



User's Manual

C100W-P1

Benchtop Water Circulator



INSTECH, Inc.

Warranty

January 17, 2025

INSTECH, Inc. guarantees the product will conform to the specifications outlined in this manual and will remain free of defects in workmanship and materials for one year from the date of delivery. Should a product, in *INSTECH*'s opinion, malfunction during the warranty period because of a defect in workmanship or material, *INSTECH* will repair or replace it at no charge to the buyer, provided the product has not been subject to accidental damage, misuse, abuse, or unauthorized alteration, modification, and/or repair.

Examples of actions that will make this warranty null and void include, but are not limited to, the following:

- ◆ Storing or operating the device at any temperature outside the operating and storage temperature range.
- ◆ Performing or attempting to perform unauthorized service or repair.
- ◆ Resale -- except through an authorized dealer.

Products requiring service under this WARRANTY should be delivered to *INSTECH*, Inc. All portions of such systems, hardware, and software should be sent, along with proof of purchase if obtained from an authorized dealer. The buyer must insure the product or assume the risk of damage or loss in transit. If unable to repair or replace the product, *INSTECH* will refund the purchase price paid by the original buyer.

DISCLAIMER

THE FOREGOING WARRANTY IS IN LIEU OF AND TO THE EXCLUSION OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. *INSTECH*, INC.'S LIABILITY AND THE BUYER'S EXCLUSIVE REMEDY FOR BREACH OF THE FOREGOING WARRANTY SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF THE PRODUCT OR REFUND OF THE PURCHASE PRICE. UNDER NO CIRCUMSTANCES WILL *INSTECH* BE LIABLE TO THE BUYER IN ANY WAY FOR DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR MISUSE OF THE PRODUCT, OR *INSTECH*'S BREACH OF THE FOREGOING WARRANTY

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Chapter 0. Safety Information



Within this manual, a set of symbols are used to call attention to Safety Warnings, Caution Notices, and Notes. The symbols are defined in

Figure 1:

		
Warning Symbol	Caution Symbol	Note Symbol
Indicates a safety guideline that should be followed at all times	Indicates a caution notice that calls attention to a potential safety risk	Indicates an important notice which should be given careful consideration.

Figure 1: Symbol Legend



Documentation: The C100W Benchtop Chiller is just one component of your Intec temperature control system. Be sure to carefully read, and follow the safety guidelines outlined for each component device in the system.



Water Leaks: While the C100W itself is well protected against water damage, the same cannot be said for equipment around, or connected to the C100W. Before powering on the C100W, be sure to secure all connections using a zip-tie or hose clamp to ensure a water-tight connection. Place the C100W in a secure location without electronics or sensitive samples below it. Be sure to consult the User's Manual for the INTEC Stage/Plate/Chuck being used with the C100W, and be sure not to connect the chiller to the Gas-purge ports instead of the frame cooling ports. These ports should be clearly labeled in the manual.



Extreme Temperatures: While the C100W case should never exceed ambient temperatures, special care should be taken concerning the Stage/Plate/Chuck/Probe station being cooled. The sample area temperature can exceed 60 C, or drop below -20 C depending on the configuration. Always be aware of the operating temperature of your stage and avoid physical contact accordingly. Contact with extreme temperatures, hot or cold, may cause bodily harm.



Current Limiting Devices [AC Input models]: For AC input models, 120-220VAC 50/60 Hz electricity is applied directly to the C100W via the black receptacle on the back panel. This receptacle contains a user-replaceable fuse rated appropriately for the end user's region. The fuse is located within the black AC power receptacle and can be accessed using a flathead screwdriver. **The fuse should only be accessed when the device is unplugged from the AC power supply.** Never replace the fuse with a fuse of a different current rating than what was originally installed (should never be more than 5A).



Power Button: Power is supplied or interrupted on the C100W benchtop chiller via an illuminated push-button switch located on the front panel of the chiller. This button can be identified by the power symbol below in **Figure 2**.



Figure 2. Primary power switch indicator



Coolant Maintenance: When using regular tap water with the C100W, it is recommended to flush and then replenish the fluid reservoir every 1-2 months. This will help prevent the buildup of mineral deposits and algae inside the chiller and extend the operational lifespan.

