



 **Koolance**[®]
Superior Liquid Cooling Systems



ALX-750/1450/2000 User's Manual

English v1.1

ISO
9001

Printed in Korea

A newer version of this User Manual may exist. Please be sure to check our support page for the latest version of this guide: www.koolance.com

GENERAL PRECAUTION

Please read this manual carefully before beginning the installation of your Koolance system.

ABOUT SIGNS

Throughout this document, critical information is highlighted in gray-colored boxes. The following symbols are intended to help prevent 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 or property.



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.

TRADEMARKS

The Koolance name and logo are trademarks or registered trademarks of Koolance, Inc. Other company and product names used in this publication are for identification purposes only and may be trademarks or registered trademarks of their respective companies.

COPYRIGHT

All rights reserved. Copyright (C) Koolance Incorporated.



WARNING: The Koolance liquid coolant contains chemicals which may be harmful or fatal if swallowed. KEEP THIS AND ALL DANGEROUS CHEMICALS OUT OF THE REACH OF CHILDREN. Please refer to the coolant MSDS available on our website: www.koolance.com

Table of Contents

Product Diagram	3
Positioning the System	4
Combining Modules	4
Tube Fittings	6
Wiring	7
USB, 0-5V, and External Sensors	8
Coolant Filling and Power On	9
Display Panel	10
Main Menu	10
Cooling Mode	11
Fan Ramp	11
Pump	12
Alarm	12
Relay	12
Display	13
Power	14
Troubleshooting	15
Limited Warranty	16

CONTACT INFORMATION

Koolance Inc. (USA)
 Address: 2840 W. Valley Hwy. N., Ste. 101, Auburn, WA 98001, USA
 Technical Support: <https://koolance.com/contact>
 Telephone: +01 253-249-7669

Product Diagram

ALX-750, ALX-1450, and ALX-2000 systems are composed of two modules physically connected together: the front “RPM” and rear “HXM”. Images below are general representations, since individual modules may vary.

RPM Reservoir and Pump Module



HXM Heat Exchanger Module



Positioning the System

This product must be operated in an upright orientation (shown below). Alternative orientations can prevent the coolant pump from operating properly.



Combining Modules

If you have purchased both RPM and HXM modules, they are combined together using hardware included with the products.



Fittings on Rear of RPM (G 1/4 BSPP)

Install the shorter fittings included with the RPM module onto its inlet and outlet ports. These should be finger-tightened, and have o-rings to make the seal. (Do not use thread tape.)



Fittings on Front of HXM (G 1/4 BSPP)

Install the longer fittings included with the HXM module onto its *front* inlet and outlet. These should also be finger-tightened without thread tape.

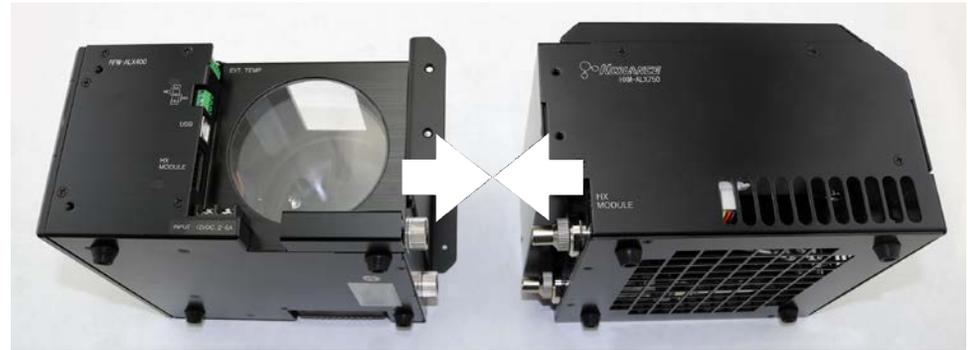


Fasten the included mounting bracket to the rear of the RPM module using four bracket screws.

The bracket must match the orientation shown to the right.

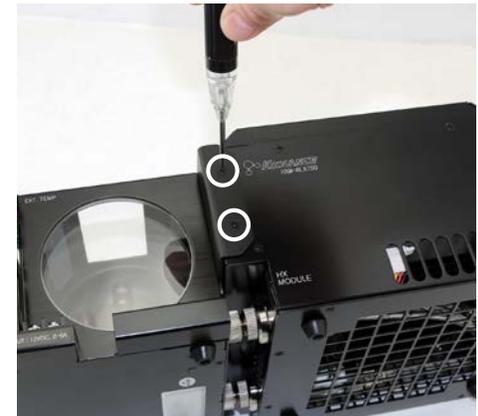


Push the RPM and HXM modules together. Their fittings will mate and seal.



