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# R-EC HP EWC

## Installation, Operation & Maintenance Instruction Manual

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## SAFETY WARNING :

The RecoSwim embodies electrical, rotational, refrigeration and pressurized hot fluid equipment and systems.

Only appropriately qualified personnel who thoroughly understand the operation of this equipment and any associated machinery should install, start-up or attempt maintenance of this equipment. Non-compliance with this warning may result in serious personal injury or death and / or equipment damage. Never work on any control equipment without first isolating all power supplies from the equipment.

Personal protective equipment should be used when carrying out any procedure to the unit, excluding controller settings.

The RecoSwim fans may start-up automatically and operate as soon as the power supply is connected and switched on. A fan may be stationary, yet fully powered and may start at any time, subject to automated control !

The product must be connected to an appropriate electrical safety ground. Failure to do so represents an electrical shock hazard.

## 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.

## ADDITIONAL ASSISTANCE AND SUPPORT

If there are any questions on any related subject or any specific information is sought, then please contact :

*Poolpak Customer Support :*

*Tel : 800-959-7725*

*Fax : 717-757-5085*

*www.poolpak.com*

# HOW TO USE THIS MANUAL

This manual provides information to support the installation and operation of the RecoSwim swimming pool environmental control product. The manual is divided into sections covering the various aspects of the installation and operation procedure. The following index is given to assist in locating and using the information contained within the manual. Please take the time to read this manual thoroughly before commencing installation.

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Lynx Controller system interface end user function information.

Web Enabled Controller Data Sheet /Installation instructions / user guide

Touch Screen Display Controller interface Data Sheet / Installation instructions / user guide

# RECEIVING THE UNIT

## IMPORTANT - INSPECT FOR DAMAGE IMMEDIATELY

This product has been thoroughly tested before leaving the factory.

However, please check at the earliest possible opportunity that the product has arrived in good condition and that no transport damage is apparent. If any damage is suspected, please contact the suppliers immediately and note it on the carrier's freight bill. Do not refuse delivery.

Do not attempt to repair any damage without first contacting Poolpak.

The delivering carrier may expect the receiver to provide reasonable evidence that any damage was present before delivery.

# STORAGE OF UNIT

The product **MUST** be protected from the elements and **not exposed to temperatures below freezing** during transport or storage. Do not remove product packaging until such time as the unit is to be positioned in final location.

# OFF LOADING & MANOEUVRING THE PRODUCT

**WARNING :** The RecoSwim is heavy and of a weight that represents a risk of serious injury or death if not lifted and handed correctly. Lifting apparatus will be required.

It is the receiver's sole responsibility to ensure safe lifting and maneuvering of the product at the time of delivery and subsequently on site. To maximize safety, it is recommended that professional lifting and maneuvering specialists are engaged.

- Each section of the unit should be lifted individually and only subsequently connected together when in final position. Do not attach protrusions such as duct spigots prior to lifting.
- Ensure that the lifting system has more than adequate weight capacity. It is recommended that gross unit section weight +50% to represent the minimum.
- All persons involved in the lift should have appropriate Personal Protective Equipment.
- Do not stand or walk on top of the unit, otherwise the unit may be damaged.
- Do not lift equipment over or above personnel or occupied structures.
- If lifting the unit via a crane, use suitable spreaders and straps to avoid damage to the unit.
- Perform a low level test lift in a safe area and ensure that the lift is secure and level and that weight distribution is correct. Do not continue with the lift unless the load is entirely secure.
- Assess all potential risks in advance and maintain a safe system of work at all times.

The supplier of the unit is not responsible for a failure to apply suitable and adequate lifting equipment or procedures.

**Note :** The RecoSwim can be damaged if due care is not taken : Do not drop or jar the product from any height - not even two or three inches. Move it gently and progressively. Do not lean the RecoSwim by more the 60°. The RecoSwim contains heavy motors which are mounted from the base.

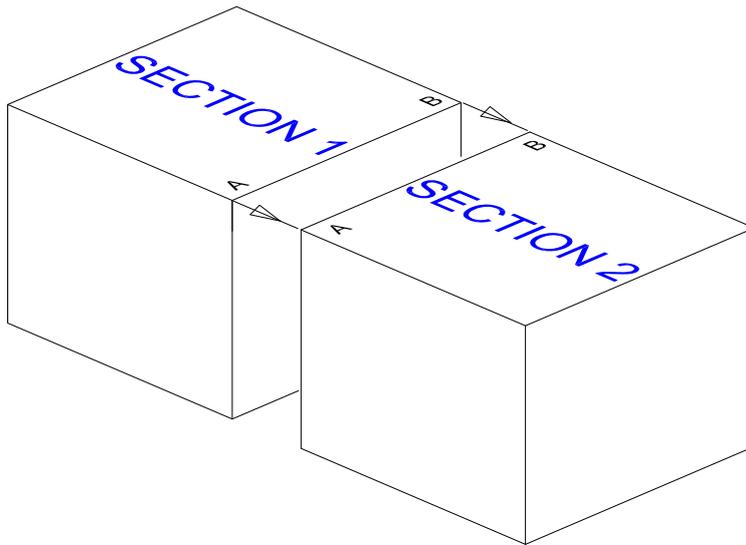
Do not attempt to lift the RecoSwim by the pipe out lets - this will cause damage and leaks.

The air duct work connection spigots on the RecoSwim can be easily removed to aid access and the pipe connections can also be cut back if necessary.

# SECTIONAL UNIT ASSEMBLY INSTRUCTIONS

The unit is normally supplied from the factory in easy to handle and assemble sections, which connect together in final position, a dedicated document would be supplied with the unit confirming the exact reassembly procedure required. The general reassembly procedure for a sectional unit would typically be as follows :

- Each unit section is clearly labelled and individually identified.  
The end of each section is marked with a letter :  
Markings 'A' should be pushed together to meet.  
Markings 'B' should be pushed together to meet. etc.
- Position all unit sections together in correct sequence in final position, as per the schematic provided.
- The adjoining sections are pre-lined with gasket foam and should be located together without damaging the gasket. Caulk around the seams on the outside of the unit to ensure good air seal.
- For each section there are a quantity of bolts & washers provided. The holes for the bolts are pre-drilled through the unit frame to be connected together.
- Remove access panels as necessary to reveal the pre-drilled bolt holes.
- Place the bolts through the holes with washers on both the bolt and the nut face of the thread. Position the nut and tighten until the gasket is compressed to 1/8".



## **Internal wiring re-connection :**

All required wire and cabling is supplied within the unit, ready for simple re-connection into the indicated terminals :

Extend provided power cables & conduits from the electrical box section into the other sections..

Re-connect the marked wires into the corresponding terminal connections.

## **Internal pipe work re-connection :**

All required pipe & connections are supplied within the unit, ready for simple re-connection.

Locate and re-connect compression couplers and PVC threaded couplers.

## **PRODUCT OVERVIEW**

### **PURPOSE :**

The RecoSwim is a product which is intended to be used, in association with other equipment and services, to facilitate control of the environment within an indoor swimming pool.

The term 'environmental control', in this instance, relates to temperatures, humidity levels and ventilation provision.

### **PRIMARY COMPONENTS :**

The RecoSwim typically incorporates the following major components (subject to selected specification) :

- A primary / supply fan to take air to and from the pool room.
- A refrigeration system to cool and condense out excess moisture from the pool room air.
- Heat emitting coils to distribute the heat energy acquired by the refrigeration system.
- An air extraction fan to ventilate pool room air to outside.
- Automated air mixing louvres to control the amount of outside air permitted to enter the system.
- A 'heat recovery' plate heat exchanger for saving energy from any room air exhausted to outside.

### **EC FAN SYSTEMS :**

All RecoSwim products use the latest technology plenum EC fan systems, utilizing high efficiency backward impellers integrated inverters and brushless DC motors. Automated variable air flows and fan system efficiencies of up to 65% are possible with this arrangement.

# MODEL VARIATIONS

To confirm your exact model, view the data plate attached to the RecoSwim product or the technical schedule provided with the product.

**'HP' : Heat Pump refrigeration system**

This indicates that the unit is equipped with a self-contained compressor driven refrigeration system, consisting of an air evaporator coil, to cool and dehumidify the air, and condensers to recycle or dissipate the collected heat energy.

**'XF' : 'Cross Flow' exhaust air heat recovery system**

This indicates that the unit is equipped with a dedicated air-to-air heat exchanger, to recover and save heat energy from the exhaust air and transfer this, via direct contact, into the incoming outside air. The system comprises of a multiple opposing air channels, separated by a series of plates.

**'H:LPHW' : Air Heating coil; LPHW**

This refers to the product incorporating an integral air heating coil, which would be connected to, and supplied with heat from, a hot water circuit, external to the unit.

**'H:ELEC' : Air Heating coil; Electric**

This refers to the product incorporating an integral electric air heating system. This product does not require to be connected to a separate hot water circuit for heating purposes. Any subsequent references to boiler or LPHW supply can therefore be ignored.

**'OA' : Outside air provision**

This refers to the product being equipped with an Outside Air duct connection, for the purpose of introducing outside air into the system. Note : unless a separate exhaust fan provision is made, the outside air duct may not be able to achieve it's full air flow potential and a negative pool room air pressure balance would not be possible. If no outside air provision is provided at the unit, a separate arrangement may be required to meet minimum outside air provision necessary to satisfy regulatory requirement.

**'EA' : Exhaust air provision**

This refers to the product being equipped with an integral exhaust air fan, able to discharge pool room air to outside. With this arrangement, the unit would normally be able to achieve a negative pool room air pressure balance and also facility economizer and purge functions.

**'PWC' Pool Water Condenser**

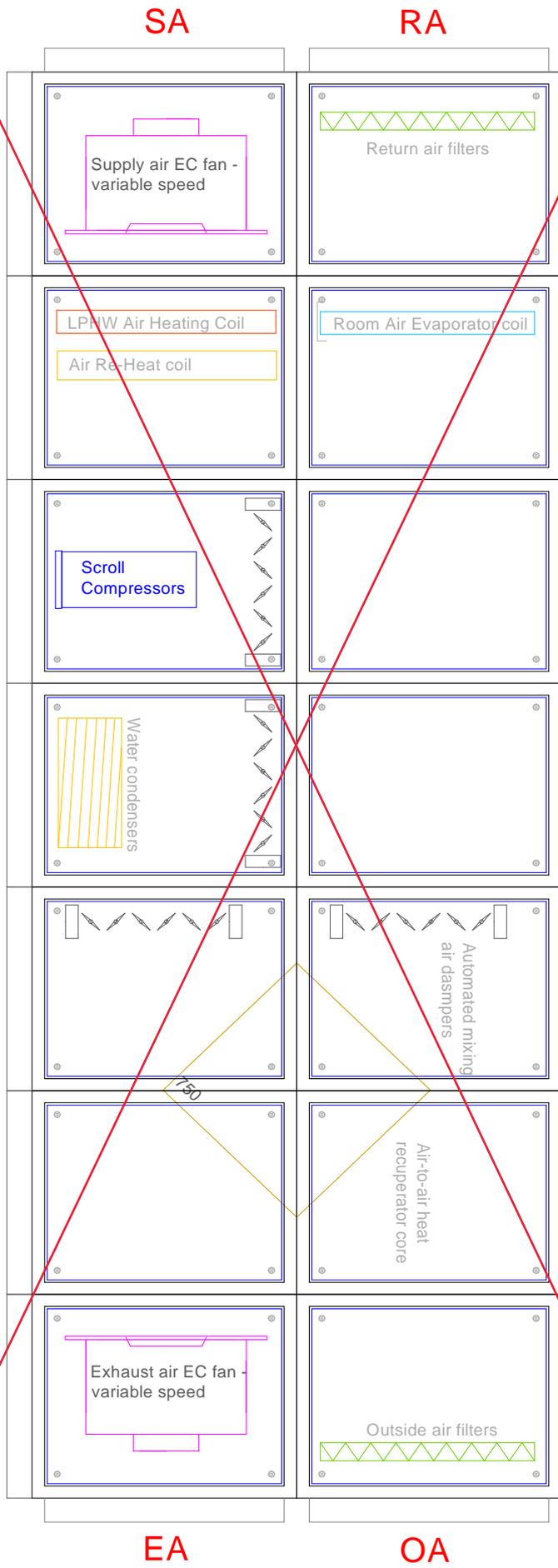
This refers to the unit incorporating a condenser which is able to dissipate heat from the refrigeration system directly into the pool water, to supplement pool water heating requirement, via a pipe circuit passing pool water through the unit.

**'EWC' External circuit Water Condenser**

This refers to the unit incorporating a condenser which is able to dissipate heat from the refrigeration system into an external water circuit. This would typically be utilized as a method of removing unwanted heat energy from the system during the room air cooling function.

**'OAC' Outside Air Condenser**

This refers to the unit incorporating a condenser and associated fan arrangement which is able to dissipate heat from the refrigeration system directly into an outside air path.



Generic Layout (R-EC HPXF model versions)

# **BASIC PRINCIPLE OF OPERATION**

## **LOCATION OF THE RECOSWIM PRODUCT :**

The RecoSwim product would normally be positioned within an adjoining mechanical equipment room with air duct channels taking air to and from the pool room. Special 'outside location' versions are also available with increased casing thermal insulation and cladding.

## **AIR MOVEMENT :**

The RecoSwim product contains a large 'supply air' fan which continually draws in air from the pool room and, subsequently, blows the same air back into the pool room. Therefore, the pool room air is 're-circulated' through the RecoSwim product. The fan is variable speed and will operate at a slower low-energy mode during times when there is no demand of climate control within the pool room.

## **HEATING THE POOL ROOM AIR :**

The RecoSwim product incorporates a heat transfer coil, similar in appearance to a large car radiator, which is plumbed to an independent fuel boiler on a closed loop circuit, similar to a domestic central heating system. The heat generated by the fuel boiler is allowed to be automatically transferred into the pool room air whenever the pool room air temperature falls below the selected optimum setting.

## **DEHUMIDIFICATION VIA REFRIGERATION :**

The RecoSwim product incorporates a large refrigeration circuit, similar in general operating principle to a domestic refrigerator or air conditioner. A refrigeration system of this nature can also be referred to as a 'heat pump'.

The refrigeration circuit incorporates a heat transfer coil, similar in appearance to a very large car radiator, positioned within the air stream coming from the pool room. This is the refrigerant evaporator coil.

When the pool room humidity level becomes high because of the steam evaporated from the pool water surface, the refrigeration system switches on automatically and this heat transfer coil becomes cold by the action of refrigeration circuit.

As the warm humid pool room air is sucked into the RecoSwim product and over this cold coil, the steam within the pool room air is condensed to cold water as it comes into contact with the cold surface of the refrigerated coil. Exactly the same principle as condensation forming on a cold glass window. The cold condensed water is then simply drained away to waste.

