

KOOLANCE™

Superior Liquid Cooling Systems



INX-420 USER'S MANUAL

English v1.00

Protected by U.S. Patents 5,731,954; 6,234,240; 6,313,990
Other Technology Pending U.S. & World-Wide Patents

This User Manual is updated regularly. Please be sure to check our support page for a newer version of this guide:

www.koolance.com/support

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

INX-420 Series Systems:

- ATX power jumper wire
- refill funnel
- liquid coolant mixture
- PVC tubing
- mounting brackets
- hose screws
- user manual

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



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.

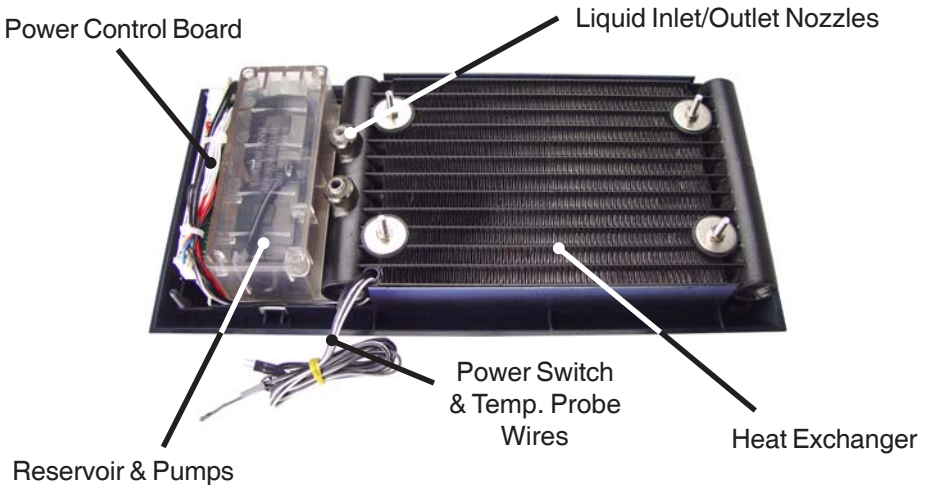
The heart of a liquid cooling system is the pump. This device pushes liquid through each cooler and into the heat exchanger. Koolance systems use **dual pumps to increase reliability and liquid pressure**. If one pump should fail, the second can help prevent potential damage caused by heat increase.

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.

INX-420 System Diagram



Power Control Board - Behind 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 13 horizontal liquid paths.

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 $^{\circ}\text{F}$).

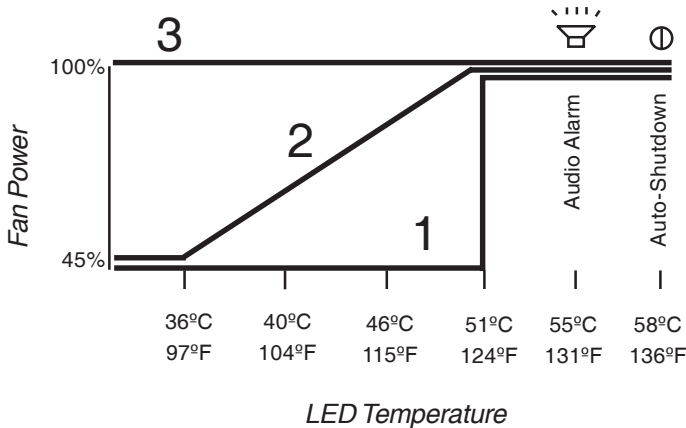


Mode 1 operates your system at 45% power until the temperature reaches 51°C (124°F), then increases to 100% power.

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 INX-420 Systems

Power Control Board

You may begin the installation of your Koolance system by mounting a power supply in the chassis. The liquid cooling system requires approximately 8-10W from any standard ATX power supply.

Connect a 12-volt 4-pin Molex plug from the power supply to the Power Control Board. Without this important connection, the Koolance system will NOT operate.



CAUTION: The Power Control Board 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.

