

# Cool **IR**

Model C104 - Cooling System

## Instruction Manual



**RESEARCH INC.**

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<b>Revision History</b>				
<b>Revision</b>	<b>Description</b>	<b>ECN Number</b>	<b>By</b>	<b>Date</b>
A	Initial Release		KJN	11/01/2013
B	Add 230v		KJN	10/21/2014
C	Cooling spec		KJN	02/26/2015

## Section 1 - Introduction

The Model C104 is a self-contained heat exchanger designed to provide circulating coolant for small Research Inc. aluminum-reflector heaters. Figure 1 below shows the C104 connection side. Power to the motor is provided with a 10ft power cord and molded plug. The unit includes an industrial grade brass pump, copper coil, 120/230volt motor with fan and 4 gallon (15 liter) reservoir. Two ¼" NPT fittings for coolant inlet/outlet are located on the side plate.



Figure 1 - C104 connections

## Section 2 - Installation and Operation:

### Safety

The maximum water/glycol temperature is 140°F (60°C). Precaution should be taken to ensure this temperature is not exceeded. Refer to the installation section for proper sizing instructions.

### WARNING!

Hazardous voltages are present within the heating/cooling/control system. Setting the set point potentiometer or control signal to minimum does NOT eliminate these hazardous voltages.

Always remove AC line voltage from the system before making contact with internal assemblies, line or load wiring, or fuses.

### CAUTION!

- Up to 480 volts AC may be present at IR heater with longer lengths (25" and 38").
- Do not make any wiring connections when power is applied.
- Disconnect power before performing any maintenance or service to the system.
- Use extreme caution when adjusting calibration potentiometers on modules when power is applied.
- Always use an isolated oscilloscope for checking waveforms.

### Sizing

The C104 can handle up to 5 KW of cooling load. The amount of cooling load is dependent upon the heater style, lamp wattage, and heating application. Table 1 shows how to size the C104. These steps are outlined below:

1. Determine heater wattage – This is a simple calculation based upon the wattage of the lamps in the heater times the number of lamps in the system.
2. Determine the cooling factor (Fc). This takes into account how much heat is going into the reflector that will be carried away by the cooling system.
3. Determine the number of C104 units required. Each C104 can handle up to 5 KW. If the calculated cooling load is less than 5 KW, then one unit will work. Multiple C104 units can be used in parallel. Consult factory.

### Size C104 Cool **IR**

1. Determine heater(s) wattage

Example: E4-05 w/500 watt lamps  
 Wattage = 4 x 500 = 2000 watts

2. Determine cooling factor (Fc)

Model	Fc	Description
E4	0.9	All
5194	0.9	Multiple 5194's facing each other
5194	0.7	5194(s) facing target > 800 °C
5194	0.5	5194(s) facing target from 400 °C to 800 °C
5194	0.3	5194(s) facing target < 400 °C
5306B	0.9	Multiple 5306B's facing each other
5306B	0.6	5306B(s) facing target > 800 °C
5306B	0.4	5306B(s) facing target from 400 °C to 800 °C
5306B	0.2	5306B(s) facing target < 400 °C

