

ITV
ICE makers



Manual WATER CHILLER

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Interventions to be carried out by the Manufacturer's qualified personnel ONLY

WATER CHILLER MANUAL

Processing water chiller

NOTES ON CONSULTING AND USING THIS MANUAL

This manual is supplied in a single copy when purchasing the machine. Should the customer require more copies, they must be ordered from the Manufacturer, stating the machine model and serial number (this information appears on the machine identification nameplate).

The User of this machine must be a professionally trained operator with a good level of experience on similar machines. If this is not the case, the User must attend a training course on the machine's use at the Manufacturer's factory plant or at the machine retailer's facility, under the guidance of the Manufacturer's qualified personnel.

This manual must be considered an integral part of the machine

The Manufacturer authorizes

the User to make copies of this document for internal use only.

The term **WARNING** is used to identify any actions which may compromise the machine's operation and pose a danger or risk for the operator. These warnings are printed in italics, or at times in bold script.

This manual has been prepared for 2 types of similar equipment, using the same type of controller, the model 6 and model 15.

MAIN NOTICES



It is mandatory to read this operation manual carefully before performing any operation on the machine: start-up and operation by unqualified operators can result in serious injury to persons and objects.



Personnel responsible for the chiller must be properly trained. The Customer must therefore ensure that staff training is adequate and, where necessary, request training sessions from the manufacturer.



Each component of the machine undergoes quality and dimensioning checks during the production process.



The maintenance, adjustment, set-up and replacement operations described in this instruction manual should only be performed after disconnecting the equipment from the electrical voltage.



This equipment uses low temperatures refrigeration gases.
Operation allowed just to certified and authorized personal.
Mandatory use of gloves.



The operator must wear adequate, non-slip footwear.
Before starting the machine, fill the water tank and the amount of antifreeze, ethylene glycol or polypropylene indicated in this instruction manual.
This procedure is extremely important, the machine must remain inactive during a maintenance period.



The safety and protective systems on this supplied machine should never be changed.

1. *Operating Manual*

- 1.1. This manual is intended for the purchasing company of the ITV equipment, as well as to the conveyors and personnel in charge of operating the equipment. This manual is general.
- 1.2. This manual indicates the design of the equipment, as well as its technical specifications. If there is a need to replace parts, this manual provides instructions for repositioning, installation and adjustment of the equipment. It also includes information on maintenance operations which facilitates the request of some component.
- 1.3. It should be noted that the manual does not replace the operator, it is only a support for the main operations to be carried out.
- 1.4. It should be considered that this manual should be carefully preserved so that it can be consulted whenever requested.
- 1.5. Recommendations:

Do not perform any operations, unless you are sure of what is being done. If necessary, contact the company or technical assistance. The manufacturer is free from any liability for damages caused to the equipment by third parties, or for the improper use of the equipment; for incorrect installation; defective power supply; inadequate programmed maintenance; modifications or repairs to the equipment without authorization; improper use of spare parts or equipment; Complete or partial failure to observe instructions; exceptional causes.

2. *Moving the equipment safely*

This section will detail the whole process of handling, loading and unloading the equipment.

2.1. Condition of equipment

The equipment is delivered packed and sealed.

2.2. Personal Requirement

There is no special requirement to be made in relation to the personnel responsible for manoeuvring the handling of loading and unloading of the equipment, only the personnel assigned to this type of work that already has sufficient knowledge for this type of operations.

2.3. Machinery needed to move equipment.

The equipment can be lifted by a truck crane capable of supporting the load of the equipment. Attached are the drawings indicative of the measures, weight and overall dimensions of the equipment.

2.4. Instructions for lifting the equipment

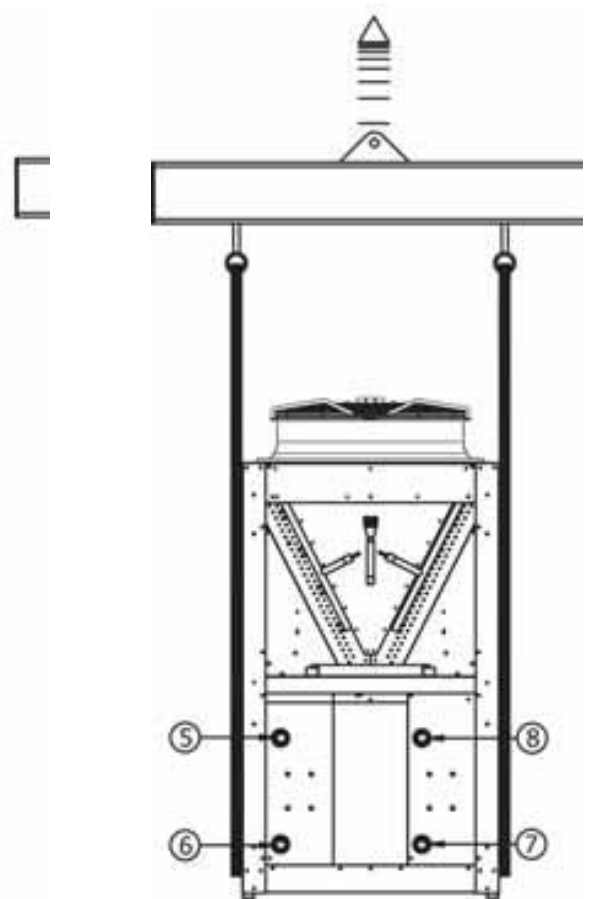
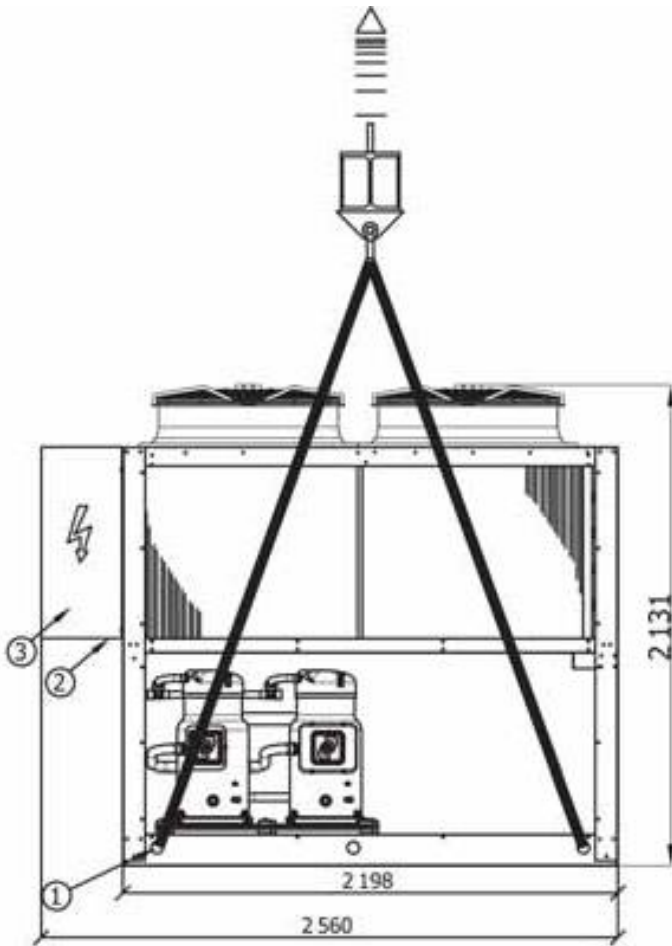
The equipment is delivered packed (if necessary). The total weight of the equipment can be seen in an additional catalog. The pallet (if any) will support the lifting of the equipment with a crane or, with a forklift, in the case of large equipment, use the handles at the base of the equipment. If a forklift is used, the correct positioning of the forklift forks on the pallet supporting the equipment is recommended.

CAUTION: If the equipment is not on top of a pallet, make sure that the forks of the stacker are not in direct contact with the structure of the equipment in order not to cause damage, nor should you use metal cables or lifting chains. The equipment, as this will cause damage to the structure of the same.

For a complete and correct use of the equipment, it must be transported and handled following some instructions, in order to avoid any kind of damage, both inside and outside.

When receiving the equipment, the fans should be protected so that there is no damage during handling of the load.

Cables or clamps shall be used covering the equipment at its ends so that it, when raised, maintains its equilibrium. Proceed to lift it, approximately 2000mm, then carry it by a forklift to the place of installation.



**CAUTION**

Do not stay under the chiller during transportation.

In case of vertical movement, in pedestrian traffic places the area should be isolated.

Put protection between the steel cables and the Chiller to avoid damaging the steel structure. Procedures for handling are on a label affixed to the Chiller. Lifting with modules up to 3 compressors.

TRANSPORT THROUGH ROLLERS SKATES

When the chiller is moved by rollers skates, they must be evenly distributed under the chiller. Its length should be at least 2000mm.

SLOPES DURING TRANSPORTATION**DANGER**

Do not tilt units with more than 300 in length and 50 in width.

Slopes higher than these can tip the chiller

2.5. Equipment accommodation

For a perfect operation of the equipment, it must be housed in a place that meets certain requirements, as:

- Minimum lateral spacing (when there is several equipment arranged laterally): 2500 mm;
- At the rear of the equipment, if there is a wall, there must be a corridor with a minimum of 600 mm;
- At the front of the equipment there must be at least 1200 mm of area for free circulation;
- If the equipment is housed in a specific place, it must have a height of 3500mm (beyond the height of the equipment) and there must be a minimum distance between the walls and the equipment of 1500mm;
- The equipment can operate anywhere, if it is not affected by a high level of dirt, abrupt changes in temperature and, of course, an extremely corrosive atmosphere.
- The creation of a perfect air exhaust system is mandatory whenever the equipment is in hot zones, or in areas that do not contemplate the minimum height intended by the manufacturer

2.6. Equipment Specifications – This section of the manual provides information on the purpose for which the equipment was designed.

2.6.1. What is the equipment for?

A.: The equipment described here must be used for the purpose for which it was designed ie cooling water and keeping it at the programmed temperature. It is an industrial equipment. **CAUTION:** The equipment is not designed for use with highly flammable liquids.

Equipment should be well ventilated;

Avoid any type of obstruction to the air flow that goes through the fins of the condenser (s);



3. - SAFETY RULES

- 3.1. ITV machines include a pushbutton and general safety switch; the user must check before starting them if both are in perfect working order.
- 3.2. The machines are equipped with protections in its components, with circuit breakers by tension and overheating, by pressure and temperature, and by flow rates.
- 3.3. The power supply lines must be protected lines up to the equipment, preferably by differentials.
- 3.4. Damaged electrical wires should be replaced immediately
- 3.5. The frigogenic fluids contained in the unit may be HFC:
R407c, R410a, R134a, R404a.
The type of refrigerant used is indicated on the equipment plate as well as the volume in kg used in each equipment.
- 3.6. The lubricating oil is not dangerous.
Being a synthetic POE, it must in any case be handled with gloves and should not be ingested.
- 3.7. It is necessary that the machines be used per the conditions set forth in this manual.

4. - General precautions



- 4.1. Do not climb on the machine.
- 4.2. Operate the machine per the information described in the manual.
- 4.3. Do not disassemble the equipment or components that are in operation.
- 4.4. Never remove protective equipment.
- 4.5. Do not do cleaning work while the equipment is running.
- 4.6. Do not use any corrosive product for cleaning.
- 4.7. Do not install the equipment in corrosive places or in places where there is a chance of combustion. Please note that this equipment does not have ATEX safety.
- 4.8. Never disconnect protective components.
- 4.9. The machines can never be used outside the conditions described in this manual.
 - 4.9.1. Never touch the fans with the machine on.
 - 4.9.2. Never touch hot areas of the compressor while the compressor is running.

5. Components and wiring

5.1. Electrical connections

After verifying that the electrical voltage is adequate, the main components must be connected.

As:

- Contactors;
- Thermal;
- Fuse ports;
- Fuses;
- Thermo-thermal;
- Timers;
- Troughs;
- Connection terminals;
- Leds;
- Transformers;
- General switches;
- Various cables;
- FVV wire;
- Microprocessors;
- PLC;
- Thermostats;
- Pressure switches:
- Transducer;
- Temperature sensors;
- Network level;
- Flow swith (expense of the component to be charged to the customer);
- Platines.

All this material meets the requirements of European standards and is standardized.

5.2. Connections of the water network

Make the connection:

- From the inlet line of the pump to the tank containing the product to be cooled;
- From the pump outlet to the refrigerator inlet;
- From the refrigerator outlet to the refrigerated product tank (continuous refrigeration) or to the product tank to be cooled (multi-pass refrigeration);

It has:

- Temperature detector in all the models. On these models, the water control is made by a water level detector by placing in the tanks of the equipment a manual or automatic by-pass, as well as in the chiller. They are provided with internal tanks of adequate capacity to the intended machine. The tanks can be made of stainless steel, by customer's request, or in standard galvanized sheet metal.

6. *Preliminary operations*

- Test the refrigerant group of water in your tank, both in the own tank circuits and in the tank circuits outside the chiller, taking into account the proposed antifreeze for the selected temperature;
- Check the direction of rotation of the components; Fans, compressors and water pumps. In groups with screw compressor, the direction of rotation is protected.
- After observing these requirements, proceed to start the equipment by selecting the temperature in the microprocessor or PLC, pressing SEL (select) and after the display shows the temperature to 'flash', press the keys (upper or lower) to obtain the desired temperature and selecting the output again, so that the selected value is assumed.
- See control parameters in paragraph 9
- After the desired temperature has been selected, pressing the pump, followed by the compressor switch, will normally start to operate. This is done on the controller or by means of a concrete mixer on the front panel of the equipment. Do not forget that without the water pump being in operation it will not be possible to start the equipment, keeping the same situation for all models. It is necessary to press the RESET key on all the models.
- Parameters.
- After the start of the appliance (ie the pump) after the compressor key has been pressed, the fans will start working thus giving a countdown to the compressor timer. So that it starts 60 "after your request.
- The flow detector, analyzes the water flow by closing the corresponding digital input, thus sending the start signal so that the equipment starts its normal operation.

7. *Electrical installation and control panel*

7.1. Electric panel

The electrical panel has all the protection and starting devices for compressors, fans and water pumps (where these exist). The models usually require external connections to the pumps and their protections, and to start the chiller via its water switch.

7.2. Microprocessor

ITV has one of the most advanced types of microprocessors as control equipment. This equipment on models is based on some of the following:

- P + I or P system;
- Adjustable temperature control;
- Set several points;
- Control of water pumps;
- Compressor startup delays (part Wending) depending on capacity;
- Starting at empty;
- Capacity control; optional
- Staged control; optional
- Modulation control; optional
- Variation control; optional
- Variable start selection of compressors;
- Protections against high and low pressure, oil, ice, etc.;
- Display for reading codes, errors, malfunctions, etc.;
- Various types of external connections, including modems (in case of more advanced microprocessors).

All these equipments vary of type and system according to the machine.

7.3. Calibration of the controller

The control software is installed and tested by the company before shipping the equipment, therefore no periodic calibration operation is required. If necessary, the company's assistance will verify the adjustment and safety controls.

7.4. Connection field

Analog Sensors and Transducers: All sensors and transducers required for normal chiller operation are installed and connected in the company, however all optional systems cost the customer and are tailored to the chiller in the company.

7.5. Digital Inputs

All digital inputs are appropriate for the type of compressor in the equipment, as well as the water flow ON / OFF switches.

7.6. Digital Outputs

The digital outputs are optionally connected to the water pump control or an audible alarm.

7.7. Lock connection

All locking devices, such as flow switches and pump start triggers are provided by the company. For a better understanding check the diagrams shown in the accompanying drawings.

7.8. External alarm circuit

All alarm inputs are controlled by the equipment PLC.

7.9. Power supply

There are several internal controller power supplies associated with the circuits. The 5VDC power regulator is used to support the analog inputs and should not be used for any external devices. There is an external 12VDC / 24VAC power supply that can be used as a power supply for external low current devices such as audible or luminous alarms, the same power, normally 24V is used in systems such as microchiller, PCO, or PLC1 ITV.

