PoolPak®

DEHUMIDIFICATION THAT WORKS

Installation, Operation and Maintenance

MPK Series

FORM #: SVW07-MPKIOM-20170601

SUPERCEDES: SVW07-MPKIOM-20170331

UPDATED: JUNE, 2017

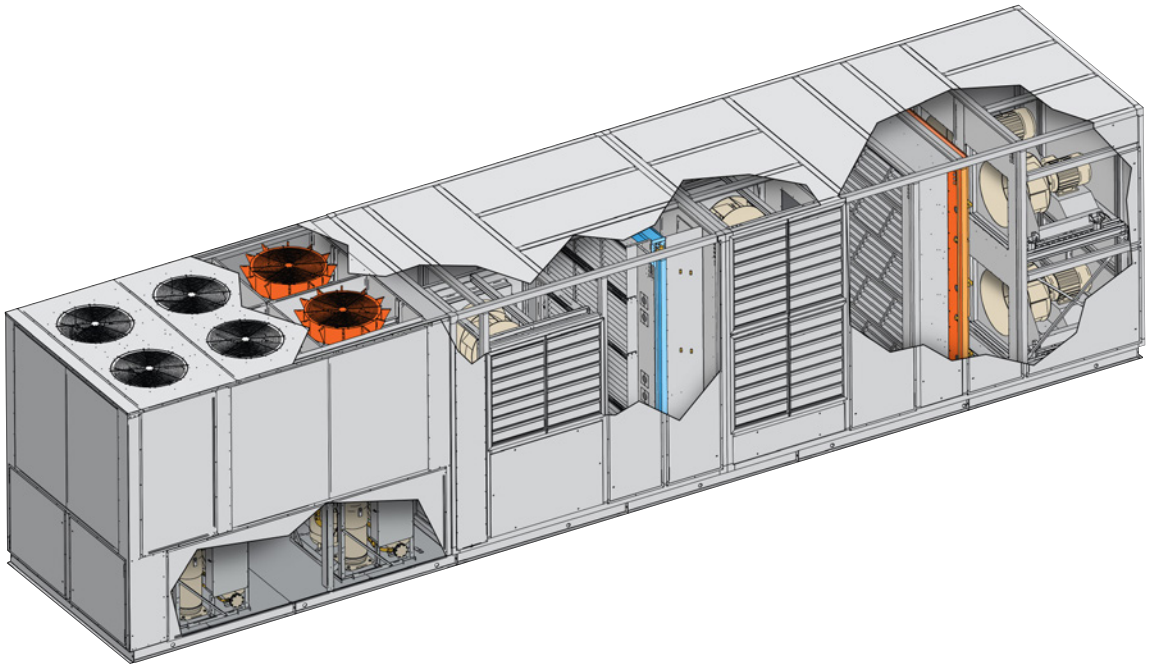


TABLE OF CONTENTS

With more than 45 years of experience in indoor pool dehumidification equipment manufacturing, PoolPak® LLC is the most well-known brand in the industry. Our people and products work daily to improve the quality and comfort of indoor pool environments. PoolPak® dehumidification solutions include a variety of heating, ventilation, and air conditioning systems, in addition to an industry-leading PoolPak® support network. For more information, please visit www.PoolPak.com.

PoolPak®
DEHUMIDIFICATION THAT WORKS

3491 Industrial Drive
York, Pennsylvania 17402 USA
800-959-7725 Fax 717-757-5085

IMPORTANT

This product has been thoroughly tested before leaving the PoolPak factory.

However, please check at the earliest opportunity that the product has arrived in good condition and that no damage occurred during shipping. If any damage is suspected, contact the carrier to file a claim.

If the product is to sit in storage for a length of time before installation, contact PoolPak Service department for proper storage guidelines.

Warning

Only suitably qualified personnel who thoroughly understand the operation of this product and any associated machinery should install, start-up or attempt maintenance of this product. Non-compliance with this warning may result in personal injury or equipment damage.

PoolPak Service department must be contacted at least 2 weeks prior to equipment startup. A PoolPak authorized service technician will perform startup and provide training for owner and site personnel.

PoolPak recommends that all troubleshooting, service, and maintenance be completed by an authorized service technician for the best service experience with the equipment. If a labor or parts warranty claim is expected, PoolPak service must be contacted before any work is to be performed. Refer to the standard PoolPak® MPK warranty for complete details.

Intended Users

This manual is to be made available to all persons who are required to install, operate or service the product or any other associated operation. Please ensure that a copy of this manual is presented to the end customer. Additional copies of this manual are available on request and on the PoolPak website, www.PoolPak.com.

SECTION I: INDOOR POOL APPLICATION

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 requires 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. 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* on the next page), 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. Energy conservation strategies, such as heat recovery, airflow measurement, and CO2 based ventilation 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°F with the air temperature about 2°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% (see Table 1-1). Greater than 60% creates a sticky feeling and/or difficult breathing. 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

POOL TYPE	WATER TEMP (°F)	AIR TEMP (°F)	ROOM RH %
Recreational Pool	80 to 85	Water Temp + 2	55 to 60
Therapy Pool	86 to 92	86[1]	55 to 60
Whirlpools	99 to 104	86[1]	55 to 60

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

Pool Water Chemistry

Proper water chemistry (Table 1-2) 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 chloramine levels in the air. Not only does this have an effect on the water, but it affects the bathers and the air they breathe.

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

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, see the PoolPak® Educational Library article *Indoor Pool Water Chemistry*.

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 to 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.

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 LLC 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 when sizing the dehumidification system or the auxiliary heating/cooling equipment.

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, the PoolPak® thinks "efficiency" and automatically selects the least expensive energy source for the poolroom conditions.

PoolPak units include a factory mounted and wired space temperature and humidity sensor at the return air opening of the unit.

> ⚠ CAUTION
>
> 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.

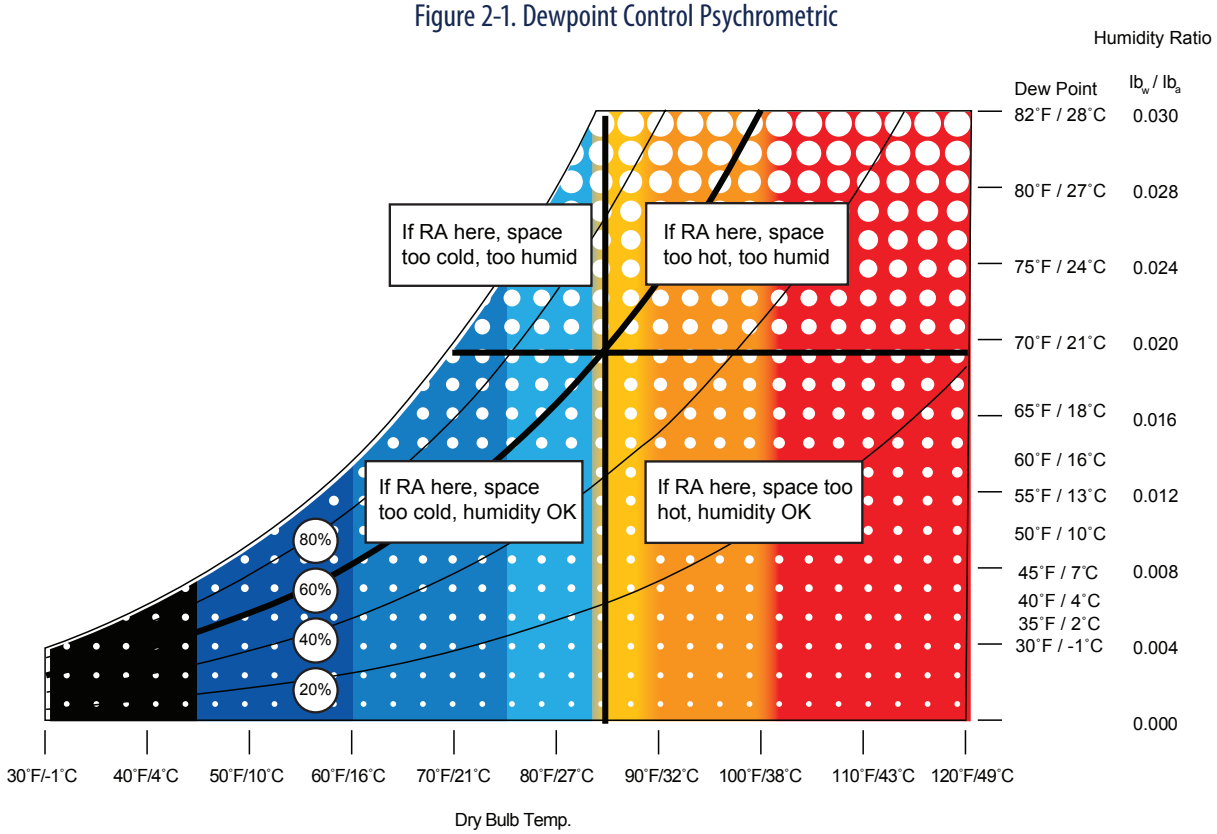
PoolPak units have active airflow monitoring and control using variable speed fans and air flow monitoring station to provide optimal airflow at lower cost.

Room Dew Point Control

The PoolPak CPCS controller operates using an advanced type of control utilizing dew point and dry bulb temperature. 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 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.

See Figure 2-1 for reference. The CPCS 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 CPCS 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.

Figure 2-1. Dewpoint Control Psychrometric



PoolPak Operation

See Figure 2-2 to illustrate the following paragraphs.

Refrigerant-Side Operation

The PoolPak® 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 is collected by the unit's condensate drain system. 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 condensing heat exchanger, which may be either air or water cooled. If air heating is required, 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.

If pool water heating is required 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 required, 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 cooling.

Air-Side Operation

The PoolPak system provides outside air ventilation to satisfy minimum air ventilation requirements during occupied periods per ASHRAE standard 62.1.

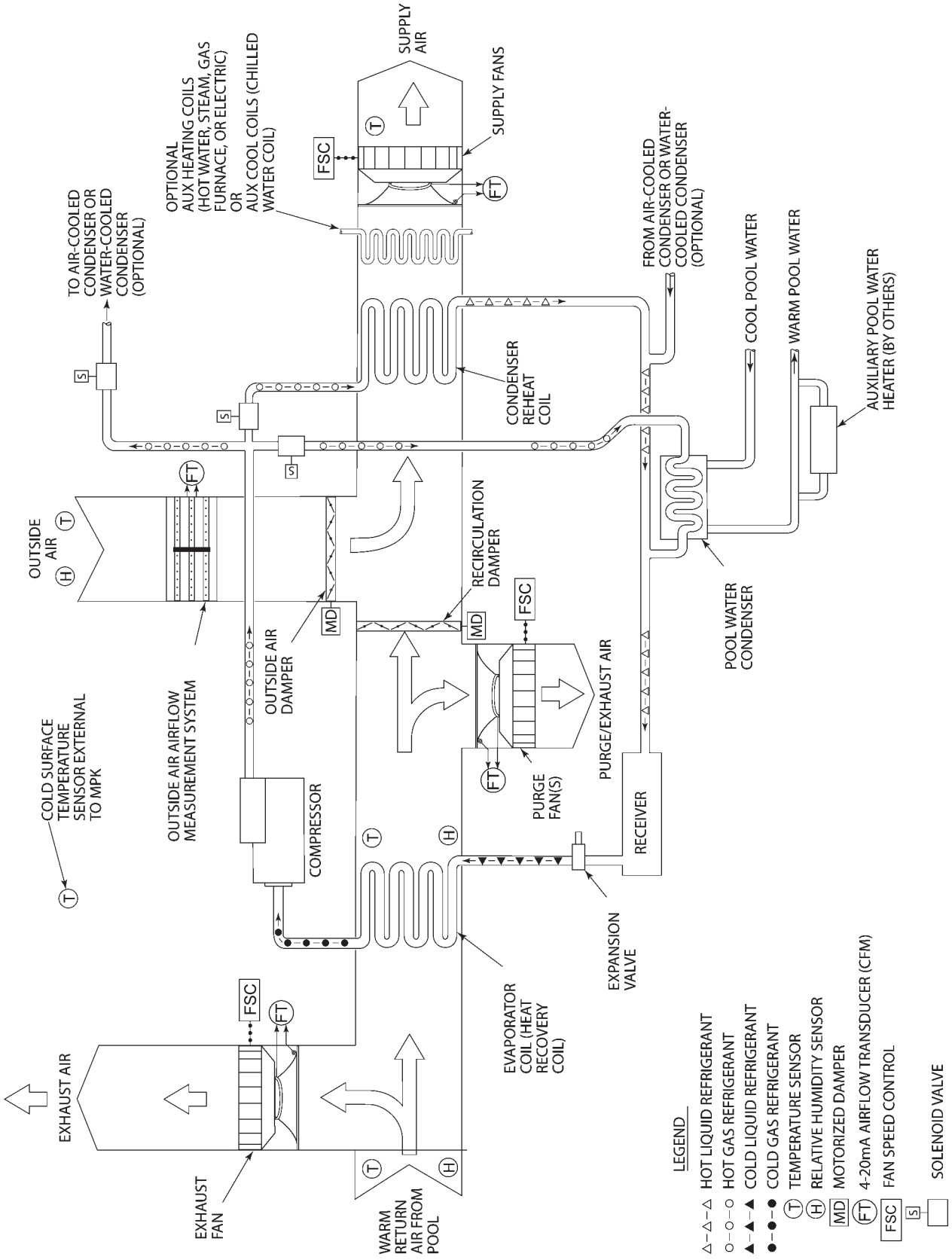
The MPK unit can include an outside air damper (S), a factory mounted exhaust fan (SE), or an exhaust and purge fan (SEP).

SEP models have an economizer function that can modulate up to 100% exhaust air and outside air. This operation allows the unit to use outdoor ambient conditions if they are favorable for free heating, cooling, or dehumidification. For a more detailed description of economizer and smart economizer operation, see the CPCS control functions section.

The PoolPak unit has been designed to best recycle the energy from the return air during mechanical dehumidification. In cooling modes for units employed with an exhaust fan (SE & SEP models), warm natatorium air is exhausted before the evaporator coil. On the other hand, in heating modes for units employed with purge fans (SEP and SP models), warm natatorium air is exhausted after the evaporator coil. This allows the unit to capture the exhaust air heat energy for heating before exhausting the air to ambient.

An available supply of outdoor air and continuous air movement is required for indoor air quality. Therefore, PoolPak does not recommend turning off the unit.

Figure 2-2. MPK System Schematic



CPCS Control Functions

Overview

The PoolPak is controlled by the CommandPak Control System (CPCS), a microprocessor-based system that incorporates all of the functions necessary to maintain correct natatorium temperature and humidity and control pool water temperature. The CPCS is designed to work with the PoolPak 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 PoolPak controls automatically operate the heating, dehumidification, and heat recovery systems in response to the greatest requirements while adjusting unit outputs to maintain building conditions. The PoolPak® controls are capable of providing full heating capacity to either air or water and of providing proportional control of heating and dehumidification by loading stages of compressor capacity as necessary. As building requirements are satisfied, the compressor unloads.

All PoolPak operating and logic controls are factory mounted and wired. The control sequences are designed specifically to control swimming pool environmental conditions. The following is a brief description of the control functions available with the CPCS System. For more detail or for finding this information in the controller, see the MPK Installation and Operation Manual (IOM).

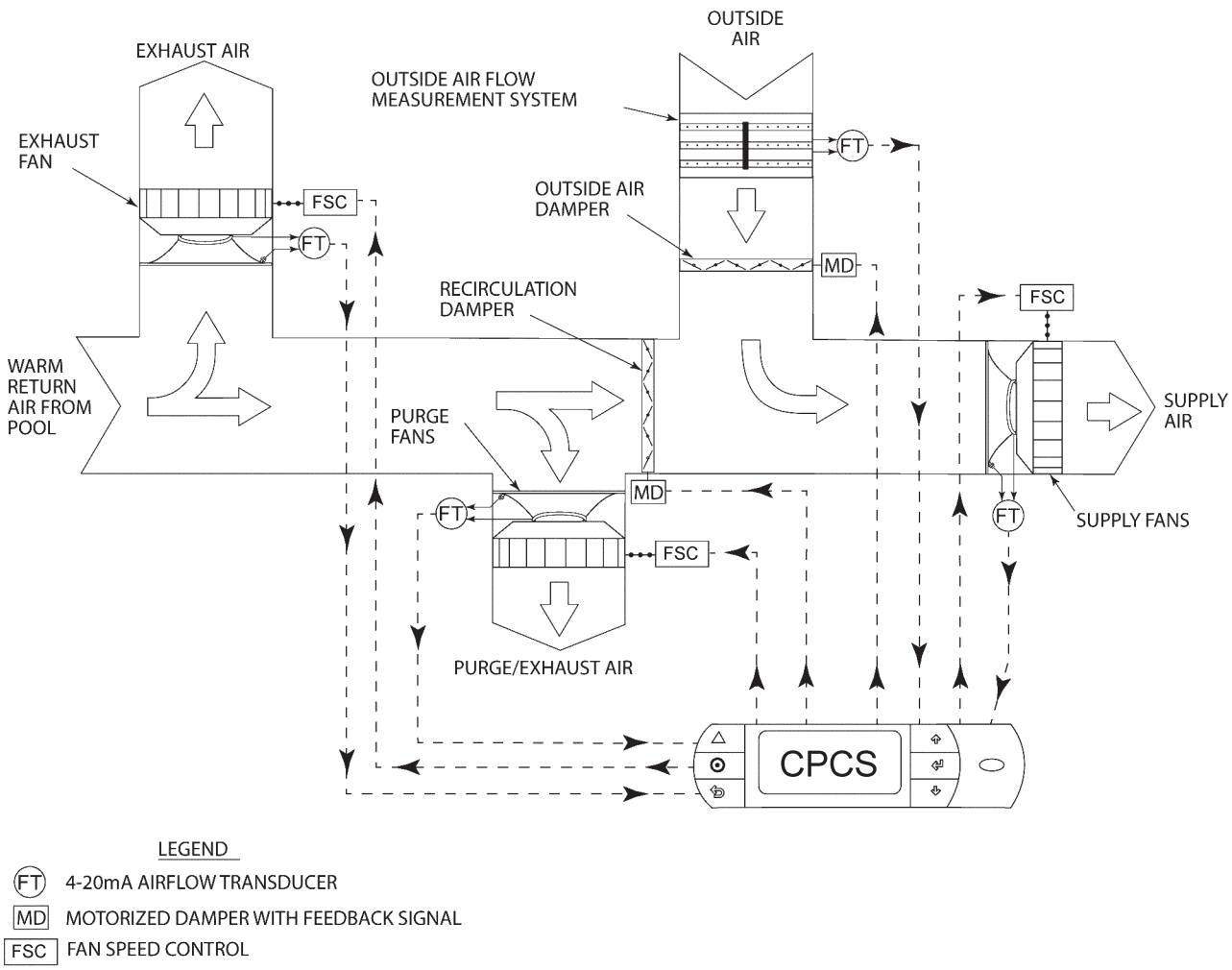
Air Flow Monitoring and Control

The best way to control building pressure is by measuring and controlling airflow rates. The PoolPak system employs factory mounted VFD or EC motors on the supply fan array, exhaust fan, and purge fans to modulate airflow. The controller receives feedback from fan inlet measuring stations and the outdoor air measuring station to continuously monitor the outside air, exhaust air, purge air, and supply air flows. These components and CPCS controller logic provide active airflow monitoring and control.

By tracking the airflow rate of the exhaust fan and outdoor air intake, a consistent building pressure can be maintained. See Figure 2-3 for reference. The CPCS controller takes the outside air flow measurement and controls the speed of the exhaust fan. This control maintains a constant return air flow/supply air flow differential whether the system is operating at the minimum outdoor airflow rate or maximum outdoor airflow rate (ie. economizer mode).

To determine the desired air flow rates, the controller must be programmed with setpoints for the desired supply air flow, the desired return air flow, the minimum outdoor air flow, and minimum mixed air temperature allowed. During minimum outdoor air ventilation, the controller controls the outside air and recirculation air dampers to maintain the minimum ventilation air requirement. During economizer mode, the controller modulates the outside air flow and exhaust air flow to maintain space conditions.

Figure 2-3. Active Airflow Control with Direct OA Measurement Schematic



Humidity Control

The primary function of the CPCS control system is humidity control. The CPCS control system accomplishes humidity control by using either the economizer mode or mechanical dehumidification.

When equipped, the economizer mode is activated only if the following conditions are present: dehumidification is required; air and water temperatures are satisfied; the absolute humidity of the outside air is lower than the absolute humidity of the pool room air; and the outside air temperature will not adversely affect the pool room air temperature. Whenever available, the economizer mode brings in favorable outside air to satisfy the pool room requirements.

When economizer is not available, the PoolPak unit performs mechanical dehumidification. The PoolPak provides full proportional control of relative humidity by staging unit capacity. The humidity controller energizes the compressor. The moist air from the pool room is drawn over the evaporator coil, where the air is cooled below its dew point. In this cooling process, the moisture in the return air is condensed onto the evaporator coil. The heat recovered in the refrigerant from the dehumidification process is directed to the air reheat condenser if the space needs heating or to the pool water condenser if pool water temperature is below the set point.

Cold Surface Temperature Humidity Reset

The CPCS 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. Typical locations for this condensate prevention surface temperature sensor are north facing exterior walls, windows, window/door frames, and skylights.

Space Heating

The CPCS controller will first look at the outside air to see if the space heating requirement can be met with the economizer mode. If conditions are unfavorable, the unit will either enable the compressors to perform space heating by heat recovery or by enabling the auxiliary heat system.

Space heating via heat recovery provides full proportional control of the space dry bulb temperature by staging compressor loading of unit capacity with humidity override. Heat is recovered automatically from the pool room return air in the evaporator coil and then re-directed into the reheat condenser coil. For SEP models, the warm natatorium air is passed through the evaporator before being exhausted. Therefore, the PoolPak unit is able to capture the heat energy from the warm pool air.

If additional heating is needed, the CPCS Controller then turns on the auxiliary heat system. The PoolPak automatically controls the output of the optional factory-installed auxiliary air-heating system which can be hot water, steam, electric or gas.

On a call for space heating only (humidity is satisfied), the controller can be configured to perform the first stage(s) of heat as auxiliary heat instead. If there is also a dehumidification need, mechanical dehumidification with the compressors will always be the first stage. Regardless, this setting change allows a facility to use auxiliary heat more often.

Smart Economizer (SEP)

The Smart Economizer utilizes the simultaneous operation of the heat recovery and economizer control sequence. When the PoolPak compressor is operating in the heating and/or dehumidifying heat recovery mode return air passes through the evaporator. The sensible and latent heat in the return air is transferred to the refrigerant. Air leaving the evaporator is cold and saturated. The exact temperature and dew point of the air leaving the evaporator is monitored and compared to outside air temperature and dew point. If the outside air is warmer and/or dryer than the air leaving the evaporator, all the air leaving the evaporator is exhausted and 100% outside air is drawn into the PoolPak. All the heat recovered in the PoolPak unit refrigerant is transferred to the supply air in the air reheat condenser. The Smart Economizer can save energy in addition to a standard mixing box and economizer.

Flywheel Air Conditioning (SEP)

If the unit is not equipped with auxiliary air cooling, this control sequence can be activated. Flywheel air conditioning uses the large thermal storage capacity of the swimming pool. During occupied times, the PoolPak cools the natatorium air by removing the sensible and latent heat from the air using the evaporator and directing it into the pool water condenser. The pool water temperature is allowed to rise a maximum of 2°F above the pool water temperature set point. Automatic staging of cooling capacity occurs in response to air conditioning load.

Space Cooling (Optional)

The PoolPak MPK (SE and SEP) units are equipped with economizer sections. The CPCS 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 CPCS monitors the outside air temperature. When appropriate, the controller will disable the compressor and bring in cool outside air for economical operation.

If space cooling is required and the unit is equipped with an auxiliary refrigerant condenser (air-cooled or water-cooled), the CPCS will activate the space cooling mode of operation. The air cooling mode of operation is

independent of the need for dehumidification. In this compressor mode, the heat removed from the space air by the evaporator will be directed to the auxiliary condenser. For MSE and MSEP units, the air is exhausted before the evaporator. By exhausting the warm air before the evaporator, the highest enthalpy air is removed from the system which reduces the load on the air cooled condenser.

AIR CONDITIONING WITH AIR-COOLED CONDENSER

The PoolPak can be equipped with a properly sized integral or remote air-cooled condenser. The remote condenser can also be installed on a separate pad.

AIR CONDITIONING WITH WATER-COOLED CONDENSER

The PoolPak can be equipped with a remote-mounted water-cooled condenser. This condenser can be either cleanable or non-cleanable. Sensible and latent heat recovered in the air conditioning mode is rejected to the water condenser if pool water temperature requirements are satisfied.

AIR CONDITIONING WITH CHILLED WATER COIL

When chilled water is available, a chilled water coil can be factory-installed upstream of the supply fan. The coil has a factory-installed and wired three-way flow control valve and is controlled by the PoolPak control system.

Pool Water Heating

If the space temperature is at or above the set point and the pool water temperature is below the set point, hot gas is directed to the pool water condenser when the compressor is running. During times when the pool water requires more heat than is available from the pool water condenser, the PoolPak® activates the auxiliary pool water heater. An auxiliary pool water heater must be supplied as part of the pool water pump and filter system.

