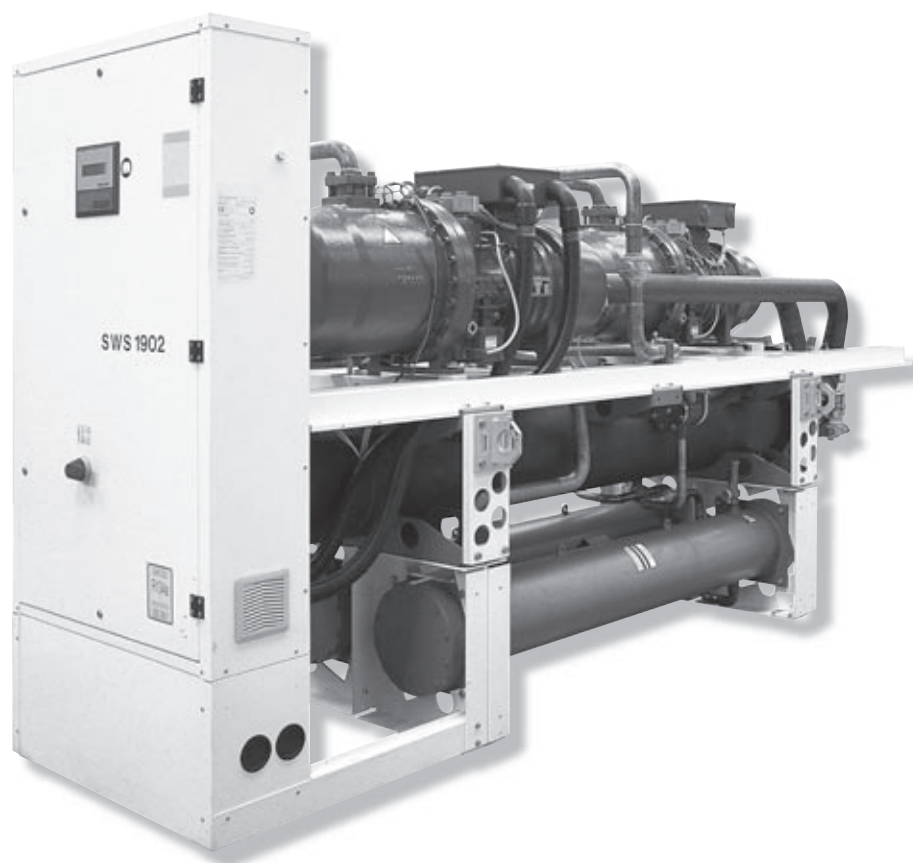


SWS / SWR



English



272
↓
1148 kW

Water cooled water chillers with screw compressors



IOM SWS-N.2GB

Date : July 2007

Supersedes : IOM SWS-N.1GB



Table of contents

1 FOREWORD		5 START-UP	
1.1 Introduction	3	5.1 Preliminary check	19
1.2 Warranty	3	5.2 Start-up	19
1.3 Emergency stop/Normal stop	3	5.3 Checking the operation	20
1.4 An introduction to the manual	3	5.4 Delivery to customer	20
2 SAFETY		6 OPERATION	
2.1 Foreword	4	6.1 General Information	21
2.2 Definitions	4	6.2 Keyboard - Display Terminal Unit	21
2.3 Access to the unit	5	6.3 Functions / Keys / Configuration	23
2.4 General precautions	5	7 GENERAL DESCRIPTION	
2.5 Precautions against residual risks	5	7.1 Introduction	26
2.6 Precautions during maintenance operations	6	7.2 General specifications	26
2.7 Safety labels	7	7.3 Compressors	26
2.8 Safety regulations	9	7.4 Refrigerant circuits	27
3 TRANSPORT, LIFTING AND POSITIONING		7.5 Evaporator	27
3.1 Inspection	12	7.6 Condenser	27
3.2 Lifting	12	7.7 Power supply and control system	28
3.3 Anchoring	13	7.8 "Chiller Control"	28
3.4 Storage	13	7.9 Accessories	29
4 INSTALLATION		8 TECHNICAL DATA	
4.1 Positioning of the unit	14	8.1 Pressure drops	30
4.2 Spring Isolator Installation	14	8.2 Technical data	32
4.3 External hydraulic circuit	15	8.3 Electrical data	42
4.4 Hydraulic connection of the condenser	16	8.4 Position of antivibration mounting springs and weight distribution on supports	45
4.5 Hydraulic connection	16	8.5 Overall dimensions and maintenance spaces	63
4.6 Power supply	16		
4.7 Electrical connections	17		

9 MAINTENANCE

9.1	General requirements	74
9.2	Planned maintenance	74
9.3	Refrigerant charge	75
9.4	Compressors	75
9.5	Condenser	75
9.6	Dehydrating filter	76
9.7	Sight glass	76
9.8	Thermostatic expansion valve	76
9.9	Evaporator	76
10	TROUBLESHOOTING	77
11	SPARE PARTS	
11.1	Spare part list	79
11.2	Oil for compressors	79
11.3	Wiring diagrams	79
12	DISMANTLING, DEMOLITION AND SCRAPPING	
12.1	Generalities	80

1 FOREWORD

1.1 Introduction

Itelco-Industry units, manufactured to state-of-the-art design and implementation standards, ensure top performance, reliability and fitness to any type of air-conditioning systems.

These units are designed for cooling water or glycoled water (and for water heating in heat pump models) and are unfit for any purposes other than those specified in this manual.

This manual includes all the information required for a proper installation of the units, as well as the relevant operating and maintenance instructions.

It is therefore recommended to read this manual carefully before installation or any operation on the machine. The chiller installation and maintenance must be carried out by skilled personnel only (where possible, by one of Itelco-Industry 's Authorised Service Centers).

The manufacturer may not be held liable for any damage to people or property caused by improper installation, start-up and/or improper use of the unit and/or failure to implement the procedures and instructions included in this manual.

1.2 Warranty

These units are delivered complete, tested and ready for being operated. Any form of warranty will become null and void in the event that the appliance is modified without Itelco-Industry 's preliminary written authorisation.

This warranty shall apply providing that the installation instructions have been complied with (either issued by Itelco-Industry , or deriving from the current practice), and the Form 1 ("Start-up") has been filled-in and mailed to Itelco-Industry (attn. After-Sales Service).

In order for this warranty to be valid, the following conditions shall be met:

- The machine must be operated only by skilled personnel from Itelco-Industry 's Authorised After-Sales Service.
- Maintenance must be performed only by skilled personnel - from one of Itelco-Industry 's Authorised After-Sales Centers.
- Use only original Itelco-Industry spare parts.

- Carry out all the planned maintenance provided for by this manual in a timely and proper way.

Failure to comply with any of these conditions will automatically void the warranty.

1.3 Emergency stop / Normal stop

The emergency stop of the unit can be enabled using the master switch on the control panel (move down the lever).

For a normal stop, press the relevant push-buttons.

To restart the appliance, follow the procedure detailed in this manual.

1.4 An introduction to the manual

For safety reasons, it is imperative to follow the instructions given in this manual. In case of any damage caused by non-compliance with these instructions, the warranty will immediately become null and void.

Conventions used throughout the manual:



The Danger sign recalls your attention to a certain procedure or practice which, if not followed, may result in serious damage to people and property.



The Warning sign precedes those procedures that, if not followed, may result in serious damage to the appliance.



The Notes contain important observations.



The Useful Tips provide valuable information that optimises the efficiency of the appliance.

This manual and its contents, as well as the documentation which accompanies the unit, are and remain the property of Itelco-Industry , which reserves any and all rights thereon. This manual may not be copied, in whole or in part, without Itelco-Industry 's written authorization.

2 SAFETY

2.1 Foreword

These units must be installed in conformity with the provisions of Machinery Directive 98/37/EC, Low Voltage Directive 73/23/EC, Pressure Vessels Directive 97/23/EC, Electromagnetic Interference Directive 89/336/EC, as well as with other regulations applicable in the country of installation. If these provisions are not complied with, the unit must not be operated.



The unit must be grounded, and no installation and/or maintenance operations may be carried out before deenergising the electrical panel of the unit.

Failure to respect the safety measures mentioned above may result in electrocution hazard and fire in the presence of any short-circuits.



Inside the heat exchangers, the compressors and the refrigeration lines, this unit contains liquid and gaseous refrigerant under pressure. The release of this refrigerant may be dangerous and cause injuries.



The units are not designed to be operated with natural refrigerants, such as hydrocarbons. Itelco-Industry may not be held liable for any problems deriving from the replacement of original refrigerant or the introduction of hydrocarbons.

Itelco-Industry units are designed and manufactured according to the requirements of European Standard PED 97/23/EC (pressure vessels).

- The used refrigerants are included in group II (non-hazardous fluids).
- The maximum working pressure values are mentioned on the unit's data plate.
- Suitable safety devices (pressure switches and safety valves) have been provided, to prevent any anomalous overpressure inside the plant.
- The vents of the safety valves are positioned and oriented in such a way as to reduce the risk of contact with the operator, in the event that the valve is operated. Anyway, the installer will convey the discharge of the valves far from the unit.
- Dedicated guards (removable panels with tools) and danger signs indicate the presence of hot pipes or components (high surface temperature).



The guards of the fans (only for units provided with air heat exchangers) must be always mounted and must never be removed before de-energising the appliance.



It is the User's responsibility to ensure that the unit is fit for the conditions of intended use and that both installation and maintenance are carried out by experienced personnel, capable of respecting all the recommendations provided by this manual. It is important that the unit is adequately supported, as detailed in this manual. Non-compliance with these recommendations may create hazardous situations for the personnel.



The unit must rest on a base which meets the characteristics specified in this manual; a base with inadequate characteristics is likely to become a source of serious injury to the personnel.



The unit has not been design to withstand loads and/or stress that may be transmitted by adjacent units, piping and/or structures. Each external load or stress transmitted to the unit may break or cause breakdowns in the unit's structure, as well as serious dangers to people. In these cases, any form of warranty will automatically become null and void.



The packaging material must not be disposed of in the surrounding environment or burnt.

2.2 Definitions

OWNER: means the legal representative of the company, body or individual who owns the plant where Itelco-Industry unit has been installed; he/she has the responsibility of making sure that all the safety regulations specified in this manual are complied with, along with the national laws in force.

INSTALLER: means the legal representative of the company who has been given by the owner the job of positioning and performing the hydraulic, electric and other connections of Itelco-Industry unit to the plant: he/she is responsible for handling and properly installing the appliance, as specified in this manual and according to the national regulations in force.

Safety

OPERATOR: means a person authorised by the owner to do on Itelco-Industry unit all the regulation and control operations expressly described in this manual, that must be strictly complied with, without exceeding the scope of the tasks entrusted to him.

ENGINEER: means a person authorised directly by Itelco-Industry or, in all EC countries, excluding Italy, under his full responsibility, by the distributor of Itelco-Industry product, to perform any routine and extraordinary maintenance operations, as well as any regulation, control, servicing operations and the replacement of pieces, as may be necessary during the life of the unit.

2.3 Access to the unit

The unit must be placed in an area which can be accessed also by OPERATORS and ENGINEERS; otherwise the unit must be surrounded by a fence at not less than 2 meters from the external surface of the machine.

OPERATORS and ENGINEERS must enter the fenced area only after wearing suitable clothing (safety shoes, gloves, helmet etc.). The INSTALLER personnel or any other visitor must always be accompanied by an OPERATOR.

For no reason shall any unauthorised personnel be left alone in contact with the unit.

2.4 General precautions

The OPERATOR must simply use the controls of the unit; he must not open any panel, other than the one providing access to the control module.

The INSTALLER must simply work on the connections between plant and machine; he must not open any panels of the machine and he must not enable any control.

When you approach or work on the unit, follow the precautions listed below:

- do not wear loose clothing or jewellery or any other accessory that may be caught in moving parts
- wear suitable personal protective equipment (gloves, goggles etc.) when you have to work in the presence of free flames (welding operations) or with compressed air
- if the unit is placed in a closed room, wear ear protection devices
- cut off connecting pipes, drain them in order to balance the pressure to the atmospheric value before disconnecting them, disassemble connections, filters, joints or other line items
- do not use your hands to check for any pressure drops

- use tools in a good state of repair; be sure to have understood the instructions before using them
- be sure to have removed all tools, electrical cables and any other objects before closing and starting the unit again

2.5 Precautions against residual risks

Prevention of residual risks caused by the control system

- be sure to have perfectly understood the operating instructions before carrying out any operation on the control panel
- when you have to work on the control panel, keep always the operating instructions within reach
- start the unit only after you have checked its perfect connection to the plant
- promptly inform the ENGINEER about any alarm involving the unit
- do not reset manual restoration alarms unless you have identified and removed their cause

Prevention of residual mechanical risks

- install the unit according to the instructions provided in this manual
- carry out all the periodical maintenance operations prescribed by this manual
- wear a protective helmet before accessing the interior of the unit
- before opening any panelling of the machine, make sure that it is secured to it by hinges
- do not touch air condensation coils without wearing protective gloves
- do not remove the guards from moving elements while the unit is running
- check the correct position of the moving elements' guards before restarting the unit

Prevention of residual electrical risks

- connect the unit to the mains according to the instructions provided in this manual
- periodically carry out all the maintenance operations specified by this manual
- disconnect the unit from the mains by the external disconnecting switch before opening the electrical board
- check the proper grounding of the unit before start-up
- check all the electrical connections, the connecting cables, and in particular the insulation; replace worn or damaged cables

- periodically check the board's internal wiring
- do not use cables having an inadequate section or flying connections, even for limited periods of time or in an emergency

Prevention of other residual risks

- make sure that the connections to the unit conform to the instructions provided in this manual and on the unit's panelling
- if you have to disassemble a piece, make sure that it has been properly mounted again before restarting the unit
- do not touch the delivery pipes from the compressor, the compressor and any other piping or component inside the machine before wearing protective gloves
- keep a fire extinguisher for electrical appliances near the machine
- on the units installed indoor, connect the safety valve of the refrigeration circuit to a piping network that can channel any overflowing refrigerant outside
- remove and leak of fluid inside and outside the unit
- collect the waste liquids and dry any oil spillage
- periodically clean the compressor compartment, to remove any fouling
- do not store flammable liquids near the unit
- do not disperse the refrigerant and the lubricating oil into the environment
- weld only empty pipes; do not approach flames or other sources of heat to refrigerant pipes
- do not bend/hit pipes containing fluids under pressure

2.6 Precautions during maintenance operations

Maintenance operations can be carried out by authorised technicians only.

Before performing any maintenance operations:

- disconnect the unit from the mains with the external disconnecting switch
- place a warning sign "do not turn on - maintenance in progress" on the external disconnecting switch
- make sure that on-off remote controls are inhibited
- wear suitable personal protective equipment (helmet, safety gloves, goggles and shoes etc.)

To carry out any measurements or checks which require the activation of the machine:

- work with the electrical board open only for the necessary time
- close the electrical board as soon as the measurement or check has been completed
- for outdoor units, do not carry out any operations in the presence of dangerous climatic conditions (rain, snow, mist etc.)

The following precautions must be always adopted:

- do not scatter the fluids of the refrigeration circuit in the surrounding environment
- when replacing an eprom or electronic cards, use always suitable devices (extractor, antistatic bracelet, etc.)
- to replace a compressor, the evaporator, the condensing coils or any other weighty element, make sure that the lifting equipment is consistent with the weight to be lifted
- in air units with independent compressor compartment, do not access the fan compartment unless you have disconnected the machine by the disconnecting switch on the board and you have placed a warning sign "do not turn on - maintenance in progress"
- contact Itelco-Industry for any modifications to the refrigeration, hydraulic or wiring diagram of the unit, as well as to its control logics
- contact Itelco-Industry if it is necessary to perform very difficult disassembly and assembly operations
- use only original spare parts purchased directly from Itelco-Industry or the official retailers of the companies on the recommended spare parts list
- contact Itelco-Industry if it is necessary to handle the unit one year after its positioning on site or if you wish to dismantle it.

2.7 Safety labels

The labels below will be affixed to each unit in the indicated point:



Identification of the refrigerant - External door

COD.PRODOTTO NEUTRO
 PRODUCT CODE



MODELLO
 MODEL

OdL 

MATRICOLA
 SERIAL NUMBER



ANNO DI COSTRUZIONE

CARICA REFR. CIRCUITO 1 2 3 4
 REFRIGERANT CHARGE Kg

ALTA PRESSIONE (max) bar
 HIGH PRESSURE

BASSA PRESSIONE (max) bar
 LOW PRESSURE

ALIM. POTENZA V/PH/Hz
 MAIN SUPPLY

CORRENTE DI SPUNTO (max) A
 LRA

CORRENTE A PIENO CARICO (max) A

POTENZA ASSORBITA (max) Kw
 POWER INPUT

PRESS. ESERC.ACQUA (max) bar
 WATER OPERATION PRESSURE

MASSA (max) Kg
 MASS


ITELCO-INDUSTRY S.r.l. Via XXV Aprile 29 20030 BARLASSINA MI (ITALIA)
 MADE IN ITALY

Identification of the unit - Outside, on the right-hand front column

**TENERE SU QUESTA LINEA
 GANCIO DI SOLLEVAMENTO**

**KEEP LIFT HOOK
 ON THIS LINE**

Gravity centre - Base

	ATTENZIONE! prima di aprire togliere tensione.	ATTENTION! enlever l'alimentation électrique avant d'ouvrir.
	ACHTUNG! vor öffnen des gehäuses hauptschalter ausschalten!	CAUTION! disconnect electrical supply before opening.

Electrical warning Adjacent to the master switch

ATTENZIONE

INSERIRE LE RESISTENZE DI RISCALDAMENTO OLIO ALMENO 12 ORE PRIMA DI OGNI AVVIAMENTO (SE PREVISTE).

PRIMA DELLA MESSA IN TENSIONE ASSICURARSI CHE LE VITI DEI CIRCUITI ELETTRICI SIANO SERRATE COMPLETAMENTE.

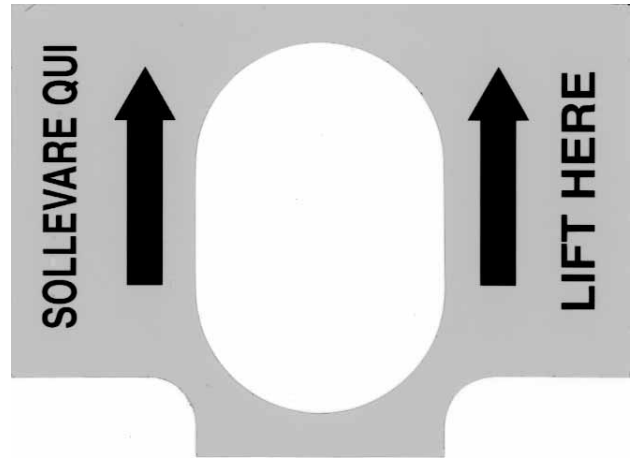
WARNING

ENERGIZE THE CRANCKCASE HEATER FOR AT LEAST 12 HOURS BEFORE EACH STARTING (IF FITTED).

BEFORE TIGHTENING-UP, TO TIGHTEN ALL TERMINAL SCREWS ESPECIALLY THOSE IN MAIN CIRCUIT.

881000215/01

Start-up warning - Outside the door of the electrical board



Lifting point - Base

CERTIFICATO DI COLLAUDO PRODUZIONE ITELCO-CLIMA
ITELCO-CLIMA PRODUCTION TEST CERTIFICATE
UNITA' ARIA-ARIA/ARIA-ACQUA - SEMICENTRALI - CHILLER AIR/AIR AIR/WATER

PROGR. COLL. NUMBER CHECK	DESCRIZIONE DEI TEST DESCRIPTION OF QUALITY CHECK	TIMERO OPERAT. INSP. CODE
01	VERIFICA ASSEMBLAGGIO VERIFY ASSEMBLY COMPLETE	
02	VERIFICA VISIVA CABLAGGIO COLLEG. ELETTRICI E CONNESSIONE VERIFY WIRING CONNECTIONS	
03	VUOTO E CARICA REF. VACUUM AND CHARGE TEST	
04	VERIFICA CON CERCAFUGHE TENUTA CIRCUITO FRIGORIFERO REFRIGERANT LEAK TEST	
05	PROVE FUNZIONALI CON RILIEVI TEMPERATURE/PRESSIONI-RUMORE FUNCTION AND RUN TEST NOISE TEST	
06	VERIFICA INTERVENTI SICUREZZE PRESSIONE E TEMPERATURA CHECK OPERATION AND SAFETY DEVICES	
07	VERIFICA TENUTA CIRCUITO IDR. E FUNZIONAMENTO POMPA (SU PACK) HYDRAULIC CIRCUIT TEST (PUMP CHECK ONLY FOR PACK UNIT)	
08	VERIFICA MONTAGGIO ACCESSORI (SE PREVISTI) E DOCUMENTAZIONE CHECK ACCESSORIES/DOCUMENTATION	
09	CONTROLLO ESTETICO FINALE E PULIZIA INTERNA VISUAL CHECK FOR DIRT AND DAMAGE	

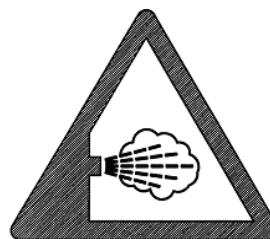
Final Test Certificate - Inside the external door

EIN - INLET
ENTRÉE - ENTRATA
AUS - OUTLET
SORTIE - USCITA

Fitting identification - Adjacent to fittings



Grounding connection - On the electrical board, adjacent to the connection



Warning - safety valves' vents



Warning - high-temperature zones Adjacent to hot pipes or components

2.8 Safety regulations

Refrigerant data	Safety data: R407C, R134a, R22
Toxicity	Low
Contact with skin	If sprayed, the refrigerant is likely to cause frost burns. If absorbed by the skin, the danger is very limited; it may cause a slight irritation, and the liquid is degreasing. Unfreeze the affected skin with water. Remove the contaminated clothes with great care - in the presence of frost burns, the clothes may stick to the skin. Wash with plenty of warm water the affected skin. In the presence of symptoms such as irritation or blisters, obtain medical attention.
Contact with eyes	Vapours do not cause harmful effects. The spraying of refrigerant may cause frost burns. Wash immediately with a proper solution or with tap water for at least 10 minutes, and then obtain medical attention.
Ingestion	Very unlikely - should something happen, it will cause frost burns. Do not induce vomiting. Only if the patient is conscious, wash out mouth with water and give some 250 ml of water to drink. Then, obtain medical attention.
Inhalation	R407C, R134a, R22: remarkable concentrations in the air may have an anaesthetic effect, up to fainting. The exposure to considerable amounts may cause irregular heartbeat, up to the sudden death of the patient. Very high concentrations may result in the risk of asphyxia, due to the reduction in the oxygen percentage in the atmosphere. Remove the patient to fresh air and keep warm and at rest. If necessary, give oxygen. In case of breathing difficulties or arrest, proceed with artificial respiration. In case of cardiac arrest, proceed with cardiac massage. Then, obtain medical attention.
Recommendations	Semiotics or support therapy is recommended. Cardiac sensitisation has been observed that, in the presence of circulating catecholamines such as adrenalin, may cause cardiac arrhythmia and accordingly, in case of exposure to high concentrations, cardiac arrest.
Prolonged exposure	R407C, R134a, R22: a study on the effects of exposure to 50,000 ppm during the whole life of rats has identified the development of benign testicle tumour. This situation should therefore be negligible for personnel exposed to concentrations equal to or lower than professional levels.
Professional levels	R407C, R134a, R22: Recommended threshold: 1000 ppm v/v - 8 hours TWA.
Stability	R407C, R134a, R22: Not specified
Conditions to avoid	Do not use in the presence of flames, burning surfaces and excess humidity.
Hazardous reactions	May react with sodium, potassium, barium and other alkaline metals. Incompatible substances: magnesium and alloys with magnesium concentrations > 2%.
Hazardous decomposition products	R407C, R134a, R22: Halogen acids produced by thermal decomposition and hydrolysis.

General precautions	Do not inhale concentrated vapours. Their concentration in the atmosphere should not exceed the minimum preset values and should be maintained below the professional threshold. Being more weighty than the air, the vapour concentrates on the bottom, in narrow areas. Therefore, the exhaust system must work at low level.
Respiratory system protection	If you are in doubt about the concentration in the atmosphere, it is recommended to wear a respirator approved by an accident-prevention Authority, of the independent or oxygen type.
Storage	Cylinders must be stored in a dry and fresh place, free from any fire hazard, far from direct sunlight or other sources of heat, radiators etc. Keep a temperature below 45°C.
Protective clothing	Wear overalls, protective gloves and goggles or a mask.
Accidental release measures	It is important to wear protective clothing and a respirator. Stop the source of the leak, if you can do this without danger. Negligible leaks can be left evaporating under the sun, providing that the room is well ventilated. Considerable leaks: ventilate the room. Reduce the leak with sand, earth or other absorbing substances. Make sure that the liquid does not channelled into gutters, sewers or pits where the vapours are likely to create a stuffy atmosphere.
Disposal	The best method is recovery and recycling. If this method is not practicable, dispose according to an approved procedure, that shall ensure the absorption and neutralization of acids and toxic agents.
Fire fighting information	R407C, R134a, R22: Not flammable in the atmosphere.
Cylinders	The cylinders, if exposed to fire, shall be cooled by water jets; otherwise, if heated, they may explode.
Protective fire fighting equipment	In case of fire, wear an independent respirator and protective clothing.

Lubricant oil data	Safety data: Polyester oil (POE)
Classification	Not harmful
Contact with skin	May cause slight irritation. Does not require first aid measures. It is recommended to follow usual personal hygiene measures, including washing the exposed skin with soap and water several times a day. It is also recommended to wash your overalls at least once a week.
Contact with eyes	Wash thoroughly with a suitable solution or tap water.
Ingestion	Seek medical advice immediately.
Inhalation	Seek medical advice immediately.
Conditions to avoid	Strong oxidising substances, caustic or acid solutions, excess heat. May corrode some types of paint or rubber.
Protection of the respiratory system	Use in well ventilated rooms.
Protective clothing	Always wear protective goggles or a mask. Wearing protective gloves is not mandatory, but is recommended in case of prolonged exposure to refrigerant oil.
Accidental release measures	It is important to wear protective clothing and, especially, goggles. Stop the source of the leak. Reduce the leak with absorbing substances (sand, sawdust or any other absorbing material available on the market).
Disposal	The refrigerant oil and its waste will be disposed of in an approved incinerator, in conformity with the provisions and the local regulations applicable to oil waste.
Fire fighting information	In the presence of hot liquid or flames, use dry powder, carbon dioxide or foam. If the leak is not burning, use a water jet to remove any vapours and to protect the personnel responsible for stopping the leak.
Cylinders	The cylinders exposed to a fire will be cooled with water jets in case of fire.
Fire fighting protective equipment	In case of fire, wear an independent respirator.

3 TRANSPORT, LIFTING AND POSITIONING

Refrigerators are supplied assembled (apart from standard antivibrating rubber supports, that will be installed on site). The equipment are full of refrigerant and oil, in the quantity required for a proper operation.

3.1 Inspection

When the unit is delivered, it is recommended to check it carefully and to identify any damage occurred during transportation. The goods are shipped ex-factory, at the buyer's risk. Check that the delivery includes all the components listed in the order.