## **ENERGY RECOVERY AND DISTRIBUTION VIA THE REFRIGERATION CIRCUIT :**

To evaporate cold water into steam (humidity) it is necessary to give the cold water heat. For example, when you boil a kettle, the steam produced contains the heat energy which the kettle has consumed, typically electricity.

However, it is possible to 'release' and recover the heat which the steam contains - simply by turning the steam back into cold water again. This 'released' heat can be referred to as 'latent energy'.

Collecting heat energy :

As the refrigeration system in the RecoSwim product condenses the steam within the pool room air back to cold water, the heat 'released' from the steam is absorbed into the cold refrigerated coil.

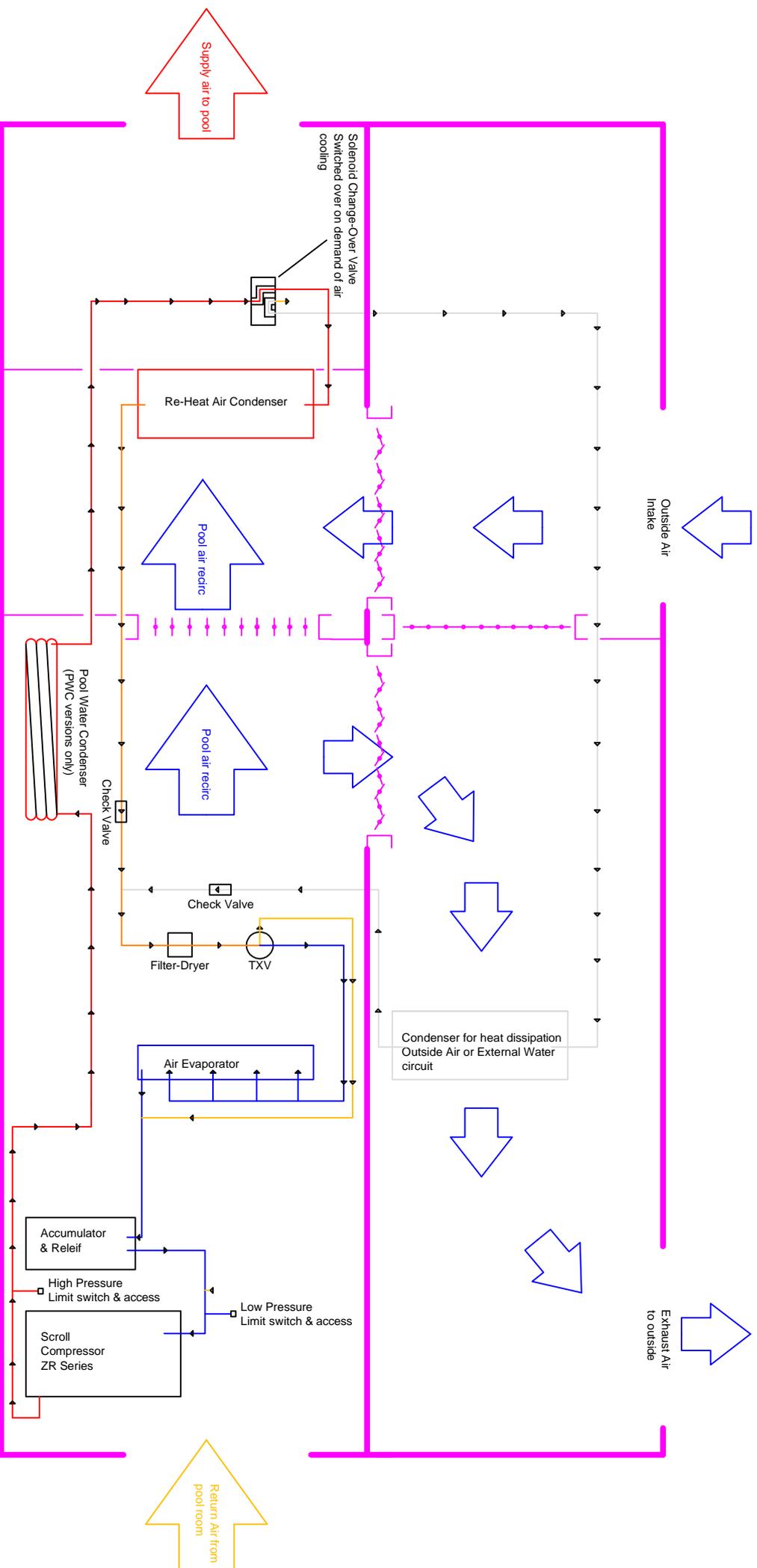
After the 'released' heat is absorbed into the cold refrigerated coil, it is then 'pumped' around the refrigeration circuit by a 'compressor', which is driven by a large electric motor.

Using and distributing collected heat :

The 'released' heat can then be returned back into the pool room air as dry heat, via a second 'car radiator' like 'warm' heat transfer coil. This is the refrigerant 'condenser' coil, which can be referred to as a 're-heat' coil, because it is 're-heating' the pool room air.

The electrical energy used to drive the compressor motor is also used and transferred in the same manner.

# Typical refrigeration circuit



NOTE : GENERIC EXAMPLE ONLY - SCHEMATIC MAY VARY FOR DIFFERENT SPECIFICATIONS

However, if the pool room air temperature is warm enough already, the 'released' heat can, subject to selected unit specification, alternatively be automatically transferred, via a further heat transfer coil, into the pool water instead.

If there is an excess of heat energy within the pool / pool room during the summer months and mechanical air cooling to the room is required, then a further warm condenser coil, subject to selected unit specification, can be utilized to enable unusable heat energy to be dissipated, either directly or indirectly, into the outside air.

#### **DILUTION WITH OUTSIDE AIR :**

To ensure that there is adequate outside air provision to the pool room, a level of mixture with outside air is required :

Most of the air sucked from the pool room is simply 're-circulated' back to the pool room as described above. However, a limited controlled amount of the pool room air sucked into the RecoSwim product is blown away to outside using an 'exhaust air' fan.

At the same time, an equally small amount of outside air is allowed to be sucked into the RecoSwim and then mixed with the air being re-circulated back to the pool room.

#### **ENERGY RECOVERY ON OUTSIDE AIR DILUTION (SUBJECT TO SELECTED SPECIFICATION) :**

The pool room air temperature will normally be very warm and, particularly during the winter months, the outside air may be very cold. Therefore, if you are blowing away warm pool room air to outside and replacing it with cold outside air, as occurs when the pool room air is diluted as described above, then you are obviously losing heat and heat costs money!

To reduce the amount of heat lost in this way, the RecoSwim can incorporate a 'plate air-to-air heat exchanger'. This is a simple non-mechanical device which consists only of a series of channels through which air can pass. Both the warm pool room air and the cold outside air are passed through adjacent channels simultaneously, but are never mixed.

The channels through which the warm pool room air is passed are positioned directly adjoining to the similar channels through which the cold outside air is passed. As there is only a thin barrier separating the two different air channels, heat is transferred through the thin barrier from the warm pool room air to the cold outside air.

During warm summer weather, if the temperature of the outside air is greater than the room air temperature, the recuperator will naturally operate in reverse, in that it will transfer excessively heat in the outside air back into the exhaust air path, therefore reducing the additional load the outside air would place on the air cooling provisions for the room.

#### **OUTSIDE AIR INTRODUCTION MODE - HIGH HUMIDITY :**

If the pool room air becomes very humid, for instance if there is high activity within the pool room, the RecoSwim product automatically increases the amount of pool room air which is blown away to outside, if the condition of the outside air is suitable.

A corresponding level of drier outside air is then introduced to the pool room through the RecoSwim product. Heat losses through ventilation with outside air in this manner are limited by the actions of the plate heat recuperator.

#### **OUTSIDE AIR INTRODUCTION MODE - HIGH ROOM AIR TEMPERATURE :**

If the pool room air becomes excessively warm during the summer months, for example as a result of solar heat gain through glazing, then the RecoSwim can automatically increase the amount of pool room air which is blown away to outside, subject to the condition of the outside air. A corresponding level of cooler and, importantly to maintain comfortable pool room conditions, drier outside air is then introduced to the pool room through the RecoSwim product.

#### **CONTROLS :**

The RecoSwim product is able to operate completely automatically and incorporates a full control system for this purpose.

# INSTALLATION REQUIREMENT SUMMARY

Installation connections required :	H:LPHW	H:Elec	PWC	EWC	OAC
<b>Electrical Power</b>	✓	✓	✓	✓	✓
<b>Air distribution ducts</b>	✓	✓	✓	✓	✓
<b>Condensate water drain</b>	✓	✓	✓	✓	✓
<b>Ethernet connection</b>	✓	✓	✓	✓	✓
<b>LPHW pipe connection</b>	✓	✗	✗	✗	✗
<b>Pool water pipe connection</b>	✗	✗	✓	✗	✗
<b>External water circuit pipe connection</b>	✗	✗	✗	✓	✗
<b>LPHW demand signal</b>	✓	✗	✗	✗	✗
<b>Pool water demand signal</b>	✗	✗	✓	✗	✗
<b>External water circuit demand signal</b>	✗	✗	✗	✓	✗

## POTENTIAL APPLICATION ISSUES

If a salt chlorination or electrolytic system is to be used on the pool then contact Poolpak immediately.

If there is no vapor barrier installed in the ceiling of the pool room then problems will be incurred with condensation within the roof structure.

If there are no thermal breaks in aluminum window frames within the pool room then condensation could occur on the frames. Any cold bridging within the pool room building will result in condensation.

Any adjoining rooms open to the pool room, such as changing rooms or toilets, should be heated to avoid condensation forming within these rooms.

If a 'one piece' plastic ceiling is to be used, then avoid removing the access panels on the RecoSwim product while the fan is running, otherwise the ceiling may be damaged. Such ceilings will also be prone to move significantly either up or down due to the ventilation effect of the RecoSwim product. This is normal and should be expected.

Any wood used within the construction of the pool room should be suitably treated in consideration of the possible variation in humidity levels and temperatures within the pool room. Wood is a 'living' material and unsuitably treated wood can be expected to move, shrink or twist. The recommended range of conditions can be 86°F +/- 30°F and 60% RH +/- 30%. Contact the suppliers of any structural wood for information and guidance on room air climate.

The main air fan within the RecoSwim will run continuously, at varying speeds, to provide continued distribution of air and to enable the room air humidity and temperature to be constantly and accurately sensed.

If the air temperature is not maintained at the correct level, when the pool is uncovered, the evaporation rate will increase dramatically and condensation may quickly become apparent.

It should be noted that swimming pool liners can be damaged if the pool water temperature is too high. If a pool liner is used, then the maximum temperature which the liner will stand should be confirmed and the pool water temperature maintained and monitored by the end user below that temperature.

The pool structure can also be damaged if the pool water is heated up from cold too quickly.

Prior to installation, the RecoSwim unit must be protected from freezing temperatures at all times.

# PLANT ROOM LAYOUT & NOTES

The RecoSwim should ideally be positioned in a mechanical equipment room or other serviceable area, preferably adjoining the pool room. Special 'outside location' versions are also available with increased casing thermal insulation and cladding.

The plant room must be large enough to accommodate the RecoSwim and to enable sufficient access for essential maintenance.

When positioning the unit take care not to obstruct any of the pipe connections or controls and OBSERVE ACCESS WARNING LABELS ON THE RECOSWIM.

The RecoSwim cannot be positioned externally without a protective enclosure, unless it has been especially adapted.

If located outside, 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.

If the plant room is not on the ground floor then anti-vibration measures may be necessary to prevent operational vibration transfer through the supporting floor.

A significant quantity of water passes through the RecoSwim unit and due consideration should be given to minimizing potential damage through flooding in the event that a leak or pipe blockage occurs.

The RecoSwim product will be damaged if exposed to flooding. Therefore an effective drain should be provided in the plant room.

## MINIMUM MAINTENANCE ACCESS

A minimum clearance of 4 ft is required on the control / electrical panel side and 18" minimum clearance on ALL other sides.

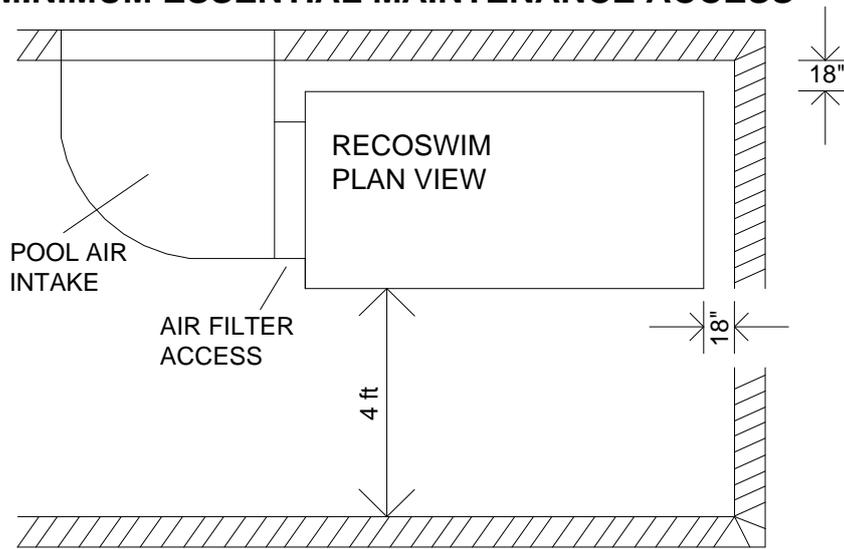
This represents the absolute minimum clearance required for essential maintenance.

Ideally, considerably greater access all around the RecoSwim is desirable.

A minimum clearance of 3 ft is required at the side of the pool air intake duct spigot in order to replace the air filters.

If the unit is located at high level, a suitable cat walk way, providing safe access for technicians with their equipment and parts will be necessary.

## MINIMUM ESSENTIAL MAINTENANCE ACCESS



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## POSITIONING THE PRODUCT

Provide a firm, level plinth or rail system, capable of supporting the weight of the RecoSwim unit.

The RecoSwim will then simply sit on this base.

Note : The plinth height will need to accommodate the condensate water drain connection and P-trap height.

If installed externally, the unit may require mechanical fixing into the support structure. Therefore all relevant national and local standards, codes and regulations must be observed and must take precedent in respect of the location, mounting and fixing of the product in situ.

# AIR DISTRIBUTION DUCTING

Note : All relevant national and local standards, codes and regulations must be observed and must take precedent in respect of the design, manufacture and installation of the air ducting systems and all associated aspects.

## **AIR DISTRIBUTION METHODS :**

The heating and climate control product would normally be located in the mechanical equipment plant room. Therefore the heated / conditioned air supplied by the climate control product is ideally distributed around the pool room using a ducting channel.

