KOOLANCE

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KOOLANCE®

Superior Liquid Cooling Systems

ALR-4600
User's Manual

English v1.1

A newer version of this User Manual may exist. Please be sure to check our website for the latest version of this guide: https://koolance.com/manuals

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.

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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

CONTACT INFORMATION

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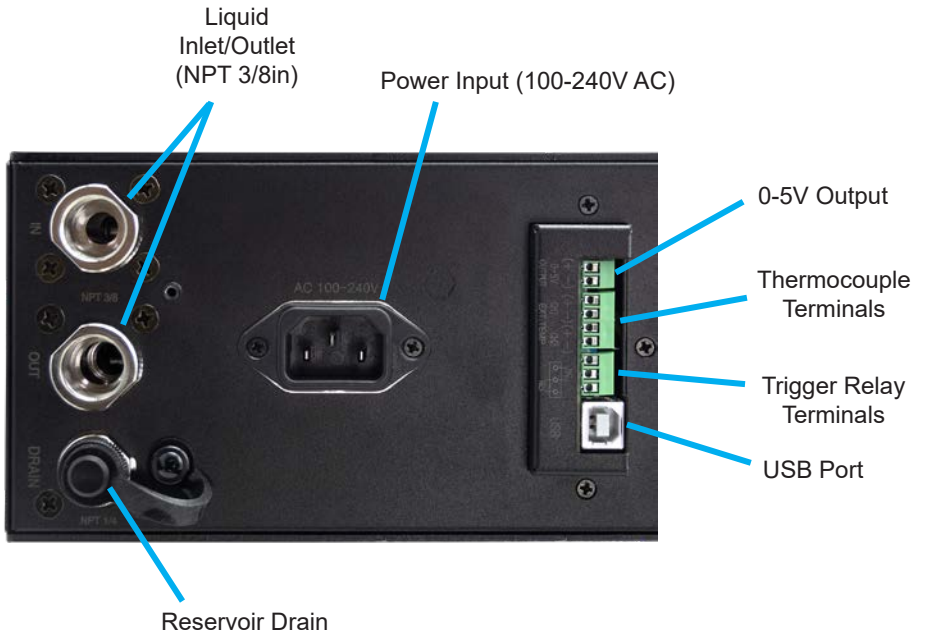
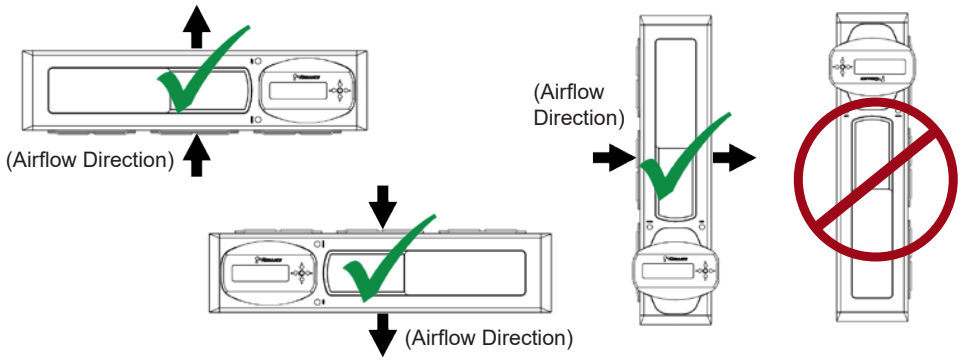
Product Diagram



Positioning the System

This product can operate in one of three orientations, illustrated below. A minimum airflow clearance of 4 inches (102mm) should be provided on two sides of the unit, though more space may improve performance. When operating horizontally, the unit should be rack mounted for airflow, rather than placed onto a flat surface.



The display panel can be adjusted for these orientations by gently pulling it forward while rotating.

Two ear brackets are included for mounting to a 19-inch equipment rack. The chassis has four M4 tapped holes on each side for attaching compatible sliding rack rails (not included).

These components will block access to the main coolant fill port. It is recommended to attach them later after coolant is added to the system.

For vertical operation, two bracket feet are included to attach below the unit. A handle strap is also included, which can be installed on the top side of the chassis.

Hose Fittings

Hose fittings are purchased separately.

The inlet and outlet fitting threads are 3/8-inch NPT. Thread tape (PTFE) is required to seal them properly.

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

Hose should be cut to the appropriate lengths for your installation. You will need to connect two segments to the rear fittings.

Each hose connection typically uses a clamp to secure it. Be sure to place this on the hose before attaching to the fitting.

