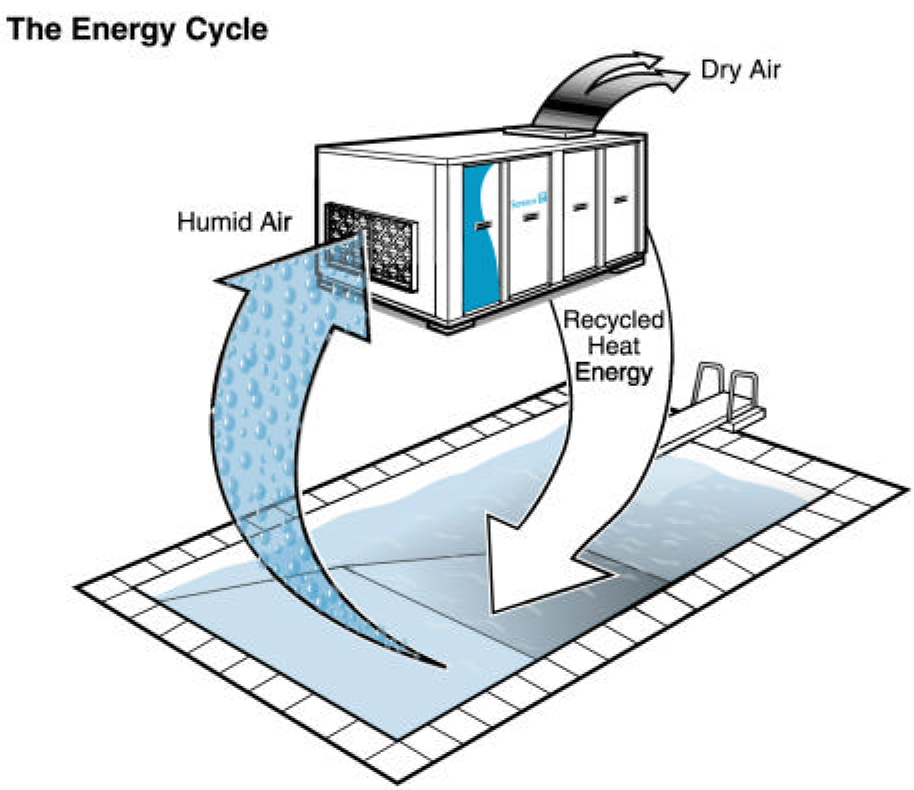
Seresco: (pronounced Sir-ES-co) Meaning, "to become dry"

Installation and Operation Manual

NE Series Dehumidifiers

For Models:
PV, NV, PH and NH Configuration Natatorium Dehumidifiers
NC Series Outdoor Air-cooled Condensers



CAUTION

ONLY TRAINED, QUALIFIED PERSONNEL SHOULD INSTALL AND/OR SERVICE SERESCO EQUIPMENT. SERIOUS INJURY AND PROPERTY DAMAGE CAN RESULT FROM IMPROPER INSTALLATION/SERVICE OF THIS EQUIPMENT. HIGH VOLTAGE ELECTRICAL COMPONENTS AND REFRIGERANT UNDER PRESSURE ARE PRESENT

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1. Preface

Natatorium: a facility that contains an indoor pool, whirlpool or spa ranging in size from a small residential installation to a large commercial indoor waterpark.

Seresco's Natatorium Dehumidifiers were developed by a team of industry experts with a lifetime of experience developed while working with many thousands of indoor pools. A natatorium has many critical design issues that must be fully understood and properly addressed to ensure years of comfortable and trouble free operation of the facility.

This booklet contains valuable design guidelines based on Seresco's extensive knowledge and experience in solving humidity control problems in many thousands of indoor pool installations. Seresco Technologies Inc., manufacturer of the NE Series of natatorium air quality control systems is dedicated to providing state-of-the-art features and design, quality engineering and the most reliable products in the market.

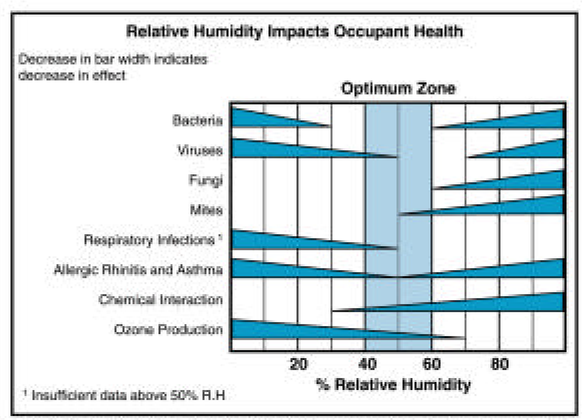
The environment in a natatorium should be the same as in any other room in a building: comfortable and healthy for the occupants and their activity, and provide good air quality. The space conditions in a natatorium need to be precisely maintained in order to maximize human comfort and health as well as preserve building integrity. Relative humidity, air temperature, water temperature and air quality are all key environmental aspects to control. High relative humidity levels are not only a problem to bather comfort and health, but can seriously damage the building structure possibly leading to building component failures. Revenues can also be affected in commercial facilities. Several hotel chains offer a full money-back guarantee should the hotel guest have any complaint regarding their stay.

A properly designed and maintained natatorium delivers years of pleasure. The first step is to become familiar with the design challenges and to understand how to address them. A Natatorium's overall performance is inversely proportional to the amount of compromises and shortcuts taken in the design and construction of the natatorium.

A Successful Facility. A natatorium is one of the most notoriously difficult facilities to design because there are so many critical considerations that if overlooked develop into problems with the building structure or complaints from the occupants. The designer must take a complete system approach, from basic engineering issues to the more subtle details in the air distribution. Experience and a complete understanding of the design issues help the designer satisfy:

- Comfort and Health
- Humidity Control
- Indoor Air Quality
- Condensation Control

Comfort and Health: Human comfort levels are very sensitive to temperature and relative humidity. It is essential that both are controlled and stable. While temperature control is generally well understood and mastered by designers, it is important to recognize what temperature levels natatorium patrons want. The space temperatures in a natatorium are unique to each project and assumptions must never be made. Fluctuation of relative humidity levels can be an even greater concern because it has a direct effect on human comfort and health. Figure 1 shows that relative humidity levels outside the 40%- 60% range can result in increased human susceptibility to disease from bacteria, viruses, fungi and other contaminants that reduce air quality and potentially lead to respiratory problems.



Study by Theodore Sterling Ltd., A. Arundel Research Associates and Simon Fraser University.

Figure 1 - Relative Humidity Effect on Health Factors.

The type of facility being designed dictates the space temperature. Table 1 helps target some typical conditions. It is critical to understand who will be using the facility in order to deliver the conditions most likely to satisfy them.

Pool Type	Air Temperature, °F	Water Temperature, °F
Competition	78 to 85	76 to 82
Diving	80 to 85	84 to 88
Elderly Swimmers	84 to 85	85 to 90
Hotel	82 to 85	82 to 86
Physical Therapy	80 to 85	90 to 95
Recreational	82 to 85	80 to 85
Whirlpool/spa	80 to 85	102 to 104

Table 1 – Typical Natatorium Operating Conditions

Indoor pools are normally maintained between 50 and 60% RH for two reasons:

- Swimmers leaving the water feel chilly at lower relative humidity levels due to evaporation off the body and:
- It is considerably more expensive (and unnecessary) to maintain 40% RH instead of 50% RH.

General Notes:

- Facilities with warmer water temperatures tend to have warmer space temperatures.
- Physical Therapy facilities will cater to therapist comfort rather than the patient because they are generally not in the space for more than an hour, whereas the therapist is there all day. The designer should consult local codes. Some States require a full purge of the room air with 100% outdoor air for every hour of occupancy.
- Elderly swimmers tend to prefer much warmer air and water temperatures.

Humidity Control: High relative humidity levels inside a building are well known for their destructive effects on building structure and can pose serious health concerns. Buildings with high humidity levels are prone to condensation problems that can destroy the building structure. They also facilitate the growth of mold and mildew, which in addition to being unsightly, can adversely impact the air quality. Controlling humidity requires that a total moisture load be accurately calculated. This amount of moisture must be removed from the space at the same rate it is generated to maintain stable space conditions.

1.1 Packaged mechanical refrigeration system.

By far the most common and popular method of removing moisture from the space, these are packaged refrigeration units like those built by Seresco. The units are designed and developed specifically for dehumidifying indoor pools.
A major benefit of this approach is that both the sensible and latent heat is combined with the heat generated by the compressor's power consumption and can be directed to wherever heat may be required in the natatorium. This process is unique in the HVAC industry as is uses both the cooling and heat rejection sides of the refrigeration cycle. The system can be simultaneously dehumidifying (cooling) the air and then reheating it and/or the pool water to deliver dehumidified and reheated air to the space, and/or warm water to the pool.

How it works. Figure 2 illustrates schematically how warm humid air passes through the dehumidifying coil and is cooled to below its dew point. As a result moisture condenses out of the air. Depending on the space temperature requirements the hot gas from the compressor can be used to reheat the air or reject its heat to an outdoor condenser. Compressor hot gas can also be used to heat the pool water.

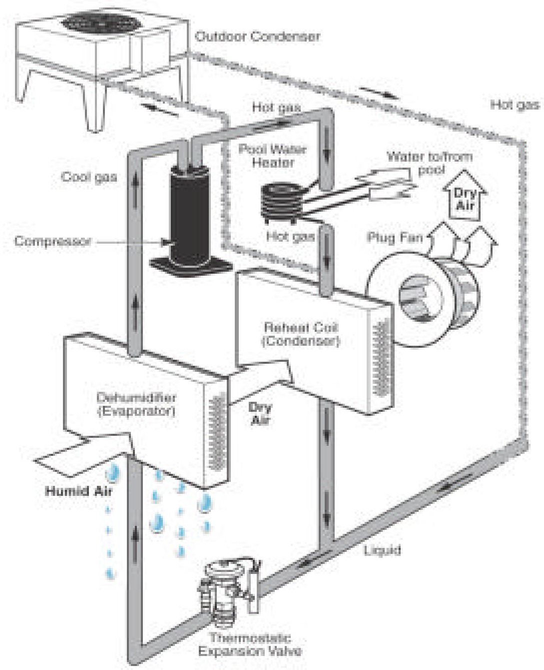


Figure 2 Mechanical Refrigeration System.

Typical Operating Conditions:
Air On Evaporator: 84°F, 50% RH
Air Off Evaporator: 50°F
Suction Pressure: 65 PSIG
High Pressure: 220 PSIG
Superheat: 12-15 °F
Pool Water Heat: in 84°F- out 92°F

1.2 NE Series Dehumidifier Features.

Major components are located within the NE Series unit.

1 - Air Filters. The standard filter is a 2” or 4” pleated 30% efficient filter. 4” 95% filters are available. Access to the filters is through a service access door.

2 - Evaporator. The 6 row deep coil is corrosion protected to ensure a long lifespan and premium dehumidification performance. It is also recessed into the cabinet allowing these units to perform even if the duct connection is less than perfect.

3 - Drain Pan. A stainless steel drain pan covers the unit’s entire coil section. The drain pan is sloped to ensure minimal water retention.

4 - Reheat Coil. This corrosion protected condenser coil is capable of rejecting 100% of compressor heat to the air steam.

5 - Blower. Plenum fans are standard on all units. A plenum fan doesn’t need extended runs of perfect ductwork to convert velocity to pressure: it’s done inside the NE unit! This feature that helps ensure the NE unit will perform to specifications even if the installation is not prefect.

6 - Compressors: The NE Series is equipped with robust high-efficiency scroll compressors.

7 - Blower Motors: The NE Series uses Inverter Spike Resistant direct driven blower motors. This blower drive design simplifies unit maintenance and delivers the air more efficiently.

8 - Electrical Panel. All electrical components and connections are inside this panel.

9 - Receiver. The receivers have two sight glasses. This facilitates the system charging process

10 - Pool Water Heater. This coaxial heat exchanger is provided with the PH and PV models. The water circuit is corrosion resistant cupro nickel pipe.

11 - Command Center. The Keypad and Display panel has a backlit graphic Liquid Crystal Display (LCD) and 7 system status LEDs.

12 - Evaporator Bypass Damper. The motorized bypass damper is controlled by the Command Center and it is used to ensure the evaporator is always operating at optimum pressures.

13 - Outside Air Opening. Manual or motorized air balancing dampers are provided and two-inch air filters.

14 - Cabinet: Seresco has taken all possible commercially feasible precautions to protect the NE Series units against the corrosion. The sheet metal is galvanized automotive grade G-90 or aluminum with both sides painted.