A ducting channel is a sealed void through which the air travels along on route to the pool room. A typical ducting channel would be comparatively large in size, depending upon the amount of air flow required from the product. Outlet grilles would be used to allow the air to exit the ducting channel at the desired locations around the pool room.

## **AIR DUCTING RESISTANCE :**

The air fans are designed to operate at a pre-determined maximum air duct resistance value. Duct resistance will be dependent upon duct size, profile, quantity of bends, and associated components such as louvers, fire dampers and noise attenuators etc. The whole duct system should be designed and installed to offer a resistance less than that which the unit is rated at, otherwise air flow performance and effective environmental control may be compromised.

Ideally, the air duct system should be designed to offer the lowest resistance possible, thereby maximizing the energy efficiency potential of the variable power EC fan systems.

## **DUCTING CHANNEL LAYOUT CONSIDERATIONS :**

The ducting channel layout should be designed to ensure :

- The air is discharged via grilles directly onto areas prone to condensation, such as external glazing.
- There are no dead areas of the pool room not covered with a movement of air.
- That the air flow velocity across the pool water surface is low.
- That operational noise transfer is reduced to a minimum.

Due consideration must be given to the position of the pool air intake and supply air ducting connections to the RecoSwim.

All ducting should be sized and designed, together with grilles, dampers, bends, filters and noise attenuators not to exceed the specified maximum air resistance.

Initially, all duct work sizes should be no smaller in area than the respective spigot connection holes on the RecoSwim.

If in any doubt please contact Poolpak.

Care should be taken to ensure that the duct work is not routed across the maintenance access panels on the RecoSwim.

All ducting should be as close to air tight as practical.

Flexible ducting or multiple runs of small diameter ducts should not be used as this offers a high restriction on the flow of air. Drainage pipe cannot be used for the ducting.

## **POOL AIR INTAKE :**

The intake duct should increase in size so it is larger than the area of the pool air intake duct spigot on the RecoSwim.

It is recommended that the air intake spigot on the RecoSwim should not be positioned directly through the pool room wall as excessive noise transfer may occur.

A minimum single 90° bend would notably limit the degree of noise transfer to the pool room.

If noise transfer into the pool room is considered an issue, then the inclusion of a noise attenuator or silencer in the duct is recommended.

The air inlet grille from the pool room should have a free area of no less than 70% and be as large as possible.

Alternatively, the plant room can be used as a plenum chamber for the pool room air, with either a louvered door or grille allowing the pool room air in. If this approach is adopted care should be taken to ensure that :

- The plant room is fully insulated and vapor sealed to pool room standards.
- No chemical fumes can leak into in the plant room air.
- Any fuel boiler located within the same area is fitted with a sealed balanced flue.
- The outside air intake duct work is well insulated to prevent condensation on the cold duct.
- Any cold water pipes or storage tanks are well insulated.
- Any electrics located within the plant room are housed within a suitably sealed enclosure.

In this instance, part of the casing of the RecoSwim may be seen to sweat during cold weather due to the close proximity of cool outside air within the unit, which is quite normal.

If the duct work is exposed to cold outside air, then it should be thermally insulated and a vapor proof foil used.

## **SUPPLY AIR DISCHARGE DUCTING :**

### ~~**UNDER FLOOR DUCTING :**~~

~~The entry hole to the under floor supply air duct requires to be positioned to accurately match up with the discharge hole on the base of the RecoSwim.~~

~~Any duct work protruding from the entry hole should be cut back so that it is flush with the surrounding finished floor or plinth level.~~

~~Note that the initial part of the under floor duct may be visible to the client via the fan viewing port on the unit and, therefore, should be made to look presentable.~~

~~If a high ground water table exists, under floor ducting should not be used due to the risk of the duct flooding and compromising the whole system. All under floor ducting should ideally be very well thermally insulated with 4" of hard-board insulation.~~

~~At least one water drainage point should be provided in the duct to enable any water which accidentally enters the duct via a hose etc. to be quickly removed.~~

### **OVERHEAD DUCTING :**

If the duct work is exposed to cold outside air or positioned in an un-insulated roof space then it should be thermally insulated with 4" mm hard board insulation and a vapor proof foil used.

It is important to seal the overhead duct as well as possible to avoid pool room air leaking into the cold roof space.

~~If there is to be both over head and under floor supply air duct work, then a manually adjustable damper should be positioned in the over head duct work in order to balance the air flow through each.~~

## OUTSIDE AIR INLET & POOL AIR EXHAUST DUCTING :

Both the length and number of bends in the ducting supplying the RecoSwim with outside air, and the duct exhausting the pool room air, should be kept to a minimum, unless the system has been specifically designed for a high duct system resistance.

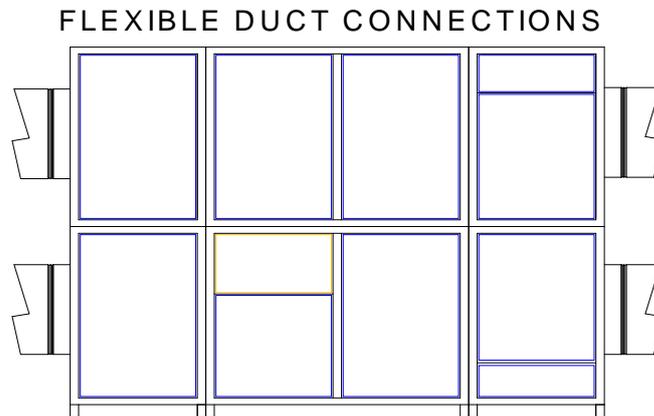
The louvers should be positioned to discourage air recirculation between the inlet and outlet. The duct openings to outside should be protected with suitable weather grilles etc to prevent birds, insects and rain from entering.

The discharged air should not be obstructed by hedges, fences, walls, snow and a minimum clearance of 3ft should be provided.

The outside air intake should ideally be positioned at least 6ft away from any boiler flue outlet and care should be taken to avoid gases omitted from the boiler flue from entering the outside air louver.

The exhaust air grille should preferably not be positioned directly under bedroom windows or towards adjoining properties to prevent noise intrusion.

If the pool room air can normally enter the plant room, then the outside air intake duct should be thermally insulated and vapor sealed to prevent condensation forming on the cold duct.



# POOL WATER PIPE CONNECTIONS (PWC versions only)

Subject to selected specification, the RecoSwim may require connection into the pool water filtration pipe work :

## **POOL WATER FLOW SPECIFICATIONS :**

Note : All relevant national and local standards, codes and regulations must be observed and must take precedent in respect of the design, manufacture and installation of the pool water pipe system and all associated aspects.

The required pool water flow rates and resistance through the RecoSwim are detailed on the technical schedule document supplied with the product, further copy available on request.

## **PIPE WORK CONNECTIONS :**

The inlet and outlet to the RecoSwim are connected via the return line going back to the pool i.e. after the pump and filter and before the chemical dosing.

The pool water inlet and outlet connections on the RecoSwim are marked and must be connected as indicated. The RecoSwim has PVC stub connections suitable for solvent welds. The RecoSwim should be connected via unscrewable couplings.

It is suggested that the connection of the RecoSwim is the last to be made in the pool water circuitry to prevent damage to the pipe stub connections on the RecoSwim.

## **ROUTING OF PIPE WORK :**

Do not route pipe work across the service access panels of the RecoSwim or the air filter access point. All pipe work must be adequately supported for the operating weight when full of water with allowance made for expansion and contraction.

## **POOL WATER BY-PASS :**

A by-pass facility with isolation valves should be installed on the connections to the RecoSwim. This will enable the pool filtration system to be operated normally in the unlikely event of a leak within the RecoSwim. If any valve positioned after the RecoSwim is closed whilst the pool water circulating pump is still running, the increase in pressure may damage the RecoSwim. It is therefore recommended that the handles be removed from such valves and placed inside the access panel of the RecoSwim.

## **POOL WATER CHEMICAL DOSING :**

All purification devices and chemical injection systems must be fitted DOWN STREAM of the RecoSwim. If they are before the RecoSwim in the line of flow, then serious corrosion damage may occur to the RecoSwim.

This includes the practice of dosing slow dissolving tablets via the skimmer or pump basket, which can result in concentrated corrosive liquids passing over metal components within the RecoSwim. This relates to any slow dissolving tablets of ANY description, whether chlorine based or not.

Please note that the installation and usage instructions for the chemical dosing equipment often recommend that the chemical is introduced before the pool water filter. This should NOT be done unless the RecoSwim is installed on a completely separate pipe circuit fed from an additional pool water pump.

## **NON-RETURN VALVE :**

If, when the pool water filtration pump is switched off or if the pool water pipe circuit is drained, chemicals introduced into the filtration system can be drawn through the RecoSwim, a non-return valve must be fitted.

## **SALT WATER POOLS :**

In the past, salt chlorination or electrolytic water purification systems have been associated with a heightened risk of corrosion damage. Therefore, both the end user and the installer should duly consider that a heightened risk of corrosion damage may exist through the applications of such a device and that any corrosion damage to

the RecoSwim, however caused, is not covered by warranty.

#### **INDEPENDENT POOL WATER HEATING METHODS :**

Any existing or independent method of pool water heating must be installed down stream of the RecoSwim. In the event that a solar panel heating system is used in conjunction with the RecoSwim, care should be taken to ensure that the flow rate of pool water through the filtration circuit is not reduced through the necessity to force water through the solar panel circuit.

#### **POOL WATER CIRCULATING PUMP OPERATION :**

Effective operation of the RecoSwim can only take place if the pool water filtration pump is providing an adequate flow of water to the unit. If the filter pump is not running then the RecoSwim cannot operate correctly. The RecoSwim unit can be configured to provide a demand signal to operate the pump when required.

#### **BOOSTER POOL WATER PUMP :**

If the RecoSwim unit is located at a distance or at a higher location than the pool water filtration equipment, then it will be necessary to install a booster pump on the pool water connections to ensure adequate flow.

#### **POOL WATER FLOW THROUGH RECOSWIM :**

The RecoSwim is fitted with a water flow pressure sensor which controls the operation of the unit when the pool water filtration pump is not operating or insufficient pool water pressure is available. Under such circumstances the RecoSwim operation will be limited.

It is possible that the flow of pool water, although inadequate, may not be insufficient enough to trigger the water flow pressure sensor. It would then be possible for the RecoSwim to cut-out on 'SYSTEM CUT-OUT' and the corresponding red neon will be lit. If this happens, the water flow should be fully restored and the RecoSwim reset, refer to 'fault finding'.

#### **HEAD OF WATER :**

If a head of water exists above the RecoSwim, then sensitive adjustment of the internal pool water flow pressure sensor may be necessary - please consult RecoSwim for further details if required.

#### **AIR VENTING OF POOL WATER PIPE WORK :**

If the RecoSwim is positioned at a higher level than the pool water filtration equipment, then a facility for venting air from the pool pipe work will be required.

#### **MAXIMUM PRESSURE AT RECOSWIM :**

The maximum working pressure at the RecoSwim should not exceed 23 PSI.

#### **POOL WATER FILTER BY-PASS ARRANGEMENT :**

It is possible to take the pool water flow for the RecoSwim from between the pool circulating pump and the pool filter. This would then enable chemicals to be introduced into the filter without being passed through the RecoSwim.

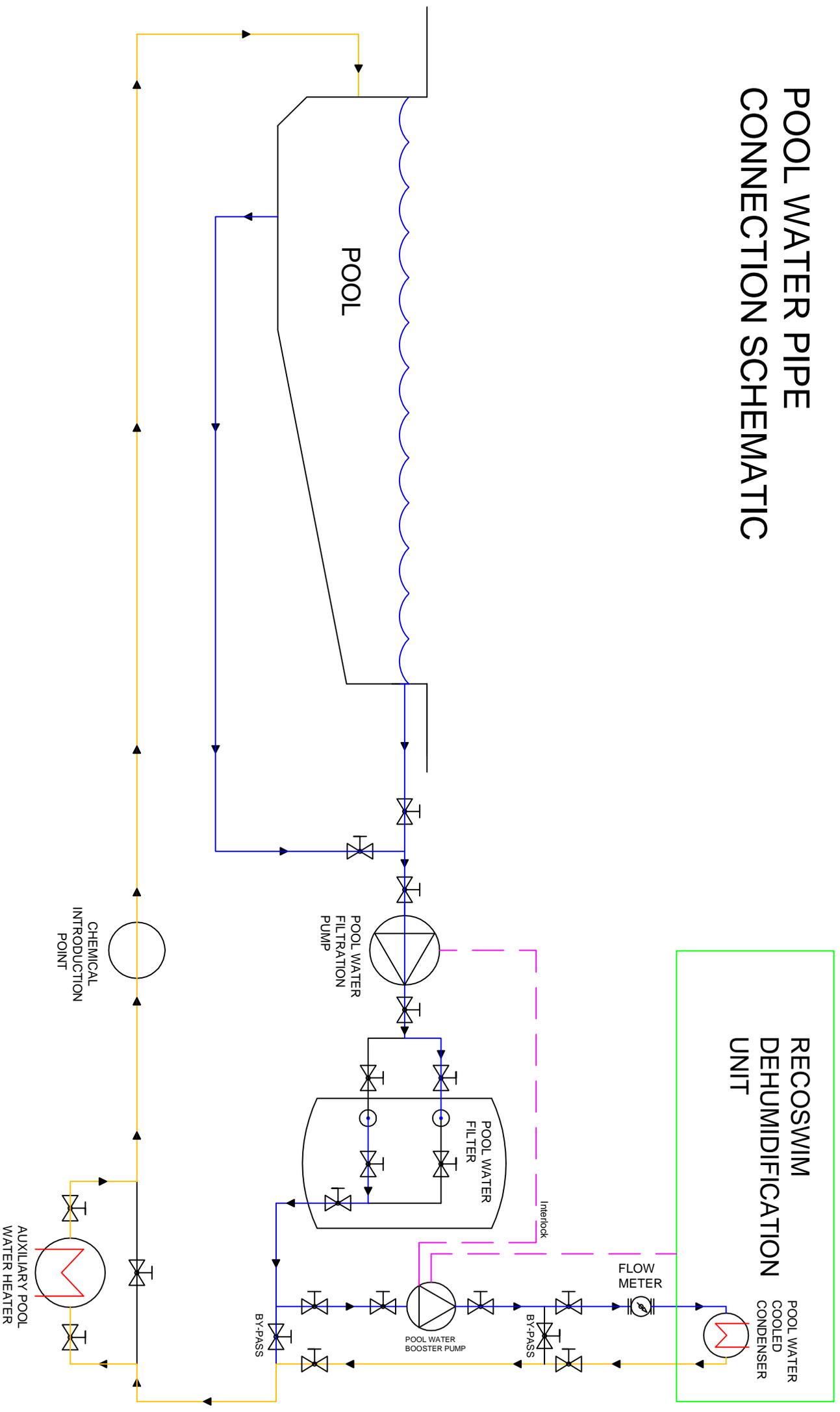
The limitation of this approach are that unfiltered pool water is passed through the RecoSwim and that the volume of water passed through the filter is invariably reduced, retarding filtration efficiency.

