



Caron Products & Services
OPERATIONS MANUAL



BATH CIRCULATOR
Model: 2050

Dear Valued Customer:

Thank you for purchasing CARON Products & Services equipment. We appreciate your business and look forward to being your preferred supplier of controlled environment equipment products in the future.

At CARON, we are committed to continuous quality improvement. Our goal is to supply our customers with highly reliable equipment at a fair price. In order to openly monitor our performance, we would appreciate your feedback on our products and services.

If you have questions, or any suggestions for improvement based on the installation or operation of the equipment you have purchased, please contact our service department at www.caronproducts.com or 740-373-6809.

Thanks again for your business!

Revision Log

Version	Date	Description
J	06-02-14	Added condenser filter
K	08-02-17	Updated consistency between all manuals
L	02-02-18	Consolidated terminology
M	05-17-18	Updated Work Area Dimensions
N	07-16-18	Updated PM Kit info
O	10-09-18	Converted to 2050-1-1 and 2050-1-4 configuration
P	03-19-19	CE compliance

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WARRANTY INFORMATION

EQUIPMENT LIMITED WARRANTY

Please review this section before requesting warranty service. At CARON, one of our primary goals is to provide customers with high levels of personal service and top quality products, delivered on time, backed by technical service and supported for the life of the product.

Before contacting us for warranty service, please be aware that there are repairs that are not covered under warranty.

WARRANTY DEFINED

Caron Products & Services, Inc. (herein after CARON) hereby warrants that equipment manufactured by CARON is free from defects in materials and workmanship when the equipment is used under normal operating conditions in accordance with the instructions provided by CARON.

COVERED:

- Parts and labor for a period of one (1) year from date of shipment.
- Any part found defective will be either repaired or replaced at CARON's discretion, free of charge, by CARON in Marietta, OH. Parts that are replaced will become the property of CARON.
- If CARON factory service personnel determine that the customer's unit requires further service CARON may, at its sole discretion, provide a service technician to correct the problem, or require the return of the equipment to the factory or authorized service depot.
- CARON will have the right to inspect the equipment and determine the repairs or replacement parts necessary. The customer will be notified, within a reasonable time after inspection, of any costs incurred that are not covered by this warranty prior to initiation of any such repairs.

NOT COVERED:

- Calibration of control parameters.
- Improper installation; including electrical service, gas and water supply tubing, gas supplies, room ventilation, unit leveling, facility structural inadequacies or ambient conditions that are out of specification.
- Cost of express shipment of equipment or parts.
- Any customer modifications of this equipment, or any repairs undertaken without the prior written consent of CARON, will render this limited warranty void.
- CARON is not responsible for consequential, incidental or special damages; whether shipping damage or damages that may occur during transfer to the customer's point of use. When the equipment is signed for at the customer's site, ownership is transferred to the customer. Any damage claims against the shipping company become the responsibility of the customer.
- Repairs necessary because of the equipment being used under other than normal operating conditions or for other than its intended use.
- Repair due to the customer's failure to follow normal maintenance instructions.
- Parts considered consumable; including: light bulbs, filters, gases, etc.
- Damage from use of improper water quality.
- Damage from chemicals or cleaning agents detrimental to equipment materials.
- Force Majeure or Acts of God.

This writing is a final and complete integration of the agreement between CARON and the customer. CARON makes no other warranties, express or implied, of merchantability, fitness for a particular purpose or otherwise, with respect to the goods sold under this agreement. This warranty cannot be altered unless CARON agrees to an alteration in writing and expressly stated herein shall be recognized to vary or modify this contract.

Ohio Law governs this warranty.

EQUIPMENT INTERNATIONAL LIMITED WARRANTY

Please review this section before requesting warranty service. At CARON, one of our primary goals is to provide customers with high levels of personal service and top quality products, delivered on time, backed by technical service and supported for the life of the product.

Before contacting your distributor for warranty service, please be aware that there are repairs that are not covered under warranty.

WARRANTY DEFINED

Caron Products & Services, Inc. (herein after CARON) hereby warrants that equipment manufactured by CARON is free from defects in materials and workmanship when the equipment is used under normal operating conditions in accordance with the instructions provided by CARON.