15 - Refrigerant Pressure transducers. These allow the user or serviceman to access the vital information of refrigerant pressures through the operator panel of the microprocessor rather than having to connect a set of refrigerant manifold gauges. This is the most important operation and diagnostic data for any refrigeration system.

2. Installation

2.1 Uncrating and Inspecting

Seresco inspects and fully tests each dehumidifier in all operating modes before it ships from the factory. The unit can suffer damage in transit. Check the equipment thoroughly for both visible and concealed damage before you sign the receiving papers. Document any damage in writing on the carrier's bill of lading to ensure that damage claims are handled promptly. If the unit has been damaged, obtain a claim form from the carrier. Promptly fill out and return the form, and notify Seresco of any damage.

NOTE: Damage claims or missing parts must be filed with the freight carrier.

2.2 Mounting and Service Clearance

The NE Series dehumidifier continuously removes a significant amount of moisture from the room air. Some models have a pool water heating option. Condensate lines and pool water circuits can leak.

NOTE: Do not install the unit in a location where a water leak will cause damage.

- The mechanical room where the unit is installed should have a floor drain.
- If there is no floor drain, a secondary pan with a drain or condensate pump should be installed under the entire unit. (As is done with a residential washing machine)
- Do not store pool chemicals in the same room as the dehumidifier.

Install the unit on an appropriate mounting base or a platform. Install industry standard components that prevent vibration and sound transmission. Never install the dehumidifier on a wooden platform that can resonate. Do not install the unit near occupied rooms such as bedrooms. Never suspend from the floor joists of an occupied room above the mechanical room. Never locate the unit above a swimming pool or a spa water surface.

Allow a minimum of 36 inches of clearance on the sides of the NE series dehumidifier for piping, duct connections, and service access.

DO NOT install an indoor dehumidifier in an unconditioned space or where ambient temperatures can fall below 45°F or climb above 90°F. If such a space is being considered, Seresco offers outdoor-rated dehumidifiers with weatherproofing and thicker insulation.

2.3 High Voltage Electrical Connections

NOTE: The installing contractor must ensure that all electrical wiring satisfies all National, State and Local codes.

2.3.1. Wire and Fuse Sizing

The field-installed power supply wires and over current devices must be sized to handle the minimum ampacity of the dehumidifier without exceeding the maximum fuse size rating. Both the MCA and MOP are indicated on the unit nameplate.

NOTE: Improper wiring to the dehumidifier could create the possibility of shock and may lead to system failure.

2.3.2. Line Voltage Connections

Figure 7 shows typical power wiring connections. Single-phase units power supply must have 3 wires (2 power, 1 ground). On three phase units the power supply must have 4 wires (3 power, 1 ground). Connect the power supply wires to the main power block located inside the electrical panel.

Always check the nameplate voltage before connecting to the unit.

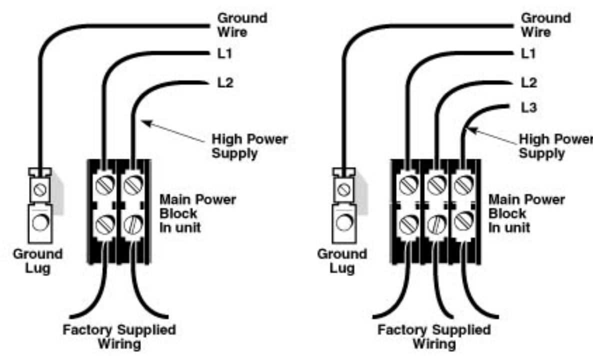


Figure 7 – Power Wire Connection

2.4 Control Wiring

The NE Series dehumidifiers have all necessary sensors unit mounted and set points pre-programmed at the factory. Remote duct heaters, outdoor air-cooled condensers, auxiliary pool water heaters and remote exhaust fans all require interfacing with the dehumidifier. Their connection terminals are identified in Table 2.

The microprocessor has been programmed to control their operation. Figure 8 illustrates how an Ethernet connection to the Internet allows all functions to be monitored by trained professionals with Seresco's Websentry. It is the final step to ensure the facility operates trouble free.

Table 2 - Control Terminals (dry contacts)	
Dry Contact 24V 5A	**Terminal Numbers**
Outdoor Condenser	J10-1, J11-10
Outdoor Air Damper	J9-9, J9-10
Alarm	J10-5, J10-6
System On Light	J10-3, J10-4
Exhaust Fan/Damper	J9-7, J9-8
Stage 1 Heat	J9-3, J9-4
Stage 2 Heat	J9-1, J9-2
Aux. Pool Water Heater	J10-7, J10-8
Firestat Interlock	J7-7, J7-8
0 – 10 VDC	Terminal Numbers
Hot Water Control Valve	J8-7
SCR heater Control	J8-8

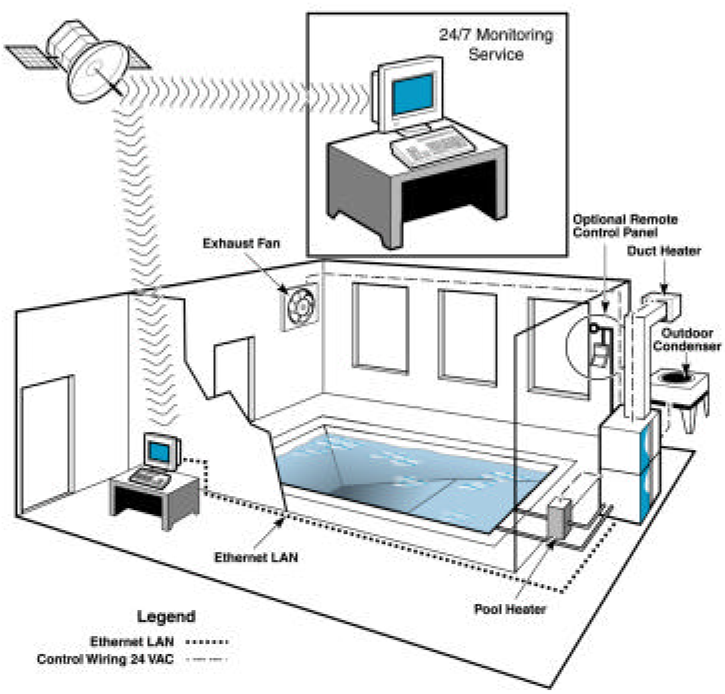


Figure 8 Web Monitoring Service.

2.5 Controller, Programming and Sensors

The NE Series Command Center (Figure 9) is the brains behind the NE Series Dehumidification System. The Command Center is composed of a microcontroller system, an LCD display and keypad, an Ethernet interface, and WebSentry – a web browser based remote interface tool for monitoring and controlling NE Series systems from anywhere in the world via the internet.

Figure 9 – Command Center

The keyboard/display panel is shown in Figure 9 and is located on the NE Series unit at the mechanical compartment access. The LCD display has a built-in backlight for easy reading in low light conditions. The keys have the following functions:

1, 2, 3
4, 5, 6 — Correspond to selections numbered on the screen (e.g. 1-Menu, press 1 for the main menu)

Back — Allows you to return to the previous menu without making any changes.

↑↓ — Used for viewing additional menus, alarms or operating data and for changing parameters on the screen such as setpoints.

Enter — Press to save changes to parameters and (optionally) press again to return to the main sensor screen.

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There are 7 LEDs as shown and their function is as follows:

Alarm	Solid Red indicates an active alarm (that has not yet been cleared). A Flashing Red indicates an alarm that has not been acknowledged yet.
Dehum	Solid Green indicates system is in dehumidification mode. Compressor will run when anti-short cycle timer is satisfied.
A/C	Solid Green indicates system is in air-conditioning mode. Compressor will run when anti-short cycle timer is satisfied.
Pool	Solid Green indicates that pool heating is on. If Dehum or A/C is also on, then heating is by the NE Series unit. If Dehum and A/C are off, auxiliary heating is energized.
Heat	Solid Green indicates that the auxiliary air heating system is on.
Filter	Solid Yellow indicates that the air filters are dirty and need changing (optional only).
Service	Solid Yellow indicates that the NE Series unit is in Service Mode. Flashing Yellow indicates that the blower or compressor have been manually disabled (when not in Service Mode).

There are two main modes of operation for the NE Series Units: “Normal Mode” and “Service Mode”. In normal mode, the user can view sensor information, view unit operating status, change setpoints (password protected), adjust the occupied/unoccupied schedule (password protected), and view alarms and warnings. The system operates automatically.

In Service Mode, the trained technician has access to special features to aid in system commissioning and troubleshooting, including Ethernet network access test utilities.
The system operates under manual control.

From the main screen, which shows sensor readings, press 1 (-Menu) to open the main menu structure. From any menu level, the Back button will return to the previous menu level **without making any changes**. Menus and selections are accessed using the “1-6” numbered keys – each menu item and parameter is preceded by a number from 1 to 6. When the scroll keys can be used to access additional menu items they will appear on the screen. The same scroll keys are used to change values after a parameter has been selected.

A User Password is required to view/change setpoints and schedules. Passwords are 3 digits long, and entry is done using the scroll keys (? and ?) to change the 1st digit to the correct password value – then press Enter to accept that digit and move on to the 2nd digit, repeat for the 3rd digit. The User password is supplied to the customer under separate cover..

Only trained Service Technicians should use the Service mode, as damage to the equipment can result from misuse. To Exit Service mode, perform a manual reset and allow the system to start up on its own.

Logs
The CommandCenter logs alarm messages which can be accessed from the LCD/Keypad.

Alarm messages are as follows:

HP# -NN	High pressure trip (# indicates compressor, NN can be SW or TD indicating switch or transducer alarm)
LP# -NN	Low pressure trip (# indicates compressor, NN can be SW or TD indicating switch or transducer alarm)
Blower OL	Blower overload trip
No Air	Airflow alarm, air pressure switch (optional) reading too low air pressure differential
Fire	Firestat signal active
Waterflow	Low water flow, controls have detected pool water out temperature is too high
Filter	Dirty filter, filter switch (optional) reading a high pressure differential
Pumpdown	Compressor pumpdown timed out (no LP switch detected)
Freeze	Freezestat
Purge	Supply air too cold during purge, purge shut down
Volt Mon	Voltage monitor
Oil #	Oil failure (# indicates compressor)
No Config	System not configured at startup (only needs to be done once)
Restart	Manual Reset required to start normal operation
SW Error	System has detected an internal error – contact factory
CompPower	Indicates that compressor has been manually disabled through an external switch for an extended period of time
SensorNNN	Indicates sensor fault where NNN identifies the sensor

The operating log is easy to read as the messages clearly indicate what action has taken place.

The sensor log uses the following abbreviations in order to display the sensor values on two screens:

RH Return Air Humidity %
RA Return Air Temperature F
HP Refrigerant Discharge Pressure PSI
LP Refrigerant Suction Pressure PSI
EV Air Temperature Leaving Evaporator F
SA Supply Air Temperature F
SH Suction gas Temperature F
CC Auxiliary Temperature sensor F
OA Outdoor Air Temperature F
PO Pool Water Leaving Temperature F
PI Pool Water Entering Temperature F

System Status

The CommandCenter has a feature which will provide more detailed information about the internal operation of the system, which can assist an owner or service technician in understanding his NE Series unit is doing at any given moment.

This feature is accessed through the menu system at /Main Menu/System/System Status.

The various system elements are broken into three main groups:

Environment	Related to air relative humidity and temperature control, pool heating control
Compressor	Related to the operation of the compressors
Other	Related to miscellaneous system operations

Selecting the Compressor elements takes you to a screen showing the compressor status, and also which solenoid valves and contactors are energized. The solenoid valves and contactors are coded as follows:

PW Compressor contactor
PD Pumpdown valve
DH Dehumidification (reheat) valve
AC Air conditioning valve
PH Pool water heating valve
PB Pool water heating bypass valve

Menu Guide:

The following table summarizes the menu selections accessible from normal mode. From the main sensor screen, press 1-Menu to enter the menu structure. Pressing the BACK button returns to the previous menu without making any changes to the screen. ENTER is used to accept changes, and also to return to the sensor screens in lieu of pressing BACK several times. See Addendum For Factory Settings and Service Mode menus.