7.10. Limit and reset signals

There are specific switches to reset the water temperature to program a new temperature (within the values allowed by the equipment), see in control and programming devices

8. *Equipment Components*

8.1. Conveyors

Hermetic scroll, semi-hermetic or screw, carefully selected for their yields and durability. See attached compressor manual.

8.2. Evaporators

Type shell and tube, covered by appropriate insulation. It has high exchange and durability. See the evaporator instruction manual attached. Can be shell and tube, plates, or flowed cooper evaporator, with open tank inside.

8.3. Condensers

Larger than most chillers, these capacitors ensure a high transfer coefficient between refrigerant and air. They are made of copper, with mechanically expanded tubes in aluminium fins, or microchannel aluminium condensers

8.4. Fans

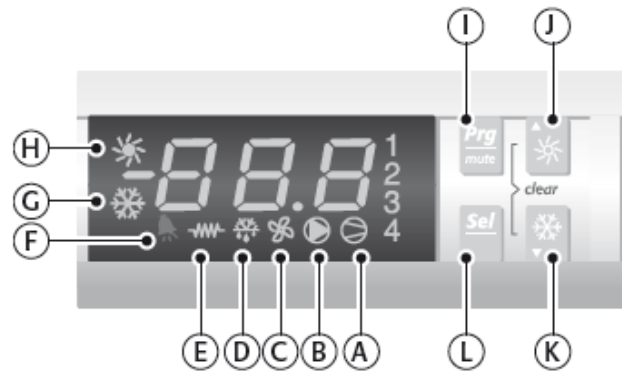
The chillers are equipped with 3 phase fans (6 poles) the fans can be of 890 rpm 910rpm or 1360rpm namely of 500mm in diameter, 630mm, 800,910mm. These do not require any kind of maintenance or intervention, enjoying a perfect aerodynamic system designed for complete efficiency and low noise. They can be operated by compressor discharge pressure or directly with compressor start up, depending on the type of equipment chosen. Motors normally used outdoors with the appropriate electrical protection indicated.

9. Control Panels

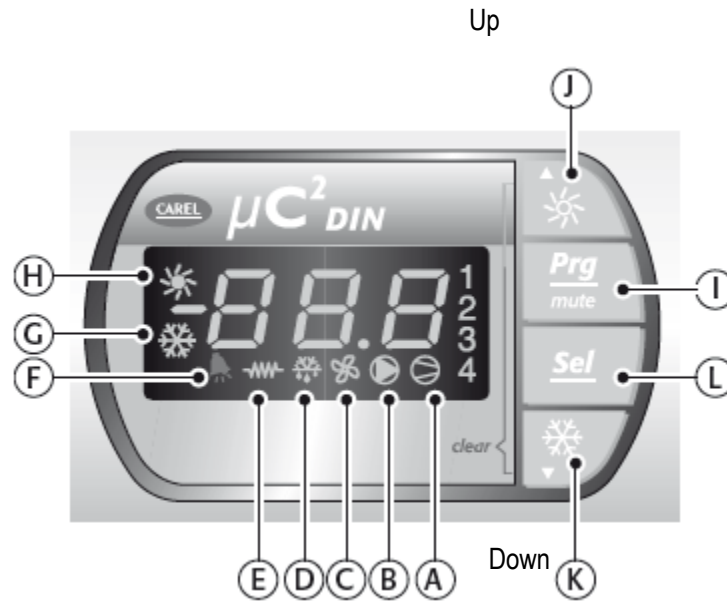
μC^2
electronic controller

CAREL





Símbol	Color	Meaning		Circuit Ref
		LED ON	LED flashing	
				1
1;2	Amber	Compressor 1 and/or 2 ON	Start request	2
3;4	Amber	Compressor 3 and/or 4 ON	Start request	1/2
A	Amber	At least one compressor ON		1/2
B	Amber	Pump/Fans. Salida ar	Start request	1/2
C	Amber	Fans. Condenser ON		1/2
D	Amber	Active Defrost	Defrost request	1/2
E	Amber	Resistance ON		1/2
F	Red	Active Alarm		1/2
G	Amber	Heat Pump Mode (P6=0)	Heat Pump Mode request (P6=0)	1/2
H	Amber	Chiller Mode (P6=0)	Chiller Mode request (P6=0)	1/2
I		Reset factory settings		Press power ON
		Exit a subgroup within the programming area until you exit fully (saving the parameters in the EPROM)		Press 1 x
		In the event of alarms, the buzzer will be muted (if present) and disarm the alarm relay		Press 1 x
L		Access to the parameters "Direct"		Press 5 sec
I+L		Access to "Programming" parameters after entering Password "		
J				
K				
J+K				
L+J				



Program and save the parameters

To access the temperature:

1- Press *Sel* 5 sec



2- The screen shows



3- Press twice (2x)



4- The screen shows



5- Press



6- The screen shows



7- Press



8- The screen shows the momentane temperature ... **14**

9- Press to increase the value



Press to decrease the value



10- Set new value

11- Press *Sel* key

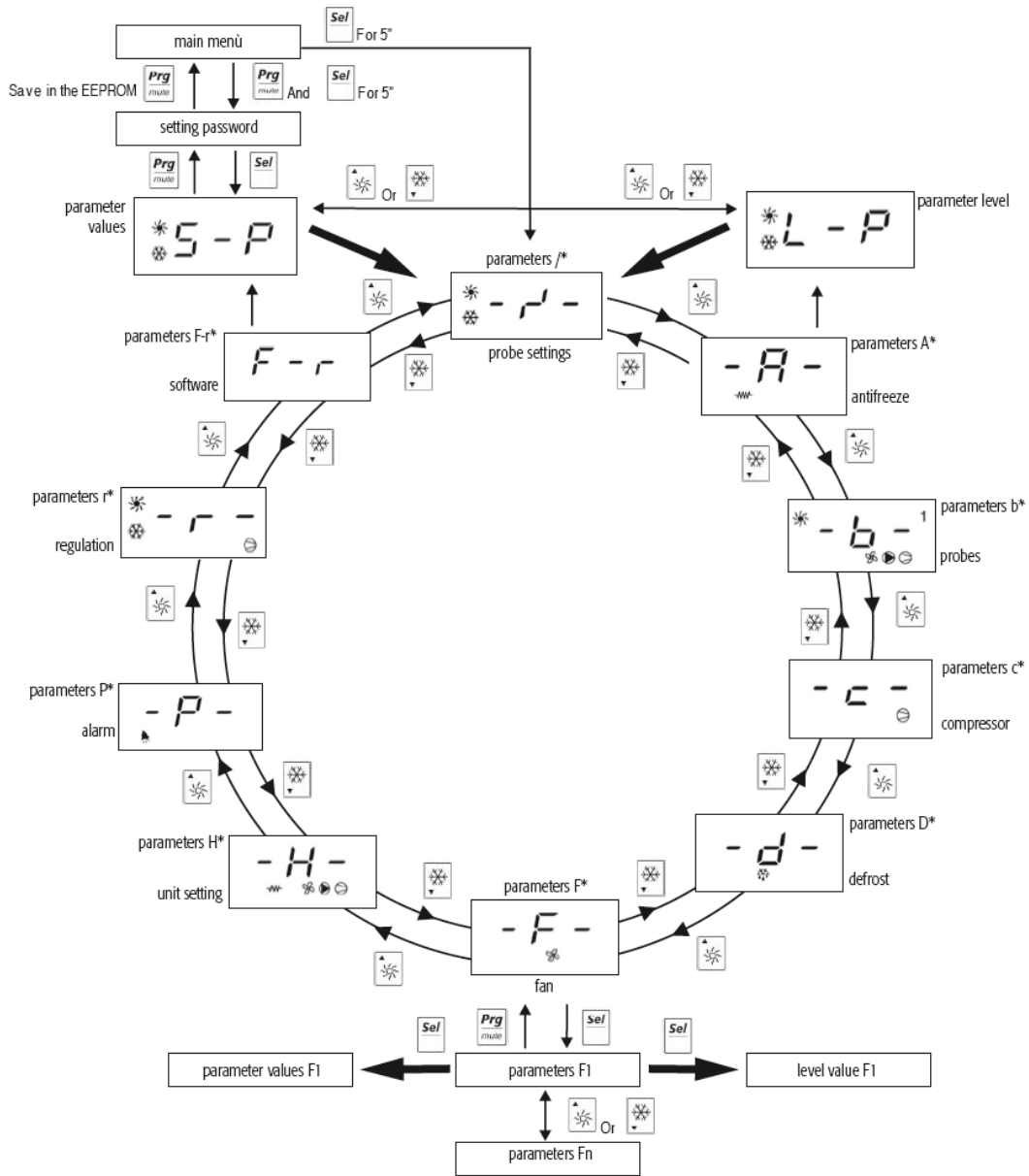


12- Press PRG 3 key 3x and in/out water temperature shall show again in the screen water I/O



Passwords

- U user 22
- S super user 11



Clear alarms

To clear alarms (F) press both keys   at the same time for 5 seconds and if the alarm does not persist, it will immediately go out

10.- ALARMS

Alarm Code	Alarm description	Reset	Compressor	Fan
HP1	High pressure alarm C1	manual	OFF	OFF
HP2	High pressure alarm C2	manual	OFF	OFF
LP1	Low pressure alarm C1	manual	OFF	OFF
LP2	Low pressure alarm C2	manual	OFF	OFF
tP	Thermal blanket	manual	OFF	OFF
tc1	Thermal circuit 1	manual	OFF	OFF
tC2	Thermal circuit 2	manual	OFF	OFF
FL	Lack of water circulation	manual	OFF	OFF
E1 / E8	Alarm reading probes	automático	OFF	OFF
EPb	Boot EEPROM Error	automático	OFF	OFF
ESP	Board reading error	automático	OFF	OFF
A1		manual	OFF	OFF
EPr	EEPROM error in function	automático		

WARNINGS LIST

Alarm Code	Alarm description	Reset	Action	
			Fan	Compressor
Ht	High temperature warning	manual		
Lt	Low temperature warning	manual		
AHt	Start Low temperature warning no start	manual		
ALt	Starting the machine, High temperature warning	manual		
ELS	Low voltage supply warning	manual		
ELH	High voltage supply warning	manual		
D1	Defrost Injection 1			
D2	Defrost Injection 2			

11. - TROUBLESHOOTING

LP1 circuit 1 ----- Low Pressure Alarm

LP2 circuit 2

Cause	Verification	Authorized technician
LACK OF WATER	Check the entire water circuit, flow rates, filters, pipes, obstructions and poor pump design	Authorized technician
FAILED EXPANSION VALVE	See thermostatic bulb, external obstructed equalizer, damaged capillary, defective orifice	Authorized technician
VERY LOW CONDENSATION PRESSURE	Check working parameters and control systems if any.	Authorized technician
LACK OF GAS IN THE REFRIGERATION CIRCUIT	Check for possible gas leaks and re-establish the original load	Authorized technician
OBSTRUCTED LINE FILTER	Replace the liquid line filter	Authorized technician
LOW PRESSURE WITH DEFECT	Check for capillary obstruction, or if it is defective, replace.	Authorized technician
ICE ON EVAPORATOR	Check parameter of lack of water and flow rates, revise temperatures and Glycol	Authorized technician

HIGH PRESSURE ALARM

HP1

HP2

The alarm appears with the compressor turned on and forces the compressor and fan to switch off immediately.

Cause	Verification	Authorized technician
Very low air flow rate	Check the condenser for dirt.	Authorized Personal: Mechanical Technician
Too hot air intake	Check the inlet air temperature. Reminder: 41,7C° Standard 45 C° Tropical Check air discharge system.	Authorized Personal: Refrigeration & Cooling Technician
Fans doesn't work	Check condensate control systems Check Thermals, Check fan blades, Check direction of rotation of motors	Authorized Personal: Electromechanical Technician
Too much gas in the circuit	Check correct load, gas exceeds limits	Authorized Personal: Refrigeration & Cooling Technician
Defective pressure switch	Replace pressure switch	Authorized Personal: Refrigeration & Cooling Technician
Compressor discharge valve too closed.	Check the condition and if necessary open the valve immediately	Authorized Personal: Electrical Maintenance Technician
Compressor very hot high compressor discharge Int failure	Check the rotation of the compressor, if necessary replace it. Check the impedance, if necessary change the compressor motor that is blocked, if necessary replace the compressor, Evaporation temperature is too high, check if the temperature is too high, both water and condensation, High overheating, power failure	Authorized Personal: Electromechanical Technician

Alarms Thermals

General Tp

tC1

tC2

Machine Circuit 1 and 2

Triggered alarm implies immediate shutdown of equipment

<p>Intervention in electrical protections</p>	<p>Control and measure voltages, measure impedances Check continuities and if necessary replace compressor Compressor may be blocked Aspiration too high Defective overheating Defective overheating Electrical Voltage Continuity of rotation</p>	<p>Authorized Personal: Electrical Maintenance Technician</p>
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Probe alarm E1 ... E2

It is an alarm that can be seen with the machine in Stand-by
 The probe values are not correct
 Input signals are not being read
 Lack of presence of probe with open entrance in ID
 Faulty probe

EEPROM Error

EPr

Can be seen with the machine in Stand-by
 Lost EEPROM configuration
 You can try a reset by turning the power off, if it persists, replace the controller.

EEPROM Error

EPb

Processor error
 Must shut down the machine, reset, if error persists, replace

Communication error

ESP

In case of expansion card to the second compressor, check the connections if they are in communication, turn off the equipment, reset if the problem persists, contact the ITV technical department.

**WATER FLOW ALARM
FL**

Cause	Verification	Authorized technician
Lack of water	Check all hydraulic system, filters, obstructions, pumps, rotations etc	Authorized Personal: Refrigeration & Cooling Technician
Short circuit pump	Check the electric motor, replace	Authorized Personal: Electrical Maintenance Technician
High pump consumption	Incorrect pump calculation, poor discharge, poor suction, poor piping, pump out of curve	Authorized Personal: Electrical Maintenance Technician
Pump Rotation	Check direction of rotation	Authorized Personal: Electrical Maintenance Technician
Differential pressure switch	Check the setting of the pressure switch or water switch	Authorized Personal: Refrigeration & Cooling Technician

ATTENTION!!!

DELTA P OIL PRESSURE SWITCH

ALWAYS THAT THE COMPRESSOR DOES NOT START AND IS INDICATED ON THE MONITOR THEIR SIGNAL, WITH THE STARTING CONTACTORS OFF, CHECK THAT THE DELTA P (OIL PRESSURE) LOCATED IN FRONT OF THE COMPRESSOR (SEE ATTACHED CATALOG) IS WITH RED LIGHT ON. IF SO, MAKE A TOTAL RESET TO THE EQUIPMENT BY TURNING IT OFF AT THE EQUIPMENT CONNECTION PANEL, WHICH IS LOCATED ON THE FRONT OF THE ELECTRICAL FRAME.

ALWAYS TURN ON FOR THE FIRST TIME THE EQUIPMENT MUST LEAVE THE OIL TO HEAT 12 HOURS BEFORE THE COMPRESSOR START THEN IT IS ENOUGH TO KEEP THE GENERAL SWITCH ON.

TABLE IN% GLYCOL

Use of glycol for temperatures below + 8 ° C is recommended.

It is the customer's sole responsibility that the lack of it causes serious problems in the equipment.

