

RECOVERY SYSTEM MANUAL & MAINTENANCE CHECK LIST

WE STAND BEHIND OUR PRODUCTS 100%. WE FIND THAT MOST OPERATIONAL PROBLEMS CAN BE AVOIDED OR QUICKLY CORRECTED BY THE USER. PLEASE READ THE FOLLOWING CAREFULLY AND BECOME FAMILIAR WITH THE KEY POINTS IN THESE SIMPLE INSTRUCTIONS AND YOU WILL BE ABLE TO EITHER FIX MOST PROBLEMS ON THE SPOT OR TO ACCURATELY REPORT A PROBLEM TO US SO THAT WE CAN DIAGNOSE THE FAULT QUICKLY AND ARRANGE A PROMPT REPAIR SERVICE.

FAULTS ARE RARE. SO PLEASE MAKE SURE YOU UNDERSTAND YOUR EQUIPMENT

iCool Recovery Systems have proven to be very reliable in service and faults are rare. The equipment is designed to give long hours of continuous service with minimum maintenance. Often what appears to be a fault is just a setup or operational error that is easily resolved if you follow these step by step instructions. If after carefully following these instructions you still have a problem then please contact us for immediate telephone or email advice and if necessary we will arrange a prompt repair or maintenance service. iCool staff are always willing to help you. (See Page 8)

THIS CHECK LIST TAKES YOU THROUGH THE 3 MAIN SYSTEMS STEP BY STEP AND TELLS YOU WHAT YOU NEED TO KNOW ABOUT EACH PART OF THE SYSTEM. PLEASE FOLLOW THE STEPS IN THE ORDER SET OUT BELOW

OPERATING OR TESTING THE SAFETY SYSTEM

THINGS YOU NEED TO KNOW

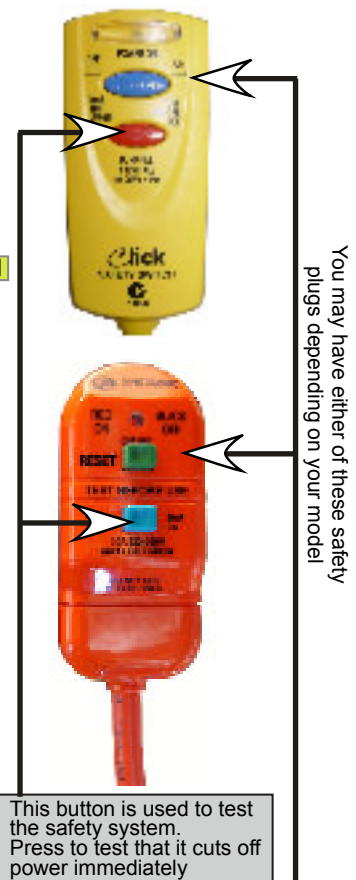
The Recovery Cooling unit is protected against electrical shock and fault hazards in 5 important ways but no system is completely foolproof. Always use common sense.

1. An Earth Leakage Safety Device is fitted to the power plug.
2. A Key switch is fitted to prevent unauthorised use. It cuts off all A.C. power.
3. A 10 Amp press to reset Circuit Breaker is fitted on the main panel.
4. The cabinet is all metal and all electrical components are earth bonded to the cabinet.
5. The main water pump impeller is non conductive and magnetically coupled to the motor.
6. **Safety devices are not a substitute for common sense. Read the warnings on the unit.**

PLEASE CARRY OUT THE FOLLOWING PROCEDURE TO RUN OR TEST THIS SYSTEM

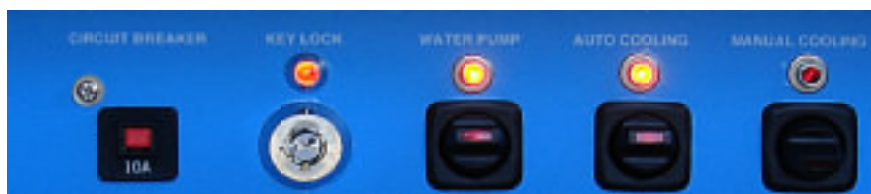
We use two types of Earth Leakage devices. (see illustration at right) They both operate the same way. As long as the power leaving the AC mains plug is equal to the power returning the function is normal. If the returning power is less for any reason even for one second the safety switch will immediately remove all power. For example if a person was to receive an electrical shock some of the power returning is lost through that person and the switch sees this and cuts off power within less than one second. Normally this happens so quickly a person would not feel the shock. This is an excellent and essential safety feature and therefore **the Earth Leakage Safety Plug should never be removed or replaced with an ordinary power plug, because that would expose users to unnecessary danger.**

