



# Operating Instructions

## CO<sub>2</sub> Incubator symphony 6.5 W



**Models covered**

<b>Models</b>	<b>Voltage**</b>	<b>Sensor*</b>
3074	115	T/C
3078	115	IR

\*T/C is a thermal conductivity sensor.

IR is an infrared sensor.

\*\*All units are 50/60 Hz.

**MANUAL NUMBER 7003074**

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<b>REV</b>	<b>ECR/ECN</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>By</b>

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**Important** Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

**Caution** All internal adjustments and maintenance must be performed by qualified service personnel. ▲

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Important operating and/or maintenance instructions. Read the accompanying text carefully.



Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.



Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.



Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.

- ✓ Always use the proper protective equipment (clothing, gloves, goggles, etc.)
- ✓ Always dissipate extreme cold or heat and wear protective clothing.
- ✓ Always follow good hygiene practices.
- ✓ Each individual is responsible for his or her own safety.

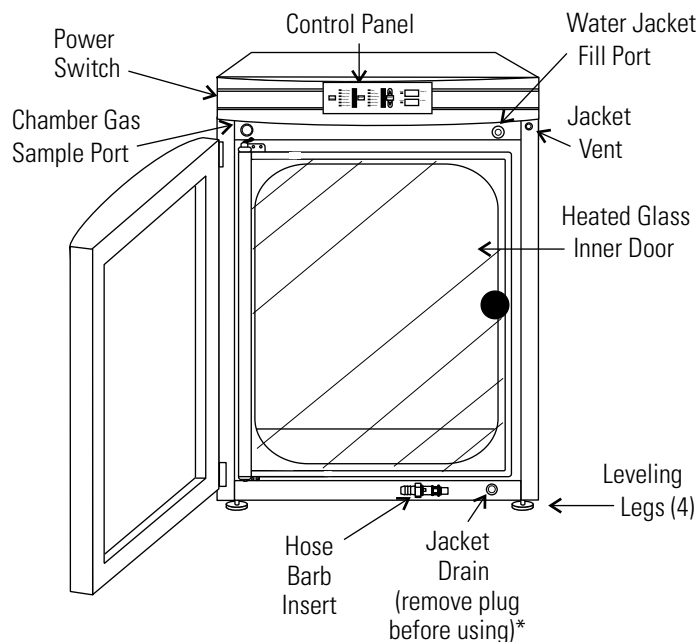


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## Section 1 Installation and Start-Up



**Figure 1-1.** Unit Components

- Outer Door - Reversible to opposite swing.
- Heated Inner Door - Keeps chamber interior dry. Reversible to opposite swing.
- Chamber Gas Sample Port - Used for sampling chamber CO<sub>2</sub> content, using a Fyrite or similar instrument.
- Main Power Switch
- Control Panel - Keypad, Displays and Indicators (Figure 1-2).
- Fill Port - Used for filling the water jacket.
- Water Jacket Vent- Do not cover! Allows air to escape from the water jacket during filling and normal expansion and contraction when the incubator heats or cools.
- Leveling Legs - Used to level the unit.
- Water Jacket Drain – Remove plug and use hose barb insert included. Plug when not in use.

**Note** The incubators are stackable. Information follows later in this section. ▲

*\*When setting up the incubator, install the cover plate packed inside the incubator shipping carton.*