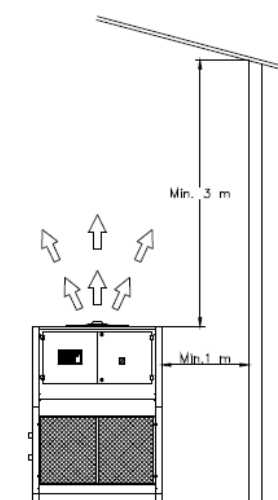
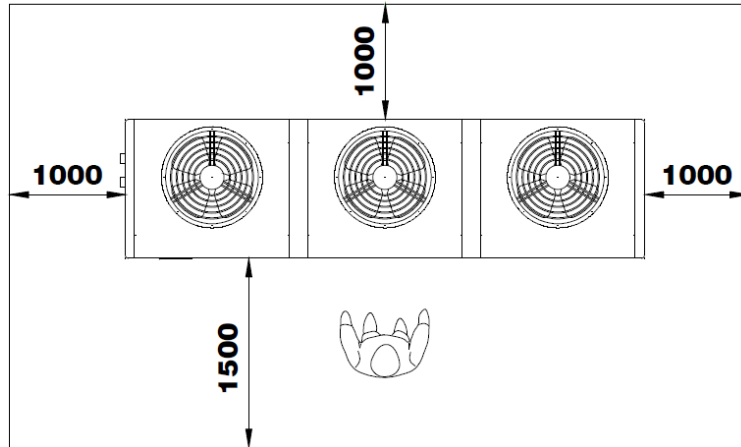
TEMPERATURE	% CONCENTRATION BY LITER WATER			
+15C°	5%			MANDATORY
+10C°		10%		
+5C°				15%
0C°				20%
-5C°				25%
-10C°				30%
-15C°				35%

* ONLY FOR CHILLERS OF SPECIAL MODELS

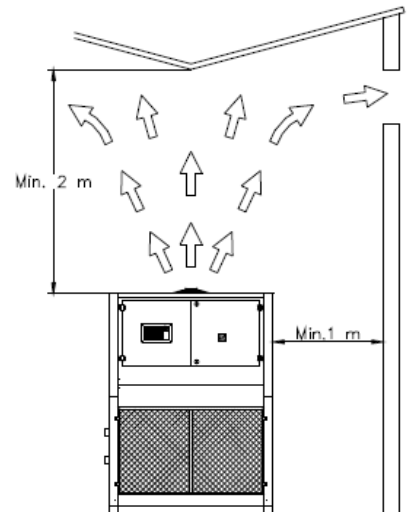
12 MACHINE OPERATION

DISTANCES TO BE OBSERVED AROUND THE MACHINE

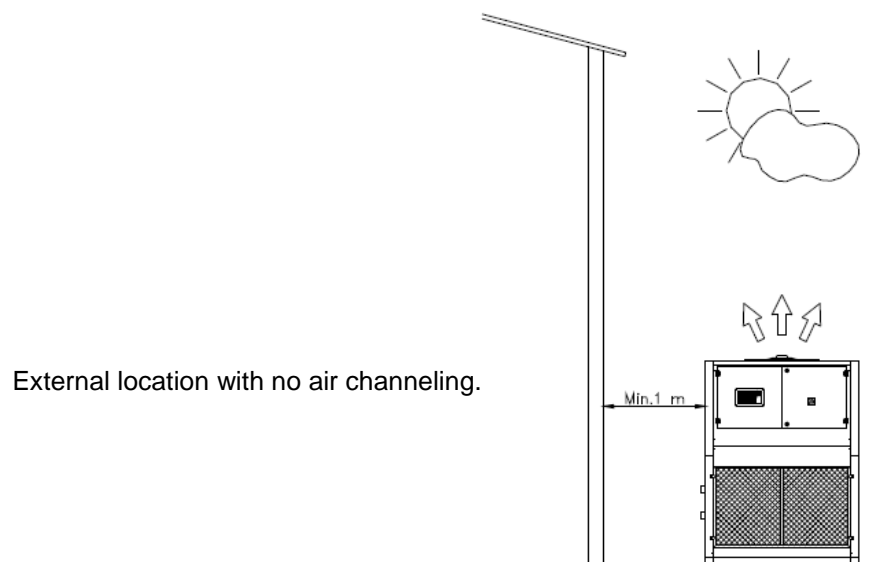
The chiller unit must be positioned according to the minimum space requirements indicated in the figure below. The surrounding space allows for the unit's correct operation and facilitates maintenance operations.



Internal location with no air channeling.
Respect the minimum distances indicated.



Internal location with no air channeling.
Respect the minimum distances indicated.



External location with no air channeling.



It is advisable to mark with paint or adhesive tape on the floor the distances to be observed around the machine's elements, so that:

- the marked off area is free and is not occupied by other machines or objects;
- no one except for the machine's operator stops or passes through this area when the machine is in operation.

Do not install the machine in the vicinity of sources of heat or containers holding inflammable and/or explosive liquids or materials.

PRELIMINARY CONTROL CHECKS

Upon reception of the machine, it is advisable to check all elements composing the unit. The following is a brief list of the elements to be checked:

1. Check that all components making up the machine have been received;
2. Make certain all accessories and options requested have been received;
3. Make certain all mechanical safety systems and safety devices are installed on board the machine.

In order to check whether the machine has been subject to any damage during transport, check all protruding machine parts as described above:

- the control panel and its control components
- the mechanical safety devices.

Carefully check that the packing material wrapped around the machine has not been torn or damaged. If any of the machine packing has been damaged, proceed as follows:

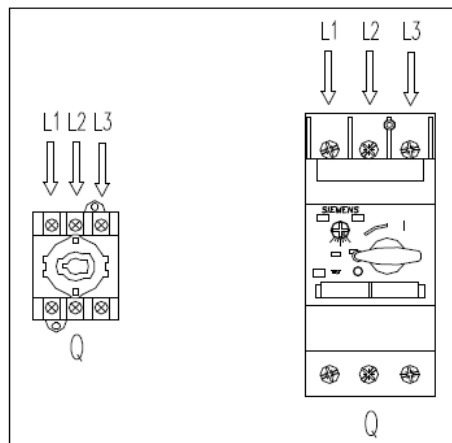
Easily recognizable damage on exterior or on machine parts: must be pointed out immediately after delivery to the shipping, and confirmed in writing by the shipper.

Damage not immediately recognizable: must be declared to the shipping company within the period prescribed by law.

Serious damage: all damage must be assessed by a qualified technician appointed by the shipper or insurance company.

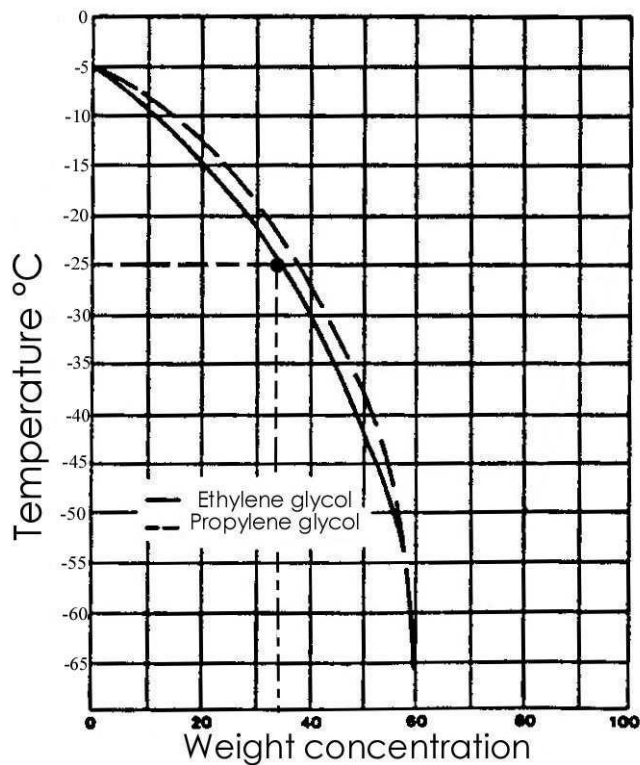
The control box, properly insulated and designed according to current standards, is located inside the machine. Use a quality cable with four wires (three phases + ground), featuring a section suitable to the chiller's specifications (see the enclosed technical file). Make certain the electric cable is in good condition before use. Insert the cable into the control box through its input **1**, until reaching the connection terminals on the main switch Q. Connect L1 – L2 – L3 to the main switch Q.

Proceed then with connecting the electric cable's external end to the main power line.



Both flexible and rigid tubes can be used for connecting the machine to the water supply line. The nominal pressure resistance of the tubes and joints must not be less than 10 bar. To guarantee an adequate water supply, the internal diameter of the tube must be at least the same as the diameter of the connection on the machine. If the service water is being fed to several user machines, a multi collector can be mounted on the machine's connector. A shut-off valve must be fitted to each connection outlet. Identification labels have been affixed on the machine by the Manufacturer to assist operators during connection operations.

FILL-CHILL ANTIFREEZE LIQUID FILLING SYSTEM



On demand, the machine can be equipped with a device for the automatic filling of antifreeze liquid: this unit comprises a FILL-CHILL tank which must be connected to the machine by means of the rubber tubing supplied with the chiller's automatic loading connection. The filling system is completely automatic or manual and is equipped with an anti-flooding device, which is detected from the machine, when the tank is empty the chillers stop, when the water is in leave on the tank the chiller starts to running

this system is only assembling in chillers with water tank



Depleted antifreeze liquid must be collected separately from other waste materials so as to not cause damage to the surrounding environment; once collected it must be eliminated by a specialised waste disposal company in compliance with regulations in force in the country in which the machine is installed.



Use the type of antifreeze agent recommended by the Manufacturer exclusively: if a different type is used, the Customer must check its physical-chemical characteristics (included in the product's attached documentation) prior to its use, verifying and comparing similarities with the recommended product: if the product is not analogous, the Customer must contact the Manufacturer regarding the product's usage.

13 – START UP

READ WITH ATTENTION FOLLOW THE STEPS

- 1
Check direction of rotation of equipment.
Your chiller has a fault relay and phase control, if your machine does not work, you want to rectify the position of the phases RST -N-PA
- 2
Check the assembly and adjustment of the switch as well as follow the assembly instructions strictly.



- 3
Always check the power cable section of your machine. A faulty or poorly calibrated cable for the current to be used can cause irreparable damage to the equipment.
- 4
Putting antifreeze glycol in the equipment. See attached table. Lack of antifreeze inhibits equipment warranty.

Referring to Fig. Never open the covers of the equipment when it is in operation
- 6
You should always place a water inlet suction filter. Failure to do so will void the warranty

Water tank
Must be supplied up to Maximum level
(About 10cm from the top of the tank)

Water pump

Compressor



Supply
 Water Inlet
 Water Outlet



INITIAL PREPARATION AND CHECK

INITIAL CHECK

Location of installation

Confirm that the location of the final installation is provided
 With water pipe and power supplies
 Convenient operation for correct chiller operation.
 Water with very high hardness should be avoided.

Check the condition of the equipment when you deliver it after transport

Installation space

Check that there are no obstacles that restrict the flow of air in the condensers or prevent maintenance work in the space specified according

Settlement of the Unit

Check and ensure that the foundation is flat, level and with a mass of 1.5 to 2 times the weight of the Chiller in operation, taking into account the foundation gradient
 Equipment for hoisting and horizontal movement shall be available.
 Chillers should be fastened with screws or fitted with anti-vibration.
 Concrete base anchors (for larger chillers) for both flooring and slab installations.
 It is advisable to install in the vicinity of grass or earth to place pebbles around the chiller to avoid obstruction of the condenser by the suction of these components.

OPERATING INSTRUCTIONS for chiller with and without hydraulic kit

COOLING UNIT (CHILLER)

To start the operation:

1.
Check water or equipment up to electronic level close circuit
Open the inlet and outlet valves.
2.
Make sure all power equipment is turned off and set the PLC board switch to 0.
3.
Confirm that R, S and T phases are connected correctly.
The correct phase binding can be checked by a phase sequence indicator. If the phases are not correctly connected, The compressor will not start due to the activation of a reverse phase protection device.
You must turn off the main switch and change two of three terminals, R, S and T and turn the circuit breaker back on.
4.
Switch on the evaporator water pump.
5.
Completely open the ball valves or other valves in the liquid lines.
Control the bypass, usually inside the tank
If it does not exist, make one outwardly
6.
Turning on the Chiller: Local Mode key "ON / OFF.
Let the chiller heat the compressor oil at least 7 hours before starting
7.
Setting the temperature (see parameters)
Set the desire temperature and differential.

Turning off the Chiller:

1.
Turning the power key off, on or off
2.
Turn off the main circuit breaker when the Chiller
For long period of time
- 3
Check water detector
Pilot lamp on phase detector or water level
The red (or green) lamp indicates normal operation.



ON Water Detector



Sequence relay and phase failure

If any of the situations are not satisfied, the equipment will not start.

Boot check

1. Check supply voltage.
2. Check for abnormal sounds and vibration.
3. Check Chiller amperage.
4. pressures of work (technical experts)

Problems

Chiller will not turn on

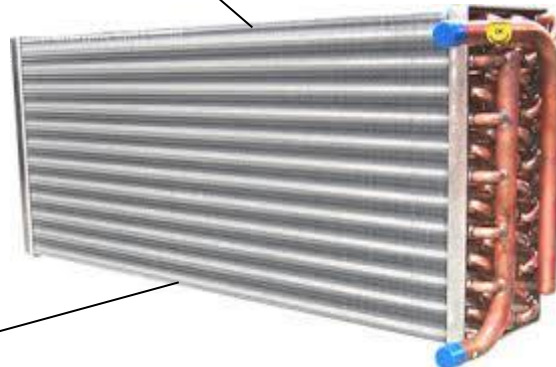
1. Has the main circuit breaker tripped?
2. Are the fuses OK?
3. Is there water circulation in the system?
4. Is the controller set to the set temperature?
5. Is the water level relay closed? Is the phase relay closed?

Low cooling capacity

1. Is the air supplied to the condenser sufficient? (to see Minimum Spacing)
 1500mm around the chiller
 2000mm between chillers
 4 meters min above the chiller
 Never block air vents
2. Is the set point temperature correct?
3. Are operating pressures normal?
4. Is there enough water in the system?
5. The "Y" filter on the chilled water inlet is clean?

Maintenance

1. Remove any obstacles to the airflow in the condenser and clean it.
2. Clean the Chiller.
3. Clean the Filter "Y" on the ice water inlet regularly.



4. Cleaning the chiller. (It is recommended that a specialist is contacted for this type of job).

POSITIONING THE CHILLER

DANGER WARNING CAUTION

If a gas leak is detected stop the Chiller and contact the maintenance service as soon as possible.

Do not use a blowtorch if the refrigeration cycle is pressurized, there may be a risk of explosion. ITV chillers can be charged with R-407C, R410A, R134A, R404A non-flammable and non-poisonous refrigerant. However, the refrigerant gas is heavier than air so the floor can be covered with refrigerant gas if there is a leak. Then, keep the environment well ventilated to avoid asphyxiation during the repair of the leak. Check to ensure that valves are open properly. If not fully opened, it could cause serious damage to the compressor due to high pressure.

Material used for hoisting as well as damage to the equipment during transport is not the responsibility of ITV. It is recommended that the floor where the chiller will be installed is of concrete with the "smoothest" finish possible, so as not to generate the accumulation of particles. The accumulation of these can be sucked by the chiller causing the obstruction of the capacitors.

15 - INSTALLATION

Initial checks

WARNING



Check the selected electrical components, circuit breakers, cables, conductors, connections, etc. These shall be in accordance with the data shown in the electrical data table or according to the installation site legislation. Check that the **ground cable** is properly installed and connected to the unit. This cable avoids electric shock.

Use of generators for Chiller power:

Generators that work with sudden variation of electric consumption, activation, deactivation or variation of consumption in function of increase and reduction of load, which is the case of our Chillers, need an ELECTRONIC SPEED CONTROLLER that is a manager of the increased loads or Withdrawn from its fed-in branch and which controls the frequency available for the network in Hz + or - 5%

independent of loads. Some generators applied in the market do not have this feature having only an Electronic Voltage Controller as standard. In this case the lack of the Electronic Speed Control can trigger an excessive increase in the frequency after the entry and exit of operation of the compressors due to the necessity of the sudden increase or reduction of the motor speed. This can cause problems on the network and the equipment it feeds. For these cases, it is recommended to combine ultra-fast fuses to protect the power and command circuits to avoid damage to the chiller.