Finish combining modules by securing the bracket with its remaining four screws.

Two screws are installed into corresponding holes on each side of the HXM module.



Tube Fittings



Tube fittings are purchased separately.

Unlike the fittings used to combine the RPM and HXM modules, the tube fitting threads are NPT 1/4-inch. Thread tape is required to seal them.



After wrapping with tape, the inlet and outlet fittings should be inserted by hand, then finished with a wrench for the last 1-2 rotations.



Cut tubing into two segments. You will need to connect each to the rear fittings.

Each tubing connection will use a threaded compression ring or tube clamp to keep it secure. Be sure to thread the compression ring or tube clamp onto the tubing before attaching it.



Squeeze the tube while pushing it firmly over the fitting. Tubing should completely cover the fitting or barb. This step can often be made easier by first soaking the end of the tubing in warm water for a moment.

Tighten the connection by sliding the compression nut down over the fitting and screwing securely. For barbed fittings, use pliers to move the clamp into the proper position before releasing.



Wiring

This cooling system requires 12V DC input power. Depending on the selected radiator module, the necessary current will range from 2-6 amps. Please refer to the power requirements labeled on the products.



CAUTION: Supply only the proper input power and polarity labeled beneath the DC terminals. Improper power or polarity could damage the product, and is not covered under the warranty.



The power terminals are located beside the reservoir window.

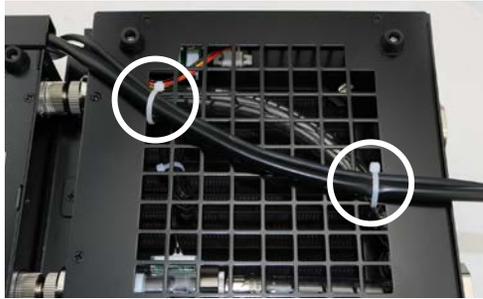
Connect power leads from a DC power supply to the positive "+" and negative "-" terminals, as labeled on the unit.

DO NOT reverse polarity of the supply voltage, or the product could be damaged.

Connect the included ribbon cable between the RPM and HXM plugs, labeled "HX Module".



The ribbon can be tucked behind the cable guide located below the reservoir window.



For a cleaner appearance, the power and USB cables can be routed beneath the HXM module towards the back panel.

Cable ties are included to secure them to the radiator grill. Use needle-nose pliers to assist with the cable ties.

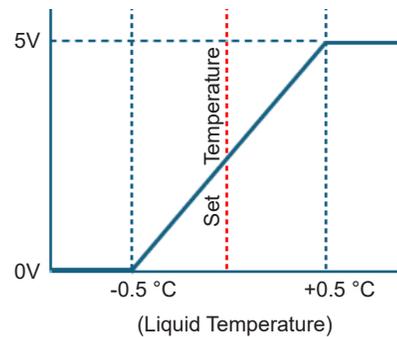
USB, 0-5V, and External Sensors



This product supports the Koolance System Monitor (KSM) software application for control and logging over the USB port. It is recommended to use the included USB cable, which is shielded. The latest version of KSM can be downloaded from: <https://koolance.com/software>



A 0-5V differential voltage output is provided for industrial process monitoring. The output is based on the difference between the user's setpoint and internal liquid temperature. (Please see the graph for details.)



The reservoir contains an internal liquid temperature sensor. For monitoring or setpoint control based on an external sensor, terminals are provided for up to two K-type thermocouples (not included). These can be connected to the terminals labeled "CH1" (channel 1) and "CH2" (channel 2).



Coolant Filling and Power-On



WARNING: Most coolants are electrically conductive. Use caution when filling the system, and keep all liquids away from electronics and power cables. Keep the power supply unplugged or disabled whenever filling or draining coolant.



Once all devices (such as cold plates and manifolds) have been properly connected with tubing, the coolant can be added.



The fill port is located above the reservoir. Remove the plug using a flathead screwdriver or large coin.

To avoid spilling, a large funnel is recommended. Coolant should be filled to about 1/2-inch (13mm) from the top of the reservoir. **Never completely fill or "top-off" the reservoir.** An air gap is needed to accommodate thermal expansion of the liquid.



This cooling system requires approximately **1 liter (0.26 gallons)** of coolant, plus additional coolant for externally attached components and tubing.

Slowly fill the system with coolant. **To maintain the product warranty, use only Koolance approved coolant.** Many alternative liquids and additives can cause permanent damage to the system through chemical reaction, corrosion, biological growth, high thermal expansion, viscosity, etc.