## Control Panel

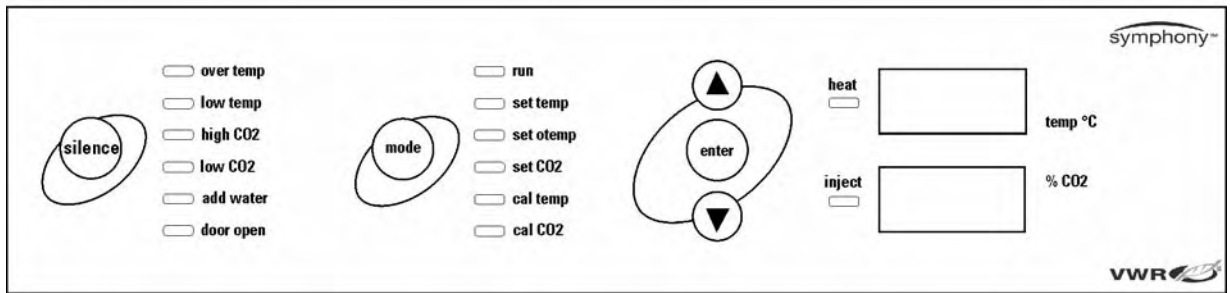


Figure 1-2. Control Panel

**Silence** - Silences the audible alarm.

**Alarm Indicators** - Specific indicator flashes during an alarm condition.

Over Temp - Chamber temp above setpoint

Low Temp - Chamber temp below setpoint

High CO<sub>2</sub> - CO<sub>2</sub> level above setpoint

Low CO<sub>2</sub> - CO<sub>2</sub> level below setpoint

Add Water - Water level in jacket is low

Door Open - Door ajar

**Mode Select Switch** - Used to select desired mode.

**Mode Indicator** - Selected mode indicator lights.

Mode Select Indicators-

Run: Normal Operation

Set Temp: Set Temperature Setpoint

Set Otemp: Set Overtemperature Setpoint

Set CO<sub>2</sub>: Set CO<sub>2</sub> Control Setpoint

Cal Temp: Calibrate Displayed Temperature (Offset)

Cal CO<sub>2</sub>: Calibrate Displayed CO<sub>2</sub> Value (Offset)

**Up and Down Arrows** - Increase or decrease parameter value

**Enter** - Saves the selected value

**Heat Indicator** - Lights when power is applied to the heaters

**Inject Indicator** - Lights when gas is being injected into the incubator

**Temp Display** - Shows chamber temperature, temperature setpoint or overtemperature setpoint

**CO<sub>2</sub> Display** - Shows percentage of CO<sub>2</sub> in the chamber or CO<sub>2</sub> setpoint

## Control Panel Operation

The symphony water jacket incubator has six modes to allow incubator setup. The modes are as follows:

- Run is the default mode that the incubator will normally be in during operation.
- Set Temp is used to enter system temperature setpoints for incubator operation.
- Set Otemp is used to enter system overtemperature setpoints for incubator operation.
- Set CO<sub>2</sub> is used to enter system CO<sub>2</sub> setpoints for incubator operation.
- Cal Temp is used to calibrate displayed chamber temperature.
- Cal CO<sub>2</sub> is used to calibrate displayed percentage of CO<sub>2</sub> in the chamber.

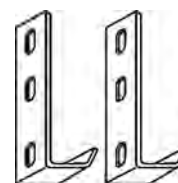
## Unit Installation

1. Locate the unit on a firm, level surface capable of supporting the unit's operational weight of 365 lbs. (166kg).
2. Locate away from doors and windows and heating and air conditioning ducts.
3. Allow enough clearance behind the unit for electrical and gas hook-up.

## Stacking

If the units have been in service, disconnect the power cord connector and drain the water jacket of the designated top unit before stacking.

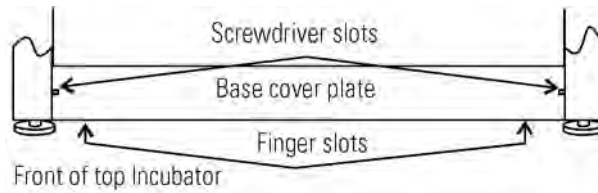
**Note** Stacking brackets (shown at right) stacking bolts, washers, and bolts for stacking are included with each unit. ▲



**Figure 1-3.**  
Stacking Brackets

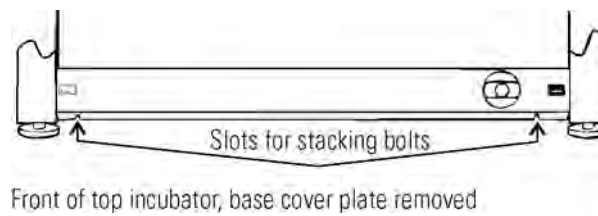
## Stacking (continued)

1. Designate one incubator to be the top unit and the other as the bottom unit. Remove the base cover plate from the top unit using the finger holes in the base or using a slotted screwdriver (Figure 1-4).



