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Operating Manual

Refrigerated and Heating Circulators – A Series

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Thank you for choosing Anova Temperature Control Instruments!

This manual covers basic operational usage of our circulators. For optimal utilization of all functions, we recommend that you thoroughly study this manual prior to beginning operation. Anova does not directly support OEM systems or system branded for other companies. OEM systems may contain different specifications and features that are not covered in this manual. This manual also does not include usage instructions for OEM / custom designed systems because they typically run custom software designed by other companies.

Unpack the circulator and accessories and inspect them for possible transport damage.

Wait 24 hours before Power On for Max Cooling Capacity on Refrigerated Systems

Immediately report damage to Anova and the responsible carrier.

Failures to report transport damage will not allow us to support your claim for insurance.

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Introduction

Anova circulators control the temperature of specific fluids in a bath tank. The system features a pump connection for temperature control of external systems in a closed loop circuit.

Anova circulators are not for direct temperature control. Direct temperature control means direct contact of the object with the bath fluid. This includes food, tobacco, pharmaceutical and other consumed organic products.

Do not use Anova circulators to directly cook food – at no time should food products come in contact with bath fluid. Food must be vacuum-sealed before use with circulator.

Safety

Anova products ensure safe operation when installed, operated, and maintained according to Safety recommendations in this manual. This section explains the potential dangers that may arise when operating Anova circulator and notes many important safety precautions.

FIRE HAZARD

Be careful when filling the bath with flammable fluids
Observe fluid flash points and adjust safety dial
Observe all warnings for bath fluids and the respective safety datasheets
Only use the system in well-ventilated areas when using flammable fluids
Insufficient ventilation may result in the formation of explosive mixtures

DO NOT OPERATE WITH SUSPECTED FAILURES

Do not run circulation fluids above their boiling point
Do not crimped circulation lines.
Do not circulate cold fluid into hot glassware
Do not set safety temperature limiter above fluid flash points.
Anova is not responsible for any damage that might result from examples similar to above

BURN HAZARD

Do not touch connectors and bath cover or fluids when bath is under high temperature

OBSERVE ALL WARNING LABELS ON PRODUCT

Read all labels on product to ensure proper usage.

GROUND PRODUCT

Proper grounding is required.

Operational Safety

Follow the safety instructions to avoid personal injury and property damage.

Fluids Safety:

- Set the temperature safety dial to at least 25 °C below the flash point of the bath fluid.
- Never operate the system without bath fluid in the bath.
- Do not introduce water into hot oil.
- Pay attention to the thermal expansion of bath oil during heating to avoid overflows.
- Do not drain the bath fluid while it is hot!

Circulation Safety:

- Note the temperature range of plastic bath tanks and tubing – they melt!!!
- Avoid bent and crimped tubing in the tubing, and maintain a sufficient distance from surrounding walls.
- Regularly check the tubing for material defects (e.g., for cracks and leaks).

Installation and transport safety:

- Place the system on an even surface to prevent spills and tip over.
- Do not operate damaged or leaking units.
- Disconnect power before cleaning the unit.
- Sudden jolts or drops may cause damage in the interior of the unit.
- Do not remove warning labels.

Application Safety:

Temperature controlling the contents of a reactor constitutes normal circulator practice.

However, we do not know what substances are contained within reactor vessels and cannot help with determining the safety of your applications.

Many chemicals are:

- **Flammable or explosive**
- **Hazardous to health**
- **environmentally unsafe**

Many materials and reaction processes are unstable at room temperature.

The user alone is responsible for the handling of these substances and determining the safety of his or her individual applications.

Installation

- **Wait at least an hour to setup the system after transportation. This will allow any compressor oil to drain back into the compressor. Failure to do so will compromise the cooling performance of the system.**
- The installation location should be large enough and provide sufficient air ventilation.
- Keep at least 1 foot of open space on the front and rear vents.
- Do not set up the unit in the immediate vicinity of heat sources.
- Do not install in outdoors and do not expose to sun light.
- Make sure that the power supply has low impedance.
- Ambient temperature range: 40 °C, min. 5 °C.
- Relative humidity: 50% (40 °C).

