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



VLR-600 User's Manual

English v1.0

ISO
9001

Printed in Korea

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 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



CAUTION: Always keep the chiller upright during operation. Additionally, **THE UNIT MUST BE KEPT UPRIGHT FOR AT LEAST 24 HOURS BEFORE POWERING ON.** This is to allow enough oil to reach the compressor. Powering-on the unit too early can permanently damage the compressor and is not covered by the product warranty.



CAUTION: This cooling system can chill liquid below the ambient air temperature, which may cause condensation to form on tubing and cold plates. It is highly recommended to keep the temperature at or above the ambient temperature. (See "TEMP SET" for details.)



CAUTION: Do not use a temperature set-point that is below the coolant's freezing point. This may damage the cooling unit and is not covered by the product warranty. It is recommended to always keep the temperature set-point at or above ambient temperature.

CONTACT

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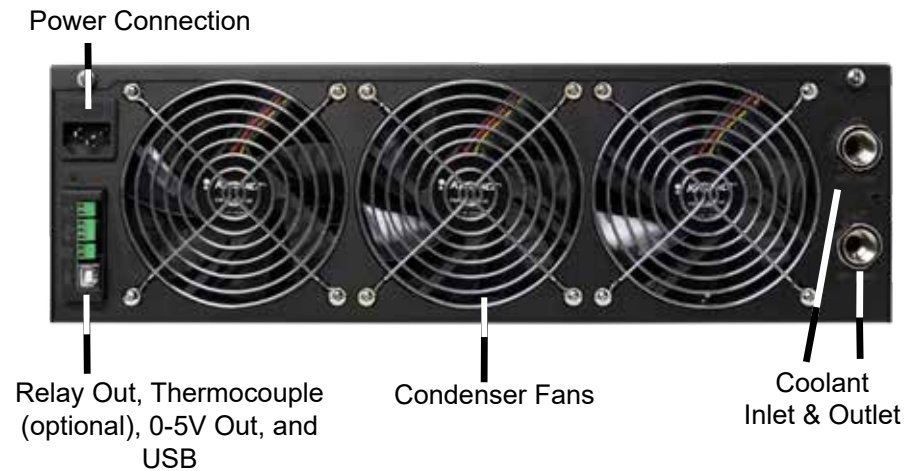
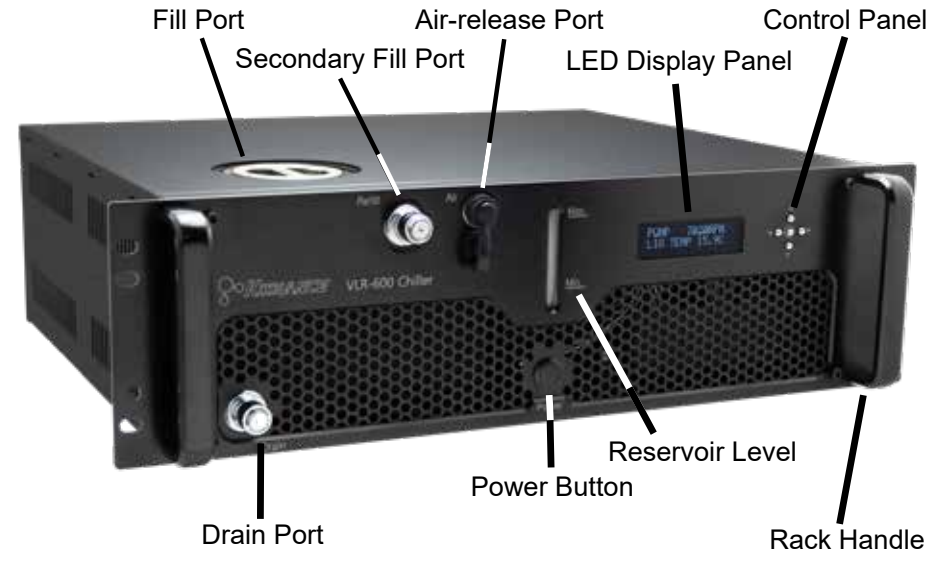
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Product Specifications

- Weight: 11.4kg (approx.)
- Dimensions: 480 x 390 x 135mm (approx.)
- Operating Temperature Range: Ambient 0-40°C, Water 0-40°C
- Cooling Capacity: 600W (2047BTU/hr) @ 25°C liquid/ambient
- Refrigerant: R-134a
- Pump: Koolance P/N PMP-500
- Power Input: 110-220VAC