Setpoint	
Temperature	Room temperature setpoint
Humidity	Room relative humidity setpoint
Pool Temp	Pool water temperature setpoint
Economizer	Outdoor air temperature below which economizer not used
Freezestat	Supply air temperature below which Freezestat alarm trips
Purge	Supply air temperature below which Purge will stop
Heat Recovery	Outdoor air temperature below which heat recovery starts
Schedule	Sets occupied/unoccupied state for ventilation control
Time Slot 1-6	There are 6 available time slots that can be established
Weekday	None/All/Weekday/Weekend/Monday to Sunday selection
On	Time at which occupied status and ventilation begins
Off	Time at which unoccupied status begins, ventilation stops
System	
Blower/Compressor	Enabling/disabling blower and compressor operation
Purge	Starts/stops purge 100% ventilation operation
System Restart	Manual reset
Alarm Log	View Alarms
System Status	See Section 2.5.4
System Summary	Summary of system configurations
User Settings	
Display	
Backlight	Turn backlight on or off
Reset Display	Idle time before display reverts to the main sensor screen
Short Message	Time for which short information messages remain visible
Long Message	Time for which long information messages remain visible
System Clock	
Date	Set the date
Time	Set the time
Zone	Set the time zone
Daylight	Set day light savings on or off manually
Date Format	Format the date on the screen
Time Format	Format the time on the screen
Synch	Synchronize with internet time server (when connected)
User Password	
Enabled	Enable/disable user password control
Password	Change user password
Retention	Set time for which password entry remains valid
Factory Settings	
Service Mode	

Figure 10 Command Center Quick Menu

2.6 System Design Checklist.

Ensuring that all critical system design aspects have been addressed is paramount to obtaining a safe and healthy pool environment. Seresco's name is a useful checklist.

System duct design and air pattern
Evaporation rate and latent loads
Required Access Space
Exhaust Air
Supply Air flow
Cooling and Heating loads
Outdoor Air

2.6.1. System Duct Design and Air Pattern

The overall duct design will determine whether or not the space will be comfortable and condensation free. Special care must be taken to ensure the entire room sees the required air changes per hour and that all exterior windows have air delivered to them. Stagnant areas, especially where occupants can access (the deck area for example) will suffer from poor air quality and lead to complaints.

Traditional problems in indoor pools are easily predictable and can be avoided by following two models provided here. Figures 12 & 13 illustrate good air distribution practices and layouts.

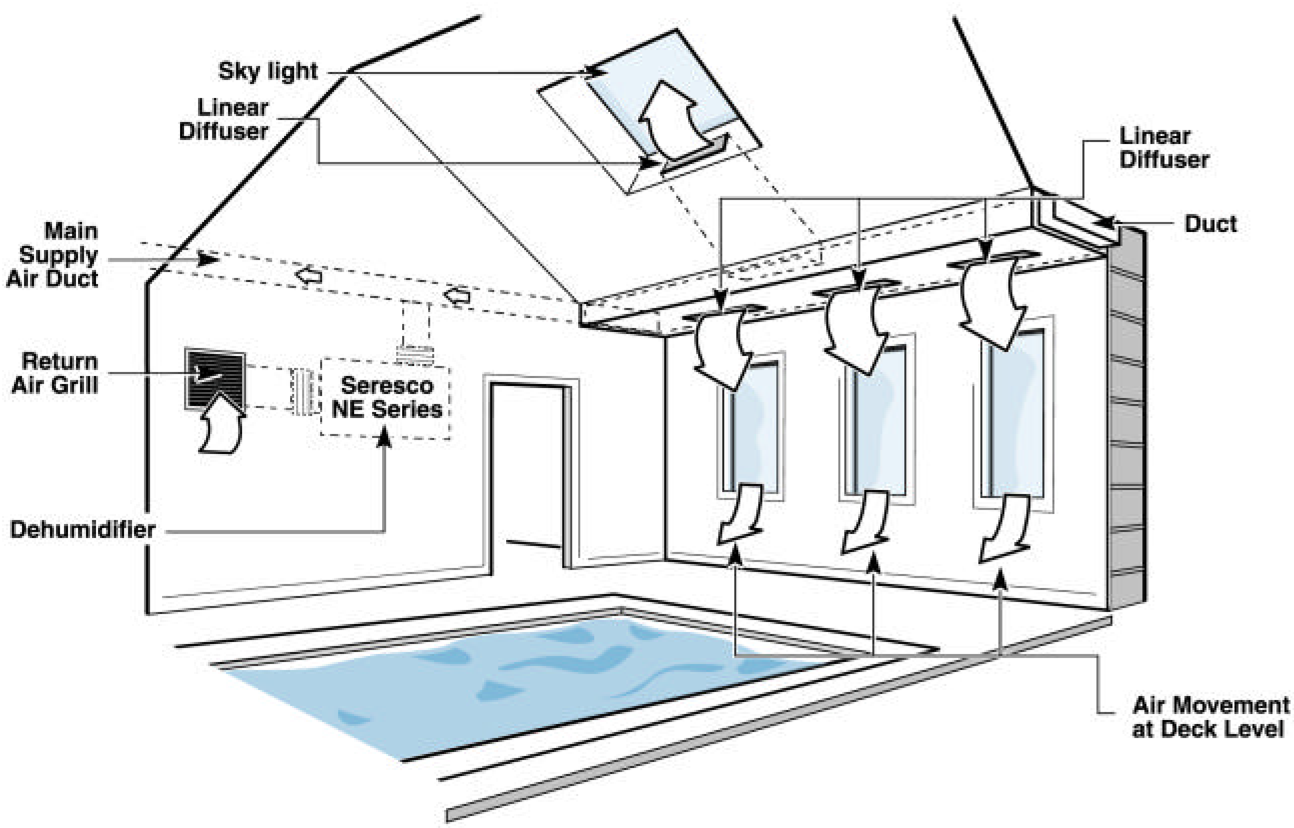


Figure 12 – Perimeter Duct Layout

All air distribution systems should:

- Supply 4-6 volumetric air changes per hour.
- Blanket exterior windows, exterior surfaces prone and other areas prone to condensation with supply air. A good rule of thumb is 3 - 5 CFM per ft² of exterior glass.
- Locate the return grille to enhance the overall air pattern within the room.
- Prevent air short-circuiting. Avoid installing the return air grille too close to a supply grille.
- Select grilles, registers and diffusers that deliver the required throw distance, and the specified CFM rating.
- Introduced outdoor air per local codes and/or ASHRAE Standard 1999
- Maintain a negative pressure in the space with an exhaust fan.

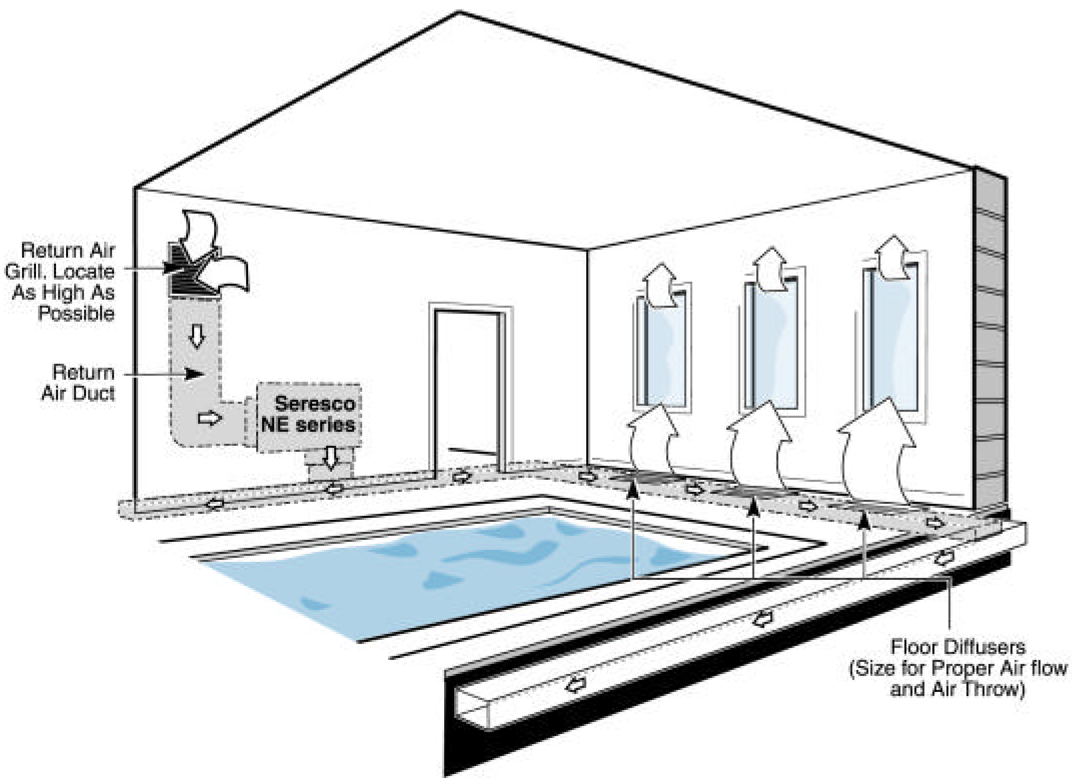


Figure 13 – Perimeter Below Grade Duct Layout

2.6.2. General Recommendations:

- Galvanized sheet metal ducts are acceptable in most installations. A below-grade duct system should use PVC or plastic-coated galvanized spiral pipe to avoid deterioration.
- Ductwork that passes through an unconditioned area should be insulated on the exterior.
- When applicable, locate exhaust fan air intakes as close to the whirlpool as possible.
- To prevent excessive vibration noise, install neoprene flex connectors when attaching ductwork to the dehumidifier.
- Skylights require significant airflow to avoid condensation on their surfaces.

2.6.3. Evaporation and Latent Loads

Every building's moisture (latent) load is calculated in the same way. There are generally three sources of moisture that are considered: Internal load: Evaporation rate, Occupants, and Outdoor air load

It is important to be aware of the design criteria used to calculate the total load and reconcile a unit selection. Seresco's Natatorium Design Manual has more information on this subject.

2.6.4. Required Access Space

No Access = no service or maintenance. All NE series dehumidifiers have been designed to require only two sides access. Allow a minimum of 36 inches of clearance on the sides indicated in Figure 14 for piping and service access. Mirror access units are also available.

2.6.5. Exhaust Air

ASHRAE recommends the room be maintained at 0.05-0.15" WC negative pressure relative to surrounding spaces.

NOTE: Ten percent more exhaust air than outdoor air is a good rule of thumb.

Figure 14 illustrates how the location of the exhaust fan can also significantly improve the air quality in the space. A spa or whirlpool should have the exhaust air intake grille located directly above it. This extracts the highest concentration of pollutants before it can diffuse into the space and negatively impact the room air quality.

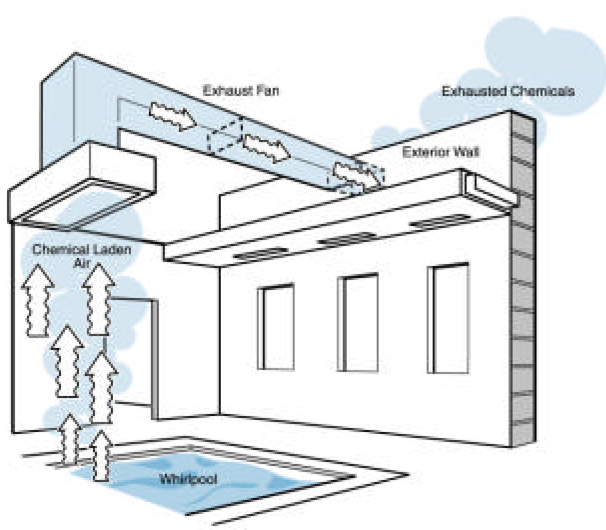


Figure 14 – Exhaust Air Intake recommendation

2.6.6. Supply Air.

ASHRAE recommendations for proper volumetric air changes per hour are important to ensuring that an entire room will see air movement.

Stagnant areas must be avoided, as they will be prone to condensation and air quality problems.

Short-circuiting between supply and return air must also be avoided as it significantly reduces the actual air changes within the space.

ASHRAE recommends:
4-6 volumetric air changes per hour in a regular natatorium.
6-8 volumetric air changes per hour in facilities with spectators

Supply air required (CFM) = [room volume (ft^3) x desired air changes] / 60

2.6.7. Cooling and Heating Loads.

All buildings should have cooling and heating load calculations done to determine their specific requirements. The room air temperature of an indoor pool facility is generally 10-15 ºF warmer than a typical occupied space. Therefore, the heating requirement is larger than a traditional room and the cooling needs are less.
Rules of thumb do not apply. This is a unique space that requires accurate load calculations. Outdoor air must be included in load calculations as it often represents up to 50% of the heating load.
Space cooling is a free byproduct from packaged dehumidifiers. These systems dehumidify by cooling the air below its dew point. The compressor heat can be used to heat the pool water during this time or merely sent outdoors to a condenser as is done with traditional air conditioning systems. If the cooling load exceeds the standard output of a dehumidification unit, a larger unit with compressor staging is often specified.

