



Koolance™
Superior Liquid Cooling Systems



EXOS USER'S MANUAL

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Other Technology Pending U.S. & World-Wide Patents

GENERAL PRECAUTION

Please read this manual carefully before beginning the installation of your Koolance system. This manual assumes the user has basic experience in building and configuring computer systems. Information referring to traditional hardware assembly is intentionally brief.

ABOUT SIGNS

Throughout this document, critical information is highlighted in gray-colored boxes. The following symbols are intended to prevent you from any situation which may cause personal injury and/or damage to equipment:



WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in personal injury or be life-threatening.



CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in damage to equipment.



PROHIBITED: Indicates a prohibited action.

PROHIBITED USE

This product is designed, developed and manufactured as contemplated for general use, including without limitation: general office use, personal use and household use, but is not designed, developed and manufactured as contemplated for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal injury, severe physical damage or other loss, including without limitation: nuclear power core control, airplane control, air traffic control, mass transport operation control, life support, or weapon launching control. If these products are used in such hazardous environments, Koolance Incorporated does not warrant them.

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WARNING: The Koolance liquid & coolant pack contain chemicals which may be harmful or fatal if swallowed. KEEP THIS AND ALL DANGEROUS CHEMICALS OUT OF THE REACH OF CHILDREN. If ingestion has occurred, seek medical attention immediately. Give two glasses of water. Do not induce vomiting. In the case of eye contact, flush eyes immediately with water for 15 minutes. Remove contact lenses. Call a physician if irritation persists. Some individuals may have an allergic skin reaction with the solution, although generally mild. Avoid contact as much as possible, and wash exposed area with soap and water for at least 15 minutes. If irritation persists, or if contact has been prolonged, get medical help. For further information, please visit our website at: www.koolance.com



CAUTION: Koolance Incorporated can not be held responsible for any damage to your system due to misconfiguration or incorrect installation. If there is any point of installation that you do not understand, please contact our Technical Support Staff at: tech@koolance.com, or visit our website at: www.koolance.com



CAUTION: Liquid cooling systems are not yet universally supported by hardware manufacturers. In some situations, adding liquid coolers and other components to computer hardware might void the manufacturer's original warranty. Procedures which may impede on hardware warranty will be indicated in the manual by gray-colored Caution boxes. Installation of the device is ultimately done at the user's own risk. If you have any specific questions on warranty coverage, please contact your component or computer manufacturer.

KOOLANCE CONTACT INFORMATION

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Included Hardware

Exos Series Systems:

- Slot Interface Adapter
- External Power Cable
- External / Internal Liquid Tubing
- Liquid Coolant
- Power Button & Motherboard ATX wire
- CPU Temperature Probe
- Quick-Disconnect Nozzles
- Rubber and Velcro Mounting Pads

Required Tools

During the installation of your system and coolers, you may need the following tools:



flat-head screw driver



Phillips-head screw driver



pliers



needle-nose pliers



scissors



6. My system appears to be leaking fluid...

Since users are allowed to configure their own coolers and clamps, it is possible a connection was not properly sealed (however unlikely). If you can see liquid somewhere on the tubing, or at the bottom of the chassis, computer components may need to be removed for a system test (see *Flow Testing*).

If liquid should get onto another computer component, shut down the system, and remove the component. In most cases, the hardware will be fine after allowing it to dry. However, the system should not be operated until you have discovered where the leak is coming from and can repair the problem. Should the leak be situated somewhere in which it can not be easily repaired, please contact our Technical Department for further diagnostic information.

7. My computer's BIOS gives me errors that there are no cooling fans attached...

Some motherboards will not boot, or may generate an error or alarm if no cooling fans are attached to the CPU or motherboard chipset power connectors. There is sometimes an option to disable these fan connections in BIOS, but you may have to boot-up with a fan attached initially to disable this setting. If the system is not booting due to this problem, clear the CMOS and try configuring BIOS again.

8. The LED Display Panel gives an Error Code...

Your system LED display may specify if there is a problem with the unit. Please use the following guide in determining the cause of a problem:

The green LED "Power" light indicates whether the pumps are working or not. It is common for this light to flicker in normal operation, but it should not go out.