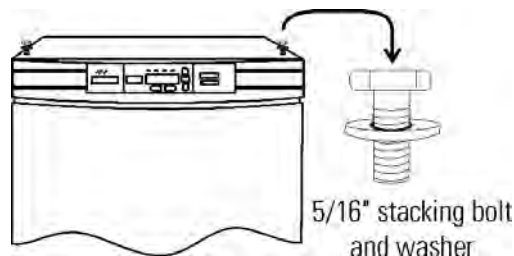
**Figure 1-4.** Remove Base Cover Plate

2. Note the two slots in the base of the incubator which accommodate the stacking bolts. Refer to Figure 1-5.



**Figure 1-5.** Stacking Bolt Slots

3. Remove the two plastic plugs from the bolt holes in the exterior top of the bottom unit. Install the 1/2" long 5/16-18 stacking bolts and washers into the bolt holes - do not tighten the bolts at this time. Refer to Figure 1-6.



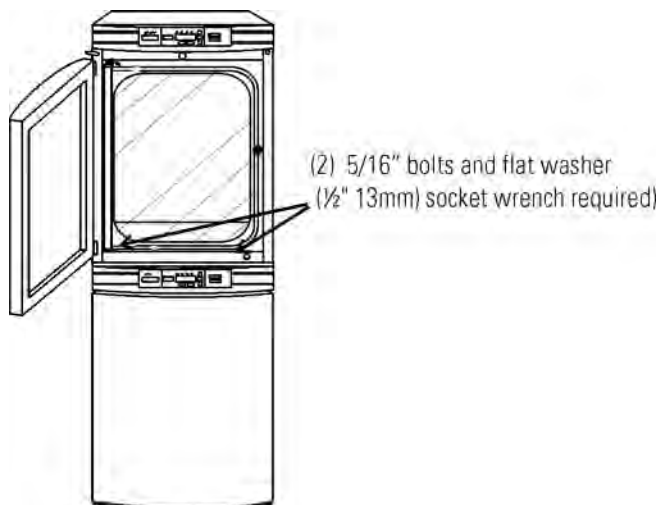
**Figure 1-6.** Bolt Holes

4. Unscrew and remove the leveling feet from the top unit and lift it onto the bottom unit, off-setting the base of the top unit approximately 2-3 inches behind the stacking bolts and washers.

**Caution** This incubator weighs 265 lbs (120kg) before filling. Have sufficient personnel to lift it. ▲

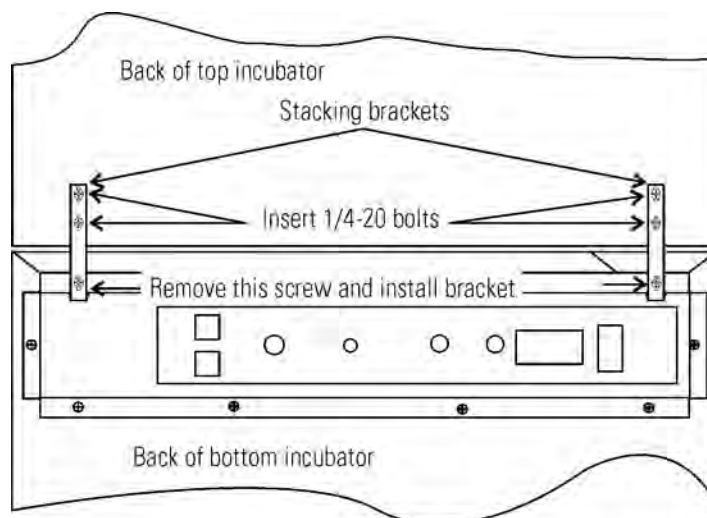
## Stacking (continued)

5. Align the sides of the top unit with the bottom unit and slide the top unit forward until the slots in the base of the top unit align with the 5/16"-18 stacking bolts in the exterior top of the bottom unit. Refer to Figure 1-7.