Chapter 1. Introduction

1.1 Product Description

The C100W benchtop chiller is a convenient solution for providing weak to moderate cooling power for *INTEC* temperature control systems. The chiller operates by circulating water through its internal reservoir, through the *INTEC* Stage/Plate/Chuck which needs to be cooled, then finally through the fan-cooled radiator. This circuit provides enough cooling power to keep most *INTEC* Stage/Plate/Chuck frames near room temperature. For Thermoelectric (TEC) type Stages/Plates/Chucks, the C100W (or equivalent/ higher-power chiller) is required for regular operation.

When used for cooling TEC Stages/Plates/Chucks, the lower temperature limit of the sample area is limited by the frame cooling used to maintain the thermal gradient across the TEC modules, and the geometry of the frame itself. To determine the lower temperature limit of your *INTEC* TEC Stage/Plate/Chuck, consult the documentation included with the Stage/Plate/Chuck, or contact **support@intec.com**. As a general rule of thumb, the cooler you can keep the TEC modules, the cooler you can keep the sample. The cooling power of the C100W can be temporarily increased by adding cubes of ice to the internal water reservoir, which is necessary in some cases when operating a thermoelectric Stage/Plate/Chuck to temporarily achieve lower sample temperatures. The C100W is primarily designed for convenience and is not sufficient for maximizing the sample cooling power of *INTEC* products. Instead, a larger chiller with integrated refrigerant capabilities is recommended, ie. CW5000.

The C100W has two output configurations: Single-output for general-purpose applications, and a dual-output for simultaneous TEC/sample cooling and Frame Cooling. These Dual-output C100W models are most commonly used on TEC stages with temperature limits higher than 150°C. Single-Output C100Ws have the Loop 2 ports plugged with Silicon stoppers. Dual-Output C100W models have barbed hose fittings installed in both Loop 1 and Loop 2 Input/ Output ports. This manual covers the Single-output C100W-P1 model, while the P2 model is covered in another document.

1.2 Features

- ◆ Coolant temperature monitoring with automated over-temp cutoff capability
- ◆ 860 mL internal water reservoir with water level monitoring
- ◆ Three operation modes: Continuous Frame Cooling Mode, Sample Cooling Mode, and TEC Stage/Plate/Chuck Cooling Mode
- ◆ Convenient form factor (20.7cm W x 26cm L x 27cm H)

Chapter 2. System Installation

2.1 Unpacking and Equipment List for C100W-P1

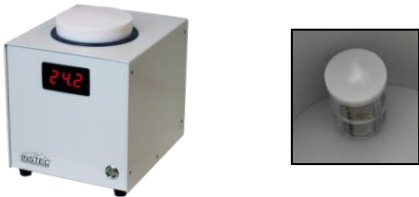
Please inspect the shipping carton for any signs of damage that may have occurred during shipment. If the shipping carton shows any signs of damage, please retain the shipping carton for insurance purposes.

Open the shipping carton and remove and inspect the contents. Please report any occurrences of shipping damage to *INTEC* immediately.



Shipping Carton: It is highly recommended to retain the shipping carton for the duration of the 1-year factory warranty. Using the original packaging for manufacturer-approved return shipping greatly reduces instances of shipping damage.

Table 1: Standard Parts for the C100W-P1

Standard Parts for the C100W	
One (1) C100W-P1 Benchtop Chiller (includes pre-installed Pump inlet Filter)	
One (1) AC Power cord (Region Specific)	
One (1) AC/DC Power Adapter, 12V 3A	
Two (2) Silicone Rubber Tubing OD 3/8" x ID 1/4" Length=2m (Inlet/Outlet Tubing)	
One (1) PS/2 cable [Not included for applications requiring only C100W Frame Cooling in Mode 1]	

