Comfort Flex®
Air Conditioning
a member of DAIKIN group

Installation, Operation and Maintenance Manual

IOM

Group: Chiller
Part Number: IOM CLIC
Date: 1 April 2024

CLIC Series
Air-Cooling Unit With Scroll Type Compressor

Model

25 to 250 RT

Refrigerant HFC-410A

60 Hz

Table of Contents

Manufactured in an ISO 9001 certified facility

Pre-Start Checklist - Scroll Compressor Chillers

Must be completed, signed, and provided to Comfort Flex *at least 2 weeks prior to requested start date.*

Job Name	
Installation Location	
Customer Order Number	
Model Number(s)	
G.O. Number(s)	

Chilled Water and Condenser Water for Water-cooled Chiller	**Yes**	**No**	**N/A**	**Initials**
Piping Complete				
Water strainer(s) installed in piping per manual requirements				
Water System - flushed, filled, and vented; Water treatment in place				
Cooling tower flushed, filled, vented; Water treatment in place (if applicable)				
Pumps installed and operational (rotation checked, strainers cleaned)				
Controls operational (3-way valves, face/bypass dampers, bypass valves, etc.)				
Water system operated and tested; flow meets unit design requirements (Not all units include it)				
Flow switch(es) -installed, wired, and calibrated				
Vent installed on evaporator				
Electrical	**Yes**	**No**	**N/A**	**Initials**
Building controls operational				
*Power leads connected to power block or optional disconnect				
Power leads have been checked for proper phasing and voltage				
All interlock writing complete and compliant with unit specifications				
Power applied at least 12 hours before startup				
Oil heaters energized at least 12 hours before startup				
Chiller components (EXV Sensors Transducers) installed and wired properly				
*Wiring complies with National Electrical Code and local codes (See Notes)				
Miscellaneous	**Yes**	**No**	**N/A**	**Initials**
Unit control switches all off				
Remote Evaporator / Condenser Piping factory reviewed				
All refrigerant components/piping leak tested, evacuated and charged				
Thermometers, wells, gauges, control, etc., installed				
Minimum system load of 80% capacity available for testing/ adjusting controls				
Document Attached: Technical Breakdown from Selection Software				
Document Attached: Final Order Acknowledgement				
Document Attached: Remote piping approval				

Notes: The most common problems delaying start-up and affecting unit reliability are:
1. Field installed compressor motor power supply leads too small. Questions: Contact the local Comfort Flex sales representative*. State size, number and type of conductors and conduits installed:
a. From Power supply to chiller _____
* Refer to NFPA 70-2017, Article 440.35
2. Remote Evaporator piping incomplete or incorrect. Provide approved piping diagrams.
3. Items on this list incorrectly acknowledged resulting in delayed start and possible extra expenses incurred by return trips.

Contactor Representative

Singed
Name _____
Company _____
Date _____
Phone / Email _____

Comfort Flex Sales Representative

Signed
Name _____
Company _____
Date _____
Phone /Email _____

This manual contains safety instructions that must be followed during installation and maintenance of the unit. Read this manual before installing or operating this unit.

NOTE: Installation and maintenance should be performed only by qualified personnel who are familiar with local codes and regulations and who have experience with this type of equipment.

⚠ DANGER ⚠

LOCK OUT/LABEL all power sources before starting, pressurizing, depressurizing or shutting down the chiller.

Disconnect electrical power before servicing equipment. More than one disconnection may be required to deenergize the unit. Failure to follow this warning to the letter can result in serious injury or death. Be sure to read and understand the installation, operating and service instructions in this manual.

⚠ WARNING ⚠

Electric shock danger. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded. Control panel connections and maintenance should be performed only by personnel knowledgeable in the operation of the equipment being controlled. Disconnect electrical power before servicing equipment. Be sure to install a earth leakage breaker. Failure to install a earth leakage breaker may result in electric shock or fire.

⚠ CAUTION ⚠

Static sensitive components. Static discharge during handling of the electronic circuit board can cause damage to components. Use a static strap before performing any service work. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

⚠ CAUTION ⚠

When moving refrigerant to/from the cooler using an auxiliary tank, a grounding strap should be used. An electrical charge builds up when halo-carbon refrigerant travels in a rubber hose. A grounding strap should be used between the auxiliary refrigerant tank and the cooler end sheet (ground to ground), which will safely carry the charge to ground. Failure to follow this procedure may result in damage to sensitive electronic components.

⚠ WARNING ⚠

If refrigerant leaks from the unit, there is a potential choking danger as the refrigerant will displace air in the immediate area. Be sure to follow all applicable published industry-related standards and local, state, and federal statutes, regulations, and codes if refrigerant is produced. Avoid exposing refrigerant to an open flame or other ignition source.

⚠ WARNING ⚠

Polyolester oil, commonly referred to as POE oil, is a synthetic oil used in many refrigeration systems and may be present in this Comfort Flex product. POE oil, if it ever comes in contact with PCV/CPVC, will coat the inside wall of the PVC/CPVC pipe and cause environmental stress fractures. Although there is no PCV/CPCV pipe in this product, keep this in mind when selecting piping materials for your application, as system failure and property damage could occur. Consult the pipe manufacturer's recommendations to determine appropriate pipe applications.

DANGER IDENTIFICATION INFORMATION

⚠ DANGER ⚠

Danger indicates a dangerous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING ⚠

Warning indicates a potentially dangerous situation which may result in property damage, personal injury or death if not avoided

⚠ CAUTION ⚠

Caution indicates a potentially dangerous situation which may result in minor injury or equipment damage if not avoided.

Notes: Indicate important details or clarifying statements for the information presented.

General Description

Comfort Flex's CLIC Series air-cooled chilled water generators are self-contained, complete, automatic chillers designed for outdoor installation. The package units are fully assembled, factory wired, charged and tested.

The electrical control center includes all operating controls and equipment protection necessary for reliable automatic operation. Components housed in a weatherproof control panel.

NOMENCLATURE

CLIC-300-VL-C-1-A-N-D-F-M-M-N-N-0-2-S-N-D-N-4-C-0

FAMILY

CAPACITY (BTU)
300 - 300,000

AIR DISCHARGE
VL - Vertical Large

OPERATION
C - Cooling Only
H - Heat Pump

UNITS
1 - Stand alone
2 - 2 units
3 - 3 units
4 - 4 units
5 - 5 units
6 - 6 units
7 - 7 units
8 - 8 units
9 - units
10 - 10 units

CONDENSER FAN
A - Axial Fixed

ANTICORROSION
C - Coat in Condenser
I - Coat in Components
M - Total Coating
N - None

VOLTAGE
C - 208-230 / 3 / 60
D - 460 / 3 / 60

COMPRESSOR
F - Fixed
V - Inverter
T - Tandem

CONDENSER
M - Microchannel
C - Cu-Al

EXTRA
0 - TBD

CONTROL
P - Parametric
(Only standalone)
C - pCO / pGD
M - MCX

REFRIGERANT
4 - R410-A
5 - R454-B

SINGLE SKID
O - With base
N - N/A

PACKAGING
D - Domestic
I - Internacional

HIDRAULIC CONNECTION
N - Not included
Y - Yes included

ELECTRICAL CONNECTION
M - Multipoint
S - Single Point

PIPE
6 - 6"

GRILLS
1 - Painted Grill
0 - N/A

FREE COOLING
N - No

HEAT RECOVERY
N - N/A
R - Heat recovery

PROTOCOL

EFFICIENCY

Our units are designed to meet the needs of any project.
Our intelligent process controllers and smart temperature sensors provide maximum performance and energy savings.
The system automatically modifies the operating mode to maintain optimum system conditions, making it very easy to operate.

All temperature sensors are calibrated and adjusted at the factory prior to shipment. Start-up should be performed by a qualified technician, during initial start-up the unit will be adjusted to local conditions and all operating points will be checked.
Once the unit has been set up, operation is a matter of pressing the start/stop button until it is certain that the unit is operating properly.
After this the unit will operate automatically, turning itself on according to the demand of the refrigeration system and local conditions.

FLEXIBILITY

The units feature intelligent processors and sensors that automatically control the temperature at optimum operating conditions.

The units were designed to be coupled with each other and combined to meet different load variations (Tandem Installation). Up to 10 modules can be combined; these combinations can be made with Water Chiller Units of different capacities ranging from 25 to 250 tons. Capacities vary depending on the number and type of units.

SAFETY

All structures are made of galvanized sheet steel, coated with electrostatic baked-on paint to ensure long durability and freedom from corrosion under all weather conditions, such as direct sunlight, rain and wind.

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

NOTE: For applications in tropical climates our units are coated inside and out with corrosion protection (upon request).

Our products have AHRI efficiency certifications and ETL safety certifications, in addition to meeting all industry safety standards. We are members of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). To show our commitment to our customers and stakeholders; our equipment comes with a 1 year major warranty after start-up.

Our units use R410A refrigerant, which is harmless to the ozone layer and is non-toxic and non-flammable, even in case of leakage.

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

DESIGN

Research conducted by the Engineering Department has resulted in units with high design efficiency and optimum performance. The selection of the main components, our quality and control system guarantee high performance and safety.

All major components are rigorously tested and qualified before installation. Each designed unit has undergone long hours of rigorous testing to ensure the safety, durability and quality of the entire system.

COMMUNICATION

The units can be controlled in tandem mode and/or can be connected to a central control unit. Operation and user access will be through a color touch screen.

Our units can be managed through different communication protocols; such as Modbus and BACnet, the most commonly used protocols in the Air Conditioning industry.

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

The control and monitoring system ensures the correct operation of the unit by monitoring in real time the condition of the major components (high or low refrigerant pressure, compressor and fan motor conditions, etc.).

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

INSTALLATION

The units have been designed for easy installation. Screw connections provide easy installation of the water piping, which are located on both sides of the unit, so that the piping can be connected to either side of the unit.

The individual assembly of the units reduces installation cost, the units have a rigid base that balances the weight of the unit and allows for easy installation.

MAINTENANCE

The simplicity in the design of each unit allows for maximum ease of maintenance. All major components are available to maintenance personnel by simply opening the service panel.

If an emergency shutdown occurs, the control section will indicate in detail the cause of the failure, helping to facilitate and accelerate troubleshooting.

TESTING

Each unit is pressure and vacuum tested and then charged with the refrigerant required for proper operation based on the customer's installation conditions.

The units are evaluated at full load operation with water flow, heat load and line voltage placed at actual operating conditions.

NOTE: The warranty policy requires that commissioning be performed by qualified personnel authorized by the company.

INSITUM ® CORROSION PROTECTION

SPRAY FOR COATING HVAC/R PRODUCTS

Coating is a flexible, water-based, water-reducible, synthetic polymer corrosion coating designed specifically for the protection of HVAC/R coils and components. Insitu® Spray Applied Coating contains ES2 (embedded stainless steel pigment) technology, an anti-corrosion coating specifically designed for the protection of coils mounted in corrosive areas.

HVAC/R coils, components and enclosures will have a permanent water-based synthetic coating with ES2 pigment applied to all areas of the coating surface with no bridging of material between fins. Therefore, ES2 pigments are suitable for even the most corrosive environments and will maintain their appearance after many years of exposure. UV degradation ES2 pigments form a multilayer structure throughout the paint film.

This creates a barrier layer that reflects sunlight away from the paint film preventing UV rays from penetrating. As a result, UV degradation of individual polymer molecules is eliminated, film integrity is maintained and the pigment particles remain well anchored to the substrate.

The resulting smooth, hard finish prevents dirt build-up. The multilayer structure of ES2 pigments delays the passage of water molecules into the film and acts as an effective moisture barrier.

Ideal applications for Insitu® spray-applied coatings.

- Mini-splits
- Packaged enclosures
- Condensing units
- Modular air handlers
- Air-cooled chillers
- Indoor and outdoor HVAC cabinets and copper tubing
- Heat exchange coils (water, condenser, evaporator, DX)

OPERATING AND STANDBY LIMITS

Table 1. Table unit CLIC

Maximum standby ambient temperature	130°F (54°C)
Maximum operating ambient temperature	113°F (45°C)
Minimum operating ambient temperature (standard control)	55°F(12°C)
Outgoing chilled water temperature	40°F to 65°F (4°C to 18°C)
Outgoing chilled fluid temperatures (with antifreeze) - Note that in cases of high ambient temperature, the lowest outgoing water temperature settings may be outside the chiller's operating envelope; see the chiller's operating envelope. Outgoing water temperature settings may be outside the chiller's operating envelope; refer to the Comfort Flex Tools to make sure that the chiller is capable of the required elevation.	15°F to 65°F (-9°C to 18°C)
Maximum evaporator inlet fluid temperature	81°F (27°C)
Maximum non-operating evaporator inlet fluid temperature	100°F (38°C)

NAMEPLATES

The unit nameplate is located on the outside of the unit power panel. Both the model number and serial number are located on the unit nameplates; the serial number is unique to the unit.
These numbers should be used to identify the unit in case of service, parts or warranty questions. This nameplate also contains the unit's refrigerant charge and electrical ratings. The evaporator nameplate is under the insulation and contains the serial number. The compressor nameplate is located on each compressor and provides pertinent electrical information.

⚠ WARNING ⚠

Installation should be performed by qualified personnel who are familiar with local codes and regulations.

INSPECTION

Check all items carefully against the bill of lading. Inspect all units for damage upon arrival. Report shipping damage and file a claim with the carrier. Check the unit nameplate before unloading, making sure it matches the available power supply.
Comfort Flex is not responsible for physical damage that occurs after the unit leaves the factory.

HANDLING

Take care to avoid rough handling of the unit. Do not push or pull the unit from other than the base while seated on properly sized dollies. To lift the unit, 2-1/2 (64 mm) diameter lifting eyes are provided at the base of the unit. Arrange the spreader bars and cables to prevent damage to the condenser coils or cabinet (see Figure 1).

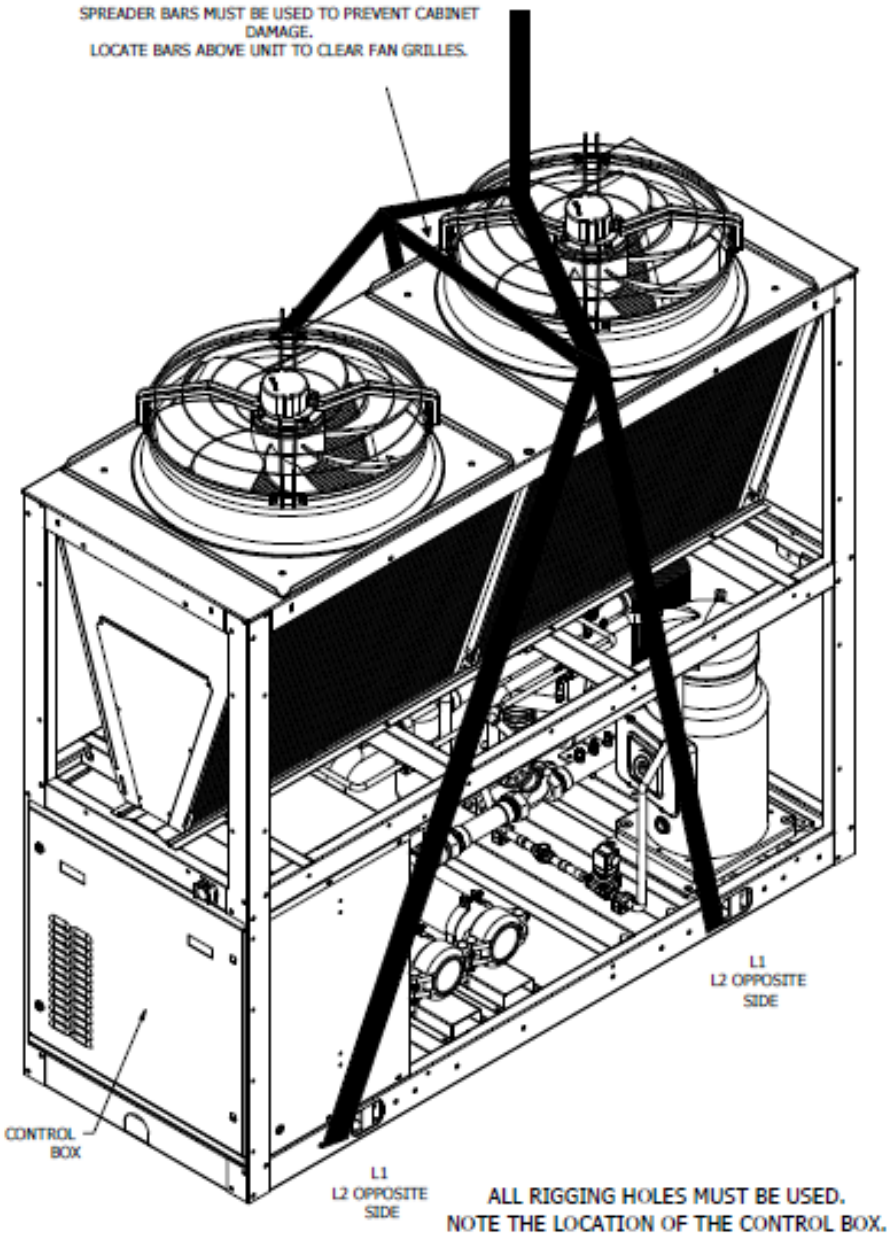
⚠ CAUTION ⚠

All lifting locations must be used to avoid damage to the unit.

⚠ DANGER ⚠

Improper rigging, lifting or moving of a unit can result in property damage, serious personal injury or death. Follow the rigging and moving instructions carefully. Do not stand under the unit while it is being lifted or installed.

Figure 1. Required elevation arrangement.



PLACEMENT OF THE UNIT

CLIC series units are for outdoor applications and can be mounted on the roof or on the ground. For roof mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof.

The use of spring isolators is recommended for roof applications. For ground level applications, install the unit on a solid base that will not settle. Use a one-piece concrete slab with a foundation extended below the frost line. Ensure that the foundation is level to within 13 mm over its entire length and width.

The foundation must be strong enough to support the weight of the unit (see “Dimensions and Weights - Single unit on page 21.) The addition of neoprene pads (customer supplied) under the unit allows water to drain from inside the frame, which can act as a dam. Installing optional spring or rubber isolators in the shear can also aid drainage.

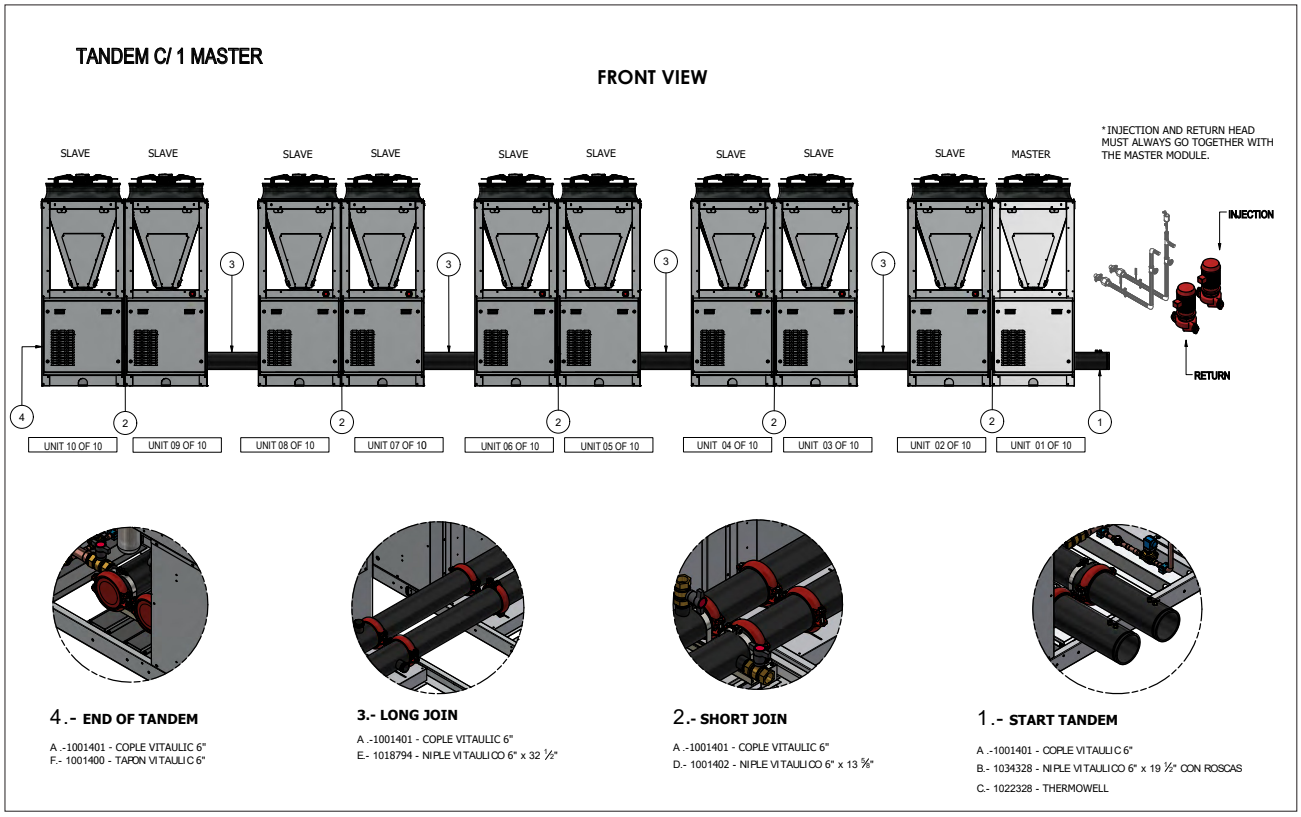
MOUNTING

The inside of the base rail is open to allow access to secure mounting bolts, etc. Mounting location dimensions are indicated on the dimensional drawing beginning on page 21 . All compressor bolts, rubber, grommets and fasteners should be left in place in the base. None of these fasteners are considered “temporary shipping bolts”.

TANDEM INSTALLATION (RECOMMENDATIONS)

For the correct installation of CLIC (Tandem) equipment, we need the installation kit that is already included in the equipment.

Figure 2. Example of hydraulic connection for tandem 250 TR



NOTE: Applies to equipment in tandem mode, likewise it is recommended the installation in open areas for optimal operation of the equipment, pre-heating of compressors, cleaning and purging of the hydronic system.

CLEANING SERVICE

A. The control panels are located at the end of the chiller and require a minimum clearance of 1.2 meters in front of the panels. The compressor, filter-driers and line shutoff valves are accessible on each side or end of the unit. Do not block access to the sides or ends of the unit with piping or ductwork.

B. These areas must be open for service access. The minimum service distance is as follows:

A. Sides

- 4 fan models: Minimum of 1.2 m (4 ft.)
- 6 to 14 fan models: It is strongly recommended that a minimum of 8 ft (2.4 m) be left on one side to allow for coil replacement. Coils may be removed from the top, leaving a minimum of 4 ft (1.2 m) side clearance; however, unit performance may be diminished.

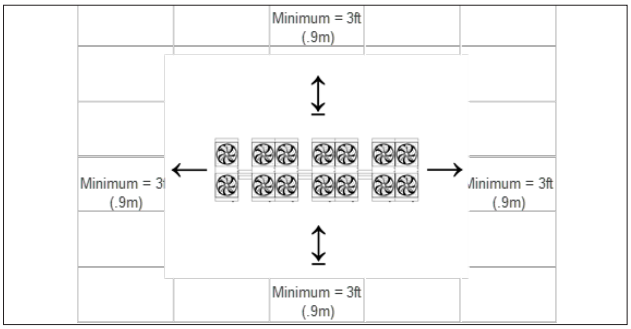
A. Control panel end

- All models: Minimum of 4 feet (1.2 meters).

A. Opposite end of control panel

- 4-fan models: Minimum 8 feet (2.4 m) to remove coil.
- 6- to 14-fan models: 8 ft (2.4 m) minimum. Clearance may be reduced to 4 ft (1.2 m) if side clearance is sufficient for evaporator service and removal.

Figure 3. Cleaning service



OPERATING SPACE REQUIREMENTS

Sufficient distance must be maintained between the unit and adjacent walls or other units to allow the required airflow from the unit to reach the coils. Failure to do so will reduce capacity and increase energy consumption.

The clearance requirements shown are a general guide and cannot take into account all scenarios. Factors such as prevailing winds, additional equipment within the space, outside air temperature and many other factors may require more clearance than shown. Additional clearances may be required under certain circumstances.

The graphs on the following pages indicate the minimum clearance for different types of installations and also the reduction in capacity and increase in power if a smaller space is used. The graphs are based on individual cases and should not be combined with other scenarios.

⚠ CAUTION ⚠

The performance of the unit may be affected if the operating clearance is not sufficient.

Case 1. Building or wall on one side of the unit

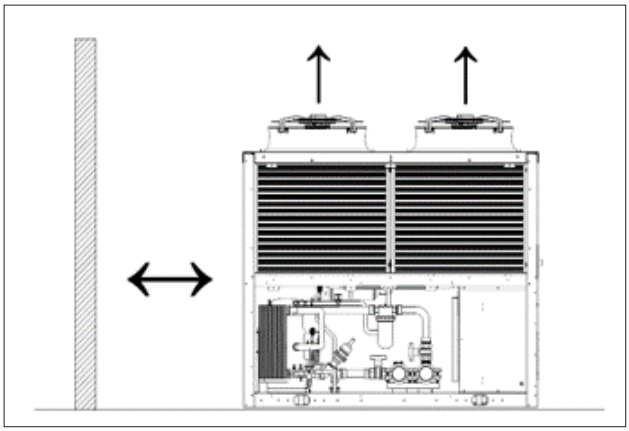
NOTES: Assumes a solid height wall higher than the unit. Refer to case 4 for partial wall openings.

For Tandem 50 RT models, maintain a minimum of 4 feet from a wall of any height.

For Tandem 100 RT models, maintain a minimum of 6 feet from a wall of any height.

For Tandem 150 RT models, maintain a minimum of 8 feet from a wall of any height.

Figure 4. Building or wall on one side of the unit

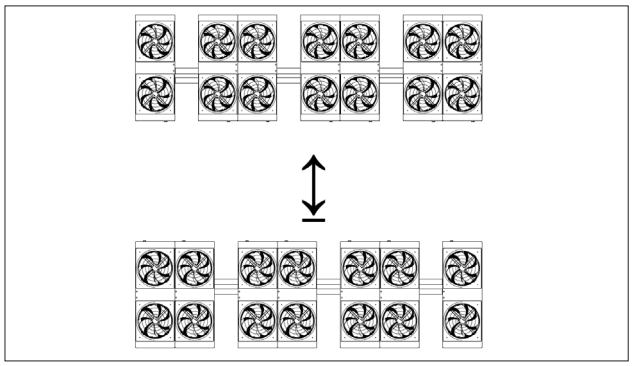


Case 2. Two units side by side

For models 050-150 , there should be a minimum of 4 feet between two units placed side by side; however, performance may be affected at this distance.

For models 175-250 , the minimum is 6 feet, since closing the gap may cause recirculation of air and elevation of condenser pressure. Assuming the requirement that one side have at least 8 ft of service clearance is met, the figures in Case 2 show the performance adjustments as the distance between two units increases.

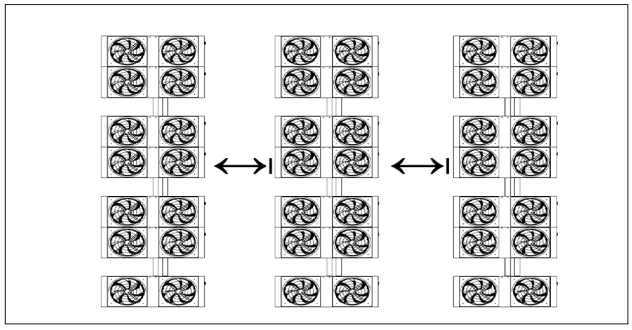
Figure 5. Two units side by side



Case 3. Three or more units, side by side

For all models, there must be a minimum distance between units placed side by side; however, performance may be affected at this distance. Minimum distances are: models 28 to 75 RT - 4 feet, models 75 to 100 - 5 feet, models 125 to 250 - 6 feet.

Figure 6. Three or more units, side by side



Case 4. Open protection walls

Decorative walls are often used to help conceal a unit, either on the ground or on the roof. Whenever possible, design these walls so that the combination of their open area and distance to the unit does not require a performance adjustment.

If the percentage of wall openness is less than recommended for the distance to the unit, it should be considered a solid wall. The wall height is assumed to be equal to or less than the height of the unit when mounted on its base bracket.

If the wall height is greater than the unit height, (refer to Case 5: Pit Installation) for performance adjustment factors. The distance from the sides of the unit to the side walls must be sufficient for service, such as opening the control panel doors. In the case of uneven wall separation, the distance from the unit to each wall can be averaged as long as no distance is less than 4 feet. Values are based on walls on all four sides.

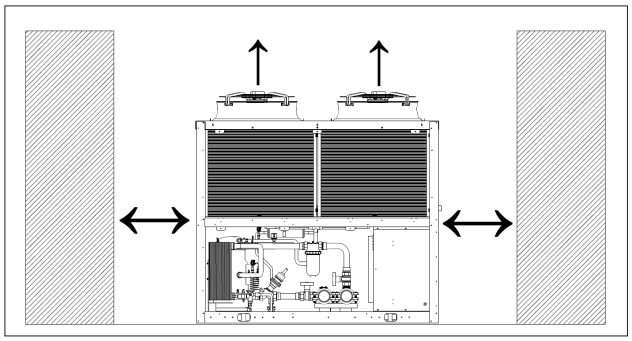
Case 5. Pit installation

Pit installations can cause operating problems due to recirculation and air restriction and require that sufficient air separation be provided, safety requirements be met, and service access be provided.

A solid wall surrounding a unit is substantially a pit and this datum should be used. Sometimes a steel grating is used to cover a pit to prevent accidental falls or trips into the pit.

The grate material and installation design should be strong enough to prevent such accidents, but should provide plenty of open area to prevent recirculation problems. Have the Comfort Flex sales representative review the installation of any pit prior to installation to ensure that it has sufficient airflow characteristics and is approved by the facility's design engineer to avoid the risk of an accident.

Figure 7. Pit installation



COLD WATER PIPES

⚠ CAUTION ⚠

To prevent damage to the evaporator and possible failure of the chiller, a supply filter is required in the inlet water piping that connects to this evaporator. This filter must be installed prior to operation of the chilled liquid pumps.

Field-installed water piping for the chiller should include:

- A cleanable filter installed at the water inlet to the evaporator to remove debris and impurities before they reach the evaporator. Install the cleanable filter within 1,500 mm tubing length from the evaporator inlet connection and downstream of any solder connections (no solder connections between the filter and evaporator). CLIC models 025-250 require a filter with perforations no larger than 0.063" (1.6 mm) in diameter. For more information, refer to the inlet strainer guidelines (page 14).
-
- A water flow switch must be installed in the horizontal piping of the supply water line (evaporator outlet) to prevent evaporator freezing under low or no flow conditions. The flow switch can be ordered as a factory-installed option, as a field-installed kit, or can be supplied and installed in the field.