1. Plug the Earth Leakage Safety plug into a normal 15 Amp power outlet.
2. All components inside the cooling unit are electrically bonded to the cabinet which is connected to the earth line of the main power cable, so **it is essential that the power outlet you use has a proper legal earth connection to ensure safety.**
3. The Earth Leakage Safety Plug will not supply power to the recovery unit until it is armed. Press the (or ON) button to arm it (The TOP button).
4. Test that the the Earth Leakage Safety Plug is working correctly by pressing the TEST (LOWER button). This simulates an unsafe condition and the device should cut off immediately. **If it does not then it is faulty and must be replaced.** Such a fault is very rare.
5. After testing the Earth Leakage Safety Plug press the TOP reset button again for normal operation.
6. Make sure all switches on the front panel are OFF and then turn on the KEY LOCK. You should not operate the KEY LOCK if the PUMP or MANUAL COOLING switches are already on as this puts a very high load on the KEY LOCK. Always turn the KEY LOCK on before doing anything else. The KEY LOCK should be left ON at all times unless you need to remove the key for security reasons.
7. Switch on the PUMP switch. Listen to hear that the pump is working, (It is not very loud)



This button is used to test the safety system. Press to test that it cuts off power immediately

This button must be pressed to start the system. If power is removed or the TEST button has been pressed this device will automatically switch off and the button will need to be pressed again.



8. If the pump starts normally please go to "WATER CIRCULATION SYSTEM" on Page 2 for the next check list you need.
9. If the pump does not start please press the CIRCUIT BREAKER. If it still does not start turn on the MANUAL COOLING SWITCH. Now both the pump and the refrigeration system should both start (much louder noise). This indicates a computer fault, however it is still possible to operate the system if required, but please be aware that the automatic temperature control will not be working, so you will have to switch the unit off manually when the desired temperature is achieved.
10. If the system only starts using the MANUAL COOLING switch or does not start at all, please report this to iCool and we will arrange to repair it.

OPERATING OR TESTING THE WATER CIRCULATION SYSTEM

THINGS YOU NEED TO KNOW

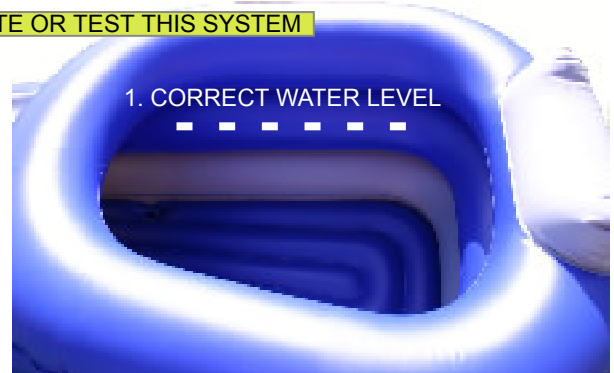
We find that the most common problem users have is due to reduced water flow or no water flow. This is usually very easy to fix because it is not a fault with the system, it usually caused by poor attention to detail when setting up the system. Follow the steps below for a simple solution.

1. The water circulation system takes water from the recovery pool to the cooling unit where it reduces the temperature inside the heat exchanger tank and then returns the cooled water to the pool.
2. Although the pump is capable of moving 60 liters per minute the flow of water is pre set at a reasonably slow 5 and 10 liters per minute for maximum heat exchanger efficiency.
3. It is a very high quality centrifugal pump designed for many thousands of hours operation.
4. As with all such high flow long life pumps it is not self priming and the inlet must be well below the top of the water level in the pool to operate correctly.
5. Such pumps can not tolerate air in the system and a bleed valve is provided to remove any trapped air on start up. Trapped air will slow or stop the flow of water.
6. The pump is a magnetically coupled design where the impeller and pump chamber are made from non conducting material that is not directly connected to the motor shaft. Power from the motor is delivered by magnetism. This makes the pump very safe electrically as water can not enter the motor even if a seal fails.
7. With magnetically coupled pumps, if the water impeller is jammed by debris in the water the pump motor can keep running without harm, but of course the water will stop flowing.
8. Running the pump for long periods without water flowing can damage it. If water is not flowing stop the pump and investigate why. Usually a blocked hose or an air leak.