2.2 C100W Overview

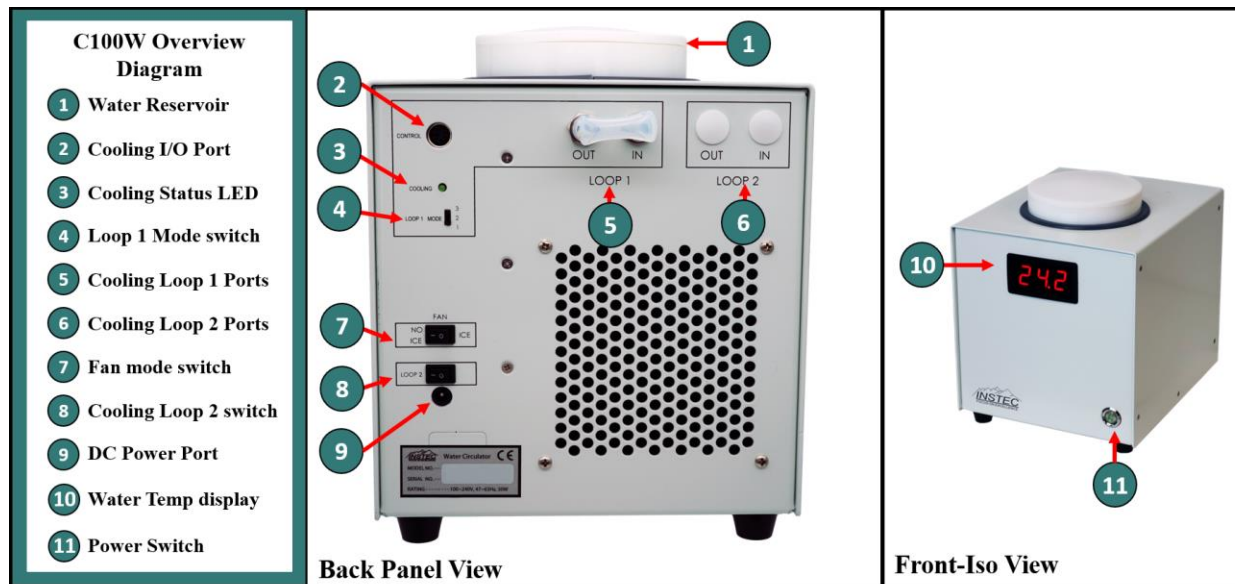


Figure 3. Overview diagram for the C100W-P1

2.3 System Setup

Place the C100W controller on a level, clean surface with ample ventilation. Because the C100W relies on a large radiator fan to keep the circulating water-cooled, make sure the intake vent on the bottom and exhaust vent on the back panel are unobstructed.

The back panel of the C100W is shown in **Figure 3**. All electrical connections to the C100W use different types of ports to eliminate the possibility of an incorrect connection. Before connecting the unit to AC power and turning the unit on, the Inlet and Outlet ports must be connected and the water reservoir filled with water.

To connect the C100W to your INTEC Stage/Plate/Chuck, simply connect the Inlet and Outlet ports of cooling loop 1 to the frame cooling ports or TEC cooling ports on the Stage/Plate/Chuck via the included silicone tubing. These ports are typically barbed hose fittings that are connected directly to the frame of the Stage/Plate/Chuck. The included silicone tubing is sized such that they will tightly fit over the frame cooling ports, and should not require any additional fastener. If the tubes do not fit tightly over the frame cooling ports, contact support@intec.com.

Fill the C100W reservoir with appx 750 ml of tap water. As the system circulates water for the first time, the volume of the transfer lines will cause the reservoir level to drop slightly. Add water to the reservoir until the water level is about even with the grey seal between the reservoir and frame. At a minimum, the water should fully cover the Pump inlet filter.

Once the C100W has been securely connected to the Stage/Plate/Chuck, the device must be configured for and connected to a temperature control system according to the application. It is recommended to read each of the diagrams located in sections 2.4.1, 2.4.2, and 2.4.3 in their entirety, and then determine which setup most closely matches your INTEC temperature control system and application. Please contact support@intec.com for any questions regarding the correct system setup.