NOTE
Contact factory for pool water temperature set points greater than 87°F.

Smart Pump Control (Optional)

Smart Pump Control allows the CPCS to control operation of a field-installed booster pump to the PoolPak pool water condenser. When the CPCS determines that pool heating and space cooling are required, a contact closure signal activates the remote pump. The pump will be deactivated when the pool heating and space cooling requirement is satisfied. This control sequence requires separate field mounting of a factory supplied pool water temperature sensor where continuous pool water flow is expected.

Networking Multiple Units

CPCS networking allows multiple units to be connected together. The units will work with each other to control water temperature, air temperature and relative humidity. Networked units have all the features of standard units plus the ability to control water temperature in multiple pools. All units on the network are accessible from a single remote interface unit for convenience.

Occupied/Unoccupied Control Mode

The PoolPak unit time clock allows 7-day, 24-hour scheduling of operational control for both occupied and unoccupied times during the year. During unoccupied times, the outside air damper and exhaust fans are kept in the closed/off position. This strategy minimizes the air-heating and/or air-cooling load during unoccupied periods. Also during unoccupied mode, the supply fan speed is reduced by 20% (Night Fan Setback) further reducing fan energy costs. During occupied times, the PoolPak operates to maintain outside air at programmed natatorium parameters.

Purge Mode (SEP)

The PoolPak has a purge cycle to fully ventilate the natatorium at the airflow (CFM) specified for the unit's supply fan. The purge cycle is programmable by the owner as necessary to ventilate the natatorium after shocking the pool. Unit controls provide completely automatic operation by controlling the supply fan and return (or purge) fan and by opening the outside air and exhaust air dampers for the programmed time intervals.

Event Mode (SEP)

The Event Mode changes the ventilation air quantity to meet the demands of an event or situation where additional outside air is needed. The unit controller can store up to 28 schedule events, which are user adjustable at the Remote User Interface (RUI). During Event Mode, the minimum damper position is raised to a value higher than the minimum damper setpoint. For each event, the screen shows the day of the week, the hour in 24-hour format, the minute, and the event type.

Summer Ventilation Mode (SEP)

Summer Ventilation Mode permits the pool operator to open the doors and windows during the summer. The CPCS control system uses the space doors and windows as its outside air intake by closing the unit's outside air damper while driving to full 100% exhaust mode through the exhaust and purge dampers at the PoolPak unit.

CO_2 Based Demand Ventilation (Optional)

The amount of outside air ventilation is controlled by the PoolPak unit based on the CO_2 level sensors in the return air stream.

Features and Options

Standard Factory Mounted Features

- Direct drive plenum fans
- Variable frequency drives or EC motors
- Two inch, double wall, foam insulated panels
- Airflow monitoring (transducers located on fans and outside air)
- Evaporator coil (heat recovery coil)
- Air reheat condenser coil
- Pool water condenser coil
- Compressor performance monitoring: suction and discharge pressure transducers
- Supply air configuration: all sides available.
- Dampers: outside air, recirculation air, evaporator bypass air
- Gravity relief dampers on exhaust and purge (SE/SEP)
- Temperature (T) and relative humidity (H) sensors:
- Return air, T and H
- Air of the evaporator, T and H
- Supply air, T
- Pool water, T
- Compressor suction temperature, T
- Filters and filter rack (return and outside air)
- Remote monitoring via internet
- Dirty filter indicator
- Network multiple units – connect up to 5 units
- Weatherproofing for outdoor installation

Standard Factory Supplied, Field Installed Features

- Temperature (T) and relative humidity (H) Sensors:
- Cold surface temperature sensor, T
- Outside air, T and H
- Pool water, T (only if Smart Pump Control option is selected)
- Remote Interface Unit (RIU)

Optional Factory Mounted Features

- Integral hot water coil and valve
- Integral auxiliary heat module (gas furnace or electric heat)
- Integral air cooled condenser and associated refrigerant piping
- Integral chilled water coil and valve
- Remote exhaust fan control
- Building automation system connection (LonWorks, Modbus, or BACnet)
- Freeze protection
- Smart Pump Control

Optional Field Installed Features

- Remote air-cooled condenser and associated refrigerant piping
- Remote auxiliary water-cooled condenser or cooling tower and associated water or refrigerant piping
- Building automation system external components and wiring
- Remote space pressure monitoring
- Remote exhaust fan

Selection

PoolPak unit selection software is more than an equipment sizing program. It is designed to accurately calculate the entire moisture load for your application. The program incorporates the key design parameters, including ASHRAE ventilation requirement, to help guide the user in meeting the necessary codes. The program also calculates the ventilation load with the outside air airflow requirement that is specified.

The basic data that would generally need to be entered to calculate a load includes:

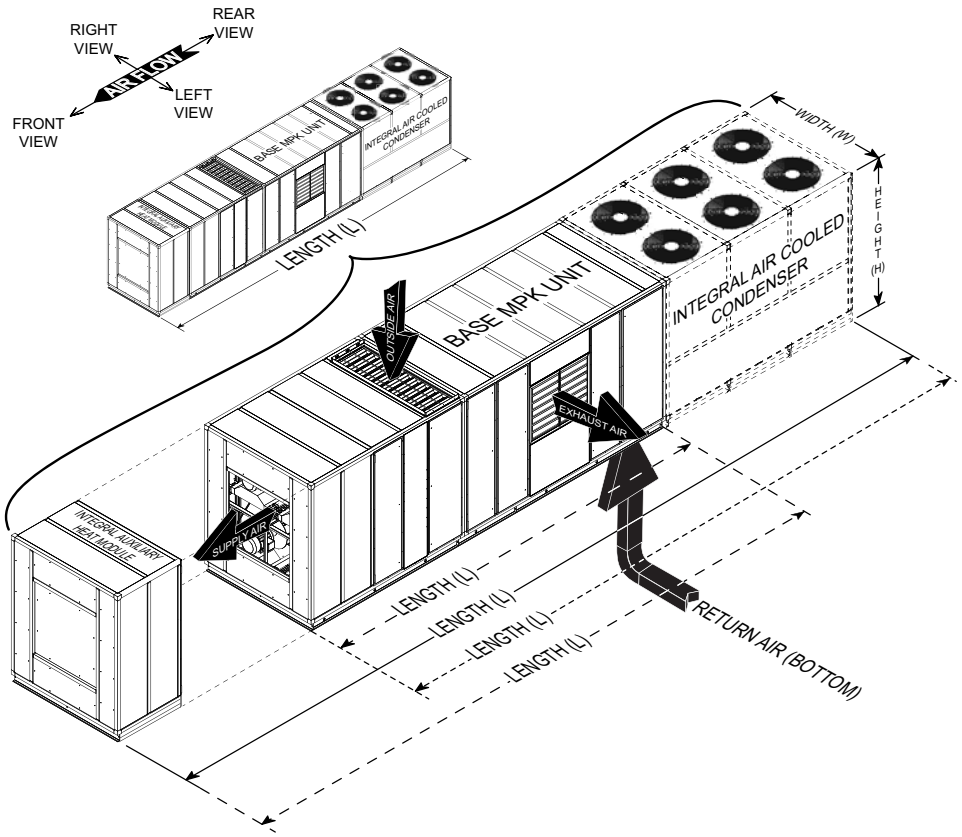
- Indoor dry bulb temperature (°F)
- Indoor relative humidity (%)
- Room volume (cu ft)
- Total wet surface area of the pool room (sq ft)
- Total dry surface area of the pool room (sq ft)
- Spectator count
- Pool temperature (°F)
- Pool usage (activity factor: light, medium, and heavy)
- Pool type (swimming pool, wave pool, therapy, and others)
- Outside airflow design (CFM)

Above and other information required for the program can be found in the *PoolPak Engineering Library article "PoolPak Selection Input Data"*. Please contact your exclusive PoolPak Sales representative for a selection.

SECTION III: SIZING AND PERFORMANCE

PoolPak Unit Dimensions and Weights

Figure 3-1. MPK Dimensional Isometric View



Refer to project specific unit drawings for dimensions and weights.

MPK Performance Summary

Table 3-1. MPK Unit Performance (at 82°F and 60% RH)

MPK Model#	Evap Coil Type1	Moisture Removal Rate (lb/hr)	Evaporator Total Capacity (MBH)	Evaporator Sensible Capacity (MBH)	Compressor Input Power (KW)	Total Heat Rejection (MBH)	Reheat Capacity (MBH)#
B - cabinet (10 - 20 kCFM)							
B030	Std (HiS)	177 (176)	401 (425)	217 (242)	29.2 (28.2)	496 (516)	496 (516)
B035	Std (HiS)	198 (205)	449 (485)	243 (272)	33.4 (32.5)	557 (590)	557 (590)
B040	Std (HiS)	221 (232)	499 (550)	269 (309)	37.5 (36.6)	621 (669)	621 (669)
B045	Std (HiS)	240 (259)	545 (607)	295 (338)	42.1 (41.3)	681 (741)	681 (741)
B050	Std	278	627	338	48	783	783
C - cabinet (20 - 30 kCFM)							
C035	Std	198	449	243	33.4	557	557
C040	Std	221	499	269	37.5	621	621
C045	Std	240	545	295	42.1	681	681
C050	Std (HiS)	278 (302)	627 (696)	338 (382)	48.0 (47.6)	783 (850)	783 (850)
C060	Std (HiS)	329 (350)	743 (813)	401 (449)	56.9 (55.5)	927 (993)	927 (993)
C070	Std	377	852	460	63.0	1056	1056
D - cabinet (23-40 kCFM)							
D060	Std (HiS)	329 (350)	743 (813)	401 (449)	56.9 (55.5)	927 (993)	927 (993)
D070	Std (HiS)	377 (412)	852 (946)	460 (518)	63.0 (63.5)	1056 (1152)	1056 (1152)
D080	Std (HiS)	437 (455)	977 (1056)	523 (583)	74.6 (74.8)	1219 (1299)	1219 (1299)
D090	Std	472	1061	570	80.1	1321	1321

[1]HiS = High Sensible Cooling Capacity option data in parentheses

MPK Factory Charge

Table 3-2. MPK Factory Refrigerant Charge (lbs of R-410A)

MPK Model #	Without Integral ACC			With Integral ACC		
	Circuit 1	Circuit 2	Circuit 3	Circuit 1	Circuit 2	Circuit 3
B - cabinet						
B030	80	80	-	110	110	-
B035	80	100	-	110	130	-
B040	80	105	-	110	140	-
B045	100	105	-	130	140	-
B050	100	130	-	130	175	-
C - cabinet						
C035	80	100	-	110	130	-
C040	80	105	-	110	140	-
C045	100	105	-	130	140	-
C050	100	130	-	130	175	-
C060	100	100	100	130	130	130
C070	100	105	105	130	140	140
D - cabinet						
D060	100	100	100	130	130	130
D070	100	105	105	130	140	140
D080	105	105	130	140	140	175
D090	105	130	130	140	175	175

PoolPak Remote ACC Specifications

Table 3-3. PoolPak Provided Remote ACC Specifications

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 ACC connections to correct refrigeration lineset sizing (See Table 4-1).

Refrig Sys Size	Ambient Air Temp	ACC Model	Fan Qty		Refrigerant Connection Sizes						Weight	ACC Voltage	FLA	MCA	MOP
			wide	long	Circuit 1		Circuit 2		Circuit 3						
					Gas	Liq	Gas	Liq	Gas	Liq					
030	95/100/105	MAC0532	2	2	1-3/8	7/8	1-3/8	7/8	-	-	3,170	208/230-3-60	36	38.3	45
												460-3-60	18	19.1	25
												575-3-60	15.2	16.1	20
035	95/100/105	MAC0602	2	2	1-3/8	7/8	1-3/8	1-1/8	-	-	3,220	208/230-3-60	36	38.3	45
												460-3-60	18	19.1	25
												575-3-60	15.2	16.1	20
040	95/100/105	MAC0682	2	2	1-3/8	7/8	1-5/8	1-1/8	-	-	3,300	208/230-3-60	36	38.3	45
												460-3-60	18	19.1	25
												575-3-60	15.2	16.1	20
045	95/100/105	MAC0742	2	2	1-3/8	1-1/8	1-5/8	1-1/8	-	-	3,330	208/230-3-60	36	38.3	45
												460-3-60	18	19.1	25
												575-3-60	15.2	16.1	20
050	95/100/105	MAC0842	2	2	1-3/8	1-1/8	1-5/8	1-3/8	-	-	3,370	208/230-3-60	36	38.3	45
												460-3-60	18	19.1	25
												575-3-60	15.2	16.1	20
060	95/100/105	MAC1003	2	3	1-3/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8	3,730	208/230-3-60	54	56.3	60
												460-3-60	27	28.1	30
												575-3-60	22.8	23.8	25
070	95/100/105	MAC1163	2	3	1-3/8	1-1/8	1-5/8	1-1/8	1-5/8	1-1/8	3,920	208/230-3-60	54	56.3	60
												460-3-60	27	28.1	30
												575-3-60	22.8	23.8	25
080	95/100/105	MAC1353	2	3	1-5/8	1-1/8	1-5/8	1-1/8	1-5/8	1-3/8	4,050	208/230-3-60	54	56.3	60
												460-3-60	27	28.1	30
												575-3-60	22.8	23.8	25
090	95/100/105	MAC1483	2	3	1-5/8	1-1/8	1-5/8	1-3/8	1-5/8	1-3/8	4,100	208/230-3-60	54	56.3	60
												460-3-60	27	28.1	30
												575-3-60	22.8	23.8	25

Remote ACC product drawings are available on the PoolPak website in the MPK Product Drawings folder

Non-PoolPak Provided Air-Cooled Consenser Selection Procedure

The procedure for selecting an optional remote air-cooled condenser is:

1. Find the unit's total heat rejection capacity from the MPK Unit Performance table.
   EXAMPLE (for MPK D060):
   Heat Rejection Capacity = 927,271 Btu/hr

2. Determine the difference between 120°F (the design condensing temperature) and the design outdoor dry bulb temperature.

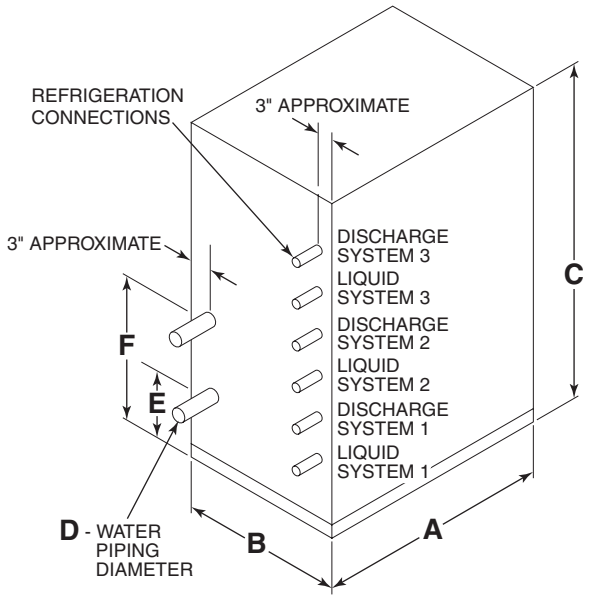
3. For the given Heat Rejection Capacity and temperature difference (from step 2), select the proper sized condenser using R-410A refrigerant.

4. It is permissible to select a condenser with the proper capacity at the nominal temperature difference +3°F. Choose the closest one.
5. The field wiring diagram requires a contact-closure signal indicating that power is applied at the air-cooled condenser for proof of operational readiness.
6. Choose a condenser with fan-cycling head pressure controls set to a minimum condensing temperature of 90°F.

If there are questions, consult the factory.

Remote Cooling Tower Condenser Sizing and Performance

Figure 3-2. Remote Cooling Tower Dimensions



POOLPAK OPTIONAL WATER-COOLED CONDENSER CABINET - REMOTE

PoolPak Optional Water-Cooled Condenser Cabinet - Remote

Table 3-4. Remote Cooling Tower and Chilled Water Cabinet Dimensions

	Dimensions from Figure 3-3 (Inches)					
Cabinet Size[2]	A1	B1	C1	E1	F1	Weight (lbs)
B	91	68	68	15	45	800
C	91	68	75	15	55	1200
D	91	68	75	15	55	1350

[1] All Dimensions are approximate — Contact factory for exact dimensions

[2] B - cabinet - B030, B035, B040, B045, B050;
C - cabinet - C035, C040, C045, C050, C060, C070;
D - cabinet - D060, D070, D080, D090

Table 3-5. Cooling Tower and Chilled Water Line Sizes

Model	Water Piping CPVC Dia (in.)	Refrigeration Connections (Inches)					
		System 1		System 2		System 3	
		Discharge	Liquid	Discharge	Liquid	Discharge	Liquid
030	2	1-3/8	7/8	1-3/8	7/8		
035	2	1-3/8	7/8	1-3/8	1-1/8		
040	2	1-3/8	7/8	1-5/8	1-1/8		
045	2	1-3/8	1-1/8	1-5/8	1-1/8		
050	3	1-3/8	1-1/8	1-5/8	1-3/8		
060	3	1-3/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8
070	3	1-3/8	1-1/8	1-5/8	1-1/8	1-5/8	1-1/8
080	3	1-5/8	1-1/8	1-5/8	1-1/8	1-5/8	1-3/8
090	3	1-5/8	1-1/8	1-5/8	1-3/8	1-5/8	1-3/8

Water Cooled Condenser Sizing and Performance

Table 3-6. WCC Performance

Model	Cooling Tower Water Condenser[1]		Chilled Water Condenser[2]		Heat Rejection[3]
	gpm	Water (ft)[4]	gpm	Water (ft)[5]	MBH
030	55	31	40	20	500
035	65	28	50	25	560
040	75	35	60	30	620
045	85	30	65	34	680
050	95	32	70	34	780
060	105	18	80	28	930
070	125	28	100	35	1060
080	150	33	115	36	1220
090	165	35	130	38	1320

[1] Maximum 90 °F EWT

[2] Maximum 55 °F EWT

[4] Cleanable, vented condenser

[5] Spiral, vented condenser

[3] Heat rejection at 120 °F Condensing Temperature

PoolPak Pool Water Condenser

Table 3-7. Pool Water Capacity

Model	Pool Water GPM3	Water (WC-ft)1	Water (WC-ft)2	Heating Capacity (MBH)
Full Water Condenser				
030	55	N/A	27	500
035	65	N/A	23	560
040	75	N/A	30	620
045	85	N/A	29	680
050	95	N/A	30	780
060	105	18	15	930
070	130	28	25	1060
080	150	35	32	1220
090	165	38	35	1320
Partial Water Condenser				
030	30	N/A	24	250
035	30	N/A	24	250
040	30	N/A	24	250
045	35	N/A	22	300
050	35	N/A	22	300
060	35	24	22	300
070	35	24	22	300
080	45	34	32	370
090	45	34	32	370

[1] Cleanable, vented condenser (double wall) D-cabinet only.
[2] Spiral, vented condenser (double wall).
[3] Minimum required pool water flow measured at the unit.

PoolPak Auxiliary Gas Furnace Option

Table 3-8. PoolPak Gas Furnace Option

			Allowable Supply Air[1] (kCFM)					
	Input	Output	B		C		D	
	MBH	MBH	Min	Max	Min	Max	Min	Max
Single Furnace	350	280	10.0	12.0				
	400	320	10.0	13.0				
Dual Furnace	450	360	10.0	16.0				
	500	400	10.0	18.0	20.0			
	600	480	10.0	19.0	20.0			
	700	560	10.0	20.0	20.0	24.0		
	800	640	10.0	20.0	20.0	28.0	23.0	28.0
Drum Furnace	938	750					23.0	32.0
	1063	850			20.0	30.0	23.0	36.0
	1250	1000			20.0	30.0	23.0	36.0
	1563	1250			20.0	30.0	23.0	40.0
	1875	1500					23.0	40.0

[1] Actual airflow allowed is determined by the cabinet size (B, C or D) and model chosen

PoolPak Auxiliary Electric Heat Option

Table 3-9. PoolPak Electric Heat Option

	Allowable Supply Air[1] (kCFM)					
Size (KW)	B		C		D	
	Min	Max	Min	Max	Min	Max
30	10.0	20.0				
40	10.0	20.0	20.0	30.0		
50	10.0	20.0	20.0	30.0		
75	10.0	20.0	20.0	30.0		
100	10.0	20.0	20.0	30.0		
125	10.0	20.0	20.0	30.0		
150	10.0	20.0	20.0	30.0	23.0	40.0
200	10.0	20.0	20.0	30.0	23.0	40.0
250					23.0	40.0
300					23.0	40.0

[1] Actual airflow allowed is determined by the cabinet size (B, C or D) and model chosen

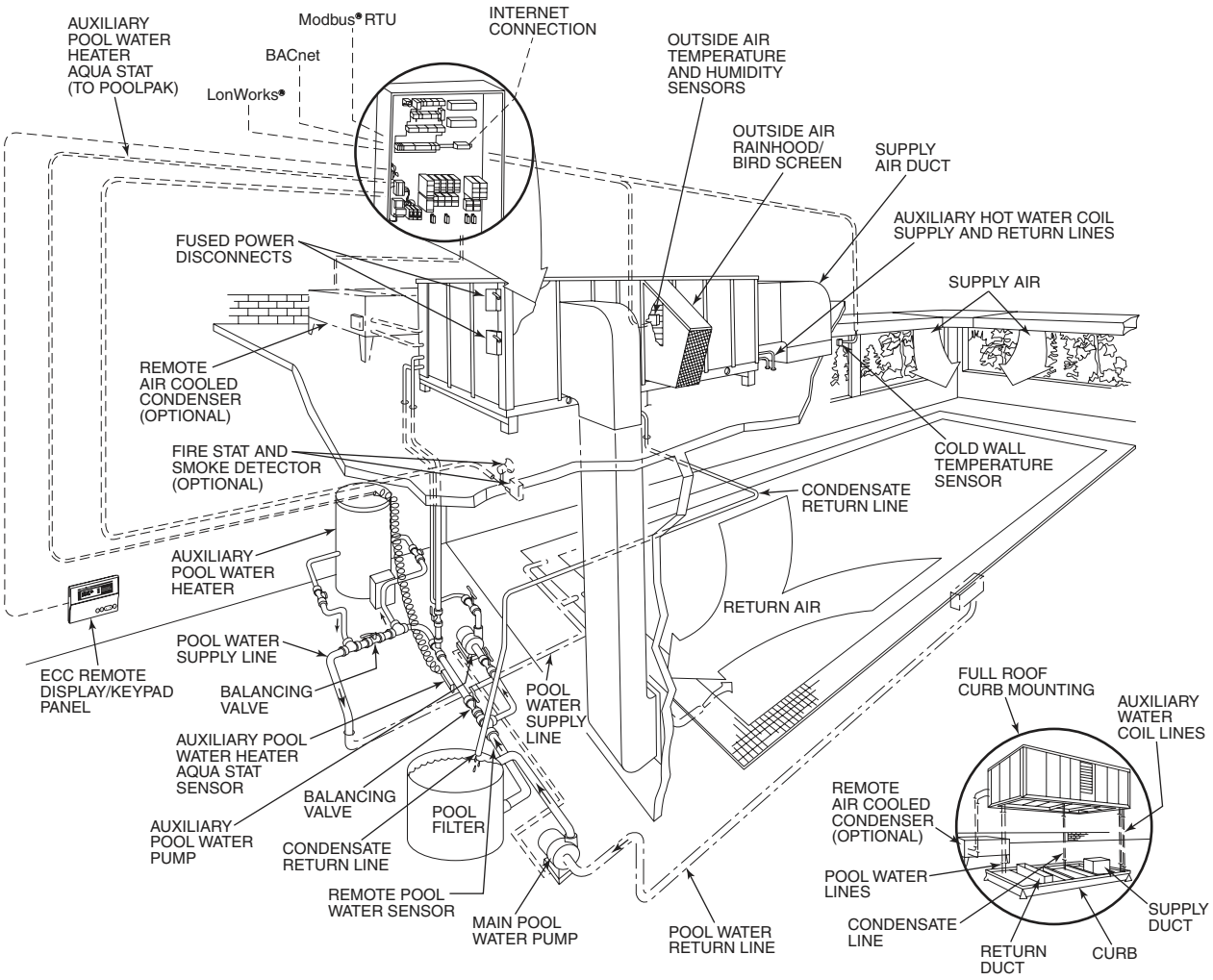
SECTION IV: INSTALLATION

MPK Installation

Introduction

Installation requires the unit to be placed on a roof mounted curb, in a mechanical 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 PoolPak 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 PoolPak control panel as shown in the field wiring diagram (Figure 6-3).

Figure 4-1. Typical PoolPak Rooftop Installation



Handling

Care should be taken during handling to avoid damage to panels, drain piping, etc. The PoolPak can be moved into position using pipe rollers underneath the base of the unit or it can be lifted using a crane or a hoist attached through the lifting points provided on the unit base frame. If the unit is set temporarily, the unit must be supported under each lifting point.

Use suitable spreaders or a frame to prevent damage to the PoolPak. Cables must be adjusted to keep the unit level during the lift.

⚠ CAUTION

Lifting hooks must be blocked away from the side of the unit to prevent damage to the door panels while lifting. Do NOT walk on top of the unit or serious damage may result.