2.6.8. Outdoor Air.

The introduction of outdoor air is essential to maintaining good air quality in any facility. The impact of outdoor air ventilation on a natatorium changes with the weather. Introducing outdoor air during the summer adds moisture to the space and in the winter removes moisture from the space. For maximum dehumidification load calculation the Summer Design conditions are considered.

Ventilation codes generally require that outdoor air be introduced into a commercial building during occupied hours. ASHRAE Standard 62-1999 recommends the introduction of outdoor air into a natatorium at the following rates:
0.5 CFM/ft^2 of pool and (wet) deck area
15 CFM per spectator.

NOTE: Most designers use the larger of the two values.

Seresco suggests that only the wet deck (a 5-6' perimeter) be considered in this calculation, as the purpose of this outdoor air is to help dilute chemicals off-gassed from water. A predictably dry portion of the deck will not factor into the IAQ issues.

The NE Series units have an outdoor air opening with a filter and manual balancing damper. Optional unit mounted motorized dampers and time clocks are available. Figure 16 illustrates a typical connection configuration.

Figure 16 – Outdoor Air Duct Detail

- Outdoor air requires considerable heating in the winter and can add significant moisture in the summer. Exceeding code requirements is not recommended as it will increase the operating expenses and may increase the size of the dehumidifier.

Locate the outdoor air intake away from any sources of airborne contamination such as exhaust fans or plumbing vents.

If more than 20% of the total airflow is outdoor air or if the winter design temperature is below 10ºF: The outdoor air must be preheated to 65ºF.

If outdoor air is introduced into the return duct: it must be preheated to the space temperature.

2.7 Condensate Drain.

The dehumidifier is a draw through configuration as a result the entire cabinet is under negative pressure. Without a trap, condensate will not drain and the unit will overflow into your mechanical room.

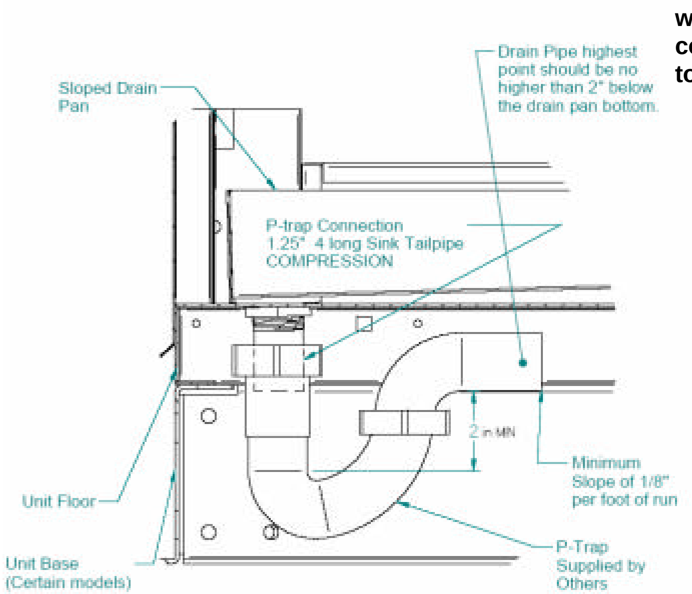


Figure 16 – P Trap

Per Figure 16 pitch the condensate drain line a minimum of 1/8" per linear foot, and support the pipe with code-approved hangers at least every 5 feet.

If the drain line passes through an unconditioned space, heat tracing is required to prevent the condensate in the drain from freezing.

When gravity disposal is not possible, a condensate pump can be used. Follow the pump manufacturer's installation instructions.

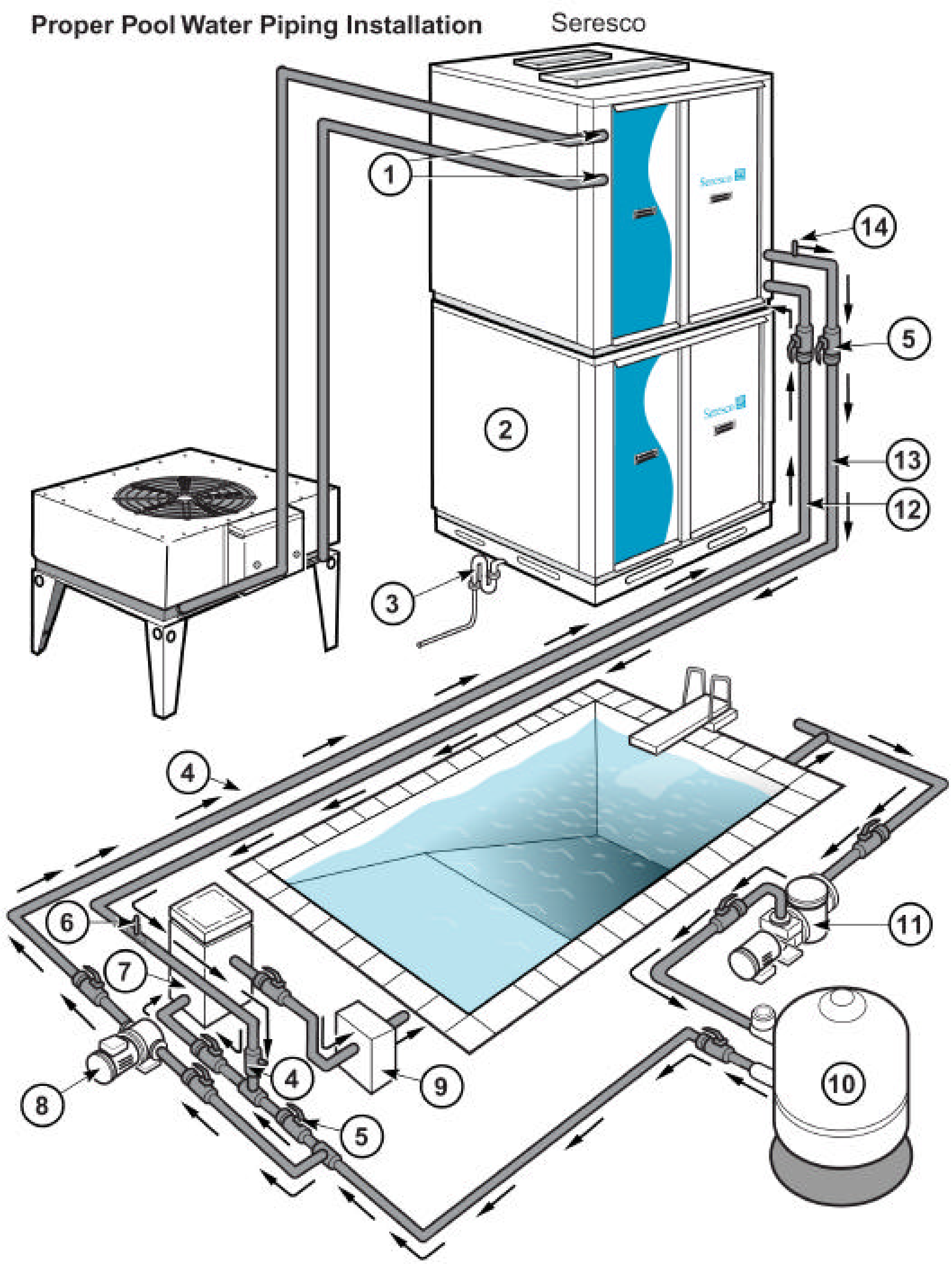
2.8 Pool Water Heating (PH and PV Models Only).

The energy a pool loses through evaporation represents approximately 90% of its annual water-heating requirement. The Seresco unit captures 100% of this heat as a by-product of the dehumidification process and can return this energy back to the pool, thereby greatly reducing pool water heating costs. During the cooling season the dehumidifier is capable of providing 100% of the pool's water-heating requirement. Refer to Figure 18 for proper pool water piping connections to the NE Series unit.

2.8.1. Water Piping Connections.

The NE unit requires only a fraction of the total water being circulated by the main filter system. Refer to Table 4 or the unit nameplate for nominal water flow rates.

- The water circuit should tap off the main pool water line downstream of the main filter and upstream of the auxiliary pool water heater and chemical feeder.
- An auxiliary water pump to deliver the unit's required water flow rate is recommended. It is an open system and the pool's main circulating pump can rarely accommodate additional system pressure.
- **NOTE: All systems require auxiliary pool water heaters. The Seresco unit will control their operation when it is not able to provide water heating.**



Legend

1. Refrigerant Piping to Remote condenser
2. Seresco Dehumidifier
3. P-Trap
4. Check Valve
5. Ball Valve
6. Flow Meter
7. Auxiliary Pool Heater
8. Auxiliary Pump at lowest possible location
9. Automatic Chemical Feeder
10. Pool Filter
11. Main Pool Pump
12. Water Inlet
13. Water Outlet
14. Air Vent

Figure 18 – Proper Pool Water Piping Installation

2.9 Outdoor Air Cooled Condenser Installation.

This condenser is used in air conditioning mode where it rejects unneeded heat from the space to outdoors. Proper installation is essential to ensure it can function as intended. Proper airflow and refrigerant piping are paramount.

- Ensure an appropriate maximum ambient air temperature has been specified.
- Ensure the unit has proper airflow per Figure 19. A perimeter of free area equal to its width must be provided.
- Use line sizes as specified by Seresco.
- To avoid potential seasonal system charge problems, ensure the installed line lengths are never longer than indicated on the plans and specifications.
- If the condenser is installed above the dehumidifier, ensure the hot gas line has proper oil traps.
- Contact Seresco if the condens er is installed more than eight (8) feet below the dehumidifier.
- The installer must endeavor to ensure that all industry standards for refrigeration component installation are met. This includes but is not limited to; proper line sizing, materials, nitrogen purging, brazing with Silfos 5 or better (NO SOFT SOLDER), evacuation, cleanliness, traps, long radius elbows and system charging.
- Install the remote condenser on a level, hard surface.

2.9.1. Refrigerant Piping of Remote Condensers

- NE series dehumidifiers are equipped with isolation valves and access valves located in the blower compartment. Do not open the isolation valves until all exterior piping is leak checked and evacuated. The last outdoor condenser vacuum can be broken with liquid REFRIGRANT. Monitor the exact amount of REFRIGRANT added, as the total system charge must be per the unit nameplate.
- NE series dehumidifiers have refrigerant pipe stubs for the line set connection inside the cabinet.
- Use standard commercial refrigeration piping practices when installing the refrigeration piping between the dehumidifier and the remote air-cooled condenser.
- Hot Gas and Liquid line sizes should be per unit nameplate. The stubs inside the NE unit will be the correct sizes for line lengths up to 50'.

Do not exceed 50' total line length or install the condenser more than 8' below the NE unit.
Per figure 20, install an oil trap at the start of and at every 15 feet of vertical lift in the hot gas discharge line as shown in Figure 18. Pitch horizontal lines a minimum of 1/2" every 5 feet *in the direction of flow*. All piping must be clean and de-burred. Keep copper chips and foreign materials out of the tubing. A nitrogen purge while brazing is paramount to reduce the chances of oxidation in the pipes.
Keep the Hot Gas and Liquid lines a minimum of 2" apart to prevent heat transfer. Insulate the hot gas line in all areas where a person may come in contact with the line and be in danger of a burn. When all piping work is complete, check for leaks by pressurizing the remote condenser and line set with dry nitrogen. If no leaks are detected, the circuit is ready to be evacuated. Evacuate the condenser and piping to a minimum 250 microns. Isolate the piping for ONE HOUR to verify that the system is free from leaks, moisture, and non-condensables.

NOTE: Consult Seresco before installing the outdoor air-cooled condenser more then 8 feet below or more than 50 feet away from the dehumidifier.