E1 - Alarm is sounding (temperature is 55-58°C, or 131-136°F). System is overheating.

E2 - System shutdown (temperature over 58°C, or 136°F). System is nearing critical temperatures.

E3 / PO - Open pump circuit (green power LED is out). The pump connector must be checked inside the unit.

E5 / SO - CPU temperature sensor open circuit (alarm sounds, green power LED is on). Check the slot interface board to ensure a proper thermal probe connection.

E6 / SS - CPU temperature sensor short circuit (alarm sounds, green power LED is on). The temperature sensor needs to be replaced.

E7 - System fault; shutdown after 10 seconds (alarm sounds, green power LED is off). Please contact our Technical Department for further assistance.

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CHAPTER 1

Introduction

Congratulations on your purchase of a Koolance system!

As the most sophisticated product of its kind, Koolance offers many unique features found nowhere else in the realm of computer cooling. In addition, you can expect to enjoy all of the advantages that water-cooling technology brings with it.

Advantages of Water Cooling

Water transfers 30 times faster, and holds over 4 times more heat than air. With this thermal conductivity and specific heat capacity, it's easy to see why liquid cooling is getting a lot of attention from hardware manufacturers.

Heat-producing devices in a typical computer are cooled by air. Generally, this involves mounting a heat sink and fan to each component. For example, heat generated from your CPU is transferred into a metal heat sink, where a fan blows air across its wide surface area.

While altering a heat sink's size and makeup can improve the effectiveness, it is still limited because air absorbs and transfers heat very slowly. To help compensate for this, the fan is often run at a higher speed. Many people have therefore come to equate high performance with high noise. As systems continued to be upgraded, the required heat sinks simply got larger and louder.

Liquid cooling greatly reduces the noise issue. A larger amount of heat is withdrawn from the components more quickly, and less airflow is required to cool them.

The heat exchanger is also located remotely from heat-producing devices, so airflow can be controlled. This considerably reduces dust accumulation on sensitive hardware and can result in a **cleaner overall system**.

Advantages of Koolance Systems

Koolance was the first company to offer fully-integrated, consumer-level PC liquid cooling systems to the world-wide market. Our products are designed and **built to look and operate professionally**. Installation of your Koolance system will probably be less difficult than assembling your own computer.

Koolance offers liquid coolers for every major hardware device. Providing enormous flexibility, you can customize your system to fit your specific needs— cool dual processors in a server, multiple hard drives in a RAID configuration, or add video cooling to a gaming rig.

4. After the system has been on for awhile, the temperature alarm sounds...

Make sure that the LED temperature reads at least 55°C (131°F) or higher while the alarm is sounding; if not, the audio alarm may in fact be your motherboard's BIOS alarm. If the system is not exhibiting signs of overheating (see #2 in *Troubleshooting*), this temperature monitor may need to be disabled to ignore false readings by BIOS. The Koolance LED Display will flash "FLT" or Error Code whenever the cooling system alarm sounds.

If the alarm sounds within a few seconds after a cold boot-up, or the LED temperature does not read at least 55°C (131°F) while the alarm is on, the control board/pumps may be malfunctioning. Please visit our support web page for more information.

Verify that the pumps are operating (see *Troubleshooting* #1), and that liquid flow is present in the reservoir. Note that if the reservoir was over-filled during system assembly, this procedure is not possible.

5. My system has boot-up problems, or does not turn on...

The majority of these problems are not related to the Koolance case, but hardware or configuration issues. In a new system, a problem with the RAM, motherboard, power supply, video card, processor, or monitor can cause the system to appear not to boot-up properly.

If the top Heat Exchanger fans do not spin, or if the front LED Display Panel does not light-up, check to see if your motherboard has a power indicator LED on the board. This is usually a green light next to the ATX power connector on newer motherboards. If this is lit, power is getting to the board.

