



# Installation, Operation & Maintenance

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## Introduction

The professionals involved in field installation, initial start-up procedures, operation and maintenance of Aquasmart® 30EV / 30EX liquid chiller units - should be familiar with the instruction manual, and specific design data of the installation site. The 30E units are designed to provide a high level of safety during installation, start-up, operation and maintenance, with proper security and reliability, as long as it is operated in accordance with its specifications.

This manual provides general information necessary to familiarize you with the control system before starting the start-up procedures. The procedures in this manual are organized according to the required sequence for machine installation, start-up, operation and maintenance. Make sure you have understood and followed all procedures and safety precautions that are part of the machine instructions, as well as those listed in this guide.

## 1. Safety & Handling

Installing, starting and servicing this equipment may be dangerous due to system pressures, the electrical components and the equipment installation site. Only service mechanics and skilled and trained installers should install, start up, and repair this equipment.

### 1.1. Safety

Aquasmart® 30EV / 30EX liquid chillers are designed to provide a safe and reliable service when operated within the design specifications. However, due to system pressure, electrical components and unit movement, some aspects of the installation, start-up and maintenance should be observed.

When working on the equipment, read all warnings specified in the manual and on the labels affixed to the unit, follow all applicable safety regulations and wear suitable protective clothing and equipment.

# 1. Safety & Handling (cont.)



## THINK SAFE!

### ATTENTION

- Observe all safety codes.
- Use Personal Protective Equipment (PPE) suitable for the work to be done. (E.g.: Wear safety goggles and gloves)
- Never put your hand inside the unit while the fan is running.
- Protect unit axial fan discharge if unauthorized persons have easy access to it.
- Disconnect the power supply before working on the unit to prevent accidents. Leave a warning that the unit is in service.

### IMPORTANT

This equipment generates, uses and can radiate radio frequency and, if not installed and used in accordance with these instructions, this equipment can cause radio interference.

Refer to the applicable Codes and / or Standards for on-site installation to ensure that the electrical wiring complies with the standards and requirements specified.

### WARNING

Electrical shock can cause injury or death. Turn off the power of this equipment during the installation. There may be more than one disconnect switch. Put signs on all disconnection spots to warn others not to restore energy until the job is completed.

### DANGER

NEVER use open flame to detect leaks in the plant or in the units. Use the recommended equipment and procedures to test for leaks.

NEVER compress air using the unit compressor.

Failure to follow these instructions can cause potential damage to the product, the installation and the physical integrity of persons who are nearby during the procedure(s).

### Reminders:

1. Keep a suitable fire extinguisher near the work site. Check the fire extinguisher regularly to make sure it is fully charged and working perfectly.
2. Use dry nitrogen to pressurize and check the system for leaks. Always use a good regulator. Be careful not to exceed 3790 kPa (550 psig) of test pressure on airtight compressors.
3. Use appropriate Personal Protective Equipment (PPE) when you need to remove the system refrigerant.

### **Installation safety considerations**

After receiving it, when the unit is ready to be installed or reinstalled, and before its start-up, check for damages. Make sure the refrigerant circuit(s) is (are) intact. Mainly, ensure that components or pipes have not changed position (e.g. after a crash). If in doubt, test for leaks and check with the manufacturer that the circuit has not been damaged. If damage is detected upon receipt, complain to the company that sent the unit.

Do not remove the frame or the packaging until the unit is in its final position. These units can be moved with a "fork" type car, as long as the booms (forks) are positioned in the correct location and direction on the unit.

The units can also be lifted with hooks, using only the lifting points marked at the four corners of the unit base.

These units are not designed to be lifted from above. Use the hooks with the correct capacity, and always follow the lifting instructions specified in the certified drawings supplied with the unit.

Safety will only be guaranteed if these instructions are carefully observed. If they are not, there are risks of material damage or personal injury.

Never cover any safety devices.

Make sure the valve(s) if used (s) in the cooling circuit is installed correctly before operating the unit (the valves are not systematically installed in the units, but this may be required by certain national safety codes, depending on the destination country).

Make sure that no refrigerant leaks from the safety valves into the building. Relief valve outlets should be directed to the outside. Refrigerant accumulation in an enclosed space can displace oxygen and cause asphyxiation or explosions. The safety valve has a threaded connection 7/8" UNF (see FIG. 1).

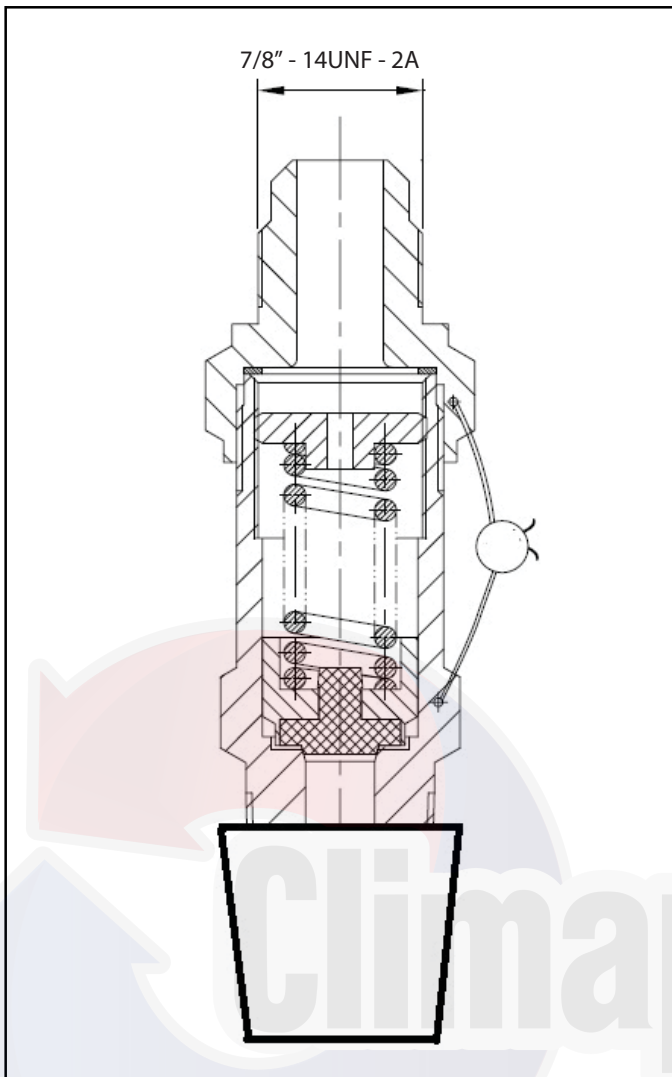


FIG. 1 - Safety Valve

Inhalation of high concentrations of vapor is harmful and may cause heart arrhythmia, unconsciousness or death. Vapor is heavier than air and reduces the amount of oxygen available for breathing. These products can cause irritation to eyes and skin. Products in a state of decomposition are hazardous.

### Equipment and components under pressure

These products incorporate equipment or components under pressure, manufactured by Carrier or other manufacturers. We recommend that you consult the appropriate national association or the owner of the components and equipment under pressure (statements, re-qualification, retesting, etc.). The features of this equipment / components are specified on the nameplate or in the required documentation provided with the products.

### Safe maintenance considerations

Engineers working on electrical or cooling components must be authorized and fully prepared for such (trained and qualified electricians in accordance with local regulations).

All repairs made to refrigerant circuits must be performed by trained technicians, who are fully qualified to work with these units. This person should be familiar with both the equipment and its installation. All welding operations must be performed by qualified experts.

Never work on a unit that is still powered on. Never work on any of the electrical components until the power supply has been cut off by turning off the switch or power box breaker. Use a locking system to prevent powering on during service.

If the work is interrupted, make sure that all circuits are turned off before restarting it. Once a year check if the high-pressure switch is connected properly and if it turns off at the correct value. (Disconnect between 635 and 665 PSI). At least once a year thoroughly inspect the protection devices (valves and fuses). If the machine operates in a corrosive environment, inspect the safety devices more often. Regularly perform a leak test and if you find any, repair it immediately.

### Safe repairs considerations

All installation parts should be serviced by the personnel in charge in order to avoid damage or injury.

Defects and leaks must be repaired immediately.

In the event of a leak, remove all refrigerant, repair the leak detected and recharge the circuit with full charge of the specified refrigerant, as indicated on the unit nameplate. Do not exceed the charge. Charge only liquid refrigerant R-410A or in the liquid line. Make sure you are using the correct refrigerant type before recharging the unit.

Using other than the original refrigerant affects machine operation and may even damage the compressors.

Compressors operate with R410-A refrigerant and must be supplied with oil, according to the unit type (fixed or variable). See CTG table on page 7.

Do not use oxygen in the purge lines or to pressurize a machine under any circumstance. Oxygen gas reacts violently with oil, grease or other common substances.

Do not exceed the specified maximum operating pressures. Check the maximum and minimum test pressures allowed in the operation manual and the pressures given on the unit nameplate.

Do not use air for leak testing. Use only refrigerant or dry nitrogen. Do not weld or use torch in the refrigerant lines or any refrigerant circuit component until it (liquid or vapor) has been removed from chiller. Steam traces can be moved with the air of dry nitrogen. Refrigerant in contact with an open flame produces toxic gases.

# 1. Safety & Handling (cont.)



The necessary protective equipment, and fire extinguishers suitable for the system and type of refrigerant used must be accessible.

Avoid spilling liquid refrigerant on skin or eyes. Use goggles. If the skin is affected, wash with soap and water. If the refrigerant comes into contact with the eyes, rinse immediately with plenty of water and see a doctor.

Never apply open flame or active steam to a refrigerant container, as this may cause a dangerous pressure increase. If you need to heat the refrigerant, use only hot water.

Do not reuse disposable cylinders or try to refill them. It is dangerous and illegal. When cylinders are empty, relief the pressure of the remaining gas, and dispose them according to local regulations. Do not incinerate.

Do not attempt to remove components or refrigerant circuit accessories, while the machine is pressurized or running. Make sure that the pressure is 0 kPa before removing components or opening a circuit.

Do not attempt to repair or retrofit any safety devices when they are corroded or there is build-up of unknown material (rust, dirt, limescale, etc.) within the body or valve mechanism. Replace the device as necessary. Do not install safety valves in series or reversed.

## ⚠ ATTENTION

Do not step on refrigerant lines. They can break because of the weight and release refrigerant, causing personal injuries. Never climb on a machine. Use a platform or scaffolding to work on a higher plane.

Use mechanical equipment (crane, lift, etc.) to lift or move heavy equipment such as compressors or plate heat exchangers. With lighter components, use lifting equipment when there is risk of slipping or loss of balance.

Use only original spare parts for any repair or replacement of components. See the list of replacement parts that corresponds to original equipment specifications.

Close the inlet and outlet water shutoff valves, and evacuate the hydronic circuit of the unit before working on components (screen filter, pump, water flow switch, etc.).

Regularly inspect all valves, fittings and pipes of the hydronic and refrigerant circuits to make sure that they do not present corrosion or signs of leakage.

## 1.2. Transportation

The current standards for transportation, handling and lifting (in the latest available revision) shall be observed:

Also observe the following general recommendations:

- Avoid damaging the equipment by not removing it from its packaging until it reaches the final installation site.
- For equipment installation or storage, the base floor must be levelled.
- Avoid ropes, chains or steel cables from touching the units to prevent damaging them.
- Do not rock the unit during transport and do not tilt it more than 15° from the vertical.
- Follow the stacking limit indicated in the unit packages.

## ⚠ ATTENTION

Check the weights (Tables 1) and dimensions of the units (sub-item 3.5 - Dimensions) to ensure that your handling devices can support the units safely.

## 1.3. Handling

Handling of forklifts shall be carried out in accordance with the following recommendations:

- The forks of the forklift should be inserted into the base of the wooden package in the existing bay.
- Make sure the forks are long enough to support both sides of the package. If necessary, use stretchers (on forks) to prevent the forks from touching any part of the product.
- Special attention is required for possible product components or parts that may be protruding from the package to prevent damaging them during handling.

## ⚠ IMPORTANT

Make sure that all unit panels are properly secured before moving them.

### 1.4. Lifting

The lifting must generally be carried out with at least 4 points of support.

Also note the following requirements:

- Safety procedures relating to lifting operations;
- If there is damage to the packaging or equipment that may affect lifting or safety in the strapping process;
- Before hoisting, test the stability and balance of the assembly. Avoid untwisted twisting or lifting.

To hoist/lift the units, a beam (or any similar structure) should be used at the ends and only at the ends, as shown in Figures 2 and 3.

The angle for the cables (or chains) should be as shown in figure 3, the length of the cables being estimated by this angle.



FIG. 2 - Hoisting/Lifting the 30EV / 30EX

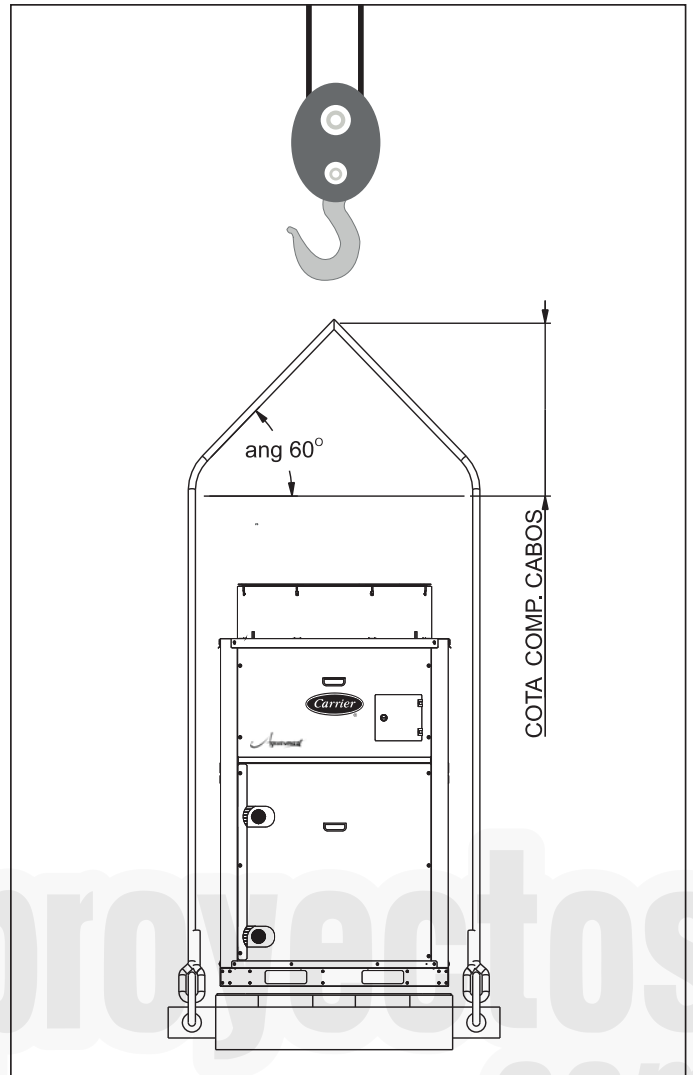


FIG. 3 - Lifting angle

#### ⚠ IMPORTANT

- Be careful when handling, suspending and positioning bulky equipment.
- Lift and lay the equipment carefully on the floor.

#### ⚠ WARNING

Never push or lift with lever any of the panels that surround the unit. Only the frame base is designed to withstand such pressures.

#### ⚠ CAUTION

Before lifting the unit, check that all the panels are securely locked. Lift and lower the unit very carefully. Shaking and rocking the unit can damage it and affect its function.

The 30E units can be lifted. The coils must be protected while the unit is being transported or handled. Use expansion brackets or bars to distribute the hooks above the unit. Do not rock a unit more than 15°.

# 1. Safety & Handling (cont.)



## 1.5. Unit Inspection and Receiving

a) Check all packages received for missing or damaged parts, and if they correspond to the shipping note/invoice. Remove the unit from its packaging after reaching the final location of installation and remove all of its protective covers. Avoid destroying the packaging, as it may cover the appliance, protecting it from dust, etc., until the work and / or installation is complete and the system ready for operation. If the unit has been damaged, notify the shipping company and Carrier immediately.

b) Check that the available power supply at the work site conforms with the equipment electrical features, as specified on the unit nameplate

The nameplate is located on the outside of the 30EV & 30EX, as shown in Figure 4.

c) Confirm that all accessories ordered for on-site installation have been delivered, and are complete and undamaged.

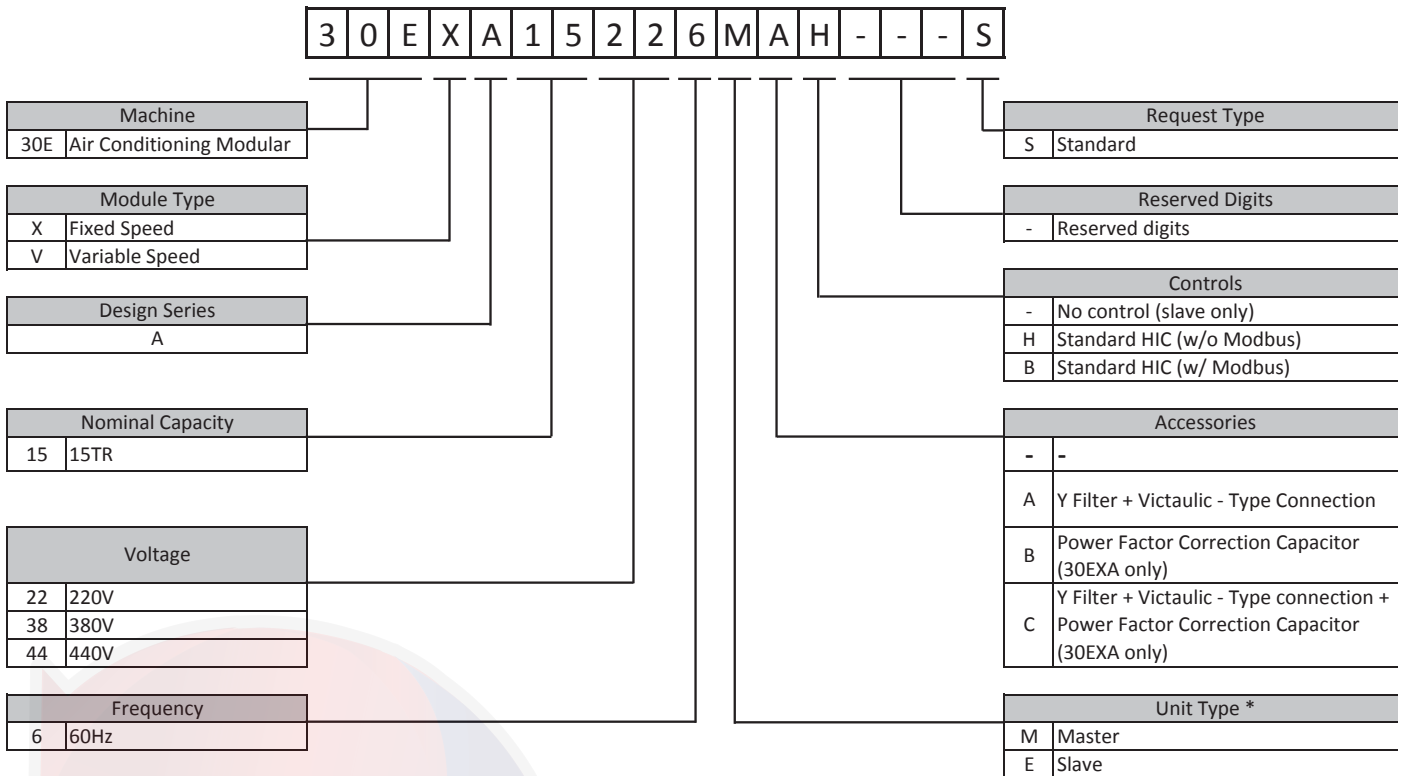
d) Do not allow the units to be exposed to adverse weather or work site accidents, and arrange for immediate transportation to the site of installation or other safe location.

30E AQUASMART SCROLL CHILLER						
Springer Carrier Ltda. Rua(Street) Berto Círio, 521 - B. São Luiz CNPJ 10.948.651/0001-61- CEP (ZIP CODE) 92420-030 Canoas - RS - Brasil (Brazil) - Tel.(Phone):(5551)3477-9500						
Modelo Model	30EVA15226M-H---S					
Número Série Serial Number						
Tipo Type	INVERTER					
Alimentação Power Supply	Tensão nom Nom voltage	220	V	Frequencia Frequency	60	Hz
	Tensão max Max voltage	198	V	Fases Phase	3	-
	Tensão min Min voltage	242	V	Potencia max Max power	0	kW
	Comando Command	24	V	Corrente max Max current	0	kW
Refrigerante Refrigerant	R-410a			Carga charge	12,3	kg
					27,2	lb
Pressão de teste Pressure test	Alta high	4481	kPa	Baixa low	3240	kPa
		650	psi		470	psi
Motores Motors		Compressor A		Compressor B	Ventilador Fan	
Corrente Nominal Nominal current	A	0		0	0	
Corrente Partida Trip current	A	NA - Inverter		0	NA - Inverter	
Potência Nominal Nominal power	kW	0		0	1,15	
Potência Máxima Max power	kW	0		0	1,15	
Peso em operação weight in operation	302,0		kg	Ind. Brasileira Made in Brazil		
	665,7		lb			
11780081			REV.		-	

FIG. 4 - Nameplate

**NOTE**  
The letters indicate the variables of each model.

## 2. Nomenclature and General Technical Features



\* Inverter unit will always be the master machine.

### Legend:

**BC1** – Communication terminals

**BC2** – Field terminals

**CMCT** – Condensator Middle Temperature Sensor

**DIST** – Discharge Temperature Sensor

**DPS** – Differential Pressure Switch

**FSC** – Fixed Compressor

**OAT** – Environment Temperature Sensor

**RLWT** – System Water Outlet Temperature Sensor

**REWT** – System Water Inlet Temperature Sensor

**SST** – Saturated Suction Temperature Sensor

**SUCT** – Suction Temperature Sensor

**VSC** – Inverter Compressor

**ULWT** – Unit Water Outlet Temperature Sensor

**FLWD** – Difference of temperature between system inlet and outlet at full load

**WP** – Water Pump

**WV** – Water Valve

**WVSCSDT** – Water valve opening delay

**WFC** – Flow switch sensor

**FP** – Power factor

**CFP** – Power Factor Correction Capacitor

**Table 1 - Operating Limits**

	Unit	30EV_15	30EX_15
Minimum flow on evaporator	m <sup>3</sup> /h	4,2	4,4
Maximum flow on evaporator	m <sup>3</sup> /h	15,3	18,2
Maximum outdoor temperature	°C	45	45
Minimum outdoor temperature	°C	10	10
Maximum REWT (evaporator) <sup>1</sup>	°C	35	35
Minimum REWT (evaporator) <sup>1</sup>	°C	6	6
Maximum ULWT (evaporator) <sup>2</sup>	°C	35	35
Minimum ULWT (evaporator) <sup>2</sup>	°C	5	5
Minimum temperature delta <sup>3</sup>	°C	3	3
Maximum temperature delta <sup>3</sup>	°C	10	10

### Notes:

- For continuous operation, the maximum temperature delta (REWT-ULWT) should not exceed 10 ° C.

<sup>1</sup> For continuous operation, REWT must be within the range of 8.0 ° C to 20.0 ° C.

<sup>2</sup> The standard control setpoint is 5 ° to 14 ° C. This value may vary depending on the FLWD of the project and the unit number configured in the control. In continuous operation at full load the maximum ULWT shall not exceed 15.0 ° C. For more details refer to the Attachment III in this manual.

<sup>3</sup> Refer to the Technical Catalogue - Performance Data section for case-by-case limits.

## 2. Nomenclature and General Technical Features (cont.)



**Table 2a - General Technical Features (SI)**

			30EVA15	30EXA15
Nominal Capacity		TR	15	15
Effective Capacity		kW	42,2	51,4
COP (full load)		-	3,1	3,1
IPLV		-	5,1	5,0
Capacity control range (per unit)		%	16 to 100%	50 / 100%
Power supply		-	220V / 380V / 440V (three-phase)	
Control - Water pump and on/off valves		-	24 VCA	
Flow Switch / Remote Alarm power supply		-	24VCA/220VCA	
Number of circuits		-	1 (tandem)	
Compressor	Type	-	Scroll	
	Quantity	-	2	
	Nominal speed (60Hz)	rpm	3500 (Fixed speed)	
	Oil charge	L	1.70 (FV68S -Polyvinyl Ether)	1.65 (Polyol Ester)
	Recommended oil	-	Daphne Hermetic Oil FVC 68D	Copeland Ultra 22CC
	Crank-case resistor	W	70	
Coil	Face area	m <sup>2</sup>	3,05	
	Number of Rows	-	2	
	Tube diameter	mm (in)	9,5 (3/8)	
	Fins per inch	FPI	20	
	Type	-	Pre-coated (Gold Fin) corrugated aluminum fins and internally grooved copper tubes	
Fan	Type / Quantity	-	Axial / 1	
	Rotation	RPM	Variable between 160 – 860	
	Flow rate	m <sup>3</sup> /h	3000 - 16000	
	Static Pressure Available	mmCA	0	
	Motor quantity / type	-	1 / BLDC	
	Motor power	W	850	
Evaporator	Type	-	Exchanger to stainless brazed plates	
	Water volume	L	7	
	Nominal flow	m <sup>3</sup> /h	7,2	
	Maximum pressure on the water side	kPa	1000	
	Type / Diameter Fittings	mm (in)	Victaulic 50.8 type (2 in)	
Refrigerant – Type		-	R-410A	
Refrigerant – Quantity		kg	12,3	12
Weight (without package)		kg	302	292
Dimensions (WxHxD)		mm	990 x 860 x 1743	

### NOTES:

1. Rated according to AHRI\* standard 550/590 at default nominal value conditions.
2. The default nominal value conditions are as follows:

#### Evaporator conditions:

- Water outlet temperature: 6.7°C (44°F) Water inlet temperature: 12.2°C (54°F)
- Fouling factor: 0,000018 m<sup>2</sup> x °C/W (0.00010 h x ft<sup>2</sup> °F/BTU)

#### Condenser conditions:

- Outside air temperature: 35°C (95°F)

\* Air Conditioning, Heating and Refrigeration Institute - USA.



**Table 2b - General Technical Features (English)**

			30EVA15	30EXA15
Nominal Capacity	Tons		15	15
Effective Capacity	kW		42,2	51,4
COP (full load)	-		3,1	3,1
IPLV	-		5,1	5,0
Capacity control range (per unit)	%		16 to 100%	50 / 100%
Power supply	-		220V / 380V / 440V (three-phase)	
Control - Water pump and on/off valves	-		24 VCA	
Flow Switch / Remote Alarm power supply	-		24VCA/220VCA	
Number of circuits	-		1 (tandem)	
Compressor	Type	-	Scroll	
	Quantity	-	2	
	Nominal speed (60Hz)	rpm	3500 (Fixed speed)	
	Oil charge	gal	0.45 (FV68S -Polyvinyl Ether)	0.44 (Polyol Ester)
	Recommended oil	-	Daphne Hermetic Oil FVC 68D	Copeland Ultra 22CC
	Crank-case resistor	W	70	
Coil	Face area	ft <sup>2</sup>	32,83	
	Number of Rows	-	2	
	Tube diameter	(in) mm	3/8 (9,5)	
	Fins per inch	FPI	20	
	Type	-	Pre-coated (Gold Fin) corrugated aluminum fins and internally grooved copper tubes	
Fan	Type / Quantity	-	Axial / 1	
	Rotation	rpm	Variable between 160 – 860	
	Flow rate	cfm	1765,7 - 9417,2	
	Static Pressure Available	mmCA	0	
	Motor quantity / type	-	1 / BLDC	
	Motor power	HP	1,14	
Evaporator	Type	-	Exchanger to stainless brazed plates	
	Water volume	gal	1,85	
	Nominal flow	cfm	4,24	
	Maximum pressure on the water side	psig	145	
	Type / Diameter Fittings	mm (in)	Victaulic 50.8 type (2 in)	
Refrigerant – Type	-	R-410A		
Refrigerant – Quantity	lb	27,1	26,4	
Weight (without package)	lb	665,8	643,7	
Dimensions (WxHxD)	in	38,9 x 33,8 x 68,6		

**NOTES:**

1. Rated according to AHRI\* standard 550/590 at default nominal value conditions.
2. The default nominal value conditions are as follows:

*Evaporator conditions:*

- Water outlet temperature: 6.7°C (44°F) Water inlet temperature: 12.2°C (54°F)
- Fouling factor: 0,000018 m<sup>2</sup> x °C/W (0.00010 h x ft<sup>2</sup> °F/BTU)

*Condenser conditions:*

- Outside air temperature: 35°C (95°F)

\* Air Conditioning, Heating and Refrigeration Institute - USA.

## 2. Nomenclature and General Technical Features (cont.)



**Table 3a - Inverter Systems**

In an Inverter system, the Inverter module will always be the master machine.

