LKA1300
Ambient Liquid Cooling System

User Guide



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Chapter 1 Introduction

1.1 Intended Use

The LKA1300 cooling system is a recirculating liquid-to-air heat exchanger that offers dependable, compact performance by removing large amounts of heat from a liquid circuit. The coolant is recirculated using a high-pressure pump to assure maximum flow rate. Heat from the coolant is absorbed by a radiant heat exchanger and dissipated into the ambient environment using silent fans.

The unit features a 3U rack mount design that allows the stacking of related devices, providing a high level of flexibility and is perfect for laboratory instrument heat dissipation applications.

The product may only be used in accordance with the instructions described in this manual. Any other use will invalidate the warranty.

1.2 Explanation of Safety Warnings

⚠ DANGER Danger indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.

⚠WARNING Warning indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.

⚠CAUTION Caution indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.

NOTICE Indicates information considered important, but not hazard-related, such as possible damage to the product.



ESD Component Caution



The CE markings on the product are the manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety, and environmental protection legislation.



The wheelie bin symbol on the product, the accessories or packaging indicates that this device must not be treated as unsorted municipal waste but must be collected separately.

1.3 Description

The LKA1300 cooling unit is intended to remove heat from a liquid circuit. The coolant can be either water or a mixture of water and water-glycol (antifreeze). Water circulates in a closed loop between the ambient cooling system and a cold plate at the heat source. Heat is removed from the water by an air-cooled heat exchanger. The capacity of the cooling unit is dependent on the temperature differential, which is defined as the difference between the ambient temperature and the water outlet temperature. The cooling unit is designed to remove up to 1300 W of heat at a temperature differential of 25 °C between the coolant and the ambient temperature.

The unit offers outstanding performance and high reliability as well as quiet operation and ease-of-use. Components inside the unit have been performance-matched for quiet operation.

The unit consists of a control system, coolant loop, and connecting plumbing. The pump draws coolant from the internal reservoir and drives it through the radiator for heat dissipation. The cooled fluid is then delivered to the process equipment, before returning to the reservoir.

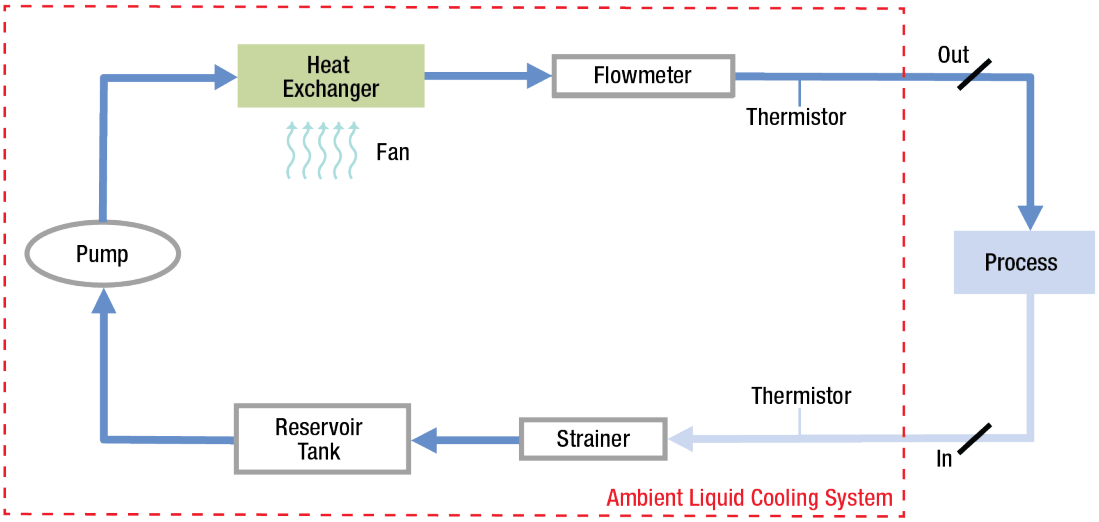


Figure 1 Plumbing Diagram

1.4 Technical Data

1.4.1 Specifications

Specifications[a]	
Temperature Control Specifications	
Maximum Cooling Power[a]	1300 W with 25 °C Liquid-Ambient Delta @ 1.5 Lpm
Temperature Setting Range[b]	Ambient[c] to 40 °C (Ambient[c] to 122 °F)
Temperature Readout Resolution	0.01 °C
Temperature Stability	±0.5 °C @ ≥ 0.5 Lpm Flow with Constant Load at Constant Ambient Temperature
External Sensor Connection	2.5 mm RCA/Phono Socket
Pump Specifications	
Pump Type	Brushless DC Magnetic Drive
Max Static Pressure (6 - 10 mm ID)	1.2 bar (17.4 psi) (Typical)
General Specifications	
Noise (at 1 m)	50 dBA Max
Radiator	Brass/Copper, 2 x 120 mm and 2 x 140 mm fans
Reservoir Volume	445 mL
Max Flow Rate (6 - 10 mm ID)	2.5 Lpm @ 25 °C Liquid with Short Inlet and Outlet
Power Supply	100 - 240 VAC, 50 - 60 Hz
Power Consumption	250 W @ 100 - 240 VAC
Operating Temperature[c]	Ambient to 40 °C (32 °F to 104 °F) with Fan in Automatic Mode
Operating Humidity[d]	20% RH to 80% RH (Non-Condensing)
Storage Temperature	-15 °C to 60 °C
IN/OUT Connection	CPC®* 1/4" Hose Barb Valved Panel Mount Coupling Insert
Dimensions (W x D x H)[e]	482.6 mm x 387.3 mm x 155.3 mm (19.00" x 15.25"x 6.11")
Dry Weight	9.35 kg

a. Specifications obtained at sea level using CDTX Coolflow DTX refrigerant antifreeze as the recirculating fluid, at 25 °C ambient condition, and at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude, or operating voltages will affect performance. See **Chapter 3**.
b. The actual achievable temperature range is related to the thermal load and ambient temperature.
c. The LKA1300 cooling system can operate with ambient liquid temperatures as low as 0 °C (32 °F).
d. Static electricity risk increases significantly when humidity <20%RH. Operation is allowed only with effective ESD protection measures; otherwise prohibited.
e. Not Including Filters, External Valves, Connectors, Reservoir Filler, and Feet.

** CPC® is a registered trademark of Colder Products Company.*

1.4.2 Performance Graphs

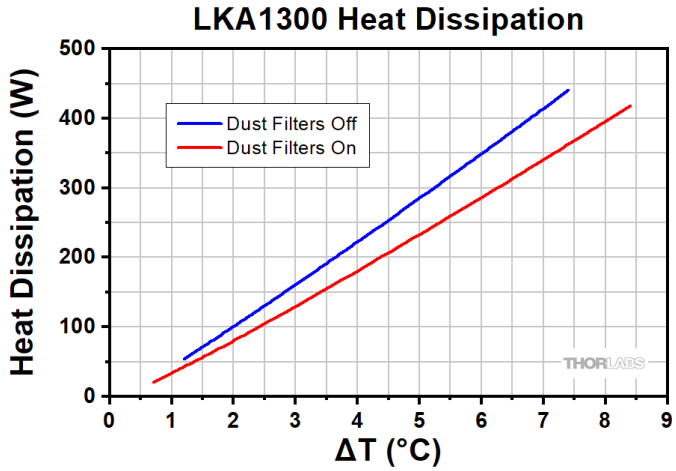


Figure 2 This graph shows the maximum heat load that the unit can dissipate. Note that ΔT is the temperature difference between the coolant and the ambient temperature, which was 25 °C. This data was measured at 30% pumping power with CDTX Coolflow DTX Refrigerant Antifreeze.