Safe Bath fluids

**Carefully read the safety data sheet of the bath fluid, pay attention to the fluid flash point!
Use only non-acidic and non-corrosive bath fluids.**

If user chooses to use non-approved fluids make sure they are non-corroding.
If using hazardous materials or materials that could become hazardous, the operator must affix safety labels to the front of the unit so they are highly visible.

Recommended Bath Fluids:

Fluid recommendations for cold temps:

Temperature ranges 1°C -20°C: Ethanol or water/glycol mixture 1:1

Temperature ranges -20°C to -40°C: Dynalene

Fluid recommendations for hot temps:

Temperature ranges 1°C to 80°C: Soft/decalcified water or distilled water only. Tap water quality is highly variable based on local conditions.

Temperature ranges 80 °C to 200 °C: Mineral/silicone oils

Warning:

- Hard water leads to calcification in the bath.
- Ferrous water can cause corrosion.
- Chloric water can cause pitting corrosion.
- Lab distilled and deionized water can cause corrosion if used long term, even in stainless steel.

Fire or other dangers when using bath fluids that are not recommended:

Please contact Anova before using other than recommended bath fluids. Anova assumes no liability for damage caused by the selection of an unsuitable bath liquid.

Unsuitable bath fluids are fluids which:

- are highly viscous
- have creep characteristics
- have corrosive characteristics

Filling

- Take care that no liquid enters the interior of the circulator.
- Recommended maximum filling level of 1.5 Inches below the rim.
- Pay attention to overflow of liquid.
- Do not drain the bath fluid while it is hot!

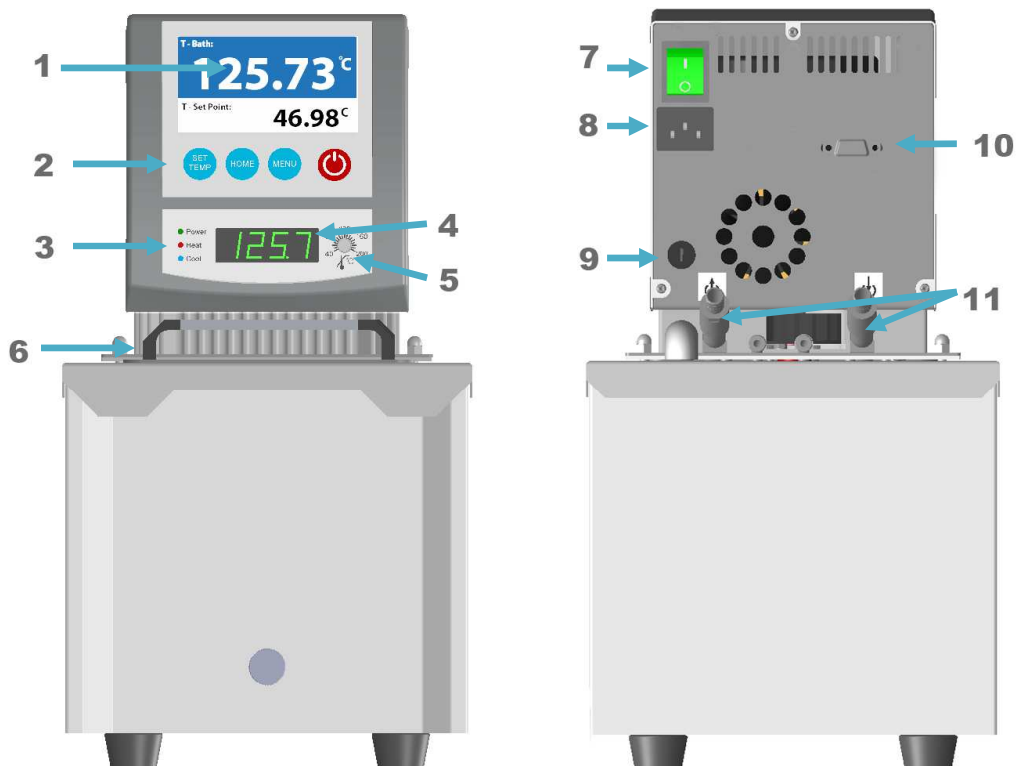
Disposal

This product uses bath fluids that might partially consist of mineral oil or synthetic oil. For disposal, observe the instructions in the safety data sheets. Some systems contains common refrigerants found in household products please contact your local waste management company to determine disposal requirements.

