C610WU Industrial Chiller

User's Manual

Version 7.01

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INSTEC, Inc.

Warranty

August 16, 2022

INSTEC, Inc. guarantees the product will conform to the specifications set forth in this manual, and will remain free of defects in workmanship and materials for a period of one year from the date of delivery. Should a product, in *INSTEC'*s opinion, malfunction during the warranty period because of a defect in workmanship or material, *INSTEC* 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 *INSTEC*, 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 risk of damage or loss in transit. If unable to repair or replace the product, INSTEC 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. *INSTEC*, 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 INSTEC 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 *INSTEC*'S BREACH OF THE FOREGOING WARRANTY

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Safety Information

WARNING

Always follow the safety guidelines outlined in this User Manual. Improper use may result in personal injury or death

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

***Figure 1**: Symbol Legend*

Documentation: The C610W is just one component of your Instec temperature control system. Be sure to carefully read, and follow the safety guidelines outlined for each component device in the system.

Electrical Connections: Always use the correct Input voltage and frequency according to the end-user's region. 110VAC 60Hz AC for North America, 220VAC 50Hz in Europe, etc. INSTEC will configure each element of the Instec temperature control system with appropriate receptacle before delivery. For the C610W, a power adapter may be required. Only use a power adapter that is rated for no less than 220VAC @ 10A (appx 2000W)

Current Limiting Devices: *Most devices used in your Instec System contain a replaceable fuse rated appropriately for each device. The fuse for the C610W is located within the chiller behind a removable cover, and can be accessed by first removing the left side panel.* ***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 is indicated on the back of the chiller, and on the currently installed fuse.*

Extreme Temperatures: While the C610W case should never exceed ambient temperatures, special care should be taken with regards to the Stage/Plate/Chuck/ probe station being controlled. Both the chassis and sample 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.

Rotating Fan Blades: The C610W has a large rotating fan located on the top side of the case. While this fan is protected by a protective cage, it is still possible for a tool to be slipped between the grates and to touch the blades while in motion. NEVER place tools on the top of the protective fan cage, or on the surrounding C610W surface. NEVER attempt to touch the rotating blades with a finger; failure to do so may result in bodily harm or death.

Power Switch: Power is supplied or interrupted to the C610W via a red-handled rotary switch located on the front panel of the chiller. This button can be identified by the photo below in Figure 2.

***Figure 2**. Primary power switch indicator*

Introduction to the C610WU Industrial Chiller

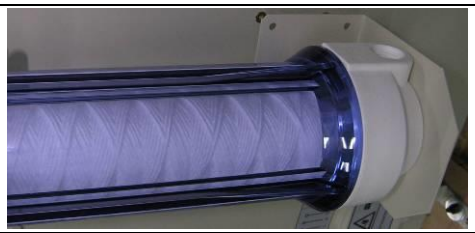
The C610W Industrial Chiller is designed to provide constant temperature coolant circulation between -20℃～50℃ with ±1.0℃ accuracy. This circulated coolant can be used for cooling of TEC modules, or sample cooling in some special cases. The recommended cooling fluids and the lower temperature limits for each are shown in Table 2.

Figure 3: *The C610WU Industrial Chiller*

Unpacking and Equipment List

Inspect the shipping carton for any obvious 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. Carefully open the shipping carton and remove and inspect the contents for any damage that may have occurred during shipment. Please report any evidence of shipping damage to INSTEC immediately. Unpack and verify the contents as shown in the packing list in Table 1.

Table 1: Packing List for C610WU Industrial Chiller

Item/ Quantity	Reference Photo
One (1) C610WU Industrial Chiller	
One (1) Power Input Cable	
Six (6) Pan Head Phillips Screw M5 X 20	
Six (6) Flat Washer M5	
One (1) Chiller inlet filter	
Four (4) Barbed Tube fittings 3/8” PT to ¼” Tube ID	

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Ten (10) Worm-Drive Hose Clamps 10-16	
One (1) Pipe Thread Sealant Tape Roll	
Two (2) 2-meter Braid-Reinforced Silicone Rubber Reducing tubing OD 1/2" x ID 1/4" to OD 7/16" x ID 3/16”	
One (1) 0.5-meter Braid-Reinforced Silicone Rubber Reducing tubing OD 1/2" x ID 1/4" to OD 7/16" x ID 3/16”	
One (1) Alarm Signal Output Connector	
One (1) Filter Service Tool	
One (1) Replacement Input Fuse 380V 20A	

Installation

To avoid any damage while shipping, several important system components have been removed and packaged separately. The first step of Installation is to locate these additional parts and install them onto the C610W main body.