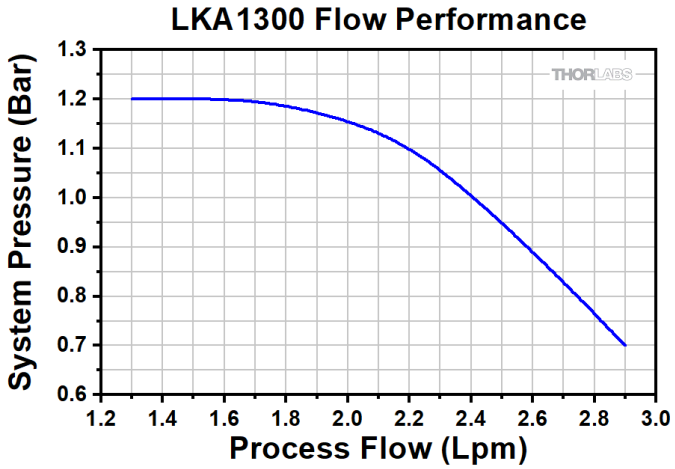


Figure 3 This graph displays the pumping capability of the LKA1300 cooling system running at 100% pumping power. Measurements were taken at 26 °C ambient temperature with water used as the coolant. Note that the kinematic viscosity of CDTX Coolflow DTX is approximately twice that of water and will result in less than half the flow performance.

NOTE:

- Pump performance results were obtained with no restrictions on the return to the system or with any options installed.
- Specifications obtained at sea level using CDTX Coolflow DTX refrigerant antifreeze as the recirculating fluid, 25 °C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See **Chapter 3**.

1.4.3 Mechanical Drawings

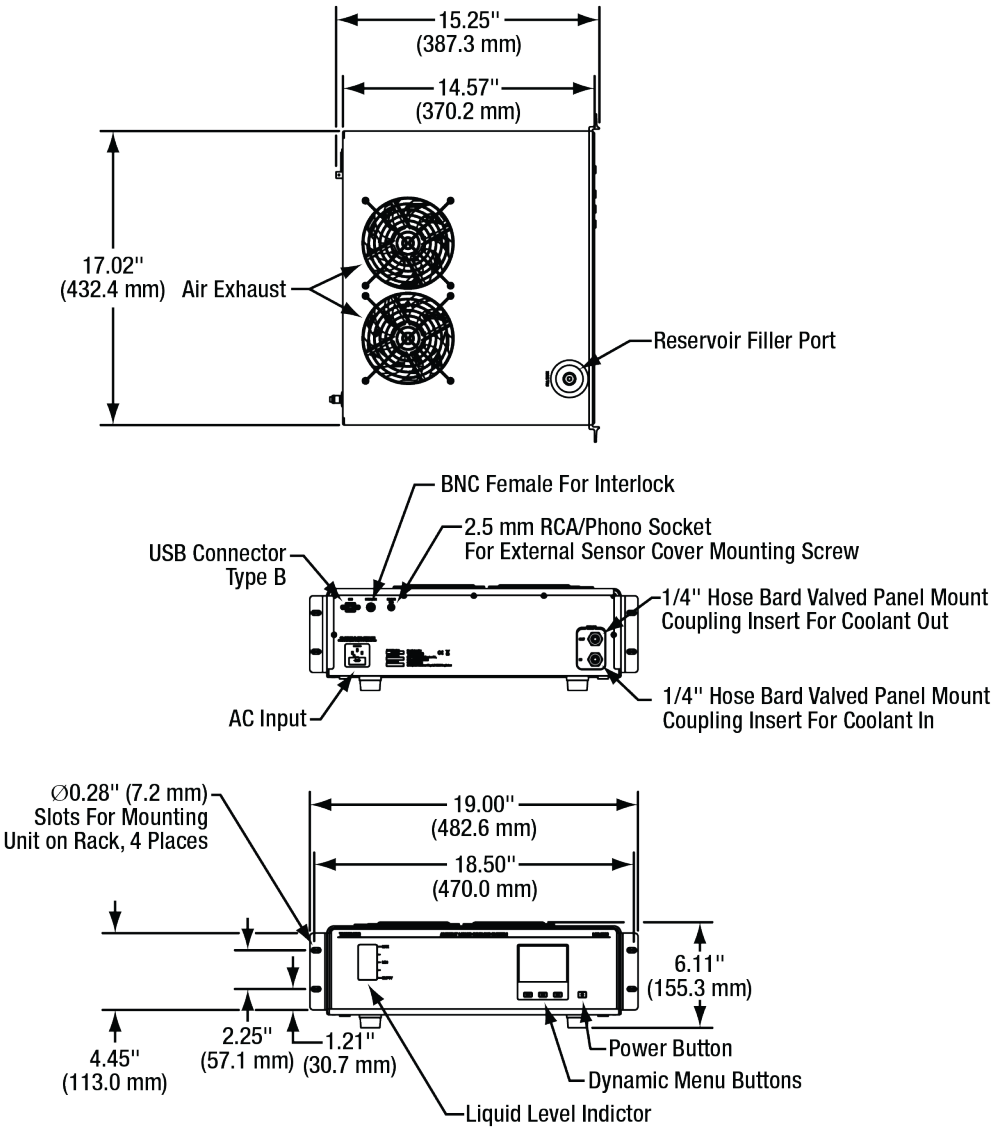


Figure 4 Mechanical Drawing

1.5 Front & Back Panels

1.5.1 Front Panel

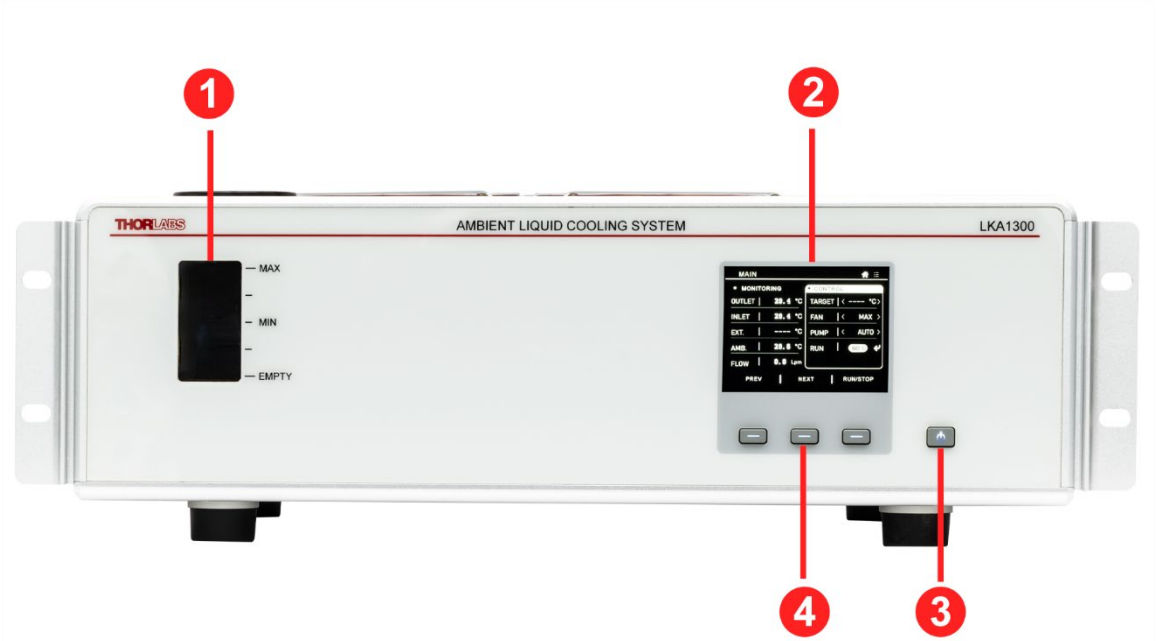


Figure 5 Front Panel

LKA1300 Front Panel	
Callout	**Description**
1	Liquid Level Indicator
2	Display
3	Power Button
4	Dynamic Menu Buttons