PLEASE CARRY OUT THE FOLLOWING PROCEDURE TO OPERATE OR TEST THIS SYSTEM

1. Make sure that the pool is filled to the recommended level.



2. Make sure that the chiller and control unit is not higher than the water in the pool. The water must be able to gravity feed to the intake level of the pump.



3. Make sure that the hose fittings are correctly fitted and that there are no air leaks. Early models have screw fittings and they must be tight. Later models have snap on fittings that give less problems with air leaks, but you should make sure that the lock levers on each fitting are completely in the locked position.

NOTE. SOME MODELS HAVE COLOUR CODED HOSES, GREEN AND CLEAR GREY, TO MAKE INSTALLATION EASIER.

4. Make sure that the the right hand water connection from the chiller is connected to the bottom of the pool.

5. Make sure that the left hand connection (closest to the transport wheel) is connected to the bottom of the pool.



For pools that receive very heavy use, we recommend fitting the simple rubber cuffs shown above over both connectors on the pool to prevent the metal levers chafing the pool material. We supply them free of charge.



TO TOP OF POOL TO BOTTOM OF POOL

FITTINGS SHOWN HERE ARE THE LATEST SNAP LOCK TYPE, EARLIER MODELS HAVE THREADED FITTINGS.



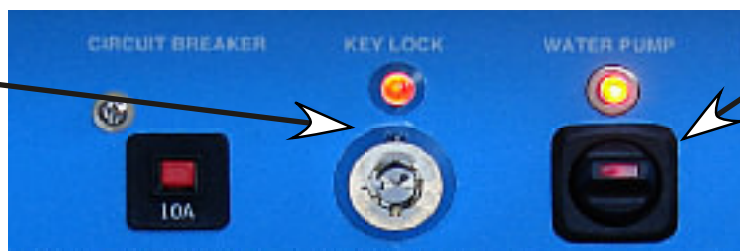
LIFT SIDE OF POOL TO CHECK THAT THIS TUBE FITTING IS NOT CRUSHED UNDER THE POOL AND THAT WATER FLOWS FREELY ESPECIALLY CHECK INSIDE THE POOL WHERE IT ENTERS.

6. Make sure that the hose and connector from the bottom of the pool is not twisted under the pool. This is the number one cause of set up problems due to low water flow rate. Later model pools have a much stronger connection tube to the pool. but this should always be checked.

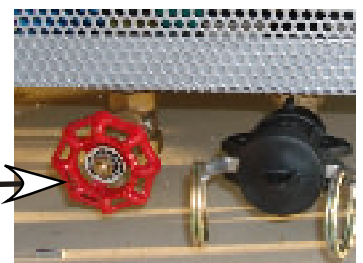
7. Once you are satisfied that all water connections are secure and air tight and that the connections under the pool are not twisted or partly obstructed, then you are ready to start the pump.