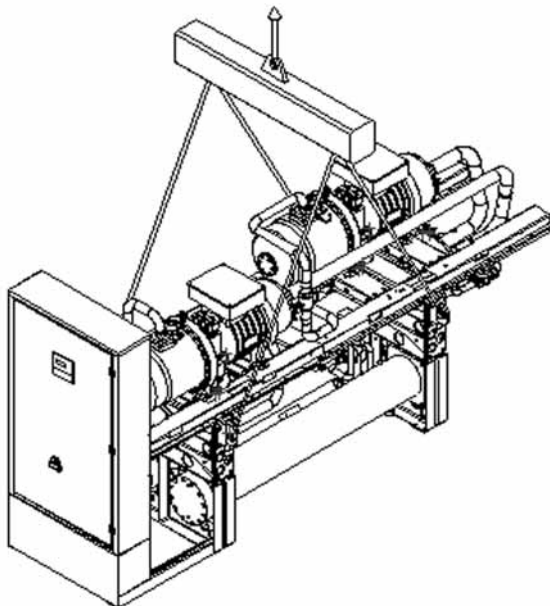
In case of damage, note it down on the carrier's delivery note and issue a claim according to the instructions provided in the delivery note.

In the presence of any serious damage, that does not affect the surface only, it is recommended to inform Itelco-Industry immediately.

Please note that Itelco-Industry may not be held liable for any damage to the equipment during transportation, even though the carrier has been appointed by the factory.

3.2 Lifting

The unit must be lifted by using the hooks inserted into the relevant eyebolts (see the figure).



It is recommended to use a spacer to prevent cables from damaging the unit.

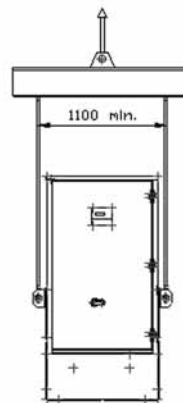


Figure a

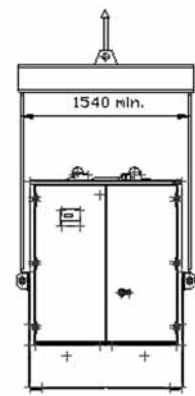


Figure b

For the minimum size of the spacer, please refer to *Figure a* for sizes from 1002 to 1902 (R407C) and from 1602 to 1902 (R134a), to *Figure b* for sizes from 2202 to 4402 (R407C) and from 2202 to 4802 (R134a).

Before positioning the unit, make sure that the place of installation is appropriate and sturdy enough to hold the weight and to withstand the stress caused by the operation of the whole assembly.



Do not displace the unit on rollers, and do not lift it with a lift truck.

To lift and displace the unit:

- Insert and secure eyebolts into the holes marked on the frame.
- Connect cables to eyebolts.
- Hook near the barycentre of the unit.
- The cables must be long enough to form, if tensioned, an angle of at least 45° with respect to the horizontal plane.

Transport, Lifting and Positioning



For lifting operations, use only tools and material fit for this purpose, in accordance with accident-prevention regulations.



It is recommended not to remove the protective plastic envelope, that should prevent scraps from penetrating into the appliance and any damage to the surfaces, until the unit is ready for operation.



The lifting eyebolts protrude from the base of the unit; it is therefore recommended to remove them once the unit has been lifted and positioned, if in your opinion they are likely to become a source of hazard and injury.

The eyebolts must be mounted on the unit whenever it shall be displaced and then lifted again.

3.3 Anchoring

It is not essential to secure the unit to the foundations, unless in areas where there is a serious risk of earthquake, or if the appliance is installed on the top of a steel frame.

3.4 Storage

When the unit is to be stored before installation, adopt a few precautions to prevent any damage or risk of corrosion or wear:

- plug or seal every single opening, such as water fittings
- do not store the appliance in a room where the temperature exceeds 50°C for the units using R407C and, if possible, do not expose to direct sunlight
- it is recommended to store the unit in a roof where traffic is minimized, to prevent the risk of accidental damage
- the unit must not be washed with a steam jet
- take away and leave to the site manager all the keys providing access to the control board

Finally, it is recommended to carry out visual inspections at regular intervals.

4 INSTALLATION

4.1 Positioning the unit



Before installing the unit, make sure that the structure of the building and/or the supporting surface can withstand the weight of the appliance. The weights of the units are listed in Chapter 8 of this manual.

These units have been designed for outdoor installation on a solid surface. Standard accessories include antivibrating rubber supports, that must be positioned under the base.

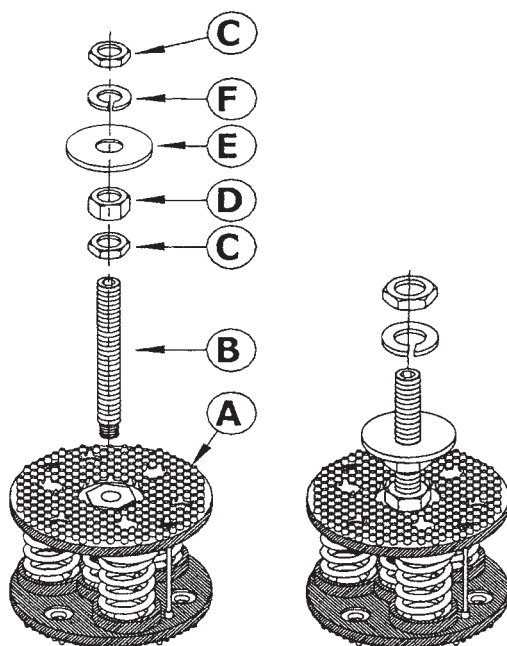
When the unit is to be installed on the ground, it is necessary to provide a concrete base, to ensure a uniform distribution of the weights.

As a general rule, no special sub-bases are required. However, if the unit is to be installed on the top of inhabited rooms, it is advisable to rest it on spring shock absorbers (optional), that will minimise the transmission of any vibration to the structures.

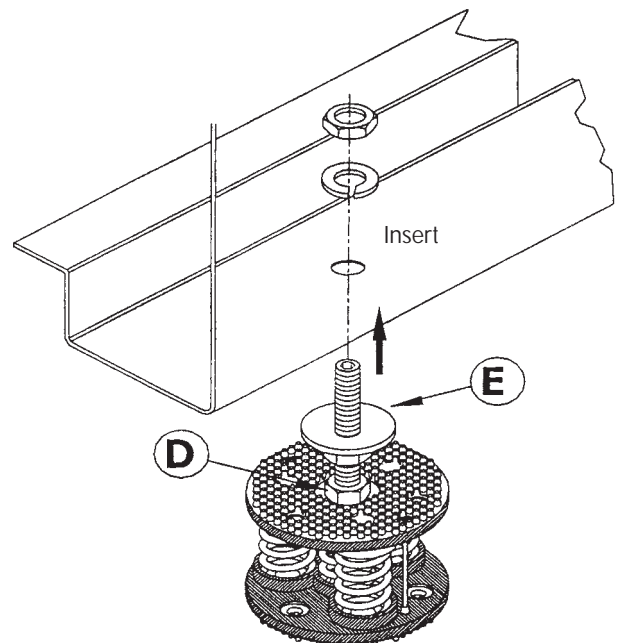
To choose the place of installation of the unit, bear in mind that the place of installation must have all the necessary spaces for air circulation and maintenance operations (see Chapter 9).

4.2 Spring Isolator Installation

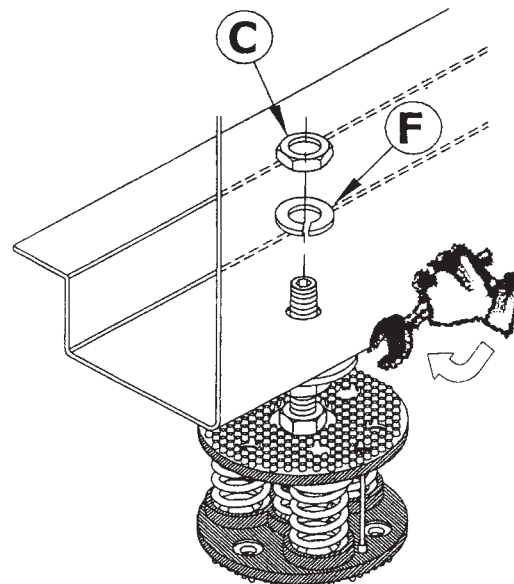
- Prepare the base, that must be flat and plane.
- Lift the appliance and insert shock absorbers as follows:



- 1) proceed with the assembly of the jack components



- 2) insert the jack into the threaded seat provided on the upper plate of the shock absorber. Then insert the jack mounted on the shock absorber, in the hole provided on the base of the machine.



- 3) make sure that the base of the machine is resting on the flat washer (E) of the jack. To offset any difference in height, work on high nut (D), using a 24 wrench. Clamp in the obtain position with the grover washer (F) and the relevant low nut (C).

At the end of this operation, check that the machine is elastic on its axes, and preset for the installation of antivibrating joints in the water connections.

Installation

4.3 External hydraulic circuit



The external hydraulic circuit must ensure the water flow to the evaporator under any working conditions and with any adjustment.

The external hydraulic circuit should consist of the following elements:

- A circulation pump which delivers a sufficient water flow and discharge head.
- The capacity of the primary hydraulic circuit should not be less than 7,5 litres/KW of cooling capacity, in order to prevent the repeated start-up of the compressor and any damage to it. If the water capacity in the primary piping of the circuit and in the evaporator is lower than this value, an insulated storage tank shall be installed.
- A membrane expansion vessel provided with safety valve with vent, that must be visible.



The capacity of the expansion vessel must allow for an expansion of at least 2% of the volume of the fluid in the circuit (evaporator, piping, user circuit and standby tank, if any). The expansion vessel needs not be isolated, because no water can circulate inside it.

- A flow meter, to disable the appliance when the water is not circulating.



The external hydraulic circuit must ensure the water flow to the evaporator under any working or adjustment conditions.

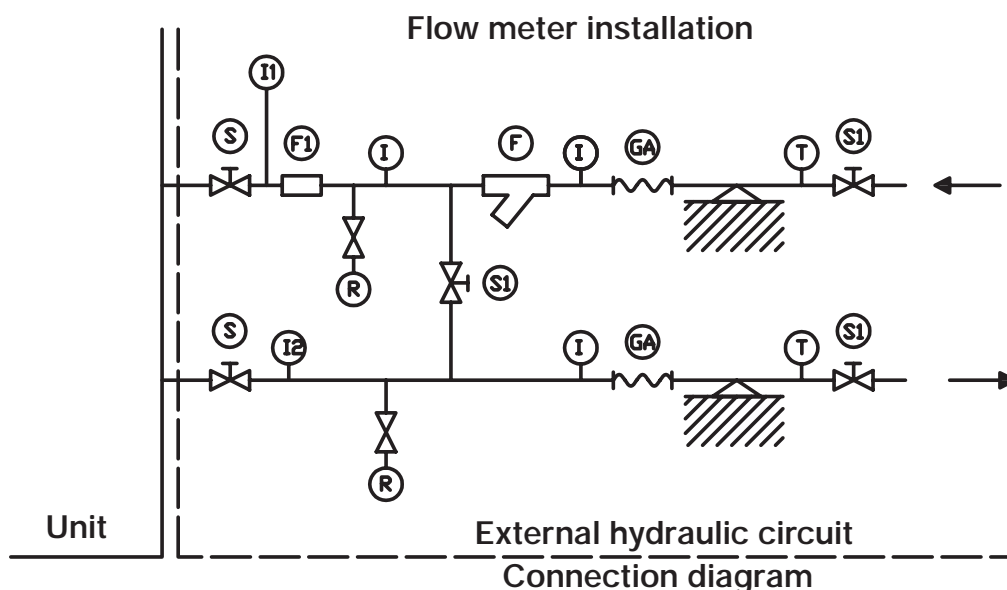
To install the flow meter, conform to the manufacturer's instructions.

As a general rule, the flow meter must be mounted on a horizontal pipe, and its distance from the curves must be 10 times the diameter of the pipe, far from valves or other components that may hinder the water flow upstream of or downstream from the flow meter.

- The air exhaust valves must be mounted in the highest point of the piping.
- The stop valves must be mounted on the water inlet/outlet piping of the evaporator and the heat recovery condenser.
- The drain points (provided with plugs, cocks etc.) must be positioned in the lowest point of the piping.

Furthermore:

- Provide the evaporator with a by-pass circuit equipped with valve, to wash the plant.
- Insulate the piping, to prevent the risk of heat loss.
- Install a filter on the suction side of the evaporator or the heat recovery condenser.



Legends:

I: Pressure gauge connection
 S: Gate valve
 F1: Flow meter
 GA: Flexible hoses

R: Drain cock
 T: Thermometer
 F: Filter
 I1/I2: Pressure gauge connection to measure pressure drop or head pressure



Before filling the circuit, it is important to check that it is free from any foreign matter, sand, gravels, rust, welding deposits, waste and other materials that may damage the evaporator.

When cleaning the lines, it is recommended to create a circuit by-pass. It is important to mount a filtering medium (30 mesh) upstream of the chiller.



If necessary, the water required to fill the circuit must be treated to obtain the requested PH.

4.4 Hydraulic connection of the condenser



The external hydraulic circuit must ensure the water flow to the condenser under any working or adjustment conditions.

The cooling of the units is generally ensured by connecting the condenser to a cooling tower, though the units can be cooled also with well water.

In the presence of a water-cooled condenser, it is necessary to check the flow rate and/or the temperature of the cooling fluid that flows through the condenser, so as to maintain the refrigerant pressure at values that can ensure a satisfactory operation.

When a cooling tower is used, the simplest regulation methods consist of checking the operation or the speed of the fan or the air volume, by means of a damper, once the pilot thermostat has been installed in the basin of the tower.

Alternatively, or if no water from a cooling tower is used, you can adopt a recirculation system provided with a 3-way valve.

This circuit shall consist of:

- A circulation pump that can ensure the necessary capacity and discharge head.
- A flow meter to turn off the appliance when no water is circulating.



The flow meter must be connected in series, as shown in the wiring diagram of the control panel.

To install the flow meter, follow the manufacturer's instructions.

As a general rule, the flow meter shall be mounted on a horizontal pipe, at a distance from the curves equal to 10 times the diameter of the pipe and far from valves or other components that are likely to hinder the water flow upstream of or downstream from the flow meter.

- The bleed valves must be mounted on the highest point of the piping.
- The stop valves must be mounted on the piping of the water entering/leaving the condenser.
- The discharge points (provided with plugs, cocks etc.) must be arranged in the lowest point of the piping.

Furthermore:

- Provide the condenser with a by-pass circuit, equipped with a shutoff valve
- Insulate piping, to prevent the risk of heat loss.
- Install a filter on the suction side of the condenser.
- A three-way valve should be installed on-site. It permits to bypass the condenser for correct operation at low return water temperature. The best position is close to the condenser.

To install the flow meter, follow the diagram illustrated in paragraph 4.3.

4.5 Hydraulic connection

The water inlet/outlet fittings shall conform to the instructions provided by the plates affixed near the connection points.

4.6 Power supply



Before carrying out any operations on the electrical system, make sure that the unit is deenergised.



It is important that the appliance is grounded.



The company in charge of the installation shall conform to the standards applicable to outdoor electrical connections.

Installation

Itelco-Industry may not be held liable for any damage and/or injury caused by failure to comply with these precautions.

The unit conforms to EN 60204-1.

The following connections shall be provided:

- A 3-phase and grounding connection for the power supply circuit.
- The electrical distribution system shall meet the power absorbed by the appliance.
- The disconnecting and magnetothermal switches must be sized to control the starting current of the unit.
- The power supply lines and the insulation devices must be designed in such a way that every line independent.
- It is recommended to install differential switches, to prevent any damage caused by phase drops.
- The fans and compressors are supplied through contactors controlled from the control panel.
- Each motor is provided with an internal safety thermal device and external fuses.
- The power supply cables must be inserted into dedicated openings on the front of the unit, and they will enter the electrical board through holes drilled on the bottom of the board.

4.7 Electrical connections

The unit must be installed on site according to the Machinery Directive (98/37/EC), the Low Voltage Directive (73/23/EC), the Electromagnetic Interference Directive (89/336/EC) and the usual procedures and standards applicable in the place of installation. The unit must not be operated if its installation has not been carried out according to the instructions provided in this manual.

The power supply lines must consist of insulated copper conductors, dimensioned for the maximum absorbed current.

Connection to terminals must be performed according to the diagram of connections provided in this manual and according to the wiring diagram which accompanies the unit.



Before connecting the power supply lines, check that the available voltage value does not exceed the range specified in the Electric Data (Chapter 8).

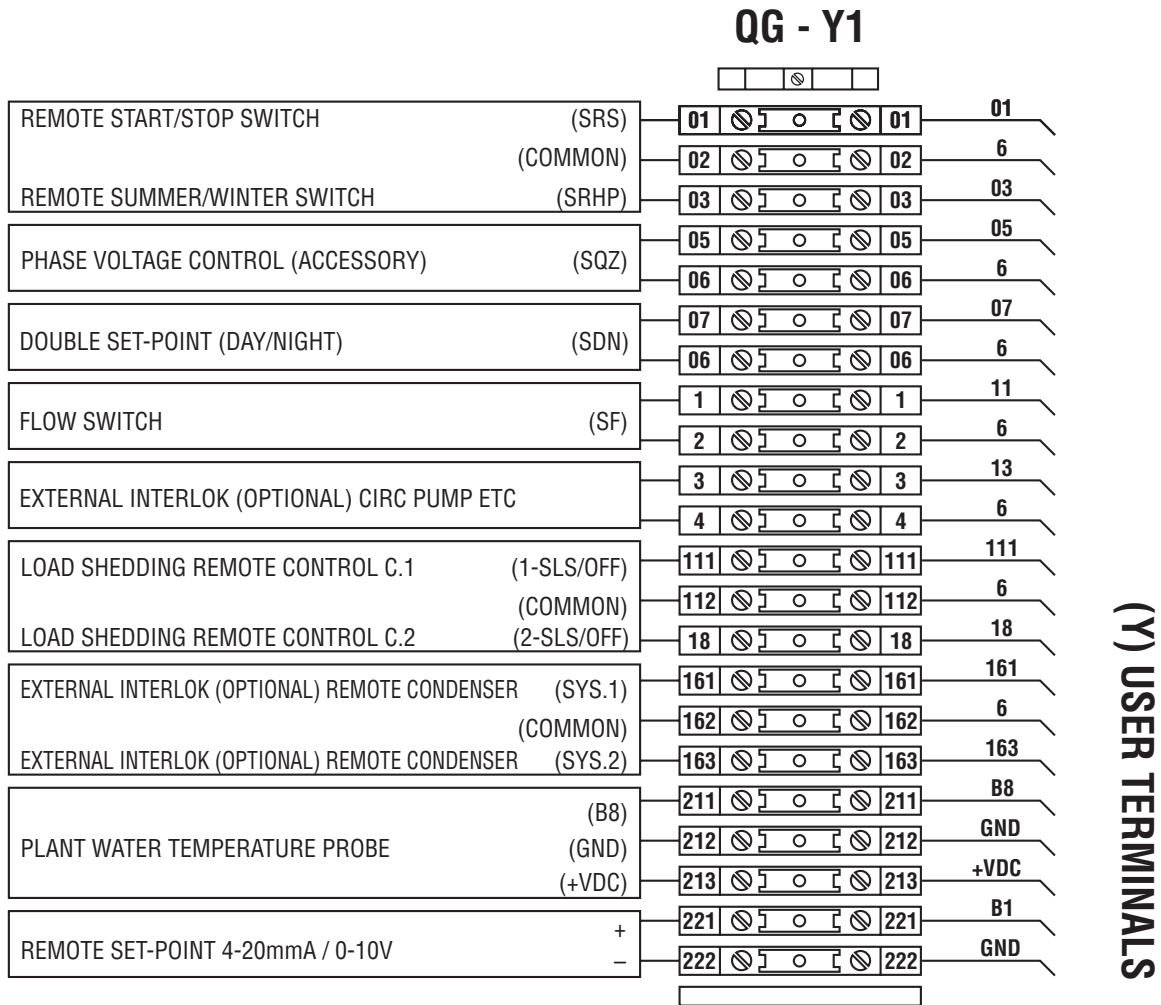
For 3-phase systems, check also that the unbalance between the phases does not exceed 2%. To perform this check, measure the differences between the voltage of each phase couple and their mean value during operation. The maximum % value of these differences (unbalance) must not exceed 2% of the mean voltage.

If the unbalance is unacceptable, contact the Energy Distributor to solve this problem.

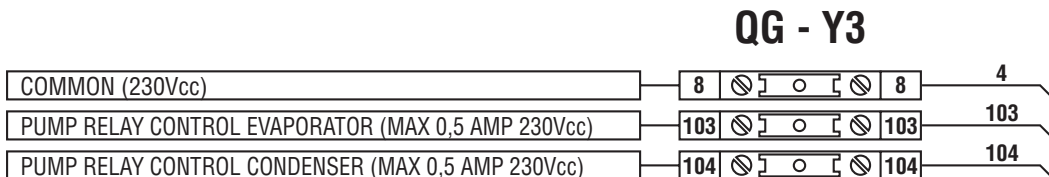
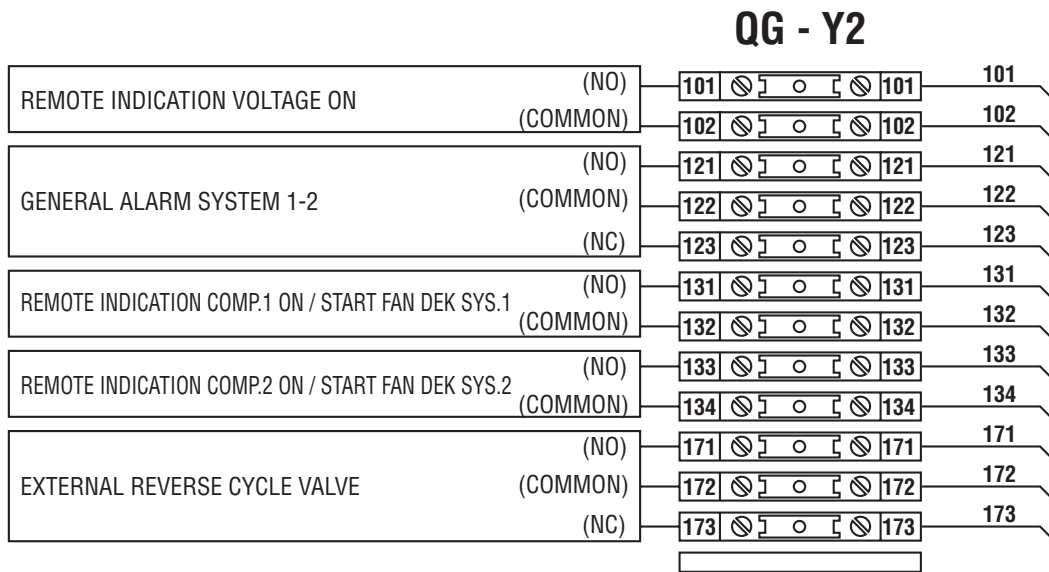


Supplying the unit through a line whose unbalance exceeds the permissible value will automatically void the warranty.

Terminal box



(Y) USER TERMINALS



5 START-UP



The unit must be started for the first time by personnel suitably trained by one of Itelco-Industry 's Authorised Service Centre. Failure to meet this requirement will immediately void the warranty.



The operations carried out by Itelco-Industry personnel are limited to the start-up of the unit, and do not include any other operation on the plant, such as, for example, electrical and hydraulic connections etc. All the other operations before start-up, including oil pre-heating for at least 12 hours, must be performed by the Installer.

5.1 Preliminary check

The checks listed below shall be performed before starting the unit and before the arrival of the personnel authorised by Itelco-Industry .

- Check the section of power supply and grounding cables; make sure that terminals are tightened and check the correct operation of contactors, with the master switch open.
- Check that any voltage and phase variation in the power supply does not exceed the prefixed thresholds.
- Connect the contacts of the flow meter and the thermal relay of the pump and of the other devices (if any), to terminals 1-2 and 3-4, respectively.
- Check that the components of the external water circuit (pump, user equipment, filters, power supply tank and reservoir, if any) have been installed properly, and according to the manufacturer's instructions.
- Check the filling of the hydraulic circuits, and make sure that the fluid circulation is correct, without any trace of leaks and air bubbles. If you use ethylene glycol as antifreeze, check that its percentage is correct.
- Check that the direction of rotation of the pumps is correct, and that fluids have been circulating for at least 12 hours for both pumps. Then, clean the filters on the suction side of the pumps.
- Adjust the liquid distribution network in such a way that the flow rate is within the specified range.
- Check that the water quality is up to the specifications.
- Check that oil heaters, if any, have been turned on at least 12 hours before.

5.2 Start-up

Start-up sequence:

- Turn on the master switch (at least 12 hours before).
- Check that the oil in the compressor has reached the requested temperature (the minimum temperature outside the pan must be approx. 40°C) and that the auxiliary control circuit is energised.
- Check the operation of all the external equipment, and make sure that the control devices of the plant are properly calibrated.
- Start the pump and check that the water flow is correct.
- Set the desired fluid temperature on the control board.
- Start the appliance (see Chapter 6).
- After about 15 minutes of operation check that there are no bubbles, through the sight glass on the liquid line.



The presence of bubbles may indicate that a part of the refrigerant charge has been released in one or more points. It is important to remove these leaks before proceeding.

- Repeat the start-up procedure after removing the leaks.
- Check the oil level in the compressor's sight glass.

5.3 Checking the operation

Check the following:

- The temperature of the water entering the evaporator.
- The temperature of the water leaving the evaporator.
- The level of the water flow rate in the evaporator, if possible.
- The current absorption upon the start of the compressor and in case of stabilised operation.

Check that the condensing and evaporation temperatures, during operation at high and low pressure detected by the pressure gauges of the refrigerant, are within the following range:

(On the units not provided with HP/LP pressure gauges for the refrigerant, connect a pressure gauge to the Schreder valves on the refrigeration circuit).

HP side	Approx 7 to 11°C above the inlet water temperature of condenser, for R407C units; approx 2 to 5°C above the inlet water temperature of condenser, for R134a units.
LP side	Approx 3.5 to 5°C below the temperature of the leaving chilled water, for R407C; approx 3.5 to 6°C below the temperature of the leaving chilled water, for R134a units.

5.4 Delivery to the customer

- Train the user according to the instructions provided in Section 6.

6 OPERATION

These chillers are equipped with a microprocessor control logic and regulation management system.

The system consists of a unit logic board and a liquid crystal control panel which manages the control, starting, shutdown and display functions.

6.1 General Information

■ Introduction

The information and the operating instructions of the electronic control system mounted on the unit are listed here below.

