POOLCOMPAK R-410A
AW/HCD SERIES
ROOFPAK SERIES

HCD (High Capacity Dehumidifier)
AW (Air and Water)

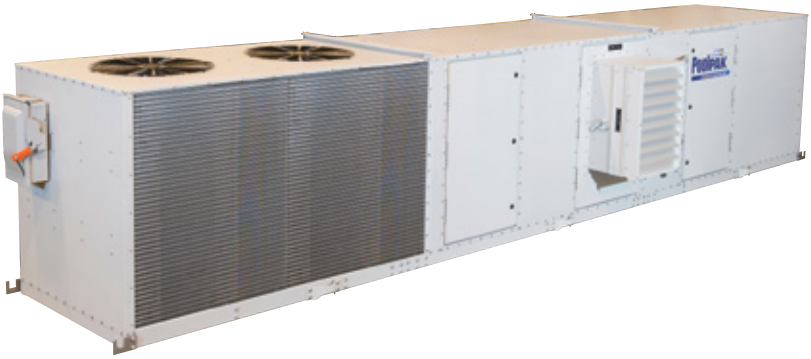
Horizontal (H) and Vertical (V) Configurations

Engineering Guide

EGW06-PCPEG-20150514

Packaged Natatorium Environment Control System

PoolComPak™ (PCP)



RoofPak (AWH/ HCDH only)

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INTRODUCTION

CREATING AN IDEAL ENVIRONMENT FOR INDOOR POOL FACILITIES

Indoor pool facilities are unlike any other structure in design, construction and maintenance requirements. Humidity, air and water temperatures are especially difficult to control, and improper management usually results in an uncomfortable environment, excessive operating costs and possibly serious structural damage. Effectively controlling these special conditions require control hardware and control sequences specially engineered for large commercial indoor pool applications. The PoolPak™ System utilizes an environmental control package designed to meet all special needs of the indoor pool environment, while reducing energy usage and building maintenance costs.

OPERATING COST

Energy consumption is a direct function of the variables necessary to satisfy the occupant and protect the facility. These variables include space heating and cooling, water heating, humidity removal and ventilation. Maintaining ideal and precise environmental conditions has a fairly high cost of operation. And for a majority of the indoor pools, regardless of geographic location, require water and space heating 70% to 90% of the year.

APPLICATION

MOISTURE LOADS

An indoor swimming pool produces large quantities of water vapor through evaporation, which accounts for roughly 95% of the pool water heat loss, making the water colder. This excessive humidity will form damaging condensation unless removed from the building. In the past, the method of removing this water vapor was by ventilating an otherwise energy efficient building, exhausting the humid air and the energy it contained. Additional energy was used to bring in and heat the make-up air and to heat the pool water.

More cost effective technologies offer an alternative method adding heat exchangers and mechanical heat recovery systems with many useful options. The ideal solution to removing the water vapor from the pool area is to convert the latent (wet) heat contained in the moist air back into sensible (dry) heat, placing it back into the pool water and air.

EFFECTS OF MOISTURE

Excess humidity in natatorium structures may be readily apparent as condensation on cool surfaces such as windows and outside doors, the growth of mildew or mold, and, when coupled with poor pool chemistry, the accelerated corrosion of metals. In its less obvious forms, moisture may penetrate walls and ceilings and cause rot that becomes noticeable only when large scale structural failure occurs. Humidity levels are also a major factor in the comfort of pool users.

INDOOR AIR QUALITY

Pools and water parks with water features have a higher evaporation rate than a standard pool because of the increased water surface area. Chloramines (See Pool Water Chemistry below), which are present in the water, become more concentrated in the air as the “water to air” interactions increase, affecting the indoor air quality. A strong “chlorine” odor is an indicator of poor pool water chemistry, and is generally offensive to the occupants. Higher levels of chloramines can cause skin/eye irritation and respiratory problems commonly known as “lifeguard lung”.

Most poolrooms are designed with a minimum ventilation rate to dilute the airborne pollutants generated from the chemical interactions in the pool water. Typically these rates are based on ASHRAE standard 62.1 and dictated by local codes at about 0.5 CFM per square foot of pool and deck area, but depending on the pool water chemistry the ventilation rate may not always be adequate for good poolroom indoor air quality.

However, increasing ventilation rates can significantly add to the cost of operation. Including energy conservation strategies such as heat recovery, airflow measurement and CO2 based control help control costs while improving indoor air quality.

Depending on the geographic location and season of the year, treating the outside air has a direct effect on energy consumption. Some facilities prefer higher than minimum ventilation rates, up to 100% of OA, to maximize indoor air quality, but the cost of treating this air can be significant.

OCCUPANT COMFORT

Occupant comfort in a natatorium is easy to understand. If you ever swam in an outdoor pool on a cold, windy day, or exited a pool in a dry, desert location--you will probably notice an immediate chill. The opposite is true where high humidity is not adequately controlled either through ventilation or by mechanical means. The moisture level can reach such a state where it is oppressive or stuffy. Common complaints are difficulty in breathing and the room being perceived to be warmer than the actual dry bulb temperature would suggest.

Regardless of the source of discomfort, users will not enjoy the facility if water/air temperatures and humidity levels are not within a narrow range. Ideal water temperature is around 82° with the air temperature about 2 degrees F higher to prevent chilling when exiting the pool and to minimize evaporation from the pool surface. Here are some recommended temperatures for poolrooms, which can be adjusted to meet specific needs of bathers. In general, “active” poolrooms are maintained at lower temperature ranges so the users don’t overheat, warmer temperatures are more common for seniors or children or less active pools.

The desirable humidity range is generally between 50% and 60%--greater than 60% creates a sticky feeling and/or difficult breathing, and low humidity results in evaporative cooling on the bather’s skin, resulting in a chill.

Poor air movement caused by improper duct placement within the poolroom will also lead to occupant discomfort. Excessive supply air blowing on bathers can create drafts, while uneven air distribution may create stagnant zones within the space.

Table 1-1. Typical Pool Water & Air Temperature Set-Points

Typical Pool Water & Air Temperature Set-Points			
Pool Type	Water Temp. °F	Air Temp. °F	Room RH %
Recreational Pools	80-85	Water Temp + 2	55-60
Therapy Pools	86-92	86[1]	55-60
Whirlpools	99-104	86[1]	55-60

[1] Normally max 86°F to minimize overheating of occupants

POOL WATER CHEMISTRY

Water chemistry in swimming pools is critical for the health of the bathers and the condition of the enclosure and components. An enclosure with poor water chemistry has a noticeable “chlorine” smell, which is an indication of high chloramines in the air. Not only does this have an effect on the water, but it affects the bathers and the air they breathe.

Dehumidification systems are not designed to remove the effects of incorrect pool water chemistry. Dehumidification/ ventilation equipment is not designed to remedy the effects of poor pool chemistry, but is designed to deliver prescribed ventilation to manage smaller amounts of pollutants generated from normal pool activity. Pool water chemistry is a part of daily maintenance and it is recommended that the users follow the current National Spa and Pool Institute standards.

For more information, review the Controling Chloramines with Proper Chlorine Management chapter in the *Indoor Pool Water Chemistry* publication in the online PoolPak™ Educational Library.

Table 1-2. Recommended Pool Water Chemistry

	Pool			Spa		
	Ideal	Min	Max	Ideal	Min	Max
Total Chlorine (ppm)	1.0 - 3.0	1	3	3.0 - 5.0	1	10
Free Chlorine (ppm)	1.0 - 3.0	1	3	3.0 - 5.0	1	10
Combined Chlorine (ppm)	0	0	0.3	0	0	0.3
Bromine (ppm) if applicable	2.0 - 4.0	2	4	3.0 - 5.0	2	10
pH	7.4 - 7.6	7.2	7.8	7.4 - 7.6	7.2	7.8
Total Alkalinity (ppm)	80 - 100	80	180	80 - 100	60	180
TDS (ppm)	1000 - 2000	300	3000	1000 - 2000	300	3000
Calcium Hardness (ppm)	200 - 400	150	1000	200 - 400	150	1000
Calcium Acid (ppm)	30 - 50	10	100	30 - 50	10	100

EQUIPMENT CHOICES

OVERVIEW

There are several methods for controlling humidity, temperature and ventilation in poolrooms. Each method offers some level of control, but there can be significant differences in first cost and operating cost of each method. Geographic location, degree of comfort, unit cost and operational cost must be evaluated in the selection of the correct system.

VENTILATION WITH HEATING

- Moisture removal is accomplished through the dilution with dryer outside air
- High cost of operation (air reheating)
- Lowest first cost
- No opportunity to recover energy in the exhaust airstream
- No opportunity to recover energy into the pool water
- No integral cooling capability
- Summer space conditions can be unbearably hot and humid

VENTILATION WITH HEATING AND ENERGY RECOVERY

- Moisture removal is accomplished through the dilution with dryer outside air
- Significant heat recovery from exhaust air stream
- Cost-effective method but with modest operating cost
- Performance limitations in humid areas or during summer peaks
- No opportunity to recover energy into the pool water
- No integral cooling capability

MECHANICAL DEHUMIDIFICATION

- Moisture removal is accomplished through mechanical refrigeration
- Significant heat recovery using “heat pump” technology
- Recovers the most energy from the exhaust airstream
- Offers an opportunity to recover energy into the supply airstream
- Offers an opportunity to recover energy into the pool water
- Higher first cost with lower operating cost
- No performance limitations based on location
- Tightest control of setpoint conditions
- Integral cooling capability
- Can be integrated to include appropriate ventilation strategies

HYBRIDS

- Combines various technologies to increase efficiency and capability
- Utilizes ventilation as primary dehumidification method
- Switches to heat pump method when conditions require better environmental control

OTHER TECHNOLOGIES

Desiccant technology can be adapted to provide super dry air which is injected into the poolroom to dilute the moisture load. The regeneration phase of the desiccant is typically driven by waste heat from refrigeration cycle or other fossil fuel.

Wheels are sometimes considered because of their wide acceptance as heat recovery devices. Latent or Enthalpy wheels are not suitable for pools, but sensible wheels may have application.

ROOM AIR DISTRIBUTION

All PoolPak™ models provide continuous air recirculation, and with a good air distribution system, will promote uniform space conditions. To remove the required moisture and maintain controlled conditions, it is essential that there be adequate air movement and distribution in the natatorium. The unit must remove the humid air from the pool area and discharge the dehumidified air back into it. The supply air should be distributed over areas subject to condensation (windows, outside walls, support trusses, skylights, etc.).

AIRSIDE DESIGN

The supply air volume and external static pressure capability of the fan is given for each model in the Performance Section. It is recommended that an experienced engineering or mechanical contracting firm do the design, sizing and layout of the duct system.

The recommended volume of supply air should provide three to eight air changes an hour. However, in larger waterparks or spaces with high sensible heat gain, higher airflows may be appropriate. Lower air volumes require more care to avoid short cycling the air between the return and supply, air stratification and pockets of high humidity.

The most even control of space conditions occurs with proper air distribution and a proper air flow rate. This provides space control without excessive loading and unloading of refrigerant-based dehumidification equipment.

Supply Air

After dehumidification, dry air is supplied back to the room. Supply air should be distributed from ducting around the perimeter (see *Figure 1-1*) of the space. The two options for perimeter supply air distribution are overhead (see *Figure 1-2*) or below grade (see *Figure 1-3*).

Figure 1-1. Perimeter Air Distribution

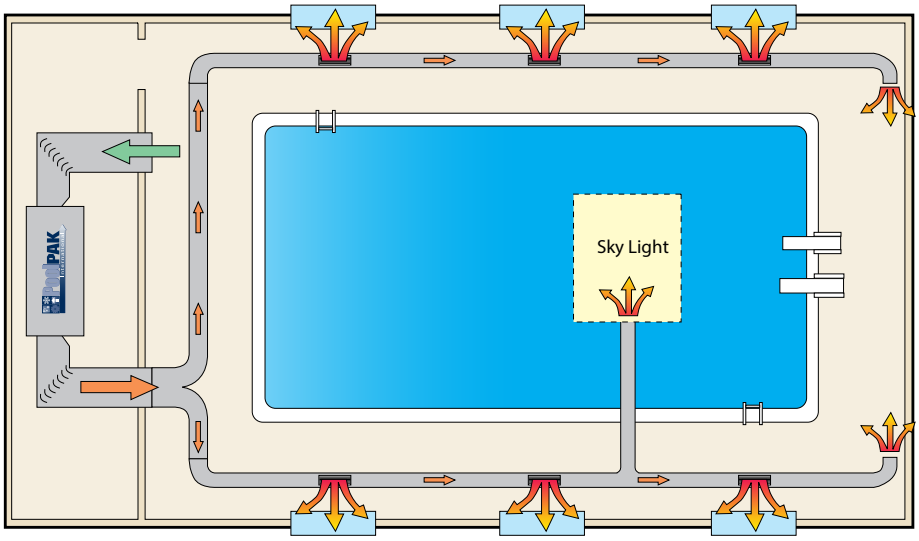

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Figure 1-2. Overhead Air Distribution

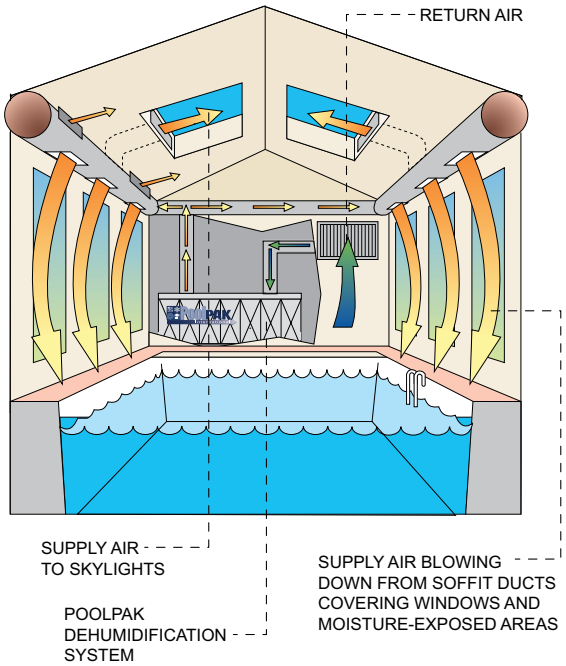

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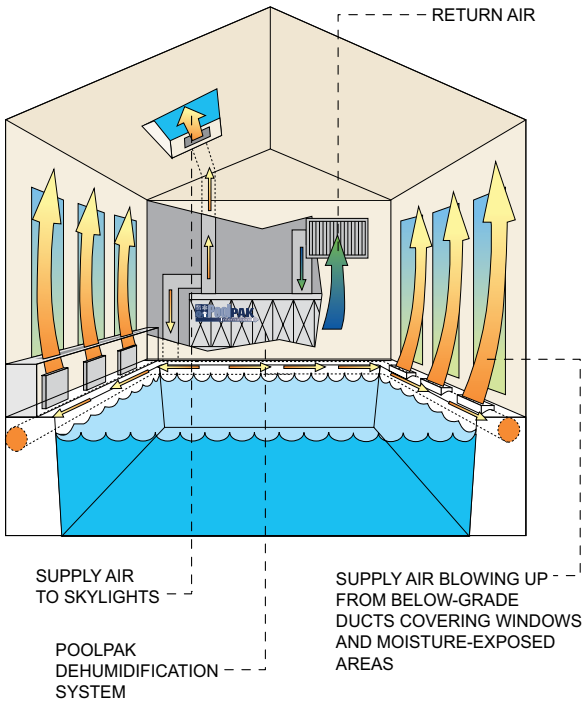
Figure 1-3. Below Grade Air Distribution



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The warm, dry air should be directed over outside walls, windows and other surfaces susceptible to condensation, or it can be directed down the center of the room blowing air toward the surfaces prone to have condensation. Supply ducts should be as short and with as few turns as possible. Use turning vanes to minimize air noise and static pressure drop.

Recommended maximum supply duct air velocity is 1000 FPM. The recommended velocity from diffusers is 300 to 500 FPM. Air velocities in ducts should be kept as low as is reasonable to avoid excessive noise in the ducts. In multiple unit installations, supply air from each unit may go into a common supply duct or into a plenum. A supply air duct collar is provided at the fan outlet. The duct should be attached to this with a flexible connection to minimize vibration transmission.

Return Air

The unit will operate most efficiently in a natatorium where the supply and return openings are placed diagonally opposite each other. All ducting should be done in accordance with acceptable practices. Return air ducts in the section just prior to entering the unit return air opening, and elbows in both the return and supply air ducts must comply with the guidelines set forth in SMACNA HVAC Duct Construction Standards Metal and Flexible – Third Edition, Chapter 4.

Ductwork Design

All supply and return duct work to the unit should be installed such that no condensate occurs in the duct work. Duct turns and transitions must be made carefully to keep friction losses to a minimum. Duct elbows should contain splitters or turning vanes and avoid short radius fittings.

Duct work that is connected to the fan discharge should run in a straight line with proper transitions, and minimum distances to elbows as recommended by SMACNA and should not be reduced in cross-sectional area. Duct turns should be in the same direction as fan rotation. Never deadhead the fan discharge into the flat side of a plenum.

Duct work attached to the PoolPak™ unit return air connection must be done in accordance with SMACNA recommended standards and /or generally accepted industry practice.

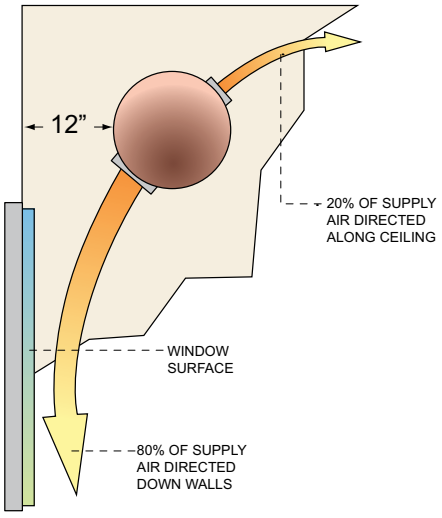
Supply and return duct work should have all seams sealed before applying insulation to the exterior of the duct work. The insulation's seams must be sealed, wrapped, and mastic coated. Use of pre-insulated duct work (interior) is acceptable if it meets local codes; however, all seams must be sealed prior to startup.

Air Distribution

Supply outlets and return grilles should be carefully placed to avoid short-circuiting in the space. Short-circuiting creates stagnant areas where humidity and temperatures may build up to undesirable levels, reducing the effectiveness of the PoolPak™ System. Return grilles can be placed high in the space to reduce return ductwork, however removal of Chloramines from the occupied area has become much more of a design consideration and so low returns are favored by poolroom designers.

Supply air should be directed 45 degrees up and down (most of the air will be directed downward) toward exterior walls, windows, skylights, and other areas where stagnant conditions could cause humidity buildup and condensation problems or drafts. The end result of the supply air ducts is to wash the surfaces of the pool room that are prone to condensation with the warm, dry supply air.

Figure 1-4. Supply Air Proportions



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Diffusers for supply ducts located overhead (as opposed to under the deck) must be sized such that the supply air will be thrown all the way to the deck and wash the entire wall surface from supply duct to the floor.

As a rule, directing the supply air at or across the pool surface increases the evaporation rate. To control the buildup of chloramines at the surface of the pool, some air may be directed at the pool surface. Supply outlets should not discharge directly onto surfaces where drafts may be created that will blow on swimmers walking along the edges of the pool. Spectators should have supply air directed toward their faces.