**Figure 1-7.** Align Slots and Bolts

6. Remove and save the two screws from the back of the control panel on the bottom unit as shown in Figure 1-8.



**Figure 1-8.** Two Screws From Control Panel Back

7. Insert the stacking brackets into the slots on the rear of the control panel of the bottom unit (Figure 1-5). Align the slots in the brackets with the mounting holes on the rear of the incubators. Secure the brackets with the screws saved above and the 1/4-20 bolts provided in the stacking kit. A 7/16" wrench or socket will be required for the bolts.

## Stacking (continued)

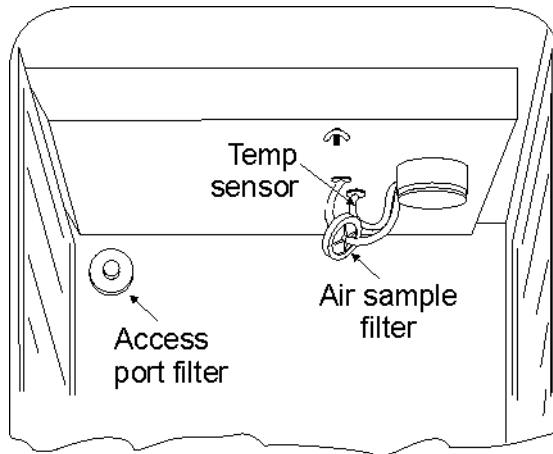
8. Secure the base of the top unit to the exterior top of the bottom unit by tightening the 5/16-18 stacking bolts using a 1/2" (13mm) wrench or suitable tool.
9. Replace the base cover on the top unit.
10. The stacked units are ready to be placed into service.

## Preliminary Cleaning

1. Remove the protective plastic coating on the shelf supports and air duct, if present.
2. Using a suitable laboratory disinfectant, clean all interior surfaces including shelves and shelf supports, door gaskets, blower wheel and CO<sub>2</sub> sensor.

## Installing the Access Port Filter

Locate the opening in the top left corner of the interior chamber. Remove the tape from the opening on the outside of the unit. Locate the stopper with filter in the hardware bag. Install in the opening inside the chamber. See Figure 1-9.



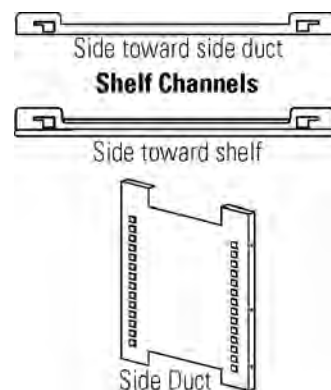
**Figure 1-9.** Filter and Sensor Locations

## Installing the Air Sample Filter

1. Remove the filter from the shipping bag.
2. Separate one section of the tubing from the filter. Install this section to the fitting on the blower plate.
3. After installing the top duct, connect the filter assembly to the tubing coming through the top duct.
4. Insert the free end of the air sample filter tubing into the larger hole in the back of the blower scroll. See Figure 1-9 for completed configuration.

## Installing the Shelves

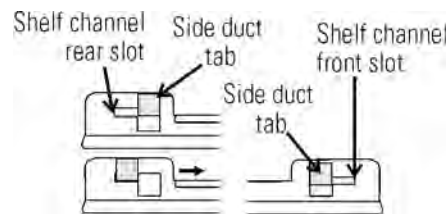
1. Install the side ducts with the tabs facing into the center of the chamber with their slots up. There are no right side or left side ducts, simply rotate one of them to fit the opposite side. Tilt the side ducts as they are placed in the chamber so the tops fit into the top air duct, then guide them into the vertical position. Figure 1-10 shows the duct as it would be oriented for the right side of the chamber.