1.5.2 Back Panel

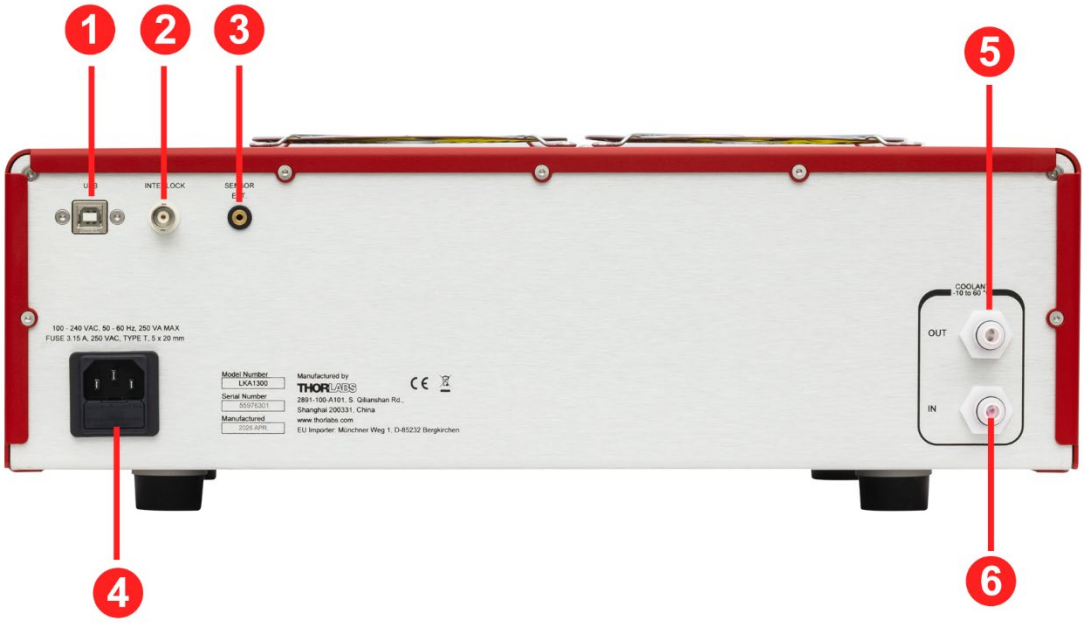


Figure 6 Back Panel

LKA1300 Back Panel	
Callout	**Description**
1	USB Connector: Type B
2	BNC Female for Interlock
3	Sensor EXT.: 2.5 mm RCA/Phono Socket
4	AC Inlet: IEC-60320-1 C14
5	1/4" Hose Barb Valved Panel Mount Coupling Insert for Coolant Out
6	1/4" Hose Barb Valved Panel Mount Coupling Insert for Coolant In

1.6 Simplified Declaration of Conformity

The full text of the EU declaration of conformity is available at the following internet address:
https://www.thorlabs.com/f325845

1.7 FCC Designation

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual,

may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Chapter 2 Safety

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly in accordance with this user manual.

⚠ DANGER

Risk of Electrical Shock
High voltage inside. Never operate the unit without the cover installed. Failure to do so could result in damage to the equipment, personal injury, and/or death.

⚠WARNING

Always turn the unit off and disconnect it from its supply voltage before moving.

NOTICE

Drain the unit of all water when transporting, shipping, or leaving unused for long periods of time. This will prevent freezing, and algae build up while idle.



ESD Component Caution
The components inside this instrument are ESD sensitive. Take all appropriate precautions to discharge personnel and equipment before making any electrical connections to the unit.

Chapter 3 Installation

3.1 Warranty Information

NOTICE

Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the Thorlabs warranty.

Units should be drained of all fluids before being packaged in its original packaging.

This precision device is only serviceable if returned and properly packed into the complete original packaging including the complete shipment plus the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

3.2 Transporting, Handling, Moving

⚠CAUTION

Bend Knees When Lifting
Bend your knees and not your waist when lifting. Avoid twisting. Get help with heavy lifts.

⚠CAUTION **Drop on Foot**
Keep feet clear of the unit while lowering it.

During transportation, handling, and moving, the unit shall be protected against mechanical shock, vibration, and excessive deformation. Lifting or moving must be carried out using appropriate tools and holding points to avoid damage to structural components, fasteners, and internal modules.

The unit should be handled gently and kept in an upright position whenever possible. Do not drop, drag, or apply concentrated impact loads. Ensure that the transportation environment is clean, dry, and free from corrosive substances.

Any improper handling may result in performance degradation, mechanical failure, or safety risks. All operations must comply with on-site safety regulations and equipment-specific handling requirements.

3.3 Packing List

The LKA1300 Ambient Liquid Cooling System contains the following components:

- Ambient Liquid Cooling System
- 0.17" ID, 1/4" OD Hose, 5 m Length
- Region-Specific Power Cord, 1x
- USB Cable for PC Connection, 1x
- Funnel with a Small Piece of Tubing, 1x
- Item # QVM6: CPC® 1/4" PTF Valved In-Line Coupling Body, 2x

3.4 Unpacking Instructions

Inspect the new unit immediately upon receiving it. Please retain all cartons and packing material until the unit is operated and found to be in good condition as the box might be needed for storage or returns.

If the unit shows shipping damage, contact the transportation company, and file a freight damage claim. The unit has been fully tested at the Thorlabs factory with new coolant. Although the system has been drained, some residual fluid may remain. This will not hinder the performance of the unit.

Follow these steps below to unpack:

1. Lay the packing box on a flat surface and tear off the adhesive tape on the outside of the packing carton.
2. Open the carton and take out the accessory box.
3. Take out the upper insert and the unit. Remove with care to protect the surface and prevent scratches.
4. Please check the package to make sure you have all the components as shown in **Section 3.3**.

3.5 Installation Instructions

3.5.1 Selecting The Unit Location

NOTICE Do not operate or store the unit outside. These systems are not intended for outdoor use.

NOTICE Never place the unit in a location where excessive heat, moisture, inadequate ventilation, or corrosive materials are present.

NOTICE The unit should be rack mounted for airflow, rather than placed onto a flat surface.

Site Requirements	
Ambient Temperature Range[a]	0 °C to 40 °C (32 °F to 104 °F)
Relative Humidity Range[b]	20% RH to 80% RH (Non-Condensing)
Operating Altitude	Sea Level to 6560 ft (2000 m)
Overvoltage Category	II
Pollution Degree	2
Degree of Protection	IP 20

a. Because of the decrease in air density, the temperature for the air entering the unit is reduced by 2 °C per 1,000 feet of altitude above sea level. In addition, a good "Rule of Thumb" is to reduce the heat dissipation capacity rating by approximately 10% per 1,000 feet of elevation.
b. Maximum relative humidity 80% for temperatures up to 30 °C decreasing linearly to 60% relative humidity at 35 °C.

To minimize the pressure drop through the connecting hoses, the unit should be located as close as possible to the heat load (user equipment). Coolant lines are best run at or near the same level as the cooling system.

Airflow is critical to optimize performance of the unit. The top and bottom of the unit must be kept clear and unobstructed. The bottom of the unit must have a free supply of ambient-temperature air. Ensure that the hot air exits the unit and does not recirculate into the inlet openings.

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

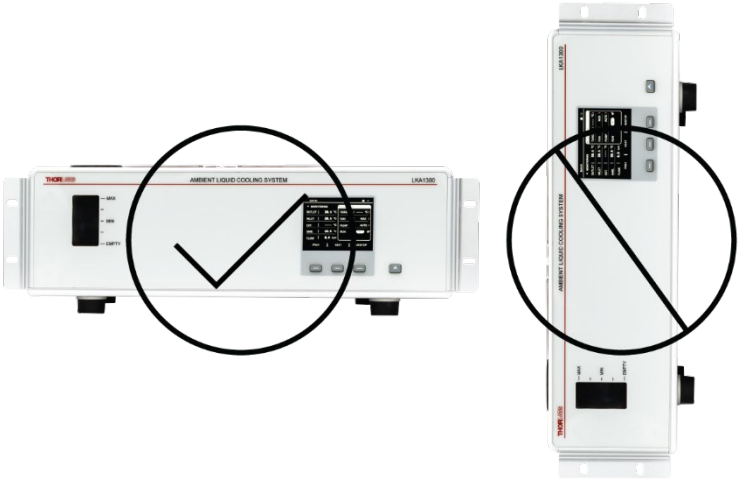


Figure 7 Operating Orientation

A minimum airflow clearance of 5" (127.4 mm) should be provided on the top and bottom sides of the unit, though more space may improve performance.