Rigging

PoolPak units require the use of spreader bars that are at least as wide as the unit. Care must be taken to prevent damage from the chains or slings used in rigging. In general, two to four lifting points are provided on each side of the unit, depending on the unit size and length. All provided lifting points must be used to prevent unit damage. Proper lifting technique for each unit type is provided by a decal on that unit. Take special care to avoid damaging the TPO roofing membrane on the top of the unit during rigging.

Clearance

The clearance for service and repair must be 4 feet on all sides. For less than 4-foot clearances, consult your local PoolPak representative or the factory. For units with integral air cooled condensers, coils require 6-foot minimum clearance. Refer to Figure 4-8 for illustration.

Dust Installation

Duct Installation is a major part of unit installation. See Ductwork Design in Section I - Indoor Pool Design in the MPK Engineering Guide for more information.

Mounting

The PoolPak unit is designed for indoor or outdoor locations, either ground-level or roof-top. The location must allow for free condensate drainage (without freezing), ventilation, supply, and return ducts, and sufficient clearance for servicing the unit.

For ground-level installation, precautions should be taken to protect the unit from tampering by or injury to unauthorized personnel. Safety precautions such as a fenced enclosure or additional locking devices on the panels or doors are advisable. Check with local authorities for safety regulations.

Foundation

The unit must be mounted on a flat and level foundation capable of supporting the entire operating weight of the equipment. The unit MUST NOT set flat on a concrete slab. The PoolPak unit MUST BE raised at least 6 inches to allow for sufficient height to adequately trap the condensate lines and to allow for electrical service entrance. The unit must be supported at each lifting point and all corners. Each support should be at least 12 inches long. The unit must be level to ensure proper condensate drainage. If the unit is elevated beyond the normal reach of service personnel, a catwalk capable of supporting service personnel, their equipment, and the scroll compressor(s) (about 1,000 lb.) must be constructed around the unit.

For ground-level installation, a one-piece concrete slab with footers that extend below the frost line is highly recommended. Additionally, the slab should not be tied to the main building foundations to prevent noise transmission. The unit must be supported with adequate space to allow for a condensate line trap.

For roof-top installation, choose a location with adequate structural strength to support the entire weight of the unit and service personnel. For non-curb mounted units, provide spring vibration isolation to minimize vibration transmission to the roof structure. The unit must be situated with adequate height for a condensate line trap. The PoolPak unit may be mounted on equipment rails with spring vibration isolation. For any alternative mountings not discussed here, contact the factory for additional guidance. Care must be taken not to damage the roof. If the roof is bonded, consult the building contractor for allowable installation procedures.

Inspection

Immediately upon receiving the unit, inspect it for damage which may have occurred during transit. If damage is evident, note it on the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once.

Unit Hookup

Avoid tearing or damaging unit insulation while working on or around the unit. Do not stack access panels. Stand them upright with the insulation away from traffic.

GAS FURNACE AUXILIARY HEAT OPTION

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.

POWER SUPPLY

The contractor is required to supply (unless supplied as an option by PoolPak) and install separate fused disconnect(s) within easy accessibility of the PoolPak 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). 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. Conduits connected to outdoor units must be sealed in accordance with NEC 300.7 (A)

If a remote air-cooled condenser is required, a separate power feed must be provided for the air-cooled condenser. When the auxiliary electric heater option is provided, another power connection point is provided in the electric heat compartment. This power connection feeds the auxiliary electric heating coil. With this option, the contractor is required to supply and install a second fused disconnect.

PoolPak MPK units are available in single and dual point power supply options. The 208V option is dual point power only. See illustrations.

Figure 4-2. Single Point Power Supply

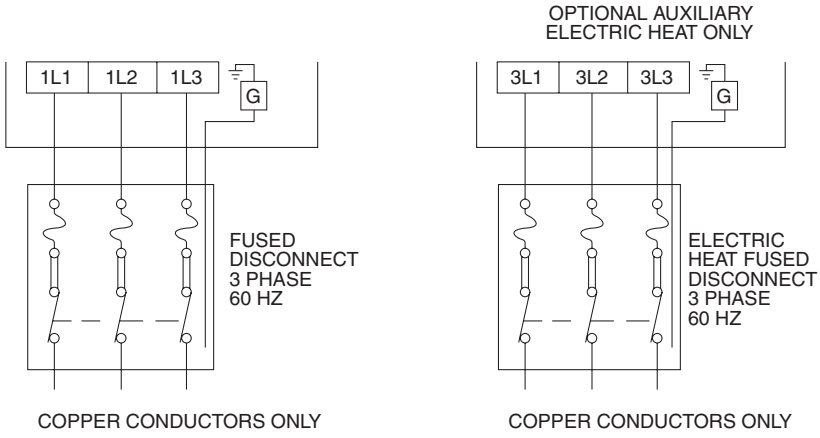
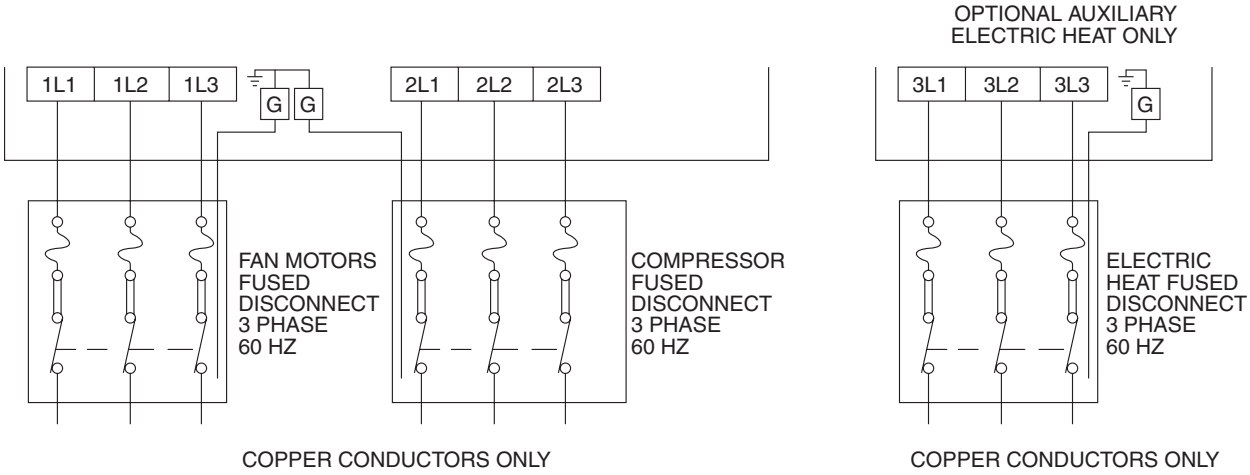


Figure 4-3. Dual Point Power Supply



CONTROL WIRING

All control wiring field connections are described in the CPCS Controls Field Wiring information in this section. This wiring diagram is also furnished with the PoolPak.

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 LLC recommends neither for, nor against, the practice of returning condensate to the pool. 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

Curbs have been designed specifically for the PoolPak® product line. Contact factory for roof curb dimensions. The outside dimensions of the curb are such that the base of the PoolPak® overhangs the edge of the curb on each side. This aids in preventing rain water, running down the sides of the unit, from getting between the base of the PoolPak and the curb.

It is the installing contractor's responsibility to properly complete the following:

- Flash the curb into the roof
- Insulate the curb
- Connect the supply and return ducts to the PoolPak
- Connect condensate drain lines with appropriate traps
- Seal the curb top surface to the bottom of the PoolPak with supplied gasket

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
- Chilled water coil

If the PoolPak is to be mounted on another manufacturer's curb, the PoolPak factory must be notified of this at the time the PoolPak sales order is submitted. PoolPak units produced for curb mounting, whether on a PoolPak curb or on another manufacturer's curb, receive special weatherizing and insulating that non-curb mounted PoolPak units do not receive.

NOTE
If the factory is not notified that a PoolPak is to be curb mounted, the PoolPak base will not be watertight, it will leak, and it will not be properly insulated.

CPCS Controls Field Wiring

OVERVIEW

The CPCS is the programmable controller designed specifically for the PoolPak dehumidification system. It is a robust system capable of a variety of functions. The following text describes the field wiring required for proper operation of the CPCS dehumidification system in a typical PoolPak 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 showing how each field wired device is connected to the PoolPak unit electrical panel.

REMOTE INTERFACE UNIT (1)

The Remote Interface Unit (RIU) allows the user to view space temperature, space relative humidity and pool water temperature. It also provides the ability to change set points, receive alarm notifications, and perform advanced diagnostic functions.

The RIU should be mounted in a convenient location, outside the natatorium, that is protected from splashing pool water and corrosive air. The ambient temperature of the mounting location must always be greater than 32°F. The maximum distance from the PoolPak control panel is 1,000 feet. For distances greater than 1,000 feet, contact the factory.

⚠ CAUTION

Mounting the RIU inside the natatorium may cause damage to the unit. Problems occurring from mounting the RIU in the natatorium will not be covered under warranty.

The CPCS includes a 7-foot long, black RJ25 cable. If the RIU is to be mounted directly to the PoolPak unit, this cable can be plugged directly into port J10 on control module CM1 in the PoolPak® control panel.

For remote mounting of the RIU, the installing contractor must run a six-conductor (three twisted pairs), 16-20 AWG cable from the PoolPak control panel to the remote location. One end of this cable will terminate on terminal block T17 in the control panel. The other end will terminate on a factory-supplied RJ25 jack. The wires for terminals T17.1 and T17.2 should be from the same twisted pair. The second pair should be used for T17.3 and T17.4 and the third pair for T17.5 and T17.6. Proper polarity and connection is essential for correct operation of the RIU. Improper wiring can cause permanent damage. Please review the color code and connections to the RJ25 jack carefully.

The RIU includes a mounting bracket that 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. Use the screws that come with the box to secure the bracket. A ¾" hole must be drilled for the 6-conductor cable which connects the remote interface unit to the PoolPak unit. Refer to the figure 4-4 for remote interface unit mounting dimensions.

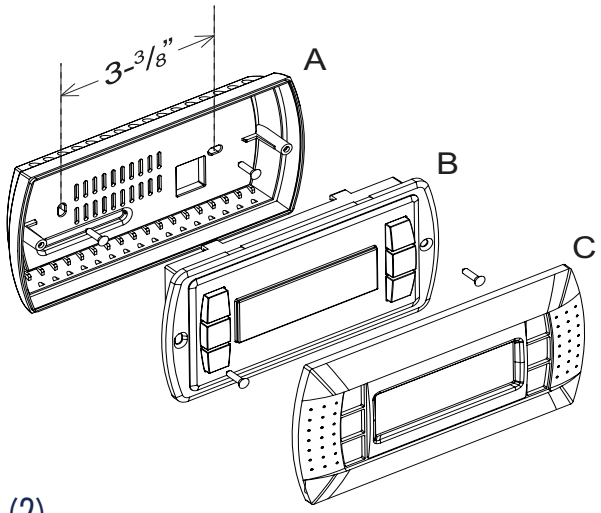
⚠ CAUTION

The Remote Interface Mounting Plate MUST be mounted on an extra deep, single gang electrical box. Do not mount flush to the wall.

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 Figure 4-4.

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 4-4. Remote Interface Mounting Plate



Multi-Unit Network Connection (2)

The CPCS utilizes a proprietary, private network to coordinate with other PoolPak units operating in the same space. This allows up to five PoolPak units to coordinate operation using a master/slave scheme. The PoolPak units are connected to each other by daisy-chaining the three terminals of T15. The network is RS485-based. The connections should be made with 24 AWG minimum, category 5 cable. Use wires from the same pair for the connection of terminals 1 and 2. The total network length should not exceed 500 feet. For total network lengths of more than 500 feet, contact the factory.

Building Automation System Connection (3)

The CPCS is capable of direct connection to LonWorks, Modbus, or BACnet BAS systems. This interface allows a BAS to monitor detailed dehumidifier status information. It also allows the BAS to make set point changes, to control occupancy modes and to control purge mode. These connections should be made with 24 AWG minimum, CAT5 cable or better. Use wires from the same pair for the connection of terminals 1 and 2.

When equipped with the LonWorks interface, the CPCS utilizes an Echelon FTT10 transceiver for connection to a TP/FT-10 network channel. The Modbus RTU interface is RS485-based, with user selectable baud rates of 1,200, 2,400, 4,800, 9,600, and 19,200. When the CPCS is equipped with the BACnet/IP interface, RJ45 connection is to the serial card port on control module CM1.

A user's guide for installation and operation for each BAS interface option is available in the Engineering Literature section of PoolPak website, **www.poolpak.com**.

Cold Surface Temperature Sensor (4)

This sensor measures the temperature of the coldest surface in the pool enclosure. When the temperature of the surface drops within 5°F of the space dew point, the dew point set point will automatically be reset downward to help prevent condensation on the cold surface. It should be noted that this function will not be able to compensate for lower-quality building materials, such as single-pane glass or non-thermally broken window frames.

The cold wall temperature sensor is shipped pre-wired and mounted on to the terminals. The sensor should be mounted on an exterior window or skylight frame not subject to direct sunlight. In cases where there are no exterior doors or windows, the sensor should be mounted on the interior surface of an exterior wall. Avoid mounting the surface temperature sensor where it will get direct exposure from sunlight. The sensor housing has a single 1/8-inch hole for mounting.

Wire as shown on the field-wiring diagram. Electrical connection should be made with two-conductor (one shielded, twisted pair), 16-20 AWG copper cable. Connect the shield drain wire to ground at the PoolPak control panel end only.

Supply Air Temperature Sensor (5)

This sensor measures the air temperature leaving the PoolPak unit to provide indication of possible freeze damage to water coils in the unit. This sensor is factory mounted on the supply fan stand or, for units equipped with an auxiliary air heating module, at the end of the unit.

Remote Space Pressure Sensor (Optional) (6)

If this option is selected, PoolPak will supply a space pressure sensor. This sensor measures the pressure difference between the pool space and a reference space. The controls will provide an alarm if the pressure difference does not meet a predetermined value that ensures sufficient negative pressure to prevent migration of pool odor.

For field wiring, wire as shown on the field-wiring diagram. Electrical connection should be made with two-conductor (one shielded, twisted pair), 16-20 AWG copper cable. Connect the shield drain wire to ground at the PoolPak control panel end only.

This sensor mounts through a wall between the pool space and a reference space (ie. hallway or lobby). Refer to mounting instructions supplied with the sensor for specific instruction.

ACC OR WCC Proof Interlock (7)

The CPCS monitors terminals T13.17 and T13.18 for a contact closure from remote air-cooled or water cooled condensers. This signal indicates the following:

- The remote condenser has power.
- The remote condenser has adequate water flow.
- The remote condenser is within the correct temperature range of the remote cooling application.

The CPCS will not select the mechanical air conditioning mode if the proof signal is inactive. For any questions on field wiring the ACC or WCC proof for your remote cooling application, contact PoolPak Service.

Freezestat (8) (Special Applications Only)

The freezestat is only present in units with certain configuration and coil types. It provides a contact closure indication to the CPCS when any point on the capillary tube sensor is below the set point (typically 40F). This will activate the freeze protection mode. In this mode, the unit will go to full recirculation and open all heating and cooling valves for full flow through the coil. The controller will generate an alarm condition to signal the user that a problem has occurred. Freeze protection mode will terminate when the supply air temperature rises above 50°F.

If the freezestat is present, it will be factory wired and located on the upstream face of the chilled water coil.

Remote Exhaust Fan Status (9)

The CPCS monitors a contact closure signal from a BAS or remote exhaust fan starter. This allows the control system to adjust the amount of air exhausted by the unit if a remote exhaust fan is providing supplemental exhaust. This field wiring should be 2 conductor, 16-20 AWG, shielded, twisted pair.

Contact factory for any remote exhaust fan application.

Summer Ventilation Mode (SE/SEP Only) (10)

The CPCS monitors a contact closure to activate the Summer Vent Mode function. This mode is identical to smoke purge, but it does not generate and alarm. The purpose of this mode is to accommodate a facility's desire to draw lots of air through the open windows and wall louvers in the summer.

Event Mode Interlock (11)

The CPCS monitors a contact closure to activate the Event Mode function. During Event Mode, the minimum damper position is raised to a value higher than the minimum damper setpoint. This can be used to temporarily allow dilution of the space air during extremely high pool usage or a large number of spectators. The higher minimum damper setpoint is configured separately in the setup menu.

Purge Mode Input (SEP ONLY)(12)

The CPCS can receive a contact closure from a remote mounted switch or from a BAS. This input must be connected to dry (voltage free) contacts only. When activated, the controller will shut down the compressors. During purge mode operation, the CPCS will attempt to maintain space temperature with the auxiliary heating system. If the supply air temperature drops to 40°F, purge mode is automatically terminated to provide freeze protection. Purge mode commands sent to the CPCS through the LonWorks, Modbus, or BACnet interface take precedence over the purge mode input.

Occupied Mode Input (13)

The CPCS can receive a contact closure from a Building Automation System (BAS) or from a time clock to override the occupancy schedule stored in the controller's memory. This input must be connected to dry (voltage free) contacts only. If the schedule is currently requesting unoccupied operation, activating this input will force the controller into occupied mode. Although this input overrides the CPCS internal schedule, it will not override commands sent to the controller via the LonWorks, Modbus, or BACnet interfaces.

Fire Trip Input (14)

The CPCS can receive a contact closure from a building fire and smoke control system. This input must be connected to dry (voltage free) contacts only. When this input is activated, the CPCS will shut down the compressors and all unitmounted fans, and will close the outside air and exhaust air dampers. The RIU will display an alarm message indicating that fire trip mode has been activated. Using the CPCS configuration menu, it is possible to set this input to be active on open or active on close.

Smoke Purge Input (SE/SEP Only) (15)

The CPCS can receive a contact closure from a building fire and smoke control system. This input must be connected to dry (voltage free) contacts only. When this input is activated, the CPCS will disable the supply fans and enable exhaust and purge fans while closing outside air and recirculation dampers to 0%. The compressors will be disabled during this mode, and the RIU will display an alarm message indicating that smoke purge mode has been activated. Using the CPCS configuration menu, it is possible to set this input to be active on open or active on close.

Auxiliary Chilled Water Control Valve (16)

The CPCS provides a signal to control a proportional 3-way valve for an auxiliary air cooling system. Terminal block T12.1-3 provides the analog signal for control of a chilled water valve.

Normally, this valve is factory-mounted and wired inside the PoolPak® unit. However, if a remote valve is used, it can be connected directly to the PoolPak® control panel. Terminal block T12 provides 24 VDC power and a control signal. The actuator on the external valve must consume less than 5 VA at 24 VDC. The default control signal to the actuator is 2-10 VDC. The voltage span of the control signal can be adjusted in the configuration menu.

Auxiliary Hot Water Control Valve (17)

The CPCS provides a signal to control a proportional 3-way valve for an auxiliary air heating system. Terminal block T12.4-6 provides the analog signal for control of a hot water or steam valve.

Normally, this valve is factory-mounted and wired inside the PoolPak unit. However, if a remote valve is used, it can be connected directly to the PoolPak® control panel. Terminal block T12 provides 24 VDC power and a control signal. The actuator on the external valve must consume less than 5 VA at 24 VDC. The default control signal to the actuator is 2-10 VDC. The voltage span of the control signal can be adjusted in the configuration menu.

Remote Air Condenser Enable Signal (18)

When mechanical air conditioning is selected, a separate contact closure control signal for each compressor system is sent to the remote condenser on Terminals T9.18-23. This signal provides indication to the remote ACC that fan operation is required. The controls in the ACC then modulate fans to maintain a preset discharge pressure. Terminals T9.18-23 are not used by units equipped with an integral air cooled condenser.

Smart Pump Control Output (19)

The CPCS provides a contact closure to activate the PoolPak water loop pump when pool water heating and space cooling are required. The output contacts may be directly connected to an external circuit provided it is 115VAC maximum and less than 1A inductive.

Units equipped with a pool water heating condenser contain factory installed pool water temperature sensor(s) on the inlet side of the pool water condensers.

If smart pump option is selected, PoolPak will provide a separate pool water temperature sensor to be field installed. It must be mounted upstream of the PoolPak unit and the auxiliary water heater, where constant pool water flow is expected. The sensor can be threaded directly into a 1/4" FPT fitting. Electrical connection should be made on T3.5&6 (and T3.7&8 for split water application) with 22 AWG, copper, 2 conductor, shielded, twisted-pair cable. Connect the shield drain wire to ground at the PoolPak unit end only.

Remote Exhaust Fan Interlock (S Only) (20)

The CPCS can provide a contact closure to enable a remote exhaust fan. These contacts will close during an occupied time period in the CPCS occupancy schedule. The contacts may be directly connected to an external circuit, provided it is 115 VAC maximum and the current does not exceed 1A inductive.

Contact Factory for any remote exhaust fan application.

Auxiliary Pool Water Heating System (21)

The auxiliary pool water heating system is not provided by PoolPak. The CPCS provides a dry contact closure signal to indicate that auxiliary pool water heat is required. A second contact closure is also provided for units designed to control water temperature in two separate pools (split pool water option).

The contacts may be directly connected to the heater control circuit, provided it is 115 VAC maximum and the current does not exceed 1A inductive. Any other application will require the use of an additional field-provided and installed relay to interface to the heater. The auxiliary heating system must provide its own thermostat, wired in series with the output of the CPCS. Typically, the set point for this thermostat is 2°F above the pool water temperature set point in the CPCS.

Alarm Output (22)

The CPCS will activate the alarm output when uncleared alarms are present. This output mimics the status of the red alarm light on the RIU. The output provides form C dry contacts. The contacts may be directly connected to an external circuit, provided it is 115 VAC maximum and the current does not exceed 1A inductive.

Auxiliary Air Cooling System (23)

The CPCS provides contact closure outputs for up to 3 stages of auxiliary cooling. These outputs operate in unison with the analog output signal as described as item 16 – Auxiliary Chilled Water Control Valve.

Auxiliary Air Heating System (24)

The auxiliary heating system is normally factory-installed inside the PoolPak unit. In this case, all interface wiring between the CPCS and the heater is factory-installed. If the PoolPak® is not equipped with an auxiliary heating option, the CPCS provides contact closures to control three discrete stages of auxiliary air heating. The contacts may be directly connected to the heater's control circuit provided it is 115 VAC maximum and the current does not exceed 1A inductive.

The three outputs are energized in order, by number, as heating demands dictate. These outputs operate in unison with the analog output signal as described

Outside Air Temperature and Relative Humidity Sensor (25)

The CPCS uses an outside air temperature and humidity sensor to make smart economizer decisions and to prevent aircooled condenser operation during low ambient conditions.

The sensor should be mounted on the exterior surface of a north-facing wall without exposure to direct sunlight. Wire entry to the sensor terminal box is provided with a compression-type fitting, suitable for cable diameters of from 1/8 to 1/4 inch.

Do not connect a conduit directly to the sensor's terminal box. Use a small piece of UV-resistant cable to make the transition from the conduit to the sensor. A direct conduit connection will allow condensation to form inside the sensor, resulting in permanent damage.

Orient the sensor as shown on the included instruction sheet. Proper orientation of the sensor and radiation shields is essential. Carefully review the wiring connections shown on the field-wiring diagram. Improper connection may damage the sensor and/or the CPCS control module. The cable should be four-conductor (two twisted pairs), 16–20 AWG copper.

⚠ CAUTION
Improper connection may damage the sensor and/or the CPCS control module. The cable should be four-conductor (two twisted pairs), 16-20 AWG copper.

Pool Water Piping and Installation

PoolPak Pool Water Circulation Loop

The PoolPak unit pool water condenser (full or partial) must be connected to a secondary circulation loop with its own circulation pump (field-supplied) to obtain the required design water flows. A typical piping configuration is shown in Figure 4-5.

The secondary pool water loop supply must come from the main pool water distribution line downstream of the main pool water pump and the pool filter and before the take off to the auxiliary pool water heater. The discharge from this secondary loop goes back into the primary distribution line downstream of the secondary loop supply and upstream of the auxiliary pool water heater. This location is required so that the PoolPak® unit will sense the actual pool water temperature.

The secondary circulation loop pump should be located near the main pool water distribution line on the supply line of the secondary loop feeding the PoolPak® unit. The pump should be self-priming and vented. The pump should be located at the lowest point possible in this secondary circulation loop. For example, if the PoolPak® unit is located on a mezzanine and the main pump filter are located in the basement below the mezzanine; the second pump should be located in the basement with the filter, not on the mezzanine with the PoolPak® unit. Particular attention must be given to venting when the PoolPak® unit is installed above the level of the main pool water system. When designing a system that has over 20 to 30 feet of vertical rise, the system should be considered to be open (size pump accordingly, assuming no gravitational assistance).

Auxiliary Water Heater (Field Supplied)

The auxiliary pool water heater must be installed downstream of the PoolPak® unit's secondary loop discharge. It is normally installed in its own secondary loop as shown in the figure. The auxiliary pool water heater is controlled by the PoolPak® System. It is only turned on either when the heat available from the PoolPak® is insufficient for pool water heating and pool water temperature drops to 1.5°F below set point or when the pool water flow to the PoolPak® unit is below the minimum required water flow.