However, the total resistance on the pool water circulating pump will be marginally reduced and the net flow increased as the pool water heat exchanger within the RecoSwim would be in parallel with the pool filter and not in series.

#### **Outside unit installation :**

If the pool water is being circulated to an outside located unit, then all external pool water pipe should be insulated and a frost control override fitted to the pool pump so that water is circulated whenever outside temperatures are below 32°F.

# POOL WATER PIPE CONNECTION SCHEMATIC



EXAMPLE SCHEMATIC ONLY - REFER TO RELEVANT TEXT IN MANUAL E80E

# EXTERNAL WATER CIRCUIT CONDENSER PIPE CONNECTIONS

Subject to selected specification, the RecoSwim may require connection into an external water circuit for excess heat dissipation :

Note : All relevant national and local standards, codes and regulations must be observed and must take precedent in respect of the design, manufacture and installation of the external water circuit and all associated aspects.

## **EXTERNAL WATER CIRCUIT FLOW SPECIFICATIONS :**

The required water flow rates and resistance through the RecoSwim are detailed in the technical schedule document supplied with the product, further copy available on request.

## **PIPE WORK CONNECTIONS :**

The water inlet and outlet connections on the RecoSwim are marked and must be connected as indicated.

Depending upon the design temperature and flow characteristics of the external water circuit, the RecoSwim will either have Copper stub or PVC solvent weld connections.

## **ROUTING OF PIPE WORK :**

Do not route pipe work across the service access panels of the RecoSwim or the air filter access point.

All pipe work must be adequately supported for the operating weight when full of water with allowance made for temperature associated expansion and contraction.

## **MANUAL WATER BY-PASS & ISOLATION :**

A by-pass facility with isolation valves should be installed on the connections to the RecoSwim. This will enable the external water circuit to be operated in the unlikely event of a leak within the RecoSwim.

If any valve positioned after the RecoSwim is closed whilst the water circulating pump is still running, the increase in pressure may damage the RecoSwim. It is therefore recommended that the handles be removed from such valves and placed inside the access panel of the RecoSwim.

## **EXTERNAL WATER CIRCULATING PUMP OPERATION :**

Effective operation of the RecoSwim can only take place if the external water circuit pump is providing an adequate flow of water to the unit. If the pump is not running then the RecoSwim cannot dissipate heat effectively.

The RecoSwim unit can be configured to provide a demand signal to operate the pump when required.

If the RecoSwim is not calling for flow from the external water circuit, then flow should not be present.

## **AIR VENTING OF WATER PIPE WORK :**

If the RecoSwim is positioned at a higher level than the pool water filtration equipment, then a facility for venting air from the pool pipe work will be required.

## **MAXIMUM PRESSURE AT RECOSWIM :**

The maximum working pressure at the RecoSwim should not exceed 25 PSI. A system of pressure control and relieve should be installed as part of the external water circuit.

**OUTSIDE UNIT INSTALLATION :**

If the water is being circulated to an outside located unit, then all external water pipe should be insulated and a frost control override fitted to the pool pump so that water is circulated whenever outside temperatures are below 32°F. This is not necessary if the water circuit has adequate antifreeze.

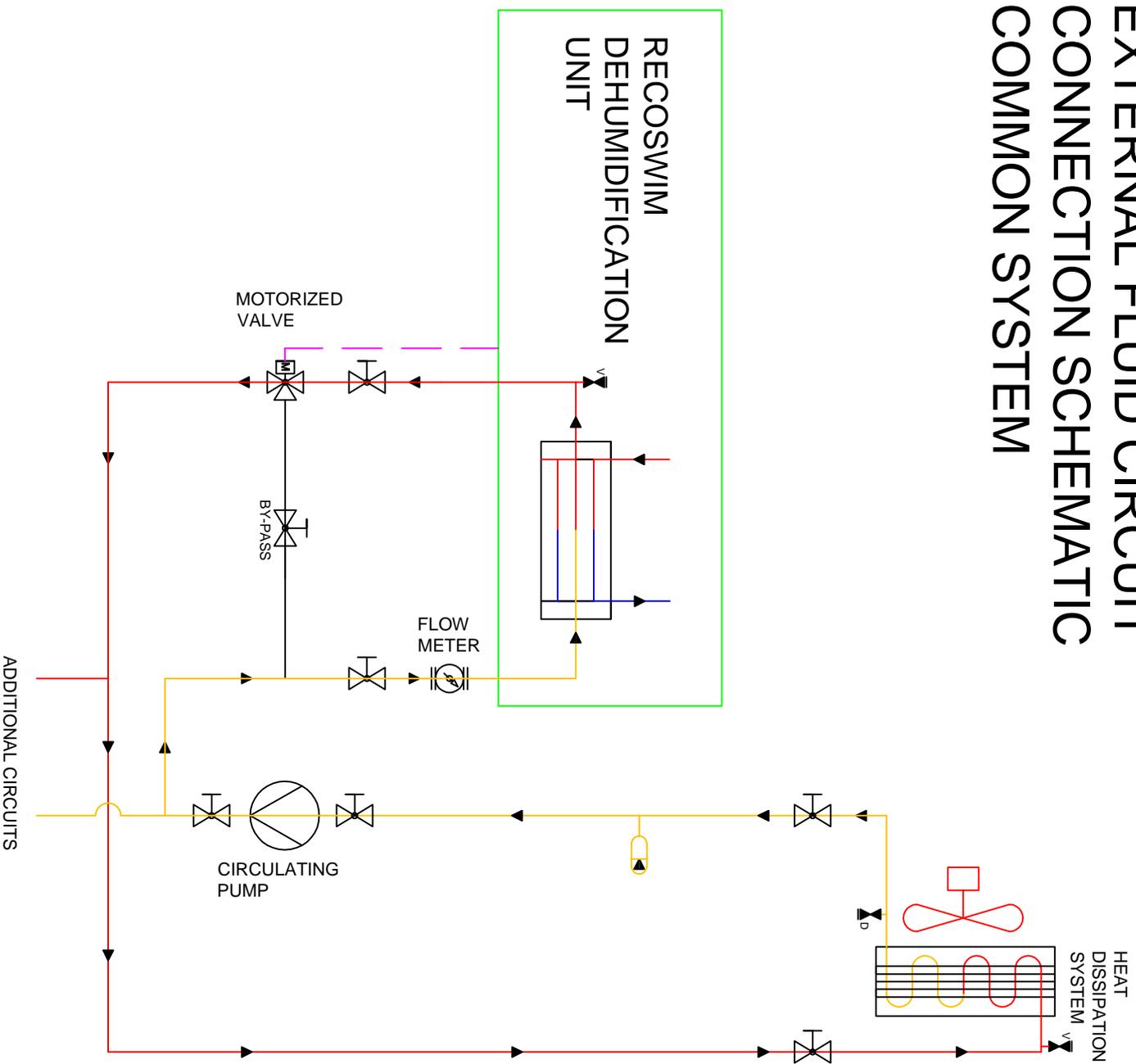
**ANTI-FREEZE PROVISION :**

If there is any possible risk that the external water circuit will be exposed to temperatures below freezing, then an adequate dilution of anti-freeze will be necessary, in line with the assessed risk temperature. Anti-freeze will impair the thermal transfer efficiency of the fluid and the flow rate necessary will need to be compensated accordingly. The anti-freeze will also affect the viscosity of the fluid to an extent and this should be factored into the pump selection. The anti-freeze dilution should be verified on commissioning and routinely periodically tested as part of the planned maintenance schedule for the system.

**CORROSION / SCALE / SLUDGING :**

The fluid within the external water circuit should be neither corrosive or scale forming. If there is any risk of sludging, then filters should be fitted externally to protect the heat exchangers. The RecoSwim external circuit heat exchanger is not warranted against internal corrosion or attrition damage or obstruction through scale or sludge formation.

# EXTERNAL FLUID CIRCUIT CONNECTION SCHEMATIC COMMON SYSTEM



# LPHW BOILER SYSTEM PIPE CONNECTIONS (H:LPHW versions only) :

Note : All relevant national and local standards, codes and regulations must be observed and must take precedent in respect of the design, manufacture and installation of the hot water heating circuit and all associated aspects.

## **ABOUT THE HEATING CIRCUIT :**

A separate heat source is required, typically a fuel boiler or heat pump boiler. The RecoSwim simply transfers the heat provided by the boiler into the pool room air, when necessary.

The heat produced by the boiler is taken to the RecoSwim using a closed circuit of pipe work filled with water, similar in principle to a standard central heating system.

The boiler heats up the water within the closed pipe circuit, which the boiler circulating pump then pumps through the pipe work to the RecoSwim.

The RecoSwim transfers this heat from the closed pipe circuit, prior to the water being re-circulated back to the boiler for the heating process to continue.

This type of circuit is known as an L.P.H.W. system (Low Pressure Hot Water) or L.T.H.W. system (Low Temperature Hot Water).

## **BOILER TYPE :**

The boiler required is a normal domestic / commercial type, identical to that which would often be used to provide heat to standard radiators.

Ground source heat pump boilers, air source heat pump boilers or heat stores can all be applied for this purpose.

The flow temperature provided from the boiler is critical to the heating ability of the system. If the flow temperature is inadequate, then effective heating will not be possible during colder weather. To use a heat pump boiler, the RecoSwim unit would normally be especially configured during manufacture to compensate for the comparatively low flow temperature available.

A specialized 'swimming pool' boiler cannot be used as these can usually only be used to heat the pool water and not the pool room air.

High efficiency condensing fuel boilers can be used.

Pressurized system fuel boilers can be used as long as the pressure is not normally allowed to exceed 30 psi.

On a fuel boiler, a balanced flue arrangement is preferable and necessary if the pool room air can enter the boiler room.

Multiple smaller boilers can be used, in place of a single large boiler, if this offers any plant room space benefits.

## **BOILER SIZE :**

The amount of heat which a boiler is capable of producing is described as the boiler out put capacity. This should not be confused with the boiler input rating which is not the same.

This will normally be rated in BTU's or kW. (3412.14 BTU's = 1 kW ).

The required boiler heat output rating, to supply the RecoSwim unit, are detailed in the data contained within the technical schedule document supplied with the product, further copy available on request.

Contact Poolpak if there is any doubt as to the correct output rating.

## **BOILER WATER CIRCULATING PUMP :**

The required boiler circulating pump flow rate performance is detailed in the data contained within the technical schedule document supplied with the product, further copy available on request.

Often, a domestic type pump will not be adequate in performance. Likewise, if the boiler circulating pump is built into the boiler, then the pump will often not be adequate in performance.

The boiler water circulating pump can be wired to run on demand from the RecoSwim.

## **L.P.H.W. SPECIFICATIONS :**

The required L.P.H.W. flow temperatures, rates and resistances are detailed in the data contained within the 'Installation Services' document supplied with the product, further copy available on request.

If the L.P.H.W. supply provided to the RecoSwim falls short of these requirements, then the full heating capacity will not be achieved.

## **BOILER PIPE CONNECTIONS TO RECOSWIM :**

The pipe connections, which are labeled, should be made with compression fittings. Soldered or brazed connections should not be used as the excessive localized heat will damage the casing of the unit and may damage internal pipe connections.

The compression connections should be able to be unscrewed to disconnect the unit for maintenance.

## **External diverter valve :**

RecoSwim versions only incorporate the air heat exchange coil and not any motorized heating valves, so an external motorized heating valve will need to be field supplied.

The external motorized heating valve is powered electrically from the electrical connections within the RecoSwim. The external heating valve should open and allow L.P.H.W. to the air heating coil when electrical power is provided.

The electrical supply to the valve from the RecoSwim is a switched 110v 1 Amp supply which is either on or off and not proportional. The RecoSwim control system governs room space temperature and regulates cycling.

## **DRAIN DOWN VALVES :**

Drain down valves should be provided at appropriate points around the boiler pipe work circuit.

## **ROUTING OF PIPE WORK :**

Do not route pipe work across the service access panels of the RecoSwim or the air filter access point.

## **OUTSIDE UNIT INSTALLATION :**

If the boiler water is being circulated to an outside located unit, then all external pipes should be extensively and adequately insulated or an antifreeze solution used, with sufficient dilution to protect against the anticipated coldest outside temperature.

## **ANTI-FREEZE PROVISION :**

If there is any possible risk that the boiler water circuit will be exposed to temperatures below freezing, then suitable precautions will need to be implemented. For example, wrapping the pipe with electric heat tape with adequate thermal insulation. (Follow heat tape manufacturer's instructions - heat tape must be powered independently to the RecoSwim unit).

If anti-freeze is utilized within the boiler water circuit then the flow rate necessary will need to be compensated.

**INSULATION OF PIPE WORK :**

All L.P.H.W. pipe work should be thermally insulated to prevent heat loss.

**AIR VENTING OF THE L.P.H.W. PIPE WORK :**

An air vent is positioned on the top section of the air heating coil within the RecoSwim.

An air vent should also be positioned at the highest point in the L.P.H.W. pipe circuit.

**ISOLATION VALVES :**

A method of isolating the flow of L.P.H.W. through the RecoSwim should be included within both the flow and return pipe connection. This will enable maintenance to be carried out on the L.P.H.W. pipe circuit within the RecoSwim without the need to drain down the entire pipe circuit.