The outside air intake and exhaust may have rain hoods if the unit is mounted outdoors. Rain hood locations are illustrated on the unit arrangement drawings. The intake and exhaust should be screened to prevent the entrance of foreign matter and arranged to avoid recirculation of exhaust and outside air. Also, when auxiliary gas heat is selected (in an outside installation), a combustion air louver or rain hood is provided.

Ductwork connections over 5 feet long must be supported to avoid damage to unit. Short Flexible connections of rubber or canvas can be made between the return duct and the unit to eliminate vibration transmission through the duct.

PoolPak™ International does not recommend the use of equipment rooms or locker rooms as return or supply air plenums due to the potential of corrosion for components installed in the room. The return air duct should always connect the pool enclosure to the return air plenum collar of the PoolPak™ unit(s).

Other Airside Considerations

A hot water, electric or gas duct heater may be installed in the supply duct to provide auxiliary space heating. Be sure that the additional air pressure drop across the heater is accounted for in the unit fan selection. These heating components must be designed for use in swimming pool environments.

Maintain the poolroom at a slightly negative pressure. This will minimize moisture and chemical odor migration to other spaces. The exhaust fan should be sized for about 5-10% greater CFM than the amount of outside air being introduced into the space. Ducts can be fabric, aluminum, PVC, or galvanized steel. Even though “dry air” is being supplied back to the pool, do not use duct board or similar materials. If the PoolPak™ unit is installed in an area that is below the natatorium’s dew point temperature, the ducts may require insulation, pitching and drainage.

Continuous vapor barriers are required between the poolroom and all other interior and exterior spaces because of the high dewpoint in the poolroom all the time. Care must be taken during design and installation to avoid gaps in the vapor barriers or building damage may result.

Windows and exterior doors must be selected with adequate thermal insulation (including thermal breaks) to minimize condensation on their interior surfaces even if the supply air is directed across these components. Doors and windows must also have as low an air leakage as possible. Although the space will be maintained at a slightly negative pressure, cold air leaking into the space from poorly sealed openings will negate all of the effects of good thermal insulation.

SECTION II: PRINCIPLES, FUNCTIONS, AND FEATURES

THE MECHANICAL DEHUMIDIFICATION SYSTEM

PRINCIPLES OF OPERATION

The PoolPak™ System is a complete environmental control system designed expressly for indoor swimming pool enclosures. It takes into account two important factors: the swimming pool occupant (personal comfort) and the swimming pool environment (the physical structure and surrounding furnishings).

The swimming pool enclosure can be a hostile environment for equipment, decor and building structures. A PoolPak™ System's major function is to dehumidify the pool enclosure air through a vapor compression cycle. During this cycle the PoolPak™ System recycles the sensible and latent heat and places it back into the pool water and air as needed. This recycling process saves money and keeps your pool environment efficient and safe.

Solid state microprocessor technology, working in conjunction with sensors, continually monitors water and air conditions provide superior occupant comfort. Unlike typical outside air ventilation systems, a PoolPak™ System recycles energy and blankets the walls and windows with warm, dry air.

PoolPak™ dehumidification systems reduce the energy input required to maintain pool water and air temperatures. By dehumidifying the air and recycling the latent energy back into the pool air and water, the unit will reduce operating costs when compared to conventional heating and ventilating systems. Pool water and enclosure heating are still required but with greatly reduced requirements.

A PoolPak™ unit, when matched correctly to the evaporation rate of the pool water and overall dehumidification requirements, will efficiently maintain the pool air at relative humidity levels between 50% and 60%. It should be noted that a lower evaporation rate occurs when the pool enclosure's air temperature is maintained above the pool water temperature. Evaporation losses, and the energy required to maintain desired room conditions, will dramatically increase if the air temperature is allowed to fall below the pool water temperature. It is recommended that the continuous dry bulb temperature entering the evaporator of the PoolPak™ unit not fall below 75°F.

PoolPak™ International recommends that backup heating equipment for both pool water and pool enclosure air is capable of carrying the full system heating requirements. This makes for a well-designed system that will provide the least amount of pool down time if unforeseen system problems occur. Building conductive loads and other losses must be taken into consideration.

AUTOMATIC CONTROL OF AIR TEMPERATURE AND HUMIDITY

An integral part of any PoolPak™ System is a proven microprocessor control system which automatically senses and maintains comfort conditions. Sensors detect changes in humidity and air temperature in the indoor pool environment and quickly regulate supply air conditions to meet set point comfort levels, even during periods of unusually heavy pool use.

To prevent condensation on walls and windows, The PoolPak™ System automatically adjusts humidity in response to changes in wall or window surface temperatures. As the seasons and weather conditions change, the PoolPak™ System changes its own mode of operation. Throughout the year, PoolPak™ thinks "efficiency" and automatically selects the least expensive energy source for the poolroom conditions.

PoolPak™ models include a factory mounted and wired space temperature and humidity sensor at the return air opening of the unit. Refer to the installation section for mounting location. Caution should be exercised. When the outside air is to be introduced into the space for ventilation, adequate exhaust capacity via an integral (or a separate external fan) must be specified to ensure the poolroom remains slightly negative. An inadequately sized exhaust system may result in damage to the structure and pool odors may be forced into other areas of the building.

ROOM DEW POINT CONTROL

PoolPak™ units with the ECC-PCP controller operate using an advanced type of control called dew point temperature control. This method of control is more accurate than conventional relative humidity control. The main purpose of a dehumidification system is to maintain the amount of moisture in the pool area below a level that would cause damage to the building. Relative humidity is a measurement of the percentage of moisture which is in the air at a given dry bulb temperature in proportion to the maximum amount of moisture that could be contained at this particular dry bulb temperature. Warmer air can hold more moisture than colder air and, therefore, changes in dry bulb temperature will change the relative humidity reading without any change in the actual amount of moisture in the air. The amount of moisture in the air is expressed as "grains of moisture per pound of dry air" and is directly related to the dew point temperature.

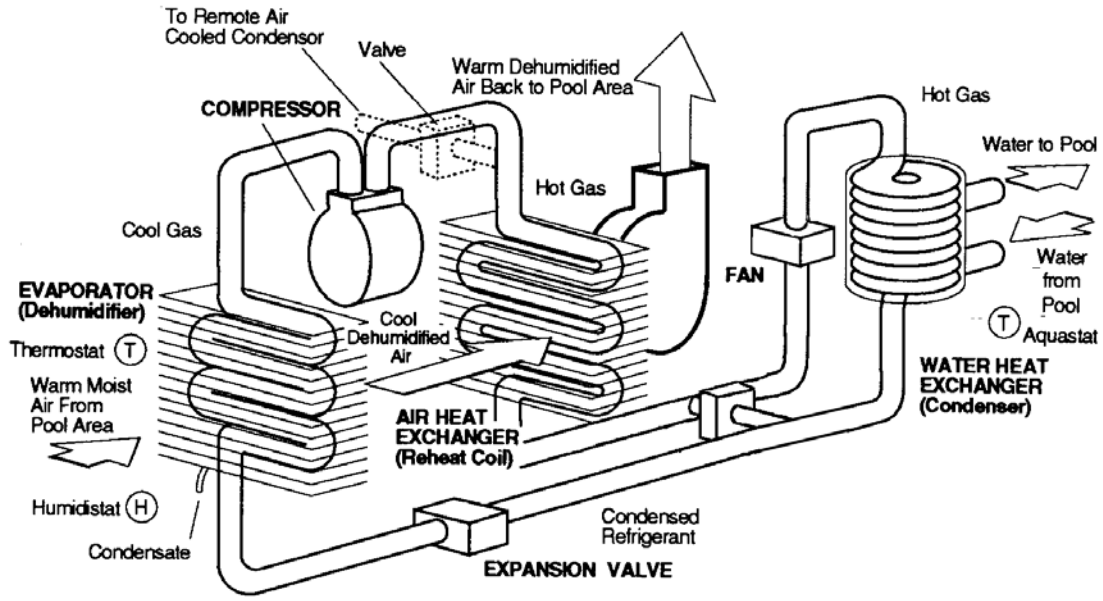
The ECC-PCP uses dew point control to operate the PoolPak™ unit and maintain the moisture level below the setpoint. The space dry bulb temperature and relative humidity determine the dew point temperature. By varying the space temperature and space relative humidity set points, the dew point set point is changed. When the space dew point temperature rises more than 1/2 degree Fahrenheit above the space dew point temperature set point, the ECC-PCP controller energizes the compressor for dehumidification. As the dew point temperature drops more than 1/2 degree Fahrenheit below the dew point temperature set point the controller de-energizes the compressor.

POOLCOMPAK OPERATION

The PoolComPak™ fan draws in warm, moist air from the pool enclosure. This air passes through the evaporator (dehumidification) coil and gives up heat energy to the refrigerant which is in a cool, liquid state. This exchange of energy causes the air temperature to fall below its dew point, resulting in moisture condensation on the evaporator coil. The moisture formed falls into the unit's condensate drain pan. After passing through the evaporator coil, the refrigerant becomes a cool gas.

The refrigerant enters the unit's compressor, where it is compressed into a hot gas. While in the compressor, the refrigerant absorbs the energy used to operate the compressor. This hot gas refrigerant then travels either through an air reheat coil, the pool water condenser or to an optional auxiliary air conditioning condenser, which may be either air or water cooled. If air heating is called for, the air reheat coil is used. The hot refrigerant exchanges energy with the cooler, dehumidified air coming from the evaporator coil. This causes the temperature of the air to rise for heating.

Figure 2-1. PoolComPak™ AW and HCD Typical Refrigerant System Schematic



PCP_EG_Schematic3D_20121204.tif

If pool water heating is required (AWH models only), the hot gas flows into a pool water condenser, where it adds energy to the incoming pool water. This heats the pool water while the refrigerant is condensed into a warm liquid. If space cooling is called for, the refrigerant flows to the auxiliary air conditioning condenser bypassing the air reheat coil and pool water condenser and allowing cool air from the evaporator coil to provide space

ECC-PCP CONTROL SYSTEM

OVERVIEW

The ECC-PCP controller is a micro-processor based system that maintains pool enclosure humidity and air and water temperatures at optimum levels automatically. It is also possible to monitor this critical data via the Internet using the optional Remote Access Package (RAP). This also allows the controller to be accessed from the factory via the internet or a telephone line. (AWH and HCDH only)

The ECC-PCP is designed to work with the PoolComPak™ dehumidification system to provide an environment that is both comfortable and cost effective. It controls unwanted humidity in the pool enclosure and helps to prevent unsightly condensation from forming on surfaces.

The ECC-PCP provides accurate control and allows the user to monitor system parameters and change setpoints easily. For this purpose, a remote interface unit with a text display and keypad is provided. The remote panel should be mounted outside the pool space, in an office or in the equipment room. (The ECC-PCP remote interface unit contains no sensors.) All setpoints are saved in the memory of the ECC-PCP and are not erased in the event of a power failure. Critical operating data can be easily accessed by a service technician for the purpose of system operation and evaluation.

HUMIDITY CONTROL

As the dewpoint temperature within the pool enclosure rises above the desired setpoint, the ECC-PCP activates the compressor within the PoolComPak™ to begin the dehumidification process. If the space temperature is below the desired setpoint, the heat recovered during dehumidification is directed to the air reheat coil for space heating. If the pool water temperature is also below the setpoint, some of the recovered heat is directed to the pool water condenser (model AW only) for pool water heating. If neither air heating nor pool water heating is required, the recovered heat can be directed to an auxiliary air conditioning condenser if the system is so equipped. If the system does not include an auxiliary air conditioning condenser, the ECC-PCP will direct the recovered heat to the air reheat coil until the need for dehumidification is satisfied.

COLD SURFACE TEMPERATURE HUMIDITY RESET

The ECC-PCP control system includes a sensor that measures the temperature of the coldest surface in the pool enclosure, usually an exterior window or door frame. When the temperature of this surface approaches the dewpoint temperature of the space, the controller lowers the humidity setpoint to activate dehumidification. This function helps to prevent condensation on the cold surface.

SPACE HEATING

When the compressor is running, the ECC-PCP directs the recovered heat to the air reheat coil. Space heating will continue until the space temperature reaches the setpoint. The ECC-PCP will activate the auxiliary space heating system if the PoolComPak™ unit is unable to satisfy the heating need with heat recovered during dehumidification. The ECC-PCP will activate the auxiliary pool water heating system if the water temperature cannot be satisfied with recovered heat. An auxiliary pool water heater must be supplied as part of the pool water pump and filter system.

NETWORKING MULTIPLE UNITS

ECC-PCP networking allows up to four PoolComPak™ units to be connected together. The units will work with each other to control water temperature, air temperature, and relative humidity. Networked PoolComPak™ units have all the features of standard PoolComPak™ plus the ability to control water temperature in multiple pools. They also allow system dehumidification capacity to be staged. All units on the network are accessible from a single remote interface unit for convenience.

SPACE COOLING (OPTIONAL)

If space cooling is required and the unit is equipped with an auxiliary air conditioning condenser (air-cooled or water-cooled), the ECC-PCP will activate the space cooling mode of operation. In this mode, the heat removed from the space air will be directed to the auxiliary air conditioning condenser. The air cooling mode of operation is independent of the need for dehumidification.

When the PoolComPak™ unit is equipped with a field supplied economizer, the ECC-PCP will automatically select the most economical method for space cooling. An economizer utilizes outside air rather than the refrigeration system to achieve space cooling. A sensor connected to the ECC-PCP monitors the outside air temperature. When appropriate, the controller will disable the compressor and bring in cool outside air for economical operation. A separate exhaust system must be installed to ensure negative room pressure during the economizer mode.

WATER HEATING (MODELS AWV AND AWH ONLY)

If the pool water temperature is also below the set point, some of the recovered heat is directed to the pool water condenser for pool water heating. Heating can only take place during the dehumidification when heat is captured in the refrigeration circuit. This is only available on the Model AW, which is equipped with a pool water condenser.

FEATURES AND OPTIONS

STANDARD ITEMS FACTORY MOUNTED

- Evaporator (dehumidification) coil
- Air reheat coil (hot gas reheat coil)
- Bottom, top (for indoor installations) or horizontal supply air configuration
- Filters and filter rack
- Air temperature and relative humidity sensor
- Compressor suction and Discharge pressure transducers
- Compressor suction temperature

STANDARD ITEMS FACTORY SUPPLIED FOR FIELD INSTALLATION

- ECC-PCP control interface device
- Cold surface temperature sensor
- Outside air temperature sensor (with economizer control kit option only)
- Pool water temperature sensor (AW models only)

SYSTEM OPTIONS

- Remote air-cooled condenser for space air conditioning
- Capability of introducing up to 30% outside air
- Economizer control
- Network multiple units
- Remote monitoring via Internet (AWH and HCDH only)
- Weatherproofing for outdoor installation (AWH and HCDH only)

- A factory-mounted water-cooled condenser with a refrigerant head-pressure controlled water regulating valve for space air conditioning. Chilled water and closed loop cooling tower water may be used for the water-cooled condenser loop. Never use ground water for the water-cooled condenser. Consult the factory for cooling tower applications.

ROOFPAK SYSTEM

The RoofPak product line is comprised of the most popular PoolComPak™ configuration and repacked as a self-contained, all-in one dehumidification system. This offering merges a highly reliable PoolComPak™ AWH or HCDH base system with an integral air-cooled condenser and either an integral gas furnace or an electric heater. The RoofPak Series is only available in horizontal configuations which can be utilized over a wide range of popular applications. See the RoofPak section of this manual for more information.

POOLCOMPAK™ DEHUMIDIFICATION SYSTEMS SELECTION

Overview

The PoolComPak™ is a compact unitary pool dehumidification system designed for commercial and residential applications. It is available in the AW Series with a pool water condenser for water heating or in the HCD Series without the pool water condenser.

Available Configurations

Indoor Installation: The PoolComPak™ fits easily into a standard utility room (vertical and horizontal configurations)
Outdoor Installation: The horizontal configuration only can be pad, roof or curb mounted depending on the application.

For detailed information for your specific model, please refer to General Arrangement Drawings.
The PoolComPak™ can be configured with an internal hot water coil or duct-mounted electric heater, and adapted for economizer operation. The horizontal model can have either a top, bottom or end supply duct connection.

Typical AW Series Applications

- Hot Tubs, Spas, and Whirlpools
- Residential Pools
- Hotel and Motel Pools
- School Natatoriums
- YMCA and Club Pools

Typical Non-Pool HCD Series Applications

- Commercial and industrial applications
- Libraries
- Manufacturing
- Agricultural
- Museums
- Archival
- Electronic
- Warehousing/storage

Unit Selection software program

PoolPak™ International LLC maintains a computerized software selection program. Information required for the program can be found in the PoolComPak Selection Input Data form found in the online *PoolPak™ Engineering Library.* Please contact your exclusive PoolPak™ Sales representative for a selection.

ROOFPAK SERIES (HCDH/AWH)

PoolPak™ has taken their most popular PoolComPak™ configuration and repacked it as a self-contained, all-in-one dehumidification system. This product comprises the RoofPak Series. This offering merges a highly reliable PoolComPak™ AWH or HCDH base system with an integral air-cooled condenser and either an integral gas furnace or an electric heater. The RoofPak Series is only available in horizontal configuations which can be utilized over a wide range of popular applications. The ten and twelve ton models are ideally suited for applications having a surface area between 1,200 sq. ft. and 2,500 sq. ft.

DESIGN FEATURES

The RookPak Series is designed with features that provide cost savings and greater reliability over traditional systems. Key features are:

- Single, self-contained unit can be installed with one crane lift
- Enclosed refrigerant system reduces refrigerant charge
- Factory assembly ensures wiring and brazing are accomplished under ideal situations
- Single power connection to minimize field wiring. (Separate power connection required for integral electric heat.)