The Power Control Board (or Exos Slot Interface Adapter) should be checked to make sure all connections are plugged-in, especially the 12V 4-pin power supply connection. Also be sure if your power supply has a rear power switch, that it is in the ON ("I") position, and switched to the appropriate regional current (115VAC or 220VAC).

Another possibility is that the motherboard is shorting-out electrically on the chassis. Remove the motherboard, and verify that the stand-offs are properly installed. Lastly, check that the IO shield (the thin aluminum rear motherboard ATX port plate) is not bent backwards around the motherboard, possibly shorting a component.

If further problems persist, you are likely having a separate hardware issue.

Troubleshooting

We hope your Koolance system will provide you with years of reliable cooling performance. To help avoid unnecessary RMA issues, we have prepared this list of possible operational problems, and their most common solutions.

1. How do I tell if the pumps are working?...

After initial air-filtering, the pumps may not create enough noise to tell if they're working properly. During normal operation, some air bubbles may even remain attached to the insides of the hoses and will not appear to move when the tubing is "flicked".

The easiest way to test pump operations is to simply monitor liquid inside the reservoir. If the pumps are operating, liquid flow will be visible.

2. My temperatures seem too high...

Unless your processor is capable of reading temperatures within the die, BIOS temperatures may not provide reliable readings for liquid cooling systems. This is due to the absence of air flow beneath the CPU socket. If the system exhibits signs of high temperature (reboots, shut-downs, etc.), there may be a problem with your system. These same symptoms can also be attributed to a faulty power supply, and other internal hardware.

Verify that the liquid coolers are making sufficient contact with each component. Make sure the CPU tension screw is placed in the correct cooler receptacle (see *CPU Cooler*).

If the thermal interface material has become over-used, or if the protective film on the CPU has not been removed, the CPU can exhibit higher temperatures than normal.

Also check that there are no blocks, twists, or crimps in the tubing system. If a nozzle has been clamped inappropriately, it should be redone.

3. The LED Display Panel does not light up...

A defective display circuit is extremely rare. Usually, this is due to a misaligned or disconnected plug on the Power Control Board (or Exos Slot Interface Adapter). Verify that all appropriate plugins are attached, particularly the 12V 4-pin power supply connection.

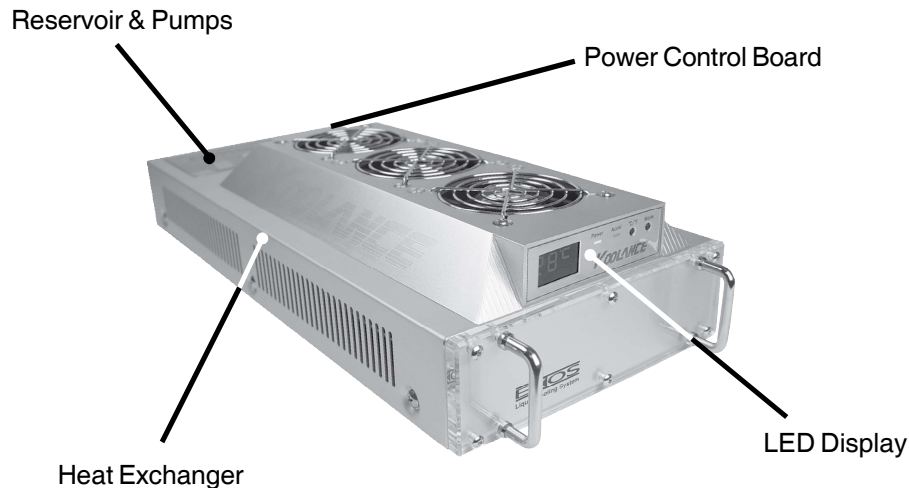
The heart of a liquid cooling system is the pump. This device pushes liquid through each cooler and into the heat exchanger. Koolance systems use **dual pumps to increase reliability and liquid pressure**. If one pump should fail, the second can help prevent potential damage caused by heat increase.

Every Koolance system **includes built-in hardware safety features**. Our proprietary power control board constantly monitors liquid temperature, sounding an alarm if it should get too high, and even turning-off your computer if you are not there to do so.