■ Main characteristics

- Microprocessor control
- User friendly easy reachable keyboard
- Proportional – Integral control of return water temperature (RWVT)
- Hysteresis type control of leaving chilled water temperature (LWT)
- Access code to Service Level
- Acoustic and LED alarm indication
- Backlighted liquid crystals display
- Closed loop condensing pressure control
- Start and stop pump down logic
- Cooling capacity steps rotation
- Oil recovery function
- Night (or Double set point) function management
- Compressor and pump working hours meter
- Discharge and suction pressure display
- Memorized alarms history
- 4 set point time programs

Possibility to connect:

- Serial Communication Card RS485 Card to connect the **Chiller Control** to a BMS net (MODBUS, LONWORK, BACNET)
- Remote Display Terminal
- Remote control
- Phase monitoring kit
- Chiller Data Logger
- GSM Modem

■ “Chiller Control” system two screw compressors unit

These cooling only water chillers are provided with a microprocessor board having a default program for the management of two refrigeration circuits each one equipped with one twin screws compressor, one low pressure transducer and one high pressure transducer. The control system consists of:

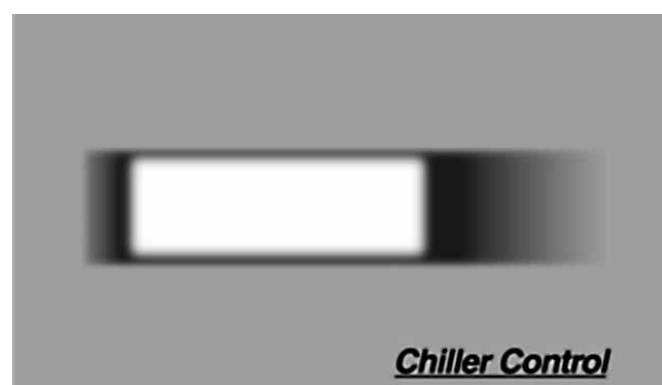
- INTERNAL ELECTRONIC PCB
- TERMINAL UNIT WITH DISPLAY AND KEYBOARD
- CHILLED FLUID TEMPERATURE SENSORS
- AMBIENT AIR TEMPERATURE SENSORS
- COIL TEMPERATURE SENSOR
- HIGH PRESSURE TRANSDUCER
- LOW PRESSURE TRANSDUCER

6.2 Keyboard – Display Terminal Unit

■ General Information

The figure which follows shows the terminal unit with open access door.

On the figure it is possible to see the microprocessor managed 4 lines – 20 columns LCD display, the keyboard and the LEDs which allow to program all the control parameters as setpoints, differential band, alarm thresholds and to perform the main functions.

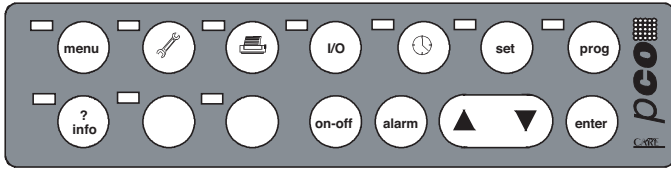





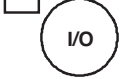
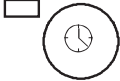





■ Keyboard

The terminal unit allows the operator to perform the following operations:

- initial configuration of the unit
- modification of the main working parameters
- displaying of the alarms and their notification by “buzzer”
- displaying of all the measured parameters

The connection between the terminal unit and the board is realized by a 6 ways phone cable. The connection between the terminal unit and the main board is not strictly necessary to the normal operation of the controller.



-  Access to the displaying mask of the main parameters and unit status mask.
-  Access to devices maintenance parameters (elapsed working hour of the device and reset of the hours meter, alarm history) (Service Level)
-  Not Available
-  Access to the displaying masks of digital and Analog inputs and outputs status and of the software release.
-  Access to clock programming mask
-  Access to the displaying / programming masks of the control setpoint (User Level - Setpoint)
-  Access to "Service level" masks
-  +  Pushing this key together it is possible to access to the "Manufacturer Level"
-  Used only for unit with four compressors or back to back configuration with master slave. Switch the displaying master unit control / slave unit control

The LEDs of each keys light up when the function related to the key is active.



Figure 1

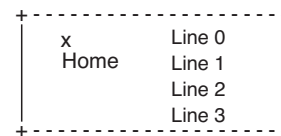
1. **On/Off** key: it allows to switch on and off the unit. Unit status is indicated by the lighting of the green LED.
2. **Alarm** key: it is used to display the alarms, to manually reset the alarms and to arrest the buzzer. If the key is lighted in red it means that at least one alarm was detected. Pushing one time this key the buzzer is arrested and the mask related the active alarm is displayed. Pushing it a second time the alarm is reset.
3. **Upward** arrow key: it allows to program the control parameters and to move between the masks (not backlighted).
4. **Downward** arrow key: it allows to program the control parameters and to move between the masks (not backlighted).
5. **Enter** key: it allows to move the cursor inside the masks and to save the programmed parameters. This key is continuously backlighted (in yellow) to show that the unit is under power.



■ Display

The unit is equipped with a 4 lines – 20 columns LCD display.

The parameters and the operation information are shown in pages called "masks".

The navigation inside each mask is possible using as follows the terminal unit keys.



When cursor position corresponds to the left corner of the upper part of the display (Home) pushing the  arrow keys it is possible to access to the masks which are associated to the selected field. If a mask contains parameters programming fields, pushing the key ENTER the cursor will move to those fields. When it reaches one of the programming fields, using the  arrow keys it is possible to modify the relevant value within its programming range. The modified value must be confirmed pushing the ENTER key.

Operation

6.3 Functions / Keys / Configuration

■ Alarms Table

Code	Alarm Description	Comp. #1 Status	Comp. #2 Status	Pump Evap. Status	Pump Cond. Status
AL01	Wrong power	Off	Off	Off	Off
AL02	Antifreeze alarm	Off	Off	On	Off
AL03	Interlock	Off	Off	Off	Off
AL04	Flow switch alarm	Off	Off	Off	Off
AL05	System #1 low suction pressure	Off	On	On	On
AL06	System #2 low suction pressure	On	Off	On	On
AL07	System #1 high discharge pressure	Off	On	On	On
AL08	System #2 high discharge pressure	On	Off	On	On
AL09	Compressor #1 thermal protection	Off	On	On	On
AL10	Compressor #2 thermal protection	On	Off	On	On
AL14	Remote interlock n°1	Off	On	On	On
AL15	Remote interlock n°2	On	Off	On	On
AL18	Clock board failure	On	On	On	On
AL21	B1 wrong signal	Off	Off	On	Off
AL22	B2-LP1 sensor failure	Off	On	On	On
AL23	B3-DP1 sensor failure	On	On	On	On
AL24	B4-TEin sensor failure	On	On	On	On
AL25	B5-TEout sensor failure	Off	Off	On	On
AL26	B6-LP2 sensor failure	On	Off	On	On
AL27	B7-DP2 sensor failure	On	On	On	On
AL28	B8-Tplan sensor failure	Off	Off	On	On
AL29	B9-TCin sensor failure	On	On	On	On
AL30	B10-TCout sensor failure	On	On	On	On
AL31	SYS #1 compressor Maintenance	On	On	On	On
AL32	SYS #2 compressor Maintenance	On	On	On	On
AL33	Pump maintenance	On	On	On	On
AL37	System #1 compressor differential pressure	Off	On	On	On
AL38	System #2 compressor differential pressure	On	Off	On	On

Notes:

1 = Check power phases rotation and/or minimum voltage. It works only in case the Phases Monitor (accessory) is installed.

■ "Menu" key

Pushing the "Menu" key the main mask is displayed:

```

U:1 RWT ..... 0.0 °C
SYS#1: OFF
SYS#2: OFF
Unit   ON
  
```

In this mask the following items are displayed:

- unit serial number and control temperature
- system #1 status
- system #2 status
- unit status.

■ I/O (input / output) Status

Pushing the "I/O" key it is possible to access to all the masks showing the values read by all the sensors installed on the unit.

Sensor	Use
Tin	Entering chilled fluid temperature
Tout	Leaving chilled fluid temperature
TpLAN	Installation control sensor (in case of "Chiller Network")
SP #1	System #1 suction pressure transducer
DP #1	System #1 discharge pressure transducer
SP #2	System #2 suction pressure transducer
DP #2	Sys 2 : trasduttore pressione mandata
TC #1	Heat recovery heat exchanger entering water temp.
TC #2	Heat recovery heat exchanger leaving water temp.

The following items are also displayed:

1. Chiller Control digital inputs and outputs status
2. Analog outputs driving the fan speed controllers
3. Code and release of the "Chiller Control" software.

■ Maintenance

Pushing the "Maintenance" key it is possible to access to the following information masks:

1. ALARM HISTORY

```

N°0000
AL000 00:00 00/00/00
Setpoint ..... 00.0 °C
TemperaturE ..... 00.0 °C
    
```

Pushing the "Enter" the cursor enter in the list of the memorized alarms. At this point the arrow keys allow to scroll the masks of all the memorized alarms which show the date, time, code and the controlled water temperature (entering or leaving) at the moment in which the alarm itself was detected.

2. PUMP WORKING HOURS

```

U:1
Pump..... 00000 h
    
```

3. COMPRESSORS WORKING HOURS

```

U:1 SYS #1
Compressor      00000 h
U:1 SYS #2
Compressor      00000 h
    
```

4. PASSWORD (*)

```

U:1
DIGIT password
      0000
    
```

Nota (*): Contact Itelco Clima Service Department to access to the following masks.

RST_HOUR METERS

```

Reset hours U:1
pump ..... N
compressors
SYS #1 N SYS #2 N
    
```

MSK_FILTERS

```

Enabling software
filters ..... S
Threshold ..... 00.5 °C
Interval ..... 020 sec
    
```

M_DISABLE

```

Enabling
compressors
SYS #1=Y SYS #2=Y
    
```

M_OFFSET1

```

Sensor calibration
Tin ..... 0.0 °C
SP #1 ..... 0.0 bar
DP #1 ..... 0.0 bar
    
```

M_OFFSET2

```

Tair ..... 0.0 °C
Tout ..... 0.0 °C
SP #2 ..... 0.0 bar
DP #2 ..... 0.0 bar
    
```

M_OFFSET3

```

Sensor calibration
TpLAN ..... 0.0 °C
    
```

HOUR_THRES

```

Maintenance alarm
threshold
      003X1000h
    
```

Operation

■ Setpoint

Pushing the "Set" key it is possible to access to user's Setpoint level. The following table contains the de-

tails of the parameters which is possible to set with the relevant limitations and default values:

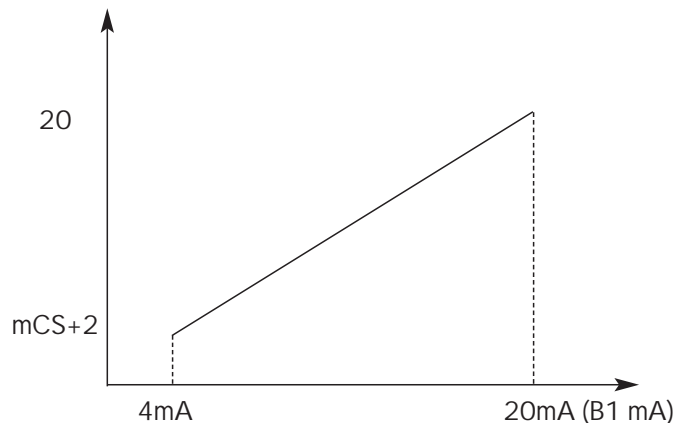
User's Setpoints	Control of	Low Limit	High Limit	Default			
System #1 ON/OFF	-	OFF	ON	OFF			
System #2 ON/OFF	-	OFF	ON	OFF			
Cooling Setpoint	Inlet	8	20	10			
	Outlet	6	20	8			
Heating Setpoint	Inlet	20	48	43			
	Outlet	20	50	45			
Glycol Setpoint	Inlet	-15	20	10			
	Outlet	-15	20	8			
Dead band	Inlet	1	10	5			
	Outlet	1	6	2			
Language Selection	—	ITA	ENG	GER	FRA	SPA	Italian

■ Remote setpoint - Input B1

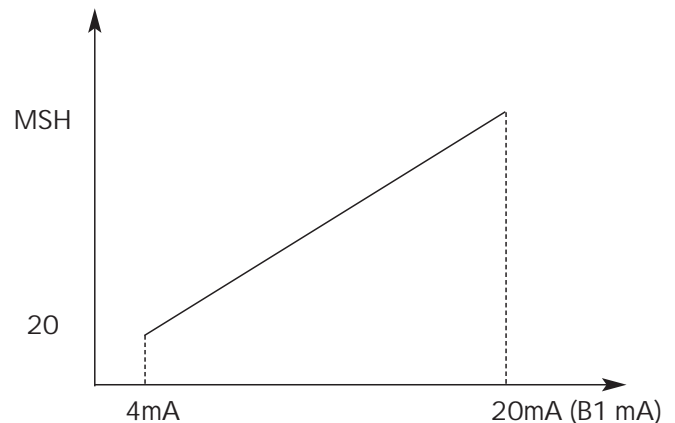
When the B1 input is enabled, the remote setpoint is activated. The active set of the machine, in cold or heat mode, is no longer the set selected on the key-

board, but is a value which corresponds to the B1 analog input in the 4-20mA scale, according to the following curve:

REM. COLD SET (°C)



REM. HOT SET (°C)



■ Clock Key

To have access to the following mask:

DATE AND TIME

U:1	Clock	
Hour		00:00
Day		
Date		00/00/00

SETPOINTS TIMING

Setp1	=	00.0	-	00:00h
Setp2	=	00.0	-	00:00h
Setp3	=	00.0	-	00:00h
Setp4	=	00.0	-	23:59h

TIMING PERIODS ENABLING

Day timing periods with setpoint variationsN

7 GENERAL DESCRIPTION

7.1 Introduction

The water chillers with two refrigeration circuits of the SWS series have been designed for indoor installation.

For heat dissipation purposes, the SWS units must be coupled to a cooling tower, or use well water.

The series includes the following versions:

Version	Description
SWS standard version (STD) SWS low noise version (LN) SWS extra low noise version (ELN)	Chillers with water condensation, working with R407C and R134a refrigerants (with R22 refrigerant on request for extra-european countries)

For each version, the corresponding moto-evaporating version is available: SWR

Available options:

Options	Description
SWS/D	The thermal recovery is ensured by a de-superheater mounted on the compressor's delivery line

7.2 General specifications

The SWS/SWR chillers are supplied complete and fitted with refrigerant connection pipes and internal wiring.

The refrigeration circuit of each SWS unit is subjected to a pressure test, drained, vacuumised, dehydrated and filled with refrigerant, and includes the necessary oil. On completion of the assembly, each unit is subjected to final testing and checking of the proper operation of all refrigeration circuits.

The base and the frame of every single unit are made of sturdy galvanised steel and fastened by stainless steel screws and bolts. Both the compressor and the components of the refrigerant circuit are lodged in a compartment coated with soundproofing material (ELN versions), whose sides can be easily removed to provide access.

The galvanised steel sections are oven-painted with white enamel (RAL 9001).

7.3 Compressors

The SWS/SWR units feature semi-hermetic screw compressors. The control of the compressor's capacity is managed by solenoid capacity control valves, that are controlled by the microprocessor of the appliance; every compressor has 3 working steps: 25% (start only), 50%, 75%, 100%.

The compressors' motors are cooled by the refrigerant gas and are provided, in each phase, by a built-in temperature-sensitive solid state device for overload protection.

The motor's terminals are weatherproof, according to standard IP-54.

COMPRESSOR START-UP	
PART - WINDING	STAR - TRIANGLE
SWS/SWR 1002 - 1902 R407C	SWS/SWR 2202 - 4402 R407C
SWS/SWR 1602 - 2202 R134a	SWS/SWR 2212 - 4802 R134a

General Description

7.4 Refrigerant circuits

Every single SWS unit has two complete refrigerant circuits, one per compressor. Each refrigerant circuit includes: a service valve for refrigerant filling, shutoff valves for suction lines (on request), as well as for the delivery and liquid lines, a thermostatic expansion valve with external equalizer, a solenoid valve to start/stop the compressor, a dehydrating cartridge filter, a sight glass with humidity indicator, a differential oil pressure switch. The moto-evaporating SWR units, which derive from the SWS versions, are provided with shutoff cocks on the delivery and liquid lines, so as to allow the connection of remote condensers.

Each circuit is also provided with safety devices, in accordance with PED 97/23/EC: HP pressure switches, pressure transducers, safety valves providing protection in case of fire or in the case of a malfunction of compressors.

7.5 Evaporator

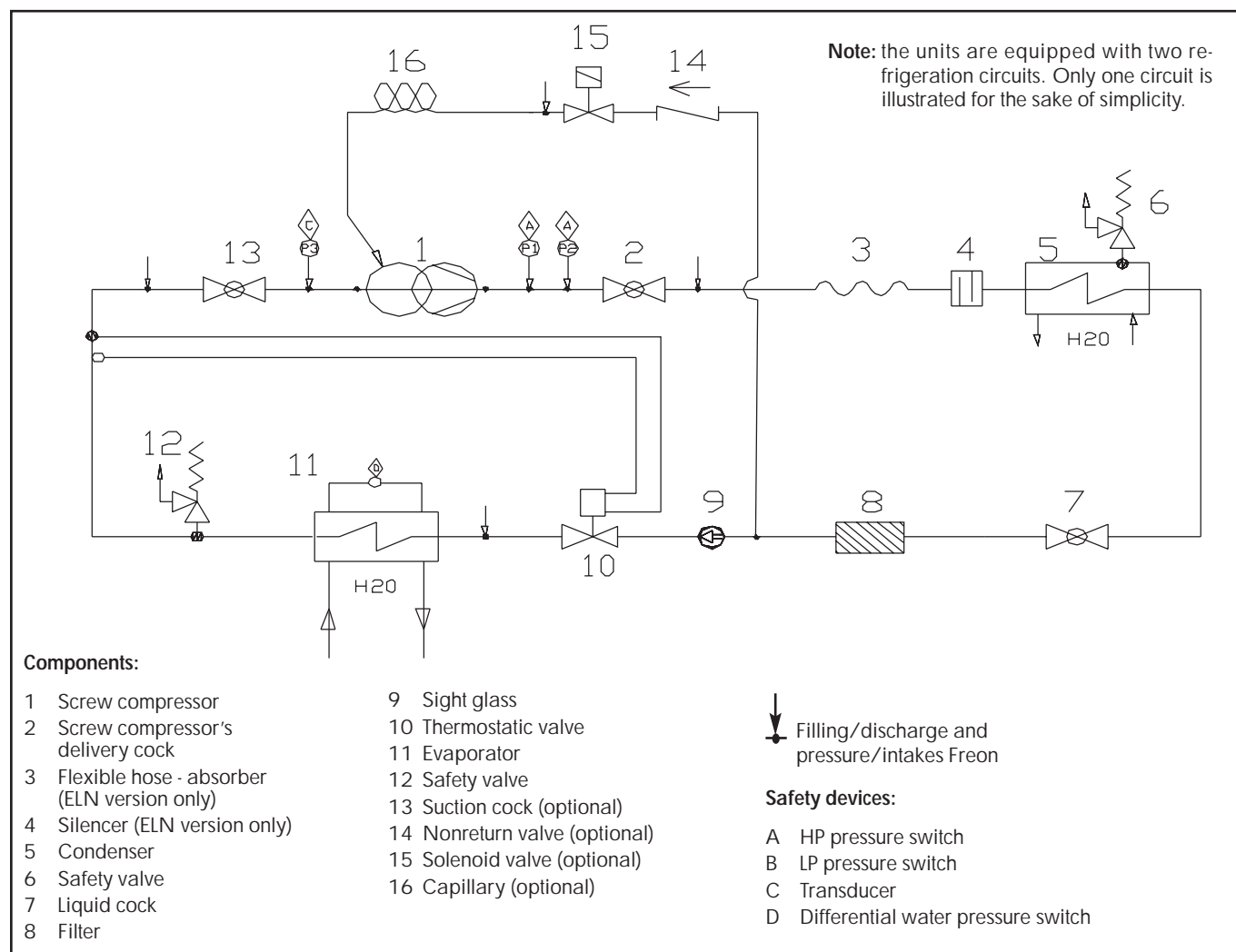
All units are equipped with a single direct-expansion refrigerant/water exchanger of shell and tube type, with several refrigeration circuits. The tube bundle can be removed for any inspections or maintenance.

The heat exchangers are insulated with 19mm-thick anti-condensate closed-cell polyethylene material. The insulating material is not UV-ray-proof.

7.6 Condenser

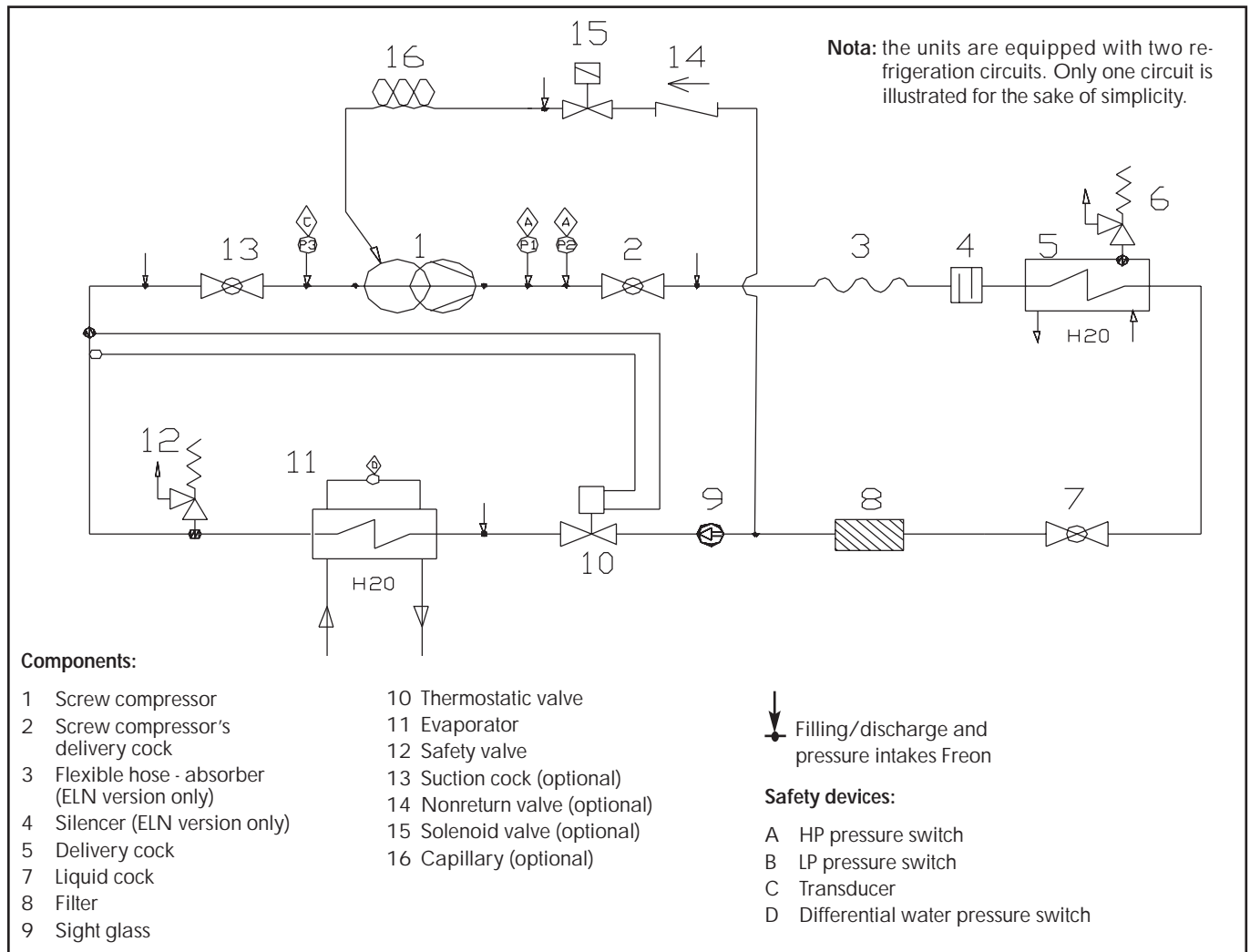
All units are provided with two condensers (one per circuit). The heat exchanger is of shell and tube type, with square plates, preset for opening for inspection, cleaning and maintenance purposes.

SWS refrigeration diagram



General Description

SWR refrigeration diagram



7.7 Power supply and control system

All units are provided with a microprocessor and a "Chiller Control" system.

The electrical connection of the controls and the start-up units for the motor are carried out and tested in the factory.

A door stop disconnecting switch is always available, and is mounted on the door of the appliance. IP 54 protection degree.

The power supply/control compartment includes:

- Master switch
- Network isolator, contactors, compressor fuses
- A transformer for auxiliaries, fuses, relay and electronic card
- The keyboard and the display of the "Chiller-Control" microcomputer, mounted on the door of the control section.

7.8 "Chiller Control"

The "Chiller Control" unit consists of an expandable interface card and a controller.

The function of the expandable interface card is to monitor the inputs and control the outputs:

- Digital inputs, such as alarm and control signals.
- Analog inputs, such as temperature/pressure measuring signals.
- Digital outputs for the excitation of control relays and remote-control switches.

The microprocessor will execute the logic that controls:

- The LED and the display of the alarm signals and the operation of the appliance.
- The compressor's start-up logic (excitation of the winding and stop), potential regulation (3+3 steps).

General Description

- The display of the compressor's working hours and the temperature of the water to the evaporator.
- The anti-cycling and delay timing upon start-up.
- The automatic advance/delay sequence for the compressor start-up.

Reference and parameter control:

- User level: the operator can modify any data with the 'ENTER', '+' and '-' keys.
- Service level: password protected access by the authorised personnel.

7.9 Accessories

List of the available accessories, supplied separately, to be mounted on-site by the installer:

Water flow meter

Prevents the operation of the unit if the circulating chilled fluid is insufficient. It is recommended to install a flow meter to ensure the correct operation of the unit.

Antivibrating supports (AVM)

solating spring supports, provided with bolts for fastening onto the base. They are supplied separate from the unit, and shall be mounted on site at the customer's expense.

Remote wall terminal (200 m)

Makes it possible to control the unit through the remote terminal, up to a maximum distance of 200 meters.

Chiller data logger

Records continuously the essential thermodynamic operating parameters, during the 10 minutes that precede the last alarm.

GSM Modem

Makes it possible to check the working mode or the switching on/off of the unit via SMS. In case of any alarms, the unit sends an SMS to the user.

RS-485 serial card

A communication interface allows you to control and manage the unit from a local station, with RS485 connection, up to a distance of 1000 m.

It is therefore possible to obtain remote control and management by integrating these functions into the building's control system.