Back panel of the C610W Chiller

The chiller is shipped in the configuration shown in **Figure 4**. The inlet port (A) and outlet port (B) are plugged with threaded inserts to prevent residual water from leaking out. The wiring port (C) is covered by a wiring cover, and the filter is completely removed from the panel (D). Finally, the chiller is fastened to the shipping platform via a series of wood screws.

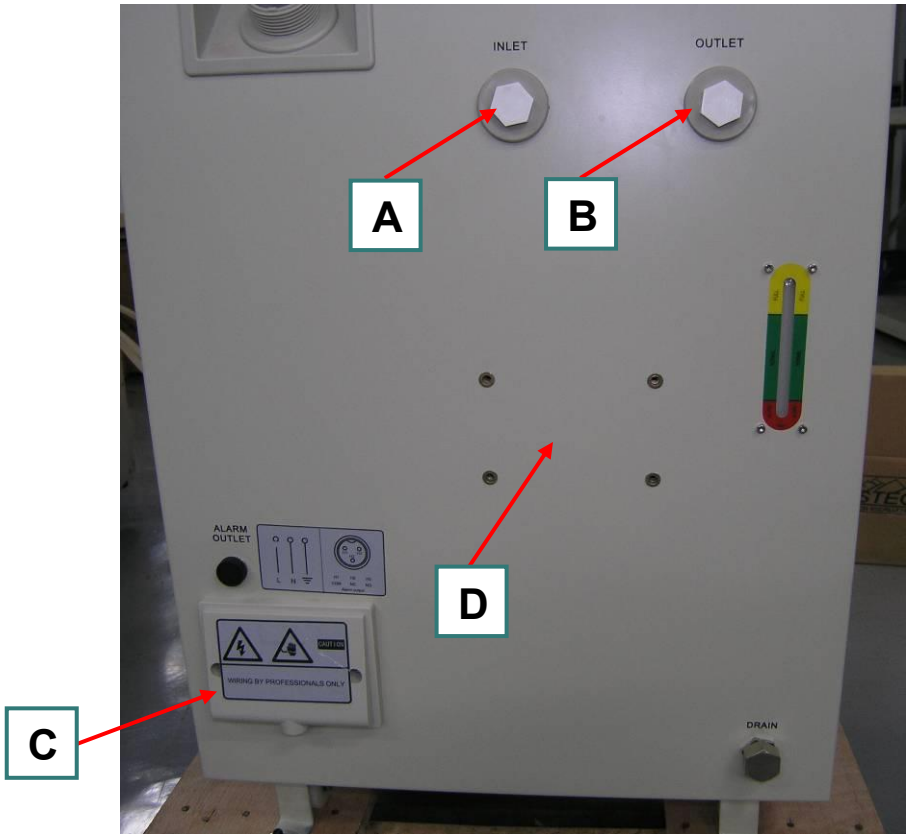

Figure 4: *Back panel of The C610WU Industrial Chiller*

Install the tube fitting at inlet/outlet port

Remove the plastic plugs and replace them with the "Barbed Tube fittings 3/8" PT to ¼" Tube ID" in the accessory box. These connections should be shipped with PTFE thread tape already affixed, but if the thread tape has come loosed for any reason, a roll has been included with the accessories**. Figure 5** comprises a photo of the completed fitting installation.

Figure 5: *C610WU Industrial Chiller with tube fittings installed*

Install the filter and connect the tubing

Locate the 4 M5 X 20 pan head screws and M5 flat washers. Attach the filter bracket to the four threaded holes on back panel of C610WU chiller. To access the screw holes, it may be necessary to first remove the filter element. Once the filter has been attached, install the two remaining barbed tube fittings to the filter Inlet and Outlet ports. Ensure these connections are effectively protected with PTFE thread tape.

Locate the 0.5m long insulated tube (Tube A), and use it to connect the Inlet of the C610W to the Outlet port of the filer. Next, attach one of the 2.0m tubes (Tube C) between the "OUTLET" port of C610W Chiller and the "IN FROM CHILLER" port of the FVC1 valve box. Finally, attach the other 2.0m tube (Tube B) between the "INLET" port of the filter and the other end to the "OUT TO CHILLER" port of the FVC1 valve box.