- Piping for units with brazed plate evaporators should have a drain and vent connection at the bottom of the bottom connection piping and at the top of the top connection

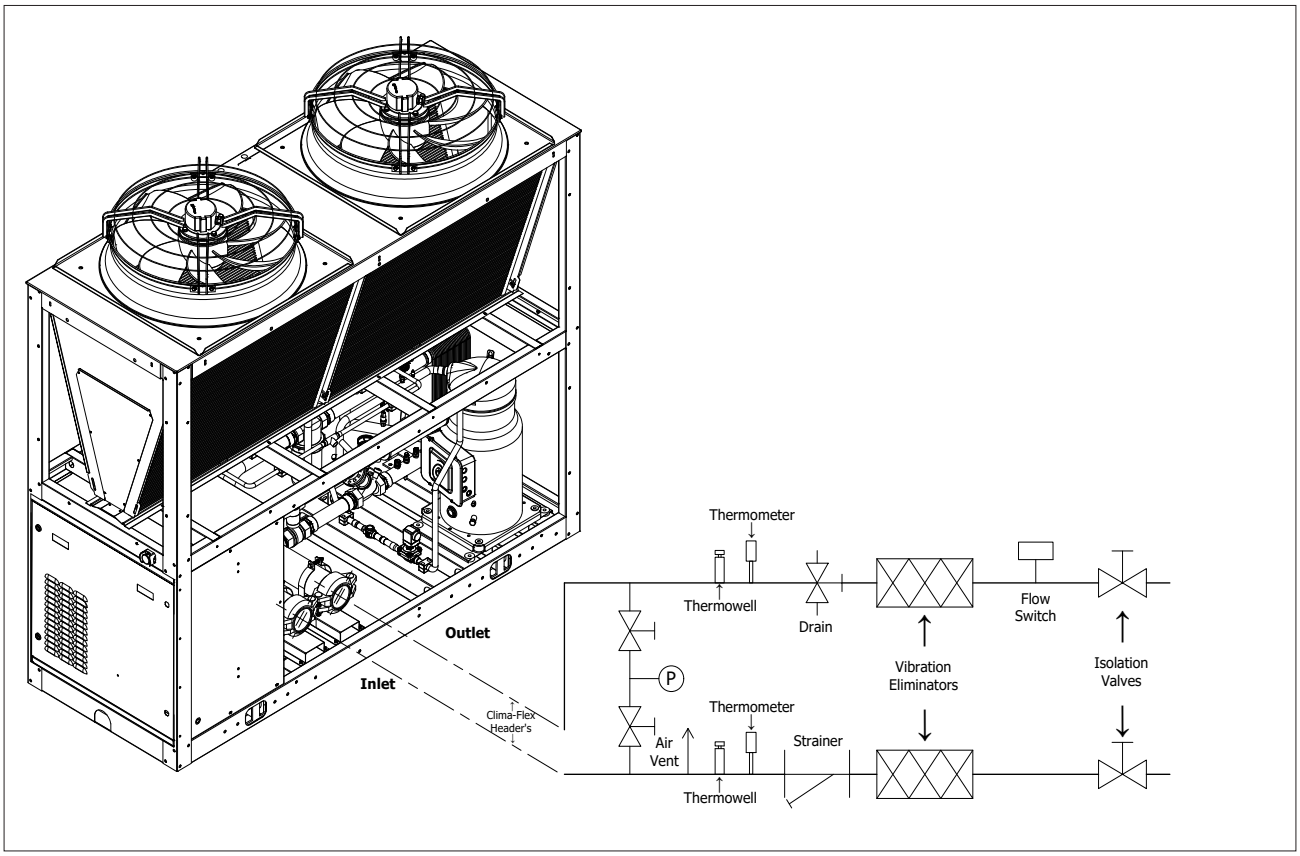
piping, respectively, (see Figure 7) These evaporators do not have drain or vent connections due to their construction. Purge air from the water system prior to unit start-up to provide adequate flow through the evaporator.

- A suitable support for piping, separate from the unit, to eliminate weight and stress on fittings and connections.
- An expansion tank and regulating valve to maintain water pressure.
- Suitable mechanical connections. All evaporators have.
- OGS type grooved water connections (adhering to AWWA C606) optionally with flanges. PVC piping should not be used.

⚠ WARNING ⚠

Polyolester oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems and is present in this Comfort Flex product. POE oil, if it ever comes in contact with PVC/CPVC, will coat the inside wall of the PVC/CPVC pipe causing environmental stress fractures. Although there is no PVC/CPVC pipe in this product, keep this in mind when selecting piping materials for your application as system failure and property damage could occur. Consult the pipe manufacturer's recommendations to determine suitable pipe applications.

Figure 8. Typical piping of a welded plate evaporator, series CLIC Tandem



It is recommended that the field-installed water piping for the chiller include:

- Temperature sensors at evaporator inlet and outlet connections.
- Water pressure gauge connection taps and pressure gauges on evaporator inlet and outlet connections to measure water pressure drop.
- Shut-off valves to isolate the unit from piping during unit maintenance.
- Minimum elevation changes and bends to minimize pressure drop.
- Vibration eliminators on supply and return water lines to reduce transmissions to the building.
- Thorough flushing of system water piping prior to making connections to the unit evaporator.
- Insulation of the piping, including a vapor barrier, helps prevent condensation and reduces heat loss.
- Periodic water analysis and chemical treatment of the evaporator loop water is recommended immediately after unit start-up.

NOTE: Failure to comply with these measures may result in performance and reliability problems.

INLET STRAINER GUIDELINES

An inlet water filter kit must be installed in the cold water piping upstream of the evaporator inlet. There are several ways available to meet this requirement:

1. A factory-installed option is available - models 025 through 250.
2. A field installation kit is shipped loose with the unit and is available for all unit sizes and consists of:
   - Y-type area strainer with 304 stainless steel perforated basket, slotted pipe connections and strainer cover.
3. A field supplied strainer that meets the specifications and installation requirements of this manual.

TECHNICAL DATA OF THE STRAINER

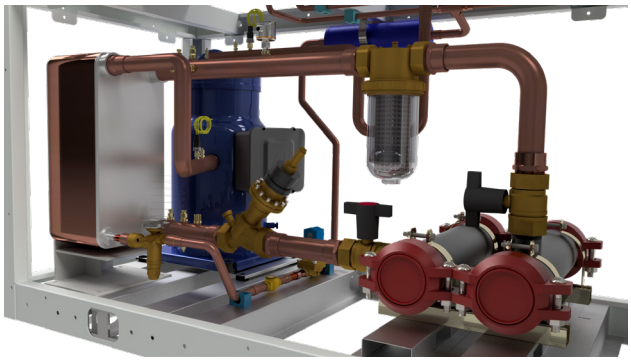
- **Head and neck nut:** Brass
- **Filter element:** Polyamide body coated with nylon mesh
- **Filter cup:** Trogamid T 5000 (virtually impact resistant, pressure wave resistant, permanently transparent, stress resistant).
- (Brass cup available on request).
- **Working pressure:** PN 16
- **Test pressure:** 25 bar
- **Maximum water temperature:** 30° C
- **Mesh size:** 95-140 µm.
- Available with and without Rp 1⁄8⁄8 pressure gauges.

Table 2. Flow rates according to DVGW test

DN 20	Rp 3⁄4	5,0 m3/h
DN 35	Rp 1	7,9 m3/h
DN 32	Rp 1 1⁄4	12,0 m3/h
DN 40	Rp 1 1⁄2	11.9 m3/h
DN 50	Rp 2	14,9 m3/h

Δp = 0,2 bar:

Figure 9. Factory installed strainer



WATER FLOW LIMITATIONS

Constant evaporator flow

Maximum flow rate and pressure drop are based on a 6°F temperature drop. Flow rates above the maximum values will result in unacceptable pressure drops and may cause excessive erosion, which could lead to failure.

The minimum flow rate and pressure drop are based on a full load evaporator temperature drop of 16°F. Evaporator flow rates below the minimum values may result in laminar flow leading to low pressure alarms, fouling and poor temperature control (See pressure drop on page 35).

Variable evaporator flow

Reducing evaporator flow rate in proportion to load can reduce system energy consumption. The rate of flow change should be a maximum of 10 percent of the flow per minute. For example, if the maximum design flow rate is 200 gpm and is to be reduced to a flow rate of 140 gpm, the flow change is 60 gpm.

Ten percent of 200 gpm equals a change of 20 gpm per minute, or a minimum of three minutes to go from the maximum flow to the desired flow.

If the flow rate falls below the minimum allowable, large reductions in heat transfer can occur. If the flow rate exceeds the maximum, excessive pressure drop and tube erosion can occur.

System water considerations

All chilled water systems need adequate time to recognize a load change, respond to the change and stabilize to avoid undesirable compressor short cycling or loss of temperature control.

In air conditioning systems, the potential for short cycling often occurs when the building load drops below the minimum capacity of the chiller plant or in tightly coupled systems with very small water volumes. Some of the aspects that the designer should consider when studying water volume are the minimum cooling load, the minimum capacity of the chiller plant during the low-load period, and the desired cycle time for the compressors. Assuming there are no sudden loads and the chiller plant has a reasonable drawdown, the rule of thumb of “water volume in gallons equals two to three times the chilled water flow rate in gpm” is often used. A storage tank may have to be added to the system to achieve the recommended volume.

The quality of water supplied by the owner/occupant/operator/user to a cooling system should minimize corrosion, scale buildup, erosion, and biological growth to achieve optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment. Filters should be used to protect cooling systems from waterborne debris. Comfort Flex is not responsible for damage caused by waterborne debris or damage to chiller heat exchangers due to improper water treatment.

Water systems should be cleaned and flushed prior to chiller installation. Testing and water treatment should be verified during initial chiller installation/commissioning and should be maintained on an ongoing basis by water treatment professionals (see limited product warranty).

⚠ CAUTION ⚠

Improper use of detergents, chemicals and additives in the cooling system water can adversely affect the performance of the chiller and potentially result in repair costs not covered under warranty. Any decision to use these products is at the discretion of the owner/occupant/operator/user, and the owner/occupant/operator/user assumes full responsibility for any damage that may occur due to their use.

Evaporator freeze protection

Evaporator freezing can be a problem in the application of air-cooled water chillers in sub-zero temperature areas. To protect against freezing, the evaporator comes with insulation.

Although the evaporator is equipped with freeze protection, it does not protect the water piping external to the unit or the evaporator itself if there is a power failure or heater burnout, or if the chiller cannot control the chilled water pumps.

Use one of the following recommendations for additional freeze protection:

1. If the unit will not operate during the winter, drain the evaporator and chilled water lines and flush them with glycol.
2. Add a glycol solution to the cold water system. Breakage protection should be approximately 10°F below the minimum design ambient temperature.
3. Insulate exposed piping.
4. Add thermostatically controlled heat by wrapping lines with heat tape.
5. When glycol is added to the water system for freeze protection, the refrigerant suction pressure will be lower, the cooling performance will be lower, and the water side pressure drop will be higher.

COLD WATER PUMP

It is important that the chilled water pumps are connected to and controlled by the chiller's microprocessor. The controller will activate the pump whenever at least one chiller circuit is enabled for operation.

This helps ensure proper start-up sequence of the unit. The pump will also turn on when the water temperature is below the freeze set point for longer than the specified time to help prevent evaporator freeze-up. Connection points are shown in the field wiring diagram beginning on page 36+.

⚠ CAUTION ⚠

Adding glycol or draining the system is the recommended method of freeze protection. If the chiller does not have the ability to control the pumps and the water system is not drained or does not have adequate glycol at subfreezing temperatures, catastrophic evaporator failure can occur.

If the chiller is not allowed to control the pump, the following problems may occur:

1. If the chiller attempts to start without first starting the pump, the chiller will lock up with the no flow alarm and require a manual restart.
2. If the chiller evaporator water temperature drops below the "freezing set point", the chiller will attempt to start the water pumps to prevent evaporator freezing.
3. If the chiller does not have the ability to start the pumps, the chiller will alarm for lack of water flow.
4. If the chiller does not have the ability to control the pumps and the water system must not be drained in freezing temperatures or contain glycol, the chiller may be subject to catastrophic evaporator failure due to freezing.

FLOW SWITCH

All chillers require a chilled water flow switch to verify that there is adequate water flow through the evaporator and to shut down the unit if necessary to prevent evaporator freeze-up under low or no flow conditions.

A factory-installed thermal dispersion flow switch will be installed on packaged models. On remote evaporator models, the flow switch can be supplied separately in the field, or optionally shipped loose for field installation. Terminals for field mounting and wiring of the water flow switch are provided in the unit control center.

Wire from the Y and R terminals on the switch to the terminals on the unit control panel shown in the field wiring diagrams, page 36 through page 57. Mount the flow switch on the outlet water line to shut off the unit when water flow is interrupted. A flow switch is an equipment protection control and should never be used to cycle the unit.

Installation should be in accordance with the manufacturer's instructions included with the switch. Flow switches should be calibrated to shut the unit off when operating below the minimum flow rate.

There is also a set of paddle switch contacts on the switch that can be used for an indicator light or alarm to indicate when a "no flow" condition exists. Protect any flow switch that is installed outdoors from freezing. It is not recommended that differential pressure switches be installed outdoors. They may freeze and not indicate a no-flow condition.

GLYCOL SOLUTIONS

The use of glycol can affect system performance depending on its concentration and should be taken into account during initial system design. When glycol is added to the chilled water system to protect against freezing, it should be noted that the refrigerant suction pressure will be lower, the cooling performance will be lower and the water side pressure drop will be higher. The reduction in performance depends on the glycol concentration and temperature. Test the coolant with a clean and accurate glycol refractometer to determine the freezing point.

⚠ CAUTION ⚠

The installed glycol level must match the nominal glycol percentage indicated on the submitted chiller technical data sheet. Failure to meet the nominal glycol percentage may result in damage to the unit and loss of unit warranty.

⚠ CAUTION ⚠

Do not use automotive grade antifreeze. Industrial grade glycols should be used. Automotive antifreeze contains inhibitors that will cause plaque formation on the cooler evaporator copper tubes. The type and handling of the glycol used should be consistent with local codes.

HIGH TEMPERATURE OPERATION

CLIC series units for high temperature operation (maximum values at ambient temperature 113°F) require the addition of the optional high ambient package which includes a small fan with a filter on the air inlet to cool the control panel. All units with the optional VFD low ambient fan control automatically include the high ambient option.

Note that in cases of high ambient, the capacity may be reduced or the lower outlet water temperature settings may be outside the chiller's operating envelope; consult with a Comfort Flex sales representative to ensure that the chiller is capable of the required elevation.

PARTIAL HEAT RECOVERY

Partial heat recovery in CLIC chillers is achieved by adding an auxiliary heat exchanger in the refrigerant circuit of each unit, between the compressors and condenser coils. The heat exchangers transfer heat from the compressor discharge gas to a separate water loop that can be used for various heating applications. The heat recovery loop is only available when the chiller is in operation.

The partial heat recovery auxiliary heat exchanger can return water up to 155°F; however, this value cannot be adjusted. The amount of heat produced can be up to 50% of the rated cooling capacity and is dependent on the cooling load requested, operating temperatures and the flow rate of water passing through the auxiliary heat exchangers. Please contact a local Comfort Flex sales representative for specific application information.

⚠ CAUTION ⚠

Potable water cannot be used in the partial heat recovery system due to the single-wall construction of the heat exchangers.

Partial heat recovery components supplied by the factory:

- Brazed plate heat exchangers: one in each circuit with water piped in parallel for one inlet and one outlet water connection.
- Insulation of heat exchangers and water piping in the unit.
- Separate temperature sensors for the inlet and outlet water pipes in the heat exchangers.
- Air vent connections on the outlet water piping and drain connections on the inlet water piping.
- Immersion heater for each auxiliary heat exchanger for freeze protection.

Partial heat recovery connections are listed below:

1. An external 3-way valve or variable speed pump in the auxiliary heat exchanger water piping for modulation of flow through the heat exchangers by the unit controller. The heat recovery water loop pump should also be controlled by the chiller controller.
2. A cleanable strainer with perforations no larger than 0.063" (1.6 mm) diameter should be installed within 5 feet (1500 mm) of pipe length from the heat exchanger inlet and downstream of any brazed connections, see page 33 for pressure drop. - Water piping and other parts of the heat recovery water loop should be insulated to prevent heat loss and possible injury due to hot surfaces.
3. Separate 120 volt power supply for immersion heaters. A junction box is provided for a 120 volt power connection.

NOTE: If the partial heat exchanger is drained, the heater must be off to avoid damage to the heat exchanger. The heat recovery heat exchanger has water in it.

It is recommended that the heat recovery water piping installed above ground include:

- A safety or relief valve and expansion tank installed on the water side to avoid hazards in case of failure of the water temperature thermostat.
- An additional water tank and water heater in the heat recovery piping loop to control the initial water temperature and improve loop stability. Typical guidance for loop sizing is for the water volume (in gallons) to be greater than or equal to approximately two to three times the heat recovery water flow rate (in gallons/minute).

PARTIAL HEAT RECOVERY TO AVOID FREEZING

- The heat recovery condenser is insulated; a factory installed heater will protect the heat exchanger from freezing at ambient temperatures down to -20°F (-29°C). When the ambient temperature drops to approximately 39°F (3.9°C), the thermostat activates the heaters. The inlet and outlet piping should be protected against freezing by one of the following methods:
- Install heat tape on all water pipes installed in the field.
- Add freeze inhibitor fluid to the partial heat recovery water loop. If adequate amounts of glycol are supplied, it is not necessary to feed the heater.

CONDENSER COIL OPTIONS AND COATING

Considerations

The standard CLIC Series chiller coils have an aluminum alloy microchannel design with a series of flat tubes containing multiple parallel flow microchannels placed between the coolant manifolds. The microchannel coils are designed to withstand the synthetic acidified seawater acidified (SWAAT) mist test of over 1000 hours (ASTM G85-02) at 120°F (49°C) with 0% loss and without developing leaks.

Epoxy coating: is an extremely flexible and durable water-based polymer coating that is uniformly applied to all coil surfaces by a multi-step electrostatic submerged coating process. Epoxy-coated coils offer ASTM B117-90 salt spray resistance of more than 10,000 hours applied to both the coil and the coil heads. Epoxy-coated coils also receive a UV-resistant urethane topcoat to provide superior resistance to degradation from direct sunlight.

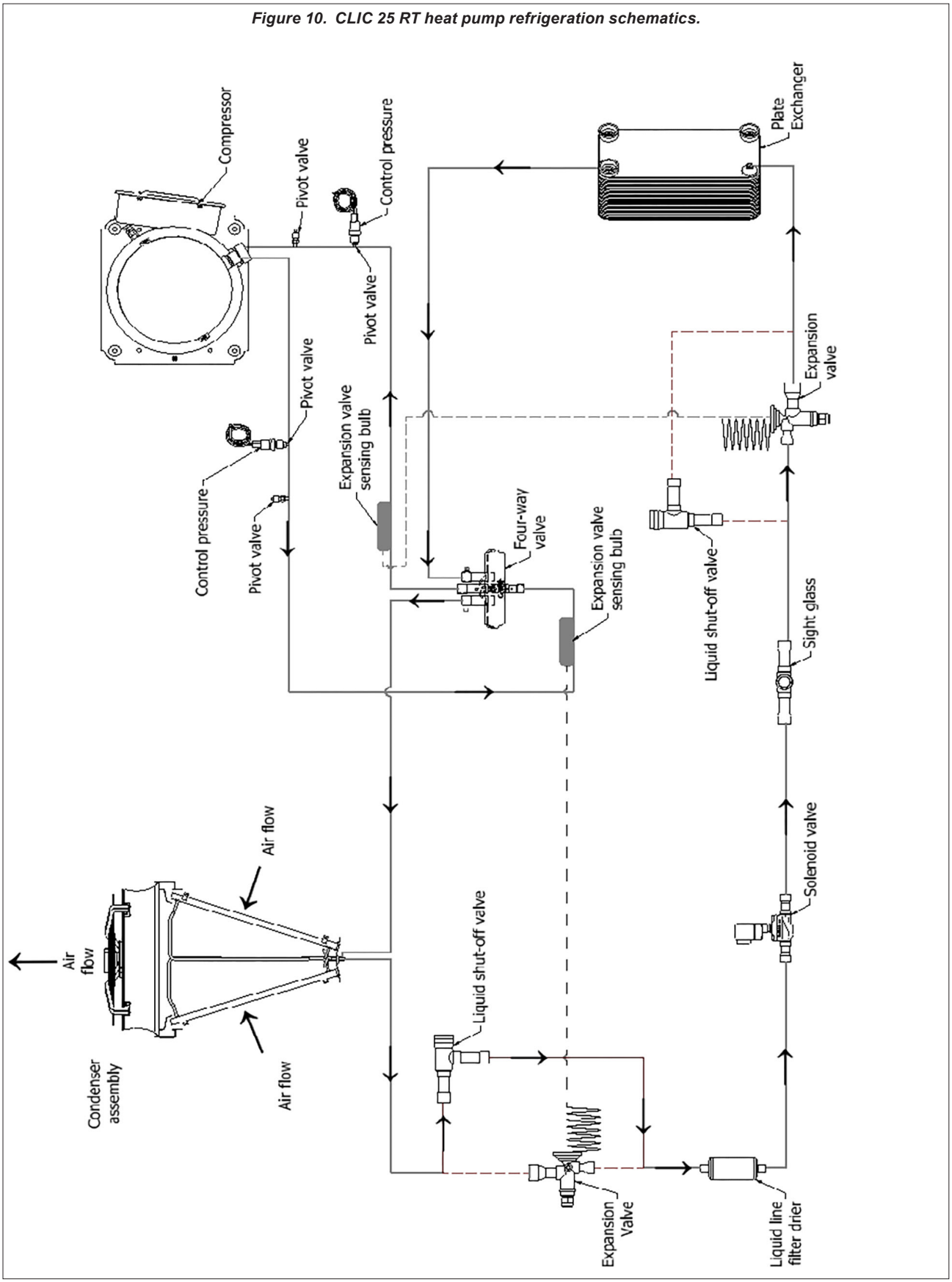
*Table 3. **Coil and coating selection matrix***

Coil Option	Non-corrosive[1]	Unpolluted marine[2]	Industrial[3]	Combined marine-industrial[4]
Standard	+++	-	-	-
Microchannel	+++	+++	+++	++

Notes:

1. **Non-corrosive environments can be estimated by the appearance of existing equipment in the immediate area where the chiller is to be placed.**
2. **Marine environments should take into account the proximity to the coast, as well as the prevailing wind direction.**
3. **Industrial contaminants can be general or localized, depending on the immediate source of contamination (e.g. diesel fumes due to proximity to a loading dock).**
4. **The marine-industrial combination is influenced by proximity to the coast, prevailing winds, and general and localized sources of pollution.**

Figure 10. CLIC 25 RT heat pump refrigeration schematics.



Refrigeration Schematics

Figure 11. CLIC 25 RT heat recovery refrigeration schematics.

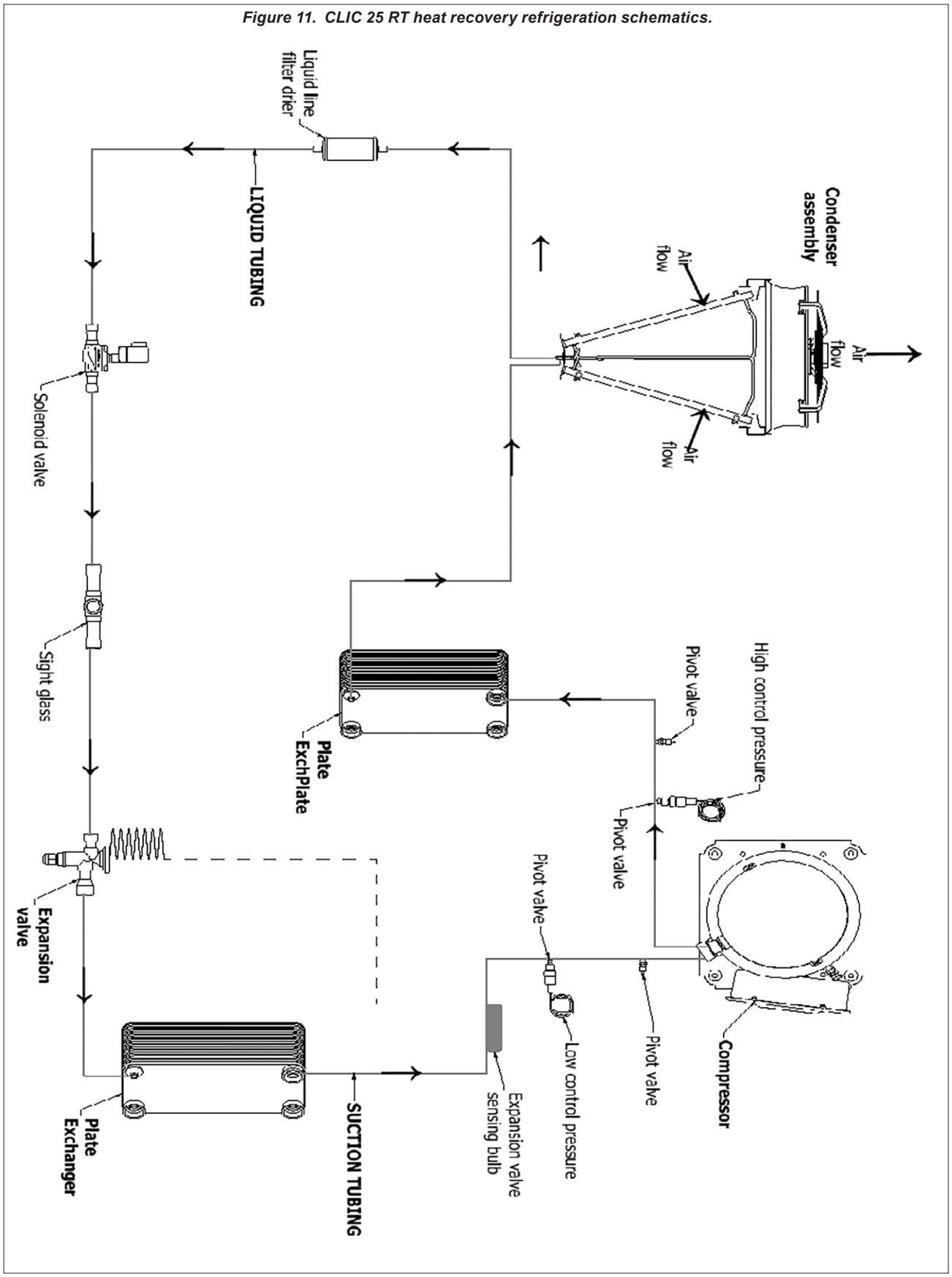


Figure 12. CLIC 25 RT cooling only refrigeration schematics.

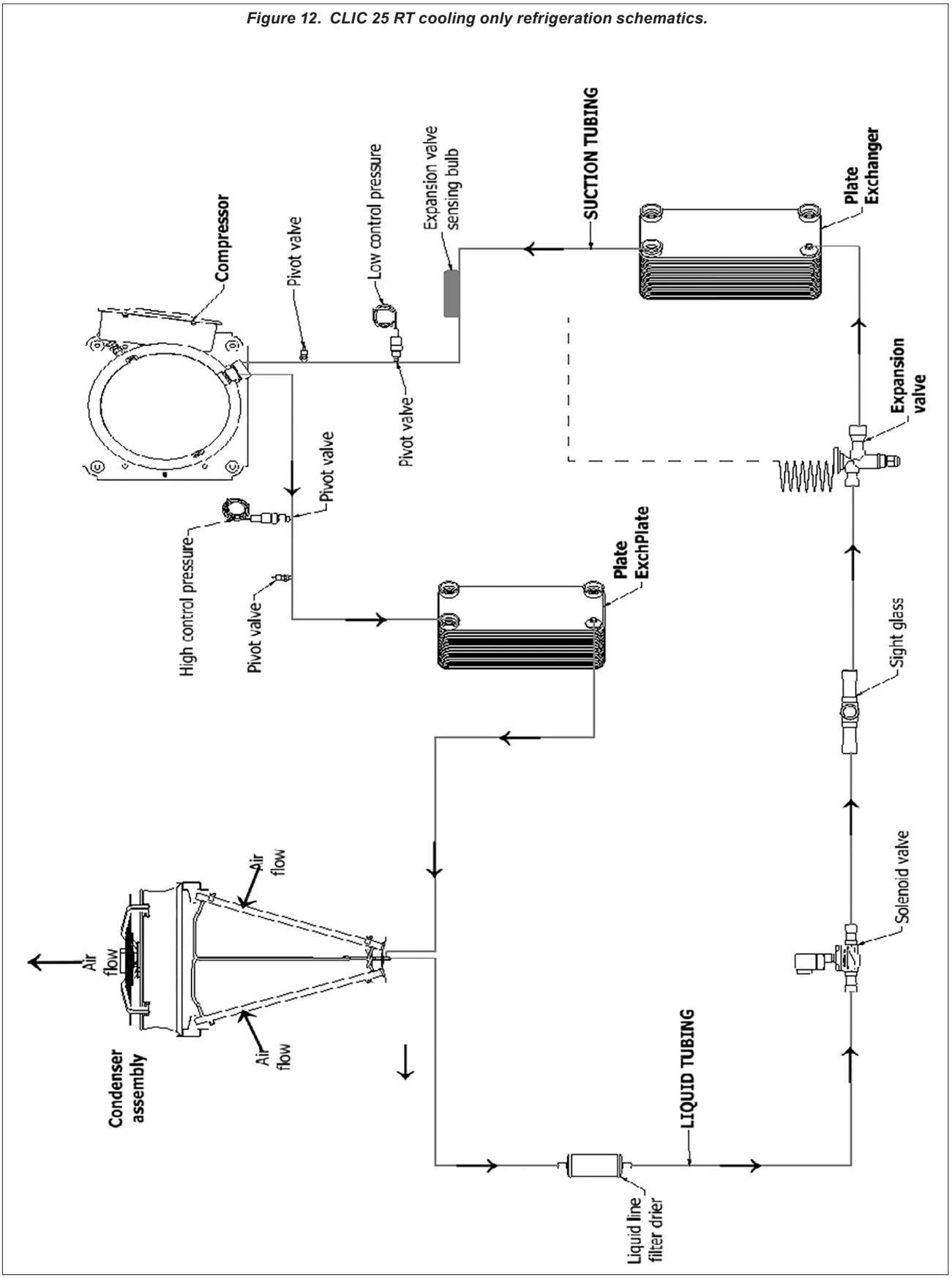


Table 4. Dimensions and weights.

UNIT	High		Length		Width		Weight	
	in	mm	in	mm	in	mm	kg	lb
CLIC 25 TR (R410)	81 ¾	2076.43	87 ⅛	2214	32 ½	825	700-750	154-165

Figure 13. Dimensional configuration 25 RT.

