QSONICA
SONICATORS

Recirculating Chiller
Model #4905 / 4906

Operation Manual

Rev. 11-24

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CE Declaration of Conformity

We: Qsonica, LLC.

declare under our sole responsibility that the

Qsonica #4905, 4906 Recirculating Chiller

meets the provisions of the directives:

Electromagnetic Compatibility (EMC) Directive 2014/30/EU
Low-Voltage (Safety) Directive 2014/35/EU
RoHS Directive 2015/863/EU – R: RoHS Option ONLY
UK S.I. 2016 No 1101

Emissions:
EN 61326-1: 2013 per EN 55011:2009 + A1: 2010 Group 1 Class A

Immunity:
EN 61326-1: 2013 Electrical Equipment for Measurement, Control, and Laboratory Use - EMC
EN 61000-3-2 Harmonics Emissions Class A
EN 61000-3-3 Voltage Fluctuations and Flicker
EN 61000-4-2 Electro-Static Discharge
EN 61000-4-3 Radiated Radio Frequency (RF) Immunity
EN 61000-4-4 Electrical Fast Transient/Burst Immunity
EN 61000-4-5 Surge Immunity
EN 61000-4-6 Conducted RF Disturbance Immunity
EN 61000-4-11 Voltage Dips, Interruptions and Short Variations
EN 61000-6-2 Electromagnetic Compatibility Part 6-2: Immunity for Industrial Environments

Safety:
EN 61010-1: 2010/AMD1:2019 Low Voltage Directive Safety requirements for electrical Equipment for measurement, control, and laboratory use.

SAFETY PRECAUTIONS AND SYMBOLS

Read the MSDS for the coolant used and follow **all** safety precautions listed in the MSDS prior to removing coolant tubes or opening the fill cap as this could result in contact with the coolant inside.

Caution! Risk of electric shock. Disconnect the power cord prior to servicing. This includes changing a fuse or opening the cover for any reason.

CAUTION

- Never disassemble the chiller as irreparable damage may occur.
- Any attempt to open or repair the unit will void the warranty
- Never store the chiller over 70 °C.
- Never operate the chiller in ambient temperatures of 40 ºC or greater unless the unit has been customized for high ambient operation.
- Never operate the chiller within 5 ºC of the coolant's freezing point.
- Only water is recommended when using a #4905 with a Sonicator and cup horn/microplate horn accessory. When using a #4906 always use only proper coolants as specified in manual. Koolance LIQ-702CL-B (27% propylene glycol and water) is recommended.
- Never ship the chiller with coolant inside the liquid cold plate as freezing temperatures may be encountered which would damage the unit. Always pump all coolant out of the chiller prior to shipping.

Symbols Used in this Manual

CAUTION

The red CAUTION equilateral triangle symbol appears throughout the manual. Please follow the important instructions accompanying this symbol to avoid significant damage to the chiller.

WARNING

The red WARNING equilateral triangle symbol appears throughout the manual accompanying certain maintenance and repair activities. Please follow the important instructions accompanying this symbol to avoid situations that could cause injury to the operator or other personnel.

#4905/4906
THERMOELECTRIC CHILLER

PRODUCT
Manual

SECTION 1
INTRODUCTION

The recirculating chiller utilizes thermoelectric technology to deliver up to 400 Watts of cooling capacity without the use of compressors or refrigerants. The system provides 1 liter per minute of constant temperature coolant, with PID control for both cooling and heating. With fewer moving parts, the system is highly reliable and energy efficient.

The chiller systems provide stable and precise temperature control for a variety of applications precise temperature control.

From conception, the chiller systems have been designed for long life and ease of use. The internal thermoelectric modules have lifetimes greater than 200,000 hours.