8 TECHNICAL DATA

8.1 Pressure drops

Evaporator

SWS R407C		1002	1202	1402	1602	1902	2202
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	23.5	23.5	11.3	11.3	7.8	4.6
Min. water flow rate	l/s	9.9	10.7	11.8	13.4	16.7	20.5
Max. water flow rate	l/s	23.1	24.9	27.6	31.4	39.0	47.7
Min. pressure drops	kPa	23.1	26.8	15.8	20.4	21.8	19.1
Max. pressure drops	kPa	126.0	145.9	86.3	111.2	118.5	104.1

SWS R407C		2602	3002	3402	3802	4202	4402
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	4.6	3.7	3.5	3.6	3.6	3.6
Min. water flow rate	l/s	23.9	27.0	30.4	35.1	36.8	39.2
Max. water flow rate	l/s	55.8	62.9	70.8	81.9	85.9	91.4
Min. pressure drops	kPa	26.1	27.1	32.4	44.1	48.5	55.0
Max. pressure drops	kPa	142.4	147.3	176.1	240.2	264.2	299.2

SWS R134a		1602	1902	2202	2212	2352
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	26.3	18.1	12.1	6.6	5.6
Min. water flow rate	l/s	9.3	12.4	15.0	18.1	19.3
Max. water flow rate	l/s	21.6	28.9	35.0	42.1	45.0
Min. pressure drops	kPa	22.7	27.8	27.4	21.5	20.6
Max. pressure drops	kPa	123.4	151.1	149.2	117.1	112.4

SWS R134a		2502	2652	2802	3012	3202
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	5.6	6.0	6.0	6.0	3.8
Min. water flow rate	l/s	20.5	21.8	23.2	24.4	26.8
Max. water flow rate	l/s	47.8	50.9	54.0	57.0	62.5
Min. pressure drops	kPa	23.3	28.7	32.3	36.0	26.9
Max. pressure drops	kPa	126.9	156.4	176.1	196.2	146.7

SWS R134a		3412	3602	4212	4602	4802
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	3.8	3.6	3.6	3.6	3.6
Min. water flow rate	l/s	28.7	30.7	32.8	35.5	38.2
Max. water flow rate	l/s	67.0	71.6	76.6	82.8	89.0
Min. pressure drops	kPa	31.0	33.5	38.4	44.9	51.9
Max. pressure drops	kPa	168.9	182.5	209.1	244.4	282.4

Condenser

SWS R407C		1002	1202	1402	1602	1902	2202
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	55.7	55.7	53.0	43.1	32.4	16.5
Min. water flow rate	l/s	6.3	6.8	7.6	8.6	10.7	13.0
Max. water flow rate	l/s	14.8	15.9	17.7	20.1	24.9	30.3
Min. pressure drops	kPa	22.4	26.0	30.5	32.1	36.8	27.8
Max. pressure drops	kPa	122.1	141.3	166.0	174.6	200.6	151.3

SWS R407C		2602	3002	3402	3802	4202	4402
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	11.8	11.8	11.2	6.7	6.4	6.4
Min. water flow rate	l/s	15.1	17.1	19.2	22.2	23.4	25.1
Max. water flow rate	l/s	35.3	39.8	44.8	51.8	54.6	58.5
Min. pressure drops	kPa	27.1	34.4	41.3	33.1	34.9	40.0
Max. pressure drops	kPa	147.6	187.2	224.8	180.3	189.8	218.0

SWS R134a		1602	1902	2202	2212	2352
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	44.8	35.3	25.3	17.1	17.1
Min. water flow rate	l/s	5.7	7.5	9.1	11.1	11.7
Max. water flow rate	l/s	13.3	17.5	21.2	25.6	27.3
Min. pressure drops	kPa	14.6	19.8	20.9	20.5	23.3
Max. pressure drops	kPa	79.7	107.6	113.9	111.4	126.8

SWS R134a		2502	2652	2802	3012	3202
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	13.7	13.7	13.7	12.3	12.3
Min. water flow rate	l/s	12.4	13.2	14.0	14.9	16.3
Max. water flow rate	l/s	29.0	30.8	32.7	34.7	38.0
Min. pressure drops	kPa	21.2	24.0	27.0	27.1	32.5
Max. pressure drops	kPa	115.4	130.6	146.8	147.7	176.8

SWS R134a		3412	3602	4212	4602	4802
K	$10^4 \text{ kPa}/(\text{m}^3/\text{s})^2$	4.9	4.9	4.9	4.9	4.5
Min. water flow rate	l/s	17.4	18.6	20.1	21.7	23.2
Max. water flow rate	l/s	40.7	43.4	47.0	50.6	54.2
Min. pressure drops	kPa	14.8	16.8	19.7	22.9	24.4
Max. pressure drops	kPa	80.5	91.6	107.5	124.5	132.9

8.2 Technical data

SWS 1002-2202 R407C

SWS R407C		1002	1202	1402	1602	1902	2202
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	2	2	2	2
Number of steps		6					
Capacity steps	%	25/50/63/75/87/100					

Refrigerant

Type		R407C					
Charge (1)	kg	59	63	70	80	99	122

Compressors

Type		Screw						
Number		2	2	2	2	2	2	
Start-up type		Part-Winding						Y/Δ

Evaporator

Type		Shell & Tube					
Number		1	1	1	1	1	1
Water flow rate	l/s	13.9	14.9	16.6	18.8	23.4	28.6
Pressure drop	kPa	45.4	52.5	31.1	40.0	42.7	37.5
Water content	l	93.3	93.3	80.2	80.2	124.7	221.7

Condenser

Type		Shell & Tube					
Number		2	2	2	2	2	2
Water flow rate	l/s	8.9	9.6	10.6	12.1	14.9	18.2
Pressure drop	kPa	44.0	50.9	59.8	62.8	72.2	54.5
Water content	l	28.4	28.4	28.4	30.8	49.4	62.4

Hydraulic connections Evaporator

Type		Victaulic					
Inlet diameter	inch	5"	5"	5"	5"	6"	8"
Outlet diameter	inch	5"	5"	5"	5"	6"	8"

Hydraulic connections Condenser

Type		Gas threaded female					
Inlet diameter	inch	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	3"	3"
Outlet diameter	inch	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	3"	3"

Weights

Shipping	kg	1645	1659	2041	2067	2554	3005
Operating	kg	1768	1780	2148	2176	2728	3288

Dimensions

Length	mm	3795	3795	3795	3795	3795	4210
Width	mm	950	950	950	950	950	1400
Height	mm	1910	1910	1910	1910	1910	2050

(1) Indicative value. Always refer to the value specified on the unit's label.

SWS 2602-4402 R407C

SWS R407C		2602	3002	3402	3802	4202	4402
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	2	2	2	2
Number of steps		6					
Capacity steps	%	25/50/63/75/87/100					

Refrigerant

Type		R407C					
Charge (1)	kg	142	160	181	209	219	233

Compressors

Type		Screw					
Number		2	2	2	2	2	2
Start-up type		Y/Δ					

Evaporator

Type		Shell & Tube					
Number		1	1	1	1	1	1
Water flow rate	l/s	33.5	37.7	42.5	49.1	51.5	54.8
Pressure drop	kPa	51.3	53.0	63.4	86.5	95.1	107.7
Water content	l	221.7	206.5	184.4	222.2	222.2	222.2

Condenser

Type		Shell & Tube					
Number		2	2	2	2	2	2
Water flow rate	l/s	21.2	23.9	26.9	31.1	32.7	35.1
Pressure drop	kPa	53.1	67.4	80.9	64.9	68.3	78.5
Water content	l	71.4	71.4	71.4	95.0	95.0	95.0

Hydraulic connections Evaporator

Type		Victaulic					
Inlet diameter	inch	8"	8"	8"	8"	8"	8"
Outlet diameter	inch	8"	8"	8"	8"	8"	8"

Hydraulic connections Condenser

Type		Gas threaded female					
Inlet diameter	inch	3	3	3	4"	4"	4"
Outlet diameter	inch	3	3	3	4"	4"	4"

Weights

Shipping	kg	3259	3326	3460	4330	4380	4254
Operating	kg	3552	3604	3716	4648	4696	4572

Dimensionss

Length	mm	4210	4210	4210	4210	4210	4210
Width	mm	1400	1400	1400	1400	1400	1400
Height	mm	2050	2050	2050	2050	2050	2050

(1) Indicative value. Always refer to the value specified on the unit's label.

Technical data

SWS 1602-2352 R134a

SWS R134a		1602	1902	2202	2212	2352
Nominal voltage	V/ph/Hz	400/3/50				
Number of circuits		2	2	2	2	2
Number of steps		6				
Capacity steps	%	25/50/63/75/87/100				

Refrigerant

Type		R134a				
Charge (1)	kg	46	61	74	52	55

Compressors

Type		Screw				
Number		2	2	2	2	2
TStart-up type		P/W			Y/Δ	

Evaporator

Type		Shell & Tube				
Number		1	1	1	1	1
Water flow rate	l/s	13.0	17.3	21.0	25.3	27.0
Pressure drop	kPa	44.4	54.4	53.7	42.2	40.5
Water content	l	80.2	124.7	221.7	162.0	184.0

Condenser

Type		Shell & Tube				
Number		2	2	2	2	2
Water flow rate	l/s	8.0	10.5	12.7	15.3	16.4
Pressure drop	kPa	28.7	38.7	41.0	40.1	45.7
Water content	l	30.8	49.4	55.4	62.0	62.0

Hydraulic connections Evaporator

Type		Victaulic				
Inlet diameter	inch	5"	6"	8"	6"	6"
Outlet diameter	inch	5"	6"	8"	6"	6"

Hydraulic connections Condenser

Type		Gas threaded female				
Inlet diameter	inch	2 ¹ / ₂ "	3"	3"	3"	3"
Outlet diameter	inch	2 ¹ / ₂ "	3"	3"	3"	3"

Weights

Shipping	kg	2067	2554	3005	3377	3470
Operating	kg	2144	2688	3212	3601	3717

Dimensions

Length	mm	3795	3795	4210	4210	4210
Width	mm	950	950	1400	1400	1400
Height	mm	1910	1910	2050	2050	2050

(1) Indicative value. Always refer to the value specified on the unit's label.

SWS 2502-3202 R134a

SWS R134a		2502	2652	2802	3012	3202
Nominal voltage	V/ph/Hz	400/3/50				
Number of circuits		2	2	2	2	2
Number of steps		6				
Capacity steps	%	25/50/63/75/87/100				

Refrigerant

Type		R134a				
Charge (1)	kg	59	63	66	70	77

Compressors

Type		Screw				
Number		2	2	2	2	2
Start-up type		Y/Δ				

Evaporator

Type		Shell & Tube				
Number		1	1	1	1	1
Water flow rate	l/s	28.7	30.5	32.4	34.2	37.5
Pressure drop	kPa	45.7	56.3	63.4	70.6	52.8
Water content	l	184.0	222.0	222.0	222.0	359.0

Condenser

Type		Shell & Tube				
Number		2	2	2	2	2
Water flow rate	l/s	17.4	18.5	19.6	20.8	22.8
Pressure drop	kPa	41.6	47.0	50.2	50.5	60.5
Water content	l	68.0	68.0	68.0	71.0	71.0

Hydraulic connections Evaporator

Type		Victaulic				
Inlet diameter	inch	6"	6"	6"	6"	8"
Outlet diameter	inch	6"	6"	6"	6"	8"

Hydraulic connections Condenser

Type		Gas threaded female				
Inlet diameter	inch	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"

Weights

Shipping	kg	3498	3592	3605	4029	4952
Operating	kg	3750	3882	3895	4323	5382

Dimensions

Length	mm	4210	4210	4210	4210	4670
Width	mm	1400	1400	1400	1400	1400
Height	mm	2050	2050	2050	2050	2050

(1) Indicative value. Always refer to the value specified on the unit's label.

Technical data

SWS 3412-4802 R134a

SWS R134a		3412	3602	4212	4602	4802
Nominal voltage	V/ph/Hz	400/3/50				
Number of circuits		2	2	2	2	2
Number of steps		6				
Capacity steps	%	25/50/63/75/87/100				

Refrigerant

Type		R134a				
Charge (1)	kg	82	88	94	102	110

Compressors

Type		Screw				
Number		2	2	2	2	2
Start-up type		Y/Δ				

Evaporator

Type		Shell & Tube				
Number		1	1	1	1	1
Water flow rate	l/s	40.2	42.9	46.0	49.7	53.4
Pressure drop	kPa	60.8	65.7	75.3	88.0	101.7
Water content	l	359.0	359.0	359.0	399.0	399.0

Condenser

Type		Shell & Tube				
Number		2	2	2	2	2
Water flow rate	l/s	24.4	26.0	28.2	30.4	32.5
Pressure drop	kPa	29.0	33.0	38.7	41.7	47.9
Water content	l	126.0	126.0	126.0	133.0	133.0

Hydraulic connections Evaporator

Type		Victaulic				
Inlet diameter	inch	8"	8"	8"	8"	8"
Outlet diameter	inch	8"	8"	8"	8"	8"

Hydraulic Connections Condenser

Type		Victaulic				
Inlet diameter	inch	4"	4"	4"	4"	4"
Outlet diameter	inch	4"	4"	4"	4"	4"

Weights

Shipping	kg	4970	4986	5112	5165	5342
Operating	kg	5455	5471	5597	5698	5875

Dimensions

Length	mm	4670	4670	4670	4670	4670
Width	mm	1400	1400	1400	1400	1400
Height	mm	2050	2050	2050	2110	2110

(1) Indicative value. Always refer to the value specified on the unit's label.

SWR 1002-2202 R407C

SWR R407C		1002	1202	1402	1602	1902	2202
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	2	2	2	2
Number of steps		6					
Capacity steps	%	25/50/63/75/87/100					

Refrigerant

Type		R407C					
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Compressors

Type		Screw					
Number		2	2	2	2	2	2
Start-up type		Part-Winding					Y/Δ

Evaporator

Type		Shell & Tube					
Number		1	1	1	1	1	1
Water flow rate	L/s	13.9	14.9	16.6	18.8	23.4	28.6
Pressure drop	kPa	45.4	52.5	31.1	40.0	42.7	37.5
Water content	l	93.3	93.3	80.2	80.2	124.7	221.7

Hydraulic connections Evaporator

Type		Victaulic					
Inlet diameter	inch	5"	5"	5"	5"	6"	8"
Outlet diameter	inch	5"	5"	5"	5"	6"	8"

Refrigerant connections

Type		To be welded					
Discharge diameter	inch	1" ⁵ / ₈	1" ⁵ / ₈	1" ⁵ / ₈	1" ⁵ / ₈	2" ¹ / ₈	2" ¹ / ₈
Liquid diameter	inch	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈

Weights

Shipping	kg	1370	1380	1755	1765	2065	2453
Operating	kg	1463	1473	1835	1845	2190	2675

Dimensions

Length	mm	3795	3795	3795	3795	3795	4210
Width	mm	950	950	950	950	950	1400
Height	mm	1910	1910	1910	1910	1910	2050

Technical data

SWR 2602-4402 R407C

SWR R407C		2602	3002	3402	3802	4202	4402
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	2	2	2	2
Number of steps		6					
Capacity steps	%	25/50/63/75/87/100					

Refrigerant

Type		R407C					
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Compressors

Type		Screw					
Number		2	2	2	2	2	2
Start-up type		Y/Δ					

Evaporator

Type		Shell & Tube					
Number		1	1	1	1	1	1
Water flow rate	l/s	33.5	37.7	42.5	49.1	51.5	54.8
Pressure drop	kPa	51.3	53.0	63.4	86.5	95.1	107.7
Water content	l	221.7	206.5	184.4	222.2	222.2	222.2

Hydraulic connections Evaporator

Type		Victaulic					
Inlet diameter	inch	8"	8"	8"	8"	8"	8"
Outlet diameter	inch	8"	8"	8"	8"	8"	8"

Refrigerant connections

Type		To be welded					
Discharge diameter	inch	2" ⁵ / ₈	2" ⁵ / ₈	2" ⁵ / ₈	3" ¹ / ₈	3" ¹ / ₈	3" ¹ / ₈
Liquid diameter	inch	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈	1" ³ / ₈

Weights

Shipping	kg	2663	2712	2825	3495	3535	3395
Operating	kg	2885	2919	3009	3717	3757	3617

Dimensions

Length	mm	4210	4210	4210	4210	4210	4210
Width	mm	1400	1400	1400	1400	1400	1400
Height	mm	2050	2050	2050	2050	2050	2050

SWR 1602-2352 R134a

SWR R134a		1602	1902	2202	2212	2352
Nominal voltage	V/ph/Hz	400/3/50				
Number of circuits		2	2	2	2	2
Number of steps		6				
Capacity steps	%	25/50/63/75/87/100				

Refrigerant

Type		R134a				
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Compressors

Type		Screw				
Number		2	2	2	2	2
Start-up type		P/W			Y/Δ	

Evaporator

Type		Shell & Tube				
Number		1	1	1	1	1
Water flow rate	l/s	13.0	17.3	21.0	25.3	27.0
Pressure drop	kPa	44.4	54.4	53.7	42.2	40.5
Water content	l	80.2	124.7	221.7	162.0	184.0

Hydraulic connections Evaporator

Type		Victaulic				
Inlet diameter	inch	5"	6"	8"	6"	6"
Outlet diameter	inch	5"	6"	8"	6"	6"

Weights

Shipping	kg	1765	2065	2453	2895	2985
Operating	kg	1845	2190	2675	3057	3169

Dimensions

Length	mm	3795	3795	4210	4210	4210
Width	mm	950	950	1400	1400	1400
Height	mm	1910	1910	2050	2050	2050

Technical data

SWR 2502-3202 R134a

SWR R134a		2502	2652	2802	3012	3202
Nominal voltage	V/ph/Hz	400/3/50				
Number of circuits		2	2	2	2	2
Number of steps		6				
Capacity steps	%	25/50/63/75/87/100				

Refrigerant

Type		R134a				
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Compressors

Type		Screw				
Number		2	2	2	2	2
Start-up type		Y/Δ				

Evaporator

Type		Shell & Tube				
Number		1	1	1	1	1
Water flow rate	l/s	28.7	30.5	32.4	34.2	37.5
Pressure drop	kPa	45.7	56.3	63.4	70.6	52.8
Water content	l	184.0	222.0	222.0	222.0	359.0

Hydraulic connections Evaporator

Type		Victaulic				
Inlet diameter	inch	6"	6"	6"	6"	8"
Outlet diameter	inch	6"	6"	6"	6"	8"

Weights

Shipping	kg	2995	3085	3095	3505	4421
Operating	kg	3179	3307	3317	3727	4780

Dimensions

Length	mm	4210	4210	4210	4210	4670
Width	mm	1400	1400	1400	1400	1400
Height	mm	2050	2050	2050	2050	2050

SWR 3412-4802 R134a

SWR R134a		3412	3602	4212	4602	4802
Nominal voltage	V/ph/Hz	400/3/50				
Number of circuits		2	2	2	2	2
Number of steps		6				
Capacity steps	%	25/50/63/75/87/100				

Refrigerant

Type		R134a				
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Compressors

Type		Screw				
Number		2	2	2	2	2
Start-up type		Y/Δ				

Evaporator

Type		Shell & Tube				
Number		1	1	1	1	1
Water flow rate	l/s	40.2	42.9	46.0	49.7	53.4
Pressure drop	kPa	60.8	65.7	75.3	88.0	101.7
Water content	l	359.0	359.0	359.0	399.0	399.0

Hydraulic connections Evaporator

Type		Victaulic				
Inlet diameter	inch	8"	8"	8"	8"	8"
Outlet diameter	inch	8"	8"	8"	8"	8"

Weights

Shipping	kg	4431	4441	4561	4581	4753
Operating	kg	4790	4800	4920	4980	5153

Dimensions

Length	mm	4670	4670	4670	4670	4670
Width	mm	1400	1400	1400	1400	1400
Height	mm	2050	2050	2050	2010	2010

8.3 Electrical data

SWS/SWR R407C		1002	1202	1402	1602	1902	2202
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50					
Nominal power input	kW	92	98	114	130	157	189
Max power input	kW	111	117	135	155	187	225
Nominal current	A	157	175	203	232	280	338
Max. current (FLA)	A	164	192	248	280	336	392
Max. start-up current (LRA)	A	360	440	367	449	613	455
External fuses	(A)	200	250	315	315	400	500
Wire cross area (1)	mm ²	120	120	185	185	2x150	2x150

Compressors

Number	n°	2	2	2	2	2	2
Nominal power input	kW	2x46	2x49	2x57	2x65	2x79	2x95
Max. power input	kW	2x55	2x58	2x68	2x77	2x94	2x113
Rated current	A	2x79	2x87	2x102	2x116	2x140	2x169
Max. current (FLA)	A	2x82	2x96	2x124	2x140	2x168	2x196
Max. start-up current (LRA)	A	2x303	2x373	2x280	2x351	2x495	2x318
Oil treater power input	W	200	200	200	200	200	200

SWS/SWR R407C		2602	3002	3402	3802	4202	4402
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50					
Nominal power input	kW	223	246	269	296	316	393
Max power input	kW	265	293	317	349	373	460
Nominal current	A	397	440	480	529	564	701
Max. current (FLA)	A	450	490	540	600	668	800
Max. start-up current (LRA)	A	512	546	642	753	829	875
External fuses	(A)	500	630	630	630	800	1000
Wire cross area (1)	mm ²	2x185	2x185	2x185	2x240	2x240	2x300

Compressors

Number	n°	2	2	2	2	2	2
Nominal power input	kW	2x111	2x123	2x135	2x158	2x158	2x197
Max. power input	kW	2x132	2x147	2x158	2x175	2x186	2x230
Nominal current	A	2x199	2x220	2x240	2x264	2x282	2x351
Max. current (FLA)	A	2x225	2x245	2x270	2x300	2x334	2x400
Max. start-up current (LRA)	A	2x354	2x374	2x453	2x543	2x595	2x595
Oil treater power input	W	275	275	275	275	275	275

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

SWS/SWR R134a		1602	1902	2202	2212	2352
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50				
Nominal power input	kW	78.8	95	114.4	158	166
Max power input	kW	109.6	132.4	159.4	220	230
Nominal current	A	141	169	204	266	279
Max. current (FLA)	A	192	210	260	360	395
Max. start-up current (LRA)	A	347.2	424.5	586	393	417.5
External fuses	(A)	250	250	315	400	400
Wire cross area (1)	mm ²	120	120	185	2x150	2x150

Compressors

Number	n°	2	2	2	2	2
Nominal power input	kW	2x39.4	2x47.5	2x57.2	2x79	79+87
Max power input	kW	2x54.8	2x66.2	2x79.7	2x110	110+120
Nominal current	A	2x70	2x85	2x102	2x133	133+146
Max. current (FLA)	A	2x96	2x105	2x130	2x180	180+215
Max. start-up current (LRA)	A	2x280	2x351	2x495	2x267	267+314
Oil treater power input	W	200	200	200	300	300

SWS/SWR R134a		2502	2652	2802	3012	3202
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50				
Nominal power input	kW	174	184	194	211	228
Max power input	kW	240	251	262	286	310
Nominal current	A	292	310	328	351	374
Max. current (FLA)	A	430	446	462	511	560
Max. start-up current (LRA)	A	464.5	491.5	502.7	597.7	632
External fuses	(A)	500	500	500	630	630
Wire cross area (1)	mm ²	2x150	2x185	2x150	2x185	2x185

Compressors

Number	n°	2	2	2	2	2
Nominal power input	kW	2x87	87+97	2x97	97+114	2x114
Max power input	kW	2x120	120+131	2x131	131+155	2x155
Nominal current	A	2x146	146+164	2x164	164+187	2x187
Max. current (FLA)	A	2x215	215+231	2x231	231+280	2x280
Max. start-up current (LRA)	A	2x280	314+341	2x341	341+436	2x436
Oil treater power input	W	300	300	300	300	300

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

Technical data

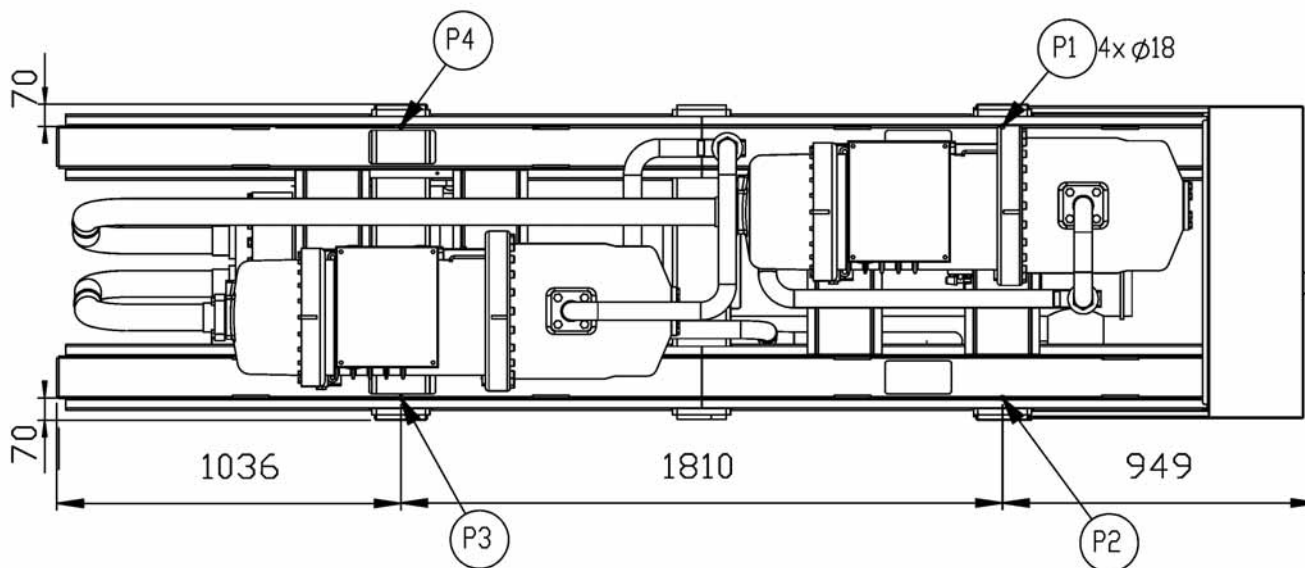
SWS/SWR R134a		3412	3602	4212	4602	4802
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50				
Nominal power input	kW	249	270	298	315	322
Max power input	kW	359	408	408	426	444
Nominal current	A	404	434	492	519	546
Max. current (FLA)	A	590	620	620	670	720
Max. start-up current (LRA)	A	661	682	803	867	902
External fuses	(A)	630	630	630	800	800
Wire cross area (1)	mm ²	2x185	2x185	2x185	2x240	2x240

Compressors

Number	n°	2	2	2	2	2
Nominal power input	kW	114+135	2x135	2x149	149+166	2x166
Max power input	kW	155+204	2x204	2x204	204+222	2x222
Nominal current	A	187+217	2x217	2x246	246+273	2x273
Max. current (FLA)	A	280+310	2x310	2x310	310+360	2x360
Max. start-up current (LRA)	A	436+465	2x465	2x586	586+650	2x650
Oil treater power input	W	300	300	300	300	300

