



Air Conditioning

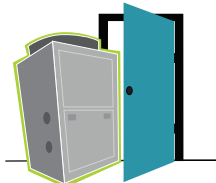


## CONTROLLER OR MICROPROCESSOR MANUAL

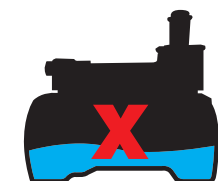
*We are leaders in the creation of innovative air conditioning solutions using state of the art technology and world class product design*



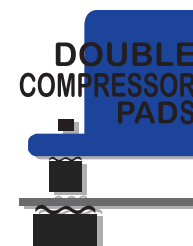
SMALL  
FOOTPRINT



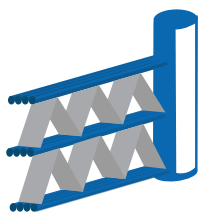
BALANCING  
VALVE



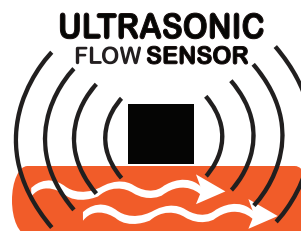
ISOLATION  
VALVE



DOUBLE  
COMPRESSOR  
PADS



MICROCHANNEL



ULTRASONIC  
FLOW SENSOR



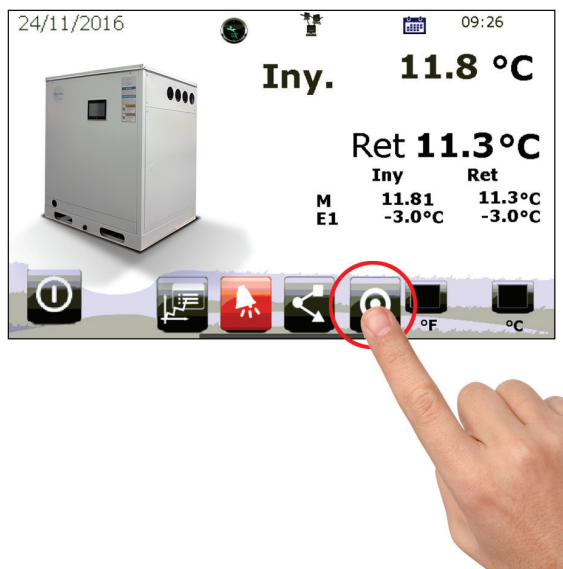
EC FANS

## CLIMA-FLEX | TECHNOLOGIES

This technology may or may not be included in the unit depending on the model

## • Step 1

From the main screen click on **MENU**



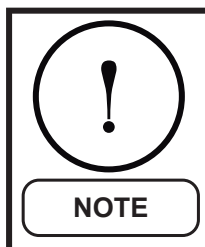
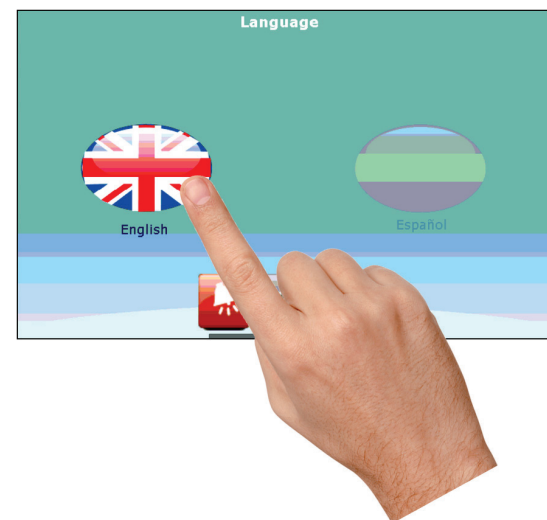
## • Step 2

From the **MENU** screen click on **LANGUAGE**

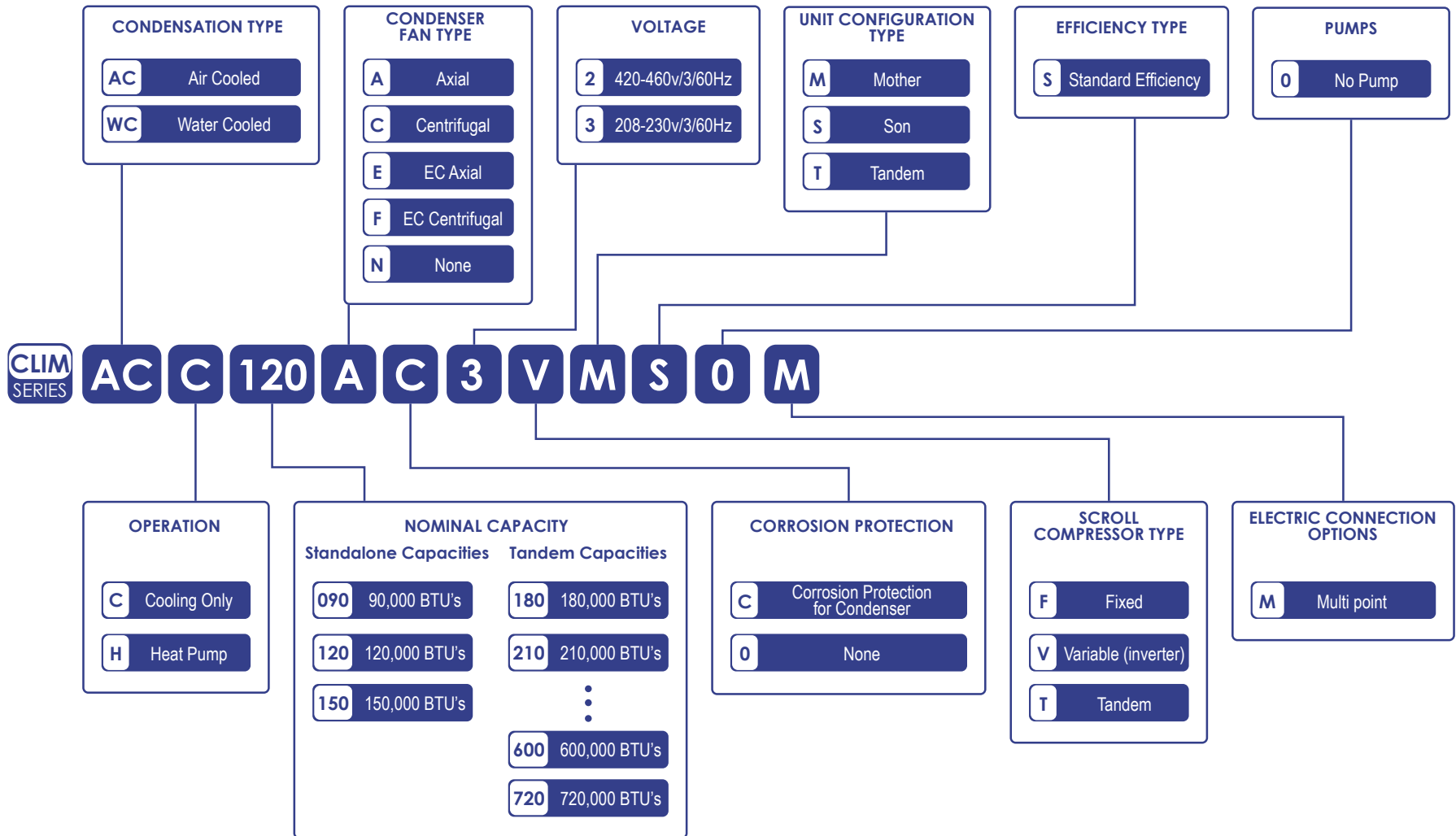


## • Step 3

From the **LANGUAGE** screen select the language you desire



**Note:** Dear customer, if you require an atypical installation or an installation with special automation (for example variable external pumping, integration to an external monitoring system, etc.) or if you have any issues during installation we are at your service, you can communicate with us at **service@clima-flex.com** or **US Toll Free 1 800 201 48 16** if you are in Mexico call to **01 800 890 59 17**.



## WARNING - CAUTION - NOTE

## IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the unit. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should service this equipment. Adhere to all warnings, cautions, operating and safety instructions on the unit placards and in this manual. Follow all operating and user instructions during and after installation.

Installer should pay particular attention to the words: **NOTE**, **CAUTION** and **WARNING**. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.



Improper installation may create a condition where the operation of the product could cause personal injury or property damage. Improper installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this manual for assistance or additional information, consult a qualified installer or service agency.

Electrical shock hazard. Disconnect voltage at main panel or power source before opening any cover. Failure to comply may result in injury or death.

To minimize the hazard of electrical shock and personal injury, this component must be effectively grounded. Refer to installation guidelines for further information.



This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including but not limited to, building, electrical and mechanical codes.

Risk of sharp edges, splinters, and exposed fasteners. Can cause injury.

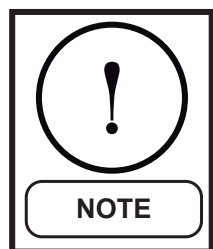
Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move the unit, lift it, remove packaging or prepare the unit for installation.

Risk of contact with hot surfaces. Can cause injury.

The compressors, fan motors, refrigerant discharge lines and reheats are extremely hot during unit operation. Allow sufficient time for them to cool before working within the unit cabinet.

Periodically inspect all valves, fittings, and piping for corrosion, rust, leaks, or damage.

This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out components, or to bypass or otherwise depart from recommended procedures. Any short-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.



Risk of clogged or leaking drain lines. Can cause equipment and building damage. This unit requires a water drain connection. Drain lines must be inspected regularly and maintenance must be performed to ensure that drain water runs freely through the drain system and that lines are clear and free of obstructions and in good condition with no visible sign of damage or leaks.

This unit may also require an external water supply to operate.

Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical equipment. Do not locate unit directly above any equipment that could sustain water damage.

## • Efficiency

Our units are designed to meet the needs of any project. Our featured intelligent process controllers and smart temperature sensors provide maximum performance while saving energy.

The system automatically modifies the operation mode to maintain optimal conditions, making it very easy to operate.

All temperature sensors are calibrated and set at the factory before shipment. Start up has to be performed by a qualified technician, during the initial startup steps the unit will be set to local conditions and all points of operation will be reviewed.

Once the unit is set, operation is a matter of pressing the start and stop button and making sure that the unit operates properly, after this the unit will operate automatically, starting itself according to the demand of the cooling system and local conditions.

## • Flexibility

The units have smart processors and sensors to automatically control the temperature at optimum operating conditions.

The units were designed to mate with each other and be combined to meet different load variations (tandem installation). You can combine up to 8 modules; these combinations may be done with chillers of different capacities ranging from 3 to 200 tons. Capacity varies depending on the number and type of units.

## • Reliability

All structures are made of galvanized steel sheet, coated with electrostatic baked paint to ensure long durability and no corrosion in any weather, such as prolonged direct sunlight, rain and wind.

All units are designed to fit a reduced installation space, eliminating thus large installation areas. We only use high quality components to ensure durability and reliability even under harsh environmental conditions.

**NOTE:** For applications in tropical climates our units are coated inside and outside with Corrosion Protection.

Our products have efficiency certifications from AHRI and electrical certifications from ETL, we also comply with all industry safety standards. We are members of the American Society of Air Conditioning, Refrigeration and Heating Engineers (ASHRAE). To support our commitment to customers and our stakeholders our units have a 1 year mayor warranty after start up, .

Our units use R410A refrigerant, which is harmless to the ozone layer and is not toxic or flammable, even in case of leakage.

Finally, the heat exchanger efficiency and modular design allow for an easy and quick installation.

## • Design

Research conducted by the Engineering Department have resulted in units with a high design efficiency and optimum performance. The selection of prime components and our quality and control system ensures performance and reliability. All main components are rigorously tested and qualified before being installed. Each unit design has gone through long hours of rigorous testing to ensure reliability, durability and quality of the entire system.

All external paint has been tested in a saline chamber and is rated at 1,500 hours proof. Compressors and heat exchangers ensure high equipment efficiency capacity. The water pump is specially designed to work properly and with minimal vibration and noise.

All units have a compact and sturdy structure while maintaining a slim profile.

## • Communication

The units can be controlled independently as a single unit (individual mode), or they can be connected to a central control unit ("Tandem Mode"). Operation and user input is done via a color 7" touch screen.

Our units can handle different communication protocols; such as Modbus and Bacnet, the most commonly used protocols in the HVAC industry.

Our units keep track of all the programming variables in real time, as well as monitoring performance and specific alarms in the refrigeration cycle, the electrical system as well as external factors such as fire and flood detection (optional sensors).

The control and monitoring system ensures the proper operation of the unit by monitoring in real time the health of all mayor components (high and low refrigerant pressure, compressors and fan motors health, etc).

In case of a malfunction the event will be recorded for later analysis, facilitating the location of the possible failure and its solution.

## • Installation

The units have been designed for a field-friendly installation. Screw type connections provide easy installation of the water pipes, said connections are located on both sides of the unit, so that the pipes can be connected on either side of the equipment.

The individual assembly of the units reduces installation costs on site, the units have a rigid base which bears the weight of the unit and allows an easy installation.

## • Maintenance

The simplicity in the design of each unit allows maximum ease in maintenance. All mayor components are available to maintenance personnel by opening the service panel. If an emergency stop occurs, the control section will indicate the detailed cause of the failure, helping to accelerate and facilitate the solution process.

## • Factory Testing

Each unit is pressure and vaccum tested, then charged with the refrigerant required for proper operation based on the client installation conditions.

The units are then evaluated at full load operation with water flow, thermal load and line voltage set to the actual conditions in which the equipment will operate. Finally the units are performance tested at application temperatures ranging from -10 °C to 45+ °C.

**NOTE:** The warranty policy requires that the start up be made by qualified and authorized personnel.

Units are built with control and design in mind, assembled with technically specialized control software. Some of our features are in house production of all piping and wiring, scroll type compressors, new generation evaporators, air cooled condensers, optional hydraulic components, and several safety and security protections. Our units are ecofriendly and operate with R-410A refrigerant.

## • Compressor

Our two-stage, fixed scroll, digital and variable compressors have better liquid handling properties. Because of its axial and radial shape, it allows parts of the scroll to be separated in the presence of coolant, thus offering protection against liquid damage.

They are more efficient over the full operating range, operating at sound levels and lower vibration than traditional compressors, it has 70% fewer moving parts, startability under any load on the system, without removing components, easy service and maintenance due to its compact size and lightweight and simple design, built to achieve optimum performance with current refrigerants without chlorine, without complex internal suction valves and discharge for quieter operation and increased reliability.

## • Evaporator

The plate heat exchanger is made of stainless steel plates welded together closely to ensure high efficiency heat exchange. The heat exchanger is insulated with a flexible elastomer of a minimum thickness of 1/2" to provide optimal thermal insulation.

The microchannel technology allows to optimize the use of refrigerant, both in the condenser and throughout the cooling cycle. This is a series of flat tubes (microchannels), through which the refrigerant circulates. Heat transfer is maximized by these extremely thin tubes, optimizing the system, providing significant savings in the use of refrigerant gas.

## • Thermostatic Expansion Valve

The Thermostatic Expansion Valve (TEV) keeps the evaporator stocked with sufficient refrigerant to meet load conditions. It has no way to turn on or off the compressor, but keeps the superheated refrigerant itself in the suction line of the compressor. The thermostatic expansion valve installed in each circuit has been selected for a range of specific operation conditions.

## • Filter-Drier

The dehydrator filter is designed to keep the circuit clean and remove residual moisture from the refrigerant circuit and avoid affecting the operation of the unit by acidification of the oil, which causes slow disintegration of the varnish that protects the motor windings in the compressor.

## • Expansion Tank

Used in the system to handle the volume variations of the liquid contained in the pipe system due to temperature changes.

## • Balancing Valve

This balancing valve is placed in the unit in order to control and maintain a constant water flow in the circuit, with the special feature that the flow can be adjusted anytime as needed.

## • Temperature Sensor

Through digital signals generated by these devices the temperature is measured accurately and in real time.

## COMPONENTS

### • Refrigeration controls

The units are equipped with solenoid valves, expansion valves, dehydrator, and service valves.

### • Electrical components

All units are equipped with a control panel, security anti-theft devices, internal and external overheating protection, compressor drive protection, flow protection, freezing protection and electrical failure protection. The control panel has LED operation indicating lights. Depending on the model some other indicators may be installed.

## HYDRAULIC COMPONENTS (OPTIONAL)

### • Water pump

The drive in the water pump is TEFC (Totally Enclosed Fan Cooled) and has anti-corrosive coating on the housing.

## CONTROL

The control unit allows the connection of the unit to the INTERNET, and allows the user to visualize all the unit's operating information, such as variable graphics, tendencies cycle time, diagnosis of components, alarms, etc. Access to this information renders a more efficient operation and system control.

## CONNECTIVITY

The connectivity via internet enables our units to operate remotely, to check the status of their maintenance cycle and remedy any situation quickly and efficiently.