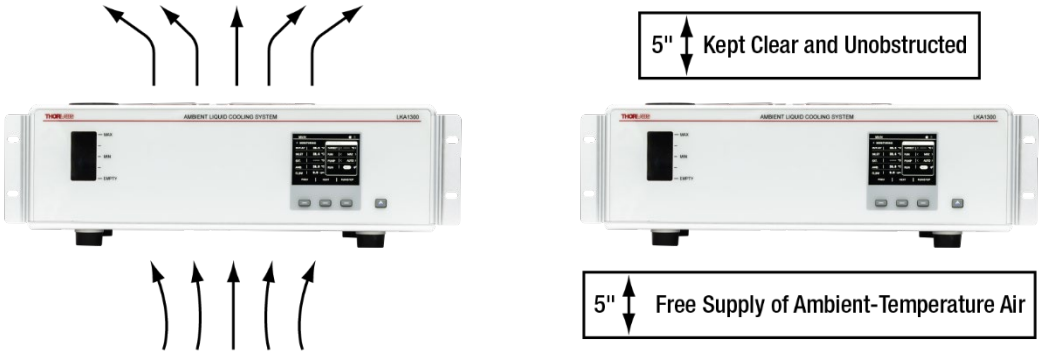


Figure 8 Air Direction (Left) and Minimum Operational Clearance Distances (Right)

Before moving the unit, cap all ports to prevent any coolant leakage. To prevent freezing during storage, drain water if the unit is located in an area below 10 °C (50 °F).

3.5.2 Electrical Requirements

⚠ DANGER

High voltage inside. To avoid electrical shock, before powering unit, make sure that the protective conductor of the 3-conductor power cord is correctly connected to the protective earth contact of the socket outlet. Improper grounding can cause electric shock resulting in severe injury or even death. Do not operate without cover installed.

A standard power cable is provided based on the user's country requirements (18 AWG/115 V AC US/Canada; 1.0 mm/220 V AC international). Refer to the product markings on the rear panel (**Figure 5**) and the of the unit's specific electrical requirements. The required supply voltage is 100 - 240 V AC (frequency 50 or 60 Hz). The mains voltage fluctuations must not exceed 10% of the nominal voltage.

The installation of electrical power supplies must comply with the rules and/or regulations imposed by local authorities responsible for the supply of electrical energy to the workplace.

All power supplies for the device must be single-phase, AC voltage, three-wire system (active, neutral, earth) and should be terminated at an appropriate power outlet receptacle that is within reach of the power cord. For safety reasons, a separate power outlet receptacle should be provided for each unit in the system. The use of extension cords or outlet adaptors is not recommended.

3.5.3 Coolant Requirements

⚠ WARNING

Laboratory Grade Ethylene glycol (EG) is poisonous and flammable. Before performing any preventive maintenance refer to the manufacturer's most current SDS for handling precautions.

NOTICE

Never use flammable or corrosive fluids with this unit. Do not use automotive antifreeze. Commercial antifreeze contains silicates that can damage the pump seals. Use of any fluid not listed below voids the manufacturer's warranty.

Strongly recommended fluid:

Non-toxic Coolflow DTX Refrigerant Antifreeze

Approved fluids are:

Filtered/Single Distilled Water

0 - 75% Laboratory Grade Ethylene Glycol/Water

NOTICE

Laboratory Grade Ethylene glycol (EG) is hygroscopic, it absorbs water from its environment. This can affect the freezing point and boiling point of the fluid over time and may result in system failure.

NOTICE

Do not use untreated tap water as the total ionized solids level may be too high.

NOTICE

Do not use aluminum with bare (unplated) copper or bare (unplated) brass in the same system. Do not use silver with nickel in the same system.

Recommended Coolant

Thorlabs recommends non-toxic Coolflow DTX Refrigerant Antifreeze with Corrosion, Scale, and Biological Inhibitors for use with units including the LKA1300 unit.

Made with ethylene glycol, this pre-diluted coolant features more efficient heat transfer characteristics than alternatives based on propylene glycol, such as lower dynamic viscosity and higher thermal conductivity; see the CDTX coolant web presentation for more details.

The coolant is a colored solution for easy leak detection. An algaecide is added to protect against corrosion and biological growth.

Though ethylene glycol is usually toxic, Coolflow DTX contains the additive DeTox®†, which makes the solution non-harmful to humans and animals if accidentally ingested. More information regarding material safety can be found on its MSDS sheet.

Compatibility with Other Approved Fluids

- **Filtered/Single Distilled Water**

  This fluid is acceptable primarily because it has all microorganisms that cause biological fouling to be removed through vaporizing and condensing the water.

  However, distilled water does not remain pure for very long when exposed to the atmosphere. Air-born spores can contaminate the water and activate algae growth. An effective maintenance plan would include switching out the fluid with newly distilled water every three to six months.

† DeTox® is a registered trademark of Evans Cooling Systems, Inc.

- **Inhibited Ethylene Glycol/Water**

  Inhibited glycol can be used to increase the operating temperature range of the fluid but not as a "pre-mixed anticorrosive" solution. Industry standards use a pH standard of 8 to determine when the fluid has become corrosive.

- **Uninhibited Ethylene Glycol/Water**

  Ethylene glycol is used to depress the freezing point of water as a coolant. We do not recommend using uninhibited (no corrosion additives) ethylene glycol. It is more corrosive to copper than plain water, so it is not recommended unless required for the application. (If used, monitor the pH as the fluid rapidly becomes acidic, especially at temperatures above 40 °C.)

Process Fluid Quality

Initially fill the reservoir with Coolflow DTX or distilled water. It is acceptable to have the fluid drop to the other levels over time, but unfavorably high total ionized solids (TIS) can accelerate the rate of galvanic corrosion. These contaminants can function as electrolytes which increase the potential for galvanic cell corrosion and lead to localized corrosion such as pitting. Eventually, the pitting becomes so extensive that refrigerant leaks into the water reservoir.

3.5.4 Selecting and Locating Hoses

- The coolant ports are located at the back of the unit and are marked as shown.



Figure 9 LKA1300 Unit Back View

- To minimize the pressure loss in the coolant lines, use the largest practical diameter tubing. If substantial lengths of cooling lines are required, they should be re-filled with coolant after connecting them to the unit.

- Flexible tubing should be of heavy wall or reinforced construction. All tubing should be rated to withstand 120 psi (8.27 bar) at 23 °C (73.4 °F). Make sure all tubing connections are secured and leak tight. Also, whenever possible use opaque lines to prevent algae growth during prolonged non-operating periods.

3.5.5 Connecting Plumbing and Filling Coolant

NOTICE Fittings should either be brass, stainless steel, or nylon. Never use aluminum, steel or cast-iron fittings, as the corrosion will damage the unit.

NOTICE Only CPC® Valved Thumb Latch Quick-Disconnect fittings can be used to connect to the unit "IN" and "OUT" port. Failure to do so could result in leakage to the system.

◆ **To Connect the Fluid Lines to the Unit and User Equipment Follow These Steps:**

1. Cut and prepare the hose. Connect the chiller side of the included hose with the CPC® Valved Thumb Latch Quick-Disconnect body fitting included in the package.