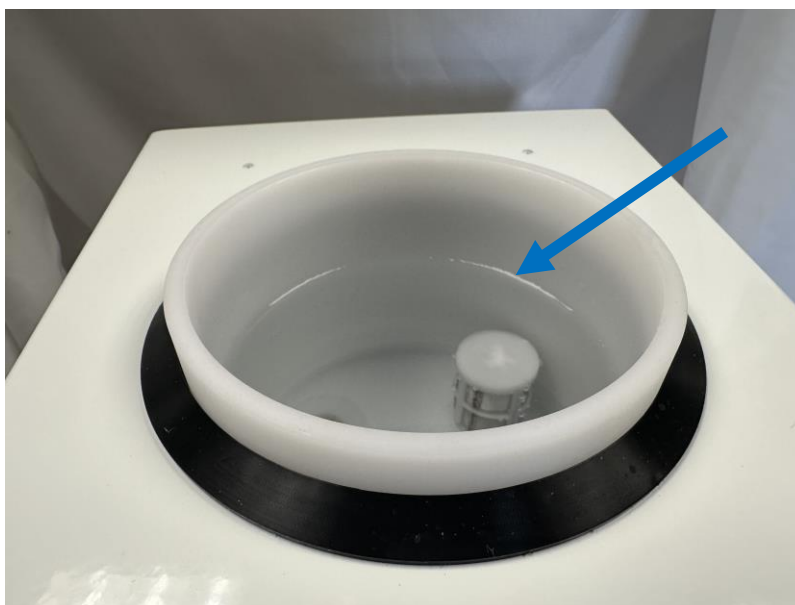


Figure 4. Recommended water level



Frame Cooling Port Identification: Be sure to consult the User's Manual for the INTEC Stage/Plate/Chuck being used with the C100W to identify the frame cooling ports. Be sure not to connect the chiller to the Gas-purge ports instead of the frame cooling ports, as this may flood the Stage/Plate/Chuck, or the surrounding area, with water.



Cooling IO Cable: INTEC will include a cooling IO cable as needed based on the system requirements. If the C100W is intended to be used in Mode 1 (Constant cooling mode), then no cooling IO cable will be included.