## VRW

This units are pioneers in the VRW technology. The most important advantages are no loss of performance tonnes over distance, uses water as heat medium, requires no special installation, far better performance at a lower cost.

## CORROSION PROTECTION (OPTIONAL)

The inorganic film on the surface is ultra thin and is formed by an inert ceramic glass layer that is obtained at ambient temperatures. This innovative technology provides:

- UV resistance
- A crystalline finished, non-yellowing
- Positively charged coating to repel H<sub>2</sub>O
- Magnificent luster and depth of image retention
- Outstanding resistance to solvents and chemicals
- Exceptional abrasion resistance

### • Energy Efficient

With Corrosion Protection you save energy between 9% to 15%. Its sealant layer of only 3-5 microns allows heat transfer be more efficient.

### • Extends the life of the equipment

Corrosion Protection extends the life of your air conditioner units, refrigerators or cooling towers, because it protects up to for 5 years, preserving its appearance and function.

Corrosion Protection is applied to cabinets, capacitors, grids and coils, achieving great benefits and durability that can not be obtained with conventional protections.



# PCO SYSTEM

## • INTRODUCTION

Welcome to CFs operation manual to control one or several water chillers jointly by using the head temperature sensors, or control independent units by using the injection temperature sensors in each unit. The system is designed to control a unit with capacity control by an inverter or a typical unloader valve in a Digital scroll compressor, this is a "Mother" unit, and up to four additional units without capacity control, called "Sons" may be added.

## • USED HARDWARE

The "Mother" unit is directly controlled by the main controller, the pCO. Each "Son" unit is controlled by an expansion module PCOE. If the units are cooled by water, it requires an extra expansion module for every four "Son" units.

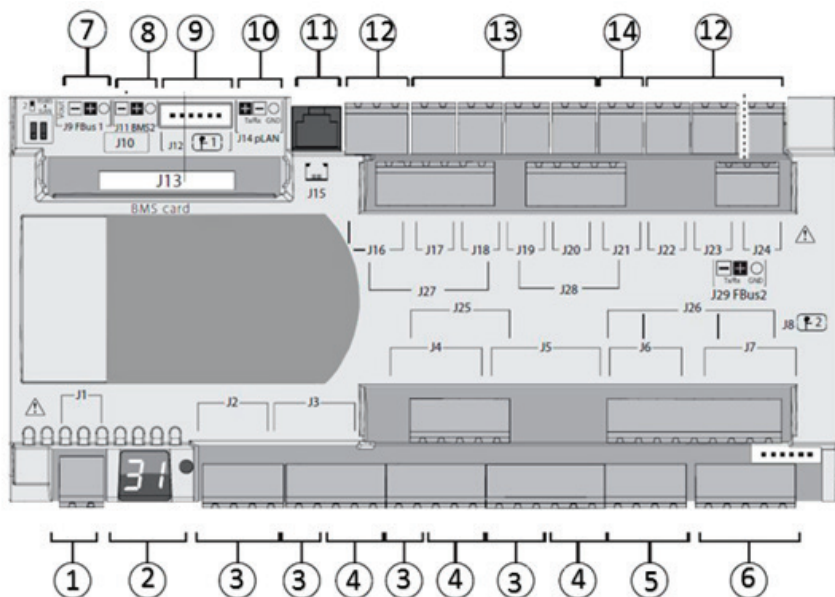
Each master unit has a 7 inches pGD Touch Tactile Terminal.



# PCO (CONTROL)

## Optional Equipment

The pCOOEM+ is a microprocessor-based, programmable electronic controller that is fully compatible (hardware and software) with the pCO System family of devices, which includes programmable controllers, user terminals, gateways, communication devices and remote management devices. These devices represent a powerful control system that can be easily interfaced with most Building Management Systems (BMS) available on the market.

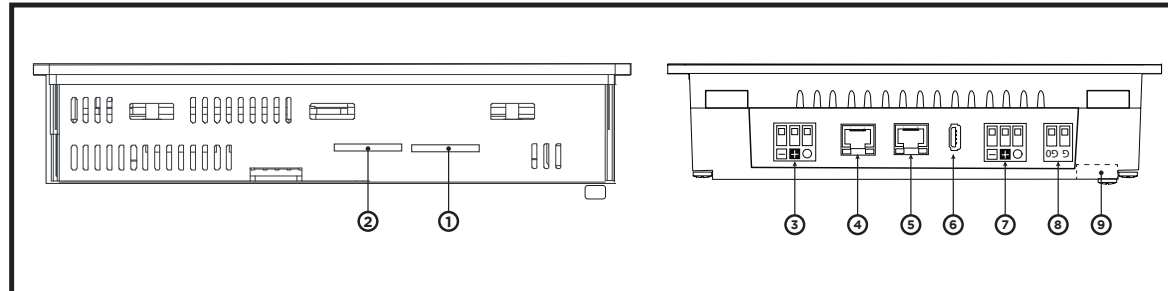


REF.	DESCRIPTION
1	POWER CONNEC TOR [G(+), G0(-)]
2	Button for setting pLAN address and secondary display, LEDs
3	Universal inputs/outputs
4	+Vdc: power to active probes +5 VR power to ratiometric probes
5	Analogue outputs
6	DI: voltage free contact digital inputs
7	Fieldbus1 connector
8	BMS2 connector
9	Unipolar Valves connectors
10	pLAN plug-in connector
11	pLAN telephone connector for terminal / downloading application program
12	Relay digital outputs
13	Powered-on relay digital outputs
14	Power supply for "powered-on relay digital outputs"

# PGD TOUCH (HMI)

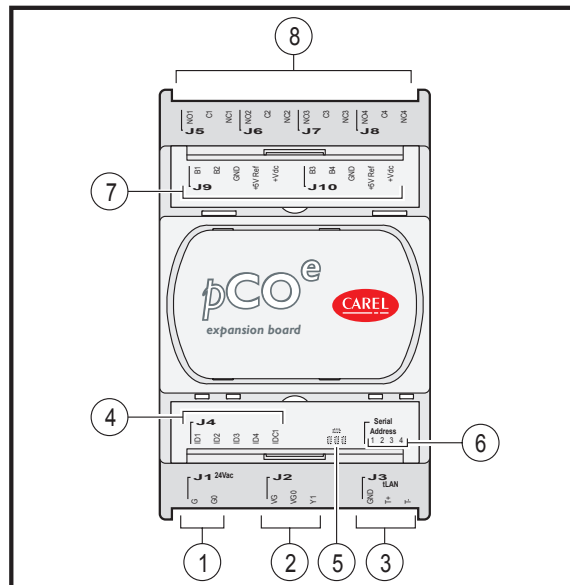
## Optional Equipment

The pDG Touch 7 inch graphic terminal belongs to the family of touch screen terminals designed to make user interface with controllers in the pCO system family easy and intuitive. The electronic technology used and the new 64K colors display allows high quality images and advanced functionality to obtain a high aesthetic standard. The touch screen panel also facilitates human-machine interaction making it easier to navigate between the various screens.



1	SD card connector
2	Preset for membrane keypad
3	RS485 port optically-isolated
4	Ethernet Port 1 (internal switch)
5	Ethernet Port 2 (internal switch)
6	USB Host Port
7	RS485 port not optically-isolated
8	Power supply
9	Plug-in connector (on rear)

## EXPANSION BOARD



1	POWER CONNECTOR [G(+), G0(-)]
2	Optically-isolated analogue output, 0 to 10 V
3	RS485 network connector (GND, T+, T-) or tLAN (GND)
4	Optically-isolated digital inputs, at 24 Vac/Vdc
5	Yellow power LED and 3 indicator
6	Serial address
7	Analogue inputs and power to
8	Relay digital outputs



## MOTOR SAVER

Is designed to protect 3-phase loads from damaging power conditions.

- Loss of any phase
- Low voltage
- High voltage
- Voltage unbalance
- Phase reversal
- Rapid cycling

### DIAGNOSIS INDICATING LIGHTS (LED STATUS)

NORMAL OPERATION	CONSTANT GREEN
START DELAY	INTERMITTENT GREEN
INVERTED PHASE	INTERMITTENT RED
PHASE UNBALANCED	RED ON LAPSES
HIGH/ LOW VOLTAGE	CONSTANT RED

## TEMPERATURE SENSOR



PT10K NTC temperature sensor, resistive to the sensor response to temperature changes, the relationship of the curve is at a higher temperature, the less resistance and vice versa.

## HIGH, LOW PRESSURE CONTROL



ACB / LCB is a small disc type pressure control for use in refrigeration and air conditioning systems. As standard, it is equipped with a 6A contact system having automatic or manual reset. The control is robust and reliable in operation in many types of units.

The small size, lightness and high degree of protection means that it can be mounted directly on the refrigeration systems where pressure regulation is required.

The control is available with different pressure settings and pressure connections to suit customer requirements.

All these features reduce installation costs and save space.

## DIGITAL INPUT (ON/OFF REMOTE, MODE OPERATION; COOL, HEAT)

Electrical component that can break an electrical circuit, interrupting the current or diverting it from one conductor to another.



Your equipment include one and only one of this sensors. Please contact to the company or your distributor to know which one is included.

## FLOW SWITCH SENSOR

The flow switch comprises of a unique paddle system, the one piece design has a paddle at the flow end which is centrally pivoted and a magnet at the opposing end. Above this magnet is a reed switch contact, isolated outside the flow chamber. A second magnet creates the force necessary to reset the paddle back to the zero flow position.



## ULTRASONIC FLOW SENSOR / METER

The flow sensor is a flow measurement device without any moving parts. It has low pressure drop and excellent measuring characteristics.

### Components:

#### 1. ELECTRONICS HOUSING WITH COVER:

2. The electronics housing contains the signal conditioning circuitry. The circuitry is encapsulated in the housing to protect it against moisture and mechanical stress. The electrical connector is mounted on the cover of the electronics housing.

#### 3. Electrical connection:

4. The electrical connection is provided by an M12x1 5-pin plug or a RAST 2.5 pin header.

#### 5. Type plate (laser marking)

6. The type plate shows the key technical data and the connector pin assignments of the sensor

#### 7. Process connection:

#### 8. Wrench flats (0.87/1.34 in a/f):

9. The wrench flats are used for bracing during installation..

10. Measuring tube:



# INPUTS AND OUTPUTS

The configuration of inputs and outputs depends on the initial system configuration. The tables in this section show the inputs and outputs assigned to each type of configuration as well as the port used for the "Mother Unit" (whose capacity is regulated by an inverter or an unloader) and the "Son" units

**Key: CO is cool only. HP is Heat Pump.**

## • pCO Analog Inputs (Mother Unit)

All analog inputs of this system consist of temperature measurements by NTC sensors.

Port	CO Air	HP Air	CO Water	HP Water	Type
U1	Injection	Injection	Injection	Injection	NTC
U2	Return	Return	Return	Return	NTC
U3	Freezing	Freezing	Freezing	Freezing	NTC
U4	Head Return	Head Return	Head Return	Head Return	NTC
U5	Head Injection	Head Injection	Head Injection	Head Injection	NTC
U6	Tem. Cond	Tem. Cond	Inj. Condenser	Inj. Condenser	NTC
U7	-	-	-	Return Condenser	NTC

## • pCO Digital Inputs (Mother Unit)

Port	CO Air	HP Air	CO Water	HP Water
U9	-	Selector	-	Selector
ID1	High Pressure	High Pressure	High Pressure	High Pressure
ID2	Low Pressure	Low Pressure	Low Pressure	Low Pressure
ID3	Remote Start	Remote Start	Remote Start	Remote Start
ID4	MotorSaver	MotorSaver	MotorSaver	MotorSaver

## • pCO Analogue Inputs 0.5 -3.5 Vcd (Mother Unit)

Port	CO Air	HP Air	CO Water	HP Water
U8	Evaporator Flow	Evaporator Flow	Evaporator Flow	Evaporator Flow
U9	-	-	Condensed Flow	Condensed Flow

## • pCO Digital Outputs (Mother Unit)

Port	CO Air	HP Air	CO Water	HP Water
NO1	Comp. Stage 1/Fan	Comp. Stage 1/Fan	Comp. Stage 1/Fan	Comp. Stage 1/Fan
NO6	Pump	Pump	Pump	Pump
NO7	Second Stage	Second Stage	Second Stage	Second Stage
NO8		Reversible Valve	-	Reversible Valve

## • pCO Analog Outputs (Mother Unit)

Port	CO Air	HP Air	CO Water	HP Water	Type
Y1	Inverter/SSR	Inverter/SSR	Inverter/SSR	Inverter/SSR	0-10 V
Y2	Inverter Fan	Inverter Fan	Inverter Fan	Inverter Fan	0-10 V

## • pCOe Analog Input (Son Expansion Module)

Port	CO Air	HP Air	CO Water	HP Water	Type
B1	Injection	Injection	Injection	Injection	NTC
B2	Return	Return	Return	Return	NTC
B3	Freezing	Freezing	Freezing	Freezing	NTC
B4	Condenser	Condenser	Inj. Condenser	Inj. Condenser	NTC

## • pCOe Analog Input (Son expansion module Auxiliary)

Port	CO Air	HP Air	CO Water	HP Water	Type
B1	Evaporator Flow	Evaporator Flow	Evaporator Flow	Evaporator Flow	.5-3.5 vcd
B2	Condenser Flow	Condenser Flow	Condenser Flow	Condenser Flow	.5-3.5 vcd
B3	Return Condenser	Return Condenser	Return Condenser	Return Condenser	NTC

## • pCOe Digital Inputs (Son Expansion Module)

**Note\*:** The digital inputs MotorSaver in "Son" units is optional and it's consideration depends on the initial system configuration, the MotorSaver entry in the "Mother" unit is indispensable.

Port	CO Air	HP Air	CO Water	HP Water
DI1	High Pressure	High Pressure	High Pressure	High Pressure
DI2	Low Pressure	Low Pressure	Low Pressure	Low Pressure
DI3	Evaporation Flow	Evaporation Flow	Evaporation Flow	Evaporation Flow
DI4	*Motor Saber	*Motor Saber	*Motor Saber	*Motor Saber

## • pCOe Digital Outputs (Son expansion module)

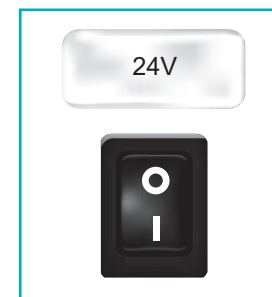
**Note\*\*:** The digital output pump in "Son" units depends on the initial configuration of the system. It will not be used if the system is configured with a single Mother pump (pCO unit).

Port	CO Air	HP Air	CO Water	HP Water
NO1	Comp.1stage/Fan	Comp.1stage/Fan	Comp.1stage	Comp.1stage
NO2	**Pump	**Pump	**Pump	**Pump
NO3	Second Stage	Second Stage	Second Stage	Second Stage
NO4		Reversible Valve		Reversible Valve

# START UP

## • 24 V

Place the control switch (Fig. 1) in the on position to energize the 24 VAC control.  
After the controller is energized it will take 2 minutes for the machine to be online.



(Fig. 1)

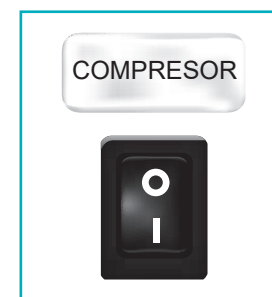
## • COMPRESSOR

Set the switch to the ON position (Figure 2), this will allow the compressor to turn ON and OFF according to the status.

**NOTE:** Once the pump is turned on it starts a delay of a few seconds until a uniform water flow is detected, at the end of this delay, the flow switch is monitored, if the switch is open it commands the pump to shutdown (5 tries within a space of 10 seconds), if a uniform water flow is detected the unit starts its operation.

Under normal conditions, the equipment will operate turning on and off the cooling circuit of the unit, according to the cooling demand. When alarms are presented in the system it will always be indicated on the user interface.

The digital control will begin the operation of the compressors according to the logic set on the control.



(Fig. 2)

## • ON/OFF (RESET)

The sequence of operation begins with a review of all points of pre programmed computer control security, if the necessary conditions are met the unit is ready to start its operation. To start the operation of the equipment set the ON / OFF switch to "ON" (Fig. 3) position.

After a few seconds the computer will command the power of the water pump. If the computer detects water flow it will command the start of the internal control sequence of this unit.