Durable Construction

- Heavy duty construction designed for outside installation to withstand the elements
- Double-wall construction enhances product longevity
- Designed for quiet operation

Rooftop Installation

- Requires only one mounting curb
- Bottom return air
- Bottom supply air
- Side outside air

Microprocessor Controller

- Utilizes the PoolPak™ proven ECC-PCP, microprocessor based contol technology
- Incorporates Remote Access Package (RAP) to allow system access via the ethernet/internet
- RAP is easily adaptable to BAS systems including BACnet (MS/TP & IP), LonWorks, and Modbus

Heating Packages

- 200 MBH or 240 MBH indirect gas furnace for consistent temperature control
- 20kW or 30kW electric heater (requires separate power connection)
- Hot water coil using PoolPak™ standard Hycor® Blue coil or optional Electro-Guard™ coils

Self-Contained Air-Cooled Condensing Section

- Built-in Air Cooled Condenser (ACC) reduces cost and eliminates field piping
- Utilizes efficient dual rotary blade fans
- Efficient to 105°F ambient outside air temperature
- Choice of coil coatings for specific applications

Evaporator Coil Options

- Hycor® Blue (standard)
- Electro-Guard™ Plus
- All copper

Totally Enclosed, Fan Cooled (TEFC) Motors

- Protects fan motors from corrosive air stream
- Extends motor life/prevents premature failure
- Reduces system maintenance

Unique Outside Air System

- Houses adjustable louvers and filter
- Convenient external filter access
- Swing-out door-mount design for easy service access to fan motor and belts

Housed Blower

- Heavy pillow-block bearings provide durability
- Rugged cast-steel housing provides longevity
- Provides greater reliability

Cupronickel Water Heat Exchanger

- Supplies 100% of available recycled energy to the pool water
- Reaches water temperature set-point conditions faster
- Efficiently maintains the water temperature set-point
- Redirects heat only after space temperature is satisfied

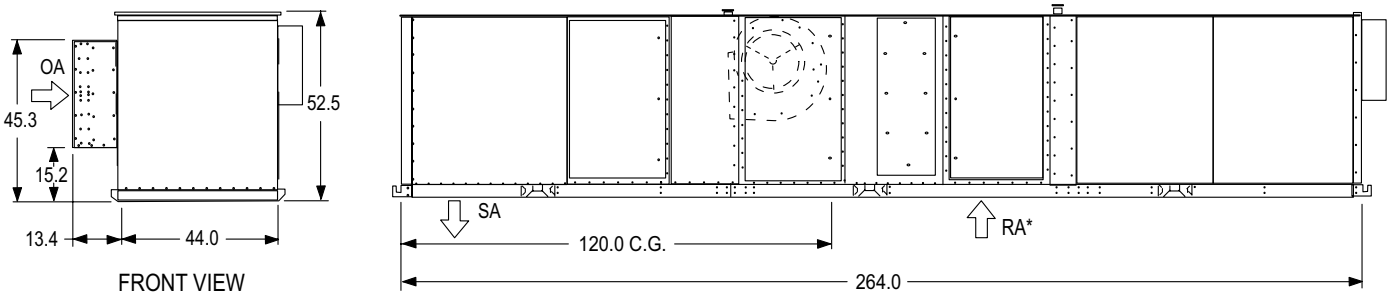
TECHNICAL SUMMARY

Table 2-1. RoofPak Technical Data

Model Number	AWH / HCDH 3500 - 10 Ton	AWH / HCDH 4000 - 12 Ton
Pool Size (Sq. Ft.)	1,200 - 2,000	1,400 - 2,500
Reheat Capacity (MBH)	170	200
Moisture Removal (Lb/Hr@82°F/60%RH)	63	70
Pool Water Flow (GPM)	26	28
Pool Water Condenser PD (FT WC)*	20	30
Pool Water Condenser Capacity (MBH)	170	200
Outside Air (CFM)(Nominal)	0 - 2,000	0 - 2,000
Total Supply Airflow CFM (Maximum)	3,500 - 7,000	4,000 - 7,000
Refrigerant Charge (lbs)	81	83
Dimensions (in inches) with integral air-cooled condenser and gas furnace		
Length	264	264
Width	57.4	57.5
Height	52.5	52.2

DIMENSIONAL DATA

Figure 2-2. PCP RoofPak Dimensions



* Side return air available; horizontal return air available without integral air-cooled condenser

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ROOFPAK WEIGHTS

Table 2-2. RoofPak Weights

Model	Configuration	Weight (lbs)
AWH/HCDH 3500/4000	With Integral Gas or Electric Heat and With Remote ACC	2,900
AWH/HCDH 3500/4000	With Integral Gas or Electric Heat and With Integral ACC	3,700
AWH/HCDH 3500/4000	With No Integral Auxiliary Heat and With Integral ACC	2,700

RoofPak weights are also included with the RoofPak Generic Product Drawings found in the *Engineering Library section of the PoolPak™ website.*

SECTION III: PERFORMANCE AND SIZING

POOLCOMPAK™ PERFORMANCE

Detailed performance and dimensional information are provided in the PoolPak™ Selection Software

PoolComPak™ AW (AWV, AWH) Performance

Table 3-1. PoolComPak™ AW Performance Summary

Performance at 82°F Air and 80°F Water						Pool water Condenser (Vented)	
Model AW	Return Air CFM	Return Air RH (%)	Moisture removal (lbs/hr)	Sensible Cooling Capacity (MBH)	ACC Max. Heat Rejection (MBH)	GPM	Pressure Drop FT water
0550	900	60	11.1	13.6	31.2	4	6
		50	8.5	15.6	30.1		
0800	1600	60	15.7	22.1	47.5	6	10
		50	11.7	24.9	45.7		
1200	1700	60	20.8	26.9	57.9	10	24
		50	15.5	30.5	55.5		
1400	2300	60	26.0	38.4	76.6	10	8
		50	18.8	43.4	73.6		
1800	2500	60	30.9	41.8	89.1	12	12
		50	22.9	47.8	86.1		
2600	3300	60	45.1	54.6	120.9	13	6
		50	35.0	60.6	115.6		
3500	4300	60	59.7	78.9	170.0	24	17
		50	44.2	89.8	163.4		
4000	4500	60	70.4	87.6	197.5	28	24
		50	52.4	100.1	189.3		

PoolComPak™ HCD (HCDV, HCDH) Performance

Table 3-2. PoolComPak™ HCD Performance Summary

Performance at 82°F Air and 80°F Water					
Model HCD	Return Air CFM	Return Air RH (%)	Moisture removal (lbs/hr)	Sensible Cooling Capacity (MBH)	ACC Max. Heat Rejection (MBH)
0550	900	60	10.2	13.2	30.5
		50	7.7	15.2	29.5
0800	1600	60	14.5	20.8	46.2
		50	10.3	23.9	44.4
1200	1700	60	19.0	25.2	56.4
		50	14.5	28.4	54.4
1400	2300	60	24.1	36.2	74.7
		50	17.9	40.5	71.8
1800	2500	60	28.9	41.8	88.1
		50	20.9	47.4	84.6
2600	3300	60	41.0	53.5	118.8
		50	31.3	59.7	113.8
3500	4300	60	56.9	80.5	169.9
		50	41.5	95.2	166.8
4000	4500	60	66.5	86.2	195.3
		50	50.2	97.9	187.8

POOLCOMPAK UNIT DIMENSIONS

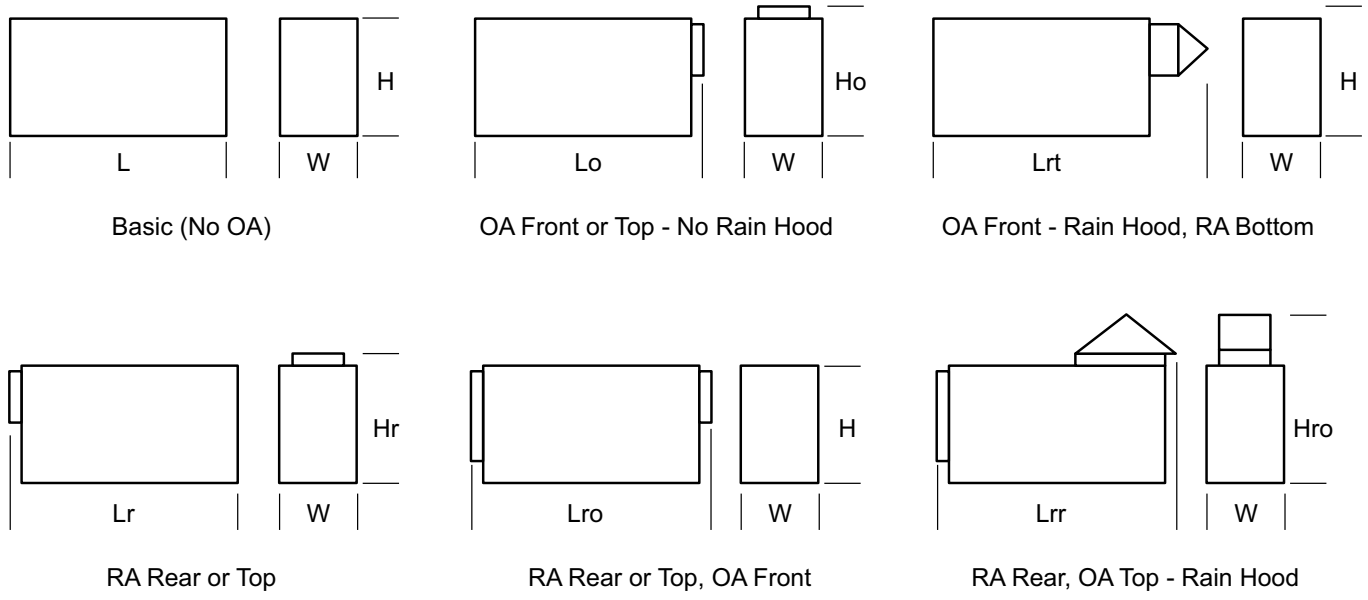
The latest detailed unit dimensional data may be found in the PoolComPak™ Series AWH/HCDH, AWV/HCDV All Models R-410A Dimensional Drawings publication (EG6_Dim_All) which can be downloaded from in the *PoolPak™ Engineering Library* (www.poolpak.com).

PoolComPak™ Horizontal Dimensions

Table 3-3. AW/HCD Horizontal Unit Overall Dimensions

		Model Number							
		550	800	1200	1400	1800	2600	3500	4000
Width	Basic (W)	33.9	33.9	33.9	44.1	44.1	44.1	44.1	44.1
Height	Basic (H)	30.6	30.6	30.6	30.5	30.5	48.6	48.6	48.6
	Top Return (Hr)	32.6	32.6	32.6	33.0	33.0	51.1	51.1	51.1
	Top OA (Ho)	41.1	41.1	41.1	43.0	43.0	61.1	61.1	61.1
	Top OA Rainhood (Hro)	50.9	50.9	50.9	52.8	52.8	70.8	70.8	70.8
Length	Basic (L)	60.1	60.1	60.1	72.0	72.0	92.1	92.1	92.1
	Rear Return (Lr)	61.8	61.8	61.8	74.7	74.7	94.8	94.8	94.8
	Front OA (Lo)	70.8	70.8	70.8	84.8	84.8	104.8	104.8	104.8
	Rear Return & Front OA (Lro)	72.1	72.1	72.1	87.0	87.0	107.1	107.1	107.1
	Front OA Rainhood (Lrt)	88.0	88.0	88.0	99.9	99.9	120.0	120.0	120.0
	Top OA Rainhood(Lrr)	71.3	71.3	71.3	88.2	88.2	108.3	108.3	108.3

Figure 3-1 AW/HCD Horizontal Unit Elevation and End Views



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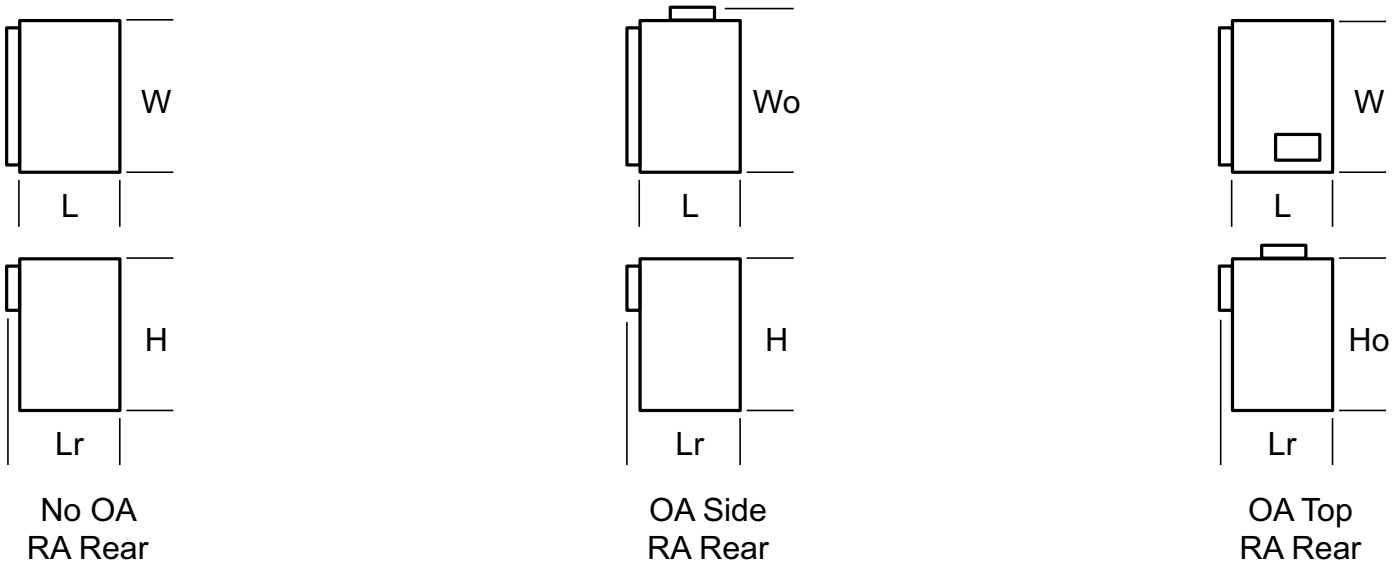
PoolComPak™ Vertical Dimensions

Table 3-4. AW/HCD Vertical Unit Overall Dimensions

		Model Number							
		550	800	1200	1400	1800	2600	3500	4000
Width	Basic (W)	32.1	32.1	32.1	38.8	38.8	49.6	68.2	68.2
	Side OA (Wo)	39.0	39.0	39.0	45.7	45.7	56.5	75.0	75.0
Height	Basic (H)	49.3	49.3	49.3	55.9	55.9	60.5	60.5	60.5
	Top OA (Ho)	56.3	56.3	56.3	62.9	62.9	67.5	67.5	67.5
Length	Basic (L)	26.2	26.2	26.2	27.8	27.8	41.4	41.4	41.4
	Rear Return (Lr)	32.2	32.2	32.2	33.8	33.8	47.3	47.3	47.3

Figure 3-2. AW/HCD Vertical Unit Elevation and Plan Views



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HOT WATER COIL CAPACITIES

Table 3-5. Hot Water Coil Capacities

Vertical (AWV, HCDV) Models 1 Row Hot Water Coil				
Model	Flow Rate Range (GPM)		Heating Capacity Range (MBH)	
	Min	Max	Min	Max
0550	5	15	35	56
0800	5	15	44	69
1200	5	15	48	75
1400	10	25	73	109
1800	10	25	82	115
2600	15	35	108	166
3500	20	40	165	248
4000	20	40	165	248

Horizontal (AWH, HCDH) Models 1 Row Hot Water Coil				
Model	Flow Rate Range (GPM)		Heating Capacity Range (MBH)	
	Min	Max	Min	Max
0550	5	15	33	54
0800	5	15	43	66
1200	5	15	48	75
1400	10	25	71	105
1800	10	25	80	111
2600	15	35	104	161
3500	20	40	147	203
4000	20	40	158	209

Horizontal (AWH, HCDH) Models 2 Row Hot Water Coil				
Model	Flow Rate Range (GPM)		Heating Capacity Range (MBH)	
	Min	Max	Min	Max
0550	15	25	54	84
0800	15	25	76	108
1200	15	25	87	123
1400	20	35	115	168
1800	20	35	134	180
2600	30	50	167	258
3500	35	55	237	326
4000	35	55	260	340

NOTE

Coils add 0.1”WC to ESP
Entering Air Temperature - 80°F
Entering Water Temperature - 180°F
Max. Working Pressure - 125 psi
Capacity is a function of Return Airflow and is independent of Supply Airflow

POOLCOMPAK OUTSIDE AIR DAMPER SIZE

Table 3-6. PoolComPak™ Outside Air Damper Size

Model#	Outside Air (OA) Location	Opening Size[1] (in.)	Damper Code	OA CFM Range[2]
PoolComPak Vertical AWV/HCDV				
V550/800/1200	Top	A, 14 x 10	OA-TR	0-800
	Left		OA-LT	
V1400/1800	Top	A, 14 x 10	OA-TR	0-800
	Left		OA-LT	
	Top	B, 14 x 22	OA-TR	800-2000
	Left		OA-LT	
V2600	Top	A, 14 x 10	OA-TR	0-800
	Left		OA-LT	
	Top	C, 14 x 30	OA-TR	800-2500
	Left		OA-LT	
V3500/4000	Top	A, 14 x 10	OA-TR	0-800
	Left		OA-LT	
	Top	C, 14 x 30	OA-TR	800-2800
	Left		OA-LT	
PoolComPak Horizontal AWH/HCDH				
H550/800/1200	Top	A, 12 x 12	OA-TC	0-450
	Front		OA-FC	
	Top	B, 12 x 24	OA-TC	450-800
	Front		OA-FC	
H1400/1800	Top	C, 16 x 20	OA-TC	0-1000
	Front		OA-FC	
	Top	D, 16 x 40	OA-TC	1000-2000
	Front		OA-FC	
H2600/3500/4000	Top	E, 20 x 20	OA-TC	0-1400
	Front		OA-FC	
	Top	F, 20 x 40	OA-TC	1400-2800
	Front		OA-FC	

[1]Size may change depending on RA CFM and ESP. See product dwg request/pulley request from section software for exact damper size.

[2]Operating these units at OA quantities different from which the unit was selected will be detrimental to the unit's operation.

REFRIGERANT

Table 3-7. Factory Refrigerant R410A Charge

	Unit Factory Charge[1] (R410A)			
	Air Cooled Condenser (ACC)		Water Cooled Condenser (WCC)	
Model	lbs	oz	lbs	oz
0550	14	3	9	9
0800	15	5	10	7
1200	18	2	13	4
1400	24	13	17	9
1800	26	5	19	1
2600	36	1	25	15
3500[2]	42 (81)	1 (0)	33	15
4000[2]	44 (83)	1 (0)	35	15

[1] Factory charge for remote ACC option does not include refrigerant for either ACC or lineset.
[2] Factory charge for RoofPak with Integral ACC in parentheses.

NOTE

Factory charge for remote ACC option does not include refrigerant nor oil charge for either ACC or connecting refrigerant line between unit and ACC.

For ACC and lineset charging, see Table 4-2 and Table 4-3 in the Installation section.

REMOTE AIR-COOLED CONDENSER (ACC)

Table 3-8. Remote ACC Performance Chart

Note: Below table contains the piping sizes of the remote ACC stub-outs. Additional field piping may be needed to make the transition from the connections to correct refrigeration lineset sizing (See Table 4-3.)

Unit Size	ACC Model*	Ambient Temp (°F)	Unit Height (inches)	Vapor O.D. (inches)	Liquid O.D. (inches)	Unit Weight	Motor FLA		Min. Circuit Ampacity	
			A	B	C		208/230V	460V	208/230V	460V
0550	ACC0041	95/100/105/115	39.3	5/8	1/2	120	3	1.5	3.8	1.9
0800	ACC0041	95/100/105	39.3	5/8	1/2	120	3	1.5	3.8	1.9
	ACC0051	110		3/4	1/2	120				
	ACC0081	115		7/8	5/8	210				
1200	ACC0051	95/100/105	39.3	3/4	1/2	120	3	1.5	3.8	1.9
	ACC0081	110		7/8	5/8	210				
	ACC0121	115	39.3	1-1/8	3/4	470	6	3	7.5	3.8
1400/1800	ACC0081	95/100/105	39.3	7/8	5/8	210	3	1.5	3.8	1.9
	ACC0121	110/115	39.3	1-1/8	3/4	470	6	3	7.5	3.8
2600	ACC0121	95/100/105/110	39.3	1-1/8	3/4	470	6	3	7.5	3.8
	ACC0301	115	49.0	1-1/8	7/8	640	14	7	20	15
3500	ACC0161	95/100/105	39.3	1-1/8	7/8	470	6	3	7.5	3.8
	ACC0301	110	49.0			640	14	7	20	15
	ACC0341	115				690				
4000	ACC0161	95/100	39.3	1-1/8	7/8	470	6	3	7.5	3.8
	ACC0211	105	40.5			550	10	5	11.2	5.6
	ACC0301	110	49.0			640	14	7	20	15
	ACC0341	115				690				

*NOTES: For models ACC00XX, see figure #3-3 (Single Fan).
For models ACC01XX, see figure #3-3 (Dual Fan).
For models ACC02XX, see figure #3-4 (Three Fan-Bohn).
For models ACC03XX, see figure #3-4 (Dual Fan-Bohn).