COVERED:

- Parts for a period of two (2) years from date of shipment.
- Any part found defective will be either repaired or replaced at CARON's or their authorized representative's discretion. Parts that are replaced will become the property of CARON.
- If CARON or their authorized representatives determine that the customer's unit requires further service, CARON or the representative may, at its sole discretion, provide a service technician to correct the problem, or require the return of the equipment to the an authorized service depot.
- CARON or their authorized representative will have the right to inspect the equipment and determine the repairs or replacement parts necessary. The customer will be notified, within a reasonable time after inspection, of any costs incurred that are not covered by this warranty prior to initiation of any such repairs.

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Caron Products & Services, Inc.
PO Box 715 • Marietta, OH 45750
740-373-6809

SYMBOLS AND WARNINGS



Warning of hazardous area



Warning of hot surface



Warning of dangerous electric voltage



Warning of risk of fire



Earth (ground) protective
conductor



Local government may require proper disposal

R290 REFRIGERANT

This unit has been manufactured with specific consideration and accountability to our environment. The refrigerant used is R290. R290 is a hydrocarbon refrigerant with 0 Ozone Depleting Potential (ODP) and a mere 3 Global Warming Potential (GWP). R290 is flammable and must be treated with proper care.



Do not damage the refrigeration circuit. Do not store explosive substances in the unit. Component parts shall be replaced with like components and servicing shall be done by authorized personnel to reduce the risk of possible ignition.



DANGER – Flammable Refrigerant Used. Risk of fire or explosion.

- Do not puncture refrigerant tubing
- Do not use mechanical devices to defrost refrigeration equipment
- Unit to be repaired only by trained service personnel



CAUTION – Flammable Refrigerant Used. Risk of fire or explosion.

- Consult repair manual, owners guide before attempting to service this product. All safety instructions must be followed.
- Dispose of properly in accordance with federal or local regulations.

EQUIPMENT OVERVIEW

Congratulations! You have just purchased the latest technology in constant temperature circulators. Before using the equipment, familiarize yourself with key components of the product and thoroughly read this manual.



INSTALLATION

Unpacking

Your unit has been packaged to avoid shipping damage. However, the unit should be fully inspected upon arrival before signing for receipt. If the package has visual damage, notes should be made on the freight bill and signed by the delivery company. In the event of concealed damage after the unit is uncrated, keep the carton and packaging material. Call the shipping company within 7 days of receipt, request inspection & retain a copy of the inspection report.

Choosing a Location

This product is intended for indoor use only. Ambient temperature range is 5°C to 40°C, altitude is to be below 2000 meters, with a maximum relative humidity of 80% at 31°C decreasing to 50% at 40°C. Verify the reservoir is empty before moving and always lift by the provided handles. To ensure proper operation, the unit must be located on a firm level surface. The unit should be located in an area where there is no direct airflow from heating and cooling ducts and out of direct sunlight. Allow four inches of clearance on the top and back of unit for airflow. **DO NOT** cover up the air vent holes. Verify proper electrical power is available (main supply voltage fluctuation is to be +/- 10% of the nominal voltage).

External Circulation

To use the external circulation, connect inlet and outlet quick-disconnect fittings to circulator. Be sure external loop is sealed & able to withstand 10 psig. Insert the male quick disconnects into the female quick disconnects. When quick disconnects are in place and the unit on, the external circulation pump will function and pump liquid at the OUTLET connection.

Selecting a Fluid

Water is recommended for applications requiring temperatures above 10°C. Add 5 mL of bleach or algaecide to circulator before starting. A solution of antifreeze (propylene glycol) and water are recommended for temperatures below 10°C. Follow the directions on the antifreeze container for the proper mix.



Use tap or distilled water. Or deionized water with a resistivity between 50KΩ-CM and 1MΩ-CM.

Connecting Electrical Power

The unit requires an electrical connection that must be properly grounded. The power cord of this circulator is equipped with a grounded plug which mates with a standard grounded wall outlet. Operate the unit using only the power cord that has been supplied when purchased. Leakage current of this unit can exceed 3.5mA.

Electrical power required is:

2050-1-1	115V, 60Hz, 10A
2050-1-4	230V, 50/60Hz, 5A

Filling the circulator



Do not operate circulator without sufficient liquid in the reservoir or severe damage could occur.



Do not overflow circulator. Allow for addition of product.

Be sure the drain plug is properly installed before filling with fluid. Fill the circulator with water, propylene glycol or other non-flammable appropriate thermal fluid. Circulator should be filled approximately 0.5" from top or until the low liquid level alarm shuts off. Additional fluid may be needed after the unit is turned on to compensate for external tubing volume.