SECTION 2
SPECIFICATIONS

Operating Range (Set Point):	5°C to 50°C standard
Ambient Temperature Range:	0°C to 40°C non-condensing
Cooling Capacity (typical[1]):	400 Watts @ 20°C in 20°C ambient air
Heating Capacity (typical):	800 Watts @ 20°C in 20°C ambient air
Noise Level (at 1 meter):	< 63 dBA (60 dBA and 49 dBA options available)
Coolant / Process Fluid #4905:	Water
Coolant / Process Fluid #4906:	Water, Koolance (27% propylene glycol / water mix) or 27-50% ethylene glycol / water mix
Process Fluid Fittings:	1/4” quick connect type connectors, Colder brand
Pumps:	Diaphragm
Wetted Materials:	Aluminum, stainless steel and polymers
Dimensions (L x W x H):	13” x 11” x 13” (32cm x 28cm x 32cm)
Weight:	28 lbs (12.7 kg)
Power Input:	Universal: 115-230 VAC, 50/60 Hz, 7-5 amps max
Controls:	Digital PID controller for heating and cooling
Communications:	Keypad or optional RS232 interface
Alarms	Temperature, fluid level, system or component failure (display and RS232 option)
Standards	TUV listed to UL, CAN/CSA and EN 61010-1, CE 61010-1, RoHS compliant
Warranty	2 years