Replace the fill port plug. **To avoid damaging the threads, do not overtighten the plug.**

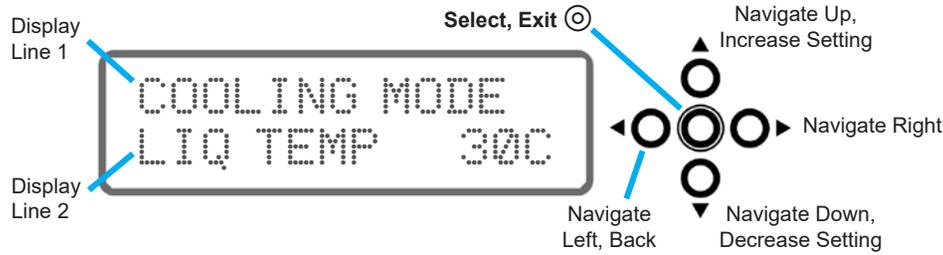


After filling, reconnect or reenble the power supply and turn on the cooling system using its front power button. Coolant should begin flowing through the tubing, and the reservoir level will quickly decrease. Unplug the AC cable from the wall outlet before adding more coolant.

This process can take several minutes, depending on the external components and filling technique. To help eliminate large air pockets, some components on the tubing may need to be temporarily lifted or tilted.

Display Panel

The Koolance display panel allows monitoring and control of the cooling system's functions. Five buttons are used, with directional arrows to navigate or change settings, and a center button to select or exit.



- You can exit any menu and return to the main screen by holding \odot for 2 seconds. The display will also return to the main screen automatically if there are no button presses for 10 seconds.
- From the main screen, hold \odot for 3 seconds to toggle display units between $^{\circ}\text{C}/\text{LPM}$ and $^{\circ}\text{F}/\text{GPM}$.
- To reset all cooling system settings to default, hold $\blacktriangle + \blacktriangledown$ for 3 seconds.

Main Menu

To enter the main menu, briefly press \odot . The selected option will begin flashing. Use \blacktriangledown and \blacktriangle to navigate this menu:

- \blacktriangle COOLING MODE: Temperature setpoint adjustment
- FAN RAMP: Hysteresis adjustment
- PUMP: Pump speed settings
- ALARM: Audio alarm settings
- RELAY: Relay trigger output settings
- DISPLAY: Main screen display settings
- \blacktriangledown POWER: Recovery default power state (product Rev.3.1 and later)

In the main menu, press \odot to select one of the above options. Otherwise, press \blacktriangleleft to exit.



CAUTION: To avoid permanent damage to the pump and other cooling system components, do not allow the liquid temperature to exceed 60°C (140°F) by setpoint or other methods. This is the maximum temperature supported by the cooling system.

COOLING MODE

Under this menu, you can adjust the active temperature setpoint the system will try to maintain. Alternatively, the radiator fans can be set to a fixed speed level. There are four cooling modes to select from. Press \blacktriangledown and \blacktriangle to scroll among them:

- \blacktriangle LIQ TEMP: Liquid Temperature (range -30 to 60°C)
- CH1 TEMP: Thermocouple Channel 1, if attached (range: -20 to 120°C)
- CH2 TEMP: Thermocouple Channel 2, if attached (range: -20 to 120°C)
- \blacktriangledown FAN PWR: Static fan power setting (range: 0 to 100%)

The cooling mode selected in this menu is what the system will follow. Only one can be active. Press \odot to adjust the selected value using \blacktriangledown and \blacktriangle . Below are some examples:

- LIQ TEMP= 35C: Maintain coolant coming from the system at 35°C .
- CH1 TEMP= 50C: Maintain thermocouple channel 1 at 50°C , if attached.
- CH2 TEMP= -5C: Maintain thermocouple channel 2 at -5°C , if attached. (This is not a sub-ambient system. Without external assistance, this temperature may not be reached.)
- FAN PWR= 45%: Keep fans at 45% power, regardless of temperature.

Press \odot again to exit configuration of the cooling mode. Press \blacktriangleleft to return to the previous menu.

FAN RAMP

The hysteresis can be changed in this menu, which adjusts the temperature difference (setpoint vs. actual) over which the fan speed ramp is applied. To avoid temperature instability, the default setting of $\pm 0.5^{\circ}\text{C}$ is recommended in most cases. Press \blacktriangledown and \blacktriangle to adjust the flashing value, or \odot to return to the previous menu.

- FAN RAMP
- TEMP +/- 0.5C: Apply the fan power ramp across a temperature delta of $\pm 0.5^{\circ}\text{C}$ (range: ± 0.5 to 10°C).