	MODELS	Nominal Capacity (TR)	Sequence of Installation (Inverter Machine, address 0000, will always be the Master)
Inverter Line	30EVA15	15	
	(01x) 30EVA15 + (01x) 30EXA15	30	
	(01x) 30EVA15 + (02x) 30EXA15	45	
	(01x) 30EVA15 + (03x) 30EXA15	60	
	(01x) 30EVA15 + (04x) 30EXA15	75	
	(01x) 30EVA15 + (05x) 30EXA15	90	
	(01x) 30EVA15 + (06x) 30EXA15	105	
	(01x) 30EVA15 + (07x) 30EXA15	120	

**Table 3b - Fixed Systems**

	MODELS	Nominal Capacity (TR)	Sequence of Installation (Machine, address 0000 will always be the Master)
Fixed Line	01x 30EXA15	15	
	02x 30EXA15	30	
	03x 30EXA15	45	
	04x 30EXA15	60	
	05x 30EXA15	75	
	06x 30EXA15	90	
	07x 30EXA15	105	
	08x 30EXA15	120	

**NOTE**

*In the event of a defect in the master unit, the system will continue to operate, however, it is possible to make one of the fixed units (fixed and slave) 3 or more) in master machine, changing the addressing. In this case, disconnect the communication cable from the master unit and switch the water sensors to the new master units. Information valid for both Inverter and Fixed systems.*

**NOTE**

*To ensure the other units in the system continue operating in the event of power loss from the Master and slave units 1, make sure to connect the 4 (four) communication cables of terminal BC1 (A, B, 12VDC and GND) + one source 12VDC/1A (connect to the terminals 12VDC e GND).*

**Table 4 - Availability of Items by Specification Standard**

Item	Factory Default		Factory Optional Item	
	30EVA	30EXA	30EVA	30EXA
<b>ELECTRICAL SWITCHBOARD</b>				
Control voltage 220V	X	X		
Control voltage 24V*	X	X		
Power factor correction	X			X
Sequence / phase loss protection (on main board)	X	X		
ModBus Kit **			X	X
Overcurrent protection (on main board)	X	X		
<b>COOLING SYSTEM</b>				
Scroll compressors	X	X		
Crank-case resistor	X	X		
High and low pressure switch	X	X		
Filter on suction (solid)	X	X		
Dryer filter	X	X		
Thermostatic expansion valve (TXV)	X	X		
Service valve on the high and low sides	X	X		
Locking valve on the high and low sides	X	X		
Condensation control	X	X		
Safety valve for evaporator	X	X		
Liquid sight glass	X	X		
Suction accumulator	X	-		
Freezing protection	X	X		
<b>OTHERS</b>				
Flow switch***	X	X		
System water inlet/outlet sensors ***	X	X		
Victaulic-type connection with Y Filter Kit			X	X
NR-13	X	X		

\* The machine control voltage is 220V, but with 24V output for pump control and water valve. (Water pump and valve are not included in the chillers).

\*\* Converter that allows communication in the Modbus RTU protocol.

\*\*\* Provided by Carrier and installation is the customer's responsibility. The flow switch must be installed before starting the unit.

Aquasmart units have the main protection routines:

- Evaporator freezing (plate changer);
- High discharge temperatures, saturated suction and suction;
- Oil return;
- Excessive cycle of compressors;
- Water temperature limits;
- Water flow.

The Aquasmart units also offer:

- Option to turn on and off remotely;
- Remote alarm signal (for Inverter systems only);
- Reset of a unit or system through the control (Access the Service menu and use password "325193").

## 2. Nomenclature and General Technical Features (cont.)



### ***Victaulic-weld Connection with Y Filter Kit***

Contains couplings and tubes with Victaulic® standard grooves, Y filter (Mesh 40) and pipe sections for welding in the piping. These parts are intended to provide a complete system for connection to the evaporator as well as its protection through the filter, which is a mandatory part of the hydraulic system.

The Y filter (Mesh 40) shall be installed at the water inlet of all modules, thus preventing severe damage to the evaporator.

#### **NOTE**

The connection kit comes in a wooden packaging. If the box is discarded make sure that there is no product in it. (See figure 6 below).

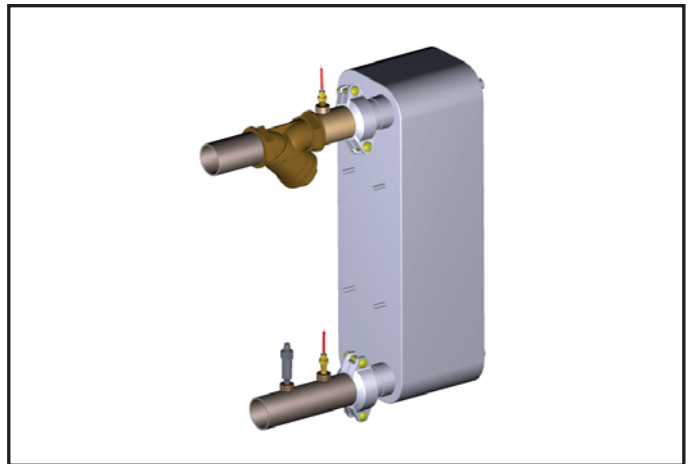


FIG. 5 - Victaulic-Weld Connection Kit with Y Filter

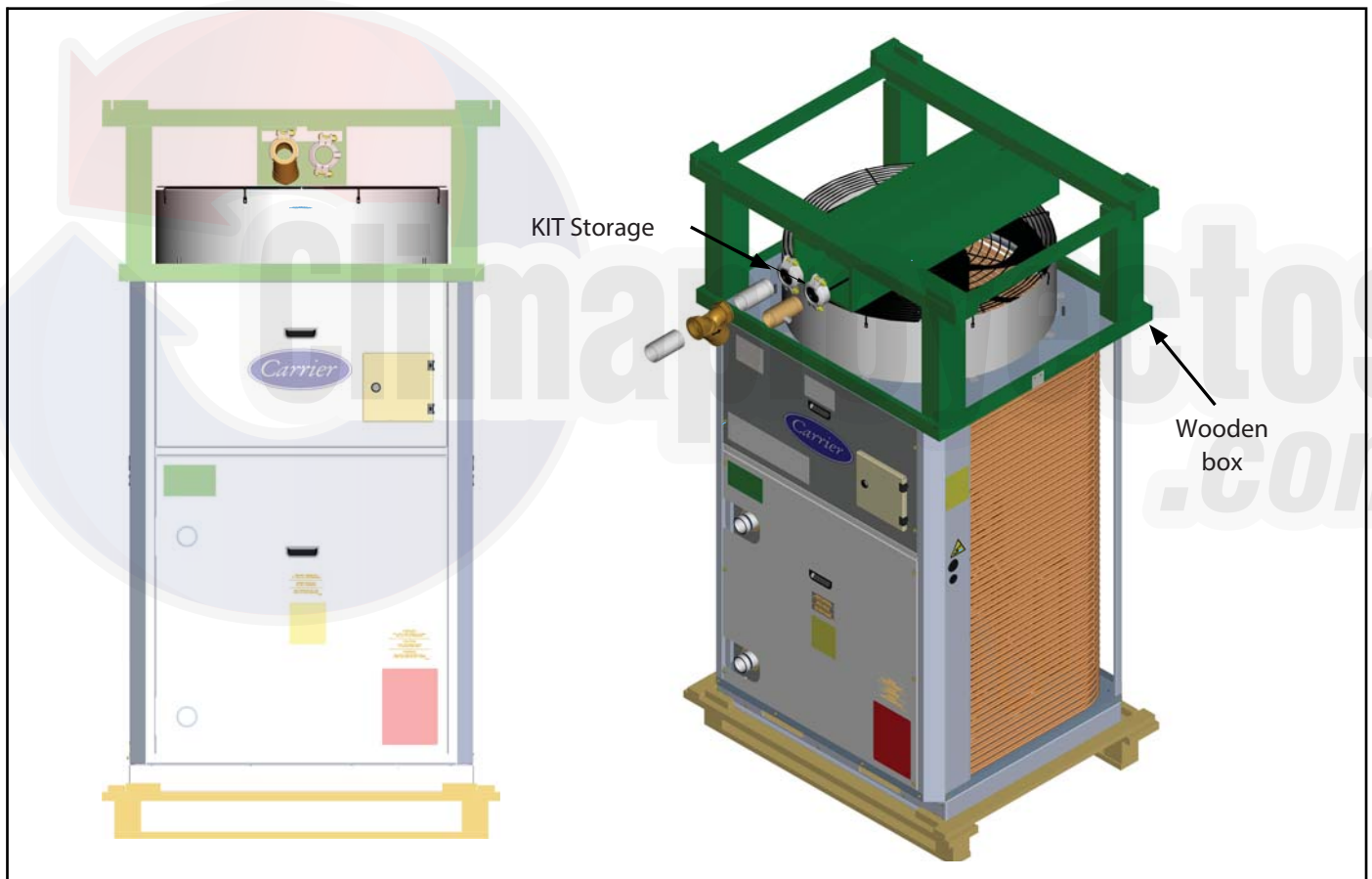
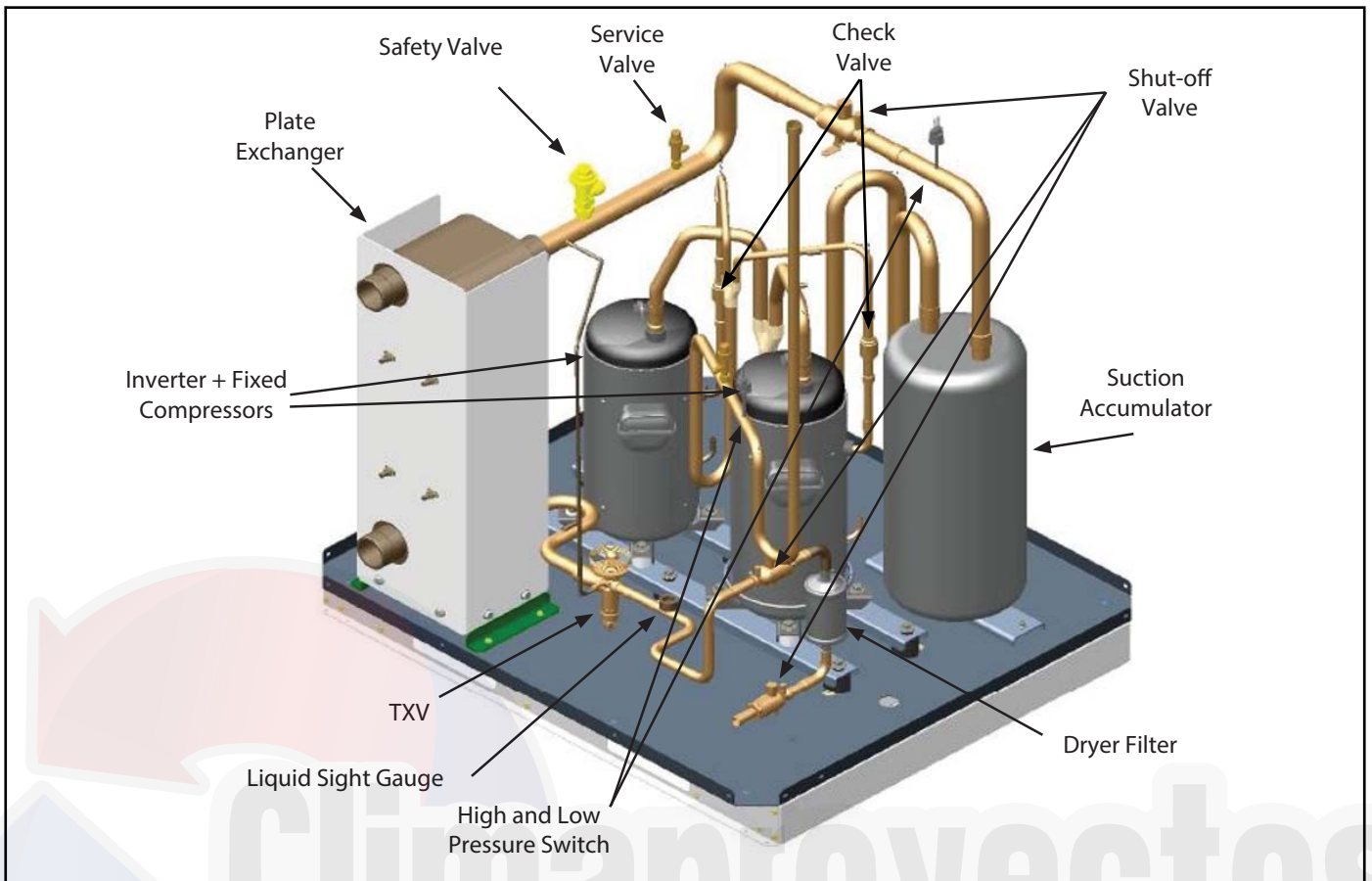


FIG. 6 - Location of Victaulic Kit

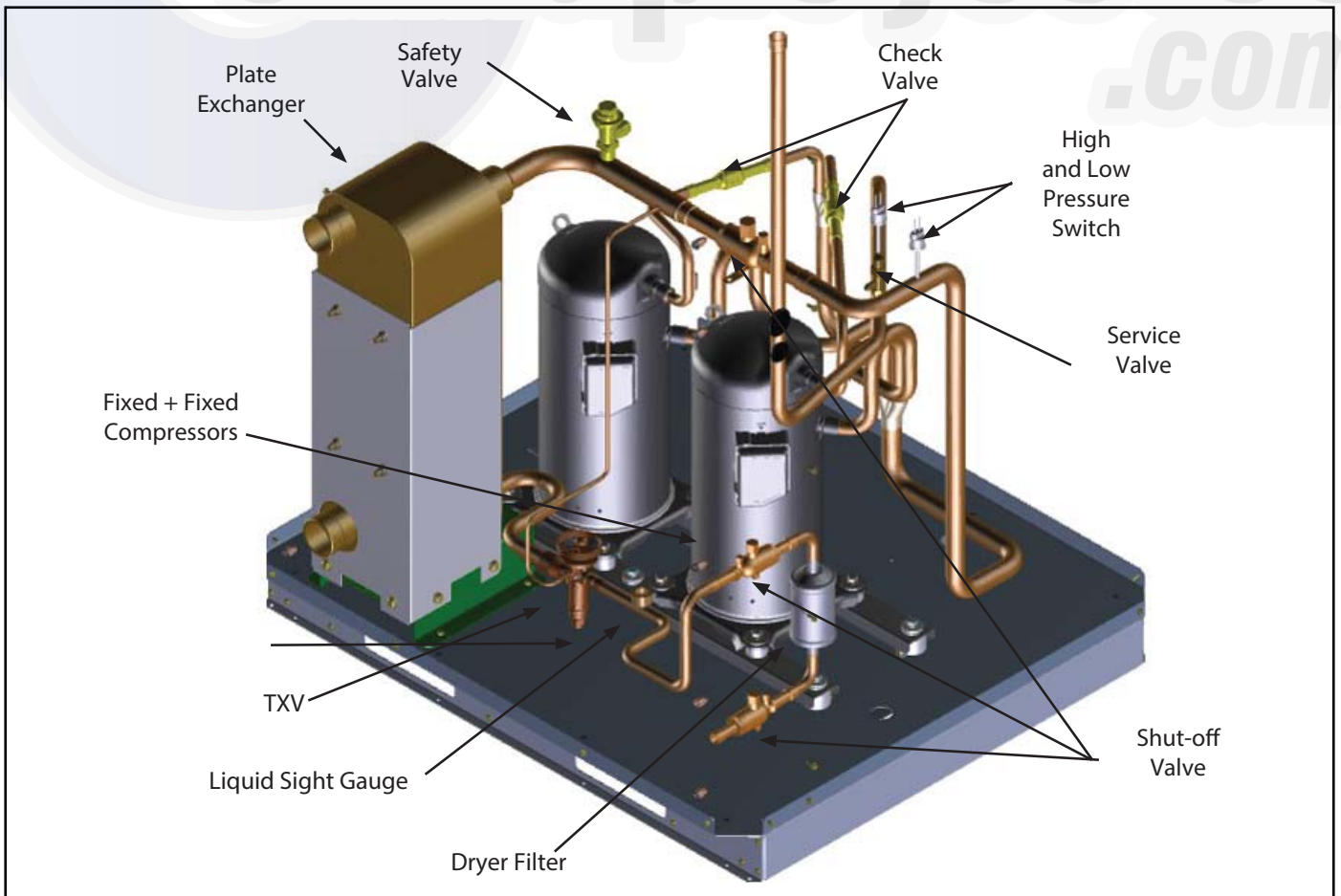
# 3.Components



## 3.1 Inverter Unit Components



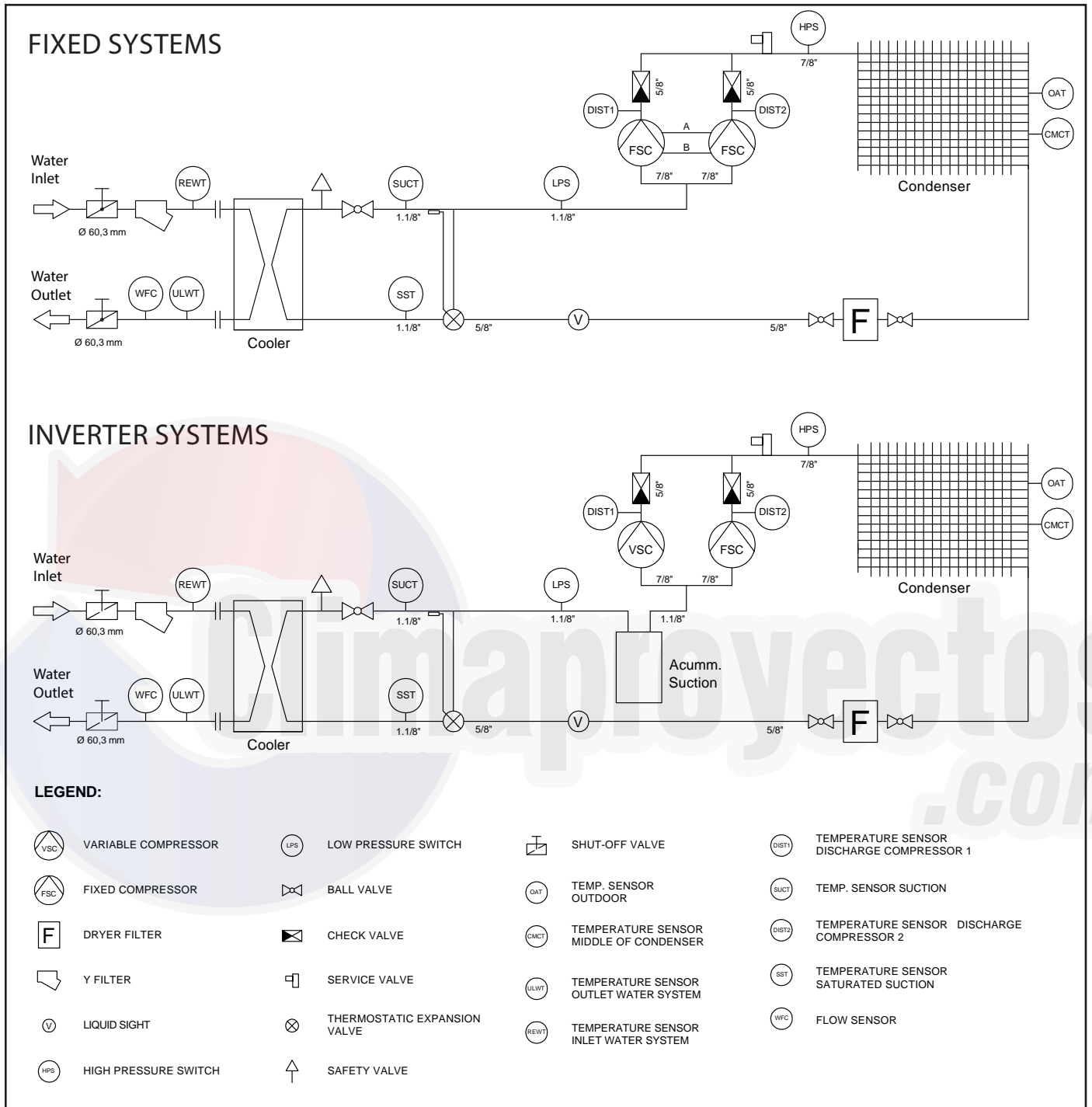
## 3.2 Fixed Unit Components



# 3.Components (cont.)



## 3.3 Components Flowchart



## 4. Instalation



### 4.1. General recommendations

#### ⚠ IMPORTANT

- The units should be positioned in a location that will provide enough support for them and also protect against severe weather.
- Make sure the Units are attached to a base to prevent movement.

#### ⚠ IMPORTANT

Each unit should have independent power.

#### ⚠ CAUTION

Check if the unit is installed in a place without risk of flammable gas leak. If inflammable gases leak around the equipment, combustion may occur.

Before performing the installation, read these instructions carefully to make sure you are familiar with the unit details.

The unit dimensions (item 4.3) and weights (table 2) are found in this manual and also in the technical catalogue.

The following rules apply to all installations.

- a) First refer to the applicable Codes and/or Rules for the installation of the unit on-site, power supply, etc. to ensure that it conforms with the standards and requirements specified (Local Standards).
- b) Carefully plan the location of the units to avoid possible interference with any type of existing (or designed) installations such as: electrical installations, water piping and sewers, etc.
- c) Install the unit where it is free from any obstruction in air circulation, both in the air outlet (discharge) and in the return (See item 4.4) air.
- d) Choose a location with enough space for general repairs or maintenance.
- e) The site should allow the passage of pipes.
- f) The unit must be properly leveled after installation.
- g) For normal and safe operation, when unit is installed in places with high wind exposure such as the coast, or tall buildings, use a duct or wind shield.

#### **Avoid installation in the following locations:**

- Saline sites such as the coast or places with large amounts of sulfur gas. In these places, special protection should be used.
- Locations with exposure to oil, vapor or corrosive gases.
- Locations near organic solvents.
- Locations where drainage water may cause some type of problem, such as contamination, etc.

- Locations near machines that generate high frequencies.
- Locations where the discharge of air from external units directly interferes with the well-being of the neighborhood.
- Locations that are exposed to strong and constant wind.
- Locations that are blocked for passage.

### 4.2. Installation on Site

Before placing the equipment on site, check the following aspects (all models).

- a) The floor should support the unit weight while in operation.  
(See 2 - General Technical Features).  
Check the structural design of the building or applicable standards to see the loads allowed. Install reinforcements when required.
- b) Provide enough space for maintenance services according to the figures in sub-item 4.4 - Minimum Recommended Clearance for installation. The front of the equipment must remain unobstructed to allow free flow of air and access to the interior of the unit.

#### NOTE

The electrical connections can be made on both sides of the units. The unit also has a lower connection at the base of the equipment.

#### **Settling the unit**

Always refer to the "Dimensions & Clearances" chapter to confirm that there is enough space for all connections and service operations. Regarding the center of gravity coordinates, the position of the unit mounting holes, and the weight distribution points, refer to the certified dimensional drawings provided with the unit.

Before positioning the unit, make sure:

- The allowable load on the spot is appropriate, and reinforcement precautions are taken.
- The surface is horizontal and flat.
- There is enough space above the unit for air flow.
- There are appropriate support points and they are in the correct location.
- The location is not subject to flooding.
- In locations where there is heavy snow and long periods with temperatures below zero, the unit should be lifted above the height of the normal course of wind or snow. Shields may be required to deflect intense winds or prevent snow falling directly on the unit. It is not necessary to restrict the flow of air into the unit.

## 4. Instalation (cont.)



### ⚠ ATTENTION

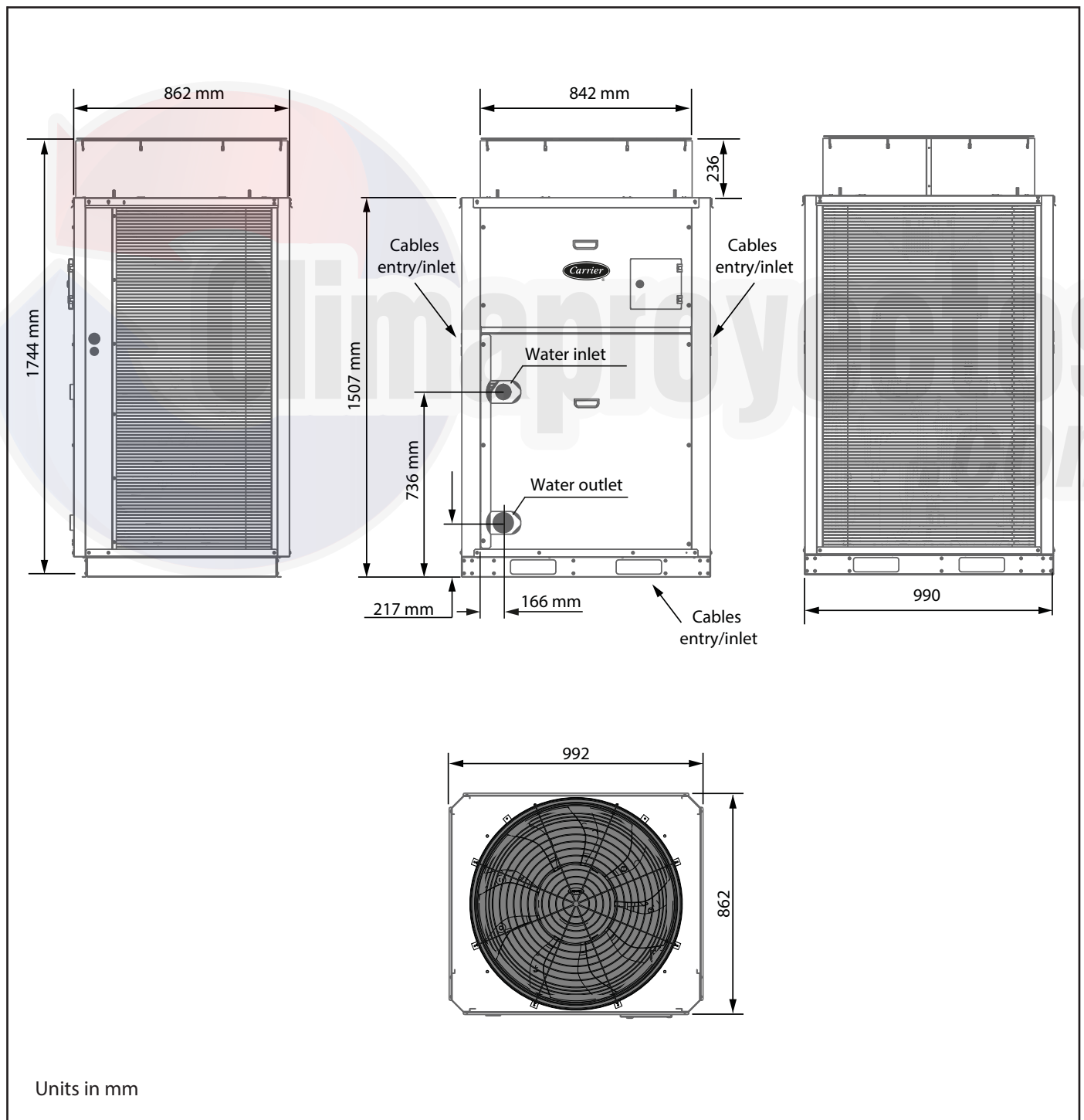
#### Painting Care - Installations in Machines Surroundings:

Carrier recommends that, during installation in the machine surroundings, as a precaution to avoid damage to the paint, the machine should be isolated/protected so that chips derived from cutting procedures on metal parts do not come in contact with the machine. This precaution is necessary, since an incandescent chip can be stuck on the paint, giving the impression that the painting process has a corrosion problem, when in fact it involves the impregnation of dirt from such installations in the surroundings.

It is also recommended that after the installation in the machine surroundings, the machine is cleaned thoroughly, so that possible installation chips or dirt are not impregnated on the machine paint.

### 4.3. Dimensions

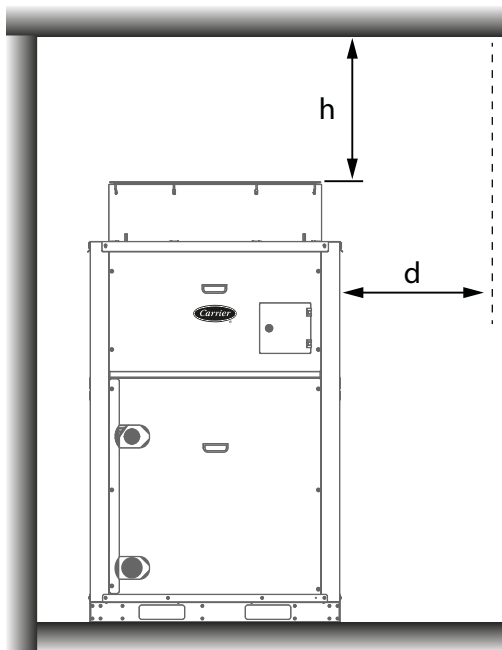
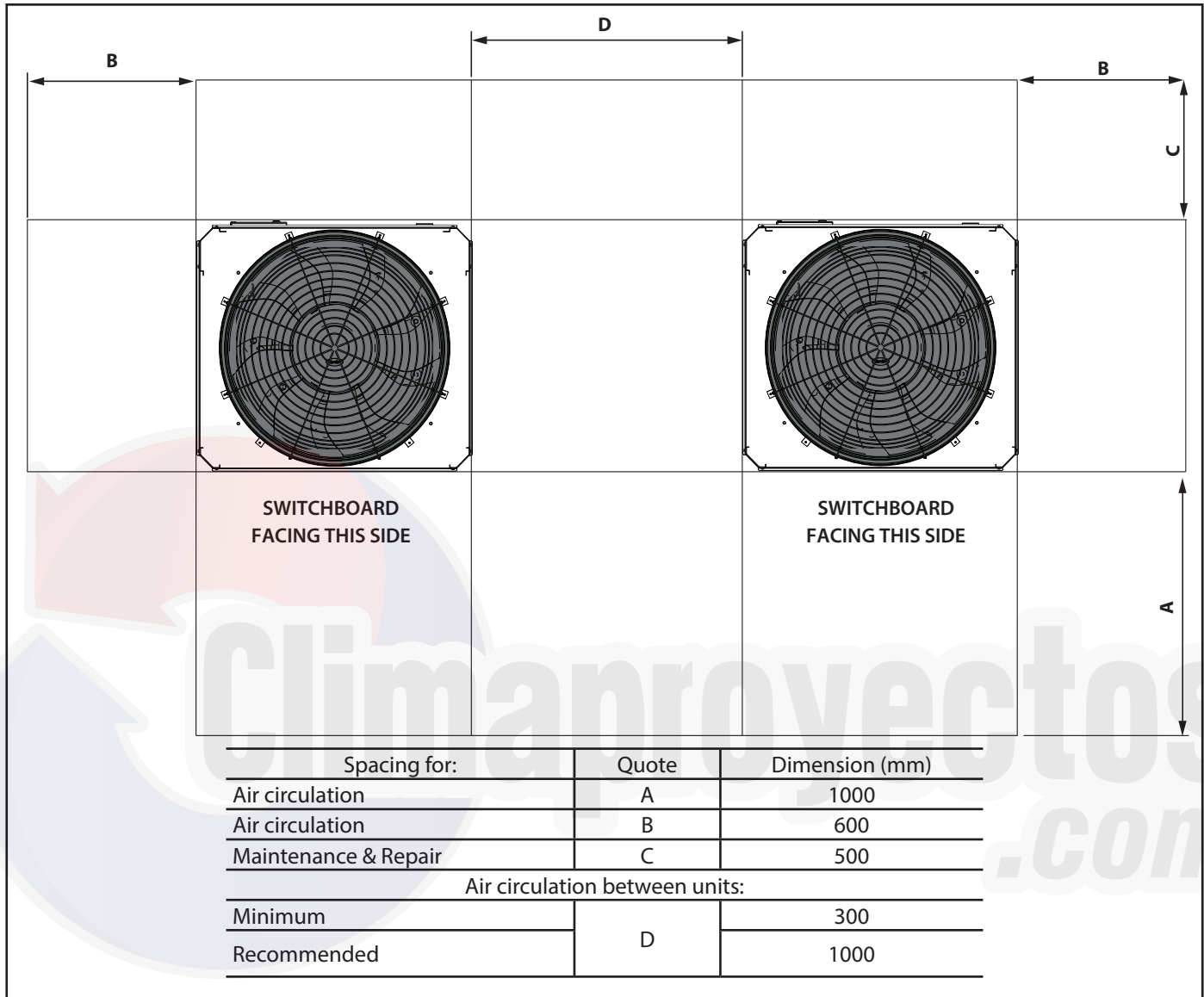
#### Units 30EV / 30EX





#### 4.4. Minimum Clearance Recommended for Installation

The minimum recommended maintenance area to ensure proper airflow through the condenser coils and to allow the fan to be maintained is indicated below.