8. Make sure that the KEY LOCK is switched ON and that all other Switches are OFF

9. Turn ON the WATER PUMP switch. Listen for the pump to start. It is not very loud.

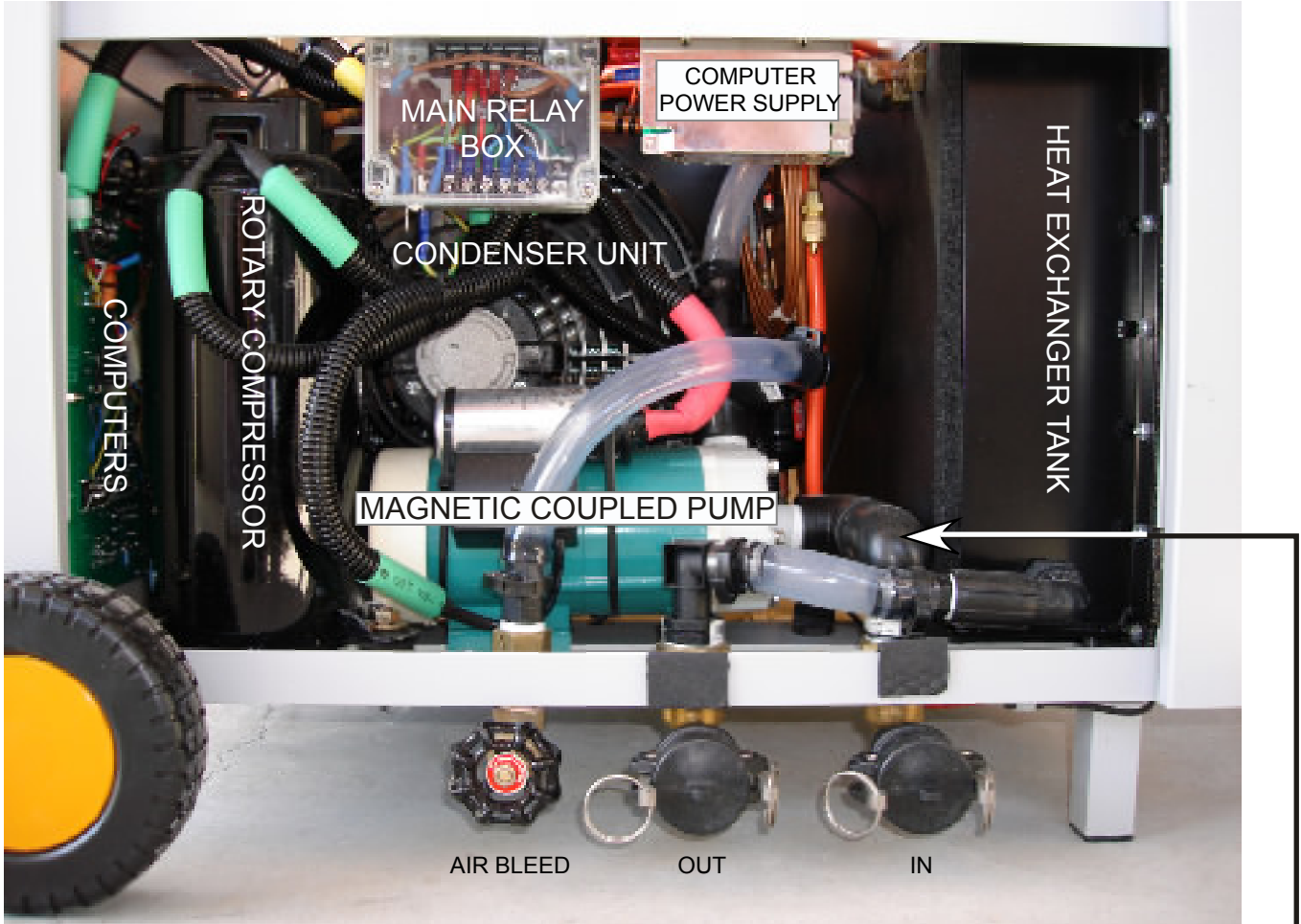


10. Centrifugal pumps can not operate correctly if there is air trapped in the system. Because there will be air in the heat exchanger tank after transporting or disconnecting the chiller unit, it is always necessary to use the bleed air tap to remove the trapped air from the tank to ensure normal pump operation. Once the PUMP has started immediately open the BLEED AIR TAP and wait until all air is purged and water flows smoothly without bubbles. This may take between a few seconds and one minute. Sometimes air will be expelled more than once. It is easy to determine when the air is fully purged because the flow of water will be very strong and smooth without bubbling sounds. Now close the TAP firmly to make sure it is sealed.

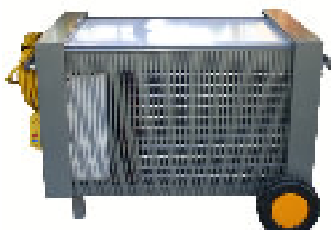
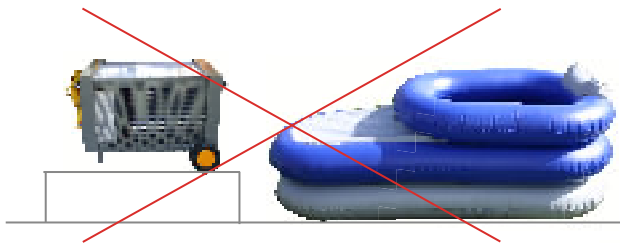


If it is necessary to avoid getting water on your floor please use a low container to catch the water. Alternatively the valve tap accepts a standard hose fitting.