Dimensioning of circuit breakers

The following items must be considered when supplying the equipment: Interruption capacity limit I_{cu} (obtained from the electrical project of the work); Breaking capacity in service I_{cs} (% of I_{cu}) 100% interruption capacity of I_{cu} . Circuit breaker rating depending on the thermal protection at the factory or differential, the section of the cable to be used (always be the same section of the equipment switch, see Amperes) These data can be checked on the equipment label.

Dimensioning Power Circuit Power Cables:

To define the section of cable to be used, consult the factory or see manuals available for this purpose with electrical cable manufacturers.

To avoid disconnection during start-up, minimum standards must be met: voltage and amperage.

To dimension the power supply cables of the power circuit, consider:

The power supply to the Chiller power circuit is unique regardless of the number of cycles of the equipment.

The current to be used as reference for the dimensioning of the power cables is the maximum current of operation, already identified in the electrical data table. Even in installations where normally the air inlet temperature is + 35 ° C to + 50 ° C

Even in installations where the air inlet temperature in the condensers is normally low, this current can be reached during the start of operation as for example in case of high ice water inlet temperature which has its origin in the continuous operation of the pump d ' With the Chiller stopped.

For the design of the Chiller cable it must be considered: in some cases, electromagnetic interference may occur in the control circuits of the Chiller, making it difficult to operate due to the variation in the pressure and temperature signals caused by it. To avoid this Electromagnetic interference in the operation of the Chiller it is necessary to ensure that the ground level does not exceed 5 ohms; The protection cable must be dimensioned considering the maximum current of operation of each circuit. The protection of land is indispensable.

16 - PROCEDURE FOR CONNECTION BETWEEN WATER PIPE AND CHILLER.



CAUTION

If the cold-water pump control is installed independently of the Chiller, not per the wiring diagram, it is important to note that your control system will cause it to remain on for at least 20 seconds after stopping the Chiller to avoid freezing of the water inside the evaporator Check the antifreeze table to apply. The guarantee depends on the use of antifreeze.

1. Grease or dirty water pipes should be cleaned before installing the ice water circuit.
2. Connect all pipes as close to the Chiller as possible, so that the connection can be made easier when required.
3. It is recommended to use flexible joints in the general inlet and outlet of ice water to prevent vibrations from being transmitted.
4. Globe valves shall be installed in the outlet of ice water, not supplied with the equipment.

They must also be installed with threaded or threaded connections, depending on the type and model of equipment, at the water inlet (top of the pipe) for air purging, at the water outlet (bottom of the Tube) for water drain in addition to gauges in the inlet and outlet of water. Obviously, this situation regarding machines with plate evaporator or Shell and tube.

5. The water line between the "Y" pump filter and the water outlet from the coolers must be cleaned internally before being connected to the machines to prevent particles from adhering to them. The use of the filter "y" at the evaporator inlet is

advisable but optional. It will ensure greater safety to the integrity of the evaporator cleaning. If it is not installed as proposed, it is extremely important that at least when suctioning the pumps, they are installed.

6. Applying insulation to the water pipes to prevent heat exchange with the environment increases Chiller performance in addition to avoiding condensation of the air in the pipes.
7. The water inlet and outlet piping is not supplied with the Chiller and the installation and installation of the Chiller is under the care of the installer.
8. In the case of aerial pipes, support must be pipes with water do not transfer to the Chiller connections avoiding to damage them.

Note: All units not indicated should be considered in millimetres (mm).

Establish the procedure for cleaning the water circuit

These procedures prevent the impurities contained in the system during its manufacture from migrating into the evaporator causing its total or partial blockage causing loss of efficiency.

The particles contained in the pipe as dust are considered in the fouling factor, but solid particles such as sand and large amounts of solder can pass through the filters and settle inside the cooler causing them to clog.

Small amounts of these particles that pass through the filters can flow normally through the cooler without causing clogging.

The exchangers have a very turbulent internal flow preventing that, during normal operation, loss of yield of the same in a short time.

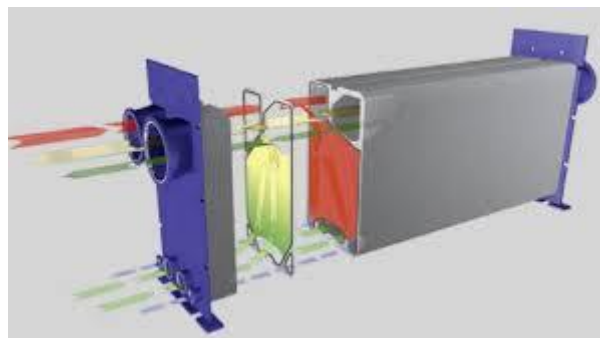
ITV does not establish special criteria for the design and installation of the cold-water system, but the minimum necessary for the interconnection of this to the Chiller.

The particles contained in the piping, such as dust, waste in suspension considered in the fouling factor, but solid particles such as sand and solder carpet etc., can pass through the filters and settle inside the cooler causing it to clog.

The evaporators have a very turbulent internal flow rate preventing that during normal operation there will be loss of efficiency of the evaporator in a short time.

The performance of the cleaning procedures will prevent impurities in the gases and others from the manufacturing process of the pipes of the chilled water and / or fluid to be cooled to migrate into the evaporator causing them to be degraded either by a clogging or by a Internal chemical reaction causing corrosion.

Internal view of plate evaporator (must be kept clean regularly) in chillers this evaporator cannot be dismounting, the water filters must be clean.

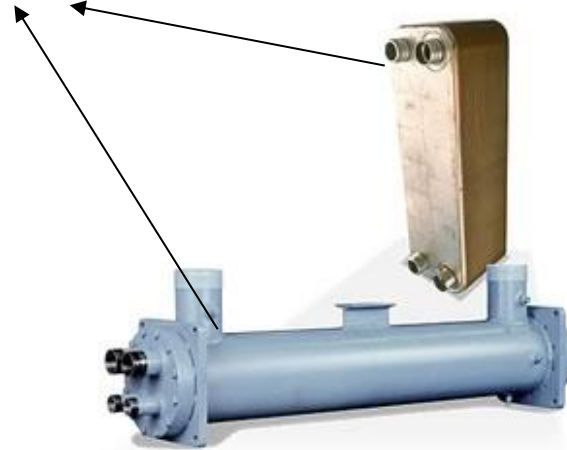


The good corrosion resistance inherent to copper and copper alloys of the exchanger tubes is due to their ability to form a natural protective layer

During operation of the evaporator. Therefore, new pipes without a protective layer should never operate with contaminated water and / or outside the parameters, in the same way that excess deposits of "dirt" and other components may prevent the formation of this protective layer. For this reason, clean water is always used for the hydrostatic test of the chilled water circuit and / or solution to be cooled. The use of contaminated water, aggressive water or oxygen-poor water is strictly advised against. For small stops, it is advisable to drain the water inside the exchanger, if not drained it is preferable that a flow is maintained even at a low velocity than leaving the water stagnant therein.

To clean the evaporators you must proceed like that ;

Disconnect the tubes that interconnect the inlet and outlet of water and / or solution to be cooled.
 Plug the chiller inlet and outlet nozzles with carbon steel blind flanges and gaskets.



On one of the blind flanges install a manometer with a scale of 0 to 5 kgf / cm² on the other install a globe-type valve with a nominal diameter of ½ "BSP;

Pressurize the cooler with inert gas (preferably Nitrogen) at a pressure of 2kgf / cm². This pressure should be checked weekly, During the inoperative phase of the liquid cooler.

LEAKAGE TEST AND "FIRST" WATER CIRCULATION IN THE SYSTEM

The hydraulic network must be tested in 2 phases:

1st Test with Pneumatic Pressure:

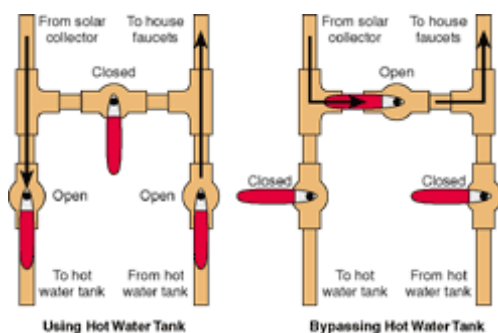
The hydraulic network must be pressurized with nitrogen with all registers and valves open and, with the aid of pressure gauges, the pressure conditions must be checked after a few hours.

2nd Test with Hydraulic Pressure:

The hydraulic network shall be pressurized with cooling water with all registers and valves open. All joints with flanges, welds or other must be checked with the water pump running.

It is recommended that in performing this test the Be in by pass, see figure

The bypass configuration is made for the chillers with water tank inside



At the moment of the "First Water Circulation in the System" it is recommended that this water does not flow through the evaporator, ie, the flow should occur through the proposed by-pass shown in the figure. Only after the cleaning of the system as well as the removal of the solid waste from the manufacture of the pipes and others is that the flow of water through the evaporator can be tested and ready to circulate.

Intelligent Systems

Intelligent remote control systems are covered in specific manuals that must be purchased or ordered from ITV. The following is the communication possibilities and remote controls:

ITV divides your systems into 3 types of controllers:

Micro chiller

PCO3

PCO5

To control from 1 to a maximum of 8 Chillers per controller a controller can be provided that aggregates all Chillers functions into a single panel that can be installed in a central control room. This panel calls us Master, and the rest the Slaves.

This driver has the following characteristics:

- Liquid crystal display;
- Control of 1 to 8 chillers of different capacities with possibility of expansion for up to 8 controls of the same network;
- Control functions (individualized or per group of chillers): the Run / Stop; O Set temperature set point, On / Off differential temperature input and output water; O Auto check control.
- Monitoring functions (individualized or per group of chillers); O Run / Stop;

Operation Mode; Page13

- O set point temperature set;
- the alarm;
- O Alarm code;
- O Alarm history.
- Timer for hourly programming:
- O Weekly programming with 3 programs per day;
- O Holiday function (cancels holiday operation);
- O Enables all or part of the chiller or group of chillers.
- Connection with signal cable with length
- Maximum between the central station and the last chiller
- Of 1000m;
- Option of local / remote control or timer.

In the case of the microchiller, we have the basic situations and basic alarms

As well as control of ventilation, control for electronic valve as optional, being the situations above., For equipment using PCO or PCO5

COMUNICACION

In the case of communication to a central PLC or microchiller, it can perform the following operations in the Chiller:

- For control:
 - On off;
 - Demand control via network or external signal (4 to 20 mA);
 - Set the set-point of the cold water via mains or external signal (output temperature) (4 to 20mA).
- Monitoring:
 - Cold water inlet temperature in the tank;
 - Cold water outlet temperature in the inertia tank;
 - Compressor high pressure;
 - Compressor low pressure;
 - Equivalent demand (approximate value);

- Operating hours of the Compressor -PCO
- General alarm indication per cycle;
- Compressor operating status. compressor.

- Communication system with supervisors only in PCO
- Communication protocol:
Modbus - RTU, standard.
Others on request.

PLANWORKS serie Plan (CAREL)

This system is applied in installations already defined to work in network Plan as a whole due to the impossibility of interfacing with other systems.

When BMS also uses Lonworks, the ITV can optionally provide a gateway that will directly communicate the Chiller.

Ask Fabrica for

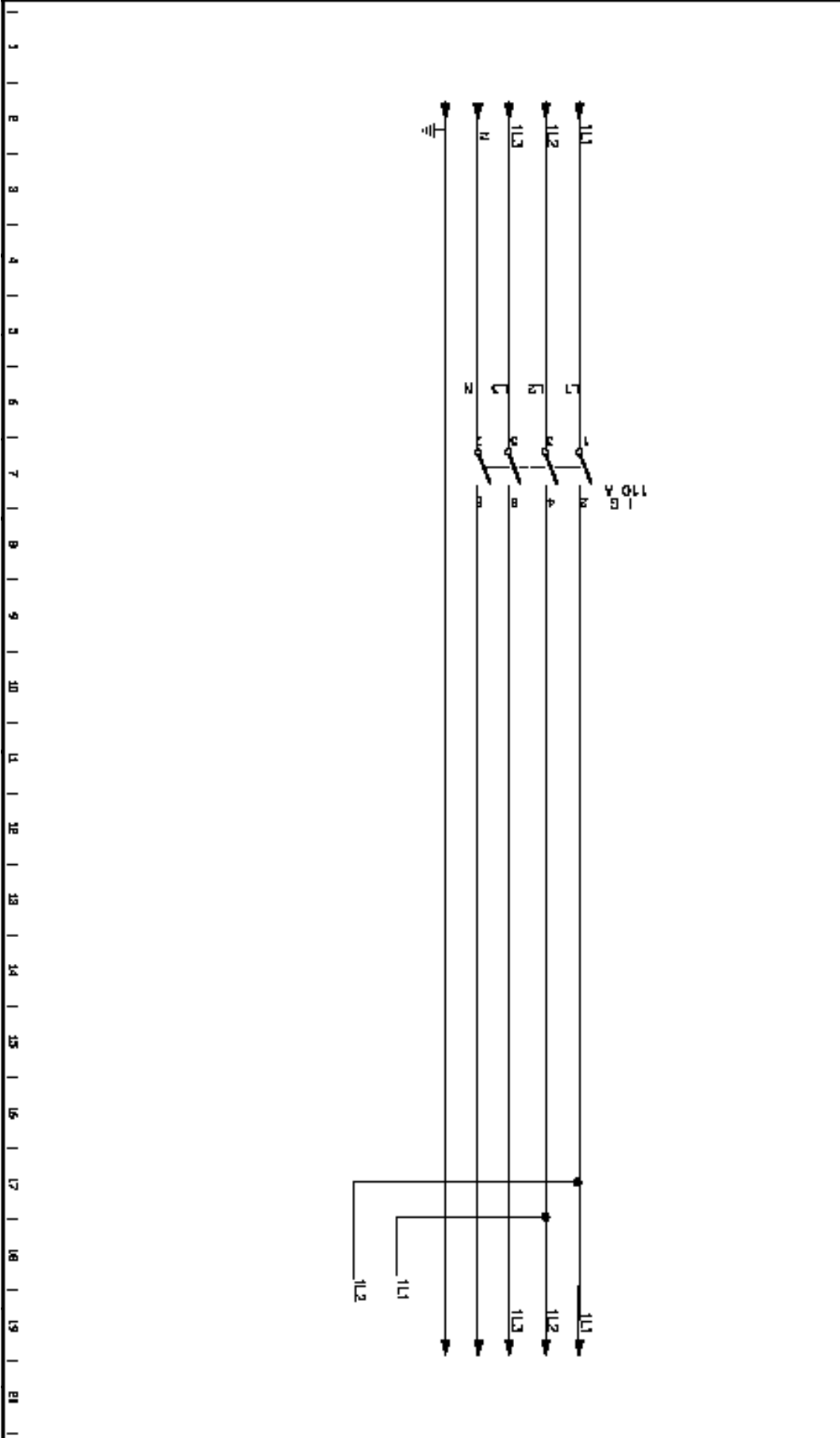
17 -Wiring diagrams

		ENTRADAS ANALÓGICAS			ENTRADAS DIGITAIS					SAÍDAS DIGITAIS				SAÍDAS DIGITAIS			RELES AUX. OIL										
FUSIVAS		X1			X2					X3				X4			RELES AUX. OIL										
		D10	D10	G0	G0	G0	D11	D11	D11	D11	2	D20	10	8	1	1	1	1	3	4	19	18					
F1	F2						28	28	28	28	28	28	28	28										K5	K4		
F3	F4																										
			53	52	54	55																		K2	A1	A2	A1

