

ACROSS INTERNATIONAL C20 RECIRCULATING CHILLER USER'S MANUAL



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1. SAFETY NOTES / ILLUSTRATED SYMBOLS

Thank you for choosing our C20 Recirculating chiller. Please read this manual carefully before operating the unit. Keep this manual on-hand so it can be used by all operators of the unit. Across International is not responsible for any injury or damage caused by misuse.

Symbol	Explanation of Symbols / Explication des Symboles
	Watch out Important note <i>Attention Remarque Importante</i>
	Protective earth connection <i>Connexion de terre de protection</i>
	Caution Hot Surface <i>Attention Surface Chaude</i>
	Caution High Voltage <i>Attention Haute tension</i>
	Danger: Situation is dangerous and may result in death or serious injury <i>Danger: La situation est dangereuse et peut entraîner la mort ou des blessures graves</i>
	Attention: Beware of rotating objects <i>Attention: Attention aux objets en rotation</i>
	Attention: Wear protective gloves and goggles to prevent personal injury <i>Attention: Porter des gants et des lunettes de protection pour éviter les blessures</i>

2. PRECAUTIONS

English

- ◆ **THIS IS NOT AN EXPLOSION PROOF RECIRCULATING CHILLER. THIS RECIRCULATING CHILLER IS NOT SUITABLE FOR USE IN CLASS I, II, OR III LOCATIONS, AS DEFINED BY THE NATIONAL ELECTRICAL CODE NFPA 70.**
- ◆ **NEVER LEAVE YOUR RECIRCULATING CHILLER UNATTENDED WHILE OPERATING.**
- ◆ Across International is not responsible for any loss of material inside the unit.
- ◆ DO NOT try to heat combustible or explosive materials, or materials that may release corrosive/erosive gases.
- ◆ Never clean the unit with flammable cleaners. Assure that all cleaning agents are completely evaporated and dried before reconnecting the unit to the power supply.
- ◆ Keep the unit away from any electromagnetic interferences, vibrations, flammable materials, fire, or corrosive/erosive gases.
- ◆ In the event of spilled of hazardous material in the recirculating chiller's reservoir, please decontaminate the chamber properly before using the recirculating chiller. Consult the MSDS of the material used for cleaning process or call Across International.
- ◆ Avoid vibration or any corrosive/erosive gases around the recirculating chiller.
- ◆ Always wear thermal gloves and protective goggles during operation.
- ◆ Always make sure your unit is on the correct power source (110V or 220V) and grounded properly. Always use the power cord that comes with the unit. Never modify the cable or power plug.
- ◆  Do not unplug the unit during normal operation.
- ◆ The unit reservoir should be cleaned and disinfected prior to use. There are many commercially available disinfectants available that are non-corrosive and non-abrasive and suitable for use on stainless steel surfaces.
- ◆ Do not position the equipment so that it is difficult to operate the disconnecting device.
- ◆ Consider conditions that may affect your recirculating chiller's ability to accurately control its temperatures. Such as extreme heat from radiators, stoves, autoclaves, etc. Avoid direct sun, fast-moving air currents, heating/cooling ducts, and high traffic areas.
- ◆ To ensure proper air circulation around the recirculating chiller, allow a minimum of 36 inches between the recirculating chiller and any walls or partitions.
- ◆ Maintain ambient temperature under 75 °F or 24 °C.
- ◆ A separate circuit for the recirculating chiller is strongly recommended to prevent possible loss of product due to overloading or failure of other equipment on a shared circuit.
- ◆ If the equipment is not used in a manner specified in this manual, the protection provided by the equipment may be impaired
- ◆ Returning shipment: Save the shipping crate until you are sure your unit is consistently working properly. If for any reason you must return the unit, first contact AI for a return material authorization (RMA) number.

3. INTRODUCTION

Ai C20 series recirculating chillers are the true thermostatic control laboratory chiller, this closed laboratory chiller is ideal for applications such as cooling rotary evaporators, analytical instrumentation, laser etching, ICP, vacuum systems, plasma etching and jacketed reactors. This system can also be used as a replacement to tap water cooling in laboratory applications.

Ai C20 are compressor-based recirculating chillers that offer outstanding performance and high reliability as well as quiet operation and ease-of-use. Powerful force/suction pump provides constant flow rates, while microprocessor PID controller gives you the ideal solution when you need precise temperature control or cooling below ambient temperature.

IMPORTANT! -20°C ULTIMATE TEMPERATURES ARE TESTED UNDER EMPTY LOAD CONDITION (NO ROTARY EVAPORATORS OR JACKETED REACTORS ATTACHED).