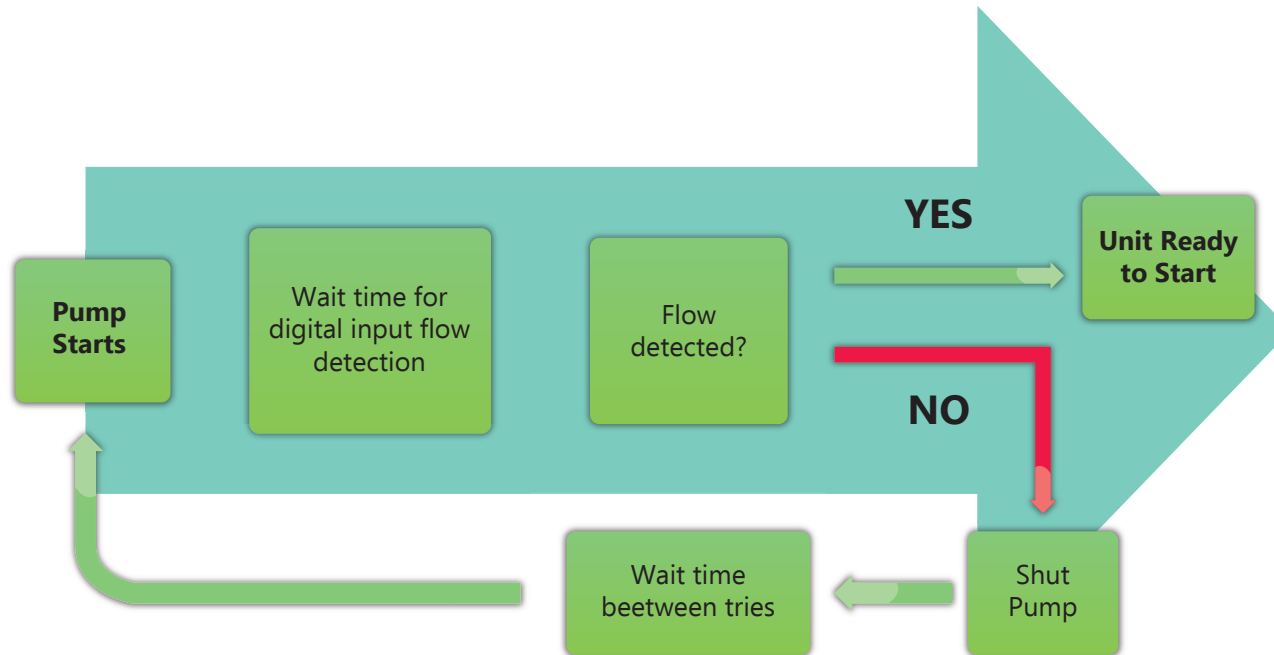


(Fig. 3)

# CONTROL LOGIC PUMP STARTUP

When the unit is turned on, if all security and safety measures are ok (vacuum pressure, discharge, phase monitor), the pumps from all the enabled units will be turned on.

Fig. 4 shows the pump start flow diagram.



**Fig.4**

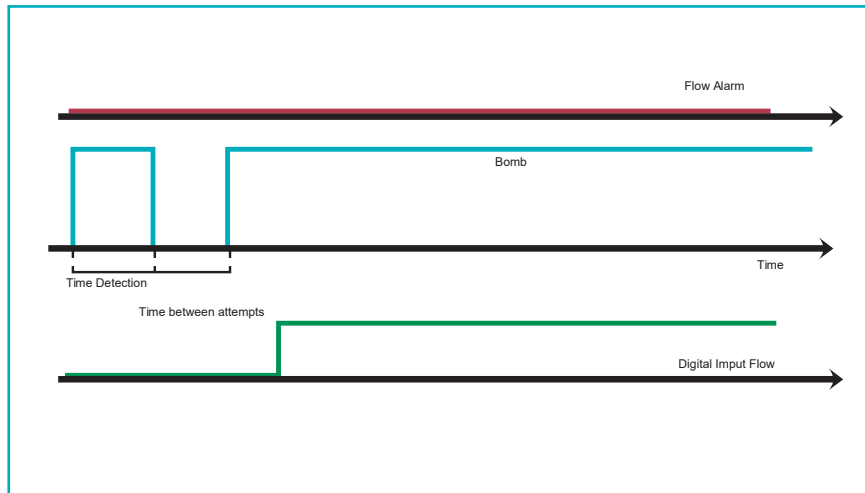
*Pumps startup control flowchart (applies for any unit). If the number of tries for pump start is exceeded, the general flow alarm will be tripped, this will halt all further operations in that unit until the alarm is reset.*

# PUMP STARTUP

The pumps in the units are always working independent of the thermal demand; flow detection as well is always being monitored.

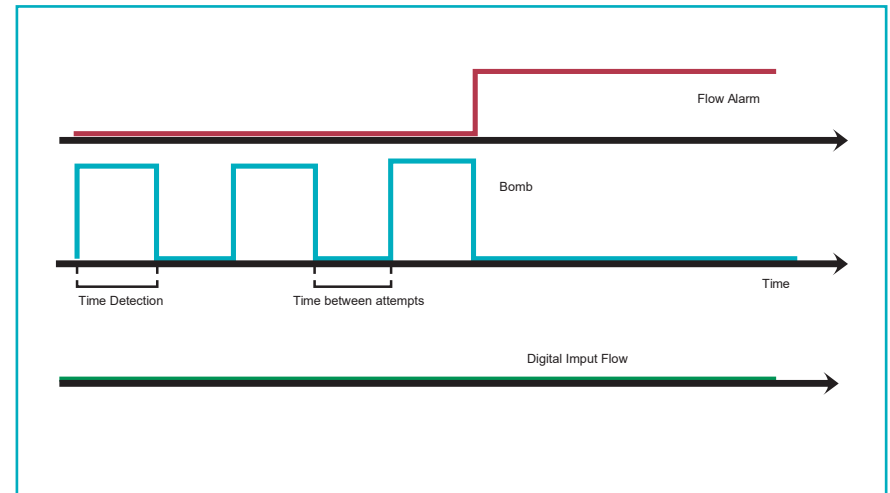
If after the timeout flow detection, digital input status change is detected, the unit start is enabled by demand for the unit in question. Fig. 5 shows an example of this case.

If the flow detection fails after the elapsed time for digital input detection, it is necessary to turn off the pump and back on to make an attempt to start after the waiting time between attempts has elapsed. If after a certain number of attempts flow is still undetected, the flow alarm is triggered and the operation of the unit in question is disabled, as illustrated by Fig. 6.



**Fig. 5**

*Example of a pump startup routine where flow is detected in the second attempt.*



**Fig. 6**

*Example of a pump startup routine where flow is not detected, after 3 attempts the flow alarm is tripped.*

**Note:** The system may have a palette flow sensor with a digital signal of "1" or "0"; or ultrasonic sensor with analog signal showing the flow on the screen.

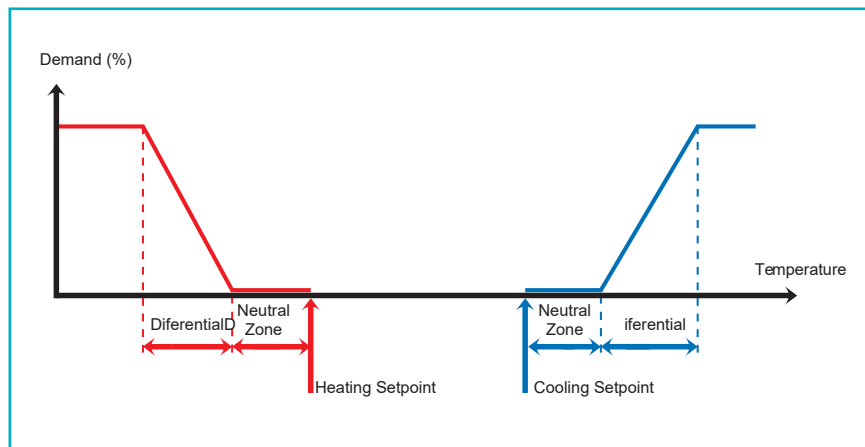


# REGULATION

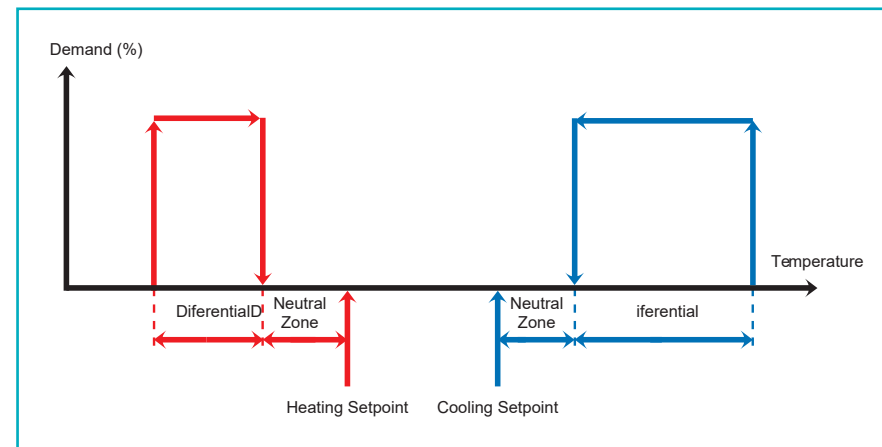
The temperature control can be performed in different ways depending on the system configuration. If there are Son units present, the temperature can be set in "Tandem" mode (all the units are coordinated by the Mother unit from the calculation of aggregate demand) or each unit can work in "standalone mode", where each unit calculates the local demand from its respective injection temperature sensor (in case of failure of the injection head sensor).

In "Tandem" mode, the control temperature is the reading from the main head sensor. From this reading the global demand is calculated. Fig. 7 shows an example of calculating demand when the control is set to "Proportional". If the units are in "independent mode", each unit calculates its local demand from its injection temperature sensor. Local demand for the Mother unit is generated by the same PID control equations, while the demand for Son units is a starting and stopping cycle with hysteresis, as Fig. 8 shows.

The choice between heating and cooling (when the system was configured as a heat pump) can be performed by the digital input "selector" or by the user terminal. All units in a tandem always work in the same mode.



**Fig. 7**  
*Example of proportional control routine in the case of global demand or demand for mother unit.*



**Fig. 8**  
*Example of a proportional control routine for the case of local demand for each son unit.*

## UNIT ROTATION

When the system is operating in “Tandem Mode”, global demand is calculated as mentioned in the previous section, depending on how many units are operating, the system will request the start or stop of units to meet demand. In any configuration, the mother compressor (whose capacity is controlled by a variator or flow valve) is the first to start and the last to stop. Fig. 9 shows an example of the management of the global demand starting and stopping units.

When because of demand the startup or shutdown of the units is requested, and the system is working in “Tandem Mode”, the system can perform the rotation of units for better wear balance between the units. The types of rotation that may be performed include:

- **FIFO.** The first unit to start is the first unit to stop.
- **LIFO.** The first unit to start is the last unit to stop.
- **Cumulative operation time.** Always starts first the unit with fewer hours of accumulated work, and the first unit turned off is the one with the most cumulative hours.
- **Custom.** You assign priorities to start and stop each unit.

**Note:** Regardless of the type of unit rotation set, the unit with frequency variator or discharger remains the first to start and the last to stop.

**Note:** If a unit is working and stops for any situation (like an alarm), it will be replaced by the next available unit in the rotation algorithm.

### • DEICE ROUTINE

Only air-cooled machines that function as a heat pump can program a deice routine in the condensing unit. This icing is done every so often and can be done in two ways: by reversing the operating mode (heating / cooling) or stopping the compressor without stopping the fan. This deicing is performed simultaneously in all units enabled in the system. You can set the frequency, mode of work, its duration, and the duration of the drip. This deice routine can be disabled by the user.

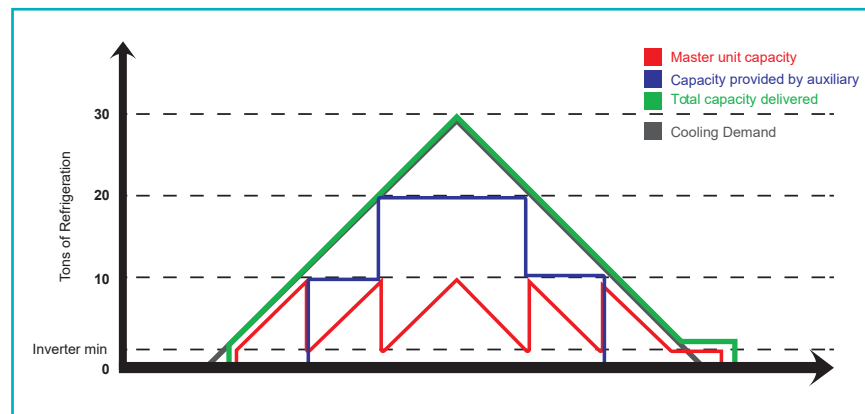


Fig. 9

Example of managed delivered capacity according to demand, for a mother unit and two son units of 10T cooling each.

## FAN CONTROL

For air-cooled units, the startup routine of the condensing unit is accomplished in two parts: the fan start and a timeout after the compressor start. When the stop of the unit is requested we proceed in the same way, the compressor stops and a scheduled time later the fan stops.

Procedures for starting and stopping the condensing unit of an air cooled machine is shown in Fig. 10.

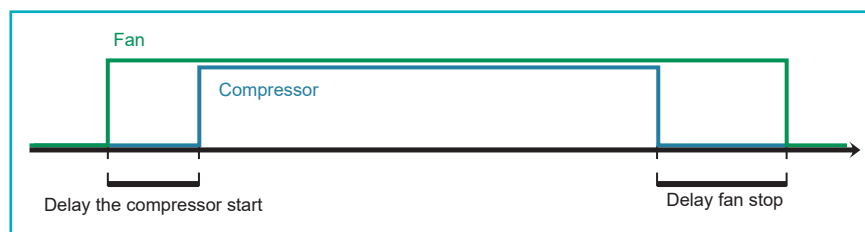


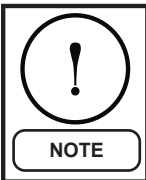
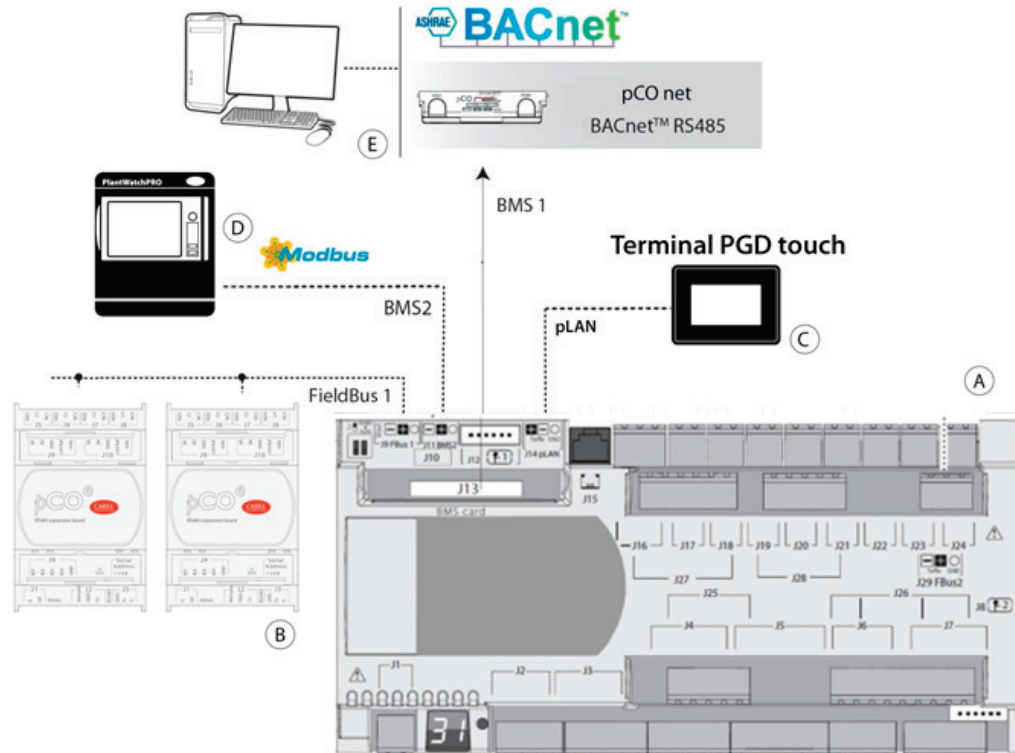
Fig. 10

Procedure for starting and stopping of air cooled condensing units.

# COMMUNICATION PROTOCOL

The pCO has four independent communication ports configured as follows:

- **pLAN:** communication with the pGD Touch terminal using the Modbus RTU Slave protocol.
- **Fieldbus 1:** communication with the expansion modules (in son units) by Modbus Mother Protocol.
- **BMS1:** communication with a supervision system using BACnet\* Protocol.
- **BMS2:** Communication with an external supervision system such as the PlantWatch Pro using Modbus RTU Slave Protocol.



**Note\*:** the BMS1 port requires a communications card (pCOnet to BACnet MS/TP or pCOWeb for BACnet IP). Programming of the logical package in the alternate protocol is also needed.

Also can be connected a FLG- Modbus to connect a bacnet MS/TP.