Main Pool Water Pump and PoolPak Pool Water Loop Pump Interlocks

The main pool water distribution pump and the PoolPak® pool water loop pump must each have its own start/stop switch. Wire the main pool water pump's auxiliary contacts in accordance with the manufacturer's specifications, and run the wires to the PoolPak® unit auxiliary pool water loop pump starter. Wire the auxiliary pump so that it operates only when the main pool water pump operates. This interlocking is necessary to prevent overheating and possible damage to the pool water piping and PoolPak® pool water loop pump.

Pool Water Isolation Valves

Hand stop valves and pressure gauge stopcocks are factory-installed in the pool water supply line and return line inside the PoolPak® unit for servicing. A third hand valve (field-supplied) should be installed upstream of the auxiliary pool water pump so that the pump can be isolated for service. A fourth hand valve (field-supplied), installed in the main pool ater line between the secondary loop supply and return, is normally required to balance the flow in the PoolPak® unit secondary loop.

Pool Water Pressure Transducer

Pool water pressure transducers are factory-installed in the MPK unit. The pressure transducers can be calibrated through the CPCS controller if necessary. The pressure transducers measure the difference in water pressure across the pool water condenser and display this head pressure in units of water column (feet of head). This reading is used to determine whether proper flow has been received by the MPK unit. The MPK unit can be operated with inadequate water flow; however, the MPK System will not go into a water-heating mode until the head pressure reaches the required value.

Pool Water Piping Composition

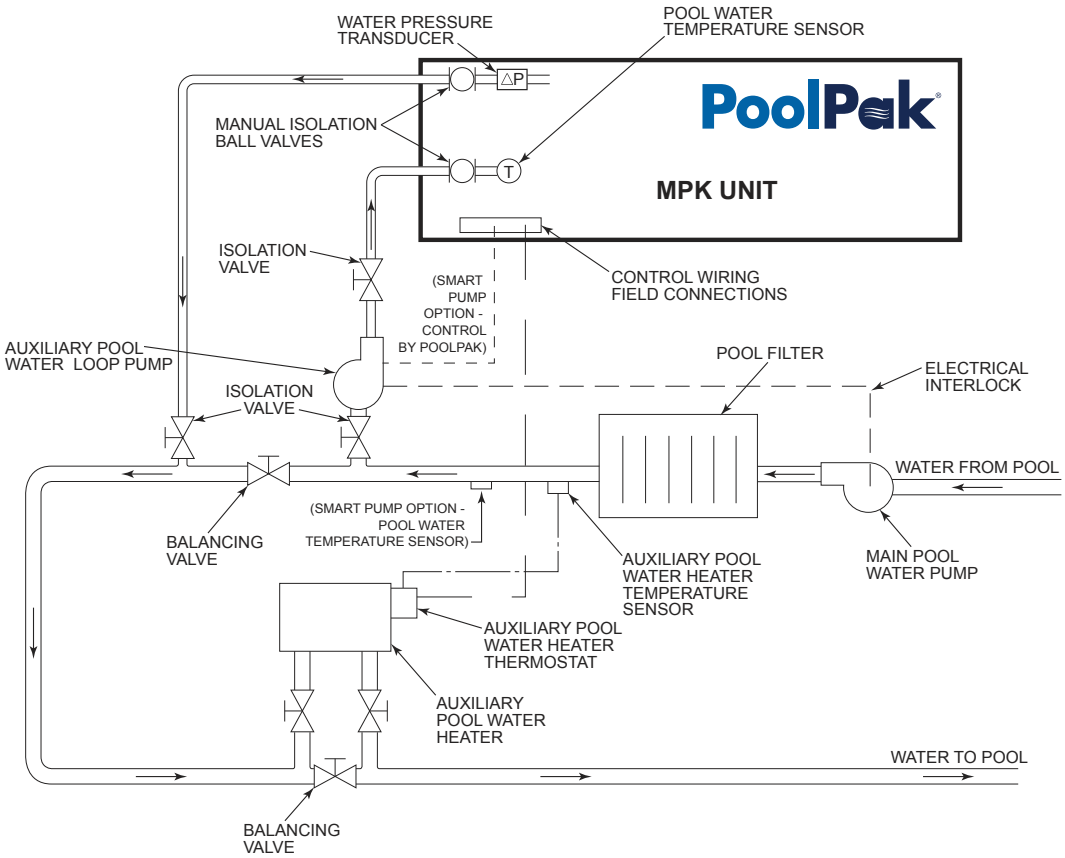
Pipe must be a suitable material such as CPVC Schedule 80 plastic pipe. PVC, copper, iron or steel pipe is NOT suitable. It must be kept free of all foreign matter.

Freeze Protection

Any pool water piping (field-supplied) exposed to outdoor ambient air temperatures must be protected against freezing. Wrap pipes with electric heat tape (follow manufacturer's instructions) controlled by an automatic thermostat and set at a minimum of 35°F. Insulate all piping. Insulation must be sealed at all seams.

NOTE
Power for the field-installed heat tape must be supplied external to the PoolPak unit.

Figure 4-5. Pool Water Piping Schematic



Condensate Drains

Condensate Drainage System Features

- The diamond plate floor is sloped towards a center drainage channel for each compartment.
- Each compartment has its own drain piping to either side of the unit
- For units selected with a curb, the unit can be ordered with through the curb/bottom condensate drainage. Each compartment will still require field installation of a drain trap and condensate piping.
- For units without a curb and/or without bottom condensate drainage, field installation of positive and negative pressure condensate drain traps is required.
- For outdoor units, these traps must also be heat-taped and insulated to protect against freezing.

Exceptions

- With an integral air-cooled condenser, the compressor module section does not have the center drain or condensate drain piping.
- The integral air-cooled condenser section (located above the compressor module section if selected) does not require condensate drain piping.

Drain Trap Field Installation Instructions

- A drain trap is required on one side of each compartment. The other side should be plugged.
- Depending on the selection of the unit, a variable number of drain traps are required.
- Drain traps located upstream of the supply fans require negative pressure condensate drain traps. See Figure 4-6
- Drain traps located downstream of the supply fans (supply fan compartment, electric heat module, and gas funace compartment) require positive pressure condensate drain traps. See Figure 4-7.
- See below illustrations for more detail on the sizing of the negative and positive pressure condensate drain traps.
- Since the drain traps are vented to ambient pressure, they can be tied together and directed towards the nearest roof or floor drain.

Required Materials

- Schedule 40 (minimum) PVC plastic pipe, elbows, tees, and a removable cap for a cleanout.
- For outdoor units, wrap drain lines and trap with electric heat tape (follow manufacturer's instructions) controlled by an automatic thermostat set at a minimum of 35°F to protect against freezing.
- For outdoor units, insulate all external condensate piping. Insulation must be sealed at all seams.
- For additional questions or concerns regarding installation of condensate drains, please contact PoolPak Service.

NOTE
Power for the field-installed heat tape must be supplied external to the PoolPak unit.

Figure 4-6. Negative Pressure Condensate Drain Piping Cross Section

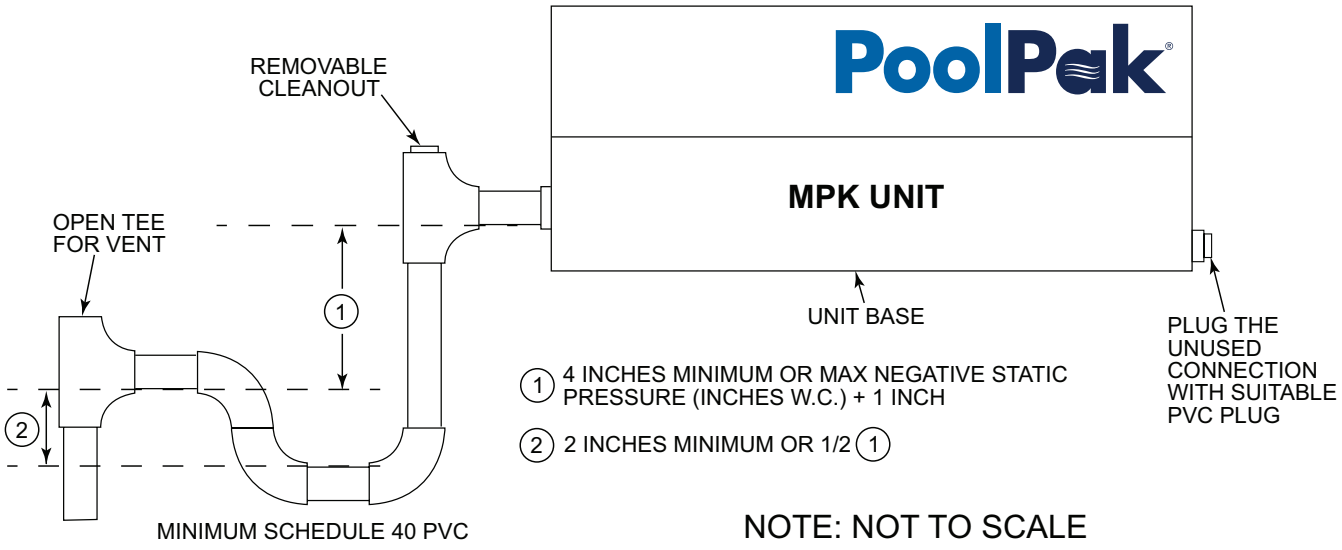
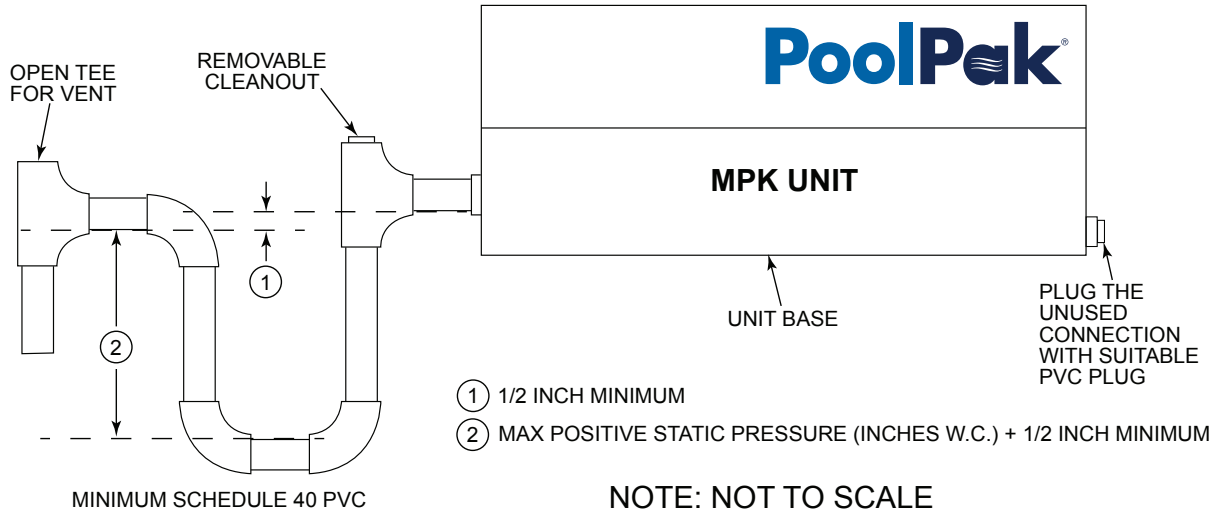


Figure 4-7. Positive Pressure Condensate Drain Piping Cross Section



Remote Air Cooled Condenser

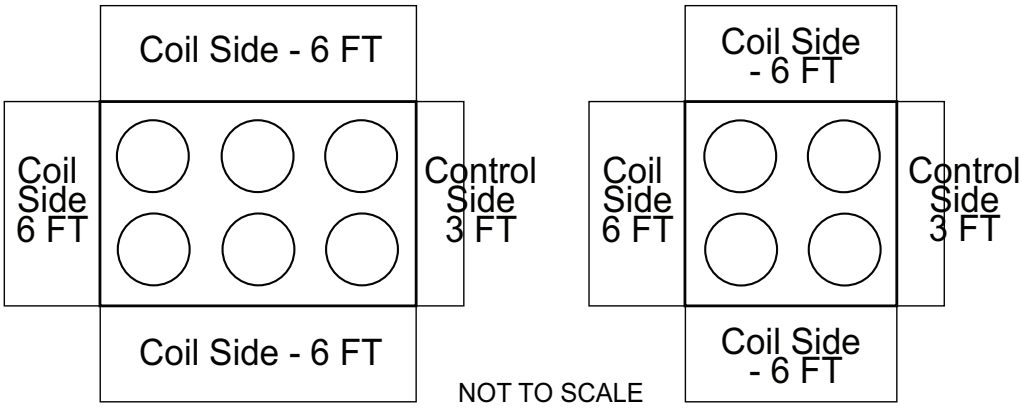
Space and Location Requirements

The most important consideration which must be taken into account when deciding upon the locations of air-cooled equipment is spacing. The air cooled condenser should be located so that ambient air may circulate freely. The heated air from the condenser should not be recirculated. 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.

The unit should be installed with enough side clearance for proper airflow to the coil and for servicing. See Figure 4-8 for recommended minimum clearances.

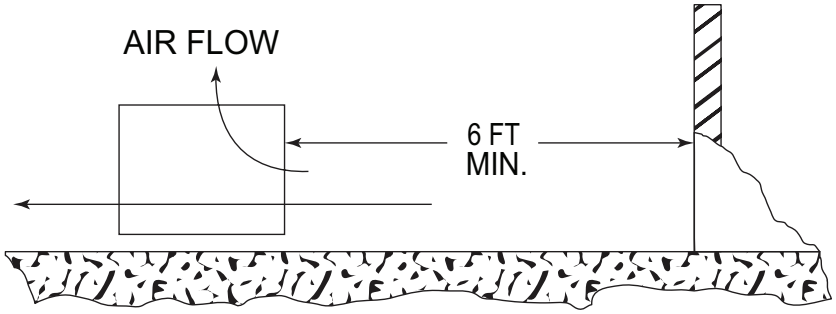
Figure 4-8. Remote ACC Installation Clearances



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 coil sides of the units should be a minimum of 6-feet away from any wall or obstruction (see Figure 4-9). 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.

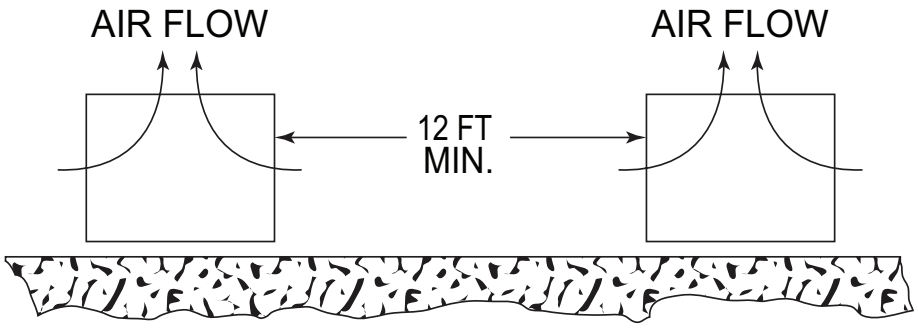
Figure 4-9. Remote ACC Installation Around Walls or Obstructions



MULTIPLE UNITS

For units placed side by side, the minimum distance between units is 12 feet on the coil sides. See Figure 4-10.

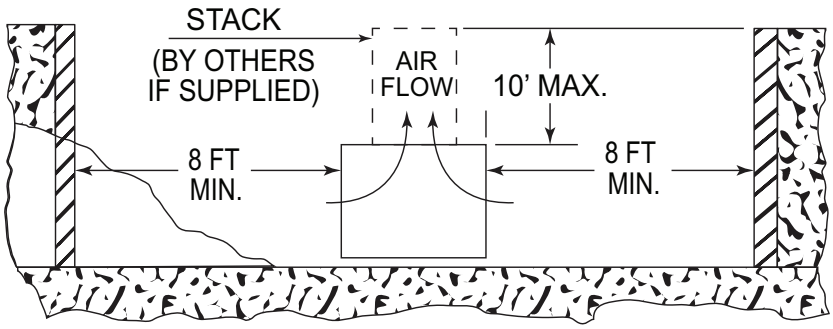
Figure 4-10. Remote ACC Installation Clearances



UNITS IN PITS

The top of the unit should be level with the top of the pit and side distances increased to 8 feet on the coil sides. 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. See Figure 4-11.

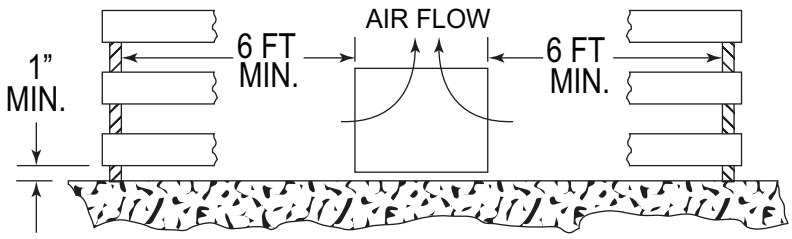
Figure 4-11. Remote ACC Installation When Installing Units in Pits



DECORATIVE FENCES

Fences must have 50% free area, with 1 foot undercut, a 6 feet minimum clearance on the coil sides, and must not exceed the tops of the unit. See Figure 4-12. If these requirements are not met, the unit must be installed as indicated for "Units in Pits".

Figure 4-12. Remote ACC Installation When Installing Units Near Decorative Fences



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 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.
- PoolPak 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 required in the field piping adjacent to the PoolPak 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. Oversizing 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. Proper sizing and charging of the lineset 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 PoolPak 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 4-1.
- ACC line lengths beyond the above limits will void warranty unless written approval is obtained from the factory PRIOR to installation and startup.

Table 4-1. Pipe Sizes for Remote Refrigerant Condensers

	Hot Gas Lines2						Liquid Lines[2]		
	Horizontal Run			Vertical Riser					
Model[1]	Circuit 1	Circuit 2	Circuit 3	Circuit 1	Circuit 2	Circuit 3	Circuit 1	Circuit 2	Circuit 3
030	1-3/8	1-3/8	-	1-3/8	1-3/8	-	7/8	7/8	-
035	1-3/8	1-3/8	-	1-3/8	1-3/8	-	7/8	1-1/8	-
040	1-3/8	1-5/8	-	1-3/8	1-5/8	-	7/8	1-1/8	-
045	1-3/8	1-5/8	-	1-3/8	1-5/8	-	1-1/8	1-1/8	-
050	1-3/8	1-5/8	-	1-3/8	1-5/8	-	1-1/8	1-3/8	-
060	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-1/8	1-1/8	1-1/8
070	1-3/8	1-5/8	1-5/8	1-3/8	1-5/8	1-5/8	1-1/8	1-1/8	1-1/8
080	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-1/8	1-1/8	1-3/8
090	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-1/8	1-3/8	1-3/8

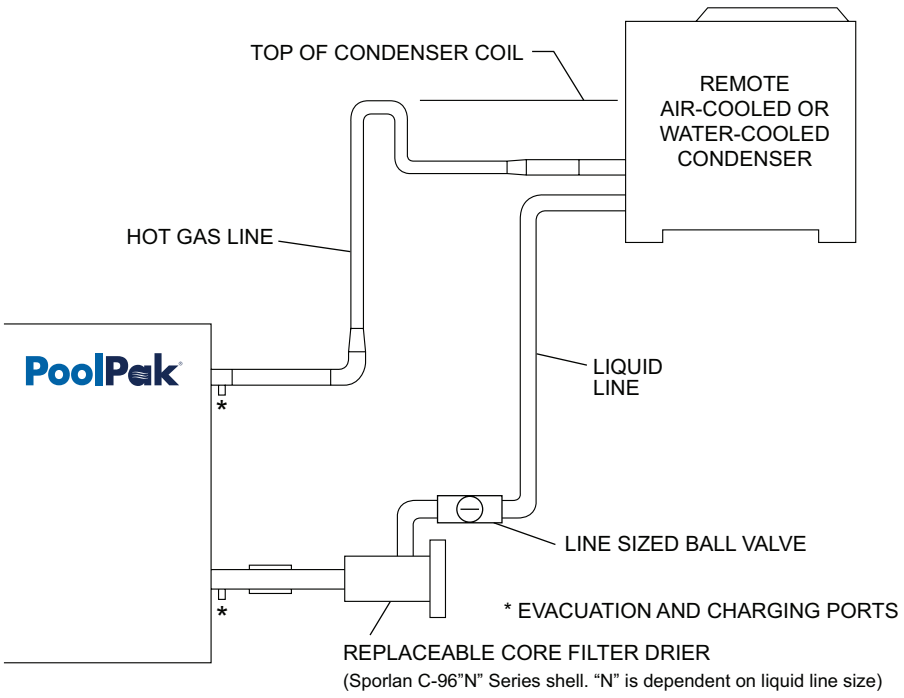
[1] Models 060, 070, 080, and 090 have 3 refrigeration circuits piped independently.

[2] All pipe diameters are nominal OD inch sizes. Use only certified refrigeration tubing.

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.

Figure 4-13. Remote ACC Above Unit



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 the below remote ACC and line size charging charts to calculate the additional charge required.
- For the additional oil required, multiply 2% by the total additional refrigerant charge (ACC and lineset length). For Bitzer compressors, use Idemitsu FVC32D PVE Oil.
- Contact Factory for additional help or verifying the additional refrigerant charge.

Table 4-2. Remote ACC Refrigerant (R-410A) Charge

ACC Model #	Circuit #1 (lbs)	Circuit #2 (lbs)	Circuit #3 (lbs)
MAC0532	30	30	-
MAC0602	30	30	-
MAC0682	30	35	-
MAC0742	30	35	-
MAC0842	30	45	-
MAC1003	30	30	30
MAC1163	30	35	35
MAC1353	35	35	45
MAC1483	35	45	45

Table 4-3. Refrigerant (R-410A) Charge for Different Line Sizes
(based on 120oF saturated condensing temperature)

Tube OD (inches)	Wall thickness (inches)	Tubing Type	Discharge (lb/ft)	Liquid (lb/ft)
7/8	0.045	L	0.021	0.192
1 1/8	0.05	L	0.036	0.327
1 3/8	0.055	L	0.055	0.499
1 5/8	0.072	K	0.076	0.684

WARNING!

Above chart is for lineset length less than 100 ft and ACC located less than 50 ft above unit or 20 ft 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.

Page Intentionally Left Blank

SECTION V: OPERATION

CPCS Controller Operation

Remote Interface Unit (RIU) Features

The PoolPak CPCS control system includes a Remote Interface Unit (RIU) display/keypad panel that can be located remotely from the unit for the convenience of the owner. For wiring and installation, see the CPCS Controls Field Wiring section.

In normal operation, the display of the RIU will automatically rotate between different screens displaying the status of the system. You can also manually browse these status screens by pressing the up or down arrows. These status screens include information on temperature and humidity, current mode of operation, occupied mode status, current air flow rates, and system status.

If an alarm occurs, the RIU will display alarm status screens for each alarm occurring. The system status information is still accessible through menu navigation.

The RIU does not have any sensors; the RIU is simply a window for viewing the controller remotely. See Figure 5-1 for physical characteristics and button call outs of the RIU.

Figure 5-1. RIU Keypad

🔔 or ⚠ ('alarm'): When an alarm occurs, this key will turn and stay red until cleared. With an alarm active, pressing this button gives the alarm status screens.

Prg or ⊙ ('program'): This key accesses the main menu of the CPCS Controller.

Esc or ← ('escape'): Pressing this key moves the user back to the previous screen.

↑ / ↓ ('up/down'): These are directional keys for navigating the controller and configuring settings.