Features

- Powerful 535 watts cooling capacity at -20°C
- Powerful 1000 watts heater
- Adjustable pumping speed up to 20 liters per minute
- 7" TFT touch screen controller
- No dry ice or liquid nitrogen needed
- ANSI standard all stainless-steel reservoir
- All steel construction for durability
- Small footprint saves valuable lab space
- Cost saving as the water consumption is completely eliminated
- Plug and play, no assembly required

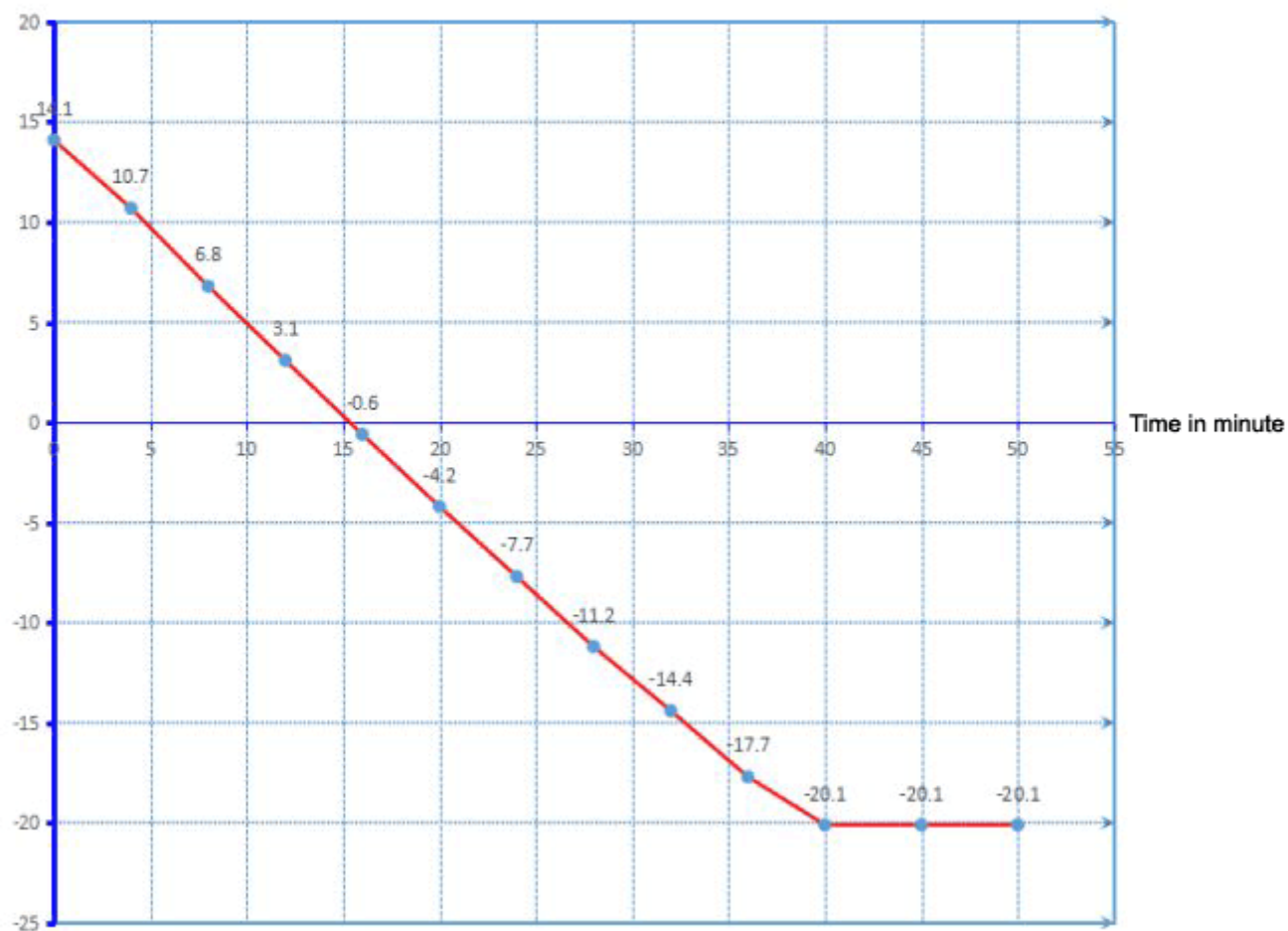
Attention! Do NOT use [Ai Chill-50 heat transfer fluid](#) with this unit.