Operation of the unit in temperature ranges near or below 0°C may cause the fluid to attract water into the reservoir, especially in areas of high ambient humidity. Overtime, this can cause the reservoir to overflow.

To prevent severe burns, keep all extremities away from the fluid in the reservoir tank or any exterior surfaces around the tank.

Emptying the circulator

Before draining the circulator, be sure the unit is at room temperature. To empty the circulator, remove the 1/8" MPT plug (unscrew by turning counter-clockwise) located on the lower left side of the circulator.



Be sure fluid is at room temperature before draining. Contact with hot fluid can cause severe burns

OPERATION

External circulation begins immediately when power is turn on. With the circulator properly installed and the appropriate utilities connected, the power switch on the left side of the control bezel can be turned on. Within minutes, the temperature will begin to approach setpoint.

The circulator keypad is designed to produce a simple, easy to understand user interface that is intuitive and user friendly. With just a few presses of the keys, the logic behind the user interface is very easy to learn and remember.

There are four basic keys to setup or change any parameter to be setup or changed.



Rotates through the menus







Saves any adjusted parameter



Adjusts a selected parameter
Up/Down

Changing the Temperature Set-point





The circulator has an operating temperature range of -15.0°C to 90.0°C. The default is 20.0°C. To change the operating temperature setpoint:

- 1) Press the  key from the main menu, "SP" is displayed briefly
- 2) Press the  to increase / decrease temperature setpoint (hold for scroll)
- 3) Press the  key to save the setpoint
- 4) Press the  key four times to return to the main menu

The refrigeration control is automatic; the refrigeration system is on for temperatures below 45°C, off for temperatures above 45°C. Please consult the factory for other configurations.





Changing the Low Temperature Tracking Alarm Level

The low temperature tracking alarm level is the deviation from the temperature setpoint, which will cause a low temperature alarm. The low temperature tracking alarm level is adjustable from -0.1 to -10.0. The default is -5.0, which indicates -5.0°C below setpoint. To change the low temperature tracking alarm level:

- 1) Press the  key twice from the main menu, "AL.L" is displayed briefly
- 2) Press the  to increase / decrease alarm level (hold for scroll)
- 3) Press the  key to save the alarm level
- 4) Press the  key three times to return to the main menu

Changing the High Temperature Tracking Alarm Level





The high temperature tracking alarm level is the deviation from the temperature setpoint, which will cause a high temperature alarm. The high temperature tracking alarm level is adjustable from 0.1 to 10.0. The default is 5.0, which indicates 5.0°C above setpoint. To change the high temperature tracking alarm level:

- 1) Press the  key three times from the main menu, "AL.H" is displayed briefly
- 2) Press the  to increase / decrease alarm level (hold for scroll)
- 3) Press the  key to save the alarm level
- 4) Press the  key twice to return to the main menu

CALIBRATION

The temperature can be calibrated as necessary. CARON recommends an annual calibration check. Place the reference instrument's temperature sensor in the tank or circulating loop at the desired control location. Before making a calibration adjustment, allow the circulator to stabilize.

The calibration offset is adjustable from -10.0°C to 10.0°C . The default is 0.0°C . To enter a calibration offset:

- 1) Press the  key four times from the main menu, "cAL" is displayed briefly
- 2) Press the  to increase / decrease the calibration offset (hold for scroll)
- 3) Press the  key to save the calibration offset
- 4) Press the  key once to return to the main menu

Temperature calibration example:

If the circulator temperature display reads 40.0°C and the calibrated independent sensor shows 40.3°C , set the calibration offset to 0.3°C . If the calibrated independent sensor shows 39.6°C , then the entered offset should be negative. In this example the required offset would be -0.4°C .

ALARM

Low Level Alarm

The circulator is equipped with an alarm system that alerts the operator of a low fluid level condition. When more fluid is needed, an audible buzzer will sound and the red low level light on the control panel will illuminate. While in alarm mode, the circulator will not properly control fluid temperature. External circulation will continue.

Add fluid per instructions in INSTALLATION section. When the fluid returns to an appropriate level, the alarm will turn off and control fluid temperature as set.

Temperature Tracking Alarms

Other than the low level alarm created by the float switch, the alarm system checks to see if the current temperature is above or below the temperature tracking alarm levels as configured in AL.L and AL.H. If an alarm conditions exists, the display cycles between the current temperature and the alarm condition at 1 second intervals.

To avoid nuisance alarms on system power up or setpoint changes, the alarms are disabled for two hours or until the actual temperature gets within the alarm high and low levels.