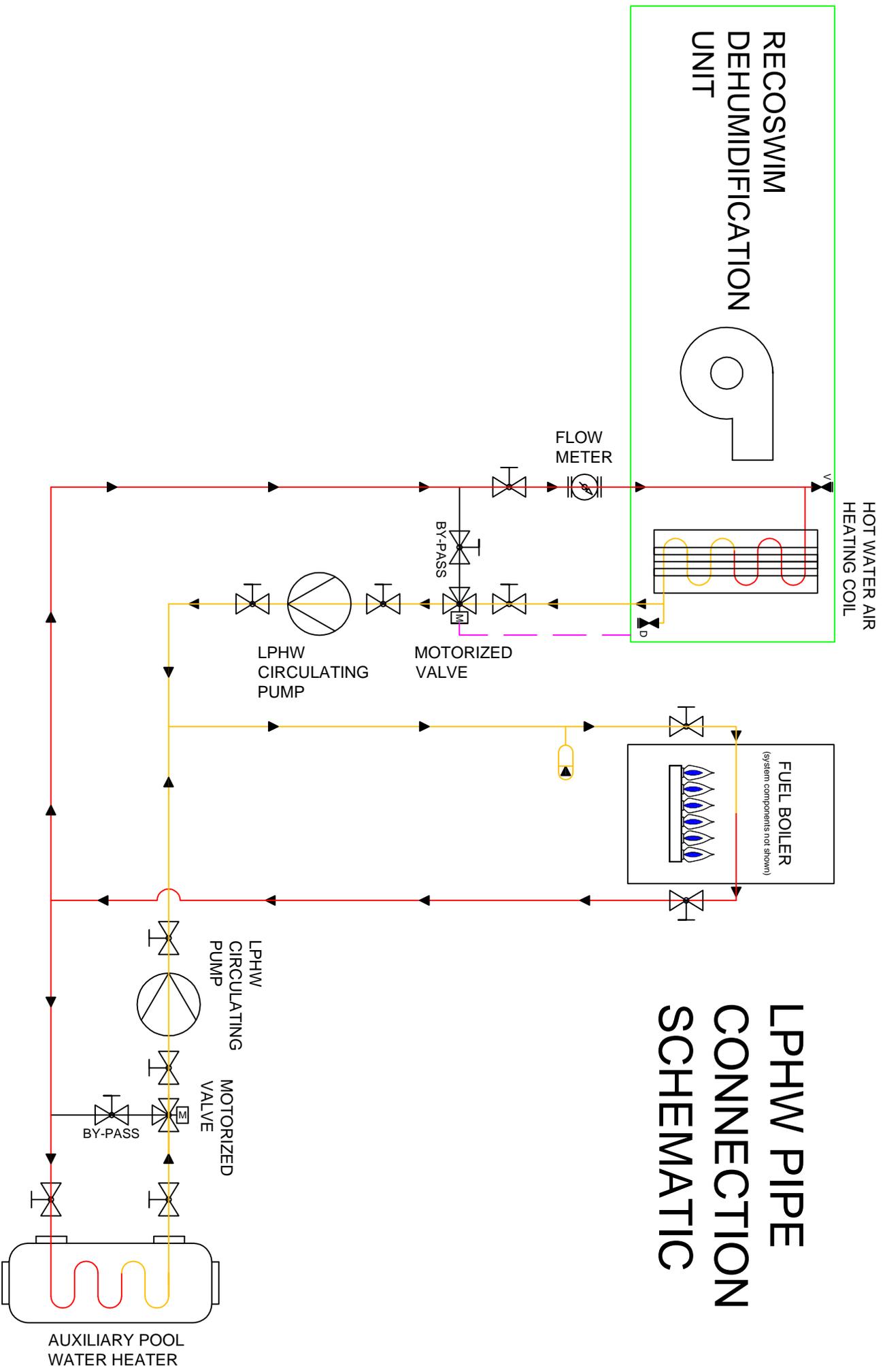
**BOILER MANUFACTURERS DATA :**

Always refer to the boiler and boiler circulating pump manufacturers installation information, prior to designing or installing the heating circuit.

**CORROSION / SCALE / SLUDGING :**

The fluid within the LPHW circuit should be neither corrosive or scale forming. If there is any risk of sludging, then filters should be fitted externally to protect the heat exchangers. The RecoSwim LPHW circuit heating coils are not warranted against internal corrosion or attrition damage or obstruction through scale or sludge formation.

# LPHW PIPE CONNECTION SCHEMATIC



# ELECTRICAL POWER SUPPLY

## **SAFETY WARNING :**

The RecoSwim embodies electrical and rotational equipment.

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

Never work on any control equipment without first isolating all power supplies from the equipment. Utilize power lock-off facilities to safeguard against power being accidentally reconnected by others.

## **STANDARDS AND REGULATIONS :**

All relevant national and local electrical standards, codes and regulations must be observed and must take precedent.

## **ELECTRICAL CONNECTIONS :**

The mains electricity supply is connected to the manual switch on the end of the RecoSwim.

All other control circuit connections are made within the 'Auxiliary Electrical Connection' box, located on the end of the unit.

Use only copper conductors and wiring.

## **ELECTRICAL FIELD WIRING CONNECTIONS REQUIRED :**

### **ALL MODELS :**

MAINS power electricity supply TO RecoSwim .

Air temperature mode switched link (12v), to manual switch or pool cover controller etc. Optional.

A 'Ventilation control' switch link is also available to halt the ventilation function of the unit. Optional.

### **'H:LPHW' VERSIONS ONLY : Demand for Heat**

110v power electricity supply, FROM RecoSwim TO external air heating motorized valve.  
This electricity supply is present when the RecoSwim senses a demand for air heating.

Note : a 0v pair of switched contacts are also provided within the Auxiliary Electrical Connection box as an alternative method of switching the heat demand.

## **EXTERNAL FIELD SUPPLIED AIR HEATING SYSTEMS :**

If air heating provision is not included within the RecoSwim, then the unit can still provide electrical signal / switch link to activate an independent electric in-duct heater or duct mounted furnace. The RecoSwim is also capable of accommodating a fault signal from such a device, if available.

### **EWC : VERSIONS ONLY : Demand for cooling**

110v power electricity supply, FROM RecoSwim TO external  
This electricity supply is present when the RecoSwim senses a demand for air cooling.  
This would typically be routed to the External circuit heat dissipation system, to activate a dedicated circulating pump, diverter valve or heat dissipation fan-coil system.

## **'LYNX' CONTROL SYSTEM - INTERNET ACCESS :**

The unit is equipped with an RJ45 coupler. An Ethernet / CAT5 cable needs to be connected into this coupler to facilitate access via the remote touch screen control interface. If multiple units are installed on the same application, then each unit will need access to a network cable. The maximum distance between the unit and an Ethernet hub or switch is 100 yards.

All sensors are pre-installed within the unit.

## **MINIMUM SUPPLY LOADS :**

The required electrical specifications are given within the technical schedule document supplied with the product and also on the unit data plate.

Both the MCA and MOP are given.

Key power consumers in the unit include the supply fan motor system, the exhaust fan motor system and refrigeration compressor motors. Subject to selected specification, an electric air heating coil may also be utilized.

To limit motor start electrical loads the fans start progressively and the compressors starts are off set by the control system.

## **SUPPLY VOLTAGE :**

The voltage limits indicated in the Electrical Specifications must not be exceeded. The correct voltage must be available under the Starting Load Current.

## **POWER CABLE SIZING :**

The RecoSwim must be connected with the correct cable size. If the electrical cable size is too small, the voltage will be restricted and the internal electrical motors could be damaged.

The cable supplying electricity to a machine with a given electrical load must increase in cross sectional area as the length increases in order that the voltage drop within the cable does not exceed the recommended limits.

Therefore, give particular consideration to cable size if there is a long cable run.

Power cables must have a minimum rating in line with the minimum circuit capacity rating of the unit.

The mains cable should be run in suitable conduit or armored casing.

## **CONTROL AND SWITCH GEAR :**

No motor starter, thermal over load or other switch gear should be connected on the mains power supply to the RecoSwim. The RecoSwim requires a continuous mains power supply, 24 hours per day. Therefore time clocks etc. should not be installed.

# ELECTRICAL SAFETY PROTECTION REQUIRED

## **GROUND / EARTH :**

The RecoSwim must be electrically connected to an appropriate safety ground. Failure to do so presents an electrical shock hazard.

The circuit protection to the RecoSwim should allow for two separate aspects, being a ground fault circuit interrupter (GFCI) and Circuit overload Breaker or equivalent.

## **GROUND FAULT CIRCUIT INTERRUPTER (GFCI) :**

The mains power electricity supply to the RecoSwim should be routed via a suitably sized ground fault circuit interrupter (GFCI).

A GFCI rating of 30mA is advised.

The purpose of the GFCI is to protect against fatal electric shock to personnel, by reducing to safe levels (not eliminating) the value and length of time a person is exposed to current flow through the body.

Equally the GFCI will help protect plant and equipment from fires started by low fault currents passing from Live to ground, that a normal fuse or circuit breaker may not detect.

**Warning :** failure to protect the unit with a corrected rated GFCI represents a serious hazard. Non-compliance with this warning may result in serious personal injury or death and / or equipment damage.

## **PHASE HEALTH PROTECTION (3 PHASE MODELS ONLY) :**

If the mains electrical supply is Three Phase in nature, then phase protection will be provided as part of the RecoSwim circuit protection.

This is to guard against the possibility of one or two of the phases being temporarily isolated due to a power cut etc.

If all three phases are not isolated together, at exactly the same time, then the large electric motors within the RecoSwim can be damaged. Such damage is not covered under the manufacturers warranty.

## **CIRCUIT BREAKER :**

In addition to an GFCI, the mains supply to the RecoSwim must be protected by a Miniature Circuit Breaker (MCB) or equivalent.

An MCB is a circuit overload protection device similar to a simple fuse, but re-settable.

An MCB normally has two modes of operation :

Thermal Overload Protection - to protect cabling and equipment from 'long term' over current damage.

Magnetic Short Circuit Protection - to protect cabling and equipment against very high fault currents caused by terminal component failure.

An MCB is rated by the normal carrying current, normal carrying voltage and by the maximum fault current and voltage they can safely / repeatedly break.

As the RecoSwim incorporates large electric motors, with high initial starting current loads, we recommend the use of a 'Type C' MCB, which allows for this initial starting load.

Standard fuses should not be used in place of a proper MCB.

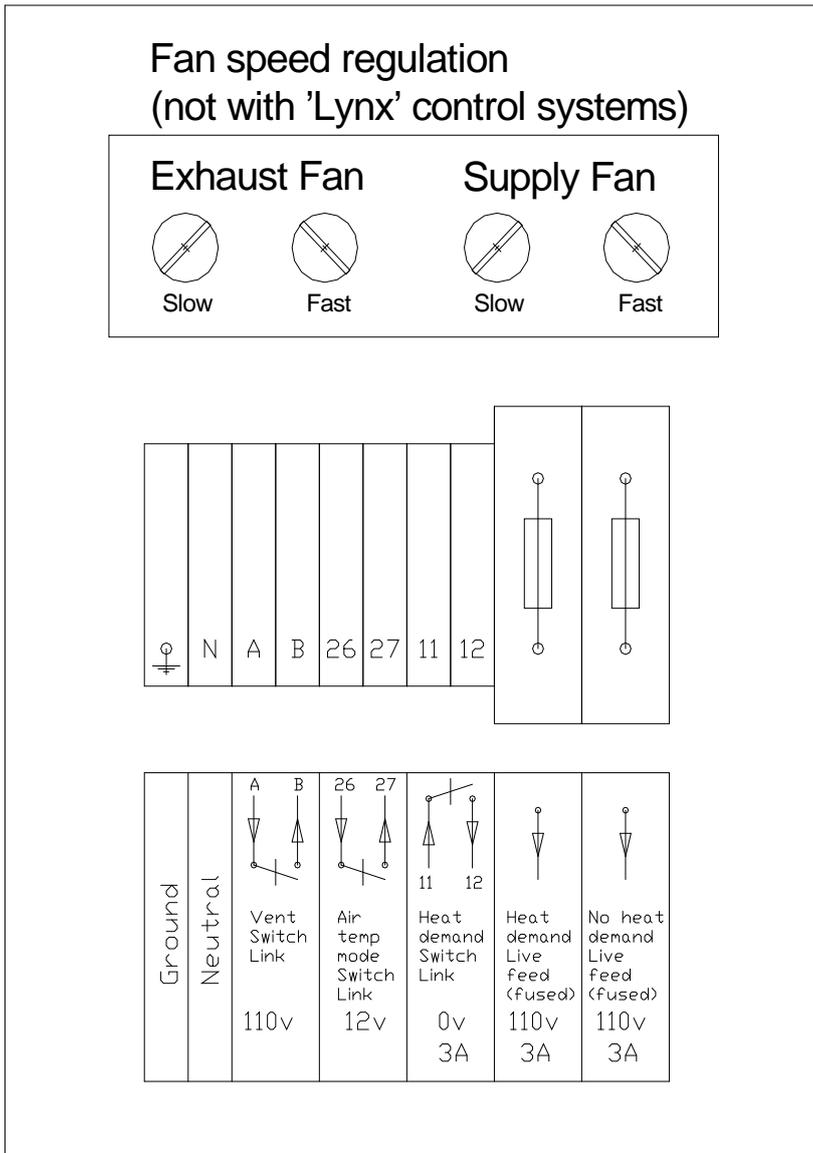
**HIGH VOLTAGE TEST :**

Never perform high voltage resistance checks on the mains wiring without first disconnecting the RecoSwim from the circuit being tested.

**PHASE ROTATION (3 PHASE MODELS ONLY) :**

If the RecoSwim is to be run on a Three Phase electricity supply, the direction of phase rotation must be confirmed to be correct on first connection of the mains supply. This is normally the responsibility of the electrical contractor. Please note that the fans in the unit will always rotate the correct way, even if phase orientation is incorrect.

# Auxiliary Electrical Contacts



## WIRING THE BOILER WATER CIRCULATING PUMP (H:LPHW version only)

It is advised that the boiler water circulating pump dedicated to the RecoSwim unit is wired to only operate on demand of heat.

To prevent the possibility of the pump operating against a dead end, it should be confirmed that :

- A by-pass pipe / valve facility has been included within the boiler water pipe circuit to the RecoSwim.  
Or, that any external motorized heating valves are 3 way in type i.e. simply divert, as opposed to shut off, the flow of water from the boiler.

## POOL COVER / SET BACK INTERLOCK (Only if cover used)

If an electric automatic pool surface cover is to be used on the swimming pool, then it is possible to electrically link the cover control box to the RecoSwim, so that 'air temperature set back' mode is automatically selected as soon as the cover closes across the pool and 'normal air temperature' mode automatically selected as soon as the cover is opened.

The electrical link in the RecoSwim comprises of a pair of terminals – one terminal has a 12v feed, if this feed is switched via a remote relay so that it connects to the second terminal, then 'cover open' mode is selected. The relay requires to maintain a 'closed circuit' status and cannot be momentary.

Alternatively, these terminals can be connected to other methods of control, i.e. a manual switch in the pool room or a time clock etc. As a simple 'default' a manual switch is supplied separate with the RecoSwim unit which can be used for the purpose of switching the set back interlock facility between the two modes.

## EXTERNAL AIR MOTORIZED VALVE (H:LPHW version only) : Field Supplied

This would apply to RecoSwim 'H:LPHW' versions only.

A separate external motorized heating valve to control air heating should be provided within the boiler pipe circuit supplying the RecoSwim.

This valve is to be electrically powered open and close by the RecoSwim.

A 110v Single phase live supply is provided from the RecoSwim to power the valve open.