But Koolance's innovations extend beyond just cooling features. Our **safe, patent-pending CPU Retention Clip** places even pressure across the CPU, protecting the chip and simplifying installation. There's even a ratcheting tension screw for precise contact pressure.

Finally, Koolance systems allow coolers to be **easily exchanged and upgraded** to address future hardware compatibility.

Exos System Diagram



Power Control Board - Next to the reservoir, the Power Control Board is responsible for a number of tasks, including: powering the pumps, LED display, heat exchanger fans, and operating the audio alarm and shutdown modes.

Reservoir & Pumps - The coolant tank includes many features which are distinctive to a Koolance system. It is also translucent for easy liquid-level monitoring. Dual pumps carry a flow rate of approximately 1030cc/min. Redundancy also provides higher system reliability; if one pump should fail, the other will maintain an acceptable temperature, or gradually bring the system to shut itself down (see *LED Display Panel*).

Heat Exchanger - The heat exchanger, or radiator, is located beneath the fan cooling module. This is the primary cooling element, specifically designed for liquid cooling, and provides high thermal dissipation in a relatively small area. Inside, an aluminum mesh (Louver fin) is webbed between parallel horizontal liquid paths.

Draining & Maintenance

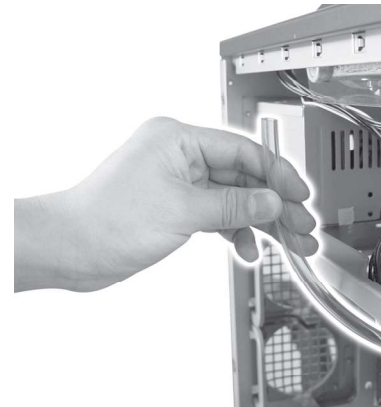
The liquid coolant in your system should be emptied for any of the below reasons:

- 1. To Keep it Clean** - Koolance recommends replacing the liquid coolant once every 12 months. The coolant should also be replaced if it becomes contaminated or significantly changes color.
- 2. Upgrading Coolers** - Whether you are adding or removing liquid coolers, upgrades can be performed more easily with a dry system.
- 3. Shipping** - Koolance recommends draining the liquid coolant if the system is to be shipped or transported in a method other than by hand.

(NOTE: In situations #2 and #3 above, the liquid coolant can later be reused if cleanly bottled.) Additional coolant may be purchased from your local Koolance dealer.



CAUTION: Because of the risk of leakage, Koolance recommends removing computer hardware before draining your system.



Remove the tubing from a single cooler nozzle connection within the chassis and hold it over a 1-Liter container.



Due to pressure variance, most of the liquid will not fall out until the reservoir refill tap has been unscrewed.





CAUTION: Positioning of Exos systems during liquid filling is important. The Exos must be higher than all internal liquid coolers, or coolant will exit the refill tap upon filling.

Because of gravity, the Exos must be placed above all internal cooling components while being filled. Otherwise, coolant will exit the refill tap once the reservoir is full.

Cut a small corner in the coolant pack, and slowly fill the reservoir. You will probably not need the entire amount of liquid.



Do not overfill the reservoir. You should be able to easily replace the refill tap without causing any liquid to spill out. It is recommended to keep paper towels on hand just in case.



Replace the refill tap screw and allow the pumps to run. When filtration has ended (usually after about 1-5 minutes), the liquid noise will stop.

If the reservoir level is noticeably depleted after this step, you may need to add more liquid coolant and repeat the process once more.

LED Display Panel

The front control panel is a convenient display which will allow you to monitor liquid temperature, set the fan mode, and toggle temperature display settings ($^{\circ}\text{C}$ or $^{\circ}\text{F}$).