SECTION 3
HOOK UP

Figure 3A: 4905/4906 Front

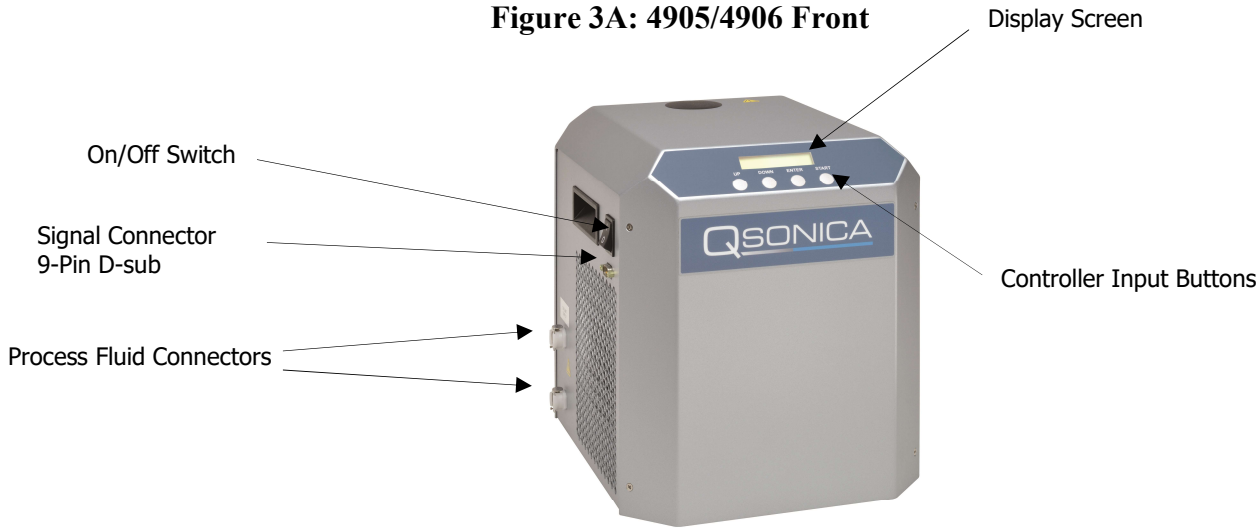


Figure 3B: 4905/4906 Side

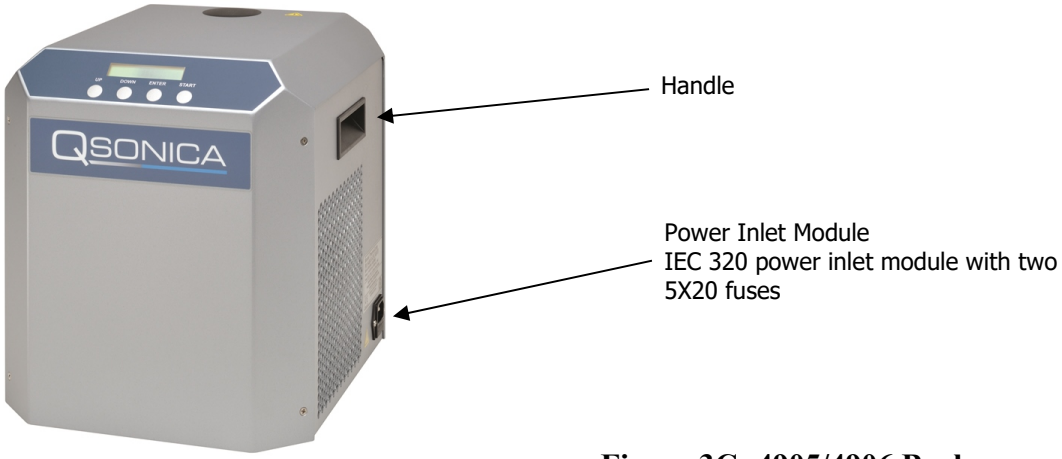


Figure 3C: 4905/4906 Back

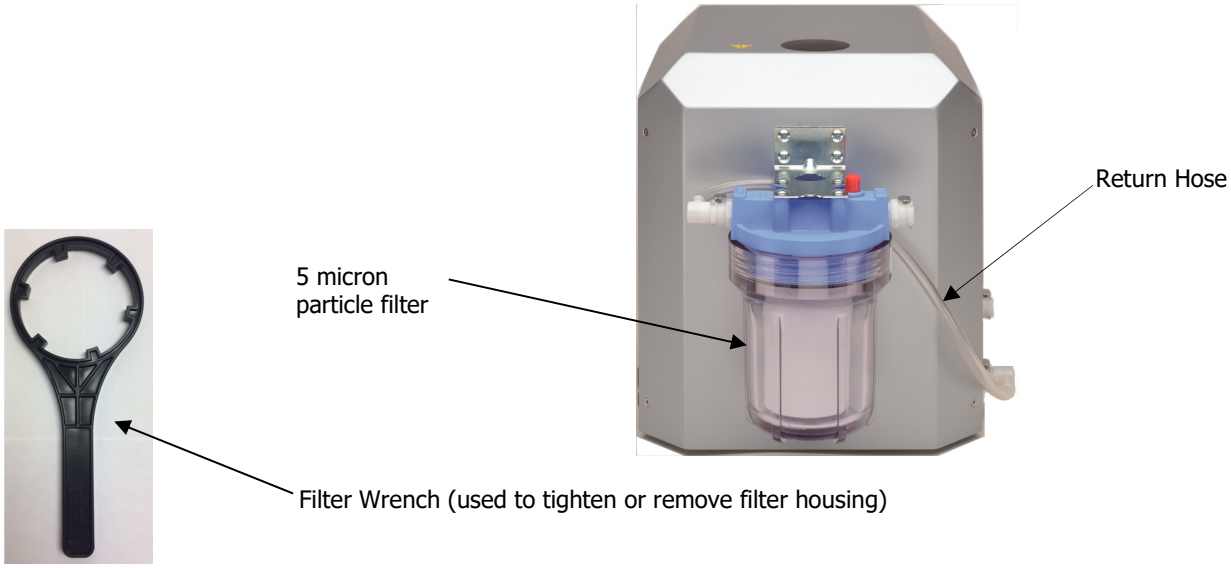


Figure 3D: 4906 ONLY

3.1 ELECTRICAL CONNECTIONS (SEE FIGURE 3)

WARNING

Electrical Shock Hazard: Never Plug in a Line Cord with Wet Hands

Power: The AC power inlet is an IEC320-C14 socket. Plug the line cord provided into this socket and then into the appropriate 115 - 230 VAC 50/60 Hz wall outlet. Continuous current draw is rated at 7 amps at 115 VAC or 5 amps at 230VAC (50/60 Hz). To ensure safe operation of the unit, it is important to ensure that the outlet is properly grounded.

The #4905 and #4906 chillers ship with a USA/Canada and Europe power cord. If a power cord for another Country/Region is required to support universal power operation please contact your representative.

Fuses: 10 amp (5mm x 20mm) GDB quick acting glass, meets IEC 127-2
Replacement Fuse: QSONICA#20-22332-10, Allied Electronics #70149445.