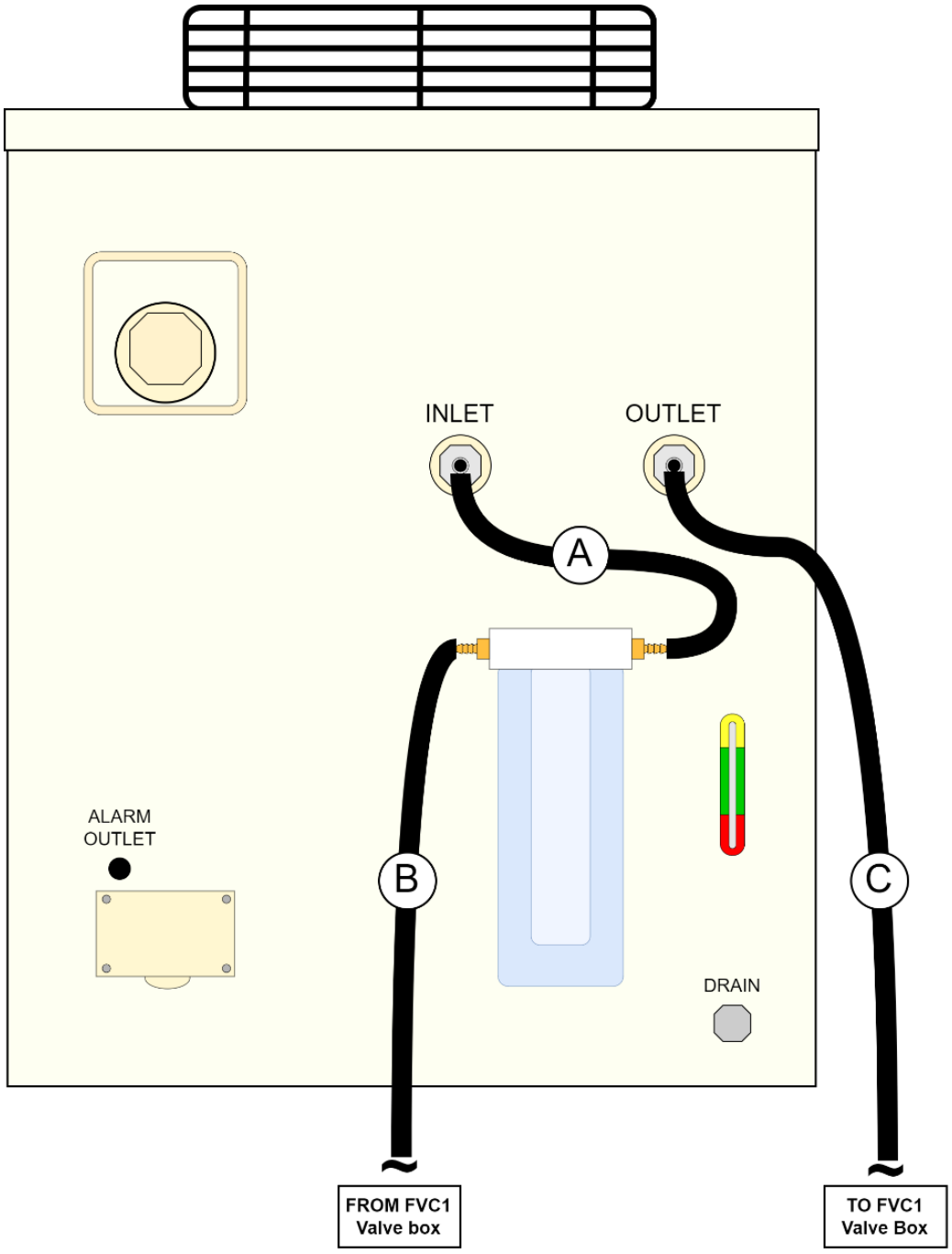

Figure 7: *Water Transfer Tube Connection Diagram*

Figure 8: *AC wiring cover location diagram*

Wiring the input cable

Locate and remove the AC wiring cover. Attach the AC Input cable to the C610W via the three labeled wire terminals. Connect the AC "HOT" wire to the L (Line) terminal, the AC Neutral Wire to the N (Neutral) Terminal, and the Protective earth conductor to the PE (Protective Earth) terminal. Replace the wiring cover after ensuring the newly installed power cable is tightly secured via the screw terminal connections.

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Figure 9: *AC Input Terminals beneath wiring cover*

Operation

The C610W circulates refrigerated coolant to supply cooling power for a variety of applications. The operating temperature limits depend on the coolant used, as ice formation can potentially damage the C610W. Instec typically recommends tap water be used as coolant, which limits the operating temperature to around 2°C. Distilled water is a better choice than tap water if it is available due to the reduced number of contaminants, but this distinction is much less important when using the chiller inlet filter as recommended.