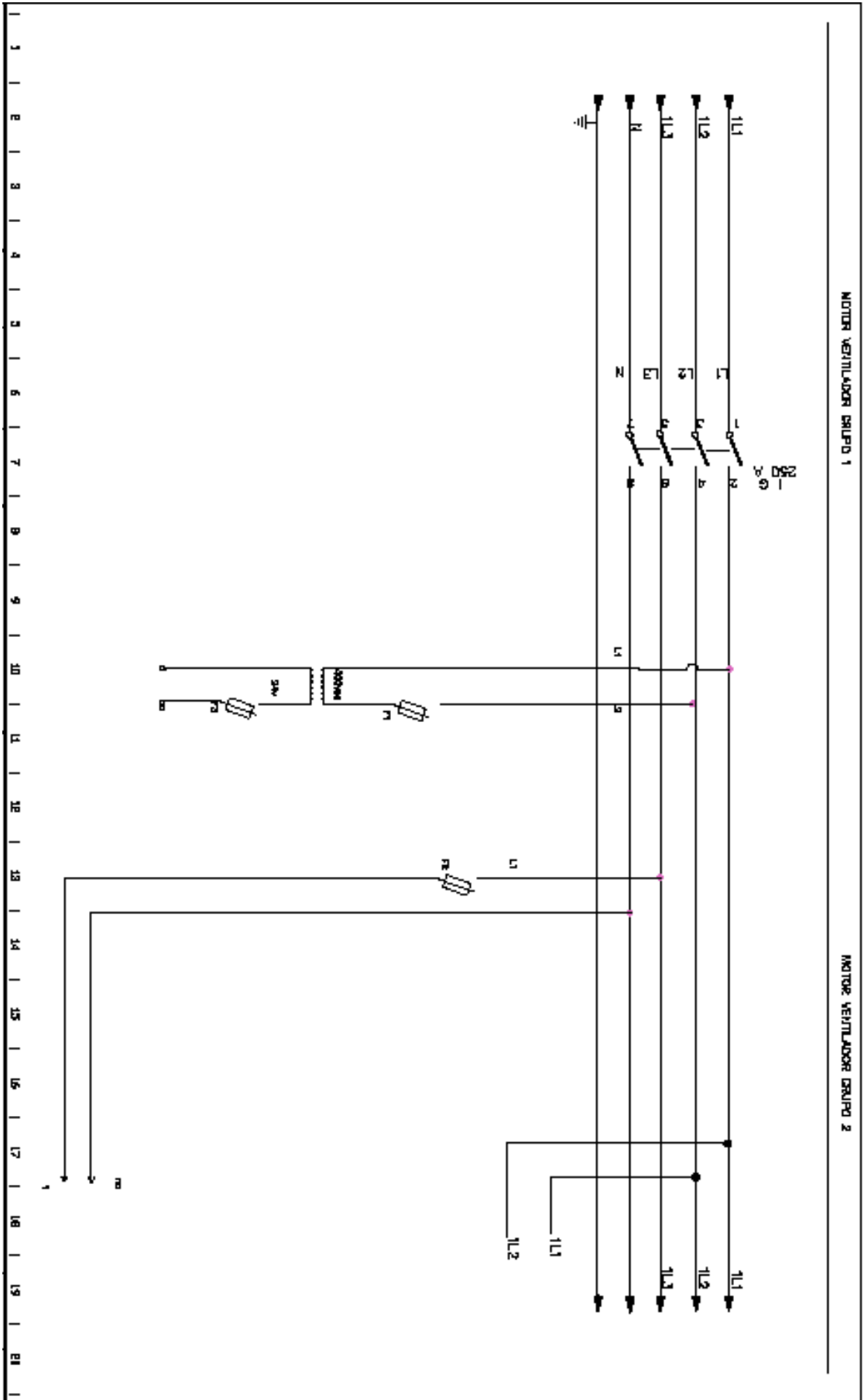
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20