4. SPECIFICATIONS

Model	C20-7
Electrical requirements	110V 60Hz 1-Phase 1500 watts
Environmental Operation Conditions	- Indoor use and altitude up to 2000m - Ambient Temperature 75 °F (24 °C) - Max. relative humidity 80% for temperatures up to 30°C decreasing linearly to 50 % relative humidity at 40°C - Mains supply volt fluctuations up to ±10 % of the nominal voltage - Transient overvoltage up to the levels of overvoltage category II (See Note 1). - Temporary overvoltage occurring on the mains supply. - Applicable pollution degree of the intended environment (pollution degree 2 in most cases (See Note 2). Note 1: These levels of transient overvoltage are typical for equipment supplied from the building wiring. Note 2: Manufacturers may specify more restricted environmental conditions for operation, nevertheless the equipment must be safe within these normal environmental conditions.
Compressor	Make: SECOP (formerly known as Danfoss), Germany Power: 115V 60Hz 1-PHASE Number of compressor: one Refrigerant: R404A (190g)
Cooling Capacity	1077 watts @ 0°C 535 watts @ -20°C
Heating Capacity	1100 watts
Recirculating pump	Pumping speed: 20 liters per minute, adjustable Maximum head: 16 feet or 5 meters
Reservoir	Dimensions: 8 x 10 x 5.5" (WxDxH) Material: Type 304 stainless steel, polished Capacity: 7.3L or 1.9 gallons Chilling fluid connection: 3/8" hose barb x 2 Chilling fluid Drain port: 3/8" hose barb with on/off valve
Temperature controller	Type: Digital microprocessor PID controlled Display: 7" TFT touch screen Display unit: Degree Celsius °C Temperature step: 0.1°C Temperature accuracy: +/- 2°C Temperature range: -20°C (-4°F) to 99°C (210°F)
Recommended coolant	10°C (50°F) or higher: Distilled water Between 10°C (50°F) to -20°C (-4°F): 50% ethylene glycol and 50% distilled water
Built-in swivel casters	No
Unit dimensions (WxDxH)	12 x 15.5 x 26"
Shipping dimensions (WxDxH)	15 x 20 x 30"
Unit weight	68 lbs.
Shipping weight	100 lbs.
Safety	Compressor over-temp protection Compressor power surge delay protection Short circuit and ground protection Over-current protection Over-temperature protection Upper/lower temperature alarm protection
Recommended for	Ai 2L, 5L or 10L short path distillation systems Ai 2L SolventVap rotary evaporators