Figure 3-3. Air-Cooled Condenser (PoolPak™) - Isometric Views

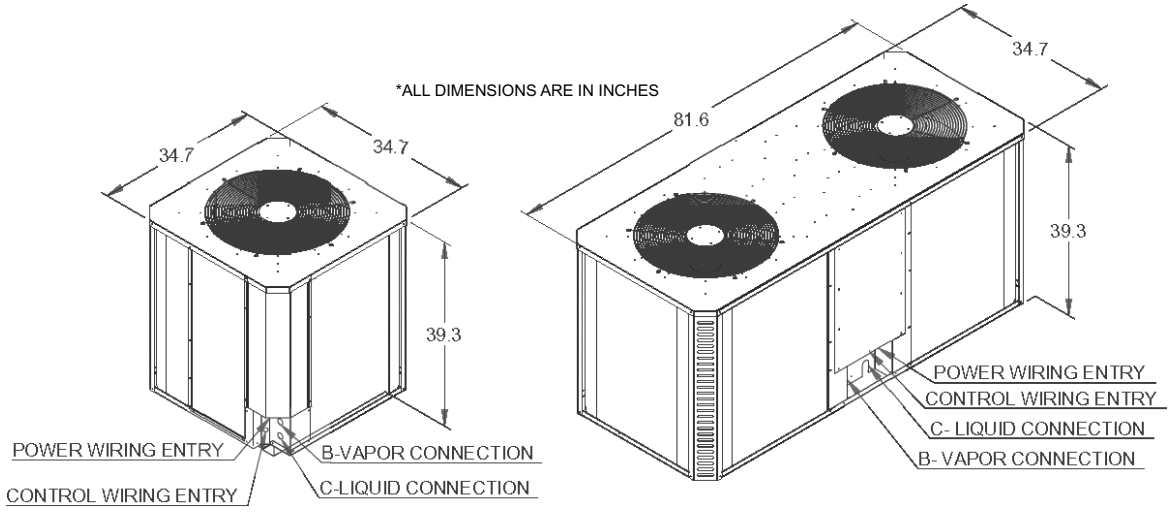

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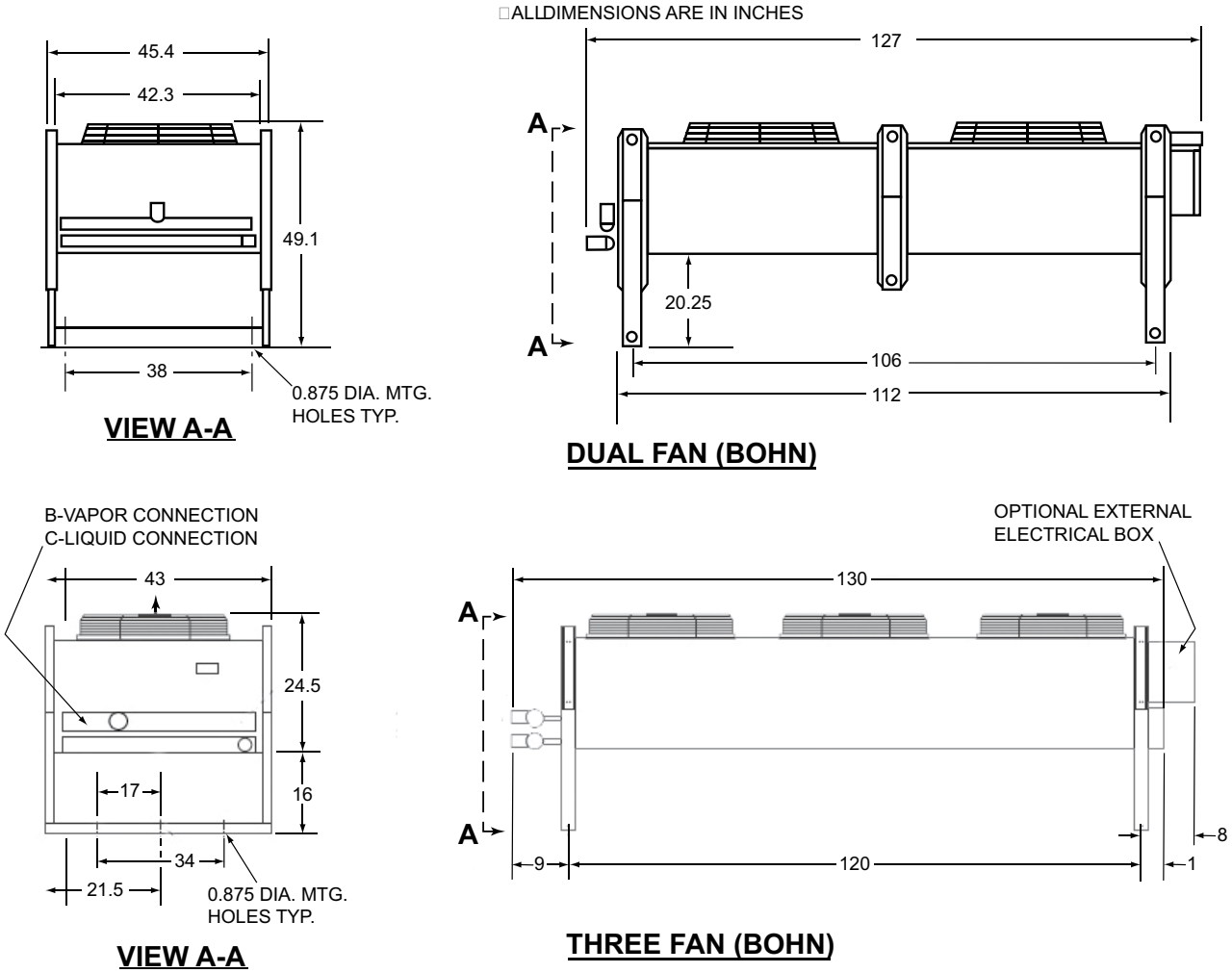
Figure 3-4. Air-Cooled Condenser (Bohn) - Elevation Views



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ELECTRIC DUCT HEATER

General Duct Heater Information

Power wiring should incorporate properly sized fuses or motor rated circuit breakers. A disconnect must be fitted within easy access and sight of the unit. Supply voltage must be maintained within +/- 10% of design voltage on both single and three phase units. Cycles must be within +/- 5% of design. Failure to operate within these ranges can adversely affect performance, cause failure of the equipment, and may void warranty terms.

- Tubular, sheathed elements
- Galvanized steel cabinet
- Duct-mounted, flanged type
- Airflow in either direction
- UL and CSA approved heater
- Airflow proving switch
- Auto and manual reset, high temperature limits
- Magnetic contactors
- 24 volt control circuit and transformer
- Standard heater for indoor installation in non-insulated duct

Figure 3-5. Duct Heater

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Duct Heater Sizes

Table 3-9. Duct Sizes

VOLTS/HZ/PH	Duct Size			
	12” X 12”	15” X 15”	20” X 20”	28” X 28”
208/60/1 or 230/60/1	5KW-1STG	10KW-1STG	20KW-1STG	---
	10KW-2STG	15KW-1STG	30KW-1STG	---
	---	15KW-2STG	30KW-2STG	---
	---	20KW-2STG	40KW-2STG	---
208/60/3 or 230/60/3	5KW-1STG	10KW-1STG	20KW-1STG	30KW-1STG
	10KW-2STG	15KW-1STG	30KW-1STG	45KW-1STG
	---	15KW-2STG	30KW-2STG	45KW-2STG
	---	20KW-2STG	40KW-2STG	60KW-2STG
460/60/3 or 575/60/3	5KW-1STG	10KW-1STG	20KW-1STG	30KW-1STG
	10KW-2STG	15KW-1STG	30KW-1STG	45KW-1STG
	---	15KW-2STG	30KW-2STG	45KW-2STG
	---	20KW-2STG	40KW-2STG	60KW-2STG

Duct Heater Installation

1. Flange both ends of the ducts outwards on three sides to match heater flanges as shown.
2. Fasten heater to duct using sheet metal screws for smaller heaters or bolts for larger ones.
3. Seal opening with suitable sealing compound.
4. If needed use additional hangers to support heater.
5. Electrical power connections must be made within NEC standards and local electrical codes.
6. Refer to the Field Wiring Diagram at the back of this manual for controls connection.

Reference Dimensions: Fan Outlet

AWH/HCDH 550/800/1200: 9-1/4 x 10-3/8 inches
AWH/HCDH 1400/1800/2600: 12-1/2 x 13-1/2 inches
AWH/HCDH 2600/3500/4000: 17 x 19 inches
Duct heater width = 8, 10 or 12 inches depending on heater kW; Flange width = 1 inch

PCP INSTALLATION

INTRODUCTION

Installation requires the unit to be placed on a roof mounted curb, the mechanical room floor, an appropriate location in the pool room, or outside on an equipment housekeeping pad. Isolation pads should be placed under the unit to minimize transmission of noise due to unit operation. Then pool water is piped to the unit. Electrical power from a properly sized fused disconnect is connected to the unit. The supply and return air ducts are connected to their respective locations on the unit. The condensate is piped back to the pool or to the sewer.

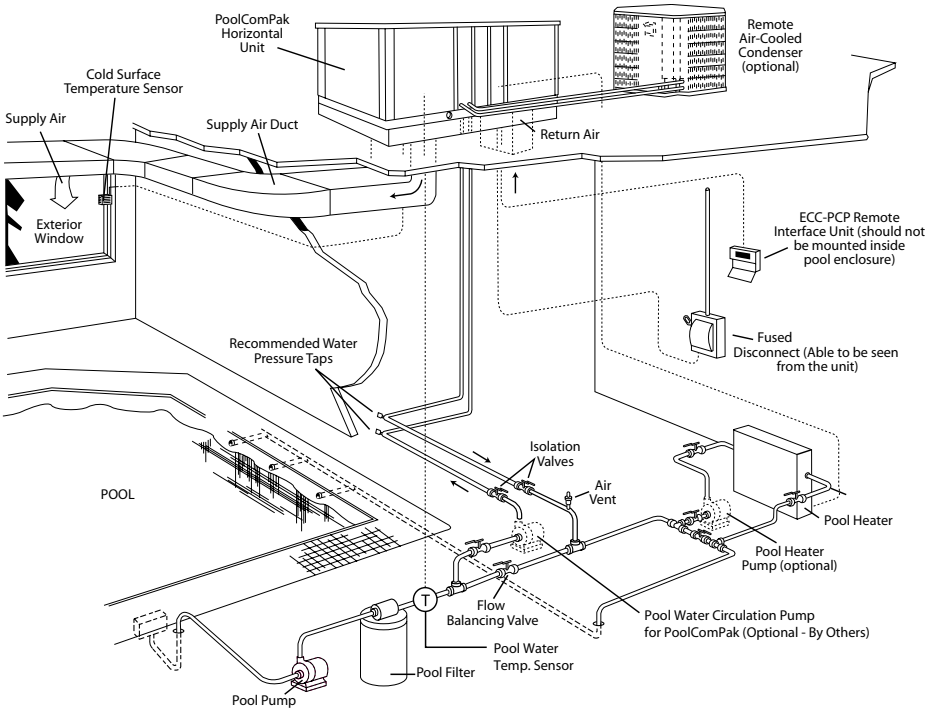
If an optional remote air-cooled condenser is used, place the condenser in a proper outdoor location. Refrigerant piping is then run from the air cooled condenser to the PoolComPak™ unit. Refrigerant lines must be leak checked and evacuated through installer provided Schrader valves. Control and power wiring are run to complete the installation. If a field-furnished auxiliary space heating coil is installed, the control for this heater must be field wired to the PoolComPak™ controls shown in Section V1 - Wiring (*Figure 6-3, Field Wiring Diagram*).

Outside air can be ducted into the unit through the optional outside air duct connection. The unit can draw up to 30% of its supply air from the outside. When ventilating the natatorium in this way, an exhaust fan must be furnished in the natatorium to exhaust to the outside an air volume slightly greater than the air volume introduced into the natatorium from the outside. This will maintain a negative pressure in the space, preventing odor and moisture migration. Outside air filters are provided for Horizontal PoolComPak™ units. For Vertical PoolComPak™ units, outside air must be filtered before entering the unit.

UNIT/FACILITY INTERFACE

A typical PoolComPak™ system layout and its connection to the natatorium and pool water piping systems is shown in the figure below.

Figure 4-1. Typical PoolComPak™ AWH Series System Layout



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HANDLING

All units are shipped completely assembled. Care should be taken to avoid damage due to rough handling. If the unit is not to be immediately installed, it must be protected from weather and site hazards.

CLEARANCE

For proper operation and service, PoolComPak™ Vertical, PoolComPak™ Horizontal and RoofPak units require 36" clearance on all sides.

MOUNTING OF POOLCOMPAK UNITS

Locate the PoolComPak™ unit on a firm level base. If floor mounting, ensure that the floor is capable of supporting the operating weight. If wall mounting or hanging a unit, provide a support structure that is capable of supporting the unit while protecting pool patrons and employees from injury. Ensure that the support structure will not interfere with the operation of the unit. Provision must be made for servicing units suspended above floor level. Install isolation pads under the unit to minimize unit transmitted vibration noise.

INSPECTION

Upon receipt of the PoolComPak™ unit(s), immediately inspect for damage. In particular, inspect the housing and the evaporator coil face. Minor indentations of the fins will not affect performance. However, if there is substantial damage, immediately notify shipping company of unseen damage at delivery with a detailed letter outlining the damage. Retain copies of all shipping damage claim documentation as well as photographs of the observed damage.

NOTE

PoolPak™ International does not ship damaged units from its facility nor is it responsible for damage incurred during transit.

POWER SUPPLY

A separate fused disconnect switch must be provided per local codes and be within easy accessibility of the PoolComPak™ unit. Use the minimum circuit capacity listed on the unit's data plate to determine the minimum wire size for incoming electrical power. The ground connection for the unit is located in the unit control panel. The power supply to the unit must be adequate for the compressor starting amperage (LRA). If it is not, a compressor rotor stall will occur during start-up due to an excessive voltage drop. All field wiring must be done according to the wiring diagram provided with the unit and in conformance to the National Electrical Code (NEC) and any other applicable local electrical code(s).

For Vertical and Horizontal PoolComPak™ units, installing contractor must punch a hole into the electrical compartment to run power wires. The hole is to be properly finished with a rubber grommet and weather sealing.

CONTROL WIRING

All control wiring field connections are described in the wiring diagram furnished with the PoolComPak™ unit as well as in the Field Wiring section of this manual. All control wiring is low voltage.

CONDENSATE PIPING

The condensate may be piped to a drain or returned to the pool if local codes allow. If returned to the pool, the condensate should be piped to the skimmer. PoolPak™ International recommends neither for, nor against, the practice of returning condensate to the pool. The overflow drain should be piped in a similar fashion. The installer should review the local codes prior to making the decision of where to dispose of the condensate. The amount of condensate produced in a year is about equal to the volume of the pool.

CURB MOUNTING

Illustrated in *Figure 4-2* is a curb that has been designed specifically for the PoolComPak™ product line. The outside dimensions of the curb are such that the base of PoolComPak™ extends over the edge of the curb all the way around. This aids in preventing rainwater from getting between the base of the PoolComPak™ and the curb.
It is the installing contractor's responsibility to complete the following:

- Flash the curb into the roof
- Insulate the curb
- Connect the supply and return duct to the curb's duct support rails.
- Connect condensate drain line with appropriate trap
- Seal the curb to the bottom of the PoolComPak™ using the gasket supplied with the curb
- Provide counter flashing between curb and PoolComPak™ unit.
- Seal the pool water pipes where they go through the curb

If specified when ordering, all water piping connections can be made through the curb. These water connections include: pool water, condensate, auxiliary hot water coil (optional).

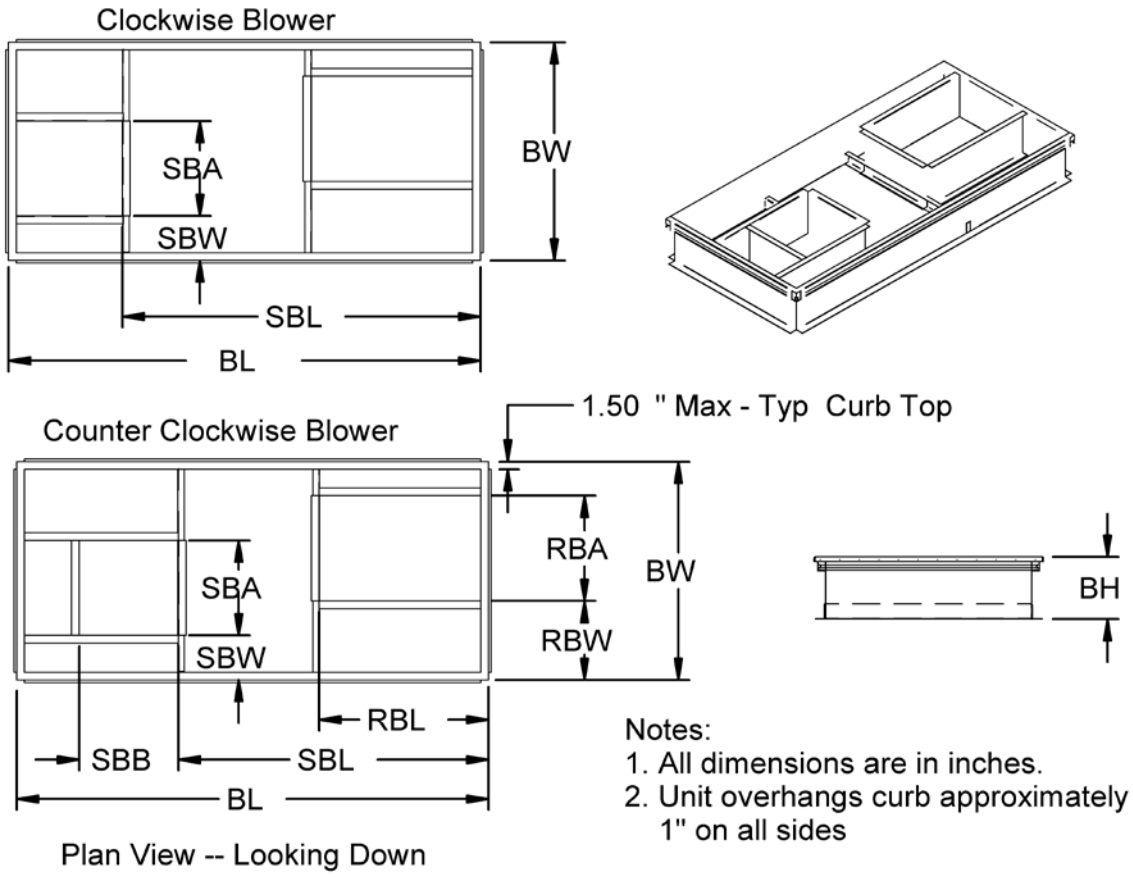
If the PoolComPak™ is to be mounted on a curb, the unit must be ordered with the "outdoor" option. PoolComPak™ Units produced for curb mounting receive special weatherizing and insulation that non-curb mounted PoolComPak™ Units do not receive.