Horizontal distance to clearance (m) - d (in meters) - d	Minimum vertical distance (in meters) - h
0,5	2,0
1	2,0
2	3,0
3	4,0
4	4,5
5	5,0

## 4. Instalation (cont.)



### 4.5. Data for Hydraulic Interconnection and System Water Sensors

The Aquasmart system always relies on the modulation between its units in order to ensure that the system's outlet water (mixing water) is meeting the temperature set point set on the master machine.

Simple and safe operation is achieved by adopting a set of sensors that allows the reading of control temperatures and keeps both the system and each module operating safely. The main safety elements are:

Equipment	Key	Function	Supply
System Inlet water sensor	REWT	Evaluate whether the inlet temperature is within the operating values for the system.	Factory default (field installation)
System Outlet water sensor	RLWT	Main system control sensor, where it allows the system to perform the modulation to guarantee the delivery of water at the desired temperature.	Factory default (field installation)
Unit Outlet water sensor	ULWT	Evaluate the outlet temperature of each unit for freeze protection.	Factory default (field installation)
Unit flow sensor	WFC	Freeze protection due to lack or low water flow per unit	Factory default (field installation)
Differential pressure switch	DPS	Switch that switches to identify pressure difference between water inlet and outlet.	Field installation. Mandatory for ODU $\geq$ 4.
Pump drive	13 and 14 of terminal BC2 (K4)	Pump drive control (WP), to ensure the correct and safe operation of the units.	The pump is not shipped from the factory, only the 24VAC command.
Valve actuation	10 to 12 of terminal BC2 (K2)	Valve drive control (WV), to ensure the correct and safe operation of the units.	The valve is not shipped from the factory, only the 24VAC command.
Y Filter	-	Filter for heat exchanger protection	Factory optional item

Table 5

 **IMPORTANT**

It is mandatory to install the Y filter (Mesh 40) on the water inlet of all modules even when not supplied as standard by the factory.

 **IMPORTANT**

It is mandatory to install the DPS (differential pressure switch for water) when more than 3 chillers are installed (above 45TR).

## Remote sensors

### Flow sensor and water Sensors

A water flow sensor (WFC) (Figure 7) is supplied with each master and slave unit, and must be installed in the field.

The system water sensors (outlet RLWT & inlet REWT) (Figure 11) comes with the master unit and must be installed in the field.

The water outlet sensor (ULWT) (Figure 11) comes with each unit, master and slave, and should be installed in the field.

It is important to make sure that the RLWT and REWT sensors are not reversed.



#### IMPORTANT

Only install the flow and temperature sensors after the welding of piping and components. Failure to observe this recommendation can cause damage to components.

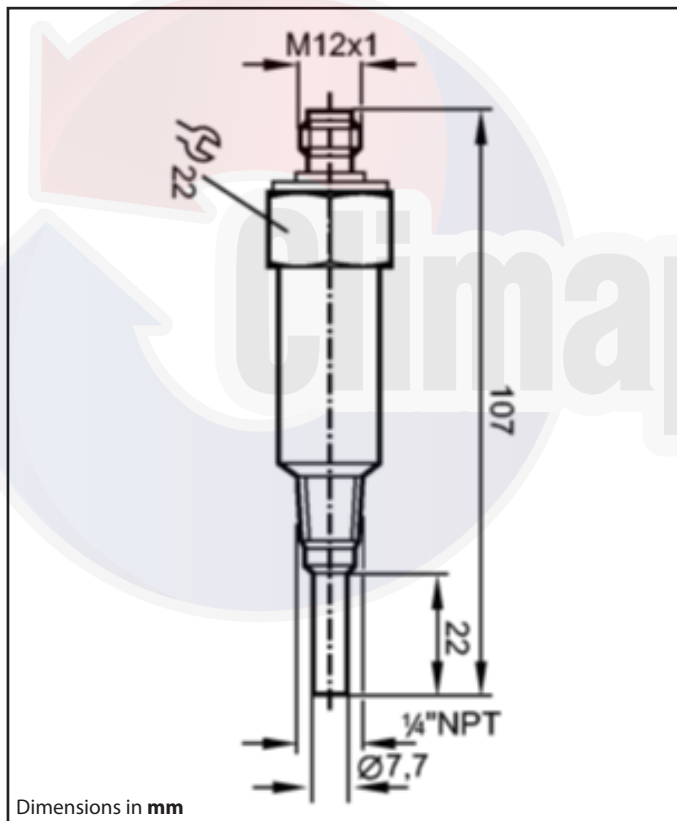


FIG. 7 - Sensor flow and connections



#### IMPORTANT

The flow sensor rod should be at least 12mm inserted in the water flow (see Figure 8). If this dimension not observed, there is the risk of triggering an alarm for lack of flow (E-34).

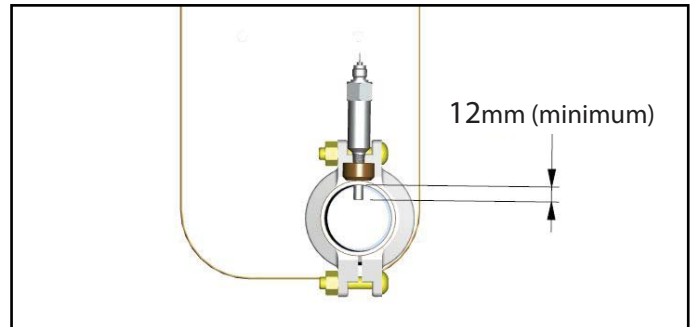


FIG. 8 - Mounting dimension of sensor rod



FIG. 9 - Flow sensor with glove

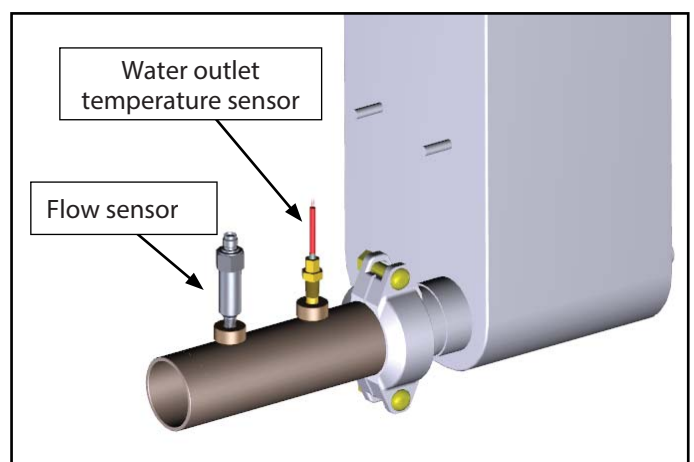


FIG. 10 - Sensor mounting position

## 4. Instalation (cont.)



FIG. 11 - Water sensor

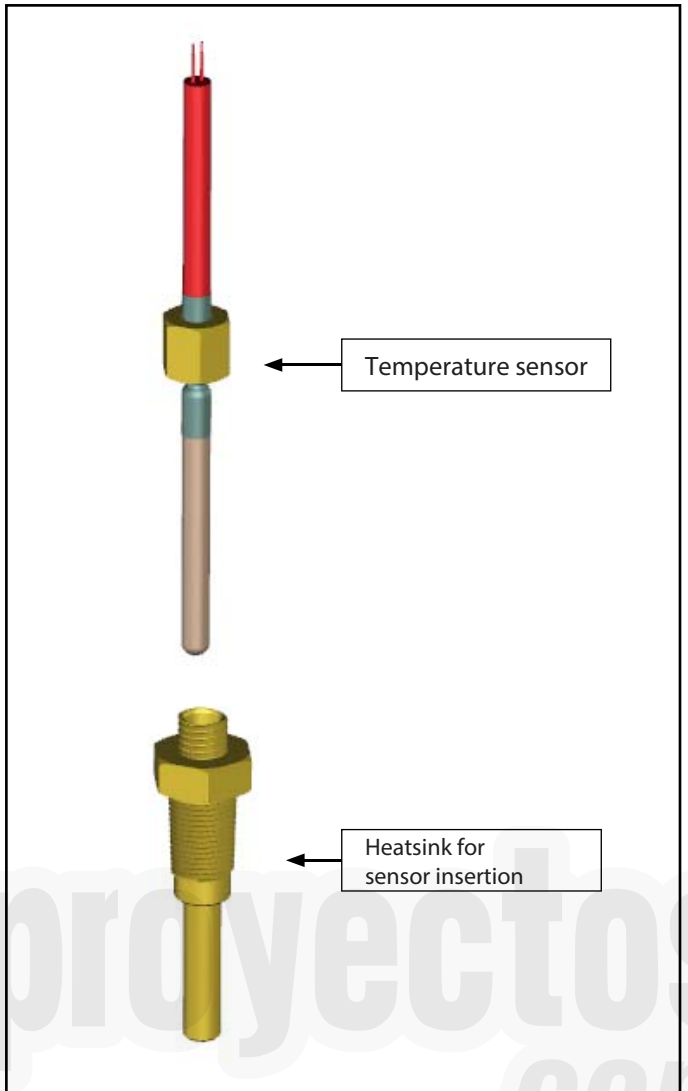


FIG. 13 - Mounting of the heatsink on the sensor

**NOTE**  
The heatsink is provided with the unit. It is necessary that field pipeline supports this sink.

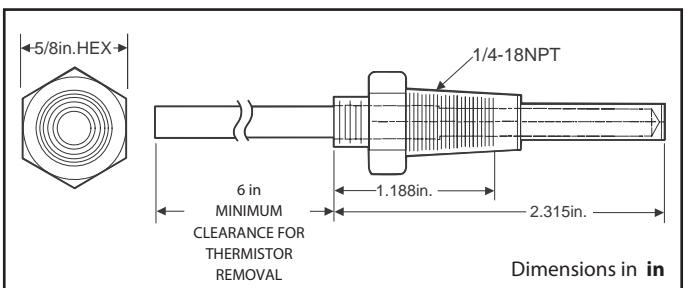


FIG. 14 - Temperature sensor well

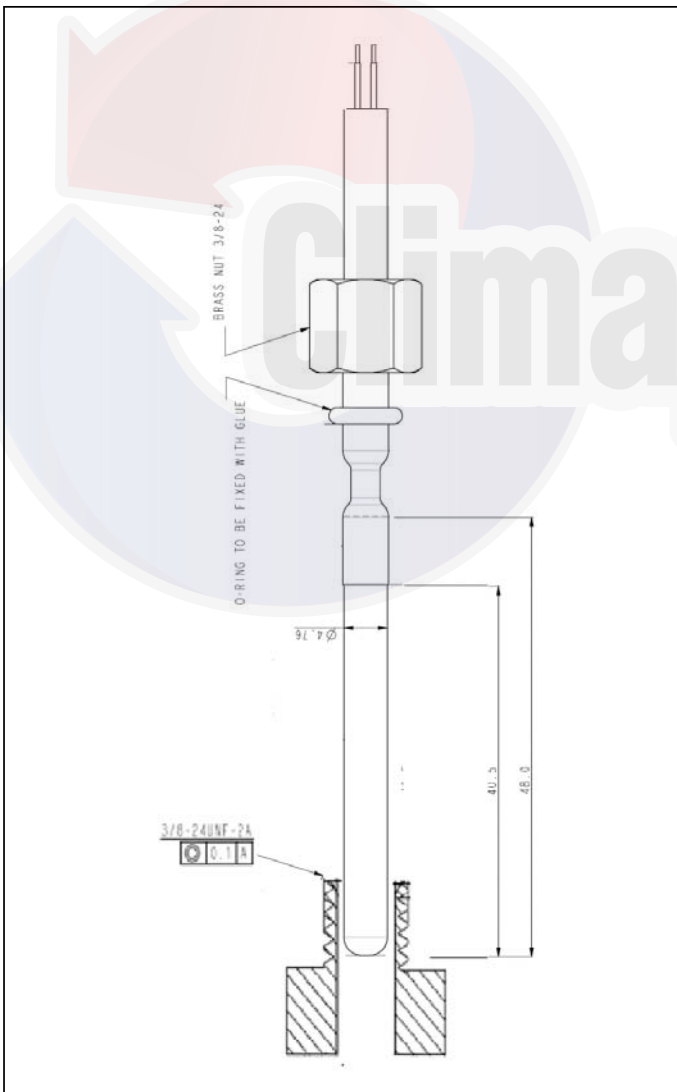


FIG. 12 - Connector of the temperature sensors

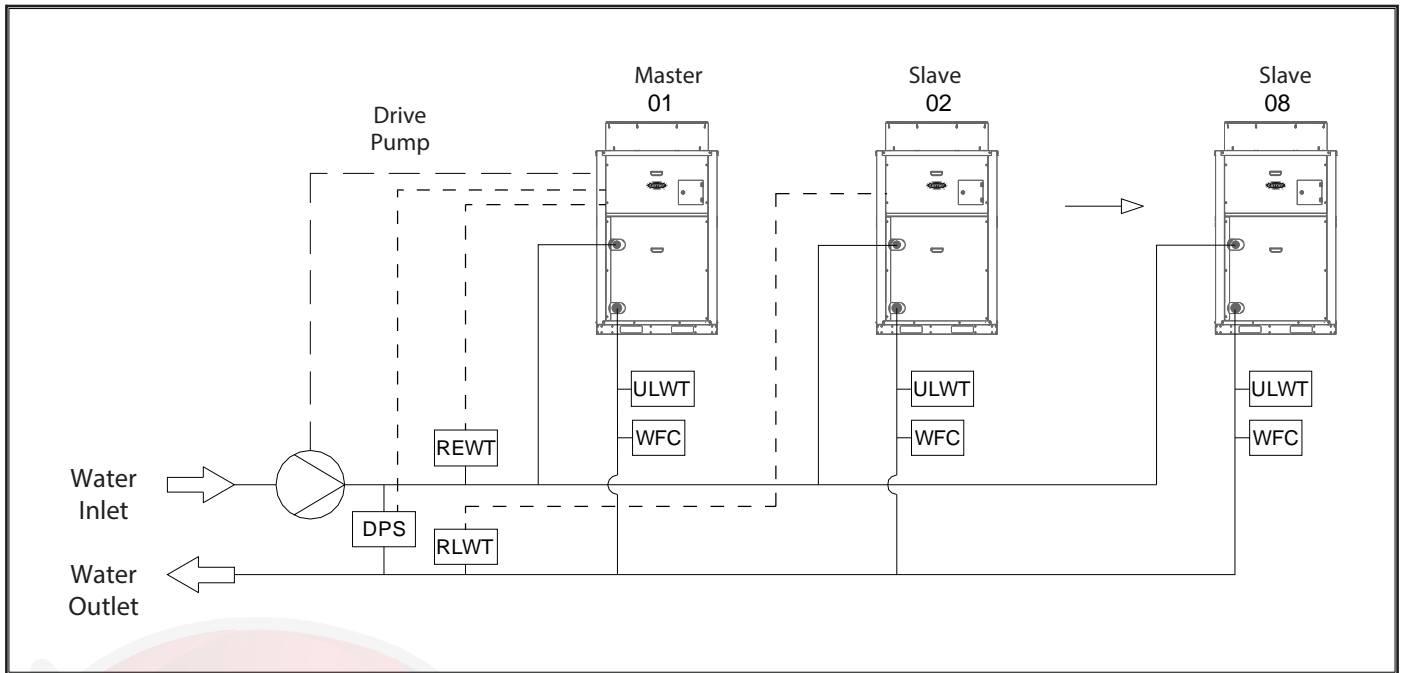


FIG. 15 - Typical schematic drawing of the system sensor positions

**⚠ IMPORTANT**

Each unit has a ULWT sensor that is connected to terminals 1 and 2 of terminals BC2. The factory master unit comes with two sensors: REWT & RLWT. REWT will always be connected to terminals 3 and 4 of terminal block BC2 in the master unit (address 0000). RLWT will always be connected to terminals 3 and 4 of terminal block BC2 in the slave unit 2 (address 0001). If the system is just one unit, RLWT must be discarded.

**NOTE**

The layout of the modules and pipeline design depend on the characteristics of each installation. It is the customer's responsibility to design their piping and install the modules meeting the minimum requirements required by Carrier.

**⚠ IMPORTANT**

The piping design shall provide for a correct distribution of fluid flow to the modules in the system, avoiding excess or lack of flow in each of the modules.

**Water flows in the chillers**

The Aquasmart system operates with the concept of flow through the modules in operation, allowing a more accurate temperature control. To ensure a constant outflow of chilled water, it is advisable to use a primary and secondary ring, resulting in greater accuracy in the outlet water temperature.

**NOTE**

In the use of primary and secondary circuits, it is common to use a cooled water tank (chillers system outlet) and a return water tank.

## 4. Instalation (cont.)



### System Hydraulic Interconnection

The control allows two types of hydraulic interconnection: Interconnection with Single Pump or Individual Pump. It is necessary to configure the control.

#### a) Interconnection with single pump

Concept where there is only one power pump for the system. An ON / OFF valve must be installed for each module that will control it individually. This valve will open when the chiller is driven by the master unit and will remain closed while the chiller is turned off. Interconnection with a single pump can be done using a variable flow pump (field installation), which allows absorbing the flow variations of the modules on / off function. If no variable flow is used, a 3-way valve must be used (see a1) instead of the two-way ON/OFF valve.

Proper flow control is mandatory. The high / low flow can trigger alarms such as E-32/34/35/36, because the PID control won't operate correctly.

It is recommended to place a flow control valve at each unit inlet. We recommend an independent pressure valve so that the flow is adequate regardless of how many modules are in operation.

#### IMPORTANT

The chiller does not have on its electrical switchboard a power system for the pumps, only signal sending to on / off. The pump power switchboard must be installed in the field. Do not use the terminal block of the chillers to power the pump.

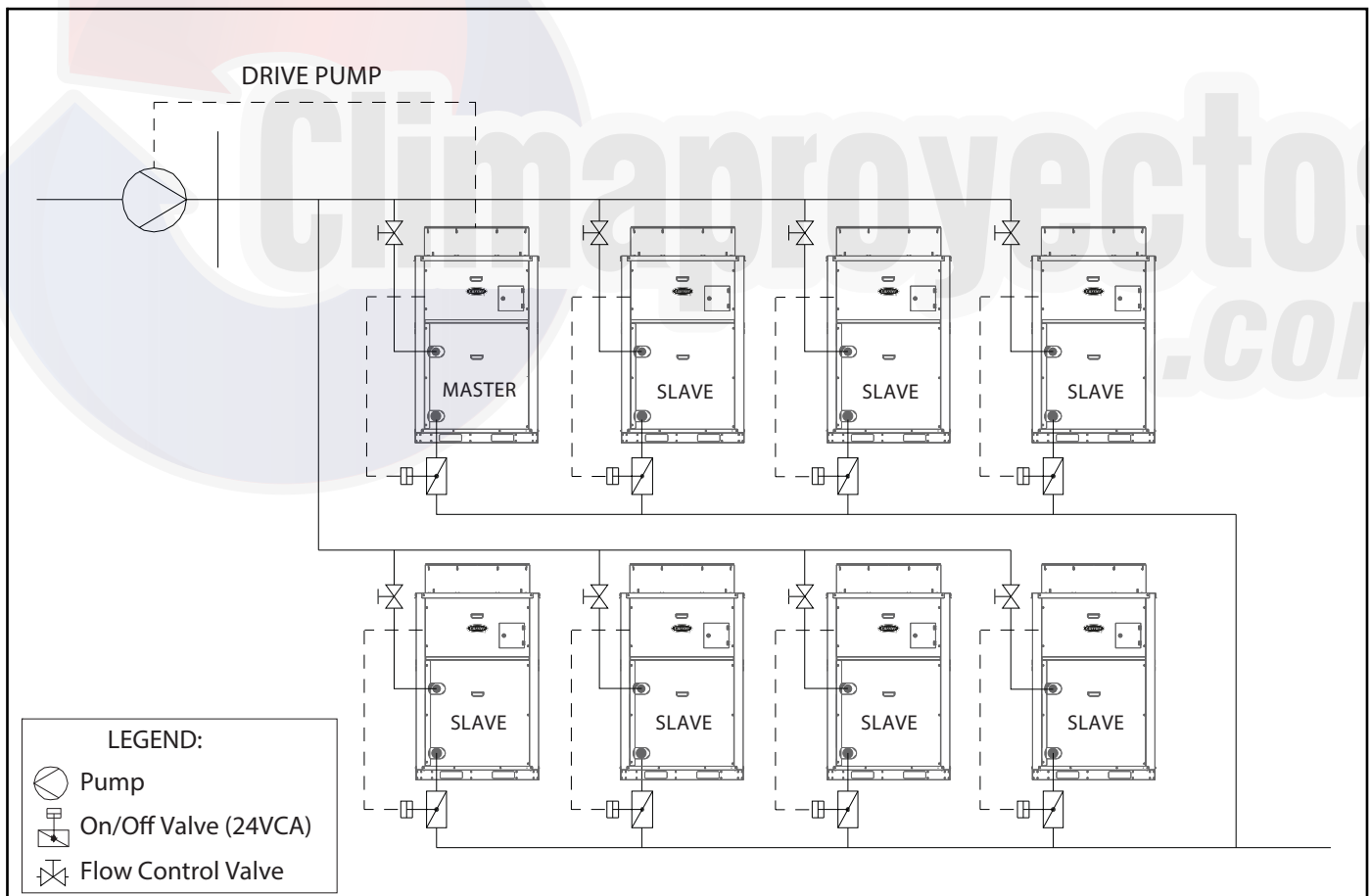


FIG. 16 : Typical Single-Pump Interconnection Schematic Drawing

#### NOTE

It is mandatory to activate the pump by the controls of the chillers.

### a1) Interconnection with single pump and use of a 3-way valve

Alternative concept for using a superior quality power pump for the system. A three-way valve where the bypass must be discharged after the RLWT sensor. This adjustment is required to provide system stability and a more precise control.

#### IMPORTANT

The chiller does not have on its electrical switchboard a power system for the pumps, only signal sending to ON/OFF. The pump power switchboard must be installed in the field. Do not use the terminal block of the chillers to power the pump.

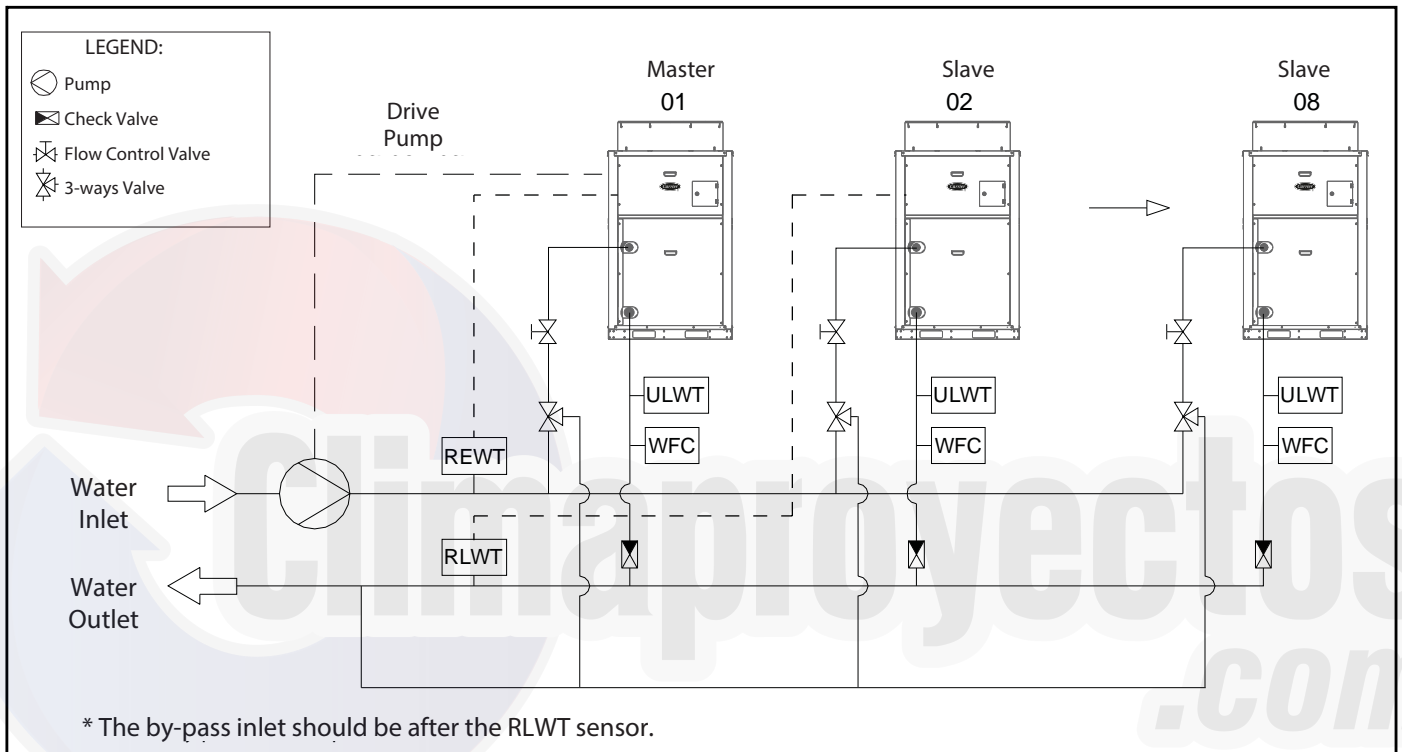


FIG. 17 : Typical Interconnection schematic drawing with a single 3-way valve pump

#### NOTE

It is mandatory to activate the pump by the controls of the chillers.

## 4. Instalation (cont.)



### b) Interconnection with single pump

Concept where each module will be interlocked with its dedicated pump, facilitating the flow balance in each unit. When a module is switched off (by demand or due to a triggered alarm), the pump will automatically shut down.

Proper flow control is mandatory. The high / low flow can trigger alarms such as E-32/34/35/36, because the PID control won't operate correctly.

It is recommended to place a flow control valve at each unit inlet. We recommend an independent pressure valve so that the flow is adequate regardless how many modules are in operation.

#### ⚠ IMPORTANT

The chiller does not have on its electrical switchboard a power system for the pumps, only signal sending to on / off. The pump power switchboard must be installed in the field. Do not use the terminal block of the chillers to power the pump.

#### ATTENTION

For this interconnection model, it is necessary to use a non-return valve at the outlet of each module.