Technical specifications

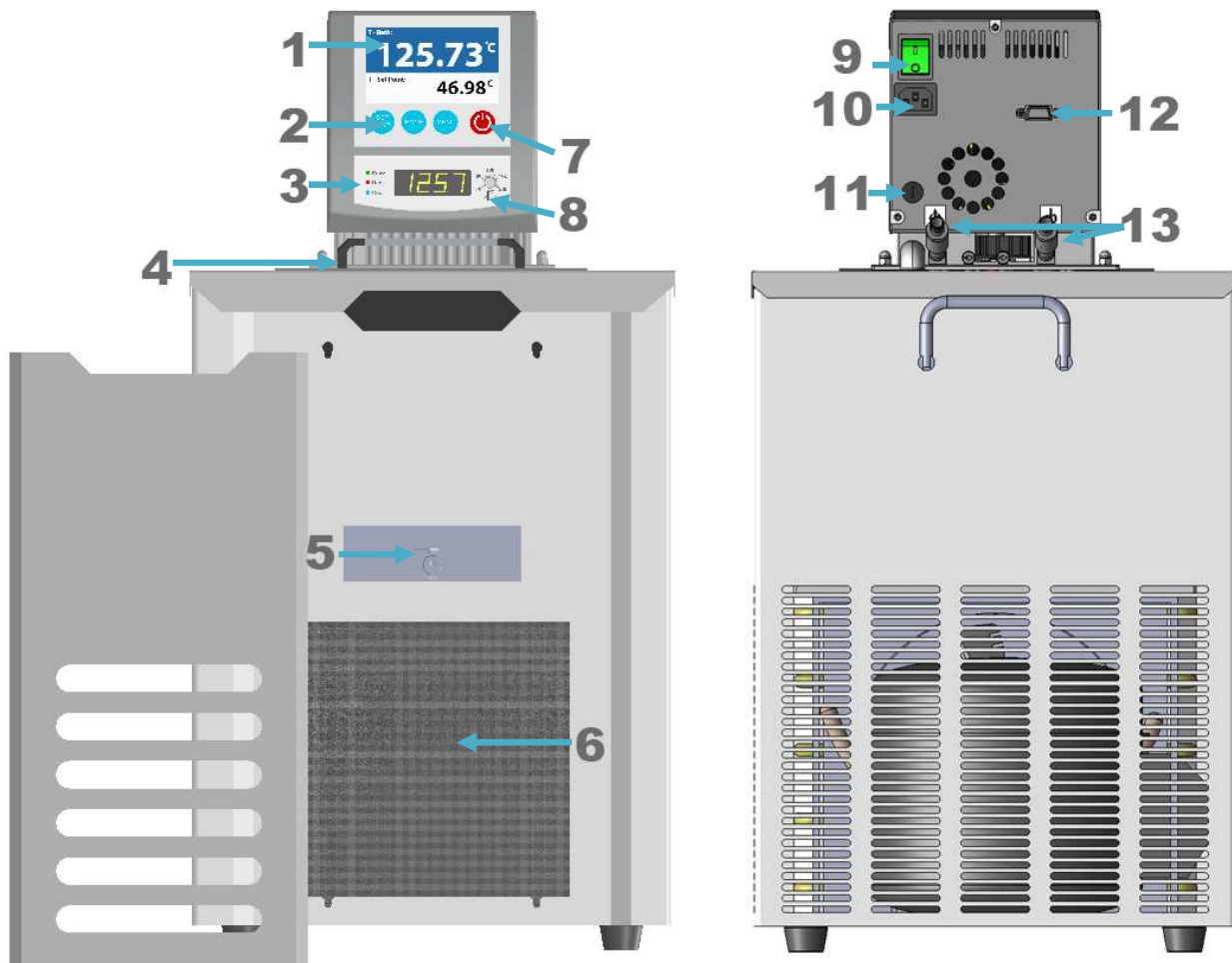
System	C6	C14	C22	A15	A25	A30	A40
Temperature Min °C	-	-	-	-20	-25	-30	-40
Temperature Max °C	150	200	200	150	200	200	200
Stability	± .01°C	± .01°C	± .01°C	± .01°C	± .01°C	± .01°C	± .01°C
Heater Power	1KW	1KW	1KW	1KW	1KW	1KW	1KW
Circulation Pump	15LPM	15LPM	15LPM	15LPM	15LPM	15LPM	15LPM
Input power	120V	120V	120V	120V	120V	120V	120V