Temperature Sensor Error

In the unlikely event that a faulty temperature sensor is detected, "SErr" will be displayed. Both the heater and the refrigeration system will remain off in this condition.

High Temperature Safety

The high temperature safety shut-off switch is preset from the factory just above 90°C. In the unlikely situation that the fluid temperature would exceed the circulator rated temperature of 90°C; an independent temperature sensor will turn off the heater. External circulation and cooling (if temperature setpoint is below 40°C) will continue. When the fluid temperature drops below 90°C, the heater function is enabled.

Contact a service representative immediately to correct the problem. The circulator should not be used until it is repaired.

PREVENTATIVE MAINTENANCE

The CARON circulator has been robustly designed to minimize performance problems. However, regular maintenance is very important for continuous trouble free operation.

Recommended Daily Maintenance Checks

- Check the Temperature display versus setpoints.
- Check for and correct any alarm condition.

Recommended Monthly Maintenance Checks

- Check condenser air intake filter on top of unit. If the filter is dirty replace it with Caron Preventative Maintenance PM Kit. Washing the filter will result in poor performance.

Here is a list of PM Kits that are available for models and accessories covered in this manual.

Model	PM Kit
2050-1-1	PM-2050
2050-1-4	PM-2050

Recommended Annual Maintenance Checks

- Disinfect all interior surfaces with a general purpose laboratory cleaning agent such as Cole-Parmer #G-08796-00.
- Vacuum or blow out fan and internal components.
- Perform a temperature calibration

R290 refrigerant

To prevent electrical shock, turn off and unplug the unit before performing any service or maintenance work on the unit.

This unit contains R290 which is a flammable hydrocarbon gas.



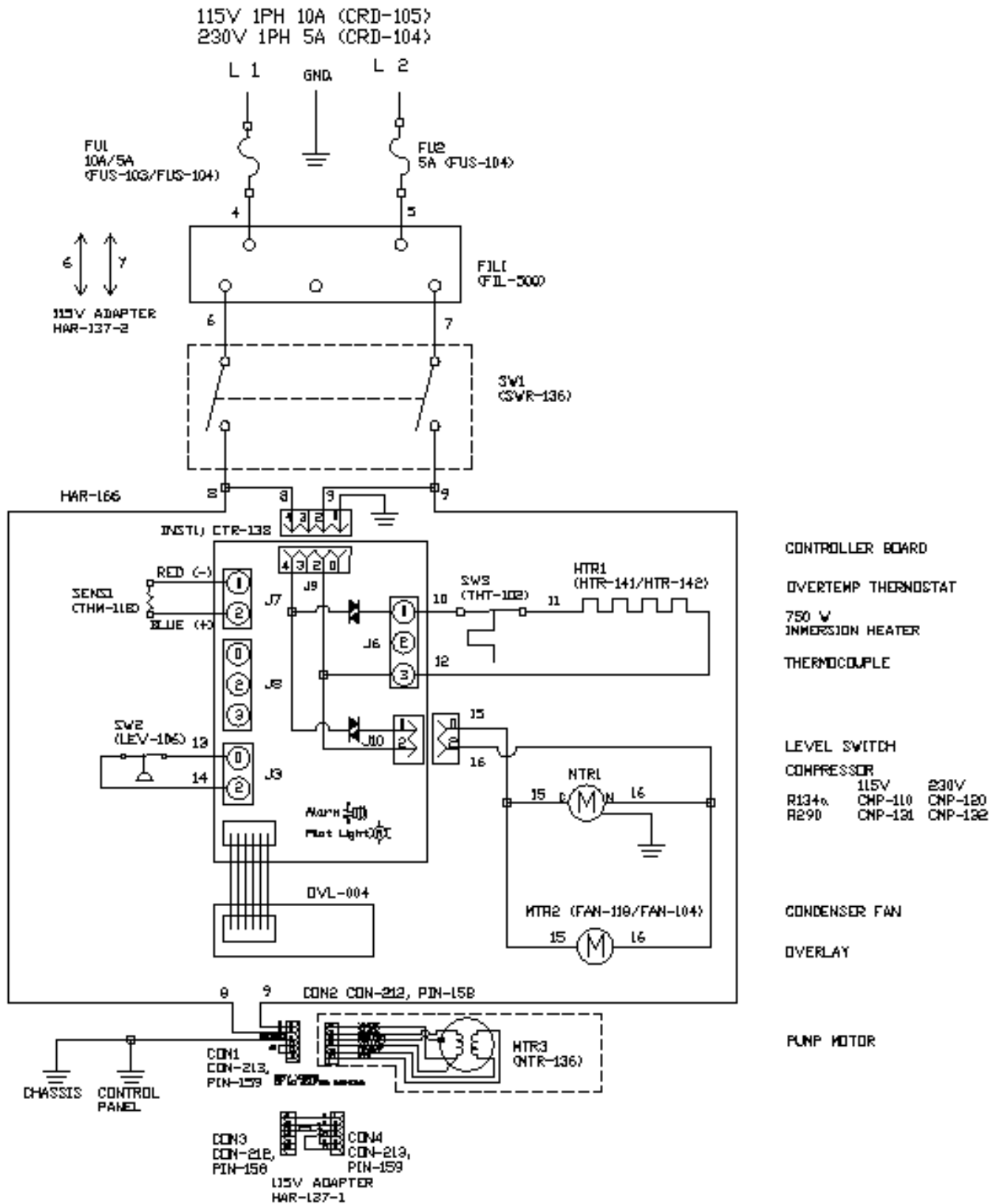
Do not damage the refrigeration circuit. Component parts shall be replaced with like components and servicing shall be done by authorized personnel to reduce the risk of possible ignition.