2.3.1 Continuous Operation Mode (Mode 1)

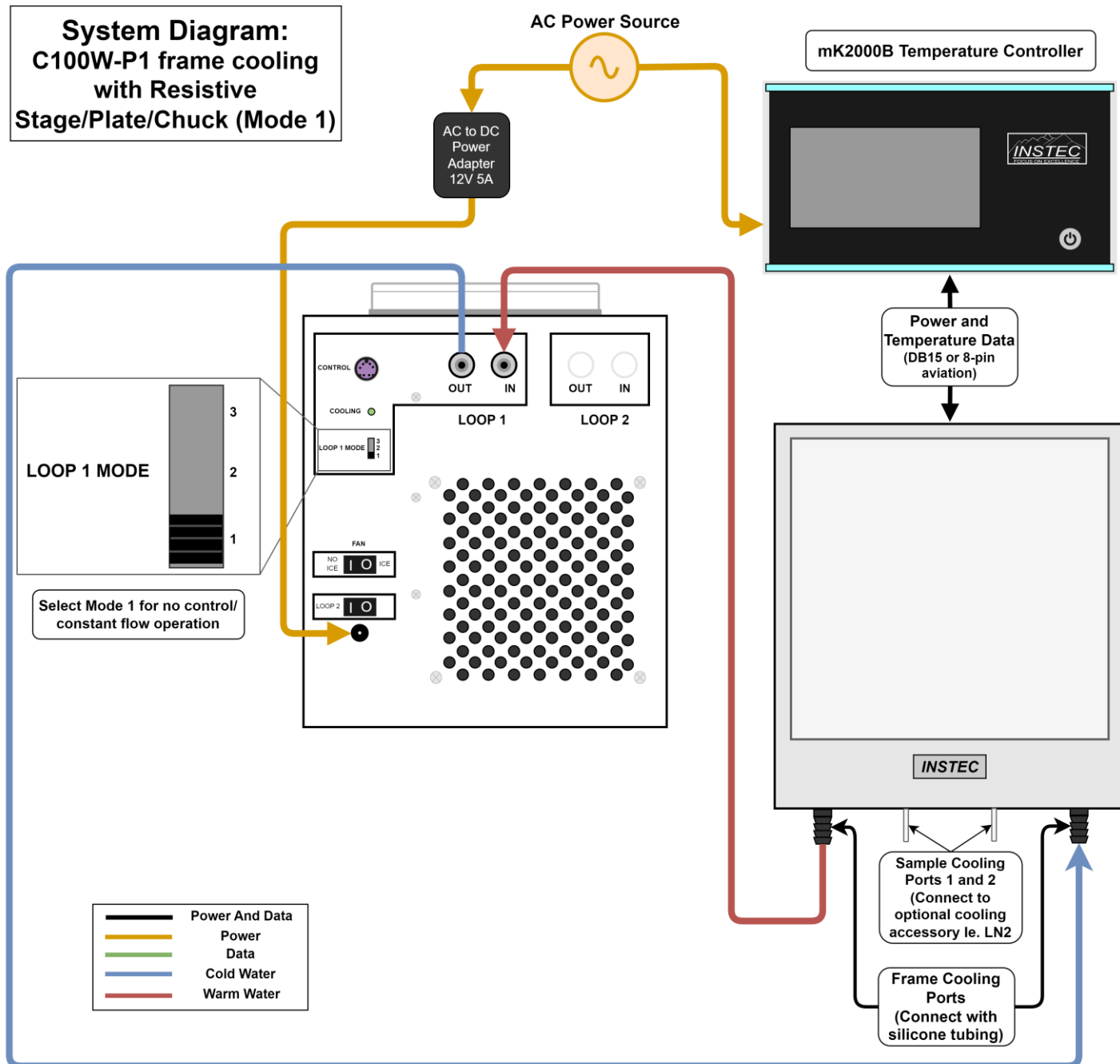


Figure 5. System setup diagram for C100W frame cooling

2.3.2 Sample Cooling Mode (Mode 2)

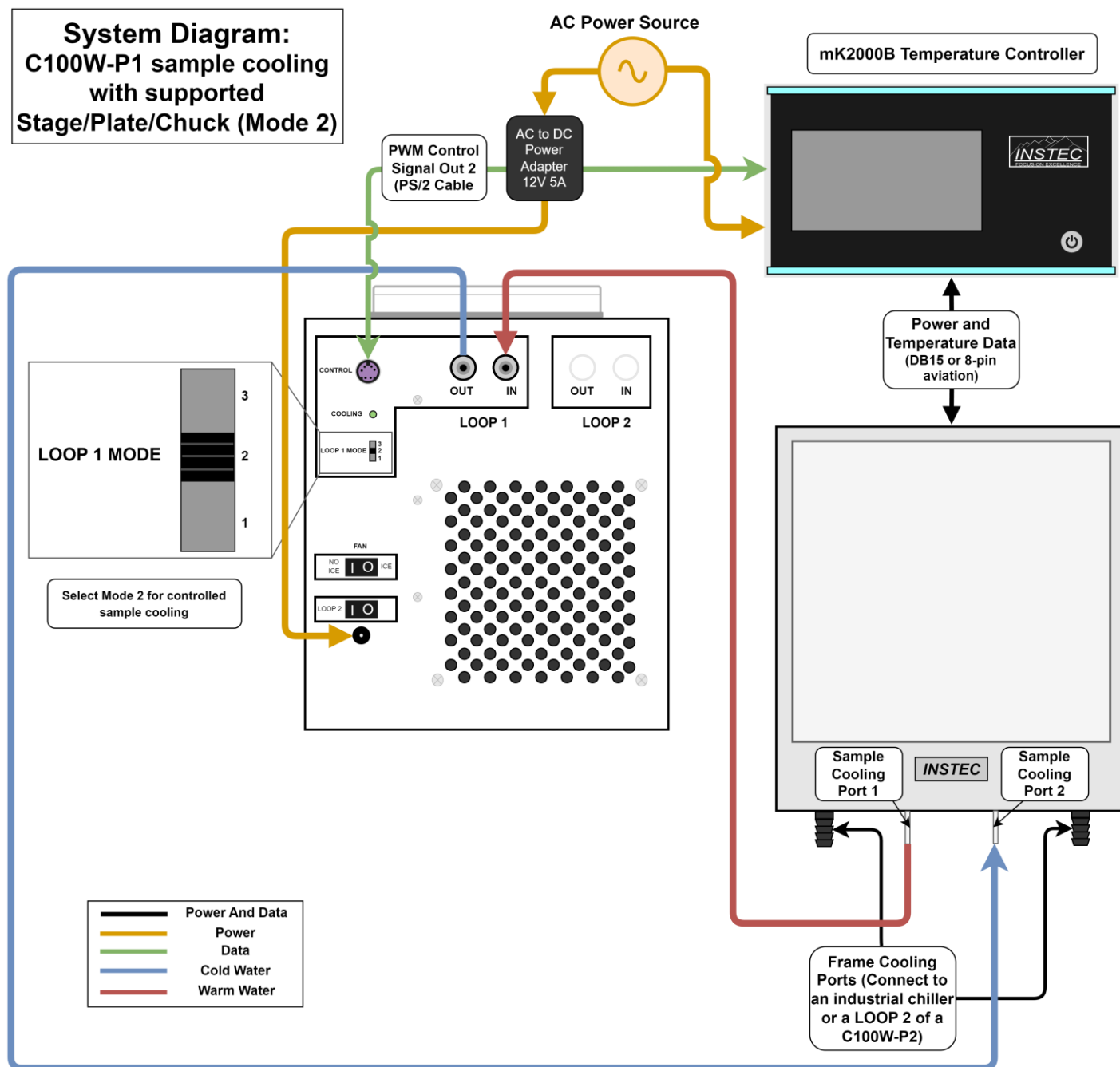


Figure 6. System setup diagram for C100W sample Cooling

2.3.3 TEC Cooling Mode (Mode 3)

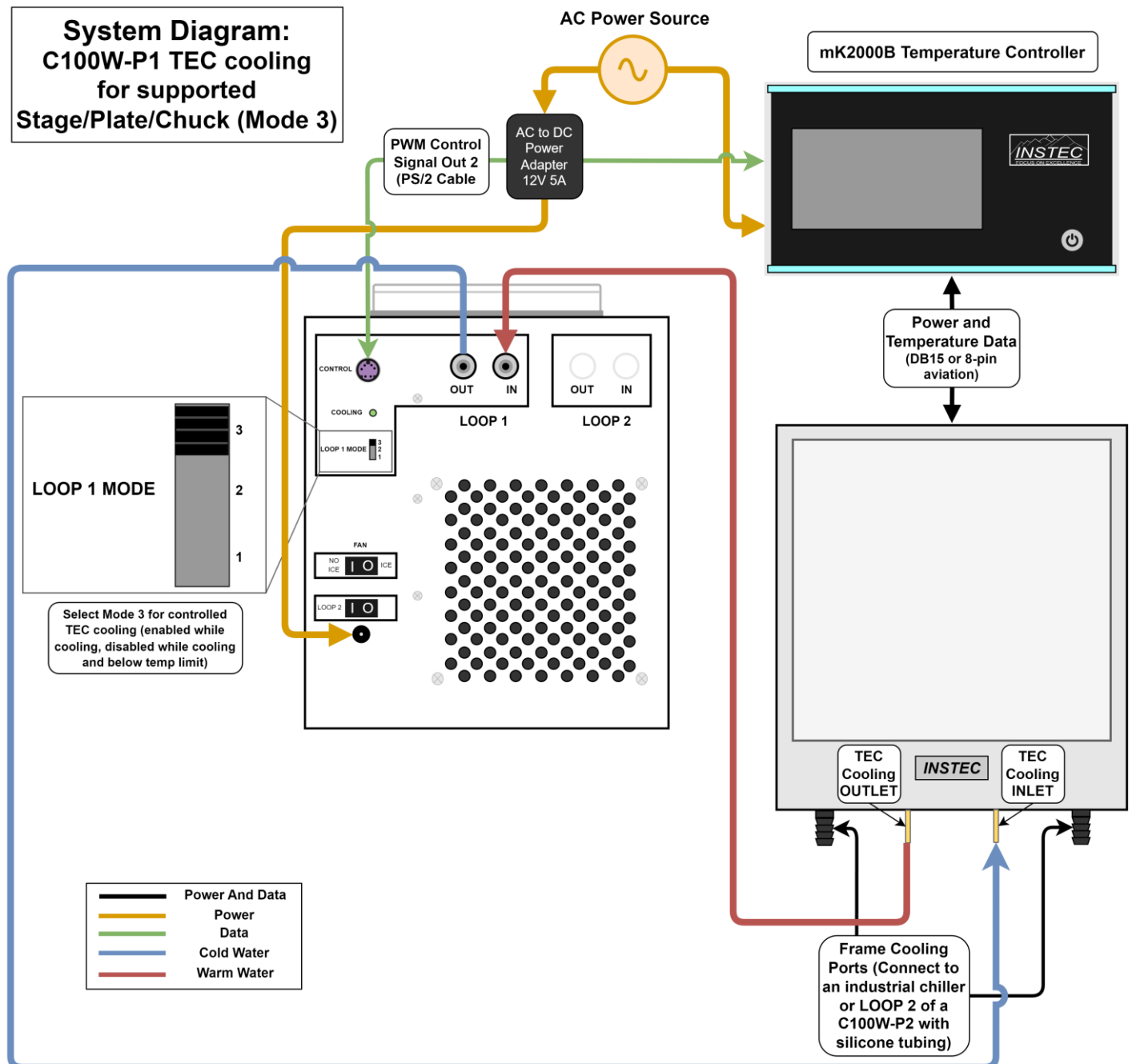


Figure 7. System setup diagram for C100W TEC cooling

2.4 System Operation

Once the C100W has been set up according to the correct block diagram, the chiller needs only to be turned on via the power switch to start circulating water. When used in Mode 1 and Mode 2, the fan switch should be set to the ON position. This will power the internal fan which cools the circulating water via a small radiator inside the chiller. When used in Mode 3, the optimal fan switch position depends on the coolant temperature of the chiller. When attempting to cool large TEC systems well below ambient