PUMP

The pump speed can be manually set from 1-10 (lowest to highest). Though not recommended, it can also be disabled by lowering the value until "OFF" is displayed.

```
PUMP
PWR (1-10): 7 : Pump Speed Level
```

The pump speed level will flash. Press ▼ and ▲ to adjust. Press Ⓞ to return to the previous menu.

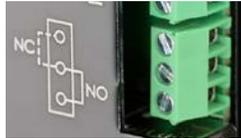
ALARM

This menu configures the audio alarm, which is a repeating beep while the offending sensor flashes on the display. There are seven simultaneously active options. Upon entering the alarm menu, the last edited line will flash. Press ▼ and ▲ to change it. Press Ⓞ to edit the value, and again to return to the previous menu. To disable an alarm, increase or decrease the value until "----" is displayed.

```
↑ LIQ TEMP: Liquid Temperature (range: 0 to 99°C)
  CH1 TEMP: Thermocouple Channel 1, if attached (range: 0 to 119°C)
  CH2 TEMP: Thermocouple Channel 2, if attached (range: 0 to 119°C)
  FAN: Fan Speed (range: 100-10,000RPM)
  PUMP: Pump Speed (range: 100-10,000RPM)
  FLOW: Coolant Flow Rate (range: 0.1 to 20.0LPM)
↓ LEVEL: Low Coolant Level in Reservoir (ON, or OFF to disable)
```

RELAY

Terminals are provided for a configurable output relay. If triggered, the offending sensor will also flash on the display. The relay wires can be connected for a normally-closed (NC) or normally-open (NO) signal, as labeled.



There are seven simultaneously active options. Upon entering the relay menu, the last edited value will flash. Press ▼ or ▲ to adjust this value. Press Ⓞ to edit the value, and again to return to the previous menu. To disable the relay, increase or decrease its setting to "----".

```
↑ LIQ TEMP: Liquid Temperature (range: 0 to 99°C)
  CH1 TEMP: Thermocouple Channel 1, if attached (range: 0 to 119°C)
  CH2 TEMP: Thermocouple Channel 2, if attached (range: 0 to 119°C)
  FAN: Fan Speed (range: 100-10,000RPM)
  PUMP: Pump Speed (range: 100-10,000RPM)
  FLOW: Coolant Flow Rate (range: 0.1 to 20.0LPM)
↓ LEVEL: Low Coolant Level in Reservoir (ON, or OFF to disable)
```

DISPLAY

The display settings configure which values you wish to appear on the main screen display:

```
DISPLAY
FIXED    CYCLIC : Show two fixed values or cycle multiple values.
```

The first option will flash. Press ◀ and ▶ to change between these options. Press Ⓞ to configure the selection, or press ▲ to exit. If "FIXED" is selected, two lines will be shown:

```
FAN SET    45% : (Field varies) Display line 1
CH1 TEMP   54.1C : (Field varies) Display line 2
```

The first line will flash. Press ▼ and ▲ to change what this line will display:

```
↑ FAN SET: (Field varies) Current cooling mode and setpoint
  LIQ TEMP : Reservoir liquid temperature
  CH1 TEMP : Thermocouple Channel 1 (if connected)
  CH2 TEMP : Thermocouple Channel 2 (if connected)
  FAN : Radiator fan RPM
  PUMP : Pump impeller RPM
↓ FLOW : Liquid flow rate through the unit
```

Press Ⓞ to move to line 2, and similarly use ▼ and ▲ to choose what will be displayed on the second line. Press Ⓞ again to exit.

If "CYCLIC" is chosen from the DISPLAY menu, multiple values will be rotated through the front display.

The first line will flash. Use ▼ and ▲ to navigate to other lines. Press Ⓞ to enable or disable each value. Values marked with * will be rotated on the the main screen:

```
↑ *FAN SET : (Field varies) Current cooling mode and setpoint
  *LIQ TEMP : Reservoir liquid temperature
  CH1 TEMP : Thermocouple Channel 1 (if connected)
  CH2 TEMP : Thermocouple Channel 2 (if connected)
  FAN : Radiator fan RPM
  *PUMP : Pump impeller RPM
↓ *FLOW : Liquid flow rate through the unit
```

Press ◀ to return to the previous menu, or press ▶ to exit.

POWER

(Available in product revision 3.1 and later.) This configures the cooling system's default behavior after a sudden loss of power.

```
DEFAULT PWR ST
OFF ON LAST : Default Power State
```

The current option will flash. Press ◀ and ▶ to select a different option. Press Ⓞ to return to the previous menu.

OFF: Keep the unit off when power is restored.