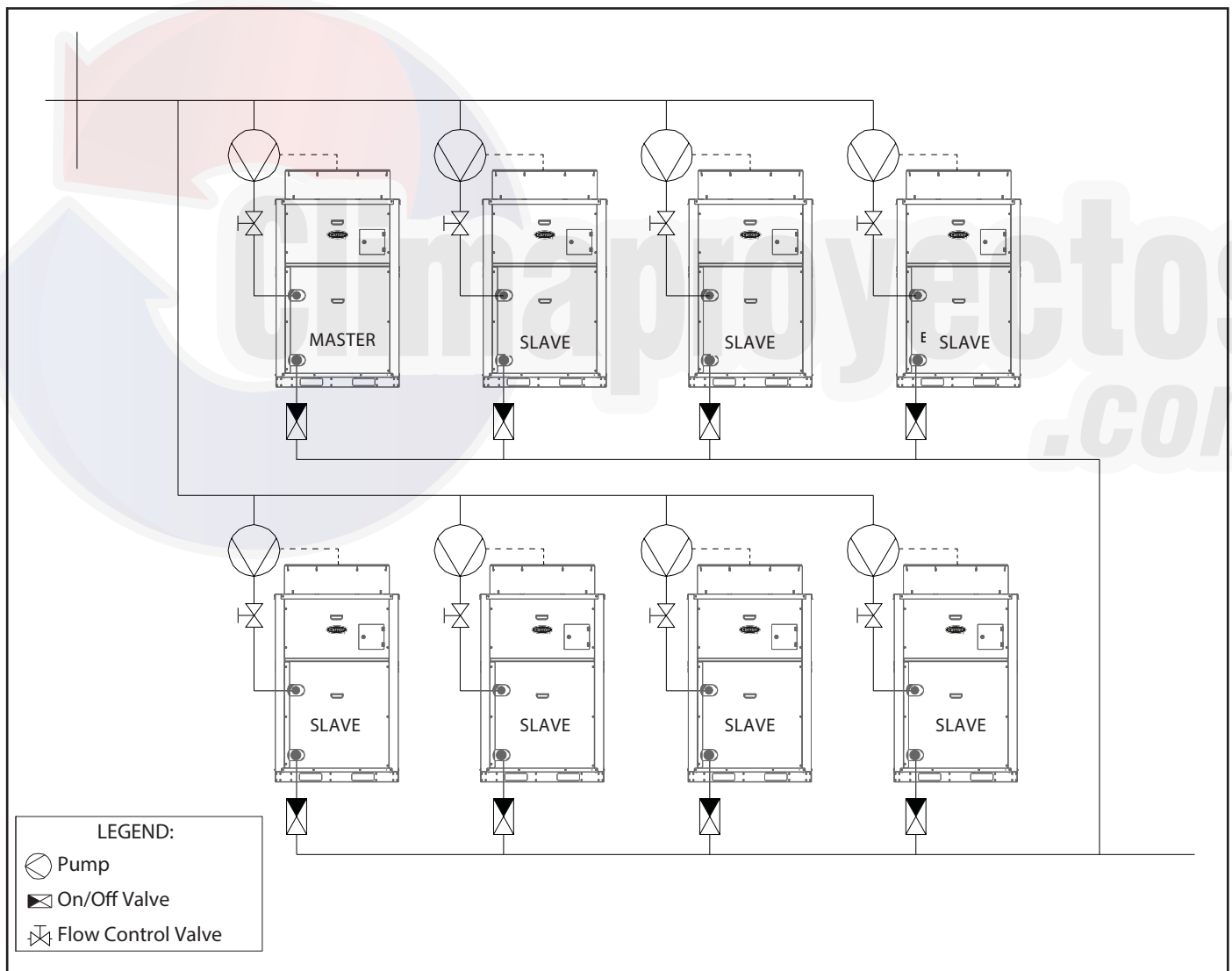


FIG. 18 : Typical Individual-Pump Interconnection Schematic Drawing

#### NOTE

It is mandatory to activate the pump by the controls of the chillers.



If it is necessary for the flow control, a signal from the unit, we suggest the configuration versus connection that follows:

- Setting on the pump control (WP) in SYSTEM (see Section 5.2.6); Inverter Speed 1 = K4 (master unit)

Inverter Speed 2-8 = K2 (each slave unit)

K4 Off = Speed Ø

K4 On + (8x) K2 Off = Speed 1 K4 On + (1x) K2 On = Speed 1

K4 On + (2x) K2 On = Speed 2

...

K4 On + (8x) K2 On = Speed 8

- Setting on the pump thermostat (WP) in INDIVIDUALLY (see item 5.2.6) Inverter Speed 1-8 = K4 (each unit)

(1x) K4 On = Speed 1 (2x) K4 On = Speed 2 (3x) K4 On = Speed 3

...

(8x) K4 On = Speed 8

#### NOTE

Use the contacts available on the auxiliary relays K2 and k4. This connection will indicate the number of active units in the system and consequently the need to increase or decrease the water flow in the system. The limit for this suggestion is the minimum frequency in which the pump motor can operate.

#### Water valve opening time adjustment (WV)

Follow recommendation table for industry standard times:

Opening and Closing Time (WV)	WVSCSDT
<20 sec	20
30 sec	30
60 sec	40
75 sec	60
90 sec	80



#### IMPORTANT

The outlet water temperature control gives is related to the opening and closing time of the water valve. The smaller the opening time, the better the control. The configurable time "WVSCSDT" of the thermostat should be set in the field according to the opening and closing time of the valve (WV).

For intermediate times, always use "WVSCSDT" of greater value. It is not recommended to use valves (WV) with opening and closing times greater than 90 seconds.

## 4. Instalation (cont.)



### 4.6. Electrical Data

Model	Voltage (V)	Compressors (2x)						Motor			I Nom. Total [A]	I Max. Total [A]	FP w/o CFP	FP w/ CFP	Nominal Power Total [W]	Nominal Power Max. [W]
		Qty	I Nom. [A]	I Max. [A]	Pow. Nom. [W]	Pow. Max. [W]	Qty	FLA [A]	Pow. Max [W]							
30EVA15	220	2	40.3	51.3	12450	16140	1	7.1	1150	47.4	58.4	-	0.94	13600	17290	
	380	2	21.8	28.8	12450	16870	1	7.1	1150	28.9	35.9	-	0.96	13600	18020	
	440	2	21.8	27.3	12450	15470	1	7.1	1150	28.9	34.4	-	0.96	13600	16620	
30EXA15	220	2	49.0	60.0	15450	20900	1	7.1	1150	56.1	67.1	0.84	0.94	16600	22050	
	380	2	30.0	36.7	15450	20900	1	7.1	1150	37.1	43.8	0.82	0.94	16600	22050	
	440	2	24.8	30.4	15450	20900	1	7.1	1150	31.9	37.5	0.82	0.94	16600	22050	

Table 6 - Electrical Data

<b>Current data for compressor 30EVA15:</b>			
Description	220V	380V	440V
I nom comp. 1	18.5	9.7	9.7
I nom comp. 2	21.8	12.1	12.1
I max comp. 1	25.8	13.9	13.9
I max comp. 2	25.5	14.9	13.4

<b>Current data for compressor 30EXA15:</b>			
Description	220V	380V	440V
I nom comp. 1	24.5	15.0	12.4
I nom comp. 2	24.5	15.0	12.4
I max comp. 1	30.0	18.4	15.2
I max comp. 2	30.0	18.4	15.2

#### NOTES:

- The fan motors are the BLDC type.
- The nominal voltage must be as indicated on the unit nameplate. Voltage variation should be at no more than +/- 10%. In this range, the unit may eventually operate the protection devices. Values outside this range are not allowed in any time interval.
- Refer to the applicable Codes and / or Standards for on-site installation to ensure that the electrical wiring complies with the standards and requirements specified.
- Nominal data obtained under the conditions of standard AHRI 550/590.
- It is mandatory to consider the values of Current and Maximum Power for calculation of electrical design (as above).
- CFP is the standard on Inverter units. In fixed units, the CFP is supplied as an accessory in their respective models.

#### 4.7. Data for Electrical Interconnection

##### a) Power supply

The power supply must be individual per module. The switchboard has a power terminal for this connection.

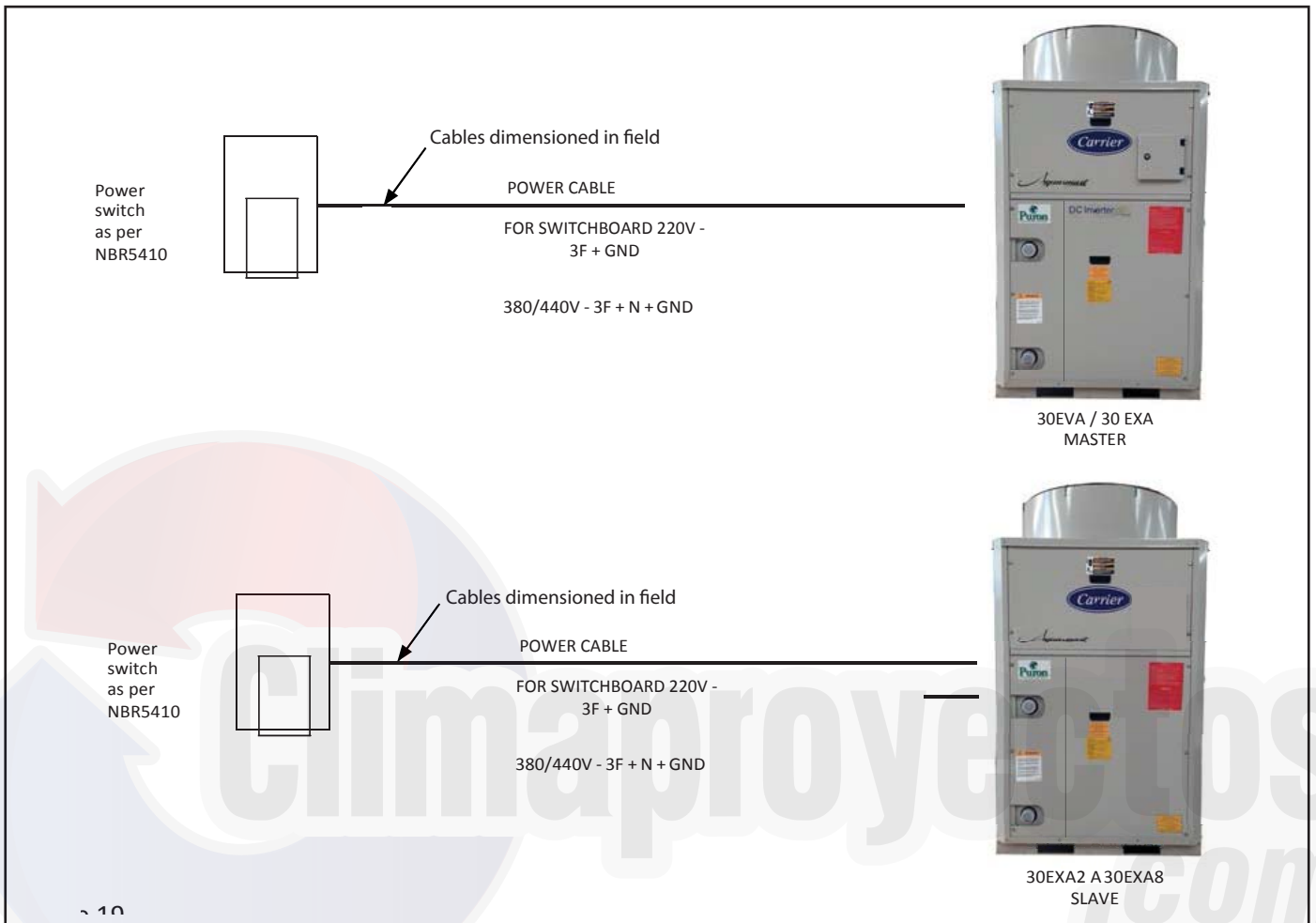


FIG. 19

##### b) Communication

All modules must be interconnected via a communication terminal named BC1. The control (thermostat) must also be connected to this bus.

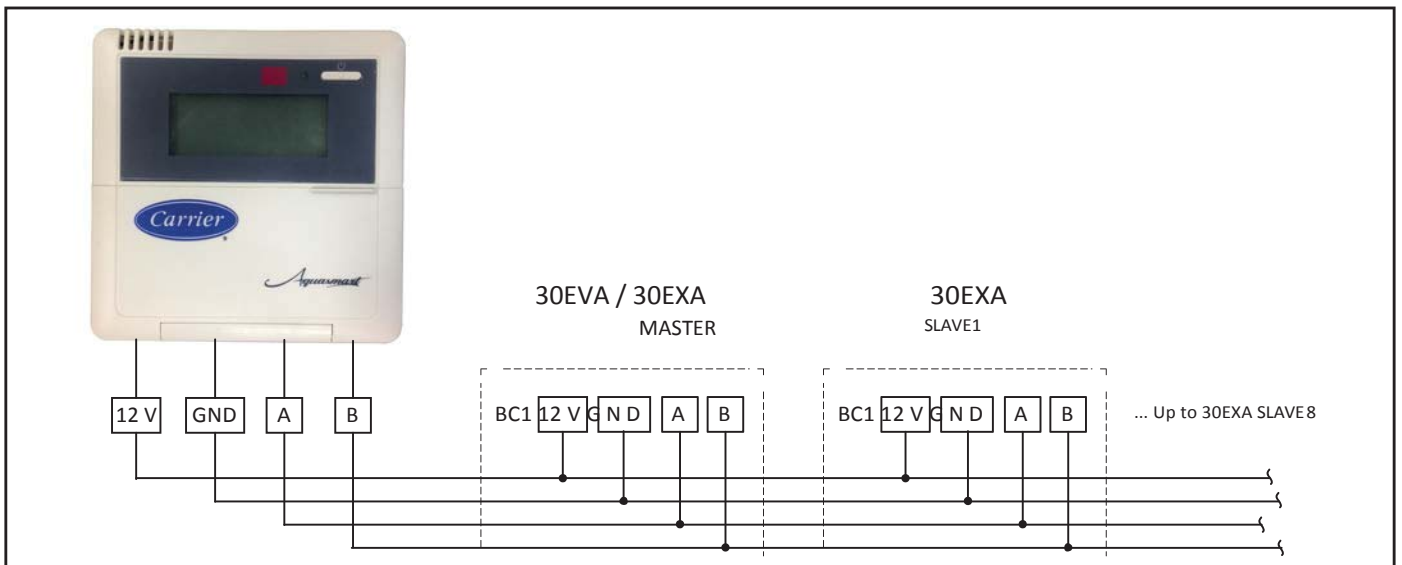


FIG. 20

## 4. Instalation (cont.)



### NOTE

The control mounted on the front panel of the unit is low DC voltage and does not require batteries to store user settings in memory.

### ⚠ IMPORTANT

The communication mode used is the RS-485 COM pattern (See figure 20). Use a twisted-pair cable with shield for communication A and B. Do not exceed the length in 120 meters to avoid the transmission rate be affected and voltage drop. Use cable 2 x 0.5mm<sup>2</sup> for thermostat power 12VDC and GND.

### ⚠ CAUTION

#### HAZARD OF DAMAGE TO THE UNIT

Failure to observe this precaution could result in equipment damage or malfunction. Improper wiring or installation can damage the control. Make sure the wiring / connection is correct before turning on the power.

### c) Terminal block BC2 Command

The units have the BC2 terminal block for interconnection of commands and signals from the control. Pay attention to the voltage difference between them. For details, go to the complete wiring diagram of the unit. Find a descriptive table of terminal block BC2 below.

TERMINALS	DESCRIPTION
1,2	ULWT – Unit Water Outlet Temperature Sensor
3,4	RLWT – System Water Inlet Temperature Sensor - for master units
3,4	RLWT – System Water Outlet Temperature Sensor - for slave units
5,6	DPS - Pressure switch contact, pressure differential between inlet and outlet water
7,8,9	WFC - Water flow sensor return and supply
10,11,12	WV - 24VAC - Power and command of water valve On / Off
13,14	WP - 24VAC - Command of the water pump
15,16	Dry contact to turn on and off the system remotely - for master units only
17,18	220VAC – Remote alarm signal (for Inverter systems only)

## 4.8. Electrical Connections

### a) Power supply

Install close the unit a fused disconnect switch or thermomagnetic circuit breaker with equivalent breaking characteristics in accordance with the local requirements. The electrical data are indicated in the Electrical Data section.

Consult an electrician or technician accredited by CREA (Regional Council of Engineering and Architecture) to evaluate the conditions of the electrical system in the facilities, and select the appropriate power and protection devices.

Carrier is not responsible for any problems resulting from failure to comply with this recommendation.

It is advisable to use a padlock to lock the switch or circuit breaker open while servicing the equipment.

### b) Power wiring

There are openings to pass in the wiring on both sides of the liquid chiller units. Install wiring from the customer's point of strength directly in the switchboards of each chiller unit.

Make sure to install a ground conductor. The voltage supplied should be according to the voltage on the reference board. The voltage between the phases must be balanced within 2% unbalance and the current within 10%, with the compressor running. Contact your local power supply company for improper voltage correction or phase unbalance.

### Voltage unbalance calculation

- Voltage unbalance (%) = Larger difference from average voltage / Average voltage:

- Example: Rated power supply

380 V - 3 phases - 60 Hz

- Measurements: AB = 383 V  
BC = 378 V  
AC = 374 V

- Average Voltage =  $\frac{383 + 378 + 374}{3} = 378 \text{ V}$

- Difference from average voltage:

AB = 383 - 378 = 5

BC = 378 - 378 = 0

AC = 378 - 374 = 4

- Greater difference is AB = 5 therefore, % voltage unbalance is:

$\frac{5}{378} \times 100 = 1,32\% \text{ (OK - allowed unbalancing)}$

### Notes:

- The calculation of the current unbalance must be done in the same way as the voltage unbalance.

- The causes of voltage unbalance can be:

\* Bad contact (in meter contacts, electrical connections, loose wire, rusty or charred lead wire)

\* Wrong diameter lead wires

\* Load unbalance in a three-phase power system.

### c) Field components interconnection

Refer to the electrical diagram to make the field interconnections between field components and liquid chiller units.

## 4.9. Application Data

### Unit operating range

	Unit	30EV_15	30EX_15
Minimum flow on evaporator	m <sup>3</sup> /h	4,2	4,4
Maximum flow on evaporator	m <sup>3</sup> /h	15,3	18,2
Maximum outdoor temperature	°C	45	45
Minimum outdoor temperature	°C	10	10
Maximum REWT (evaporator) <sup>1</sup>	°C	35	35
Minimum REWT (evaporator) <sup>1</sup>	°C	6	6
Maximum ULWT (evaporator) <sup>2</sup>	°C	35	35
Minimum ULWT (evaporator) <sup>2</sup>	°C	5	5
Minimum temperature delta	°C	3	3
Maximum temperature delta	°C	10	10

### Notes:

- For continuous operation, the maximum temperature delta (REWT-ULWT) should not exceed 10 °C.

1 For continuous operation, REWT must be within the range of 8.0 °C to 20.0 °C.

2 The standard control set point is 5 ° to 14 °C. This value may vary depending on the FLWD of the project and the unit number configured in the control. In continuous operation at full load the maximum ULWT shall not exceed 15.0 °C. See Attachment III "Table Set Point".

### Minimum water flow

If the installation flow rate is below the minimum flow, recirculation of water flow may occur in the evaporator with risk of excessive fouling.

## 4. Instalation (cont.)



### Maximum water flow on the evaporator

This is limited by the pressure drop allowed in the evaporator. One must ensure a minimum  $\Delta$  in the evaporator of 2.8 K, which corresponds to a water flow of 0.9 l/s per kW.

### Water flow into the loop

The minimum volume of the water loop, in liters, is given by the following formula:

Volume = CAP (kW) x N \* = liters, where CAP is the nominal cooling capacity at nominal operating conditions.

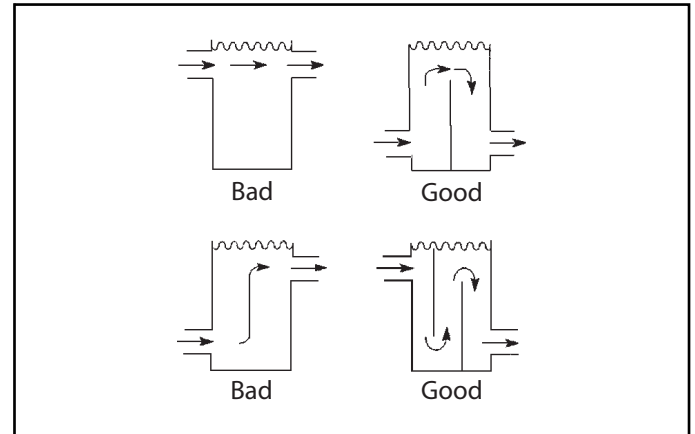
\*See the Application table below:

Application	
Air conditioning	6
Industrial cooling	See NOTE

### NOTE

For applications in industrial cooling, where the water temperature levels must be stable, the values above must be increased. We recommend that you contact the factory for these special applications.

This volume is necessary for temperature stability and accuracy. To achieve this volume, it may be necessary to add a reservoir tank to the circuit. This tank must be equipped with baffles to allow mixing of the fluid water. Please check the examples below.



When using a bypass on the water outlet to the water inlet, the minimum volume of water in the loop must be considered. If it is not considered, the volume of water circulating in the units will be too small and the units may oscillate and even trigger alarms. (See Figure 21 by-pass below).

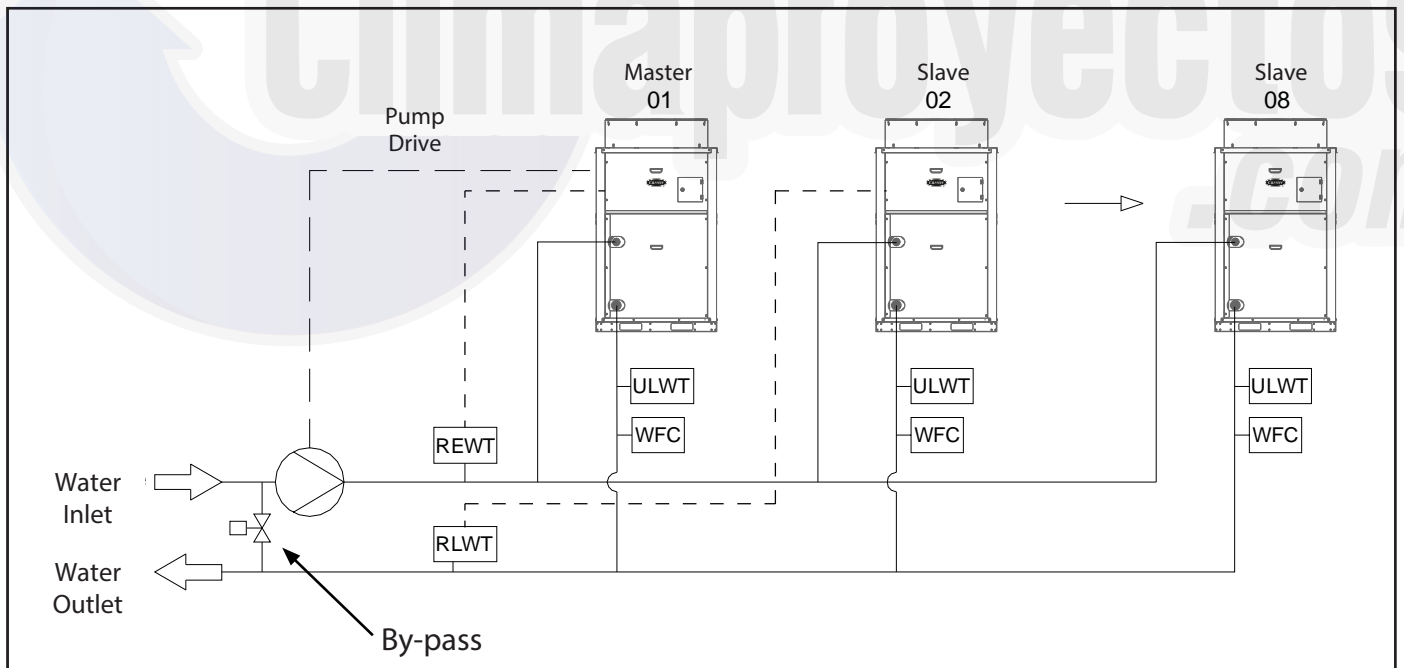
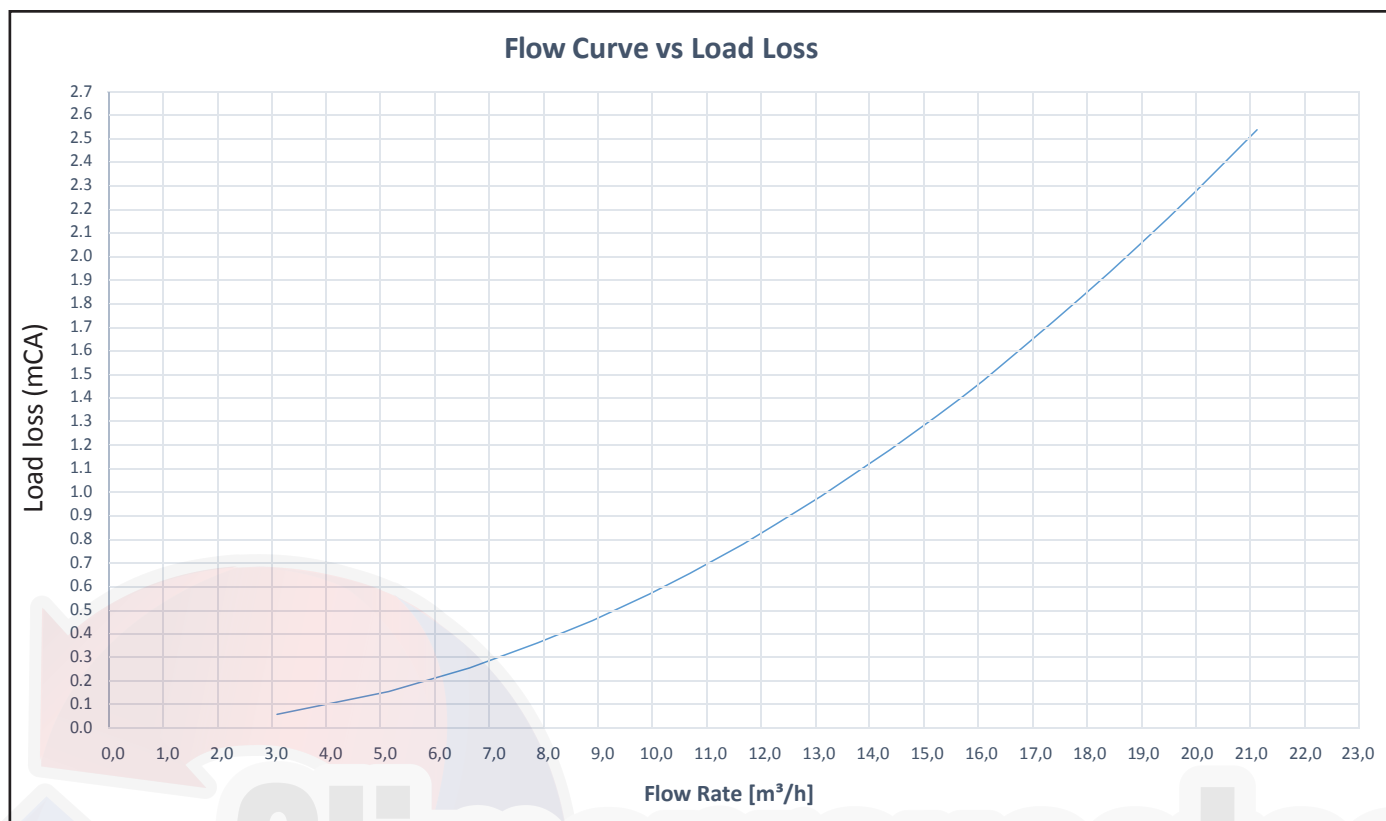


FIG. 21 - Interconnection diagram with by-pass

### Load loss on evaporator



### Flow Pressure Lost

Flow	Load loss
3,1	0,1
5,1	0,2
6,6	0,3
7,9	0,4
8,9	0,5
9,9	0,6
10,7	0,7
11,6	0,8
12,2	0,9
13,1	1,0
14,3	1,2
15,2	1,3
15,6	1,4
16,1	1,5
16,8	1,6
17,3	1,7
17,9	1,8
18,4	1,9
18,9	2,0
19,5	2,2
20,0	2,3
20,6	2,4
21,1	2,5

## 4. Instalation (cont.)



### 4.10. Water Connections

Regarding the size and position of the inlet and outlet water connections, refer to the dimensional drawings provided with the unit. The water pipes must not transmit any radial or axial force or vibration to the heat exchangers.

The water supply must be analyzed and properly filtered and treated, as well as the control devices, insulation and drain valves in order to prevent corrosion, dirt and deterioration of the pump components. Consult a water treatment specialist or specialized literature on the subject.

#### Design, installation and operation precautions

The water circuit should be designed to have the lowest number of corner “knees” and horizontal pipes at different levels. The following are the main connection items to be tested / checked:

- The water inlet and outlet shown in the unit are correct.
- Install manual or automatic air drain valves at high points in the circuit.
- Use an expansion device to maintain pressure in the system and install a safety valve as well as an expansion tank. It can be supplied optionally.
- Install thermometers in the water inlet and outlet.
- Install drain connections at all low points to allow the entire circuit to be drained.
- Install stop valves, close the inlet and outlet water connections.
- Use flexible connections to reduce the transmission of vibrations.
- Insulate all piping after testing for leaks, both to reduce thermal bridges and to prevent condensation.
- Installing a screen filter in front of the pump, when there are particles in the fluid that may block the heat exchanger. The filter should be Mesh 40. The optional Y filter + Victaulic are provided with this filter.
- Install thermometers and pressure gauges in the inlet and outlet water connections.



#### IMPORTANT

Depending on the weather conditions in your area, you should:

- Add ethylene glycol with appropriate concentration to protect the installation of a temperature of 10 ° C below the lowest temperature likely at the installation site.
- If the unit is not used for an extended period, it is recommended to drain it, and as a precaution introduce ethylene glycol in the heat exchanger, through the connection of incoming water drain valve. At the beginning of the new season, refill with water, add an inhibitor and do the recommended treatment (see section 6.4).
- The installer must comply with basic standards for the installation of auxiliary equipment, especially the maximum and minimum flow limits, which must be between the values listed in the operating limit table. (Application Data)



#### IMPORTANT

In order not to void the equipment warranty, the chilled water pumps of the unit must be actuated by chiller control, avoiding severe damage to the evaporator. Refer to the Product Catalogue or selection program according to the operating conditions of the unit to evaluate the recommended operating conditions. See the specific wiring diagram for more detailed information about field interconnections for your unit.