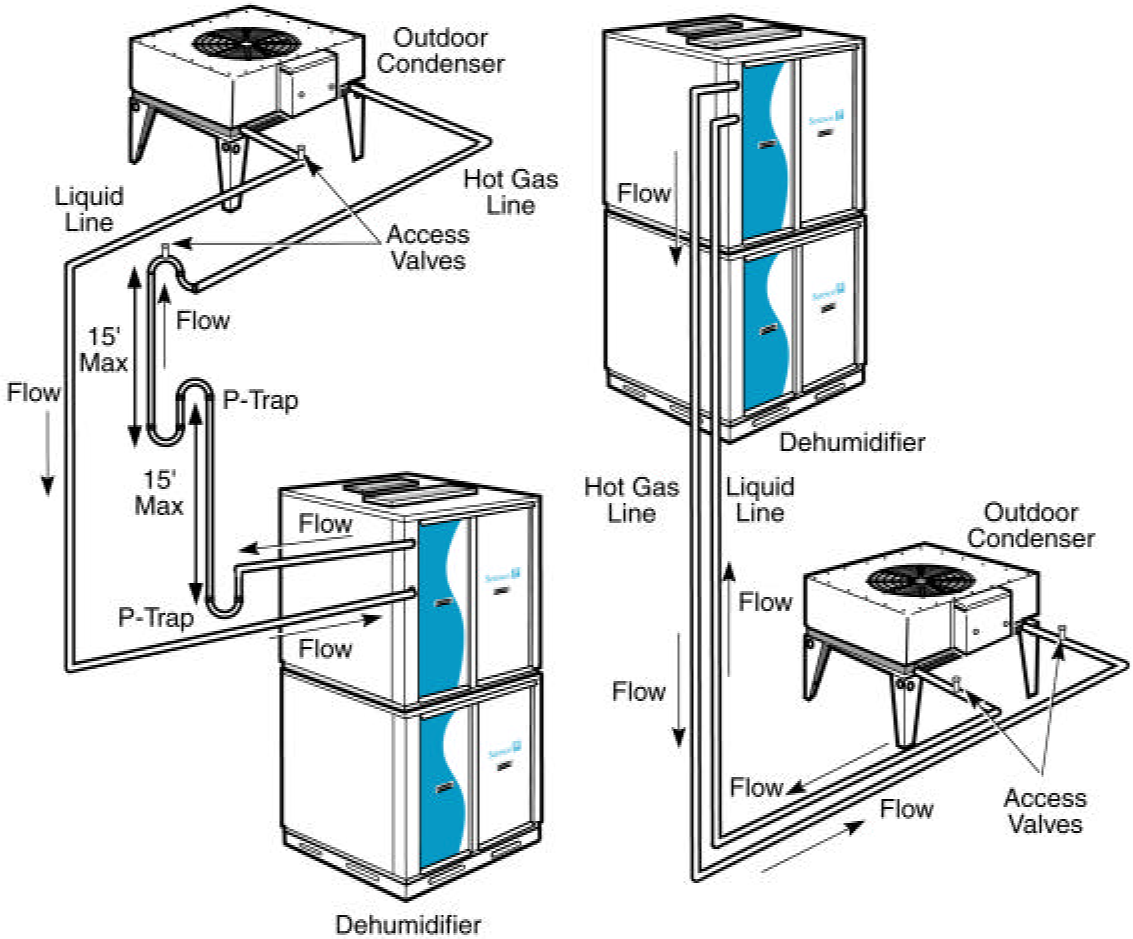


Figure 20 – Typical Outdoor Condenser Installation

2.9.2. Charging of Remote Condensers

Once a proper evacuation has been accomplished the system is ready for charging. The outdoor air-cooled condenser requires a field charge by the installing contractor. The field charge required depends on the size of the condenser and the length of the piping. The unit nameplate will show the exact field charge required.

The last vacuum can be broken with liquid refrigerant. Monitor the exact amount of refrigerant added, as the total system charge must be per the unit nameplate.
Connect the control wiring to the terminals provided inside the electrical compartment of the dehumidifier and outdoor condenser. Refer to the low voltage wiring schematic for details. The condenser fan(s) will not operate until this is complete.
Once you have charged and checked the condenser and line set for leaks, open the service valves located in the compressor compartment of the dehumidifier.
There is an access valve in the liquid line after the pump down valve. The pump down valve can be manually closed during start-up mode via the controller. Add only as much refrigerant as is needed to get to the total charge indicated on the nameplate. Never charge liquid into the suction line access valve!
The receiver has 2 sight glasses with float balls to help ensure the maximum and minimum refrigerant levels are easily met.

2.9.3. Power and control wiring.

The power supply and disconnect for the outdoor air-cooled condenser is provided by the installing contractor. The installing contractor must provide control wiring for the 24 volt – 5 Amp circuit between the NE unit and the outdoor air-cooled condenser to enable the condenser fan(s) while the system is in air conditioning mode. The control wire terminal numbers can be found in Table 2 on page 8.

3. Start-up Procedures

3.1 Pre Start-up

A complete start-up is required to ensure all systems have been setup and adjusted to ensure optimum and reliable unit operation. The final adjustment and balancing must be done when all space and water temperatures are at design conditions. The use of auxiliary or portable air heaters may be required to heat the room. Read this section thoroughly before attempting to commission the Seresco dehumidifier.

NOTE: Do not use the unit as a construction site heater. Construction dirt will invade the unit and can significantly deteriorate unit performance and lifespan.

1. Ensure the unit installation conforms to all recommendations made by Seresco in this manual.
2. Check to ensure all packing materials and shipping brackets have been removed from the unit.
3. Leak test (with halogen leak detector) all factory and field piping. Shipping and handling may have caused refrigerant leaks inside the dehumidifier.
4. Check the nameplate for power requirements and confirm that it matches the available power supply.
5. Voltage must be within ±10% of the voltage printed on the nameplate. Verify that all field wiring matches the Seresco wiring schematics. Inspect and tighten all field and factory wiring.
6. Leave power on and allow 24 hours of crankcase heater operation before attempting the start-up.
7. Check the drain pan and the condensate piping. Test the drain and prime the P-trap by pouring water into the drain pan.
8. Verify that any space heating coil is installed in the supply air duct (after the evaporator coil) and *not* in the return duct.
9. PV or PH models have a pool water heater. Energize the circulating pump and establish water flow. Inspect the piping and repair any water leaks. Ensure the control wiring has been installed between the unit and auxiliary pool water heater.
10. Ensure the control wiring has been installed to the outdoor air-cooled condenser.
11. Ensure all peripheral controls and sensors are connected and wired correctly.
12. Verify that all service valves in the refrigeration lines are fully open.
13. Inspect the air filters and coils to assure they are clean. If necessary, clean the coils and install new air filters.
14. Verify that the unit has appropriate vibration isolators and that the unit is level.
15. Complete the Pre Start-up checklist section of the Warranty Registration/Start-up Form (copy provided with the unit and on page 34 of this manual).

3.2 Start-up

All appropriate fields and sections of the Warranty Registration and Start-up report should be completed. A proper start-up requires that the unit be run and monitored in all modes of operation at design conditions with the operating data recorded on the forms provided in the annex of this manual. Seresco reviews every report to ensure all aspects of the system are functioning within normal operating parameters. Carefully follow the process detailed in the start-up report.

NOTE: If the space is not at design conditions at the time of the start-up, a follow up visit for final adjust and balance is required.

Mail or fax the completed start-up report back to Seresco to validate your unit's warranty. Seresco will archive it for future reference. If you do not have a start-up report, call the Seresco for a new copy or download a PDF version from www.seresco.net.

3.3 System Operation Modes

The standard sequence of operation for a Seresco dehumidifier is relatively simple.
Whenever the compressor operates the evaporator coil is active where it absorbs heat from the warm, humid air stream. The cooling process at the evaporator coil drops the air well below its dew point and thereby dehumidifies the air.
Whenever the compressor operates the evaporator is always dehumidifying and cooling the return air.
The heat removed from the air at the evaporator (plus the heat of compression) must be rejected to one of three heat sinks; room air, pool water (PH AND PV models) or outdoors (remote condenser/Dry cooler/cooling tower). The microprocessor will direct the heat to where it is needed based on the room conditions.

In the case of PH AND PV models with remote condensers, if both the water *and* the air require heat, the dehumidifier heats the air first. If neither the water nor the air requires heat, then the dehumidifier rejects the heat to the Air conditioning condenser.

3.3.1. Power turned ON (or after power failure)

Blower begins to operate immediately and continuously.
Microprocessor self test and system diagnostics begins. If all systems are a go, the microprocessor will use sensor feedback to resume normal unit operation.
Microprocessor confirms with internal real time-clock and operation log that compressor has been off for 5 minutes.

3.3.2. Dehumidification Mode

This mode occurs when the space requires dehumidification. The air discharged from the unit is dehumidified and about 20°F warmer than when it entered.

The return air Relative Humidity is above setpoint.

The compressor starts.

The evaporator sees nominal airflow.

The compressor hot gas condenses at the reheat coil.

3.3.3. Air Conditioning Mode.

When the room air requires cooling only the NE unit will direct 100% the refrigerant hot gas heat outdoors. The air discharged from the unit is dehumidified and about 15°F cooler than when it entered.

Air Conditioning Mode Stage 1

The return air temperature is above setpoint.

The compressor starts if not already operating in dehumidification mode.

The evaporator sees nominal airflow.

The compressor hot gas condenses at the outdoor air-cooled condenser.

Air Conditioning Mode Stage 2

The return air temperature is above setpoint 2.

The compressor starts if not already operating in Stage 1 AC or dehumidification mode.

The evaporator bypass damper closes for maximum airflow across the coil.

The compressor hot gas condenses at the outdoor air-cooled condenser.

3.3.4. Pool Water Heating Mode (PH AND PV Models Only)

If the unit is in dehumidification or air conditioning mode then there is free heat available from the dehumidifier.

The pool water temperature drops below setpoint.

Water heating demand alone will not start the compressor. There must be a pre-existing demand to operate. If the compressor is already operating:

The pool water control valve directs hot refrigerant flow through the heat exchanger.

The heat exchanger rejects heat to the pool water. It also acts as a refrigerant sub-cooler increasing system capacity and efficiency.

If there is no other demand for the compressor to operate the microprocessor sends an on/off signal to the external auxiliary pool water heater (by others). No additional controls are required to operate the auxiliary pool water heater.

3.3.5. Blower Operation

Units have been factory wired for continuous blower operation. This helps prevent air stagnation and stratification. Continuous blower operation is also required to ensure that the sensors read conditions representative of the entire Natatorium.

3.3.6. Compressor Start Sequence

All NE units have a pump down sequence and anti-short cycle timer. When a demand requires the compressor to operate the following sequence occurs:

Blower operation confirmed by microprocessor and ASCT sequence completed.

Pump down solenoid opens.

25 psig will close the low pressure safety switch contact.

Compressor starts.

3.3.7. Space Heat Demand (Unit Mounted or remote)

The Seresco unit's microprocessor is designed to control a space-heating coil (unit mounted or remote). When the room temperature drops below the set point the microprocessor will send a signal to the heating coil's control mechanism.

4. Service and Maintenance

The NE unit is a piece of mechanical equipment, which requires routine maintenance and service. The service required is nothing more than a traditional commercial air conditioner. If a problem is encountered, refer to the TROUBLESHOOTING GUIDE in Section 6.2.

If all suggestions in the "Trouble shooting guide" have been exhausted, call Seresco's service department. Be sure to have the Model and Serial number when you call.

1-888-SERESCO (737-3726)

If the unit has been ordered with the Internet connection capabilities, Seresco or the local factory representative can directly access the unit and diagnose the problem from their facility.

4.1 Routine Maintenance

Seresco dehumidifiers are designed for years of reliable service. In order to ensure this, they require periodic maintenance.

4.1.1. Monthly Service

Check the air filters and replace them if necessary.

Verify that all setpoints are programmed into the controller as desired by the facility.

4.1.2. Annual Service

Tighten all field and factory electrical connections.

Verify that the coils in the dehumidifier and the remote outdoor air-cooled condenser or dry cooler are clean. Use compressed air or a commercial coil cleanser if they are dirty.

Verify that the airflow around the remote condenser or dry cooler remains unobstructed.

Check drainpan and clean out any residue that may have accumulated.

Conduct a complete system check up. This requires the service technician to fill out page #2 of the Warranty Registration and Start-up Report. A copy of this worksheet is located on page 33. This form is a valuable maintenance tool, which can help to uncover problems before they get expensive.

4.2 Compressor Replacement

Compressor failures can be caused by:
Liquid slugging, air or moisture in the refrigerant circuit, solid contaminants, excessive heat or electrical service malfunctions. To avoid repeated failures, the cause of the failure must be determined and then corrected. If the compressor has failed because its' motor has burned out, the refrigerant, oil, and piping is contaminated. The procedure in section 4.2.1 should be followed to replace the compressor and clean the refrigerant system.

NOTE: All acid must be removed from the system to avoid future burnouts.

Use an oil test kit to determine the severity of the burnout. Be sure to follow directions provided by the test kit manufacturer for complete system cleansing and acid removal. Make sure you use rubber gloves and eye protection, as contaminated refrigerant and oil can cause severe burns!