Optional Alarms: Alarm signals are TTL signals, normally high (>4 VDC), located on the 9-pin d-subminiature connector as follows:

System Alarm:	Pin 7
Alarm Signal Return:	Pin 8
Temperature Alarm:	Pin 9

Optional RS-232: The chiller has an RS-232 communication link option. Connections are made via a 9-pin dsub connector (see section 7 for wiring and communications details).

3.2 PLUMBING CONNECTIONS (SEE FIGURE 3)

The standard process fluid inlet (coolant return) and outlet (coolant supply) connections, located on the left side, are 1/4" Colder brand fittings.

Important Note: The chiller should be located at approximately the same level or above the system.

3.3 Air Considerations

The air inlet and outlet are located on the left and right sides respectively. Restricting airflow into or out of the unit will impair performance. At least 3 inches of clearance is required on each side to ensure adequate airflow.

3.4A Coolant Fill (for the 4905 chiller only)

CAUTION

Use only recommended coolants

Recommended Coolants:

Qsonica recommends DI water only. For cup horn or microplate horn cooling, DI water only is required. Please contact a Qsonica representative before using any other coolants as they may not be compatible with the cup horn or microplate horn accessories.

3.4B Coolant Fill (for the 4906 chiller only)

Read the Coolant MSDS Prior to filling the chiller

The coolant fill cap is located at the top rear of the unit. Twist off the cap counter-clockwise to open. Fill reservoir to just below the bottom of its neck with coolant. Replace cap and close before operating chiller.

If using the #4906 Chiller with a coolant other than water discontinue using the filter on the back of the unit. Connect the Coolant Return tubing from the flow cell water jacket directly to the chiller Coolant Return port bypassing the filter.

Recommended Coolants:

DI water, ethylene glycol/water mixtures or Koolance, a pre-mixed 27% propylene glycol/water based coolant containing an algaecide and corrosion inhibitors, are acceptable coolants.

CAUTION

Use only recommended coolants

Koolance comes in several colors, the colorless or blue versions in 700 ml bottles, part number: LIQ-702CL-B (clear) or LIQ-702B-B (blue). These versions are recommended as the dyes in the other colored versions can form small particulates when not well mixed.

Contact Koolance for details:

Koolance USA
2840 West Valley Highway North
Auburn, WA 98001
(253) 893-7551

Note that algae/bacteria growth can occur when water is used alone as a coolant. Use AquaClear from Belart https://www.belart.com/aqua-clear-water-conditioner-cleanware.html or similar that does not damage acrylic, to treat and keep water in the system clean.

SECTION 4
START UP

Note: In order to avoid injury or damage, operators must only use this product in the manner specified below.

WARNING

Electrical Shock Hazard: Never Plug in a Line Cord with Wet Hands

Start-up the chiller using the following steps:

1) Connect coolant tubing to fluid connections located on the left side of the unit, labeled Process Out (supply) and Process In (return).
2) When using a #4905 chiller: review the Cup horn or Microplate horn accessory instructions for information on how to fill with DI water.
   When using a #4906 chiller: Remove the reservoir cap on top and fill the reservoir to just below the bottom of its neck with coolant. Replace cap.
3) Plug line cord into 115 - 230 VAC, 50/60 Hz.
4) Turn on switch located on the left side of the unit. The front display should read the current coolant temperature.
   Note: When using the #4906 chiller: If the front display reads "TANK LEVEL LOW", add more coolant to the reservoir until the display changes to read the coolant temperature.

CAUTION

Running the ThermoCube dry (no fluid) may damage the pump

Important Notes:

Do not run the chiller dry for more than a few seconds.

SECTION 5
OPERATION

The chiller is operated via the control panel located on the front panel. The control panel has a 16-character LCD display and four input keys: UP, DOWN, ENTER, and START/STOP. These keys work as follows:

Key	Action
UP	Pressing the UP key raises the parameter value displayed.
DOWN	Pressing the DOWN key lowers the parameter value displayed
ENTER	Pressing the ENTER key momentarily enters the parameter changed.
ENTER	Pressing and holding the ENTER key for 3 seconds causes the chiller to change the display menu (see menu structure)
START/STOP	Pressing the START/STOP key turns on temperature control.
START/STOP	Pressing the START/STOP key while the chiller is operating turns off temperature control (Operating Mode = *).