# ALARMS

The alarms that may occur, depending on the initial configuration are:

- **Sensor Failures Alarms:** If a sensor is detected as disconnected or broken, the algorithm which is used will be disabled. If the sensor is the head injection sensor, the units will work in standalone mode automatically
- **Phase Failure Alarm:** activated by a digital input. The MotorSaver alarm is a high priority situation and stops all machine functions. It is manually reset.
- **No Flow Alarm:** The No Flow Alarm is a high priority alarm and must be manually reset. This alarm stops all machine functions.
- **Freezing Alarm:** If the freezing temperature sensor is below a programmed threshold, the freeze alarm is triggered. This condition stops all functions of the equipment in question. This alarm is automatically restored when the temperature exceeds a value of restitution and keeping the unit in reset mode (no power to operate) for the scheduled time.
- **Freezing Water Alarm:** Same case as the freezing alarm, but in this alarm the reading from the injection sensor is considered.
- **High Pressure Alarm:** It is activated through a digital input. This alarm is a high priority event and stops compressor operation; but it does not stop the pump. It is a manually reset alarm. If the unit is cooled by air a command is sent to start the fan of the condenser unit. To restore keep the unit in high return, the compressor will not start until the scheduled time has elapsed.
- **Low Pressure Alarm:** It is activated through a digital input. This alarm stops the compressor of the unit in question. It is automatically restored but keeps the unit in a low return mode.
- **Disconnection Alarm:** If the system was setup with any "Son" units and any of these units disconnects this alarm will be triggered.
- **Condenser High Temperature Alarm:** This alarm is enabled only when the unit is air-cooled. The alarm is activated when the reading from the condenser temperature sensor exceeds its limit. No control action is taken.
- **Condensate Flow Alarm:** the condensate flow alarm functions like the main flow alarm; the alarm routine is activated only when the system is cooled by water.
- **Lack of Refrigerant Alarm:** this alarm is activated when a start command is sent because of cooling demand, and after a while no temperature change is detected in the injection temperature sensor. This alarm takes no action control and can be disabled by the user.

# USER INTERFACE

## • Navigaton Bar

The navigation bar is found on every screen of the system. The bar hides and unhides automatic by pressing the tab at the bottom as shown in Fig. 11. When the tab is pressed the navigation menu is displayed, as in Fig. 12.

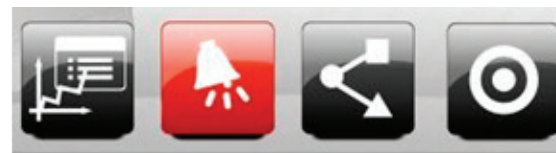











Fig. 11. Navigation bar display tab. / Fig. 12. Example of navigation bar in the main screen.

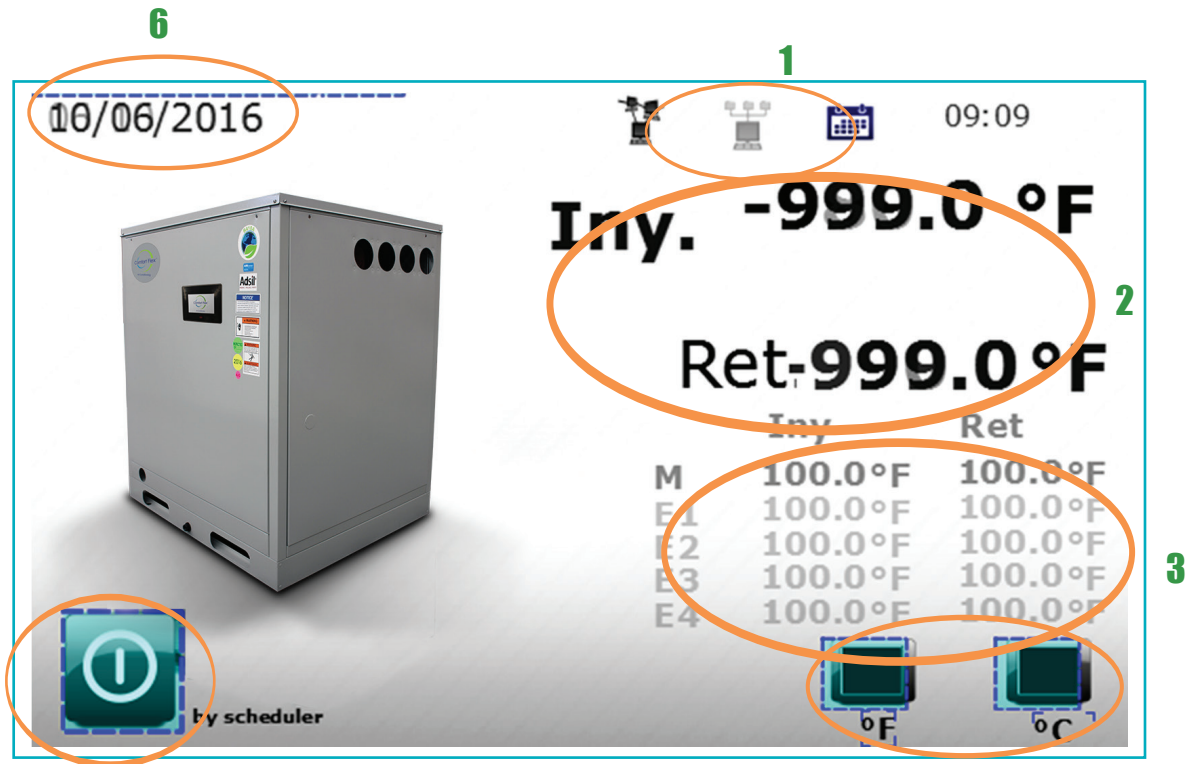
The navigation menu changes its access icons depending on the context where user is located inside the system. Potential navigation buttons are shown below.

<b>Alarms</b>		Always visible, sends the user to the Alarms Page.
<b>Home</b>		Always visible, sends the user to the Home Page.
<b>Return</b>		Sends the user to the last screen accessed.
<b>Main Menu</b>		Sends the user to the Main Menu.
<b>Alarm Log</b>		Sends the user to the Alarm Logs screen.
<b>Inputs / Outputs</b>		Sends the user to the Inputs & Outputs screen.
<b>Graphics</b>		Sends the user to the temperature graphs screen.
<b>Graphics Config</b>		Allows the user to configure the graphics display.
<b>Summary</b>		Sends the user to the summary screen.

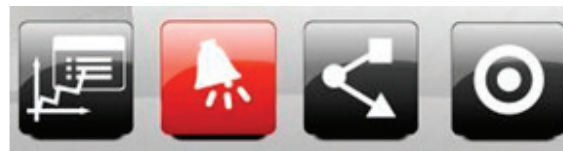
# MAIN SCREEN

The configured devices will show this screen by default as the initial screen of the system. It shows the following information:

1. **System Work mode icon**, either in "Tandem Mode" or standalone mode.
2. **Head unit injection and return temperature** if the system is in "Tandem Mode" or injection and return temperature of the master unit if the system is in standalone mode.
3. **Injection and return temperatures of the individual units**. This section only appears if at least one "Son" unit is enabled. In the case of standalone machines this section is not shown.
4. **Control State**, It can be on, off by digital input or off by the terminal (pGDTouch).
5. **Temperature metric selection** (fahrenheit or celcius)
6. **Date**



In the navigation menu of the initial screen, the icons displayed in order from left to right lead to the following sections:



- Temperature Graphics
- Alarms
- System Overview
- Navigation Menu

# ALARMS PAGE

The Alarm section can be accessed from any system screen, its access button being present in the navigation bar of any screen. Depending on whether or not there is an alarm present, the navigation button is displayed as:



**NO ALARMS**



**AT LEAST ONE ALARM PRESENT**

## • Active Alarms

By pressing the "No Alarms" button, the user will be shown a screen like the one shown below:

No alarms

By pressing the "Alarm Present" button, the alarm screen shown below is displayed. In this screen all alarms that are active at that time are shown. Any alarm can be reset with the "Reset" button. It is worth mentioning that if the alarm condition is not corrected, the alarm will be triggered again.

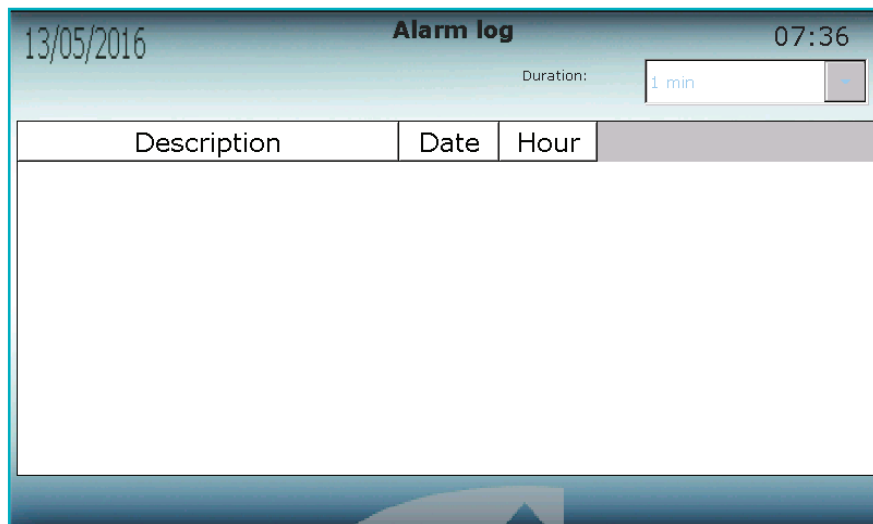
Active Alarms			13:08
12/05/2016			
Description	Date	Hour	
E1 offline	5/12/2016	10:30:21 AM	
E2 offline	5/12/2016	10:30:21 AM	
E3 offline	5/12/2016	10:30:21 AM	
E4 offline	5/12/2016	10:30:21 AM	
Aux. IO Module 1 offline	5/12/2016	10:30:21 AM	
Flow sensor of unit E2 broken	5/12/2016	10:30:21 AM	
Flow sensor of unit E3 broken	5/12/2016	10:30:21 AM	
Flow sensor of unit E4 broken	5/12/2016	10:30:21 AM	

## ALARM LOG

Within the navigation bar of these two screens the button "Alarms Log" will be displayed.



**BY PRESSING THIS BUTTON, THE USER IS TAKEN TO THE SECTION "ALARM LOG".**



In this screen you can see the alarms that have been activated in a given period of time. These records are stored in the internal memory of the terminal so it does not matter if the alarm condition is no longer present, it will be saved in memory for review at a later time.

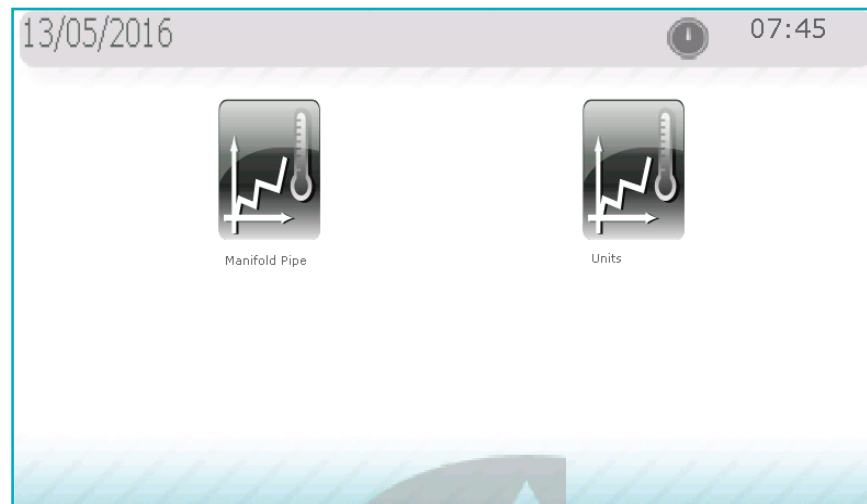
## GRAPHS

The pGD Touch terminal stores in its internal memory the temperature data readings of the injection and return sensor in the head unit, and injection and return temperatures for all units enabled. Pressing the Graphics button in the navigation bar of the home screen will take the user to a menu where graphic type can be selected.

In the section "head unit" (and only if the sensors are enabled in the head unit) readings for the injection and return of the mother head unit are displayed. In the section "units" sensor readings for injection and return for all units are shown.

The graphics properties that can be edited are: Duration (time scale) and minimum and maximum limits (temperature scale). These properties are edited in the navigation menu screens where graphics are displayed by pressing the "graphics settings" button.

The pGD Touch terminal stores a reading for each of the temperatures mentioned (head injection and return, and injection temperature for every unit enabled) every 180 seconds (every 3 min) and may save up to 100,000 data samples before rewriting the oldest data. With these parameters, the pGD Touch can store data up to seven months old (208 days old).

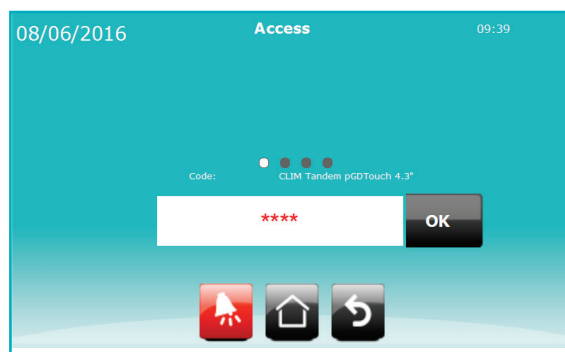


# MENU
















On the home screen is the access button to the navigation menu. This menu contains the navigation pages that contain all system parameters. It is divided into four sections: open access, access Level 1, Level 2 and Level 3.



To access the menu sections level 1, 2 and 3, the user has to go to the "access" section and type the password for the corresponding level. The password for level 3 unlocks all levels; Level 2 unlocks level 1 and level 2; level 1 unlocks only level 1. User access is restored when the screen goes to sleep (after 2 minutes of inactivity).

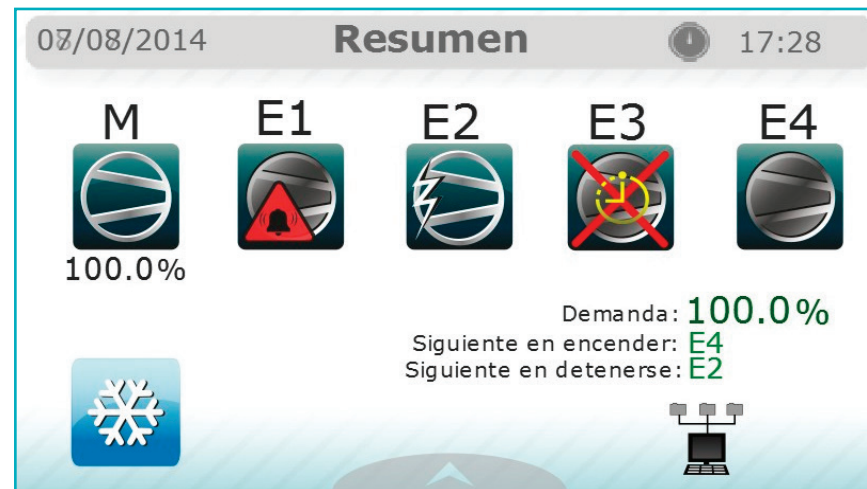


The following table shows the menu navigation options with the access level required.

<b>(open access)</b>	Date and Time adjustments	
	Regulation Parameters	
	System Overview and equipment	
	Work Mode	
	Work Hours Counter	
	Access	
<b>1 (password 1)</b>	Hours Counter Reset	
	Maintenance	
<b>2 (password 2)</b>	Adjustments	
	Calibration	
	Data Export	
	Data Delete	
<b>3 (password 3)</b>	General Configuration	
	Device Configuration	
	Reset	

# SUMMARY

In the summary page you can view the status and operation of the whole system. The first screen shows all configured units; the state of the temperature control (tandem or independent), the operation mode (cooling or heating), and the state of the compressors. If the control is in "Tandem Mode" it will also indicate the overall system demand and the next unit to start and stop according to the established rotation order and the priority of the units.



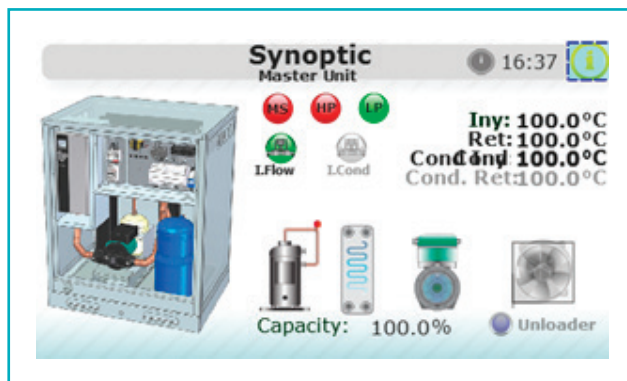
The meanings of the status symbols of the compressors are:

	The compressor is off but ready to start if required by demand.
	The compressor has just been turned off and is protected by the minimum downtime. It cannot be turned on again until the end this lapse.
	The compressor has been shut off by an alarm condition (high or low pressure) and will not be started until this situation is resolved.
	The compressor was forced to stop by an alarm (freezing, ice water, MotorSaver, etc.) and is unable to start again until the situation is resolved.
	The compressor is in reset time after an alarm reestablishes (freezing, ice water or low pressure).
	The compressor is starting. This symbol indicates that the fan has just started (if air-water) and is awaiting the compressor.
	The compressor has just started and cannot be stopped for demand control, only an alarm condition can stop the compressor during the startup period.
	The compressor is turned on and ready to be stopped if demand required it.