Figure 10 Ferruleless Compression Fitting for Easy Connection with Hoses

2. Connect the CPC® Valved Thumb Latch Quick-Disconnect body fitting to the "IN" and "OUT" fitting located at the back of the unit. Connect the other side of the hoses to the thermal load.



Figure 11 LKA1300 "IN" and "OUT" Ports

NOTE: *Once there is a foreign substance in the circulating pipeline, it will cause problems such as stuck flow meters and stuck pumps. We recommend installing an in-line filter such as Thorlabs' Item # LKF40 at the return port of the unit.*

3. Check that fittings are tight to prevent leaks.

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

1. The fill port is located on the top side of the unit. Remove the reservoir cap. If necessary, use a 5 mm hex key to assist in loosening and opening the cap.

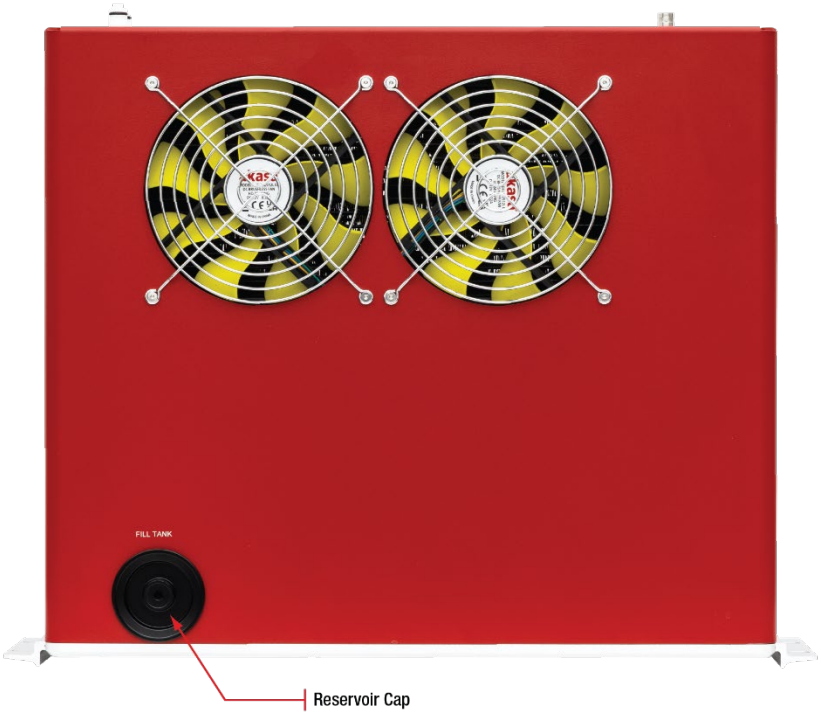


Figure 12 LKA1300 Unit Top View

2. Use a bottle to fill the reservoir, we strongly recommend using the included funnel for help. Please note that this device is safe to operate even if small spills occur or the reservoir overflows. Use the liquid level indicator on the front of the unit to see the coolant level in the tank during filling. Be sure to allow for the volume of coolant needed to fill the cooling lines between the unit and the equipment, if they were not filled with coolant before installation.



Figure 13 LKA1300 Resevoir Cap (Left) and Threaded Rubber Funnel (Right)

After coolant lines are purged of air, fill the reservoir approaching the “MAX” indicator line as indicated by the liquid level indicator. We recommend that the liquid level should not be lower than the “MIN” indicator line when the unit is running.

Notes:

1. *Please leave the reservoir open and start running the unit. The pump will start, filling the tubes and heat load with coolant, and the air remaining inside will be released into the atmosphere through the open reservoir cap. If the coolant level is low, fill the reservoir with more coolant to keep the system topped off when external circulation is started.*
2. *Overflow hole shall not be blocked or modified.*

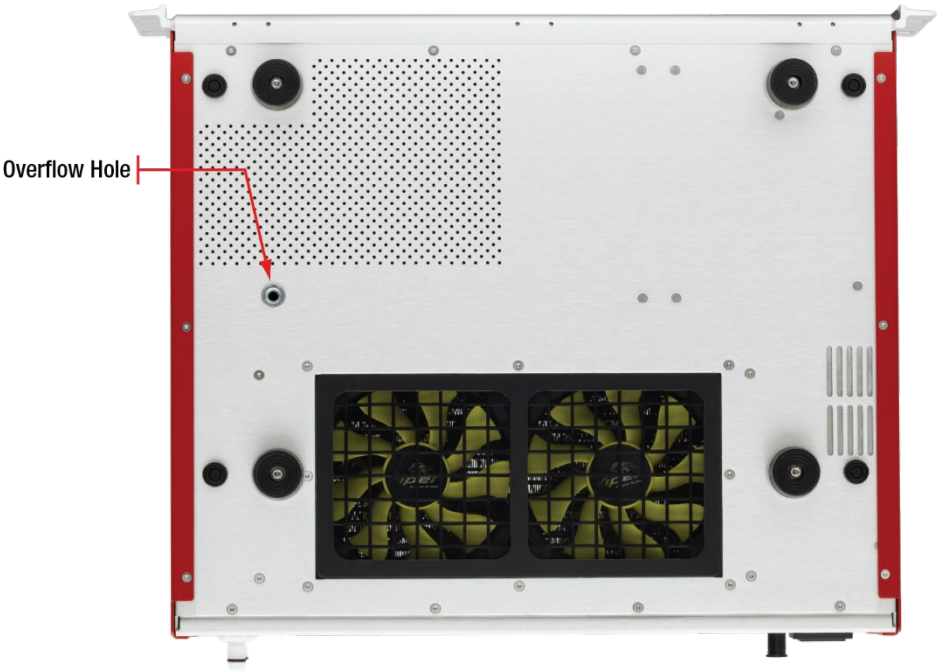


Figure 14 LKA1300 Unit Bottom View with Dust Filter Removed

3. *Never fill coolant beyond the* "MAX" *indicator on the liquid level window; overfilling may cause coolant to leak from the unit's bottom overflow hole. Maximum and minimum fill markings are provided on the front side of the unit to help maintain the coolant level.*



Figure 15 Liquid Level Indicator

3.5.6 Priming the Centrifugal Pump

NOTICE

The 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 Thorlabs warranty.

◆ **Pump Priming Must Be Performed Under the Following Conditions:**

- At Initial Start-Up
- The System is Drained of its Fluid.
- A New Pump is Installed

Centrifugal pumps are classified as non-self-priming pumps. This means that the pump will not displace the air inside the pump housing, which prevents fluid from being drawn in. Each must be "primed" prior to operation. "Priming" simply means to manually introduce fluid into the pump housing prior to operation.

In a typical unit installation, the flow of fluid through the pump suction hose into the pump is prevented by the presence of trapped air. Without a way for the air to escape, the fluid has no way of entering the pump housing. The following are recommended procedures to prime a centrifugal pump.

◆ **Method - Pump Priming**

1. Connect the fluid lines to the unit and user equipment, please refer to **Section 3.5.5** for details.
2. Fill the reservoir, please refer to **Section 3.5.5** for details.
3. Allow time for the fluid to feed into the pump housing.
4. If there is difficulty priming the pump using this method, use a wet vac to assist in drawing the fluid from the tank into the pump housing. If the pump has failed to prime, turn the unit off and contact your local Thorlabs Technical Support office.

Chapter 4 Operation

⚠WARNING

In order to avoid electric shock, be sure to wipe up all fluid spills in the unit before applying electrical power. Failure to do so could result in damage to the equipment, personal injury and/or death.

NOTICE

Do not use a Deionization (DI) filter cartridge with Inhibited EG or Inhibited PG. A DI filter removes inhibitors from the solution rendering the fluid ineffective against corrosion protection. Also, inhibitors increase fluid conductivity.

NOTICE

Never connect the process fluid lines to your facility water supply or any pressurized liquid source.

NOTICE

The pump is capable of producing 1.2 bar (17.4 psi). Ensure your plumbing is rated to withstand this pressure at your operating temperature.