5.1 Simple Operation

The chiller comes with preset operating parameters that will work well for most applications. If temperature control at one temperature is desired, follow the steps below.

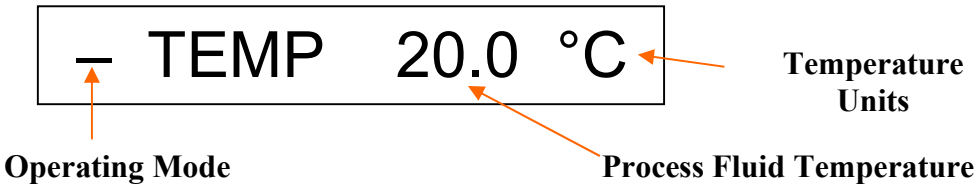
1) Turn on the chiller and wait for display to read TEMP.
2) Press the UP or DOWN keys to change SETTEMP1 to the desired set point.
3) Press ENTER to accept the value.
4) Press the START/STOP key to begin controlling to the temperature just entered (SETTEMP1). The Operating Mode will now show "–" (cooling) or "+" (heating).
5) Pressing START/STOP while the unit is controlling temperature will stop temperature control. The Operating Mode will now show "*" for Standby (not controlling).

Caution: Do not externally shut off the flow of coolant for more than a ten second period; pump damage will result if run deadheaded/dry for extended periods of time.

The chiller will now control to the set point temperature. To change the set point temperatures just press the UP or DOWN keys again to change SETTEMP 1 to the new set point, followed by ENTER and then START/STOP. The Operating Mode will now show "–" (cooling) or "+" (heating). If the Operating Mode shows "*", press START/STOP to begin controlling.

Status Menu: The status menu displays the chiller operating status and coolant temperature. The chiller operating mode is shown in the display's first character: (See Figure 5)

Figure 5: Operating Display



* = Standby mode, chiller is not controlling temperature
– = Cooling mode, chiller is controlling temperature and process fluid temperature is above the set point
\+ = Heating mode, chiller is controlling temperature and process fluid temperature is below the set point

The process fluid (coolant) outlet temperature is shown after TEMP in °C or °F.

Pressing the UP or DOWN keys with the # of cycles set to zero (default) will change the set point temperature upon pressing the ENTER, then the START/STOP key.

5.2 ALARMS

The chiller has two TTL level alarms, one for temperature and one for system failure:

Temperature: TTL high (>4 VDC) fluid temp below alarm set point
TTL low (<0.5 VDC) fluid temp above alarm set point
System: TTL high (>4 VDC) system operating normally
TTL low (<0.5 VDC) system failure has occurred

A list of system failures causing the system alarm to change to TTL low can be found in Section 6. In the event of a system failure, the alarm type will be shown on the front display.

5.3 DRAIN PROCEDURE

Draining procedures for the #4905 and #4906 are specific to the accessory they are used with. Please refer to the accessory (e.g. cup horn, microplate horn or flow cell) instructions for information on how to drain the set up.

SECTION 6
SYSTEM ALARMS/TROUBLESHOOTING

WARNING

Electrical Shock Hazard: Always unplug the unit before removing the cover.

WARNING

Do not attempt to service or repair the unit beyond the troubleshooting checks described in this section without first contacting Solid State Cooling Systems

The chiller has multiple system alarms that when triggered will show on the display. When an alarm is displayed the system will not attempt to heat or cool the coolant.