#### IMPORTANT

The units which are not supplied with the filter + Victaulic kit must be installed as close to the heat exchanger as possible in a position that is easily accessible in case of removal or cleaning. The plate heat exchanger can get easily dirty during initial start-up as it complements the filter function, and the unit operation will be impaired (reduced water flow rate due to increased pressure drop).



# 5. Operation



## 5.1 System Configurations

**⚠ IMPORTANT**

Before putting the unit / system into operation by pushing the Power button, you need to set the units and system configurations.

Each unit has a configuration switch (DIP), as Figure 22 on the side, and it is used to set up the address and capacity of each unit. Follow the instructions on the table below. It is mandatory that the address follows the ascending order from number 1.

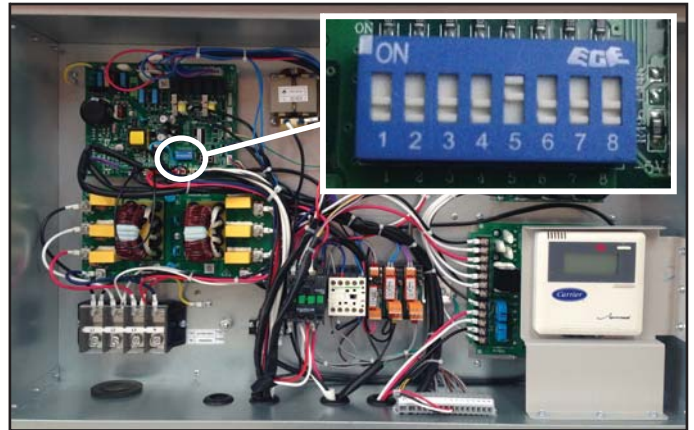


FIG. 22 - Configuration switch DIP

UNIT NUMBER			DIP ADDRESS MAIN ELECTRONIC BOARD				UNIT CAPACITY	NOT APPLICABLE
			SW1	SW2	SW3	SW4	SW5	SW6/7/8
30EVA / 30EXA	Single or Master	1	0	0	0	0	-	
30EXA	Slave 2 (First)	2	0	0	0	1 (ON)	-	
30EXA	Slave 3	3	0	0	1 (ON)	0	-	
30EXA	Slave 4	4	0	0	1 (ON)	1 (ON)	-	
30EXA	Slave 5	5	0	1 (ON)	0	0	-	
30EXA	Slave 6	6	0	1 (ON)	0	1 (ON)	-	
30EXA	Slave 7	7	0	1 (ON)	1 (ON)	0	-	
30EXA	Slave 8	8	0	1 (ON)	1 (ON)	1 (ON)	-	

\* Not available

In addition to the DIP configuration, you should set the configuration of the control items that follow. See item 5.2.6.

MENU	FACTORY DEFAULT	OPTIONS	DESCRIPTION
<b>Number of units</b>	1	01/08	Total number of units in the system.
<b>System Type</b>	Fixed	Inverter or Fixed	Type of system.
<b>Voltage</b>	380/440V	220V ou 380/440V	System voltage. In the Inverter system, the selection is automatic.
<b>Power Recover</b>	Keep-off	Keep-off or Last status	So that the unit should go back in the energy return: Keep-off - returns off and Last status - back in last function.
<b>DPS</b>	ON	ON or OFF	Differential pressure switch If the system has 4 or more units, you cannot change this parameter.
<b>WP</b>	Individually	Individually or System	Pump application type Individually - 1 pump per unit and System - 1 pump per system.
<b>FLWD</b>	8	3 to 10	Design water temperature difference delta
<b>Mfg Setting</b>	Reset to original factory parameters (default).		
<b>WVSCSTD</b>	80	20, 30, 40, 60 ou 80	Valve opening / closing time
<b>Remote</b>	OFF	ON or OFF	It allows you to turn on and off the unit remotely, enabling or disabling the thermostat.
<b>Reset errors and units</b>	OFF	ON or OFF	It allows you to reset the unit with error or the entire system. <b>IMPORTANT:</b> <b>After resetting ON, it is necessary to return to OFF.</b>

## 5. Operation (cont.)



### 5.2. Start-up

#### **IMPORTANT**

The units have crankcase resistors in the compressors. The resistors are connected depending on the outside temperature. If the outside temperature is below 16°C, leave the units energized for 24 hours before turning them on.

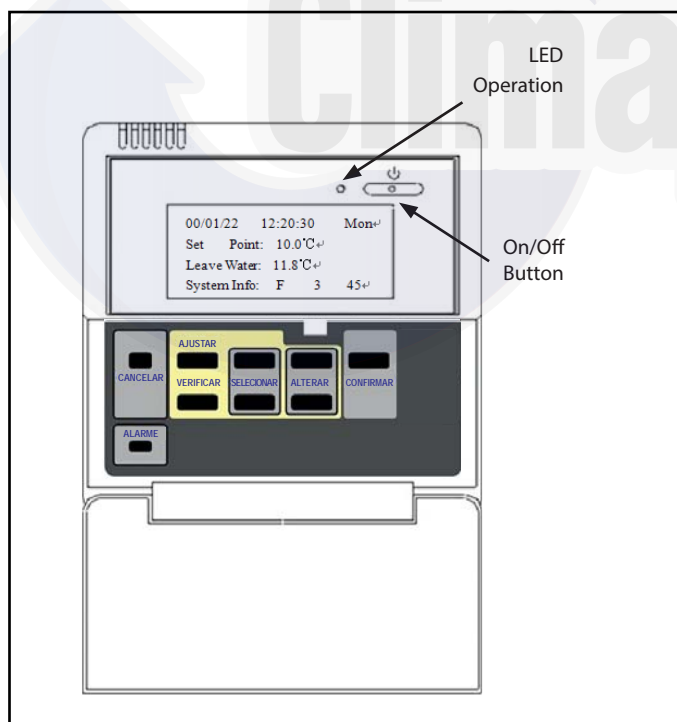
#### **IMPORTANT**

- Chiller start-up should be supervised by a qualified engineer.
- Starting and operating tests must be performed by applying heat and circulating water at the evaporator.
- All set-point adjustments and other existing setting parameters in control and DIP should be performed before starting the unit.

Before starting the unit, check the above conditions and the following items:

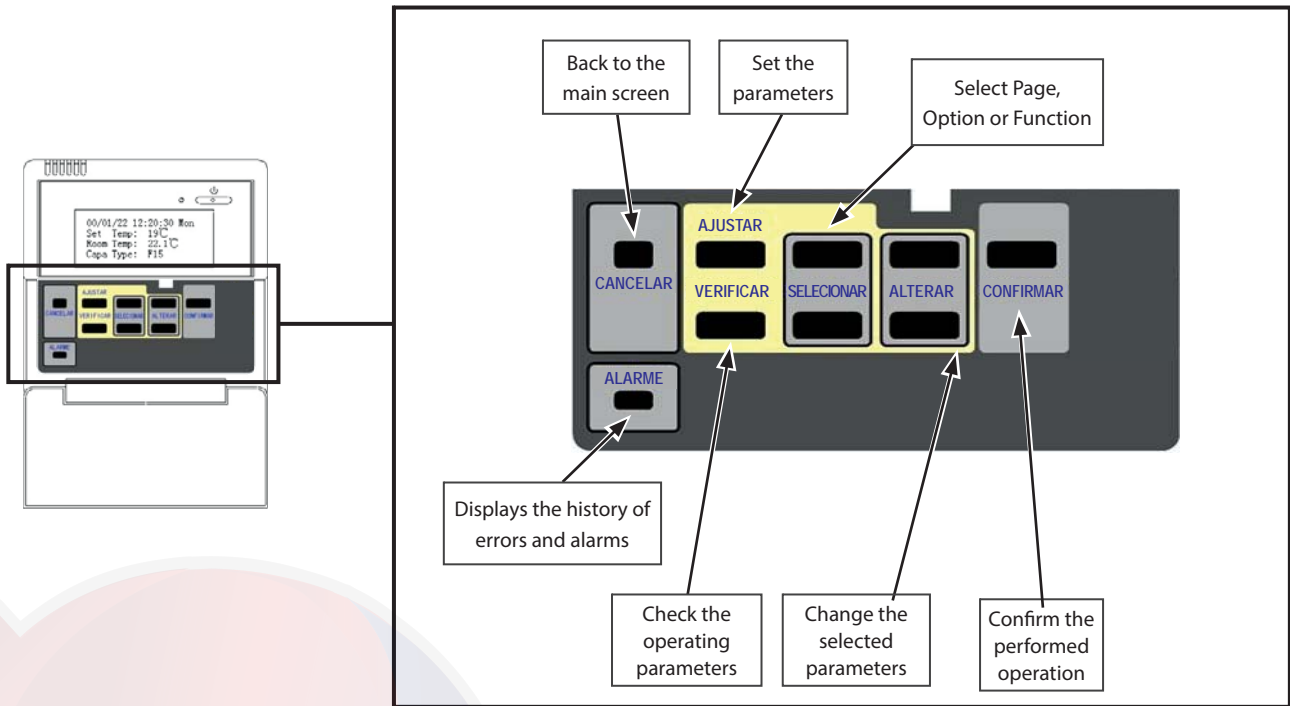
- Check the chilled water circulating pumps the air terminal units (Fan Coil) and all other equipment connected to the evaporator.
- Check that everything is in accordance with the wiring diagrams provided with the unit.
- Make sure all electrical connections are tightened with the proper torque.
- Make sure that the power supply is compatible with the electrical characteristics of the unit.
- Make sure that there are no refrigerant leaks.
- Ensure that all service valves are in the correct operating position, that is, open.
- Make sure that the manufacturer's instructions are all understood.

#### 5.2.1 Control Handling (thermostat)



<b>Power input:</b>	12VDC $\pm$ 10%, power consumption is below 1.5 W.
<b>Communication mode:</b>	RS-485 COM standard, 120 m maximum recommended distance.
<b>LCD Display:</b>	4 lines of 22 letters each.
<b>Sound signal (beep):</b>	A beep when turning on; A beep when you press each button; three consecutive beeps when the alarm sets off.
<b>Backlight:</b>	10-second lighting by pressing the buttons or system errors.
<b>LED:</b>	Lit when the system is operating.

### 5.2.2 Keyboard Instructions



### 5.2.3 Main Menu

When connecting the remote control, the display will show the main display page:

```

00/01/22 12:20:30 MON
SET POINT : 10°C COOL
LEAVING TEMP: 22.1°C
SYSTEM INFO: F 3 45
    
```

**NOTE**

The display of the remote control shows as an example a fixed 45TR system with 3 units DE 15TR.

DISPLAY LINE	DISPLAY	FORMAT / DESCRIPTION
1st line:	Date - Time - Day of the Week	<ul style="list-style-type: none"> <li>Year/Month/Day</li> <li>Hours: Minutes: Seconds</li> <li>Weekday (see below)                             <ul style="list-style-type: none"> <li>Mon = Monday</li> <li>Tue = Tuesday</li> <li>Wed = Wednesday</li> <li>Thu = Thursday</li> <li>Fri = Friday</li> <li>Sat = Saturday</li> <li>Sun = Sunday</li> </ul> </li> </ul>
2nd line:	Setting Temperature and Operating Mode	Temperature set and operating mode. The operation mode will be cool *(Cooling). * Chiller units do not have other operating mode.
3rd line:	Outlet Temperature	System water outlet temperature.
4th line:	Type, Quantity and Capacity	Indicates the system type: <ul style="list-style-type: none"> <li>Fixed "F" or Variable (Inverter) "V".</li> <li>Number of units.</li> <li>Total capacity of chiller units in TR (tons of refrigeration).</li> </ul>

## 5. Operation (cont.)



### 5.2.4 Set Date and Time

1. Press AJUSTAR "Set" (A) to enter the menu;
2. Use the buttons SELECCIONAR "Select" (B) to select the "Set Time" option (C) and press CONFIRMAR "Enter" (D);
3. The date and current time appear on the screen (F). Use the buttons SELECCIONAR "Select" (B) to select the parameter to be adjusted;
4. Use the buttons ALTERAR "Change" (E), up (increase) and down (decrease), to set the desired parameter;
5. Press CONFIRMAR "Enter" (D).

Home screen

00/01/22 12:20:30 Mon  
 Set Point: 10.0°C Cool  
 Leaving Temp: 11.8°C  
 System Info: F 3 45



C

Set Time  
 Time Mode: Disable  
 Timer  
 Service Access

F

yy/mm/dd 00/01/22  
 hh:mm:ss 22:33:45

#### IMPORTANT

After the date and time are set, they will be displayed in the initial display page.  
 Set the date and time before turning on the power in order to properly set the timer.

### 5.2.5 Set Timer

#### NOTE

On Timer: Time programmed to call.  
 Timer OFF Scheduled time to shut down.

#### TIMER MODE

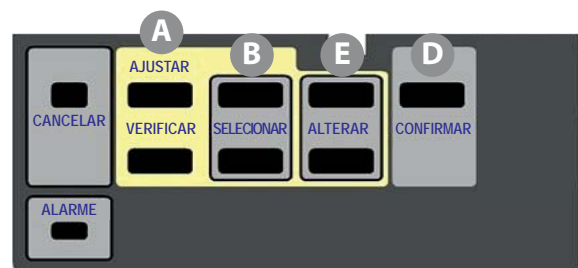
<b>DISABLE</b>	Timing disabled
<b>CURRENT</b>	If the equipment is on, it allows you to program one schedule for it to shut down. If the machine is turned off, it allows you to schedule a time for it to be turned on.
<b>DAILY</b>	Enables you to turn on and switch off the equipment in two distinct periods.
<b>WEEKLY</b>	Enables you to turn on and switch off the equipment in two distinct periods in each day of the week.

#### NOTE

The format definition (shown as "-: -") shows that the set time is not set, so the "Timer" is disabled.  
 This function works every day in which the "Timer" is set.

#### Disable Mode:

1. Press AJUSTAR "Set" (A) to enter the menu;
2. Use the buttons SELECCIONAR "Select" (B) to select the "Time Mode" option (C) and press CONFIRMAR "Enter" (D);
3. Use the buttons ALTERAR "Change" (E), up (increase) and down (decrease), and select the "Disable" option.

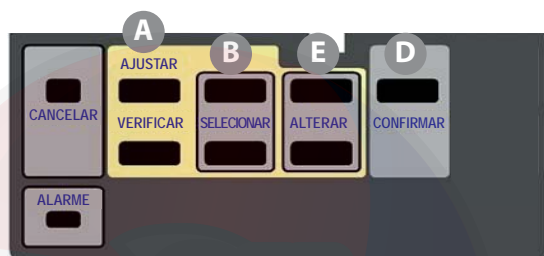


C

Set Time  
**Time Mode: Disable**  
 Timer  
 Service Access

### Current Mode:

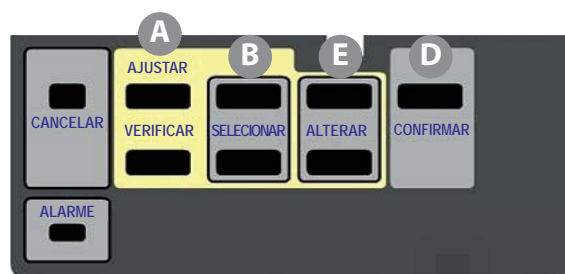
1. Press AJUSTAR "Set" (A) to enter the menu;
2. Use the button SELECCIONAR "Select" (B) to select the "Time Mode" option (C) and press CONFIRMAR "Enter" (D);
3. Use the buttons ALTERAR "Change" (E), up (increase) and down (decrease), and choose the "Current" option;
4. Use the buttons SELECCIONAR "Select" (B) to select the "Timer" option (F) and press CONFIRMAR "Enter" (D);
5. Press SELECCIONAR "Select" (B) up or down to select "Timer On" or "Timer Off" (G);
6. Press ALTERAR "Change" (E) up or down to set the time of the "Timer On" and "Timer Off". After, press CONFIRMAR "Enter" (D).



C	Set Time
	<b>Time Mode: Current</b>
	Timer Service Access
F	Set Time
	<b>Time Mode: Disable</b>
	Timer Service Access
G	Timer1 On : 00:00
	Timer1 Off : -- :--

### Daily Mode:

1. Press AJUSTAR "Set" (A) to enter the menu;
2. Use the buttons SELECCIONAR "Select" (B) to select the "Time Mode" option (C) and press CONFIRMAR "Enter" (D);
3. Use the buttons ALTERAR "Change" (E), up (increase) and down (decrease), and choose the "Daily" option;
4. Use the buttons SELECCIONAR "Select" (B) to select the "Timer" option (F) and press CONFIRMAR "Enter" (D);
5. Press SELECCIONAR "Select" (B) up or down to choose "Timer 1 On" or "Timer Off 1" (G);
6. Press ALTERAR "Change" (E) up or down to set the time of the "Timer On" and "Timer Off". After, press CONFIRMAR "Enter" (D).



C	Set Time
	<b>Time Mode: Daily</b>
	Timer Service Access
F	Set Time
	<b>Time Mode: Disable</b>
	Timer Service Access
G	Timer1 On : 00:00
	Timer1 Off : -- :--
	Timer2 On : -- :--
	Timer2 Off : -- :--

## 5. Operation (cont.)



### Weekly Mode:

1. Press AJUSTAR "Set" (A) to enter the menu;
2. Use the buttons SELECCIONAR "Select" (B) to select the "Time Mode" option (C) and press CONFIRMAR "Enter" (D);
3. Use the buttons ALTERAR "Change" (E), up (increase) and down (decrease), and select the "Weekly" option;
4. Use the buttons SELECCIONAR "Select" (B) to select the "Timer" option (F) and press CONFIRMAR "Enter" (D);
5. Press SELECCIONAR "Select" (B) up or down to choose the desired day of the week with "Timer 1 On" or "Timer 1 Off" (G);
6. Press ALTERAR "Change" (E) up or down to set the time of the "Timer On" and "Timer Off". After press CONFIRMAR "Enter" (D) and return to Step 5 to set the other days of the week.



C

Set Time
<b>Time Mode: Weekly</b>
Timer
Service Access

F

Set Time
Time Mode: Disable
<b>Timer</b>
Service Access

G

Mon Timer 1 On :	00:00
Mon Timer 1 Off :	01:00
Mon Timer 2 On :	02:00
Mon Timer 2 Off :	03:00

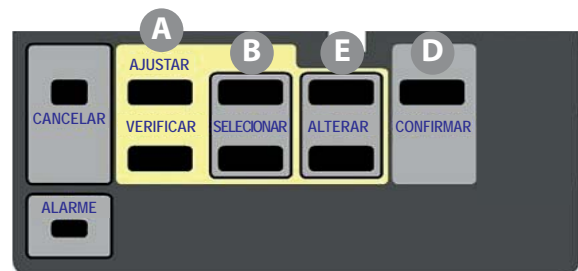
The screen presents in detail the weekly configuration starting with "Mon", Monday.

### 5.2.6 System Parameters Setup

#### ATTENTION

Note that whenever you need to change some system parameters, the software will ask for the password.

1. Press AJUSTAR "Set" (A) to enter the menu;
2. Use the buttons SELECCIONAR "Select" (B) to select the "Service Access" option (C) and press CONFIRMAR "Enter" (D);
3. Use the buttons ALTERAR "Change" (E) to change the numbers of each digit and use the buttons SELECCIONAR "Select" (B) to toggle the password digits.



C

Set Time
Time Mode: Disable
Timer
<b>Service Access</b>

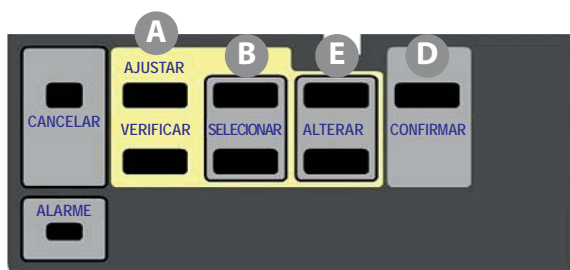
4. It shows the "Password" option. Press ALTERAR "Set" (E) to Change "000000" to "325193" and press CONFIRMAR "Enter" (D).

Password: 000000
------------------

Password: <b>325193</b>
-------------------------

To set the number of outdoor units “Number of ODU”:

1. Use the buttons ALTERAR “Change” (E) to choose the amount of system units (1-8) and press CONFIRMAR “Enter” (D);



<b>Number of units: 01</b>
System Type : Inv
Voltage: ---
Power Recover: Keep-Off

**IMPORTANT**  
Be sure to select the correct number of units in the system. It should not exceed 8.

To set the “System Type” (Inverter or Fixed) follow the instructions:

1. In the “Service Access” menu use the button SELECCIONAR “Select” (B) to select the “System Type”.
2. With the buttons ALTERAR “Change” (E) choose the “Inv” option for Inverter and “Fix” for Fixed.
3. Press CONFIRMAR “Enter” (D) to end.

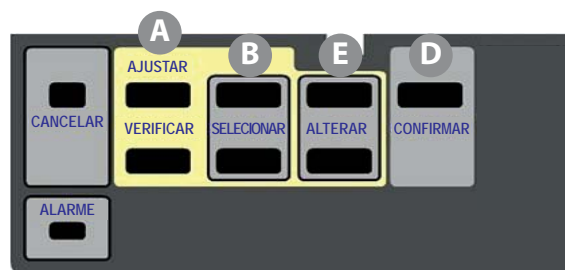


Number of ODU: 01
<b>System Type : Inv</b>
Voltage: ---
Power Recover: Keep-Off

Number of ODU: 01
<b>System Type : Fix</b>
Voltage: 220V
Power Recover: Keep-Off

To set the System Voltage:

1. In the “Service Access” menu use the buttons SELECCIONAR “Select” (B) to select the “Voltage” option.
2. Press ALTERAR “Change” (E) up or down to choose “220V”, “380V” or “440V”. After, press CONFIRMAR “Enter” (D) to end.



Number of ODU: 01
System Type : Fix
<b>Voltage: 220V</b>
Power Recover: Keep-Off

Number of ODU: 01
System Type : Fix
<b>Voltage: 380V</b>
Power Recover: Keep-Off

Number of ODU: 01
System Type : Fix
<b>Voltage: 440V</b>
Power Recover: Keep-Off

To set the Mode the unit should return in power recover:

1. Press SELECCIONAR “Select” (B) up or down until the Power Recover option.
2. Press ALTERAR “Change” (E) up or down to choose one of the options available (Keep-Off (a) or Last Status (b)).

- **Keep-Off:** Keeps the system off after the power recovers.

- **Last Status:** The system is turned on after the power recovers.

(a)

Number of ODU: 01
System Type : Fix
Voltage: 220V
<b>Power Recover: Keep-Off</b>

(b)

Number of ODU: 01
System Type : Fix
Voltage: 220V
<b>Power Recover: Last Status</b>

## 5. Operation (cont.)



To enable or disable the differential pressure switch “**DPS Protection**”, follow these steps:

1. In the “Service Access” menu use the buttons SELECCIONAR “Select” (B) to select the “**DPS Protection**” option.
2. Press ALTERAR “Change” (E) up or down to select the “ON” or “OFF”, press CONFIRMAR “Enter” (D) to end.



<b>DPS Protection : ON</b>
WP : Individually
FLWD : 8°C
Mfg Setting

To set the type of pump application (WP):

1. Press SELECCIONAR “Select” (B) to the “WP” option.
2. Use the buttons ALTERAR “Change” (E) up or down to choose one of the options available, Individually (a) or System (b):
  - **Individually:** 1 Pump per unit.
  - **System:** 1 Pump per system



(a)

DPS Protection : ON
<b>WP : Individually</b>
FLWD : 8°C
Mfg Setting

(b)

DPS Protection : ON
<b>WP : System</b>
FLWD : 8°C
Mfg Setting

To set the design’s water temperature difference Delta (FLWD):

1. Press SELECCIONAR “Select” (B) down to “FLWD”, press CONFIRMAR “Enter” (D).
2. Press ALTERAR “Change” (E) up or down to choose from 3.0°C to 10°C:



DPS Protection : ON
WP : Individually
<b>FLWD : 8.0°C</b>
Mfg Setting

To Restore Factory (Default) Settings (**Mfg Setting**):

1. In the “Service Access” menu use the buttons SELECCIONAR “Select” (B) to select the “System Type”.
2. Use the buttons SELECCIONAR “Select” (B) again to select the “Mfg Setting” (C) and press CONFIRMAR “Enter” (D);



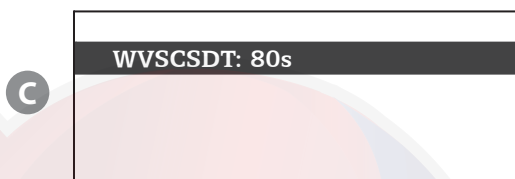
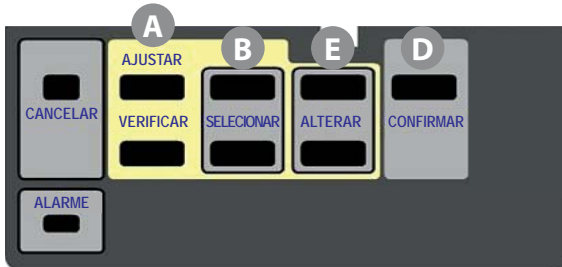
(C)

Set Time
Time Mode: Disable
Timer
<b>Mfg Setting</b>



To set the opening / closing time of the valve:

1. Use the buttons SELECCIONAR "Select" (B) to select the option "WVSCSDT" (C) and press CONFIRMAR "Enter" (D);
2. Press ALTERAR "Change" (E) up or down to choose between the options: 20, 30, 40, 60, 80 to 10°C:

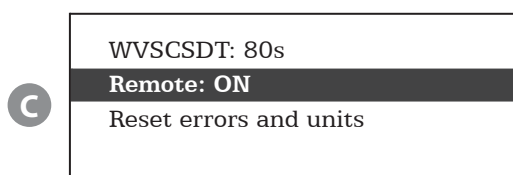


**IMPORTANT**

The outlet water temperature control gives is related to the opening and closing time of the water valve. The smaller the opening time, the better the control. The configurable time "WVSCSDT" of the thermostat should be set in the field according to the opening and closing time of the valve (WV).

To set the Remote Connection option:

1. In the "Service Access" menu use the SELECCIONAR "Select" (B) to select the "Remote" option (C).
2. Press ALTERAR "Change" (E) up or down to select the "ON" (On) or "OFF" (off), press CONFIRMAR "Enter" (D) to end.

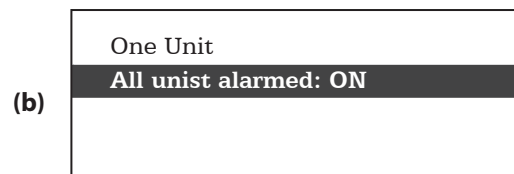
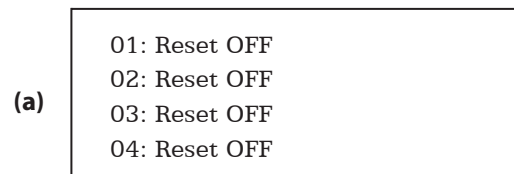
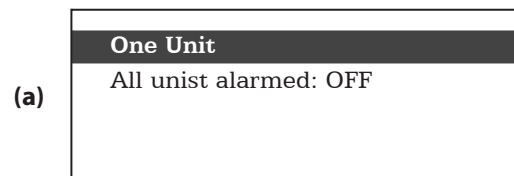
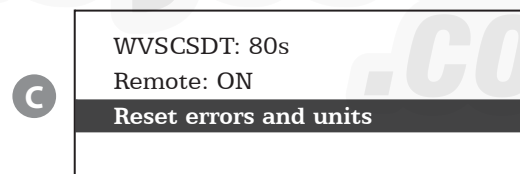
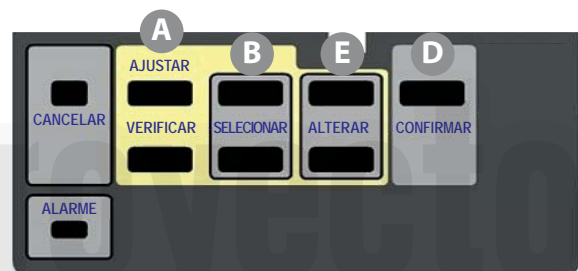


To Reset the Alarm of a unit or system:

1. In the "Service Access" menu use the buttons SELECCIONAR "Select" (B) to select the "Reset errors and units" option (C).
2. Press CONFIRMAR "Enter" (D).
3. Press SELECCIONAR "Select" (B) to choose between the "One Unit" option (a) or "All units alarmed" (b):
  - **One Unit:** The user can select the unit he wants to reset.
  - **All units alarmed:** All units will be reset.
4. Choose the desired option, press CONFIRMAR "Enter" (D).
5. Use the button ALTERAR "Change" (E) to change the ON/ OFF status.

**IMPORTANT**

To reset the system or a certain unit, it is necessary to choose the ON option and press Enter (D). After confirming, the user should turn back to option OFF.



## 5. Operation (cont.)

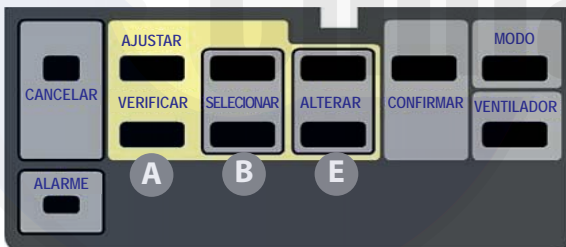


### 5.2.7 Checking the System Information

#### NOTE

- To switch between the units, press [CHANGE].
- To navigate the pages of chiller units, press [SELECT] up or down to view the next page or the previous page.
- Data from the 4th page appear only when the chiller unit (ODU) is Inverter; otherwise, there are only four pages to be displayed.
- ODU [01] [02] [03] ... [08] are the addresses of chiller units.