If a unit icon is pressed, the user will be sent to the summary page containing more detailed information of that unit.

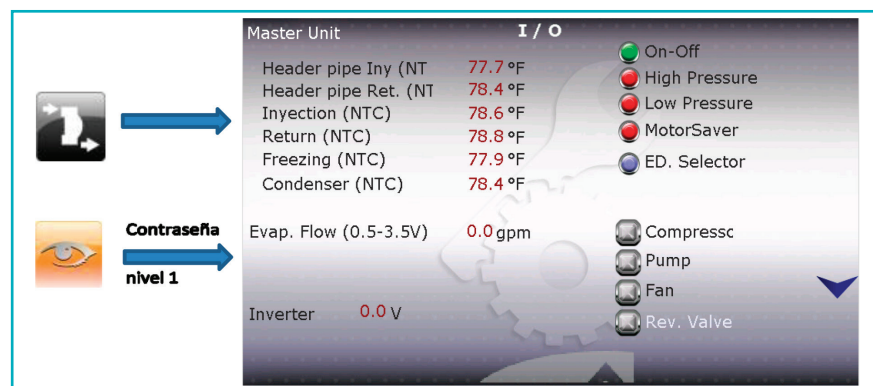
In this page you can view the system inputs (temperature sensors, digital inputs for suction and discharge pressure of MotorSaver) and outputs of the unit (compressor, pump and fan).

In this case we can find two kind of display's one with palette water flow sensor and another with ultrasonic water flow sensor, that depends of the kind of unit you have.

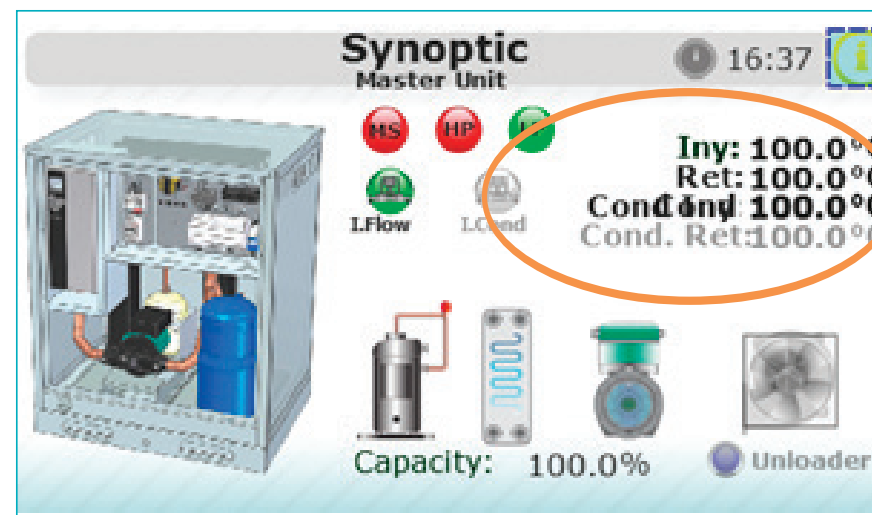
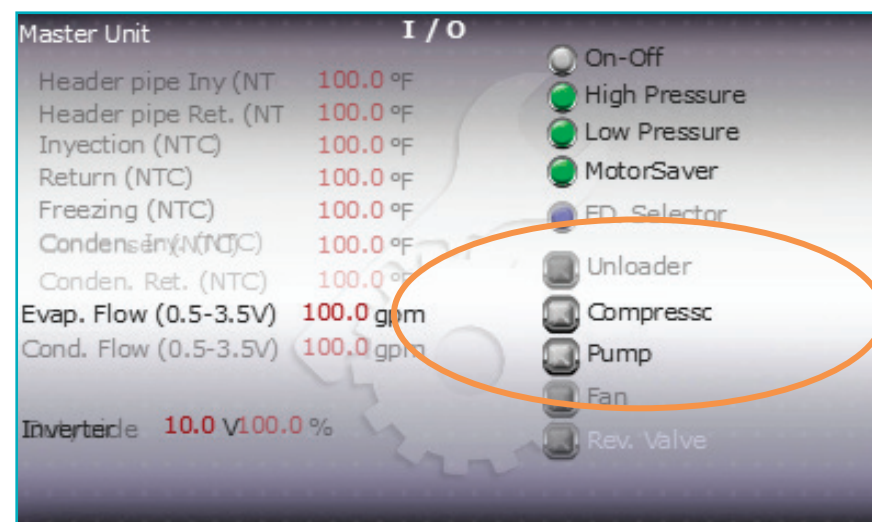


In the navigation bar of these pages is the icon of "Input / Output". This will display a screen with the explicit information of all inputs and outputs of the configured devices in the initial setup.

This screen is also accessible via the navigation button with Level 1 "Maintenance".



For a water heat pump chiller you will see the outlet condenser temperature and the condenser flow.



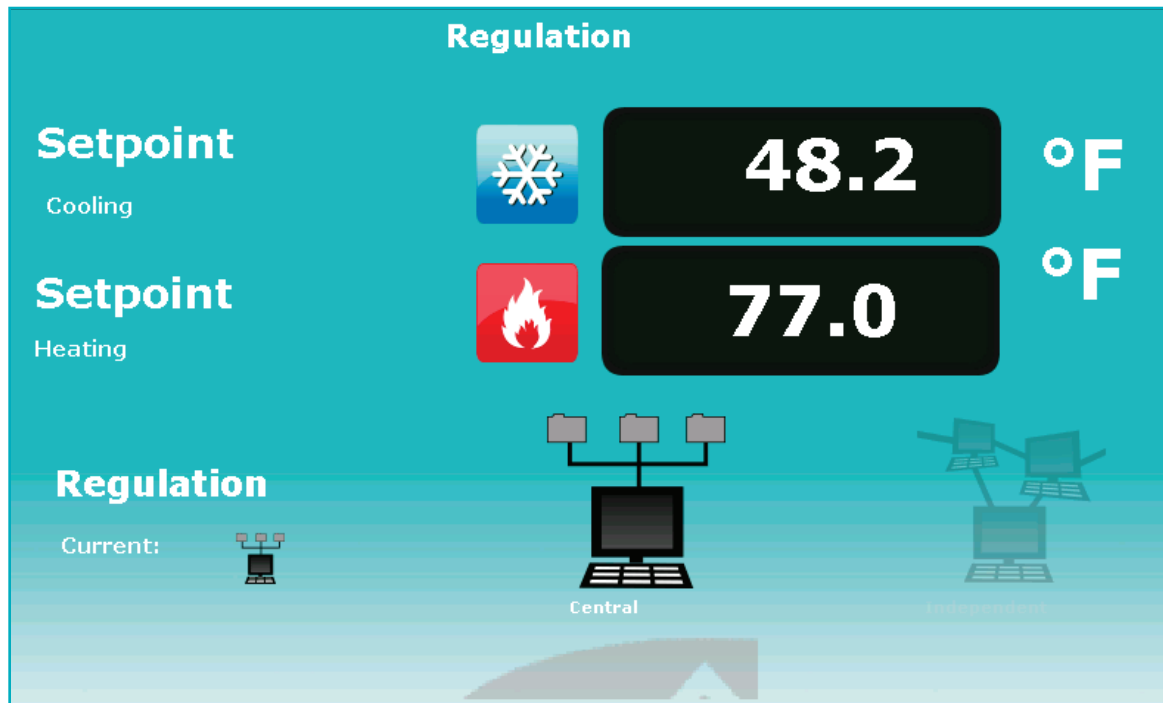
# REGULATION

In the regulation section, the user can modify the set point for cooling and heating (for units configured as a heat pump) and choose the operation mode of the units.

- **Central control (tandem):** means that the control temperature sensor is the injection sensor in the head unit. This reading will be displayed in the initial screen and the calculation of global demand will decide on the operation of all units. Unit rotation logic is also enabled.

- **Independent control:** ignores the injection and return temperature sensors in the head unit. In the screen the temperature readings for injection and return of the Master unit will be displayed. Every unit will generate its own demand load based on its injection temperature. Unit rotation logic is disabled.

**Note:** If the system is configured as central control, but the sensors in the head are broken or disconnected, the system automatically switches to standalone mode.

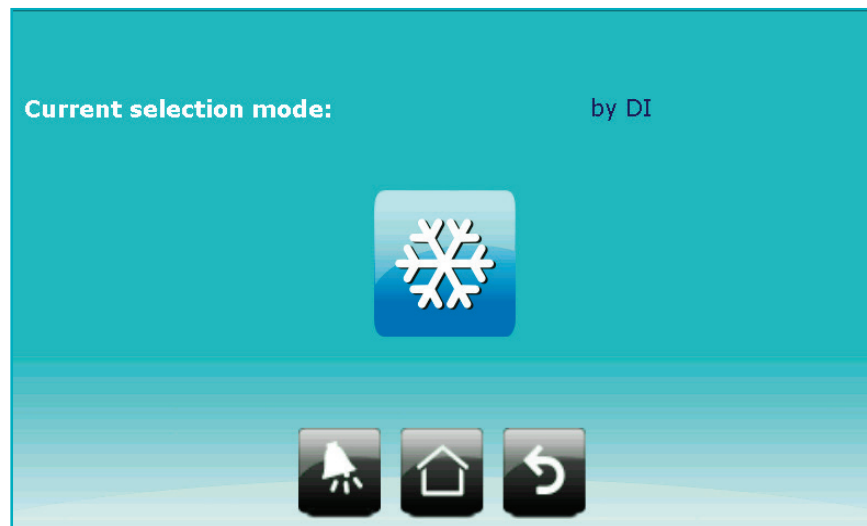


# WORK MODE SELECTION

*This section is only enabled for systems that are configured as "heat pump".*

The work mode selection screen is divided in two sections:

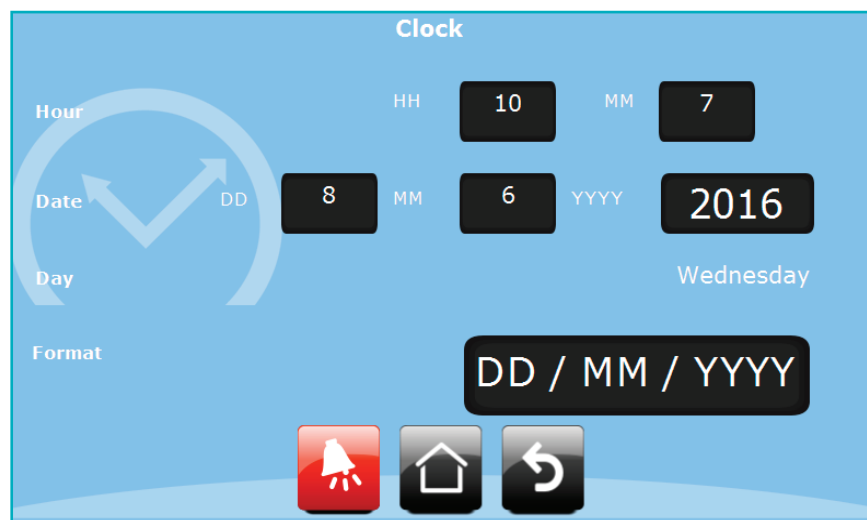
- Selection work mode from the terminal or Digital input
- Current work mode indicator.



The selection of the operating mode can be configured in two ways: by digital input or by selecting it in the terminal (configuration section). If the working mode selection is done via digital input any other selection at the terminal will be ignored. If the work mode selection is set by the user at the terminal, only via this screen can the work mode be edited or changed, ignoring the state of the digital input.

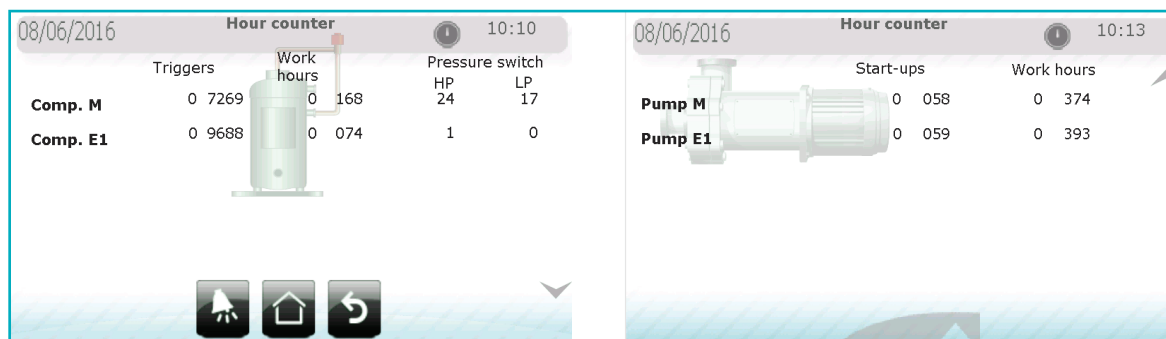
## Clock Adjustment

In the clock settings page the user can set and change the date, time and how to display the date: there are two options, standard format (day-month-year) or US format (Month-Day-Year).



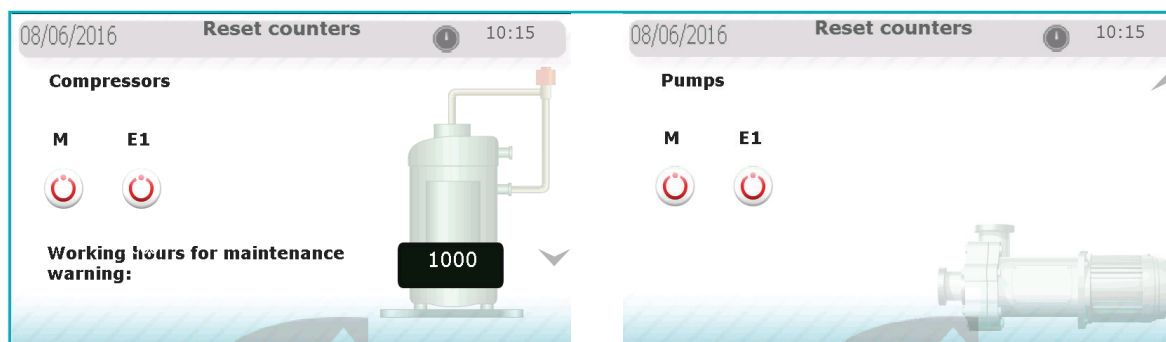
## WORK HOURS COUNTER

The work hours counter page will display the number of work hours, number of starts of the compressors and pumps of the configured devices in the system. In addition, you can also see the number of times the high and low alarms have been tripped for a specific unit.



## WORK HOURS RESET

In this section, accessible with level 1 password, the user is given the option to reset the counters through buttons for each section. The reset counters button resets the compressor number of starts, the number of working hours and the number of activations of the digital inputs of discharge and suction pressure. The pump reset button resets the number of pump starts and the number of pump working hours.



## SETTINGS

In the Settings section, password-protected access level 2, the parameters for the control and management of demand for cooling (and heating for the systems configured as heat pump) are shown.

The parameters for the central control ("Tandem Mode") are completely independent of the type of regulation in standalone mode, with the exception of the cooling set point, the heating set point and the choice to erase the accumulated integral error when the set point is reached.