NOTICE

If the set point is 10 °C/50 °F or below, a freezing point depressant, such as ethylene glycol, is required. This unit is equipped with a low flow alarm. This feature will shut the unit down during a low-flow situation to prevent freezing.

NOTICE

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 set-point or other methods. This is the maximum temperature supported by the cooling system.

Please apply appropriate settings on the screen in the Main Page or Settings Menu for direct operation. This includes temperature settings, pump speed settings, and fan speed settings.

4.1 Control Panel Functions

The controller controls temperature designed with an easy-to-use operator interface.

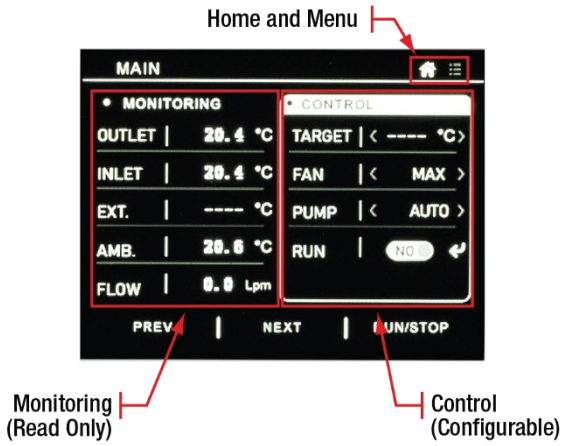


Figure 16 LKA1300 Controller Display

Description of Indicators	
Temperature Display	Displays temperature or set point in °C or °F.
Target Temperature	When the fan is set to Auto mode, the target temperature can be configured from 0 - 40 °C in 0.5 °C increments. By default, the outlet sensor is used as the target temperature source.
Fan Speed Set Point	The fan offers two speed modes: Auto and Max. It defaults to Auto mode. When set to Max, the target temperature is not configurable.
Pump Speed Set Point	The pump speed defaults to Auto mode; you may also manually adjust it from 10% to Level 100%. When the pump is set to Auto mode, the system will regulate the flow rate within 1.5 ± 0.2 Lpm.
Error Alarm Indicator	On the home screen, the warning/error icon to the left of each display item illuminates to indicate an alarm or fault condition.

NOTE:

1. If the system pressure drop is excessively high such that the flow rate cannot be reduced to 1.3 Lpm even when the pump operates at maximum speed, the pump will run at full speed.

2. Ambient temperature refers to the actual air temperature measured at the air intake. This temperature may be higher than the ambient air temperature of the surrounding area, due to restricted air circulation in the surrounding environment or internal heat leakage.

4.2 Getting Started

4.2.1 Pre-Start

1. Connect Equipment to the unit

Please see ***Chapter 3*** to install the unit and connect it to your equipment.



Figure 17 System Loop

Before starting the unit, double check all electrical and plumbing connections. Ensure the power cord is secured to the rear of the unit. If the unit will not start, please refer to **Chapter 6 Troubleshooting and Repair**.

2. Starting the unit

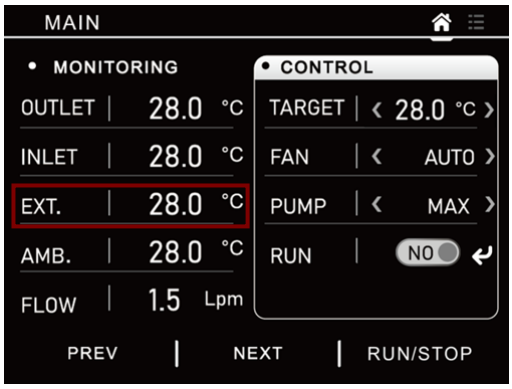
Press the power switch to turn on the unit. The initialization screen will be displayed at startup. The unit will then enter the home screen and start initialization. The unit remains operational during initialization.



3. Connecting an External Sensor (Optional)

A 2.5 mm stereo jack (3 in **Figure 5**) is located on the unit's back panel. This jack is designed for the connection of a Thorlabs TSP-TH thermistor temperature probe as an external sensor. Other equivalent thermistors fitted with a 2.5 mm stereo plug may also be used.

Connect the external sensor, and the external temperature will be shown on the main screen.



4. Interlock

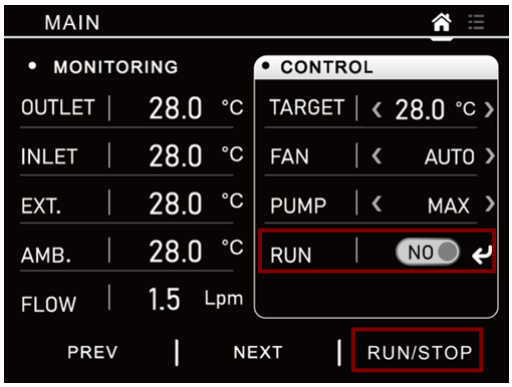
A BNC female port (2 in **Figure 5**) is provided on the unit's back panel.

The port outputs an open signal when the unit is stopped and a closed signal when the unit is running.

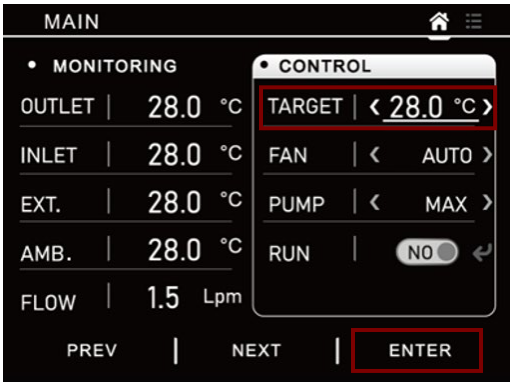
It outputs an open signal when the unit is error-free, and a closed signal when a fault or error occurs.

4.2.2 Direct Start

1. See section 4.2.1 for details regarding startup and connection to the unit.
2. Short press (<3 seconds) the power button (5 in **Figure 4**). The device powers up, recognizes all sensors and is ready for operation within 3 seconds. The power button is illuminated when the device is powered up. The following screen will appear on the display. The cursor is in the RUN/STOP position by default.



3. Press the “PREV/NEXT” buttons can move the cursor to the position you need to set, and the icon where the cursor is located will turn white. Press the “ENTER” button to confirm the selection and press the “PREV/NEXT” buttons to change the value. Press “ENTER” again to validate the value change.



4. Configure the unit via the Settings Menu on the device according to the setup used, including Brightness, screen off and unit. For this, please see the respective chapters on further instructions.
5. Press RUN/STOP button to run the unit. The controller does a self-test and then the system starts. The temperature and flow will display through the GUI.

NOTE:

- If no operation is performed within 5 seconds at the cursor level, the cursor will automatically return to RUN/STOP.
- If no operation is performed in the option settings interface within 5 seconds, the system will automatically return to the main screen.

4.2.3 Switch Off LKA1300

To turn off the unit, press the power button for approximately 1 second until the display shuts down. The measurement and device settings will be stored in the device.

4.3 Physical Controls

For direct control, the unit has three dynamic menu buttons (4 in **Figure 4**).

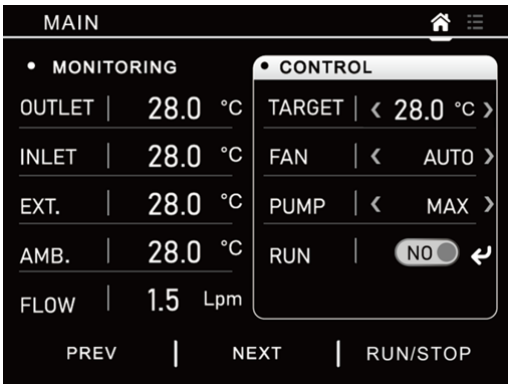
Dynamic Menu Button

The three buttons refer to the screen elements shown at the bottom of the screen. Pressing the Dynamic Menu Button mirrors touching the icon on the screen.