> ***NOTE***
>
> ***If the factory is not notified that a PoolComPak™ is to mounted outdoors, the unit will not be weather tight, it will leak and it will not be properly insulated.***

INTEGRAL GAS FURNACE OPTION (ROOFPAK ONLY)

When using a gas furnace, power venting is provided for all unit sizes. External vent piping and/or cap is required. Please refer to the furnace manufacturer's manual for piping and venting instructions. Install, leak-test, and properly regulate piping for the gas-fired heater. Pressures should be regulated to the entering pressures as shown on the furnace manufacturer's data plate or manual.

Figure 4-2. PoolComPak™ Curb Assembly



PCP_EG_CurbDimensionsIdentification_20121204.tif

Table 4-1. Horizontal PoolComPak™ Curb Dimensions

Model#:	550/800/1200	1400/1800	2600/3500/4000	2600/3500/4000
Fan Size:	**9”x7” Blower**	**12”x9” Blower**	**12”x9” Blower**	**18”x13” Blower**
Overall Dimensions				
BL	58.5	70.5	90.5	90.5
BW	32.3	42.5	42.5	42.5
BH	12	12	12	12
Return Duct Chase				
RBW	14.6	20	15.4	15.4
RBL	22.2	25.5	32.7	32.7
RBA	12	15	20.5	20.5
Supply Duct Chase				
SBW	15.7	18.6	8.4	8.4
SBA	10.6	13.6	13.3	18.6
SBB	12	15.5	14.9	21
SBL (CW Rotation)	44.8	53.5	72.8	66.7
SBL (CCW Rotation)	41.7	49.3	59	59

ECC-PCP CONTROLS FIELD WIRING

OVERVIEW

The ECC-PCP is the Electronic Control Center programmable controller designed specifically for the PoolComPak™ dehumidification system. It is a robust system capable of a variety of functions. The following text describes the field wiring required for for proper operation of the ECC-PCP dehumidification system in a typical PoolComPak™ unit installation.The field wiring diagram (*see Section VI - Wiring*) shows the location of the connections for the sensors and other required devices.The numbers following the text identify the location on the field wiring diagram where each device is connected to the PoolComPak™ unit electrical panel.

REMOTE INTERFACE UNIT (1)

The remote interface unit allows the user to view space temperature, pool water temperature, and relative humidity, change set points, and receive fault notifications. It should be mounted in a convenient location that is outside the pool area. The ambient temperature of the mounting location must always be above 32 F.

> ***NOTE***
>
> ***The maximum distance from the Remote Interface Unit to the PoolComPak™ unit is 1000 feet. For distances greater than 1000 feet, contact the factory.***

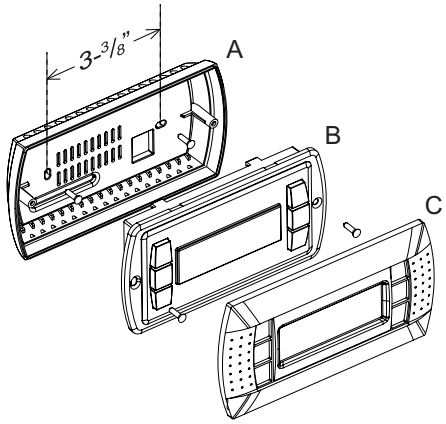
The control panel does not contain any sensors and should be mounted outside the pool enclosure. A factory supplied 6 ft cable RJ25 (6 conductor) must be installed between the PoolComPak™ unit and the control panel.

For distances greater than 6 feet, use 6 conductor, 22 AWG, shielded, twisted-pair cable along with the supplied RJ25 jack and second 6 foot cable shipped loose with the unit.

The wall mounting of the terminal first requires the back piece (A) of the RIU assembly. The RIU is designed to fit a single gang, extra-deep electrical box mounted horizontally in the wall. The RJ25 jack and most of the black cable should be placed inside the box before installing the mounting bracket. A ¾" hole must be drilled for the 6-conductor cable which connects the remote interface unit to the PoolPak™ unit. The below is specific mounting instructions that correspond to the mounting schematic below:

1. Fasten the back piece (A) to the gang box using the rounded-head screws supplied in the packaging. Use the screws that come with the box to secure the bracket.
2. Thread the 6-conductor cable through the back piece (A) and connect to the back of front panel (B).
3. Rest the front panel (B) on the back piece A and fasten the parts together using the flush-head screws supplied in the packaging.
4. Finally, fit the click-on frame (C).

Figure 4-3. Remote Interface Mounting Plate



ALL_EG_RIUMounting_20131219.eps

COLD SURFACE TEMPERATURE SENSOR (2)

This sensor is used to measure the temperature of the coldest surface in the pool enclosure. The sensor is an aluminum bar 1" long by ¼" square with a clearance hole for a number 8 screw and two 6" wires on one end.

When the temperature of the surface drops to within 5 F of the space air dew point the humidity set point will be automatically reset downward to help prevent condensation on the cold surface. It should be noted that resetting the humidity set point will not compensate for lower quality building materials such as single pane glass or non-thermally broken frames.

The sensor should be mounted on an exterior window or door frame that is not in direct sunlight. In cases where there are no exterior windows or doors, the sensor should be mounted on the inside surface of an exterior wall. The sensor must be in contact with the cold surface. Electrical connection should be made with 22 AWG, copper, two-conductor, shielded, twisted-pair cable. Connect the shield drain wire to ground at the PoolComPak™ unit end only.

ECONOMIZER SYSTEM (OPTIONAL) (3)

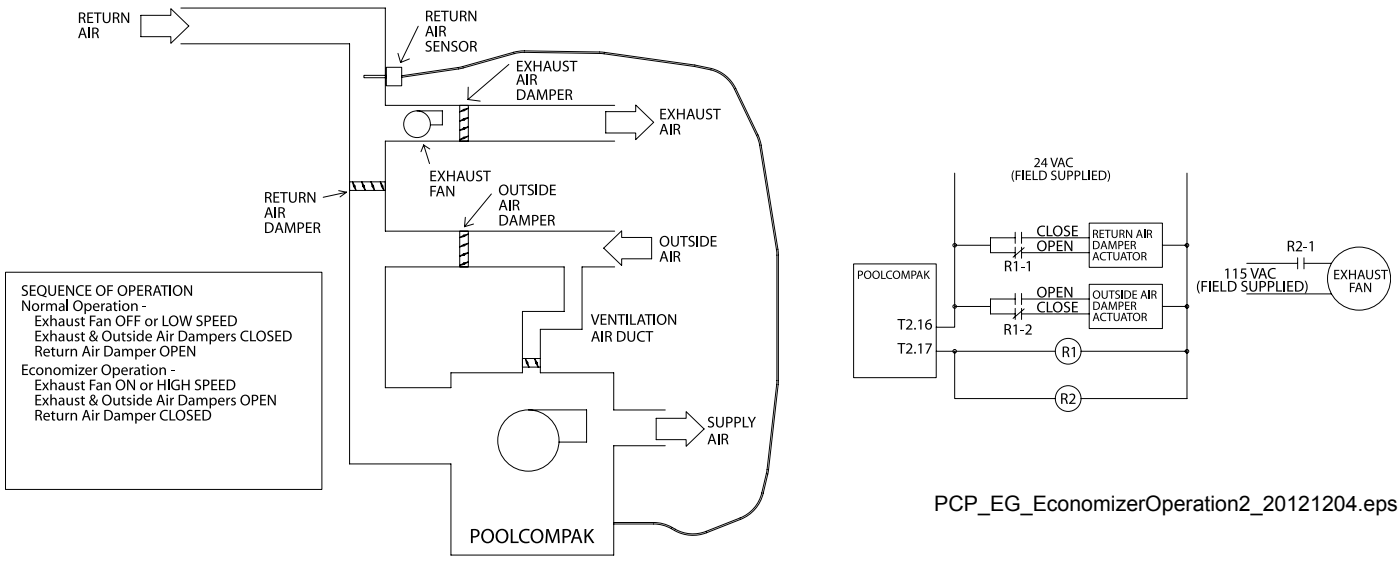
An economizer system cools the space with outside air instead of the compressor. The ECC-PCP provides a dry contact closure to activate the economizer. The contacts of the ECC-PCP may be connected directly to the economizer control circuit provided the circuit is 24 VAC maximum and the current does not exceed 1 amp inductive. The other components of the system must be provided by others. (See figure below for an illustration of a typical economizer system.)

Units equipped with an economizer require relocation of the factory mounted return air sensor. It must be located in a duct that will always contain air that represents the space temperature and humidity.

The economizer will operate only when space cooling is required and there is no dehumidification requirement. When the outside air temperature is greater than 50°F and more than 5°F below the space temperature set point and the space temperature rises above the set point, the compressor is disabled and a dry contact closure between T2.16 and T2.17 is made to activate the economizer.

When the ECC-PCP contacts close relay R1 is energized causing the outside and exhaust air dampers (by others) to open and the return air damper (by others) to close. At the same time relay R2 is energized causing the exhaust fan to run. If the space temperature continues to rise and exceeds the space temperature set point by more than two degrees, the economizer contact is opened, reversing the damper positions. The compressor is energized in the space cooling mode (if so equipped). The compressor will then continue to run until the call for space cooling is satisfied. The economizer will also be activated in the space cooling mode if the auxiliary air conditioning condenser option is not installed or if the compressor is locked out by a fault condition.

Figure 4-4. Economizer Operation



PCP_EG_EconomizerOperation2_20121204.eps

⚠ WARNING!

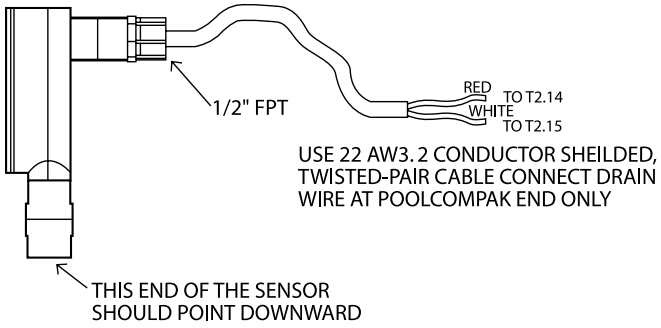
When economizer option is selected, adequate exhaust capacity via a separate fan must be specified to ensure the natatorium pressure remains slightly negative. Failure to specify adequately sized exhaust system may result in damage to structure and pool odors may be forced into other areas of the building.

OUTSIDE AIR TEMPERATURE SENSOR (ECONOMIZER OPTION ONLY) (4)

The outside air temperature sensor is installed only when the outside air economizer option is included. The sensor is mounted inside a 1/2" PVC conduit pull elbow. It can be mounted to the outside of the building using standard PVC conduit fittings. The sensor should be mounted near the outside air intake vent for the economizer system. It is very important to mount the sensor so that it does not receive direct sunlight. The exposure to sunlight will cause the sensor housing to warm, resulting in temperature readings that are higher than the actual air temperature. This condition may prevent the ECC-PCP from selecting the economizer mode of operation. If possible, mount the sensor under an overhang or on a surface with a northern exposure.

Electrical connection should be made with 22 AWG, copper, 2-conductor, shielded, twisted-pair cable. Connect the shield drain wire to ground at the PoolComPak™ end only. See figure below for an illustration of the outside air temperature sensor. Seal the conduit leading to the sensor with silicone caulk to prevent moisture from migrating out to the sensor and condensing inside the sensor.

Figure 4-5. Outside Air Sensor

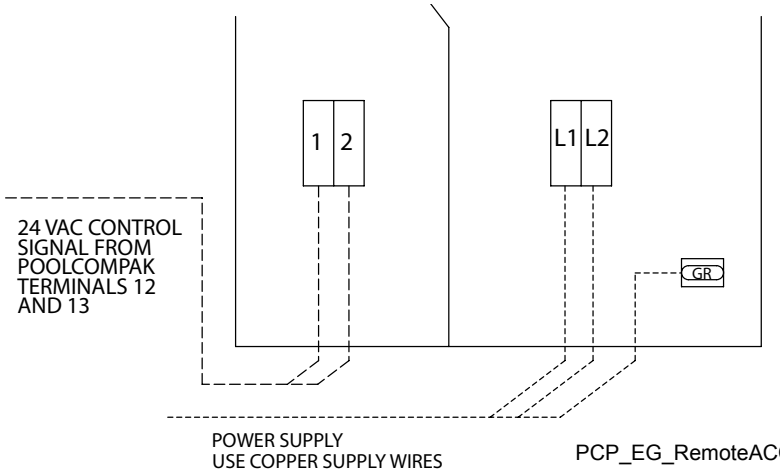


PCP_EG_OutsideAirSensorInstallation_20121204.eps

AIR COOLED CONDENSER (OPTIONAL) (5)

The air-cooled condenser is used to reject heat recovered during the space cooling mode of operation. Only PoolComPak™ brand air-cooled condensers (PAC Units) should be used with a PoolComPak™ Unit. The ECC-PCP provides 24 VAC control signal to the speed control located in the PAC unit control panel. The speed control then runs the condenser fan motor at the appropriate speed. See figure below for an illustration of a PAC unit field wiring.

Figure 4-6. PAC Unit Field Wiring



PCP_EG_RemoteACCFieldConnection_20121204.eps

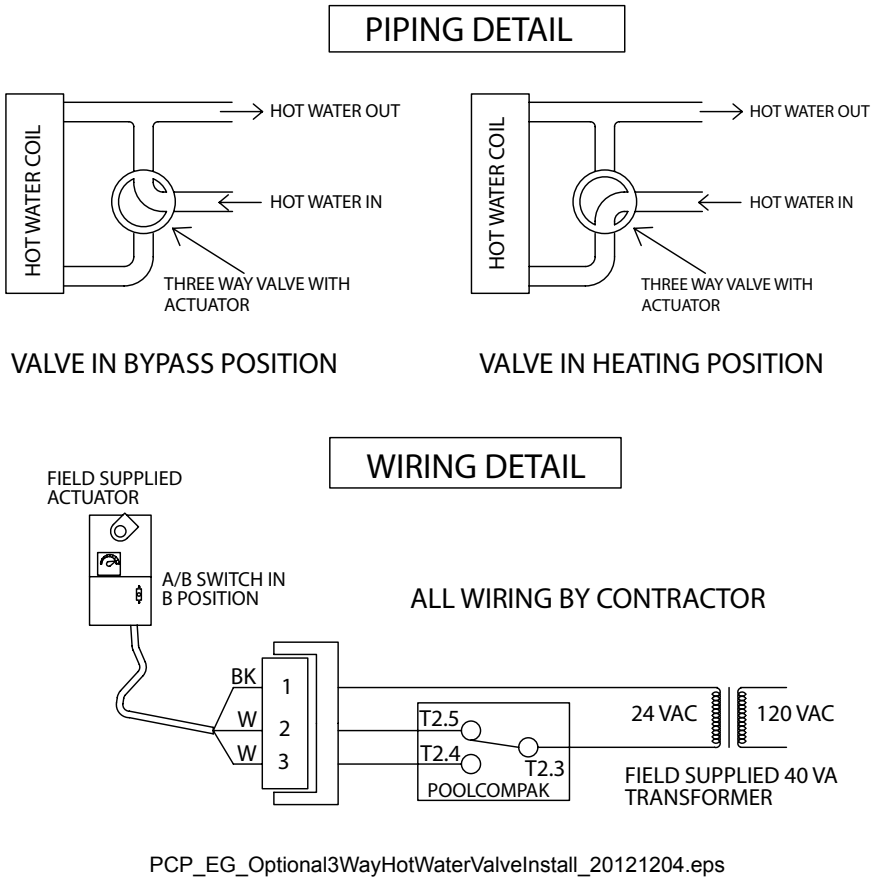
AUXILIARY POOL WATER HEATING SYSTEM (AWH MODEL ONLY*) (6)

The auxiliary pool water heating system is provided by others. Typically a gas fired or electric pool water heater is used. The ECC-PCP provides a dry contact closure that signals a need for auxiliary water heating. The contacts of the ECC-PCP may be connected directly to the heater's control circuit provided the circuit is 24 VAC maximum and the current does not exceed 1 amp inductive. Any other applications will require an additional relay (by others) to be installed between the ECC-PCP and the pool water heating system.

AUXILIARY AIR HEATING SYSTEM (7)

Typically a duct mounted electric heater, hot water coil or a factory installed unit mounted hot water coil is used to provide air heating. The ECC-PCP provides a form "C" (NO and NC) dry contact closure that signals a need for auxiliary air heating. The ECC-PCP contacts may be directly connected to an electric duct heater control circuit provided the circuit is 24 VAC maximum and the current through the contacts does not exceed 1 amp inductive. The figure below shows a typical installation that utilizes a 3-way hot water control valve and a unit or duct mounted hot water coil.

Figure 4-7. Installation of a Hot Water Coil 3-Way Valve



PCP_EG_Optional3WayHotWaterValveInstall_20121204.eps

EXTERNAL ALARM SYSTEM (8)

The ECC-PCP provides a normally open contact closure for connection to a building management system. If a fault occurs, the controller will energize this output to indicate that there is a problem with the dehumidification system. The remote interface unit will display the cause of the fault and provide a suggested course of action. This output may also be used to energize an external alarm light or buzzer. It may also be directly connected to an external circuit as long as the circuit is 24 VAC maximum and the current through the contacts does not exceed 1 amp inductive.

BUILDING FIRE CONTROL SYSTEM (9)

The ECC-PCP can receive a contact closure signal from a building fire control system. This input of the controller must be connected to dry (voltage free) contacts only. When this input receives a contact closure, the PoolComPak™ unit compressor and fan will be shut down and the remote interface unit will show an alarm condition. When the contact closure opens, The PoolComPak™ unit will resume normal operations. It is possible to change the operation of the fire trip input to be active on open instead of close. See *ECC-PCP Service* in the Operation section for further explanation.

RETURN AIR SENSOR (10)

The return air sensor measures air temperature and relative humidity. The sensor is normally factory mounted in the PoolComPak™ unit return air section. However, with the optional economizer it is necessary to field mount this sensor in the duct work. The sensor must be located in the return duct upstream of the exhaust duct connection. (See *Figure 4-4. Economizer Operation* for a typical location of the sensor in the economizer system.)

When field mounting is necessary, the sensor will be provided from the factory and must be field wired using 22 AWG, copper 4-conductor, shielded, twisted-pair cable.

PURGE MODE INPUT (11)

The ECC-PCP can receive a contact closure signal from an external source to activate purge mode operation. During purge mode, the compressor is disabled and the economizer output is activated to bring in 100% outside air.

AC PROOF INPUT (12)

An optional interlock used with certain types of heat rejection condensers. Dry contact closure indicates a problem and prevents compressor operation in air cooling mode.