11. Check that the water is flowing into the top of the pool smoothly. The water flow is not very high, the flow rate is controlled within the chilling system to within approximately 5 to 10 liters per minute. This ensures sufficient time for effective cooling as it passes through the heat exchanger and gives maximum cooling efficiency.
12. If the water is running smoothly to the pool you are ready to test the operation of the **COOLING SYSTEM**



THIS ILLUSTRATION OF THE CHILLING AND CONTROL UNIT WITH THE SIDE COVER REMOVED MAKES IT EASY TO SEE THE POSITION OF THE CENTRIFUGAL PUMP AND WHY IT IS NECESSARY FOR THE WATER IN THE POOL TO BE ABOVE THE LEVEL OF THE PUMPS' INTAKE PORT



CHILLER UNIT AND POOL MUST BE SET UP AT THE SAME LEVEL FOR CORRECT OPERATION. CHILLER CAN NOT FUNCTION IF IT IS HIGHER THAN THE POOL. IT CAN HOWEVER BE LOWER THAN THE POOL IF NECESSARY.

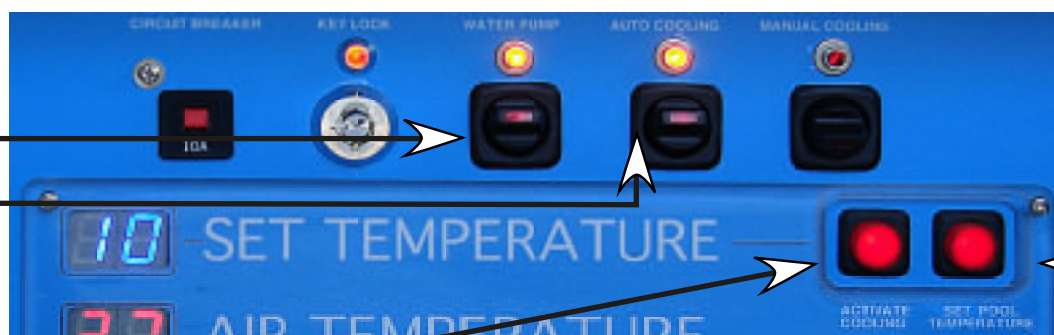
OPERATING OR TESTING THE COOLING AND CONTROL SYSTEM

THINGS YOU NEED TO KNOW

1. The Cooling and Control System has 3 separate modules , each with it's own computer or microprocessor. Modern Micro computer chips tend to be very reliable.
2. Microprocessor 1 is dedicated to the count down timer.
3. Microprocessor 2 controls all switches and buttons and stores the user selected temperature.
4. Microprocessor 3 receives the desired temperature input stored in processor 2 and uses it to controls all functions of the heat pump system through the main relay box. It also monitors all temperature probes and compares them to pre set safety requirements.
5. There is a manual over ride switch that will bypass most of the functions of the Microprocessors in case of a fault. This allows the unit to be operated manually in the event of a computer problem. However **no control or temperature monitoring circuits will operate in the manual mode and therefore the unit will cool non stop**. This means that if MANUAL COOLING is used the unit must be switched off manually to stop it getting too cold.
6. **The temperature should never be set below 4 degrees as this will generate ice in the system which can damage both the heat exchanger tank and the pump**. This is because when water turns to ice it expands considerably and can put tremendous pressure on sealed tanks. In addition particles of hard ice can block the pump. We are not aware of any research that requires water colder than 5 degrees and in any case such a low temperature could be dangerous. Later model units will not allow settings below 4 degrees , however some earlier models are not restricted so care should be taken.
7. **In manual mode care should be taken to switch off the system before it reaches 5 degrees or below to prevent ice damage as mentioned above.**
8. In normal operation temperature control is completely automatic.
9. Once a set temperature is reached and the unit switches the heat pump off , the pump will continue to circulate the water. This is normal to allow the sensors to continue to monitor the pool temperature.
10. The heat pump will switch back on when the pool water rises more than 1 degree above the set temperature, but not before at least 3 minutes has passed. This pre set minimum delay allows the gas pressure to drop sufficiently to prevent overloading the compressor in very hot conditions.
11. If the unit is working hard it can get quite hot, this is normal, however the gas pressure may sometimes be too high for the compressor to restart immediately. It will cut off and retry at regular intervals. You will hear a fairly loud buzzing sound for a few seconds and a click. This is normal and is just the sound of the over pressure safety relay. The compressor will keep trying to start until the pressure is correct and will return to normal operation. This does no harm.
12. **The system needs good ventilation**. There is a tremendous amount of heat in 350 liters of water and when this is added to the very high load caused by losses to the surrounding warm air and the ground or floor, plus the high heat load from athlete's bodies, it means that the heat pump is doing a lot of work. This work produces a lot of waste heat that must be removed from the system effectively by the condenser fan. **The iCool system is designed to handle these high loads but it can not do so if the air flow is restricted. Restricted airflow will cause the heat pump temperature to rise**. If the digital indicator for the heat pump temperature is higher than 85 degrees , it means there is not enough air flow or the overall conditions are too hot for safe operation. The compressor has a safety circuit that will cut it off above 90 degrees. This should only occur in the most severe climatic conditions.