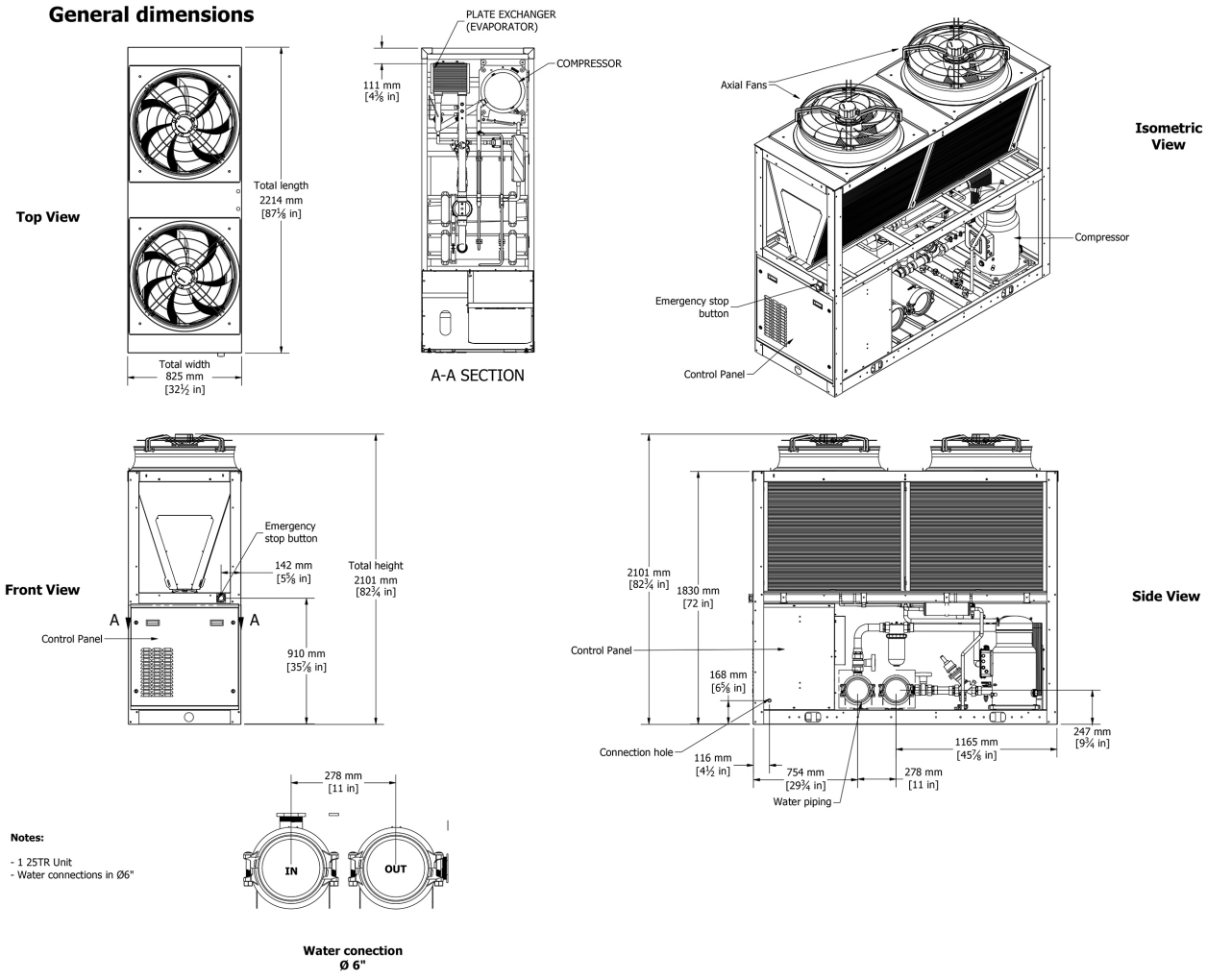
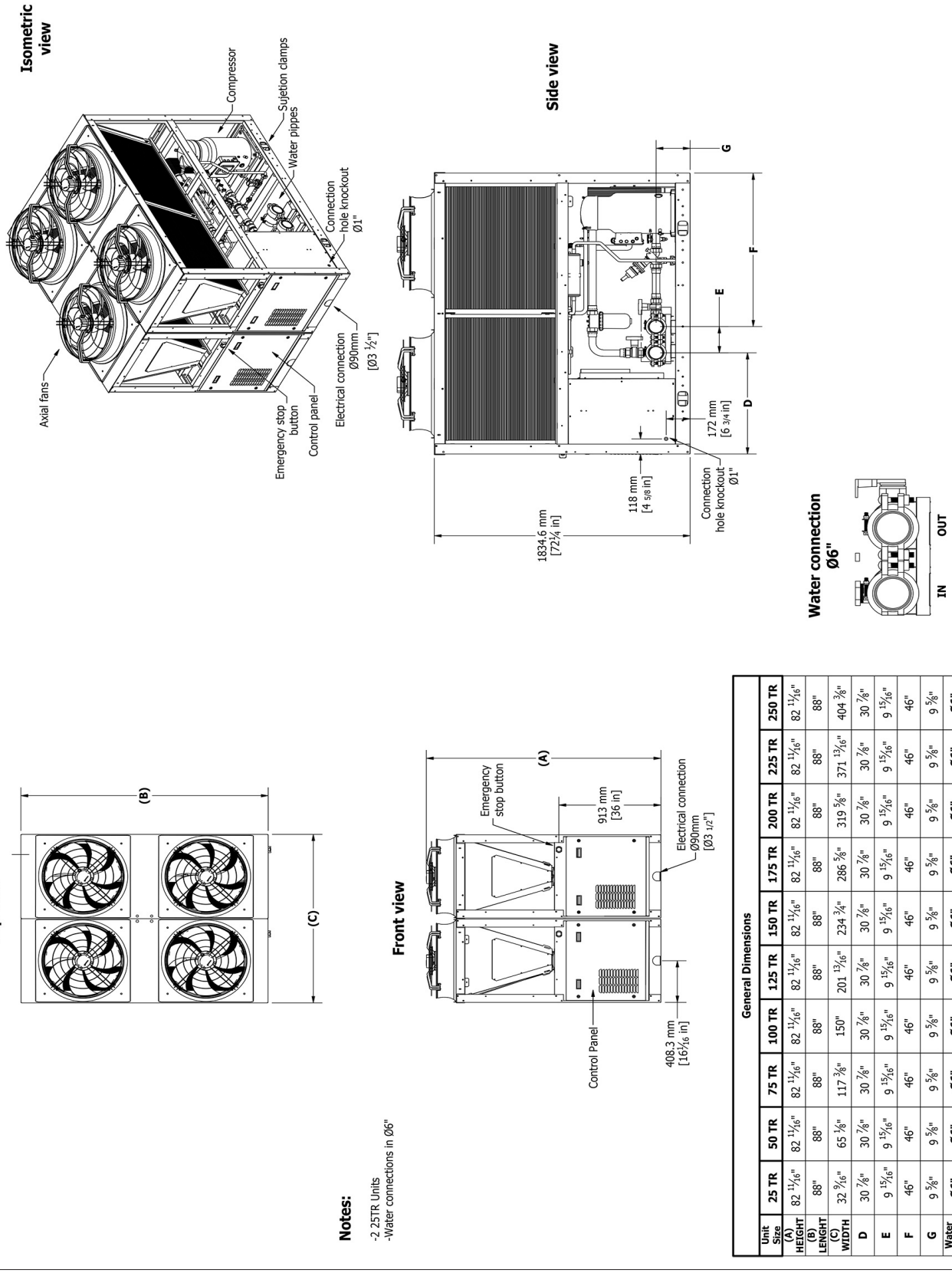


Figure 14. Dimensional configuration 50 RT.



Notes:

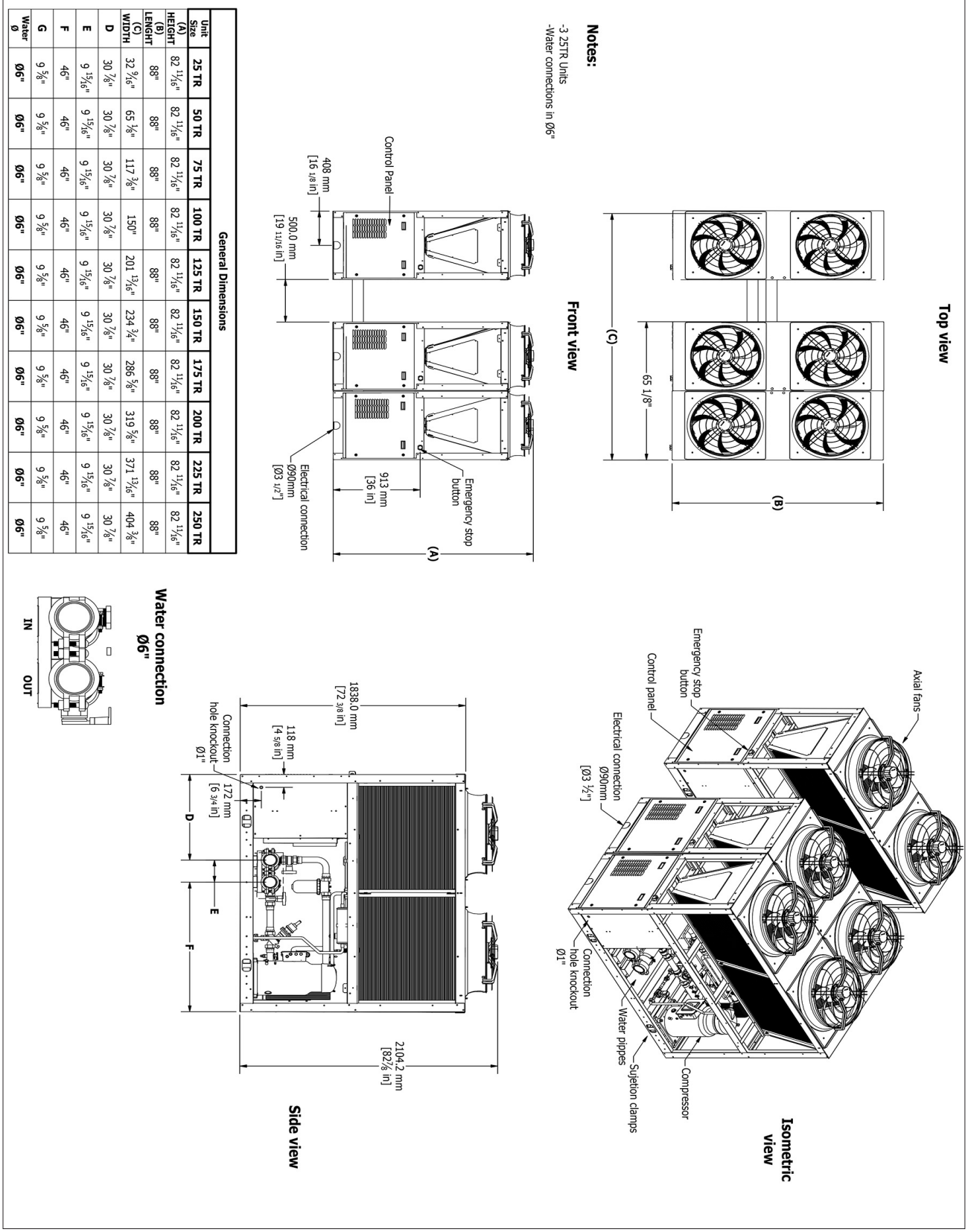
-2 25TR Units
-Water connections in Ø6"

General Dimensions

Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

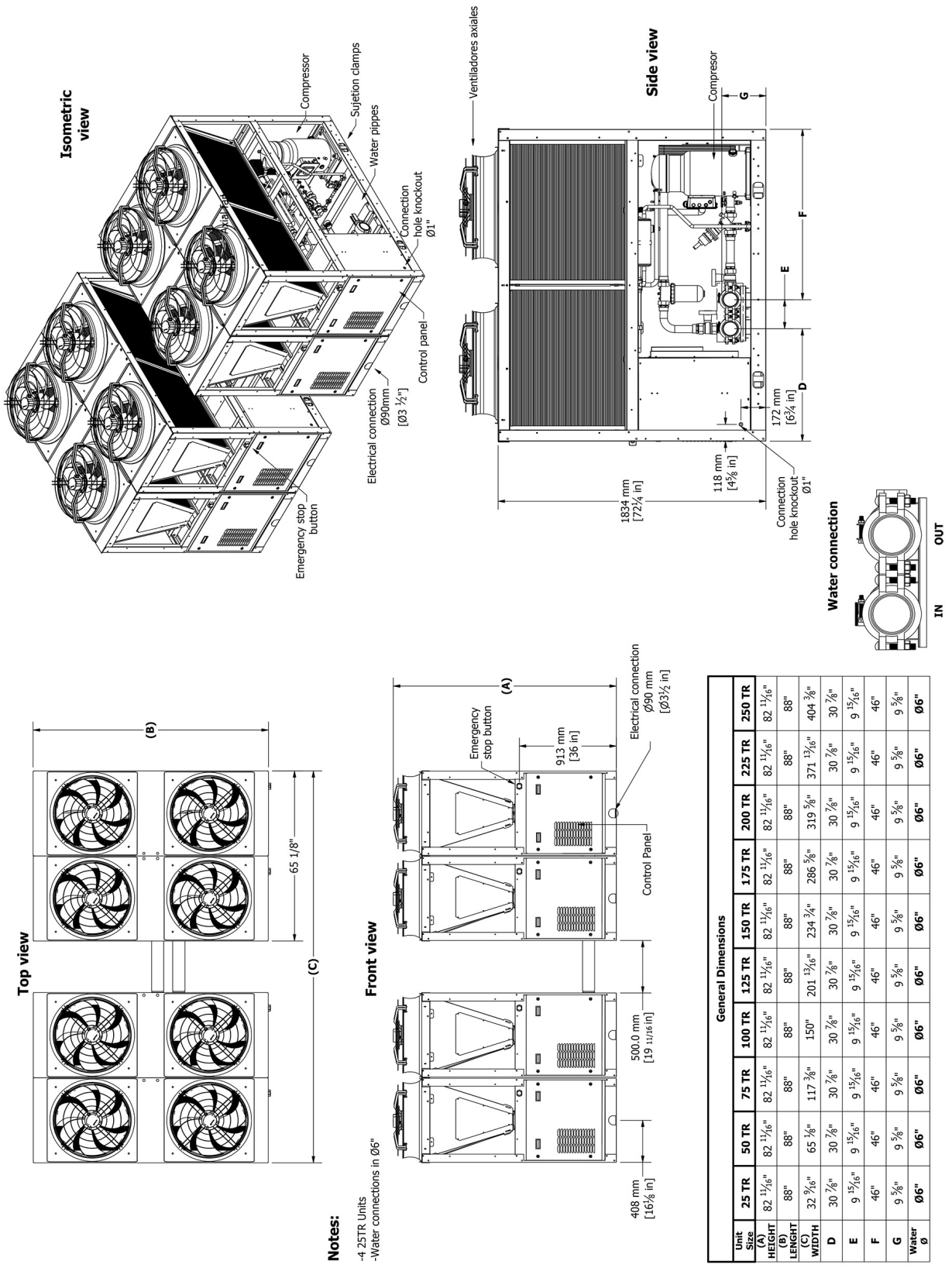
DIMENSIONS - PACKAGED UNITS

Figure 15. Dimensional configuration 75 RT.



Unit Size	General Dimensions									
	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 1/16"	82 1/16"	82 1/16"	82 1/16"	82 1/16"	82 1/16"	82 1/16"	82 1/16"	82 1/16"	82 1/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

Figure 16. Dimensional configuration 100 RT.



Notes:

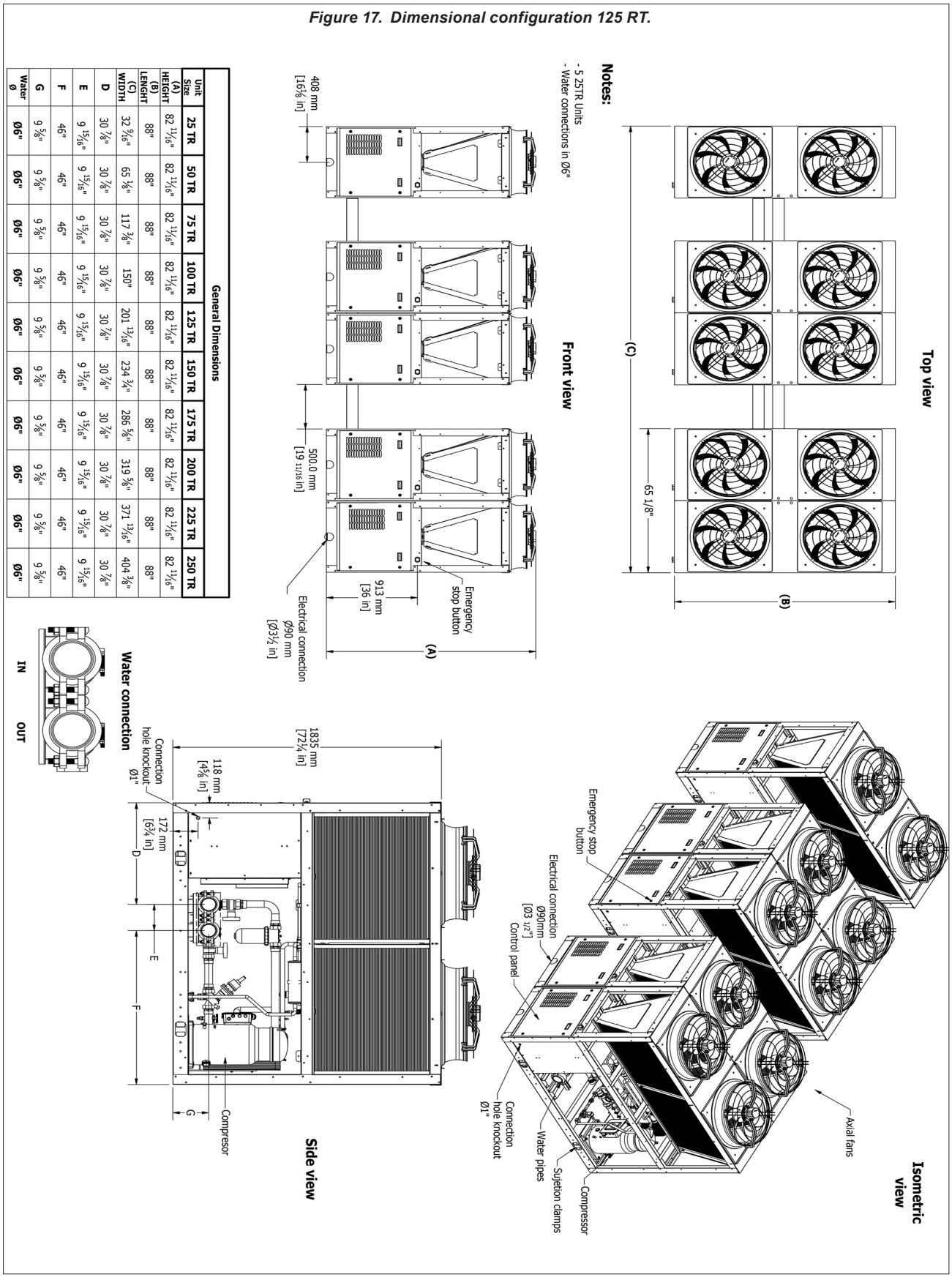
-4 25TR Units
-Water connections in Ø6"

General Dimensions

Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

Dimensions - Packaged Units

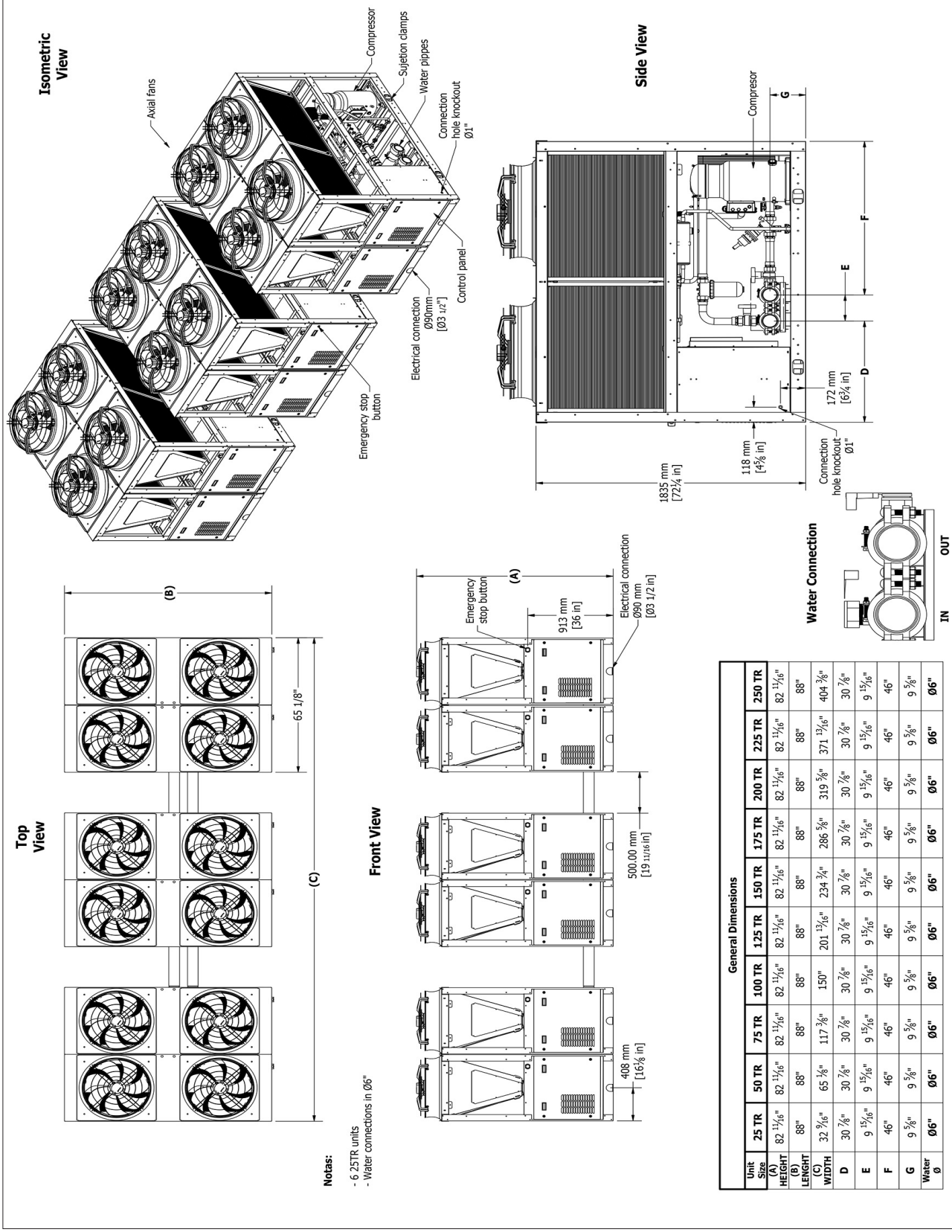
Figure 17. Dimensional configuration 125 RT.



General Dimensions

Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

Figure 18. Dimensional configuration 150 RT.



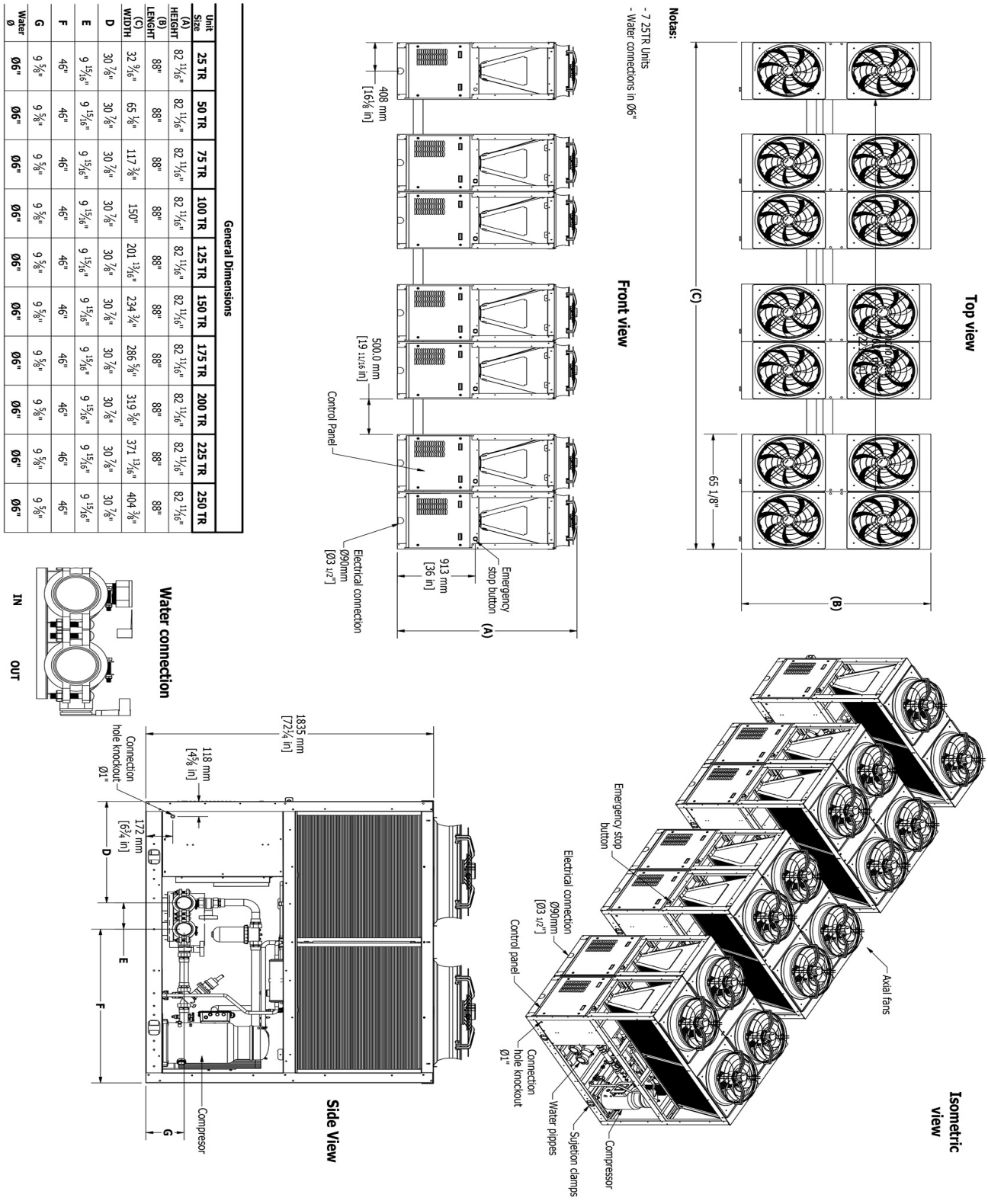
Notas:
- 6 25TR units
- Water connections in Ø6"

General Dimensions

Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

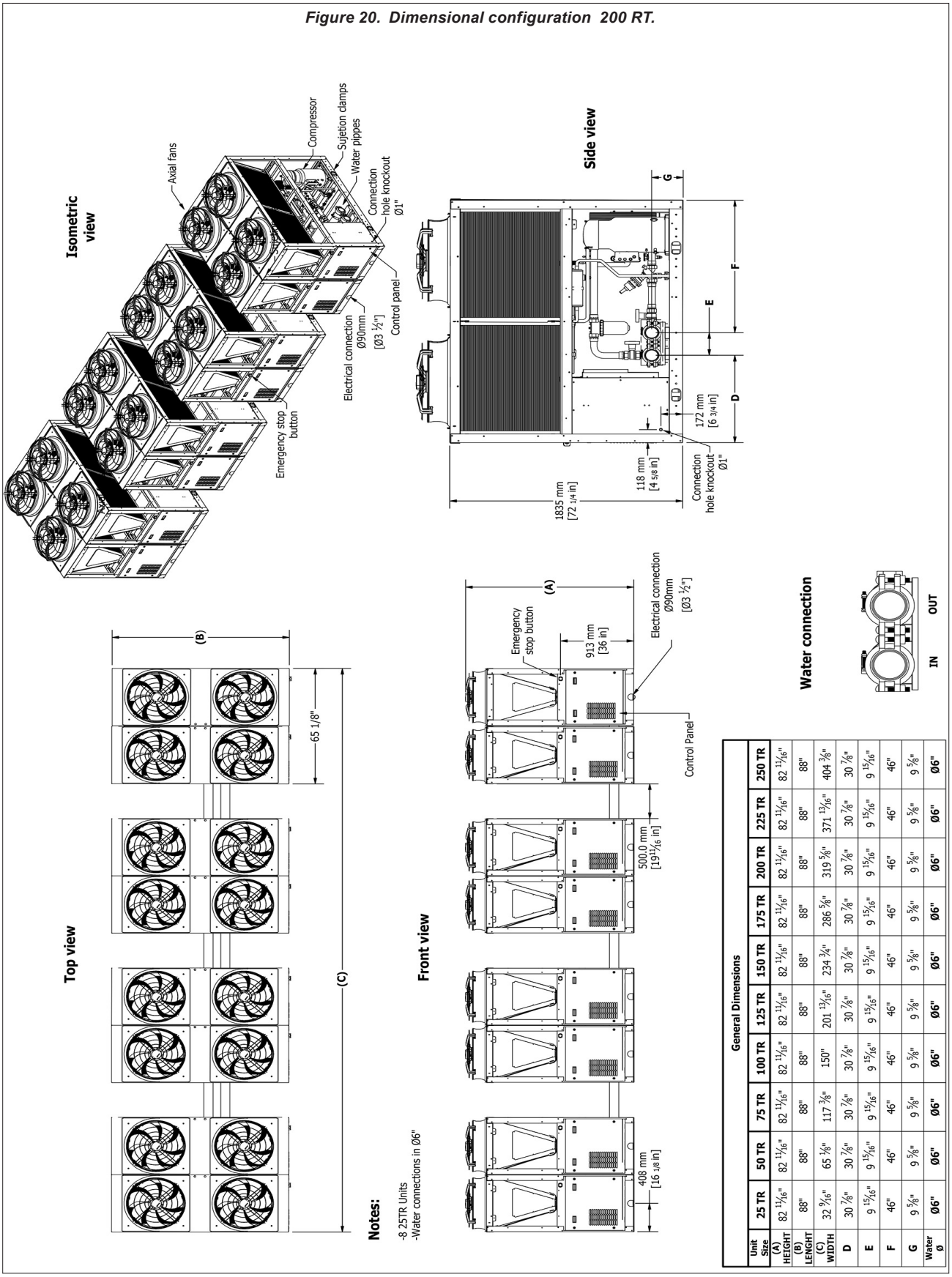
DIMENSIONS - PACKAGED UNITS

Figure 19. Dimensional configuration 175 RT.