To control the flow of coolant between the chiller and the sample/ chassis being cooled, an FVC1 valve box is used. This valve box is controlled by the mK2000 temperature controller.

Instec will pre-configure the C610W chiller for operation using water before delivery. However, using temperature controller panel, C610W parameters can be modified. Table 5 contains instructions on how to use the controller interface, and **Table 6** contains a list of each C610W parameter and its function.

Table 2: Temperature limits by coolant

Cooling Fluid	Lower Temperature Limit
Distilled or Tap Water	2°C
Ethylene Glycol (antifreeze)	-10°C
Alcohol	-20°C

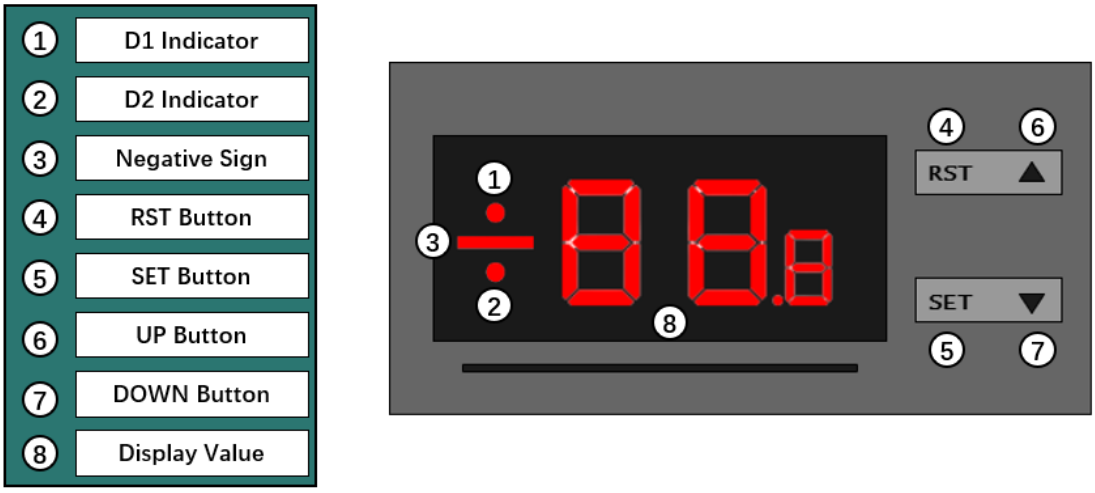

Figure 10: *The Control Panel*

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The indicator lights D1 and D2 (1 and 2 in **Figure 10**) display the current chiller operating mode. The following Table describes each operating state and its corresponding indicator status. By Default, Instec configures the C610W to run in "Constant Temperature Mode", where the coolant temperature is set independently of the ambient temperature.

Table 3: Indicator Light Definition Table

D1 Solid On: Smart Mode	D2 On: Refrigeration Active
D1 Off: Constant Temperature Mode	D2 Off: Refrigeration Inactive
D1 Flashing On: Parameter-set mode or displaying room temp	D2 Flashing On: Energy Saving Mode

Table 4: Control Panel Key Functions

Action	Mode or Display
Default	Current Coolant Temperature (°C)
Click ▲ Button	No response
Click ▼ Button	Display Room Temperature
Click SET Button	Enter target temperature mode. In Constant temperature mode, use arrows to select coolant temperature. In Smart mode, use arrows to select the difference between the coolant and ambient temperature. Press SET again to exit target temperature mode without saving changes.
Click RST Button	Press RST to confirm a value entered in target temperature mode.
Hold Set Button and ▲ for 5 seconds	Enters Advanced Parameter setting mode. Entering parameter setting menu will display 0 on the display. Enter the password using the arrow keys (8 by default) to view and change Advanced Parameters.
While in Advanced Parameter setting mode (Hold)	
Click ▲ or ▼ Button	Moves between F0-F9 Parameters

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Click Set Button	Select a parameter sub-menu. Once inside a parameter sub-menu, use the arrow buttons to change parameter values. Press SET again to exit the current parameter sub-menu.
Click Reset Button	Save changes and Exit Advanced Parameter set mode.