POOL WATER TEMPERATURE SENSOR (13)

Units equipped with a pool water heating condenser require installation of factory supplied pool water temperature sensor. It must be mounted upstream of the PoolComPak™ and the auxiliary water heater. The sensor can be threaded directly into a 1⁄4” FPT fitting. Electrical connection should be made with 22 AWG copper, 2 conductor, shielded, twisted-pair cable. Connect the shield drain wire to ground at the PoolComPak™ end only.

POOL WATER PIPING (AWH AND AWV MODELS ONLY*)

⚠ CAUTION
Do not run piping across service panels, evaporator coil face or air discharge outlet.

If a new or existing pool water heater is piped within the same circuit, the PoolComPak™ unit should be connected in a parallel loop between the filter and the other heater. This allows the PoolComPak™ unit to act as the primary water heating source and the other heater as a backup or supplemental water heater.

All pool purification and chemical feed systems MUST be installed downstream of the unit. This includes the practice of adding chemicals directly to the skimmer which results in highly concentrated, corrosive chemicals passing over and through the PoolComPak™ water condenser. Water chemistry must be maintained at a pH level between 7.2 and 7.6, with a free chlorine level not exceeding 3.0 PPM and a combined chlorine level less than 0.3 PPM.

If possible, install the PoolComPak™ unit above the pool water level. If it is installed below the pool level, isolation valves must be added. Breakable couplings should be located near the unit on both the water inlet and outlet lines. When installing piping, connect the piping to these couplings last so as not to place stress on the other connection in the plumbing system.A constant flow of water is required through the PoolComPak™ units' condenser. The circuit to and from the unit must be capable of maintaining the flow rate as specified for the installed unit (see PoolComPak™ Performance data in *Table 3-1*). To ensure correct water flow, the filter pump usually operates at the same time as the PoolComPak™ unit. However, to reduce energy consumption during filter off cycle times, a two-speed or small auxiliary water pump which bypasses the filter may be used.

⚠ CAUTION
CAUTION! Excessive water flow can cause premature erosion and pitting of the pool water condenser. Adjust valve so that the water flow does not exceed the GPM or pressure drop listed in the table. PoolPak™ recommends a fixed flow control or adjustable flow circuit setter.

PoolPak™ International recommends installing water pressure tap ports to check influent and effluent water pressure. See PoolComPak™ Performance data in *Table 3-1* for the particular unit model in question for the proper flow rate and pressure drop across the pool water condenser. The pressure tap ports should be installed in a straight length of the water piping, exterior to the PoolComPak™ unit. Install the port before any 90-degree turns and approximately 6 inches from the corner-post of the unit.

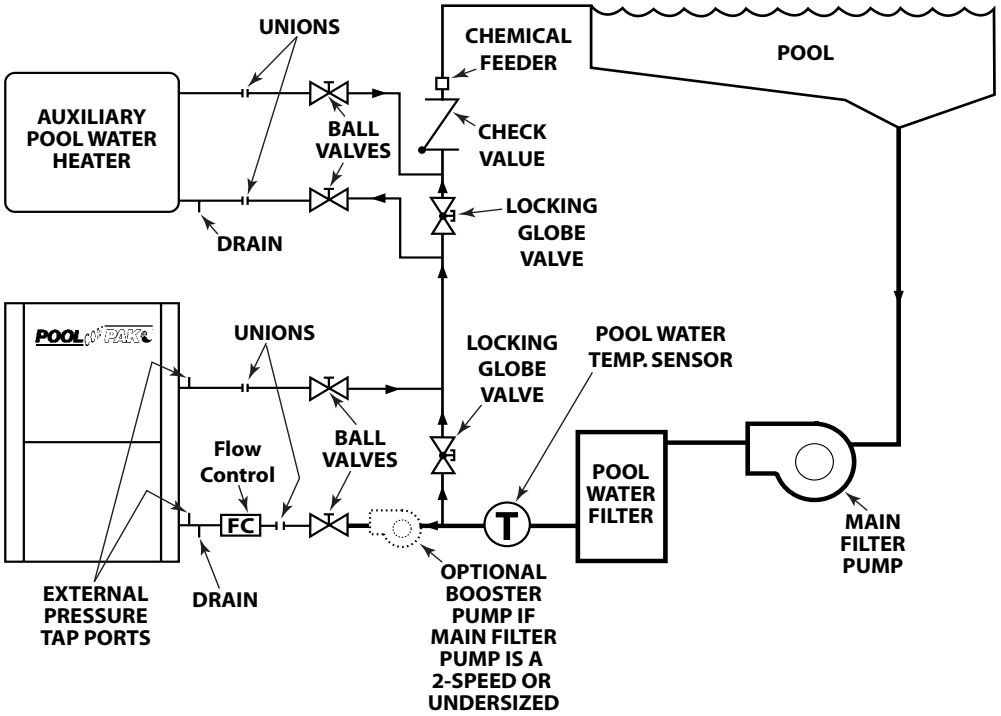
In some instances, piping from the PoolComPak™ unit to the filter return line may not be feasible or economical. The unit may be installed on its own supply and return line using a properly sized water pump and appropriate strainer. Ensure that auxiliary water heating systems are staged to supplement the PoolComPak™ unit water heating.

If the PoolComPak™ unit is installed above the pool surface and the main circulating pump cannot provide the proper water flow to it at the specified pressure, an auxiliary booster pump is required.

Condensate may be returned to the pool (if local codes allow), but PoolPak™ International neither recommends nor disapproves this practice. The installer should check local codes prior to making this decision. Condensate must be filtered prior to being returned to the pool.

If multiple PoolComPak™ units are installed on the pool water piping circuit, pipe them (and any auxiliary water heater) in parallel. Piping PoolComPak™ units in series may result in the downstream unit(s) sensing the pool water temperature as satisfied and not reject heat to the water to its full capacity. The actual pool water temperature should be sensed by each PoolComPak™ unit and auxiliary water heater.

Figure 4-8. Typical Pool Water Piping Diagram (AWH and AWV Model Only)*



PCP_EG_PoolWaterConnectSchematic_20140305.eps

SALT WATER POOLS

For units (AW models only) installed serving a salt water pool, wire the pool bonding system to the bonding lug on the unit copper pool water piping. This connection is required to prevent corrosion of the internal PoolComPak™ water piping.

For more information on salt water pools, see the article “Salt Water Pools” *in the Pool Water Chemistry section of the PoolPak educational library.*

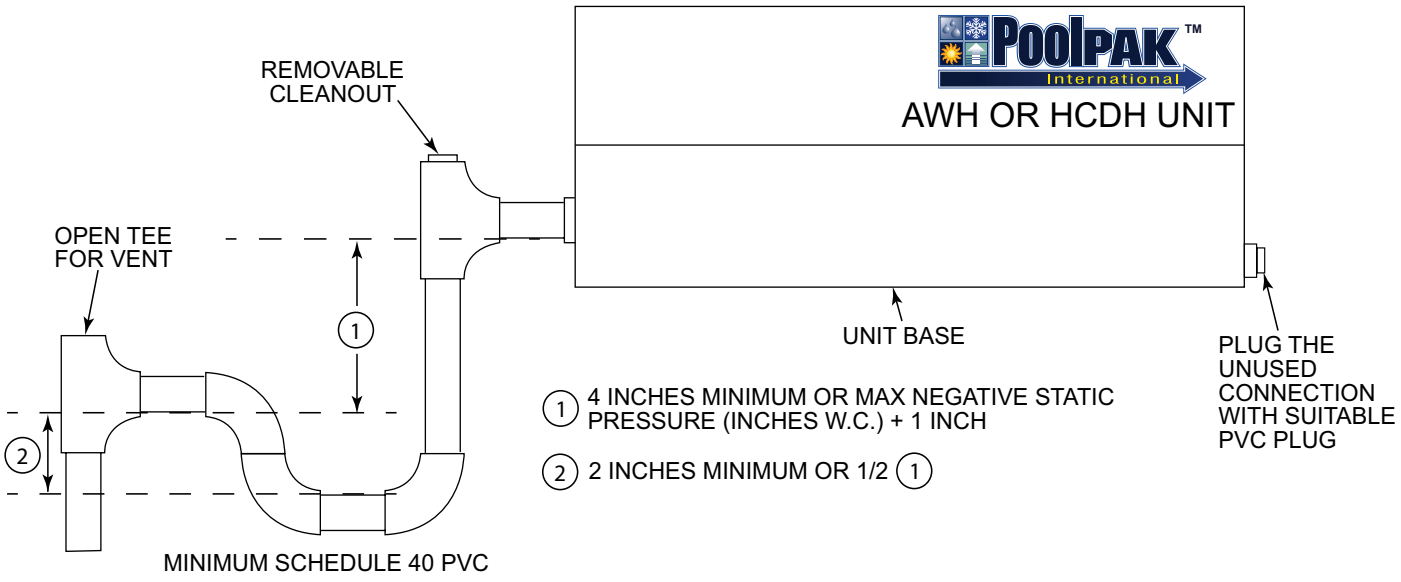
CONDENSATE DRAINS

Drain pans are connected to a common drain system and must be trapped for proper operation. For AWH and HCDH units, a trap and piping must be supplied and installed by the customer. The trap depth must be a minimum of 6 inches (See figure 4-9). For AWV and HCDV units a condensate trap is located inside the unit and the field condensate piping and overflow drain must not have an additional trap.

Provisions MUST be made for disposal of condensate. Condensate from the dehumidifier coil will have nearly the same properties as the pool water itself. It is recommended that building materials subjected to the condensate and systems used for its disposal are checked for compatibility. For drain piping use PVC plastic pipe minimum Schedule 40. The drain line must be sloped to provide proper drainage.

Drain line exposed to outdoor ambient temperatures must be protected against freezing. Wrap lines with electric heat tape (follow manufacturer's instructions) controlled by an automatic thermostat set at a minimum of 35°F to protect against freezing. Insulate all piping. Insulation must be sealed at all seams. Power for heat tape must be supplied external to the PoolComPak™.

Figure 4-9. AWH and HCDH Condensate Trap



PCP_EG_NegPressCondPiping_20140122.eps

WATER COOLED CONDENSER

A standard option for PoolComPak™ units is an integral water-cooled condenser. For this option, all valves and refrigerant piping is internal to the unit. No additional field wiring is required. No additional refrigerant or oil charge is required. Water piping connections are 1-1/4" MPT and labeled on the unit.

REMOTE AIR-COOLED CONDENSER

SPACE AND LOCATION REQUIREMENTS

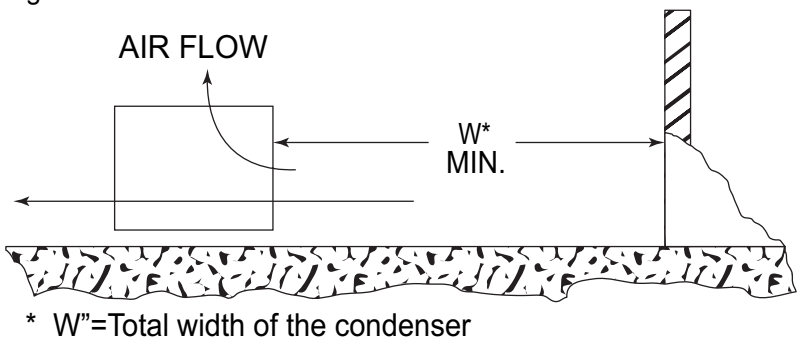
The most important consideration which must be taken into account when deciding upon the locations of air-cooled equipment is the provision for a supply of ambient air to the condenser, and removal of heated air from the condenser area. Where this essential requirement is not adhered to, it will result in higher head pressures, which cause poor operation and possible eventual failure of equipment. Units must not be located in the vicinity of steam, hot air, or fume exhausts.

Another consideration which must be taken is that the unit should be mounted away from noise sensitive spaces and must have adequate support to avoid vibration and noise transmission into the building. Units should be mounted over corridors, utility areas, rest rooms, and other auxiliary areas where high levels of sound are not an important factor. Sound and structural consultants should be retained for recommendations.

Walls or Obstructions

The unit should be located so that air may circulate freely and not be re-circulated. For proper air flow and access all sides of the units should be a minimum of "W" away from any wall or obstruction. It is preferred that this distance be increased whenever possible. Care should be taken to see that ample room is left for maintenance work through access doors and panels. Overhead obstructions are not permitted. When the unit is in an area where it is enclosed by three walls, the unit must be installed as indicated for units in a pit.

Figure 4-10. Remote ACC Installation Around Walls or Obstructions

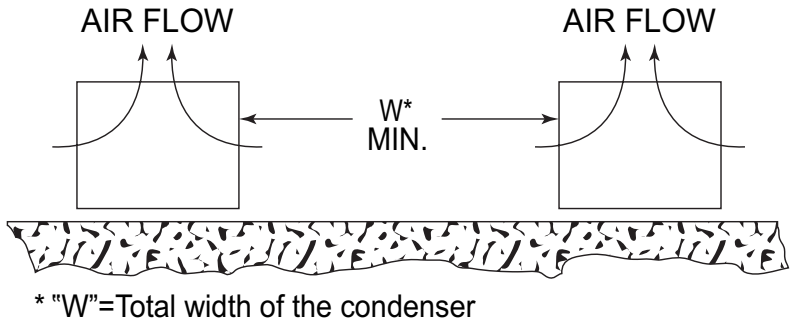


ALL_WallsorObstructions_20131111.eps

Multiple Units

For units placed side by side, the minimum distance between units is the width of the largest unit. If units are placed end to end, the minimum distance between the units is 4 feet.

Figure 4-11. Remote ACC Installation When Installing Multiple Units

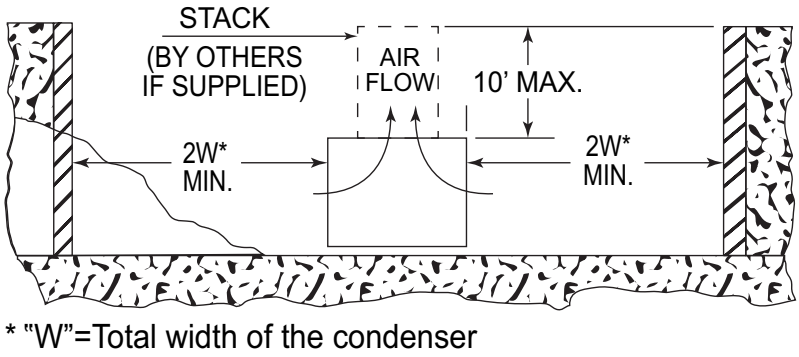


ALL_MultipleUnits_20131111.eps

Units in Pits

The top of the unit should be level with the top of the pit and side distances increased to “2W”. If the top of the units is not level with the top of the pit, discharge cones or stacks must be used to raise discharge air to the top of the pit. This is a minimum requirement.

Figure 4-12. Remote ACC Installation When Installing Units in Pits

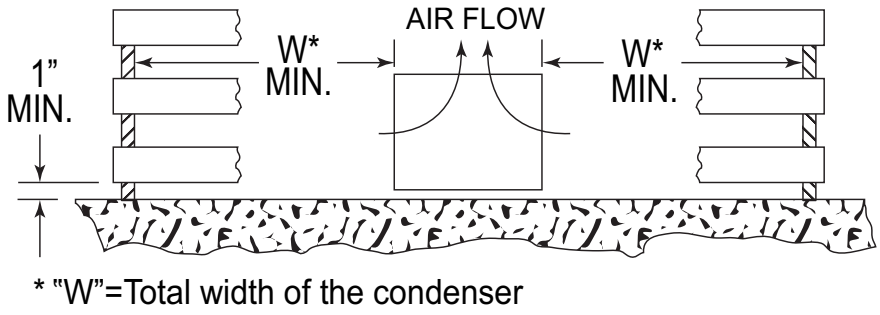


ALL_UnitsinPits_20131111.eps

Decorative Fences

Fences must have 50% free area, with 1 foot undercut, a “W” minimum clearance, and must not exceed the tops of the unit. If these requirements are not met, the unit must be installed as indicated for “Units in Pits”.

Figure 4-13. Remote ACC Installation When Installing Units Near Decorative Fences



ALL_DecorativeFences_20131111.eps

FIELD INSTALLED PIPING

Installation of the outdoor air-cooled condenser should only be done by a qualified refrigeration mechanic familiar with this type of work. Many service problems can be avoided by taking adequate precautions to provide an internally clean and dry system and by using procedures and materials that conform to established procedural standards.

Piping Guidelines

The following piping recommendations are intended for use as a general guide. For more complete information, refer to the latest ASHRAE Handbook.

Materials:

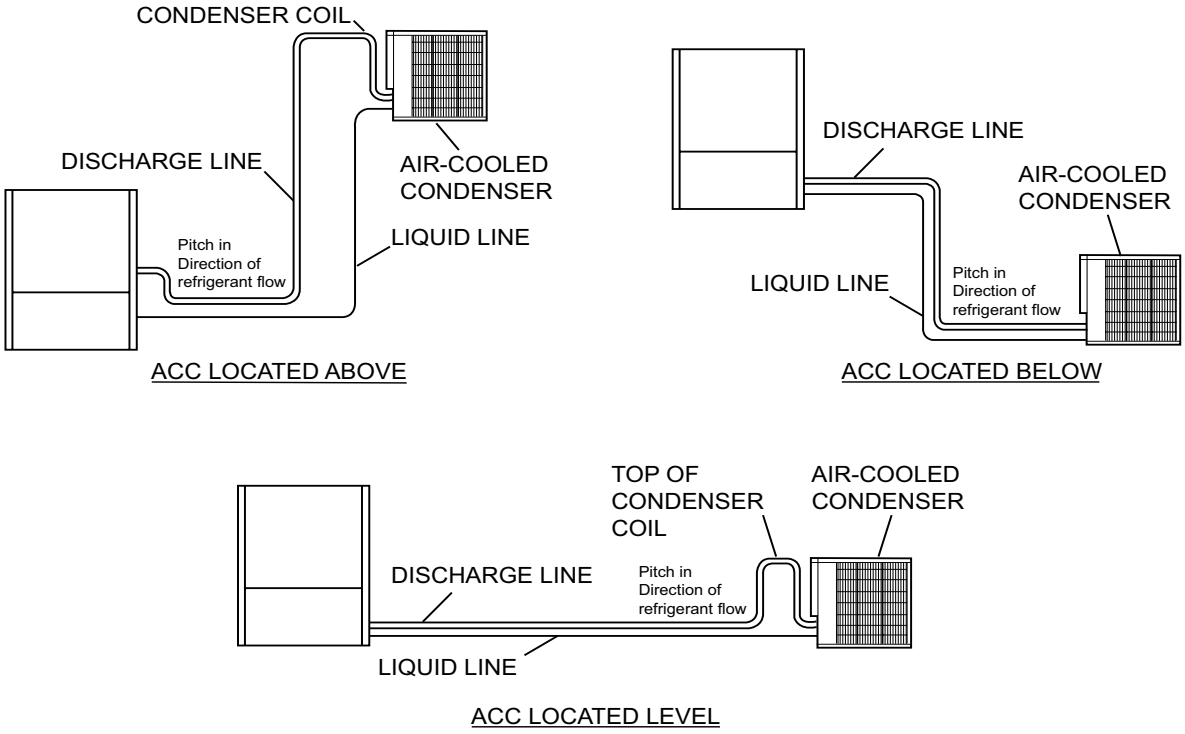
- Use clean, dehydrated, refrigeration-grade copper tubing for all refrigerant lines. Hard drawn tubing should be used where no appreciable amount of bending around pipes or obstructions is necessary. If soft copper tubing must be used, care should be taken to avoid sharp bends which may cause restrictions and excessive refrigerant pressure drops.
- Use long radius elbows wherever possible with one exception - short radius elbows should be used for any traps in the hot gas riser.
- Braze all copper to copper joints with a phosphorus-copper alloy material such as Silfos 5 or equivalent. Do not use soft solder.
- During brazing operations flow an inert gas, such as nitrogen, through the lines to prevent internal oxidation scaling and contamination.
- Support refrigeration lines at intervals with suitable hangers, brackets or clamps.
- Pack glass fiber insulation and a sealing material around refrigerant lines, where they penetrate a wall, to reduce vibration and to retain some flexibility.
- The liquid line and discharge line should not be in contact with one another. If the installing contractor must tie these lines together because of an installation requirement, the contractor must insulate them from each other to prevent heat transfer. Because the discharge line is hot during system operation, precautions should be taken to avoid personnel injury.
- PoolComPak™ units do not utilize compressors with unloading stages. Consequently, double hot gas risers are not needed for reduced load conditions as refrigerant flow rates will not fall below minimum velocities necessary to carry oil up through the discharge line.
- A field provided, field installed liquid line filter-drier is recommended in the field piping to the PoolComPak™ unit.