### CENTRAL CONTROL OR TANDEM

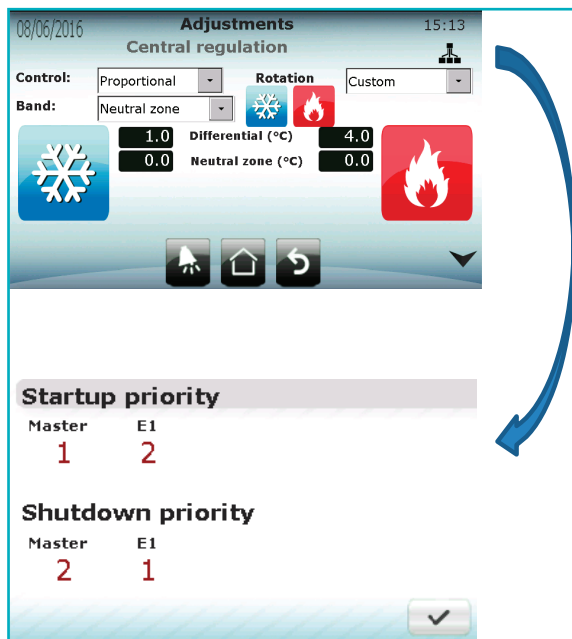
The control parameters in the central regulation mode or tandem using temperature control as the temperature of a head unit are:

- **Central control parameters or "Tandem Mode":**

- Type of regulation (P, PI or PID)
- Remove the integral error when reaching the set point to avoid fluctuations inherent to the integral control
- Rotation Type
- Differential (Chiller and heat pump)
- Neutral zones (chiller and heat pump)
- Integral time
- Derivative time

**Note:** To set PD control, select PID and set the integral time to 0.

- If the type of rotation is selected as Custom, a window will be enabled to prioritize the start and stop of the units enabled with the button marked 
- The order of priority is ascending, with 1 being the highest and 5 the lowest priority.
- The available unit (without alarms) with higher priority is first turned on or stopped.



**Note:** Even if you select the rotation type as custom, the unit with frequency variator or unloader (master unit) will always be the first to be turned on and the last to be turned off, regardless of their assigned priority.

# INDEPENDENT CONTROL

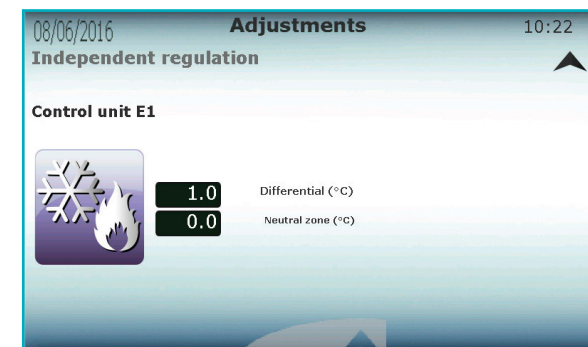
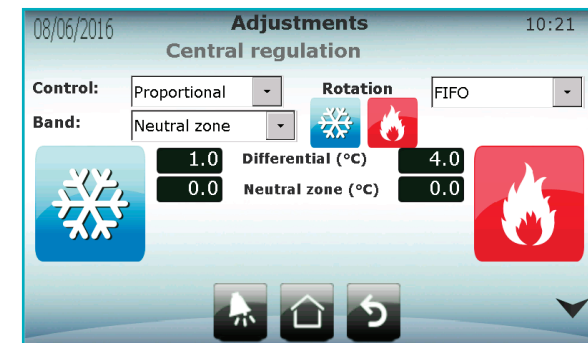
Independent control computes all the parameters that regulate the demand control in each unit independently using the injection temperature as the main parameter.

As the master unit can regulate its capacity, it has a single proportional control algorithm, P + I, or PID with independent parameters to the central control. If you want to set the PD control, the user must select PID and set the integral time to 0 sec.

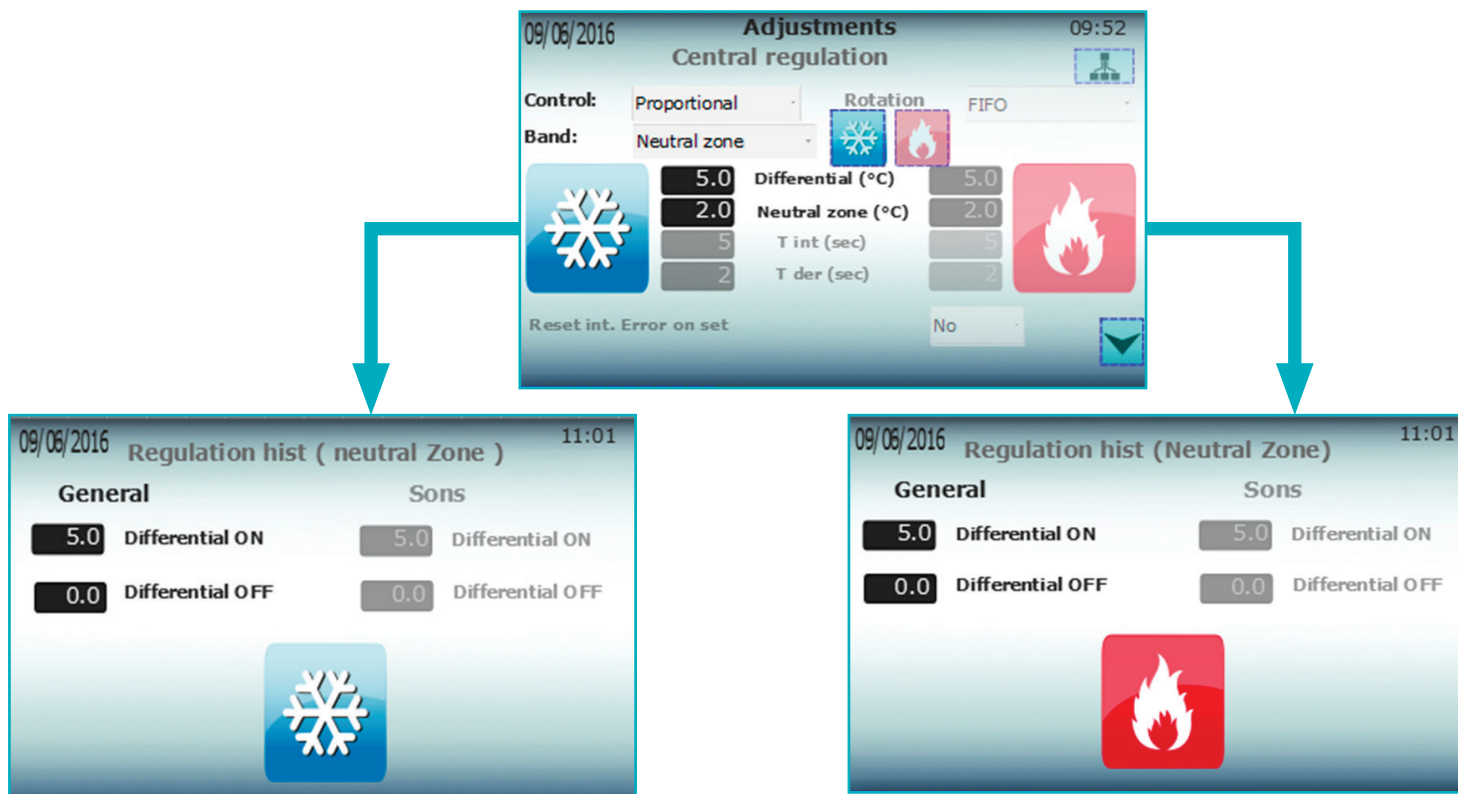
- Parameters mode or central Independent regulation for Master unit:
- Type of regulation (P, PI or PID)
- Remove the integral error when the set point is reached to avoid fluctuations inherent to the integral control.
- Differential (Chiller and heat pump)
- Neutral zones (Chiller and heat pump)
- Integral time
- Derivative time

**Individual Control in “Son” units only requires the following parameters:**

- Differential (same process for cooling and heating)
- Neutral zone (same process for cooling and heating)



# HYSTERESIS CONTROL



The unit have the option to configurate the ON and OFF respectly from the Set point, for cool as well as heat mode, in General the diferrential ON will be the value to ON and the differential OFF the value to OFF, always respectly the set point of the unit

Example

Differential ON = 5

Differential OFF = 0

Set point = 50

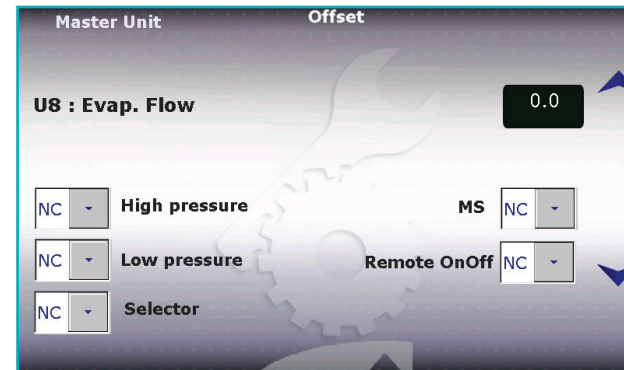
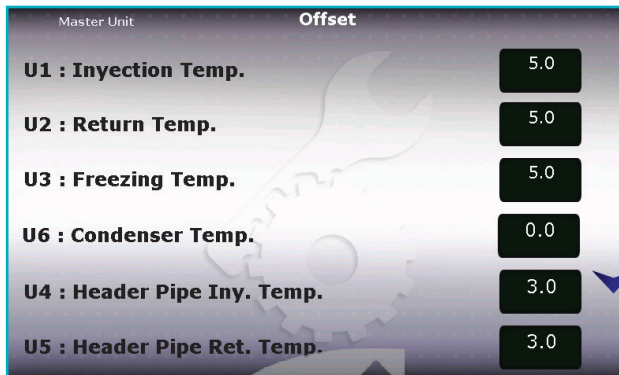
The unit will start in set point + 5 (55) and will turn off in set point -0 (55)

Also in Sons area you can configurate the ON, OFF of the "Sons", this configuration is a proteccion to avoid a frezzin or cold water alarm in TANDEM (central) mode, the function y same as the general is respectly the set point,

**Note:** The diferential ON in general an Sons part should be always >0 ,If not the unit never turn ON

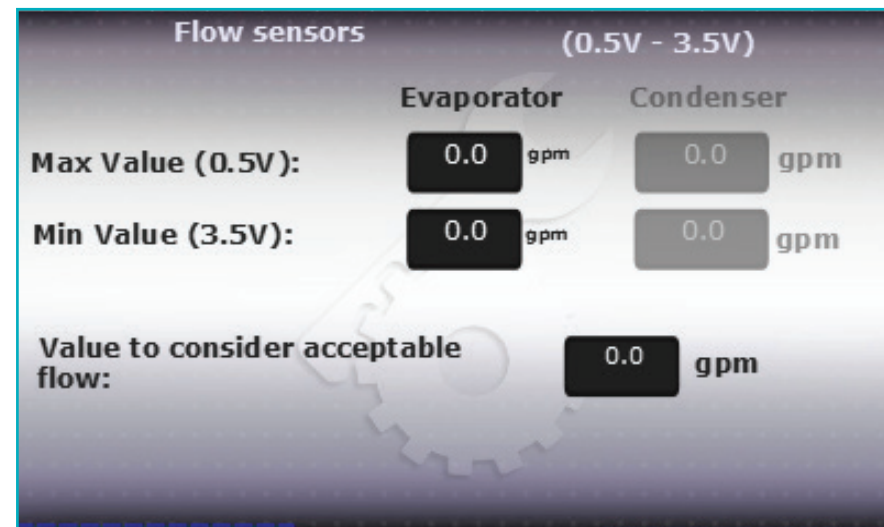
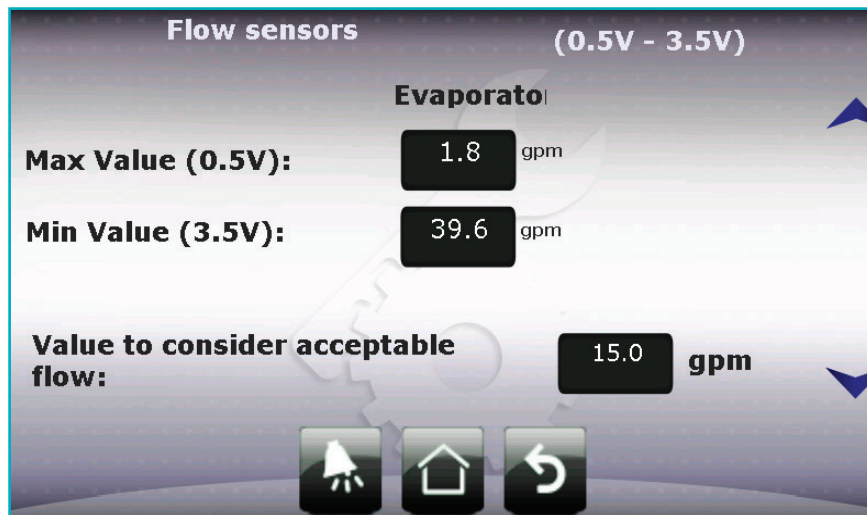
# CALIBRATION

In the calibration section, protected by password level 2, the user can adjust the sensor readings connected to units so that they match the readings in a measurement pattern. In addition, you can set the operating logic of the digital inputs; they can be "normally open" (NO) or "normally closed" (NC).



Also you can calibrate the minimum flow to be permitted to start the system, the chiller system require 2.4 Gal/min per Ton. So if you have a 10 Ton chiller you will need 24 gal/min, in some cases if the hydronic installation can't provide these flow you can rise to 80 % of you permitted flow to reduce the flow alarms, be careful to decrease down to 80 %, could have several problems in your system

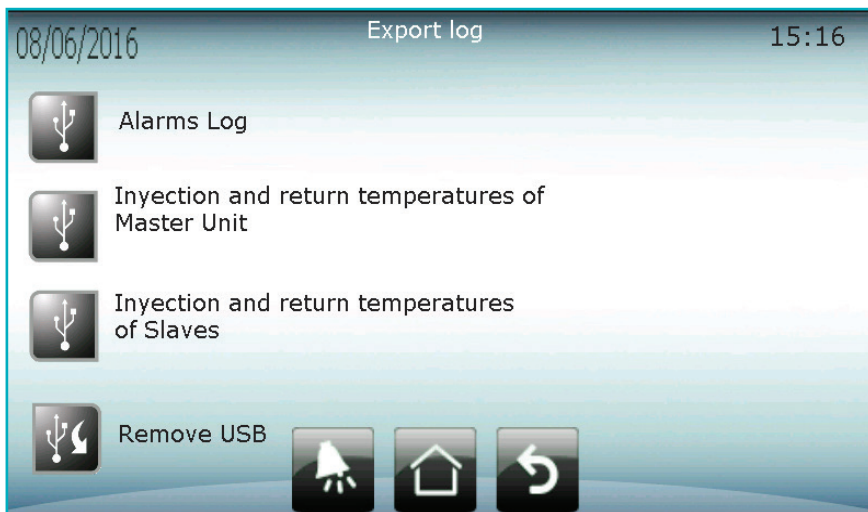
For water heat pump you will see the condenser sensor, don't change the Max and Min. Value shoul be configured in the facility



This kind of sensor can't messure up to 39.6 gal/min so if you have more of this value the value in the display tag going to show 295.6 prox. Check your hydronic system to regulate the flow.

The value consider acceptable will be the same for evaporator and condenser sensor.

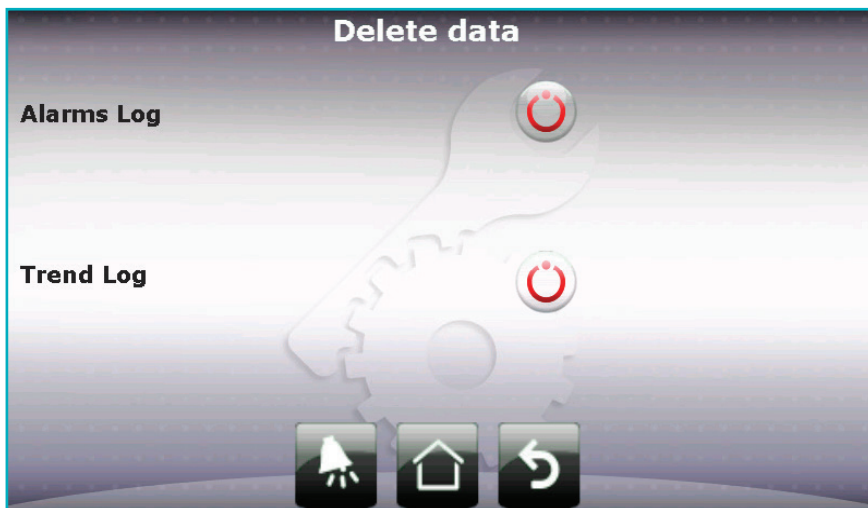
## EXPORT RECORDS



• The user may export to a USB drive all the data stored in the unit to a comma-separated value format (CSV) file. The user may export 3 different files with different information:

- The alarm log
- The injection temperature of the master unit and if available head unit temperatures
- Injection temperature for "Son" units (if present in the system)

## DELETE RECORDS



In the last section of the level 2 navigation menu, the user may delete historical graphics and alarm records from the internal memory of the pGDTouch terminal.

**Note:** If the records are deleted they cannot be recovered later.

# CONFIGURATION

The global configuration of the system is protected by password access level 3.

In the configuration section are the global parameters of the system. These are separated into three categories:

## Global Parameters

- Reset Delay: if the controller is turned off, when resetting the controller will wait this time before beginning regulatory processes.
- Enable unit on by digital input
- Selecting the operating mode
- Set point Safety Limits

The screenshot shows the 'Configuration' screen with the following settings:

- Startup delay:** 10 s
- Enable on-off by DI:** Yes
- Mode selection between Cooling/Heating:** by DI
- Setpoint limits:**
  - Max: 30.0 °C
  - Min: 5.0 °C

At the bottom, there are navigation icons for alarm, home, back, and a BMS/VNC status indicator.