Table 5: Advanced parameter descriptions

Parameter Number	Parameter Label	Parameter	Range	Factory Default Setting	Note
1	F0	Temperature Setting	F9 - F8	2	Used in Constant Temperature Mode
2	F1	Temperature difference setting	-15 - +5	-2	Used in Smart Mode
3	F2	Cooling Hysteresis	0.1 - 3.0	.5	Determines the coolant temperature stability
4	F3	Control method	0 - 1	0	1 = Smart Mode, 0 = Constant Temperature mode
5	F4	High temp alarm	1 - 20	20	Units in degrees C
6	F5	Low temp alarm	1 - 20	1	Units in degrees C
7	F6	Room temp alarm	40 - 50	45	Units in degrees C
8	F7	Password	00 - 99	8	Used to prevent accidental changing of parameters
9	F8	High temp setting limit	F0 - 40	30	Highest target temperature that the user is allowed to enter
10	F9	Low temp setting limit	1 – F0	2	Highest target temperature that the user is allowed to enter

Periodic Maintenance

Table 6: Periodic Maintinence summary

Every 15-30 Days	Every 2-3 months
• Clean intake filters	• Replace Water in reservoir (does not apply to other coolants)

Cleaning Intake Filters

To maintain adequate airflow, the side panels of the chiller should be removed and cleaned every 15-30 days. These side panels contain mesh air filters designed to trap dust/ particles in the environment. If these filters are not regularly cleaned, airflow will become restricted, and the cooling capacity of the chiller will decrease. The panels can be removed using the grey clasps in each of the top corners. To clean the filters, first remove them by pulling UP and then OUT, releasing the filters from the mounting channels. Use a vacuum cleaner or damp towel to remove the debris trapped in both sides of the filter.

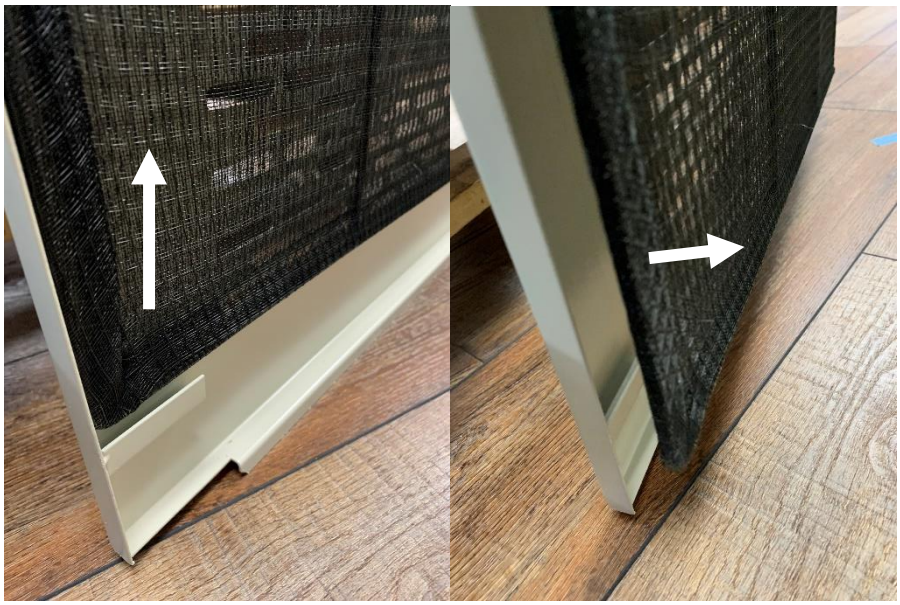

Figure 11: *Side panel filter removal*

Replacing water

To prevent growth of organics in the water reservoir, it is recommended to change the water every 2-3 months. The coolant reservoir can easily be drained using the draining port located on the bottom right corner of the C610W back panel. Be sure to open both the drainage port and the reservoir inlet port to ensure the coolant drains quickly.