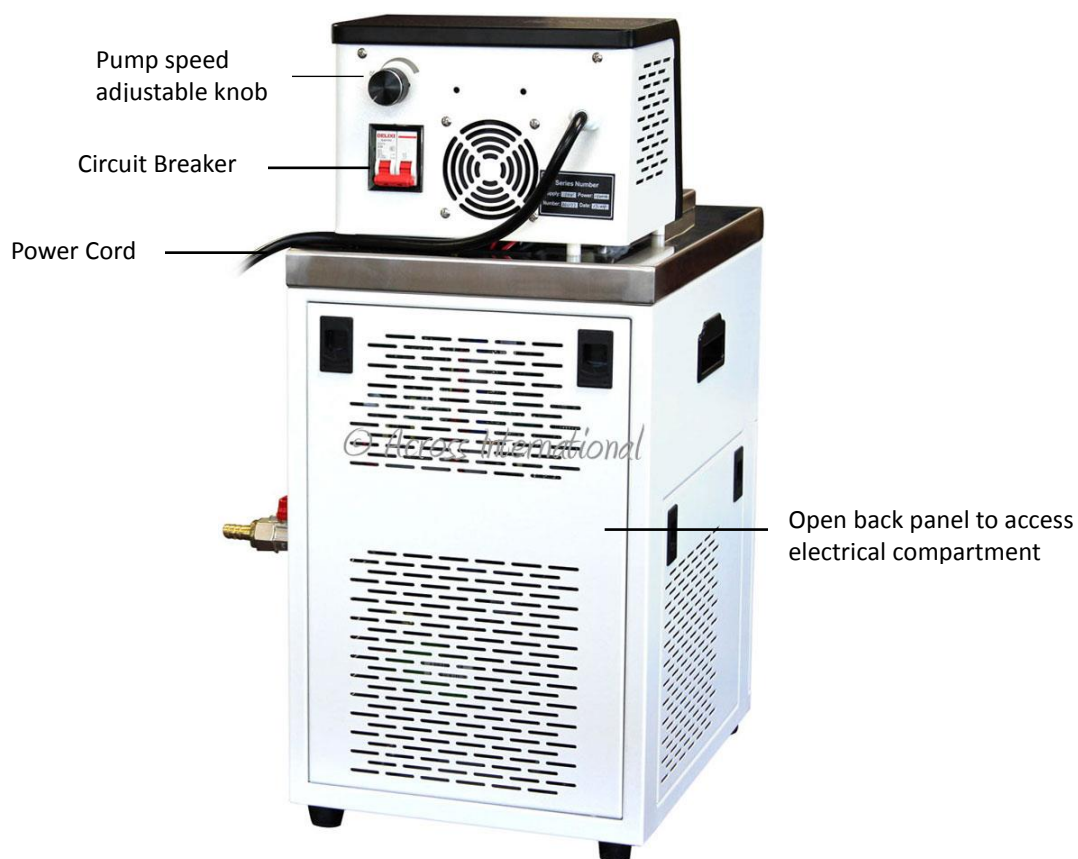
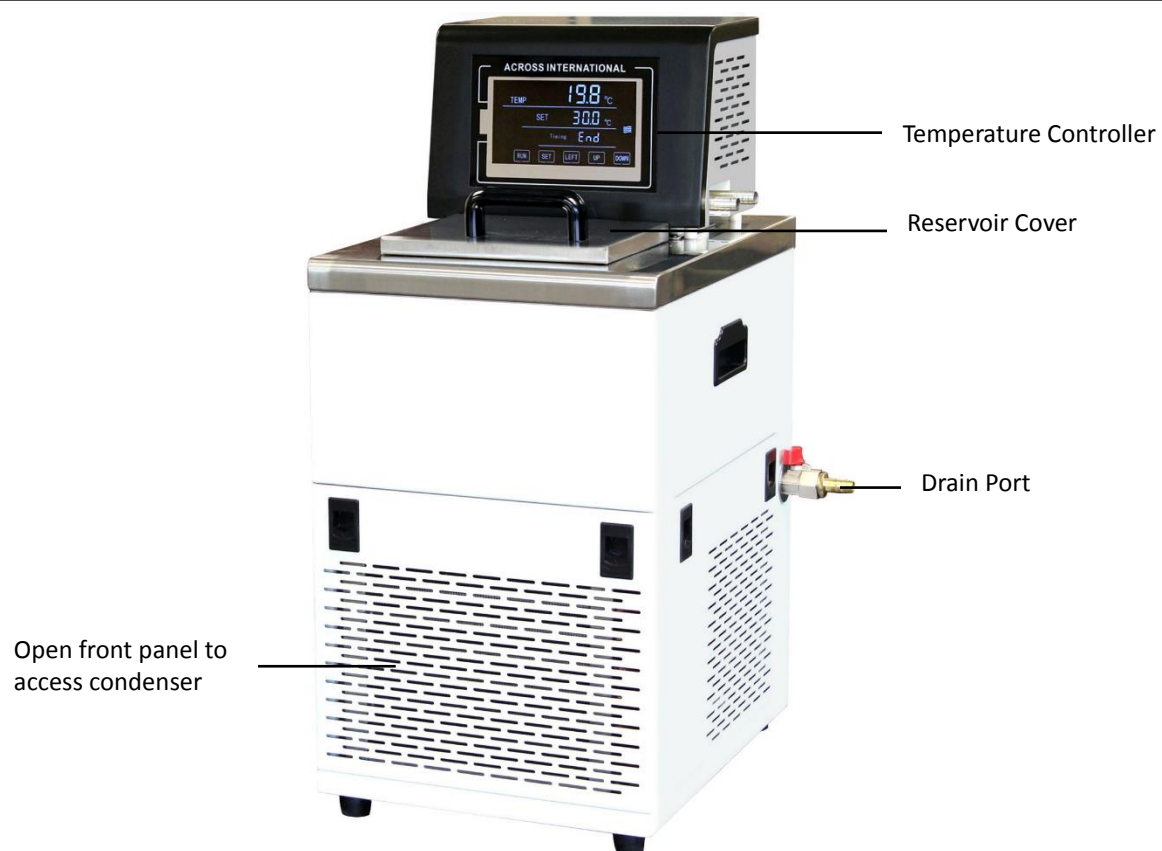
C20 Pump Curve

Temperature in Celsius



Cooling media: 70% water + 30% ethanol, ambient temperature 60°F (15°C)

5. COMPONENTS



6. INSTALLATION

English

It is necessary for 2-3 people to assist in uncrating this unit. Crated unit can weigh between 100 Lbs. and can be a little heavy for one person. Remember your safety is our concern so please use all the safety equipment to move the crate such as a pallet jack and good gloves. When uncrating the unit, remove the bottom screws of crate and pull the crate up, remembering that 2-3 people will need to help. Next remove all foam and any plastic bags that come with unit.