Operating controls and functional elements



- 1) LCD with touchpad
- 2) Control Keypad
- 3) Indication LEDS
- 4) Temperature Display
- 5) Safety Dial Temperature Limiter
- 6) Bath Opening
- 7) Power Switch
- 8) Power Connector
- 9) Fuse
- 10) RS232 Port
- 11) Circulation Inlet/outlet

Operating controls and functional elements (cooling systems)



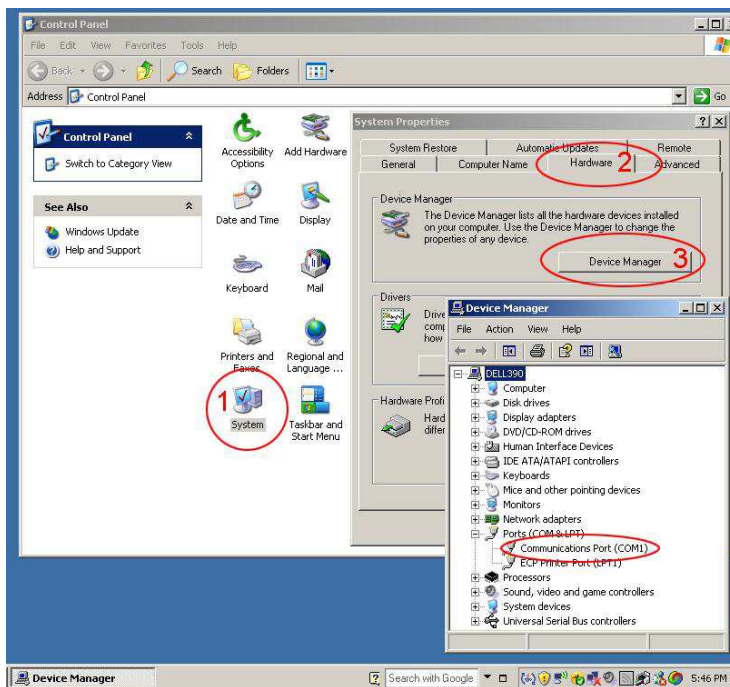
- 1) LCD with touchpad
- 2) Control Keypad
- 3) Indication LEDS
- 4) Bath opening
- 5) Drain port (on back in some models)
- 6) Air Filter for condenser
- 7) Start/Stop
- 8) Temperature LED Indicator / Safety Dial
- 9) Power Switch
- 10) Power Plug – Please used use Anova supplied heavy duty power cord
- 11) Fuse – (location may vary)
- 12) RS232 Port – for PC control
- 13) Circulation Inlet/outlet

Computer Control (RS232 Operation) Cable Requirements

In order to interface to a PC you need the following hardware cable pictured below:



DB9 Serial Cable Male to Female – Strait through configuration. Do not purchase a “Null Modem,” “crossover,” or “Crossed over” cables.



Before interfacing with a PC, make sure a RS232 port exists on your PC. RS232 ports will be in parentheses and named “COM1-100” like the one above named COM1
RS232 Port Settings (continued)

Baud Rate - 9600, Data Bits - 8, Parity - none, Stop bits - 1, Flow control – none.

Most programming packages like LabView, LabWindows and Visual Studio will allow you to program comport settings dynamically in program.