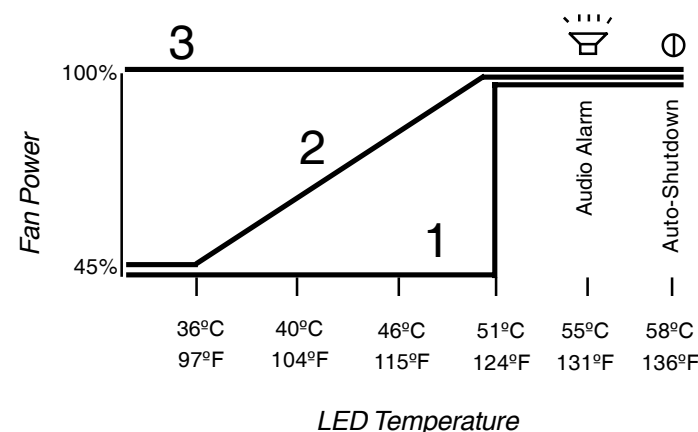


Mode 1 operates your system at 45% power until the temperature reaches 51°C (124°F), then increases to 100% power.

Mode 2 operates your system at 45% power until the temperature reaches 36°C (97°F), then increases gradually to 100% at 50°C (122°F).

Mode 3 runs the cooling system at 100% power. While this will provide the best temperature range, it is not the most silent, and largely unnecessary in operating your Koolance system.

The “Accelerated” light indicates that your system is running above 45% power.



CAUTION: If the LED temperature reaches 58°C (136°F), power will automatically be shut-off to the entire computer. Unsaved files and documents may be lost. Always make regular backups of your files.

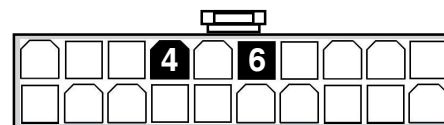
CHAPTER 2

Connecting Exos Systems

Testing & Filling

Your Koolance system is designed to automatically filter air from the liquid. Before filling, the cooling system should be “jump-started” to assist in the circulation process.

Make sure the AC power cord is attached to the power supply. If the power supply has a rear switch, it must be in the ON (-) position. Using the ATX Jumper Wire, insert the metal prongs into pin numbers **4 and 6** on the 20-pin motherboard ATX power supply connector (green and a black ground wire-- See *diagram*).



CAUTION: Jumping the incorrect ATX power supply pins can cause permanent damage to the power supply.



You should now hear the pumps running in an empty reservoir.



The large, slot-headed refill tap is located above the reservoir. Remove it with a flat screw driver. With the reservoir open, insert the refill funnel.



WARNING: The liquid coolant is electrically conductive. Use caution when filling the system, and keep all liquids away from computer hardware and power cables. In case of emergency during installation, immediately unplug the computer's rear power cable. Dry the system thoroughly before proceeding.

Tubing and Liquid Coolers

You should now install your liquid coolers (CPU, GPU, Hard Drive, etc.) before continuing this User Manual. Please refer to your cooler kit's individual installation instructions, then continue on to the next section.

CHAPTER 3

Filling & Maintenance

Positioning the Exos™

As an external unit, the Exos is designed to operate in various locations. Based on testing, Koolance has found the Exos to function adequately even up to 10 meters (33 feet) away from some computers, depending on the system configuration and environment. (Excessive distance can lead to pump pressure drop and undesirable temperatures, however.)

The Exos must be operated upright. The pumps and reservoir are less effective when running sideways, and it is difficult to maintain air filtration in this manner.



Rubber foot pads, or alternatively, self-adhesive velcro strips are included to attach the Exos to your computer chassis. If you are frequently transporting your computer system, Koolance recommends the “Exos Attachment Belt” (purchased from your Koolance dealer) to firmly strap the unit to your computer chassis.