temperatures, it may become necessary to add ice to the C100W reservoir. Ice dramatically lowers the coolant temperature and allows for TEC systems to more easily reach sub-zero temperatures. If ice is added to the C100W reservoir, then the fan switch should be set to the “ICE” position. This will keep ambient air from warming the ice and improve the duration of TEC system measurements. If ice is NOT used with the C100W in Mode 3, then the fan switch should remain in the “NO ICE” position.

While using ice to lower the C100W coolant temperature, it may become necessary to partially drain the reservoir of warm water to make room for more ice or a new ice pack. The best method for draining the reservoir during operation is to add a tee fitting at the inlet port and affix a drain line with a valve to the tee. When the reservoir needs to be drained, the valve can be turned, and warm water returning to the chiller will be rerouted to a bucket or drain, lowering the reservoir level and making room for more ice. INTEC offers a reservoir draining kit that may be useful in cases where ice is used frequently. Contact support@intec.com and ask about the C100W inline drain kit for more information.



Figure 8. Mounting holes for optional ice-water drain kit



Fan Switch mode: When using the C100W with ice to lower the coolant temperature, the primary fan switch should be set to the OFF position.



Coolant Choice: Regular tap water is the recommended coolant choice for the C100W. Distilled or Deionized water can cause corrosion inside the C100W and stage/plate/chuck being cooled, so they are not recommended as coolants. To prevent algae growth or malodors in the tap water coolant, anti-algae additives or other water disinfectants can be added. Anti-freeze is not required for the C100W because it only cools the circulating coolant down to room temperature.