4.2.1. Compressor Burnouts

If the compressor has failed due to a burnout, the entire refrigerant charge has been contaminated. In the service mode, all solenoid valves can be opened in order to evacuate the circuit completely. On systems equipped with an optional pool water condenser, take care to avoid freezing the condenser during evacuation.
Verify that the TX Valve and solenoid valves are free of debris. Clean or replace them as necessary.
Replace the suction filter with a suction line filter-drier designed specifically for cleaning system burnouts (Sporlan "HH" series or equivalent). Select filters that are equipped with a tap for measuring the pressure drop across the filter.
Remove the old liquid line filter-drier and replace it with a new filter one size larger than the original.
Remove the old compressor if you have not already done so. Install the new compressor.
Evacuate the system to 250 microns or lower.
Replace all compressor contactors, start capacitors, run capacitors, and starting relays.
Check the piping and joints for leaks, and recharge the system.
Operate the unit for an hour in all modes. (The duct heater may have to operate to maintain the space temperature while operating in air conditioning mode. Contact Seresco for instructions.)

NOTE: It is critical that the unit be run in AC mode for cleaning system burnouts. The entire system must clean and acid free.

Monitor the pressure drop across the suction filter. If the pressure drop is 3 psi or less after one hour, continue to run the system for 24 hours, then take an oil sample. If the oil sample is dirty or acidic, or if the one-hour pressure drop is greater than 3 psi, then recover the system charge and replace both the suction and liquid filter-dryers.
Repeat the previous step until your oil sample tests negative.

Seresco will require a copy of the acid test result if there is a warranty replacement request.

5. Pool Water Chemistry.

Pool water quality affects not only human health and comfort but also space air quality and performance of the mechanical equipment.

NOTE: Poor water chemistry is the single biggest cause of indoor air quality (IAQ) and corrosion problems in a Natatorium.

The owner/operator of the natatorium is responsible for maintaining proper pool water chemistry. Table 6 shows the National Spa and Pool Institute recommended levels for water quality.

Failure to maintain proper pool water chemistry will result in several problems:
- **Air Quality Complaints**
- **Corrosion**
- **Frequent and Costly Maintenance**
- **Reduced Equipment Life**

NOTE: Codes require a separate, ventilated space MUST be provided to store pool chemicals.

NOTE: DO NOT STORE POOL CHEMICALS IN THE MECHANICAL EQUIPMENT ROOM!

5.1 Foul Odors in the Pool Area.

The powerful chlorine smell that is often associated with indoor pools is not actually the smell of excess chlorine in the water but of Combined Chlorines. Combined Chlorines are a product of insufficient chlorine and can result in high levels of bacteria and algae in the pool water. Maintaining proper chlorine and constant pH levels will eliminate the foul odors. Airborne Combined Chlorines also have a strong affinity to pure water such as condensate. Consequently any condensation will become corrosive and further damage the structure.

The proper amount of outdoor air and exhaust air to and from the space is also crucial to ensuring chemical concentration levels are maintained within acceptable levels.

NOTE: The powerful chlorine smell that is often associated with indoor pools is NOT the result of too much free chlorine in the water; it is TOO LITTLE free chlorine that is the culprit!

5.2 pH Levels.

High pH levels (alkaline range) encourage scale formation, which reduces pool water heater efficiency. With low pH levels, the water is acidic and corrosive and may damage the metal parts in pumps, water heaters and piping. Maintaining pH levels between 7.2 and 7.6 will ensure the longest life for the pool equipment.

5.3 Water Exchange Rates.

Adequate water exchange rates are necessary to prevent the buildup of bio-wastes and their oxidation products. High concentrations of dissolved solids in water have been shown to directly contribute to high combined chlorine (chloramine) levels.

Pool water test kits must be able to accurately monitor:

- **pH Levels**
- **Alkalinity**
- **Free Chlorine**
- **Combined Chlorine**
- **Dissolved Solids**
- **Total Hardness**

Table 6 lists the NSPI recommended levels of each.

	Pools	**Whirlpools**
	Desirable Range	Desirable Range
PH	7.4 – 7.6	7.4 – 7.6
Alkalinity	80 – 100 PPM	80 – 100 PPM
Free Chlorine	2.0 – 3.0 PPM	3.0 – 4.0 PPM
Combined Chlorine	0 PPM	0 PPM
Dissolved Solids	100 – 300 PPM	100 – 300 PPM
Total Hardness	225 – 250 PPM	175 – 275 PPM

Table 6 - National Spa and Pool Institute Recommended Levels for Water Quality

5.4 Corrosion.

Unbalanced pool water chemistry leads to health problems and the deterioration of the pool building and equipment. Conversely, a balanced pool with proper water treatment and sufficient outdoor air/exhaust air dilution offers an environment that will not affect the health of the users or cause damage to mechanical equipment or the structure.

Although it stands to reason that every pool operator does their utmost to create and maintain an optimum environment for patrons and equipment, mishaps do occur. Both swimmers and equipment should expect exposure to occasionally elevated levels as a result of inaccurate pool chemical treatment or chemical spills. Seresco has taken all possible commercially feasible precautions to protect the NE Series units against the corrosion caused by accidentally high chemical levels. The equipment, materials and paints are all resistant to airborne chemicals for a short period of time.

6. Service

6.1 Nameplate

The unit nameplate and Outdoor air-cooled condenser nameplate is attached to the outside of the electrical box door. You will require the electrical rating plate information when you install and service the dehumidifier.

NOTE: The serial number will be required should you ever require information to a specific unit.

7. Recommended maintenance procedure for roof mounted units

Each Seresco Seasons-4 Roof Mounted Unit is designed and constructed for minimum maintenance and dependable operation. However, certain maintenance procedures are required to ensure maximum operating efficiency. Some suggested procedures are listed below with recommended intervals.

CAUTION: Before attempting to check or service unit, turn electrical power off and lock out to prevent accidental startup of unit.

7.1 Special maintenance

After each severe windstorm check unit panels for secureness and damage.
After each electrical storm check units for blown fuses or tripped overloads. Use new fuses equal in amperage with original fuses. Use dual element fuses in all motor circuits.
Frequently check supply diffusers and grilles for accumulation of dust and/or lint, etc.
Check unit insulation for secureness.

7.2 Monthly maintenance

Change filters (more frequently if dusty conditions exist)
Check tightness and condition of blower fan belts. Belt tension should be such that the belt may be depressed ¼" midway between pulleys with the fingers (actual belt tension is shown on the blower door). When replacing belts where (2) belts are used, replace both belts with a matched set of belts equal in quality to original belts.
Inspect pulleys for tightness.
Check for dirty or clogged condenser and evaporator coils.
Check damper linkage for tightness. Check barometric relief dampers for free movement.
Check motor mountings for tightness. Check compressor mounts.
Check evaporator blower wheel(s) for dust collection.
Check "Blower Bearings Lubrication Schedule" on inside of blower door. Lubricate as required.
Check all access doors for air leaks and adjust handles as required. Adjust handles by loosening the cam latch located on the inside of the door and sliding the cam toward the door. If excessive pressure is required to close the door, re-adjust the handle to reduce closing pressure. Excessive force applied to the handle may damage the door handle assembly!

7.3 Quarterly maintenance

Check motor bearings for dryness.
Clean condenser and evaporator coils with pressurized air or water. Caution should be used so that the coil fins are not damaged.

7.4 Mechanical System Troubleshooting

Issue	Possible Cause	Remedy
Supply blower will not start	Firestat contact closure	Check firestat switch
	Loss of main power	Check for tripped circuit breaker or blown fuses
	Manually shut down on controller	Restart
	Faulty control wiring	Check for loose or incorrect wires on system and controller
	Faulty wiring	Check for loose or faulty wiring on system and controller
	Motor windings have shorted	Replace motor
	Blower overload has tripped	reset overload
Compressor will not start	Manually shut down on controller	Restart
	Faulty control wiring	Check for loose or incorrect wires on system and controller
	No demands to run	Adjust setpoints to what is indicated on the unit Nameplate
	Loss of main power	Check for tripped circuit breaker or blown fuses
	Blower not operating	Refer to supply blower problem section
	Faulty wiring	Check for loose or faulty wiring on system and controller
	Compressor thermal; protector is open	Allow one hour for compressor to cool off.
	Compressor delay-timer	Wait 3 minutes for timer
	Compressor overload has tripped	Correct cause and reset overload
	Compressor draws locked rotor amps	Replace compressor (or check fuses on three-phase units)
	Motor windings have shorted	Replace compressor
	Compressor starts but does not pump	Replace compressor
Low Suction pressure Normal: 60 – 75 PSIG	Bubbles in sight glass	Lack of refrigerant. Check receiver sight glasses –level indicators. Is the bottom ball floating?
		Blocked filter drier.
	Return air is below 70°F	Is cold outdoor air mixing upstream of the coil?
		Too much cold outdoor air being introduced to the space.
		Duct heater not able to accommodate actual load. Review space heating requirement.

Seresco

Low Suction pressure Normal: 60 – 75 PSIG	Return air % RH level too low	Check register locations for short-cycling of air.
		Check setpoints; unit should not be operating.
	Insufficient evaporator air flow	Evaluate system air flow
		Check for dirty filters or restricted ductwork
		Assure coils are not blocked or dirty.
		Close bypass damper to force additional air across the coil.
	Blocked filter drier	Evaluate filter pressure drop and replace if necessary
	Expansion valve not feeding properly	Evaluate expansion valve setting and performance. Replace if necessary.
	Restriction in refrigeration piping	Check piping for kinks
High Head pressure Normal: 200- 250 PSIG	Compressor discharge service valves closed or not fully open	Fully open service valves
	Excessive refrigerant charge	Check receiver sight glasses – level indicators. Is the top ball floating? Re-evaluate system charge
	Non-condensables in system	Evacuate or purge system
	Solenoid valve not opening	Check all solenoid valves operation
	Restriction in refrigeration piping	Check coil and tubing for kinks
	Refrigeration system is overloaded	Check operating conditions against the unit design conditions on the nameplate. It may be undersized.
	Too much airflow across evaporator	Verify the bypass damper is open.
		Balance the system airflow as directed in section 6.4
Outdoor Condenser and Dry Cooler related High Head Pressure	Air on condenser temperature above design condition.	If this is a chronic situation a larger condenser or dry cooler may be required.
	Excessive pressure drop in line sets	Re-evaluate remote condenser installation and line sizing
	Fan motor overload tripped.	Reduce fan speed and reset overload
	Contactor faulty	Replace contactor
	Outdoor condenser fan does not run.	Control wiring missing from dehumidifier
	ORI valve setting too high	Adjust ORI in water heating mode so unit delivers 10 degrees of water heating.

Unit operates but windows have condensation	Poor air distribution	Ensure all exterior windows see 3-5 CFM/ft² of air over their entire area
	Airflow across evaporator is too high. Coil only doing sensible cooling	Check bypass damper operation. Ensure fully open or recalibrate in Service mode.
	Unit is undersized	Re-evaluate unit sizing. Check for initially neglected sources of humidity
	Air and/or pool water temperature incorrect	Reset controller setpoints to original design specifications
Pool Water Heating (PH and PV Models)	Low water temperature rise	Solenoid valve not opening
		Excessive water flow. This erodes the water heater and must be rectified.
	High water temperature rise	Insufficient water flow.
Compressor runs for short periods and shuts off	Conditions are being satisfied quickly	Check register locations for short-circuiting of air
		Unit oversized
Low Supply Air Temperature rise in Dehumidification Mode	Too much airflow through unit.	Balance the system airflow as directed in section 6.4
High Supply Air Temperature rise in Dehumidification Mode	Too little airflow through unit.	Close bypass plugs until desired target range reached.
		Re-evaluate duct pressure losses to ensure they are within the parameters indicated on the unit nameplate.

7.5 Microprocessor Troubleshooting

Issue	Possible Cause	Remedy
Communication fault	Broken or loose wire between controller and IO board	Repair any damaged or loose wires.
	Corrosion on pins or terminals	Clean pins and terminals
	Defective IO board – LED is not on	Replace IO board
	Defective controller	Replace controller
Sensor fault	Sensor wires broken or shorted to ground	Connect sensor directly to IO board. If it functions replace wire.
	Sensor reading outside design parameters	Replace sensor
Setpoint out of range	Setpoint parameters are outside acceptable limits	Reenter setpoint. Replace sensor if problem persists

8. Airflow Adjustment Procedure

8.1 Supply Airflow adjustment.

All Seresco units have adjustable sheaves airflow balancing ports.

8.1.1. Internal Static Pressures (ISP).

The standard NE Series unit is configured for ¾” - 1” External Static Pressure (ESP) depending on options. Should the ESP change from what was initially specified contact the factory to help evaluate whether a motor or fan change may be required.

9. Basic Unit Operation

9.1 Controller Set Points

All NE units have been selected based on predetermined operating conditions for each facility. Most operating conditions fall within the parameters suggested in Table 1 on page 5. Changing setpoints can significantly increase the evaporation load from the pool. Before making significant changes (more than 2ºF) to the setpoints indicated on the unit nameplate, contact factory to verify that the resulting load does not exceed unit capacity.