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Troubleshooting

Table 7: Troubleshooting matrix

Symptom	Possible Cause	Potential Solution
C610W does not power on (Power switch does not illuminate)	Unit is not powered.	Verify power cable is correctly installed and AC outlet is active.
	Input fuse is blown.	Replace with the included backup fuse.
	Internal components have failed.	Contact Support@INSTEC.com for assistance.
C610W turns on, but coolant does not flow	Coolant lines, internal or external, are leaking.	Check for any leaks, contact support@instec.com if any are found.
	Coolant level in reservoir might be too low.	Add coolant to reservoir until the reservoir level gauge is in the green zone.
	AC Input voltage is incorrect.	Double check AC input voltage.
The coolant is flowing but there is an alarm active	Check error code against **Table 7**.	
The coolant temperature is too high	Cooling power may be diminished due to airflow restriction.	Verify that the chiller has appropriate ventilation, is not too close to any walls or large objects, and cleaned intake filters
	AC input power may be insufficient.	Ensure AC supply voltage is correct and stable
	Chiller parameters may be corrupted or incorrectly entered.	Restore factory default settings by holding up and down buttons together until display says “rE”.
	Coolant may not have reached operating temperature before thermal load was applied.	Allow sufficient time for coolant to reach target temperature before applying heat load.
	Thermal load is larger than the chiller can dissipate.	Reduce the thermal load placed on the chiller, or upgrade to a more powerful chiller.
The room temperature is too high	Room may not have sufficient ventilation.	Ensure room is well ventilated. If the room already has sufficient ventilation, take action to cool the surroundings with an active cooling method.
Excessive condensation forms on water lines	Relative humidity near transfer lines is too great.	Increase coolant temperature or heat area around transfer lines. Another alternative is to decrease the ambient humidity.

Table 8: Error code details

E1	E2	E3	E4	E5
Room temperature exceeds limit	Water temperature exceeds limit	Water temperature below lower limit	Room temperature sensor failure	Water temperature sensor failure

***Special Note: Replacing AC Input Fuse**

In some rare cases, the AC input fuse inside the C610W may be "blown" to protect the internal components. To replace this fuse, the left side panel and fuse access cover must be removed. The fuse access cover is secured using 4 Phillips head screws. Once the fuse holder is exposed, pull the fuse holder directly out to remove it. Replace the fuse, and re-insert the fuse holder. Be sure to replace both the access cover, and the left side panel before powering the chiller back on. If the fuse once again blows after being replaced, there is most likely a substantial hardware failure inside the chiller, and it will need to be evaluated by Instec.

Current Limiting Devices: *Most devices used in your Instec System contain a replaceable fuse rated appropriately for each device. The fuse for the C610W is located within the chiller behind a removable cover, and can be accessed by first removing the left side panel.* ***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 is indicated on the back of the chiller, and on the currently installed fuse.*

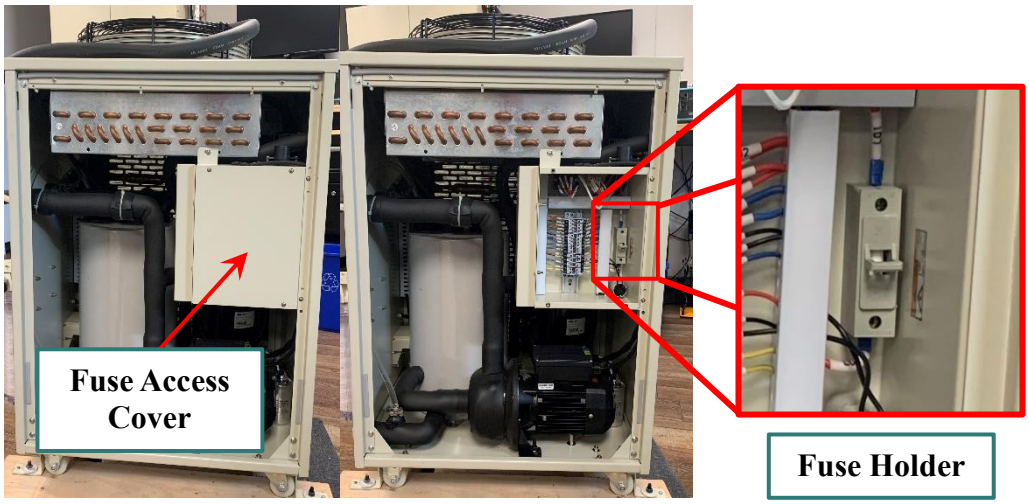

Figure 12: *Fuse socket location*

Mechanical Dimensions and Specifications

Table 9: C610W Specifications

C610W Industrial Chiller Specifications	
Model No.	C610WU
Input Voltage	AC208~230V
Frequency	60Hz
Current	1.5~7.5A
Cooling Capacity	2500W(30℃) 2000W(20℃) 1500W (10℃) 700W(0℃) 300W(-10℃) 100W(-20℃)
Coolant Tank Capacity	15L
Coolant Inlet/Outlet	8mm OD barbed brass connector
Max Lift	25M
Net Weight	65Kg
Gross Weight	75Kg
Chiller Dimensions	60 X 47 X 89cm
Package dimensions	74 X 60 X 109cm