- 1) Press VERIFICAR "Check" (A) to check the operating parameters;
- 2) The address of the chiller unit is informed on the 1st page next to the error information "Sys Error"; to check the parameters of the other chiller units press ALTERAR "Change" (E);
- 3) There are 3 pages with parameters for each unit; use the buttons SELECCIONAR "Select" (B) to change page;
- 4) The 4th page (E) shows the parameters only for units with variable speed (Inverter).



#### 1st Page

Entering Temp.: 18.5°C  
 Unit Leave Temp.: 12.0°C  
 Outdoor Air Temp.: 35°C  
 Sys Error: E12 [01]

#### 2nd Page

Discharge1 Temp.: 80°C  
 Discharge2 Temp.: 75°C  
 Saturated Temp.: 10°C  
 Suction Temp.: 10°C [01]

#### 3rd Page

Condenser Temp.: 40°C  
 AMP Fixed 1: 00.0A  
 AMP Fixed 2: 00.0A  
 Main Board Ver: 000 [01]

4th Page  
 (for INVERTER system only)

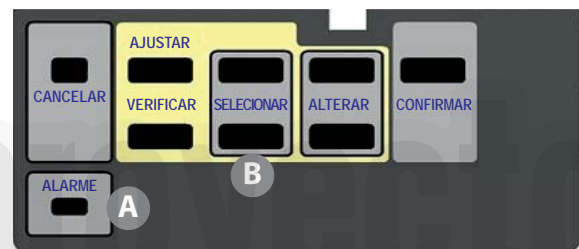
Comp freq: 000Hz  
 Comp INV AMP: 00.0A  
 Heatsink Temp: 30°C  
 Dc bus Volt: 000 [01]

5th Page

Driver NEC ver.: 000  
 Driver DSP ver: 000  
 BLDC ver: 000  
 HIC ver: 000

### 5.2.8 Error History

1. Press "Alarm" (A) to check the recent errors that occurred in each condenser unit;
2. On the screen (C) the date and time, the code for each error in chronological order and the condenser unit where it occurred will be shown. Use the buttons SELECCIONAR "Select" (B) to change page.



Date (AA/MM/DD)	Hour (hh:mm)	Chiller Unit	Error Code
00/01/01	00:00	[--]	--
00/01/01	00:00	[--]	--
00/01/01	00:00	[--]	--
00/01/01	00:00	[--]	--

#### NOTE

If an error occurs, it will be displayed in the sub-menu. In this situation only the last 27 events will be saved.

### 5.3 Modbus



FIG. 23 - Modbus Kit

**⚠ IMPORTANT**

**RTU MODBUS COMMUNICATION PROTOCOL**

The system communication is performed serially in RS-485 standard, with enclosed protocol. To convert to Modbus RTU protocol, the K35402026 converter should be used (called Gateway).

#### Features

1. "Modbus Gateway" is a slave device.
2. The RS485 standard is robust to noise and interference, but the higher the distance the shorter the transmission rate. Maximum distance is 1200 meters. Distance to maintain maximum transmission rate is up to 12 meters.
3. Standard format Request Frame (TX):

Address	Function	Recorder Start	No. Recorders	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

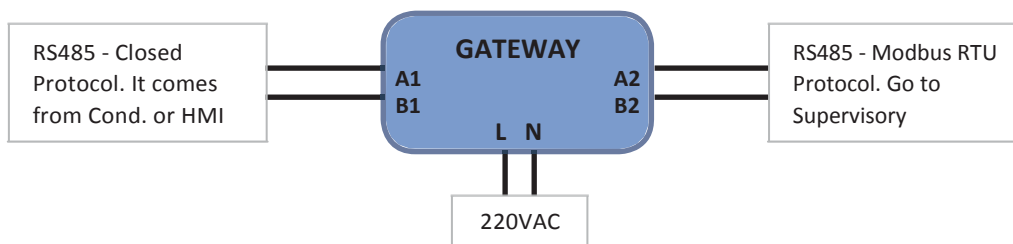
4. The setting of the DIP existing in Gateway should be carried out as follows (as indicated by the dashed lines):

8	7	6	5	4	3	2	1	Description
Check		Transmission Rate		Address				
0	0							No parity, 2 stop bit
0	1							Even, 1 stop bit
1	0							Odd, 1 stop bit
1	1							No check, 2 stop bit
		0	0					19200
		0	1					9600
		1	0					4800
		1	1					2400
				0	0	0	0	Gateway Address 1
				0	0	0	1	Gateway Address 2
				0	0	1	0	Gateway Address 3
				0	0	1	1	Gateway Address 4
				0	1	0	0	Gateway Address 5
				0	1	0	1	Gateway Address 6
				0	1	1	0	Gateway Address 7
				0	1	1	1	Gateway Address 8
				1	0	0	0	Gateway Address 9
				1	0	0	1	Gateway Address 10
				...	...	...	...	... up until ...
				1	1	1	1	Gateway Address 16

## 5. Operation (cont.)



### 5. Electrical Connection:



#### NOTE

When using an RS485 converter > 232, do not power it from the Gateway.

### Reading and Writing map

Input Register (Function 04) - CHILLER 1		
Address	Description	Comment
H0001	Type of System	See the "Type of System" table (Analyze on Hex)
H0002	Error Code	
H0003	Outlet Water Temperature (INT)	
H0004	Inlet Water Temperature (INT)	Chiller <2, referring to Chiller unit. Chiller > 2, referring to the system.
H0005	Outdoor Temperature	
H0006	Middle Condenser Temperature	
H0007	Suction Temperature	
H0008	Discharge Temperature Comp.1	
H0009	Discharge Temperature Comp.2	
H000A	Saturated Suction Temperature	
H000B	Reserve	
H000C	Heatsink Temperature (Inverter only)	
H000D	DIP setting	See in the detailed DIP setting section
H000E	Comp Current 1 (Fixed)	Multiply the reading by 0.25
H000F	Comp Current 2	Multiply the reading by 0.25
H0010	Digital inputs (DI)	Bit5-0 means entries 6-1 (See Table "DI")
H0011	Digital Outputs (DO)	Bit4-0 means outputs 5-1 (See table "DO")
H0012	Comp Frequency (Inv)	
H0013	Comp Current (Inv)	Multiply the reading by 0.25
H0014	DC BUS Voltage (Inverter only)	
H0015	Cond Motor Speed	RPM
H0016	System demand	%
H0017	Reserve	
H0018	Mainboard Software Version	
H0019	Reserve	
H001A	Outlet Water Temperature (FRACTION)	

## Reading and Writing map (Cont.)

Input Register (Function 04) - CHILLER 2		
Address	Description	Comment
H0101	Reserve	
H0102	Error Code	
H0103	Outlet Water Temperature (INT)	
H0104	Inlet Water Temperature (INT)	Chiller <2, referring to Chiller unit. Chiller> 2, referring to the system.
H0105	Outdoor Temperature	
H0106	Middle Condenser Temperature	
H0107	Suction Temperature	
H0108	Discharge Temperature Comp.1	
H0109	Discharge Temperature Comp.2	
H010A	Saturated Suction Temperature	
H010B	Reserve	
H010C	Reserve	
H010D	DIP setting	See in the detailed DIP setting section
H010E	Comp Current 1	Multiply the reading by 0.25
H010F	Comp Current 2	Multiply the reading by 0.25
H0110	Digital Inputs (DI)	Bit5-0 means entries 6-1 (See Table "DI")
H0111	Digital Outputs (DO)	Bit4-0 means outputs 5-1 (See Table "DO")
H0112	Reserve	
H0113	Reserve	
H0114	Reserve	
H0115	Cond. Motor Speed	RPM
H0116	Reserve	
H0117	Reserve	
H0118	Main Software Version	
H0119	Reserve	
H011A	Outlet Water Temperature (FRACTION)	
H011B	Inlet Water Temperature (FRACTION)	

## 5. Operation (cont.)



### Reading and Writing map (Cont.)

Input Register (Function 04) - CHILLER 3-16		
Address	Description	Comment
H0201-701	Reserve	
H0202-702	Error Code	
H0203-703	Outlet Water Temperature (INT)	
H0204-704	Reserve	
H0205-705	Outdoor Temperature	
H0206-706	Middle Condenser Temperature	
H0207-707	Suction Temperature	
H0208-708	Discharge Temperature Comp.1	
H0209-709	Discharge Temperature Comp.2	
H020A-70A	Saturated Suction Temperature	
H020B-70B	Reserve	
H020C-70C	Reserve	
H020D-70D	DIP adjustment	See the detailed DIP setting section
H020E-70E	Comp Current 1	Multiply the reading by 0.25
H020F-70F	Comp Current 2	Multiply the reading by 0.25
H0210-710	Digital inputs (DI)	Bit5-0 means entries 6-1 (See Table "DI")
H0211-711	Digital Outputs (DO)	Bit4-0 means outputs 5-1 (See table "DO")
H0212-712	Reserve	
H0213-713	Reserve	
H0214-714	Reserve	
H0215-715	Cond Motor Speed	RPM
H0216-716	Reserve	
H0217-717	Reserve	
H0218-718	Main Software Version	
H0219-719	Reserve	
H021A-71A	Outlet Water Temperature (FRACTION)	
H021B-71B	Reserve	

Holding Register (Function 03/16) - HMI		
Address	Description	Comment
H0001	On / Off	1 - On / 0 - Off
H0002	Set Point	Allowed values: according to the water delta
H0003	Reserve	EOL test. Only applied to the factory. (Do not use)
H0004	Reserve	
H0005	Gateway Version	

## Type of System

Address: H0001		System Type:
High	Low	
01	18	Fixed 15
01	19	Fixed 30
01	1A	Fixed 45
01	1B	Fixed 60
01	1C	Fixed 75
01	1D	Fixed 90
01	1E	Fixed 105
01	1F	Fixed 120

Address: H0001		System Type:
High	Low	
00	08	Inverter 15
00	09	Inverter 30
00	0A	Inverter 45
00	0B	Inverter 60
00	0C	Inverter 75
00	0D	Inverter 90
00	0E	Inverter 105
00	0F	Inverter 120

**Table DI**

	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Description	High Pressure Switch	Low Pressure Switch	Emergency	WFC	Remote ON/OFF	DPS
Description	High Pressure Switch	Low Pressure Switch	Emergency	Flow Sensor	Remote On-Off	Water differential pressure switch
0 - Closed 1 - Opened	0 - Ok 1 - Alarmed	0 - Ok 1 - Alarmed	0 - Ok 1 - Alarmed	0 - Ok 1 - No flow	0 - Turn on 1 - Turn off	0 - Ok 1 - Alarmed
0 - Closed 1 - Opened	0 - No error 1 - Alarmed	0 - No error 1 - Alarmed	0 - No error 1 - Alarmed	0 - With Flow 1 - No Flow	0 - On 1 - Off	0 - No error 1 - Alarmed
Comments					Only for Chiller 1	Only for Chiller 1

**Table DO**

	bit 4	bit 3	bit 2	bit 1	bit 0	
Description	Water Pump (WP)	Crankcase Heater (CH)	Water Valve (WV)	Fixed Speed Compressor 2	Remote error	Fixed Speed Compressor 1
Description	Water Pump (WP)	Crankcase Heater (CH)	Water Valve (WV)	Fixed Speed Compressor 2	Remote alarm	Fixed Compressor 1
0 - OFF 1 - ON	0 - OFF 1 - ON	0 - OFF 1 - ON	0 - OFF 1 - ON	0 - OFF 1 - ON	0 - No alarm 1 - Alarmed	0 - OFF 1 - ON
0 - OFF 1 - ON	0 - OFF 1 - ON	0 - OFF 1 - ON	0 - OFF 1 - ON	0 - OFF 1 - ON	0 - No error 1 - With error	0 - OFF 1 - ON
Comments					Only for Chiller 1	
					<b>INVERTER</b>	<b>FIXED</b>

## 6. Maintenance & Repair



All technicians that need to handle the machine for any purpose must be qualified to work with refrigerant and electrical circuits.

### IMPORTANT

Before performing any work on the machine, ensure that the power supply is turned off. If a refrigerant circuit is opened, it must be evacuated, refilled and tested for leaks. Before any operation on a refrigerant circuit, it is necessary to completely remove the refrigerant charge with a group of refrigerant charge recovery.

### Crankcase heater

They are supplied in all compressors of the unit to prevent refrigerant build-up in the oil during equipment shutdowns. Make sure that the heaters are firmly attached to prevent them from moving.

### IMPORTANT

The units have crankcase resistors in the compressors. The resistors are activated depending on the outside temperature. If the outside temperature is below 16°C, leave the units energized for 24 hours before turning them on.

### 6.1 - Refrigerant Circuit Maintenance

#### General maintenance

Keep the unit and the space around it clean and free from obstructions. Once the installation is complete, remove any waste, such as packaging materials.

- Regularly clean the piping, removing all dust and dirt. This makes it easier to find water leaks, and they can be repaired before more serious problems occur.
- Confirm that all connections and gaskets are screwed are secure. Secure connections prevent leakage and vibration.
- Check that all insulation gaskets are closed tightly and that all insulation is fixed in place. Check all heat exchangers and pipeline.

#### Refrigerant circuit

- Leakage tests: The units are shipped with full R-410A operating charge (see Attachment 2) and must be under enough pressure to have a leak test performed.

### CAUTION

This system uses R-410A, which has higher pressures than R-22 and other refrigerants. No other refrigerant can be used in this system. The set of pressure gauges, hoses and recovery systems should be designed for R-410A refrigerant. If you have questions about the equipment, contact the equipment manufacturer.

Tests for leaks to make sure there were no leaks during unit transportation. System dehydration is not required, unless all the refrigerant charge was lost. Do not reuse gaskets. Repair any leaks found using good cooling practices.

- Dehydration: Refer to the Carrier's Standard Service Techniques Manual, Chapter 1, Refrigerants, Sections 6 and 7 for more details. Do not reuse the compressor to evacuate the system.
- Refrigerant charge (See Table 1): Right in front of the drier filter of each circuit there is a factory-installed liquid line service valve. Each valve has a 1/4-inch Schrader connection to charge liquid refrigerant.

### WARNING

**If it is necessary to perform the vacuum procedure in the interconnection pipes, consider the following items:**

- NEVER use the compressor for the vacuum procedure.
- For product safe and efficient operation it is essential to ensure the vacuum process and prevent air from entering during the refrigerant fluid charging procedure.
- Failure to follow the above recommendations can cause potential damage to the product, the installation and the physical integrity of persons who are nearby during the procedure.

### CAUTION

When charging, flush water through the cooler throughout the process to avoid freezing. Damage caused by freezing can void Carrier's warranty.

### CAUTION

DO NOT OVERLOAD the system. THE overload results in damage to the compressor as a result of a higher discharge pressure and higher power consumption.

### CAUTION

The refrigerant charge should be removed slowly to avoid oil losses from the compressor that can result in a damaged compressor.



## Principles

### *Procedure rules with refrigerant:*

Cooling installations must be inspected and maintained regularly and thoroughly by specialists. Their activities should be supervised and checked by properly trained people. To minimize discharge to the atmosphere, refrigerants and lubricating oil must be transported using methods which reduce leaks and losses to a minimum.

### *Leaks must be repaired immediately.*

All units are equipped with two special connections in suction and liquid lines, which allows the connection of recovery valves with quick connection without refrigerant loss.

If the residual pressure is too low to make the transfer, a refrigerant recovery unit built for this purpose should be used.

The compressor lubricating oil contains refrigerant. All the oil drained from a system during maintenance must be properly handled and stored.

Refrigerant under pressure must never be discharged into the atmosphere.

### **IMPORTANT**

The 30E units are charged with liquid refrigerant HFC R410A.

### **Low charge**

If there is not enough refrigerant in the system, gas bubbles will appear in the liquid sight glass.

If the charge is too low, large bubbles will appear in the sight glass, and the suction pressure will drop. The compressor suction will overheat.

The machine must be recharged after the leak is repaired. Find the leak and drain the system with a refrigerant recovery unit. Perform the repair, test for leaks, and recharge the system.

### **IMPORTANT**

After repairing the leak, the circuit should be tested without exceeding the maximum operating pressure in low side, as indicated on the unit nameplate.

The refrigerant must always be refilled in the liquid line in liquid form.

The refrigerant cylinder must always contain at least 10% of its initial charge.

Regarding the amount of refrigerant per circuit, refer to the data on the unit nameplate.

### **IMPORTANT**

Carrier does not recommend, for maintenance procedures, that the refrigerant be collected in the condenser unit, using the compressor unit. For refrigerant collection, use the appropriate pump and cylinder.

Never put the unit in operation without making sure that the service valves are open.

Failure to follow the above recommendations can cause potential damage to the product, installation and physical integrity of persons who are nearby during the procedure.

## 6.2 - Electrical maintenance

When working in the unit, follow the safety instructions provided in section 1.

- It is recommended to check that all electrical connections are to the proper torque:
  - a. Upon receipt of the unit, at the time of installation, and before the initial start-up.
  - b. One month after the first start-up, the electrical components have reached their nominal operating temperatures.
  - c. Regularly, once a year.

## 6. Maintenance & Repair (cont.)



### 6.3 - Condenser coil

We recommend that finned coils are inspected regularly to check for dirt. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that lose leaves.

To clean the coil, do the following:

- Remove fibers and dust accumulated on the condenser surface with a soft brush (or vacuum cleaner).
- Clean the coil with the appropriate cleaning agents.

We recommend Carrier products for coil cleaning:

- Product for traditional cleaning
- Product for cleaning and degreasing.

These products have a neutral pH, do not contain phosphates, they are not harmful to the human body, and can be discharged into the public sewer system.

Depending on the level of contamination, both products may or may not be used diluted.

In routine maintenance, we recommend using 1 kg of the concentrated product, diluted to 10%, to clear a 2m<sup>2</sup> coil surface. This process can be performed with a Carrier gun, or with a spray gun in the low-pressure position. One should be careful with cleaning methods under pressure in order not to damage the coil fins. The spraying on the coil should be done as follows:

- In the direction of the fins;
- In the direction of the air flow;
- With a large diffuser (25-30 °);
- At a distance of 300 mm.

Both cleaning products can be used for any of the following coil finishes: Gold Fin Cu / Cu, Cu / Al, Cu / Al with Polual, Blygold or Heresite protection.

It is not necessary to rinse the coil, since the pH of the product is neutral. To make sure the coil is completely clean, we recommend rinsing with a small stream of water. The water pH value should be between 7 and 8.



#### WARNING

Never use pressurized water without a large diffuser. Concentrated or rotating water jets are strictly prohibited. The correct and frequent cleaning (approximately every three months) will prevent 2/3 the problems with corrosion.

### 6.4 - Water Quality - Carrier Recommendations

The water supply must be analyzed and properly filtered, treated and contain internal control devices to meet the application and prevent corrosion, fouling and deterioration of the pump components.

Consult a water treatment specialist or specialized literature on the subject.

1. No ammonia ion NH<sub>4</sub><sup>+</sup> in the water, since they are very harmful and attach the copper. This is one of the most principal factors for copper pipe life. A content of several tenths of mg / l will severely corrode copper over time. If necessary, use sacrificial anodes.
2. Chloride ions Cl<sup>-</sup> are also detrimental to copper with a risk of perforating corrosion. If possible, keep a level below 10 mg/l.
3. Sulfate ions SO<sub>4</sub><sup>2-</sup> can cause perforating corrosion if its content is greater than 30 mg/l.
4. No fluoride ion (< 0,1 mg/l).
5. No Fe ion Fe<sup>2+</sup> and Fe<sup>3+</sup> no negligible levels of dissolved oxygen should be present. Dissolved iron <5 mg/l with dissolved oxygen <5 mg/l.
6. Dissolved silicon: Silicon is an acid element of water and can also lead to corrosion risks. Content < 1mg/l.
7. Water hardness: TH > 2.8 °C. Values between 10 and 25 may be recommended. This will facilitate scaling that can limit copper corrosion. TH values that are too high can cause pipe blockage over time. A total alkalinity (TAC) level below 100 is desirable.
8. Dissolved oxygen: Any sudden change in water oxygenation conditions should be avoided. It is very harmful to deoxygenate the water by mixing it with inert gas, as is the excess of oxygen compounds mixed with pure oxygen. Changing the oxygenation conditions encourages the destabilization of copper hydroxides and the widening of the particles.
9. Specific resistance - electrical conductivity: The higher the specific resistance, the less likely it is to corrode. Values above 3,000 Ohm / cm are desirable. A neutral environment favors the maximum specific resistance values. Electrical conductivity values of approximately 200-6000 S / cm may be recommended.
10. Ph: ideal neutral pH between 20-25 °C and 7 < pH < 8
  - If the water circuit is to be emptied for more than one month, the complete circuit should be placed under nitrogen to avoid any risk of corrosion by differential aeration.
  - Charging and removing fluids from the heat exchanger should be done with the devices that are included in the water circuit by the installer. Never use the heat exchanger unit to add heat exchange fluid.

## Water Quality Guidelines

CONDITIONS	ACCEPTABLE LEVEL		
<b>pH</b>	Within a range of 7 to 9 for copper. In a range from 5 to 9, nickel-copper pipes can be used.		
<b>Total hardness</b>	Calcium and magnesium carbonate should not exceed 20 grains per gallon (350 ppm).		
<b>Iron oxide</b>	Less than 1 ppm.		
<b>Iron bacteria</b>	None admissible		
<b>Corrosion*</b>		Maximum level	Coaxial metal
	Ammonia Ammonia Hydroxide	0.5 ppm	Cu
	Ammonium Chloride, Ammonium Nitrate	0.5 ppm	Cu
	Ammonia Sulphate	0.5 ppm	Cu
	Chlorine / Chlorides	0.5 ppm	CuNi
	Hydrogen Sulfide **	None admissible	—
<b>Brackish and salty</b>	Use a nickel-copper heat exchanger when the concentrations of calcium (or sodium chloride) greater than 125 ppm are present. (Sea water is approximately 25,000 ppm.)		

\* If the concentration of these corrosive substances exceeds the maximum level allowed, then there is potential for serious corrosion problems.

\*\* Sulfides in water oxidize rapidly when exposed to air, requiring no agitation while the sample is collected. Unless tested immediately at the site, the sample will require stabilization with a few drops of a Molar zinc acetate solution, allowing accurate determination of sulfide within 24 hours of collection. A low pH and high alkalinity causes problems in the system even when both values are within the recommended limits. The term pH refers to the acidity, basicity or neutrality of the water supply. Lower than 7.0 water is considered acid. Above 7.0 water is considered basic. Neutral Water has a pH of 7.0.

NOTE: To convert ppm to grains per gallon, divide by 17.  
Hardness in mg/l is equivalent to ppm.

### ⚠ ATTENTION

Carrier does not accept responsibility when the water used in the system is not within the recommended parameters, in which case the equipment warranty will be void. Water outside the parameters can cause leaks and consequent water freezing of evaporator water.

### ⚠ CAUTION

The water should be within design flow limits, clean and treated to ensure correct machine performance and reduce potential damage to pipes due to corrosion, crusts, erosion, and seaweed. Carrier does not accept any liability for damages to the evaporator resulting from untreated or otherwise treated water.

## 6.5 - Routine Cleaning of Coil Surfaces

It is essential that the monthly cleaning with Totaline® eco-friendly cleaners is carried out to prolong coil life. This cleaner is available in the Carrier service division with code P902-0301 for a one gallon container, and code P902-0305 for five gallon containers. It is recommended that all coils be cleaned with the Totaline eco-friendly cleaner as described below. Cleaning of the coil should be part of the unit's regular scheduled maintenance procedures to ensure long life to the coil.

Failure to comply with cleaning recommendations will result in reduction of durability in the environment. Avoid using:

- Coil polishers
- Acid cleaning before painting
- High-pressure washers
- Low quality water for cleaning

Totaline eco-friendly coil cleaner is non-flammable, hypoallergenic, anti-bactericidal and considered a biodegradable agent, and will not harm the coil or components around it, such as electrical wiring, painted metal surfaces, or insulation. The use of non-recommended coil cleaners is strongly discouraged as they may affect the life of the coil and the unit.

### ⚠ CAUTION

Aggressive chemicals, household bleach, acids or basic cleaners of any kind should not be used to clean internal and external coils of any kind. It can be very difficult to remove by rinsing these products from the coil and they can accelerate corrosion at the fin / pipe interface where varied materials are in contact. If there is dirt below the coil surface, use the Totaline eco-friendly coil cleaner as described above.

### ⚠ CAUTION

Never use high speed water from a high-pressure washer, garden hose or compressed air to clean a coil. The force of the air or water jet will bend the ends of the fins and increase the pressure drop on the side of the air. Unit performance reduction or inconvenient unit shutdown may occur.

Instructions for Application of Totaline Green Serpentine Cleaner:

1. It is recommended to wear appropriate eye protection with safety goggles during mixing and application.
2. Remove any dirt and grime from the surface with a vacuum cleaner as described above.
3. Thoroughly wet the finned surfaces with clean water and a low speed garden hose, being careful not to bend the fins.
4. Mix Totaline eco-friendly coil cleaner in a 2.1/2-gallon garden sprinkler according to the instructions included with the cleaner. The ideal solution temperature is 100°F.

## 6. Maintenance & Repair (cont.)



### **WARNING**

DO NOT USE water over 130 ° F (54.4 ° C), to not destroy enzymatic activity.

5. Apply the Totaline eco-friendly coil cleaner solution to all coil surfaces, including the finned area, side plates and coil manifolds.
6. Hold the spray nozzle near the finned areas and apply the cleaner with vertical movement, up and down. Avoid spraying horizontally to minimize potential damage to the fins.
7. Make sure that the cleaning agent penetrates deep into areas with fins.
8. Internal and external areas with fins should be thoroughly cleaned
9. The finned surfaces must remain wet with cleaning solution for 10 minutes.
10. Make sure surfaces do not dry out before rinsing them. Re-apply the cleaner as needed to ensure saturation in the 10-minute period is reached.
11. Thoroughly rinse all surfaces with clean water at low speed using the water spray nozzle with a downward rinse. Protect fins against damage from sprinkler nozzle.
12. If the temperature sensors are wet by the cleaning process, wait for their reading equalization, thus avoiding erroneous readings and malfunctions.

#### Recommendations on Coil Washing

Coil Type	Washer Type	Minimum Work Pressure	Minimum Recommended Distance
Gold Fin	Domestic	45 psig (3 Bar)	305 mm

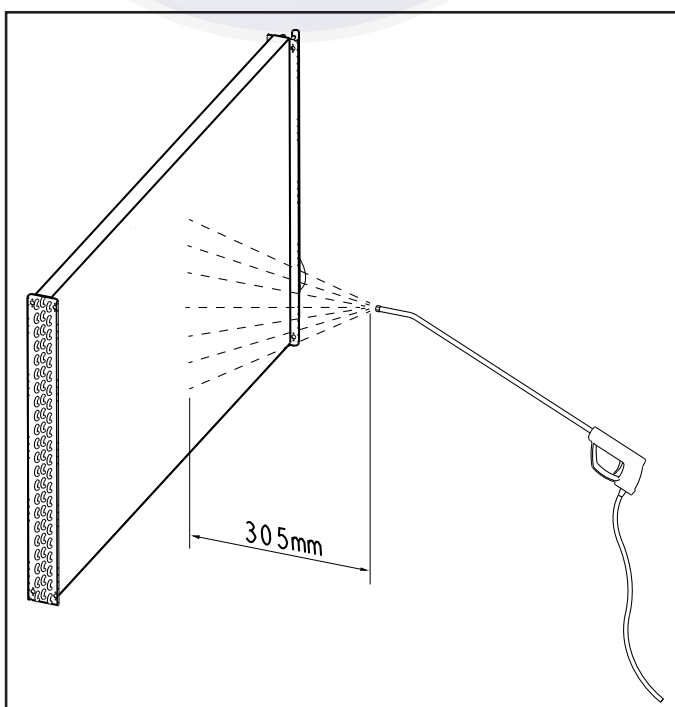


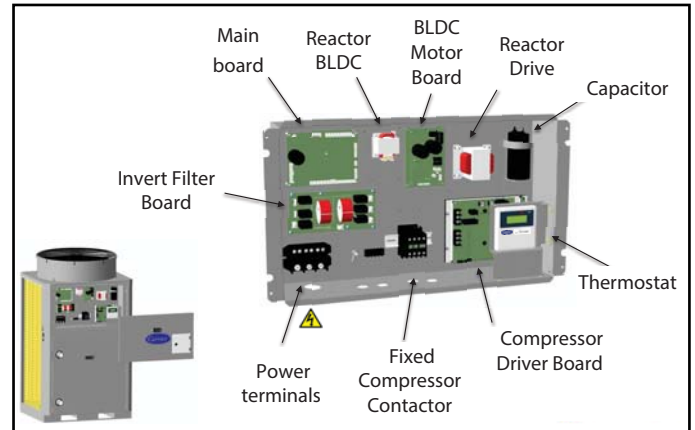
FIG. 24 - Cleaning Instructions

### 6.6. Removal of Closing Panels

#### a) Switchboard Section

Turn off the power of the 30E.

To access the switchboard on the units, remove the screws from the top front panel, as shown:



#### b) Compressor Section

To access the compressors on the 30EX / 30EV unit, rotate the screws on the lower front panels of the unit.

#### c) Condenser Fan Section

On the 30EX / 30EV units, remove the discharge ducts and top panel.