Alarms:

RTD Open: The temperature sensor has failed or its connector has come loose. *Turn off the chiller and disconnect the AC power cord. Contact Qsonica for a replacement RTD, or for a RMA number to return the unit for RTD replacement.*

Fan Fail: Fan is supplying insufficient air to cool the thermoelectric heat exchanger. *Either the fan has failed or the airflow into or out of the system is blocked. Check that the side air inlet and outlet gratings are not blocked. The chiller requires at least 3 inches of clearance around these gratings. If airflow is not blocked, contact Qsonica for a replacement fan, or for a RMA number to return the unit for fan replacement.*

Pump Fail: The liquid heat exchanger plate temperature is either too hot or too cold, indicating pump failure, a blockage in the external plumbing lines or operation outside the normal 5°C to 50°C coolant temperature (without –LT or –HT options). *Turn off the chiller and disconnect the AC power cord. Verify that no kinks or blockages exist in plumbing line, both outside and inside the chiller. If no coolant flow blockages exist, contact Qsonica for a replacement pump, or for a RMA number to return the unit for pump replacement.*

Tank Level Low(#4906 Only): Liquid reservoir level is too low. *Unless filling for the first time, check all outside plumbing lines for leaks. Once all leaks are sealed, remove the cap and add more coolant until the alarm disappears.*

No Display: If the liquid crystal display does not illuminate upon turning on the chiller, the internal 12 or 24VDC power supply has failed, the diaphragm pump has failed, or the LCD display has failed. *Contact QSONICA for a RMA number to return the unit for replacement of the power supply, diaphragm pump, or display.*

Temperature Control Poor: If no other alarms are present, poor temperature control indicates the heat load is too great for the chiller, the TE cooling/heating engine is not receiving power, the PID constants have been corrupted or the chiller needs repair. *First check the PID constant values shown section 5.2 match the factory defaults. If not, change the values to the default values. Otherwise, contact QSONICA for technical support.*

Important: The tank level low alarm will automatically reset when the tank is filled. The RTD, Fan and Pump failure alarms will not reset until the system power is turned off.

SECTION 8
CLEANING YOUR CHILLER

The exterior surfaces of the chiller may be cleaned with a non-shedding wipe dipped in isopropyl alcohol.

SECTION 9
TECHNICAL SUPPORT

Customer service is our highest priority. Please contact us immediately for technical assistance if you have questions or concerns.

Hours: 8 a.m. to 5 p.m. Eastern Time, Monday - Friday
Telephone: 203-426-0101
Fax: 203-426-7026
E-mail: info@sonicator.com

WARRANTY POLICY

This chiller is covered under a two-year parts and labor warranty from the date of shipment, assuming proper use and maintenance of the unit. All warranty work shall be performed at Qsonica's facility, located in Newtown, CT, USA and requires pre-authorization by QSONICA. Malfunctioning products should be returned after receiving an RMA. Qsonica will determine if the problem is covered under the warranty.

Warranty Coverage:

Products with defects in components or manufacturing which are reported to Qsonica before the end of the warranty period will be repaired or replaced at no cost (see below for reporting requirements). The warranty period begins on the date the product was initially shipped from Qsonica.

Excluded from Warranty:

Excluded from warranty is any damage caused to the product occurring during, but not limited to, such events as shipment, installation, storage, or usage occurring during a situation specifically cautioned against or noted in the product manual.

Specific situations, which invalidate the warranty, include (but are not limited to):

- Removing the serial number label.
- Any disassembly (partial or complete) of the product.
- Changing any components of the product.
- Subjecting the product to temperatures below the freezing point of the coolant used.
- Subjecting any product to temperature, voltage, current, or pressure (internal or external) greater than that specified in the product manual.
- Any actions prohibited in the "Caution" section of the product manual.

Returned Goods Procedure and Reporting Requirements

Before a failed product is returned to the factory, a Returned Materials Authorization (RMA) number must be obtained from Customer Service at 203-426-0101. The date the RMA is requested will be the reporting date noted and relevant to the warranty. Products, which have received an RMA, must be received at QSONICA's factory, within 30 days or the reporting date will be moved ahead 30 days and a new 30-day waiting period will begin. Customers shall pay shipping cost of returning any unit to QSONICA and QSONICA shall pay shipping cost of returning any unit repaired under warranty to the customer.

All out of warranty returned goods will require an evaluation purchase order prior to receipt at Qsonica.