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

8.4 Position of antivibration mounting springs and weight distribution on supports

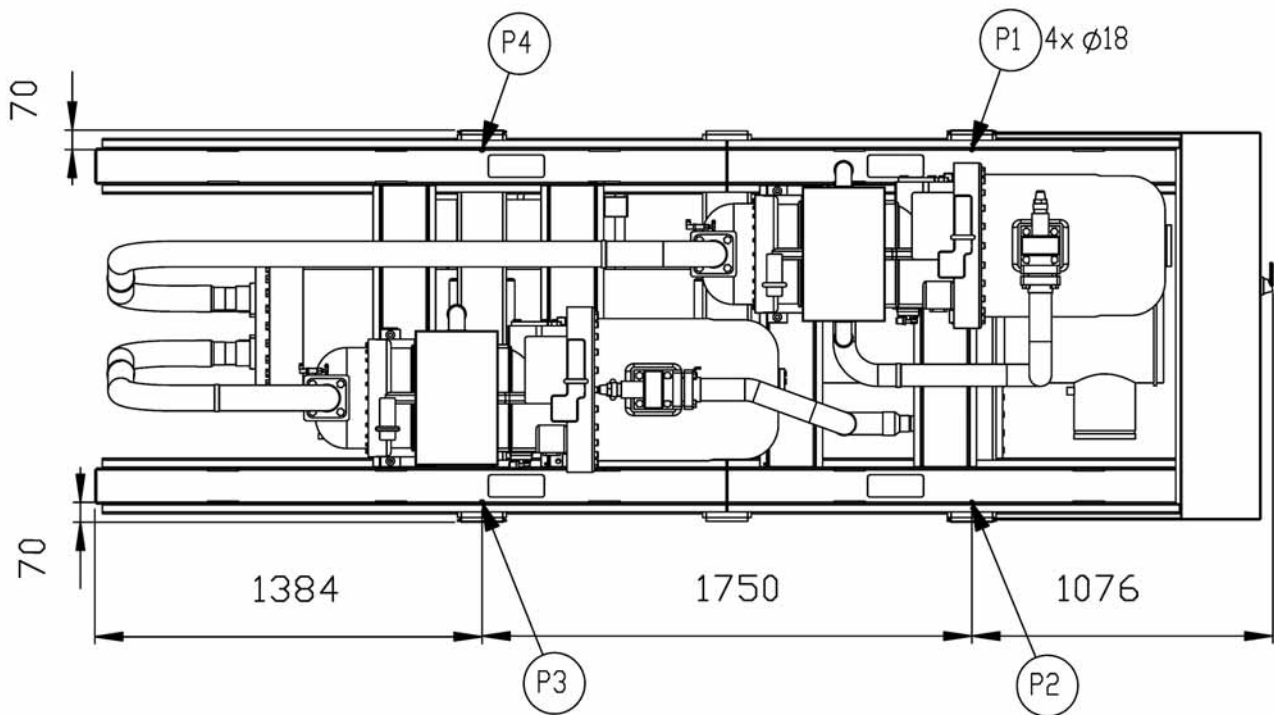


Weight distribution SWS 1002-1902 R407C STD

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1002	1768	442	442	442	442
1202	1780	445	445	445	445
1402	2148	537	537	537	537
1602	2176	544	544	544	544
1902	2728	682	682	682	682

Weight distribution SWS 1602-1902 R134a STD

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1602	2144	536	536	536	536
1902	2688	672	672	672	672

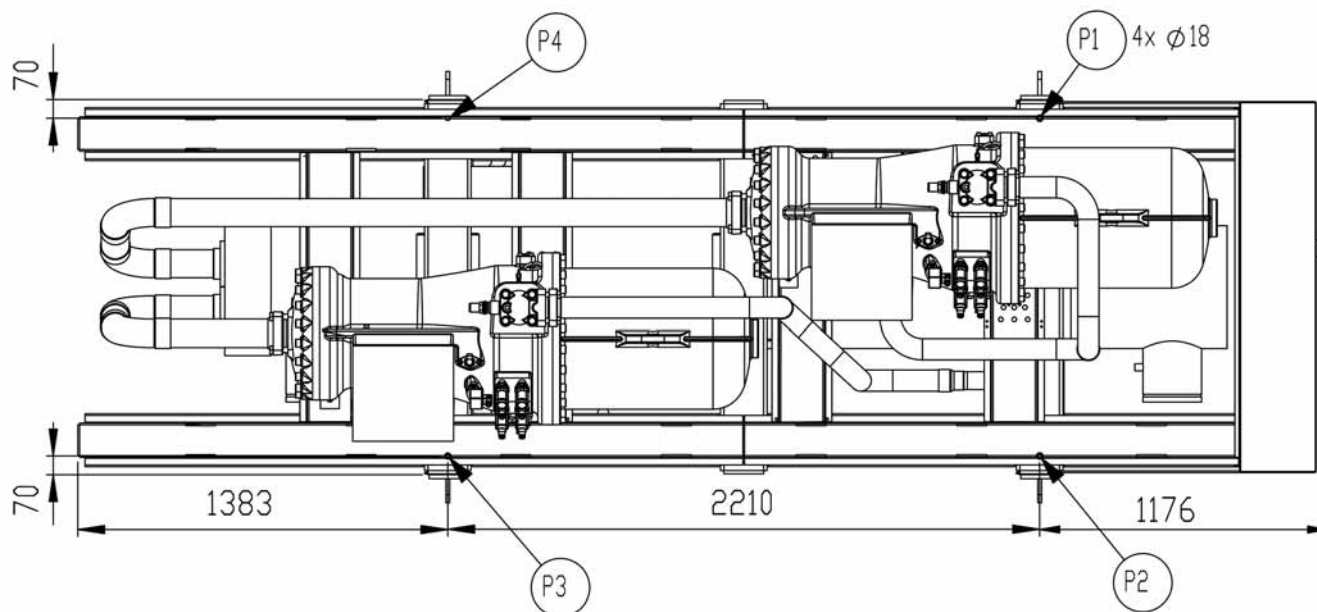


Weight distribution SWS 2202-4402 R407C STD

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3288	822	822	822	822
2602	3552	888	888	888	888
3002	3604	901	901	901	901
3402	3716	929	929	929	929
3802	4648	1162	1162	1162	1162
4202	4696	1174	1174	1174	1174
4402	4572	1143	1143	1143	1143

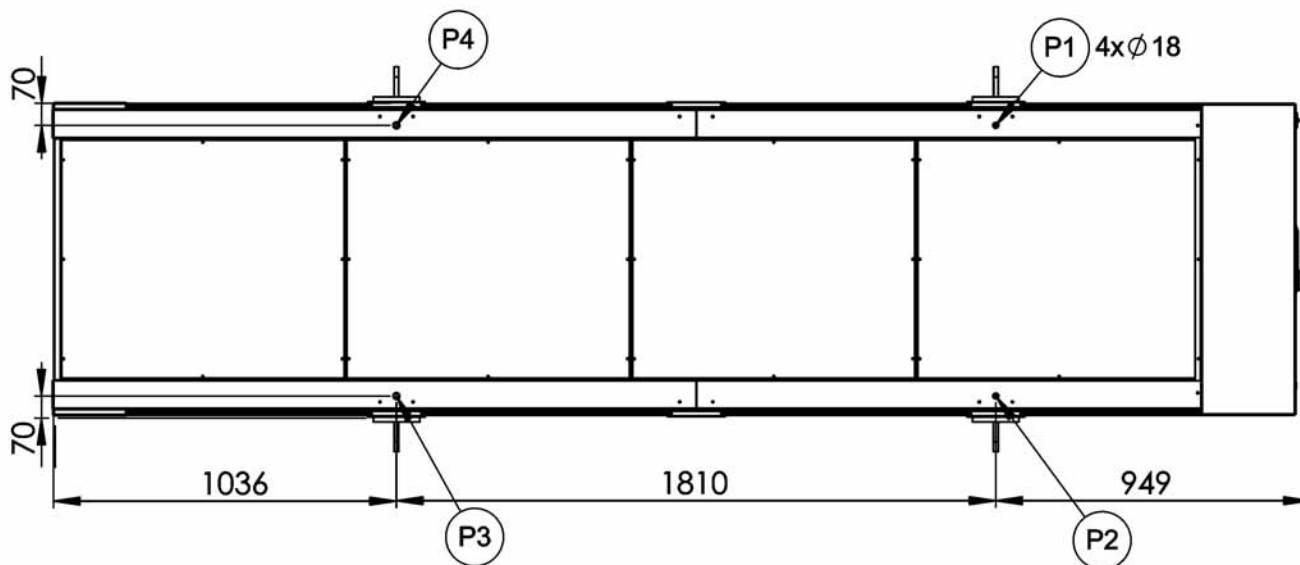
Weight distribution SWS 2202-3012 R134a STD

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3211	803	803	803	803
2212	3601	900	900	900	900
2352	3717	929	929	929	929
2502	3750	937	937	937	937
2652	3882	970	970	970	970
2802	3895	974	974	974	974
3012	4323	1081	1081	1081	1081



Weight distribution SWS 3202-4802 R134a STD

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
3202	5382	1346	1346	1346	1346
3412	5455	1364	1364	1364	1364
3602	5471	1368	1368	1368	1368
4212	5597	1399	1399	1399	1399
4602	5698	1424	1424	1424	1424
4802	5875	1469	1469	1469	1469

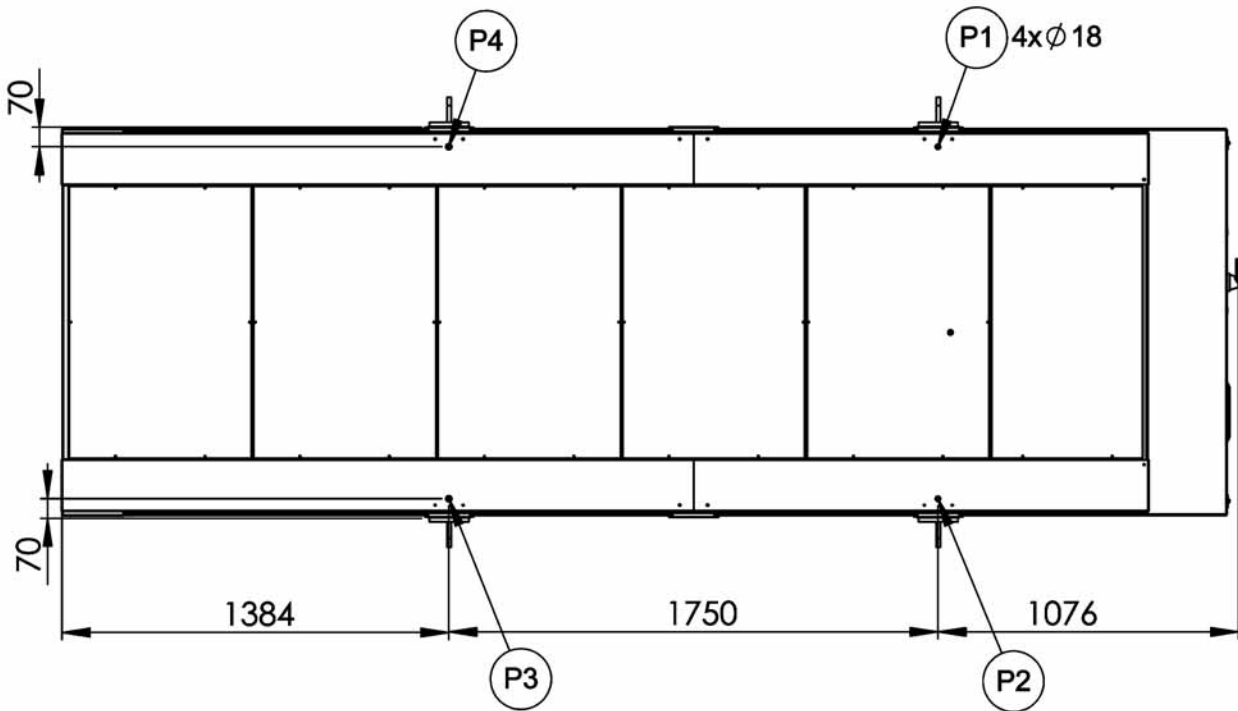


Weight distribution SWS 1002-1902 R407C LN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1002	2077	519	519	519	519
1202	2091	523	523	523	523
1402	2460	615	615	615	615
1602	2488	622	622	622	622
1902	3038	759	759	759	759

Weight distribution SWS 1602-1902 R134a LN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1602	2454	613	613	613	613
1902	3000	750	750	750	750

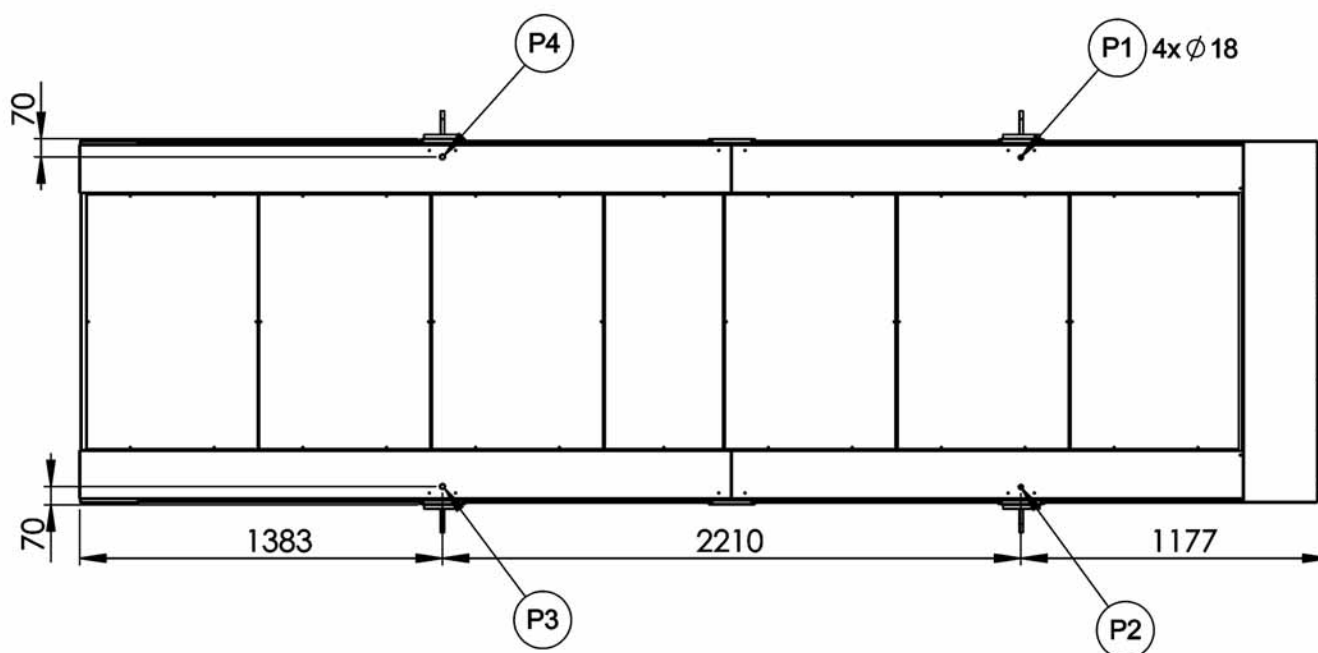


Weight distribution SWS 2202-4402 R407C LN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3689	922	922	922	922
2602	3952	988	988	988	988
3002	4004	1001	1001	1001	1001
3402	4115	1029	1029	1029	1029
3802	5047	1262	1262	1262	1262
4202	5097	1274	1274	1274	1274
4402	4971	1243	1243	1243	1243

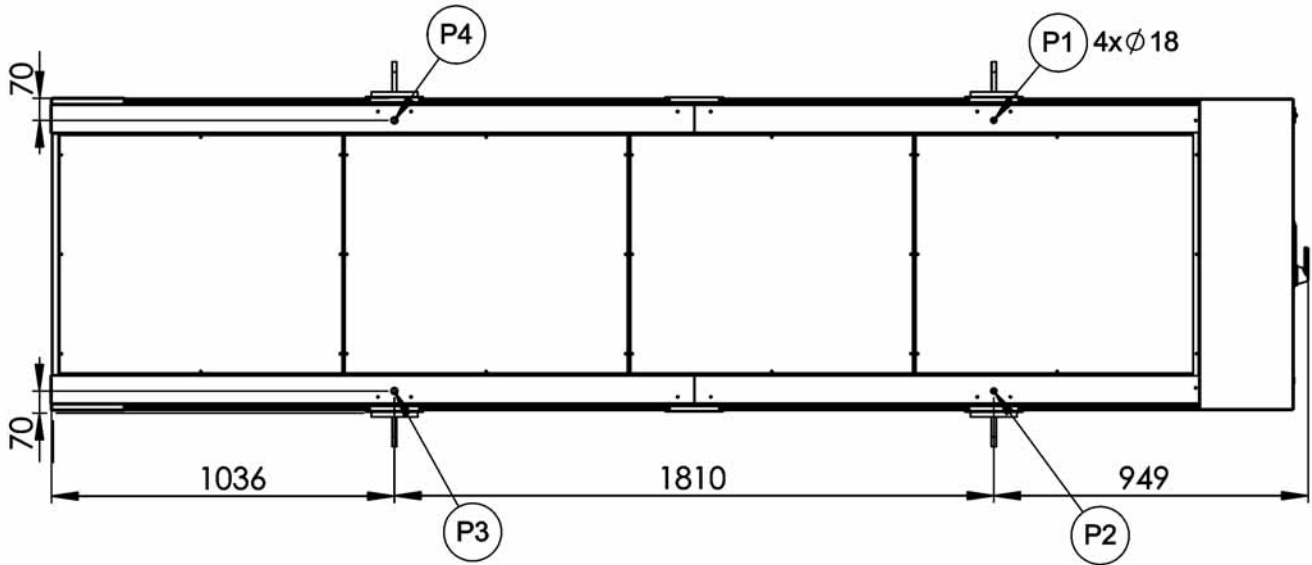
Weight distribution SWS 2202-3012 R134a LN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3611	903	903	903	903
2212	4001	1000	1000	1000	1000
2352	4117	1029	1029	1029	1029
2502	4150	1037	1037	1037	1037
2652	4282	1070	1070	1070	1070
2802	4295	1074	1074	1074	1074
3012	4723	1181	1181	1181	1181



Weight distribution SWS 3202-4802 R134a LN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
3202	5882	1471	1471	1471	1471
3412	5955	1489	1489	1489	1489
3602	5971	1493	1493	1493	1493
4212	6097	1524	1524	1524	1524
4602	6198	1549	1549	1549	1549
4802	6375	1594	1594	1594	1594

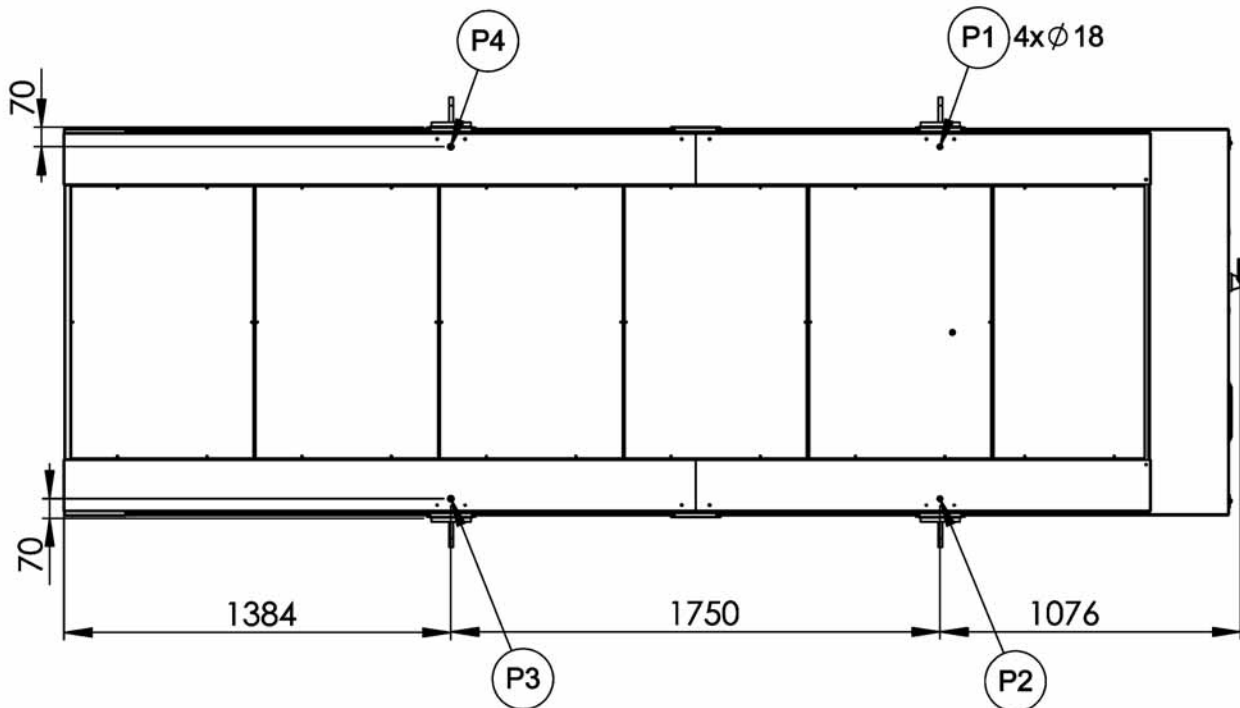


Weight distribution SWS 1002-1902 R407C ELN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1002	2167	542	542	542	542
1202	2181	545	545	545	545
1402	2550	637	637	637	637
1602	2578	644	644	644	644
1902	3128	782	782	782	782

Weight distribution SWS 1602-1902 R134a ELN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1602	2544	636	636	636	613
1902	3090	772	750	750	750

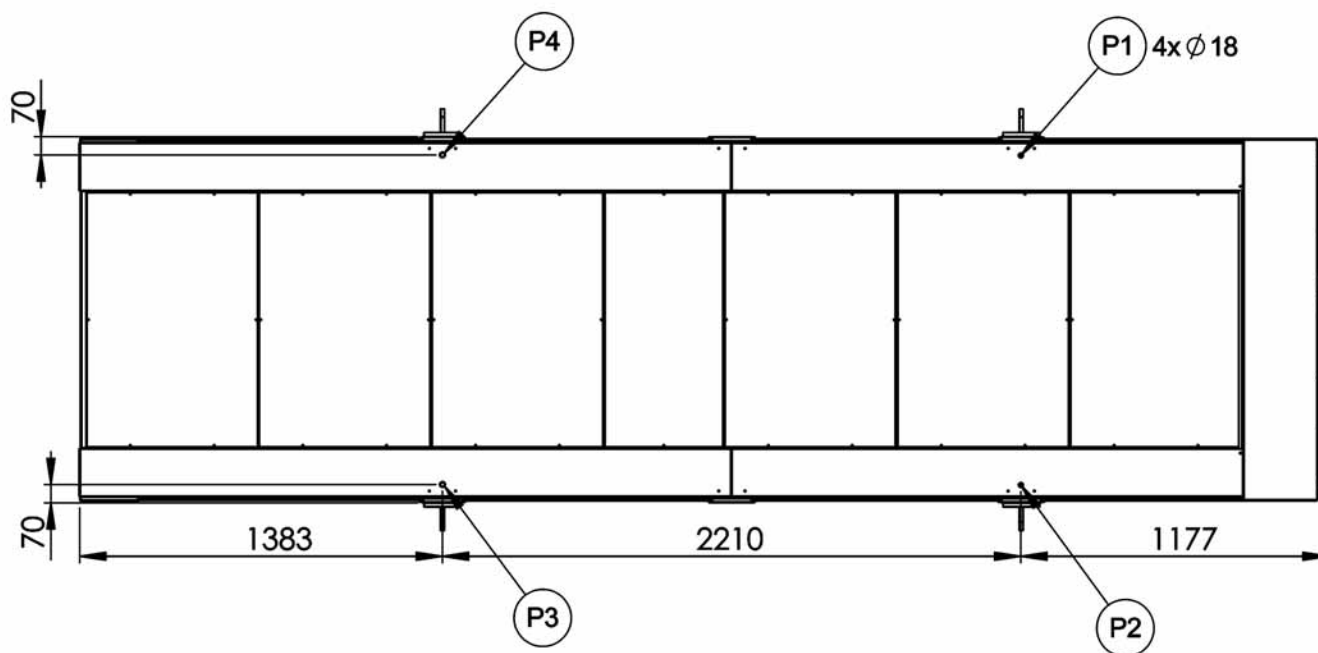


Weight distribution SWS 2202-4402 R407C ELN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3809	952	952	952	952
2602	4072	1018	1018	1018	1018
3002	4124	1031	1031	1031	1031
3402	4235	1059	1059	1059	1059
3802	5167	1292	1292	1292	1292
4202	5217	1304	1304	1304	1304
4402	5091	1273	1273	1273	1273

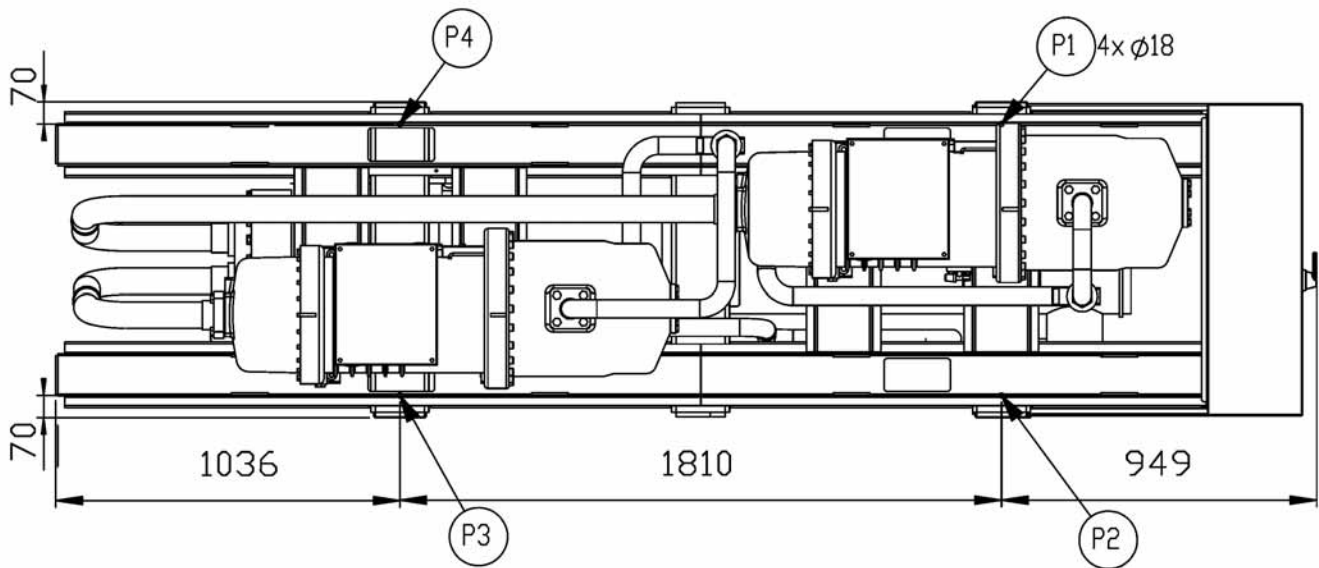
Weight distribution SWS 2202-3012 R134a ELN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3731	933	933	933	933
2212	4151	1038	1038	1038	1038
2352	4267	1067	1067	1067	1067
2502	4300	1075	1075	1075	1075
2652	4432	1108	1108	1108	1108
2802	4445	1111	1111	1111	1111
3012	4873	1218	1218	1218	1218



Weight distribution SWS 3202-4802 R134a ELN

SWS	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
3202	6052	1513	1513	1513	1513
3412	6125	1531	1531	1531	1531
3602	6141	1535	1535	1535	1535
4212	6267	1567	1567	1567	1567
4602	6368	1592	1592	1592	1592
4802	6545	1636	1636	1636	1636