RS232 Commands

Note: All Rs232 commands are not case sensitive.
Do not include quotation marks when entering in commands.
Commands are "initiated" by a carriage return.

Status Commands

"help" – returns list of end user commands
"version" – returns software version information
"status" – returns status of system
"default" – sets ramp rate and pump speed to "auto" settings.
"temp" – returns bath temperature

Control Commands

"start" – starts system
"stop" – stops system
"clear" – clears stops from errors

Settings Commands

"set temp xxx.xx" - sets temperature max 5 significant digits
"set highlimit xxx.xx" – sets high temperature warning
"set lowlimit xxx.xx" – sets low temperature warning
"set pump speed" – sets pump speed from 20-100

"get temp setting" – returns temperature settings
"get highlimit setting" – returns high temperature warning
"get lowlimit setting" – returns low temperature warning

System Maintenance

General Information

- Always turn off the unit when not in operation.
- Electrical connections and any other work must be performed by Anova certified personnel only.

Maintaining Cooling Performance

Coolant Maintenance

1. Power off chiller and open chiller reservoir drain port.
2. Drain reservoir into drip pan. Tip chiller to remove all fluid from the reservoir.
3. Flush chiller. If it is a water-soluble coolant, use water to flush out. If it is an oil-based coolant, use surfactant and water to flush out. For cleaning the bath tank and the immersed parts of the circulator, use a mild surfactant like dish soap and a soft brush. Do not use steel wool or bleach - this will cause corrosion and pitting of the bath.
4. Turn chiller on.

Cleaning the Exhaust Vent

1. Wipe the rear exhaust vent with a wet towel.
2. Remove any excess restrictions with compressed air.

Cleaning the Air Filter

1. Remove front panel.
2. Remove the air filter.
3. Clean under running water. This may require surfactants or detergents based on air contents.

Chiller Maintenance Schedule

1. Replace coolant when visibly dirty. Although it is possible to run the instrument, using old coolant will significantly decrease instrument usability and life by clogging the pump and restricting system performance.

Repairs

Please contact an Anova representative for a return authorization (RA) number.

- During transport, the unit must stand upright. Mark the packaging with the RA number.
- When returning a unit, take care of careful and adequate packing.
- Anova is not responsible for damages that might occur from insufficient packing.
- Must be shipped by freight when returning the entire unit.

WARRANTY PROVISIONS

1. Do not restrict airflow from the back and front of the system.
2. Use appropriate coolant – no acid/base solutions or salts.

Failure to comply with aforementioned requirements will result in voidance of manufacturer's warranty.

The following Warranty Provisions shall apply to products sold in North America by Anova ("**Seller**") to the entity shown as buyer ("**Buyer**") on Seller's invoice.

1. **Warranty.** Seller warrants to the Buyer that the products manufactured by the Seller are free from defects in material and workmanship for a period not to exceed one year or five thousand (5,000) hours of operation, whichever comes first, from the date the product is shipped by Seller to Buyer (the "**Warranty**").

2. **Exclusions.** The Warranty does not include damage to the product resulting from accident, misuse, improper installation or operation, unauthorized or improper repair, replacement or alteration (including but not limited to repairs, replacements, or alterations made or performed by persons other than Seller's employees or authorized representatives), failure to provide or use of improper maintenance, unreasonable use or abuse of the product, or failure to follow written installation or operating instructions. Buyer must return the product's record of purchase to the Seller or one of Seller's authorized representatives within thirty (30) days of the date the product is shipped by Seller to Buyer in order to make a claim under the Warranty. Notwithstanding anything contained herein to the contrary, all glassware, including but not limited to reference thermometers, are expressly excluded from the Initial Warranty.

3. **Governing Law.** The Warranty Provisions and all questions relating to their validity, interpretation, performance, and enforcement shall be construed in accordance with, and shall be governed by, the substantive laws of the State of Texas.

4. **Shipping.** Buyer will arrange and pay for shipping and handling charges for the unit to be returned to the Seller. Seller will arrange and pay for shipping and handling for the return of the unit to the Buyer.