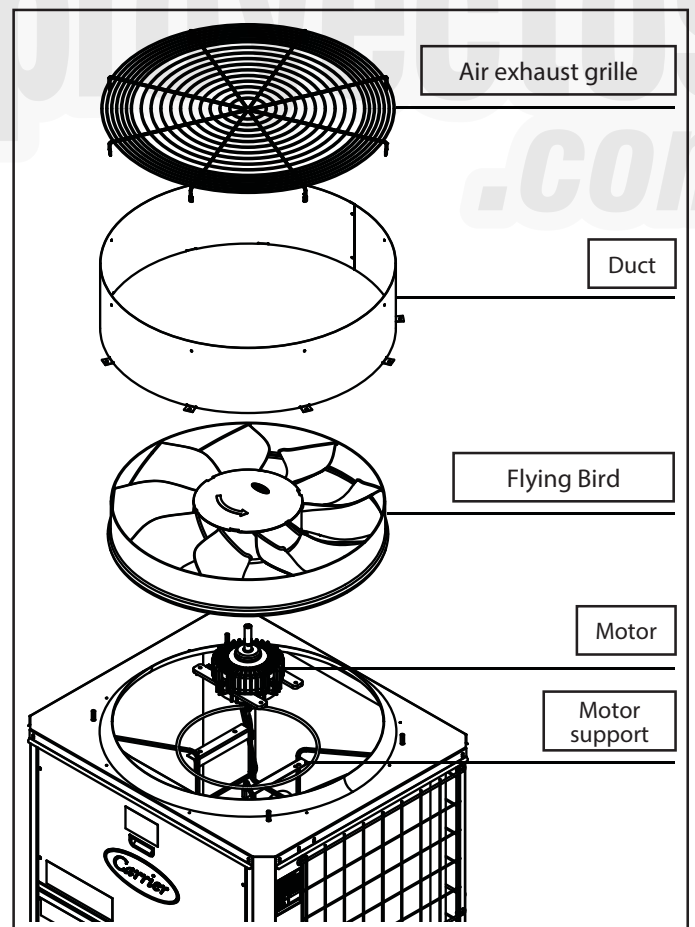


FIG. 25 - Cutaway view of fan assembly of 30EX/30EV units and Flying Bird Propeller

**⚠ WARNING**

1. To dismantle the fan, it is necessary to remove the protective cover in the Flying Bird propeller, to allow access to the screw that attaches the propeller to the motor shaft.
2. Complete assembly is understood by motor support, motor, propeller, panel, duct and air discharge grille.

**6.7. Lubrication**

**Motors**

Electric motors have bearings with permanent lubrication, requiring no additional lubrication.

**Compressors**

The compressors have their own oil supply (see Table 2 - General Technical Specifications).

**Units 30EX / 30EV**

The fixed units (30EX) are lubricated with Copeland Ultra 22cc oil, recommended for cooling systems with R410-A. The Inverter units (30EV) operate with Daphne Hermetic FVC 68d lubricants used for commercial cooling or air conditioning systems. Compatible with HFC refrigerants containing anti-oxidant additives and anti-abrasive agents.

**6.8. Switchboard**

**a) General Notes**

The unit switchboard has been designed to simplify inspection and maintenance services.

You can access the switchboard by removing its closing panel (see section) and the drive and protection elements of the equipment are located there.

**For Units 30EX/30EV**

The 30EX and 30EV units offer the highest technology in actuating and protecting the system, as well as chiller water outlet temperature control.

The 30EV units have the Inverter compressor that provides a smooth start and the right consumption according to need.

The power cabinet has a power plug and a grounding point for powering the machine. The control is carried out through the communication terminal and a 12VDC control (with its own protocol) is used to turn on the system or monitor the parameters.

Through software routines, the drives offer protections that extend the life of all electrical / electronic components.

**b) Pressure switches**

The low and high pressure switches are of the miniaturized, automatic reset type, and are directly coupled to the suction and discharge lines respectively.



FIG. 26 - Cleaning care

## 6. Maintenance & Repair (cont.)



### 6.9. Troubleshooting

ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
<b>E-01</b>	Phase Sequence Error	No unit in the system starts.	Only the unit with error won't start.	Turn off the unit with error. Check/ correct the phase sequence.
<b>E-02</b>	Phase failure	No unit in the system starts.	Only the unit with error won't start.	Turn off the unit with error. Check / measure if there is voltage on the terminal block. If not, establish voltage.
<b>E-03</b>	Faulty outdoor sensor	It only turns off the faulty unit.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (25°C - 10kΩ). Replace faulty sensor.
<b>E-04</b>	Faulty sensor in the middle of the condenser	It only turns off the faulty unit.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (250C - 10kΩ). Replace faulty sensor.
<b>E-05</b>	Faulty suction sensor	It only turns off the faulty unit.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (250C - 10kΩ). Replace faulty sensor.
<b>E-06</b>	Faulty discharge sensor in compressor 1	I only turns off the faulty compressor.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (25°C - 100kΩ). Replace faulty sensor.
<b>E-07</b>	Faulty discharge sensor in compressor 2	I only turns off the faulty compressor.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (250C - 100kΩ). Replace faulty sensor.
<b>E-08</b>	Low suction pressure	It only turns off the faulty unit. The system resets automatically according to pressure switch actuation.		With the unit running measure suction pressure. Check pressure switch actuation. Replace the component as necessary. Check/correct leaks/obstructions in the low circuit. Evaporator cleaning. Replacement of filter drier. Check refrigerant charge.
<b>E-09</b>	High discharge pressure	It only turns off the faulty unit. The system resets automatically according to pressure switch actuation.		With the unit running, measure discharge pressure. Check pressure switch actuation. Replace the component as necessary. Check / correct obstructions in the condenser/high circuit. Condenser cleanliness. Check refrigerant charge.

ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
<b>E-10</b>	Low Suction Pressure Note: Occurrence of more than 3 times E-08 at 1 hour interval.	It only turns off the faulty unit. The system won't reset automatically.		With the unit running measure suction pressure. Check pressure switch actuation. Replace the component as necessary. Check/correct leaks/obstructions in the low circuit. Evaporator cleaning. Replacement of filter drier. Check refrigerant charge.
<b>E-11</b>	High Discharge Pressure Note: Occurrence of more than 3 times E-09 at 1 hour interval.	It only turns off the faulty unit. The system won't reset automatically.		With the unit running, measure discharge pressure. Check pressure switch actuation. Replace the component as necessary. Check / correct blocking obstructions in the high/condenser circuit. Condenser cleanliness. Check refrigerant charge.
<b>E-12</b>	Error/failure in communication between control and unit	No unit in the system works.		Check and correct communication between the unit and control Check for any cable breaks or loose connection.
<b>E-13</b>	High discharge temperature of compressor 1	I only turns off the faulty compressor.		Check/correct: Discharge temperature sensor of compressor 1. Also check through the condenser middle temperature sensor (CMCT) Condenser fan motor speed. Refrigerant charge. Condenser cleanliness. Obstruction inside the cooling circuit (plugged filters, valves, etc.)
<b>E-14</b>	High discharge temperature of compressor 2	I only turns off the faulty compressor.		Check/correct: Discharge temperature sensor of compressor 2. Also check through the condenser middle temperature sensor (CMCT) Condenser fan motor speed. Refrigerant charge. Condenser cleanliness. Obstruction inside the cooling circuit (plugged filters, valves, etc.)
<b>E15</b>	DIPs settings	No unit in the system starts.	Only the unit with error won't start.	Turn off the unit with error. Note: For the Master unit it is important to wait at least 1 minute after the power is turned off, the time to discharge the residual energy from the capacitors (Leds flashing). Check/correct the DIPs settings.

## 6. Maintenance & Repair (cont.)



ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
<b>E16</b>	Emergency stop error	If the unit is running, the system will shut down. The system won't reset automatically.	It only turns off the indicated unit. The system won't reset automatically.	Check the building's emergency system. Only restart the system if you are sure that there is no evidence of security risks. If you are not using this option, check the DI4 input on the mainboard, because it is probably jumpered.
<b>E-17</b>	High condenser temperature (CMCT)	It only turns off the indicated unit.		Check/correct: Condenser coil middle temperature sensor Condenser fan motor speed. Refrigerant charge. Condenser cleanliness. Obstruction inside the cooling circuit (plugged filters, valves,).
<b>E-18</b>	No connection between the compressor and Inverter compressor board	It only turns off the inverter compressor.	NA	Turns off the unit. Note: It is important to wait at least 1 minute after the power is turned off, the time to discharge the residual energy from the capacitors (Leds flashing). Check / correct the connection between the compressor and its control board, as well as its communication with the main board.
<b>E-19</b>	Error in control connection	No unit in the system starts. If any of the units is running it will shut down.		Check/correct: Connection between the control and unit. Possible failure in the control.
<b>E-20</b>	High current in fixed compressor 1. Fixed units only.	It only turns off the inverter compressor. The compressor won't reset automatically.		Check/correct: Supply voltage, phase balance. Compressor contactor connection Bad contact in some component. High discharge pressure Compressor locked out
<b>E-21</b>	High current in fixed compressor 2. Fixed units only.	It only turns off the inverter compressor The compressor won't reset automatically.		Check/correct: Supply voltage, phase balance. Compressor contactor connection Bad contact in some component. High discharge pressure Compressor locked out
<b>E-22</b>	Active system inlet water temperature sensor (RLWT) It is not an error, it is a reminder that the system has more than one unit in the system, and that the RLWT sensor will control the system temperature.	Disappears within 15 seconds		Disappears within 15 seconds



ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
E-23	Error in communication between the fan board and main board.	It only turns off the indicated unit.		Communication cable between the fan board and main board.
E-24	High suction temperature error (SUCT)	It only turns off the indicated unit. The system won't reset automatically.		Check/correct: Suction temperature sensor. Compressor operation Refrigerant charge.
E-25	Low suction temperature error (SUCT). Antifreeze protection in the cooler	It only turns off the inverter compressor. The unit does not restart automatically if the error repeats 3x in less than two hours.		Check/correct: Suction temperature sensor. Lack of refrigerant. Obstruction inside the cooling circuit (plugged filters, valves, etc.) Low water flow in the evaporator.
E-27	Error in communication between units	Shuts off the system	Shuts off the corresponding slave unit.	Check for any disruption in the communication cable or loose connection on the communication terminal.
E-28	Failure in the unit water outlet sensor (ULWT)	It only turns off the indicated unit.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (250C - 5kΩ). Replace faulty sensor.
E-29	Failure in the system inlet water sensor (REWt) or in the system outlet water sensor (RLWT)	Turns off the system		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (250C - 5kΩ). Replace faulty sensor.
E-30	Faulty saturated suction sensor (SST)	It only turns off the indicated unit.		Check whether the sensor is properly connected. Disconnect and measure the sensor ohmic resistance (250C - 10kΩ). Replace faulty sensor.
E-31	Low temperature error Suction saturated temperature (SST). Antifreeze protection in the cooler	It only turns off the inverter compressor.  The unit does not restart automatically if the error repeats 3x in less than two hours.		Check/correct: Saturated suction temperature sensor. Lack of refrigerant. Obstruction inside the cooling circuit (plugged filters, valves, etc.) Low water flow in the evaporator
E-32	Error in the unit outlet water temperature (ULWT) outside the allowable limits Note: For start-up, temperatures should be between 5 and 35°C.	Turns off the compressors. If the unit is turned off, it does not allow compressor input.  The unit won't reset automatically; if the error repeats 3x in less than three hours.		Check/correct: Outlet water temperature sensor. Lack of refrigerant. Obstruction inside the cooling circuit (plugged filters, valves, etc.) Low water flow in the evaporator

## 6. Maintenance & Repair (cont.)



ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
E-33	Suction saturated temperature error (SST); it is outside the allowable limits.	Turns off the compressors. If the unit is turned off, it does not allow compressor input.  The unit won't reset automatically; if the error repeats 3x in less than three hours.		Check/correct: Saturated suction temperature sensor. Lack of refrigerant. Obstruction inside the cooling circuit (plugged filters, valves, etc). Low water flow in the evaporator.
E-34	Missing / low water flow error (WFC).	Turns off the unit.  The unit does not restart automatically if the error repeats 3x in less than two hours.		Check/correct: Valve opening and closing time set on control vs component. Type of application for the pump set on control. If the system is set to System, the on/off valve is installed. Water flow sensor. Water Pump Position of the sensor inserted into the pipe. Must be at least 12mm in water flow. Water flow below the minimum allowed. Clogged Y filter.
E-35	Inlet water temperature error (REWT) outside the allowable limits. Note: For start-up, temperatures should be between 6 and 35°C.	Turns off the system.  The system does not restart automatically if the error repeats 3x in less than three hours.		Check/correct: Inlet water temperature sensor. Lack of refrigerant. Obstruction inside the cooling circuit (plugged filters, valves, etc.) Low water flow in the evaporator
E-36	Water temperature delta outside the maximum limit allowed	Turns off the unit.  The unit does not reset automatically if the error repeats 3x in less than two hours.		Check/correct: Outlet and inlet water temperature sensor. Dirt in Y filter. Low water flow in the evaporator.
E-37	Water sensor reversion error	Turns off the system.  The system won't reset automatically.		Check the connection of the water inlet and outlet sensors because the sensors may be reversed or improperly connected.
E-38	High current on the Inverter compressor board, valid for 220V units only	It only turns off the inverter compressor, resetting automatically after 2 min.	NA	Check/correct: Compressor supply voltage. Phase balance. Connection between board and compressor. Bad contact in some component. High discharge pressure Compressor locked out Failure in the condenser fan system. Excessive refrigerant charge. Replace the board as required.

ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
E-40	Error in the Inverter compressor board	Models 380/440V: Turns off or does not enable Inverter compressor starting. Models 220V: Turns off the Inverter compressor and tries to start again after 3 min.	NA	Check/correct: Supply voltage on the board Connection on the board Ground conditions Replace the board if required.
E-41	Error in compressor board (communication between)	Models 380/440V: It only turns off the inverter compressor.	NA	Check/correct: The board supply voltage, connection on the board, ground conditions Replace the board if required.
	High current on Inverter compressor	Models 220V: It only turns off the inverter compressor, returning after 2 min.	NA	Check/correct: Compressor supply voltage. Phase balance. Connection between board and compressor. Bad contact in some component. High discharge pressure Compressor locked out Failure in the fan system. Excessive refrigerant charge refrigerant charge. Replace the board if required.
E-42	Error on compressor board sink sensor	Models 380/440V: Inverter compressor won't start If the compressor is running, it will go off.	NA	Replace the board.
	No phase at the compressor board inlet.	Models 220V: Inverter compressor won't start. If the compressor is running, it will go off.	NA	Check/correct: The point where voltage is interrupted.
E-43	No phase at the compressor board inlet.	Models 380/440V: Inverter compressor won't start If the compressor is running, it will go off.	NA	Check/correct: The point where voltage is interrupted.
	High temperature in the compressor board inverter module.	Models 220V: Inverter compressor won't start If the compressor is running, it will shut down, returning after the heatsink temperature has been reduced.	NA	Check/correct: Heatsink temperature (maximum 105°C). Voltage and current on the board. If the problem is in the sensor, replace the board.

## 6. Maintenance & Repair (cont.)



ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
<b>E-44</b>	High temperature in the compressor board inverter module.	Models 380/440V: Inverter compressor won't start If the compressor is running, it will shut down, returning after the heatsink temperature has been reduced.	NA	Check/correct: Heatsink temperature (maximum 80°C). Voltage and current on the board. If the problem is in the sensor, replace the board.
	Error on the compressor board (overload).	Models 220V: It only turns off the inverter compressor, resetting after 2 min.	NA	Check/correct: Board supply voltage. Ground conditions Replace the board as required.
<b>E-45</b>	Error in the Inverter module.	Models 380/440V: It only turns off the inverter compressor, resetting after 2 min.	NA	Check/correct: Board supply voltage. Connection on the board. Ground conditions Replace the board if required.
	Error in the DC bus voltage.	Models 220V: Shuts off the Inverter compressor	NA	Check/correct: Supply voltage on board Connection between board and compressor Voltage on components - reactor and capacitor Reference range: 180VDC to 380VDC If necessary replace the board
<b>E-46</b>	Error in the compressor board	Models 380/440V: Turns off the It only turns off the inverter compressor, resetting after 3 min.	NA	Check/correct: Supply voltage on the board Connection on board Ground conditions Replace the board if required.
	Low supply voltage on the compressor board.	Models 220V: Inverter compressor won't start. If the compressor is running, it will go off.	NA	Check/correct: Supply voltage on the board Minimum voltage 190 VAC
<b>E-47</b>	High current on Inverter compressor	Models 380/440V: It only turns off the inverter compressor, resetting after 2 min.	NA	Check/correct: Compressor supply voltage. Phase balance. Connection between board and compressor. Bad contact in some component. High discharge pressure Compressor locked out Failure in the fan system. Excessive refrigerant charge. Replace the board if required.
	No supply voltage on the compressor board.	Models 220V: It only turns off the inverter compressor.	NA	Check/correct: Board supply voltage. Ground conditions Replace the board if required.

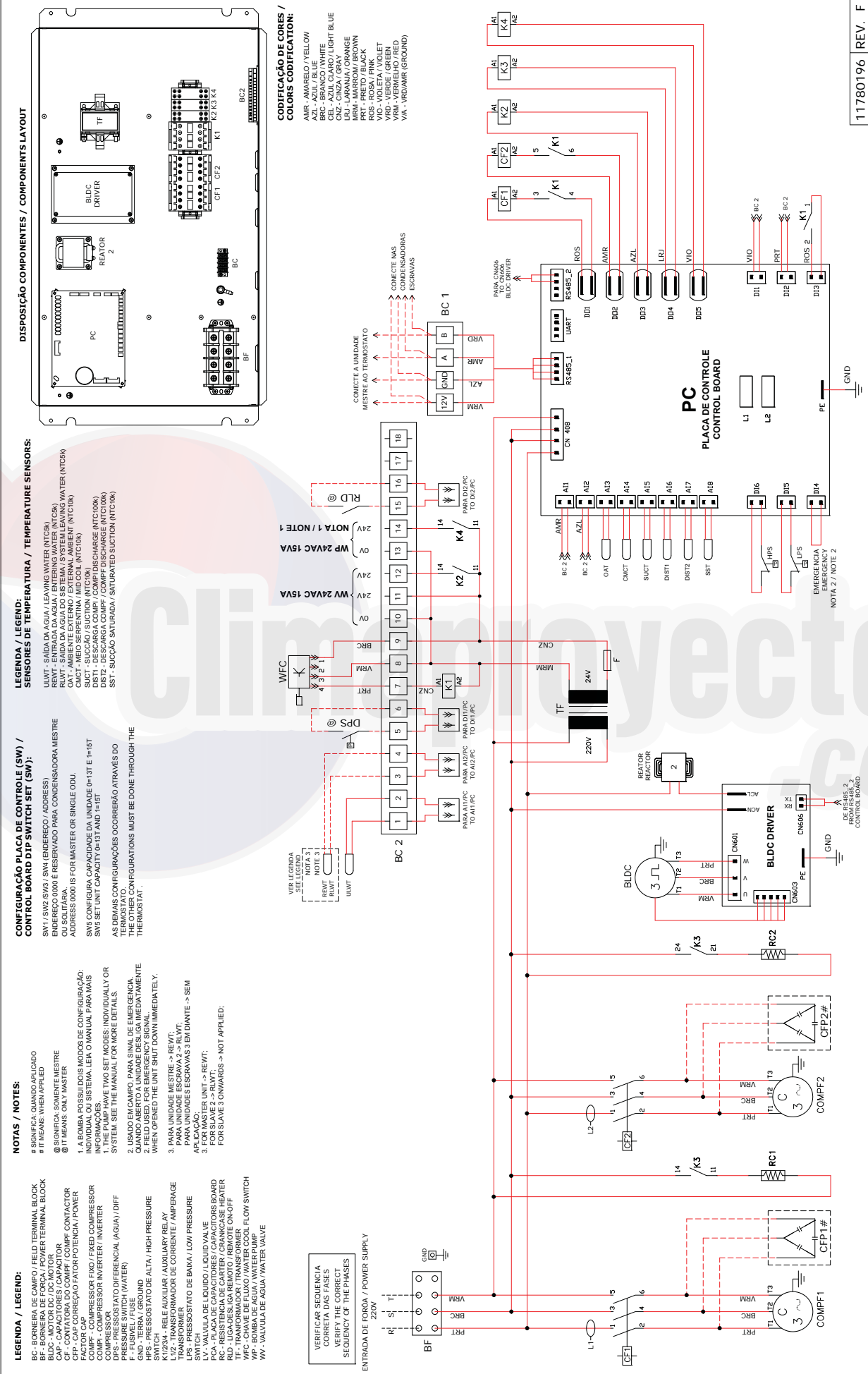
ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
<b>E-48</b>	Error in the DC bus voltage.	Models 380/440V: Shuts off the Inverter compressor	NA	Check/correct: Board supply voltage. Connection between board and compressor. Voltage on components - reactor and capacitor. Reference range: 350VDC to 650VDC. Replace the board if required.
	Error in the compressor board (Communication between processors)	Models 220V: It only turns off the inverter compressor.	NA	Check/correct: Board supply voltage. Connection on the board. Ground conditions. Replace the board if required.
<b>E-49</b>	High temperature in the compressor board heatsink.	Models 380/440V: Inverter compressor won't start If the compressor is running, it will shut down, returning after the heatsink temperature has been reduced.	NA	Check/correct: Heatsink temperature (maximum 80°C). Obstruction of airflow in the sink (dirt). Fan speed If the problem is in the sensor, replace the board.
	Error in communication between the compressor board and main board.	Models 220V: Inverter compressor won't start If the compressor is working, it will shut off.	NA	Check/correct: Communication between boards. Reference value: 0VDC to 5VDC. Replace the board if required.
<b>E-50</b>	High fan current	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Fan supply voltage. Damage to the propeller. Replace the board if required.
<b>E-51</b>	High current on fan board module	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Fan supply voltage. Replace the board if required.
<b>E-52</b>	Motor locked out	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Damaged motor. Replace the component(s) if required.
<b>E-53</b>	No phase on fan motor.	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Connection between board and fan. Voltage on components - reactor and capacitor. Replace the board if required.
<b>E-54</b>	Low fan motor speed	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Hall sensor hall connection on motor board. Supply voltage Check whether the condenser middle sensor is correctly connected. Disconnect and measure the sensor ohmic resistance (250C - 10kΩ). Replace the component(s) if required.

## 6. Maintenance & Repair (cont.)



ERROR CODE	TYPE OF ERROR	CONSEQUENCE of ERROR only on Chiller 1 (Master)	CONSEQUENCE of ERROR only on Chiller 2 to 8 (Slaves)	RECOMMENDED ACTIONS
E-55	Overload on fan start	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Connection between board and fan. Voltage on components Replace the component(s) if required.
E-56	Error on Hall Effect sensor	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Hall sensor hall connection on motor board. Replace the component(s) if required.
E-57	Error in the fan board	It only turns off the indicated unit.		Check/correct: Fan supply voltage. Connection on the board. Replace the component(s) if required.
E-58	Error in DC bus voltage on fan board	It only turns off the indicated unit, resetting automatically after the voltage returns to normal parameters.		Check/correct: Board supply voltage. Connection between board and fan. Voltage on components - reactor and capacitor. Replace the component(s) if required.
E-59	High temperature on module of fan board	Shuts off only the faulty unit, resetting it automatically after 1 min.		Check/correct: Board supply voltage. Replace the component(s) if required.
E-60	Error on processor	It only turns off the indicated unit.		De-energize the unit and re-energize it If the problem persists, replace the component(s).
E-65	Pressure differential error between the inlet and outlet water. Required for systems with more than 3 modules (> 45TR)	Turns off the system. The system does not reset automatically if the error repeats 3x in less than two hours.		Check/correct: Water flow in the system. If the pressure switch (DPS) is on in the master unit. DPS contact is opening and closing - operational? If the system has three units or less and DPS is not used, make sure that the setting is OFF in control.
E-66	Room temperature error <5 °C and crankcase resistor	Turns off the compressors.		The unit must not operate at temperatures below 5 °C. If the temperature is above 5 °C, check the electrical connection and physical connection of the room
E-67	Unit water low outlet temperature (ULWT). Freezing protection on cooler	It only turns off the inverter compressor. The system does not reset automatically if the error repeats 3x in less than two hours.		Check/correct: Outlet water temperature sensor Water flow below the minimum limit for Dirt in Y filter.







# INVERTER UNITS - 380/440V

### LEGENDA / LEGEND:

- BC - BOMBA DE CAMPO / FIELD TERMINAL BLOCK
- BF - BOMBEIRA DE FORÇA / POWER TERMINAL BLOCK
- BLOC - MOTOR DC / DC MOTOR
- CAP - CAPACITORES / CAPACITOR
- CF - CONDENSADOR DE FATOR DE POTENCIA / POWER FACTOR CAP
- COMP - COMPRESSOR FIXO / FIXED COMPRESSOR
- COMP2 - COMPRESSOR INVERTER / INVERTER COMPRESSOR
- DPS - PRESSOSTATO DIFERENCIAL (AGUA) / DIFF PRESSURE SWITCH (WATER)
- FT - FILTRO AC / AC FILTER
- FT - TERRA / GROUND
- FT - ALTA PRESSÃO / HIGH PRESSURE SWITCH
- K1234 - RELE AUXILIAR / AUXILIARY RELAY
- L12 - TRANSFORMADOR DE CORRENTE / AMPERAGE TRANSFORMER
- L3 - TRANSFORMADOR DE BOMBA / PUMP TRANSFORMER
- L4 - VALVULA DE LÍQUIDO / LIQUID VALVE SWITCH
- PCA - PLACA DE CAPACITORES / CAPACITORS BOARD
- RC - RESISTENCIA DE CARTER / MANIFOLD HEATER
- RF - TRANSFORMADOR / TRANSFORMER
- TF - TRANSFORMADOR / TRANSFORMER
- WFC - CHAVE DE FLUXO / WATER COOL FLOW SWITCH
- WV - VALVULA DE AGUA / WATER VALVE

### NOTAS / NOTES:

- # SIGNIFICA QUANDO APLICADO / WHEN APPLIED
- ® FIDELIAS, WHEN APPLIED
- ® SIGNIFICA SOMENTE MESTRE / MASTER ONLY
- 1. A BOMBA POSSUI DOIS MODOS DE CONFIGURAÇÃO: INDIVIDUAL OU SISTEMA, LEIA O MANUAL PARA MAIS DETALHES. / THE PUMP HAS TWO SET MODES: INDIVIDUALLY OR SYSTEM. SEE THE MANUAL FOR MORE DETAILS.
- 2. USADO EM CAMPO, PARA SINAL DE EMERGENCIA, QUANDO ABERTO A UNIDADE DESELCA IMEDIATAMENTE. / WHEN OPENED THE UNIT SHUT DOWN IMMEDIATELY.
- 3. 380V DEVE SER LIGADO NO NEUTRO. / 380V SHOULD BE CONNECTED IN THE PHASE T OR R.
- 3. UNITS 440V SHOULD BE CONNECTED IN THE PHASE T OR R.