Chapter 3. Maintenance and Troubleshooting

3.1 Periodic Maintenance

Table 2: Periodic Maintenance Summary

Every 1-2 Months	Every 3-5 years
Drain and replace water in the reservoir + Clean Inlet Filter	- Replace silicon rubber tubing if needed - Replace Pump Inlet Filter if needed

3.1.1 Drain and replace water in the reservoir / Service filter

To prevent the buildup of algae, hard water deposits, or other contaminants, it is recommended to change the water used in the C100W once every 2-3 months. When changing the water, be on the lookout for mineral deposits or algae growth. If excessive minerals are present, consider using distilled water to flush the C100W of sediment, then replacing the fluid reservoir with fresh tap water. If there is algae growth, consider using an anti-algae additive to prevent growth in the future, or change the water in the reservoir more frequently. Periodically flushing the system with fresh water, or with a distilled bleach solution can help keep the system clean, especially if it is used frequently.

Whenever the water is replaced, it is recommended to rinse the pump inlet filter. To remove the filter, gently pull upwards to pop it out of place. Rinse the filter under a stream of tap water to remove any trapped minerals or debris. If blockages on the filter cannot be removed, contact **Support@intec.com** to order a replacement. Re-install the filter by gently pushing it downwards in the pump inlet. The pump Inlet can be identified by looking directly

downwards into the reservoir inlet/ outlets (**Figure 9**). The pump inlet will be significantly darker than the outlet, and the pump impeller should be visible when illuminated with a flashlight.

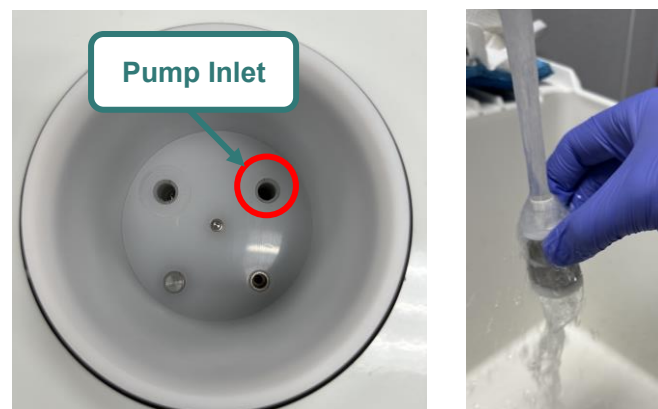


Figure 9. Pump Inlet location (left) and Filter Service (Right)

3.1.2 Replacing silicon rubber tubing

Over time, the silicon rubber tubing used to transfer water between the C100W and the stage/plate/chuck may dry out and become more prone to cracking. If the included C100W transfer lines become brittle, it may be a good idea to replace them before they fail and cause a water leak.

3.2 Troubleshooting

Table 3: Troubleshooting cause/ potential solution table

Symptom	Possible Cause	Potential Solution
C100W does not power on (Power Switch does not illuminate)	The unit is not powered	Verify power cable is fully inserted into the C100W power socket (Or AC to DC adapter), and that the status LED on the adapter is illuminated. Also, ensure that the DC power connector is fully inserted
	AC Input fuse has blown (AC input models only)	Remove and inspect fuse, replace using included spare if blown
	Internal components have failed	Contact support@INTEC.com for assistance
C100W alarms when powered on	The water reservoir is not sufficiently filled	Add water to the reservoir until the level reaches the grey seal between the lid and frame
The control signal is applied (manual or remote), but the pump does not power on	Poor connection to mK2000	Verify PS2 accessory cable is fully inserted into the Cooling I/O port, gently manipulate the cable to check for defective socket or wire insulation
	Incorrect operational mode	Make sure the operational mode is set to Mode 2 or Mode 3 according to the application
	Internal components have failed	Contact support@INTEC.com for assistance
C100W does not cool effectively	Air inlets/outlets are blocked	Re-position C100W so back and side panels are unobstructed, as well as bottom vent
	Silicon rubber water lines are obstructed/bent	Straighten all water lines and ensure there are no kinks/obstruction
	Reservoir Filter is Blocked	Clean Pump Inlet Filter
	The radiator fan is disabled	Set primary fan switch to ON position
C100W displays error code “LLL” or “Err”	The temperature sensor has failed	Contact support@INTEC.com for assistance
C100W displays error code “HHH”	The reservoir temperature has exceeded the measurement range (110 °C)	Immediately disable the heat source and ensure the primary fan switch is enabled.
	The temperature sensor has failed	Contact support@INTEC.com for assistance