Sizing:

- The lines must be sized and routed so that oil is carried through the system. Using smaller lines than recommended will give excessive pressure drops, resulting in reduced capacity and increased power consumption. Oversized lines could result in an oil flow problem within the system and possible compressor damage.
- Excessive pressure drops in the liquid line may cause flashing of the refrigerant and a loss of a liquid seal at the expansion valve inlet. A reduction in capacity may then occur because the presence of gaseous refrigerant will partially block the expansion valve. Using hot gas and liquid line sizes recommended in the Air Cooled Condenser section for these units and the proper system refrigerant charge will prevent this problem.
- Discharge lines should be designed to prevent condensed refrigerant and oil from draining back to the compressor during OFF cycles. Use the following guidelines.
  - The highest point in the discharge line should be above the highest point in the condenser coil.
  - The hot gas line should loop toward the floor if the condenser is located above the PoolComPak™ unit, especially if the hot gas riser is long.
- For refrigerant line sizing for an Air Cooled Condenser (ACC) where the lineset length is less than 100 feet or the ACC location is less than 50 feet higher or 20 feet lower than the unit, use the below Table 4-3.
- **ACC line lengths beyond the above limits will void warranty unless written approval is obtained from the factory PRIOR to installation and startup.**

PCP_EG_ACCPiping_20140122.eps

Figure 4-14. ACC Refrigerant Piping



Refrigerant and Oil Charging:

- PoolPak™ units are shipped with the required charge for self contained operation only. The remote ACC option does NOT provide the refrigerant charge or oil required for the ACC and line sets.
- Refer to Table 4-2 for the additional ACC condenser charge.
- Refer to Table 4-3 for the required additional oil and refrigerant charge. Use the calculation method shown to calculate the additional refrigerant and oil.
- For the additional oil required, multiply 2% of additional refrigerant charge of both ACC and refrigerant line length. Use the correct oil type of POE oil depending on the compressor installed:
  - For Alliance models SXA, SPA, SSA compressors, use Copeland Ultra P/N 998-E022-00
  - For Trane models CSHD compressors, use Trane P/N OIL00080

Sample Charging Calculation:

For an AWV2600 with 73 feet line length and ACC0121 located 30 feet above the unit,

- Table 4-3 indicates: 3/4” discharge line and 5/8” liquid line piping sizes.
- Using R410A oz/ft, additional charge for the lineset is: 73 feet x 0.25 oz/ft + 73 feet x 1.48 oz/ft = 126.0 oz
- Table 4-2 indicates additional charge for ACC0121 (allow 30 F Operation) is: 39 lb x 16 oz/lb = 624.0 oz
- Total additional R410A charge for both ACC and refrigerant line is: 126.0 + 624.0 oz = 750 oz or 46 lbs 14 oz
- Total additional oil charge is: 750 oz x 2% = 15 oz.

Table 4-2. R410A Charge for Air Cooled Condensers (lb.)

ACC Model #	30°F Ambient Operation (lb)
ACC0041	8.8
ACC0051	10.1
ACC0081	19.6
ACC0121	39.0
ACC0161	39.0
ACC0211	30.9
ACC0301	25.6
ACC0341	35

Table 4-3. Refrigerant (R410A) Charge for Different Line Size

Model		Refrigerant Line Size (ACC)				Refrigerant Charge for Units with Air Cooled Condensers (ACC)							
		Discharge		Liquid		Line Length (ft) vs R410A Charge (lbs)							
		OD	R410A oz/ft	OD	R410A oz/ft	25 ft		50 ft		75 ft		100 ft	
						Lbs	Oz	Lbs	Oz	Lbs	Oz	Lbs	Oz
0550	*	1/2	0.10	3/8	0.49	0	15	1	14	2	13	3	12
	**	5/8	0.16	1/2	0.92	1	11	3	6	5	1	6	13
0800	*	5/8	0.16	3/8	0.49	1	0	2	1	3	1	4	2
	**	5/8	0.16	1/2	0.92	1	11	3	6	5	1	6	13
1200	*	5/8	0.16	1/2	0.92	1	11	3	6	5	1	6	13
	**	3/4	0.25	5/8	1.48	2	11	5	6	8	1	10	13
1400	*	5/8	0.16	1/2	0.92	1	11	3	6	5	1	6	13
	**	3/4	0.25	5/8	1.48	2	11	5	6	8	1	10	13
1800	*	3/4	0.25	1/2	0.92	1	13	3	10	5	8	7	5
	**	7/8	0.34	5/8	1.48	2	14	5	11	8	9	11	6
2600	*	3/4	0.25	5/8	1.48	2	11	5	6	8	1	10	13
	**	1 1/8	0.58	3/4	2.21	4	6	8	12	13	1	17	7
3500	*	7/8	0.34	5/8	1.48	2	14	5	11	8	9	11	6
	**	1 1/8	0.58	7/8	3.07	5	11	11	7	17	2	22	13
4000	*	7/8	0.34	3/4	2.21	3	16	7	16	11	15	15	15
	**	1 1/8	0.58	7/8	3.07	5	11	11	7	17	2	22	13

Note:

1. This table applies to ACC line length less than 100 ft only. Contact factory if ACC line length is more than 100 ft.
2. Line size ** should be used for ACC at the same level or located up to 20ft below the unit
3. Line size * should be used for ACC located up to 50 ft above the unit.

WARNING!

Above chart is for lineset length less than 100 ft and ACC located less than 50ft above unit or 20ft below unit. Failures due to a piping layout not within these limits nor receiving prior PoolPak™ Factory approval will not be covered under PoolPak™ warranty.

ECC-PCP REMOTE INTERFACE UNIT

Figure 5-1. RIU Keypad

PCP_EG_StraightOnKeypadAnnotated_20121204.eps

The ECC-PCP Remote Interface Unit (RIU) is designed around the Carel pGD0, 4-line x 20 character, backlit, LCD display module. The RIU displays are accessed through six backlit selection buttons. They consist of a Return/ Enter Key, Up Key, Down Key, Program Key, Alarm Key, and Escape Key, as shown above.

After approximately 5 minutes, the RIU will display the status screen rotation. Press the Escape key to bypass the five minute delay and move directly to the status display.

STATUS DISPLAY

The status screens contain basic information about operation of the PoolComPak™ system. Press the up or down arrow keys to move from screen to screen. The screens will also rotate automatically every 10 seconds.

Figure 5-2. Status Screen 1

SPACE TEMP	__ oF
SPACE RH	__ %
SPACE DEWPOINT	__ oF
(OUTSIDE TEMP)	__ oF

Status Screen 1 displays:
- Space Temperature in °F or °C
- Space Relative Humidity in %
- Space Dew Point in °F or °C
- Outside Air Temperature in °F or °C (with Economizer Option Only)

Status Screen 2 displays:
- Water Heating - YES indicates that the unit is returning recovered heat back to the pool water.
- Aux Water Heat - YES indicates that the controller has closed the relay contact requesting auxiliary pool water heater operation.
- Water Temperature in °F or °C

Status Screen 3 displays:
- SPACE temperature control requirement:
- TEMPERATURE- OK Indicates the space temperature is at setpoint.
- HEATING- YES Indicates the space requires heating.
- COOLING- YES Indicates the space requires cooling.
- AUX AIR HEAT Indicates the space requires additional heating. The auxiliary air heating relay contacts close to activate the external heating system.

- DEHUMID (SURFACE) Indicates the space requires dehumidification. The word SURFACE indicates that the unit is temporarily lowering the dew point set point to minimize condensation at the cold surface temperature sensor.
- ECONOMIZER MODE Indicates the unit is cooling the space with outside air. ECONOMIZER MODE is only shown if the optional economizer system is present.

Status Screen 4 displays:
- The first line displays the current system status.
- The second line displays compressor status.

SET POINT CHANGE MENU

- Press the PRG key to access the main menu.
- Use the arrow keys to scroll to the menu selection for Set Points and then press the Enter key.
- Use the arrow keys to select the set point to be changed and then press Enter. Available set points are:

Air Temperature

The allowable range for the air temperature set point is 70 to 95°F. Use the arrow keys to change the set point and then press Enter. The new dew point set point is shown immediately as DPT. The set point change screen will remain visible for a short time to allow verification of the new dew point set point. After about five seconds, the RIU will return to the status screen display.

Relative Humidity

The allowable range for the relative humidity set point is 40 to 65°F. Use the arrow keys to change the set point and then press Enter. The new dew point set point is shown immediately as DPT. The set point change screen will remain visible for a short time to allow verification of the new dew point set point. After about five seconds, the RIU will automatically return to the status screen display.

Pool Temperature

The allowable range for the water temperature set point is 70 to 104°F. Use the arrow keys to change the set point and then press Enter. The RIU will automatically return to the status screen display.

Recommendations

- Air Temperature (Range 70°F to 95°F) The air temperature should normally be set about 2°F above the pool water temperature to minimize the pool water evaporation rate (high temperature spas are an exception).
- Relative Humidity (Range 40% to 65%) The normal range for the humidity set point is 50% to 60%. Lower set points will require more energy (electricity) to satisfy the dehumidification requirement and increase pool water evaporation.
- Pool Temperature (Range 70°F to 104°F) The pool temperature set point is normally set between 80°F and 88°F for a typical swimming pool and higher for a spa, depending on user preference.

⚠ CAUTION
The dehumidifier should be configured to operate at the set points designed for the facility. These set points are shown on the yellow label on the door of the RIU. Set points other than those shown may not be attainable with this dehumidifier.

PURGE MODE CONTROL MENU

⚠ CAUTION
It is the user's responsibility to use this feature properly to prevent freeze damage to downstream equipment. 100% outside air at below freezing conditions has the potential to cause serious damage.

Purge Mode causes the unit to force the optional, field-provided, economizer dampers and fan to full open, introducing large quantities of outside air to the space. This is typically used when "shocking" the pool. Compressor operation is disabled during purge, but the auxiliary air and water heating systems remain active.

If the unit is not equipped with the economizer option, a flashing **"CAUTION!!! NO FREEZE PROTECTION"** warning will be displayed. This warning indicates that operation of purge mode, without regard for outside air temperatures below freezing, can result in damage to hot water coils or other equipment in the pool area.

DETAILED STATUS MENU

To access the detailed status menu:
- Press the PRG key to access the main menu.
- Use the arrow keys to scroll to the menu selection for Detailed Status and then press the Enter key.

Detailed Status Screen 1 displays Temperatures
- Surface – The temperature measured at the cold surface sensor.
- Dew Point – The calculated dew point of the space.
- Dewpt Setpoint – The dew point set point calculated from the temperature and relative humidity set points.

Detailed Status Screen 2 displays
- Disch Press – The measured refrigerant pressure in the discharge line at the compressor.
- Suct Press – The measured refrigerant pressure in the suction line at the compressor.
- Suct Temp – The refrigerant temperature measured on the surface of the suction line at the compressor.
- Suct SH – The calculated superheat at the suction of the compressor.

Detailed Status Screen 3 displays the number of hours the following device or system has been active since power was last applied to the unit
- Cmpr - Compressor
- Fan – Supply Fan
- A/C – Mechanical Air Cooling (Economizer Cooling Not Included)
- Aux – Air – Auxiliary Air Heating
- Aux - Wtr – Auxiliary Water Heating

Detailed Status Screen 4 displays:
- Fault Count – The total number of high pressure, low pressure, and defrost trips that have occurred since power was last applied to the unit. When this number reaches 10, the compressor is locked out.
- AC Proof – Indicates a status of "Proven" if AC mode operation is allowed. "Not Proven" indicates that AC mode operation is not allowed.

Detailed Status Screen 5 (only present in units configured for multi-unit networking) displays
- Network Role – Indicates if the unit currently being displayed by the RIU is the master or a slave.
- Net Status – Indicates "CONNECTED" if the unit is properly connected to the multi-unit network. "NO LINK" indicates the unit is not connected.
- Unit ID Number – Indicates the unit address on the multi-unit network.

Detailed Status Screen 6 (only present in units configured for multi-unit networking) displays
- Unit 1 Present – Indicates if the unit currently being displayed by the RIU can communicate with unit 1 on the multi-unit network
- Unit 2, 3, 4 – Same as for unit 1, but for the other 3 possible units on the network.

ECC-PCP NETWORK OPERATION

Networked ECC-PCP units operate in a MASTER/SLAVE environment. This means that one unit (master) determines heating, cooling, and dehumidification requirements and broadcasts them on the network to the other units (slaves). This ensures that all units work together instead of against other. Each networked unit contains all sensor and controls necessary for independent operation and is capable of acting in the master role. Units on the network are identified by a number between one and four. The unit with the lowest identification number having no uncleared alarms will be the master unit.

If an alarm condition occurs in the master unit, it will give up the role of master. The unit with the next lowest identification number and no unclear alarms will take over the master role. The unit that experienced the alarm condition will operate in the slave role until the alarm is cleared at the control panel.

The control panel provides two network status screens. These can be accessed in the detailed status menu. The figure above shows the first screen that displays the status of units one through four as present or not. Use this screen to verify that all units on the network are connected and communicating with each other. The figure below shows the second screen that displays network information for the unit that is being displayed by the remote interface unit, including network role, connection status and network identification number.

NETWORK CONFIGURATION

Using the following four parameters, it is possible to configure the ECC-PCP network to accommodate a wide variety of installation options. Network configuration can be accessed in the service menu. These parameters must be set in each unit individually.

Pool Water Temperature Control

Determines whether the unit will control water temperature based on the master's command (NETWORK) or its own temperature sensor and set point (LOCAL). If a unit set to LOCAL becomes the master, other units in the network will not use the master's command for water heating. They will look to the next line that is not set to LOCAL. This parameter is only set to LOCAL if the unit is connected to a different pool than the rest of the units on the network. Because the unit is controlling water temperature on its own, it is necessary to select the correct unit with the control panel before changing the water temperature set point.

Staged Dehumidification Control

Determines whether the unit will run in dehumidification when there is a need for 1 stage or 2 stages of dehumidification. The master unit will start on any need for dehumidification independent of this parameter. Slave units with this parameter set to YES will dehumidify only if the master is asking for 2 stages of dehumidification. Setting this parameter to NO will cause the unit to dehumidify when the master calls for at least 1 stage of dehumidification. Using this parameter, it is possible to configure the number of units in each dehumidification stage.

Dehumidification Stage 2 Offset

Determines how far the dewpoint (relative humidity) of the space has to rise above the set points before the unit will request 2 stages of dehumidification on the network. This parameter is normally the same in all units on the network. Making this parameter smaller will bring on the second stage of dehumidification sooner.

Enable Network Control

Determines whether the unit will participate in the master/slave environment. Setting this parameter to NO will cause the unit to act like a standard ECC-PCP single unit. The unit will never become the master on the network and will not listen to the demands broadcast by the master on the network. Although units with this parameter set to NO do not participate in the master/slave environment, they are still accessible through the network control panel. Like the LOCAL pool

water temperature setting, this parameter, when set to NO, requires this unit to be displayed on the control panel before changing any of the set points. The other screens for Pool Water Temperature Control, Staged Dehumidification, and Stage 2 Offset are not available when this parameter is set to NO.

Changing Set Points

Each unit on the network maintains two groups of set points, network and local. If a unit has the Enable Network Control parameter set to YES and the Water Temperature Control parameter set to NETWORK, it will control to the network set points. Set points changed when the remote interface unit is displaying this unit will be changed in every unit on the network with the same NETWORK and Water Temperature Control parameters. Units that are configured for Network Control and LOCAL water temperature control will control using local water temperature set point, the network air temperature and relative humidity set points. When the air temperature and relative humidity set points are changed when the remote interface unit is displaying the unit, they will be changed in all units configured for Network control. The water temperature set point will only be changed in the unit currently being displayed by the remote interface unit. Units that are not configured for Network Control will use all local set points. Therefore any set points changed while the remote interface unit is displaying this unit will only be changed in this unit.

ECC-PCP SERVICE

SERVICE MENU

To access the service menu:
- Press the PRG key to access the main menu.
- Use the arrow keys to scroll to the menu selection for Service and then press the Enter key.
- A password is required to access the service menu.

The following sub-menus are available in the service menu.

I/O CONFIGURATION

Digital Inputs

This menu contains a screen for each digital input. Each screen contains the following parameters:
- Status of the data point linked to the input.
- Status of the raw digital input.
- Input type.

The following parameter list shows the available digital input screens.
- Defrost Switch
- Cpr High Temp
- Water Flow
- Fire Trip
- AC Proof
- Cpr High Prs
- Fan Overload
- Low Pressure
- Purge Input

Digital Outputs

This menu contains a screen for each digital output. Each screen contains the following parameters:
- Current output status
- Requested output status
- Override

The following digital output screens are available:
- Supply Fan
- Compressor
- Bypass Solenoid
- Water Heating Solenoid
- Reheat Solenoid
- AC Solenoid
- Aux Water Heat
- Alarm Output
- ACC Run Signal
- Economizer
- Aux Air Heat Stage 1
- Aux Air Heat Stage 2

Analog Inputs

This menu contains a screen for each analog input. Each screen contains the following parameters:
- Current read-only value from the input.
- Fail
- Tol
- Offs
- Ovrd
- Min
- Max

The following analog input screens are available:
- Discharge Pressure
- Suction Pressure
- Return Relative Humidity
- Suction Temperature
- Return Air Temperature
- Pool Water Temperature
- Surface Temperature
- Outside Air Temperature

UNIT CONFIGURATION

Installed Options

This menu contains parameters that indicate the hardware options installed in the dehumidifier. The parameters are set by the factory and do not typically require modification.

Aux Air Heating

This menu contains parameters that configure the auxiliary air heating system:

Aux Water Heating

This menu contains parameters that configure the auxiliary water heating system:

Temperature Ctrl

This menu contains parameters that configure the air temperature control routines of the dehumidifier.

Humidity Control

This menu contains parameters that configure the humidity control routines of the dehumidifier. Water Temp Ctrl
This menu contains parameters that configure the compressor based water heating system of the dehumidifier.