Squeeze the hose while pushing it firmly over the fitting. The hose should completely cover the fitting. This step can often be made easier by first soaking the end of the hose in warm water for a few minutes.

For ear and band clamps, slide them into the proper position over the fitting and secure using an appropriate tool.

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. Unplug the cooling system's AC power cable from the wall outlet whenever filling or draining the coolant.

CAUTION: The cooling system's pump can not be run dry for any period of time. Do not power on the unit without sufficient coolant in the reservoir. This condition can cause pump damage and is not covered under the product warranty.

Once all external components (such as cold plates and manifolds) have been properly connected to the cooling system with tubing, the coolant can be added.

The main fill port is located above the reservoir when the unit is oriented vertically. With the fill port upright, remove the large reservoir cap by hand or with a hex wrench.

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 **3 liters (0.8 gallons)** of coolant, plus additional coolant for externally attached components and hose.

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 cap on the reservoir, while ensuring the rubber o-ring remains on the cap. Hand tightening is recommended to avoid damaging the reservoir threads. **Do not overtighten.**

This product has a secondary fill port, which can be used when the fans are oriented below the unit. A small funnel is included for it.

This fill port may be convenient for replenishing coolant after the system has already been rack mounted.

After filling, plug the power cable back into the wall outlet, and power on the cooling system. 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.

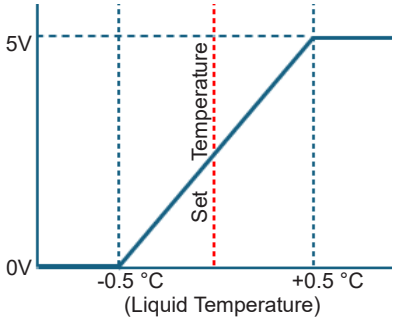
Draining

A maintenance drain is located on the rear of the unit to release the coolant. Before opening the drain plug, ensure that one of the reservoir fill ports is facing upright. While draining, this fill port can be opened to allow air into the top of the reservoir.

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

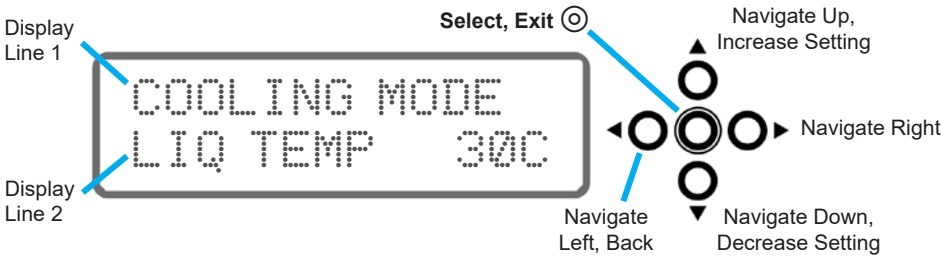
A 0-5V differential voltage output is provided for industrial process monitoring. The output is based on the difference between the user's setpoint and the internal liquid temperature. Please see the graph for details.



The reservoir contains an internal liquid temperature sensor. For monitoring or setpoint control based on an external sensor, rear 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).

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 ◎ 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 ◎ for 3 seconds to toggle display units between °C/LPM and °F/GPM.
- To reset all cooling system settings to default, hold ▲ + ▼ for 3 seconds.

Main Menu

To enter the main menu, briefly press ◎. The selected option will begin flashing. Use ▼ and ▲ to navigate this menu:

- `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
- `POWER`: Recovery default power state (product Rev.1.2 and later)

In the main menu, press ◎ to select one of the above options. Otherwise, press ◄ 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 ▼ and ▲ to scroll among them:

- `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)
- `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 ◎ to adjust the selected value using ▼ and ▲. 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 ◎ again to exit configuration of the cooling mode. Press ◄ 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 ±0.5°C is recommended in most cases. Press ▼ and ▲ to adjust the flashing value, or ◎ to return to the previous menu.

`FAN RAMP`
`TEMP +/- 0.5C`: Apply the fan power ramp across a temperature delta of ±0.5°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
```

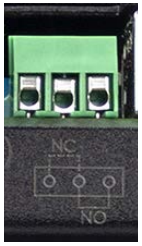
The pump speed level will flash. Press ▼ and ▲ to adjust. Press ◎ to return to the previous menu.

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 1.2 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 an upward-facing 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 NPT 3/8-inch threaded fittings. Thread tape is required to seal the fittings, which should be wrapped in the appropriate direction and amount on the thread.

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.

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