Rubber Foot Pad



Velcro Adhesive Strip

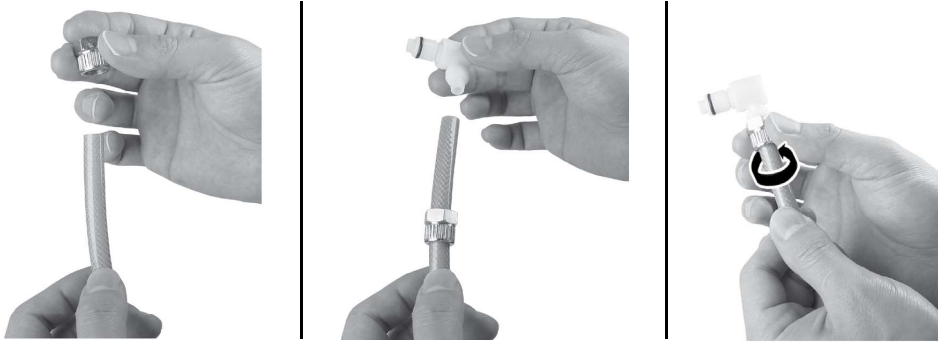


Exos Attachment Belt

External Quick-Release Nozzles & Power Cable

Cut the included blue external tubing into two segments. You will need to install a white quick-release nozzle on one end of each.

Thread a metal valve bolt over the end, and slide the tube over the narrow portion of the nozzle. Tighten the metal bolt by firmly screwing it to the plastic nozzle.

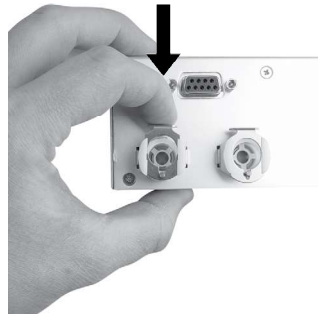


Once completed, connect both quick-release nozzles and the external power cable to the Exos.



If you are having difficulties inserting quick-release nozzles into the rear connections, press the top valve button to close the valve. The nozzle will not fit into the Exos if the valve is open.

NOTE: Once filled, it is normal for the quick-release nozzles to leak a small amount of liquid upon disconnection.

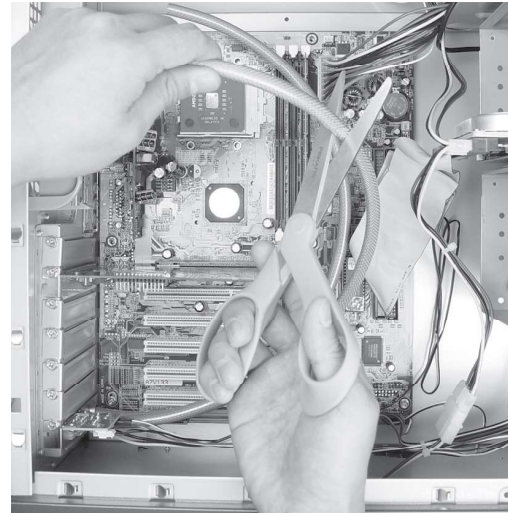
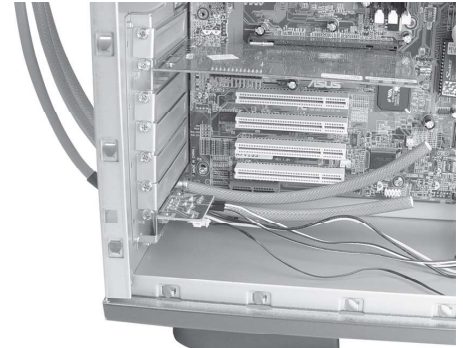


Cutting Tube Lengths

Before securely clamping the coolers, you must cut appropriate lengths of tubing with scissors to connect each device. If you are building a new computer system, it may be easier to temporarily lay the motherboard and CPU inside the case to better estimate the required amounts.

The Exos external (blue) tubing connects to the first and last coolers in your system. Standard (clear) tubing is used in between each individual cooler.

Additional tubing has been included with your system should you require it, and more can be purchased from your Koolance dealer.

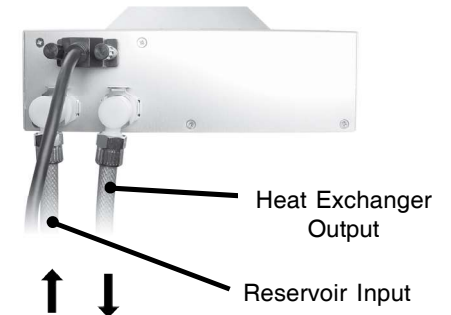


With one of the connected hoses, roughly estimate the length you will need to your first cooler (usually the CPU cooler), and cut it.