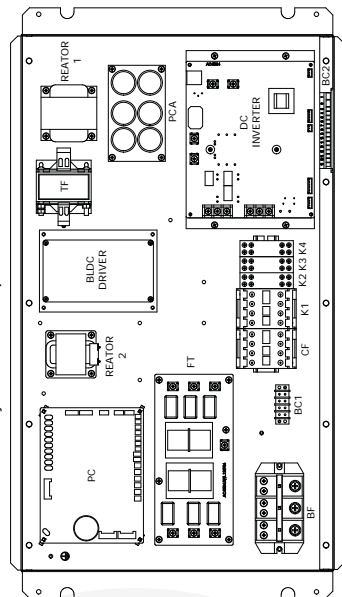
### CONFIGURAÇÃO PLACA DE CONTROLE (SW) / CONTROL BOARD DIP SWITCH SET

- SW1 / SW2 (SW3) SW4 (ENDEREÇO / ADDRESS)
- SW5 (SW6) SW7 (TEMPERATURA / TEMPERATURE SENSORS)
- SW8 (SW9) SW10 (SAÍDA DA ÁGUA / LEAVING WATER (NTC8))
- SW11 (SW12) SW13 (SAÍDA DA ÁGUA DO SISTEMA / SYSTEM LEAVING WATER (NTC9))
- SW14 (SW15) SW16 (MÉDIA SERPENTE / AVERAGE COIL (NTC10))
- SW17 (SW18) SW19 (SUÇÃO / SUCTION (NTC11))
- SW20 (SW21) SW22 (SUÇÃO / SUCTION (NTC12))
- SW23 (SW24) SW25 (SUÇÃO / SUCTION (NTC13))
- SW26 (SW27) SW28 (SUÇÃO / SUCTION (NTC14))
- SW29 (SW30) SW31 (SUÇÃO / SUCTION (NTC15))
- SW32 (SW33) SW34 (SUÇÃO / SUCTION (NTC16))
- SW35 (SW36) SW37 (SUÇÃO / SUCTION (NTC17))
- SW38 (SW39) SW40 (SUÇÃO / SUCTION (NTC18))
- SW41 (SW42) SW43 (SUÇÃO / SUCTION (NTC19))
- SW44 (SW45) SW46 (SUÇÃO / SUCTION (NTC20))
- SW47 (SW48) SW49 (SUÇÃO / SUCTION (NTC21))
- SW50 (SW51) SW52 (SUÇÃO / SUCTION (NTC22))
- SW53 (SW54) SW55 (SUÇÃO / SUCTION (NTC23))
- SW56 (SW57) SW58 (SUÇÃO / SUCTION (NTC24))
- SW59 (SW60) SW61 (SUÇÃO / SUCTION (NTC25))
- SW62 (SW63) SW64 (SUÇÃO / SUCTION (NTC26))
- SW65 (SW66) SW67 (SUÇÃO / SUCTION (NTC27))
- SW68 (SW69) SW70 (SUÇÃO / SUCTION (NTC28))
- SW71 (SW72) SW73 (SUÇÃO / SUCTION (NTC29))
- SW74 (SW75) SW76 (SUÇÃO / SUCTION (NTC30))
- SW77 (SW78) SW79 (SUÇÃO / SUCTION (NTC31))
- SW80 (SW81) SW82 (SUÇÃO / SUCTION (NTC32))
- SW83 (SW84) SW85 (SUÇÃO / SUCTION (NTC33))
- SW86 (SW87) SW88 (SUÇÃO / SUCTION (NTC34))
- SW89 (SW90) SW91 (SUÇÃO / SUCTION (NTC35))
- SW92 (SW93) SW94 (SUÇÃO / SUCTION (NTC36))
- SW95 (SW96) SW97 (SUÇÃO / SUCTION (NTC37))
- SW98 (SW99) SW100 (SUÇÃO / SUCTION (NTC38))

### LEGENDA / LEGEND: TEMPERATURA / TEMPERATURE SENSORS:

- UVWT - SAÍDA DA ÁGUA / LEAVING WATER (NTC8)
- RUVT - SAÍDA DA ÁGUA DO SISTEMA / SYSTEM LEAVING WATER (NTC9)
- CMKT - MÉDIA SERPENTE / AVERAGE COIL (NTC10)
- SUCT - SUÇÃO / SUCTION (NTC11)
- DIST1 - DESCARGA COMPI / COMPLETE DISCHARGE (NTC100)
- DIST2 - DESCARGA COMPI / COMPLETE DISCHARGE (NTC100)
- SST - SUÇÃO SATURADA / SATURATED SUCTION (NTC108)

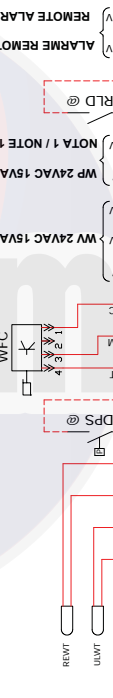
### DISPOSIÇÃO COMPONENTES / COMPONENTS LAYOUT



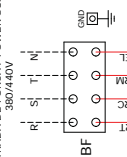
### CODIFICAÇÃO DE CORES / COLORS CODIFICATION:

- AMR - AMARELO / YELLOW
- BRC - BRANCO / WHITE
- CEL - AZUL CLARO / LIGHT BLUE
- L4 - LARANJA / ORANGE
- MRM - MARROM / BROWN
- PRT - PRETO / BLACK
- VIO - VIOLETA / VIOLET
- VRD - VERDE / GREEN
- VRM - VERMELHO / RED
- VIA - VÍDEO / GROUND

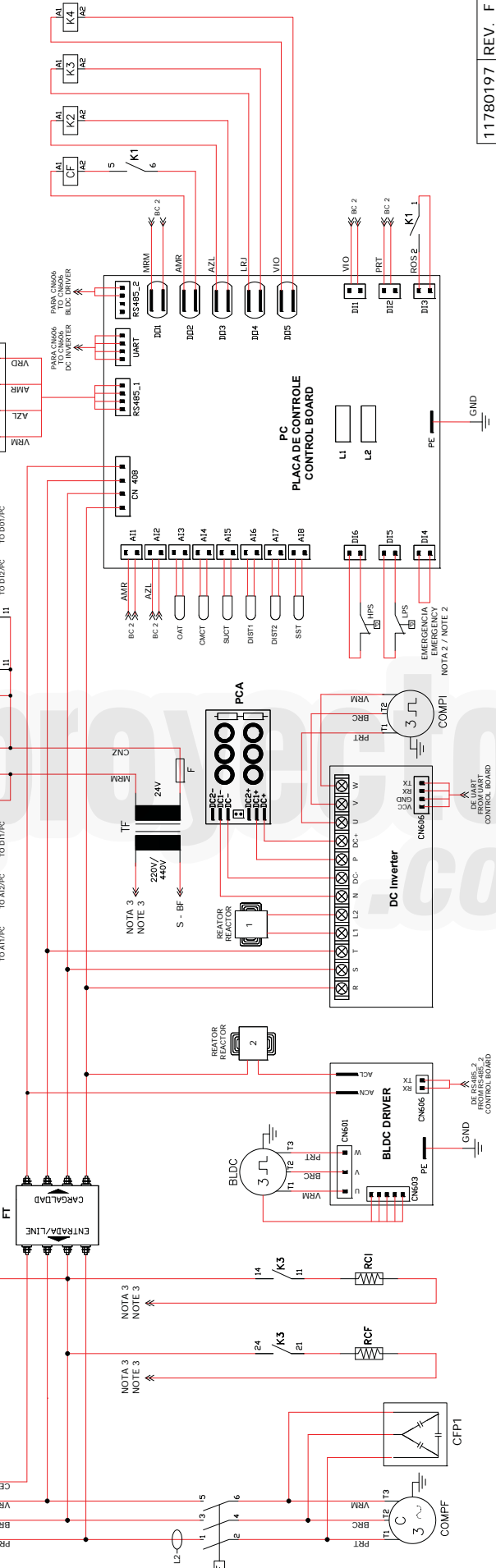
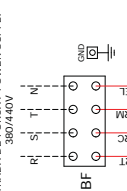
### ALARME REMOTO

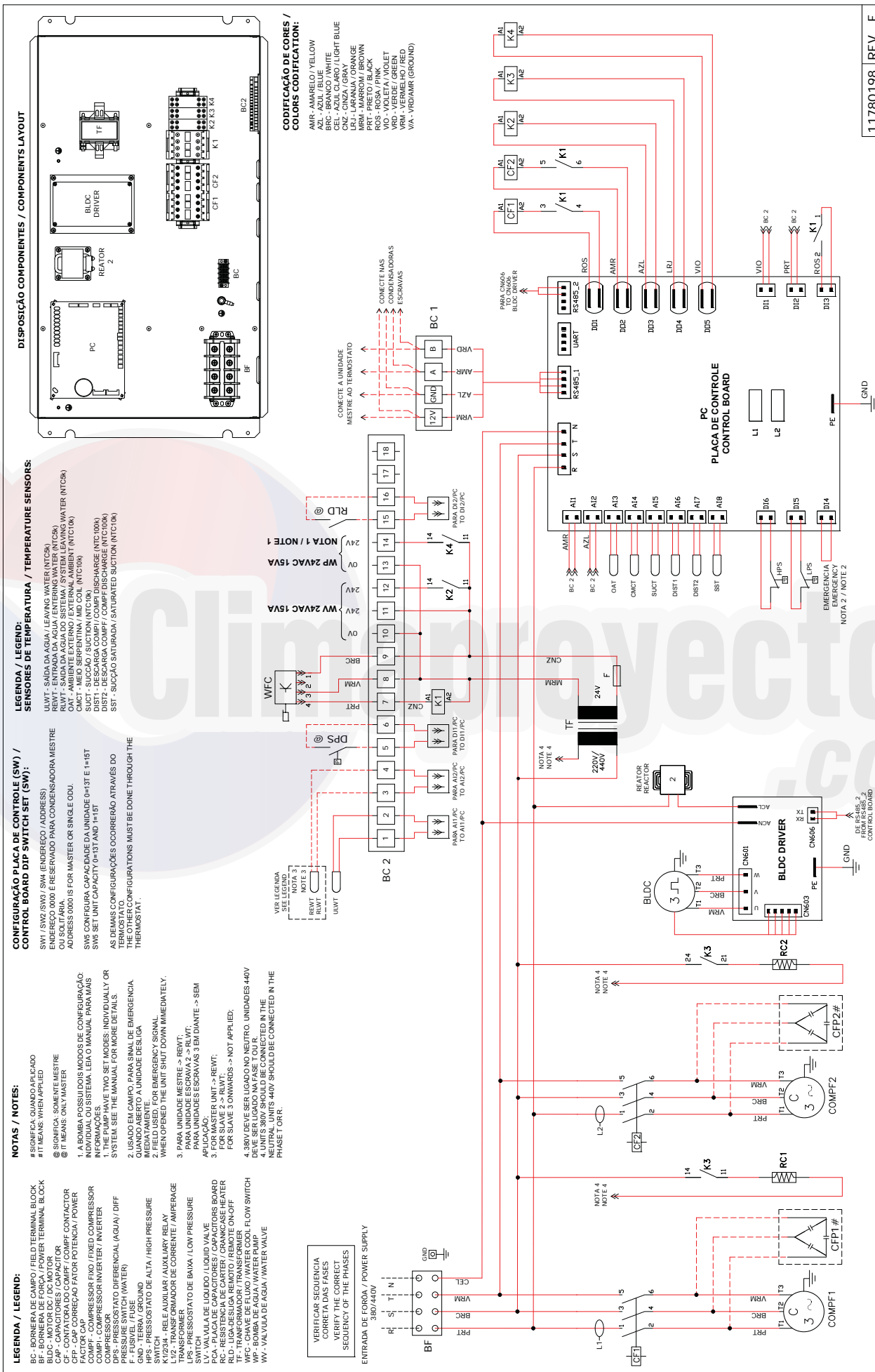


### VERIFICAR SEQUENCIA CORRETA DAS FASES / VERIFY THE CORRECT SEQUENCE OF THE PHASES



### ENTRADA DE FORÇA / POWER SUPPLY





**LEGENDA / LEGEND:**

- BC - BORNHEIRA DE CAMPO / FIELD TERMINAL BLOCK
- BLDC - MOTOR DC / DC MOTOR
- CA - CAPACITORES / CAPACITORS
- CFP - CAP CORREÇÃO FATOR POTENCIA / POWER FACTOR CAP
- COMP - COMPRESSOR FUS / FUSED COMPRESSOR
- COMP1 - COMPRESSOR INVERTER / INVERTER COMPRESSOR
- DPS - PRESSOSTATO DIFERENCIAL (AGUA) / DIFF F - FUSIVEL / FUSE (WATER)
- GND - TERRA / GROUND
- HPS - PRESSOSTATO DE ALTA / HIGH PRESSURE SWITCH
- K1234 - RELE AUXILIAR / AUXILIARY RELAY
- L1/2 - TRANSFORMADOR DE CORRENTE / AMPERAGE TRANSFORMER
- L3 - PRESSOSTATO DE BAIXA / LOW PRESSURE SWITCH
- LV - VALVULA DE LÍQUIDO / LIQUID VALVE
- PCA - PLACA DE CAPACITORES / CAPACITORS BOARD
- PCB - PLACA DE COMANDO / COMMAND BOARD
- RLO - LIGA-DESLIGA REMOTO / REMOTE ON/OFF
- TF - TRANSFORMADOR / TRANSFORMER
- WF - CHAVE DE LIGA/DESLIGA DE ÁGUA / WATER VALVE
- WV - VALVULA DE ÁGUA / WATER VALVE

**NOTAS / NOTES:**

- # SIGNIFICA QUANDO APLICADO / IT MEANS WHEN APPLIED
- © SIGNIFICA SOMENTE MESTRE / IT MEANS ONLY MASTER
- 1. A BARRA POSSUI DOIS MODO DE CONFIGURAÇÃO / INFORMATION OF THE SYSTEM, LEIA O MANUAL PARA MAIS INFORMAÇÕES / THE PUMP HAVE TWO SET MODES, INDIVIDUALLY OR SYSTEM SEE THE MANUAL FOR MORE DETAILS.
- 2. USADO EM CAMPO, PARA SINAL DE EMERGENCIA. QUANDO ABERTO A UNIDADE DESLIGA / FIELD USED FOR EMERGENCY SIGNAL WHEN OPENED THE UNIT SHUT DOWN IMMEDIATELY.
- 3. PARA UNIDADE MESTRE -> REWIT. PARA UNIDADES ESCRAVAS 2 -> RLVIT. PARA UNIDADES ESCRAVAS 3 EM DIANTE -> SEM APLICAÇÃO.
- 4. 500V DEVE SER USADO NO NEUTRO. UNIDADES 400V DEVE SER LIGADO NA FASE / OUR NEUTRAL UNITS 400V SHOULD BE CONNECTED IN THE PHASE 1 ONR.

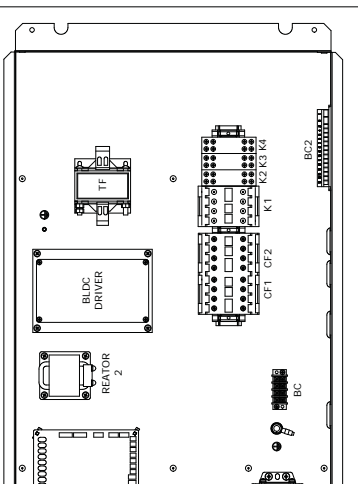
**CONFIGURAÇÃO PLACA DE CONTROLE (SW) / CONTROL BOARD DIP SWITCH SET (SW):**

- SW1 / SW2 (SW3 / SW4 ENDEREÇO / ADDRESS) ENDEREÇO 0000 É RESERVADO PARA CONDENSA/DOR MESTRE OU SOLITÁRIA.
- SW3 CONFIGURA CAPACIDADE DA UNIDADE 0=13T E 1=15T
- SW4 SET UNIT CAPACITY 0=13T AND 1=15T
- AS BARRAS CONFIGURAÇÕES OCORRERÃO ATRAVÉS DO TERMOSTATO.

**LEGENDA / LEGEND:**

- BLWT - SEDA DA ÁGUA / LEAVING WATER (NTC8)
- BLWT - ENTRADA DA ÁGUA / ENTERING WATER (NTC8)
- OAT - AMBIENTE EXTERNO / EXTERNAL AMBIENT (NTC10)
- SUCT - SUÇÃO / SUCTION (NTC10A)
- DIS1 - DESCARGA COMPI / COMPI DISCHARGE (NTC10B)
- SS1 - SUÇÃO SATURADA / SATURATED SUCTION (NTC10C)

**DISPOSIÇÃO COMPONENTES / COMPONENTS LAYOUT**



- CODIFICAÇÃO DE CORES / COLORS CODIFICATION:**
- AMR - AMARELO / YELLOW
  - AZL - AZUL / BLUE
  - BRC - BRANCO / WHITE
  - CEL - AZUL CLARO / LIGHT BLUE
  - LRJ - LARANJA / ORANGE
  - MRM - MARROM / BROWN
  - PKC - PRETO / BLACK
  - RGS - ROSA / PINK
  - VIO - VIOLETA / VIOLET
  - VRD - VERDE / GREEN
  - VIA - VERMELHO / RED
  - VIA - VERDE/AMR (GROUND)

# Attachment II - Conversion Table R-410A



Steam Pressure			
Saturated Temperature (°C)	MPa	kg/cm <sup>2</sup>	psi
-40	0,075	0,8	11
-39	0,083	0,8	12
-38	0,091	0,9	13
-37	0,100	1,0	14
-36	0,109	1,1	16
-35	0,118	1,2	17
-34	0,127	1,3	18
-33	0,137	1,4	20
-32	0,147	1,5	21
-31	0,158	1,6	23
-30	0,169	1,7	24
-29	0,180	1,8	26
-28	0,192	2,0	28
-27	0,204	2,1	30
-26	0,216	2,2	31
-25	0,229	2,3	33
-24	0,242	2,5	35
-23	0,255	2,6	37
-22	0,269	2,7	39
-21	0,284	2,9	41
-20	0,298	3,0	43
-19	0,313	3,2	45
-18	0,329	3,4	48
-17	0,345	3,5	50
-16	0,362	3,7	52
-15	0,379	3,9	55
-14	0,396	4,0	57
-13	0,414	4,2	60
-12	0,432	4,4	63
-11	0,451	4,6	65
-10	0,471	4,8	68
-9	0,491	5,0	71
-8	0,511	5,2	74
-7	0,532	5,4	77
-6	0,554	5,6	80
-5	0,576	5,9	84
-4	0,599	6,1	87
-3	0,622	6,3	90
-2	0,646	6,6	94
-1	0,670	6,8	97

Steam Pressure			
Saturated Temperature (°C)	MPa	kg/cm <sup>2</sup>	psi
0	0,695	7,1	101
1	0,721	7,4	105
2	0,747	7,6	108
3	0,774	7,9	112
4	0,802	8,2	116
5	0,830	8,5	120
6	0,859	8,8	124
7	0,888	9,1	129
8	0,918	9,4	133
9	0,949	9,7	138
10	0,981	10,0	142
11	1,013	10,3	147
12	1,046	10,7	152
13	1,080	11,0	157
14	1,114	11,4	162
15	1,150	11,7	167
16	1,186	12,1	172
17	1,222	12,5	177
18	1,260	12,9	183
19	1,298	13,2	188
20	1,338	13,6	194
21	1,378	14,1	200
22	1,418	14,5	206
23	1,460	14,9	212
24	1,503	15,3	218
25	1,546	15,8	224
26	1,590	16,2	231
27	1,636	16,7	237
28	1,682	17,2	244
29	1,729	17,6	251
30	1,777	18,1	258
31	1,826	18,6	265
32	1,875	19,1	272
33	1,926	19,6	279
34	1,978	20,2	287
35	2,031	20,7	294
36	2,084	21,3	302
37	2,139	21,8	310
38	2,195	22,4	318
39	2,252	23,0	327

Steam Pressure			
Saturated Temperature (°C)	MPa	kg/cm <sup>2</sup>	psi
40	2,310	23,6	335
41	2,369	24,2	343
42	2,429	24,8	352
43	2,490	25,4	361
44	2,552	26,0	370
45	2,616	26,7	379
46	2,680	27,3	389
47	2,746	28,0	398
48	2,813	28,7	408
49	2,881	29,4	418
50	2,950	30,1	428
51	3,021	30,8	438
52	3,092	31,5	448
53	3,165	32,3	459
54	3,240	33,0	470
55	3,315	33,8	481
56	3,392	34,6	492
57	3,470	35,4	503
58	3,549	36,2	515
59	3,630	37,0	526
60	3,712	37,9	538
61	3,796	38,7	550
62	3,881	39,6	563
63	3,967	40,5	575
64	4,055	41,4	588
65	4,144	42,3	601

# Attachment III - Set Point Table



## Minimum Values

Delta	N° Chiller's							
	1	2	3	4	5	6	7	8
3	5,0	5,0	5,0	5,1	5,2	5,2	5,2	5,3
3,1	5,0	5,0	5,0	5,1	5,2	5,2	5,3	5,3
3,2	5,0	5,0	5,1	5,2	5,2	5,3	5,3	5,3
3,3	5,0	5,0	5,1	5,2	5,3	5,3	5,3	5,4
3,4	5,0	5,0	5,1	5,2	5,3	5,3	5,4	5,4
3,5	5,0	5,0	5,1	5,3	5,3	5,4	5,4	5,4
3,6	5,0	5,0	5,2	5,3	5,4	5,4	5,4	5,5
3,7	5,0	5,0	5,2	5,3	5,4	5,4	5,5	5,5
3,8	5,0	5,0	5,2	5,3	5,4	5,5	5,5	5,5
3,9	5,0	5,0	5,2	5,4	5,4	5,5	5,5	5,6
4	5,0	5,0	5,3	5,4	5,5	5,5	5,6	5,6
4,1	5,0	5,0	5,3	5,4	5,5	5,6	5,6	5,6
4,2	5,0	5,0	5,3	5,5	5,5	5,6	5,6	5,7
4,3	5,0	5,1	5,3	5,5	5,6	5,6	5,7	5,7
4,4	5,0	5,1	5,4	5,5	5,6	5,7	5,7	5,7
4,5	5,0	5,1	5,4	5,6	5,6	5,7	5,7	5,8
4,6	5,0	5,1	5,4	5,6	5,7	5,7	5,8	5,8
4,7	5,0	5,1	5,5	5,6	5,7	5,8	5,8	5,8
4,8	5,0	5,2	5,5	5,6	5,7	5,8	5,8	5,9
4,9	5,0	5,2	5,5	5,7	5,8	5,8	5,9	5,9
5	5,0	5,2	5,5	5,7	5,8	5,9	5,9	6,0
5,1	5,0	5,2	5,6	5,7	5,8	5,9	5,9	6,0
5,2	5,0	5,2	5,6	5,8	5,9	5,9	6,0	6,0
5,3	5,0	5,3	5,6	5,8	5,9	6,0	6,0	6,1
5,4	5,0	5,3	5,6	5,8	5,9	6,0	6,1	6,1
5,5	5,0	5,3	5,7	5,9	6,0	6,0	6,1	6,1
5,6	5,0	5,3	5,7	5,9	6,0	6,1	6,1	6,2
5,7	5,0	5,3	5,7	5,9	6,0	6,1	6,2	6,2
5,8	5,0	5,4	5,7	5,9	6,1	6,1	6,2	6,2
5,9	5,0	5,4	5,8	6,0	6,1	6,2	6,2	6,3

**Minimum Values**

	N° Chiller's							
6	5,0	5,4	5,8	6,0	6,1	6,2	6,3	6,3
6,1	5,0	5,4	5,8	6,0	6,2	6,2	6,3	6,3
6,2	5,0	5,4	5,9	6,1	6,2	6,3	6,3	6,4
6,3	5,0	5,5	5,9	6,1	6,2	6,3	6,4	6,4
6,4	5,0	5,5	5,9	6,1	6,2	6,3	6,4	6,4
6,5	5,0	5,5	5,9	6,2	6,3	6,4	6,4	6,5
6,6	5,0	5,5	6,0	6,2	6,3	6,4	6,5	6,5
6,7	5,0	5,5	6,0	6,2	6,3	6,4	6,5	6,5
6,8	5,0	5,6	6,0	6,2	6,4	6,5	6,5	6,6
6,9	5,0	5,6	6,0	6,3	6,4	6,5	6,6	6,6
7	5,0	5,6	6,1	6,3	6,4	6,5	6,6	6,7
7,1	5,0	5,6	6,1	6,3	6,5	6,6	6,6	6,7
7,2	5,0	5,6	6,1	6,4	6,5	6,6	6,7	6,7
7,3	5,0	5,7	6,1	6,4	6,5	6,6	6,7	6,8
7,4	5,0	5,7	6,2	6,4	6,6	6,7	6,7	6,8
7,5	5,0	5,7	6,2	6,5	6,6	6,7	6,8	6,8
7,6	5,0	5,7	6,2	6,5	6,6	6,7	6,8	6,9
7,7	5,0	5,7	6,3	6,5	6,7	6,8	6,8	6,9
7,8	5,0	5,8	6,3	6,5	6,7	6,8	6,9	6,9
7,9	5,0	5,8	6,3	6,6	6,7	6,8	6,9	7,0
8	5,0	5,8	6,3	6,6	6,8	6,9	6,9	7,0
8,1	5,0	5,8	6,4	6,6	6,8	6,9	7,0	7,0
8,2	5,0	5,8	6,4	6,7	6,8	6,9	7,0	7,1
8,3	5,0	5,9	6,4	6,7	6,9	7,0	7,0	7,1
8,4	5,0	5,9	6,4	6,7	6,9	7,0	7,1	7,1
8,5	5,0	5,9	6,5	6,8	6,9	7,0	7,1	7,2
8,6	5,0	5,9	6,5	6,8	7,0	7,1	7,1	7,2
8,7	5,0	5,9	6,5	6,8	7,0	7,1	7,2	7,2
8,8	5,0	6,0	6,5	6,8	7,0	7,1	7,2	7,3
8,9	5,0	6,0	6,6	6,9	7,0	7,2	7,3	7,3
9	5,0	6,0	6,6	6,9	7,1	7,2	7,3	7,4
9,1	5,0	6,0	6,6	6,9	7,1	7,2	7,3	7,4
9,2	5,0	6,0	6,7	7,0	7,1	7,3	7,4	7,4
9,3	5,0	6,1	6,7	7,0	7,2	7,3	7,4	7,5
9,4	5,0	6,1	6,7	7,0	7,2	7,3	7,4	7,5
9,5	5,0	6,1	6,7	7,1	7,2	7,4	7,5	7,5
9,6	5,0	6,1	6,8	7,1	7,3	7,4	7,5	7,6
9,7	5,0	6,1	6,8	7,1	7,3	7,4	7,5	7,6
9,8	5,0	6,2	6,8	7,1	7,3	7,5	7,6	7,6
9,9	5,0	6,2	6,8	7,2	7,4	7,5	7,6	7,7
10	5,0	6,2	6,9	7,2	7,4	7,5	7,6	7,7

# Attachment III - Set Point Table (cont.)



## Maximum values

Delta	N° Chiller's							
	1	2	3	4	5	6	7	8
3	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0
3,1	14,0	14,0	14,0	14,0	14,0	14,0	13,9	13,9
3,2	14,0	14,0	14,0	14,0	14,0	13,9	13,9	13,9
3,3	14,0	14,0	14,0	14,0	13,9	13,9	13,9	13,8
3,4	14,0	14,0	14,0	14,0	13,9	13,9	13,8	13,8
3,5	14,0	14,0	14,0	14,0	13,9	13,8	13,8	13,8
3,6	14,0	14,0	14,0	13,9	13,8	13,8	13,8	13,7
3,7	14,0	14,0	14,0	13,9	13,8	13,8	13,7	13,7
3,8	14,0	14,0	14,0	13,9	13,8	13,7	13,7	13,7
3,9	14,0	14,0	14,0	13,8	13,8	13,7	13,7	13,6
4	14,0	14,0	13,9	13,8	13,7	13,7	13,6	13,6
4,1	14,0	14,0	13,9	13,8	13,7	13,6	13,6	13,6
4,2	14,0	14,0	13,9	13,7	13,7	13,6	13,6	13,5
4,3	14,0	14,0	13,9	13,7	13,6	13,6	13,5	13,5
4,4	14,0	14,0	13,8	13,7	13,6	13,5	13,5	13,5
4,5	14,0	14,0	13,8	13,7	13,6	13,5	13,5	13,4
4,6	14,0	14,0	13,8	13,6	13,5	13,5	13,4	13,4
4,7	14,0	14,0	13,7	13,6	13,5	13,4	13,4	13,4
4,8	14,0	14,0	13,7	13,6	13,5	13,4	13,4	13,3
4,9	14,0	14,0	13,7	13,5	13,4	13,4	13,3	13,3
5	14,0	14,0	13,7	13,5	13,4	13,3	13,3	13,3
5,1	14,0	14,0	13,6	13,5	13,4	13,3	13,3	13,2
5,2	14,0	14,0	13,6	13,4	13,3	13,3	13,2	13,2
5,3	14,0	13,9	13,6	13,4	13,3	13,2	13,2	13,1
5,4	14,0	13,9	13,6	13,4	13,3	13,2	13,1	13,1
5,5	14,0	13,9	13,5	13,4	13,2	13,2	13,1	13,1
5,6	14,0	13,9	13,5	13,3	13,2	13,1	13,1	13,0
5,7	14,0	13,9	13,5	13,3	13,2	13,1	13,0	13,0
5,8	14,0	13,8	13,5	13,3	13,1	13,1	13,0	13,0
5,9	14,0	13,8	13,4	13,2	13,1	13,0	13,0	12,9

**Maximum values**

	N° Chiller's							
6	14,0	13,8	13,4	13,2	13,1	13,0	12,9	12,9
6,1	13,9	13,8	13,4	13,2	13,0	13,0	12,9	12,9
6,2	13,8	13,8	13,3	13,1	13,0	12,9	12,9	12,8
6,3	13,7	13,7	13,3	13,1	13,0	12,9	12,8	12,8
6,4	13,6	13,6	13,3	13,1	13,0	12,9	12,8	12,8
6,5	13,5	13,5	13,3	13,1	12,9	12,8	12,8	12,7
6,6	13,4	13,4	13,2	13,0	12,9	12,8	12,7	12,7
6,7	13,3	13,3	13,2	13,0	12,9	12,8	12,7	12,7
6,8	13,2	13,2	13,2	13,0	12,8	12,7	12,7	12,6
6,9	13,1	13,1	13,1	12,9	12,8	12,7	12,6	12,6
7	13,0	13,0	13,0	12,9	12,8	12,7	12,6	12,6
7,1	12,9	12,9	12,9	12,9	12,7	12,6	12,6	12,5
7,2	12,8	12,8	12,8	12,8	12,7	12,6	12,5	12,5
7,3	12,7	12,7	12,7	12,7	12,7	12,6	12,5	12,4
7,4	12,6	12,6	12,6	12,6	12,6	12,5	12,5	12,4
7,5	12,5	12,5	12,5	12,5	12,5	12,5	12,4	12,4
7,6	12,4	12,4	12,4	12,4	12,4	12,4	12,4	12,3
7,7	12,3	12,3	12,3	12,3	12,3	12,3	12,3	12,3
7,8	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2
7,9	12,1	12,1	12,1	12,1	12,1	12,1	12,1	12,1
8	12,0	12,0	12,0	12,0	12,0	12,0	12,0	12,0
8,1	11,9	11,9	11,9	11,9	11,9	11,9	11,9	11,9
8,2	11,8	11,8	11,8	11,8	11,8	11,8	11,8	11,8
8,3	11,7	11,7	11,7	11,7	11,7	11,7	11,7	11,7
8,4	11,6	11,6	11,6	11,6	11,6	11,6	11,6	11,6
8,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5	11,5
8,6	11,4	11,4	11,4	11,4	11,4	11,4	11,4	11,4
8,7	11,3	11,3	11,3	11,3	11,3	11,3	11,3	11,3
8,8	11,2	11,2	11,2	11,2	11,2	11,2	11,2	11,2
8,9	11,1	11,1	11,1	11,1	11,1	11,1	11,1	11,1
9	11,0	11,0	11,0	11,0	11,0	11,0	11,0	11,0
9,1	10,9	10,9	10,9	10,9	10,9	10,9	10,9	10,9
9,2	10,8	10,8	10,8	10,8	10,8	10,8	10,8	10,8
9,3	10,7	10,7	10,7	10,7	10,7	10,7	10,7	10,7
9,4	10,6	10,6	10,6	10,6	10,6	10,6	10,6	10,6
9,5	10,5	10,5	10,5	10,5	10,5	10,5	10,5	10,5
9,6	10,4	10,4	10,4	10,4	10,4	10,4	10,4	10,4
9,7	10,3	10,3	10,3	10,3	10,3	10,3	10,3	10,3
9,8	10,2	10,2	10,2	10,2	10,2	10,2	10,2	10,2
9,9	10,1	10,1	10,1	10,1	10,1	10,1	10,1	10,1
10	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0



*At the factory's discretion and with the objective of improving the product, the features mentioned here may change at any time without notice.*