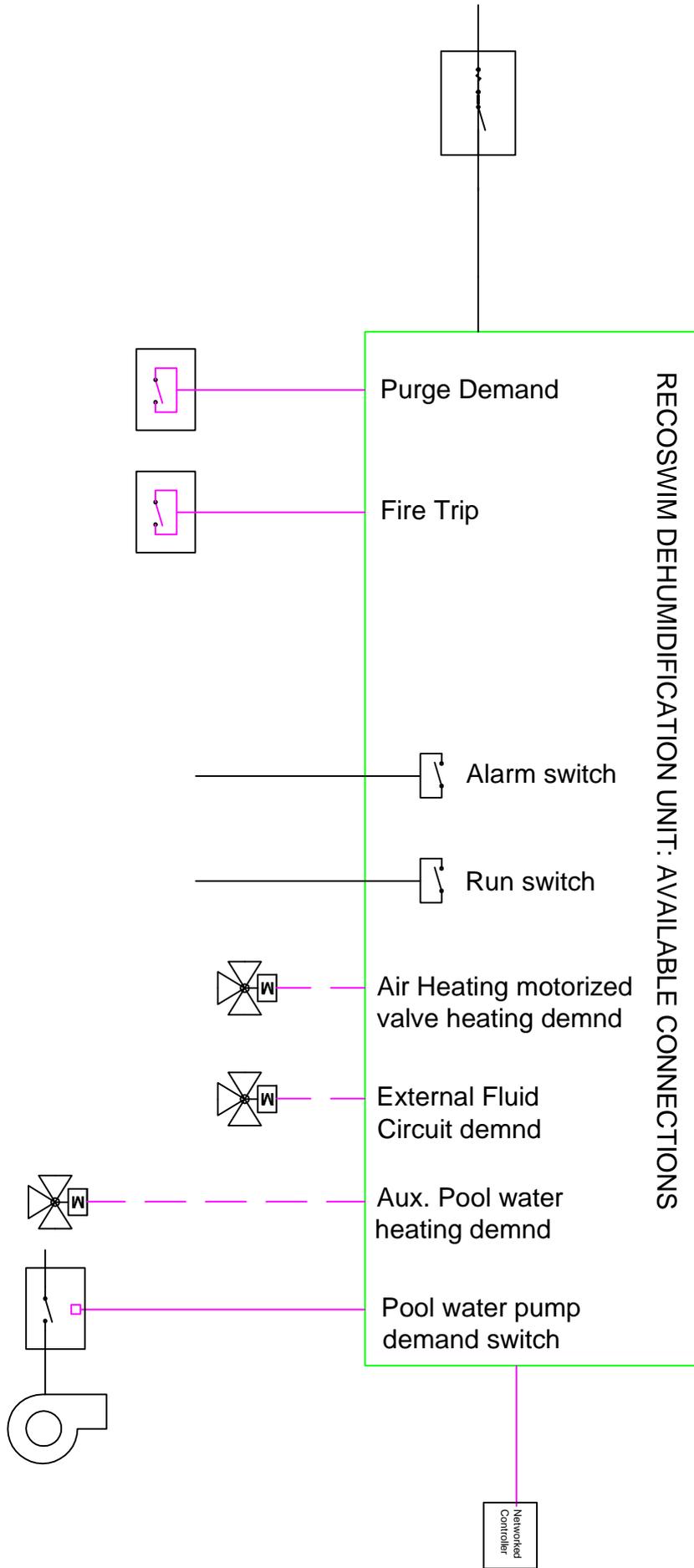
If the motorized heating valve is of 'spring return' type, then the valve will close automatically as soon as the 110v supply from the RecoSwim is switched off.

If the motorized heating valve is of 'power close' type, then a separate 110v supply is provided from the RecoSwim to power the valve close.

A Neutral and ground connection should also be made to the external motorized valve from the RecoSwim electrics.

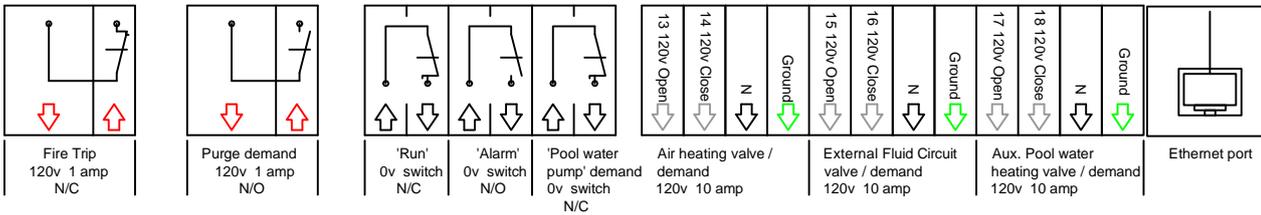
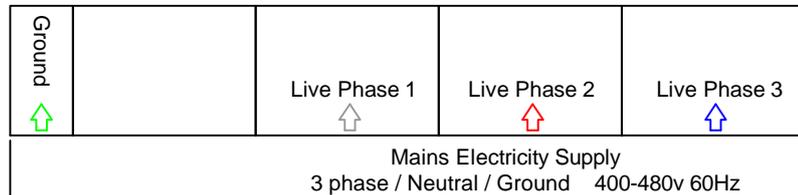
The maximum current available from the RecoSwim for this purpose is 3 Amps.

If the current loading of the motorized heating valve exceeds this rating, then a separate suitably sized relay should be installed to switch the electricity to the valve.



# Field Installed Electrical Connections

All external wiring & connections supplied & installed by contractor



## CONDENSATE WATER DRAINAGE

Under normal operation the RecoSwim will produce condensate water at a rate up to 0.5 Gallons per minute.

Condensate from the unit should be run to a suitable waste sewer via a 1" pipe.

It is necessary that a P-TRAP be included in the pipe to prevent the suction effect of the fans in the RecoSwim from sucking up the condensate water back into the unit and potentially flooding the area surrounding and below the unit. The trap should have a drop of at least 4 inches, subject to unit internal pressure.

NOTE : In order to accommodate the required trap height, the unit may need to be located at a height higher than the surrounding floor/surface, or a recess positioned within the floor etc. for the trap height.

The drain pipe must be installed to run downhill and must be supported appropriately.

For ease of cleaning and maintenance, it is advised that some of the drain pipe is push fitted together and not glued. Equally a short section of transparent pipe would assist in monitoring the condensate flow.

If the drain pipe or drain is positioned outside, care should be taken to ensure that it is not allowed to freeze during cold weather and suitable precautions will be necessary. For example, wrapping the pipe with electric heat tape with adequate thermal insulation. (Follow heat tape manufacturer's instructions - heat tape must be powered independently to the RecoSwim unit).

It is not advised to run the condensate water back to the swimming pool due to the possibility of contamination.

# POOL ROOM CLIMATE CONTROL BASICS :

## **POOL WATER TEMPERATURE :**

The pool water requires to be heated to an acceptable temperature. Within a typical indoor pool, the pool water is normally heated to a temperature between 80°F and 86°F. The vast majority of the heat loss from the pool water is through evaporation from the warm pool water surface into the pool room air.

## **POOL ROOM AIR TEMPERATURE :**

The pool room air requires to be heated to an acceptable temperature.

Ideally, in order to limit heat loss and evaporation from the pool water surface, the pool room air temperature should be maintained slightly higher than that of the pool water. For example, if the pool water temperature is 82°F, the pool room air temperature should be maintained at 84°F.

It should be noted that, although such comparatively warm air temperatures provide a pleasant environment for suitably attired bathers, for whom wetted skin enhances the cooling effect on the body, such conditions may prove uncomfortably warm for other activities and for fully clothed spectators.

## **POOL ROOM AIR HUMIDITY :**

The warm, heated pool water will give rise to continuous evaporation of significant quantities of water vapor from the pool surface into the pool room air. The room air humidity level represents the quantity of water vapor contained within the room air.

This moisture laden humid air also contains the majority of the heat energy being lost by the pool water and, therefore, is rich in energy.

The quantity of humidity present is expressed as % Relative Humidity (% R.H.). Note : The amount of vapor which the air can hold before condensation starts to occur is 'relative' to the temperature of the air.

Therefore, it is possible to increase the 'relative humidity' value of the room air, simply by reducing the room air temperature, although the actual quantity of water vapor in the air would remain the same. Likewise, a decrease in 'relative humidity' can be achieved simply by increasing the room air temperature.

The cooler the air, the higher the 'relative humidity' reading and the easier condensation will occur.

## **WHAT IS THE IDEAL POOL ROOM AIR HUMIDITY LEVEL?**

Within a typical indoor pool, at typical room air temperatures, the humidity would be controlled at around 60-65% R.H., which would provide pleasant conditions for bathers and control condensation on the pool room structure. If the relative humidity is reduced further, then the rate of evaporation, and therefore the heat loss, from the pool water surface is unnecessarily increased together with the requirement for dehumidification.

Under certain circumstances it may be the case that the humidity would intentionally be maintained between, perhaps, 50-60% R.H. if there is a desire to maximize the ability of the system to provide mechanical cooling to the room, maybe for the benefit of spectators and other occupants. Such a system would need to be designed from the outset to manage such a scenario.

## **HOW IS THE POOL ROOM AIR HUMIDITY LEVEL CONTROLLED?**

If the pool humidity level is not limited, the humidity level will progressively increase until heavy condensation occurs on the pool room building structure, leading to rapid deterioration of the decor and possible eventual structural failure.

To prevent this, a method of 'dehumidification' must be employed.

In the past fuel costs were comparatively inexpensive and, therefore, it was possible to simply extract the humid energy laden pool air to outside, whilst replacing it with often cooler outside air which required rapid heating to an acceptable temperature.

Given present day fuel costs, such a wasteful approach would, understandably, prove prohibitively expensive to operate.

This approach is also compromised if the condition of the outside air is too high in moisture content to provide effective humidity reduction in the room.

Modern systems therefore utilize methods of energy recovery, primarily using refrigeration technology to condense out excess humidity without the need to 'throw away' the warm pool room air. Such systems also enjoy the ability to 'reclaim' the latent heat contained within the humid pool air, back to either the air or pool water.

### **HOW DOES A 'POOL WATER SURFACE COVER' WORK ?**

Savings on operating costs are often possible through the use of a pool surface cover.

Such a cover primarily acts to 'seal off' the pool water surface when the pool is not in use, reducing evaporation and heat loss to an absolute minimum.

When a pool surface cover is in place, the pool room air can then be allowed to fall to a temperature below that of the pool water without any adverse effects. This is referred to as the 'set back air temperature'.

Prior to the pool cover being removed, the pool room air temperature should ideally first be restored to the normal level i.e. above that of the pool water.

A pool cover can provide the following energy saving benefits :

- When a pool surface cover is in place, the heat loss through convection and evaporation from the pool water is reduced and, as a result, less pool water heating is necessary.
- As the pool air can be maintained at a lower temperature when a pool cover is in place, less air heating is necessary.
- In reducing evaporation from the pool surface, the amount of dehumidification necessary is also reduced.

Please note that liquid evaporation inhibitors, although beneficial, will not offer the benefits of a physical pool cover.

### **FACTORS AFFECTING HEAT LOSS, HEAT GAIN & HUMIDITY :**

The following factors affect the rate of evaporation and heat loss from the pool water surface and subsequently the humidity within the pool room air :

- Surface area of the pool and other water features.
- Pool water temperature in relation to the pool room air temperature.
- Swimming activity within the pool and surface agitation.
- Wetted pool surround resulting from swimming activity.
- Humidity level of the pool room air.
- Air movement velocity across the pool water surface.
- Use of a pool water surface cover.

Factors affecting the rate of heat loss from the pool room air :

- Structural transmission / fabric heat loss from the pool room walls, roof, windows etc.
- Amount of colder outside air introduced to the pool room.

Factors contributing towards the humidity level of the pool room air :

Evaporation from pool water and other wetted surfaces.

Moisture emitted from occupants and spectators.

Moisture introduced within outside air entering the room, subject to variables in the condition of the outside air.

Factors contributing towards heat gains in the pool room :

Solar gain.

Structural transmission gains through the pool room walls, roof, windows etc.

Heat introduced within outside air entering the room, subject to variables in the condition of the outside air.

Transmission losses from pool water surfaces.

Energy gain from electrical equipment, such as lighting, fans etc.

Heat emitted from occupants and spectators.

#### **OUTSIDE AIR PROVISION :**

The majority of modern swimming pool dehumidification systems primarily 're-circulate' the pool room air.

However, regional regulations may exist which stipulate minimum outside air ventilation provisions based upon surface area of the pool water, surface area of the potentially wetted floor around the pool and the quantity of occupants and spectators. Accordingly, all relevant national and local standards, codes and regulations must be observed and must take precedent.

The Recoswim can be specified to provide the following optional features :

Outside Air for normal dilution :

A controlled quantity of outside air will need to be provided to ensure adequate air for the benefits of occupants and to constantly dilute any gases associated with the normal sterilization provisions for the pool water.

Negative pool room air pressure differential :

Ventilation with outside air also provides the opportunity and means to achieve a continuous negative air pressure differential within the pool room, to discourage the pool room air from migrating into areas adjoining the pool room and also entering the building structure.

Economizer Outside Air function :

As an alternative to providing room air cooling or dehumidification using the mechanical power of the refrigeration system, when the condition of the outside air permits, the system will automatically utilize the natural resource of the outside air to achieve either cooling or dehumidification to the room. As this process only necessitates fan operation, the energy consumed by the system is significantly reduced.

Purge Outside Air function :

The system can activate in maximum outside air mode on demand, overriding the normal automatic control system. The pool operator may utilize this facility if, for example, they are executing certain occasional sterilization procedures to the pool water which may give rise to increased levels of associated gas emissions.

# WEB ENABLED CONTROL SYSTEM :

The unit controller is a Trend IQ3 Building Management System Controller, which is supplied pre-integrated into the unit. The controller uses Ethernet and TCP/IP or BACnet networking technologies. Each controller incorporates a web server which can deliver user-specific web pages to a PC or mobile device with a web browser. A user with the appropriate security codes can monitor or adjust the controller from any internet access point. Full details of the controller is included as an appendix to this manual.