Unit must be installed 3 feet away from any walls or partitions for easy access of main power switch.



Maintain ambient temperature below 75 °F (24 °C).



Place the chiller on a flat, leveled surface.

In case the chiller is delivered sideways, put the chiller up right and let it sit for 24 hours before turning the unit on.



Always use insulated tubing for the chilling fluid connection. Connect the insulated tubing from the chiller coolant inlet and outlet port to the inlet and outlet ports on the device being chilled. (Refer to figure 1).



If heating temperature is higher than 80°C, allow one inch of top space in the reservoir when adding fluid, to allow fluid heat expansion.



Coolant:

- If the chilling temperature is between 10 °C and -20 °C, we recommend using a mix of 50% ethylene glycol + 50% distilled water (See table 1 below for ethylene glycol parentage freezing point)
- If the chilling temperature is 10 °C or higher, we recommend distilled water.
- Do not use salted water (NaCl/H₂O or CaCl₂/H₂O)

Table 1:

Ethylene Glycol Percentage	15 %	25 %	30 %	40 %	50 %	55 %
Freezing point	23 °F / -5 °C	14 °F / -10 °C	5 °F / -15 °C	-7.6 °F / -22 °C	-27 °F / -33 °C	-40 °F / C



IMPORTANT! -20°C/-4°F ULTIMATE TEMPERATURES ARE TESTED UNDER EMPTY LOAD CONDITION (NO ROTARY EVAPORATORS CONNECTED).

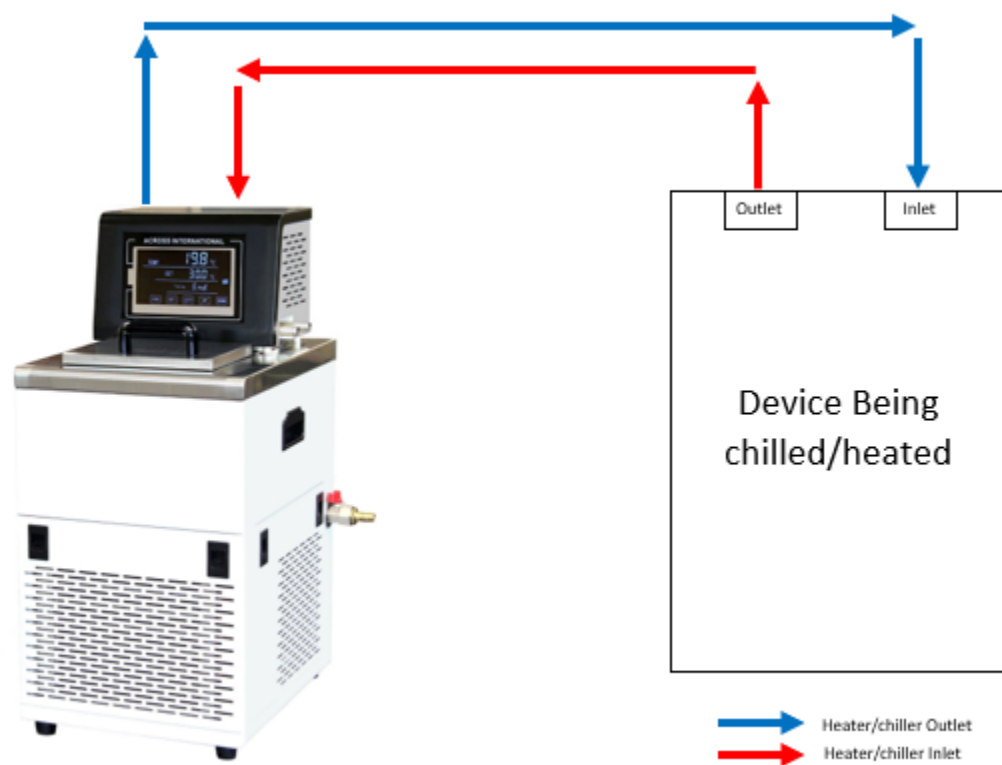
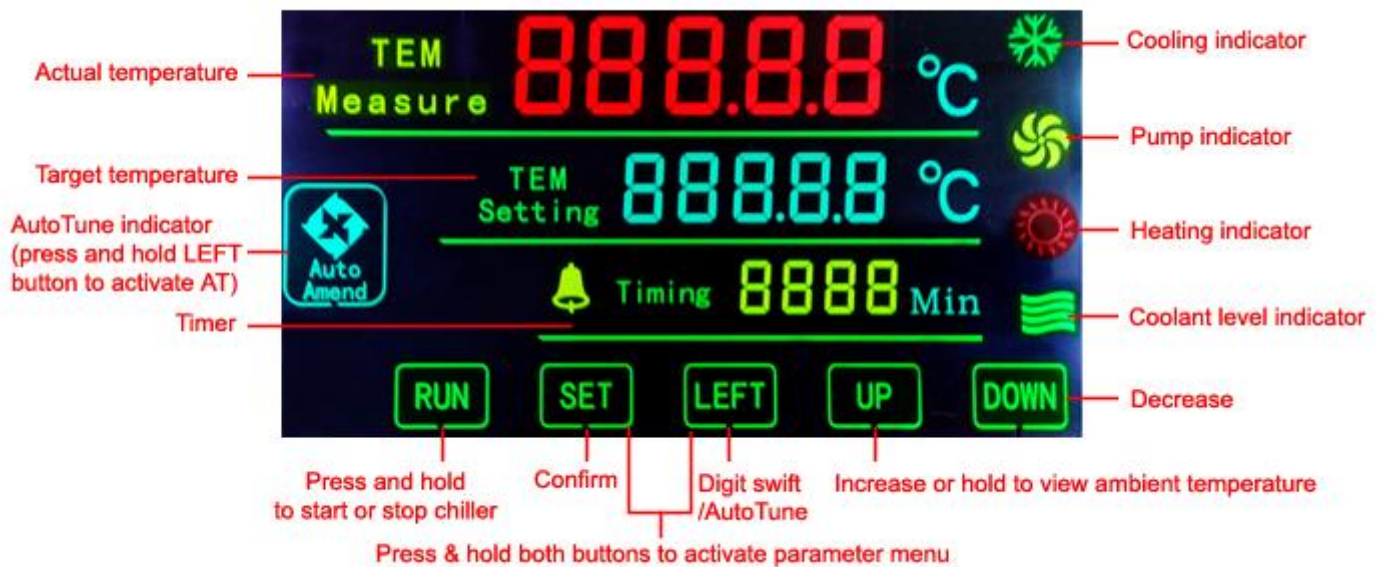