3. Calculate cooling load (Lc)

Lc = Heater wattage x Fc  
 Example: Lc = 2000 x 0.9 = 1800 watts

4. Determine number of C104's needed

C104 rating = 5000 watts  
 Lc = 1800 watts

1 - Model C104 required

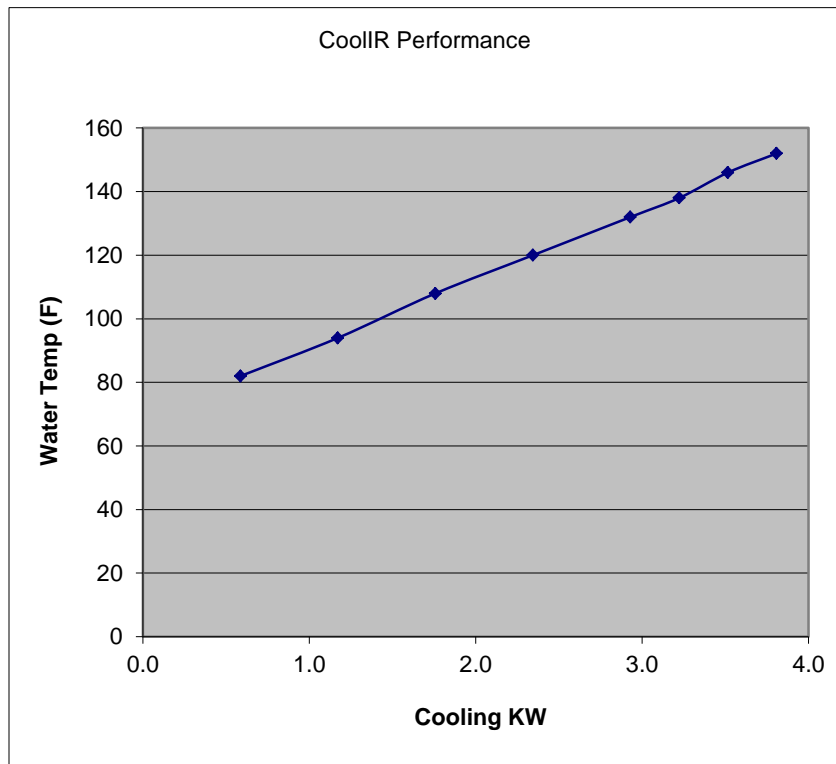
**Table 1 - C104 Heater/Cooler Sizing**

### Installation:

1. Cut two lengths of poly tubing supplied with the IR heater to connect to the cooling unit to the heater. Both IR heater and cooling unit are supplied with push-to-connect fittings for simple installation without tools. Cut tubing square for positive leak free connections.
2. Flow direction through the heater does not matter. If using the heater protection kit (HPK, p/n 107109-001) then follow the flow directions provided on the enclosure
3. Remove filler cap and fill reservoir with one of the following coolant types:
  - Add mixture of distilled water (3 gallons) and propylene glycol (1 gallon, RV type, pink color) solution. Checked monthly and changed as needed.

- Add mixture of distilled water (3 gallons) ethylene glycol (1 gallon, automotive type compatible with aluminum) solution. Check every 6 months and change as needed.
- **Do not** use anti-freeze with stop leak additive, which will clog the filter screen and damage the pump.

4.) Connect power to 115/230vac source



**Table 2 - C104 Cooling Performance**

**Caution:**

- Coolant should be allowed to flow through the system continuously, if not the pump will run hot, shortening its life if allowed to operate for more than a short period against a closed or plugged discharge. When used with automatic equipment having a coolant solenoid valve, bypass the solenoid or, wire the cooler into the equipment so that it operates only during operation.
- Do not transport or attempt repair unless unit is disconnected from power source.
- Operation of the pump without coolant will cause serious damage.
- Pump warranty is void if user opens or disassembles the pump.
- Pump life and fitting life will be reduced if coolant temperature in tank exceeds 140°F (60°C). Table 2 shows the coolant temperature as a function of cooling KW.
- Operate the cooler only at the voltage and frequency stamped on the serial nameplate (120V, 230V, 50/60 Hz),

## Operation

The C104 system needs to run when the heater is being run. After the heater is shut off, the user should continue to run the C104 system for 3 – 5 minutes to allowing the heater to cool.

## Section 3 - Specifications

Motor voltage	Max current draw	IEC Cooling Capacity	Tank Capacity	Dimensions	Weight
115vac, 50/60Hz	5.9A (50Hz) 4.7A (60Hz)	1780W (6070 BTU/hr.) 1.1qt./min (1 L/min)	4 gal (15 L)	H: 16.25 in. (413mm) W: 15.25 in. (387mm) D: 18.75 in. (476mm)	40lb (18kg)

Motor voltage	Max current draw	IEC Cooling Capacity	Tank Capacity	Dimensions	Weight
230vac, 50/60Hz	3.5A (50Hz) 2.5A (60Hz)	1780W (6070 BTU/hr.) 1.1qt./min (1 L/min)	4 gal (15 L)	H: 16.25 in. (413mm) W: 15.25 in. (387mm) D: 18.75 in. (476mm)	40lb (18kg)

### Pump Capacity:

100 psi max. 1.5 gpm (5.68 lpm) @ 50 psi.

### Heat Exchanger:

High efficiency, copper core, rustproof

### Motor Voltage / Amps:

115 Volt AC, single phase, 50/60 Hz, 4.7A 60Hz, 5.9A 50Hz  
230 Volt AC, single phase, 50/60 Hz, 2.5A 60Hz, 3.5A 50Hz

### Coolant Connections:

1/4" N.P.T. supplied with push-to-connect fitting for 1/4" tubing

### Net Weight:

40 lbs. (25.4 kg)

### Dimensions:

16.25 inches (413 mm) H, 15.25 inches (387 mm) W, 18.75 inches (476 mm) D

## Section 4 - Maintenance and Parts

### Routine Maintenance

Perform the following maintenance on a minimum of 3 month time cycle:

- Remove dust from radiator by means of compressed air, in order to insure optimum cooler performance.
- Check the filter screen, by removing the 15/16" acorn nut on the pump. Clean the filter or replace as necessary.
- Add mixture of distilled water (3 gallons) and propylene glycol (1 gallon, RV type, pink color) solution. Checked monthly and changed as needed.
- Add mixture of distilled water (3 gallons) ethylene glycol (1 gallon, automotive type compatible with aluminum) solution. Check every 6 months and change as needed.
- **Do not use anti-freeze with stop leak additive, which will clog the filter screen and damage the pump.**