Unit Size	General Dimensions										
	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 1/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/4"	117 3/4"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

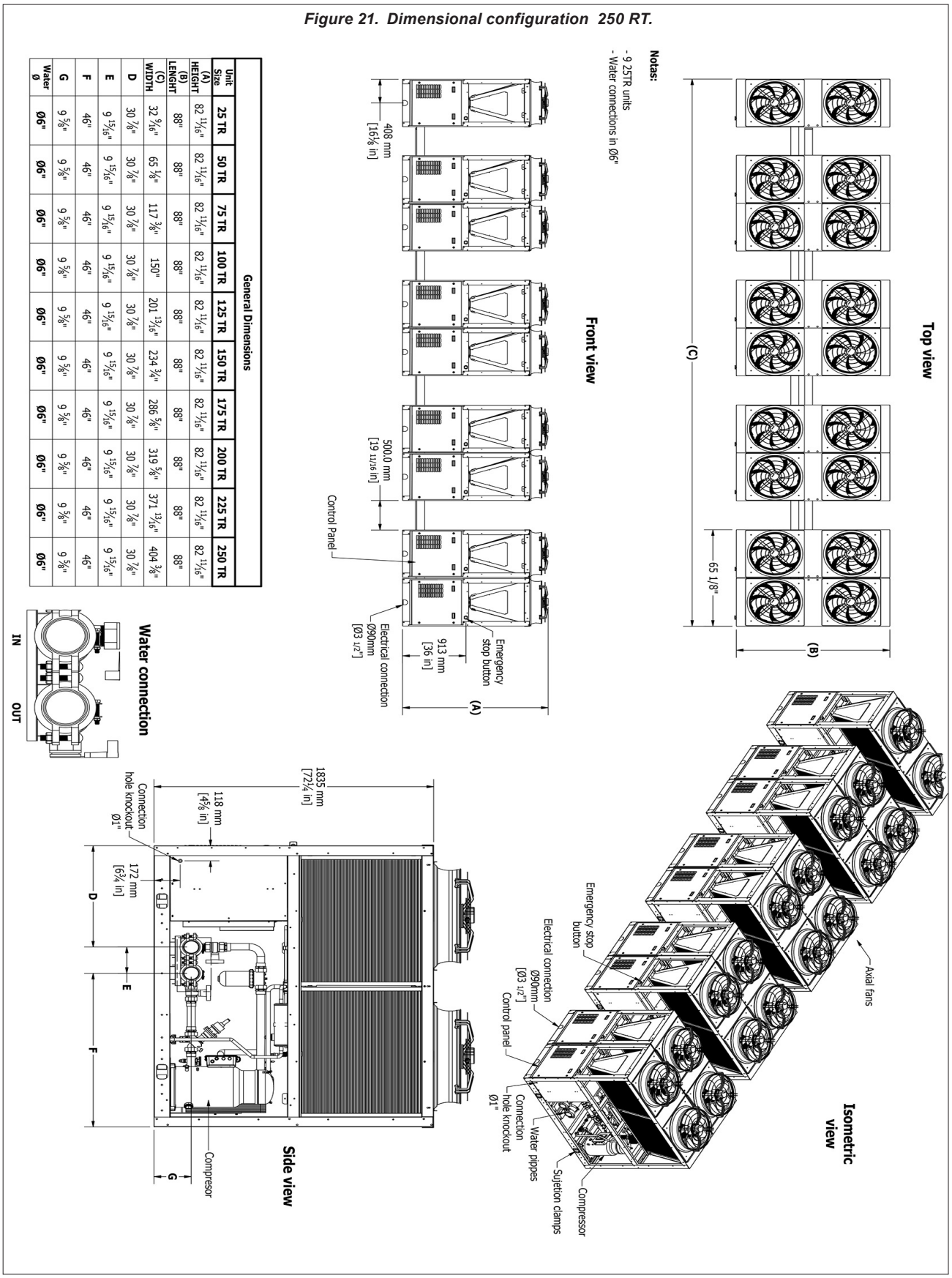
Figure 20. Dimensional configuration 200 RT.



General Dimensions												
Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

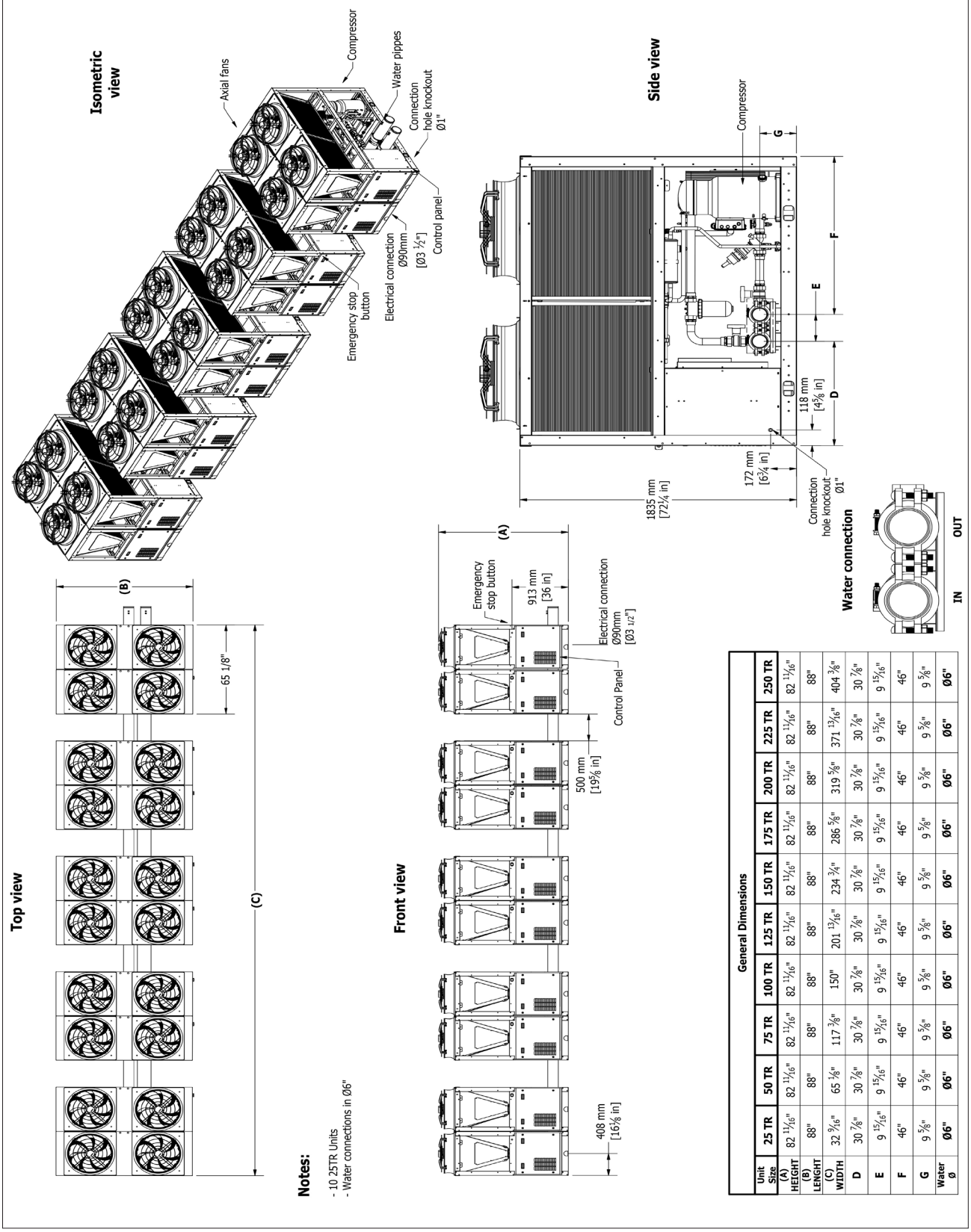
DIMENSIONS - PACKAGED UNITS

Figure 21. Dimensional configuration 250 RT.



General Dimensions											
Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/8"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

Figure 22. Dimensional configuration 250 RT.



General Dimensions

Unit Size	25 TR	50 TR	75 TR	100 TR	125 TR	150 TR	175 TR	200 TR	225 TR	250 TR
(A) HEIGHT	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"	82 11/16"
(B) LENGHT	88"	88"	88"	88"	88"	88"	88"	88"	88"	88"
(C) WIDTH	32 9/16"	65 1/8"	117 3/4"	150"	201 13/16"	234 3/4"	286 5/8"	319 5/8"	371 13/16"	404 3/8"
D	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"	30 7/8"
E	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"	9 15/16"
F	46"	46"	46"	46"	46"	46"	46"	46"	46"	46"
G	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Water Ø	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"	Ø6"

Vacuum PROCEDURE

Anysystemthathasbeenexposedtotheatmospheremustbeproperly dehydrated. This is achieved with a proper vacuum procedure. To achieve a proper vacuum, a VACUUM PUMP (not a compressor) and a VACUOMETER are required.

The procedure is as follows:

- First of all, the access points to the system must be defined. For both the low and high side, use the existing service valves on the condensing unit, i.e. the high pressure switch, connected to the smaller diameter pipe, and the low pressure switch, connected to the larger diameter pipe.
- Once this is done, the system can be evacuated.

Basically, it can be done in two ways:

DILUTION METHOD

1. Turn on the vacuum pump and build up vacuum in the pump (register 1 closed).
2. Open register 1 and let the system evacuate until it reaches at least 500 mcron. To obtain the measurement, close register 1 and open register 2 and make the vacuum gauge feel the system pressure. After reaching 500 mice, isolate the vacuum pump and open register 3, letting the Nitrogen pass through to break the vacuum. Isolate the Nitrogen tube.
3. Vent the Nitrogen through the connection between the copper line and register 3.
4. Repeat the operation at least twice, making the third evacuation in the last phase. At the end at least 200 mice should be obtained.

⚠ WARNING ⚠

Never disconnect the copper tubing from register 3, simply loosen the connection to purge the nitrogen.

To obtain an accurate vacuum value, isolate the vacuum pump from the system by closing register 1 and waiting about 5 minutes for an accurate measurement. If the value does not hold, the system still has moisture or there is a leak. Always check all connections (points 1, 3 and valves).

HIGH VACUUM METHOD

It is applied with a vacuum pump capable of achieving a vacuum of less than 200 microns in a single evacuation. Proceed as follows:

1. Turn on the vacuum pump and then open register 1.
2. Subsequently, isolate the vacuum pump and open register 2.
3. When a value of less than 200 mecrons is obtained (try to reach the lowest possible value), the vacuum procedure is finished.

⚠ WARNING ⚠

The pump oil should be changed periodically to ensure vacuum efficiency.

⚠ WARNING ⚠

Before charging the refrigerant, check the safety data sheet of the refrigerant.

REFRIGERANT CHARGE

⚠ WARNING ⚠

After evacuating the system properly, close the manifold registers and isolate the vacuum pump, vacuum gauge and nitrogen tube.

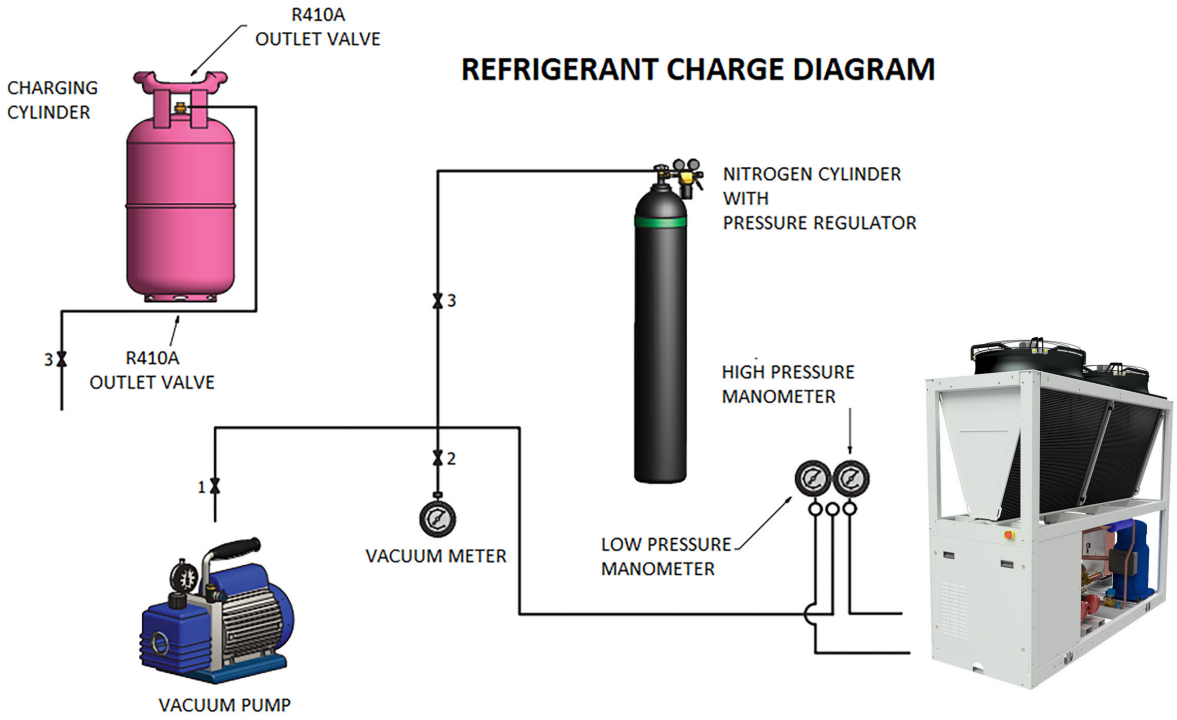
NOTE: To make the refrigerant gas charge replace the nitrogen tube (Figure 23) with a refrigerant gas tube.

1. Purge the hose connecting the tubing to the service valve.
2. Open the service valve that provides access to the refrigerant gas tube and then the manifold discharge port.
3. To properly charge the system, check the unit identification labels for the amount of refrigerant gas to be added to the system.
4. With the system stopped, charge the liquid refrigerant gas through the liquid line service valve (smaller diameter). To assist you, use a scale (if a graduated tube is not used). Wait at least 10 minutes before turning on the equipment.
5. Close the manifold discharge register, open the suction register and with the system running complete the charge with refrigerant gas in gas form (5% to 20% of the total).
6. Check on the scale the weight of the refrigerant gas that was added to the system. If charging is complete, close the manifold suction register, disconnect the suction and discharge hoses and close the pipe register.
7. The charging procedure is complete.

Table 5. Refrigerant charge.

COMPRESSOR	MODEL	R410A (LBS)	R410A (GR)
VZH117	Microchanel	19,07	8650,0
SH295	Microchanel	19,07	8650,0
DSH295	Microchanel	18,00	8164,7
VZH117	Cu/Al	30,00	13607,8
SH295	Cu/Al	30,00	13607,8

Figure 23. Diagram for obtaining vacuum and for refrigerant charge.

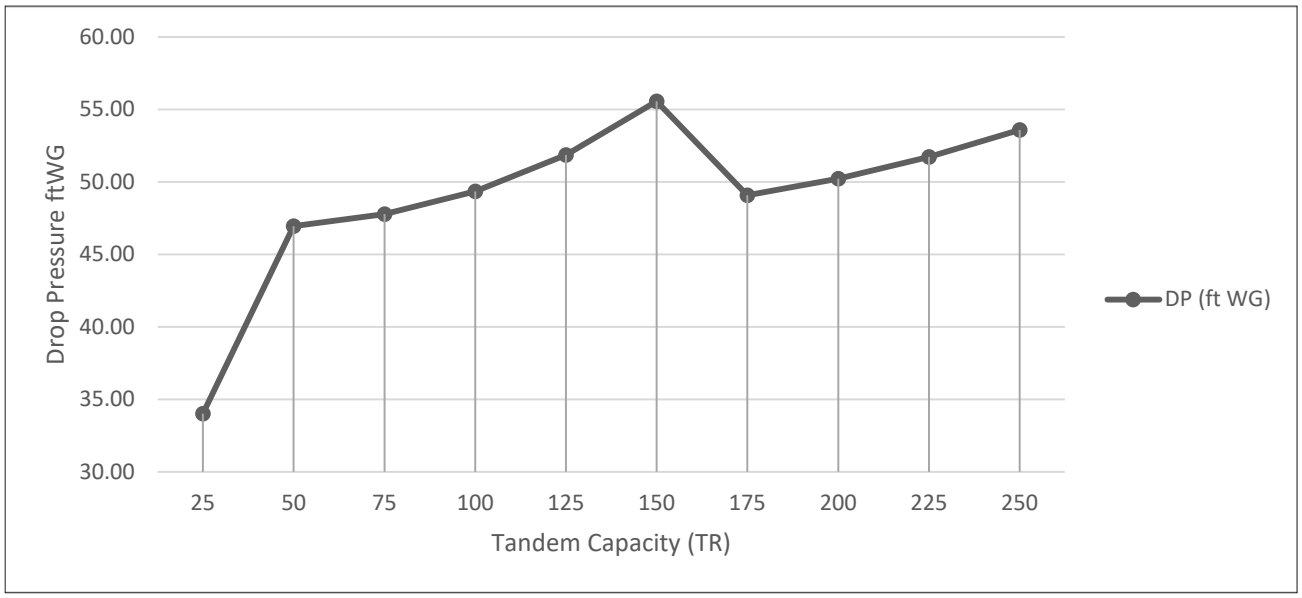


Drop Data

Table 6. Evaporator pressure drop data.

UNIT	CAPACITY	# MODULE	GPM	Φ PIPE SIZE	DP (FT WG)
M	25	1	60	4	34.01
M+E	50	2	120	4	46.94
M+(E*2)	75	3	180	4	47.78
M+(E*3)	100	4	240	4	49.34
M+(E*4)	125	5	300	4	51.86
M+(E*5)	150	6	360	4	55.55
M+(E*6)	175	7	420	6	49.07
M+(E*7)	200	8	480	6	50.23
M+(E*8)	225	9	540	6	51.73
M+(E*9)	250	10	600	6	53.58

Figure 24. Units from 25 to 250 RT.



ELECTRICAL CONNECTION

The required field wiring varies depending on the configuration of the unit. Refer to page 36 for wiring diagram information. Voltage limitations are:

1. Within 10 percent of nameplate rating.
2. Voltage unbalance must not exceed 2 percent. Since a voltage unbalance of 2% can cause a current unbalance of 6 to 10 times the voltage unbalance per NEMA MG-1, it is important that phase-to-phase unbalance be kept to a minimum.

⚠ DANGER ⚠

Qualified and licensed electricians must perform wiring. There is an electrical shock hazard that can cause serious injury or death.

⚠ DANGER ⚠

LOCK OUT / DISCONNECT all power sources before starting, pressurizing, depressurizing or shutting down the chiller. Disconnect electrical power before servicing equipment, including condenser fan motors or compressors. More than one disconnect may be required to deenergize the unit. Failure to comply with this warning can result in serious injury or death. Be sure to read and understand the installation, operating and service instructions in this manual.

Chiller electrical wiring connections may be made with either copper or aluminum wiring, provided the size and number of wires match the chiller terminals. All wiring must be in accordance with applicable local and national codes, including NECA/AA 10402012 for installation of aluminum wiring in buildings (ANSI).
Wiring inside the unit is sized in accordance with the NEC®. Refer to the unit nameplate and unit selection report for correct electrical ratings.

1. The control transformer is supplied and no separate 115V power is required. For single and multipoint power connections, the control transformer is on circuit #1 with control power wired from there to circuit #2. For multipoint power, disconnecting power from circuit #1 disconnects the control power from the unit.

2. The size of the wiring supplied to the control panel shall be in accordance with the field wiring diagram.

3. The single point power supply requires a single disconnect to supply electrical power to the unit. This power supply must have a fuse or use a circuit breaker.

4. All field wiring terminal range values listed in the unit selection report apply to 75°C cable per NEC.
5. It must be grounded per national and local electrical codes.

⚠ CAUTION ⚠

Static discharge during handling of the circuit boards can cause damage to the components. Use an antistatic strap before performing any main tenance work. Never unplug cables, circuit board terminal blocks or plugs while the panel is powered.

USE WITH ON-SITE GENERATORS

Switching from site mains to generator power and vice versa requires the chiller to be off or the power to be disconnected for more than five seconds to avoid sending out-of-phase voltage to the chiller.
A properly installed and fully synchronized automatic transfer switch must be used to transfer power if the chiller is operating under load.

Generator sizing

⚠ WARNING ⚠

The generator should be sized by an electrical engineer familiar with generator applications.

Transfer back to the grid

Proper transfer of power from the standby generator to the grid is essential to prevent damage to the chiller and must be used to ensure proper operation of the unit.

⚠ WARNING ⚠

Stop the chiller before transferring power from the generator to the mains. Transferring power while the chiller is running can cause serious damage to the chiller.

The procedure required to reconnect generator power to the mains is as follows:

1. Set the generator to always run five minutes longer than the unit start timer, which can be set from two to sixty minutes, while keeping the chiller powered by the generator until the fully synchronized Automatic Transfer Switch properly delivers chiller power from the site.

2. Set the transfer switch supplied with the generator to automatically shut down the chiller before the transfer is made. The automatic shutdown function can be accomplished through a BAS interface or with the “remote on/off” wiring connection shown in the field wiring diagrams. A start signal can be given at any time after the stop signal, as the three-minute start timer will be in effect.

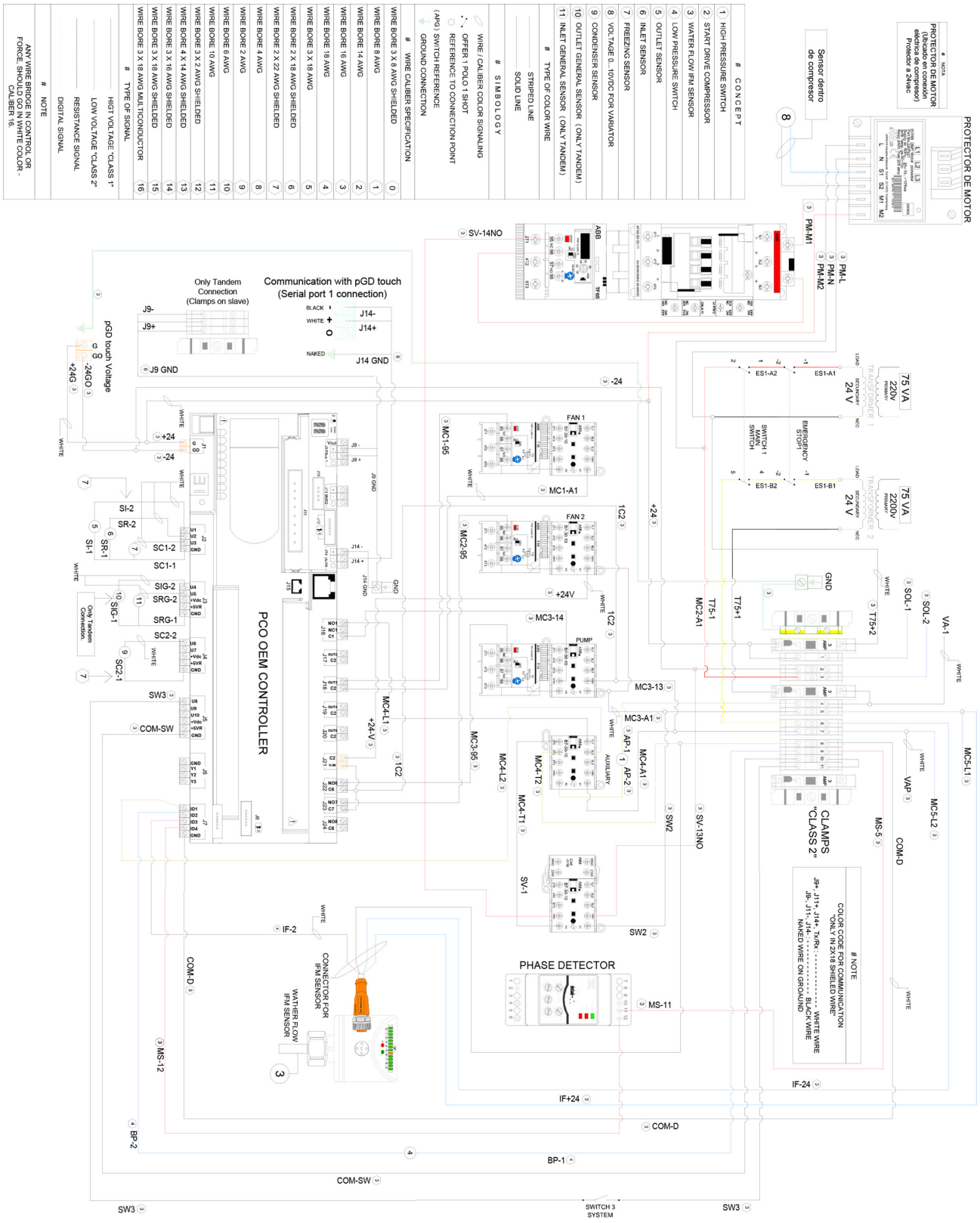
⚠ WARNING ⚠

Electric shock danger. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded. Control panel connections and maintenance should be performed only by personnel knowledgeable in the operation of the equipment being controlled. Disconnect electrical power before servicing equipment. Be sure to install a earth leakage breaker. Failure to install a earth leakage breaker may result in electric shock or fire.

⚠ WARNING ⚠

When installing the earth leakage protector make sure that it is compatible with the inverter (resistant to high frequency electrical noise) to avoid unnecessary opening of the earth leakage protector.

Figure 25. Typical field wiring diagram of the 220V fixed master single chiller unit (single point connection with all options shown)



ELECTRICAL DATA

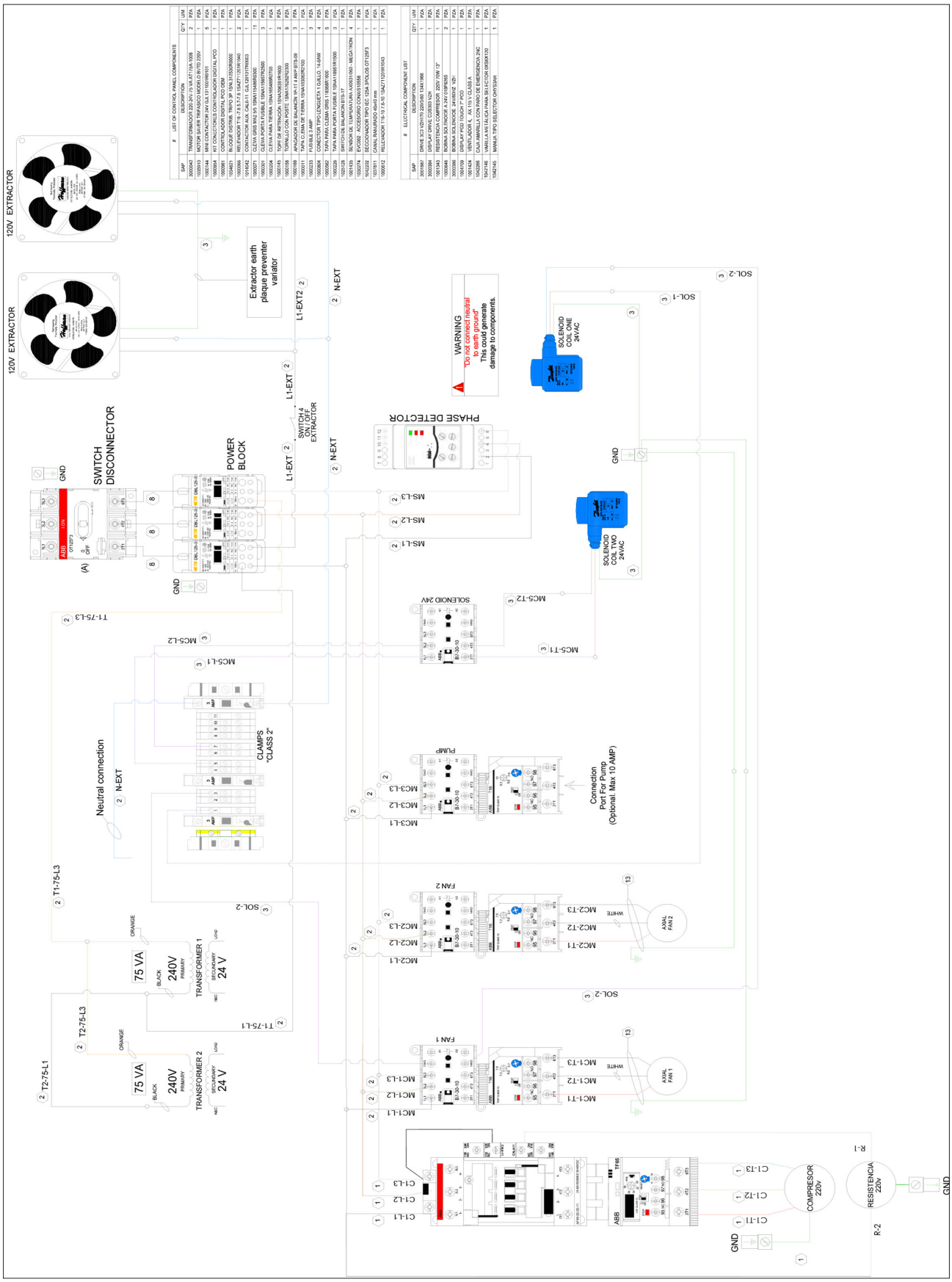
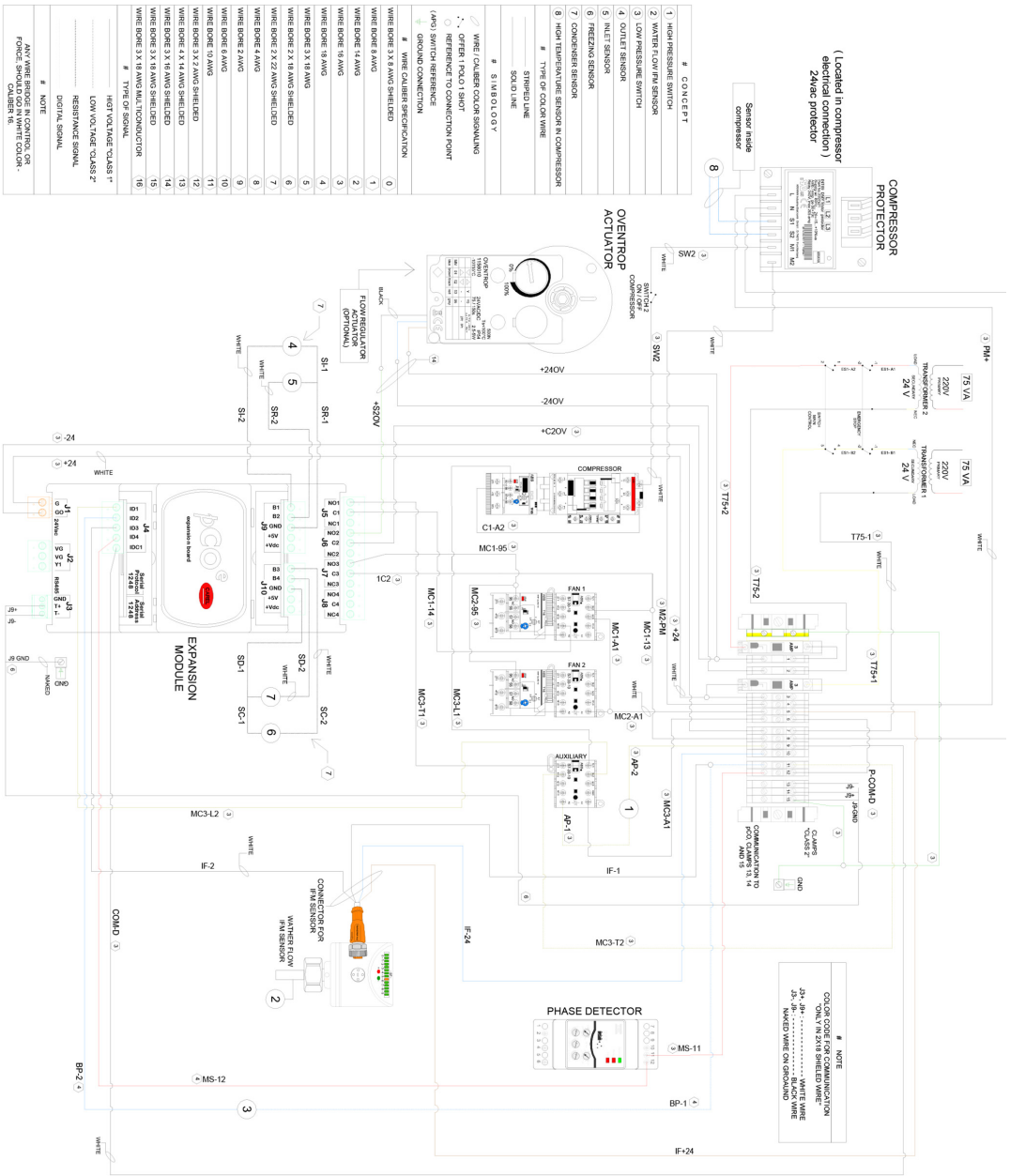
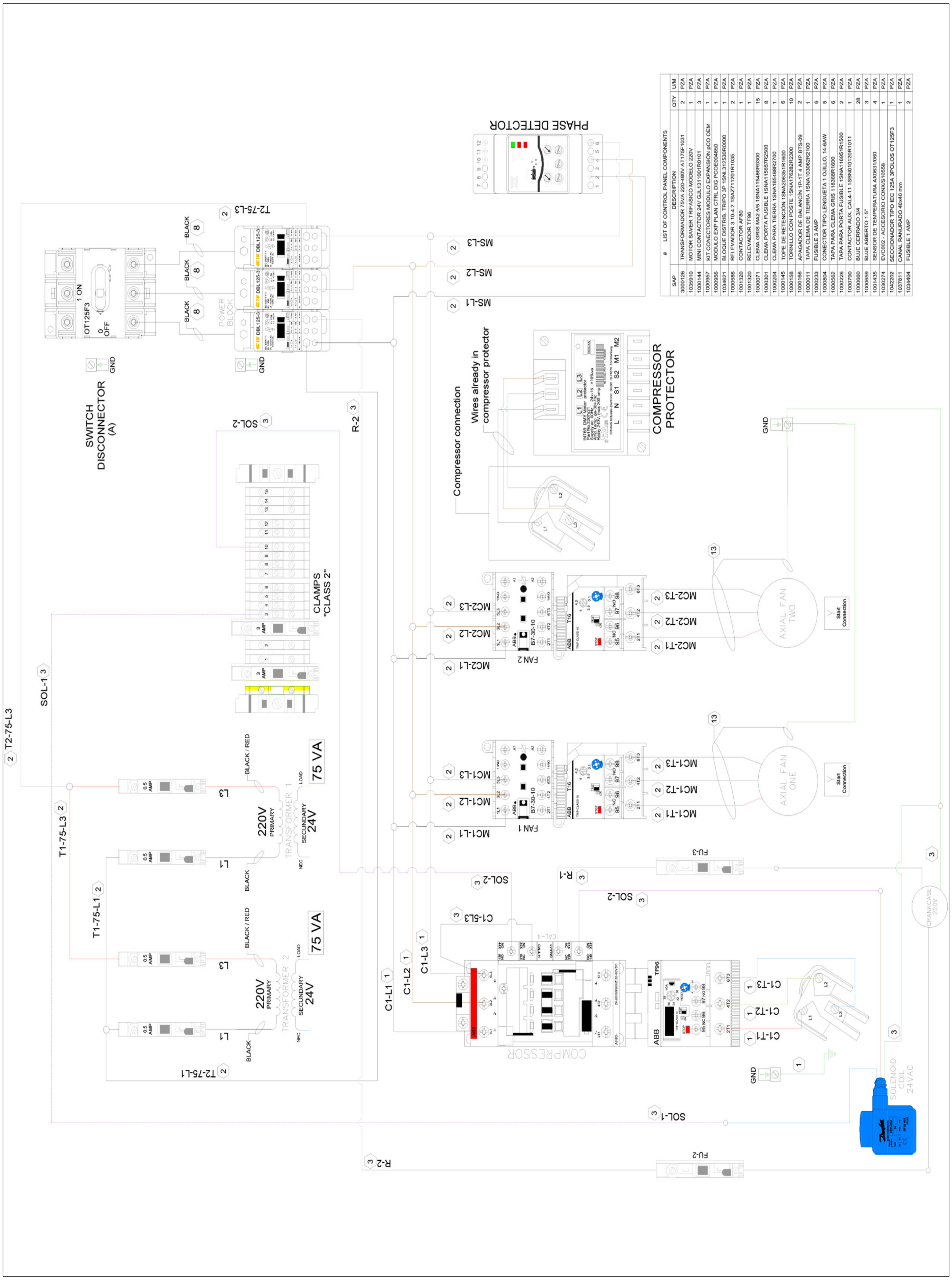