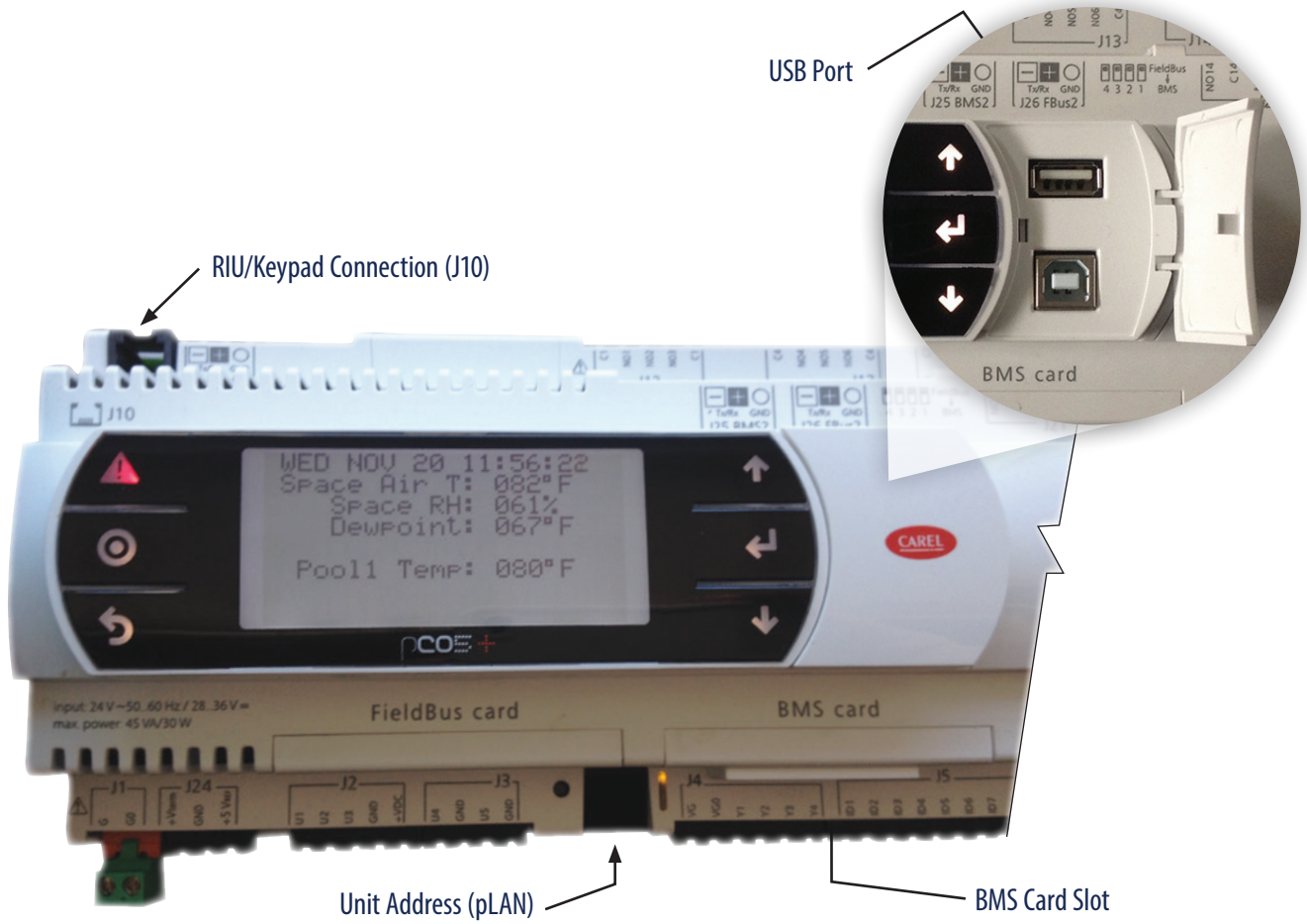
↵ ('enter'): Pressing this key moves the user to the next selection on the same screen. If any selection is made, pressing this key will save that new setting.

For Multi-Unit networking operation, while the RIU is connected to any of the units, press **Esc** + ↑ at the same time to view the next unit's display within the network.

CPCS Controller Features

The CPCS Controller (Figure 5-2) consists of several Control Modules (CM). The main controller, named Control Module 1 (CM1), is the only controller in the main control cabinet with a display. The CM1 display has the same keys and can be operated in the same way as the remote keypad. See the picture showing the physical characteristics and feature call outs of the CM1.

Figure 5-2. CPCS Controller (CM1) Display



In addition to the key features for the RIU, more description of some of the physical features on the CM1 controller is below:

- RIU/Keypad connection (J10): For service convenience, there is an auxiliary RJ25 jack located on the upper left side of CPCS Control Module #1, port J10. The RIU may be removed from its remote location and connected here using the special RJ-25 cable supplied with the control system.
- USB port: For communication with standard USB pendrives or direct connection to a PC, this port is used primarily for downloading fault history logs and other system performance parameters.
- BMS card slot: This slot is the connection point for the Building Automation System to the CPCS Controller. See the Communications section for more details.
- Unit Address (pLAN): This feature is for adjusting the controller address and is used specifically for CPCS Network Operation.

Multi-Unit Network Operation

When there is more than one PoolPak® unit servicing a single room, the units should be connected together. The CPCS controller allows up to five PoolPak® units to be connected together over a proprietary, private network. The networked units will then work together to maintain space conditions. Refer to the field wiring section of this manual for instructions to connect the units.

Networked units operate in a MASTER/SLAVE environment. The fuzzy logic engine in the master unit determines the heating, cooling and dehumidification requirements and broadcasts them over the network to the other units. This ensures that each unit will make control decisions based on the same information. During steady state conditions, all units networked together will operate in the same basic mode (ie. heating or cooling). Changing the setpoints on any of the networked units changes setpoints for all networked units. If a networked unit is manually disconnected from the network, this unit will revert to its local setpoint settings.

Each networked unit must contain all sensors and controls necessary for independent operation to be capable to taking over the MASTER role. Units on the network are identified by an address of one to five. The unit with the lowest address with having no uncleared alarms is the MASTER unit. In the event of a failure or uncleared alarm, the unit with the next lowest address and no uncleared alarms will become the MASTER unit. In the unlikely event that all units have uncleared alarms, each unit will function individually. Refer to CM1 Network Configuration for instructions on viewing and adjusting the unit ID.

A single RIU can be used to monitor all units on the network. While the RIU is connected to any of the units, press **Esc** + ↑ at the same time to view the next unit's display within the network. Refer to the Status Screens section under Controller Navigation for more description on how to simply view network status. If separate RIUs are desired, they must be uniquely addressed on the network. Refer to RIU network configuration below.

CM1 NETWORK CONFIGURATION

The unit networking address is set by pressing the small button to the right of the CM1 plug, J3. Pressing the button one time will display the current Unit ID address setting. On single unit installations, this should be 1. On multi-unit installations, each unit should be set to a different address between 1 and 5. No two Unit IDs can be the same while connected to the same network.

To change the I/O address, press and hold the button for approximately 5 seconds until it begins flashing slowly. Once flashing, release the button and press it sequentially until the desired address is displayed (must be 1, 2, 3, 4 or 5) and release the button. After approximately 5 seconds, the displayed number will begin flashing faster to indicate the new address has been set. Cycle power at the Control Power switch to complete the address change.

RIU NETWORK CONFIGURATION

To set up multiple keypads in the same network, each keypad must be uniquely addressed. The RIU network address is set by pressing the ↑, ↓ and ↵ buttons simultaneously and holding them down for approximately 5 seconds. The display will show "Display address setting". Press the to move the cursor to the current address field. Use the ↑ and ↓ keys to change the address to either 10, 11 or 12 and press ↵.

To configure the ECC III RIU addresses, press the ↑, ↓ and ↵ buttons simultaneously and hold them down for approximately 5 seconds. The display will show "Display address setting". Press the key ↵ four times to move the cursor past the screens showing "Display address setting", "I/O Board address" and "Terminal config Press ↵ to continue. Use the keypad to enter the RIU configuration as follows:

P: 0x Adr Priv/Shared (x = CM1 I/O address)
Trm1 10 Sh
Trm2 11 Sh
Trm3 12 Sh Ok? Y

When prompted "OK?", select "Y" to save the configuration and to exit. The RIU will go blank and then beep several times before bringing up the normal status display.

Communications

BUILDING AUTOMATION SYSTEM (BAS) CONNECTION

The PoolPak CPCS control system provides four optional Building Automation System (BAS) connection types: LonWorks, ModBus, BACnet/IP, and BACnet MS/TP. These standard BAS connections are attached to the building system at the T16 terminal block.

The BACnet/IP option includes the Remote Access Package feature. When the CPCS controller is equipped with the BACnet/IP interface, RJ45 connection is made to the serial card port on control module CM1. The controller has a second card port and can run a separate BAS in parallel with RAP.

See the respective *BAS Installation & Operation Guide* on the PoolPak website for more details, www.poolpak.com.

VIRTUAL-TECH® PLUS MPK

The PoolPak MPK is remotely monitored and controlled by PoolPak factory service technicians with the *Virtual-Tech® Plus* MPK remote access package (RAP). Remote monitoring is accomplished via an entirely factory mounted and wired cellular web server located in the dehumidifier unit control panel.

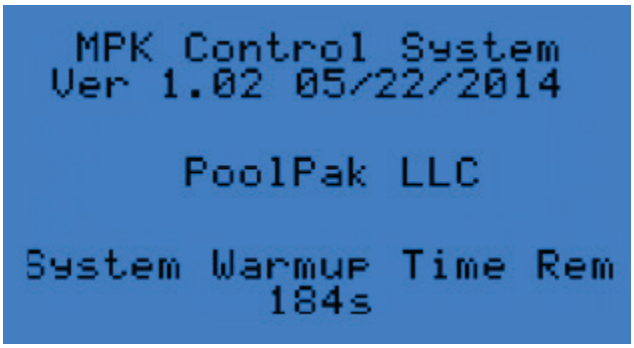
In addition to the on-board data-logging of the CPCS controller, datalogging and trending is also available via the remote server of the RAP. The RAP becomes active upon application of power at unit startup. The remote interface is then viewable by PoolPak service technicians to quickly handle any alarm conditions or to remotely troubleshoot the unit from the factory.

Basic Controller Operation

Startup

Upon startup, the screen shows the above indicating software version, date, and system warmup time remaining (counts down from 300 seconds). After the counter times out, the controller will automatically rotate the status screens. For detailed information on menus and settings, refer to the Controller Navigation section.

Figure 5-3. Startup Screen



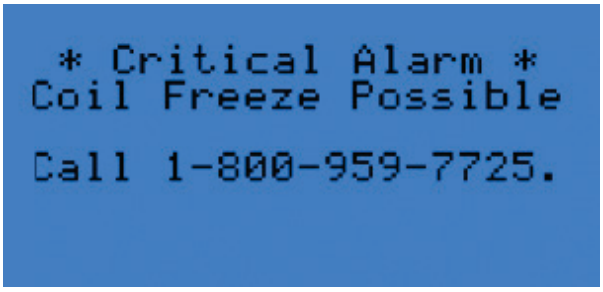
Fault Condition

When properly installed according to the instructions in this manual, the PoolPak control system will perform as designed and will provide a pool environment that is both comfortable and cost effective. However, in the unlikely event that the system does not function properly, the controller has many features that will help a service technician resolve the issue.

Whenever a fault condition occurs, the alarm button on the RIU 🔔 and CM1 ⚠ will glow red and the displays will show a fault condition screen. After 10 compressor-related faults occur, the affected compressor module will be locked out for protection. Repetitive faults can cause compressor motor failure. When a compressor fault condition exists, it must be diagnosed and corrected before resetting the system. For more information on the possible fault conditions that can occur, refer to the *Troubleshooting* section in this manual.

After a fault has been eliminated, the control panel alarm light will remain lit. However, the alarm will no longer be shown in the normal status screen rotation. Pressing the alarm key will show any faults that have occurred since the alarm light was reset.

Figure 5-4. Fault Condition Status Screen - Coil Freeze Warning



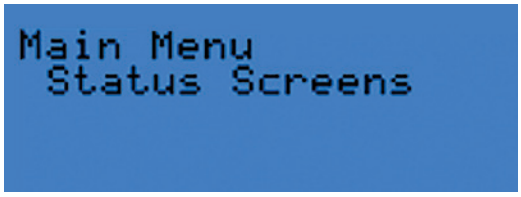
Alarm Reset

To reset the alarm on the RIU, press 🔔 and Esc at the same time. CM1/compressor module: ⚠ and ⮌. If there are currently no active fault conditions, the alarm light will go off. The alarm contact closure output of the controller operates in conjunction with the alarm light on the RIU and CM1.

Controller Navigation

Main Menu

Figure 5-5. Main Menu Screen

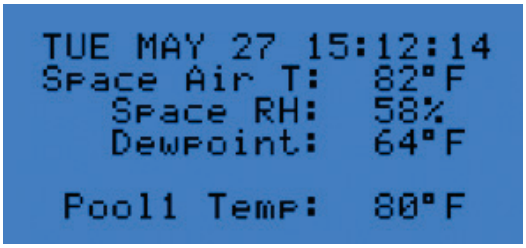


Pressing the program key at any time gives the above screen. From here, Status Screens, Detailed Status, Set Points, Schedules, and Service menus are all accessible.

Status Screens

Status Screens and Detailed Status both contain read-only indicators of the operation of the unit. For example, these describe room conditions, airflow conditions, unit status, stages of heat or cooling requested, stages of aux heat or aux cool available, and fan motor status. All four status screens also show the weekday, month, day and 24H time.

Figure 5-6. Status Screen 1: Return Air/Pool Status



- Space Air T = Return Air Space Temperature (°F)
- Space RH = Return Air Space Relative Humidity (%)
- Dewpoint = Return Air Dewpoint calculated from space air dry-bulb T and RH (°F)
- Pool1 Temp = Pool 1 water temperature (°F)
- Pool2 Temp = Pool 2 water temperature (°F) – if enabled
- Outside Air T = Outside Air Temperature (°F)
- Outside RH = Outside Air Relative Humidity (%)
- Dewpoint = Outside Air Dewpoint calculated from outside air dry-bulb T and RH (°F)
- Dehum - Dehumidification mode active? (Yes or No)
- Cooling - Cooling mode active? (Yes or No)
- Heating - Heating mode active? (Yes or No)
- Occupancy = Occupied mode on? (Occ or Unocc)
- Out Air Vol = Outside Air Volume (kCFM)
- Sup Air Vol = Supply Air Volume (kCFM)

If Multi-Unit Control is enabled, all Status and Detailed Status screens will indicate network status on the bottom line. To enable Multi-Unit Control, refer to the Unit Config Menu Installed Features section of Controller Navigation.

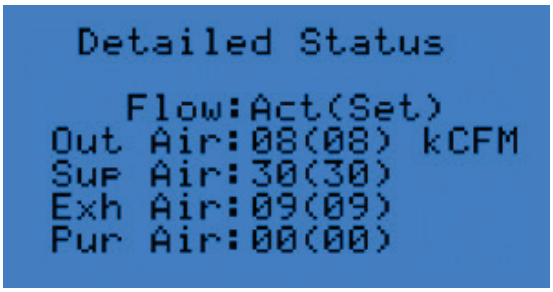
- Solid numeral indicates the unit network ID currently connected to the display
- Flashing numerals indicate units on network with uncleared alarms
- ONLINE – Unit is connected to at least one other device on the network. This could be a keypad.
- OFFLINE – Unit does not see any other network devices.

- MASTER – Unit is providing heat/cool and dehumidification stage values to all other networked units that are online. By default, the unit with the lowest unit ID with no active alarms is the MASTER. To set unit ID, refer to the Controller Features section.
- SLAVE – Unit is listening to the MASTER unit on the network and ignoring its own heat/cool and dehum stage values.

Detailed Status

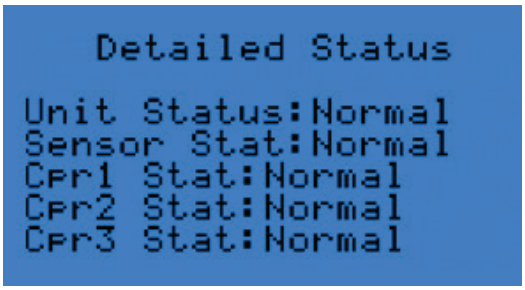
- Additional current operating details are found in the Detailed Status menu. This information includes:
- Space Air T = Return Air Space Temperature (°F)
- Space RH = Return Air Space Relative Humidity (%)
- Dewpoint = Return Air Dewpoint calculated from space air dry-bulb T and RH (°F)
- Outside Air T = Outside Air Temperature (°F)
- Outside RH = Outside Air Relative Humidity (%)

Figure 5-7. Detailed Status Screen 4: Airflow Status



- Flow: Act (Set) = Key for below screens, Act = Actual airflow, Set = Setpoint Airflow
- Out Air = Outside Air Flow, Actual (Setpoint) kCFM
- Sup Air = Supply Air Flow, Actual (Setpoint) kCFM
- Exh Air = Exhaust Air Flow, Actual (Setpoint) kCFM
- Pur Air = Purge Air Flow, Actual (Setpoint) kCFM

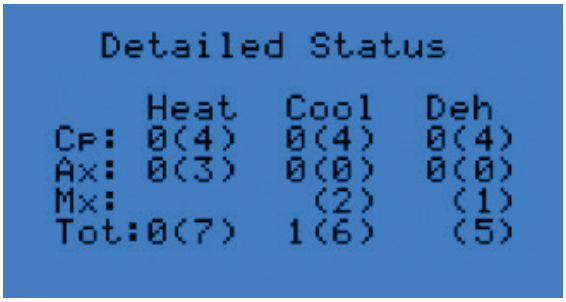
Figure 5-8. Detailed Status Screen 5: Status Overview



- Unit Status = Unit Status Normal or *AlarmName* condition
- Sensor Stat = Sensor Status Normal or *SensorName*. If multiple sensors are in error, this field indicates the highest priority sensor with an error.
- Cpr1 Stat = Compressor Module 1 Status Normal or *CprFaultName*
- Cpr2 Stat = Compressor Module 1 Status Normal or *CprFaultName*
- Cpr3 Stat = Compressor Module 1 Status Normal or *CprFaultName*

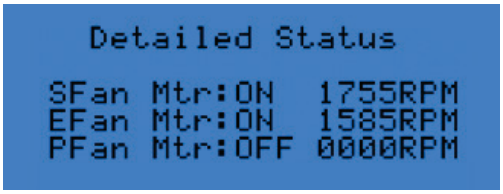
Refer to the Troubleshooting section for a listing and description of AlarmName, SensorName. and CprFaultName.

Figure 5-9. Detailed Status Screen 6: Operation Mode Stages



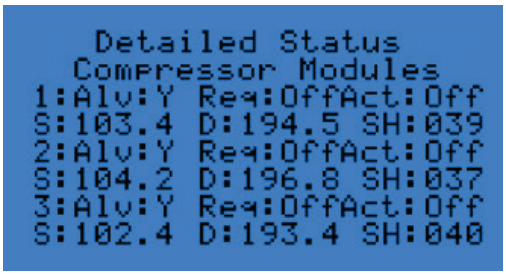
- Cp = Compressor Stages Requested (Available) for Heating, Cooling, or Dehumidification
- Ax = Auxiliary Stages Requested (Available) for Heating, Cooling, or Dehumidification
- Mx = Mixing Box Stages Requested (Available) for Cooling or Dehumidication
- Tot = Total Stages Requested (Available) for Heating, Cooling, or Dehumidification

Figure 5-10. Detailed Status Screen 7: Fan Motor Status



- SFan Mtr = Supply Fan Motor OFF or ON. If ON, RPM is indicated
- EFan Mtr = Exhaust Fan Motor OFF or ON. If ON, RPM is indicated
- PFan Mtr = Purge Fan Motor OFF or ON. If ON, RPM is indicated
- RemExhFan Rqd = Remote Exhaust Fan Required No or Yes
- RemExhFan Status = Off or On
- Remote kCFM Rqd = Remote Exhaust Fan Air Flow Required

Figure 5-11. Detailed Status Screen 9: Compressor Module Status



- 1 = Compressor Module 1
- Alv = Available Y or N
- Req = Requested Off or On
- Act = Active Of or On
- S: = Refrigerant Suction Presssure (psi)
- D: = Refrigerant Discharge Pressure (psi)
- SH: = Refrigerant Suction Superheat (°F)

Set Point

Figure 5-12. Set Points Air Temperature Screen

- Under the Set Points Menu, the following set points can be accessed:
- Air Temperature: default - 84°F, range: 70-95°F
- Relative Humidity: default - 55%, range: 45-65 %
- Pool1 Temp: default - 81°F, range: 70-95°F
- Pool2 Temp (if enabled): default - 81°F, range: 70-95°F
- Min Out Air Amt = Minimum Outside Air Amount: default – 25%, range: 0-100%
- Max Out Air Amt = Maximum Outside Air Amount: default – 100%, range: 0-100%

Timed Purge Cycle – to override the controls and start a timed purge anytime of fixed duration (min), this screen also indicates the time remaining (min) on the Timed Purge Event

The RIU can be configured with a password on Set Point changes for additional security.

Schedules

The Schedules menu contains the setup screens for an Occupied/Unoccupied schedule, a Purge schedule, and an Event Mode Schedule.

Figure 5-13. Occupancy Schedule Screen

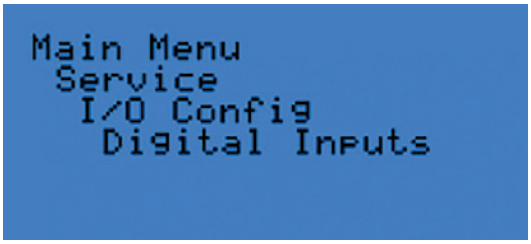
Each of these schedules has a total of 28 events that can be configured. Keep in mind that each schedule requires two events to be scheduled, a START and an END event. This allows for 14 unique schedules to be configured per week. Setting the "Save This Event?" to YES will momentarily display YES before displaying NO. Do not worry, the event has been saved. Proceed to the next event # to continue scheduling.

Service

The Service menu is the advanced diagnosis and programming menu. This menu includes Input/Output Configuration, History, Unit Configuration, Manual Mode, and Utilities. To access Service ↵, the password 0005 at the prompt.

INPUT/OUTPUT CONFIGURATION

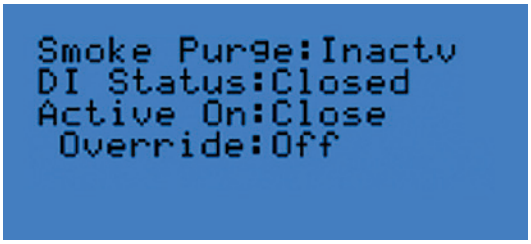
Figure 5-14. Service - I/O Config screen



This menu contains settings for digital and analog inputs and outputs. Access to any of these screens is password protected with the advanced service password. Contact factory before changing these settings as improper settings may cause equipment damage.

Digital Inputs

Figure 5-15. Digital Inputs - Smoke Purge screen



Each screen indicates the current status of the digital input, the input setting (Active on: open or close), and an override setting (default: OFF). The available digital inputs are:

- Smoke Purge – default: Active on Close
- Fire Trip – default: Active on Close
- Occ Override – default: Active on Close
- Purge Mode – default: Active on Close
- Rem Exh Fan – default: Active on Close
- Freezestat – default: Active on Open
- Event Mode – default: Active on Open
- Summer Vent Mode – default: Active on Open
- AC Proof Input – default: Active on Open
- CCH Brkr (Crankcase Heater Breaker) Status – default: Active on Close
- Master Run/PD Sw – default: Active on Close

The below inputs apply to D cabinet units only (VFDs).

- Sply Inv Flt – default: Active on Close
- Sply Inv Wrn – default: Active on Close
- Sply Inv Run – default: Active on Close
- Exh Inv Flt – default: Active on Close
- Exh Inv Wrn – default: Active on Close
- Exh Inv Run – default: Active on Close
- Pur Inv Flt – default: Active on Close
- Pur Inv Wrn – default: Active on Close
- Pur Inv Run – default: Active on Close

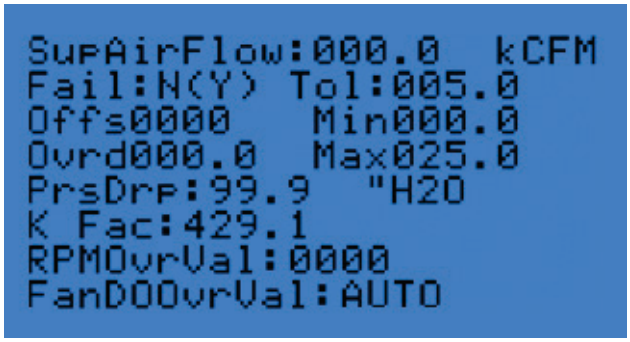
Figure 5-16. Digital Outputs - Supply Fan screen

Digital Outputs

Accessing the Digital Outputs menu is typical for troubleshooting. Each screen indicates the current status at the top, the normal (NRM) operation, and an override setting (default: AUTO). The digital outputs are:

- Supply Fan
- Exhaust Fan
- Purge Fan
- Aux Air Heat 1
- Aux Air Heat 2
- Aux Air Heat 3
- Aux Air Cool 1
- Aux Air Cool 2
- Aux Air Cool 3
- Alarm Output
- Remote Exhaust Fan
- Pool1 Aux Water Heat
- Pool2 Aux Water Heat
- Smart Pump Output 1
- Cpr1 ACC Fan Enable
- Cpr2 ACC Fan Enable
- Cpr3 ACC Fan Enable

Figure 5-17. Analog Inputs - Supply Air screen



The analog input screens are typically used to calibrate sensors. Each sensor configuration screen contains the following information:

Current Value (Read only) – displayed in the upper right of each screen

Fail Y (N) – indicates the read only status of the sensor with a writeable failure override in parenthesis. A value of N indicates normal or non-failure. A value of Y indicates the sensor reading is outside of the expected range.

Tol – This value is the tolerance of acceptable readings outside of the sensor's range. Therefore, for a sensor to be in failure, the reading must exceed the max or min value by more than the tolerance value.

Offs – The offset value is useful for calibrating the sensor. For example, if the reading from the space temperature is 2°F higher than the actual value, setting the offset to -002.0 will calibrate the sensor reading.

Min – The minimum acceptable reading for the sensor. For current loop sensors (4-20 mA), this parameter is the sensor value when the current in the loop is 4 mA. For voltage mode signals (0-10 VDC), this parameter is the sensor value when the voltage is 0 VDC. For thermistor based sensors, this parameter is the low limit value.

Max – The maximum acceptable reading for the sensor. For current loop sensors (4-20 mA), this parameter is the sensor value when the current in the loop is 20 mA. For voltage mode signals (0-10 VDC), this parameter is the sensor value when the voltage is 10 VDC. For thermistor based sensors, this parameter is the high limit value.