## Network Communication

The controller port BMS2 may be used for monitoring the entire system remotely with an external supervisor via Modbus RTU protocol.

On this screen the user sets the parameters of the communication protocol to link to the external device. These parameters are:

- Address
- Speed (baud per second)
- Stop bits
- Parity

The screenshot shows the 'BMS2 configuration' screen with the following settings:

- Protocol:** Modbus RTU slave
- Address:** 1
- Baudrate:** 38400 bps
- Stop bits:** Two
- Parity:** No parity

A checkmark icon at the bottom right indicates the configuration is saved.

## Defrost Configuration

Only for Air-Water Systems with Heat Pump Function

1. Enable defrost routine
2. Enable deice when starting the controller
3. Defrost type (stop compressor or cycle reversal)
4. Defrost activation (By temperature or by time)
  - By Temperature (Start temperature)
  - By Time (Elapsed time)
5. Dripping Time (stop the condensing unit to allow water drainage)
6. Duration of the defrost
7. Activate fan while dripping
8. Defrost halting

The screenshot shows the 'Defrost config' screen with the following settings and annotations:

1. Enable defrost routine: Yes
2. Enable defrost at startup: No
3. Type of defrost: stopping compressor
4. Activation: by temperature
5. Dripping: 0 s
6. Length: 0 s

At the bottom, there are icons for fan activation (7) and defrost halting (8).

09/06/2016 Conf. Units 08:47

**Enable operation of devices:**

Master E1

Yes Yes

Master's minimum capacity 30.0 %

Units of different size Yes

Device power Safety timers

**Size of devices**

Master Unit 10.0 TR

Unit E1 10.0 TR

**Unit Capacity:**  
If the system is set up with units of different capacities, a button will be enabled that will open this window, here the user may set the enabled units individual capacity.

**Simultaneous load & unload safety timers**

Load	15 s
Unload	15 s
Comp. Minimum on time	10 s
Comp. Minimum off time	15 s
Pumps min. On time	10 s
Comp. Startup delay time	60 s
Fan shutdown delay time	10 s

**Unit protection time lapse:**

- Charging time (time between starts of multiple units)
- Discharge time (time between the stop of several units)
- Minimum time for compressors cycles
- Minimum time for pump stop
- Start Delay and fan stop (Only for air-water equipment).

## DEVICES

This section contains device configuration parameters for each of the enabled units. On the first page of the section, the user can enable or disable units to prevent their operation (in case of maintenance for example). **Disabled units are ignored in the rotation algorithm and may not start by demand.**

The minimum demand to start the master unit is also set here. If the unit is modulated by a downloader the period is also set here.

You can also determine if the units are of different capacities (only if at least one "Son" is present).

On the second page of the Devices section, the user sets the parameters for the alarm routines. The screen contains four groups (or five if the units are air-water); the following are the alarm routines:

- Water Flow Alarm
- Ice Water / Freezing Alarm
- Low Vacuum Pressure and High Discharge Alarm
- Refrigerant Alarm
- Condensing Unit High Temperature Alarm (only for air-water equipment)

## FLOW ALARM

Detection routines for water flow are explained in the section "Starting Pumps." The parameters that the user must assign are:

- Waiting time for detection of the digital input once the pump has been turned on
- Number of attempts to start the pump in case of digital inflow detection failure
- Timeout between attempts to start the pump

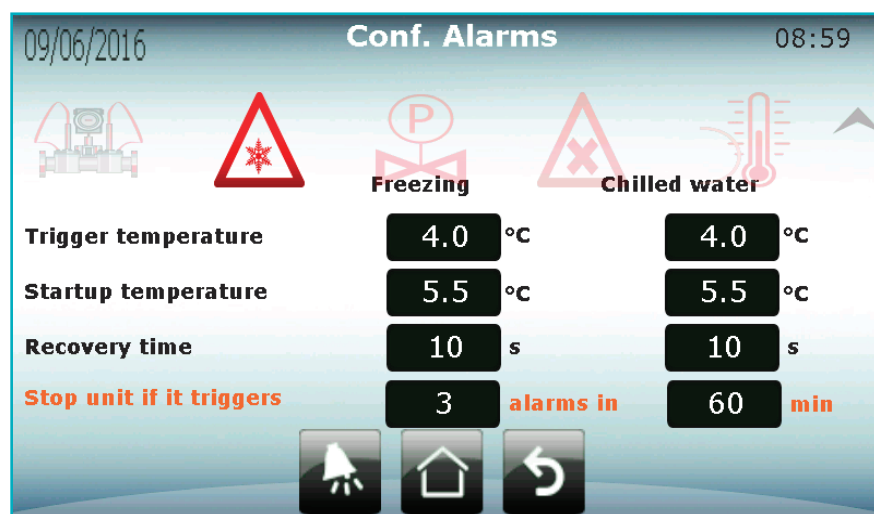


## FREEZING & COLD WATER ALARM

The freezing and ice water logic are the same, except that a one considers the freezing sensor, and the other the injection sensor as the main source of data

For each of the alarms a trigger value, restoration time and recovery time (in which the active alarm unit will not restart) should be established.

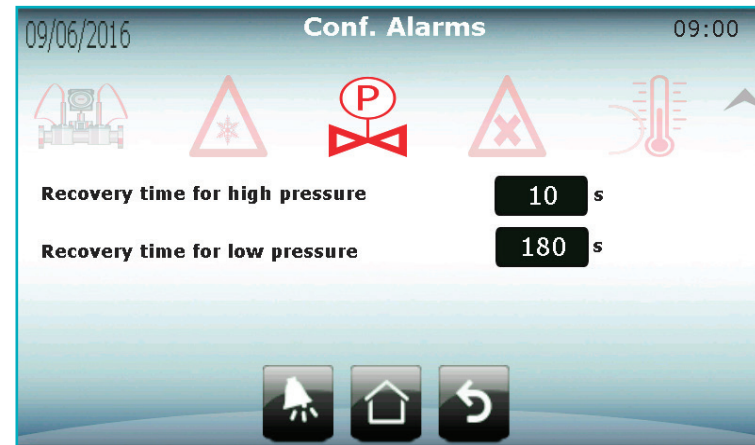
Each unit has an internal counter that keeps track of how many times the unit has had a freezing or cold water alarm. If the unit exceeds a certain number of alarms in a given time, the continuous freezing alarm will be triggered, which will disable the unit until the user reestablishes the unit.



## HIGH & LOW PRESSURE ALARMS

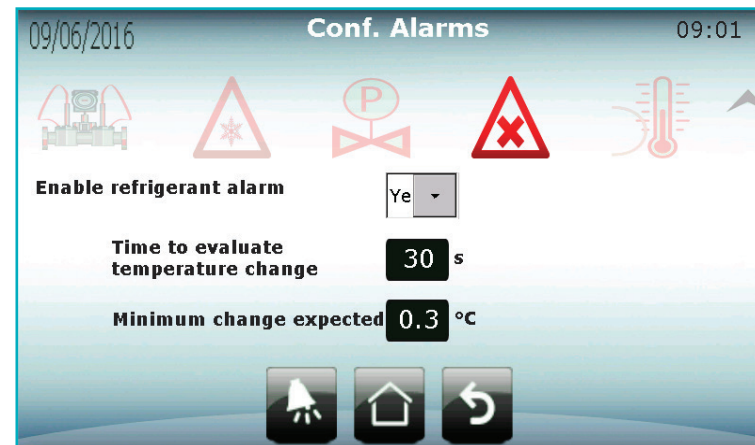
The High and low pressure alarms are activated immediately after a change has been detected in the digital input. Both alarms stop the compressor operation immediately.

The high pressure alarm does not reset automatically, the user must restart it manually. The low pressure alarm is automatically restored when a change is detected in the corresponding digital input. During alarm reestablishment the compressor is disabled during the recovery time that the user sets in this section.



## REFRIGERANT ALARM

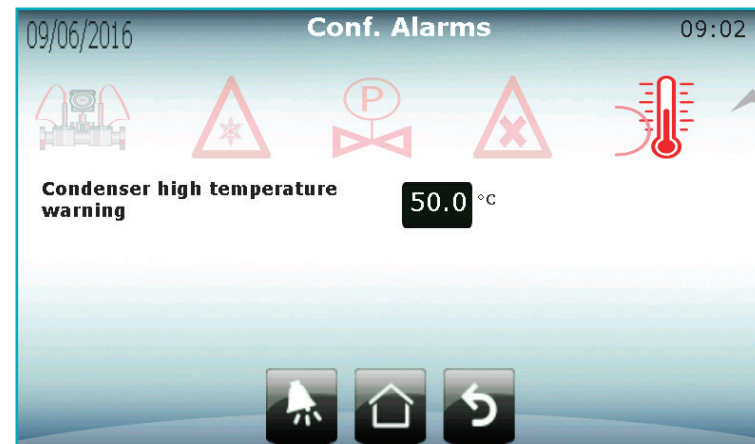
The Refrigerant Alarm is a user-enabled warning that evaluates the change in the injection temperature sensor when the compressor starts working. If it detects a change in the given time the alarm is triggered. This alarm will not stop any routine control. In this section the user can enable or disable the alarm, and if applicable, set the minimum detection rate and the maximum time in which this change should happen to not trigger the alarm.



## CONDENSING UNIT HIGH TEMPERATURE ALARM

*This routine is only enabled if the System is air cooled*

This alarm is triggered when the condenser temperature sensor exceeds the value set in this section. This alarm is a warning, it does not affect any routine control or stop the compressor from operating.



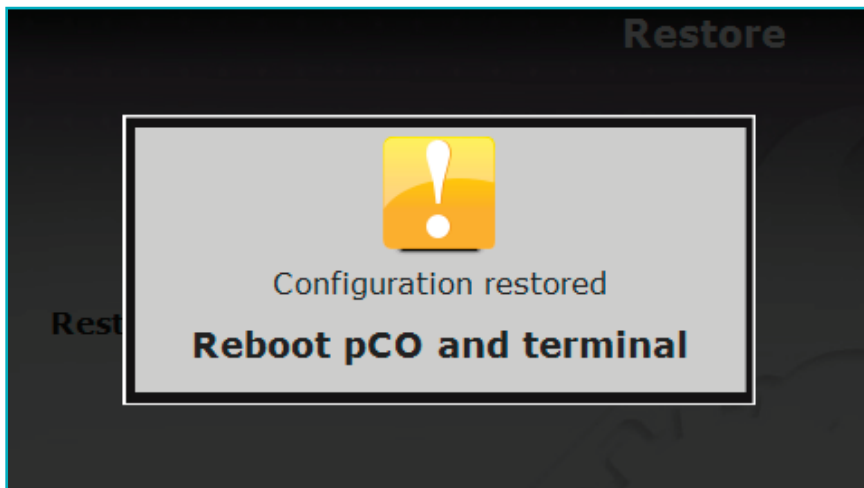
# RESTORE

In the last section of the password access level 3 is the option to restore the unit to factory settings.

Restoring the system allows the user to reconfigure the system as a brand new installation and re-establish the initial settings. The restoration resets the parameters of initial system configuration, but does not modify any other values stored in the controller memory (set points, differentials, alarms, etc.).

**It is the responsibility of the user to properly configure the system with the new configuration for the correct operation of the units.**

**Note:** When the system is restored, the user must restart both the controller (pCO) and the terminal (pGDTouch).



## APPENDIX

### • Expansion Modules Serial Address

Each slave unit uses an expansion module that communicates via Modbus with the Master (PCO) controller via the port controller Fieldbus1. Consequently, the units need to be configured with the correct serial address. To avoid errors the serial address is set and fixed when the controller is programmed and cannot be changed. The only thing that the users have to do is set the physical direction of the expansion modules by combining four "dip switches" in each expansion module.

The address in the "Switches" is set with the four-bit binary number that they represent. The switch down position is "1", and the up position is "0".

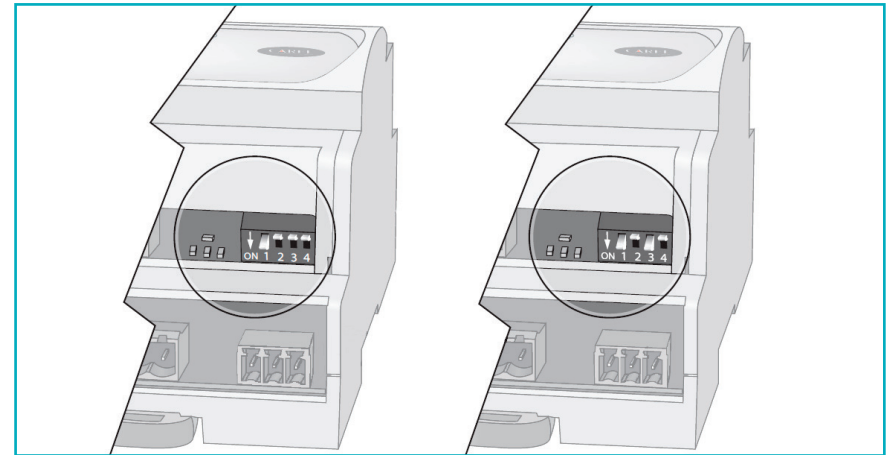
The addresses to be assigned are:

Expansion Module pCOE	Serial Address	Switches in pCOe
Son Unit 1	1	
Son Unit 2	2	
Son Unit 3	3	
Son Unit 4	4	

Expansion Module pCOE	Serial Address	Switches in pCOe
Son Auxiliary Unit 1	9	
Son Auxiliary Unit 2	10	
Son Auxiliary Unit 3	11	
Son Auxiliary Unit 4	12	

No other serial address will be recognized, the expansion module disconnect alarm is triggered if a wrong address is used.

### EXAMPLE:



Direction 1

Direction 5

**Note:** It is important that the addresses are not repeated, or the entire network of instruments on that port may collapse.

# INTERNET CONNECTIVITY

## • PREVIOUS REQUIREMENTS

Before continuing it is very important to meet the following requirements on site:



### 1. Installation

The equipment to be controlled must be properly installed according to the installation manual. The unit must operate normally and should not be in alarm condition.



### 2. Connectivity

The unit to be controlled must be connected to your local internet infrastructure. The touch screen connects to a port on your local router / switch the same way as any other device or computer on your local area network (LAN). Logic controllers have two LAN ports (RJ45) connection and either work properly with a CAT5 ethernet cable.

### 3. Configuration

The units use Dynamic Domain Name Servers (DDNS) to be accessible from outside the local area network (LAN). You need to configure a DDNS service host and then set it up on your ISP LAN router / switch.

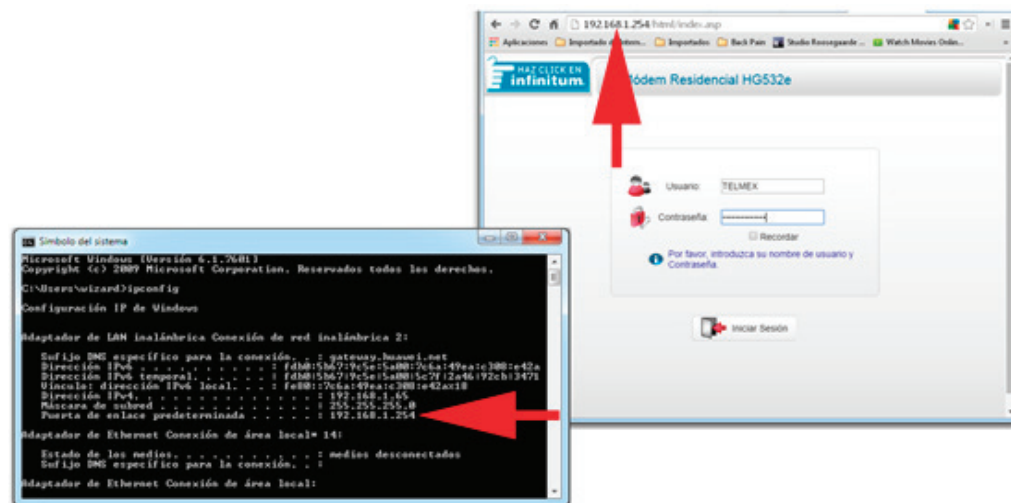


no-ip

#### 3.1. Access to Router

Login from an internet browser (Chrome, Safari, IE, etc) to the control panel of your ISP router, for this simply enter the IP address of the router in your browser. You can find out the IP address of your router by typing IPCONFIG from a command Prompt window of Windows, the IP address for the "Default Gateway" is the IP address of your router.