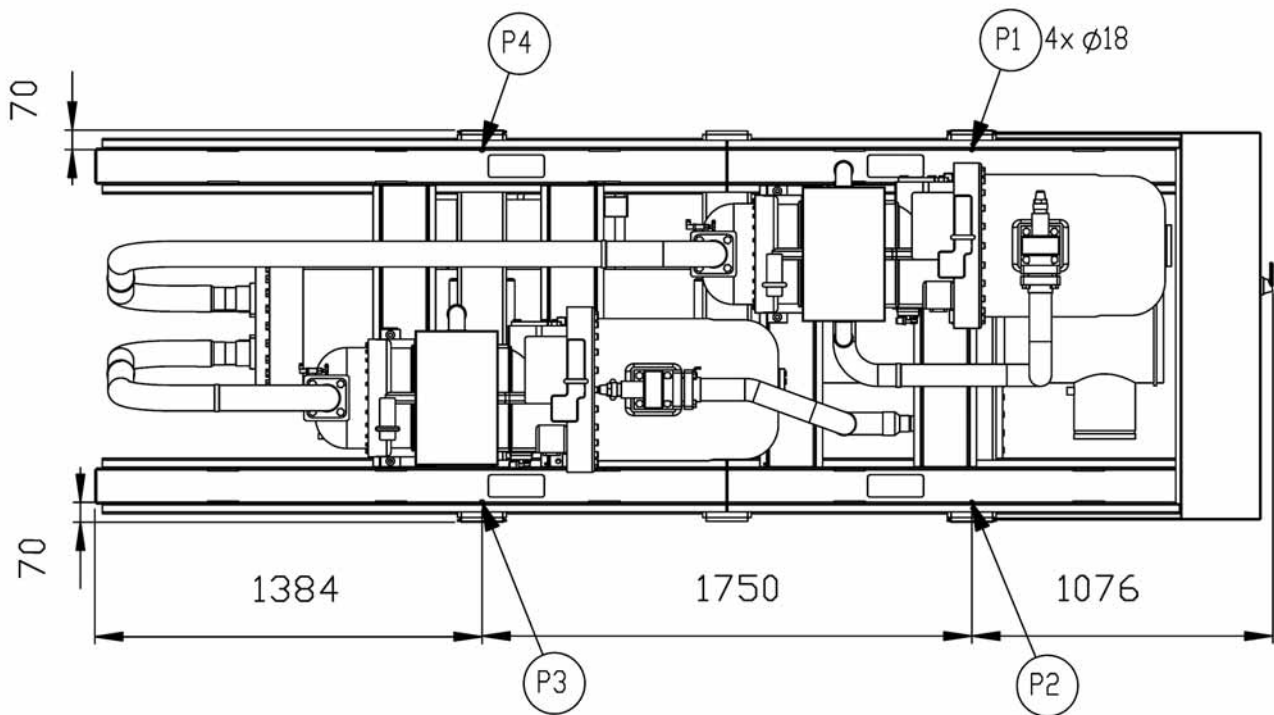


Weight distribution SWR 1002-1902 R407C STD

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1002	1464	366	366	366	366
1202	1472	368	368	368	368
1402	1836	459	459	459	459
1602	1844	461	461	461	461
1902	2188	547	547	547	547

Weight distribution SWR 1602-1902 R134a STD

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1602	1844	461	461	461	461
1902	2188	547	547	547	547

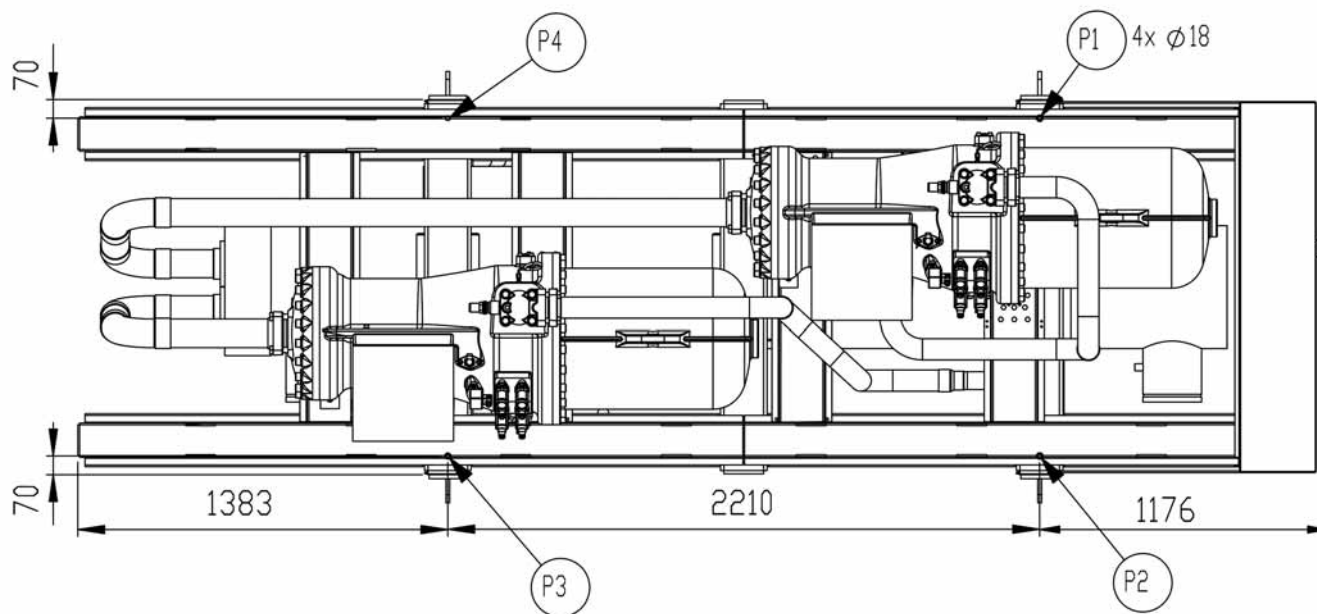


Weight distribution SWR 2202-4402 R407C STD

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	2676	669	669	669	669
2602	2884	721	721	721	721
3002	2920	730	730	730	730
3402	3008	752	752	752	752
3802	3716	929	929	929	929
4202	3756	939	939	939	939
4402	3616	904	904	904	904

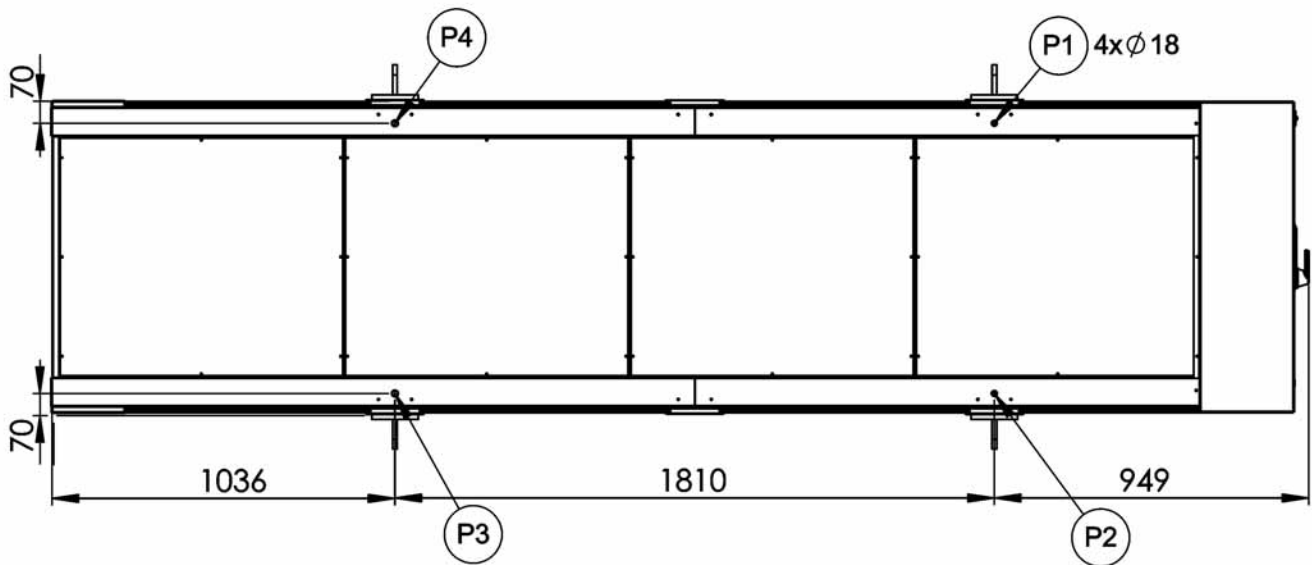
Weight distribution SWR 2202-3012 R134a STD

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	2676	669	669	669	669
2212	3057	764	764	764	764
2352	3169	792	792	792	792
2502	3179	795	795	795	795
2652	3307	827	827	827	827
2802	3317	829	829	829	829
3012	3727	932	932	932	932



Weight distribution SWR 3202-4802 R134a STD

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
3202	4780	1195	1195	1195	1195
3412	4790	1198	1198	1198	1198
3602	4800	1200	1200	1200	1200
4212	4920	1230	1230	1230	1230
4602	4980	1245	1245	1245	1245
4802	5153	1288	1288	1288	1288

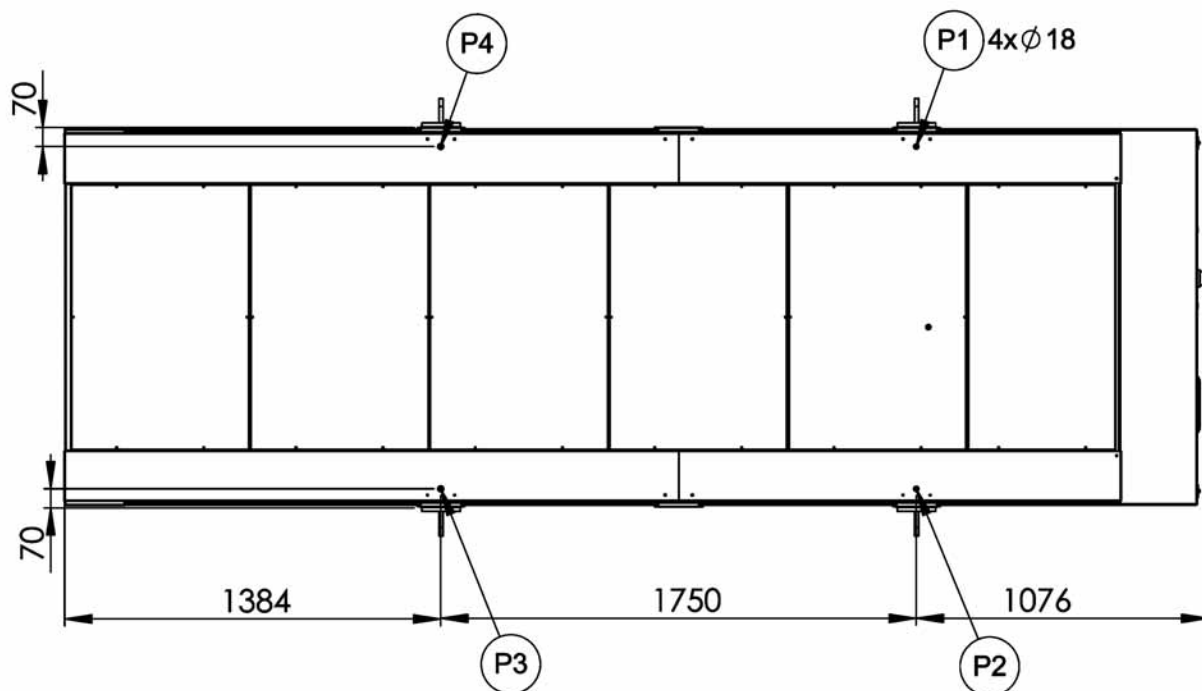


Weight distribution SWR 1002-1902 R407C LN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1002	1773	443	443	443	443
1202	1783	446	446	446	446
1402	2145	536	536	536	536
1602	2155	539	539	539	539
1902	2500	625	625	625	625

Weight distribution SWR 1602-1902 R134a LN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1602	2155	539	539	539	539
1902	2500	625	625	625	625

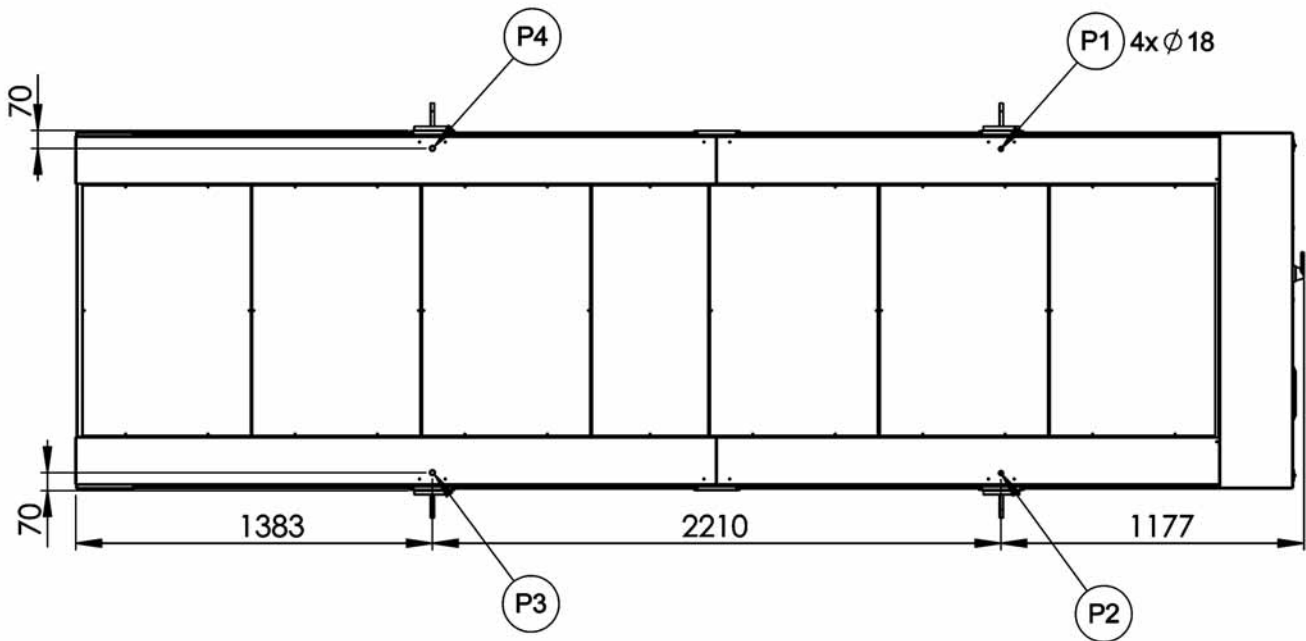


Weight distribution SWR 2202-4402 R407C LN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3075	769	769	769	769
2602	3285	821	821	821	821
3002	3319	830	830	830	830
3402	3409	852	852	852	852
3802	4117	1029	1029	1029	1029
4202	4157	1039	1039	1039	1039
4402	4017	1004	1004	1004	1004

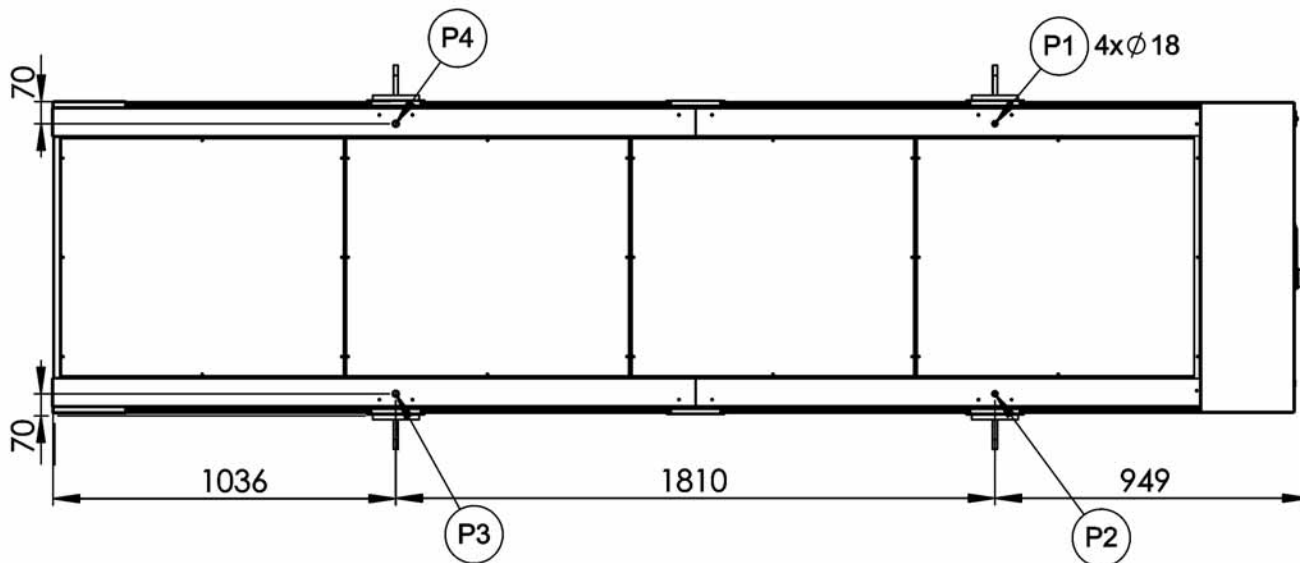
Weight distribution SWR 2202-3012 R134a LN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3075	769	769	769	769
2212	3457	864	864	864	864
2352	3569	892	892	892	892
2502	3579	895	895	895	895
2652	3707	927	927	927	927
2802	3717	929	929	929	929
3012	4127	1032	1032	1032	1032



Weight distribution SWR 3202-4802 R134a LN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
3202	5280	1320	1320	1320	1320
3412	5290	1323	1323	1323	1323
3602	5300	1325	1325	1325	1325
4212	5420	1355	1355	1355	1355
4602	5480	1370	1370	1370	1370
4802	5653	1413	1413	1413	1413

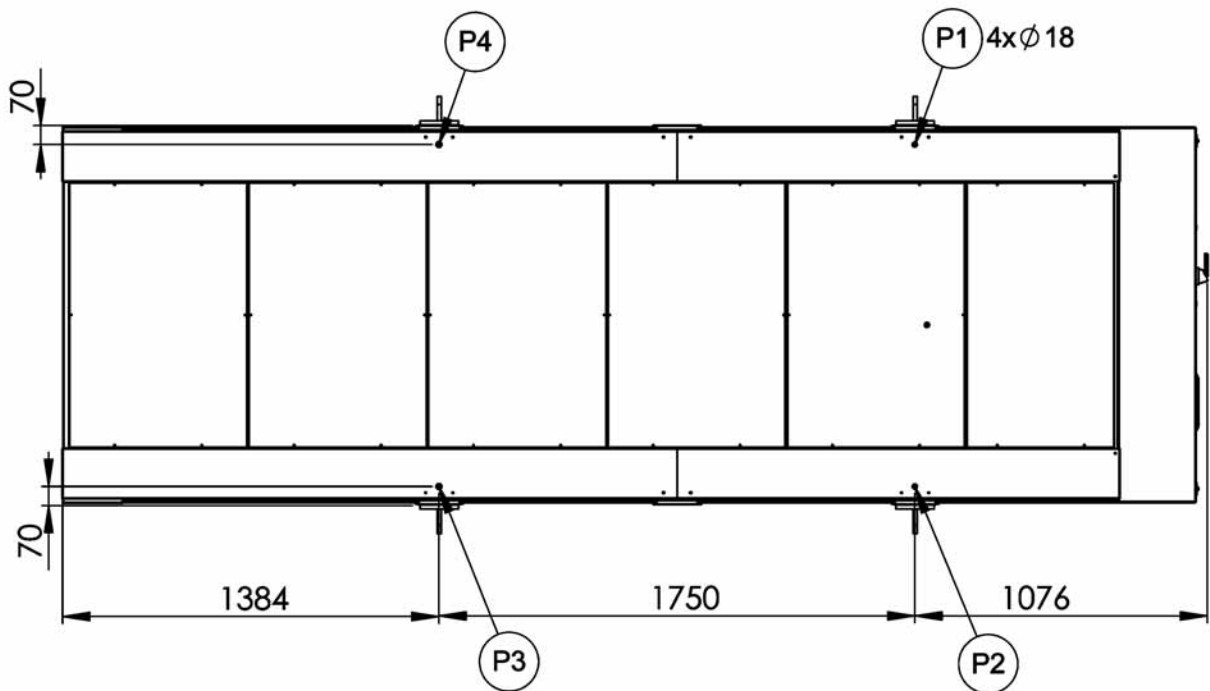


Weight distribution SWR 1002-1902 R407C ELN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1002	1863	466	466	466	466
1202	1873	468	468	468	468
1402	2235	559	559	559	559
1602	2245	561	561	561	561
1902	2590	647	647	647	647

Weight distribution SWR 1602-1902 R134a ELN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
1602	2245	561	561	561	561
1902	2590	647	647	647	647

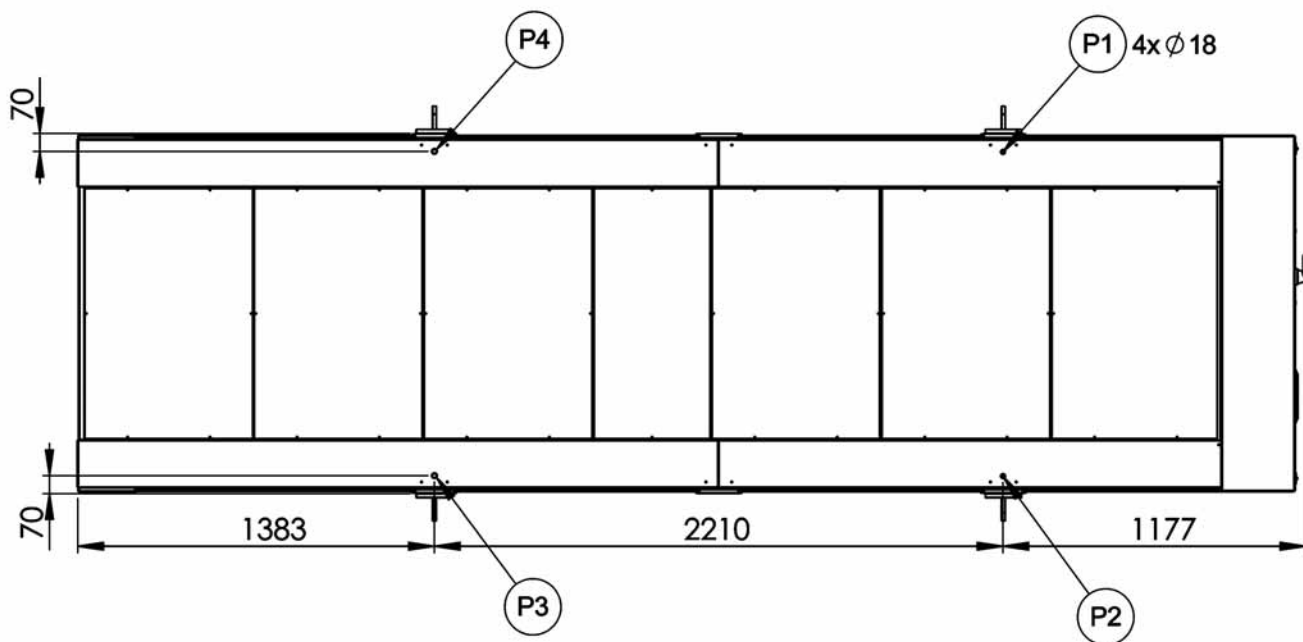


Weight distribution SWR 2202-4402 R407C ELN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3195	799	799	799	799
2602	3405	851	851	851	851
3002	3439	860	860	860	860
3402	3529	882	882	882	882
3802	4237	1059	1059	1059	1059
4202	4277	1069	1069	1069	1069
4402	4137	1034	1034	1034	1034

Weight distribution SWR 2202-3012 R134a ELN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
2202	3591	799	799	799	799
2212	3607	902	902	902	902
2352	3719	930	930	930	930
2502	3729	932	932	932	932
2652	3857	964	964	964	964
2802	3867	967	967	967	967
3012	4277	1069	1069	1069	1069



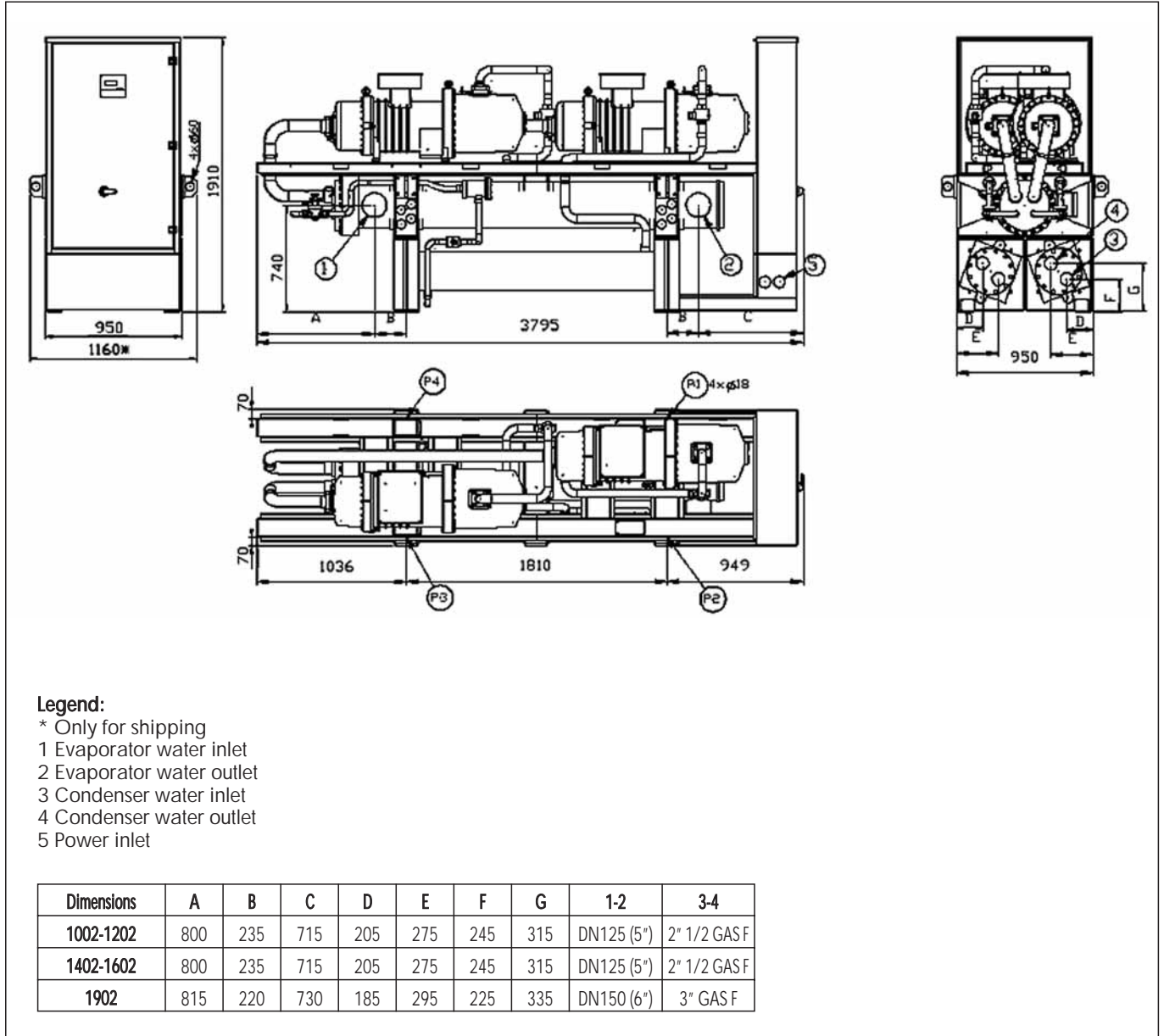
Weight distribution SWR 3202-4802 R134a ELN