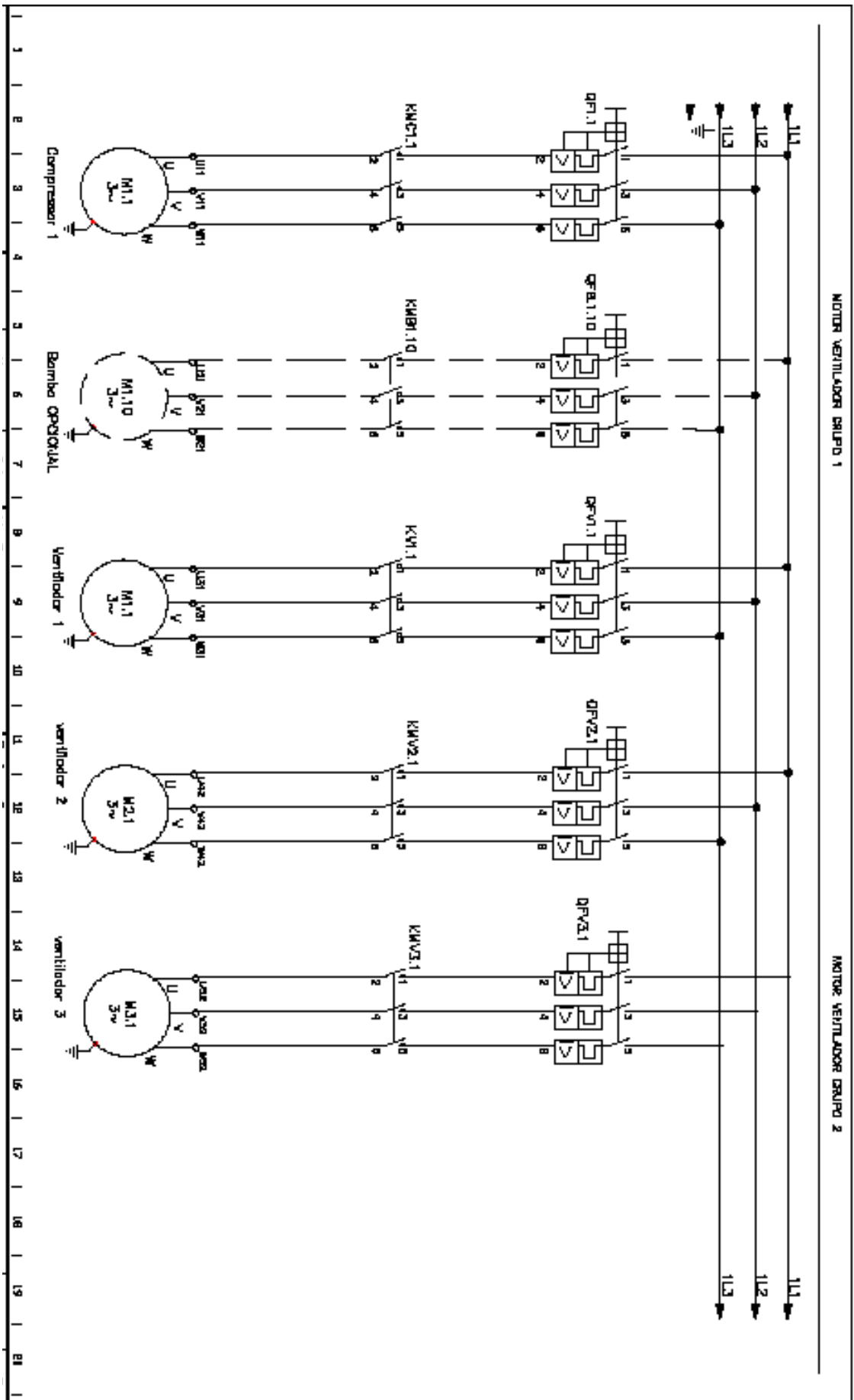
MOTOR VENTILADOR GRUPO 1

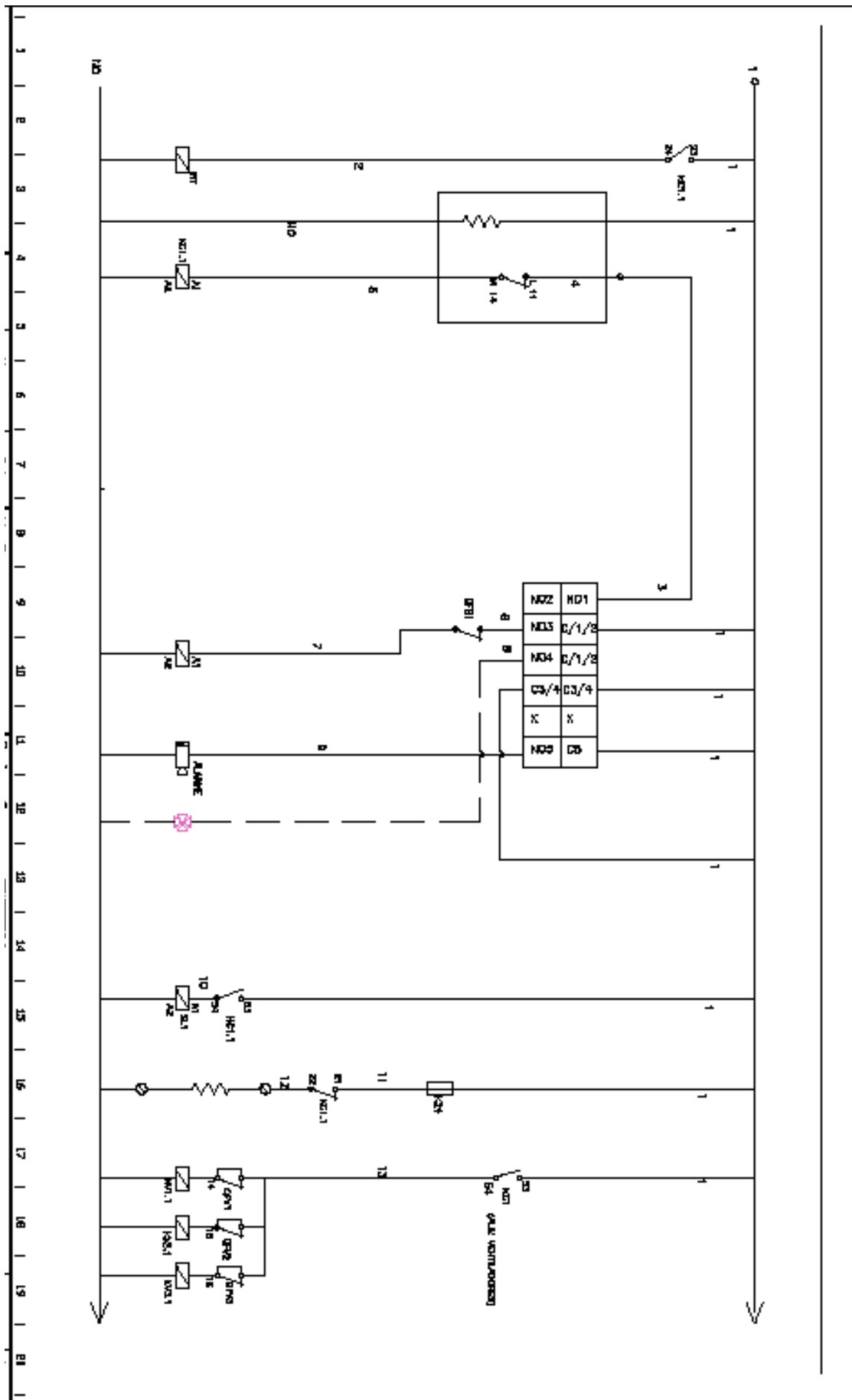
MOTOR VENTILADOR GRUPO 2

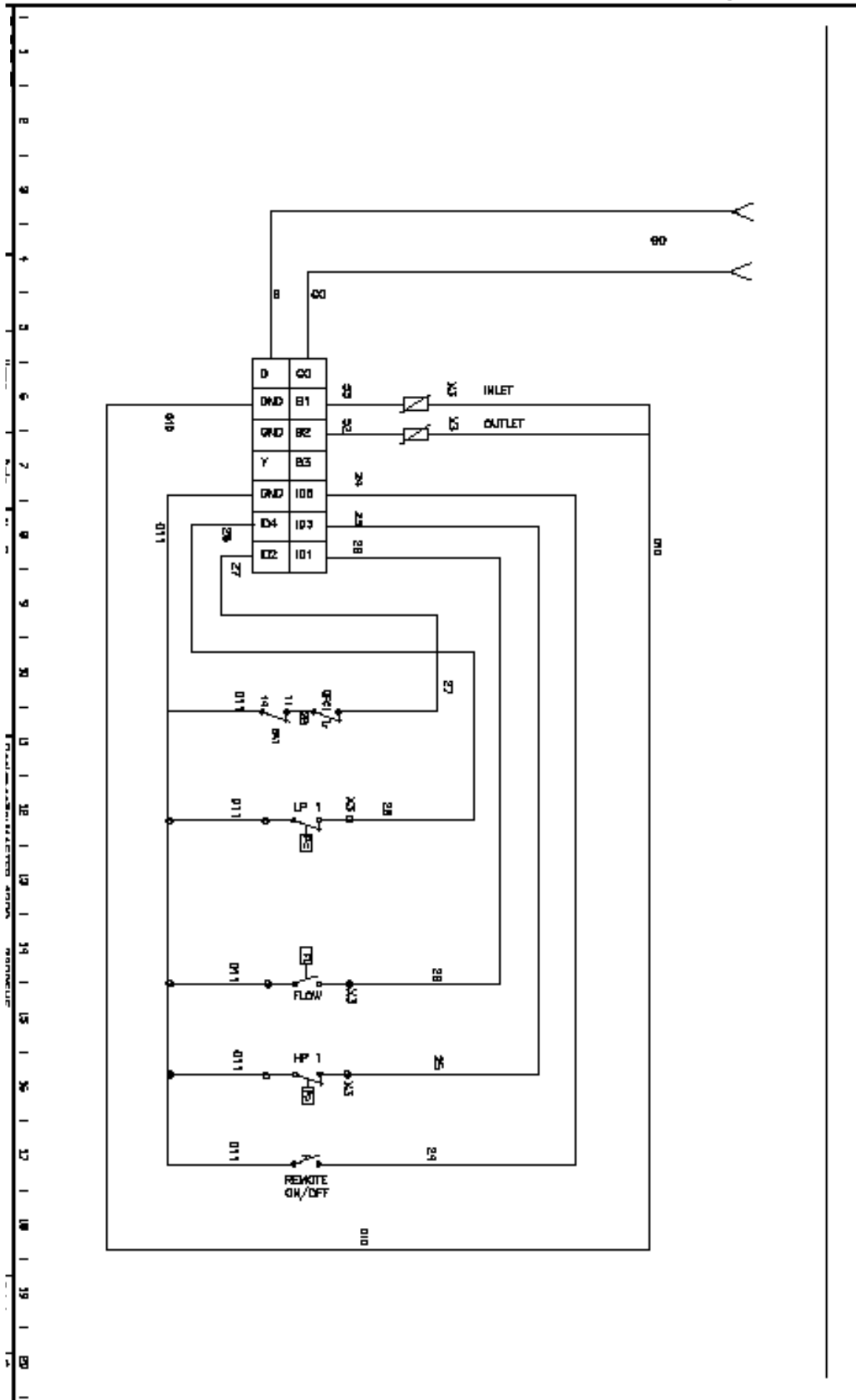


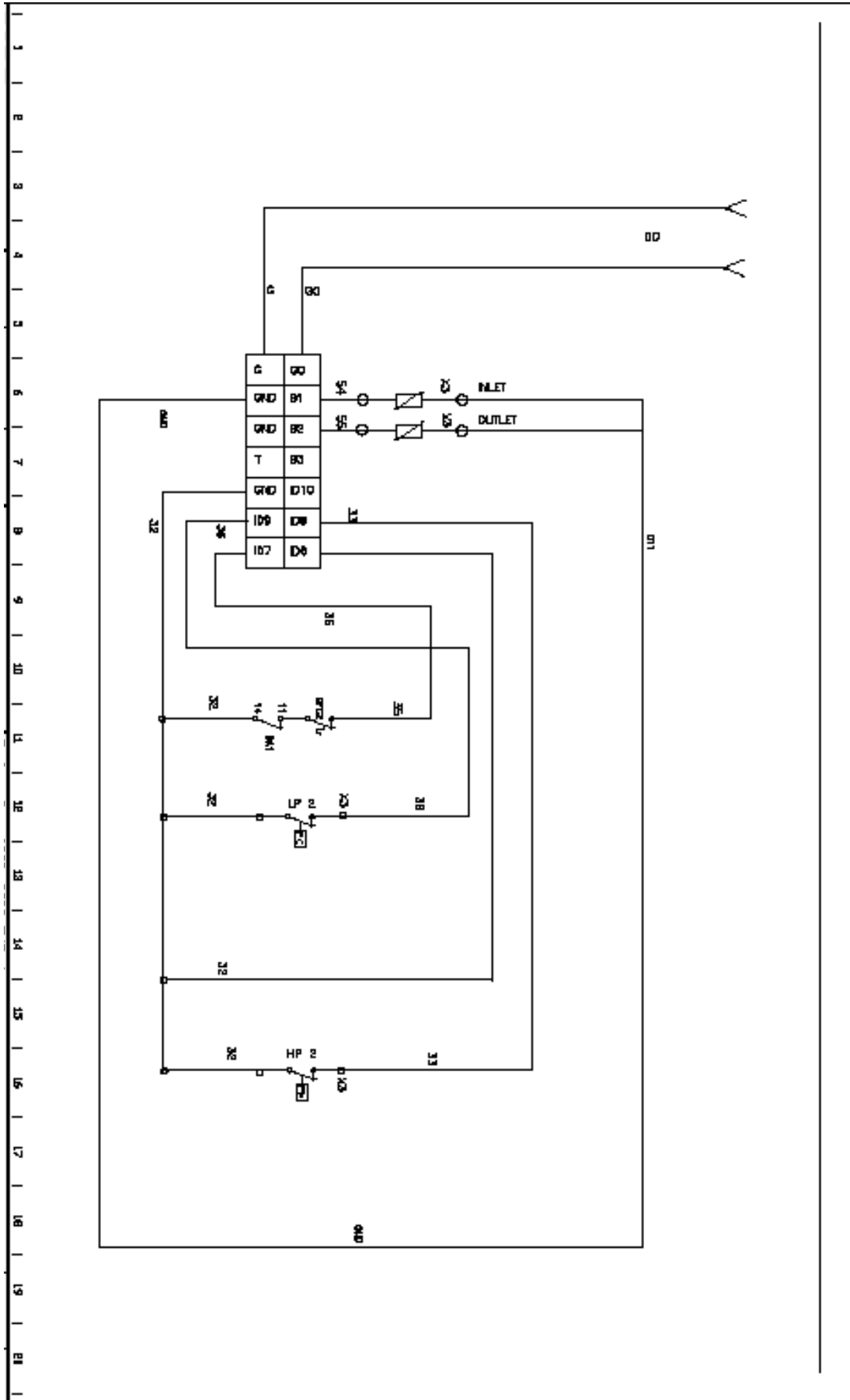
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |





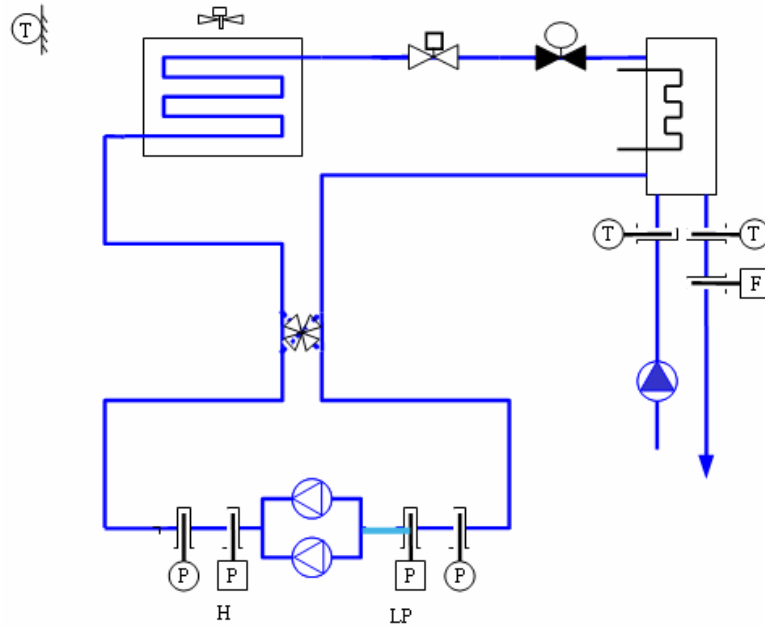




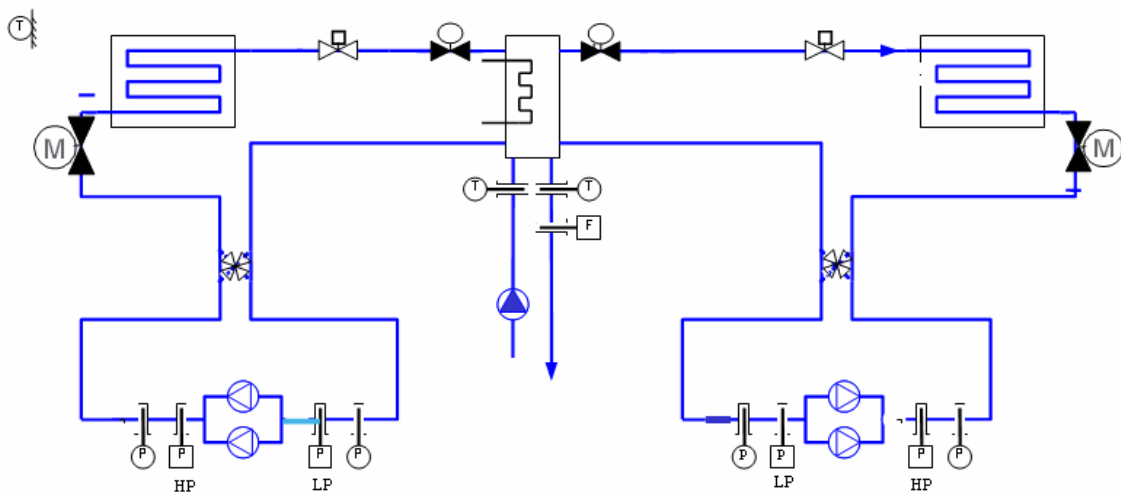


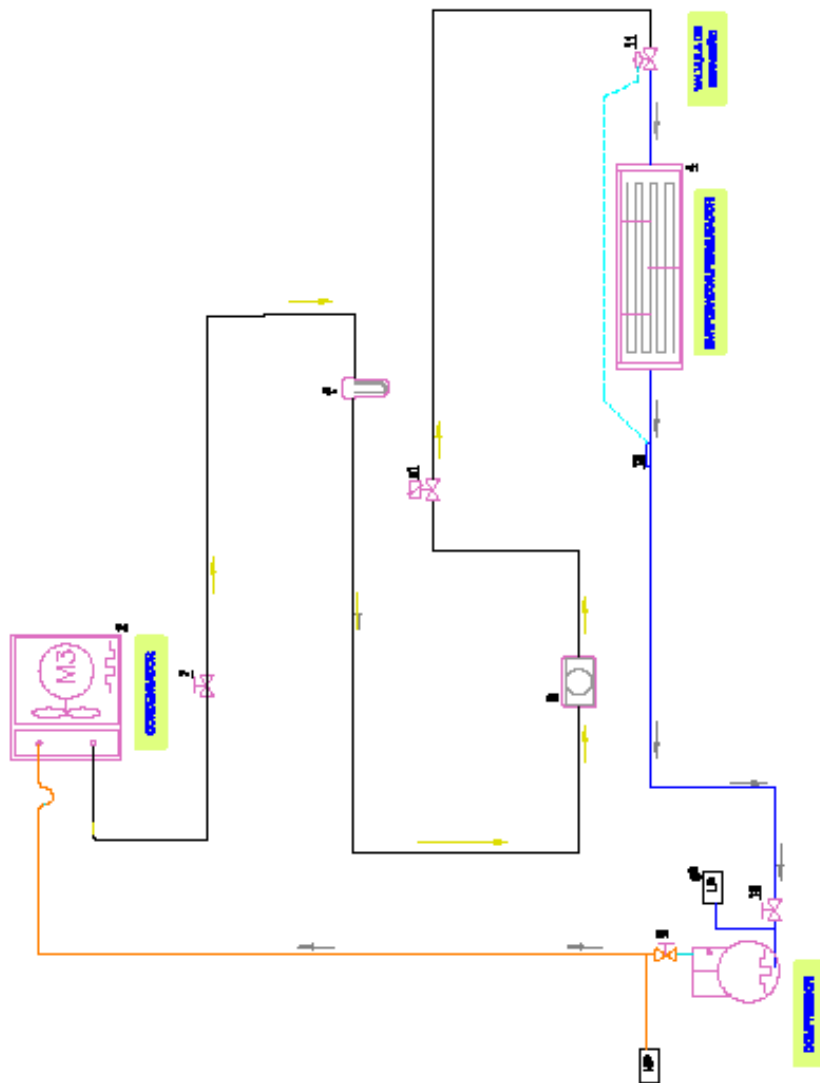
ALARME		protecção compressor	
presostato alta		fusíveis	
presostato baixa		valvula selenoide	
protecção compressor		falta de agua	
protecção ventilador		resistência	
protecção bomba			
interruptor marcha			
Contacto compressor			
Contacto bomba			
Contacto ventilador			
sonda saída			
sonda entrada			

One circuit chiller



Two circuits chiller



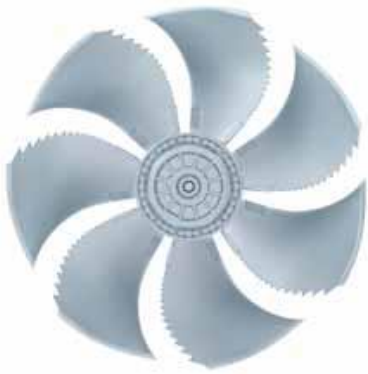


Ventilation

FE2 owl

for three phase alternating current, 6-6 pole

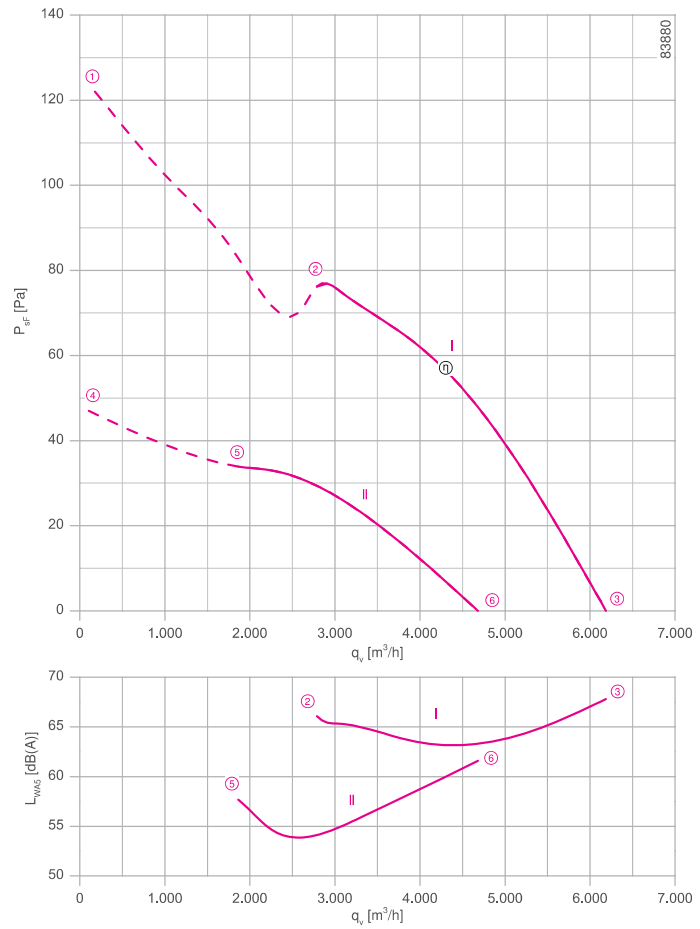
FN 0 5 0 -S D



Description

Motor technology: AC
 Rated voltage U_N : 3~400 V (Δ/Y) $\pm 10\%$ *
 Rated frequency f_N : 50 Hz* (60Hz data available)
 Input power P_i : 290/150 W*
 Rated current I_N : 0.74/0.36 A*
 Rated speed n_N : 880/590 min⁻¹*
 Starting current I_A : 1.50 / 0.40 A
 Current increase ΔI : 0 %
 Thermal class: THCL155*
 Min. permitted ambient temperature $t_{R(min)}$: -40 °C
 Max. permitted ambient temperature $t_{R(max)}$: 70 °C
 Electrical connection: Terminal box
 Number of blades: 7
 Protection class: IP54
 Motor protection: thermal contact
 Blades: Aluminium, uncoated
 Rotor: Aluminium, uncoated
 Conformity: ErP 2015, CE
ErP-data
 Efficiency η_{statA} : 30.1 %
 Efficiency: $N_{actual} = 40.2 / N_{target} = 40\%$ **
 * Rated data
 **ErP 2015

Characteristic curve



Measured in full bell mouth without guard grille in installation type A according to ISO 5801

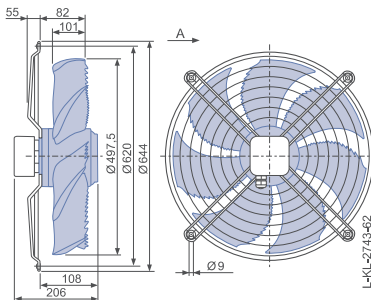
Connection diagram Page 531
 for airflow direction A 1360-108XB
 for airflow direction V 1360-108XA

System components Page 430

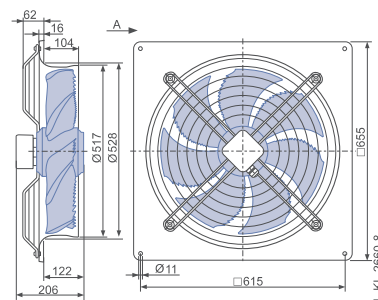
Dimensions mm

Airflow direction A

Design W - axial bolted, mounting for short bell mouth, guard grille suction side

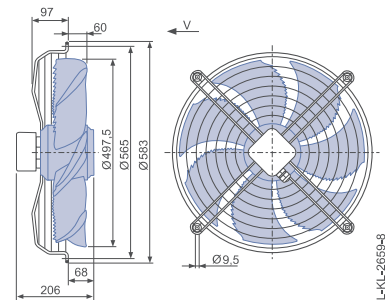


Design Q - square full bell mouth, guard grille suction side



Airflow direction V

Design K - axial bolted, mounted for short bell mouth, guard grille pressure side



FE2owlet Axial fan

for three phase alternating current, 6 pole

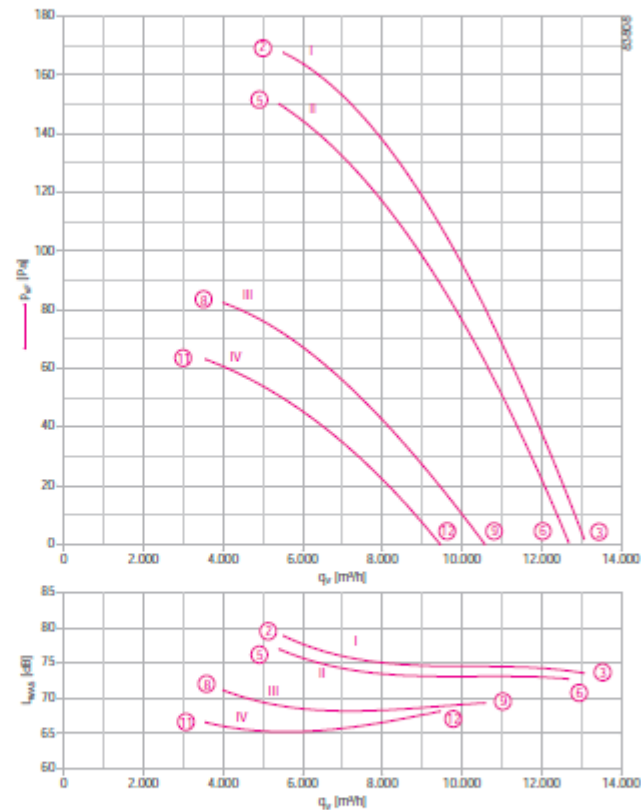
FN063-6D



Description

Motor technology: AC
 Rated voltage U_N :
 3- 230/400 V (Δ/Y) | 265/460 V (Δ/Y) $\pm 10\%$
 Rated frequency f_N : 60 Hz
 Input power P_i : 0.94 kW | 1.00 kW
 Rated current I_N :
 2.80/1.60 A (Δ/Y) | 2.70/1.55 A (Δ/Y)
 Rated speed n_N : 980 min⁻¹ | 1030 min⁻¹
 Starting current I_s : 4.0 A | 4.6 A
 Current increase ΔI : 5 %
 Dynamic pressure: $p_{d0} = 4.6 \cdot 10^{-2} \cdot v_{q0}^2$ [Pa]
 Thermal class: THCL155
 Min. permissible media temperature $t_{\text{perm, min}}$: -40 °C
 Max. permissible media temperature $t_{\text{perm, max}}$: 65 °C | 65 °C
 Number of blades: 7
 Protection class: IP54
 Motor protection: Thermostat switch
 Blades: die-cast aluminium impeller, uncoated
 Motor: die-cast aluminium, uncoated