SPECIFICATIONS

MODEL	2050-1-1	2050-4-1
Temperature Range	-15°C to 90°C	
Temperature Control	± 0.1°C	
Temperature Controller	Digital display, PID control	
Cooling Capacity @ 20C	300 Watts	
External Pumping	6.5 LPM at 0' head	
Work Area Dimensions	6.0" W (8" opening) x 2.25" F-B x 6.5" D	
External Dimensions	13.5" W x 13.5" F-B x 14.0" H	
Heater	750 Watts	
Safeties	Over-temperature shutoff and low level alarm	
Reservoir Capacity	1.4 gallons (5.3 liters)	
Circulator Reservoir / Lid Material	Stainless steel	
Cabinet Material	Stainless steel & powder coated metal	
Electrical	115, 60 Hz 10A	230V, 50/60 Hz, 5A
Shipping Weight	53 lbs. (24.0 kg)	

*Specifications are subject to change without notice.
230V 50/60 Hz unit is CE Marked*

ELECTRICAL SCHEMATICS



SECTION 10 – TROUBLESHOOTING

Problem -- Unit will not turn on

- Is the unit connected to an electrical circuit as defined in the installation section?
- Is there power at the electric outlet the unit is plugged into?
- Is the unit's power switch turned on?
- Is the fuse blown?

Problem -- Temperature is above setpoint

- Is the condenser filter on the top of the unit clean?
- Is the pump agitating fluid inside the reservoir?
- Is the fluid rated for the temperature being set (ie. water only at temperatures above 10°C)

Problem -- Temperature is below setpoint

- Has the over temperature safety shut-off tripped?
- Is the pump agitating fluid inside the reservoir?
- Is there sufficient fluid inside the reservoir (low level alarm on)?

Problem – No external circulation

- Are the external circulation fittings connected properly?
- Is the pump agitating fluid inside the reservoir?
- Does the fluid have free-flow through the external tubing (<2 psig pressure drop)

SECTION 11 – SPARE / REPLACEMENT PARTS

General

Part Number	Description
CMP-131	Refrigeration compressor, 115V
CMP-132	Refrigeration compressor, 230V
CRD-104	Power Line Cord, 230V, European style
CRD-105	Power line cord, 115V, North American style
CTR-138	Temperature controller
DRI-111	Refrigeration filter / dryer
FAN-104	Condenser fan, 230V
FAN-118	Condenser fan, 115V
FIT-101	Drain pipe plug
FIL-126	Condenser Filter
FUS-103	Fuse for 115V models (T10A 250V) T=Slow Blow, 10A=10 amps, 250V=250 volts
FUS-104	Fuse for 230V models (T5A 250V) T=Slow Blow, 5A=5 amps, 250V=250 volts
HTR-141	Heater, 115V
HTR-142	Heater, 230V
LEV-106	Level float switch
MTR-136	Pump motor
QDC-101	Inlet / outlet female fittings in tank top
QDC-103	Male quick-disconnects for external circulation
SWR-136	Rocker switch
THT-102	Over temperature thermostat
THM-118	Temperature sensor
TUB-175	Internal silicone tubing