Figure 1

7. OPERATION



7.1 Basic Setting: Target Temperature

- 7.1.1 Make sure all fluid connections are secured, and the fluid level is proper.
- 7.1.2 Plug in the power cord
- 7.1.3 Flip the circuit breaker on.
- 7.1.4 If you hear any buzzing sound, then press any button to clear it.
- 7.1.5 Press "SET" once and set your target temperature in the "TEM Setting" section. Use "LEFT", "UP", or "DOWN" to adjust the temperature setting and press "SET" again to confirm.
- 7.1.6 Set your timer setting in the "Timing" section. Use "LEFT", "UP", or "DOWN" to adjust the temperature setting and press "SET" again to confirm and return to main screen. When timer is up, controller will display "END", then chiller stops, and you will hear a buzzing sound, press any button to clear it. If the timer is set to 0, then chiller will run continuously until the chiller is stopped manually by the user (See picture 1).



Picture 1

7.2Turning the recirculating pump on

7.2.1 Use the knob on the back to turn the pump on and adjust the pumping speed.

Note: The recirculating pump should be kept on at all time during the chiller operation

7.3Running the chiller

7.3.1 Press and hold the “RUN” button to start the chiller, the recirculating pump will turn on automatically

7.3.2 Compress may kick in after a 2-3minutes of delay.

7.4Turning the chiller off

7.4.1 Press and hold the “RUN” button to stop the chiller.

7.4.2 If you hear a buzzing sound, press any button to clear it.

7.4.3 Flip the circuit breaker off.

7.4.4 Unplug the power cord.

8. ADVANCED SETTINGS

Under the main mode, press and hold “SET” and “LEFT” button simultaneously to enter the lock screen (LK). Enter 18 or 28 and press the “SET” button to access the advanced setting tables on the following pages.

Table 1: LK-18

Prompt	Name	Description	Factory value
HT	Unit of time	0: minute 1: hour	0
SC	Ambient temperature offset	Offset ambient temperature difference	0.00
AL	Alarm setting	Alarm sounds when measured temperature is higher than AL	3.0
CL	Refrigeration control Setting	Compressor start-stop control available at the time, when the temperature more than set value + CL and conform to the compressor refrigeration control delay, the light cooling, refrigeration contact through, to start the compressor.	0.5
Ct	Compressor delay	Compressor start delay between two adjacent delay time Ct = 0 indicates no delay	180
Pb	Zero Adjustment	When the zero error of the controller is bigger, full error is small, adjust the value, generally Pt100 rarely adjust the value.	0.0
Pk	Full Adjustment	When the zero error of the controller is lesser, full error is bigger, can adjust the value. $Pk = 4000 \times (\text{mercury thermometer reading values} - \text{current temperature measuring points}) / \text{current temperature measuring points}$	0
HT	Unit of time	0: minute 1: hour	0