PLEASE CARRY OUT THE FOLLOWING PROCEDURE TO OPERATE OR TEST THIS SYSTEM

1. Check that the MANUAL COOLING switch is OFF and that the PUMP switch is ON and water is flowing into the top of the pool smoothly. No other section of the chilling system will operate unless the water pump is switched on. This is to prevent the system from running with no water, because the unit is so powerful it could rapidly build up a large amount of damaging ice in the heat exchanger tank.
2. If the water is running smoothly press the SET POOL TEMPERATURE BUTTON repeatedly until the SET TEMPERATURE DISPLAY reads the temperature you require. The display steps one degree each time it is pressed up to a maximum of 30 degrees and then returns to 1 degree and starts again. If you hold the button down it will step more quickly however you will not see the indicated temperature until you release the button.



3. Now press the ACTIVATE COOLING button to load your setting into the control computer. The AIR TEMPERATURE and HEAT PUMP TEMPERATURE digital displays should now light up to indicate that the control computer has accepted your setting.
4. Switch on the AUTO COOLING switch and the compressor and main condenser fan will start. Note an increase in the sound level and a large flow of air from the side of the system.

5. Water will be chilled until the set temperature is reached and then the heat pump will cycle on and off to maintain the temperature. (Please re read THINGS YOU SHOULD KNOW parts 8 to 12 on page 5)
6. Make sure the unit has good ventilation and that the HEAT PUMP TEMPERATURE digital readout is not above 85 degrees.
7. The AIR TEMPERATURE digital readout should not be above 45 degrees. Operation above 40 degrees is outside the units specifications and will cause a drop in performance. Cooling will take much longer at such high temperatures although once the set temperature is reached the unit can hold it even in hot conditions.
8. At normal air temperature of 20 to 30 degrees the unit should cool a full pool (350 liters) at least 5 degrees per hour. In good conditions it will be even faster than this. If you are using 2 pools the cooling will of course take longer because the work load is doubled , however once the pool (pools) reach the set temperature the unit is powerful enough to hold the temperature even in very hot conditions and when used by several athletes in quick succession.



9. The POOL TEMPERATURE display indicates the temperature of the water returning to the pool. In most conditions this should be very close to the actual temperature of the water in the pool. For safety reasons a sensor can not be placed in the pool itself as this would provide an undesirable electrical path between the pool and the chilling unit.
10. For safety reasons, if power is lost for any reason while the chilling unit is running it will not restart automatically when the power is restored. This is because to do so would override the built in safety features. Naturally it is desirable to find out why the power stopped before restoring it. For example the power will stop instantly (via the Earth Leak Safety Plug) if a user was to receive even a mild electric shock and it would be very unsafe to have the power restore automatically without first checking the reason for the fault.
11. If power is lost for any reason, first check to see why this happened. Make sure that the unit is plugged directly into a 15 amp power point , not a 10 amp power extension board. Avoid very long extension cables as this will cause a voltage drop and may confuse the Earth Leak Safety Plug. Check that there is actually power to the power point and check that the SET button on the Earth Leak Safety Plug is pushed in.
12. The unit has a built in 10 Amp circuit breaker on the front panel. This protects all main high voltage power circuits but it does not isolate the 12 volt computer power supply. Therefore even if this circuit breaker has tripped, the digital displays will still light up. So if the displays light up and the MANUAL COOLING switch does not restore operation of the heat pump press the CIRCUIT BREAKER in. If this restores operation then return to normal setting procedures and operate via AUTO COOLING. (Turn off MANUAL COOLING)

If the unit still does not operate please contact iCool for immediate assistance.