4.4 Main and Options Screen

4.4.1 Main Screen

The screen opens with the main screen upon power-up. Shown here is the main control screen.



In the default the main display shows the settings and measurement results.

4.4.2 Option Screen

Pressing the “PREV/NEXT” buttons to move the cursor to the  icon and pressing the “ENTER” button will reveal the option screen. The following information is displayed on the option screen:



- **Brightness**

Displays the current controller brightness. To change the brightness, move the cursor to Brightness and press the “ENTER” button to confirm the selection. Either turn the knob or press the “PREV/NEXT” buttons to change the value from 10% to 100%. Press “ENTER” again to validate the value change.

- **Screen Off**



: Open controller screen.



: Close controller screen.

To enter Screen Off, move the cursor to Screen Off. Press the “ENTER” button to confirm the selection and press the “PREV/NEXT” buttons to change to “ON”. Press “ENTER” again to enter dark mode. When in Screen Off, push any button to activate the screen.

- **Switch Units**

To set up the units, move the cursor to Unit set position. Press the “ENTER” button to confirm the selection and press the “PREV/NEXT” buttons to change the unit to ℃ or ℉. Press “ENTER” again to enter the unit.

Chapter 5 Maintenance and Cleaning

⚠ DANGER Always disconnect power to the unit when performing maintenance. Failure to do so could result in damage to the equipment, personal injury, and/or death.

⚠WARNING A qualified service technician must perform all service and maintenance internal to the unit. Unqualified individuals conducting service on the unit could result in damage to the equipment, personal injury, and/or death.

NOTICE Handle the unit with care. Sudden jolts or drops can damage its components.

5.1 Inspections

After your unit is up and running, it takes only a small amount of care and maintenance to keep it running well.

Every installation is unique, and the operating conditions determine how often the equipment should be inspected and maintenance be performed. The following are some guidelines.

5.1.1 Weekly Inspections

- **Noise Level**

  Any abnormal sounds or a substantial increase in noise level since the last weekly inspection may indicate the following: impending pump, fans, or coolant blockage problem. Investigate the cause and perform the necessary service. Refer to the troubleshooting guide in this manual.

- **Leakage**

  If you notice coolant on the floor near the unit or dripping from the unit enclosure turn off the unit. Disconnect the power cord. Find and repair any leaks immediately.

- **Coolant Level**

  Any significant drop in the coolant level should be investigated further. If there is no visible system leak, then the loss may be due to equipment leakage elsewhere.

- **Pump / Motor**

  No maintenance is required on the pump. Listen to any abnormal sounds. As a precaution, the pump must be periodically replaced. This will avoid damaging the unit and the cost associated with excessive downtime.

- **Fan Assembly**

  No maintenance is required on the fan. Listen for any abnormal sounds.

- **Water Filter**

With a new system the filter quickly accumulates foreign matter introduced during system setup. This can lead to a decrease in system performance in a short period of time. Inspect the filter cartridge one day after you set up a new system to ensure the filter is clean and the system runs at maximum capacity. After this initial filter inspection, check the filter weekly.

If it becomes fouled the flow rate will decrease and the pump may wear prematurely. If the unit outlet and inlet are shorted and the flow rate is less than 2Lpm when the pump is set to maximum, it is recommended to clean the filter.

For a detailed procedure in cleaning the filter or replacement filters please refer to the steps below：

1. See **Section 5.2** to drain the entire unit including the hoses and equipment being cooled.
2. See **Section 3.5.5** to remove the reservoir cap and then use an 8 mm hex key to remove the filler port.
3. Remove the red cover.
4. Remove the hoses at both ends of the filter to remove the filter.
5. Open the filter caps, remove the filter screen and clean it with clean water.

5.1.2 Periodic Inspections

- **Hoses**

  Inspect and tighten the unit's external hoses and clamps on at least a semiannual basis.

- **Algae**

  Thorlabs recommends the use of an algae inhibitor to prevent growth in the reservoir.

- **Radiator Fin**

NOTICE Directing airflow at the radiator fins at an angle may result in bending/damage of the radiator fins, resulting in decreased radiator performance.

For maximum performance the radiator fins should be free of dust and debris. To clean the radiator, follow the steps below. All work should be performed while wearing safety glasses and ear protection with the unit powered off.

1. See **Section 5.2** to drain the entire unit including the hoses and equipment being cooled.
2. See **Section 3.5.5** to remove the reservoir cap and then use an 8 mm hex key to remove the filler port.
3. Remove the red cover.
4. Remove the cable, fans, and any duct work covering the condenser.
5. Attach an air nozzle to a compressed air source regulated to between 50 and 100 psi.
6. Direct the air at the face of the condenser in the opposite direction the fan blows. Keep the nozzle 2 to 4 inches from the face of the condenser. The air flow should be very close to perpendicular to the face of the coils.
7. Sweep the air flow back and forth across the face of the coil to remove any excess contamination which would have built up during use until clean.
8. Reattach the cable, fans and any ducting.

- **Control Box Fuse Replacement**

  This fuse is an internal inline fuse to the control box and should only be replaced by a qualified technician. Open the inline fuse holder (just below 7 in **Figure 5**) on the back panel to remove the blown fuse and insert a new fuse. Use a 5x20 mm time lag fuse 3.15 A 250 V (SCHURTER P/N 0034.3122) or equivalent.

- **Cleaning the System and Reservoir**

  To clean the system, follow these steps below.

  1. Drain the entire unit including the hoses and equipment being cooled.
  2. Replace the coolant with clean water.
  3. Run the unit with the clean water for 15 minutes.
  4. Drain the unit again.
  5. Clean or replace the water filter (See **Section 5.1.1**).
  6. Refill the unit with new coolant.

- **Maintenance of the Liquid Level Indicator Window**

NOTICE The liquid level indicator window should be scrubbed with a soft cloth, never use any cleaning agent containing granular objects, and do not use various chemical bath agents to scrub.

The liquid level indicator window is made out of an acrylic sheeting. In the process of use, it will inevitably produce dirt and dust, making knowledge of how to clean and maintain the window vital to extending the service life of the unit.

Cleaning the Liquid Level Indicator Window

Acrylic sheeting can be damaged by harsh solvents and cleaners. Use a commercial plastic cleaner or mild soap and water to remove dirt and debris. When applying cleaner, use a non-abrasive lint-free or microfiber cloth that won't scratch the surface. For tough grease, oil, or tar residue, use commercial grade hexane or kerosene. All solvents need to be wiped clean with fresh water and blotted dry to reduce and prevent water spotting.

When cleaning acrylic sheeting, never use ammonia, acetone, carbon tetrachloride, or gasoline as a cleaning solution. These kinds of solvents can cause cracks in acrylic sheeting and give the surface a frosted appearance.

Repairing the Liquid Level Indicator Window

Scratches, haziness, and small cracks can be easily fixed in acrylic sheeting. For removing and buffing out scratches and haze, use a plastic polish, car polish, or automobile wax with a clean, microfiber cloth. If the acrylic is still hazy, carefully sand the acrylic using several different grits, followed by a more abrasive polish.

Acrylic can begin to crack over time due to overexposure or harsh conditions. For small cracks, use a 1/8" drill bit to drill a hole on both sides of the crack. Use a silicone sealant to fill the crack and let it dry. This should help restore the integrity and appearance of the acrylic.

5.2 Draining Procedure for The Unit

⚠CAUTION

A container should be available to hold the fluid removed from the unit. This container should be labeled in accordance with OSHA rules and regulations concerning handling of the fluid being removed from the unit. Failure to do so could result in personal injury.

⚠CAUTION

Reference the MSDS sheet for the fluid being removed from the unit for further handling, storage, and disposal instructions. Disposal of fluid removed from the Thorlabs Rack-mounted unit should be in accordance with all Local and Federal disposal laws. Failure to do so could result in personal injury.

