA13 to WRA90)

When this option is ordered, the unit is supplied with 4 eyebolts mounted in the upper part of the unit, in order to allow easy handling with ropes.
Find below technical information of the eyebolts.

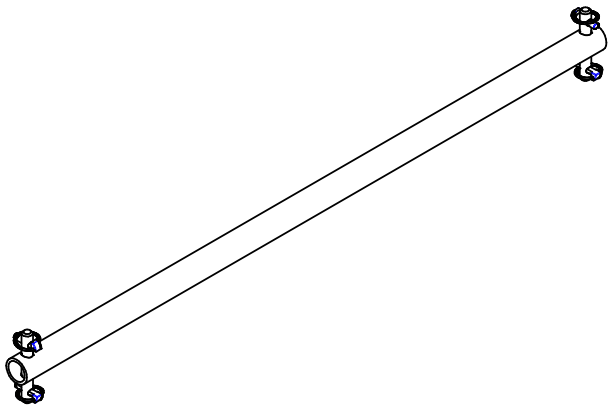


The eyebolts are supplied inside the electrical box.

d	d1	d2	d3	h	l
M10 (WRA13-50)	45	25	25	45	13
M16 (WRA55-90)	63	35	35	63	27

11.11. Lifting pipes (for WRA 0A-5A)

When this option is ordered, the unit is equipped with 2 lifting pipes, mounted in the lower part of the unit. Find below a picture of the pipe.

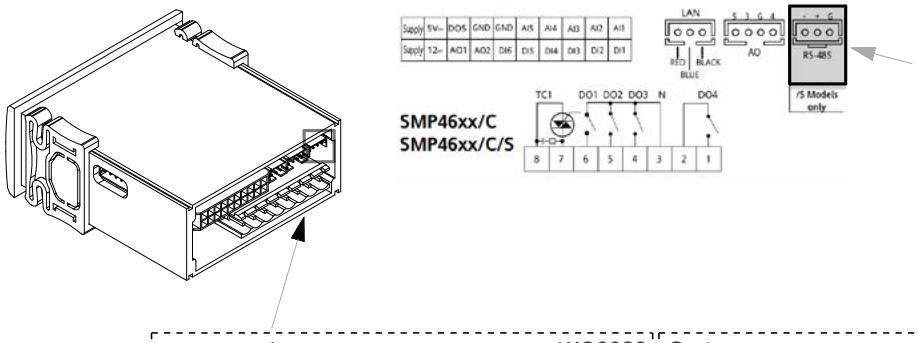


11.12. Higher insulation of the hydraulic circuit

When this option is orderer the unit is supplied with higher insulated components of the hydraulic circuit (as volute pump, hydraulic fittings, ...) with thermoformed expanded polyethylene shells with closed cells and thickness of 15 mm. The closure with velcro allows the opening of insulated material without substitution, for example for calibration operation (bypass, flow switch), inspection and repair of eventual hydraulic losses. This option includes also piping insulation with insulated pipes with thickness of 13 mm. All the insulation material is anti-UV and can e used outdoor.

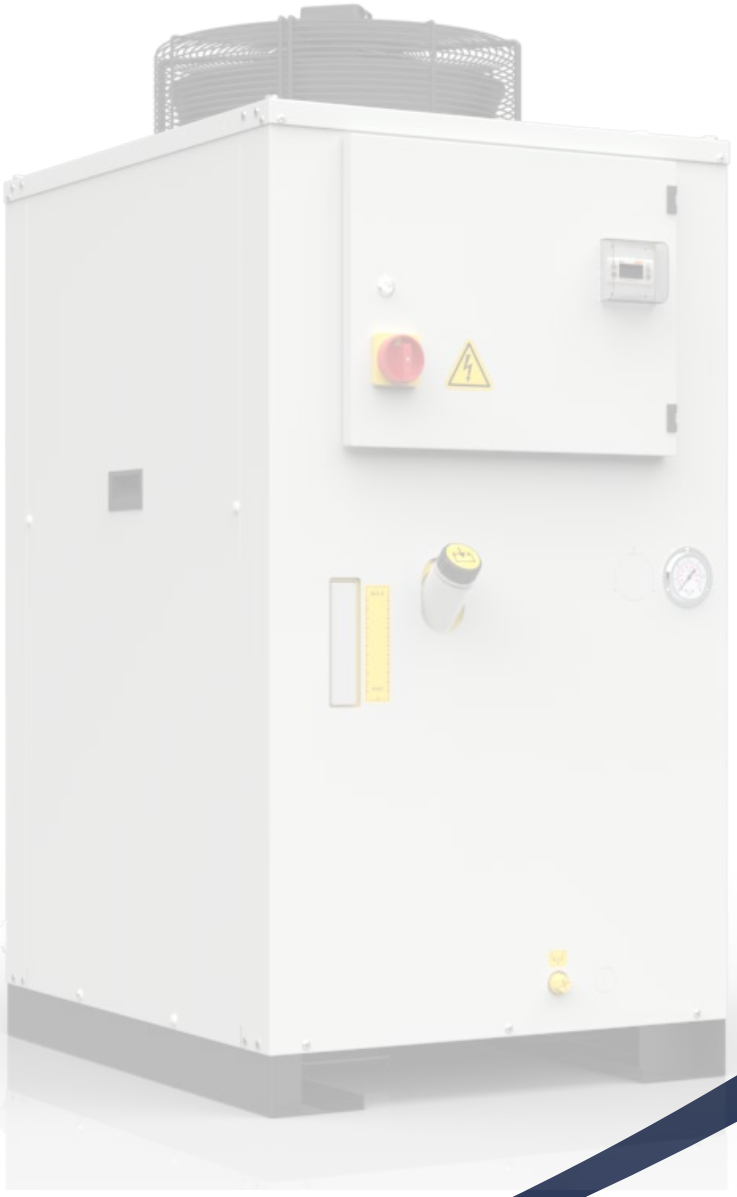
11.13. RS485

When this option is ordered, the unit control is supplied with an RS485 serial port (there is a little bag into the electrical panel). Cable 1KO0088 is supplied, which is used to connect to the RS485 serial port of the Eliwell thermostat, as shown in the picture below.
Also supplied are two adhesive collar supports and the corresponding cable ties, which can be used to tie the cable inside the machine's electrical cabinet.



Connection data

Connection technology	CAGE CLAMP®
Actuation type	Lever
Connectable conductor materials	Copper
Solid conductor	0.2 ... 4 mm² / 20 ... 14 AWG
Stranded conductor	0.2 ... 2.5 mm² / 18 ... 14 AWG
Fine-stranded conductor	0.2 ... 4 mm² / 18 ... 14 AWG
Strip length	11 mm / 0.43 inch
Total number of connection points	2



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