Ovrd – Setting this parameter to a non-zero value will replace the sensor reading with this value. This parameter is stored in permanent memory and will remain even if power to the controller is cycled. This parameter can be used to temporarily restore unit operation if a sensor has failed.

AvgFilter – Some of the sensors have this additional parameter. This is for additional sensor calibration/dampening. Do not change this value except under the instruction of PoolPak® authorized service technician.

In addition, the Supply, Purge, and Exhaust air flow sensor screens display the below parameters for help during initial air balancing.

PrsDrp (read only) – Pressure Drop
K Fac – K Factor
RPMOvrVal – RPM Override Value
FanDOOvrVal – Fan Digital Output Override Value

The below is a listing of the Analog Inputs and their related **default** values:

- Sply Fan Cur - Supply Fan Current - Tol = 005.0, Min = 000.0, Max* = 200.0 (Applies to D cabinets (VFDs) only.)
  *Max value must match actual maximum value in VFD
- Exh Fan Cur - Exhaust Fan Current - Tol = 005.0, Min = 000.0, Max* = 200.0 (Applies to D cabinets (VFDs) only.)
  *Max value must match actual maximum value in VFDr
- Pur Fan Cur - Purge Fan Current - Tol = 005.0, Min = 000.0, Max = 200.0 (Applies to D cabinets (VFDs) only.)
  *Max value must match actual maximum value in VFD

- Rtn Air Temp - Return Air Temperature - Min = 025.0, Max = 130.0
- Out Air Temp - Outside Air Temperature - Min = -040.0, Max = 150.0
- Off Evap Temp - Air Off the Evaporator Temperature - Min = -040.0, Max = 150.0
- Surf Temp - Surface or Cold Wall Temperature - Min = 000.0, Max = 130.0
- Sply Air Tmp - Supply Air Temperature - Min = 000.0, Max = 250.0

- Rtn Air RH - Return Air Relative Humidity - Tol = 010.0, Min = 000.0, Max = 100.0
- Outs Air RH - Outside Air Relative Humidity - Tol = 010.0, Min = 000.0, Max = 100.0
- Air Off Evp RH - Air Off the Evaporator Relative Humidity - Tol = 010.0, Min = 000.0, Max = 100.0

- Rcrc Dpr Fbk - Recirculation Air Damper Feedback - Tol = 005.0, Min = -025.0, Max = 100.0
- Outs Dpr Fbk - Outside Air Damper Feedback - Tol = 005.0, Min = -025.0, Max = 100.0
- EvapBypDpr Fbk - Evaporator/Bypass Damper Feedback - Tol = 005.0, Min = -025.0, Max = 100.0

- RtnFltrPD - Return Air Filter Pressure Drop - Tol = 0.500, Min = 0.000, Max = 2.000
- OutFltrPD - Outside Air Filter Pressure Drop - Tol = 0.500, Min = 0.000, Max = 2.000

- ExhAirFlow - Exhaust Air Flow - Tol = 005.0, Min = 000.0, Max = 025.0
  Airflow: K Fac = 97.0, RPMOvrVal = 0000, FanDOOvrVal = AUTO
- OutAirVol - Outside Air Volume - Tol = 005.0, Min = 000.0, Max = 043.0
- SupAirFlow - Supply Air Flow - Tol = 005.0, Min = 000.0, Max = 025.0
  Airflow: K Fac = 429.1, RPMOvrVal = 0000, FanDOOvrVal = AUTO
- PurAirFlow - Purge Air Flow - Tol = 005.0, Min = 000.0, Max = 025.0
  Airflow: K Fac = 194.1, RPMOvrVal = 0000, FanDOOvrVal = AUTO

- Rtn Air CO2 - Return Air CO2 Level - Tol = 0100, Min = 0000, Max = 2000

- Spc Air Prs - Space Air Pressure - Tol = 0500, Min = -1000, Max = 1000

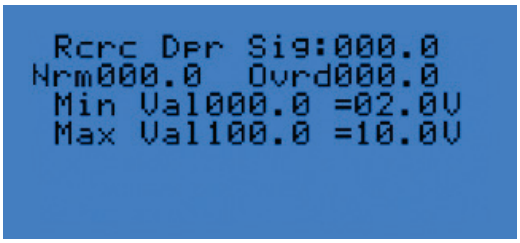
- Pool 1 Temp - Pool 1 Water Temperature - Tol = 010.0, Min = 010.0, Max = 150.0
- Pool 2 Temp - Pool 2 Water Temperature - Tol = 010.0, Min = 010.0, Max = 150.0

- PoolA Wtr PD - Water Pressure Drop for condenser section “PoolA” (ft of water)
  Tol = 005.0, Min = 000.0, Max = 069.2

- PoolB Wtr PD - Water Pressure Drop for condenser section “PoolB” (ft of water)
  Tol = 005.0, Min = 000.0, Max = 069.2

Analog Outputs

Figure 5-18. Analog Outputs - Recirculation Damper Screen



Accessing the Analog Outputs menu is typical for advanced troubleshooting. Below is a listing of the available analog outputs and **default** values for testing:

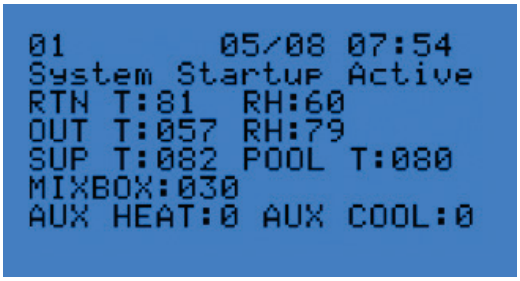
- Rcrc Dpr Sig – Recirculation Air Damper Signal -
  Ovrd = 000.0, Min Val 000.0 = 02.0V, Max Val 100.0 = 10.0V
- OA Dpr Sig – Outside Air Damper Signal -
  Ovrd = 000.0, Min Val 000.0 = 02.0V, Max Val 100.0 = 10.0V
- EvapByp Dpr Sig – Evaporator/Bypass Damper Signal -
  Ovrd = 000.0, Min Val 000.0 = 02.0V, Max Val 100.0 = 10.0V
- AuxAir Ht Sig – Auxiliary Air Heating Signal (Control Valve) -
  Ovrd = 000.0, Min Val 000.0 = 02.0V, Max Val 100.0 = 10.0V
- AuxAir Cl Sig – Auxiliary Air Cooling Signal (Control Valve) -
  Ovrd = 000.0, Min Val 000.0 = 02.0V, Max Val 100.0 = 10.0V
- Sply Spd Sig – Supply Fan Speed Signal -
  Ovrd = 000.0, Min Val 000.0 = 00.0V, Max Val 2000.0 = 10.0V
- Exh Spd Sig – Exhaust Fan Speed Signal -
  Ovrd = 000.0, Min Val 000.0 = 00.0V, Max Val 2000.0 = 10.0V
- Pur Spd Sig – Purge Fan Speed Signal -
  Ovrd = 000.0, Min Val 000.0 = 00.0V, Max Val 2000.0 = 10.0V

HISTORY

The History menu, also known as the Fault History Log, maintains a log of the last 100 unit faults. Each fault in the log is assigned a number from 1 to 100 (Fault #01 is the most recent). This fault number is in the upper left of each fault screen. The time and date the fault occurred is in the upper right. The Fault Condition is on the second line on each screen. See the list of Fault Conditions in the *Troubleshooting section*.

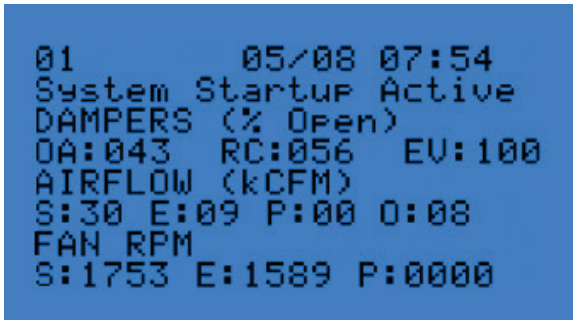
Use the ↑ and ↓ arrow keys to cycle through the faults one at a time. For each fault, there are also six screens of additional information. Use the ↵ key to scroll through these detailed fault screens. See below breakdown of each screen for more details.

Figure 5-19. Fault Screen 1 – System Status Overview



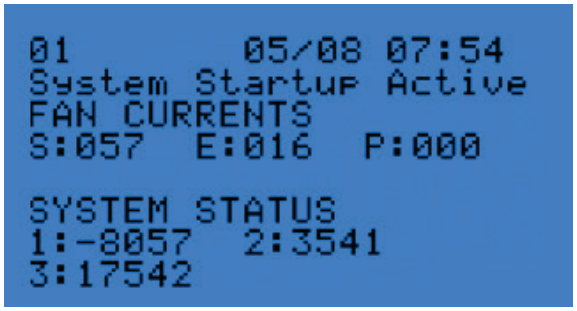
RTN T – Return Air Temperature (°F)
RH – Return Air Relative Humidity (%)
OUT T – Outside Air Temperature (°F)
RH – Outside Air Relative Humidity (%)
SUP T – Supply Air Temperature (°F)
POOL T – Pool Water Temperature (°F)
MIXBOX – Mixing Box Position (%)
AUX HEAT – Auxiliary Heat Stages
AUX COOL – Auxiliary Cool Stages

Figure 5-20. Fault Screen 2 – Airflow Status



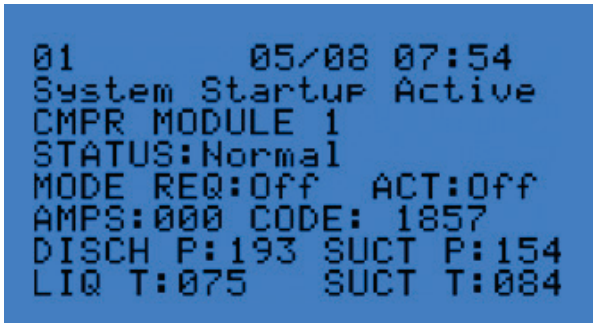
Dampers (% Open):
OA – Outside Air RC – Recirculation Air EV – Evaporation Bypass Air
Airflow (kCFM)
S – Supply Air E – Exhaust Air P – Purge Air O – Outside Air
Fan RPM
S – Supply Fan E – Exhaust Fan P – Purge Fan

Figure 5-21. Fault Screen 3 – Fan Currents



Fan Currents (Amps) D cabinets only:
S – Supply Fan E – Exhaust Fan P – Purge Fan
System Status – Factory Use Only

Figure 5-22. Fault Screen 4 – Compressor Module 1 Fault Screen



CMPR MODULE 1 STATUS: No Active Faults or CprFaultName
MODE REQ – CmprMode requested by Controller at time of fault
ACT – Actual CmprMode running at time of fault
AMPS – Compressor Run Amps
CODE – Factory Use Only
DISCH P – Discharge Refrigerant Pressure (psi)
SUCT P – Suction Refrigerant Pressure (psi)
LIQ T – Liquid Refrigerant Temperature (°F)
SUCT T – Suction Refrigerant Temperature (°F)

Unit Configuration

Figure 5-23. Unit Configuration - Installed Features Menu

The Unit Configuration menu is where to access system set-up parameters. From here, the following configuration parameters can be accessed: Installed Features, Supply Fan, Exhaust Fan, Purge Fan, Compressor System, Dampers, Pool Water Heating, Auxiliary Air Heating System, Auxiliary Air Cooling System, Auxiliary Air Dehumidification System, Space Temperature Control, Space Dewpoint Control, Mixing Box Control, and BAS Interface. For all below parameters, the **default** setting is in **bold** font.

Inst Features – Installed Features

- Cpr Stgs Ins – Compressor Stages Installed – 3 (Range 0 to 4)
- Cpr1 Wtr Circ – Compressor 1 Water Circuit – **A&B** (Range A or A&B)
- Cpr2 Wtr Circ – Compressor 2 Water Circuit – A (Range A or B)
- Split Wtr Cond – Split Water Condenser – No or Yes
- Air Cool Type – Mechanical Air Cooling Type – **None**, ACC (Air-Cooled Condenser), WCC (Water Cooled Condenser, or CHW (Chilled Water Coil)
- Max EF Vol – Maximum Exhaust Fan Volume – 32.6 kCFM (Range 0 to 99.9)
- Pool Wtr Cond – Pool Water Condenser Type – **Full** or Partial or None.
- Exhaust Fan Inst – Exhaust Fan Installed in unit – No or Yes
- Purge Fan Inst – Purge Fan Installed in unit – No or **Yes**
- Spc Press Sen Inst – Space Pressure Sensor Installed in space – **No** or Yes
- Rtn CO2 Sen Inst – Return Air CO2 Sensor Installed – **No** or Yes
- MultiUnit Control – **No**, set to Yes for multi-unit networking
- Rem Exh Fan Ins – Remote Exhaust Fan Installed – **No** or Yes
- CW/HW DH Mode – Chilled Water/Hot Water Dehumidification Mode installed – **No** or Yes
- Fan Speed Ctl Type - EC or VFD

Supply Fan – Supply Fan Configuration

- Run Cur Tol – Fan Proof Current – **002.5 A** (Range 0 to 999.9) D cabinet only
- Run Cur Dly – Time Delay to Prove Current – **05** s (Range 0 to 99) D cabinet only
- Flow Ctl – Airflow Control Mode
- **CFM Setp** – This mode indicates that the fan speed or outside air damper position will be controlled to maintain airflow at CFM set points.
- Spd Setp – This mode indicates that the supply fan speed will be controlled by setting the supply fan RPM set points.

If Spd Setp selected, set the below setpoints:

- Occ Speed – Fan Speed during Occupied Mode – **1752** RPM (Range 30 to 1800)
- Unocc Speed – Fan Speed during Unoccupied Mode – **1402** RPM (Range 30 to 1800)
- Purge Speed – Fan Speed during Purge Mode – **1752** RPM (Range 30 to 1800)

If CFM Setp selected, set the below setpoints:

- Occ Flow – Occupied Mode Airflow – **30.0** kCFM (Range 0 to 70)
- Unocc Flow – Unoccupied Mode Airflow – **24.0** kCFM (Range 0 to 70)
- Purge Flow – Purge Mode Airflow – **30.0** kCFM (Range 0 to 70)
- Min Ctl Spd – Minimum Control Speed – **540** RPM (Range 0 to 2000)

Max Ctl Spd – Maximum Control Speed – 1950 RPM (Range 0 to 3000) Contact Factory before adjusting the below values:

- Ctl Dband – Control Deadband – **00.0** kCFM (Range 0 to 10.0)

- Ctl Gain – Control Gain – **065.0** kCFM (Range 0 to 999.9)
- Ctl Int Time – Control Integral Time – **003** s (Range 0 to 999)
- Ctl Der Time – Control Derivative Time – **000** s (Range 0 to 999)
- Ctl Upd Time – Control Update Time – **05000** ms (Range 0 to 32767)
- Ctl Anti-Bump – Control Anti-Bump? **Off** or On

Exhaust Fan – Exhaust Fan Configuration

- Minimum kCFM – Minimum Airflow – **05.5** kCFM (Range 0 to 99.9)
- Maximum kCFM – Maximum Airflow – **11.0** kCFM (Range 0 to 99.9)
- Run Cur Tol – Fan Proof Current – **002.5** A (Range 0 to 999.9) D cabinet only
- Run Cur Dly – Time Delay to Prove Current – **05** s (Range 0 to 99) D cabinet only
- Purge Speed – The speed (RPM) of the exhaust fan during purge. – **1590** RPM (Range 30 to 1800)
- Exh Fan Spd – Exhaust Fan Speed Control Setting –
  - **CFM Setp** – This mode indicates that the fan speed or outside air damper position will be controlled to maintain airflow at CFM set points.
  - OAD%/Spd – This mode indicates that the exhaust fan speed will be controlled by setting the RPM set points based on the amount of outside air in the supply air.
- Exh/OA Offs – Exhaust Air/Outside Air Offset – **7.0 %** (Range -20.0 to 20.0)
- RemExhVol – Remote Exhaust Fan Air Volume – **00.0** kCFM (Range -50.0 to 50.0)

If CFMSetp selected, set the below set points:

- Min Ctl Spd – Minimum Control Speed – **0540** RPM (Range 0 to 2000)
- Max Ctl Spd – Maximum Control Speed – **1950** RPM (Range 0 to 3000)

Contact Factory before adjusting the below values:

- Ctl Dband – Control Deadband – **00.0** kCFM (Range 0 to 10.0)
- Ctl Gain – Control Gain – **020.0** kCFM (Range 0 to 999.9)
- Ctl Int Time – Control Integral Time – **003** s (Range 0 to 999)
- Ctl Der Time – Control Derivative Time – **000** s (Range 0 to 999)
- Ctl Upd Time – Control Update Time – **05000** ms (Range 0 to 32767)
- Ctl Anti-Bump – Control Anti-Bump? **Off** or On

If OAD%/Spd selected, set the below set points:

- Unocc 1-7 (Unoccupied Mode Stages 1 to 7) – (Range 0 to 100%/ 0 to 2000 RPM)
  1. **000.0%/0787 RPM**
  2. **015.0%/0787 RPM**
  3. **030.0%/0787 RPM**
  4. **045.0%/0900 RPM**
  5. **060.0%/0950 RPM**
  6. **070.0%/1000 RPM**
  7. **100.0%/1100 RPM**
- Occ 1-7 (Occupied Mode Stages 1 to 7) – (Range 0 to 100%/ 0 to 2000 RPM)
  1. **000.0%/0609 RPM**
  2. **015.0%/0609 RPM**
  3. **030.0%/0609 RPM**
  4. **045.0%/0620 RPM**
  5. **060.0%/0753 RPM**
  6. **070.0%/1000 RPM**
  7. **100.0%/1107 RPM**

Purge Fan – Purge Fan Configuration

- Minimum kCFM – Minimum Airflow – **11.0** kCFM (Range 0 to 99.9)
- Maximum kCFM – Maximum Airflow – **21.6** kCFM (Range 0 to 99.9)
- Run Cur Tol – Fan Proof Current – **002.5** A (Range 0 to 999.9) D cabinet only

- Run Cur Dly – Time Delay to Prove Current – **05** s (Range 0 to 99) D cabinet only
- Purge Speed – The speed (RPM) of the purge fan during purge – **1811** RPM (Range 30 to 1800)
- Pur Fan Spd – Purge Fan Speed Control Setting –
  - **Flow Ctl** – This mode indicates that the fan speed or outside air damper position will be controlled to maintain airflow at CFM set points.
  - RPM Setp – This mode indicates that the purge fan speed will be controlled by setting the supply fan RPM set points.
- Purge Min OAT – minimum allowable outside air temperature during purge (°F) – **40.0**°F (Range -40.0 to 99.9)
- Enab Prg Min OAT – Enable the Purge Min OAT limit **YES** or No
- Min Ctl Spd – Minimum Control Speed – **0540** RPM (Range 0 to 2000)
- Max Ctl Spd – Maximum Control Speed – **1950** RPM (Range 0 to 3000)

Contact Factory before adjusting the below values:
- Ctl Dband – Control Deadband – **00.0** kCFM (Range 0 to 10.0)
- Ctl Gain – Control Gain – **100.0** kCFM (Range 0 to 999.9)
- Ctl Int Time – Control Integral Time – **003** s (Range 0 to 999)
- Ctl Der Time – Control Derivative Time – **000** s (Range 0 to 999)
- Ctl Upd Time – Control Update Time – **05000** ms (Range 0 to 32767)
- Ctl Anti-Bump – Control Anti-Bump? **Off** or On

Compr Sys – Compressor System Configuration
- Cpr 1 Enabled – Compressor Module 1 Enabled? **Yes** or No
- Cpr 2 Enabled – Compressor Module 2 Enabled? **Yes** or No
- Cpr 3 Enabled – Compressor Module 3 Enabled? **Yes** or No
- Cpr Air Cool – Compressor Air Cooling Mode Enabled? **Enabled** or Disabled
- Cpr Air Heat – Compressor Air Heating Mode Enabled? **Enabled** or Disabled
- Cpr Wtr Heat – Compressor Water Heating Mode **Enabled**? Enabled or Disabled
- Cpr Cool Min OAT – The minimum allowable outside air temperature during compressor cooling (°F) – **62.0 °F** (Range 0 to 99.9)
  - Stage **1** Cpr Cfg – Which compressor module(s) to enable for Stage 1? Default: 1 (Range None, 1, 2, 3, 1&2, 1&3, 2&3, 1&2&3)
  - Stage 2 Cpr Cfg – Which compressor module(s) to enable for Stage 2? Default: **1&2** (Range None, 1, 2, 3, 1&2, 1&3, 2&3, 1&2&3)
  - Stage 3 Cpr Cfg – Which compressor module(s) to enable for Stage 3? Default: **1&2&3** (Range None, 1, 2, 3, 1&2, 1&3, 2&3, 1&2&3)
  - Stage 4 Cpr Cfg – Which compressor module(s) to enable for Stage 4? Default: **1&2&3** (Range None, 1, 2, 3, 1&2, 1&3, 2&3, 1&2&3)

Dampers

Outside Air – Outside Air Damper
- Pos Correction – Damper Position Correction based on damper feedback readings Yes or **NO**
- Flow Ctl – Type of damper flow control –
  - % Open – Correlates the Mixing Box % or percent of OA that makes up supply air to the OA damper
  - **CFM Setp** – This mode indicates that the outside air damper position will be controlled to maintain airflow at CFM set points.

Contact Factory before adjusting the below values:
- Ctl Gain – Control Gain – **000.0** kCFM (Range 0 to 999.9)
- Ctl Int Time – Control Interval Time – **030** s (Range 0 to 999)
- Ctl Der Time – Control Derivative Time – **000** s (Range 0 to 999)
- Ctl Dband – Control Deadband – **00.0** kCFM (Range 0 to 99.9)
- Ctl Upd Time – Control Update Time – **05000** ms (Range 0 to 32767)
- Ctl Anti-Bump – Control Anti-Bump? **Off** or On

If % Open selected, set the below set points:

- MB%/OA% 1-7 (Mixing Box %/ Outside Air % Stages 1 to 7) – (Range 0 to 100.0%)
  1. 000.0/000.0
  2. 015.0/030.0
  3. 020.0/035.0
  4. 030.0/045.0
  5. 050.0/060.0
  6. 075.0/080.0
  7. 100.0/100.0

Recirc Air – Recirculation Air Damper

- Pos Correction – Damper Position Correction based on damper feedback readings Yes or NO
- Point 1- Point 7 OAD%, RAD% - OA damper position to RA damper position Stages 1 to 7.
  1. 000.0%/100.0%
  2. 030.0%/070.0%
  3. 045.0%/055.0%
  4. 055.0%/045.0%
  5. 065.0%/035.0%
  6. 085.0%/020.0%
  7. 100.0%/000.0%

Evap Bypass – Evaporator/Bypass Air Damper

- HighSHR Evap kCFM – High Sensible Heat Recovery Evaporator Coil Airflow – 24.7 kCFM (Range 0 to 99.9)
- LowSHR Evap kDFM – Low Sensible Heat Recovery Evaporator Coil Airflow – 20.2 kCFM (Range 0 to 99.9)
- Point X1,Y1 to X7, Y7 % Open per Airflow kCFM – Damper Position per Airflow (Range 0 to 99.9)

  X1: 00.0 kCFM Y1: 00.0%OP
  X2: 02.4 kCFM Y2: 30.0%OP
  X3: 06.7 kCFM Y3: 50.0%OP
  X4: 10.7 kCFM Y4: 60.0%OP
  X5: 16.0 kCFM Y5: 70.0%OP
  X6: 19.6 kCFM Y6: 80.0%OP
  X7: 27.7 kCFM Y7: 99.9%OP

Pool Water Heating

- Cmpr Wtr Heat – Enable Compressor Pool Water Heating? **Enabled** or Disabled
- Smart Pump – Enable Smart Pump Control? Enabled or **Disabled**
- Smart Pump Frz Pro – Enable Freeze Protection when using Smart Pump Control? **Yes** or No
- Circ A Min PD – Circuit A Minimum Water Flow Pressure Differential in order to run pool water heating – **08.3' W.C.** (Range 0 to 99.9)
- Circ B Min PD – Circuit B Minimum Water Flow Pressure Differential in order to run pool water heating – 08.3' **W.C.** (Range 0 to 99.9)
- A On/Off DB – Circuit A On/Off Deadbands – **00.0/01.8'** (Range 0 to 99.9)
- B On/Off DB – Circuit A On/Off Deadbands – **00.0/01.8'** (Range 0 to 99.9)
- Pool1 Cpr DB – On/Off Deadbands for Compressor Pool Water Heating of Pool 1 – **0.2 /0.5** (Range -9.9 to 9.9)
- Pool2 Cpr DB – On/Off Deadbands for Compressor Pool Water Heating of Pool 2 – **0.2 /0.5** (Range -9.9 to 9.9)
- Pool1 Aux DB – On/Off Deadbands for Auxiliary Pool Water Heating of Pool 1 – **0.7 /-0.2** (Range -9.9 to 9.9)
- Pool2 Aux DB – On/Off Deadbands for Auxiliary Pool Water Heating of Pool 2 – **0.7 /-0.2** (Range -9.9 to 9.9)

Aux Air Heating – Auxiliary Air Heating Configuration

- Sys Type – Type of Auxiliary Heating System Installed
  - None – No Aux Heat Installed

  - **LPHW – Low Pressure Hot Water Heat**
  - Elec – Electric Aux Heat
  - Gas – Gas Aux Heat
  - Steam – Steam Coil Aux Heat
- Frz Stat Inst – Freeze Stat Installed? Yes or **No**
- Stages Installed – Number of Aux Heat Stages Installed – 5 (Range 0 to 5)
- Aux Heat First – **Yes** or No – This parameter determines if the Auxiliary Heat or compressor is the first stage of space heating. On a call for both space heating and dehumidification, compressor will always be first.
- Ctl Type – Control Type setting for the Auxiliary Heat System – **Staged** or Disch Air Tmp (Control based on
- Discharge Air Temperature)
- Stg 1-5 Setp – Stage 1-5 Setpoints for staging aux heat capacity (Range 0 to 100%)
  1. **020.0%**
  2. **040.0%**
  3. **060.0%**
  4. **080.0%**
  5. **100.0%**
- Min Sply Tmp – Minimum Supply Temperature – **40.0°F** (Range 0 to 99.9)
- FrzAlmClearDly – Freeze Alarm Clear Delay (sec) – **0900** s (Range 30 to 9999)
- Sys Fail Detect – System Fail Detect Enabled? (gives an alarm if the aux system is on but does not satisfy the Minimum Temperature Rise) Yes or **No**
- Failure Delay – Time delay before a failure is reported – **300** s (Range 0 to 999)
- Min Temp Rise – Minimum Temperature Rise (°F) – **10.0°F** (Range 0 to 99.9)
- Stage 1-5 Offset (Range 0 to 100.0)
  1. **005.0**
  2. **010.0**
  3. **015.0**
  4. **020.0**
  5. **025.0**
- Min Ctl Pct Outp – Minimum Control Percentage Output – **000.0** (Range 0 to 999.9)
- Max Ctl Pct Outp – Maximum Control Percentage Output – **100.0** (Range 0 to 999.9)

Contact Factory before adjusting the below values:

- Ctl Gain – Control Gain – **065.0°F** (Range 0 to 999.9)
- Ctl Int Time – Control Integral Time – **030** s (Range 0 to 999.9)
- Ctl Der Time – Control Derivative Time – **000** s (Range 0 to 999.9)
- Ctl Dband – Control Deadband – 0**0.0°F** (Range 0 to 10.0)
- Ctl Upd Time – Control Update Time – **10000 ms** (Range 0 to 32767)
- Ctl Anti-Bump – Control Anti-Bump? **Off** or On

Aux Air Cooling – Auxiliary Air Cooling Configuration

- Sys Type – Type of Auxiliary Cooling System – **None** or CHW (Chilled Water Coil)
- Frz Stat Inst – Freeze Stat Installed? Yes or **No**
- Stages Installed – Number of Aux Cool Stages Installed – **0** (Range 0 to 5)
- Aux Cool First – Yes or **No** – This parameter determines if the Auxiliary Cooling system or compressor is the first stage of space cooling. On a call for both space cooling and dehumidification, compressor will always be first.