BACnet Points available

object-type	object-instance	description
AI	1	Return Temperature
AI	2	Return Humidity
AI	3	Water Temperature
AI	5	Primary Water Flow temp
AI	6	Primary Water Return temp
AI	7	Fresh Air Temp
AI	8	DIX 1
AI	9	DIX 2
AI	10	DIX 3
AI	11	Exhaust Air Temp
AI	99	IQView8 Reference Sensor
BI	4	Pool Cover Interlock
BI	5	Party Mode Switch
BI	50	3 Phase Sequence detector
BI	51	Ventilation switch
BI	52	1st Floor Extend
BI	53	High Pressure Cut-Out
BI	54	Low Pressure Cut-Out
BI	55	Air Heating valve open
BI	56	1st Floor Extend
BI	57	Water Heat Recovery valve open
BI	58	Rtn Air Filter Fouling Alarm
BI	59	Fresh Air Filter Fouling Alarm
BI	60	1st Floor Extend
BI	61	Extract Fan Fault
BI	62	Water Htg Recovery vlv failed
BI	63	Air Vent Htg vlv failed
BI	64	Water Htg vlv failed
BI	65	Common Alarm
BI	70	HPXF EC SP
BI	71	XF EC SP
BI	72	HP EC SP
BI	73	HPXF AC EC HPXF SP

object-type	object-instance	description
AV	1	Water Htg SP
AV	2	Space Htg OCC SP
AV	3	Space Htg NOCC SP
AV	4	Space Htg Clg deadband
AV	5	Space Humidity 1st Stage SP
AV	6	Supply Fan High speed SP
AV	7	Supply Fan Low speed SP
AV	8	Extract Fan High speed SP
AV	9	Extract Fan Low speed SP
AV	10	1=Phnx 2=XF 3=Andrmda 4=Taurus
AV	11	Party Mode period
AV	12	Party Mode SP
AV	13	Space Humidity 2nd Stage SP
AV	101	Return Temperature Offset
AV	102	Return Humidity Offset
AV	103	Water Temperature Offset
AV	105	Primary Water Flow temp Offset
AV	106	Primary Water Rtn Temp Offset
AV	107	Fresh Air Temp Offset
AV	110	Overheat Deadband
AV	111	Exhaust Air Temp Offset
AV	200	Engineering
BV	1	System enable
BV	2	Module 1 Fitted
BV	3	Use Single Phase
BV	4	Fresh Air Sensor Fitted
BV	5	Party Mode
BV	6	Fresh Air Filter Alarm Enable
BV	7	Rtn Air Filter Alarm Enable
BV	8	Fresh Air Sensor Disable
BV	9	Exhaust Air Sensor Disable
BV	10	Water Heating Disable
BV	14	Water Pressure switch Disable
BV	15	Air Vent Htg vlv Disable
AO	1	Supply Fan speed
AO	2	Extract Fan speed
AO	3	Compressor and Wtr Recover Htg
AO	4	Water and Air Htg valves
BO	5	Dampers
AO	6	Pool Vent Cooling control

## CONTROLS SYSTEM INTERFACE :

The controls system is accessed via a 'Trend IQview8 touch screen Controller', which can be positioned at various locations, subject to network distribution on site. If preferred, it can also be specified to be mounted on the unit itself.

The IQView8 is a touch screen display which provides an interface to the Trend control system which is integral to the RecoSwim unit.

It enables the user to view and adjust monitor alarms, make adjustments to controlling parameters and display graphs or logged data.

Schematic displays provide the ability to view, change and graph data from color graphics pages. Alarms can be sent directly to the IQview8 where they appear on a special display, an audible and visual indication of the alarm is given.

The interface is panel mountable with surface and embedded mounting options available, enabling the IQView8 to be mounted in a way suitable for its environment and use.

The controller should not be located within the swimming pool atmosphere or external to the building.

The installation instructions for the touch screen controller are included as an appendix to this manual.

## 'LYNX' DEDICATED CONTROL PROTOCOL :

The controls system is preconfigured for the RecoSwim, enabling easy and logical operation. See included appendix for detailed operating instructions.

# PRE UNIT START-UP CHECK LIST

**Warning :** the RecoSwim embodies electrical, rotational, refrigeration and pressurized hot fluid equipment and systems. Only appropriately qualified personnel who thoroughly understand the operation of this equipment and any associated machinery should install, start-up or attempt maintenance of this equipment. Non-compliance with this warning may result in serious personal injury or death and / or equipment damage.

Never work on any control equipment without first isolating all power supplies from the equipment. Utilize power lock-off facilities to safeguard against power being accidentally reconnected by others.

**Caution :** The RecoSwim fans may start-up automatically and operate as soon as the power supply is connected and switched on. A fan may be stationary, yet fully powered and may start at any time, subject to automated control !

## **PROJECT STATUS :**

Do not start the RecoSwim if construction works are continuing which may result in dust being drawn into the return air or the outside air duct connections.

## **UNIT POSITION :**

- Check and confirm that there is adequate and safe access to the unit for the purpose of maintenance and service and that access panels are clear of obstructing pipes or electrical conduits etc.
- Check that the unit is acceptably level and that the weight of all unit sections are evenly, adequately and safely supported and that there is adequate height for the condensate pipe P-trap.
- Check that all unit sections are correctly bolted together to form a good air seal.

## **ELECTRICAL POWER :**

- Double check that the line voltage available to the unit at the disconnect matches the power requirements of the unit, as stated on the unit data plate.
- Check correct and good ground connection.
- Check and verify the rating and operation of external GFCI (ground trip) and MCB breakers.
- Check the rating and operation of the external disconnect & fuses is correct and in line with the power requirements of the unit, as stated on the unit data plate.

## **FIELD INSTALLED SERVICES :**

- Check that key field supplied devices are present and installed and confirmed as being of correct specification and voltage, such as air heating motorized valve, external water circuit motorized valve or pump etc., pool water loop booster pump etc.
- Check that the required field wiring has been connected, for example to the air heating motorized valve, the external water circuit motorized valve or pump, the pool water loop booster pump etc.
- Check that there is an adequate P-trap on the condensate outlet pipe and that it is run to an appropriate sewer.
- Check that the air duct work system is complete, sealed to the unit and clear from obstructions or water ingress. If any air or fire dampers are fitted within the duct work or grilles, ensure these are open.
- The LPHW circuit is connected, complete, leak tested, vented and available to operate.
- Any external water circuits are connected, complete, leak tested, vented and available to operate.
- The pool water pipe loop connection to the unit, if required, is connected, complete, leak tested, vented and available to operate.

## **UNIT BASIC INSPECTION :**

- Check that any internal intersectional pipe work or electrical cabling has been re-connected and all electrical conduits are secure and cannot move.
- Check for any visual indication of any internal damage to the unit, panels or any fluid or refrigerant leak.
- Check that all sensors are retained in their correct locations.
- Check that the return air and outside air filters are in place and that they have not become obstructed by construction dust and debris etc.
- Check that all internal electrical circuit breakers are switched on.
- Ensure that all access panels on the RecoSwim are present and securely fastened in place.
- Check that the controller interface is present and physically undamaged and, if positioned remotely from the unit, is correctly installed and has both power supply and Ethernet connection to the main unit.
- The unit has been cleaned after the installation / construction works were complete.

## **THE SWIMMING POOL :**

The RecoSwim should not be started until the pool is full of water and the pool filtration circuit ready and able to operate normally.

### **ACTIVATE POOL WATER FILTRATION PUMP (PWC versions only)**

Power up the pool water filtration pump and leave running until the entire water system is primed and all air has been expelled from the pipe work. This can take a period of time.

It may be necessary to bleed air from high points in the pipe circuit.

Check that there are no leaks within the pool water pipe circuit and that the pressure gauge on the pool water filter is indicating normal pressure.

### **ACTIVATE LPHW CIRCUIT (H:LPHW versions only)**

Ensure that the fuel boiler and associated circulating pump is ready to function.

If the fuel boiler is controlled via the RecoSwim, the boiler may not activate until the RecoSwim is switched on and demanding heat.

### **ACTIVATE EXTERNAL WATER CIRCUIT (EWC versions only)**

Ensure that the circuit and associated circulating pump is ready to function.

If the external circuit pump is controlled via the RecoSwim, the pump may not activate until the RecoSwim is switched on and demanding heat dissipation via the external water circuit.

# ACTIVATING / PUTTING THE UNIT INTO COMMISSION

It is recommended that initial activation of the unit is carried out by a Poolpak technician or authorized start-up contractor. If start-up is attempted by non-authorized personal, then the product warranty will be voided.

**Warning :** the RecoSwim embodies electrical, rotational, refrigeration and pressurized fluid equipment and systems. Only appropriately qualified personnel who thoroughly understand the operation of this equipment and any associated machinery should install, start-up or attempt maintenance of this equipment. Non-compliance with this warning may result in serious personal injury or death and / or equipment damage.

Never work on any control equipment without first isolating all power supplies from the equipment. Utilize power lock-off facilities to safeguard against power being accidentally reconnected by others.

**Caution :** The RecoSwim fans may start-up automatically and operate as soon as the power supply is connected and switched on. A fan may be stationary, yet fully powered and may start at any time, subject to automated control !

## **SWITCH ON POWER SUPPLY TO RECOSWIM**

**Safety Warning :** Never switch power onto the unit unless all duct work is connected and louvers are in place. Never switch power onto the unit if any of the air duct spigots connections remain exposed or any of the unit access panels are not correctly located in position and fixed. Risk of serious injury or death may result.

On the RecoSwim control panel, the 'POWER' amber colored neon should be lit and the controller interface screen should power up.

The supply and exhaust fans may begin to start and ramp up to speed immediately.

The refrigeration circuits may not switch on until the humidity level in the pool room has had the opportunity to build up. This will only normally happen when the pool water is heated up to near the required temperature or the room air is significantly cooler than the intended design.

## **ELECTRICAL POWER SUPPLY**

### **DOUBLE CHECK ELECTRICAL PHASE ROTATION :**

The unit contains a phase protection device, which should prevent operation if the phase orientation or the phase health is considered to be incorrect. If this is the case, this will be displayed as an alarm on the controller interface.

Note : the fans will operate in the correct direction regardless of phase orientation. However, the compressors will not and may be damaged if they are operated for a prolonged period in reverse.

If the compressors are running in reverse, they will not achieve normal refrigeration pressures and will make an untypical noise.

If the unit will not run correctly because the motor rotation is incorrect, it will be necessary for the electrician to swap over the connections of the mains power supply electricity cables to the whole unit until the correct phase orientation is established.

### **VOLTAGE SUPPLY :**

The electrician should ensure that, with all equipment running under load, that the voltage supplied to the RecoSwim falls in line with the minimum requirements as listed under the Technical Schedule Document, supplied with the unit.

### **ELECTRICAL CONNECTIONS :**

Re-check all electrical terminal connections for tightness and visually inspect wiring for any indications of abnormal temperatures.

## REFRIGERATION SYSTEMS

Refrigeration circuits are fully pre-charged at the factory and hermetically sealed. No external refrigeration connections are required.

Attach gauges and note standing 'non operational' pressure and prevailing air temperature for each separate compressor system.

Note : The refrigerant is R407C, which operates at significantly lower pressures than other refrigerants.

The compressors will activate in sequence, depending upon automated control.

After each compressor system has been operation for at least 45 mins. note the head and back pressure and the corresponding room air humidity and temperature.

Do not make any adjustment to TEV's or refrigerant charge without expressed authorization of Poolpak.

## AIR DUCT WORK SYSTEM

Check that there is appreciable air flow from all grilles. Check that all air discharge grilles within the pool room are angled correctly and diverting air onto areas of glazing.

Note : Detailed commissioning of the ducting system may be undertaken separately by an appropriate specialist and does not form part of the dedicated commissioning procedure for the unit.

## POOL WATER FLOW (PWC models only)

FLOW CUT-OUT TEST :

With the RecoSwim running, switch off the electrical power supply to the main and, if applicable, booster pool water pumps.

On the RecoSwim controller interface, the 'POOL WATER FLOW FAULT' should indicate.

If there is a head of water above the RecoSwim, the flow pressure sensor may require adjustment. Should this be the case, please contact Poolpak for details.

After the test, switch the pool water pumps back on and, on the controller interface, observe that the above fault has been cleared.

CHEMICAL DOSING :

Check that all methods of chemical introduction are carried out after the flow of pool water has passed through the RecoSwim.

If they are before the RecoSwim in the line of flow, then serious damage may occur to the RecoSwim.

This includes any slow dissolving tablets of ANY description.

The general chemical balance of the pool water should not exceed the indicated appropriate limits.

Note : Detailed commissioning of the pool water filtration system may be undertaken separately by an appropriate specialist and does not form part of the dedicated commissioning procedure for the unit.

## **L.P.H.W. CIRCUIT / BOILER OPERATION (H:LPHW models only)**

Ensuring that the boiler is called to operate :

If the boiler is dedicated to the RecoSwim then, depending upon how the electrician has chosen to wire the control circuit, the boiler may only switch on automatically when the heating is called for.

With the RecoSwim running, on the RecoSwim controller interface 'Air Heating' active should be indicated.

If this is not the case then temporarily increase the control setting temperature until it is.

### **AIR HEATING MOTORIZED ACTUATOR VALVE :**

When air heating is demanded by the control system, the external valve should begin to move so that flow from the boiler is diverted to pass through the RecoSwim unit.

This should also ensure that the boiler is called to operate.

The boiler water is simply re-circulated through the RecoSwim, then back to the boiler.

The boiler water is pumped around this closed circuit by the boiler circulating pump, which will normally be located close to the boiler.

After a short time, the copper pipe work from the boiler through the RecoSwim should become very hot. The temperature of the pipe entering and exiting the unit should be confirmed to be both hot.

Boiler water temperature :

The boiler will invariably have a temperature control which governs how hot the boiler water through the RecoSwim will be. This should be set to 180°F with fuel boilers or in line with the agreed specification.

Such a temperature is obviously very hot and is not far short of boiling. Therefore the copper pipe entering the RecoSwim should be far too hot to hold for any length of time. If this is not the case, then the boiler is not supplying enough heat to the RecoSwim.

### **CONDENSING FUEL BOILERS :**

If the fuel boiler is a high efficiency condensing type boiler, then it may be necessary to operate at lower boiler water flow temperatures in order to achieve optimum efficiency, for example 160°F flow / 120°F return.

It must be appreciated that operating at these reduced flow temperatures will directly reduce the heating output ability of the RecoSwim. If the intention is to operate a condensing boiler at these temperatures, then it will be necessary to make allowance in the initial selection / design of the project if correct pool room temperatures are to be maintained at all times.

Water flow rate through Boiler circuit :

The temperature of the boiler water coming out of the RecoSwim should be slightly lower than that going in. This is because the RecoSwim has transferred some of the heat to the pool room air.

If the temperature difference between the 'in' pipe and the 'out' pipe is greater than 20°F, then the rate of boiler water flow through the RecoSwim is not fast enough to transfer the optimum amount of heat. With condensing type fuel boilers a 40°F temperature reduction would normally be utilized.

If there is a manual by-pass valve positioned between the 'in' pipe and the 'out' pipe of the boiler pipe circuit, then it is possible that the valve requires to be closed slightly more than it is at present. Do not close such a valve completely as may create problems when the RecoSwim no longer requires any heat from the boiler.