Figure 26. Typical field wiring diagram of the 220V slave single cold unit (single point connection with all options shown)

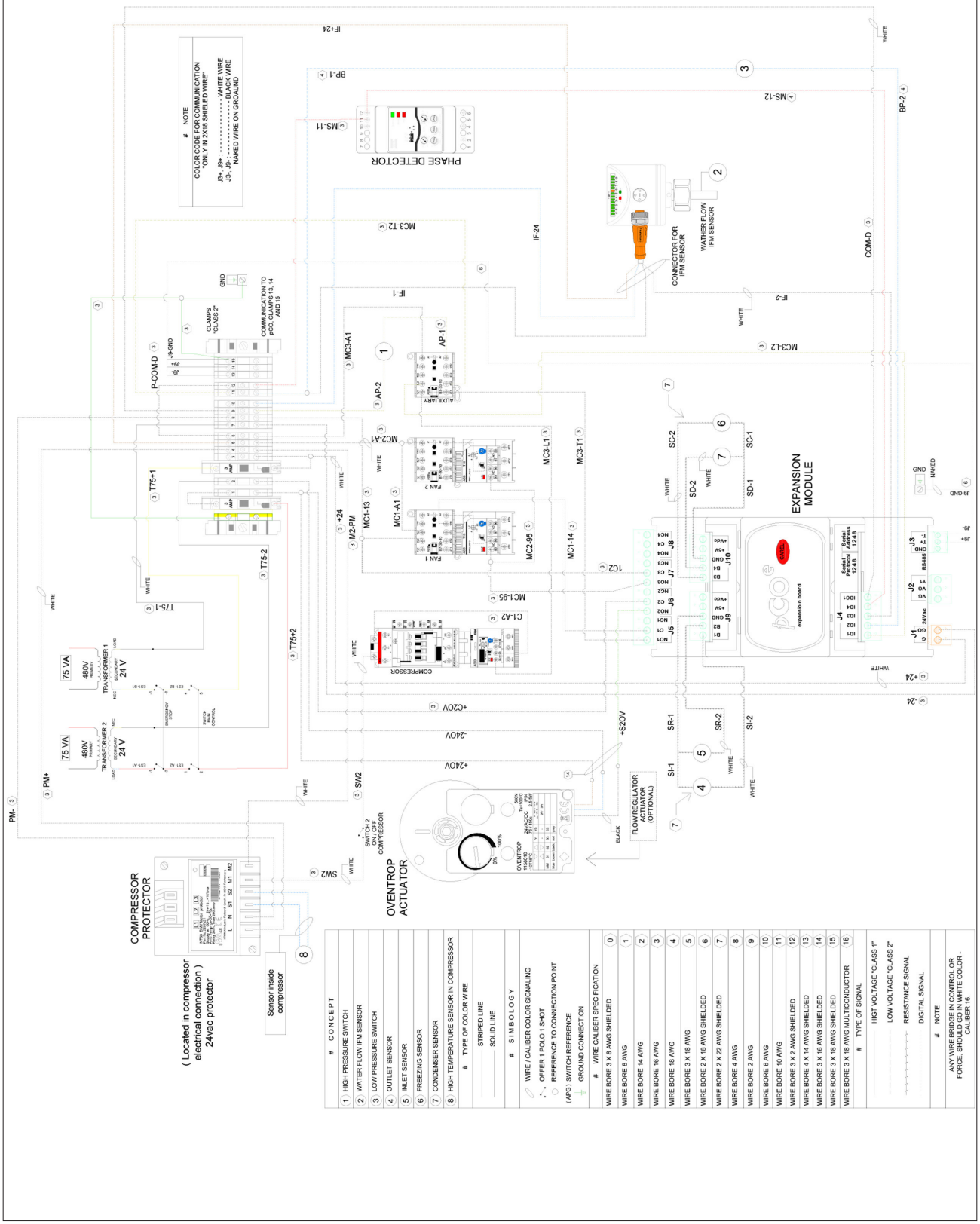


ELECTRICAL DATA



SAP	# LIST OF CONTROL PANEL COMPONENTS DESCRIPTION	QTY	U/M
3000126	TRANSFORMADOR 75VA 220-480V AT175F1031	2	PZA
1035910	MOTOR SAVER TRIFASICO MODELO 220V	1	PZA
1000144	MINI CONTACTOR 24V GJL1311001R0101	3	PZA
1000957	KIT CONECTORES MODULO EXPANSIÓN pCO OEM	1	PZA
1000956	MODULO EXP PLAN CTRL DIG PCOE004850	1	PZA
1034621	BLOQUE DISTRIB. TRIPO 3P 1SNL312530R0000	1	PZA
1000586	RELEVADOR 3.10-4.2 1SAZ711201R1035	2	PZA
1001320	CONTACTOR AF80	1	PZA
1001320	RELEVADOR TF96	1	PZA
1000071	CLEMA GRIS MA2 5/5 1SNA115486R0300	15	PZA
1000301	CLEMA PORTA FUSIBLE 1SNA115657R2500	8	PZA
1000204	CLEMA PARA TIERRA 1SNA165488R2700	1	PZA
1000145	TOPE DE RETENCIÓN 1SNA206351R1600	6	PZA
1000158	TORNILLO CON POSTE 1SNA176282R2300	10	PZA
1000166	APAGADOR DE BALANCÍN 1P-1T 4 AMP BTS-09	2	PZA
1000011	TAPA CLEMA DE TIERRA 1SNA103062R2100	1	PZA
1000233	FUSIBLE 3 AMP	6	PZA
1000804	CONECTOR TIPO LENGUETA 1 OJILLO, 14-6AW	5	PZA
1000562	TAPA PARA CLEMA GRIS 118368R1600	6	PZA
1000226	TAPA PARA PORTA FUSIBLE 1SNA116951R1500	2	PZA
1000790	CONTACTOR AUX. CAL4-11 1SBN010120R1011	1	PZA
1000660	BUJE CERRADO 3/4	28	PZA
1000659	BUJE ABIERTO 1.5"	3	PZA
1001435	SENSOR DE TEMPERATURA AX0631/060	4	PZA
1030274	EVC002 - ACCESORIO CONX/S10558	1	PZA
1042202	SECCIONADOR TIPO IEC 125A 3POLOS OT125F3	1	PZA
1037811	CANAL RANURADO 40x40 mm	1	PZA
1034404	FUSIBLE 1 AMP	2	PZA

Figure 27. Typical field wiring diagram of 440V slave single cold unit (single point connection with all options shown)



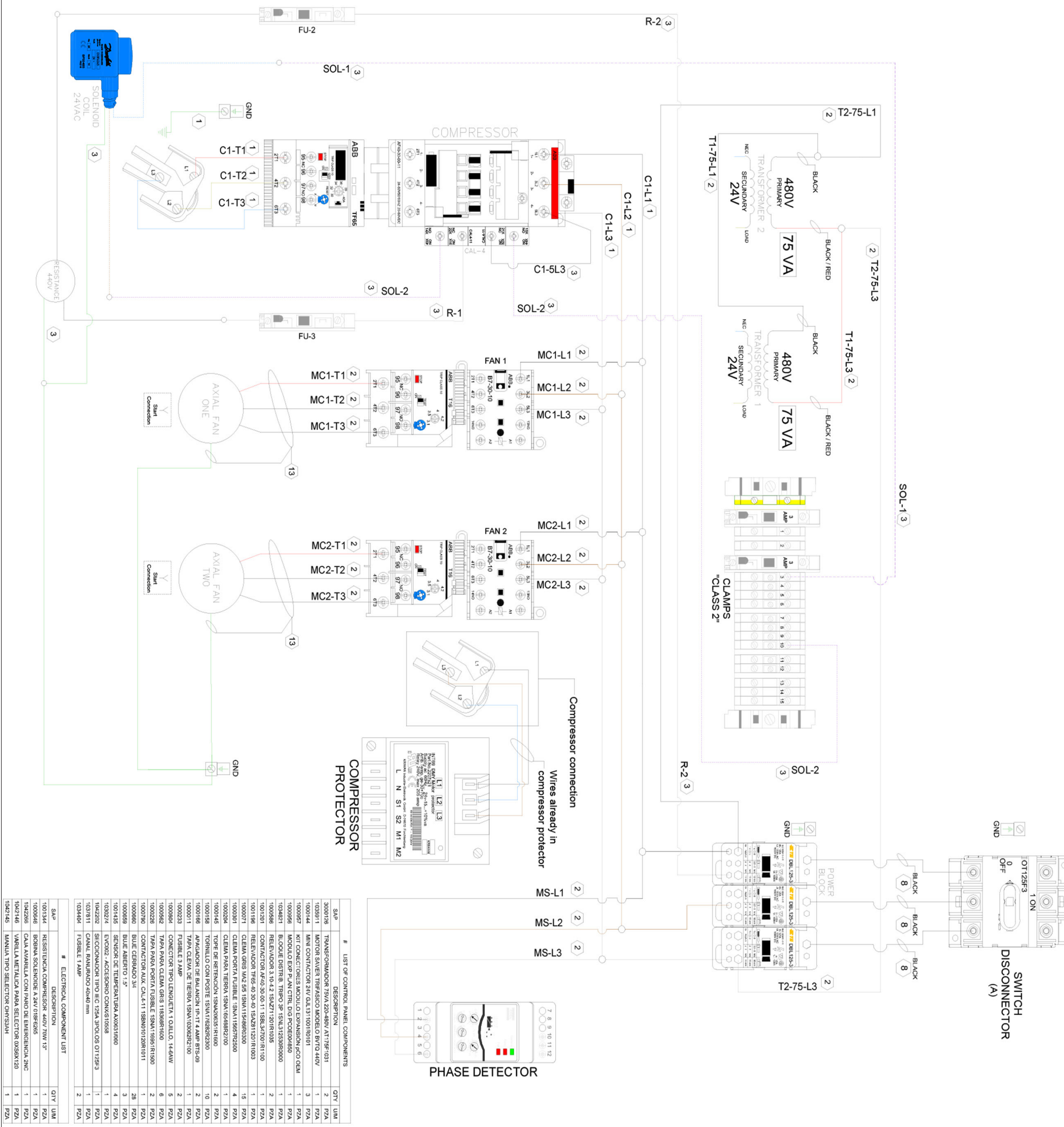
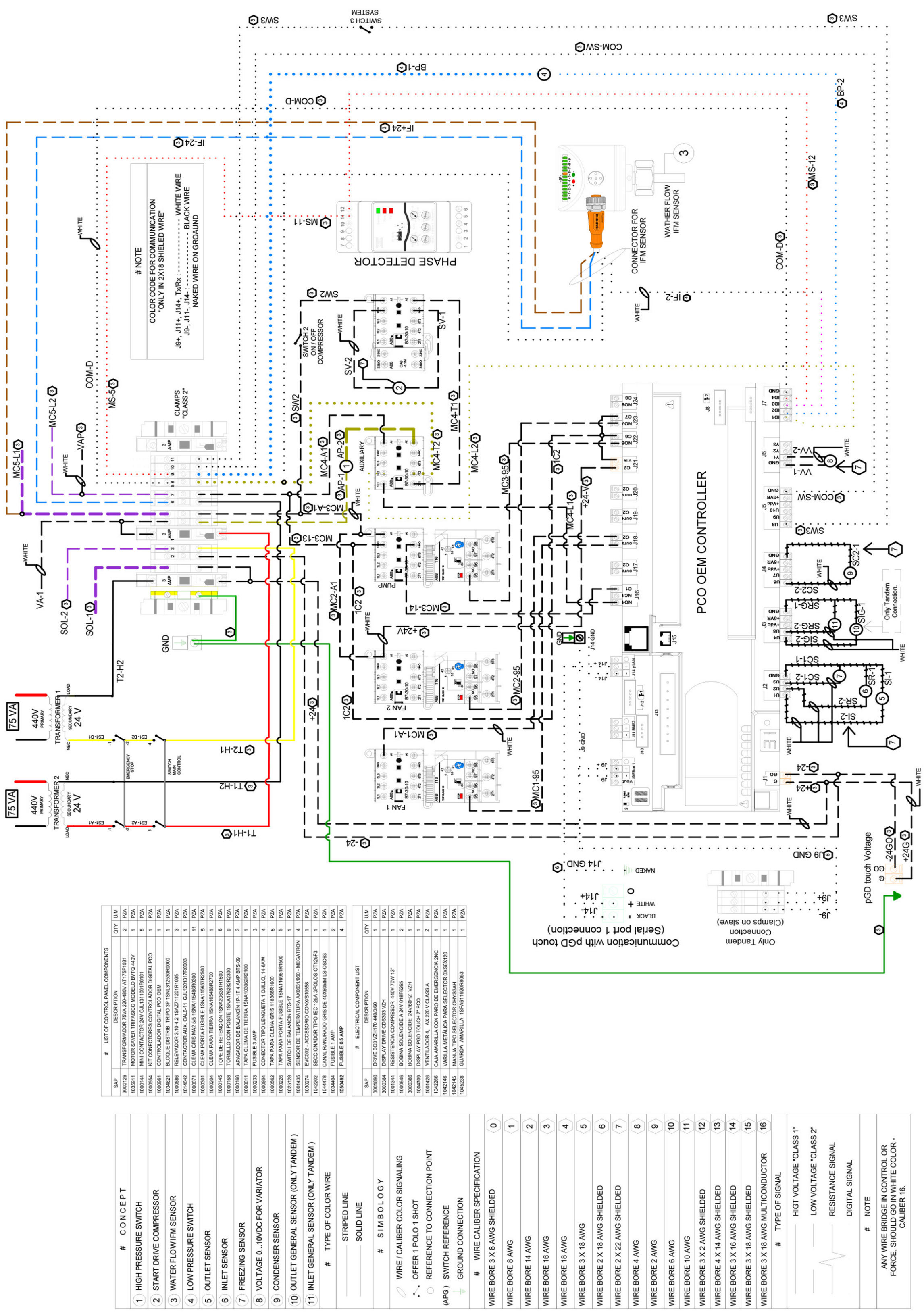
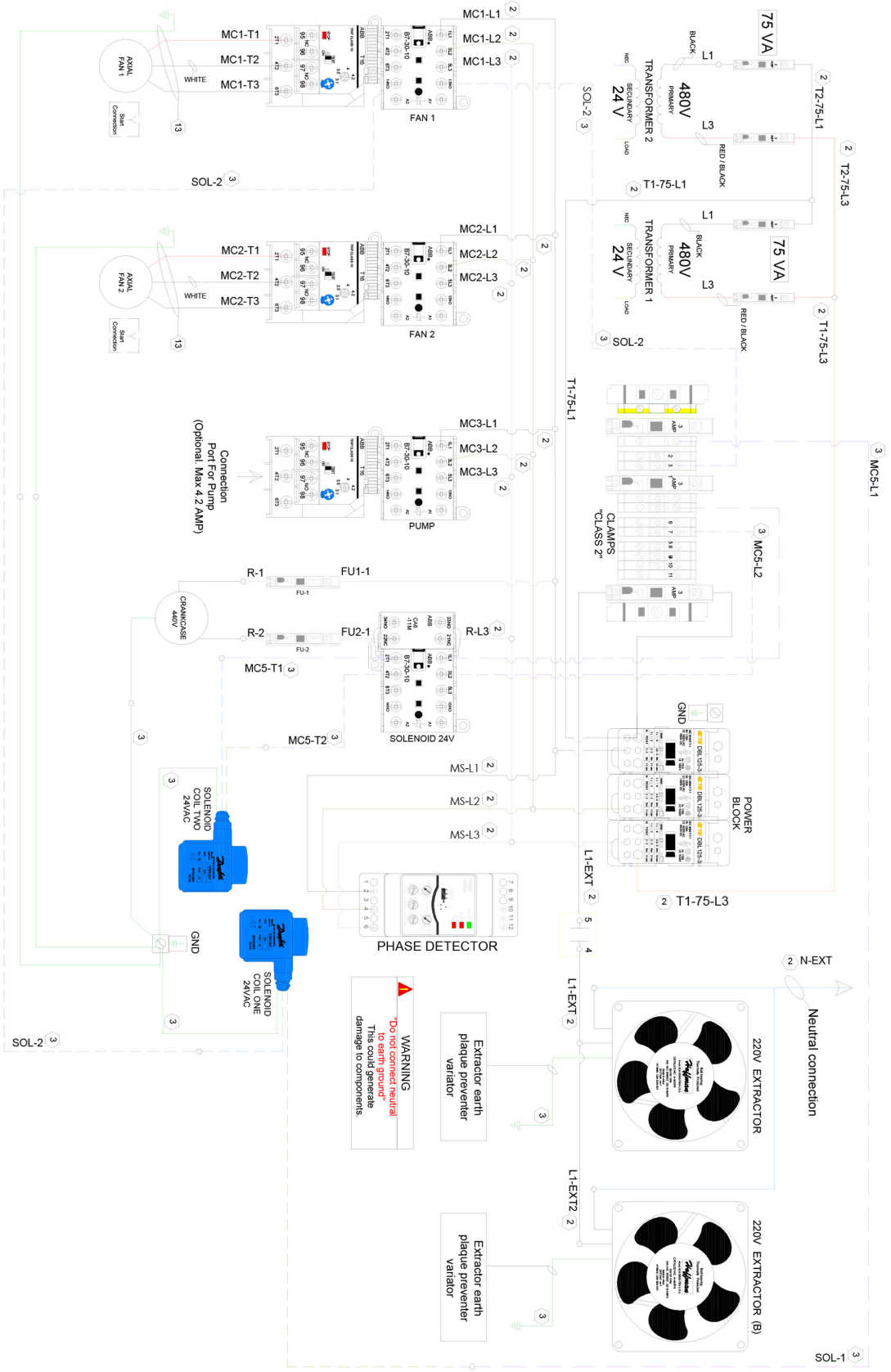

FU-2
R-2
SOL-1
C1-T1
C1-T2
C1-T3
C1-L1
C1-L2
C1-L3
C1-5L3
SOL-2
R-1
FU-3
FAN 1
MC1-L1
MC1-L2
MC1-L3
MC1-T1
MC1-T2
MC1-T3
FAN 2
MC2-L1
MC2-L2
MC2-L3
MC2-T1
MC2-T2
MC2-T3
MS-L1
MS-L2
MS-L3
T2-75-L3
PHASE DETECTOR

Figure 28. Typical field wiring diagram of 440V master cool only unit (single point connection with all options shown)



ELECTRICAL DATA



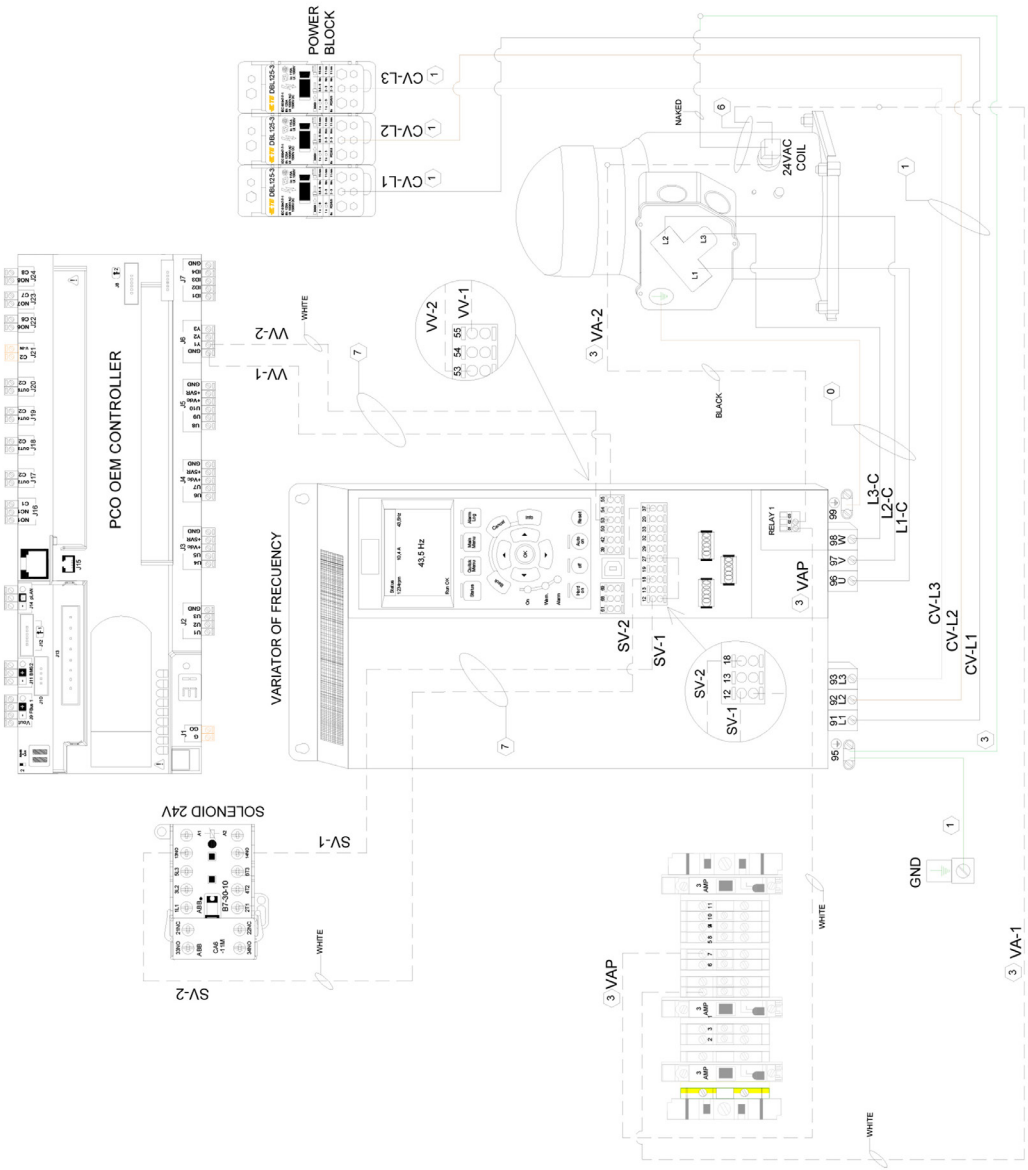
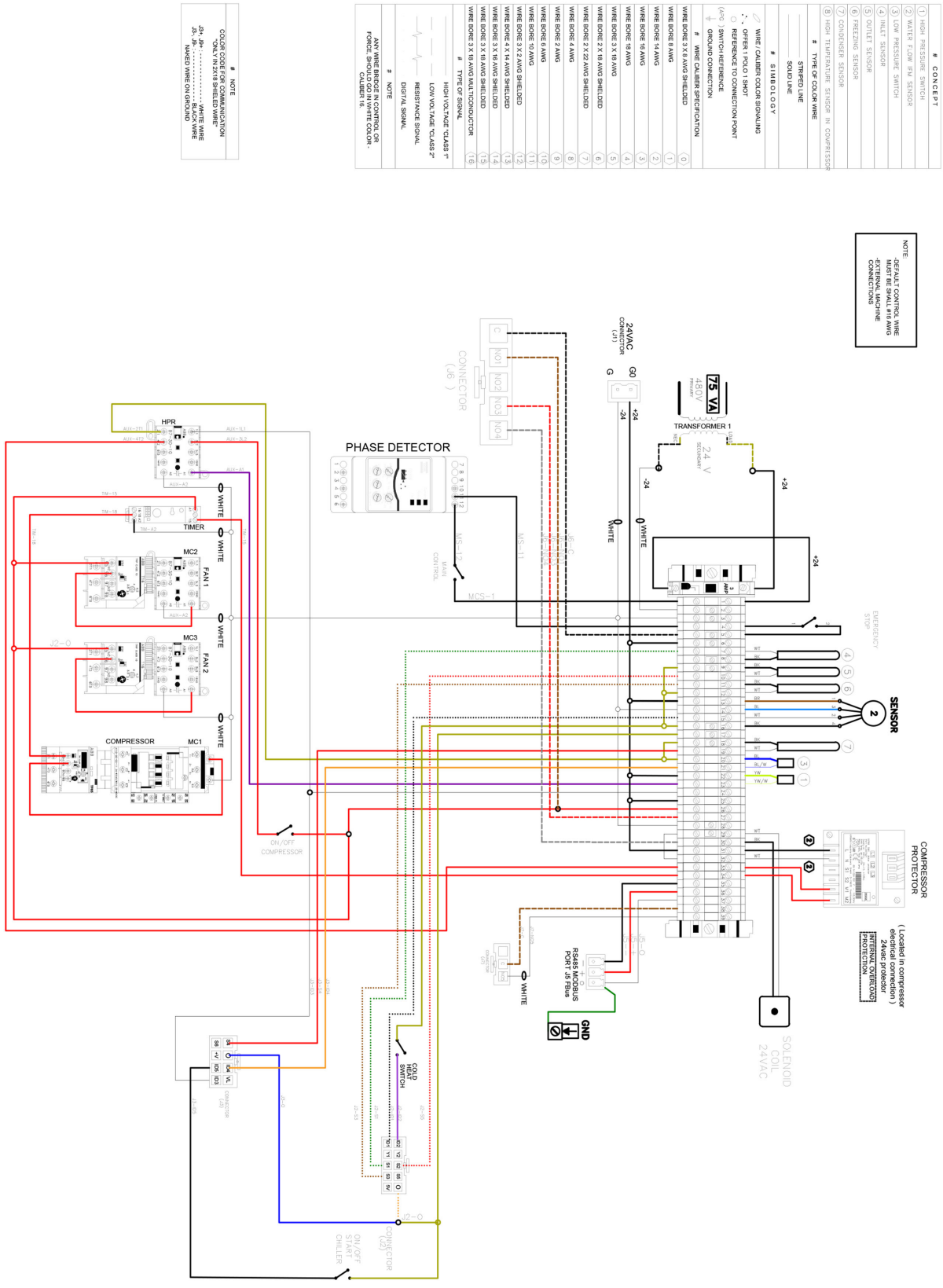
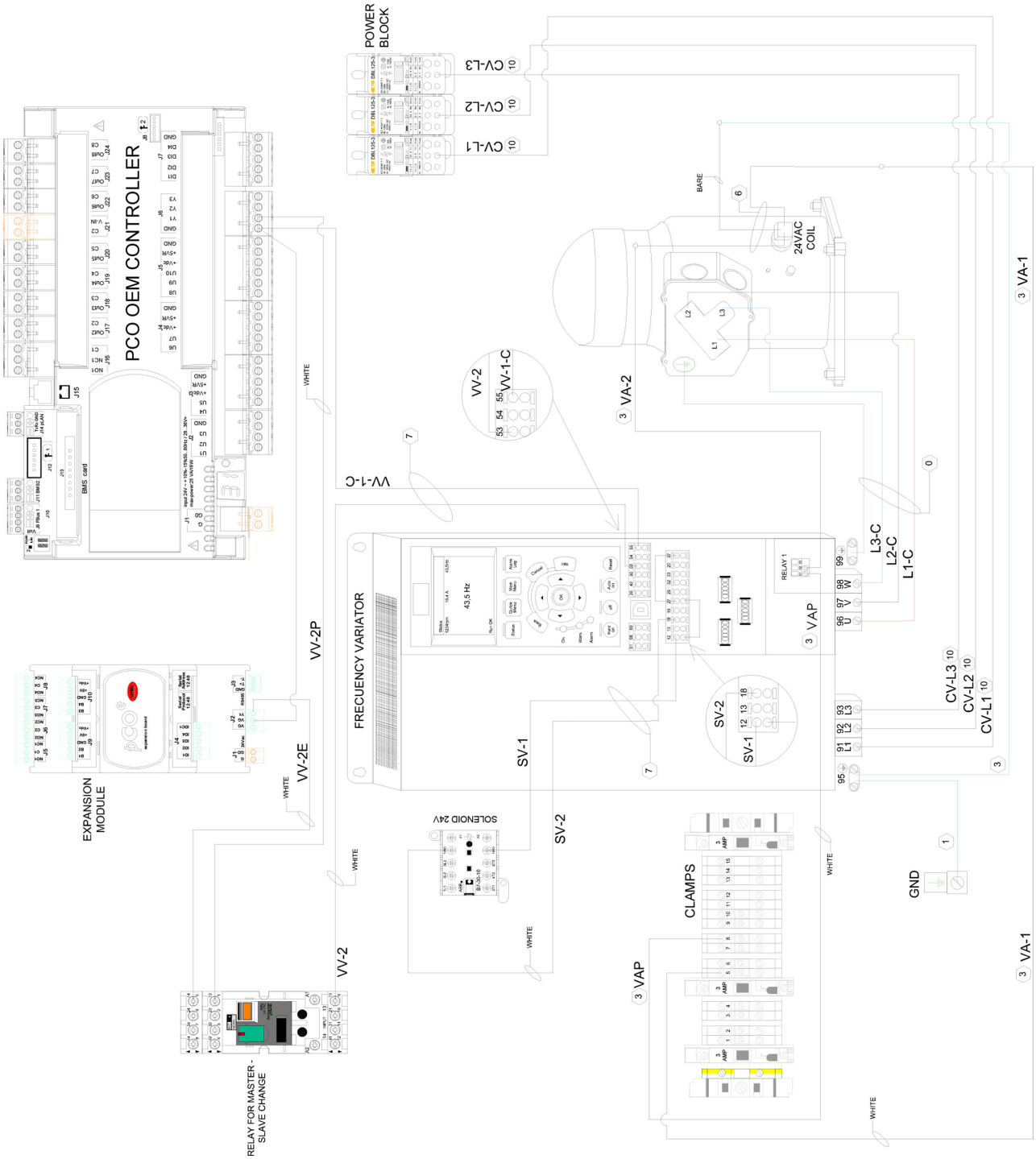

POWER BLOCK
CV-L3
CV-L2
CV-L1
NAKED
24VAC COIL
PCO OEM CONTROLLER
VARIATOR OF FRECUENCY
VV-2
VV-1
VA-2
BLACK
WHITE
SV-2
SV-1
VAP
L3-C
L2-C
L1-C
CV-L3
CV-L2
CV-L1
SOLENOID 24V
GND
VA-1

Figure 29. Typical 440V slave heat pump unit field wiring diagram (single point connection with all options shown)




POWER BLOCK
CV-L3
CV-L2
CV-L1
PCO OEM CONTROLLER
BMS card
VV-1-C
VV-2
VV-1-C
VA-2
BARE
24VAC COIL
VA-1
FRECUENCY VARIATOR
43,5 Hz
VAP
L3-C
L2-C
L1-C
CV-L3
CV-L2
CV-L1
SV-2
SV-1
SV-1
SV-2
SOLENOID 24V
CLAMPS
GND
VV-2P
VV-2E
VV-2
WHITE
EXPANSION MODULE
RELAY FOR MASTER - SLAVE CHANGE

GENERAL DESCRIPTION

The pCOOEM+ is an electronically programmable microprocessor-based controller that is fully compatible (software and hardware) with the pCO family of products and systems that include programmable controllers, user terminals, gateways, communication devices and remote device management. These devices represent a powerful control system that can be easily linked with the vast majority of Building Management Systems (BSM) available on the market.