- Stg 1-5 Setp – Stage 1-5 Setpoints for staging aux cool capacity (Range 0 to 100.0)
  1. **020.0%**
  2. **040.0%**
  3. **060.0%**
  4. **080.0%**
  5. **100.0%**
- Min Sply Tmp – Minimum Supply Temperature – **40.0°F** (Range 0 to 99.9)
- Sys Fail Detect – System Fail Detect (gives an alarm if the aux system is on but does not satisfy the Minimum Temperature Drop) Yes or **No**
- Failure Delay – Time delay before a failure is reported – **300 s** (Range 0 to 999)
- Min Temp Drop – Minimum Temperature Drop (°F) – **10.0°F** (Range 0 to 99.9)

Aux Air Dehum – Auxiliary Air Dehumidification System Configuration
- Aux CW/HW Deh – Auxiliary Chilled Water/Hot Water Dehumidification Enabled? Enabled or **Disabled**
- OAT Trigger Temp – Minimum Differential Temperature between Outside Air and Return before auxiliary dehumidification system will be enabled – **20.0°F** (Range 0 to 50.0F)
- Aux Dehum First – Yes or **No** – This parameter determines if the Auxiliary Dehumidification system or compressor is the first stage of dehumidification.

Space Temp Ctl – Space Temperature Control Setting
- F/W Cool - Flywheel Air Cooling mode - **00.0** (Range 00.0 to 30.0) - This parameter controls the PoolPak flywheel air conditioning feature. A setting of 00.0 disables flywheel cooling. A setting of 05.0 or greater activates flywheel cooling. The parameter value is the number of degrees that the space temperature is allowed to drop below the set point while cooling the pool during the unoccupied period.
- Select either **ECCII Fuzzy Dly** or PID Delay. Contact Factory before adjusting the below values

If ECCII Fuzzy Dly selected:
- Base Stg Delay – Base Stage Delay (min) – 08.0 min (Range 1.0 to 20.0)
- Fuzzy Max Rate – A fuzzy logic parameter – 04 (Range 1 to 10)
- Fzy Calc Period – A fuzzy logic parameter – 20 s (Range 10 to 99)

If PID Delay selected:
- Control Band – 250.0 °F (Range 10.0 to 999.9)
- Int Time – 0120 s (Range 0 to 3000)
- Der Time – 0300 s (Range 0 to 9999)
- Update Time – 10000 ms (Range 0 to 32767)
- Base Dly Tim – 06.0 min (Range 1.0 to 20.0)

Dew Point Control – Dew Point Control Setting

Select either ECCII Fuzzy Dly or PID Delay. Contact Factory before adjusting the below values

If ECCII Fuzzy Dly selected:
- Base Stg Delay – Base Stage Delay (min) – 08.0 min (Range 1.0 to 20.0)
- Fuzzy Max Rate – A fuzzy logic parameter – 04 (Range 1 to 10)
- Fzy Calc Period – A fuzzy logic parameter – 20 s (Range 10 to 99)

If PID Delay selected:
- Control Band – 250.0 °F (Range 10.0 to 999.9)
- Int Time – 0120 s (Range 0 to 3000)
- Der Time – 0300 s (Range 0 to 9999)
- Update Time – 10000 ms (Range 0 to 32767)
- Base Dly Tim – 06.0 min (Range 1.0 to 20.0)

Mixing Box Ctl – Mixing Box Control Configuration

- Type – None or Var Stage (Variable Stage Control)
- Event Min Pos – Event Mode Minimum Mixing Box Position (%) – 50 % (Range 0 to 99)
- Purge Max Pos – Purge Mode Maximum Mixing Box Position (%) – 100 % (Range 0 to 100)
- Deh Econo (read only?) – Dehumidification Economizer Enabled or Disabled?
- Cool Econo (read only?) – Cooling Economizer Enabled or Disabled?
- ClTD/Stg 1-7 – Mixing Box Cooling Positions for Variable Stage Control – (Range 0 to 99.9)
  1. 05.0/50.0
  2. 10.0/36.0
  3. 15.0/28.0
  4. 20.0/20.0
  5. 25.0/15.0
  6. 30.0/10.0
  7. 40.0/10.0
- DPTD/Stg 1-7 – Mixing Box Dehumidification Positions for Variable Stage Control – (Range 0 to 99.9)
  1. 05.0/50.0
  2. 10.0/36.0
  3. 15.0/28.0
  4. 20.0/20.0
  5. 25.0/15.0
  6. 30.0/10.0
  7. 40.0/10.0
- Min DPT Diff – Minimum Dewpoint Difference allowed (°F) – 3.0 °F (Range -99.9 to 99.9)
- Min Tmp Diff – Minimum Temperature Difference allowed (°F) – 3.0 °F (Range -99.9 to 99.9)

BAS Interface – Building Automation System Interface Configuration

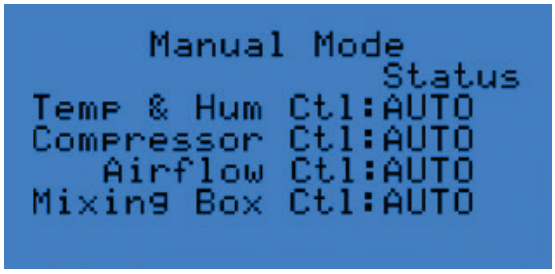
- Type – The BAS Type available
  Default: Carel (Range BACnet, LonWorks, Modbus)
- Baud Rate – Transfer speed of communications
  Default: 19200 (Range 1200, 2400, 4800, 9600, 19200)
- Unit's BAS Addr – Address of the Controller in a supervisory system network
  Default: 001 (Range 001 to 207)

Manual Mode

Accessing the manual mode from the service menu may be preferable to digging through the inputs and outputs and configuration parameters. Manual mode also does not require the advanced service password for access. This control function is best used for unit troubleshooting for temperature and humidity control, compressor control, airflow control, and mixing box control. See below review of each screen.

Manual Mode Overview - Screen 1

Figure 5-24. Manual Mode Screen 1 - Overview



The first screen indicates the current status of manual mode activity.

- AUTO = Unit mode is running normally (Manual Mode inactive)
- MANUAL = Manual Mode is active for that unit mode

Temp & Hum Ctl - Temperature and Humidity Control

To activate manual mode parameters for Temperature and Humidity Control change to read MANUAL. Man is the manual stages entered by the user. Auto is the stages currently requested by the controller if under normal operation.

- Ht/Cl Stgs – Heat or Cool Stages Active (Range -09 to 09)
- Dehum Stgs – Dehumidification Stages Active (Range 00 to 09)
- SHR Mode – Sensible Heat Recovery Mode (Low or High)
- EvpByp Dpr – Evaporator/Bypass Damper Position (Range 00 to 100.0)

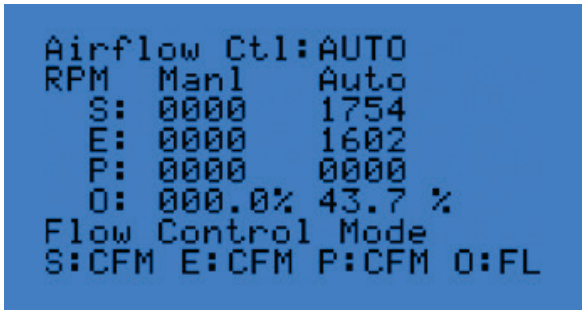
Cpr Mode Ctl - Compressor Mode Control

To activate manual mode parameters for Compressor Mode Control change to read MANUAL. Man is the manual stages entered by the user. Req is the mode requested under MANUAL entry. Act is the actual mode of operation of the controller as either under AUTO control or MANUAL entry. Compressor modes:

- Off – Compressor module inactive
- AC – Air Cooling mode
- WH – Water Heating mode
- AH – Air Heating mode

Airflow Ctl - Airflow Control Screens 1 and 2 (RPM and kCFM)

Figure 5-25. Manual Mode Screen 4 - Airflow Control: Fan Speed (RPM)



To activate manual mode parameters for airflow control based on FAN SPEED or AIRFLOW, change to read MANUAL. Manl is the manual RPM or kCFM levels as entered by the user. Auto is the RPM or setpoint kCFM that would apply if it were not in MANUAL mode. Fan codes are:

- S = Supply Fan
- E = Exhaust Fan
- P = Purge Fan
- O = Outside Air Opening (Flow or %O - Percent Open)

Flow Control Mode – These parameters are shown on both the RPM/%Open control screen and the kCFM airflow control screen. The purpose is to allow the user to control each device in either kCFM or RPM manual modes.

Mix Box Ctl - Mixing Box Control

To activate Mixing Box Control, change the top parameter to MANUAL. Man is the value as entered by the user. Auto is the value as if the unit were in AUTO mode.

- % Open – The percent of outside air in the supply air (Range 0 to 100.0)
- Exh Loc – Exhaust Location B4Evp (Before Evaporator) or AftEvp (After Evaporator)

Digital Outputs - Digital Output Test Mode Screens 1 and 2

These screens are to be used to test the digital outputs. To test an output, press the enter key until the cursor is next to the desired output and use the arrow keys to change to either OFF or ON then press the enter key. Available digital outputs:

- SFan – Supply Fan
- Efan – Exhaust Fan
- PFan – Purge Fan
- RemEF – Remote Exhaust Fan
- PPump – Pool Water Pump (Smart Pump Output)
- Alarm – Alarm output
- AxHt1-3 – Auxiliary Heat Outputs 1 to 3
- AxCl1-3 – Auxiliary Cool Outputs 1 to 3
- AxWt1-2 – Auxiliary Water Heat Outputs 1 and 2.

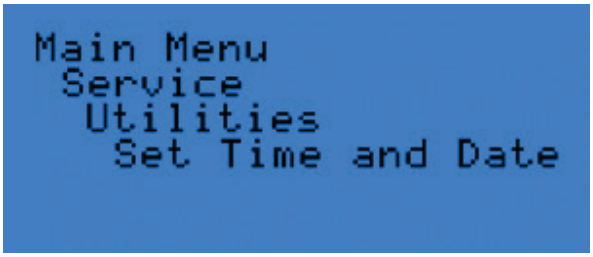
Analog Outputs - Analog Output Test Mode Screens 1 and 2

These screens are to be used to test the analog outputs. To test an output, press the enter key until the cursor is next to the desired output and use the arrow keys to select a desired setting. Available analog outputs:

- RcrcDpr – Recirculation Damper Position (Range 0 to 100.0 %)
- OutsDpr – Outside Air Damper Position (Range 0 to 100.0 %)
- EvapDpr – Evaporation/Bypass Damper Position (Range 0 to 100.0 %)
- AuxHeat – Auxiliary Heat Valve Position (Range 0 to 100.0 %)
- AuxCool – Auxiliary Cool Valve Position (Range 0 to 100.0 %)
- SupFan – Supply Fan Speed RPM (Range 0 to 2100)
- ExhFan – Exhaust Fan Speed RPM (Range 0 to 2100)
- PurFan – Purge Fan Speed RPM (Range 0 to 2100)

Utilities

Figure 5-26. Utilities Menu - Set Time and Date



The Utilities menu is holds the following additional system settings:

- Set Time and Date – Calibrating the local time and date for the PoolPak unit is important since this information is used in the Fault History log and will give the exact time a fault has occurred.
- Passwords – Passwords are available for protecting both SetPoint Changes (0000) and Scheduling Changes (0000) from unauthorized tampering.
- Units of Measure – Use this setting to convert the readings to either SI or Eng (English) units.

Airflow Balancing

Overview

Airflow balancing is an important part of operation and unit commissioning. The design conditions especially for static pressures are not expected to meet actual conditions and thus adjustments will need to be made. The MPK unit is able to maintain a self-balancing condition with its Smart Air ManagementTM feature but must first be properly configured.

Guidelines for Performing a Proper Airflow Balance

PoolPak LLC recommends that the air balance be performed by an independent air balancing contractor. In addition to supplying the proper tools, a good air balancing contractor will follow the below guidelines:

- Supply a report with all the below recorded design and actual data.
- Take a representative traverse of the duct to attain good readings for supply, return, exhaust, and outdoor air flows. This may require additional traverses for a particular air inlet depending on the duct installation.
- Record the following design and actual data for all supply, return, exhaust, and outdoor air flows:
  - Air flow rates
  - Static pressure readings
  - Fan speeds and power consumption (fan amps on D cab only)
  - All motorized damper set points for each set of data
- Record the above data at both the minimum and maximum operating modes:
  - Purge mode (or 100% outside air)
  - Unoccupied mode (or 0% outside air)

PoolPak requires the above information as complete as possible. This information is needed to adequately configure the MPK unit to attain the desired ventilation.

Controller Adjustments

The controller airflow parameters can be adjusted to properly balance the airflow entering and leaving the MPK unit. PoolPak recommends that this procedure be done at unit startup and therefore a full procedure is part of the PoolPak MPK Start Up Procedure.

Troubleshooting

Overview

The below section is a brief description of general features of the PoolPak CPCS controller that can be used in troubleshooting fault conditions that arise with the PoolPak unit.

System Status Information

To aid in troubleshooting, the CPCS controller contains all of the pertinent system status information to let the user know the current operation status of the PoolPak unit. Many alarms can be diagnosed and resolved just by reviewing the system status information. The below is a list of the conditions and possible causes depending on the type of condition:

ALARMNAME:

Below is a list of all alarms as displayed on the controller and possible causes:

Freeze = Freeze Warning – Supply Temp too low (< 40F)

Check aux air heating system.
Check for stuck outside air damper.
If SplyTemp sensor failure also shown, check supply air temp sensor.

FireTrip = Fire Trip active
Check for signal from building fire and smoke control system.
Verify that the input is correctly configured for active on open or close.

SmkPurge = Smoke Purge active
Check for signal from fireman's switch or fire control system.
Verify that the input is correctly configured for active on open or close.

SFanOff = Supply Fan is off
The controller is asking the supply fan to run, but it is not.
Check to be sure the supply fan VFD is in AUTO mode. (D cab only)
Check for fault messages on the supply VFD display.(D cab only)
Check to be sure the supply fan digital output is not forced to OFF.
Check to be sure the supply fan speed analog output is not forced to zero (0).

EFanOff = Exhaust Fan is off
The controller is asking the exhaust fan to run, but it is not.
Check to be sure the exhaust fan VFD is in AUTO mode. (D cab only)
Check for fault messages on the exhaust VFD display.(D cab only)
Check to be sure the exhaust fan digital output is not forced to OFF.
Check to be sure the exhaust fan speed analog output is not forced to zero (0).

PFanOff = Purge Fan is off
The controller is asking the purge fan to run, but it is not.
Check to be sure the purge fan VFD is in AUTO mode. (D cab only)
Check for fault messages on the purge VFD display.(D cab only)
Check to be sure the purge fan digital output is not forced to OFF.
Check to be sure the purge fan speed analog output is not forced to zero (0).

EFanFail = Exhaust Fan failure (same as for SFanFail, PFanFail)
The fan VFD or EC motor is indicating a fault condition.

Some Possible FanVFD Faults as displayed on VFD display (D cabinet models only):

1. Overcurrent – Output current exceeded the limits of the VFD.
   Check to be sure that backdraft damper can open freely.
   Check to be sure motor shaft can spin freely.

2. DC Overvolt – DC bus voltage in VFD is too high.
   Check for high incoming line voltage. Must be in range shown on dataplate.
   Check to be sure that the VFD is configured to allow the motor to coast to stop

3. Dev Overtemp – VFD internal temperature is too high.
   Check to be sure heatsink fan can spin freely.
   Check to be sure the heatsink is free of dust and debris.

4. Short Circuit – The VFD has identified a short in the motor or wiring.
   Check for shorted motor windings.
   Check for a short in the wiring between the VFD and the motor.

5. DC Undervolt – DC bus voltage in VFD is too low.
   Check for low incoming line voltage. Must be in range shown on dataplate.

Check for a blown fuse or open phase on the incoming power supply.

SysStart = System Startup Active
Indicates that control power has recently been cycled.
Normal indication.

SFDeadHd = Supply Fan Dead Head Warning
Controller has identified that recirc and outside air dampers are both almost closed.
Check recirc and outside air dampers and actuators.

AxHtFail = Auxiliary Heat System failure
Controller has identified that the temperature rise through the air heating system is lower than expected.
Check aux air heating system.

- Hot Water Coil – Check valve actuator and for presence of hot water.
- Furnace – Check power vent fan/motor, gas supply pressure, and furnace fuses.

AxClFail = Auxiliary Cool System failure
Controller has identified that the temperature drop through the aux air cooling system is lower than expected.
Check aux air cooling system.

- Chilled Water Coil – Check valve actuator and for presence of chilled water.

Cpr1Flt = Compressor 1 Fault active (same as for Cpr2Flt, Cpr3Flt)

A fault condition has occurred in compressor module 1. If the fault is still active, it will show under Current Status. If it has automatically cleared, refer to the condition shown under Last Fault. Refer to the list of compressor module fault conditions for more information on troubleshooting.

CPRFAULTNAME:

Below is a list of all compressor faults as displayed on the controller and possible causes:

SwitchOff = Compressor Run/Pumpdown Switch is in the PD position
Indicates that the compressor module has been disabled. Placing the switch back in the RUN position will clear this condition. Be sure that the compressor module is OK to run before setting this switch to RUN.

Warmup = Compressor module warmup mode is active.
Indicates that control power to the module has been turned on within the last 5 minutes. During this period, the compressor will not run.

LiqTFail = Liquid refrigerant Temperature failure
Indicates that the value read from the liquid temperature sensor is outside of the expected range. This sensor is located on the liquid line in the TXV compartment of the unit.

- If the value is a large negative number (-192F), this indicates an open circuit to the sensor. Check the sensor and wiring connections.
- If the value is a large positive number (256F), this indicates a short circuit to the sensor. Check the sensor and wiring connections.

SucTFail = Suction refrigerant Temperature failure
Same as LiqTFail. This sensor is located under the insulation on the suction line in the compressor module.

CurFail = Compressor Current transducer failure
Indicates that the value read from the compressor current transducer is outside of the expected range.

- If the value is negative, this indicates an open circuit to the transducer or a lack of +VDC power. Check the sensor and wiring connections and the output voltage of the +VDC terminal on the compressor control module. The voltage at this terminal should be between 20 and 30 VDC. The DC current in the sensor loop should be between 4 and 20 mA.
- If the value is greater than the max value in the analog input configuration screen, this indicates a failed

transducer or a short circuit in the wiring. In this condition, it is also possible for the analog input to be damaged. This can happen if the transducer fails shorted or is connected improperly.

SucPrsFail = Suction Pressure transducer failure (same as for DisPrsFail - Discharge Pressure transducer failure)
Indicates that the value read from the transducer is outside of the expected range.

- If the value is negative, this indicates an open circuit in the wiring to the transducer.
- A high positive value indicates a failed transducer or improper wiring.

The transducer is a 3 wire ratiometric device. It receives +5VDC power from the compressor control module. It provides an output signal between 0.5 and 4.5 VDC for the rated pressure range of the transducer.

LowPress = Low refrigerant Pressure condition has occurred
The controller detected a lower than expected suction pressure.
This is detected by either the pressure transducer and/or the "loss of charge" low pressure switch.
Please contact PoolPak Service for assistance in troubleshooting this fault condition.

MotorTmp = Compressor Temperature failure
The controller detected an alarm signal from the compressor protection module.
This module is located in the terminal box of the compressor. It provides an alarm signal when the compressor's motor winding temperature is too high or when the power supply to the compressor is incorrect in voltage or phase rotation.
Please contact PoolPak Service for assistance in troubleshooting this fault condition.

HighPress = High refrigerant Pressure condition has occurred
The controller detected a higher than expected discharge pressure.

- This is detected by either the pressure transducer and/or the high pressure cutout switch.
- The controller also detects this condition if there is no current to the compressor when it should be running.

Please contact PoolPak® Service for assistance in troubleshooting this fault condition.

SENSORNAME:

Below is a list of the sensor names as displayed on the controller. For troubleshooting, refer to the respective letter code below.

RtnTemp = Return Air Temperature (A)
RtnRH = Return Relative Humidity (B)
SplyTemp = Supply Temperature (A)
OutsTemp = Outside Air Temperature (A)
SplyCFM = Supply Airflow sensor (B)
ExhCFM = Exhaust Airflow sensor (B)
PurCFM = Purge Airflow sensor (B)
OutCFM = Outside Airflow sensor (B)
SFCur = Supply Fan current (B) (D cabinet models only)
EFCur = Exhaust Fan current (B) (D cabinet models only)
PFCur = Purge Fan current (B) (D cabinet models only)
Pool1Tmp = Pool1 Temperature (A)
PoolA PD = PoolA Water Flow Pressure Differential (B)
Pool2Tmp = Pool2 Temperature (A)
PoolB PD = PoolB Water Flow Pressure Differential (B)
OffEvapT = Air Off the Evaporator Temperature (A)
OffEvpRH = Air Off the Evaporator Relative Humidity (B)
OutRH = Outside Air Relative Humidity (B)
EvpBypFB = Evaporator/Bypass Damper Feedback (C)

OutDprFB = Outside Air Damper Feedback (C)
RcrDprFB = Recirculation Air Damper Feedback (C)
SpcPress = Space Pressure Sensor (B)
RtnCO2 = Return CO2 sensor (B)
SurfTemp = Cold Surface/Wall Temperature (A)
OAFltrPD = Outside Air Filter Pressure Differential (B)
RAFltrPD = Return Air Filter Pressure Differential (B)

A - Value from the sensor is outside of the expected range.

- If the value is a large negative number (-192F), this indicates an open circuit to the sensor. Check the sensor and wiring connections.
- If the value is a large positive number (256F), this indicates a short circuit to the sensor. Check the sensor and wiring connections.

B - Value from the sensor is outside of the expected range.

- If the value is negative, this indicates an open circuit to the sensor or a lack of 24VDC power. Check the sensor and wiring connections and the status of the DC power supply. The DC current in the sensor loop should be between 4 and 20 mA.
- If the value is greater than the max value in the analog input configuration screen, this indicates a failed sensor or a short circuit in the wiring. In this condition, it is also possible for the analog input to be damaged. This can happen if the sensor fails shorted or is connected improperly.

C - Feedback value from the actuator is outside of the expected range.