Air venting :

If air is present within the boiler water pipe circuit, then this may restrict the flow of heat from the boiler to the RecoSwim and cause the problems described above.

There should be air vents positioned at high points around the boiler pipe work circuit and there is an air vent positioned on the top of the air heating coil within the RecoSwim.

Caution :	Very hot water may be sprayed from the air vents and due care must be taken to avoid scalding and eye damage.
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Once the boiler circuit is confirmed to be operating correctly, the air discharged into the pool room by the RecoSwim should be noticeably warm. Check the boiler pipe circuit for water leaks when both warm and cool.

Once air heating function is confirmed, reduce the air temperature set point on the controller interface so that air heating is not active. The external valve should begin to move so that flow from the boiler is diverted to by-pass the RecoSwim unit. The temperature of the pipe entering and exiting the unit should be confirmed to both be no longer hot to touch.

Note : Detailed commissioning of the L.P.H.W. circuit and boiler system may be undertaken separately by an appropriate specialist and does not form part of the dedicated commissioning procedure for the unit.

## **EXTERNAL WATER CIRCUIT (HEAT DISSIPATION) OPERATION (EWC models only)**

With the RecoSwim running, on the RecoSwim controller interface reduce the temperature set point so that air cooling is demanded and 'Air Cooling' active is displayed in the controller.

Ensuring that the external water circuit pump is called to operate :

The external circuit water is simply re-circulated through the RecoSwim, then back to the circuit. The external circuit water is pumped around this closed circuit by a pump.

If the pump is dedicated to the RecoSwim then, depending upon how the electrician has chosen to wire the control circuit, the pump may only switch on automatically when the unit demands for heat dissipation.

If there are other equipment on a common external water circuit, then there may be a motorized valve which is used to divert flow through the RecoSwim on demand and the demand signal from the unit may simply be used to open / close this valve.

External water circuit temperature :

The temperature of the water within the external circuit is important for correct operation of the RecoSwim unit. If it is significantly different from the design, or it is unable to effectively dissipate the heat given to the circuit, then normal function may not be possible.

Note : Detailed commissioning of the external water circuit system may be undertaken separately by an appropriate specialist and does not form part of the dedicated commissioning procedure for the unit.

### **Condensate drain :**

Ensure that the P-trap is filled with water and that the drain pipe is running freely.

# ABOUT THE WARMING UP PERIOD

Once the RecoSwim is operational, the temperatures and humidity within the pool room will start to be controlled.

## **Room Air temperature :**

Air can be heated up comparatively quickly and, therefore, the pool room air can immediately be heated up to the required temperature within a matter of minutes.

If the air heating control is 'ON', the air being discharged into the pool room will feel notably warm.

If the pool room structure is well insulated, then the air will tend to hold it's temperature with minimal heating.

## **Pool water temperature :**

To heat up water takes a lot of heat and a lot of time and a typical swimming pool contains many thousand liters of water.

To progressively warm up all the swimming water to the required temperature will normally take 5 days or more.

If the pool water heating control is 'ON', the temperature of the heated water coming back into the pool will not necessarily feel appreciably warmer.

This is because the pool water will only be increased very slightly in temperature on every re-circulation through the filtration pipe work and the RecoSwim and is normal.

Some types of pool shell construction and tiling are sensitive to being heated up too quickly and can be damaged through thermal shock. The warm up time for the pool may require to be manually restricted by the pool owner / operator not to exceed 1°F /hr. Contact the pool construction contractor for advice if in doubt.

It should be noted that, if the pool water heating is 'OFF', the pool water will take a similarly long time to cool down.

## **Pool Room Humidity levels :**

With a new building it will take around two weeks to properly dry the structure and this may temporarily affect the pool room humidity.

During the warm up period, most of the available heat will be transferred into the pool water at the expense of the air.

If the pool does not have a surface cover in place during the warm up period, then the correct temperature balance will not be sustained during this period and temporarily high humidity levels may be anticipated.

## **Seasoning of wood & plaster :**

With a new pool room construction, when the RecoSwim is first switched on and the pool room air heated, the humidity levels could become very dry until the pool water reaches normal temperature.

Any wood used within the construction of the pool room should be suitably treated in consideration of the possible variation in humidity levels and temperatures within the pool room. Wood is a 'living' material and unsuitably treated wood can be expected to move, shrink or twist.

Likewise, new plaster will initially contain a lot of water and, if dried too quickly, could crack. If in doubt, set the pool room air temperature at no more than 70°F to help slow the drying process.

## ADJUSTMENTS TO THE CONTROL SETTINGS

Within a new installation, it will take around 10-14 days for the system as a whole to balance and stabilize and no control adjustment is advised during this initial period.

If these conditions are acceptable then the controls on the RecoSwim will require no further adjustment.

If you require to operate the system at conditions not yet obtained, then adjust the controls accordingly (refer to separate information on the controller).

It should be noted that the controls should not be moved more than two degrees per 24 hours, otherwise the balance of the system may be disturbed.

## CONTROL OF THE POOL WATER CIRCULATION PUMP (PWC versions only)

The RecoSwim should NOT be connected to any external time switch.

The main pool water circulation pump can be operated via a time clock, as long as :

- The circulation pump is running during the periods when the pool is in use and the surface cover removed.
- If no surface cover is fitted, then the pool circulation pump must run 24 hours per day.
- The circulation pump is running for sufficient time per day to enable effective pool water heating and filtration to take place.

With regard to pool water heating, the minimum run time possible for the pool water circulation pump is variable and may typically be around 8 hours per day.

The RecoSwim will automatically sense, via a flow pressure switch, if the pool water circulation pump has switched off and will respond accordingly.

If a dedicated booster pump is utilized for the Recoswim unit, then the Recoswim can signal the pump to operate on demand. The booster pump will also require to be interlocked to the main pool water pump so that it only attempts to operate when the main pool is already operating.

## CONTROL OF THE LPHW SOURCE (BOILER/PUMP) (H:LPHW versions only)

The boiler supplying heat to the RecoSwim should not be governed by any form of time switch control. This also applies to the boiler water circulating pump.

The RecoSwim may call for heat from the boiler at any time, day or night, and, if that heat is not available, then control of the pool room environment will be compromised.

# **BASIC MAINTENANCE REQUIREMENTS**

**Warning :** the RecoSwim embodies electrical, rotational, refrigeration and pressurized fluid equipment and systems. Only appropriately qualified personnel who thoroughly understand the operation of this equipment and any associated machinery should install, start-up or attempt maintenance of this equipment. Non-compliance with this warning may result in serious personal injury or death and / or equipment damage.

Never work on any control equipment without first isolating all power supplies from the equipment. Utilize power lock-off facilities to safeguard against power being accidentally reconnected by others.

**Caution :** The RecoSwim fans may start-up automatically and operate as soon as the power supply is connected and switched on. A fan may be stationary, yet fully powered and may start at any time, subject to automated control !

## **PROFESSIONAL SERVICING :**

To ensure that the RecoSwim is operating to full efficiency, it is recommended that a service is carried out by suitable qualified and trained personnel at six monthly intervals. With some applications three month intervals may be required. The supplier will assess and advise as appropriate.

It is also recommended that the fuel boiler, external water circuit and pool water filtration plant are also regularly professionally serviced.

## **REFRIGERANT & HANDLING :**

Refrigerant : R407C

This is a ternary blend of hydrofluorocarbon compounds : 23% of R32, 25% of R125 and 52% of R134a. No chlorine content, no ozone depletion potential, ODP = 0, Global warming potential GWP = 1610

As with all HFC refrigerants, there is an environmental implication to it's potential release to atmosphere and appropriate, responsible and safe practices should be implemented whenever handling refrigerant. It is advised that only suitably trained and qualified persons should attempt any process with the refrigeration systems.

Full safety data sheets on the refrigerant are available on request.

Note : The refrigerant is R407C, which operates at significantly lower pressures than comparable less environmentally friendly refrigerants and has different temperature/pressure properties.

As with other blended refrigerants, it must be charged in a liquid state.

No adjustment to refrigerant charge or TEV should be attempted without first acquiring the express authorization of Poolpak.

The following aspects can be periodically checked :

Note : Personal protective equipment should be used when carrying out any procedure to the unit, excluding controller settings.

## **AIR FILTERS :**

The RecoSwim unit will have two separate air filter arrangement, for the air from the pool room and for outside air.

The purpose of the air filter is to prevent the finned air heat exchange coils within the RecoSwim from becoming blocked and to ensure that undesirable particles and foreign bodies are obstructed from entering the system.

The type of air filters used are disposable box panels containing a filter material. When dirty, the entire air filter is simply disposed off and a new filter fitted.

If the air filters are allowed to become blocked, the airflow to the RecoSwim will be restricted, resulting in inefficient and ineffective operation or, in extreme cases, damage to the internal motors.

Shortly after the system is initially started, it may be necessary to renew the air filter. This is because there is likely to be excessive dust in the pool room during this period.

To remove the filter from the access slot provided, switch off electrical power to the RecoSwim, release and remove the access panel simply pull the filter panels towards you.

Note : It is advised to use a dust mask when handling used filters. Avoid disturbing the dust within the filters and place the used filters directly into a garbage sack and seal the sack.

Replacement air filters are available from your supplier.

Please note : The RecoSwim should not be operated while building work or tile cutting is still in progress for the dust will quickly block the air filter.

### **CONDENSATE WATER DRAIN PIPE :**

Any dust etc. which may accumulate on the air heat exchange coils within the RecoSwim may be washed down into the condensate drain pipe.

If allowed to build up, such dust may cause a blockage in the pipe, resulting in over flowing of the condensate water collection tray within the RecoSwim.

Therefore the pipe should be periodically inspected to ensure that it is clear.

## **FROST DAMAGE PREVENTION**

The RecoSwim obviously incorporates water fed heating coils and, if exposed to freezing temperatures, the water contained within the coils would be prone to frost. The resulting damage would be extensive and costly to repair.

Even before initial installation, the RecoSwim should always be protected from frost during storage, for the unit will invariably contain residual water from the testing procedures applied.

If the pool is not in use at any time during the winter months and the heating system shut down, the RecoSwim will need to be disconnected from the services and fully drained down.

Please note : Frost damage is not covered by the unit warranty.

# CORROSION DAMAGE PREVENTION (PWC versions)

The RecoSwim incorporates metal heating coils which come into direct contact with the pool water as it passes through the unit.

All metals can be damaged through corrosion if exposed to pool water with an aggressive and incorrect chemical composition.

It is obviously usual to continually add potentially corrosive chemicals, such as chlorine and acid, to the pool water in order to maintain a minimum standard of water quality.

However, the metal alloys used within the RecoSwim are selected due to their high durability and, if a correct and appropriate chemical balance is maintained within the pool water, and the method of chemical introduction is appropriate, then the RecoSwim will be protected from such corrosion damage.

The pool owner or operator must ensure that the chemical balance of the pool water is correct at all times. Corrosion damage to the RecoSwim, of any description, is not covered under the warranty.

The most basic test kit would provide indication of the Free Chlorine level, pH value, Total Dissolved Solids (TDS) level, and Total alkalinity level.

Although these are the most important aspects to monitor, the pool water composition may contain many more chemicals and substances which could be causing difficulties and, if corrosion damage problems occur and the cause is not clear, often an extensive laboratory test is necessary followed by extensive dilution of the pool with fresh water.

The following precautions will assist in preventing corrosion damage :-

## **CHEMICAL INTRODUCTION :**

All purification devices and chemical injection systems must be fitted **DOWN STREAM** of the RecoSwim.

This includes the practice of dosing slow dissolving tablets via the skimmer basket, which can result in concentrated corrosive liquids passing over vulnerable metal components within the RecoSwim. This relates to any slow dissolving tablets of ANY description, whether chlorine based or not.

Please note that the installation and usage instructions for the chemical dosing equipment often recommend that the chemical is introduced before the pool water sand filter. This should **NOT** be done unless the RecoSwim is installed on a completely different pipe circuit.

If the chemicals are introduced down stream of the RecoSwim but, if the filtration pump stops or the filtration system is drained down, the chemicals can be drawn back through the RecoSwim, then a non-return valve must be fitted in the pool water pipe work.

## **pH Value :**

The degree of acidity or alkalinity of water is measured in terms of its pH value. A pH of 7 is neutral; a pH falling below 7 indicates an increasing degree of acidity, and a pH rising above 7 indicates an increasing degree of alkalinity.

The correct pH value is necessary normally to ensure effective disinfection and to prevent corrosion or scale formation.

The pH level **MUST** be maintained between 7.2 and 7.8.

## **ALKALINITY :**

The correct alkalinity must be maintained to buffer the water against pH fluctuations and to prevent damage through corrosion or scale formation.

The total alkalinity level **MUST** be maintained between 80 - 180 mg/L.

T.D.S. (Total Dissolved Solids) :

The chemicals which are introduced into the pool water leave by-products which can build up over a period of time, such as chlorides and sulfates.

T.D.S. can only be reduced by dilution with fresh water. Dilution occurs every time the pool filter is back washed.

The T.D.S. level **MUST** not exceed 1500 mg/L.

## **DISINFECTANT LEVEL :**

Free chlorine is most important in relation to swimming pool disinfection. In chlorine treated pools a free chlorine residual of at least 1mg/L should be maintained at all times. The free chlorine level **MUST** be maintained between 1 and 3 mg/L.

If bromine is used, the level must be maintained between 2 and 4 mg/L.

If ozone is used, the level must be maintained between 0.8 and 1.0 mg/L.

## **SALT PURIFICATION SYSTEMS :**

The RecoSwim is not warranted for use in conjunction with any form of salt chlorination or electrolytic system due to potential concerns of an enhanced risk of corrosion. The warranty exclusion relates only to corrosion damage. Special versions equipped with titanium coils are available for salt chlorination applications.

## **ELECTROLYSIS :**

Electrolysis can be caused by a bad or non-existent ground connection. Faulty electrical insulation on any apparatus connected in the system will allow electricity to run to ground via the metal components in contact with the swimming pool water.

This will create a cathode / anode effect and may lead to metal components being damaged.

## **INCORRECT WINTERISATION :**

If the RecoSwim and filtration system are not required to be in operation for a period of time and are not flushed with fresh water, then the conditions of the stagnant pool water retained within the system may prove damaging as the water evaporates to leave increased concentration of corrosive chemicals.

The essential requirement is that the water should be properly balanced - that it is neither corrosive nor scale forming when measured by the Langelier Saturation Index.

As the condition of the pool water and the design of the disinfection system are obviously beyond the control of the manufacturers, no warranty claim can be accepted if the product has been damaged in any way due to any form of corrosion.

Please look after your RecoSwim.