The controller menu can be accessed from a touch screen, this screen has all the parameters and the operating status of the equipment. The pCOOEM+ continuously performs pre-fault scans of the equipment status to prevent damage to parts and components if a fault occurs.
The controller menu contains different screens and submenus that provide the operator or service technician with a complete overview of:

1. User.
2. Maintenance.
3. Service Manufacturing

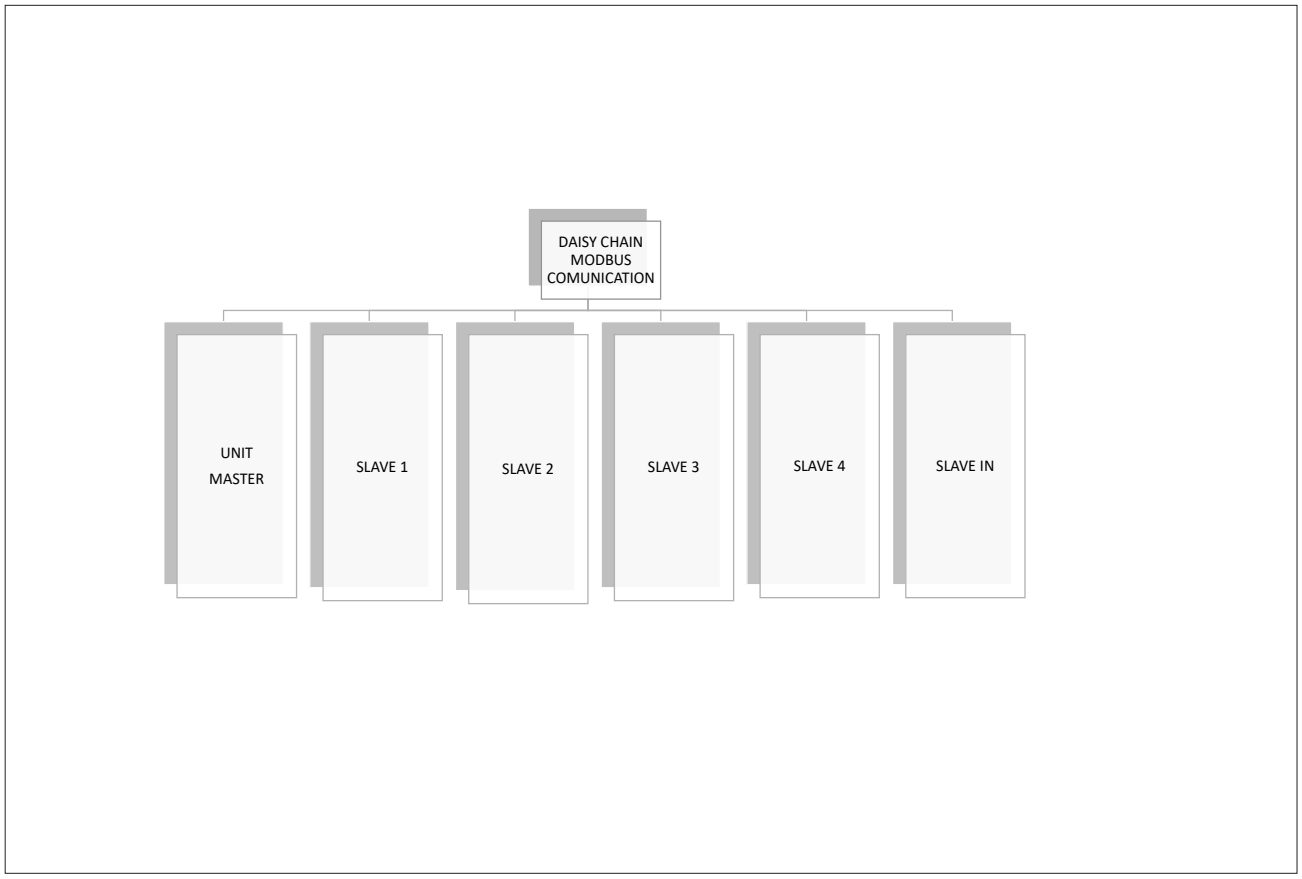
SYSTEM ARCHITECTURE

The general architecture of the controls uses the following

- Unit controller.
- E/S extension modules as required based on the unit configuration.
- Communications interface slave modules.
- The units in the architecture have a configuration based on a MASTER unit and unit E/S slaves, these slaves can be connected via rs485 serial Modbus and can be configured from the configuration screen.

All E/S slave modules can be connected directly or via a wiring harness.
The connection order of the slaves can be from left to right or from right to left, always respecting the master as the main unit.

Figure 30. System Architecture



CONTROLLER INPUTS AND OUTPUTS

The configuration of the inputs and outputs depends on the initial configuration screen for the first time in this case the table shows the assigned inputs and outputs of each configuration in this case when cold mode is selected the description code is CO AIR and when heat mode is selected the description code is HP AIR.

Table 7. Analog inputs of the MASTER unit

#	COLD AIR TYPE DESCRIPTION	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
U1	INJECTION	INJECTION	NTC	NTC Thermistor R25=10KΩ +1% β25/85=3435K +1% -discrete type (No SMD
U2	RETURN	RETURN	NTC	NTC Thermistor R25=10KΩ +1% β25/85=3435K +1% - discrete type (No SMD)
U3	FREEZING	FREEZING	NTC	NTC Thermistor R25=10KΩ +1% β25/85=3435K +1% - discrete type (No SMD)
U4	GENERAL RETURN	GENERAL RETURN	NTC	NTC Thermistor R25=10KΩ +1% β25/85=3435K +1% - discrete type (No SMD)
U5	GENERAL INJECTION	GENERAL INJECTION	NTC	NTC Thermistor R25=10KΩ +1% β25/85=3435K +1% - discrete type (No SMD)
U6	CONDENSER TEMPERATURE	CONDENSER TEMPERATURE	NTC	NTC Thermistor R25=10KΩ +1% β25/85=3435K +1% - discrete type (No SMD)
U7	RECOVERY	RECOVERY	N/A	N/A

Table 8. Digital inputs of the MASTER unit

#	DESCRIPTION COLD AIR TYPE	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
U9	N/A	SELECTOR	DRY CONTACT	N/A
ID1	HIGH PRESSURE	HIGH PRESSURE	DRY CONTACT	N/A
ID2	LOW PRESSURE	LOW PRESSURE	DRY CONTACT	N/A
ID3	REMOTE ON/OFF	REMOTE ON/OFF	DRY CONTACT	N/A
ID4	MOTOR PHASE DETECTOR SAVER	MOTOR PHASE DETECTOR SAVER	DRY CONTACT	N/A

Table 9. Analog outputs of the MASTER unit

#	DESCRIPTION COLD AIR TYPE	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
Y1	INVERTER/SSR	INVERTER/SSR	VCD VOLTAGE	0-10
Y1	INVERTER FAN	INVERTER FAN (NOT INCLUDED IN ALL UNITS)	VDC VOLTAGE	0-10
U3	FREEZING	FREEZING	NTC	345 A 300 kΩ

Table 10. Digital outputs of the MASTER unit

#	DESCRIPTION COLD AIR TYPE	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
NO1	COMPRESSOR stage 1 / VENTILATOR	COMPRESSOR stage 1 / VENTILATOR	DRY CONTACT	24VAC
NO6	PUMP	PUMP (NOT INCLUDED IN ALL UNITS)	DRY CONTACT	24VAC
NO8	N/A	HEAT VALVE	DRY CONTACT	N/A

Table 11. Analog inputs of the SLAVE unit

#	DESCRIPTION COLD AIR TYPE	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
B1	INJECTION TEMPERATURE	INJECTION TEMPERATURE	NTC	r25=10kΩ + 1%
B2	RETURN TEMPERATURE	RETURN TEMPERATURE	NTC	r25=10kΩ + 1%
B3	SUCTION	SUCTION	NTC	r25=10kΩ + 1%
B4	CONDENSER TEMPERATURE	CONDENSER TEMPERATURE	NTC	r25=10kΩ + 1%

Table 12. Digital inputs of the SLAVE unit

#	DESCRIPTION COLD AIR TYPE	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
DI1	HIGH PRESSURE	HIGH PRESSURE	DRY CONTACT	N/A
DI2	LOW PRESSURE	LOW PRESSURE	DRY CONTACT	N/A
DI3	EVAPORATOR FLOW	EVAPORATOR FLOW	DRY CONTACT	N/A
DI4	PHASE MOTOR PROTECTOR	PHASE MOTOR PROTECTOR	DRY CONTACT	N/A

Table 13. Digital outputs of SLAVE unit

Note: The digital output pump on SLAVE units depends on the initial configuration. It is not possible to use the pump if the system is configured with only one MASTER pump unit.**

#	DESCRIPTION COLD AIR TYPE	DESCRIPTION HOT AIR TYPE	SIGNAL TYPE	EXPECTED RANGE
NO1	COMPRESSOR stage 1/ VENTILATOR	COMPRESSOR stage 1/ VENTILATOR	DRY CONTACT	24VAC
NO2	**PUMP	**PUMP	DRY CONTACT	24VAC
NO3	SECOND STAGE	SECOND STAGE	DRY CONTACT	24VAC
NO4	RECOVERY	RECOVERY	DRY CONTACT	N/A

SET POINTS

When we start configuring the unit for the first time all the preload parameters have a default value, these values are stored in permanent memory but can be changed depending on the application of the unit.

The values can be changed from the display and the submenus require a password if you want to change the values; if an option is not included in the display menu the data is only an internal value in the controller and will be visible only if that mode is selected.
The table below has a description of each default set point and can be set to any value in the range column.

Table 14. Default Values And Unit Level Setpoint Ranges

DESCRIPTION	BY DEFAULT	RANGE
INSTALLATION OF THE MAIN SCREEN		
TYPE OF MA-CHINE	AIR-WATER	WATER, AIR-WATER
MACHINE TYPE	CHILLER	CHILLER, HEAT PUMP
CAPACITY	INVERTER	PWM, INVERTER
NUMBER OF SLAVES	NONE	NONE, ONE, TWO, THREE, FOUR, FOUR, FIVE, SIX, SEVEN, SEV-EN, EIGHT, NINE, TEN
DATE	CURRENT DATE	30 DAYS
MONTH	CURRENT MONTH	12 MONTHS
YEAR	CURRENT YEAR	9999 YEARS
USER MENU SCREEN		
CLOCK		ACCESS
WORKING HOURS		ACCESS
SYNOPTIC		ACCESS
CHILLER/HP		ACCESS
PROGRAMMING		ACCESS
REGULATION		ACCESS
ACCESS		ACCESS
LANGUAGE AND MAINTENANCE SCREEN		
LANGUAGE	INGLES	ESPAÑOL, INGLES
CLOCK SCREEN		
DATE	CURRENT DATE	30 DAYS
MONTH	CURRENT MONTH	12 MONTHS
YEAR	CURRENT YEAR	9999 YEARS
WORKING HOURS DISPLAY(1)		
TOTAL STARTS		
COMP.M	0	0 a 999
COMP.E1	0	0 a 999
COMP.E2	0	0 a 999
COMP.E3	0	0 a 999
COMP.E4	0	0 a 999
COMP.E5	0	0 a 999
COMP.E6	0	0 a 999
COMP.E7	0	0 a 999
TOTAL STARTS PER HOUR		
COMP.M	0	0 a 999
COMP.E1	0	0 a 999
COMP.E2	0	0 a 999
COMP.E3	0	0 a 999
COMP.E4	0	0 a 999
COMP.E5	0	0 a 999
COMP.E6	0	0 a 999
COMP.E7	0	0 a 999
HIGH PRESSURE METER (HP)		
COMP.M	0	0 a 999
COMP.E1	0	0 a 999
COMP.E2	0	0 a 999
COMP.E3	0	0 a 999
COMP.E4	0	0 a 999
COMP.E5	0	0 a 999
COMP.E6	0	0 a 999
COMP.E7	0	0 a 999
LOW PRESSURE (LP) METER		
COMP.M	0	0 a 999
COMP.E1	0	0 a 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
FROZEN WATER (FW)		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
FREEZING (FREEZING)		

COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
SYNOPTIC DISPLAY (2)		
TOTAL STARTS		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
TOTAL STARTS PER HOUR		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
HIGH PRESSURE METER (HP)		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999

LOW PRESSURE (BP) METER		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
FROZEN WATER (FW)		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
FREEZING		
COMP.M	0	0 to 999
COMP.E1	0	0 to 999
COMP.E2	0	0 to 999
COMP.E3	0	0 to 999
COMP.E4	0	0 to 999
COMP.E5	0	0 to 999
COMP.E6	0	0 to 999
COMP.E7	0	0 to 999
RUNTIME WORK SCREEN(3)		
TOTAL STARTS		
PUMP E5	0	0 to 999
PUMP E6	0	0 to 999
PUMP E7	0	0 to 999
REAL TIME OPERATION		
PUMP E5	0	0 to 999
PUMP E6	0	0 to 999
PUMP E7	0	0 to 999
PANTALLA DE RESUMEN		

Figure 31. Sequence of operation of the unit.

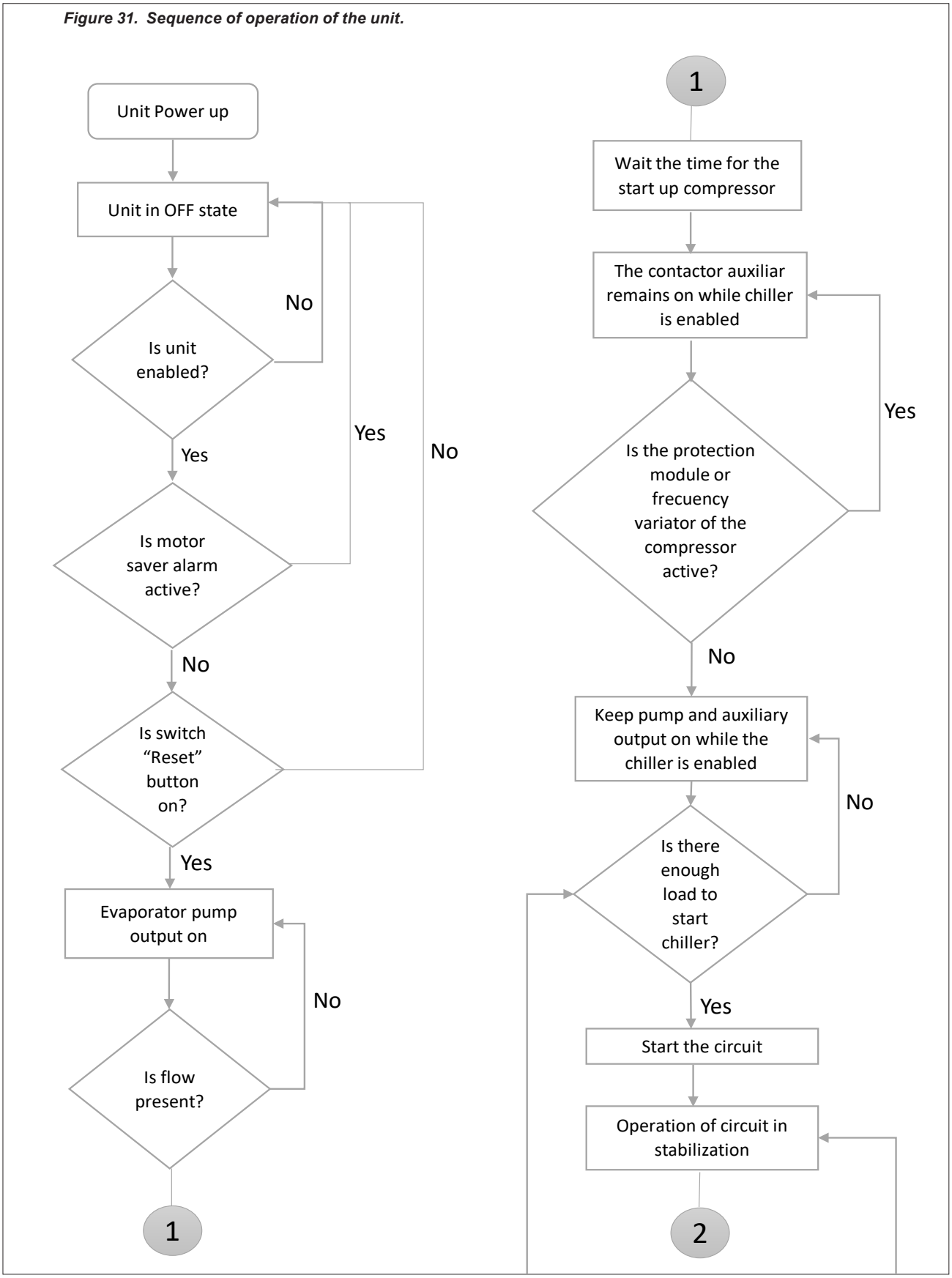
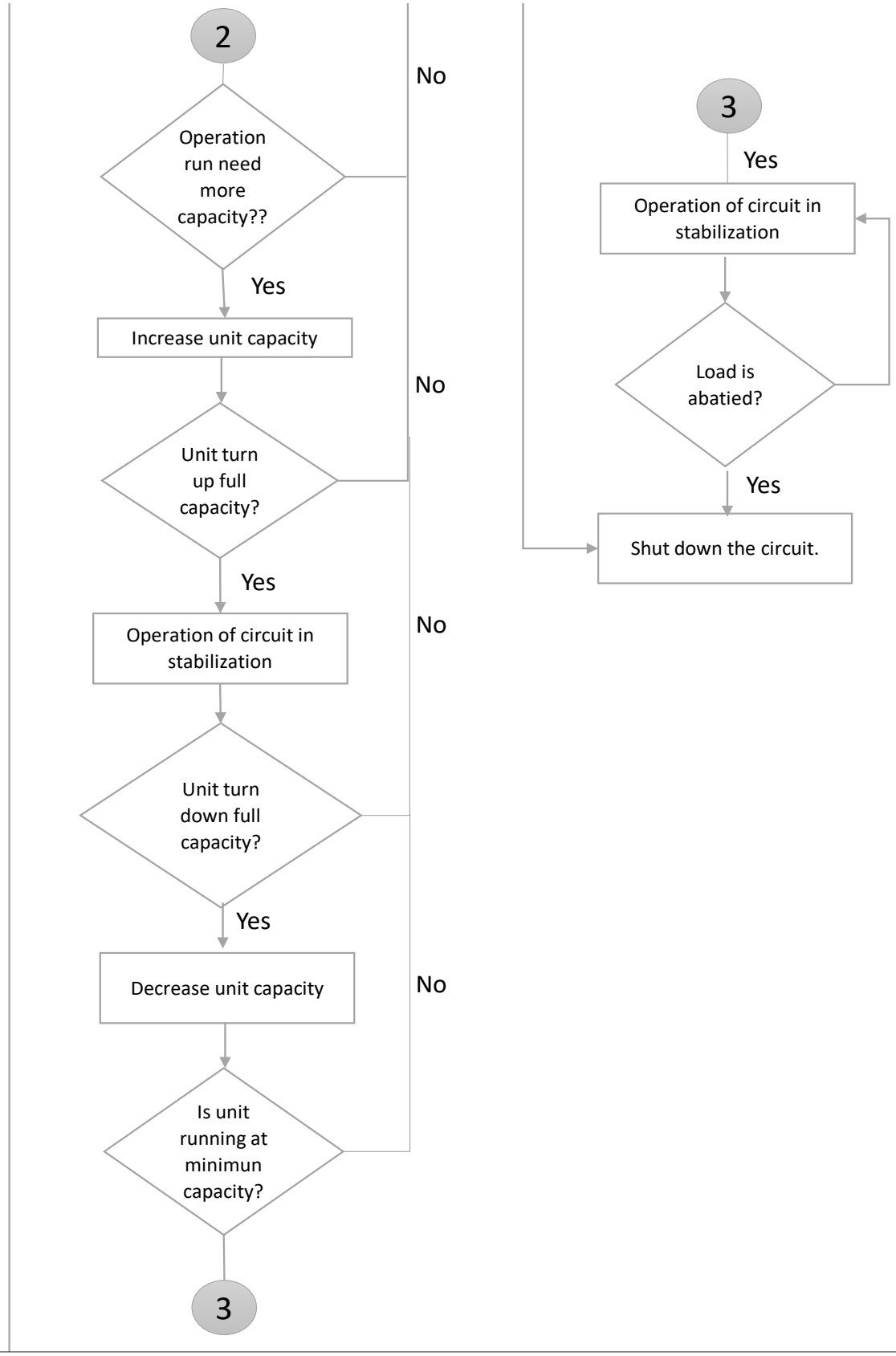


Figure 32. Sequence of operation of the unit (continued)



The calculations in this section are used in unit-level control logic or all-circuit control logic.

EVAPORATOR DELTA T

The Delta T of the evaporator water is calculated as the temperature of the water entering minus that leaving through all circuits.

PENDING LWT

The slope of LWT is calculated such that the slope represents the estimated change in LWT is immediately.

RATE OF DECLINE

The slope value calculated above will be a negative value as the water temperature is falling. The rate of decline is calculated by inverting the slope value and imitating it to a minimum value of 4°C/sec.

ERROR LWT

The LWT error is calculated as LWT - target LWT.

UNIT CAPACITY

Unit capacity is the Delta T of the unit operating for GPM of water.

Table 15. Minimum flow rates and corresponding maximum effective Delta T capacity with variable flow rate.

TR	"Number of compressors"	Capacity Unit	"Nominal Nominal (Nominal %)"	"Maximum effective full (°F) Capacity DT"
25	1	100%	100%	10.0
50	2	100%	96%	10.5
75	3	100%	92%	10.9
100	4	100%	88%	11.3
125	5	100%	85%	11.8
150	6	100%	81%	12.4
175	7	100%	77%	13.0
200	8	100%	73%	13.6
225	9	100%	70%	14.3
250	10	100%	63%	15.9

CONTROLLER CALCULATIONS

Refrigerant saturation temperature

The saturated coolant temperature will be calculated from the pressure sensor readings for each circuit.

Evaporator approach

The evaporator approximation will be calculated for each circuit. The equation is as follows
Evaporator approximation = LWT - Evaporator saturated temperature.

Capacitor approach

The capacitor approximation will be calculated for each circuit. The equation is as follows
Capacitor approximation = Capacitor saturated temperature-OAT.

Suction reheating

The suction superheat shall be calculated for each circuit using the following equation:
Suction superheat = Suction temperature - Evaporator saturated temperature.

Pumping pressure

The pressure at which a circuit will pump down is based on the low pressure set point of the evaporator. The equation is as follows
Pump down pressure = Evaporator low pressure set point - 103KPA (15 PSI)

CIRCUIT LOGIC CONTROL

Circuit enablement

- A circuit must be enabled to start if the following conditions are met:
- The circuit breaker is closed
- No circuit alarms are active
- The circuit mode setpoint is set to Enable
- At least one compressor is enabled to start (according to the enable setpoints)

COMPRESSOR AVAILABILITY

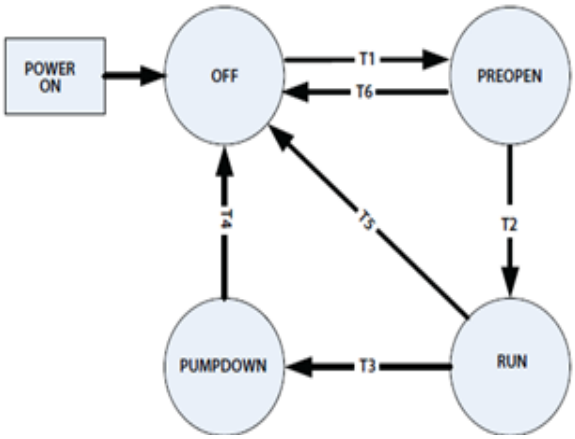
A compressor is considered to be available to start if all of the following are met:

- The corresponding circuit is enabled.
- The corresponding circuit is not in pump down.
- No cycle timers are active for the compressor.
- The corresponding circuit is not in pumping stop state -No cycle timers are active for the compressor.
- Compressor is enabled through the enable set points.
- Compressor is not running.

CIRCUIT STATES

The circuit will always be in one of four states:
Off - The circuit is not running.
Pre-open - The circuit is preparing to start up Running - The circuit is running
Pump off - The circuit is performing a normal shutdown.
The transitions between these states are shown in the diagram on the next page.

Figure 33. Circuit states.



T1 - A la pre-opening

- No compressor is running and any compressor in the circuit is commanded to start (see unit capacity control).

T2 - Pre-open to run

- 5 seconds have elapsed in pre-opening state.

T3 - Run to pump down

Any of the following is required:
- Last compressor in the circuit is commanded to stop.
- Unit status = Pump stopped
- Circuit breaker is open
- Circuit mode is disabled
- Circuit breaker is open -Circuit mode is disabled -Pump down alarm is active

T4 - Pumping down on Off

Any of the following is required:
- Evaporator pressure < Pump downstream pressure value.
- Unit status = Off
- Unit status = Off -Quick circuit shutdown alarm active.

T5 - Run to Off

Any of the following is required:
- Unit status = Off
- Fast circuit shutdown alarm is active
- Low temperature start attempt failed

T6 - Pre-open to Off

Any of the following is required:
- Unit status = Off
- Unit status = Pump off
- Circuit breaker is open
- Circuit mode is disabled
- Circuit quick stop alarm is active
- Pumping alarm is activated

COMPRESSOR CONTROL

Compressors should operate only when the circuit is in the operating or pumping state. They should not operate when the circuit is in any other state.

Compressor start-up

A compressor must start if it receives a start command from the unit capacity control logic.

Compressor shutdown

- A compressor must be shut down if any of the following situations occur:
- The unit's capacity control logic commands it to shut down.
- A discharge alarm occurs and sequencing requires this compressor to be the next compressor to shut down.
- The circuit status is pumping and sequencing requires this compressor to be the next compressor to shut down.

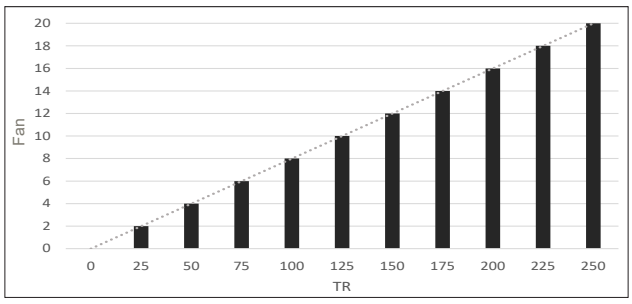
CONTROLLER CALCULATIONS

A minimum time between compressor starts and a minimum time between compressor stop and compressor start will apply. The time values are determined by the start timer and stop timer set points. These cycle timers should not be applied by power cycling the chiller. This means that if the power is cut off, the cycle timers should not be active. These timers can be cleared by a setting on the controller.