- Water Heat First: This parameter indicates whether the control routine will use the compressor for water heating when there is no dehumidification requirement.
- Deadband: This parameter is the deadband used by the compressor based pool water heating control routine.

BAS INTERFACE

This menu contains parameters that configure the building automation system interface of the dehumidifier.

MULTI-UNIT NETWORK

This menu contains parameters that configure the operation of dehumidifier in a multiple unit installation.

COMPRESSOR

This menu contains parameters that configure the operation of the dehumidifier compressor.

ECONOMIZER

This menu contains parameters that configure the operation of the optional field provided and field installed economizer damper system.

HISTORY

The history screen provides information on the last 50 faults that have occurred in the dehumidifier. It can be used for troubleshooting by an experienced HVAC technician. The faults are recorded with a sequence number from 1 to 50. Sequence number 1 is always the most recent fault. The following information is stored and displayed for each fault in non-volatile memory:

- Hour at which the fault occurred.
- Fault Code Number
- Return Air Temperature
- Return Air Humidity
- Discharge Pressure
- Suction Pressure
- Suction Temperature
- Pool Water Temperature
- AC Solenoid Status
- Bypass Solenoid Status
- Compressor Status
- Reheat Solenoid Status

MANUAL MODE

The Manual Mode menu for use by qualified service personnel provides two options, Demand Control and Digital Output Control.

UTILITIES

The Utilities menu provides sub menus for configuring units of measure and passwords for set point and service access control.

MAINTENANCE

OVERVIEW

Periodic routine maintenance will promote extended equipment life. While PoolComPak™ units use components that are usually maintenance free and do not require service, a simple check could result in noticing possible problems before they develop into major problems.

DAILY MAINTENANCE

- Pool water chemistry is a part of daily maintenance and it is recommended to follow National Spa and Pool Institute standards. PoolPak™ International strongly recommends following the National Spa and Pool Institute values.

Table 5-1. Pool Water Chemistry

	Pool			Spa		
	Ideal	Min	Max	Ideal	Min	Max
Total Chlorine (ppm)	1.0 - 3.0	1	3	3.0 - 5.0	1	10
Free Chlorine (ppm)	1.0 - 3.0	1	3	3.0 - 5.0	1	10
Combined Chlorine (ppm)	0	0	0.3	0	0	0.3
Bromine (ppm) if applicable	2.0 - 4.0	2	4	3.0 - 5.0	2	10
pH	7.4 - 7.6	7.2	7.8	7.4 - 7.6	7.2	7.8
Total Alkalinity (ppm)	80 - 100	80	180	80 - 100	60	180
TDS (ppm)	1000 - 2000	300	3000	1000 - 2000	300	3000
Calcium Hardness (ppm)	200 - 400	150	1000	200 - 400	150	1000
Calcium Acid (ppm)	30 - 50	10	100	30 - 50	10	100

- PoolPak™ International recommends daily logging of your pool water chemistry. MAINTENANCE AND YOUR POOL WATER CHEMISTRY IS IMPORTANT TO PROTECT YOUR WARRANTY RIGHTS.

MONTHLY MAINTENANCE

- Air Filters, inspect and replace or clean as applicable. Dirty filters restrict air flow and can cause improper unit operation.
- Ensure that the condensate collection pan is draining properly and the condensate is not overflowing or being drawn into the supply air stream. Check the condensate and overflow lines to ensure that neither are clogged.
- Check the operation of the blower motor and scroll. Ensure that the scroll does not rub the housing. Check for proper belt tension. Worn or cracked belts should be replaced. Check fan and mounting brackets for tightness.
- Ensure that the ALARM light is not illuminated.

ANNUAL MAINTENANCE

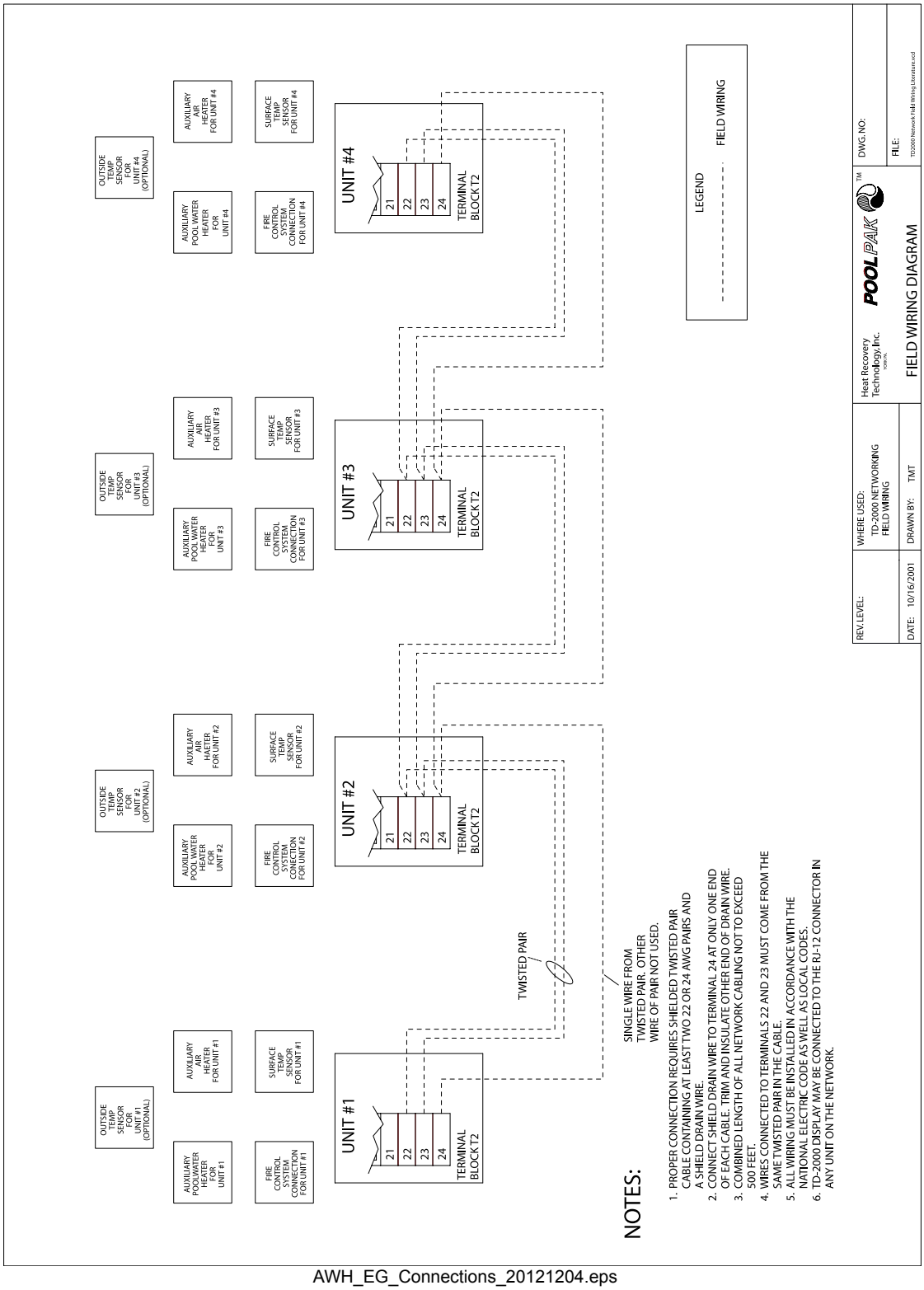
- Inspect the refrigeration and water circuits for leaks, wear or corrosion. Corrosion on the water piping or condenser may indicate poor pool chemical maintenance and improper chlorine and pH levels.
- Check electrical components for loose wiring.
- Although the exterior of the PoolComPak™ units are powder coated, wipe down unit, particularly if installed in an area subject to dirt or chemical concentration.
- Wash, brush, or vacuum the evaporator and air condenser coils. This will ensure proper heat transfer and reduce static pressure losses. Caution should be taken not to wet electrical components inside the unit.

NOTE

If service and inspections are not performed by a competent and experienced service firm, the manufacturer warranty may be voided.

AUXILIARY AIR & POOL WATER HEATER CONNECTIONS FOR MULTIPLE UNIT INSTALLATION

Figure 6-1. Auxiliary Air and Pool Water Heater Connections for Multiple Units



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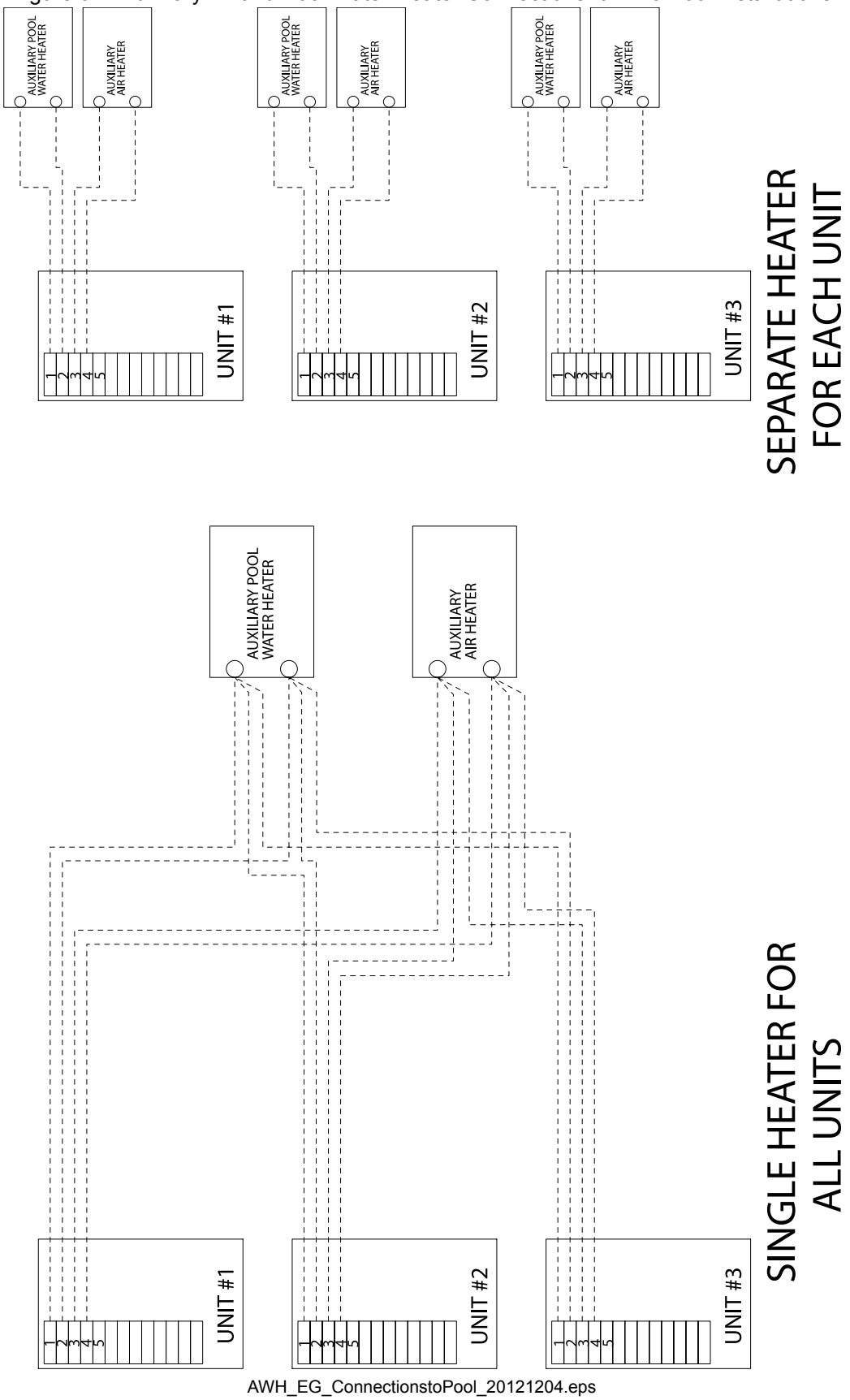
AUXILIARY AIR & POOL WATER HEATER CONNECTION FOR A TWO POOL INSTALLATION

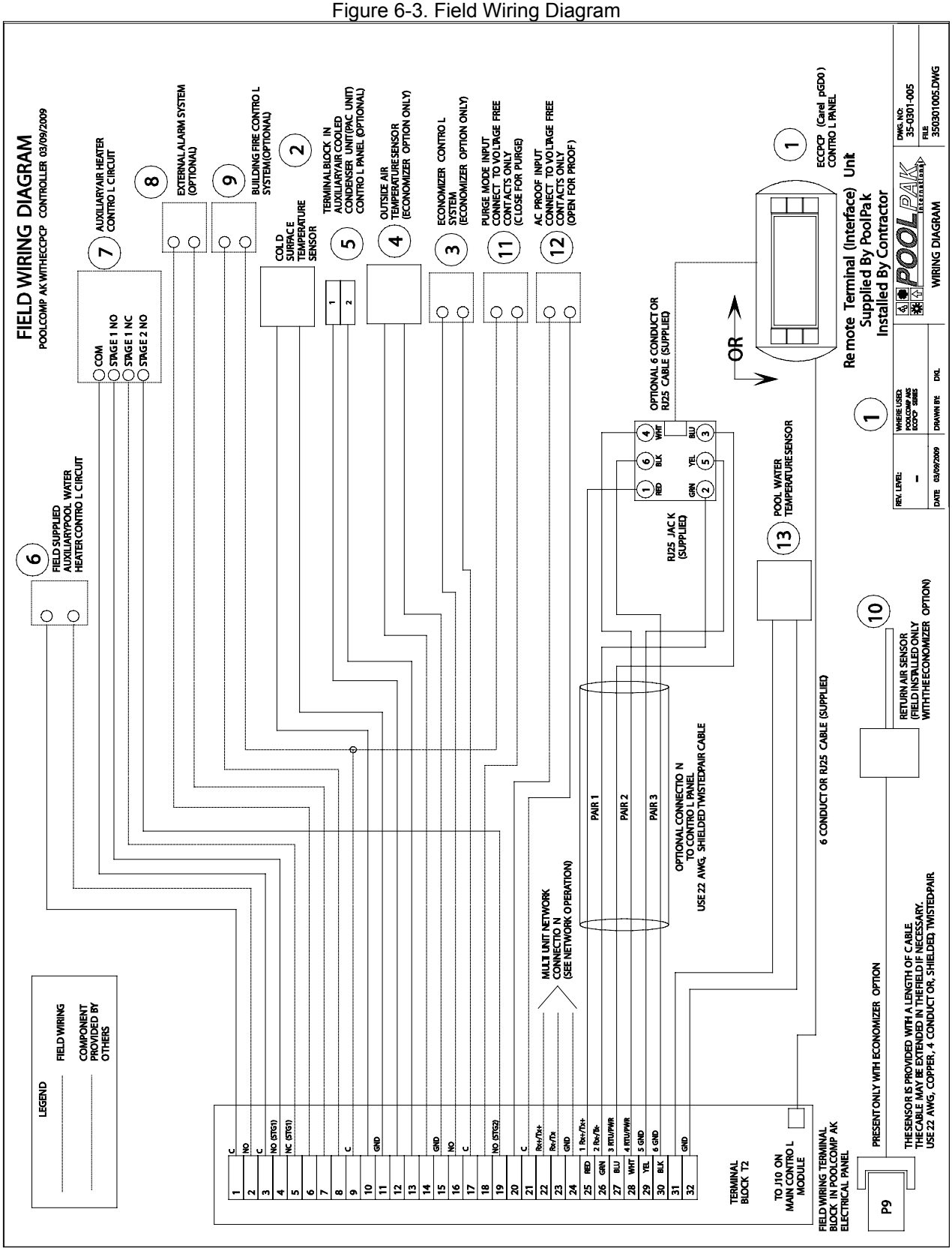
Figure 6-2. Auxiliary Air and Pool Water Heater Connections for Two Pool Installations



AWH_EG_ConnectionstoPool_20121204.eps

FIELD WIRING

Figure 6-3. Field Wiring Diagram



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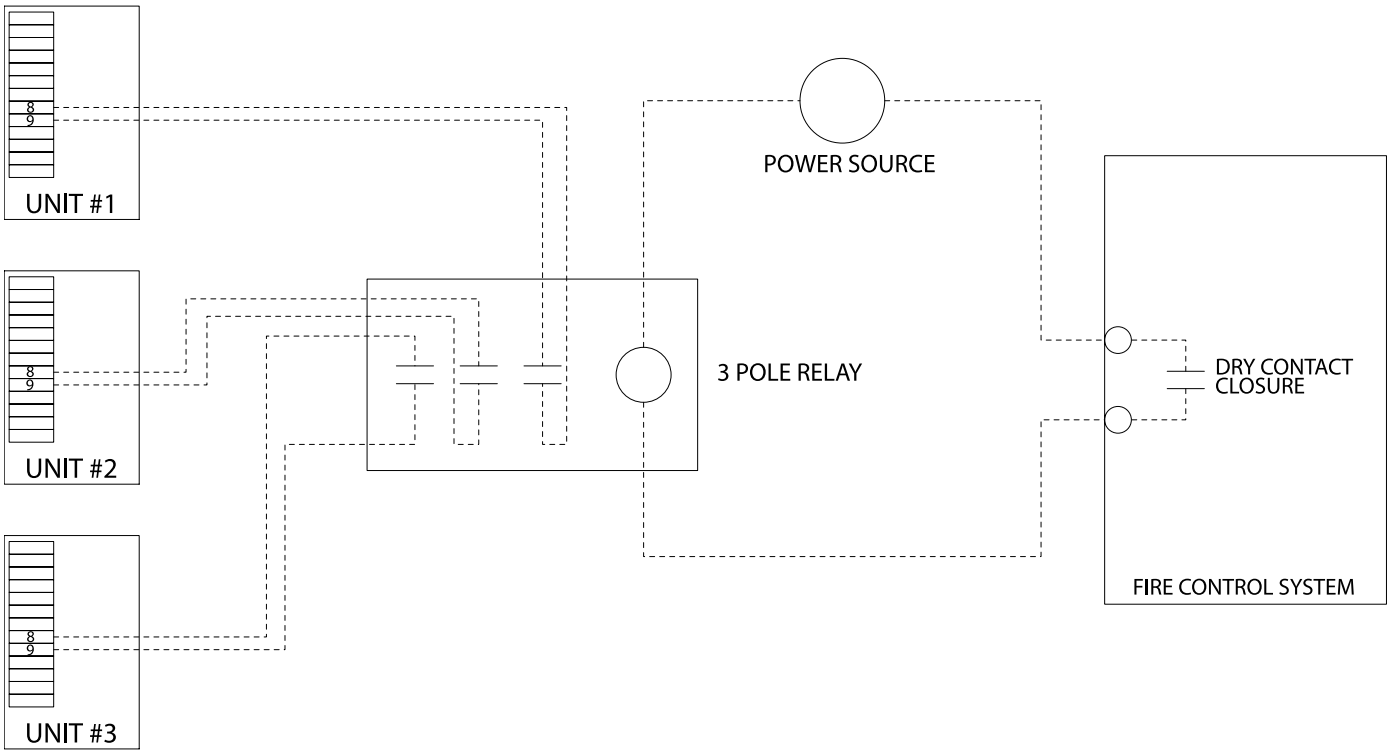
FIRE CONTROL SYSTEM CONNECTION

Figure 6-4. Fire Control System Connection



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