ON: Turn the unit on when power is restored.

LAST: Follow the most recent power state (off or on) when power is restored.

Troubleshooting

Below is a list of operational issues and their most common solutions.

1. After filling the reservoir with coolant and turning on the system, there are no visible signs of liquid movement...

Make sure the pump has not been disabled (see "PUMP"), and check the flow rate and pump RPM values on the display (see "DISPLAY"). If the reservoir was recently filled with coolant and there is no flow rate value ("0 LPM"), but the pump RPM is higher than 0, it may not have finished priming.

Open the reservoir fill port, and try increasing or decreasing the pump speed to help push out the air. If necessary, the cooling system can be temporarily tilted to assist with priming after closing its reservoir fill port.

2. The alarm sounds for an unknown reason...

The offending sensor and value will flash in the front display whenever an alarm sounds. Check if the corresponding alarm or relay trigger is configured as desired (see "ALARM" and "RELAY"). The alarm and relay settings can be defaulted by holding ▼ + ▲ for 3 seconds. This will also reset all other cooling system settings to their default values.

3. The alarm sounds and "TOO HOT" flashes in the display...

The maximum liquid temperature of 60°C (140°F) has been reached. Turn off the cooling system and allow it to cool-down before diagnosing the problem.

4. The system seems to be leaking coolant...

Check that all fittings are properly installed and tightened. This product uses two different fitting thread specifications. Be sure to use thread tape only on the NPT 1/4in fittings (see "Combining Modules" and "Tube Fittings").

5. The front display is not responding to button presses...

Reset all system settings by holding ▼ + ▲ for 3 seconds. After a reset, all configuration settings (setpoint, alarm, etc.) must be adjusted again.

6. The pump is not operating at low speed settings...

Due to variations in pumps, the motor may not always operate at the lowest speed settings. The pump should be kept at a setting which allows for the coolant to flow continuously. During power up, the pump will briefly operate at maximum speed before changing to the user's preset level.

Limited Warranty

Koolance Incorporated warrants that on the date of original purchase and for a period of one (1) year thereafter, this Product will be free from defects in material or workmanship. If, during the warranty period, this Product is found to be defective in material or workmanship, it will be repaired or exchanged at Koolance's option.

All warranty claims must be accompanied by the original proof of purchase. Koolance does not provide a warranty for products purchased from unofficial dealers or 3rd-party marketplaces. This warranty is non-transferable.

THIS WARRANTY DOES NOT COVER DAMAGE RESULTING FROM ACCIDENT, MISUSE OR ABUSE, LACK OF REASONABLE CARE, PHYSICAL DAMAGE, CORROSION, SHIPPING DAMAGE, MODIFICATIONS, THE AFFIXING OF ANY ATTACHMENT NOT PROVIDED WITH THE PRODUCT, OR OPERATING COMPONENTS OUTSIDE OF THEIR INTENDED SPECIFICATIONS.

Use of 3rd-party coolants or coolant additives will void this warranty. Koolance Incorporated will not pay for warranty service performed by a 3rd-party repair or diagnostic service and will not reimburse the consumer for damage resulting from warranty service performed by a 3rd-party repair service. No responsibility is assumed for any special incidental or consequential damages due to a defective Koolance product. No other warranty, written or oral, is authorized by Koolance Incorporated.

Return shipments without a valid RMA number will be refused. 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.

Disclaimer

IN NO EVENT SHALL KOOLANCE INCORPORATED OR ITS EMPLOYEES, AGENTS, SUPPLIERS, MANUFACTURERS, OR CONTRACTORS BE LIABLE FOR ANY DAMAGES OF ANY KIND OR CHARACTER, INCLUDING WITHOUT LIMITATION ANY COMPENSATORY, INCIDENTAL, DIRECT, INDIRECT, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES, LOSS OF USE, LOSS OF DATA, LOSS OF INCOME OR PROFIT, LOSS OF OR DAMAGE TO PROPERTY OR PERSONS, CLAIMS OF THIRD PARTIES, OR OTHER LOSSES OF ANY KIND OR CHARACTER, AND WHETHER OR NOT THE POSSIBILITY OF SUCH LOSS OR DAMAGE HAS BEEN NOTIFIED TO KOOLANCE INCORPORATED. IN NO EVENT SHALL KOOLANCE INCORPORATED'S TOTAL CUMULATIVE LIABILITY (INCLUDING, WITHOUT LIMITATION ATTORNEY'S FEES) FOR ANY CLAIMS IN CONNECTION WITH THIS POLICY EXCEED THE COST OF GOODS PAID TO KOOLANCE INCORPORATED.