CONDENSER FAN CONTROL

The condenser fan control shall start the fans as required whenever the compressors are running in the circuit (Tandem).
All fans and solenoid valves shall be off when the circuit is in the off and pre-open state.
The digital outputs of the condenser fans will turn on or off immediately for condenser stage changes. The outputs of the capacitor solenoid valves will turn on immediately when a step-up stage requires the output to turn on, but will have a delay to turn off during a step-down stage.
This delay is 20 seconds. If the circuit is turned off, the capacitor solenoid valve outputs will turn off without delay.

Figure 34. Fan sequence according to capacity



OVERHEATING CONTROL STATUS OPERATION

TXV Operation

The measurement of refrigerant flow to the evaporator is the exclusive function of a TXV. It must measure this flow at precisely the same rate at which the refrigerant is evaporated by the heat charge.

The TXV does this by maintaining the coil with enough refrigerant to maintain the correct superheat of the suction gas leaving the evaporator coil.

The TXV regulates flow in response to charge superheat.

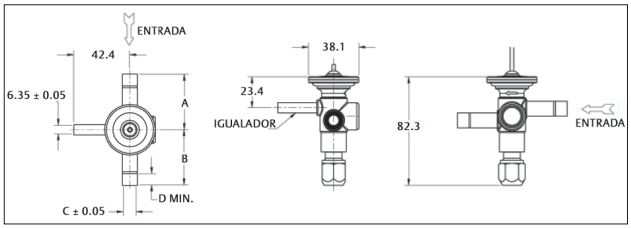
If it is suspected that a TXV is not operating properly, checking for overheating is the only way to be sure. Do this with precision instrumentation to obtain meaningful results.

Operating overheat of 8°F to 12°F are considered normal. Here are some “tips” to help in detecting and fixing performance failures in a TXV:

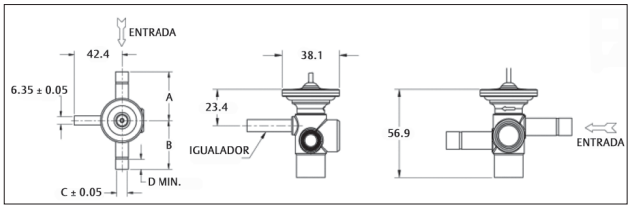
- Check the bulb to make sure it is properly connected to the suction line. If you can move the bulb manually, it is not properly secured.
- The bulb must be perfectly insulated to protect it against the effects of a draft.
- Check the equalizer line for restrictions (kinks) or signs of frost. A frosted equalizer line indicates internal leakage and will require valve replacement. Repair or replacement of a bent equalizer will be necessary for the valve to operate properly.

TXVs are designed to measure liquid refrigerant flow. If the refrigerant at the valve inlet contains flash gas, the valve capacity will be reduced. Make sure that the system is properly charged and that there is some subcooling at the valve inlet before discarding the TXV.

Dimensions (Mm)



Adjustable - ODF connections with 1/4” equalizer



Non-adjustable - Odf connections with 1/4” equalizer

Connections	Dimensions			
	A	B	C	D
3/8 ODF	41.9	41.9	9.6 (3/8)	8.6
1/2 ODF	41.9	41.9	12.8 (1/2)	12.2
5/8 ODF	54.6	54.6	16.0 (5/8)	19.0
7/8 ODF	54.6	54.6	22.3 (7/8)	19.0
1-1/8 ODF	61.0	61.0	28.7 (1-1/8)	23.1

Alarms

The alarms described below contain the on-screen description of each alarm.

MASTER ALARMS
FAILURE IN TEMPERATURE MASTER INJECTION HEAD PROBE, BROKEN OR DISCONNECTED
FAILURE IN TEMPERATURE MASTER RETURN TEMPERATURE PROBE, BROKEN OR DISCONNECTED
MOTOR SAVER ALARM
LOW MASTER PRESSURE ALARM
HIGH MASTER PRESSURE ALARM
MASTER EVAPORATOR FREEZE ALARM MASTER CONDENSER FREEZE ALARM
MASTER CONDENSER FREEZE ALARM MASTER CONDENSER FREEZE ALARM
MASTER CHILLED WATER CONDENSER ALARM
MASTER EVAPORATOR FLOW ALARM
MASTER CONDENSER FLOW ALARM
MASTER REFRIGERANT ALARM
MASTER INJECTION SENSOR PROBE FAILURE
MASTER RETURN SENSOR PROBE FAILURE
MASTER FREEZE PROBE FAILURE
E1 SLAVE ALARMS
E1 ENGINE SAVER ALARM
LOW PRESSURE ALARM E1
HIGH PRESSURE ALARM E1
EVAPORATOR FREEZE ALARM E1
CONDENSER FREEZE ALARM E1
CONDENSER HIGH CHILLED WATER CONDENSER E1
EVAPORATOR FLOW ALARM E1
E1 CONDENSER FLOW ALARM E1
E1 REFRIGERANT ALARM E1
E1 INJECTION SENSOR PROBE FAILURE E1
RETURN SENSOR PROBE FAILURE E1
SLAVE ALARMS E2
ENGINE SAVER ALARM E2
LOW PRESSURE ALARM E2
HIGH PRESSURE ALARM E2
EVAPORATOR FREEZE-UP ALARM E2
CONDENSER FREEZE-UP ALARM E2
CONDENSER CHILLED WATER HIGH ALARM E2
EVAPORATOR FLOW ALARM E2
E2 CONDENSER FLOW ALARM E2
E2 REFRIGERANT ALARM E2
E2 INJECTION SENSOR PROBE FAILURE E2
E2 RETURN SENSOR PROBE FAILURE E2
E3 SLAVE ALARMS
E3 ENGINE SAVER ALARM
E3 LOW PRESSURE ALARM
HIGH PRESSURE ALARM E3
E3 EVAPORATOR FREEZE ALARM E3
E3 CONDENSER FREEZE ALARM
CONDENSER HIGH CHILLED WATER CONDENSER E3
E3 EVAPORATOR FLOW ALARM
E3 CONDENSER FLOW ALARM
E3 REFRIGERANT ALARM E3
E3 INJECTION SENSOR PROBE FAILURE E3
E3 RETURN SENSOR PROBE FAILURE E3
E4 SLAVE ALARMS
E4 ENGINE SAVER ALARM
E4 LOW PRESSURE ALARM
HIGH PRESSURE ALARM E4
E4 EVAPORATOR FREEZE ALARM E4
E4 CONDENSER FREEZE ALARM
CONDENSER HIGH CHILLED WATER CONDENSER E4
E4 EVAPORATOR FLOW ALARM E4
E4 FLOW CONDENSER ALARM

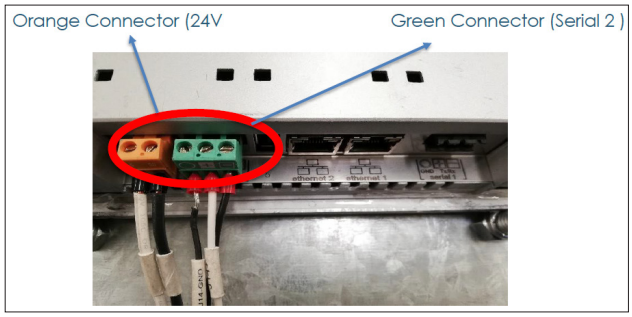
E4 COOLANT ALARM
INJECTION SENSOR PROBE FAILURE E4
RETURN SENSOR PROBE FAILURE E4
E5 SLAVE ALARMS
E5 ENGINE SAVER ALARM
E5 LOW PRESSURE ALARM
E5 HIGH PRESSURE ALARM
E5 EVAPORATOR FREEZE ALARM
E5 CONDENSER FREEZE ALARM
CONDENSER HIGH CHILLED WATER CONDENSER E5
E5 EVAPORATOR FLOW ALARM
E5 CONDENSER FLOW ALARM
E5 REFRIGERANT ALARM
E5 INJECTION SENSOR PROBE FAILURE E5
E5 RETURN SENSOR PROBE FAILURE E5
E6 SLAVE ALARMS
E6 ENGINE SAVER ALARM
LOW PRESSURE ALARM E6
HIGH PRESSURE ALARM E6
EVAPORATOR FREEZE ALARM E6
E6 CONDENSER FREEZE ALARM
CONDENSER HIGH CHILLED WATER CONDENSER E6
E6 EVAPORATOR FLOW ALARM
E6 CONDENSER FLOW ALARM
E6 REFRIGERANT ALARM E6
INJECTION SENSOR PROBE FAILURE E6
E6 RETURN SENSOR PROBE FAILURE E6
E7 SLAVE ALARMS
E7 ENGINE SAVER ALARM
LOW PRESSURE ALARM E7
HIGH PRESSURE ALARM E7
E7 EVAPORATOR FREEZE ALARM E7

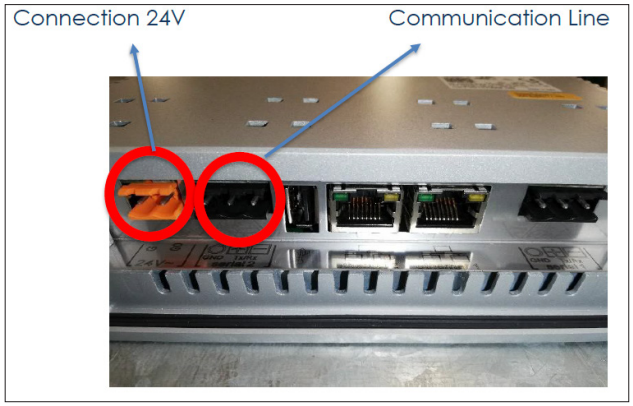
E7 CONDENSER FREEZE-UP ALARM
E7 HIGH CHILLED WATER CONDENSER
E7 EVAPORATOR FLOW ALARM
E7 CONDENSER FLOW ALARM
E7 REFRIGERANT ALARM E7
E7 INJECTION SENSOR PROBE FAILURE E7
E7 RETURN SENSOR PROBE FAILURE E7

PGD TOUCH 72 CAREL CONNECTION

For the correct operation of the PGD TOUCH it is necessary to consider the following way of connection, since the incorrect arrangement of the communication lines may result in an incorrect operation at the moment of switching on the equipment.

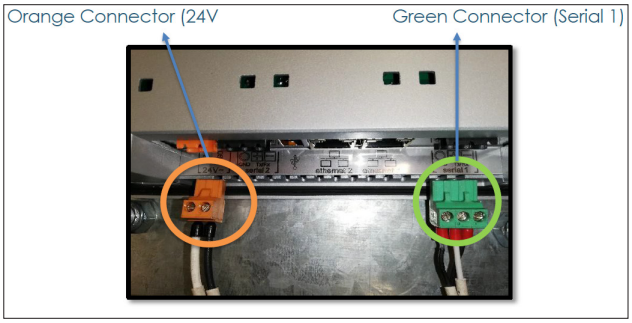
Incorrect Form

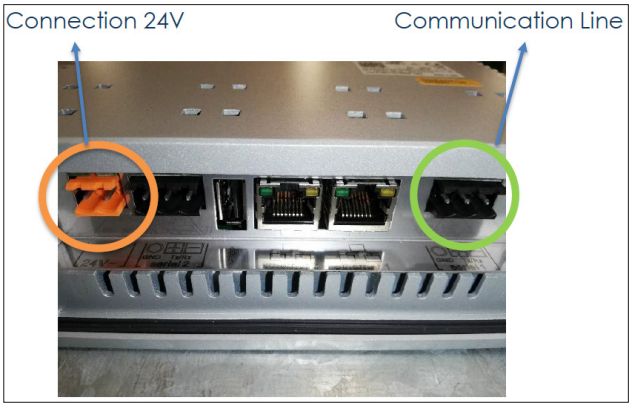




- When connected in this way, the equipment cannot be manipulated and the display will show EQUIPMENT NOT CONFIGURED.
- To reset it is necessary to make the correct connection, turn off and turn on the 24v supply again.
- Once this is done the equipment will turn on normally.

Correct Form





When this connection is made correctly, when the equipment is turned on, the temperature and equipment legends will be displayed on the PGD TOUCH.

GRAPHICAL USER INTERFACE

Control states

The configured devices will display this screen by default.

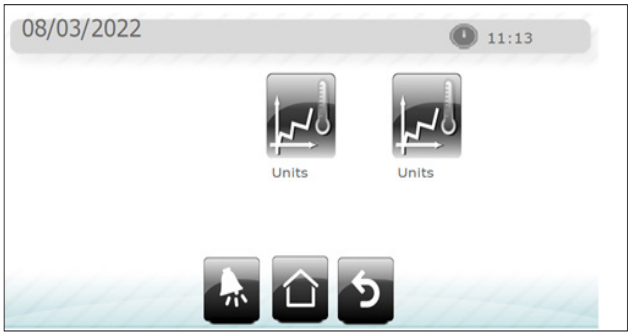
1. Control status button: Can be active or inactive by a digital input or inactive by the pGDTouch terminal.
2. Selection of temperature measurement type: (*1Fahrenheit or Celsius).
3. Date.
4. Time

TRENDS

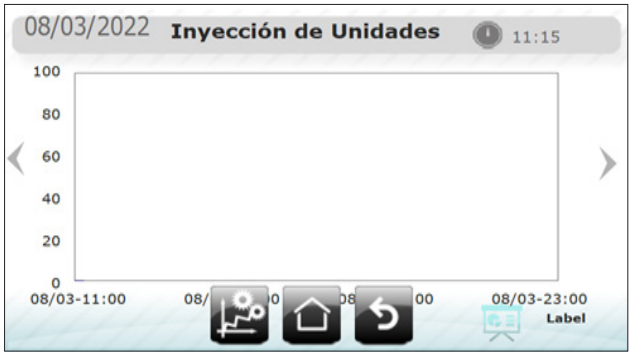
The pGDTouch terminal has in memory the information about the temperature readings of the injection and return sensor of the main unit, as well as the injection and return temperatures of all enabled units. When pressing the trend button, the user will be redirected to a menu where he/she can select the type of trend to display.

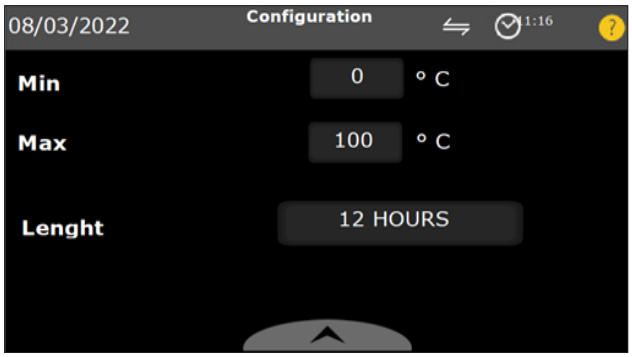
In the main unit section, the injection and return readings of the main unit will be displayed. In the unit section, the injection and return sensor readings of all units will be displayed.

The trend properties that can be edited are the duration, high and low limits. These properties are editable in the navigation menu.
The pGDTouch terminal saves a reading of each of the above temperatures every 180 seconds and can save more than 100,000 samples of data before starting to overwrite the old data. With these parameters the pGDTouch terminal can store data for the last 7 months.



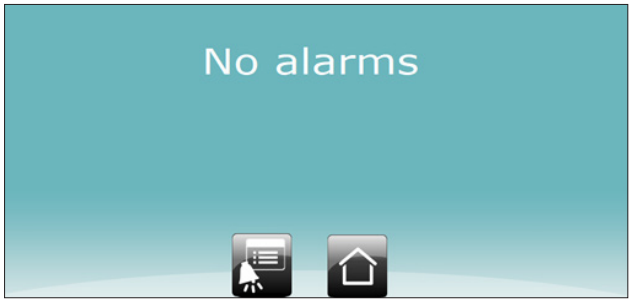
This menu shows the current temperature in the equipment



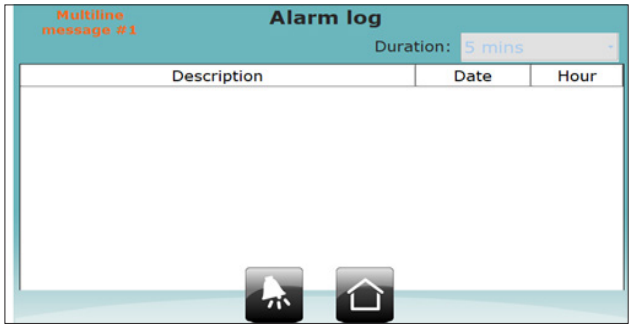


ALARMS PAGE

When the alarms button is clicked, the user will be presented with a page showing whether or not alarms are present.

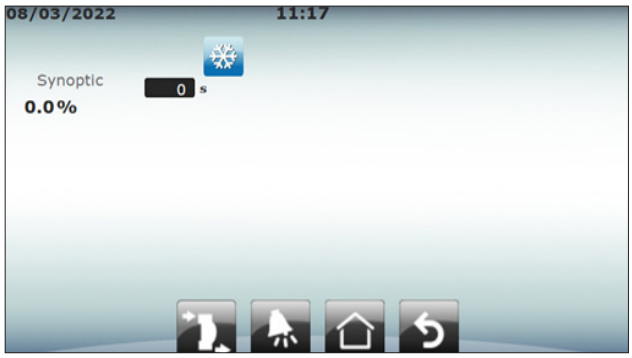


Pressing the active alarms button will display the alarm log.

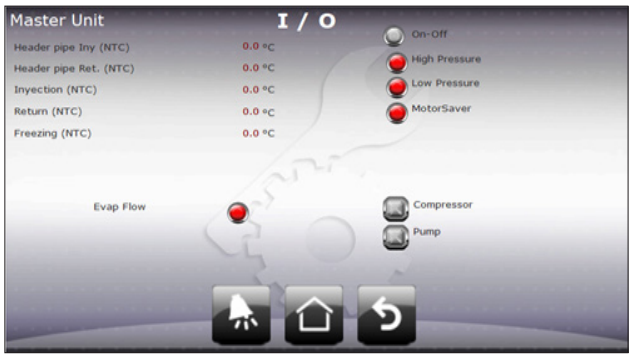


This screen shows the records of the alarms occurring in the short period of time of each alarm.

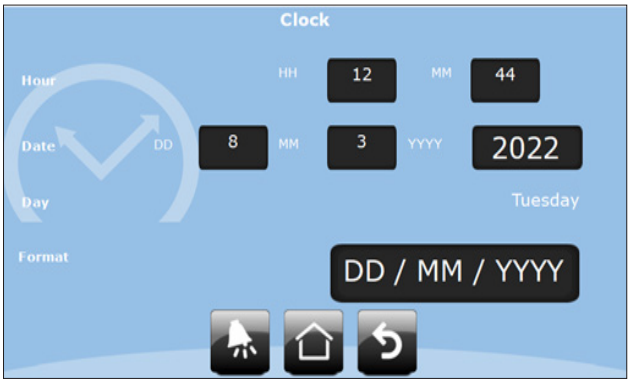
This screen shows the current working equipment HEATING/ COOLING PUMP.



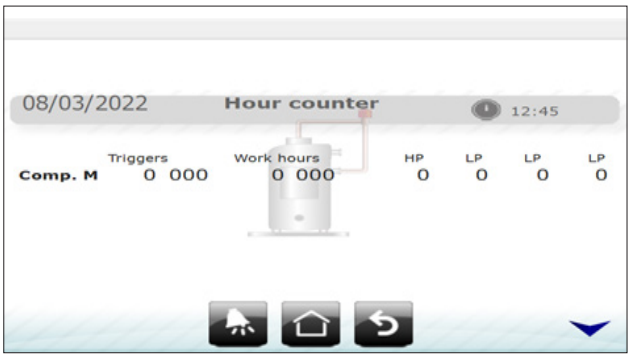
These screens show the actual inputs for each controller.



In this screen you can set the time and date of the log alarms or the information about the diagnostics.



This screen can check the counter of each high pressure failure, low pressure failure, and the working hours of each compressor.



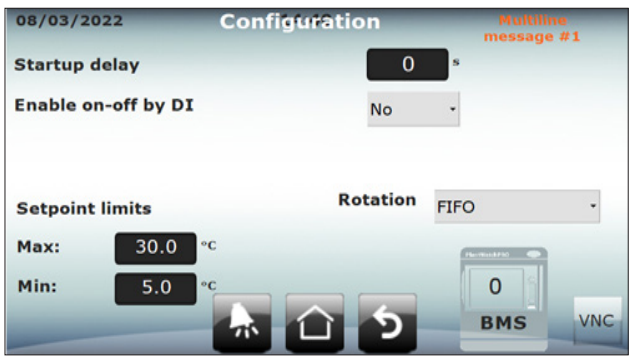
In this screen you can modify the setpoint temperature of the equipment.

In this screen you can change the language.

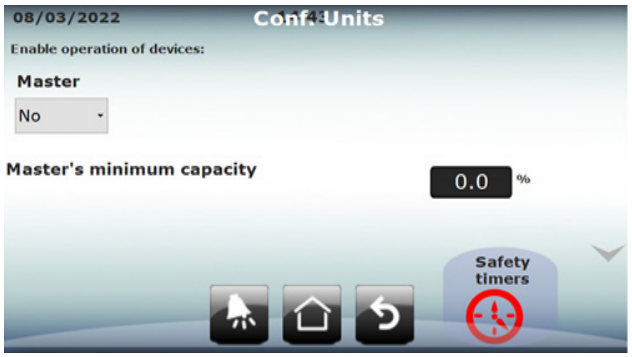
EXPORT REGISTRATION

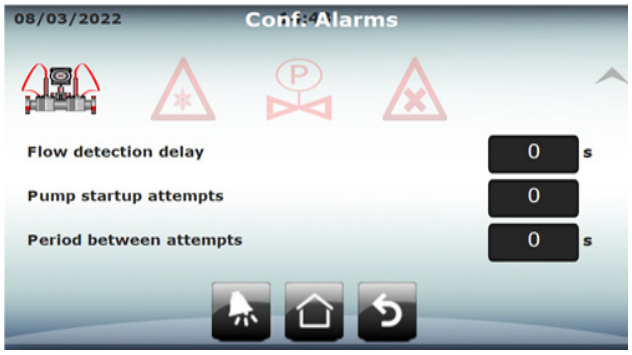
The user can export to a USB memory stick all the information stored in the unit as a csv file (comma separated values file), the user can extract:

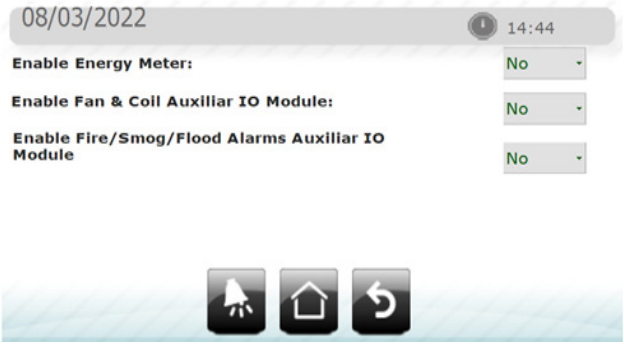
- Alarm log.
- Injection and return temperatures of the master unit.
- Injection and return temperatures of the slaves.
- User log.

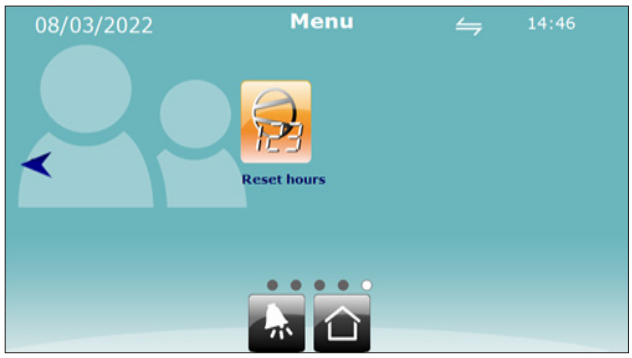


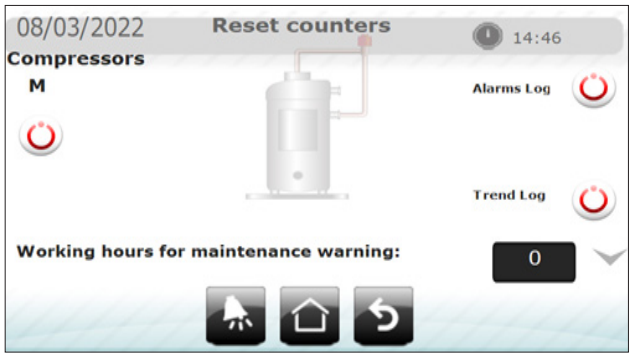
If the user presses the reset button it will be possible to reconfigure the system as a new installation. The reset resets the initial configuration parameters of the system, but does not modify any of the values stored in the controller's memory.









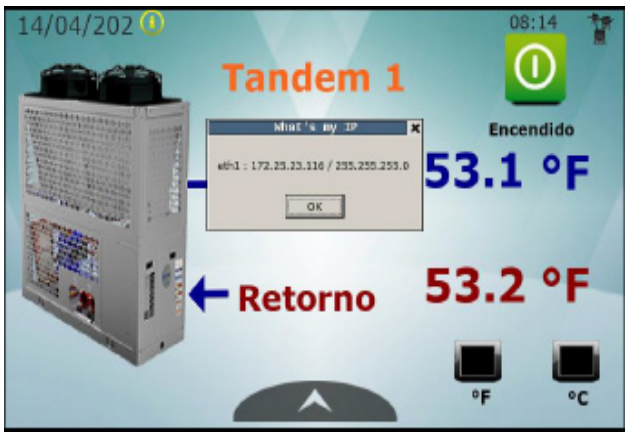


IP DISPLAY AND CONFIGURATION

To view the IP of the unit, click on the indicated point to open the menu.

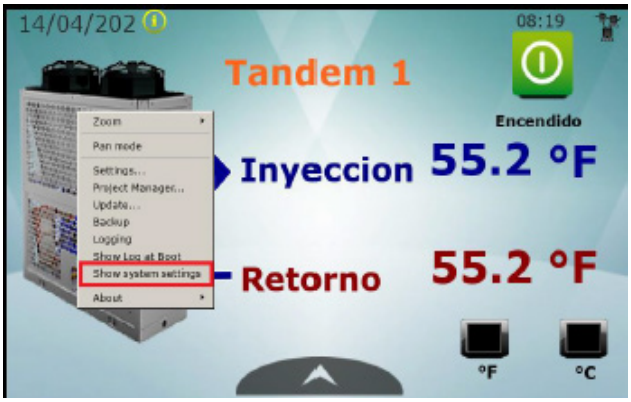
Click “About, What´s my IP.

The configured IP will then be displayed.

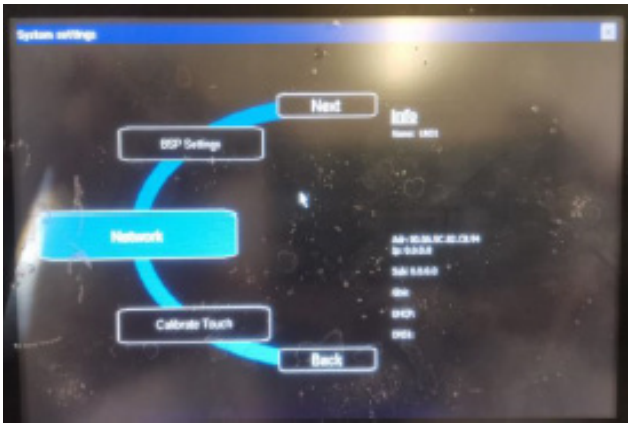


To configure IP, click on the indicated point to open the menu.

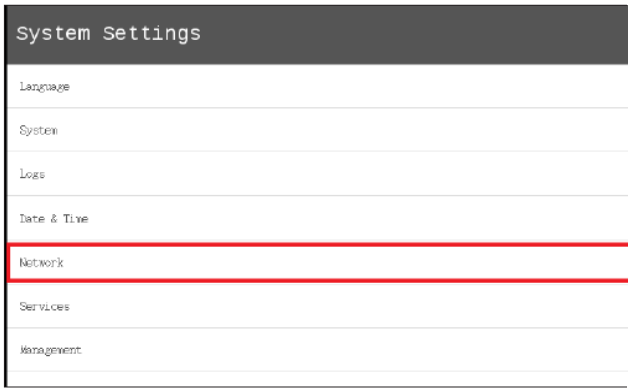
Presionar Show system settings, el menú puede variar en su interfaz.



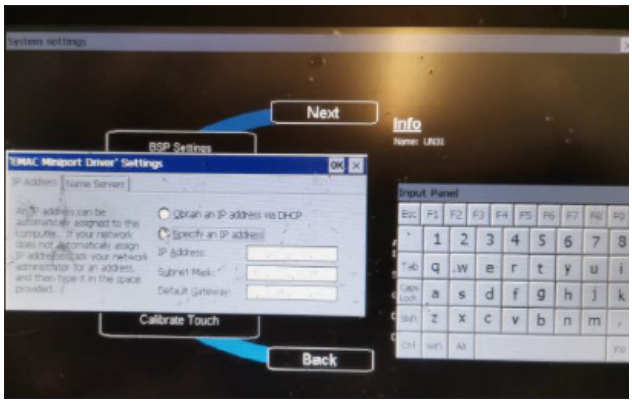
Option 1:



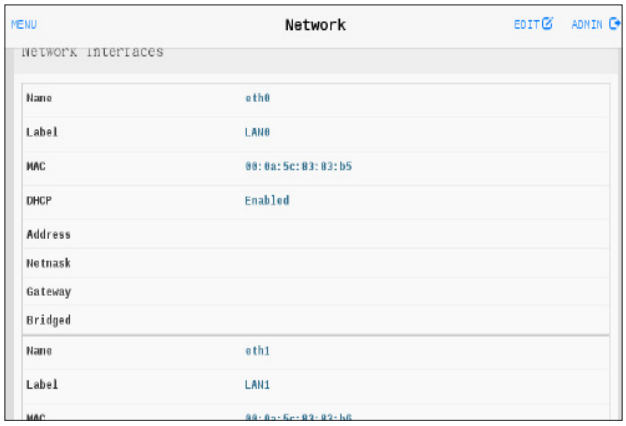
Option 2:



Option 1:



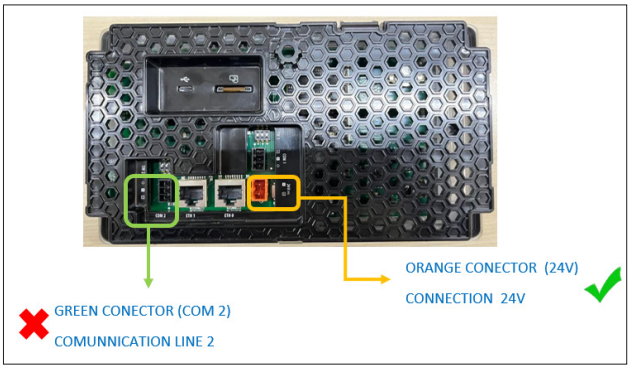
Option 2:



For IP configuration press edit to assign the desired IP.