Table 1: LK-28

Prompt	Name	Description	Factory value
P	Proportional	Increasing P may reduce temperature overshooting. Decrease P to allow for a faster heating rate.	5.0
I	Integral time	Increase I to lower temperature fluctuation	400
D	Derivative	Differential time constant, d is larger, the differential function is stronger and can overcome the overshoot.	400
Ar	Overshoot inhibition	Used to suppress overshoot (Ar identified as: 1.5 to 2 times the steady-state output duty cycle)	100
t	Control cycle	Silicon controlled rectifier output is commonly 2 to 3 seconds, the remaining power of the larger equipment dispatch T can reduce the static error of PID control.	3

9. MAINTENANCE AND INSPECTION

English

10.1 Maintenance

Please take the time to review all aspects of the unit and possible wear and tear items that are not listed below.

- 10.1.1 It is incumbent for you as a customer to have someone competent to maintain and service your equipment in a safe manner. No certification or special licenses are needed to maintain this unit, however, due to ever increasing of Safety regulations and OSHA, some level of Risk Management is needed for you to safely maintain this unit.
- 10.1.2 Power Cord and Plug – Do not modify or change the power cord or plug. A dedicated circuit should be established power output.
- 10.1.3 Clean the condenser using a brush every 3 month or as needed. (see images 1, 2 and 3 for condenser conditions)
- 10.1.3.1 Turn the circuit breaker off and unplug the unit. Remove the side panel to access the condenser coil.
- Important:** Proceed with caution when removing the side panels. Panels may have ground wires attached, which can become disconnected from the terminals if the panels are pulled too far away.
- If the chiller has handles on the side, the side panels can be popped off.
- 10.1.3.2 Clean the front of the condenser coil with a brush. Try to remove as much debris as possible.
- 10.1.3.3 Use either of the following methods to further clean the coil:
- Compressed air: Use to blow off the remaining dust.
 - Coil cleaner: Start from the bottom of the coil and work your way up to the top. Spray the cleaner into all areas of coil. Let the cleaner stay on the coil for as long as the cleaner instructions specify. Use a spray bottle filled with water to rinse the cleaning agent off. Dry all of the water out of the interior of the cabinet.
- 10.1.3.4 Re-assemble and test the cold trap to make sure everything is working properly