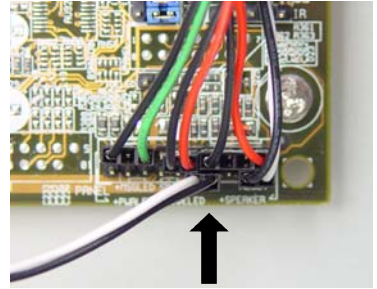
ATX Power Switch

The ATX “pass through” lead is responsible for shutting off your computer if the LED temperature (CPU cold plate) reaches 58°C (136°F).



Connect the male ATX power lead from the INX-420 to the chassis main power switch.

Connect the female ATX power lead from the INX-420 to the motherboard's power button connection (often marked "PWRSW", "PWSW", or "PWBT").



CAUTION: The auto shut-down safety features of the INX-420 will not function properly without connecting the ATX power button lead.



Proceed to install the tubing and liquid coolers.

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.

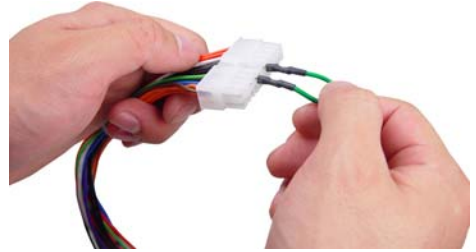
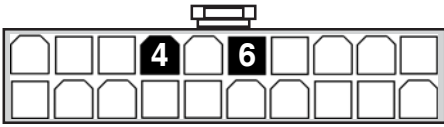
CHAPTER 3

Filling & Maintenance

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.





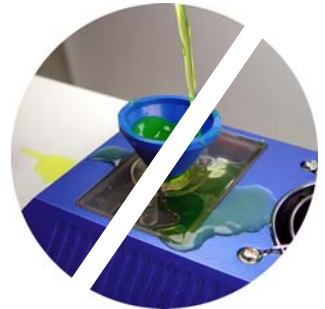
WARNING: The liquid coolant is electrically conductive. Use caution when filling the system, and keep all liquids away from computer hardware and power cables. In case of emergency during installation, immediately unplug the computer's rear power cable. Dry the system thoroughly before proceeding.



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.

Draining & Maintenance

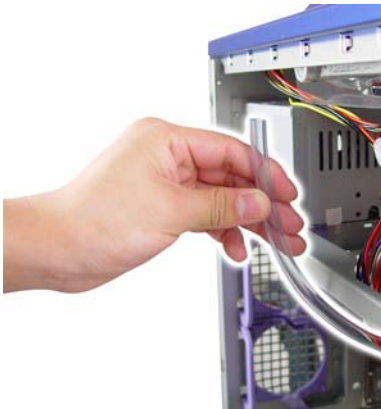
The liquid coolant in your system should be emptied for any of the below reasons:

- 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.



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.

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" (fault) 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.

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). Check the slot interface board and power control board connections.

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 on). Please contact our Technical Department for further assistance.

Limited Warranty

Koolance Incorporated (“Koolance”) warrants each new Koolance liquid-cooled system (“the system”), against defects in materials or workmanship for a period of one year from the date of purchase, and agrees to repair or replace any defective Koolance system without charge. Shipping costs are non-refundable.

This warranty is non-transferable. All warranty claims must be accompanied by the original proof of purchase.

THIS WARRANTY DOES NOT COVER DAMAGE RESULTING FROM ACCIDENT, MISUSE OR ABUSE, LACK OF REASONABLE CARE, SHIPPING DAMAGE, MODIFICATIONS, THE AFFIXING OF ANY ATTACHMENT NOT PROVIDED WITH THE PRODUCT, LOSS OF PARTS, OR OPERATING COMPONENTS AT SPEEDS OR FUNCTIONS OTHER THAN THOSE SPECIFIED BY THEIR MANUFACTURERS.

Use of unauthorized replacement parts or liquid additives will void this warranty. Koolance Incorporated will not pay for warranty service performed by a non-authorized repair or diagnostic service and will not reimburse the consumer for damage resulting from warranty service performed by a non-authorized repair service. No responsibility is assumed for any special incidental or consequential damages due to a defective Koolance product.

In order to obtain warranty service, contact our RMA department for information. The product must be shipped postage prepaid to an authorized Koolance service location. It is suggested that, for your protection, you return shipments of product by insured mail, insurance prepaid. Damage occurring during shipment is not covered by this warranty. Shipping costs are non-refundable. No other warranty, written or oral, is authorized by Koolance Incorporated.

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