SWR	Operating weight (kg)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)
3202	5450	1363	1363	1363	1363
3412	5460	1365	1365	1365	1365
3602	5470	1368	1368	1368	1368
4212	5590	1398	1398	1398	1398
4602	5650	1413	1413	1413	1413
4802	5823	1456	1456	1456	1456

8.5 Overall dimensions and maintenance space

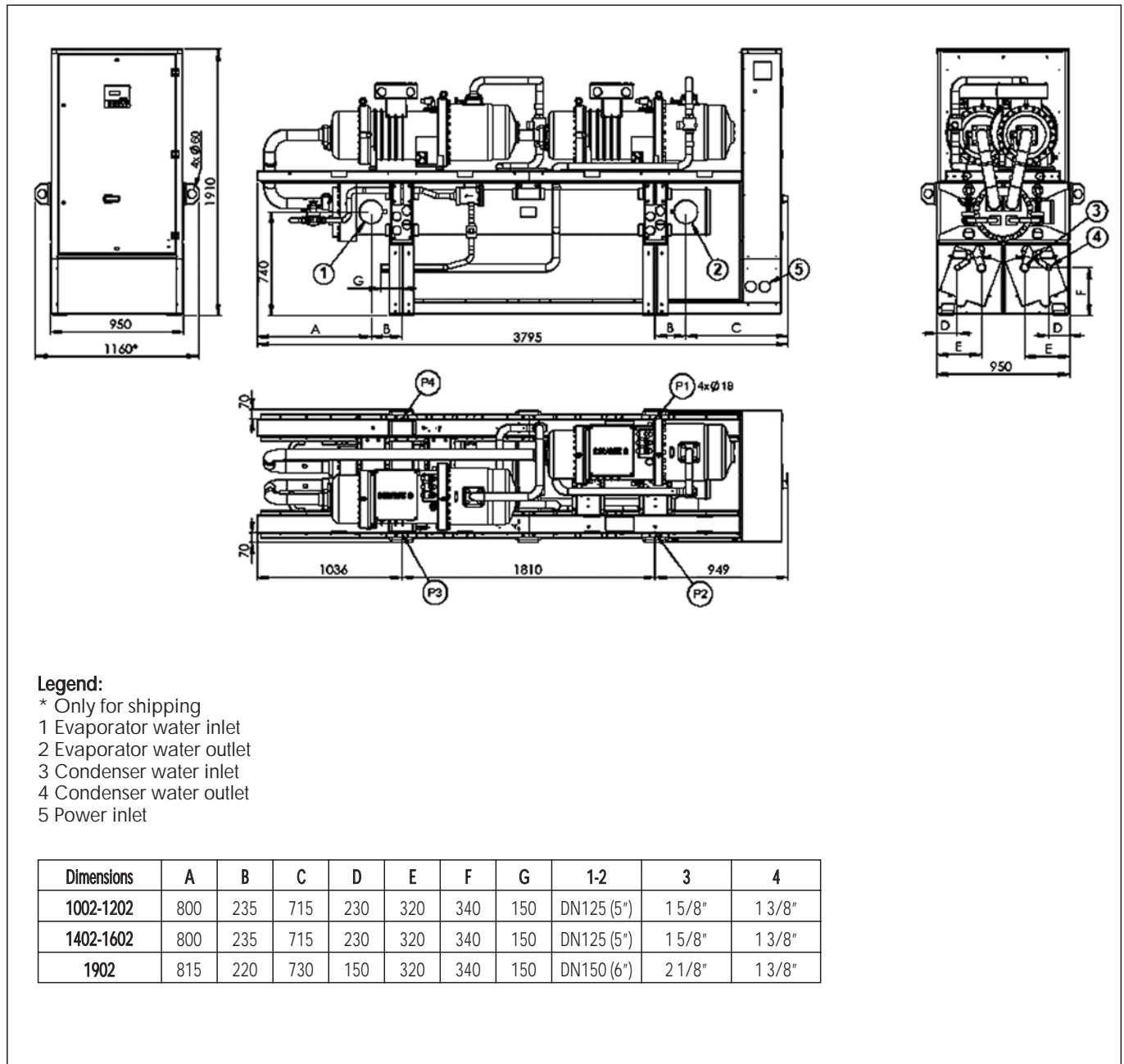
Overall dimensions

SWS 1002 - 1902 STD R407C and SWS 1602 - 1902 STD R134a



Overall dimensions

SWR 1002 - 1902 STD R407C and SWR 1602 - 1902 STD R134a

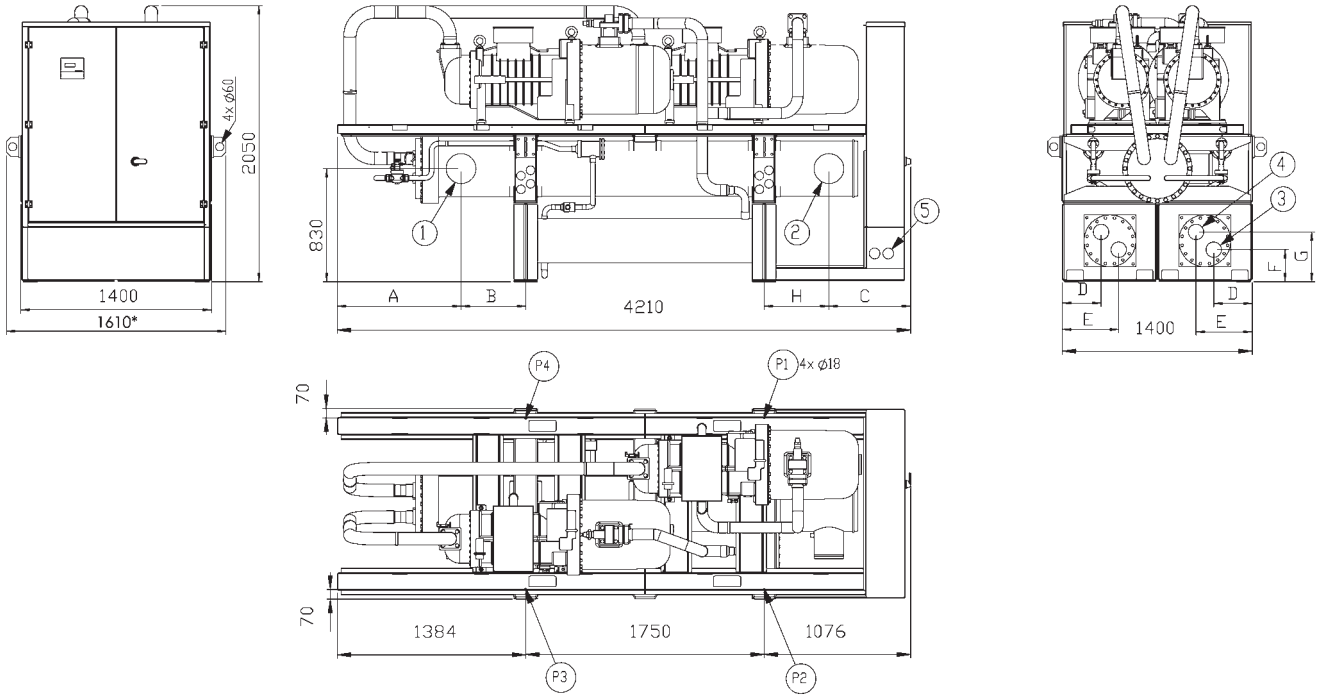


Legend:

- * Only for shipping
- 1 Evaporator water inlet
- 2 Evaporator water outlet
- 3 Condenser water inlet
- 4 Condenser water outlet
- 5 Power inlet

Dimensions	A	B	C	D	E	F	G	1-2	3	4
1002-1202	800	235	715	230	320	340	150	DN125 (5")	1 5/8"	1 3/8"
1402-1602	800	235	715	230	320	340	150	DN125 (5")	1 5/8"	1 3/8"
1902	815	220	730	150	320	340	150	DN150 (6")	2 1/8"	1 3/8"

Overall dimensions
SWS 2202 - 4402 STD R407C and SWS 2212 - 3012 STD R134a

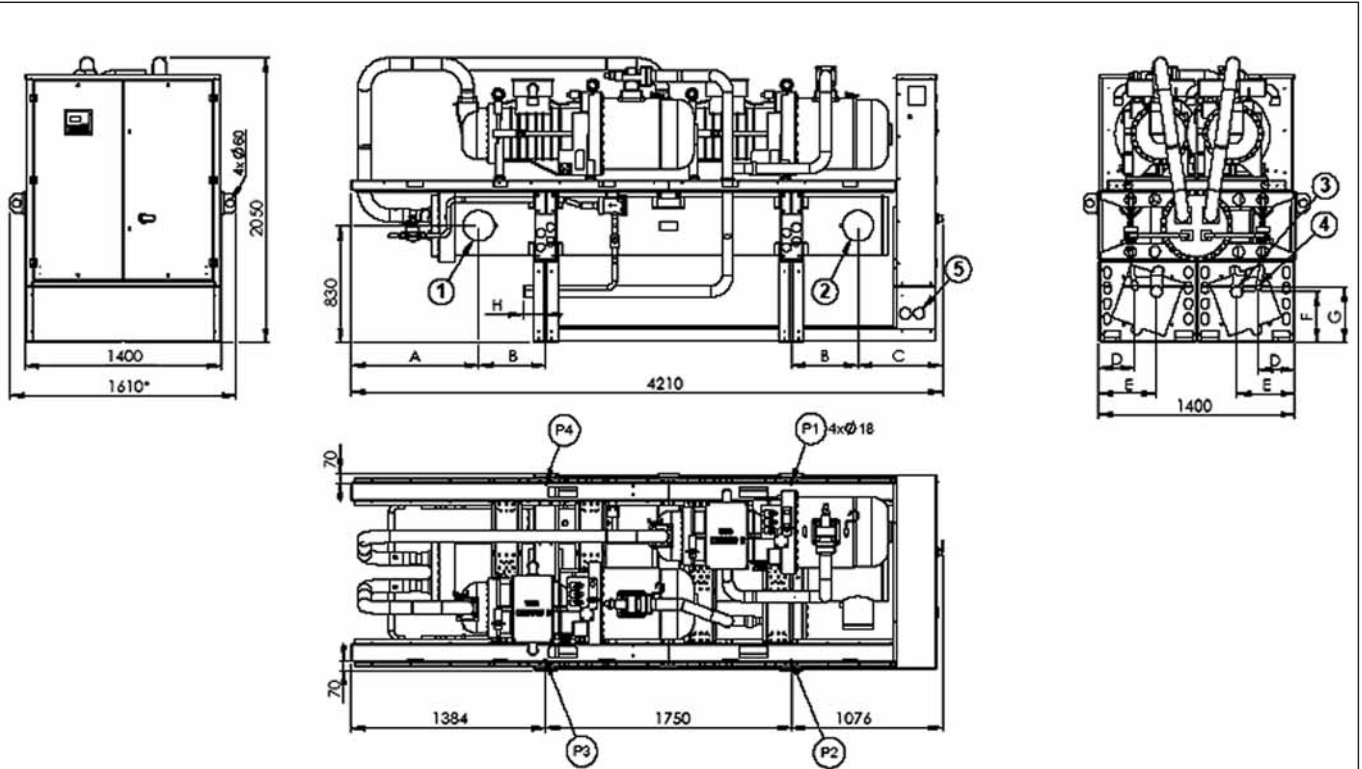


egend:

- * Only for shipping
- 1 Evaporator water inlet
- 2 Evaporator water outlet
- 3 Condenser water inlet
- 4 Condenser water outlet
- 5 Power inlet

Dimensions	A	B	C	D	E	F	G	H	1-2	3-4
2202	1160	225	850	295	400	245	355	255	DN200 (8")	3" GAS F
2602-3002-3402	1160	225	850	295	400	245	355	255	DN200 (8")	3" GAS F
3802-4202-4402	910	475	600	285	415	235	365	475	DN200 (8")	4" GAS F
2212-2352-2502	1176	208	835	295	405	245	355	208	DN150 (6")	3" GAS F
2652-2802-3012	923	460	587	295	405	245	355	490	DN150 (6")	3" GAS F

Overall dimensions SWR 2202 - 4402 STD R407C

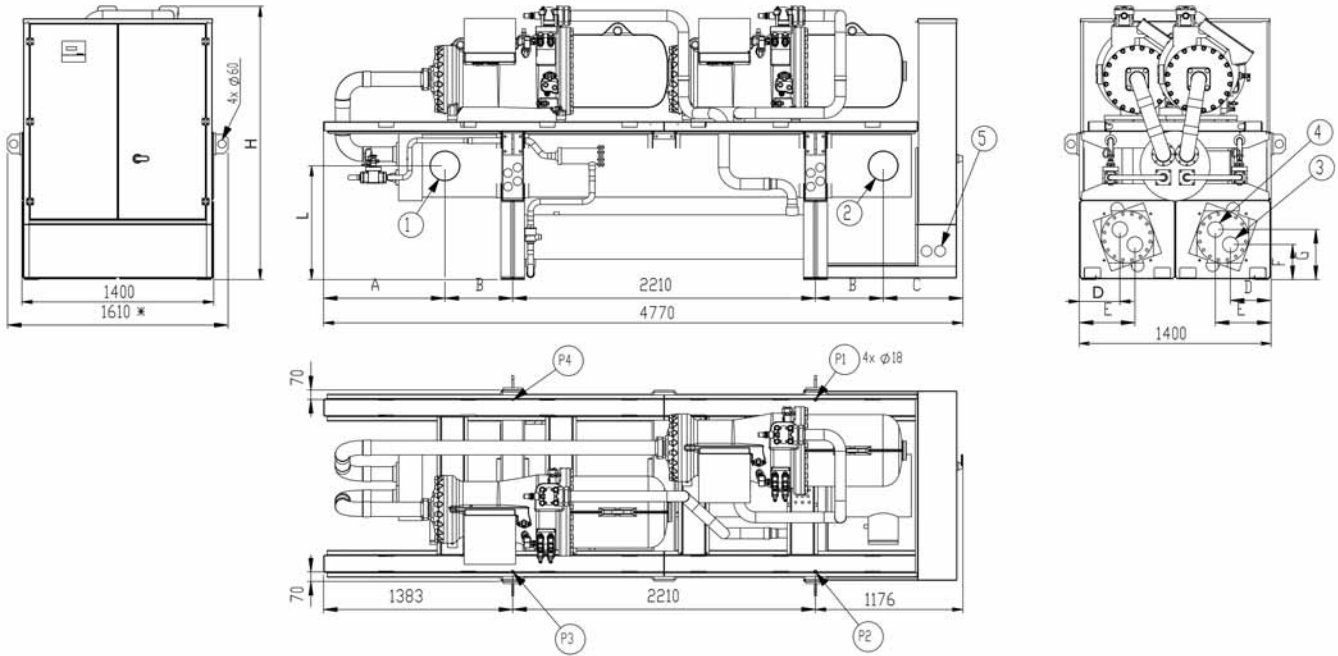


egend:

- * Only for shipping
- 1 Evaporator water inlet
- 2 Evaporator water outlet
- 3 Condenser water inlet
- 4 Condenser water outlet
- 5 Power inlet

Dimensions	A	B	C	D	E	F	G	H	1-2	3	4
2202	1160	225	850	260	430	360	390	160	DN200 (8")	2 1/8"	1 3/8"
2602-3002-3402	1160	225	850	260	395	360	390	160	DN200 (8")	2 5/8"	1 3/8"
3802-4202-4402	910	475	600	260	410	360	390	160	DN200 (8")	3 1/8"	1 3/8"

Overall dimensions
SWS 3202 - 4802 STD R134a



Legend:

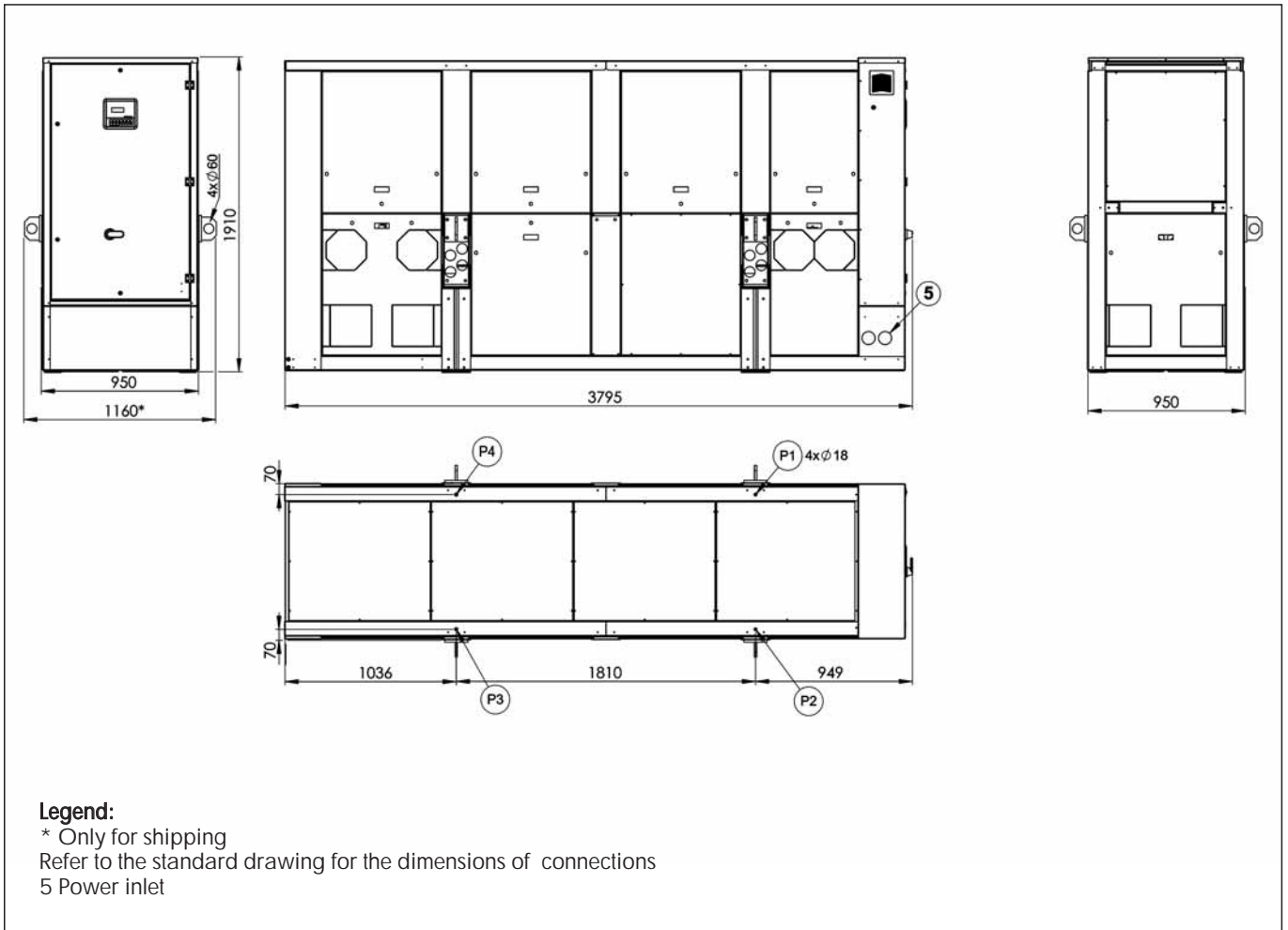
- * Only for shipping
- 1 Evaporator water inlet
- 2 Evaporator water outlet
- 3 Condenser water inlet
- 4 Condenser water outlet
- 5 Power inlet

Dimensions	A	B	C	D	E	F	G	H	L	1-2	3-4
3202	888	495	682	297	407	256	366	2050	830	DN200 (8")	3" GAS F
3412-3602-4212	888	495	682	297	400	256	366	2050	830	DN200 (8")	DN100 (4")
4602-4802	888	495	682	297	400	256	366	2110	860	DN200 (8")	DN100 (4")

Overall dimensions

SWS 1002 - 1902 LN/ELN R407C and SWS 1602 - 1902 LN/ELN R134a

SWR 1002 - 1902 LN/ELN ad R407C and SWR 1602 - 1902 LN/ELN R134a



Legend:

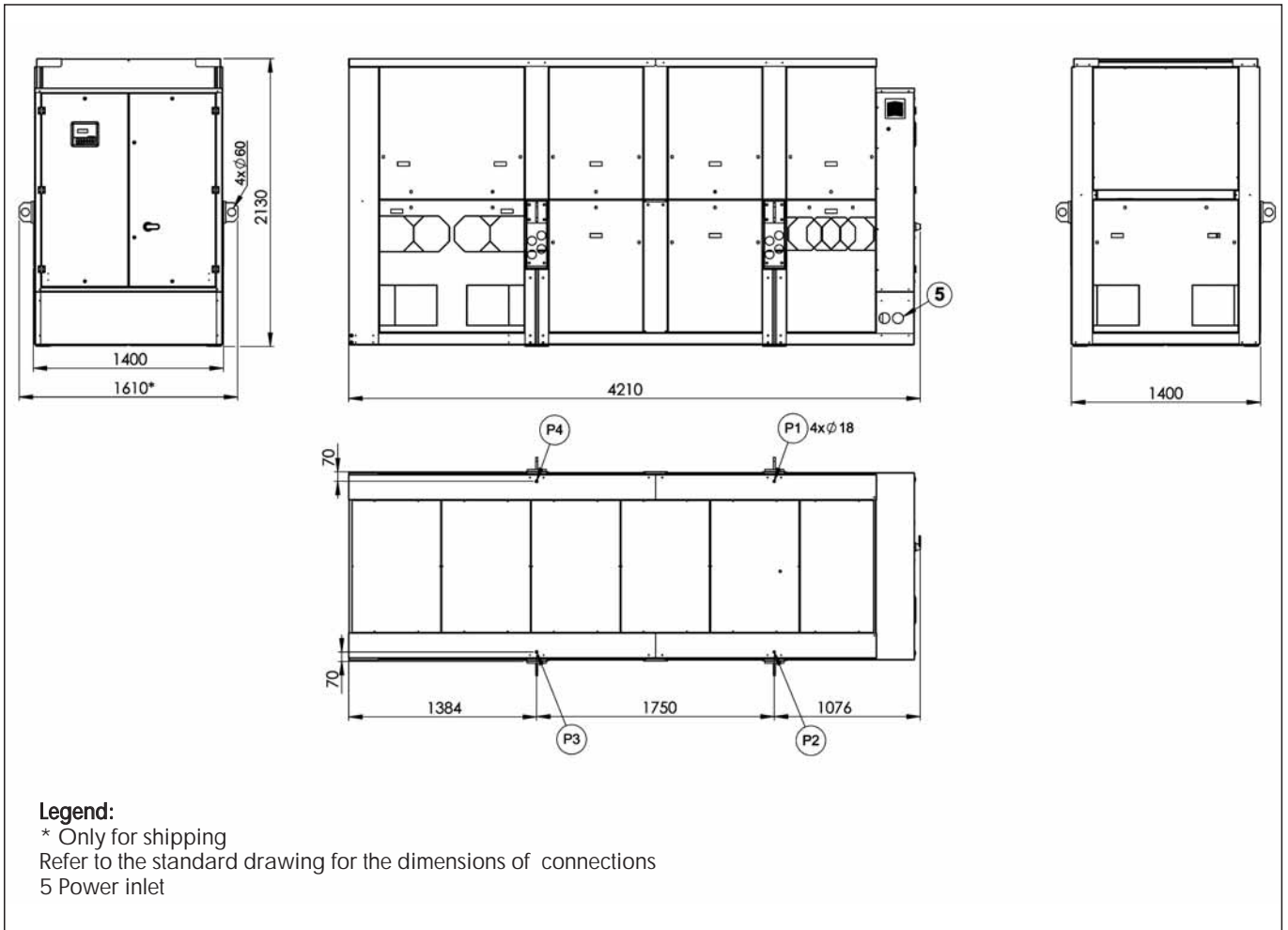
* Only for shipping

Refer to the standard drawing for the dimensions of connections

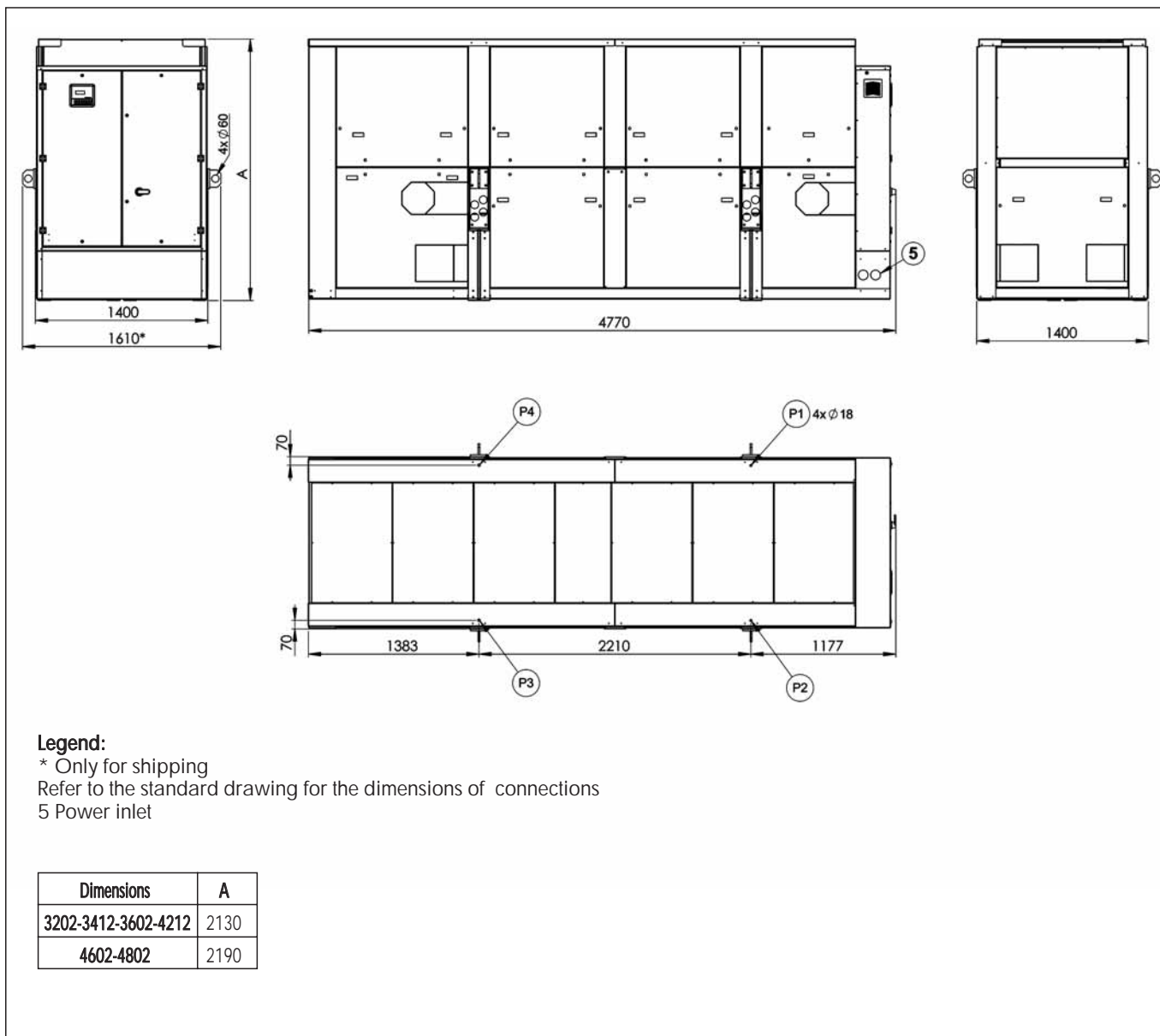
5 Power inlet

Overall dimensions

SWS 2202 - 4402 LN/ELN R407C and SWS 2202 - 3012 LN/ELN R134a
SWR 2202 - 4402 LN/ELN R407C and SWR 2202 - 3012 LN/ELN R134a