PGDX TOUCH 7” CAREL CONNECTION

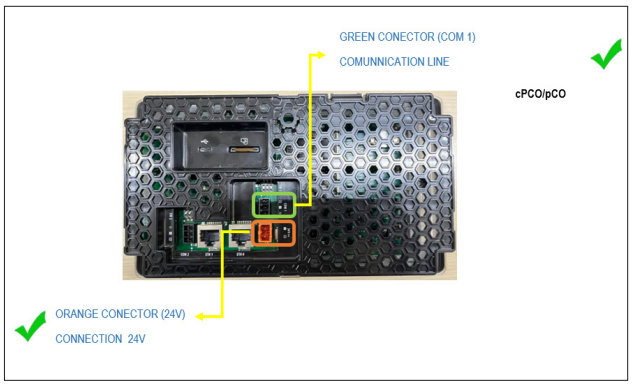
Incorrect Form



- When connected in this way, the equipment cannot be manipulated and the display will show EQUIPMENT NOT CONFIGURED.
- To reset it is necessary to make the correct connection, turn the 24V power supply off and on again.
- Once this is done the equipment will switch on normally.

Correct Form

For the correct operation of the PGDX TOUCH it is necessary to take into account the following way of connection, since the incorrect arrangement of the communication lines can result in an incorrect operation at the moment of switching on the equipment.



Once the connection has been made correctly, the temperatures and other data of the equipment will appear on the screen as shown in the following image.

CONTROL PANEL

The following instructions apply to the graphical LCP (LCP 102):
The control panel is divided into four functional groups:

1. Graphical display with status lines. All data is displayed on a graphical LCP display, which can show up to five items of operating data while displaying the [Status].
2. Menu keys and indicator lights - change parameters and switch between display functions.
3. Navigation keys and indicator lights (LEDs).
4. Operation keys and indicator lights (LEDs).

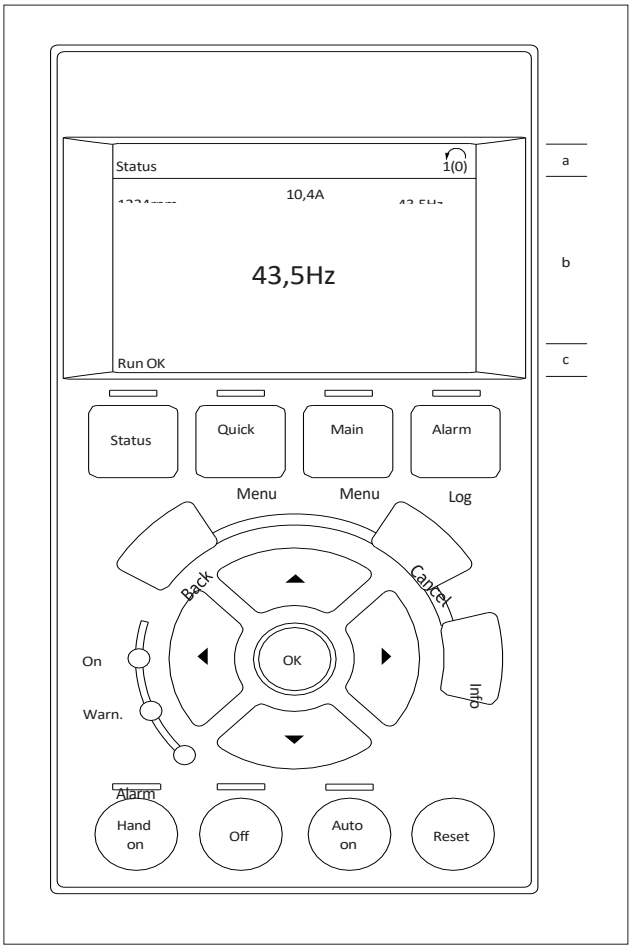
DISPLAY LINES

A.Status line: Status messages showing icons and graphic.
B.Line 1-2: Operator data lines showing user-defined or user-selected data. By pressing the [Status] key, up to one additional line can be added.
C.Status line: Status messages displaying text.

ADJUSTING THE DISPLAY CONTRAST

Press [Status] and [▼] to make the display darker.
Press [Status] and [▲] to make the display brighter.

Figure 35. LCP Overview

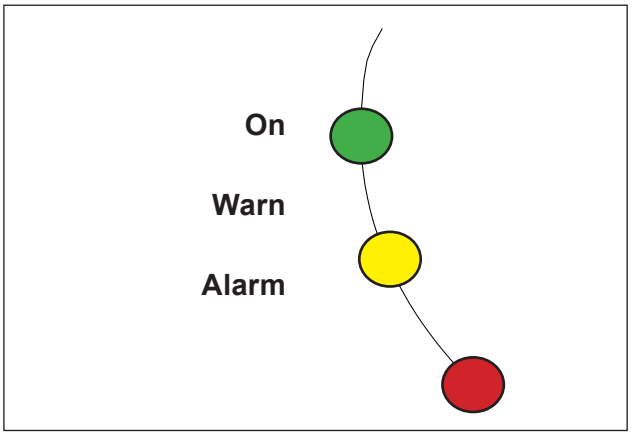


INDICATOR LIGHTS

If certain threshold values are exceeded, the alarm LED lights up and/or the alarm LED lights up. An alarm status and alarm text are displayed on the control panel.
The control panel. The power LED is activated when the frequency inverter is supplied with mains voltage.

- Green LED/on: The control section is running.
- Yellow LED/Warning: Indicates a warning.
- Red LED flashing/Alarm: Indicates an alarm.

Figure 36. Indicator lights



LCP KEYS

The control keys are divided into functions. The keys below the display and the indicator lights are used for parameter settings, including the choice of display indication during normal operation.

Figure 37. Function keys

The [Status] indicates the status of the frequency converter and/or compressor motor.
Choose between 3 different readouts by pressing the [Status] key: 5-line readout, 4-line readout or Smart Logic Control by pressing [Status] twice.
Press [Status] to select the display mode or to return to the display mode from the quick menu mode, main menu mode or alarm mode. Also press [Status] to toggle single or dual readout mode.

The [Quick Menu] allows quick access to different quick menus such as:

- Q1 - My personal menu
- Q2 - Quick Setup
- Q3 - PID Process Loop
- Q4 - Compressor functions
- Q5 - Changes made
- Q6 - Records
- Q7 - Load profile

Use [Quick Menu] to program the parameters belonging to the Quick Menu. It is possible to switch directly between the Quick Menu mode and the Main Menu mode.

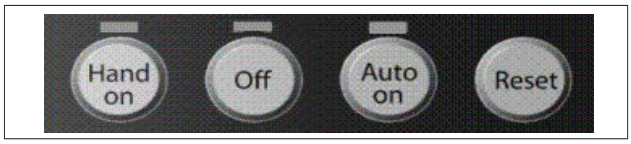
NAVIGATION KEYS

The 4 navigation keys are used to navigate between the different options available in [Quick Menu], [Main Menu] and [Alarm Log].
Press the keys to move the cursor.
The [OK] key is used to select a parameter marked by the cursor and to enable changing a parameter and logs from the Quick Menu.

Local control keys

The keys for local control are located at the bottom of the control panel.

Figure 38. Local control keys



The [Hand On] option allows the frequency converter to be controlled by the LCP. The [Hand on] option also starts the motor compressor and it is possible to enter the speed data of the motor compressor using the arrow keys.
The key can be selected as [1]
Activate or [0] Deactivate via the [Hand on] key 0-40 on the LCP.
External stop signals activated via control signals or a serial bus will override a “start” command via the LCP.
The following control signals will remain active when.[Hand on] is activated:

- [Hand On] - [Off] - [Auto On].
- Reset
- Reverse coasting stop
- Reverse
- Select lsb (least significant bit) - [Off] - [Auto On] - [Auto On
- msb (most significant bit) select msb (most significant bit) select msb (most significant bit)
- Stop command from serial communication
- Fast stop
- DC brake

The [Off] key stops the connected motor compressor. The key can be selected as [1] Enable or [0] Disable via the 0-41 [Off] key in LCP. If no external stop function is selected and the [Off] key is inactive, the motor compressor can be stopped by disconnecting the voltage.

[Auto On] allows the frequency converter to be controlled via the control terminals and/or serial communication. When a start signal is applied to the control control terminals and/or the bus, the frequency converter will start. The key can be selected as [1] Enable or [0] Disable via the 0-42 [Auto on] key on the LCP.

NOTE: An active HAND-OFF-AUTO signal via the digital inputs has higher priority than the [Hand on] and [Auto on] control keys.

The [Reset] key is used to reset the frequency converter after an alarm (trip). It can be selected as [1] Enable or [0] Disable using the 0-43 [Reset] key on the LCP.
Direct access to the parameters can be made by holding down the [Main Menu] key for 3 seconds. Direct parameter access allows direct access to any parameter.

QUICK TRANSFER OF PARAMETER SETTINGS

Once the configuration of a frequency converter has been completed, store the data in the LCP or on a PC using the MCT 10 Set-up Software.

DATA STORAGE IN LCP

1. Go to 0-50 LCP Copy in the main menu.
2. Press [OK].
3. Select [1] All to LCP.
4. Press [OK].
5. All parameter settings are now stored in the LCP indicated by the progress bar. When 100% is reached, press [OK].

NOTE: Stop the motor compressor before performing this operation. The LCP can now be connected to another frequency converter and copy the parameter settings to this frequency converter as well.

INITIALIZATION TO DEFAULT CONFIGURATION

Initialize the frequency converter to default settings in two ways:

A.Recommended initialization (via operating mode 14-22)

- Select operating mode 14-22.
- Press [OK].
- Select [2] Initialization.
- Press [OK].
- Disconnect the mains power and wait until the display turns off.
- Reconnect the mains power.
- A80] (Alarm 80) appears - the frequency converter has been reset.

14-22 Operating mode Initializes everything except:

- 8-30 Protocol
- 8-31 Address
- 8-32 FC port baud rate
- 8-33 Parity / Stop Bits
- 8-34 Estimated cycle time
- 8-35 Minimum Response Delay
- 8-36 Maximum Response Delay
- 8-37 Maximum Inter-Carriage Delay 8-38 Maximum Inter-Carriage Delay
- 14-50 RFI filter
- 8-30 Protocol
- 8-31 Address
- 8-32 FC port baud rate
- 8-33 Parity / Stop bits 8-34 Estimated cycle time
- 8-34 Estimated Cycle Time
- 8-35 Minimum Response Delay
- 8-36 Maximum Response Delay

- 8-37 Maximum Inter-Carriage Delay 8-38 Maximum Inter-Carriage Delay
- 14-50 RFI Filter
- 15-00 Operating Hours
- 15-01 Operating Hours
- 15-02 kWh counter
- 15-03 Ignitions
- 15-04 Over temperature
- 15-05 Over voltage
- 15-20 History Log: Event
- 15-21 History Log: Value
- 15-22 History Log: Time
- 15-30 Fault Log: Error Code
- 15-31 Fault Log: Value
- 15-32 Fault log: Time

B.Manual initialization

- Disconnect from the mains and wait until the display turns off.
- Press [Status] - [Main menu] - [OK] at the same time while the LCP 102 graphic is switched on.
- Release the keys after 5 s.
- The frequency converter is now programmed according to the default settings.

This procedure initializes everything except:

- 15-00 Operating hours
- 15-03 Power on
- 15-04 Over temperature
- 15-05 Over voltage

DATA TRANSFER FROM THE LCP TO THE FREQUENCY CONVERTER

NOTE: Stop the motor compressor before performing this operation.

1. Go to 0-50 LCP Copy.
2. Press [OK].
3. Select [2] All from LCP.
4. Press [OK] again.
5. The parameter settings stored in the LCP are transferred to the frequency converter indicated by the progress bar. When 100% is reached, press [OK].

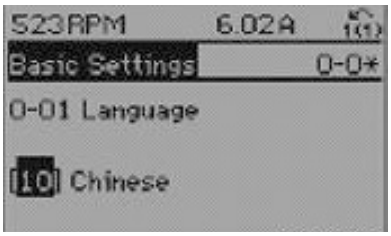
PARAMETER SELECTION

In the main menu mode, the parameters are divided into groups. Use the navigation keys to select a parameter group.
The following parameter groups can be accessed:

- - 0-** Operation/Display
- - 1-** Load/Motor
- - 3-** Reference/Ramps
- - 4-** Limits/Warnings
- - 5-** Digital input/output
- - 6-** Analog input/output
- - 7-** Controls
- - 8-** Communication and options
- - 13-** Intelligent logic
- - 14-** Special functions
- - 15-** Drive information
- - 16-** Data readouts
- - 25-** Cascade controller
- - 28-** Compressor functions

After selecting a parameter group, select a parameter with the navigation keys. The middle section of the display shows the number and name of the parameter as well as the value of the selected parameter.

Figure 39. Screen example - Parameter selection



DATA CHANGE

The procedure for changing the data is the same in both the Quick Menu and the Main Menu mode.
Quick menu and in the main menu mode.
Press [OK] to change the selected parameter. The procedure for changing the data depends on whether the selected parameter represents a numerical data value or a text value.

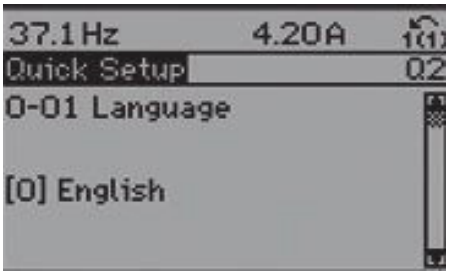
MODIFICATION OF A TEXT VALUE

If the selected parameter is a text value, change the value by pressing the [▲]/[▼] navigation keys. The [▲] key increases the value and [▼] decreases the value. Place the cursor on the value and press the [OK] key to save.

CHANGE A GROUP OF NUMERICAL VALUES

If the selected parameter represents a numerical data value, change it by pressing the navigation keys. Press [<]/[>] to move the cursor horizontally. Press the [▲]/[▼] key to change the data value. The [▲] key increases the data value and the [▼] key decreases the data value. Place the cursor on the value and press [OK] to save.

Figure 40. Screen example



NOTE: The equipment should be energized 24 hours prior to start-up in order to warm up the compressor crankcase before starting the unit. the compressor crankcase before starting the unit.

⚠ WARNING ⚠

If the equipment has not been energized for the indicated time, do not proceed with the start-up as this may cause damage to the equipment.

⚠ WARNING ⚠

The installer must take these procedures into account; his personnel must be qualified and certified to perform the installation in order to comply with all specifications and good practices to ensure proper operation of the unit.

PRE-START-UP CHECKLIST

The following data should be checked before putting the unit into operation.

Date:	
Place of Work:	
Location:	
Installing Contractor:	
Technician/Company:	
Unit Commissioning:	
Unit model:	
Serial number:	

PHYSICAL INSPECTION (BEFORE ELECTRICAL CONNECTION)

Check that the unit has not been damaged by handling or transport.	
Visually check for refrigerant leaks.	
Open the unit for hydraulic installation only. Do not remove the connection guards until the hydraulic circuit is closed.	
Check for foreign objects in the fan discharge.	
Check that the air inlet is not obstructed and has the suggested clearance.	

NOTE: Accessories such as thermometers, pressure gauges, measuring ports, etc., Are recommended but not necessary for the operation of the unit

INSPECTION OF THE HYDRAULIC CIRCUIT

Date:	
Place of Work:	
Location:	
Installing Contractor:	
Technician/Company:	
Unit Commissioning:	
Unit model:	
Serial number:	

It is necessary to install a water filter in all hydraulic circuits to prevent the entry of solid particles, these must be installed on the return side of the circuit and must be cleaned once the initial system load is finished.

Check that the water filter is clean.	
Check that all service valves are open.	
Check the correct structure of the water supply.	
Check that all pipes are filled with water and that air has been evacuated.	
Check thermometers (not included from factory).	
Check the pressure gauges (not included in the delivery).	

⚠ WARNING ⚠

If the hydraulic circuit contains air, it may compromise the operation of the unit.

CHECKING THE ELECTRICAL SUPPLY

The units require grounded, three-phase electrical power.

Verify that the circuit breaker is of the correct rating for the unit.	
Check that all electrical connections are secure.	
Check for false ground contacts as well as all wiring.	
Check internal control and power connections.	
Measure voltage on all units, ground, neutral and 3-phase line.	
Check that the motor overload protection conforms to design requirements and is in automatic mode.	
Check voltage (*Motor save), which is set to supply the correct supply voltage for the unit.	

Note: The control panel of each of the equipment has a duct, placed solely and exclusively for forced ventilation of the equipment. It must not be obstructed for any reason.

* The percentage of unbalance of the power supply must be calculated with the following formula, and adjusted with the UNBALANCE command.

UNBALANCE PERCENTAGE = [(MAXIMUM AVERAGE DEVIATION) / (AVERAGE)] X (100)

DIAGNOSTIC LIGHT INDICATORS (LED STATUS)	
Regular operation	Evergreen
Delayed start	Flashing green
Reverse phase	Flashing red
Phase unbalance	Red in lapses
High/low voltage	Constant red

NOTE: The units are factory set, however the power supply may vary in each installation and due to this imbalance must be adjusted prior to start-up in order to protect the motors and electrical components of all units.

INSPECTION OF THE CONTROL PANEL

Check that the control panel is free of foreign objects.	
Power supply unit with three-phase electrical current.	
The unbalance phase should be less than 2% of the average.	
Turn on each fan to ensure proper rotation.	
Turn on the water pump (if applicable) to make sure it is running.	

⚠ WARNING ⚠

CLIC* units use scroll compressors, which only operate in one direction, disregarding this point, forcing the compressor to operate in the opposite direction can lead to failure.

After completing the inspection of the above installation points and ensuring that all elements of the unit are correct, the unit can be powered up. Turn the switch on the CONTROL UNIT to the ON position to power the control unit with 24 volts.

START-UP

After powering up the controller, wait 5 minutes for the unit to be ready to operate.

The operating sequence will begin by checking all pre programmed safety points on the unit. If all required conditions are correct, the unit will be ready to start operations.

UNIT CONTROL

To start operations, turn the ON/OFF switch to the ON position. After 6 seconds, the control will command the pump to start. If water flow is detected in the piping, the internal sequence of the unit will start.

NOTE : After completing the inspection of the above installation points and making sure that all elements of the unit are correct, the unit can be turned on. Place the switch on the CONTROL UNIT in the ON position to power the control panel with 24 volts.

ON/OFF

The operating sequence begins with the review of all the pre-programmed safety points in the equipment control, if the necessary conditions are met the equipment is ready to start operation.

To start operation of the unit, turn the ON/OFF switch to the “ON” position.

After 6 seconds the equipment will command the water pump to turn on.

If the unit detects flow in the water pipe, the internal control sequence of this unit will start.

COMPRESSOR

Set switch APG1, 24V to the on position, then set switch APG2, Compressor to the on position and finally set switch APG3, Reset to the on position. switch APG3, This will start the compressors operating cycle.

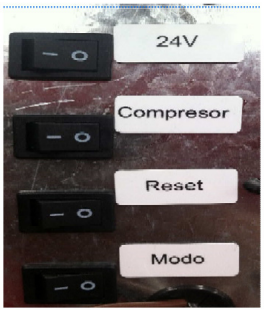
Note: Switch APG4 selects the operating mode of the machine, cooling only or heat pump.

If you want it to operate in heat pump mode activate the damper.

24V COMPRESSOR RESET

COOLING ONLY MODE

HEAT-PUMP MODE



MAINTENANCE

Service or maintenance of these units should be performed by experienced personnel with specific refrigeration training. Check Repeated safety devices and cycle control components should be analyzed and corrected before initiating a restart.

The simplified design of the refrigeration circuit completely eliminates potential problems during regular operation of the unit. No maintenance is required on the refrigeration circuit as long as the unit operates regularly.

Ease of maintenance has been taken into account during the design phase; thus, the unit is easily accessible for service and maintenance. By accessing through the panel on the front of the unit, service and maintenance of the unit can be easily performed.

The electrical components are located in the terminal box at the top of the front panel, allowing easy access to them.

Under normal circumstances, this water chiller unit requires only a check and cleaning of the air inlet through the coil surface. This can be done monthly or quarterly, depending on the environment in which the units are installed.

When the environment is constantly invaded with grease or dust particles, the coils should be cleaned by an air conditioning service technician on a regular basis to ensure adequate cooling capacity and therefore efficient operation of the Unit. The regular life of the unit may be shortened if proper service is not performed.

For continued durability and performance of the unit, proper maintenance should always be performed on a regular basis.

Over long periods of operation, the heat exchanger will become fouled, impairing efficiency and reducing the units performance. Consult your local supplier about cleaning the heat exchanger The internal water circuit requires no further maintenance or service, except in the event of a water pump failure. It is recommended that the water filter be checked periodically and replaced if it is dirty or clogged.

Always check the water level in the system to protect the moving parts of the hydraulic kit from overheating and excessive wear.

NOTE: The company is not responsible for the malfunction of the unit if the main cause is lack of maintenance or the operating conditions of the unit do not correspond to those recommended in this manual.

GENERAL

Routine checks and maintenance should be performed during initial operation as well as periodically during start-up. These include checking the liquid lines, condensing and suction pressure measurements, and checking the unit for normal overheating and undercooling. A maintenance schedule is recommended at the end of this section.

COMPRESSOR MAINTENANCE

Internal pressure and surface temperature are dangerous and could cause permanent injury. Maintenance operators and installers must have the proper tools and knowledge.

Tube temperatures can exceed 100°C and could cause severe burns. Ensure that regular maintenance inspections are carried out to ensure reliability and compliance with local regulations. To avoid system-related compressor problems, perform the following recommended periodic maintenance tasks:

- Check that safety devices are operational and properly adjusted.
- Make sure that the system is not leaking.
- Check the compressor current level.
- Confirm that the system is operating in a manner consistent with previous maintenance records and ambient conditions.
- Check that all electrical connections are securely fastened.
- Keep the compressor clean and check for rust and rust on electrical connections, tubing and compressor housing.

ELECTRICAL TERMINALS

Electrical connections should be inspected and tightened if necessary. Heat and vibration can cause connections to loosen and fall out, thus causing arcing stress.

For servicing electrical components:

- Disconnect main electrical lines before repairing or replacing any components or cables.
- Tighten all wire connections attached to the terminal block and/or components.
- Check connectors, cables and/or components for burn marks, frayed wires, etc. If any of them present these conditions, they should be repaired. or replaced.
- The voltage on the equipment should be checked with a meter periodically to ensure adequate power supply.

NOTE: Each unit comes with complete wiring. Have the diagrams handy when making connections. Electrical connections required at the time of installation are: Power line to power inlet and control wiring for the remote control. Do not wire the remote control with high voltage wires. High voltage may interfere with the control signals and/or may cause erratic or poor operation.

⚠ WARNING ⚠

Risk of electric shock, can cause injury and death.

Disconnect all power sources before inspecting the fan.

Disconnect all electrical power sources when working inside the unit. Potentially lethal voltages exist within the equipment during operation.

Review all cautions and warnings contained in this manual. Only qualified personnel should service this unit.

CONDENSER

Maintenance consists mainly of removing dirt and debris from the outer surface of the fins and repairing any damage to the fins. For units installed in corrosive environments, cleaning of the fins should be part of the regular maintenance program.

In this type of installation, dust and debris should be removed promptly to avoid build-up that will interfere with the regular operation of the unit.

⚠ WARNING ⚠

Risk of electric shock, may cause injury and death.

Risk of serious injury. Fan may start up and cause injury. Disconnect all power sources before inspecting the fan.

FILTER DRIER

Any particles from the condenser piping, compressor or various components are swept by the refrigerant into the liquid line and trapped by the filter drier.
It is recommended that the filter drier be replaced each time a refrigerant line repair is performed.

EXPANSION VALVE

The function of the expansion valve is to maintain adequate supply of refrigerant to the evaporator. This is in order to satisfy the charge conditions.

Before adjusting the superheat, verify that the unit charge is correct and that the liquid line is completely full and free of bubbles, and that the circuit is operating under stable load conditions The superheat suction for the evaporator suction discharge is factory set for 10°F.

⚠ WARNING ⚠

Risk of explosive discharge of refrigerant at high pressure. This can cause personal injury or equipment damage. Never loosen refrigerant or electrical line connections until the compressor has been depressurized on both sides.

ANNUAL MAINTENANCE SCHEDULE

Before performing any work on the unit, make sure you have the proper Personal Safety Equipment (EPS), and that the unit is turned off and idle. It is also recommended that the unit be turned on 24 hours prior to first start-up to begin warming up the compressor crankcase.

HYDRAULIC MAINTENANCE

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cleaning of the hydronic circuit filter, if present.	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												
Visual inspection of all water pipes for leaks.	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												
Replacing the water in the hydronic circuit.	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												

ELECTRICAL MAINTENANCE

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Re-tighten electrical panel connectors and terminals, control parts, power and junction boxes (quarterly)	Plan	x			x			x			x		
	Real												
Physical inspection of all electrical panel connectors and relays (monthly)	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												
Check amperage of all electric motors, compare them according to the nameplate for anomalies (quarterly)	Plan	x			x			x			x		
	Real												
Physically check for false contacts (Twice a month)	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												
Cleaning of the electrical panel (monthly)	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												

PHYSICAL INSPECTION													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cleaning of the condenser with pressurized water (twice a month)	Plan	x		x		x		x		x		x	
	Real												
Refrigerant pressure check (quarterly)	Plan	x			x			x			x		
	Real												
Inspection of fan blades, cleaning of fan blades (Quarterly)	Plan	x			x			x			x		
	Real												
Compressor power consumption check to determine refrigerant loss (quarterly)	Plan	x		x		x		x		x		x	
	Real												
Compressor oil inspection (monthly)	Plan	x	x	x	x	x	x	x	x	x	x	x	x
	Real												
Review and cleaning of the inside of the equipment (Bimonthly)	Plan	x		x		x		x		x		x	
	Real												
Review of condensate drain line, must not be clogged (Quarterly)	Plan	x			x			x			x		
	Real												
Review of alarm history (monthly)	Plan	x	x	x	x	x	x	x	x	x	x	x	x

TROUBLESHOOTING CHART

Problem	Possible causes	Possible corrective actions
Compressor does not run.	Main or compressor disconnect switch open.	Circuit breaker closed.
	Fuse damaged, circuit breakers open.	Check the electrical circuit and possible short circuit, line to ground, loss of connections or motor windings causing the failure. Replace the fuse and reset the compressor brakes, only after detecting and correcting the cause of the fault.
	Thermal overloads have tripped.	Overloads are self-resetting. Check supply voltage, operating amps, cycle times and mechanical operations. Allow time for automatic reset.
	Faulty contactor or coil.	Replace.
	System shutdown by equipment protection devices.	Determine the type and cause of the shutdown and correct it before restarting the equipment. For example, low or high pressure, water freezing, etc.
	No cooling required.	Wait until the unit calls for cooling.
	Liquid line solenoid does not open.	Repair or replace the solenoid. Check wiring.
	Motor electrical problems.	Check for open, shorted or bubbled motor.
	Loose wiring.	Check all wire connections and tighten all terminal screws.
Compressor makes noise or vibrates	Compressor running in reverse.	Check that the unit and compressor are on the correct phase of the line voltage.
	Improper piping or supports on suction or discharge.	Reposition, add or remove hangers.
	Compressor insulator bushing worn.	Replace.
	Compressor mechanical failure.	Check for possible problem in compressor failure and replace.
	Low oil level.	Check the possible problem before it damages the compressor.
High discharge pressure.	Dirty condenser coil.	Clean the coil.
	Fan failure.	Check electrical circuit and fan motor.
		Check the electrical circuit and possible problems before changing the motor fan.
	Coolant overcharge.	Remove excess coolant and check the liquid subcooling.
	Fan motor running in reverse.	Check that the unit and fan motor are correctly supplanted by the line voltage.
	No or failed condenser caps.	Check or replace condenser caps on front and rear of unit.
	No condensables in the system.	Remove the non-condensables in the system and replace the charge.

Troubleshooting Chart

Problem	Possible causes	Possible corrective actions
Low suction pressure.	Dirty evaporator.	Backwashing or chemical cleaning.
	Lack of refrigerant.	Check for leaks, repair and add the necessary charge. Check liquid sight glass.
	Low water flow.	Adjust the water flow required for the equipment.
	Expansion valve malfunction or failure.	Check or replace (if necessary) the valve and adjust the proper superheat.
	Solenoid value not open.	Check circuit and possible problem of solenoid valve not opening, if necessary replace.
	Liquid line filter drier fouled.	Check pressure drop or temperature for diagnostics.
	Condensing temperature too low.	Check means of regulating condenser temperature.
	Excess oil used.	If the system has excess oil, recover and adjust by observing the sight glass on the compressor.
Motor overload relays or circuit breakers open.	Voltage unbalance or out of range.	Correct power supply.
	Faulty or grounded wiring on motor.	Check electrical circuit for possible problem. Then replace compressor.
	Loose power wiring or faulty contactors.	Check all connections and tighten, if necessary replace contactors.
	High condenser temperature.	See corrective steps for high discharge pressure.
Compressor thermal protection switch open.	Operation beyond design conditions.	Correct to bring conditions within allowable limits.
	Voltage range or unbalance.	Check and correct.
	High overheating.	Set correct superheat. Check for possible problem. Then replace the compressor.
	Short cycling.	Check and stabilize load or correct control settings for the application.

Problem	Possible causes	Possible corrective actions
Compressor oil level too high or too low.	Low oil level.	Adjust the water flow required for the equipment.
	Insufficient water flow - level too high.	Check or replace (if necessary) the valve and adjust the proper superheat.
	Solenoid valve return oil not open.	Check circuit and possible problem of solenoid valve not opening, if necessary replace.
	Short cycling.	Check pressure drop or temperature for diagnostics.
	Excess liquid in crankcase - level too high.	Check means of regulating condenser temperature.
	Level too high with compressor operation.	If the system has excess oil, recover and adjust by observing the sight glass on the compressor.
	Operation or selection of expansion value.	Correct power supply.
	Compressor mechanical problems.	Check electrical circuit for possible problem. Then replace compressor.
	Incorrect oil for application.	Check all connections and tighten, if necessary replace contactors.
	Oil collapse in remote piping.	See corrective steps for high discharge pressure.
	Loose fitting in oil line	Correct to bring conditions within allowable limits.
Compressor staging intervals too short.	Control band not properly adjusted.	Check and correct.
	Water temperature sensor failure.	Set correct superheat.
	Insufficient water flow.	Check for possible problem. Then replace the compressor.
	Rapid temperature or flow changes.	Check and stabilize load or correct control settings for the application.
	Oversized equipment.	Evaluate equipment selection.
	Light loads.	Checking and adjusting the load.
Equipment will not run.	Inadequate voltage.	Check voltage and correct it.
	Reset switch is off.	Power up.
	No water flow in the system.	Flush the system.
	Water flow is reversed.	Check water direction.
Unit runs, but does not cool sufficiently.	Set temperature value is an incorrect setting.	Set values.
		Check data sheet and check system for leaks.
	High condensing temperature.	Check condenser and repair.
	Equipment does not have sufficient water flow.	Check technical data, check filter in water line and adjust flow if necessary.
The fan does not work.	No supply voltage.	Check electrical circuit (line down).
	Motor defective.	Contact the manufacturer.
	Motor thermal protection switch open.	Check operating conditions, if necessary contact the manufacturer.

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Air Conditioning
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