System Diagram



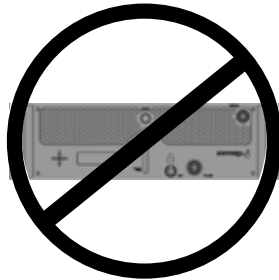
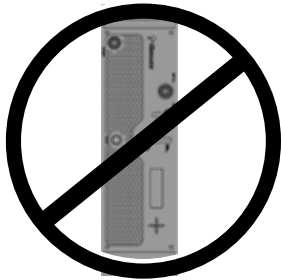
Positioning the System



CAUTION: Always keep the chiller upright during operation. Additionally, **THE UNIT MUST BE KEPT UPRIGHT FOR AT LEAST 24 HOURS BEFORE POWERING ON.** This is to allow enough oil to reach the compressor. Powering-on the unit too early can permanently damage the compressor and is not covered by the product warranty.



The chiller must be run upright at all times. Upon arrival of this product via transport or courier shipping, **it must be kept upright FOR AT LEAST 24 HOURS BEFORE BEING POWERED ON** to allow enough oil to reach the compressor.



Tube Fittings



Tube fittings are purchased separately.

Threading for the tube fittings is tapered 3/8-inch NPT. Plumber's tape (PTFE) is required to seal them properly.



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.



Squeeze the tube while pushing it firmly over the fitting. Tubing should completely cover the fitting or barb. This step can be eased by first dipping the end of the tubing in water.



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.

Coolant Filling and Powering-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 primary AC power cable unplugged whenever filling or draining 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 liquid in the reservoir. Dry-running (and thereby damaging the pump) is not covered under the Koolance product warranty.

Once all devices (cold plates, fittings, etc.) have been connected with tubing, the system can be filled with coolant.

The fill port is located above the reservoir. With the fill port oriented upright, remove the large reservoir cap.



Never completely fill or "top-off" the reservoir. An air gap must always remain to accommodate thermal expansion of the liquid.

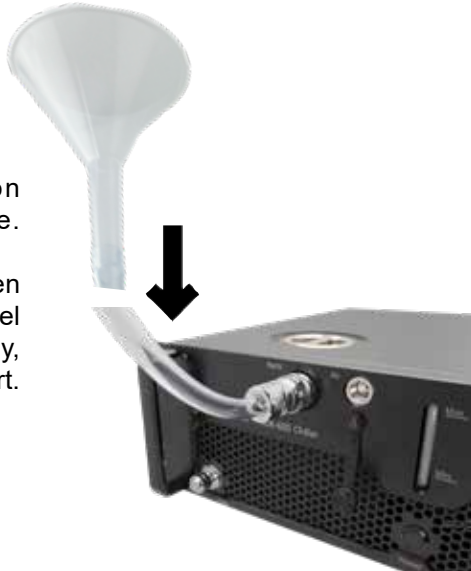
Maximum and minimum fill markings are provided on the front side of the unit to help maintain the coolant level.



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 cooling unit (through chemical reaction, corrosion, biological growth, high thermal expansion, viscosity, etc.).

Replace the fill port on the reservoir.



A secondary fill port is located on the front of the unit for convenience.

To use the secondary fill port, first open the air-release port. Then, insert the funnel into the tubing and attach the fitting. Finally, connect the tubing to the secondary fill port.



Insert the main power cable into the cooling unit and connect the other end to an appropriate AC wall outlet. **Be sure the supply voltage matches what's labeled on the unit.**



Power on the cooling unit, and increase the pump speed to move coolant if needed. When most of the air has been pushed out of the tubing, the liquid noise will decrease. This process can take several minutes, depending on the filling technique and components attached to the cooling system.

During this process, liquid components (or the cooling system itself) may need to be tilted gently to assist with air evacuation. The reservoir level will decrease during this procedure. Remove the fill port cap and add more liquid as needed.

Draining

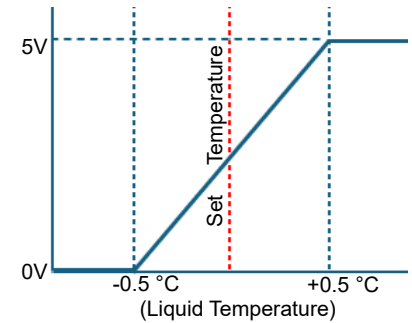
A drain is located on the front of the unit for emptying or replacing the coolant. To drain the coolant, first open the air-release port. Then, attach the included fitting to the tubing and connect it to the drain.