RECOMMENDED SET POINTS:

- Humidity: 50% to 60% RH.
- Air temperature: 2º to 4º F above the pool water temperature.
- Refer to Table 1 on page 5 for guidelines.

WARNING: Never shut down a dehumidifier. Even when not in use, pool water continues to evaporate moisture to the air. It is also prudent to cover the pool if the facility is to be unattended for longer periods of time.

9.2 Typical Unit Operation Parameters.

There are several variables that impact unit performance. If the unit is operating within the parameters listed in Table 8, the systems are well balanced and the unit is performing well.

- These are “Rule of Thumb” guidelines only and do not include outdoor air. Outdoor air would need to be shut off fully during the time of the measurement or be factored into these values based on its exact conditions at the time of the test.
- The indicated refrigerant pressures are the most important to target as they directly impact all aspects of system performance.
- If any operating parameters are outside those listed in Table 8 on page 30, refer to the trouble-shooting guide in section 6.3 for possible solutions.

10. Factory Start-up Supervision

Seresco factory start-up supervision can be purchased with the equipment. A factory start-up includes several key services:

- The expertise of an accomplished, factory-trained technician who will supervise the commissioning of the equipment.
- This Seresco representative will assist the installing contractor with filling out the Start-Up Report.
- They will also inspect the installation to make sure that the dehumidifier has been properly integrated with the rest of the equipment on the jobsite.
- Finally, they can train the maintenance personnel to operate and service the equipment if necessary.

A factory start-up does *not* include installation assistance. The installing contractor is responsible for ensuring that the system is ready for start-up when the Seresco representative arrives. If the system is not ready, Seresco reserves the right to bill the contractor for a second visit.

When the installing contractor is confident the system will be ready, contact the Seresco Sales representative to schedule the start-up. Please call at least two weeks before the desired start-up date to prevent scheduling conflicts.

Items required for Start-Up

- A service technician and a fully stocked service vehicle.
- A set of refrigerant manifold gauges.
- Air balancing equipment (magnehelic differential pressure gauge).
- Volt/Amp/Ohm meters.
- A digital thermometer w/clamp on sensors.
- A halogen leak detector, REFRIGRANT and a scale.

Items to be Completed Before Start-up

- Refrigerant leak-check (with halogen leak detector) and inspect the unit for internal concealed damage.
- Level and support the dehumidifier properly.
- Install the outdoor air duct filters and damper (if applicable).
- Install the condensate P- trap and drain.
- Pipe the remote condenser fan pressure controls to the condenser hot gas lines (if applicable).
- Evacuate and leak-check the remote condenser line set (if applicable).
- Tighten all electrical connections and verify that the line voltage is correct for the unit.
- Install all controls and verify that all field wiring matches the schematic.

- Fill and heat the pool and room to design conditions.
- Install the pool water piping and a flow meter (if applicable). Purge all air from pool lines.
- A complete system air balancing.

Typical Unit Performance				
	Dehumidification	Air Conditioning	Water Heat & A C	Water Heat & Dehumidification
Supply Air Temperature change	+ (10 – 15)ºF	- (10 – 15)ºF	- (10 – 15)ºF	+ (0 – 3)ºF
Air off evaporator	47- 55ºF	47- 55ºF	47- 55ºF	47- 55ºF
Leaving Water Temperature change	0 ºF	0 ºF	+ (8 – 10)ºF	+ (8 – 10)ºF
Suction - PSIG	60-75	60-75	60-75	60-75
High - PSIG	200-250	200-250	200-250	200-250

11. Warranty

General Policy

This warranty applies to the original equipment owner and is not transferable. Seresco Inc. warrants as set forth and for the time periods shown below that it will furnish, through a Seresco Inc. authorized installing contractor or service organization, a new or rebuilt part for a part which has failed because of defect in workmanship or material. Seresco Inc. reserves the right to apply handling and inspection charges in the case of parts or equipment improperly returned as defective whether under warranty or not.

Warranty Registration and Start-up Report

Warranty void unless upon start-up of the unit the "Warranty Registration and Start-up Report " is completed and sent to the factory within one week of initial start-up. This report will also register the compressor warranty with the compressor manufacturer.

Labor Warranty

During the first 90 days from initial start-up and subject to prior approval from the factory Seresco Inc. will provide and/or reimburse the required labor, materials, and shipping costs incurred in the replacement or repairing of a defective part.

Parts Warranty

If any part supplied by Seresco Inc. fails because of a defect in workmanship or material until completion of the 24th month from date of shipment, Seresco Inc. will furnish a new or rebuilt part F.O.B. factory. No reimbursement will be made for expenses incurred in making field adjustments or replacements unless specifically approved in writing beforehand by Seresco Inc.

Applicability

This warranty is applicable only to products that are purchased and installed in the United States and Canada. This warranty is NOT applicable to:

1. Products that have become defective or damaged as a result of the use of a contaminated water circuit or operation at abnormal water temperatures and/or flow rates.
2. Parts that wear out due to normal usage, such as air filters, belts and fuses. Refrigerant lost during the parts warranty will be reimbursed in accordance to the current market price of refrigerant at the time of repair. Seresco Inc. will not be responsible for refrigerant lost from the system due to improperly installed contractor piping to the remote outdoor air cooled condenser.
3. Refrigerant coils that corrode due to improperly balanced pool chemistry or corrosive air quality.
4. Components that have been relocated from their original placement at the factory.
5. Any portion of the system not supplied by Seresco Inc.
6. Products on which the model and/or serial number plates have been removed or defaced.
7. Products which have become defective or damaged as a result of unauthorized opening of refrigeration circuit, improper wiring, electrical supply characteristics, poor maintenance, accidents, transportation, misuse, abuse, fire, flood, alteration and/or misapplication of the product.
8. Products not installed, operated and maintained as per Seresco Inc. Owner's Manual.
9. Products on which payment is in default.

Transportation Costs

After the initial 90-day warranty period has expired, charges covering transportation of the defective part to Seresco Inc. from the customer site and replacement part(s) from Seresco Inc. to the customer site are not covered by this warranty.

Limitations

This warranty is given in lieu of all other warranties. Anything in the warranty notwithstanding, any implied warranties of fitness for particular purpose and merchantability shall be limited to the duration of the express warranty. Manufacturer expressly disclaims and excludes any liability for consequential or incidental damage for breach of any express or implied warranty.

Where a jurisdiction does not allow limitations or exclusions in a warranty, the foregoing limitations and exclusions shall not apply to the extent of the legislation; however, in such case the balance of the above warranty shall remain in full force and effect.

This warranty gives specific legal rights. Other rights may vary according to local legislation.

Force Majeure
Seresco Inc. will not be liable for delay or failure to provide warranty service due to government restrictions or restraints, war, strikes, material shortages, acts of God or other causes beyond Seresco Inc. control.

Second to Fifth Year Compressor Warranty (optional) This extended warranty must be purchased before the shipment of the unit.

NOTE: Seresco Inc. will provide a replacement compressor for 60 months from the date of shipment provided the compressor fails as a result of manufacturing defect and is returned to the factory with transportation prepaid. This extended compressor warranty is subject to all the terms of the standard Seresco Inc. warranty but applied to the compressor only.

NOTE: No charges attributed to the replacement of a component, except as detailed in the above Labor Warranty, will be allowed unless specifically granted in writing beforehand by Seresco Inc.

Second to Fifth year Coil Warranty (optional)

This extended warranty must be purchased before the shipment of the unit.

Under this warranty a replacement coil will be supplied at Seresco Inc.'s expense, provided the failed coil is returned to the factory with transportation prepaid. This extended coil warranty is subject to all the terms of the standard NE Series warranty but applied to the coil only.

This warranty is contingent to the proper maintenance of pool water chemistry including a pH of between 7.2 and 7.6 free chlorine not exceeding 2.0 ppm and combined chlorine maintained at less than 0.3 ppm. These parameters are to be measured and recorded daily and are available for review upon request.

Second to Tenth year Coil Warranty (optional) This extended warranty must be purchased before the shipment of the unit.

Under this warranty a replacement coil will be supplied at Seresco Inc.'s expense, provided the failed coil is returned to the factory with transportation prepaid. This extended coil warranty is subject to all the terms of the standard NE Series warranty but applied to the coil only.

This warranty is contingent to the proper maintenance of pool water chemistry including a pH of between 7.2 and 7.6 free chlorine not exceeding 2.0 ppm and combined chlorine maintained at less than 0.3 ppm. These parameters are to be measured and recorded daily and be available for review upon request.