Cut the second hose with enough length to connect with the last cooler that will be in your system.

Using the standard clear tubing, cut shorter pieces to link between each individual cooler.

Although it is most common for tubing from the heat exchanger to go directly to the CPU cooler, liquid may circulate in either direction through the coolers.



Cooler Arrangement

The components in your Koolance system are connected in series. Each system contains a heat exchanger and reservoir, but you must choose which coolers you wish to install in between, for example:

CPU Cooler, Motherboard Chipset Cooler, Video Chipset Cooler



CPU Cooler, 2nd CPU Cooler, Video Cooler, Hard Drive Cooler



Although it is possible to use up to eight (8) coolers in a Koolance system, a maximum of six (6) is recommended due to a reduction in liquid pressure. Coolers can also be added or removed later as required.

Typically, a cooler sequence will be:

1. Exos
2. CPU Cooler
3. CPU Cooler (for dual-processor systems)
4. Motherboard Chipset Cooler
5. Video Card Chipset Cooler
6. Hard Drive Cooler
7. Exos (which connects the reservoir and heat exchanger)

However, *this order is optional* and you may connect your coolers in an alternate sequence if desired.

Slot Interface Adapter

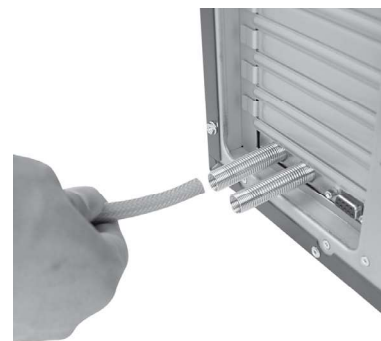
The Slot Interface Adapter allows the Exos to connect with any computer through an available card slot. It is responsible for both input and output tubes, along with the external power cable connection. This prevents the computer chassis from requiring any modifications.



Install the Interface Adapter from the inside of the case, guiding the tension springs out the back of the slot. The Interface Adapter may be installed into any available rear card slot in your computer.



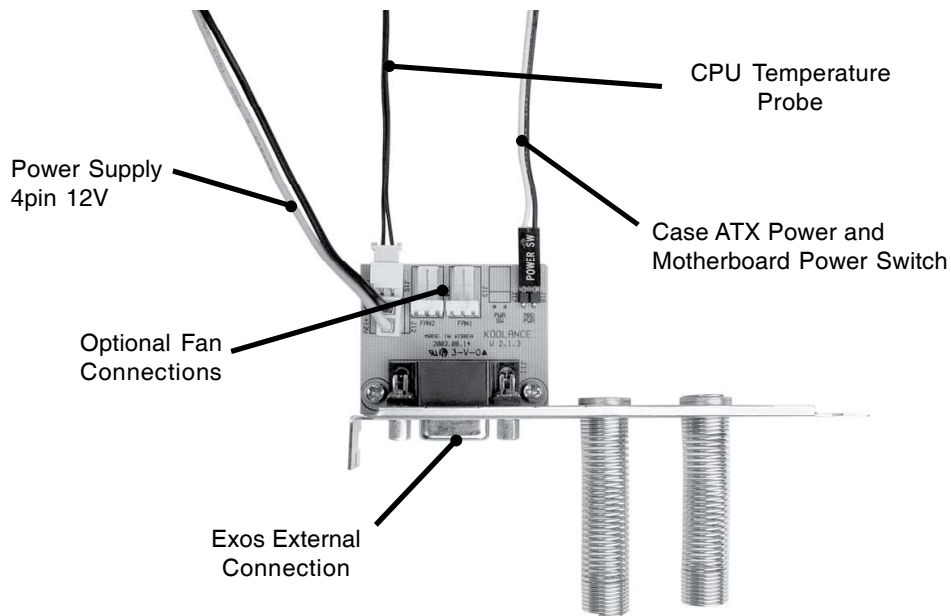
Screw the Interface Adapter in place as you would a normal device.