0-5V Output and USB



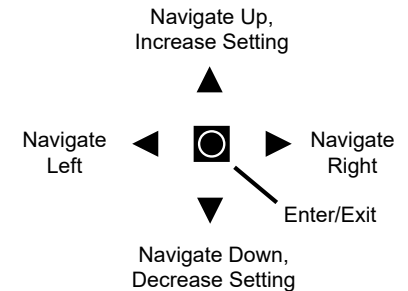
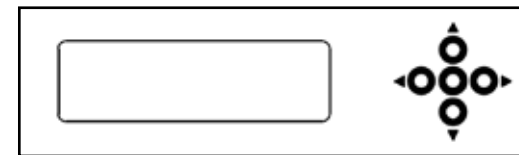
A 0-5V differential voltage output is provided for industrial process monitoring. The output is based on the difference between the user's set point and the internal liquid temperature. Please see the graph for details.







This product supports Koolance's "System Monitor" software application for control and logging via the USB port. Visit www.koolance.com/software to download the latest version of the program. Please consult the application's readme.txt for further details.

Display Panel

The Koolance display panel allows control and monitoring of various aspects of the cooling unit. 5 buttons are used, with directional arrows to navigate or change settings, and a center button to select/exit.



- On the main screen, hold  for 3 seconds to change display units between °C/°F and LPM/GPM.
- You can exit any menu and return to the main screen by holding  for 2 seconds.
- To reset **ALL** settings to default, hold  +  for 3 seconds.

Main Menu

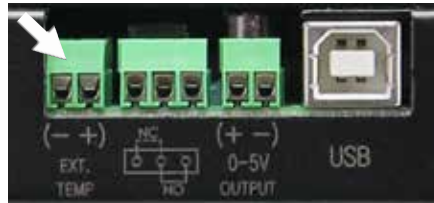
To enter the main menu, briefly press **⏻**. The selected option will begin flashing. Use **▼** and **▲** to navigate this menu.

↑ TEMP SET: Temperature set-point adjustment
ALARM SET: Alarm settings
RELAY SET: Relay Trigger settings
PUMP SET: Pump speed settings
↓ DISPLAY SET: LED display settings

When in the top menu, press **⏻** to enter one of the above categories. To exit from here, press **⬅**.

External Sensors

This unit has an integrated liquid temperature sensor. It also provides a terminal for connecting a K-type thermocouple (not included) for external temperature monitoring and set point options.



TEMP SET



CAUTION: This cooling system can chill liquid below the ambient air temperature, which may cause condensation to form on tubing and cold plates. It is highly recommended to keep the temperature at or above the ambient temperature. (See below for details.)



CAUTION: Do not use a temperature set-point that is below the coolant's freezing point. This may damage the cooling unit and is not covered by the product warranty. It is recommended to always keep the temperature set-point at or above ambient temperature.

Under "TEMP SET", you can select the active temperature sensor and set-point the chiller will try to follow. There are four temperature options to select from. Press **▼** and **▲** to scroll among these options:

↑ LIQ TEMP: Liquid temperature (Range: -20 to 40°C)
EXT TEMP: Rear sensor, if attached (Range: -20 to 120°C)
↓ LIQ-AMB: Delta-T between liquid & ambient (Range: -50 to 50°C)
EXT-AMB: Delta-T between rear sensor & ambient (Range: -50 to 50°C)

The sensor currently displayed in this menu is what the chiller will follow. Only one can be active. Press **⏻** to adjust the target temperature value using **▼** and **▲**. Below are some examples:

LIQ TEMP= 28C Maintain coolant coming from the chiller at 28°C
EXT TEMP= 50C Maintain the external sensor at 50°C (if attached)
LIQ-AMB= -5C Maintain a difference between the liquid and ambient air of -5°C (keep liquid 5°C below ambient)
EXT-AMB= 5C Maintain a difference between the external sensor and ambient air of +5°C (keep sensor 5°C above ambient)

Press **⏻** again to exit configuration of the sensor. Press **⬅** to return to the previous menu.

Depending on the heat load, it may be possible to reduce the liquid temperature to below the ambient room dew point. To avoid condensation (water droplets) from forming on tubing and cold plates connected to the chiller, **it is recommended to keep the chiller on "LIQ-AMB" with a value of 0°C or higher.**

ALARM SET

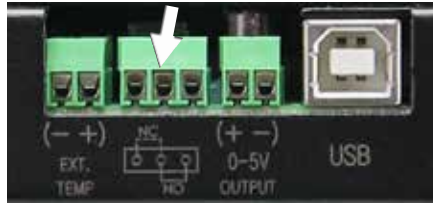
This menu affects when the built-in audio alarm will sound. There are five options which are simultaneously active. Upon entering the alarm menu, the last edited line will flash. Press **▼** or **▲** to change it. Press **⏻** to edit the value, and again to return to the previous menu.