### Options:

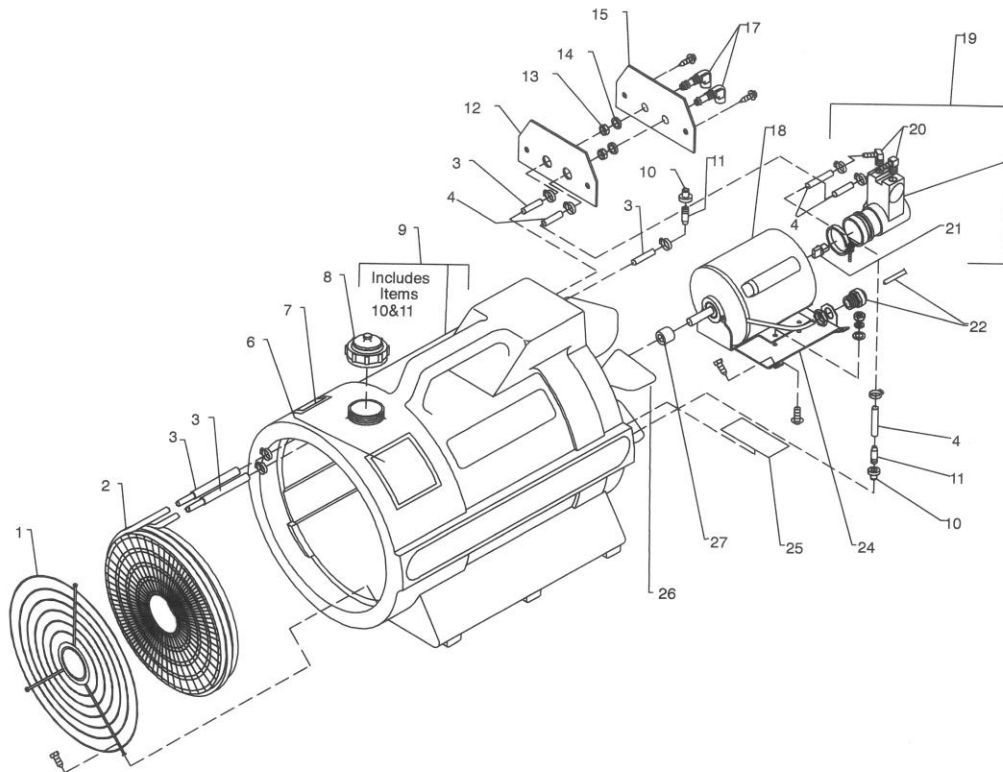
Model #	Description	Part Number
C100 - E4- kit	E4 fitting kit	
C100 - FHK	Fitting and hose kit	
C100 "T" kit	"tee" kit to connect two heaters	
PK	Heater protection Kit	107109-001
Manifold-4	4 port, aluminum	120068-001
Manifold-6	6 port, aluminum	120068-002

Table 3 - C104 Parts and Kits

### C104 Ordering Information

Model #	Description
C104-120	5kW heat exchanger, 120v motor
C104-120-PK	5kW heat exchanger, 120v motor , heater protection kit
C104-230	5kW heat exchanger, 230v motor
C104-230-PK	5kW heat exchanger, 230v motor, heater protection Kit





**Figure 2 - Exploded view**

# C104 Parts List

Figure 2 - above

Item No.	Description	Quantity Used	
1	Wire form, radiator end	1	
2	Radiator, coolant tank w/ weather stripping	1	
3	Hose, rubber braided, .375 ID x .650 OD x 12"	2	
4	Hose, rubber braided, .375 ID x .650 OD x 10.5	2	
6	Label, caution incorrect coolant	1	
7	Label, warning general pre caution (CE Model)	1	
8	Cap, tank screw-on w/ screw type vent	1	
9	Tank., coolant	1	
10	Bushing	2	
11	Barbed hose fittings	2	
12	Insulator, front panel	1	
13	Nut, hex, jam .500-20	2	
14	Washer, toothed .512ID x .900 OD	2	
15	Plate, Identification	1	
17	Fitting, hose barbed	2	
18	Motor, 115vac / 230v 50/60Hz 1425/1750RPM	1	
19	Pump,	1	
20	Fitting, barbed, 3/8" NPT	2	
21	Coupler, drive pump	1	
	Strainer – screen, not shown	1	
22	Cable, pwr, 115vac 16ga. , 3conductor, 10ft	1	
24	Bracket, motor mount	1	
25	Label, warning moving parts	1	
26	Blade, fan 10"	1	
27	Tubing,	1	