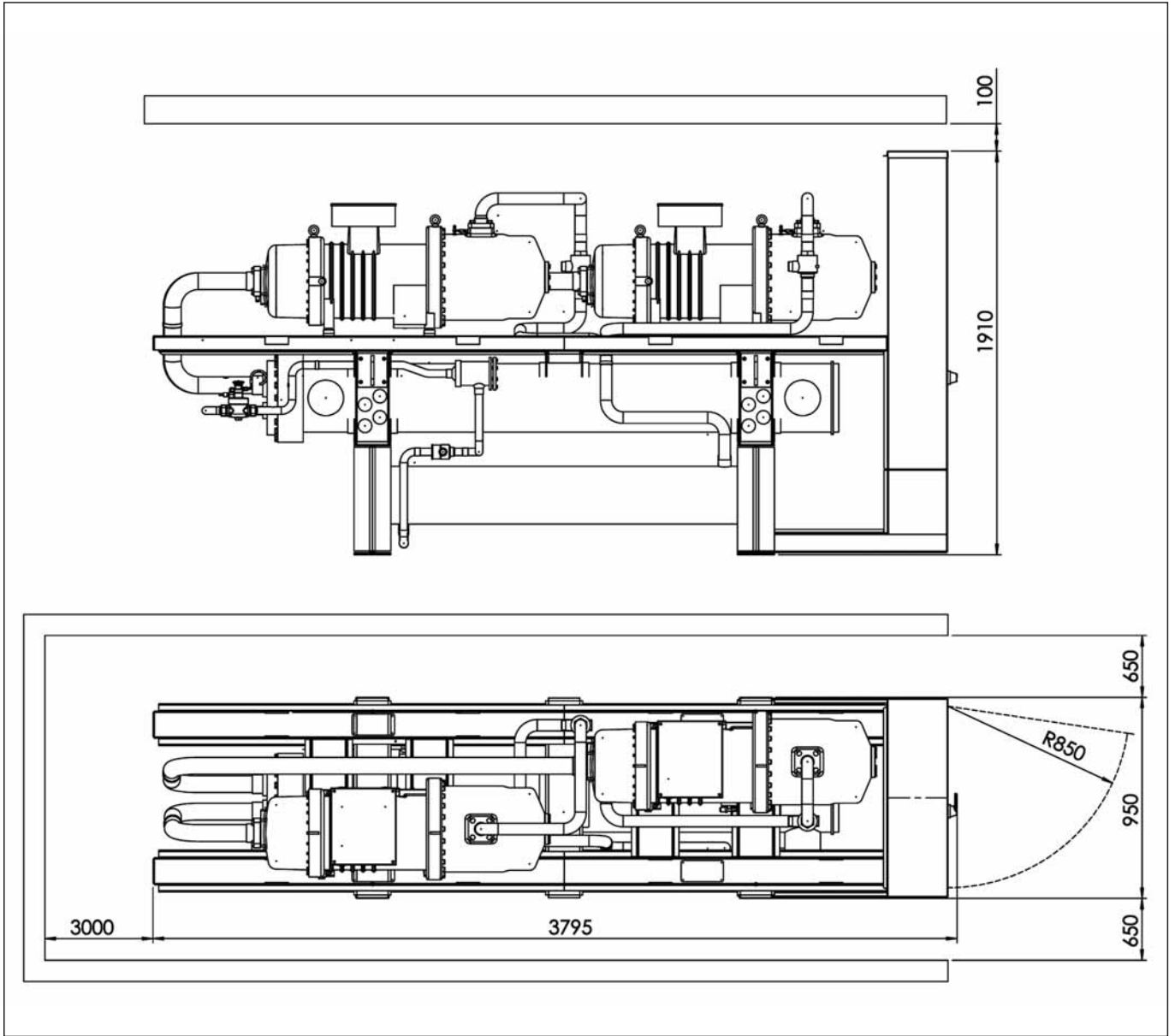
Overall dimensions SWS 3202 - 4802 LN/ELN R134a SWR 3202 - 4802 LN/ELN R134a



Maintenance space

SWS 1002 - 1902 R407C and SWS 1602 - 1902 R134a

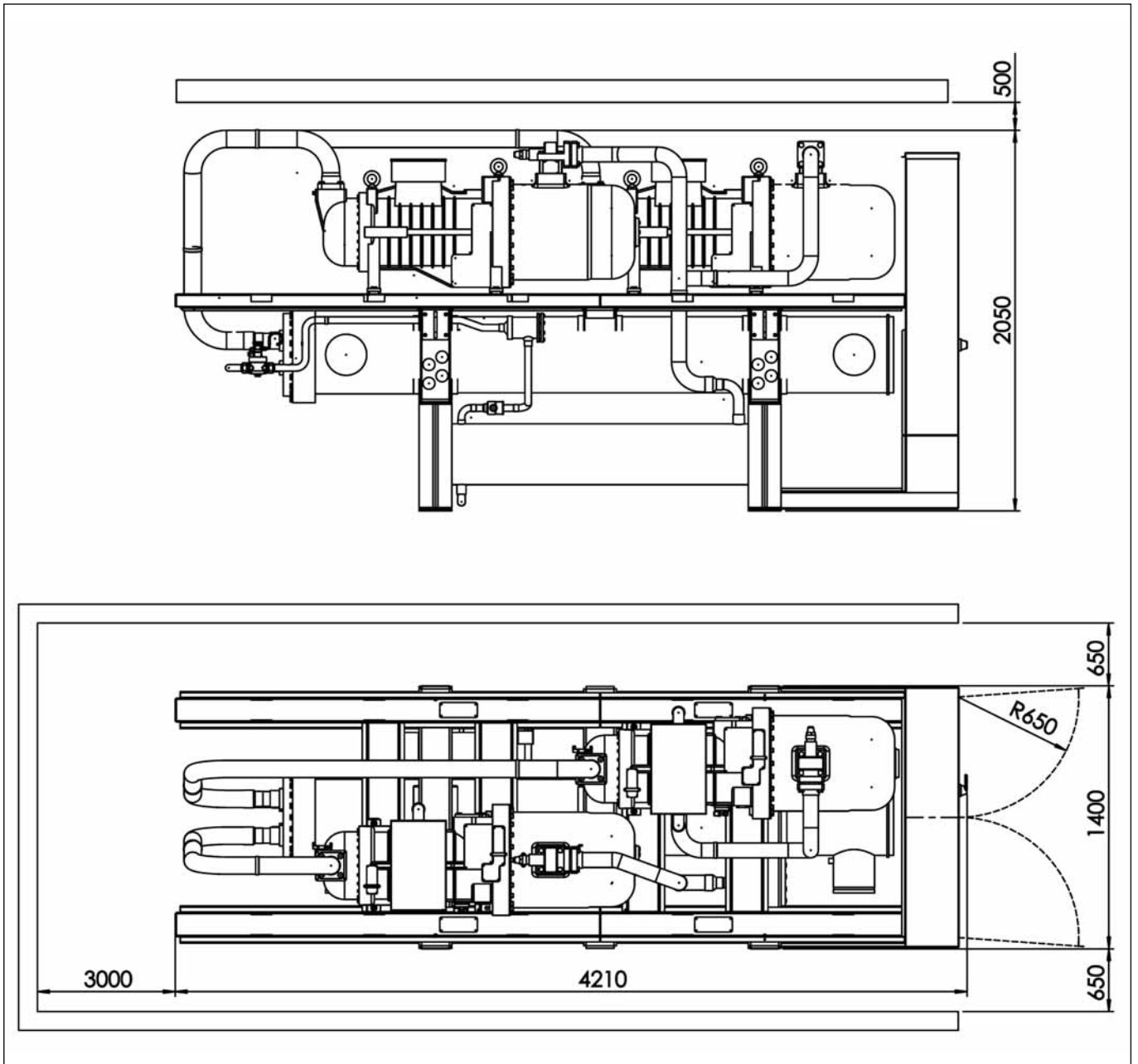
SWR 1002 - 1902 R407C and SWR 1602 - 1902 R134a



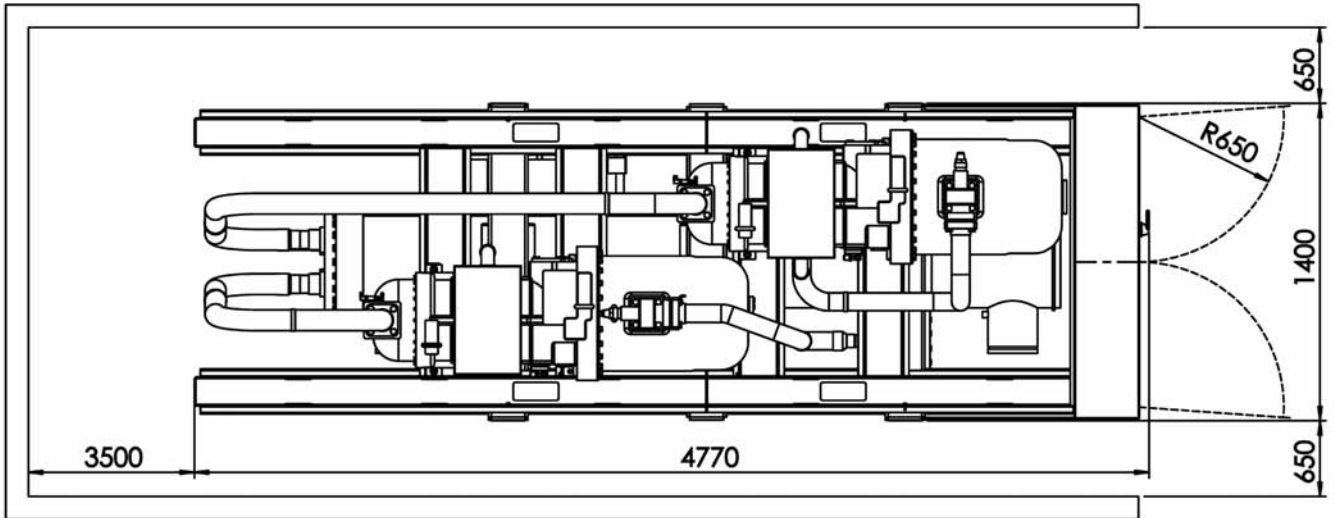
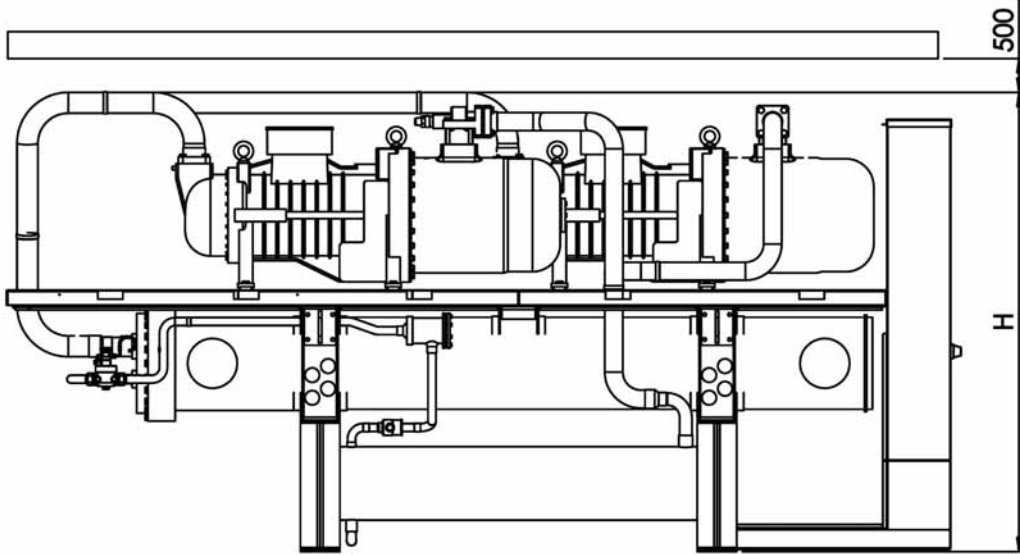
Maintenance space

SWS 2202 - 4402 R407C and SWS 2202 - 3012 R134a

SWR 2202 - 4402 R407C and SWR 2202 - 3012 R134a



Maintenance space
 SWS 3202 - 4802 R134a
 SWR 3202 - 4802 R134a



Dimensions	H
3202	2050
3412-3602-4212	2050
4602-4802	2110

9 MAINTENANCE

Carefully read the "Safety" section of this manual before carrying out any maintenance operations.



Do not discharge the refrigerant into the atmosphere while the refrigeration circuits are being drained. Use appropriate recovery equipment.

When the recovered refrigerant cannot be re-used, return it to the manufacturer.



Do not throw away the waste oil of the compressor, because it contains refrigerant in solution.

The waste oil must be returned to the manufacturer.

Unless otherwise specified, the operations described below may be carried out only by a trained maintenance operator.

9.1 General requirements

Itelco-Industry units have been designed for continuous operation, providing that they are subjected to regular maintenance, within the limits specified in this manual. Each unit must be serviced according to the programme by the User/Customer, and must be inspected at regular intervals by the personnel of one of Itelco-Industry 's authorised Service Centers.

It is the responsibility of the User to meet these maintenance requirements and/or to enter into an agreement with one of Itelco-Industry 's Service Centers, so as to properly safeguard the operation of the appliance.

During the warranty period, in case of damage or failures caused by improper maintenance, Itelco-Industry will not refund the costs incurred to repair the appliance in its original state.

The provisions of this section apply only to standard units; according to the order requirements, other documentation may be added, concerning any modifications or supplementary accessories.

9.2 Planned maintenance

Maintenance inspections must be carried out according to the program below, by a qualified person. As a general rule, units cannot be repaired directly by the user, who shall not try to service or repair any failures or anomalies identified during daily inspections. If you are in doubt, please contact Itelco-Industry Service Centre.

Scheduled Maintenance

Operations	Daily	Weekly	Monthly	Beginning of season	End of season
Check the temperature of the leaving fluid	•				
Check the pressure drops in the heat exchanger		•			
Check for electric absorption		•			
Check suction pressure and temperature		•			
Check delivery pressure and temperature		•			
Check the oil level in the compressor		•			
Check that there are no gas bubbles in the liquid line		•			
Check that the fins of the external coil are clean (if any)			•		
Check the operation of the oil heaters			•		
Check the remote control switches			•		
Check the operation of the LP pressure switch				•	
Check the operation of the HP pressure switch				•	
Check the insulation of the heat exchanger				•	
Check that terminals are tightened				•	
Check that the terminals screws are tightened				•	
Clean the exterior of the unit with water and soap				•	
Check the density of the antifreeze (if any)				•	•
Check the operation of the flow switches				•	
Check the operation of the solenoid valve				•	•

9.3 Refrigerant charge



Do not inject refrigerant liquid into the LP side of the circuit. Be very careful, and charge the circuit properly. If the charge is insufficient, the efficiency of the unit will be lower than expected. In the worst of cases the LP pressure switch may be activated, resulting in the halting of the unit.

In the presence of an excess charge, the condensing pressure will rise (in the worst of cases, the HP pressure switch may be activated, resulting in the stop of the equipment), and the consumption will increase as well.



It is strictly forbidden to use the compressor as a vacuum pump to drain the plant.

Fill the refrigeration circuit after it has been drained for maintenance purposes (leaks, replacement of the compressor etc.). The amount of the charge is indicated on the plate affixed to the unit.

Before refilling, it is important to drain and de-hydrate the circuit, thus obtaining a minimum abs. pressure value of 50 Pa.

Inject the refrigerant fluid before removing the vacuum, then fill the circuit up to 90% of the total gas requirement (in liquid form). The appliance must be filled through the filling valve on the liquid line, on the outlet side of the condenser.

It is recommended to connect the refrigerant cylinder to the filling valve on the liquid line, and to arrange it in such a way as to inject only liquid refrigerant.

Then start the compressor and let the gas flow from the cylinder, up until the liquid flow, which can be observed through the sight glass, is limpid.

9.4 Compressors

The frequency of the checks to be made on compressors depends on a variety of factors, first of all the working conditions. Anyway, it is advisable to adopt the following tips:

- After 300 hours of work, check the conditions of the oil: a certain amount of impurities from the system may accumulate in the oil of the compressors.
- Check the acidity of the oil every year.

- After 8000 hours of work, carry out a visual inspection on the suction/discharge valves for wear. If necessary, replace these components. If compressors are started/stopped frequently or in particularly demanding working conditions, it is advisable to reduce this period to 5000 hours. Anyway, this time is indicative only.
- After 24000 hours of work, carry out a general overhaul of the compressor. If the compressors work for a period shorter than 40% of a year, the overhaul can be performed every about 5 years. This period depends on the type of application, the working conditions, the duration of start/stop cycles.



If it is necessary to replace the compressor (in case of burning of the winding or mechanical failure), contact one of Itelco-Industry's Service Centres.

Compressors use polyester oil, for both the versions manufactured for R134a and R407C. During maintenance operations on the compressor, or if you have to open the refrigerant circuit in any point, remember that this type of oil is highly hygroscopic, and accordingly it is important that it is not left exposed to the weather for prolonged periods, as this would require the replacement of the oil.

9.5 Condenser

Check the condenser water side for cleanliness at regular intervals. This may be accomplished by checking water side pressure drop (refer to Section 9).

Soiling of the condenser results in increased condensing pressure, which reduces efficiency and increases current consumption and may cause the high pressure switch to activate.

It is advisable to supply the condensers with antialgae and anti-line treated water.

If soiled, the heat exchanger must be chemically cleaned by Authorised service personnel.

For other types of service (special maintenance, heat exchanger replacement, etc.), contact an Authorised Service Centre).

9.6 Dehydrating filter

The refrigeration circuits are provided with dehydrating filters.

The filter clogging is marked by the presence of air bubbles in the sight glass, or by the difference between the temperatures measured downstream from and upstream of the drying filter. If, once the cartridge has been cleaned, there are still some air bubbles, the appliance has lost a part of the refrigerant charge in one or more points, that must be identified and serviced.

9.7 Sight glass

The sight glass is used for inspecting the refrigerant flow and the humidity % of the refrigerant. The presence of bubbles indicates that the dehydrating filter is clogged or the charge insufficient.

A colour indicator is positioned inside the sight glass.

If you compare the colour of the indicator to the scale on the ring of the sight glass, you can calculate the percentage of humidity of the refrigerant. If it is excessive, replace the filter's cartridge, operate the appliance for 1 day and then check the humidity % again. When the humidity % is within the pre-determined range, no other operations are required. If the humidity % is still too high, replace the dehydrating filter again, start the unit and operate it for another day.

9.8 Thermostatic expansion valve

The circuit of the unit is equipped with a thermostatic expansion valve, with external equalizer.

The valve is shop-calibrated for an overheating of 5°C.

Procedure to check for overheating:

- Measure the suction pressure with the pressure gauges on the board of the unit or using a pressure gauge connected to the service valve on the suction side.
- From the pressure gauge's temperature scale, measure the saturated suction temperature (T_{sa}) which corresponds to the pressure value.
- Using a contact pressure gauge affixed to the outlet fitting of the gas of the evaporator, measure the actual temperature (T_{se}).

Overheating calculation (S):

$$S = T_{se} - T_{sa}$$

Overheating is regulated through the thermostatic expansion valve.

Make the adjusting screw follow a complete turn, and operate the appliance for five minutes. Check again and, if necessary, repeat the regulation.

If the expansion valve cannot be regulated, it is probably broken, and shall be replaced. The replacement must be carried out by a Service Centre.

9.9 Evaporator

Check at regular intervals that the water side of the heat exchanger is perfectly clean. To do this, measure the pressure drop, water side (see Section 8) or measure the temperature of the liquid leaving and entering the heat exchanger, and compare it to the evaporation temperature.

To obtain an effective heat exchange, the difference between the temperature of the leaving water and the saturated evaporating temperature must be in the 3.5-6°C to R134a and 3.5-5°C to R407C. A greater difference would indicate a low efficiency of the heat exchanger (i.e. the heat exchanger is dirty).

In this case, the heat exchanger must be subjected to chemical cleaning, an operation that shall be carried out by authorised engineers.

For other maintenance operations (extraordinary overhauling, replacement of the heat exchanger etc.), contact an authorised Service Centre.

10 TROUBLESHOOTING

The table below lists the anomalies of operation of the unit, the relevant causes and the corrective measures. For anomalies of any other type or not listed, contact one of Itelco-Industry 's Service Centre for technical assistance.

Anomaly	Cause	Operation
The unit continues to work, but without cooling.	Insufficient charge of refrigerant.	Refill.
	The dehydrating filter is clogged.	Replace.
Ice on the suction line.	Wrong calibration of overheating.	Increase overheating.
		Check the charge.
Excessive noise.	Vibration of lines.	Check the clamping brackets, if any.
	Whistler emitted by the thermostatic expansion valve.	Refill.
		Check the dehydrating filter.
Noisy compressor.		Seized bearings; replace the compressor.
		Check that the compressor's locknuts are tightened.
Low oil level in the compressor.	One or more gas or oil leaks in the circuit.	Identify and remove leaks.
	Mechanical failure of the compressor.	Request the intervention of a Service Centre.
	Anomaly of the oil heater of the compressor's base.	Check the electric circuit and the resistor of the heater of the motor base, and replace defective components.

Troubleshooting

Anomaly	Cause	Operation
One or both compressors are not working.	Breaking of the electric circuit.	Check the electric circuit and detect any ground dispersions and short circuits. Check fuses.
	Intervention of the HP pressure switch.	Reset the pressure switch and the control panel and restart the appliance. Identify and remove the cause that enabled the pressure switch.
	The fuse of the control circuit is broken.	Check for ground dispersions and short circuits. Replace fuses.
	Loosened terminals.	Check and tighten.
	Halt caused by thermal overload of the electric circuit.	Check the operation of check and safety devices. Identify and remove the cause.
	Wrong wiring.	Check wiring of check and safety devices.
	The line voltage is too low.	Check voltage. If problems regard the system, solve them. If they are caused by the distribution network, inform the Energy Distributor.
	Short-circuit of the compressor's motor.	Check the continuity of the winding.
	Seized compressor.	Replace the compressor.
Activation of the LP alarm, stop of the unit.	Gas leak.	Identify and remove the leak.
	Insufficient charge	Refill.
	Failure of the pressure switch.	Replace the pressure switch.
Activation of the HP alarm, stop of the unit.	Failure of the pressure switch.	Check the operation of the pressure switch, replace it if defective.
	The delivery valve is partially closed.	Open the valve and replace it, if faulty.
	Substances with condensable gases in the circuit.	Drain the circuit.
The liquid line is too hot.	Insufficient charge.	Identify and remove the cause of the loss of charge and refill.
Frosting of the liquid line.	The valve of the liquid line is partially closed.	Check that valves are open.
	The liquid filter is clogged.	Replace the cartridge or the filter.

11 SPARE PARTS

11.1 Spare part list

The table below shows the list of spare parts recommended during the first two years of operation.

Component	Number
HP pressure switch	1
Gas filter	2
Thermostatic valve	2
Auxiliary relays	2
Compressor's fuses	6
Auxiliary fuses	6
Set of compressor contactors	1
Water sensor	1
High Pressure Transducer	1
Low Pressure Transducer	1
Electronic card	1
Keyboard	1
Compressor oil resistor	1

11.2 Oil for compressors

The compressors are lubricated with:

Compressor	Refrigerant	Lubricant oil
REFCOMP	R134a, R407C	DEA SE 170
	R22	CPI CP- 4214-320
BITZER	R134a, R407C	BITZER BSE 170
	R22	BITZER B320SH

11.3 Wiring diagrams

The wiring diagrams are installed inside the doors of the electrical panels of the unit.

Any request for wiring diagrams shall be forwarded to Itelco-Industry Service Centre.

12 DISMANTLING, DEMOLITION AND SCRAPPING



During the draining of the refrigeration circuits, do not let the refrigerant overflow in the surrounding atmosphere. The circuit must be drained using suitable recovery equipment.



Do not disperse the waste oil of the compressors in the environment, since it contains some dissolved refrigerant.

For the disposal, contact the competent authority for information.

Unless otherwise specified, the maintenance operations listed below may be carried out by any trained maintenance operator.

12.1 Generalities

Open each line that supplies the unit, including the ones of control circuits. Make sure that all disconnecting switches are secured in the off position. The power cables can be disconnected and disassembled. Refer to Chapter 4 for the position of connection points.

Remove all the refrigerant from the refrigeration circuits of the unit and store it in suitable containers, using a recovery unit. If its characteristics have remained the same, the refrigerant can be used again. Contact the competent authority to obtain information about disposal. In **NO** event shall the refrigerant be discharged into the atmosphere. The oil in each refrigeration circuit must be drained and collected into a suitable container; then it shall be disposed of in conformity with local regulations that apply to the disposal of waste lubricants. Any oil spillage must be recovered and disposed of in like manner.

Isolate the unit's heat exchangers from the external hydraulic circuits and drain the heat exchange sections of the plant. If no isolation valves are installed on the cooler it might be necessary to drain the complete hydronic system.



If no shutoff valves have been provided, it may be necessary to drain the whole plant. If a glycoled solution or a similar fluid has been used in the hydraulic circuits, or if chemical additives have been added to the circulating water, the circulating fluid **MUST** be drained in a proper way. For **NO** reason shall a circuit containing glycoled water or a similar solution be discharged directly into the drains or surface waters.

After draining operations, the piping of the hydraulic networks can be disconnected and disassembled.

Once they have been disconnected as specified, the packaged units can be disassembled in a single piece. First of all, disassemble the anchoring screws and then lift the unit from the position of installation, and hook it to the lifting points provided, using suitable lifting equipment.

To this end, refer to Chapter 4 for the installation of these appliances, to Chapter 8 for their weights and Chapter 3 for handling.

The units that, once disconnected, cannot be removed in a single piece, must be dismantled on site; in this case, be very careful with the weight and handling of every single component.

It is always advisable to dismantle the units following the installation steps, but in reverse.



Some residues of oil, glycoled water or similar solutions may remain in certain parts of the unit. These residues must be recovered and disposed of according to the procedures specified above.

It is very important to ensure that, while a component of the unit is being removed, all the others are properly supported.



Use only lifting means of adequate capacity.

Once disassembled, the components of the unit can be disposed of in conformity with current regulations.

As part of our ongoing product improvement programme, our products are subject to change without prior notice. Non contractual photos.

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