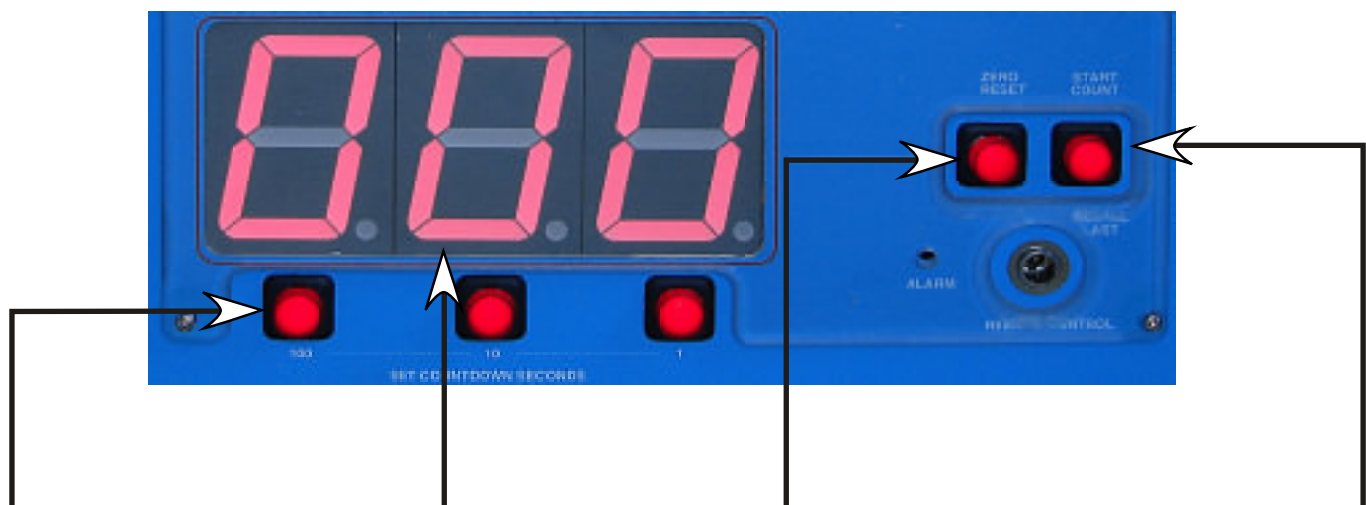
USING OR TESTING THE USER IMMERSION CIRCUIT

THINGS YOU NEED TO KNOW

The built in timer display provides a convenient way for athletes and coaches to accurately control the time of immersion. Research indicates that combined with accurate temperature control it is very important to control the time of immersion and to be able to repeat it accurately for maximum recovery benefits.

1. The built in count down timer is large enough to be clearly seen from a distance.
2. The timer will count down any interval from 1 to 999 seconds, which is well within the ranges used by sports medicine specialists for cold water recovery.
3. The setting can be made very quickly because there is a separate button for each decade.
4. The last setting can be recalled instantly and used repeatedly.
5. The setting can be returned instantly to zero to speed up entering a new setting.
6. The system gives a clear beep signal to indicate to the athlete that the time has started.
7. The system gives a clear beep signal to the athlete at ten seconds to go and beeps every second until zero. At zero a much longer beep indicates that it is time to leave the pool.
8. A remote control unit is available separately that allows remote start and stop and recall of the last setting, plus a continuous repeat of the current time setting for situations where several athletes use the pool in quick succession.

PLEASE CARRY OUT THE FOLLOWING PROCEDURE TO OPERATE OR TEST THIS SYSTEM

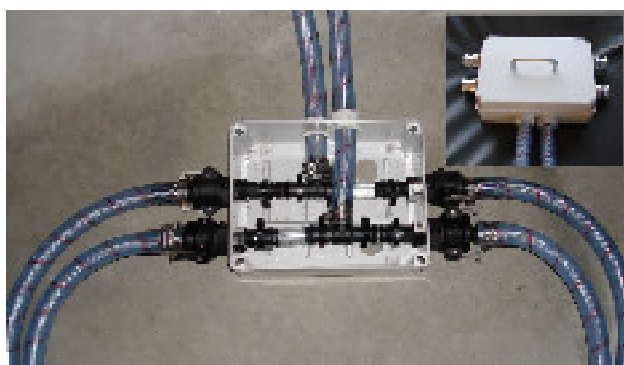
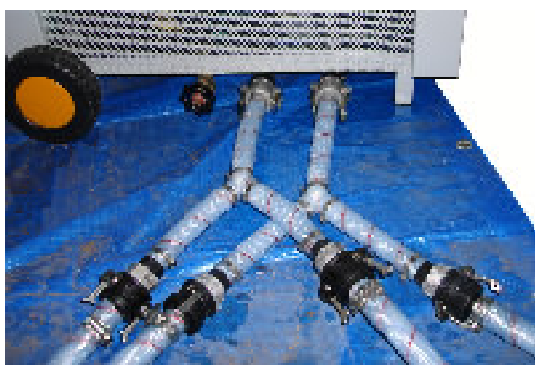