Characteristic curve

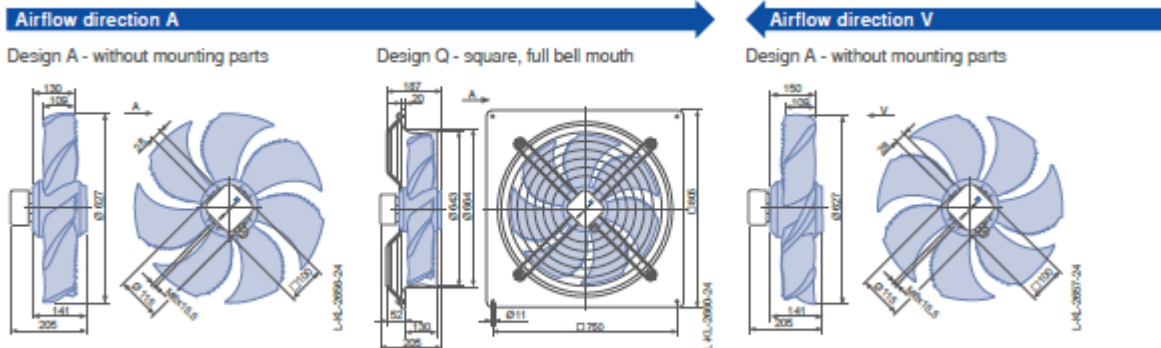


measured in full bell mouth without guard grille in installation type A according to ISO 5801

Connection diagrams Seite 15
 for airflow direction A 1360-106XA
 for airflow direction V 1360-106XB

System components Seite 100

Dimensions [mm]



www.ziehl-abegg.com

FE2owlet Axial fan

for three phase alternating current, 6 pole

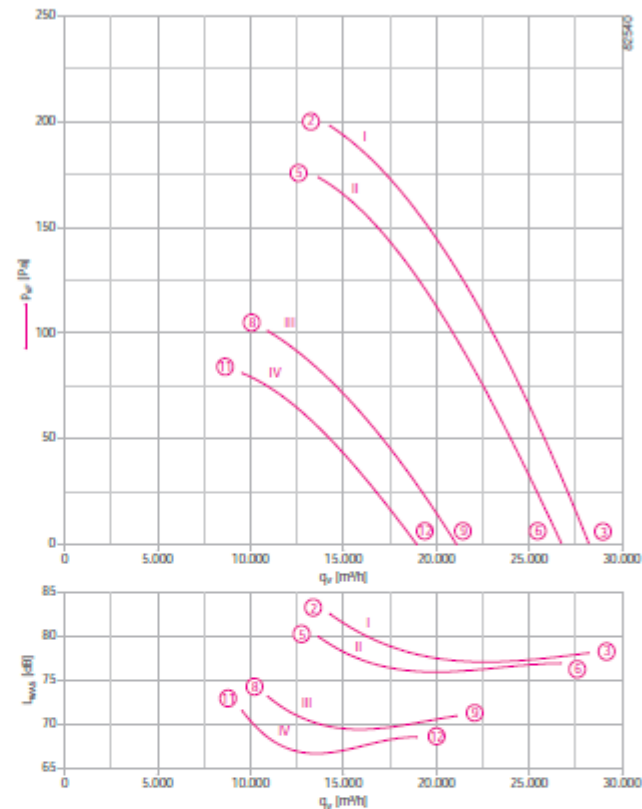
FN080-6D



Description

Motor technology: AC
 Rated voltage U_n :
 3- 230/400 V (Δ/Y) | 265/460 V (Δ/Y) $\pm 10\%$
 Rated frequency f_n : 60 Hz
 Input power P : 2.20 kW | 2.50 kW
 Rated current I_n :
 7.10/4.10 A (Δ/Y) | 7.30/4.20 A (Δ/Y)
 Rated speed n_n : 930 min^{-1} | 990 min^{-1}
 Starting current I_s : 3.2 A | 3.8 A
 Current increase Δ : 0 %
 Dynamic pressure: $p_{d0} = 1.86 \cdot 10^{-2} \cdot q_v$ [Pa]
 Thermal class: THCL155
 Min. permissible media temperature $t_{\text{perm, min}}$: $-40\text{ }^\circ\text{C}$
 Max. permissible media temperature $t_{\text{perm, max}}$: $60\text{ }^\circ\text{C}$ | $55\text{ }^\circ\text{C}$
 Number of blades: 7
 Protection class: IP54
 Motor protection: Thermostat switch
 Blades: die-cast aluminium impeller, uncoated
 Motor: die-cast aluminium, uncoated

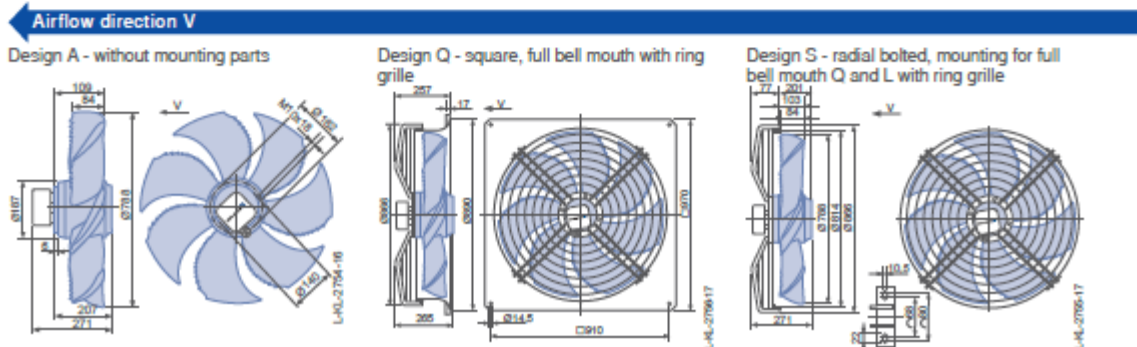
Characteristic curve



Connection diagram for airflow direction V Seite 15
1360-106XA

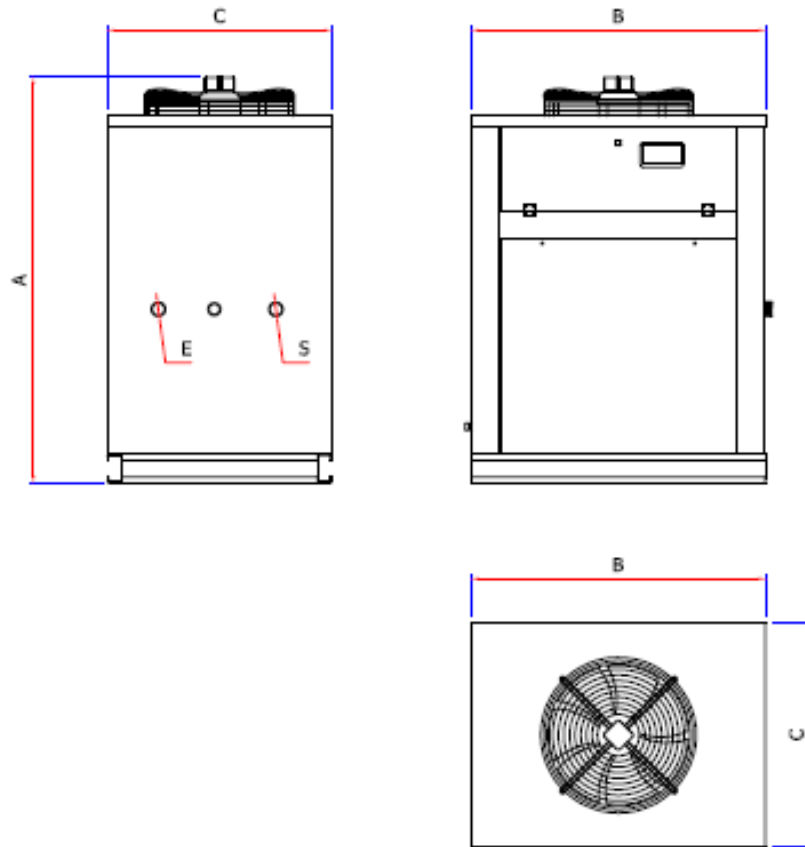
System components Seite 100

Dimensions [mm]



Models and features technical data

Consumption tables and water connection measures



Model	Compressor			Cooling capacity		Fans						
	Nº x cop x A.max			kW +7C +12C				kW	Ap	Ø	M/3 total	Rpm
6	1	4.3	10.78	8	6	Placas/Plate	1	0,72	1.4	500 mm	4.800	870
10	1	4.1	12.51	13	10	Placas/Plate	1	0,72	1.4	500 mm	5.000	870
15	1	4.4	14.82	17	15	Placas/Plate	1	0,72	1.4	500 mm	7.600	870
20	1	4.3	15.79	24	20	Placas/Plate	1	0,72	1.4	500 mm	7.900	870

Model	Evaporator	Weight	Connections	Width	Depth	Height
	Qn m3/h	Kg	E/S	A mm	B mm	C mm
6	1,2	129	1"	900	900	1.300 + 120
10	1,8	206	1.1/4	900	900	1.300 + 120
15	2,4	255	1.1/4	1100	1.100	1.300 + 120

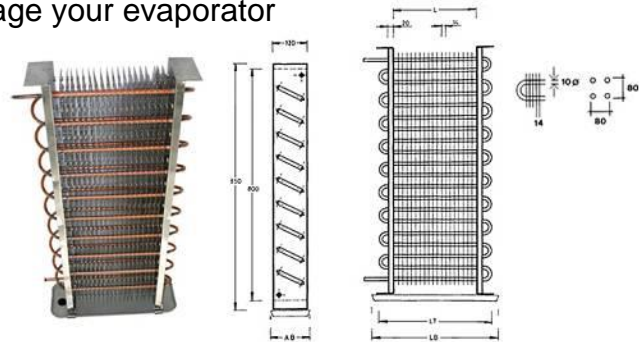
Small resume

Remember!

keep always the condenser clean
don't destroy the fins with a strong air blow
by your air compressor



check the water quality in your tank
keep the evaporator clean by keeping the water in good condition
change the water at least 6 at 6 months of working
never use corrosive chemicals, that could damage your evaporator



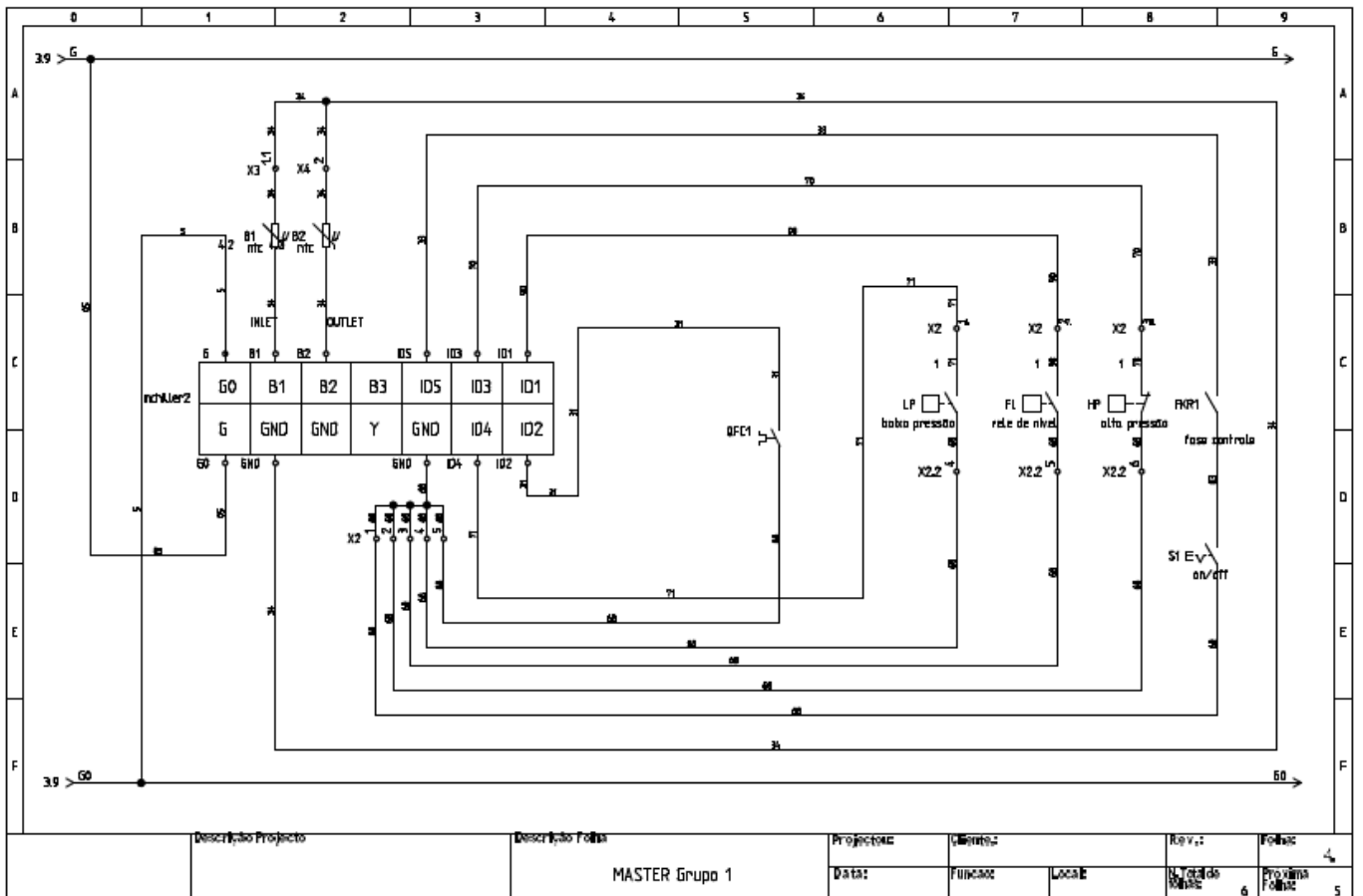
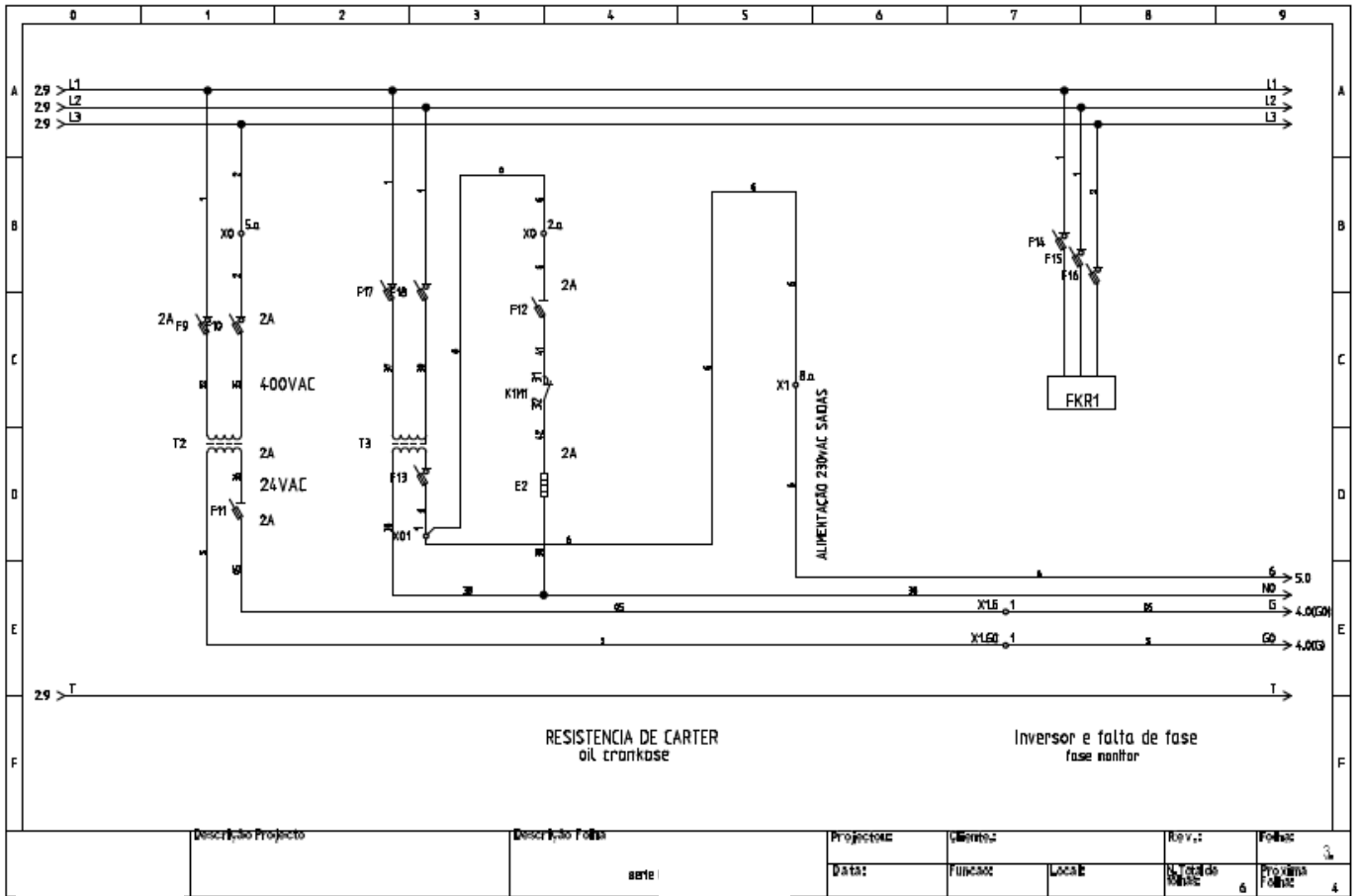
check your compressor regularly
see if the oil is level and do not forget to change the oil at about 40000h of work