↑ (TEMP SET) : Difference from Set Point Temperature; Range: +/- 1 to 50°C
FAN: Condenser Fan Speed; Range: 100 to 10,000RPM ("----" to disable)
PUMP: Pump Speed; Range: 100 to 10,000RPM ("----" to disable)
↓ FLOW: Coolant Flow Rate; Range: 0.1 to 20.0LPM ("----" to disable)
LEVEL: Low Coolant Level in Reservoir (ON, or OFF to disable)

The regular audio alarm is a repeating beep.

RELAY SET

Terminals are provided for a configurable relay. Wires can be connected as normally-open (NO), or normally-closed (NC), labeled near the terminals.



There are five options which are simultaneously active. 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.

↑ (TEMP SET) : Difference from Set Point Temperature; Range: +/- 1 to 50°C
FAN : Condenser Fan Speed; Range: 100 to 10,000RPM ("----" to disable)
PUMP : Pump Speed; Range: 100 to 10,000RPM ("----" to disable)
↓ FLOW : Coolant Flow Rate; Range: 0.1 to 20.0LPM ("----" to disable)
LEVEL : Low Coolant Level in Reservoir (ON, or OFF to disable)

PUMP SET



WARNING: The cooling system's pump can not be run dry for any period of time. Never power-on the chiller without sufficient liquid in the reservoir. Dry-running and damaging the pump is not covered under the Koolance product warranty.

The pump speed can be manually set from 0 (OFF) to 10 (highest):

PUMP (0-10) 7LV : Pump Speed Level

The pump speed level will flash. Press ▼ or ▲ to adjust. Press to return to the previous menu. **NOTE: Level 0 will disable the coolant pump, and should not be selected for most applications.**

DISPLAY SET

The display settings configure which values you wish to appear on the front display and how they are shown:

DISPLAY
FIXED CYCLIC : Show 2 fixed values or cycle multiple values

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

LIQ SET 20C : First line display option
EXT TEMP 21.4C : Second line display option

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

↑ LIQ SET : (Field varies) Shows current active sensor and user set-point
AMB TEMP : Shows ambient air temperature
LIQ TEMP : Shows reservoir liquid temperature
↓ EXT TEMP : Shows external sensor temperature (if connected)
FAN : Shows condenser fan RPM
PUMP : Shows pump impeller RPM
FLOW : Shows liquid flow rate through the unit

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

If "CYCLIC" is chosen from the DISPLAY SET menu, multiple values can 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. This will remove the asterisk, thereby hiding that line from being shown on the main screen:

↑ *LIQ SET : (Field varies) Show current active sensor and user set-point
*AMB TEMP : Show ambient air temperature
LIQ TEMP : Hide liquid temperature
↓ *EXT TEMP : Show external sensor temperature (if connected)
FAN : Hide condenser fan RPM
PUMP : Hide pump impeller RPM
*FLOW : Show liquid flow rate through the unit

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

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

Check the flow meter value (see “DISPLAY SET”). If there is no detected flow immediately after filling the reservoir, or the flow rate is very low or periodic, this usually indicates the pump has not finished priming. Open the fill port on top of the reservoir and temporarily set the pump speed to 10 (see “PUMP SET”) to help push out the air.

If possible while the pump is running, gently tilt your cold plates or other components connected to the system in various directions to assist with bleeding air from the cooling loop. If it becomes necessary to significantly tilt the unit to assist with priming, close the fill port and power-off the unit before doing so.

2. The temperature alarm sounds and I’m not sure why...

The offending temperature sensor and value will flash in the front display whenever an alarm sounds. Check that your currently selected temperature sensor and alarm are configured as desired (see “TEMP SET” and “ALARM SET”). If you are certain the cooling system is working properly otherwise, try resetting all system settings by holding ▼ + ▲ for 3 seconds.

3. My system appears to be leaking fluid or water...

Check that all fittings are properly installed and tightened. This product uses NPT 3/8-inch threaded fittings. Plumber’s tape is required to seal the fittings.

4. The front display is locked up or not responding.

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

5. The pump is not operating at lower power level settings.

Due to variations in pumps, the motor may not always operate at the lowest speed settings. This is more likely to occur if the speed is increased from a very low level rather than decreased from a higher level. The pump speed must be kept on a level that allows the motor to operate continuously. Note that during system power-up, the pump automatically throttles to maximum speed before dropping to the user’s preset level (to help prevent stalling).

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 liquids 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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