- Check to be sure actuator is receiving 24VDC power and is moving as requested by the position signal.

Fault History Log

To assist in troubleshooting, the CPCS controller maintains a rolling log of the last 100 faults. In addition, each compressor module also maintains a rolling log of the last 100 faults occurring at that compressor module.

The fault history log is the "History" option as selected in the "Service" menu. See the History section of Controller Navigation for more details on these screens.

Manual Mode

The CPCS controller contains an enhanced manual control mode for improved troubleshooting efficiency. Manual Mode is located in the Service menu of the controller. Navigating the manual mode menus is the best method to troubleshoot complex issues with system performance, digital outputs, and analog outputs.

Refer to the Manual Mode section of Controller Navigation for more information.

Digital and Analog Input Configuration

In the Input/Output Configuration (I/O Config) under the Service menu of the controller, the status and configuration of digital and analog inputs can be viewed. This information can be helpful to determine if an input is correctly configured to be received by the CPCS controller.

DIGITAL INPUT

Each digital input of the CPCS controller can be viewed in the Service menu of the controller. These screens give you a read-only indication of the status of these inputs. These inputs can be useful in confirming whether or not the CPCS controller is receiving an input from a certain component (ie. fire alarm system, smoke detectors, occupied override, manual purge mode, remote exhaust fan status, freezestat, or remote AC proof).

ANALOG INPUT

In addition to the digital and analog outputs, each analog input of the CPCS controller can be configured or

adjusted. This ability is especially important when calibrating sensors or in the event of a failed sensor in order to continue normal operation.

DIGITAL AND ANALOG OUTPUT CONFIGURATION

Input/Output Configuration (I/O Config) is a selectable option in the Service menu of the Controller. With this function, the qualified HVAC service technician has access to Digitial Outputs and Analog Outputs.

DIGITAL OUTPUT

Each digital output of the CPCS controller may be controlled individually by setting the corresponding parameter to one of three possible values: AUTO, ON, or OFF. A setting of AUTO gives control of the digital output relay to the software in the CPCS. ON will force the output relay to energize regardless of the status requested by the software. OFF will force the output relay to de-energize regardless of the status requested by the software.

The digital outputs found in this menu are solenoid valves, fan start signals, compressor run signals, auxiliary heat run signals, smart pump enable, and more.

ANALOG OUTPUT

Each analog output of the CPCS controller may be controlled individually by setting the corresponding parameter. This is helpful determining functionality of auxiliary control valves or dampers.

Startup & Warranty

Pre-startup

After receiving the PoolPak® unit, there are several tasks to complete before scheduling the factory startup. PoolPak Service maintains and provides a checklist of these activities that they require in order to schedule startup.

This checklist provides additional confirmation of the proper installation of the unit and any field installed components. These items include but are not limited to field wiring for remote ACC/WCC, field wiring for field installed sensors, refrigerant piping for remote ACC/WCC, and water piping for pool water and remote WCC applications.

This checklist determines that the space conditions and unit condition will be suitable for startup. If the checklist is completed satisfactorily, startup and owner training can be accomplished in a single day.

This pre-startup checklist will be given at the time of order acknowledgement. It can also be found in the PoolPak website, *www.poolpak.com*, under the *Start-up and Warranty Information section of the Parts & Service Downloads* page.

Startup

PoolPak Service requires a minimum of 2 weeks notice to allow adequate time to schedule startup. This 2 weeks notice includes a completed pre-startup checklist as described above. If Startup is required within the first month of shipment, special arrangements must be made with PoolPak Accounting Department at the time of Order Acknowledgement.

In instances where the equipment start-up will be delayed, a Delayed Startup Warranty Extension may be purchased in one-month increments for up to an additional 12 months. This delayed startup can be purchased any time before the actual startup. Contact PoolPak Service at *service@poolpak.com* to apply.

If special access is required to access the site, PoolPak service must be made aware of special access requirements at the time of 2 week notice. PoolPak Service will also ask for site contact information to provide to the startup technician.

All MPK units ship without the CPCS CM1 controller. This is done to ensure a proper startup of the equipment before regular operation.

The startup technician will bring the CPCS CM1 controller, the Startup Procedure document, and any other Startup materials to the jobsite. The startup technician is expected to perform only the startup procedures as described in the Startup Procedure document. Field supplied components, such as auxiliary duct heaters or remote condensers, are expected to be installed and started up by the owner per the manufacturer's instructions.

All PoolPak units require proper startup by a PoolPak authorized service technician. PoolPak service will arrange this startup with the previously approved and trained service technicians.

For a list of current authorized service technicians in your area, please visit the *Service Locator* page of the PoolPak website, *www.poolpak.com*.

If there are additional service companies that you would like to recommend to become authorized providers, please contact PoolPak® Service at service@poolpak.com. PoolPak Service holds a Service Training School three times per year. See the Service section of our poolpak website for more details.

Owner Training

As a part of the Startup procedure, the poolpak technician will also provide a brief orientation on the PoolPak® unit, keypad operation, and recommended maintenance. In this presentation, he will refer to the MPK Installation and Operation Manual as a guide.

It is the responsibility of the facility or sales rep to schedule maintenance personnel and other interested parties to attend this training. The owner training typically occurs at the end of the Startup day. If necessary, owner training can be scheduled with the technician for a later day. Keep in mind that a second trip may require additional compensation beyond a single day startup allowance.

Warranty

PoolPak maintains a standard labor and parts warranty on MPK units. For a description of this standard warranty, please visit the Parts & Service Downloads section of our website, www.poolpak.com.

All parts and labor warranty claims require prior written authorization of PoolPak® Service department to be covered under warranty.

PoolPak units require regular care and maintenance. Component failure due to poor pool chemistry, maintenance neglect, or customer abuse will be denied warranty coverage.

For instances where pool chemistry is a suspected factor in component failure, PoolPak Service may request the facilities' pool chemistry logs.

The all copper and Hycor® Blue coil warranties are contingent on the pool water free chlorine level being maintained in the 1.0 ppm to 3.0 ppm range and the chloramine level not exceeding 0.2 ppm.

Maintenance

Overview

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

Daily Maintenance

PROPER MAINTENANCE OF YOUR POOL WATER CHEMISTRY ON A DAILY BASIS IS IMPORTANT TO PROTECT YOUR WARRANTY RIGHTS.

1. Daily logging of pool water chemistry is typically required by local state health codes and may be requested by PoolPak in order to determine proper pool water chemistry maintenance. These logs should include both free chlorine and total chlorine measurements at a minimum.
2. PoolPak LLC strongly recommends following the below National Spa and Pool Institute standards.

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

For more information on pool water chemistry, see the PoolPak Educational Library article “Indoor Pool Water Chemistry”.

Monthly Maintenance

Perform the following on a monthly basis:

NOTE

To prevent personal injury, disconnect all electrical power to the unit prior to performing any of the following maintenance procedures.

1. AIR FILTERS: Check and replace as necessary.
2. Direct Drive Plenum Fans & Motors: Fan motor bearings are greased from the factory. DO NOT RE-GREASE FAN MOTOR BEARINGS.
3. COMPRESSOR OIL LEVEL: The ideal time for checking the oil level is during an extended period of operation because there will be the least amount of refrigerant mixed with the oil. The compressor should have been in operation at least 1/2 hour. During the period of operation, the refrigerant will be pumped out of the oil until only the normal quantity remains. The compressor is equipped with an oil sight glass for checking oil level. The sight glass is located on the compressor shell. Oil should be added to the system by a qualified refrigerant service technician only. The oil level in the compressor is correct when oil is visible between the bottom and two-thirds of the sight glass.
4. REFRIGERANT CHARGE: Check the sight glasses located in the valve compartment on the end of the evaporator coil. When the refrigerant charge is correct, there should be no bubbles in the sight glasses. Intermittent bubbles are normal during the first 10 minutes of operation or following a change in operating mode.
5. CONDENSATE LINE: Ensure that it is free of obstructions. Always keep the condensate trap and lines free and clear. The PoolPak® is capable of producing up to 60 gallons of condensate per hour.
6. UNIT INTERIOR/EXTERIOR: Check for torn insulation and repair if necessary. Check for scratches, nicks, rust, etc.
7. LOGBOOK: Check and record, in the logbook, the following actual operating values and the values read from the CPCS controller display:
   - Space Temperature
   - Space Relative Humidity

- Pool Water Temperature
- Pool Water pH
- Pool Water Free Chlorine
- Pool Water Total Chlorine

8. DAMPER OPERATION: Ensure that dampers open and close fully without binding.

Semi-Annual Maintenance

In addition to the Monthly Maintenance items, the following should be performed on a semi-annual basis:

Condenser coil cleaning:

- PoolPak recommends that the finned surface of all integral condenser coils be cleaned approximately every six months. More frequent cleaning may be required if extreme conditions cause clogging or fouling of air passages through the coil.
- Calgon Corporation's CalClean 41352 (or equal) is acceptable for cleaning this unit.
- The cleaning solution should be applied liberally to entering air and leaving air surfaces of the coil in accordance with the cleaning solution instructions.
- For a unit specific coil cleaning procedure, please see the Maintenance Section under Parts & Service Downloads on the PoolPak website, www.poolpak.com
- Note: For non-coated copper coils, if you notice the coil surface turning green, you have a problem with pool water chemistry. Address this root issue before seeking out more destructive coil cleaning solutions to remove the green from the coil.

Annual Maintenance

Perform the following on an annual basis:

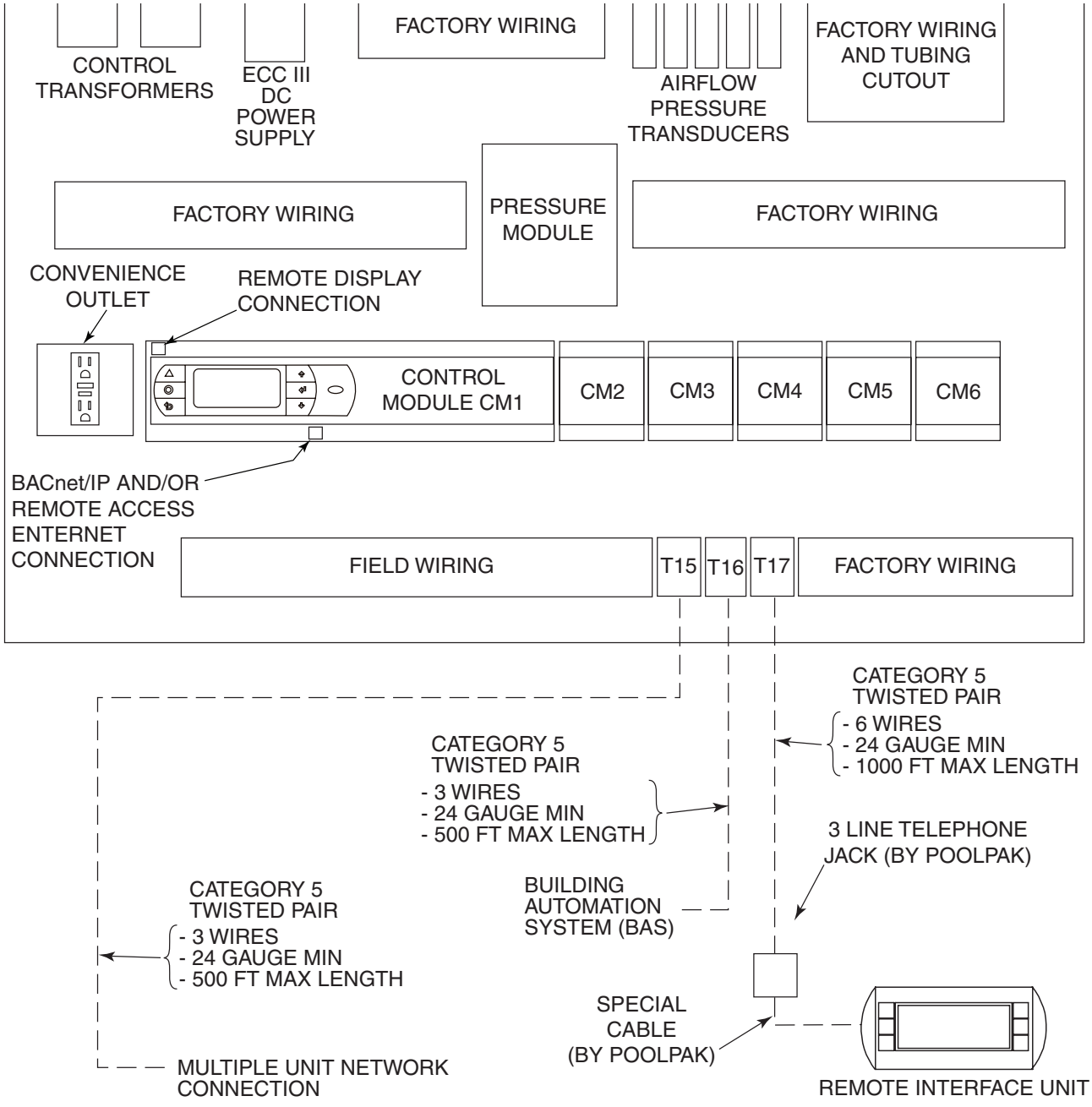
1. All items listed under MONTHLY MAINTENANCE and SEMI-ANNUAL MAINTENANCE.
2. COMPRESSOR AND REFRIGERATION SYSTEM: The compressor and refrigeration system should be inspected annually by a qualified service technician. At minimum, the following items should be done:
   - Change and inspect the refrigerant filter drier (only if the system has been open).
   - Complete unit operation test including log entries.
   - Inspect fan motor bearings for excessive wear and replace if necessary.
   - General refrigeration system inspection for possible leaks, chafing between tubing, or other items detrimental to operation.
   - Touch up scratches in the paint.
   - Check electrical connections for tightness including those in the compressor electrical box.
   - Clean debris and dirt from drain pans.
3. Variable Frequency Drives (D cabinet models only): Although typically seen as being maintenance free, there is some simple maintenance that can be done on a regular basis for VFD. The main goal of VFD maintenance is to keep it clean, keep it dry, and keep the connections tight. The below are the general PoolPak recommended tips for maintaining your VFD. These should be done annually by a qualified service technician.
   - Check the control cabinet for any signs of moisture. If present, the cabinet joints should be re-sealed with PoolPak approved silicone sealant.
   - With the power off, spray dry, oil-free air over the heat sink fan(s) to remove dust.
   - With the power off, carefully remove the cover and visually check for any internal damaged components.
   - Use a dry dust-catching fabric (such as Swiffer® cloths) on the outside and inside of the VFD cabinet to remove dust and debris.
   - With the cover carefully removed, check all electrical connections on each VFD for tightness. A simple "tug" test should be sufficient. Tighten any loose connections. Re-install the cover.

For additional description of advanced VFD maintenance tips, see *PoolPak Parts & Service article "How to Maintain a VFD"*.

SECTION VI: WIRING

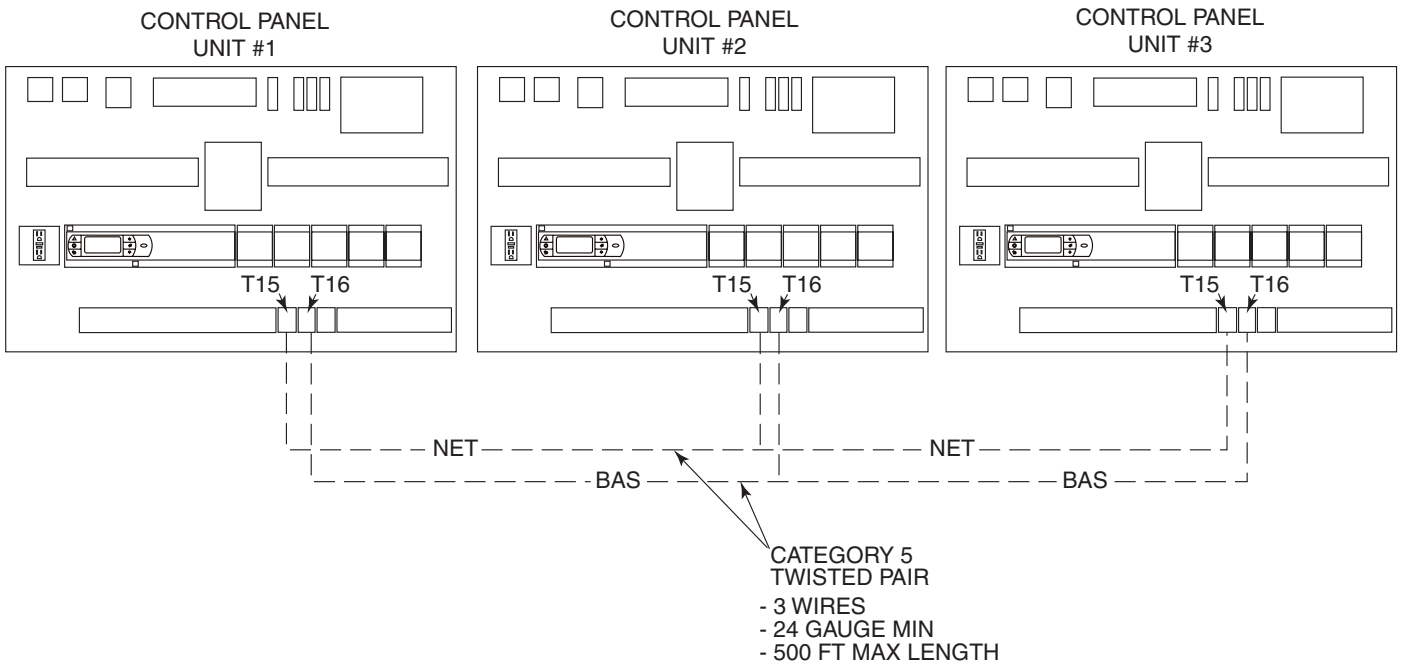
Remote Connections Schematic

Figure 6-1. PoolPak Control Panel



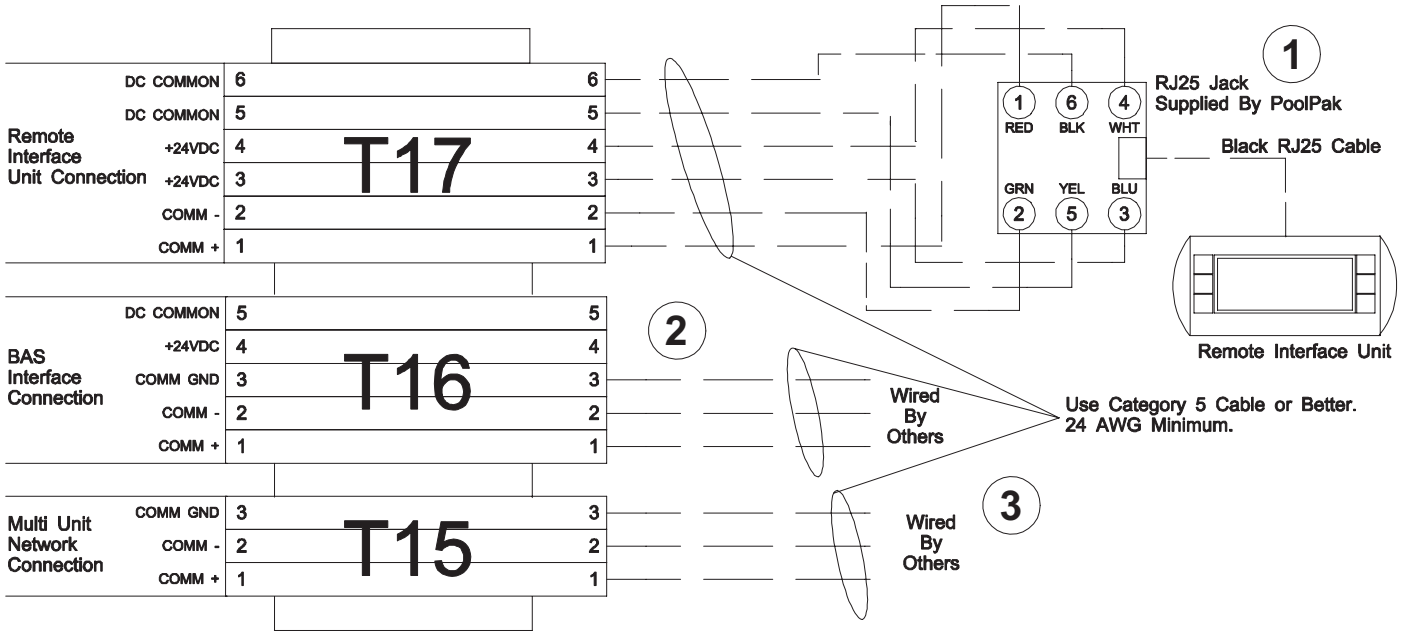
Multiple Unit Control Schematic

Figure 6-2. Multiple Unit Connection Schematic



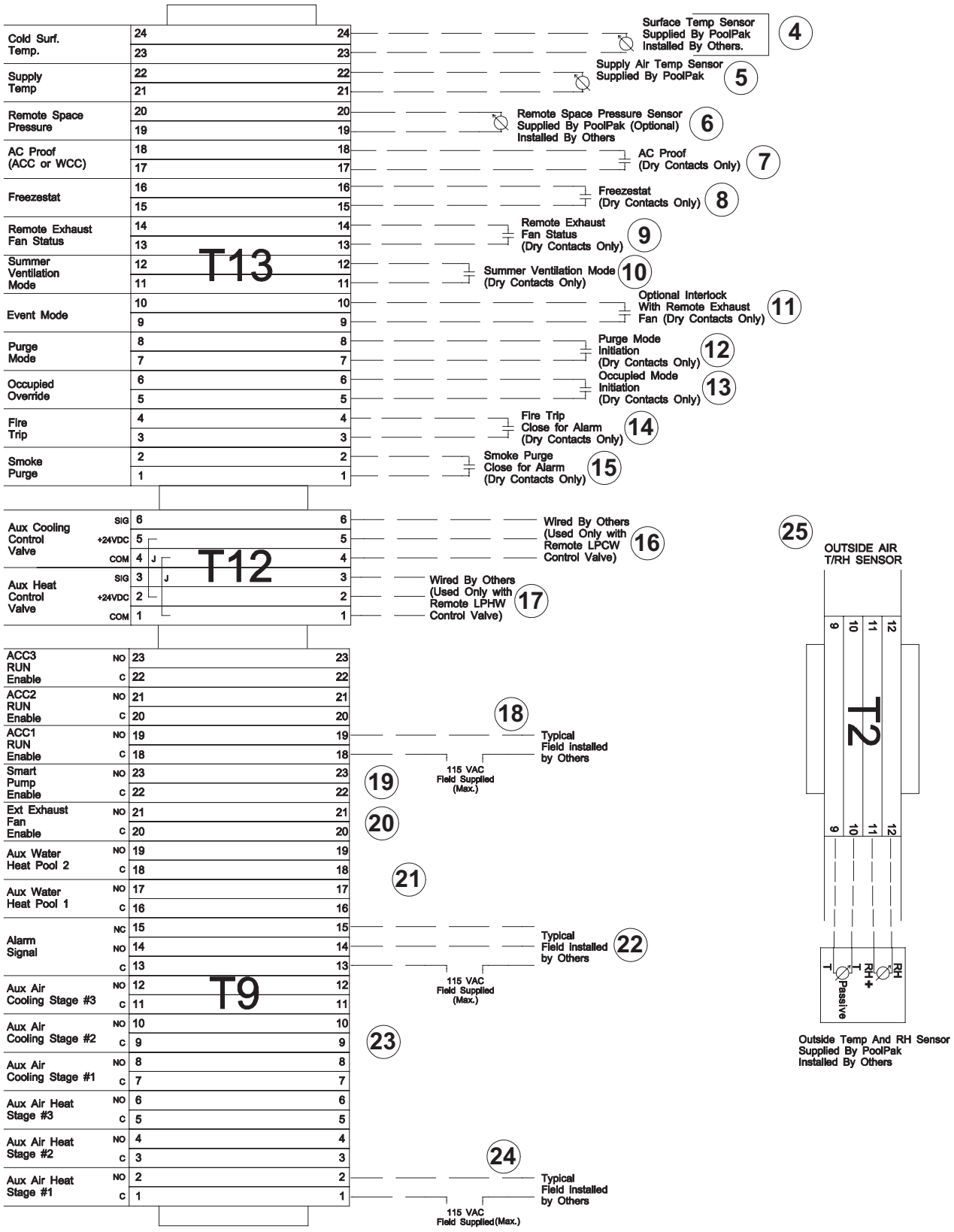
MPK Field Wiring - Communications

Figure 6-3. Field Wiring - Communications



MPK Field Wiring

Figure 6-4. MPK Field Wiring



Page Intentionally Left Blank

With more than 45 years of experience in indoor pool dehumidification equipment manufacturing, PoolPak® LLC is the most well-known brand in the industry. Our people and products work daily to improve the quality and comfort of indoor pool environments. PoolPak® dehumidification solutions include a variety of heating, ventilation, and air conditioning systems, in addition to an industry-leading PoolPak® support network. For more information, please visit **www.PoolPak.com**.

PoolPak®
DEHUMIDIFICATION THAT WORKS

3491 Industrial Drive
York, Pennsylvania 17402 USA
800-959-7725 Fax 717-757-5085
 SVW04-MPK-IOM-20170601