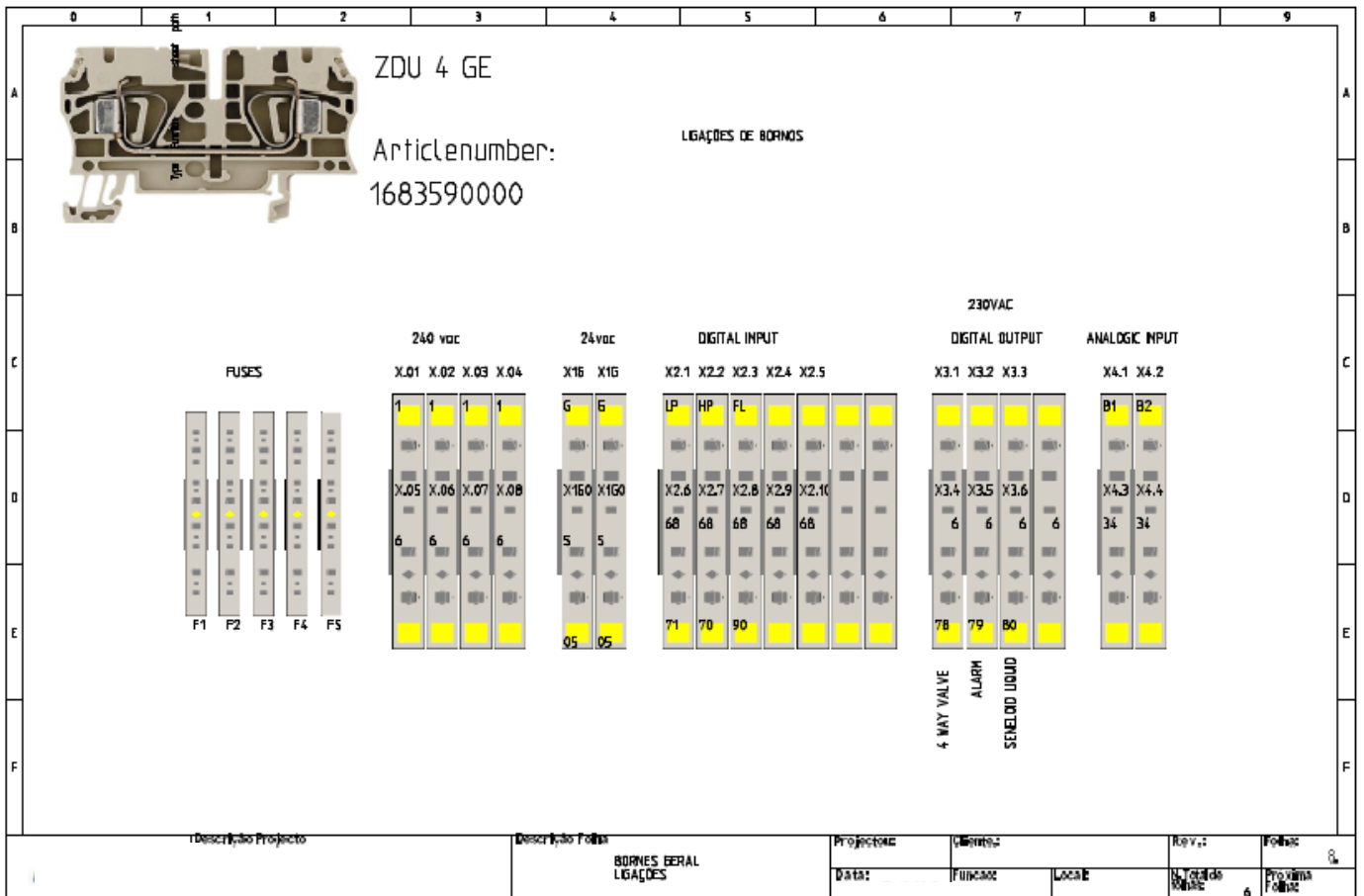
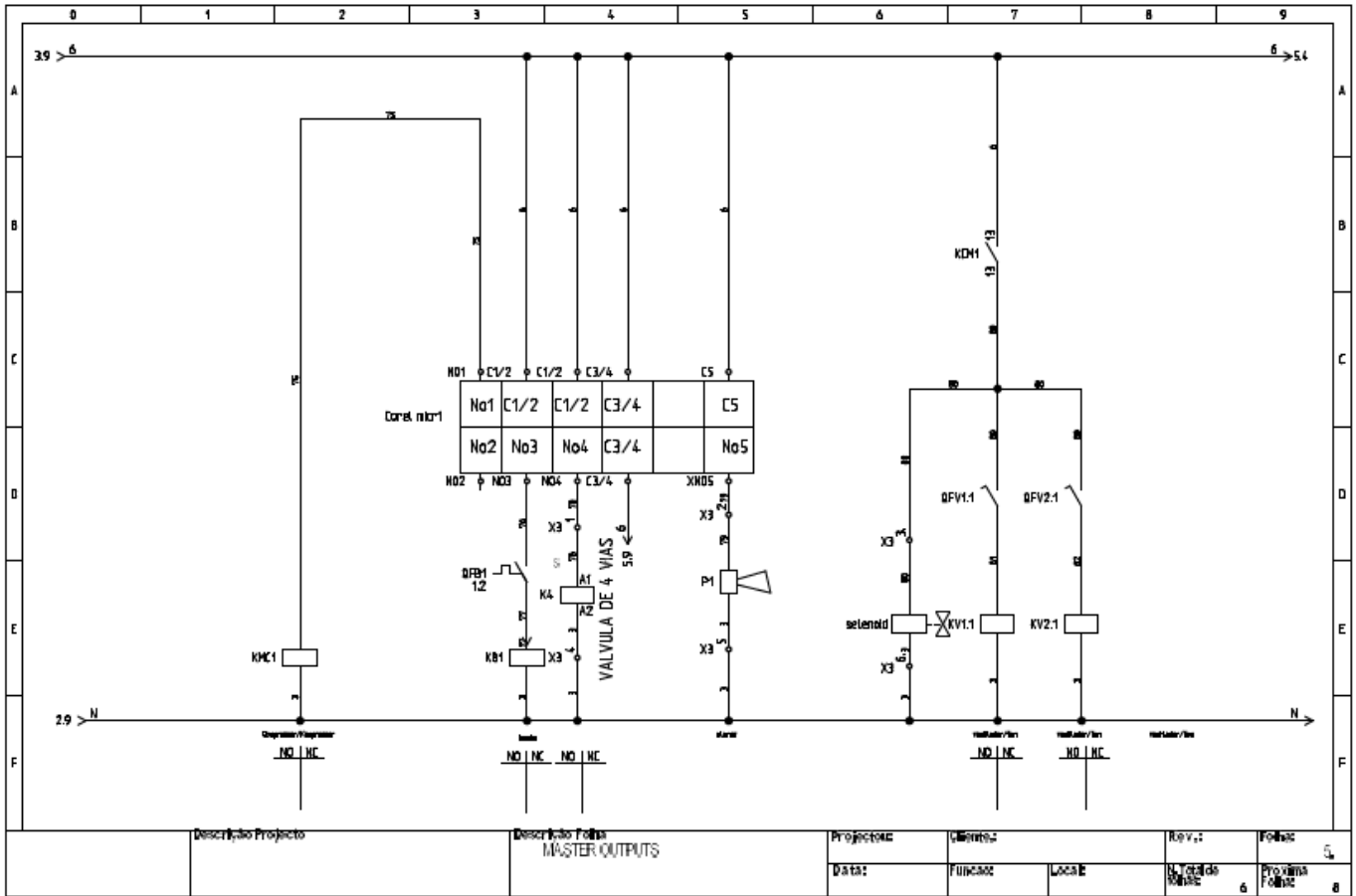
consult the technical services in this situation
check any leakage hypothesis regularly

make a regular leak inspection:
6 months for less than 30kg of gas~
12 months for more than 30kg of gas

Never change the type of gas used on the system







INFORMATIONS

The machine's identification nameplate is situated in a clearly visible location and provides its main

identification data:

- CE marking
- Manufacturer's name and address
- Machine model
- Serial number,
- Year of manufacture
- Machine electrical information
- Voltage Power supply frequency
- Installed power
- Auxiliary voltage Insulation voltage
- Type of gas
- Cooling flow rate (water 7°C – air 35°C)

The identification nameplate shown below refers to machinery for which compliance to Directive 97/23/EC on high-pressure equipment (PED) is not required; for other machines, the Manufacturer provides a booklet attached to the manual.

SAFETY REGULATIONS

- unless continuous operation is not required, the system must be powered off;
- before carrying out electrical maintenance observe the following:
make certain the maintenance technician is not carrying objects which can act as conductors; inspect the work area and make certain the floor is clean and dry; make certain work instruments to be used are suitable and in a good condition to allow for safe intervention;
- measurement instruments must be periodically calibrated;
- check the procedure of the operation to be carried out before starting, checking the electric diagram to see how the system is structured;
- while maintenance operations are being carried out, make certain:
the technician knows which circuits are high voltage no resistance measures are carried out in live circuits one hand is used to carry out operations on powered circuits the instrument terminal must be grounded before carrying out operations on powered circuits
- maintenance operations can be considered complete only when all components have been reinstalled on the unit.

SAFETY MEASURES ON COOLING CIRCUITS

The coolant used for this installation can be dangerous if not used correctly; it is therefore necessary to take the following precautions when handling this substance:

- Never unload, stock or use the coolant liquid in the presence of flames, since combustion will produce a noxious gas (phosgene) should it come into contact with flames.
- The cooling liquid must not come into contact with personnel's eyes;
- The cooling liquid must not come into contact with personnel's skin; if contact occurs, wounds must be treated using the same methods as for frostbite;
- Avoid high concentrations of cooling liquid, which can cause suffocation; if such a situation should occur, the person suffocating must be evacuated from the area and artificial respiration must be provided.

DANGERS DERIVING FROM GAS LEAKAGE IN CASE OF FIRE

Since the machine is typically installed away from heat sources and inflammable/explosive materials, the possibility of it being involved in a fire is very remote. Overheating due to natural events, such as sunlight cannot raise the temperature beyond 60° C inside the refrigerating circuit, and therefore below its preset TS and PS. Full observance of the machine's positioning and installation instructions provided herein is highly recommended.

DANGERS DERIVING WATER-BASED FLUIDS IN CIRCULATION

If fluid leaks, it poses the danger of coming into contact with electrical parts which are not suitably protected against contact with the fluid.

Tubes inside the chiller unit are capable of sustaining a pressure of up to 10-bar.

Pumps employed can attain a pressure of 2.5 - 8 bar.

Fluid leaks may occur if regular maintenance is not carried out on tube fastening systems.

WHEN TO DISCONNECT ELECTRICAL POWER

Disconnect the power supply immediately using the switch upstream from the machine's power line when:

- the electrical power cable is worn or damaged;
- maintenance operations or repairs are being carried out on the machine;
- the machine is being cleaned.

MAINTENANCE SAFETY ADVICE

- wear safety gloves in carrying out maintenance work;
- always disconnect the electrical power supply before opening the safety panels;
- wait a few minutes for the machine's internal parts to cool down before opening the safety panels;
- do not tamper with faucets on the gas/water circuit;
- use appropriate warning signs when the machine is shut down due to maintenance or repairs;
- use original spare parts exclusively;
- use appropriate electric and hydraulic connections.

USER INFORMATION

1 - The manufacturer reserves the right to update subsequent production and its operating manuals without the obligation to update previous production and manuals.

2 - The specifications of materials may be changed at any time according to technological evolution, without prior notice.

3 - Should the machine supplied be devoid of electrical control and safety elements (electrical panel on board the machine), the Manufacturer declines any responsibility for problems regarding safety measures arising as a result of electrical parts non-conforming with current standards and regulations. In any case, all responsibility for ensuring appropriate standards and legislation for electrical equipment on the machine lies with the Customer, who must make certain that this work is carried out correctly and in accordance to current standards.

4 - The manufacturer shall not be held responsible for damage caused by any of the following:

- ✘ incorrect machine use
- ✘ use by untrained personnel
- ✘ use which is contrary to the indications established in this manual
- ✘ use which fails to comply with current standards and legislation
- ✘ use with a faulty power line supply
- ✘ use with serious inadequacies in foreseen maintenance
- ✘ use with non-authorized changes and /or modifications; any modifications must be explicitly approved by the manufacturer in writing
- ✘ use with non-original spare parts, or parts not designed for the machine
- ✘ use with a partial or complete disregard for the instructions contained in this manual

5 - The general sales warranty shall be declared void in the following cases:

- incorrect machine use
- mishandling of the machine
- poor conservation of the machine
- problems arising from incorrect machine use
- use by untrained personnel
- exceeding the machine's performance limits
- excessive use of mechanical and / or electrical parts
- machine use under unsuitable or dangerous conditions as described at point 4.

Requests for extra copies of this instruction manual must be made to **the manufacturer**, demonstrating proof of purchase.