1. If the 3 digit display is not already at 000 then press the ZERO RESET button to return the setting to zero.
2. Press the 3 SET COUNTDOWN SECONDS buttons to set a time. The buttons set 100s 10s and 1s as indicated. For example to set 145 seconds press the 100s button once, the 10s button 4 times and the 1s button 5 times. This is a very quick and logical method of setting.
3. To start the countdown press the START COUNT BUTTON. The unit will beep once to indicate the start. At 10 seconds to go the unit will beep every second until zero. At zero it will give a long beep to indicate that the time has ended.
4. To use the same setting again press the START COUNT once which will reset the previously set time on the display. Press the same button again to start the countdown. This button can also be used at any time to stop the countdown. If you stop the countdown pressing it again will restore the previously set time to the display ready to be used again.
5. If a new time is required press the ZERO RESET to reset the display to zero and proceed from step 2 again.
6. If the optional remote control is used it is possible to operate most functions of the timer remotely and in addition to set it in automatic mode so that the set time repeats over and over including all of the audible beeps. This is very useful for multiple athlete use, because they can save time when using the pool immediately after each other by simply responding to the beeps.

USING 2 POOLS WITH 1 CHILLER UNIT

THINGS YOU NEED TO KNOW

1. The standard iCool Chilling Unit is capable of running 2 pools at the same time.
2. The only trade off is that it will take longer to chill the water to the desired temperature, than a standard one pool system, however there is virtually no change in performance once the temperature is reached.
3. Once the required set temperature is reached the unit is powerful enough to maintain that temperature of 2 pools almost as accurately as one and with almost zero drift even if several athletes are using both pools immediately after one another.
4. Generally, as you would expect, it will take twice as long to chill twice as much water, however so long as the air temperature is not extreme (under 30 degrees) it will actually take less than twice as long.
5. A set of distribution manifolds is provided with a 2 pool set up.
6. Because of the additional hoses and the manifold, additional care is required to make sure that the water flows to both pools evenly. This is not difficult but does require a little more attention.
7. Over long hours of operation with 2 pools, the water level between the pools may become uneven. This is because there will be a slightly different resistance to the flow of water between the hoses depending on how they are bent or curved to achieve a connection. This is only a minor problem that only occurs after many hours or days of continuous running. It may be necessary to transfer some water from one pool to the other to make the water levels equal again. This can be done by either disconnecting the top hose from the pool with the most water and placing it temporarily into the other pool. Alternatively, as the difference in level is normally only a few buckets full, then bucketing it is a quick and simple solution.



1. There are two types of 2 pool water distribution manifolds in use. The one shown at left is the one we prefer to supply because of its simplicity. It is also easier for the operator to see where each hose is directed.
2. Whichever distributor is used it is essential that careful attention is paid to the connections.
3. The set up is exactly the same as for a single pool except that the normal single 'BOTTOM' connection from the Chiller unit is split in a manifold and goes to the BOTTOM of both pools and obviously the normal single 'TOP' connection from the Chiller unit is split in a manifold and goes to the TOP of both pools.
4. Care should be taken to limit the radius of any bends in the hoses and to avoid sharp turns as this may make the flow of water uneven between the pools as described in Things You Need To Know point 7 above.
5. Make sure water is running freely to each pool and check that the fittings under each pool are not crushed or obstructed as described on Page 3 in Item 6.

USING THE NEW SNAP FITTINGS



These high quality snap on water tight fittings make set up faster and easier and they are less likely to cause air leaks.

If your unit was delivered with the new snap fittings not yet attached, or if you have an older model with threaded fittings that you would like to update, please follow the illustrations above.

Using Teflon plumbing tape wrap a few turns around the male thread on both the Pool and the Chilling unit and tighten with a shifting spanner as shown. On the pool please be careful not to over tighten, as this may damage the nylon threads. On the Chiller unit the threads are brass, so a little more tightening is acceptable to prevent leaks.

MORE TECHNICAL INFORMATION AND THE LATEST UPDATES ARE AVAILABLE ON OUR WEB SITES

WEBSITE ASSISTANCE. www.icoolsport.com and www.icool.com.au

EMAIL ASSISTANCE. We also provide assistance by email at support@icoolsport.com

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