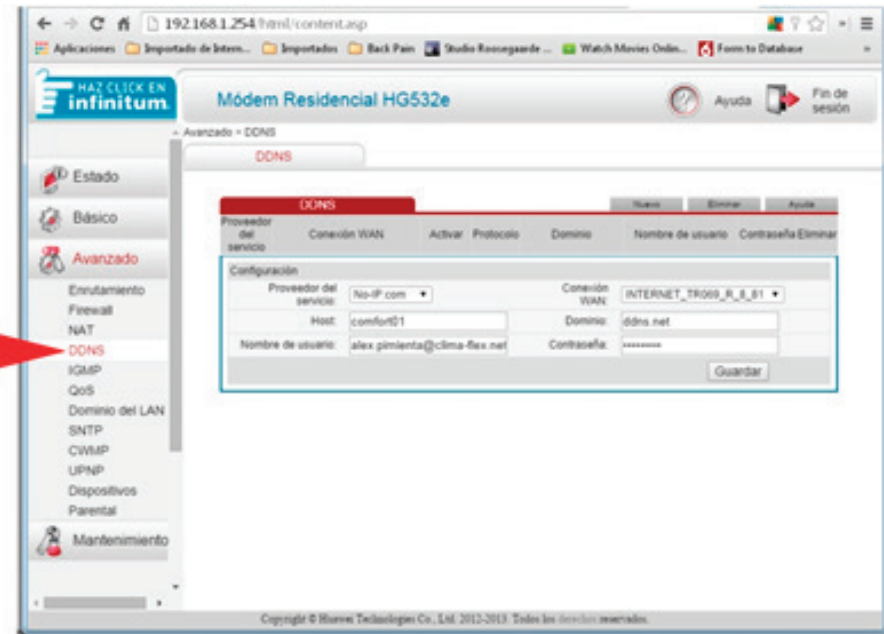
You will need to have the user name and password for the ISP Router, If you do not know your username or password contact your internet service provider.



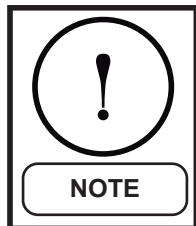
### 3.2. Enable DDNS

Once inside your ISP router you need to configure a DDNS (Dynamic Domain Name Server) host, usually this setting is in the ADVANCED section but you may need to seek this option in the other menus of your router. Use the data of the DDNS host you want to use to configure your connection and save the configuration.

- **DDNS Host configuration example using NOIP.COM as a DDNS provider**
- **DDNS provider:** No-Ip.Com
- **WAN Connection:** Your local internet connection
- **Host:** ACunit
- **Domain:** MyDomain.Com
- **User Name:** example@somedomain.com
- **Contraseña:** 1234567890



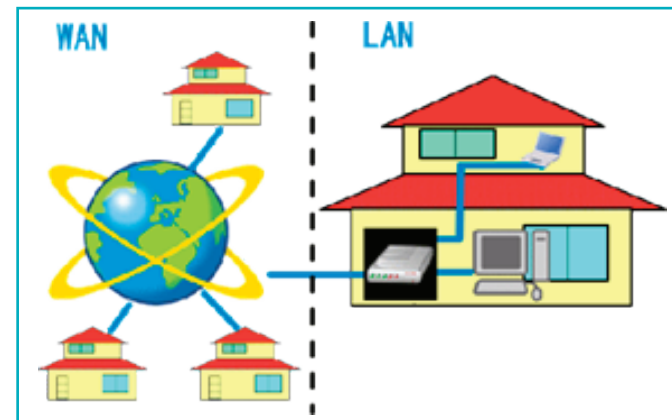
The combination of the DDNS host and domain results in the final "Domain Name" to be used by a unit, this domain name must be unique for each unit to be hooked up to the internet and is the internet address you can use to access your unit from outside (WAN) of your local area network (LAN). Along with the DDNS "host" the unit will have an IP address assigned to be controlled and manipulated from within (LAN) of your local area network.



The "local area network" refers to your local Internet connection, such as the WiFi network you have installed in your home (LAN). When you want to remotely operate your unit from outside (WAN) of your local area network will use the "Domain Name".

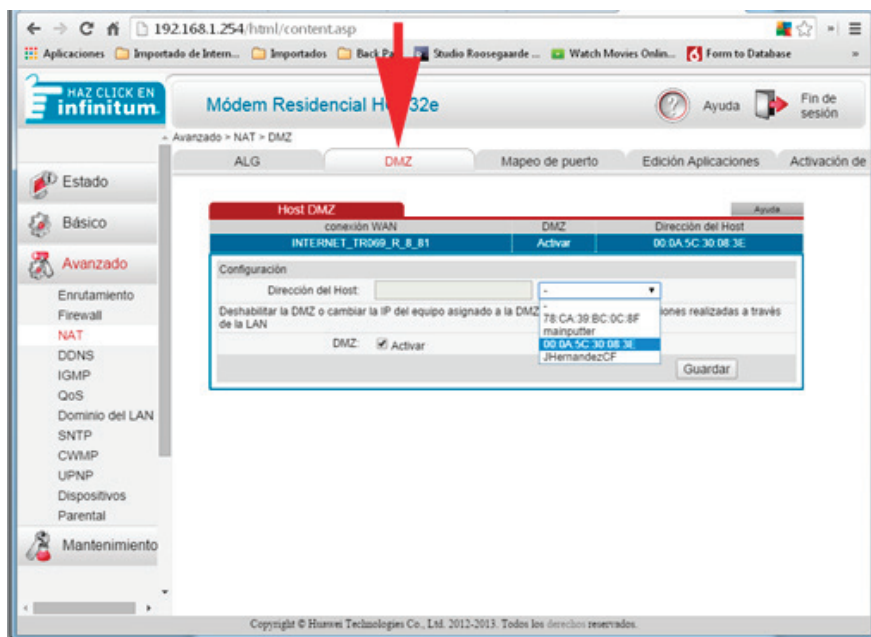
When you want to connect to your unit from inside the (LAN) local area network use its IP address.

**Domain Name:** ACunit.MyDomain.com  
**Internal IP:** 192.168.1.61



### 3.3. Granting Permissions and Access

You need to allow outside access to your unit through your local area network (LAN). The easiest way is to put your unit in the Demilitarized Zone (DMZ) of your router. The DMZ (Demilitarized Zone) allows full interaction of computer signals and commands from the outside, thus avoiding having to edit or change your local safety schemes. Look in your router's DMZ section, correctly select the connected equipment you want to place in the DMZ and save your settings.



### 4. Extension

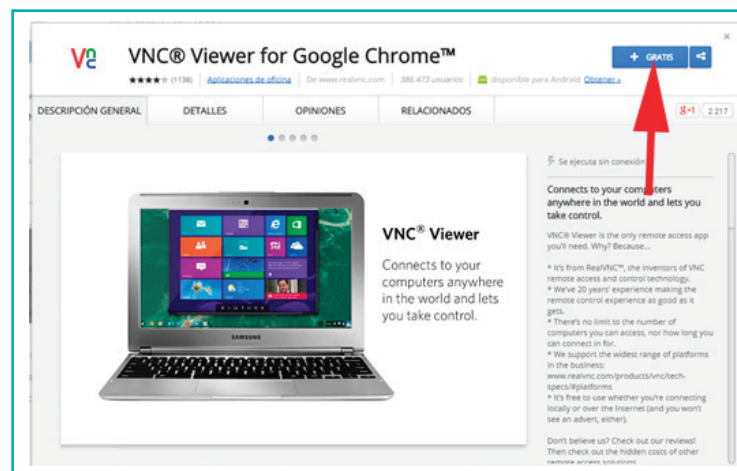
You need to have the Google Chrome browser installed on the device from which you want to control the unit and download and install the VNC Viewer extension for Google Chrome. If you still have not installed Google Chrome you can download and install it for free at [www.google.com](http://www.google.com)

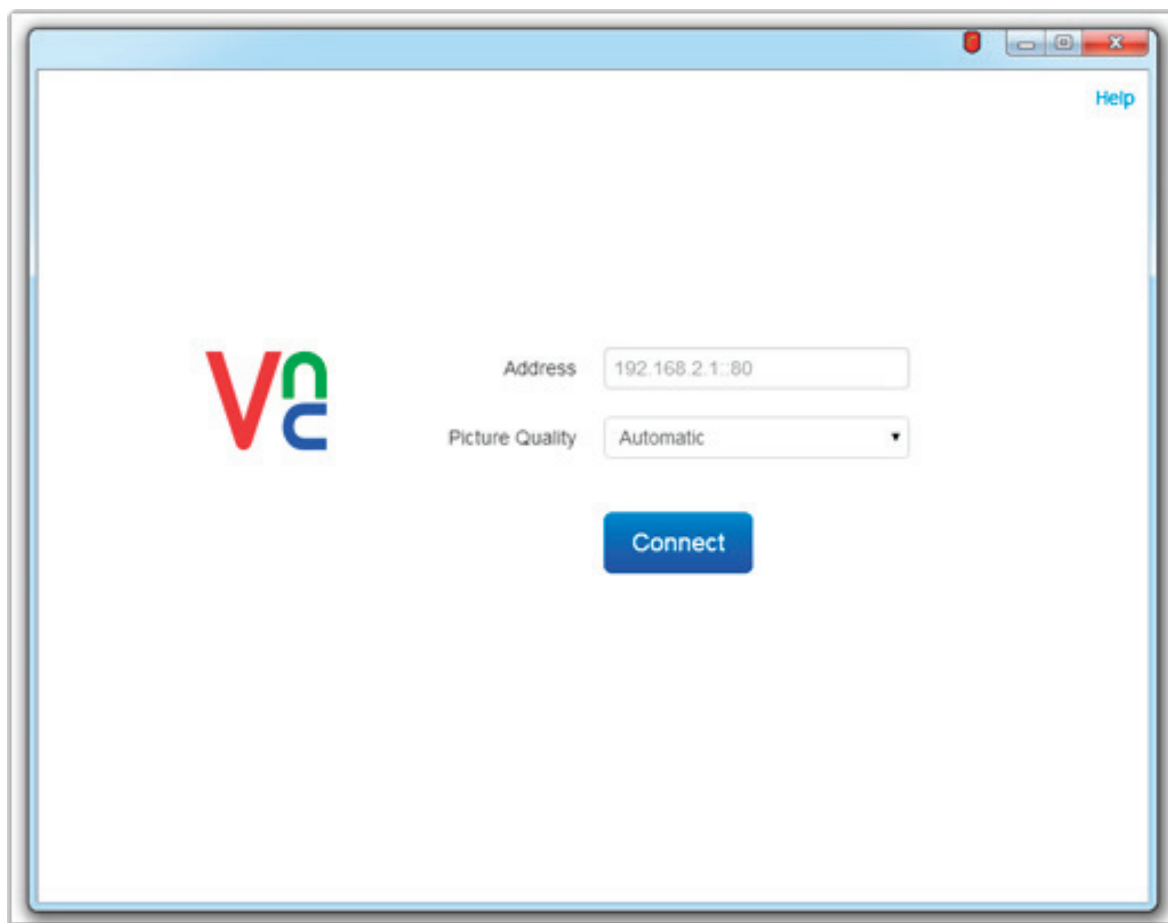


VNC is a technology that allows to access and manipulate remote computing equipment from other devices. The installation of VNC for Google Chrome is fast, simple and free.

Please follow these steps to install the VNC Viewer extension to Google Chrome, these instructions work for Windows, iOS and Android:

- **4.1.** Enter Google Play Store and search for "VNC Viewer for Chrome".
- **4.2.** Once on the VNC Viewer for Google Chrome screen click FREE, the APP will download, please proceed to install it like any other APP on your device.





- **4.3.** Once VNC Viewer for Chrome is installed on your device please start the APP. You will be presented with the following screen asking for two parameters.

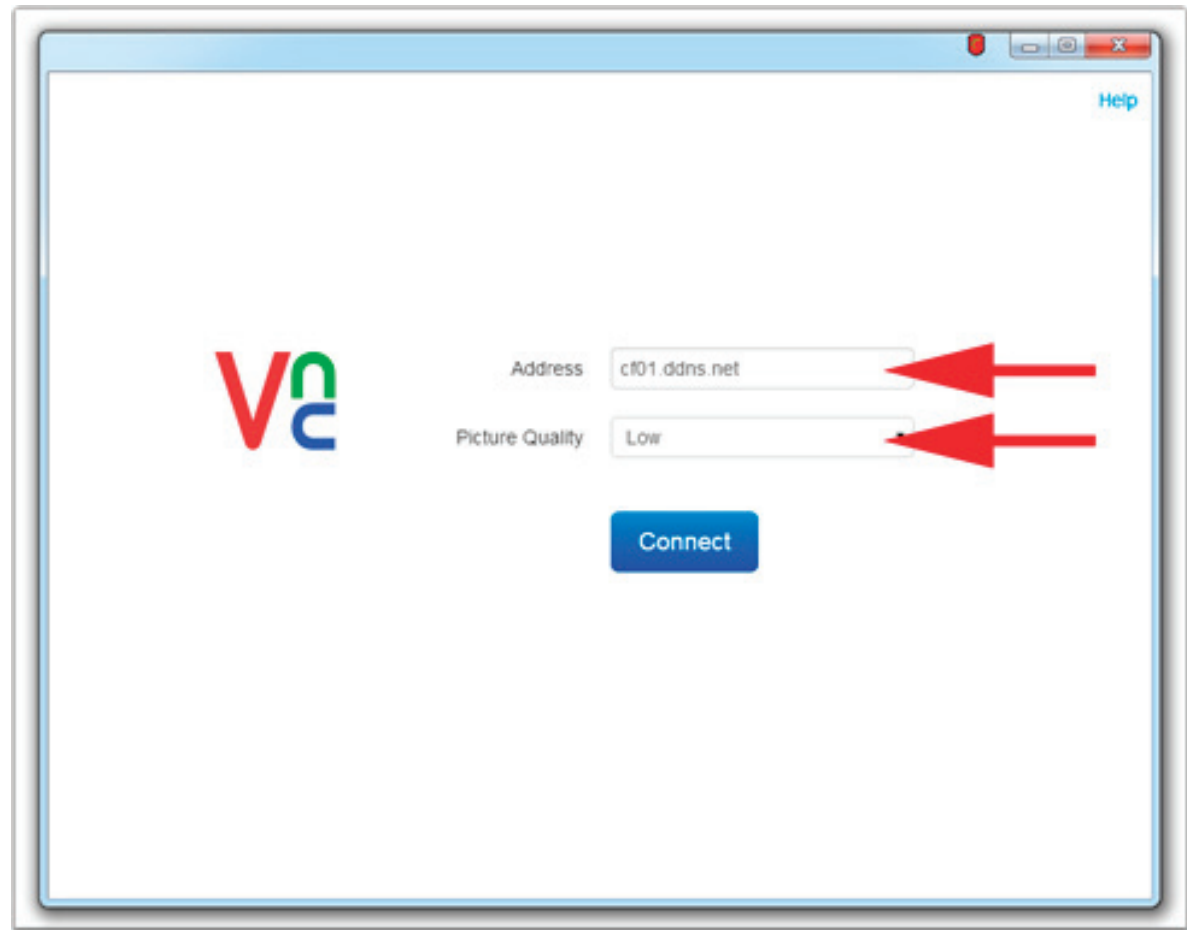
**Address:** This may be the IP or domain name your unit, remember that if you are inside your local area network (LAN) you must use the IP address, and if you are outside your local area network (WAN) you must use the DDNS domain name of your Climate Flex® unit.

**Picture Quality:** The image quality affects the speed and performance of your remote connection to your unit, we recommend using the LOW option to get the best experience of control. You can change this option each time you connect to your unit.

### 5. Remote Connection to your Unit

When you are ready to connect to your unit simply enter the IP address or domain name address of your unit, select LOW in the Image Quality option and click CONNECT.

VNC Viewer will try to connect to your unit, you can see the process move forward on the screen. Once the connection is made you are likely to receive a warning that the connection is not "Encrypted" please ignore this warning because it is not required or necessary to encrypt sessions when controlling a unit remotely.



## 6. Unit Remote Operation



Please observe and mind for all actions performed remotely just as if you were physically manipulating the unit. Remote operation of units is very simple and is done mostly through your local keyboard and mouse, all actions performed with the mouse and keyboard on the VNC Viewer screen will be transmitted as it is.

The connection via VNC to your unit is identical as if you were manipulating the unit physically, and you can actually see that the physical unit screen replicates all remote actions you perform.

Please keep in mind that depending on the speed and status of your Internet connection can have a delay of up to several seconds between the actions carried out remotely and that these actions are reflected, please have patience.

FOR MORE INFORMATION ABOUT THE OPERATION OF THE VNC VIEWER YOU CAN ACCESS THE APP HELP SCREENS AND MANUAL BY CLICKING ON THE ? ICON IN THE BOTTOM CONTROL BAR.

FOR MORE INFORMATION ABOUT THE OPERATION OF YOUR UNIT PLEASE CONSULT YOUR USER MANUAL.





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