6.8 Refrigeration Diagrams

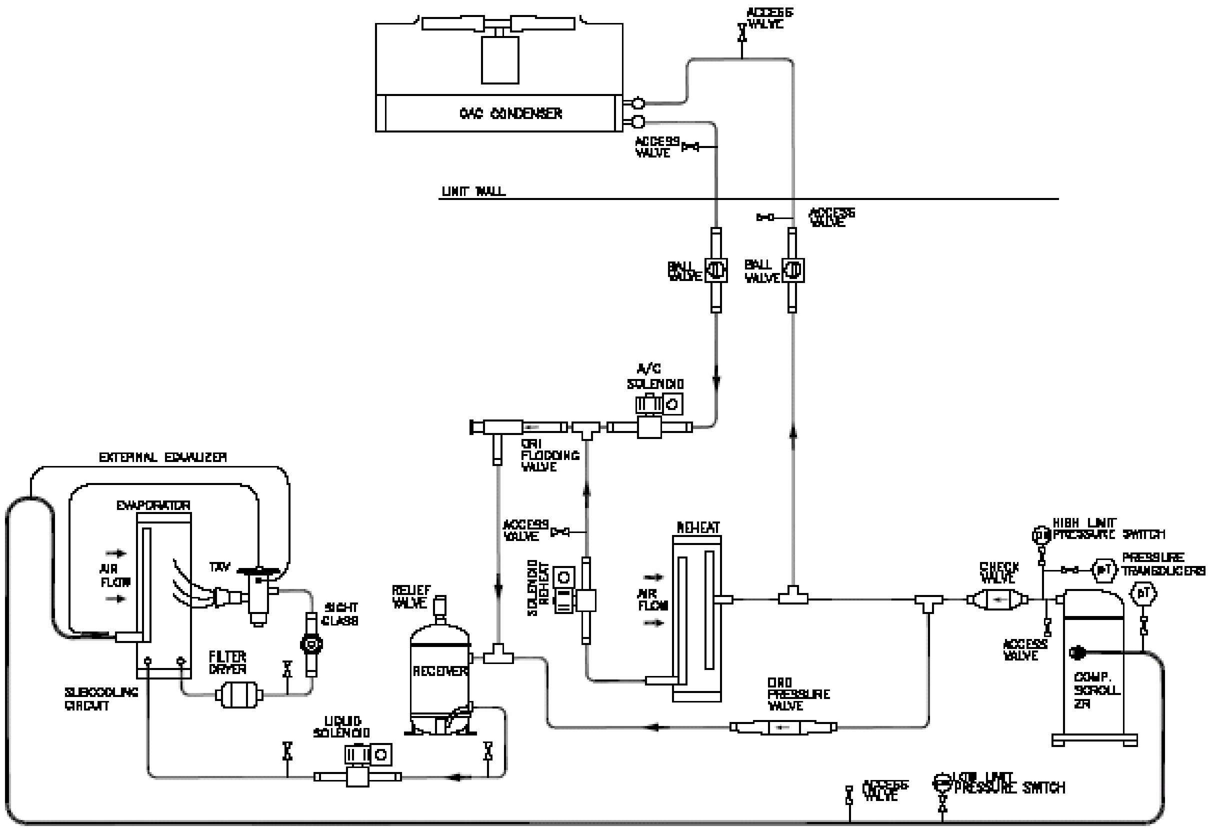


Figure 26 – Refrigeration Typical Circuit – c/w Outdoor Condenser

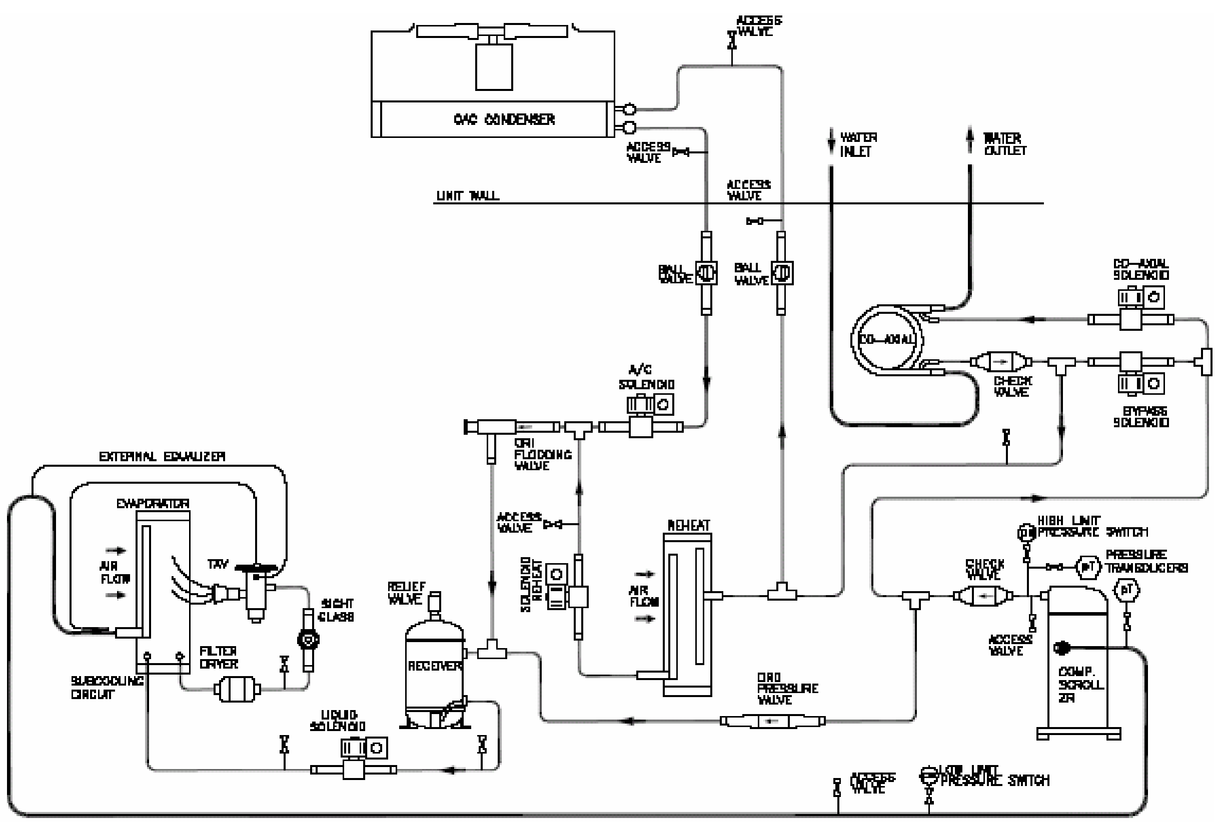


Figure 27 – Refrigeration Typical Circuit – c/w Pool Heating and Outdoor Condenser

STARTUP REPORT

Project Name ___________________________

Location _______________________________

Jobsite telephone number _________________

Seresco Representative ___________________

NE Series Model _____________________

Serial Number ______________________

Compressor Serial # __________________

Voltage on site _______________________

Electrical Data	L1 – L2	L2 – L3	L1 – L3	Nameplate
Compressor Amperage				
Compressor Voltage				
Blower Amperage				
Blower Voltage				

Installation Review and Checklist

- ❑ Supply air blowing on exterior doors and windows?
- ❑ No supply-return air short-circuiting?
- ❑ Outdoor air connected to Seresco unit?
- ❑ Exhaust fan installed and operating?
- ❑ Vapor Barrier installed?
- ❑ Adequate service access provided?
- ❑ Units level and vibration isolated?
- ❑ Flex-Connectors used at both unit duct connections?
- ❑ Condensate P-Trap installed and filled?
- ❑ Condensate line tested?
- ❑ Pool Water piping properly installed?
- ❑ Pool water circulating pump operating?
- ❑ Auxiliary circulating pump installed?
- ❑ Pool water flow per specifications?
- ❑ Floor Drain in mechanical room?
- ❑ Chemicals stored in separate ventilated room?
- ❑ Outdoor air cooled condenser or Dry Cooler properly installed?
- ❑ Unit nameplate voltage verified?
- ❑ Main disconnect installed?
- ❑ Wiring connections checked & tightened?
- ❑ Control wiring to outdoor condenser or Dry Cooler installed?
- ❑ Control wiring to auxiliary pool water heater installed?
- ❑ Ethernet cable connected to unit.
- ❑ Blower rotation correct?
- ❑ Air balance report on file?

Fax to 613 – 254 - 7405

Outdoor Air cooled condenser or Dry Cooler location:

- ❑ ……. ft [above / below] Seresco unit
- ❑ If above, oil traps installed: [yes / no]
- ❑ Same Level as Seresco Unit
- ❑ Condenser/Dry Cooler Model installed:………………………….

- ☐ Total line length to OACC or Dry Cooler…………………………..
- ☐ Hot gas line size……………………..
- ☐ Liquid line size……………………...
- ☐ Total lbs of refrigerant added………………
- ☐ Pipe size to Dry Cooler……………

Water Cooled and Dry Cooler AC

- ☐ Fluid GPM………………………..
- ☐ Glycol %:…………………………
- ☐ Glycol stabilizers added: [yes / no]

- ☐ Piping and valves installed per Specs?
- ☐ Water/fluid temperatures:
  Entering Seresco unit:……………..
  Exiting Seresco unit:……………….

Operational Data						**Controller Programming**	
	Dehum.	A C	Water Heat & A C	Water heat & Dehum		**Sensor**	**Setpoint**
Return Air (°F)						Space temperature	
Supply Air (°F)						Space relative humidity	
Return Air %RH						Water temperature	
Entering Water (°F)							
Leaving Water (°F)							
Water – GPM							
Air off evaporator (°F)						**Outdoor Air**	
Suction - PSIG						CFM	
High - PSIG						DB/WB	
Compressor Discharge Temp (°F)						Intake minimum 6' from an exhaust outlet?	
Sight Glass Clear?						Preheated prior to entering unit?	
Receiver sight glass ball floating? Top/Bottom						Heat recovery device used?	

Comments:………………………………………………
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Telephone Number:…………………………….. ……

Date:……………………………………………………

Technician…….………………………………
Company:………………………………

Fax to 613 – 254 - 7405

Your local Seresco representative:

Design Checklist

System design and air flow pattern

Exhaust Air

Required Access Space

Evaporation rate and latent loads

Supply Air

Cooling and Heating loads

Outdoor Air

Project: ____

Reviewed by: ____

System design and air flow pattern

All exterior windows, doors and skylights are fully blanketed with supply air.
No stagnant areas including the water surface.
Vapor retarder is installed on the warm side of the dew point in the roof and walls.

Evaporation rate and latent loads

Pool load calculated.
Outdoor Air load calculated.
Water features reviewed with factory.
Spectators and swim meet mode calculated.

Required Access Space

Unit is accessible.
Unit has adequate service clearance.
Suspended unit has unobstructed access.

Exhaust Air

Exhaust fan identified on the plans.
Exhaust Air is minimum 110% the outdoor air CFM.
Exhaust air drawn from the whirlpool or any other warm or highly active water area.

Supply Air

System delivers 4 air changes per hour or greater.
Supply air is delivered to the deck area.
No short-circuiting of supply air to the return duct.

Cooling and Heating loads

Sensible cooling load has been calculated for the space design temperature.
Heating load has been calculated for the space design temperature.
Outdoor air has been included in all load calculations.

Outdoor Air

1.0 CFM/ft² of water and wet deck for pool with water features.
0.5 CFM/ft² of water and wet deck for regular pool.
15 CFM per spectator.

Comments:
____
____
____
____

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Seresco

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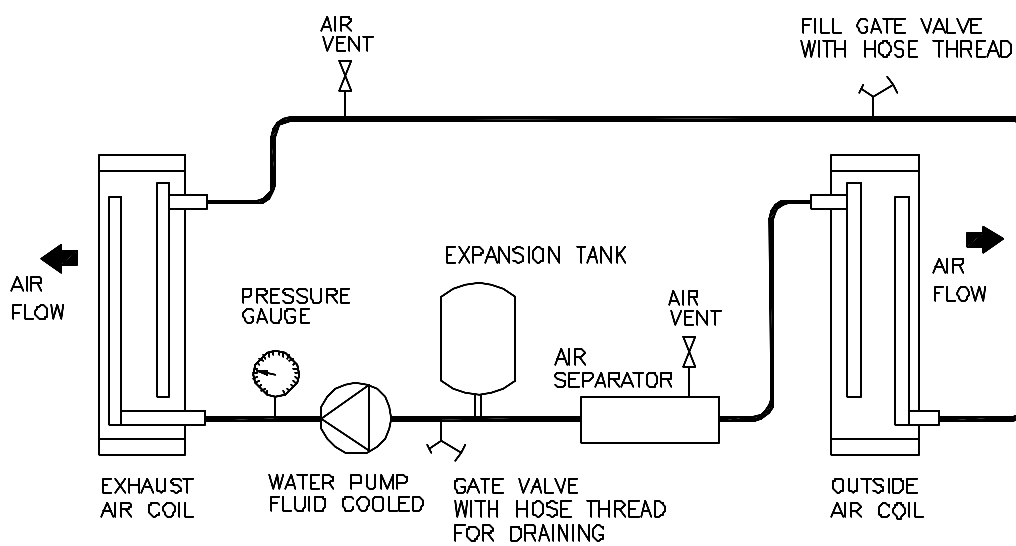
Appendices

Your local Seresco representative:

Heat Recover (Run Around Loop)

The energy a room loses from the exhaust air, as a result of the fresh air requirements, can represents approximately 50 % of the room heating requirements. The Seresco unit captures 50-60 % of this exhaust heat with its heat recovery loop. By doing so it supplies heat to warm the cold OA and can provide generous energy savings to the room and reduce heating costs. During freezing weather conditions the OA can provide much of the dehumidification required and minimizing the time the compressors run offsetting some of the running electrical costs.

Our typical energy recovery loop places two glycol coils one in the outside air intake and the other in the exhaust air-stream. The coils are connected in counter-flow closed loop piping system. The system comprises an inline fluid cooled pump, an air separator, and in some larger systems a pressure tank and pressure gauge. By circulating a glycol mixture, typical 30%, we can extract enough heat from exhaust air stream to preheat the outside air intake to about 50-60% of the room temperature. Extracting more heat from the exhaust air stream is possible but would also lead to possibly freezing of the exhaust air and would require a more complex and costly system of frost prevention. Keeping our effectiveness down to 50-60% reduces initial cost and keeps things simple.



Types of Solutions:

We recommend and typically use ethylene glycol in our systems but local codes or building requirements may specify propylene glycol mixtures. The higher viscosity of propylene means a stronger pump is required or a lower circulating water flow will occur. So it is best to contact the factory if a switch from one glycol to another is preferred.

It is important to use corrosion inhibitors and in the correct amount. When adding the corrosion inhibitor solution please followed the suggested instructions for the required quantity of fluid.
Seresco strongly recommended that if the glycol, if not already mixed, it be mixed with distilled water. The final toping up and pressurizing of the system can be done with clean tap water. In municipalities where local tap water has a high mineral content, Seresco strongly advises the use of distill water otherwise “sludging” and premature failure may occur.

Your local Seresco representative:

Annual testing should be made of the fluid solution to ensure the adequate glycol concentrations and corrosion inhibitor protection. Freeze point and PH test strips are available from your local plumbing supply house. It is important to insure the solution wont freeze in the case of a power failure or that it is not acidic and will prematurely corroding the system.
The glycol mix should be replaced after 5 years or when quality is deem unsatisfactory and cannot be restored.

Filling or Refilling the Glycol Loop:

When filling the system please insure all air has been removed. Air in the system will cause corrosion and improper functioning of the pump. Do not run the pump for any extent time with air in the system it will foam up the glycol and this will make it difficult to remove the air. If this happens pressurize the system with some water to about 15 PSI and let stand overnight. Before restarting vent as much air as possible running the pump for very short burst to move the water and any possible air bubbles around slowly to the vents.

For systems with a pressure tank keep the system under a 10-15 PSI positive pressure to ensure no air get into the system.

If the system is left dry for any period of time electrically disable the pump to avoid it possible coming on without fluid in the system.

Please keep record, near the unit, the type of glycol used; ethylene or propylene, the two types should not be mixed.
Keep careful track of what percentage by volume was used and when it was changed. And the last time it was check.

Fill in this page and keep it with the unit.

Type of Glycol:……………………………………………….

Glycol Concentration:…………………….%

Total Volume of Solution:…………………Gallons

Amount of inhibitor added:………………

**Comments:………………………………………………………………………………………………………
……
……**

Technician……………………………………… Company:………………………………

Telephone Number:……………………………. Date:……………………………………

I

Your local Seresco representative:

Addendums to the Manual

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Wiring Diagrams

Unit Schematics

&

Specifications

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Unit Component Specifications

&

Component Service Sheets

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