NOTICE

Not following this procedure may result in extensive damage to the unit. It is extremely important to completely drain the unit when not in use for extended period of time, shipping outside of its current location, during certain repairs, and for scheduled fluid maintenance. Failure to fully drain the system could result in damage to the equipment. Thorlabs recommends method #1 as the most efficient way to remove fluid from the unit.

5.2.1 Method #1 - Recommended

1. Thorlabs recommends using a wet vac to thoroughly remove fluid from the unit. Remove the reservoir cap on the top of the unit. Vacuum this tank until it is completely free of any fluid. Keep the reservoir cap removed from the reservoir until step #5.
2. Attach CPC® Valved Thumb Latch Quick-Disconnect body fittings to the "IN" and "OUT" fitting located at the rear of the unit and connect them with a hose. Then drain most fluids from the "IN" fitting. (Note: A container should be available to hold the fluid removed from the unit).
3. Using a wet vac, vacuum the "IN" connection until all the fluid has been removed from the drain side.
4. After all the fluid has been removed from the drain side, move the vacuum to the "OUT" connection. Vacuum this connection until all fluid has been removed. (Note: make sure the reservoir cap is removed, allowing air to enter system)
5. Install the reservoir cap plug into the reservoir.

5.2.2 Method #2 - Without Access to a Wet Vac

1. Remove the reservoir cap on the top of the clean fluid reservoir. Keep the reservoir cap removed from the reservoir until step #4.
2. If possible, elevate the unit approximately 1 meter off the ground. This will allow you to drain the system into a bucket.
3. Use CPC® Valved Thumb Latch Quick-Disconnect body fitting connected to the "IN" and "OUT" fitting located at the rear of the unit to connect the water pipe circuit of the entire unit to a tank of compressed air. We recommend purging the outlet and inlet with compressed air, which allows the coolant from the water pipe to drain almost completely from the reservoir.

4. Install the reservoir cap plug into the reservoir.

5.3 Coolant Maintenance

5.3.1 Recommended Coolant for Use in the unit

- Thorlabs offers non-toxic Coolflow DTX Refrigerant Antifreeze with Corrosion, Scale, and Biological Inhibitors for use with units.
- Do not use automotive antifreeze as the rust inhibitors may cause premature failure of the pump seals.
- Avoid using water with a high mineral content.
- If the unit is exposed to sunlight, add an algaecide to control organic growth in the coolant. A mixture of 30% Ethylene or Propylene Glycol can also be used to control algae growth.

5.3.2 Checking Coolant Level

- There is a coolant level indicator on the front of the unit. Coolant should be added as soon as this indicator approaches the "MIN" indicator line.
- Reducing the coolant volume may reduce the unit's cooling capacity.
- Inspect coolant level weekly or whenever the unit is powered on.

5.3.3 Flush & Replace Coolant Periodically

⚠WARNING In order to avoid electric shock, be sure to wipe up all fluid spills in the unit before applying electrical power. Failure to do so could result in damage to the equipment, personal injury and/or death.

- Depending on the environmental conditions, the coolant should be flushed and replaced as necessary, depending on the amount of particulate matter that has been found in the system during planned maintenance inspections.
- If the water filter and coolant are found to have little or no contamination after the first inspection, replacing the coolant and cleaning the strainer can be done less frequently.
- When the strainer is cleaned or replaced, the electrical power must be disconnected and the power inlet located at the rear of the unit.

5.4 Dust Filter

The unit is equipped with a dust filter on its base in front of the bottom air intake plate. Users can remove the dust filter to achieve the full cooling power of the unit, which is 1300 W with a 25 °C liquid-ambient delta with 1.5 Lpm. With the filter installed, there is a 100 W to 200 W loss of cooling power. Please note that long term operation of the unit without a filter is only recommended for a standard photonics lab environment or a cleanroom.

The filter is magnetically attached to the unit and can be installed or removed by hand directly. The dust filter can be cleaned using a vacuum cleaner or by flushing under tap water.



Figure 18 Removing the Dust Filter

Chapter 6 Troubleshooting and Repair

6.1 Error Codes

Several different errors may occur during the unit operation. These errors are displayed on the front screen of the system. See below for an explanation of each error.

Err 01 - Inlet Temperature Too High

This error indicates that the inlet temperature exceeds 60 °C. When the error occurs, the device will stop operating.

Err 02 - Outlet Temperature Too High

This error indicates that the outlet temperature exceeds 60 °C. When the error occurs, the device will stop operating.

Err 03 – External Sensor Temperature Too High

This error indicates that the external sensor temperature exceeds 60 °C. When the error occurs, the device will keep operating.

Err 04 - Flow Fault

This error indicates that coolant flow is missing or insufficient. When the error occurs, the device will stop operating. See Section **6.3** for troubleshooting suggestions.

Err 05 - Fan Fault

This error indicates that the speed of all four fans speed is less than 300 Rpm in all five speed samples. Possible causes include a disconnected, cut, or short sensor wire, or an internal transducer failure. When the error occurs, the device will stop operating. Please contact your local Thorlabs Technical Support office.

6.2 Warning Codes

Several different warnings may occur during the unit operation. These warnings are displayed on the front screen of the system. See below for an explanation of each warning.

When a warning occurs, the device continues to operate normally.

Warn 01 - Inlet Temperature Too High

This warning indicates that the inlet temperature exceeds 45 °C.

Warn 02 - Outlet Temperature Too High

This warning indicates that the outlet temperature exceeds 45 °C.

Warn 03 - External Sensor Temperature Too High

This warning indicates that the external sensor temperature exceeds 45 °C.

Warn 04 - Flow Warning

This warning indicates that coolant flow falls below 0.5 Lpm. See Section 6.3 for troubleshooting suggestions.

Warn 05 - Fan Warning

This warning indicates that up to three fans have stopped functioning. Possible causes include a disconnected, cut, or short sensor wire, or an internal transducer failure.

6.3 Troubleshooting Guide

Troubleshooting Guide		
Problem	**Possible Cause**	**Recommended Remedy**
Unit Does Not Start or Shut Off Shortly After Starting	No power to the unit, circuit breaker off or tripped.	Make sure the unit is plugged in. Verify power to the unit. Turn on the unit with the ON (⏻) key on the keypad. Check the main power fuse (see Maintenance & Repair section).
	Low flow shut off will cause the unit to stop after starting.	Fill the external line prior to starting up. Pump is not Primed. See **Chapter 3**.
	Low Voltage.	Have a qualified electrician check the electrical service to the unit.
The Unit Shuts Down During Operation	Auto alarm has tripped.	Check if an error is displayed on the screen.
	Circuit breaker off or tripped.	Make sure the unit is plugged in. Verify power to the unit.
Noisy Pump Motor / Pump Motor Overheats	The pump is worn out.	Replace the pump with a new one. Please contact your local Thorlabs Technical Support office for help.
	Improper voltage to the system.	Verify and correct the voltage to the unit.
	Obstruction in pump head.	Shut down unit, clear obstructions and restart unit
Flow Error	Water filter dirty or clogged.	Change or clean filter cartridge and reassemble.
	Low coolant level or no coolant in the reservoir.	Check for leaks. Repair any leaks and fill reservoir.
	Restriction in coolant lines external to the unit.	Eliminate restrictions on the lines. Open any valves.
	Pump overload has tripped.	Turn unit off. Wait for the overload to cool. It will reset on its own in 30 minutes or less.
	Leaks in external piping.	Check for leaks. Repair any leaks.
	Damaged Sensor, Pump or Pressure drop through system is too large.	Short circuit (directly connect) the inlet and outlet. If there is still low coolant flow. Please contact your local Thorlabs Technical Support office for help.

Chapter 7 Disposal



Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end of life” Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out “wheelie bin” logo (see right), were sold to and are currently owned by a company or institute within the EC and are not dissembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. “End of life” units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site. It is the user’s responsibility to delete all private data stored on the device prior to disposal.

Chapter 8 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



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