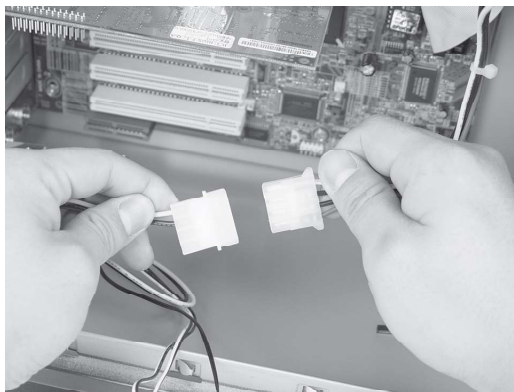
From the rear of the case, carefully feed both ends of the liquid tubing through the tension springs and into the chassis.

Plug the remaining end of the Exos external power cable into the Slot Interface Adapter.





There are 3 main internal connections to the Slot Interface card which must be made. The Exos may appear to operate without some of these connections, but the hardware safety features will be deactivated.



The Exos cooling system requires approximately 8-10W from any standard ATX power supply. Since it is adapted internally, the Exos does not need a dedicated external AC power cable.

Connect a 12-volt 4-pin Molex plug from the power supply to the Slot Interface Adapter. Without this important connection, the Exos system will NOT operate.

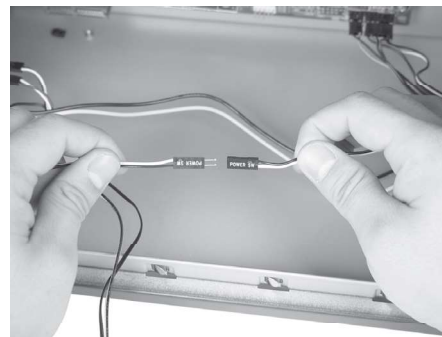
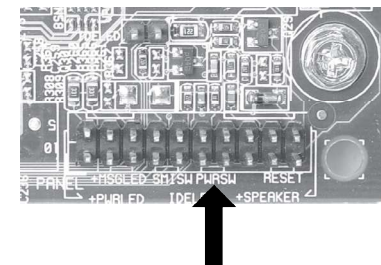


CAUTION: The Slot Interface Card is vital to system operation. A 12V 4-pin plug from the power supply must remain connected to the circuit at all times while the computer is in use.

The black CPU temperature probe is the reading displayed by the front LED panel. You will position this thermal probe later during the installation of your CPU cooler.

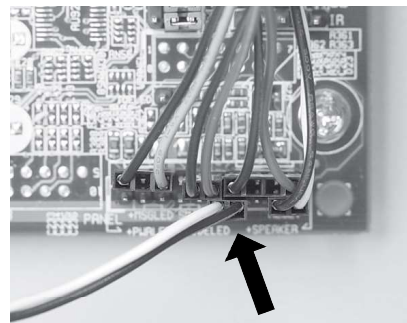
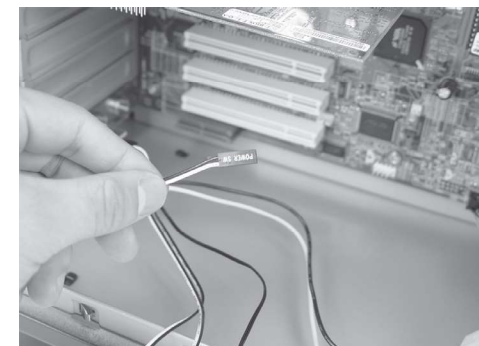
There are 2 power switch connections to the Slot Interface Card on a split wire lead. Instead of connecting the chassis power switch to your motherboard, it will meet with a wire to the Slot Interface Adapter.

Unplug the chassis ATX power switch lead from the motherboard. The power switch is typically labeled "PWRSW", "PWSW", or "PWB".



Connect this lead to the pronged male connection from the Exos Slot Interface Adapter.

The second lead from the Slot Interface will connect to your motherboard where the power switch was originally located.



The new ATX power switch connection originates from the Slot Interface Adapter. All other wire leads to your motherboard should remain connected.