Image 1: Clean Condenser



Image 2: semi-dirty condenser

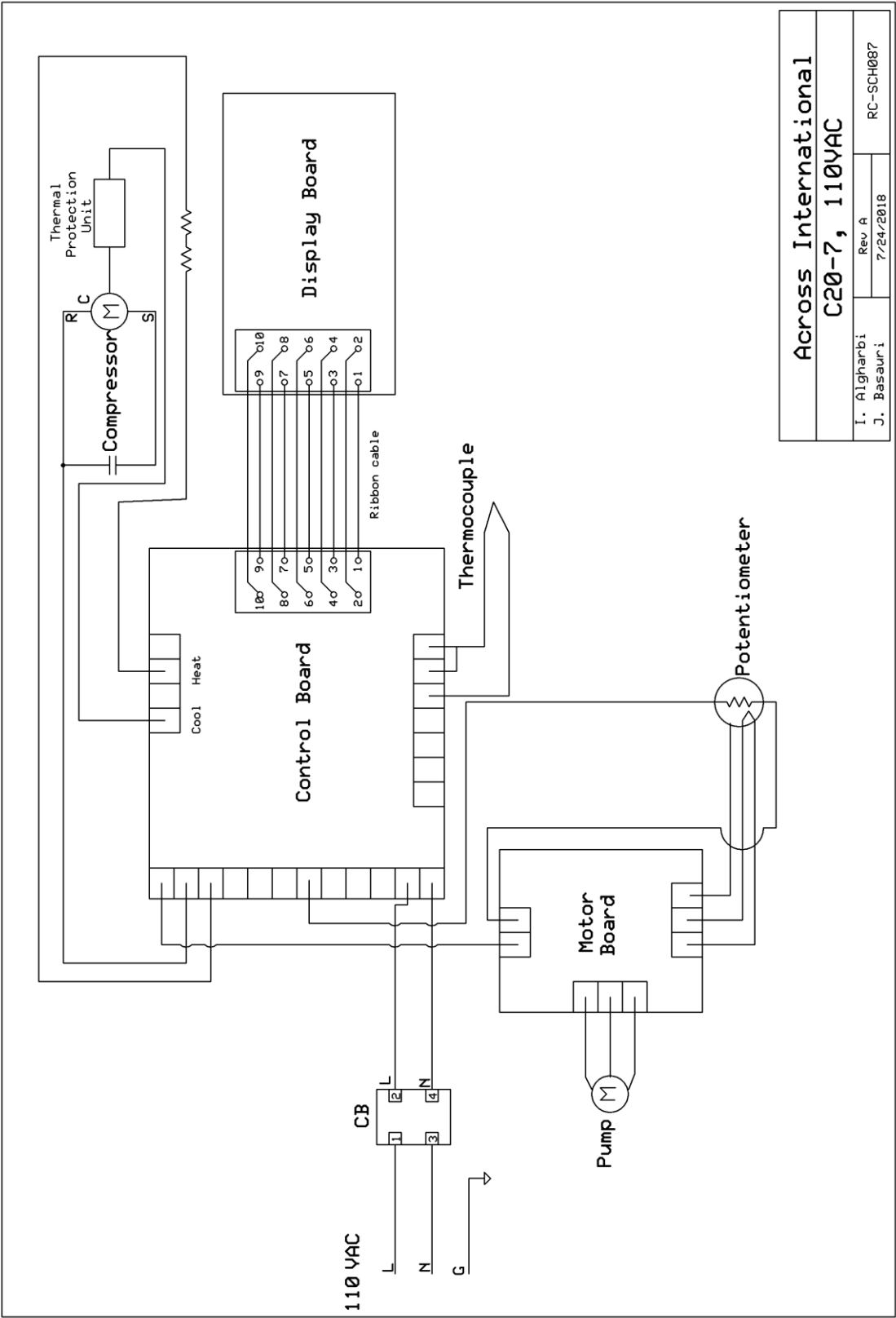


Image 3: Dirty Condenser

10.2 Inspection

- 10.2.1 Every 3 – 6 months, qualified personnel should inspect the unit and keep any records of it maintenance for any City, State, or Federal Inspector.
- 10.2.2 Service Technician - equipment being serviced should at least be shut down for 4 hours prior to the Service Technician arriving.
- 10.2.3 Product specific risks that may affect service personnel:
 - 10.2.3.1 Glass being broken - Use caution and proper gloves to handle broken glass.
 - 10.2.3.2 Using Antistatic Gloves and or Grounding yourself is important so you won't get shocked.
- 10.2.4 Verification of the safe state of the equipment after repair:
 - 10.2.4.1 Visual inspections of the unit is the first thing that will need to be done. Make sure that everything is adjusted or cleaned.
 - 10.2.4.2 Testing the unit to see if all the repairs have worked is the form of verification.

9. SCHEMATICS



10. STANDARD PACKAGE

Part Description	Quantity	Part Image
Ai C20-7 -20°C 7L recirculating chiller	1 pc	
3/8" insulated chilling fluid tubing	10 ft	
User's manual	1 pc	

11. WARRANTY

Across International (AI) warrants for the original user of this product in the U.S.A. only that this product will be free from defects in material and workmanship for a period of one year from the date of delivery to the original user – the “Warranty Period”.

During the warranty period, AI, at its election and expense, will repair or replace the product or parts that are proven to manufacturer’s satisfaction to be defective, or at manufacturer’s option, refund the price or credit (against the price of future purchases of the product) the price of any products that are proven to manufacturer’s satisfaction to be defective.

This warranty does not include any labor charges if outside of the U.S.A. This warranty does not cover any damage due to accident, misuse, negligence, or abnormal use. This warranty is void in the event that repairs are made by anyone other than AI without prior authorization from AI.

Use of AI’s product in a system that includes components not manufactured by AI is not covered by this warranty. Any alteration or removal of the serial number on AI’s products will void this warranty. Under no circumstances will AI be liable for indirect, incidental, consequential, or special damages.

The terms of this warranty are governed by the laws of the states of New Jersey and Nevada without regards to the principles of conflicts of laws thereof. If any provision of this limited warranty is held to be unenforceable by any court of competent jurisdiction, the remainder of this limited warranty will remain in full force and effect.

This warranty is in lieu of and excludes all other warranties or obligations, either express or implied. AI expressly disclaims all implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose.

After the warranty period, AI will continue to provide support and spare parts at a reasonable cost.



Returning shipment: Save the shipping crate until you are sure your unit is consistently working properly. If for any reason you must return the unit, first contact AI for a return material authorization (RMA) number.

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