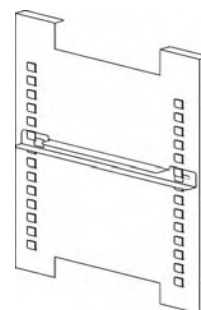
2. Referring to Figure 1-10, note that there is no difference between left and right side shelf channels.
3. Install the shelf channels by placing the channel's rear slot over the appropriate rear tab on the side duct. Pull the shelf channel forward and engage the channel's front slot into the side duct's appropriate forward tab. Refer to Figure 1-11.

**Figure 1-10.** Shelf Channels and Side Duct

4. Figure 1-12 shows one of the channels installed on the right side duct.



**Figure 1-11.** Slot and Tab



**Figure 1-12.** Channel Installed

## Leveling the Unit

Check the unit for being level by placing a bubble-style level on one of the shelves. Turn the hex nut on the leveler counterclockwise to lengthen the leg, or clockwise to shorten it. Level the unit front-to-back and left-to-right.

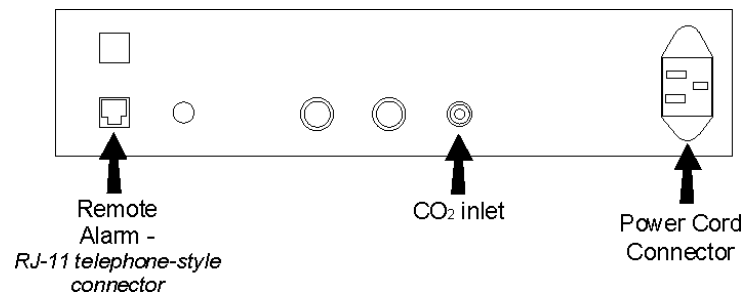
## Connecting the Unit to Electrical Power

See the serial tag on the side of the unit for electrical specifications, or refer to the electrical schematics included in this manual.

**Caution** Connect the incubator to a grounded dedicated circuit only. The power cord connector is the mains disconnect device for the incubator. Position the unit so that it can be easily disconnected. ▲

Plug the provided power cord into the power inlet connector (see Figure 1-13) and into the grounded dedicated circuit.

Electrical Specifications: 115V, 50/60Hz, 3.6A, 1 PH, 2W



**Figure 1-13.** Rear Panel - showing all options

## Filling the Water Jacket

Turn the power switch on. ADD WATER will appear in the message center. Press the Silence key to silence the alarm.

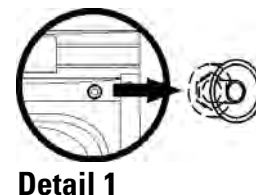
**Note** The fill port has a plug that must be removed before filling and replaced after filling is complete. ▲

**Caution** Chlorine is detrimental to stainless steel. Using chlorinated tap water, or additives that contain chlorine, will void the water-jacket warranty! ▲

## Filling the Water Jacket (continued)

Fill the water jacket with 11.7 gallons (43.5 liters) of pure water. Silicone tubing and a funnel are shipped in the accessory bag with the unit.

For ease of connecting/disconnecting, use the silicone tubing provided to connect directly to the fill port. See Figure 1-1 and this detail. Do not install vinyl tubing directly onto the fill port as it may be difficult to remove. A 3/8" to 3/8" hose connector has been provided to attach lengths of vinyl tubing to the silicone fill port tubing, to reach the distilled water source.



When the jacket is full, the audible alarm sounds a continuous tone for 10 seconds and the alarm condition clears. Refer to Section 3, Table of Alarms.

**Note** The symphony Water Jacket Incubator is shipped from the factory with a rust inhibitor added to the water inside the unit. The rust inhibitor must be replenished every 2 years. ▲

## Filling the Humidity Pan

For best operation of the incubator, sterilized distilled, demineralized or de-ionized water should be used in the humidity pan. Refer to ASTM Standard D5391-93 or D4195-88 for measuring water purity.

Distillation systems and reverse osmosis water purity systems produce water that is neutral in pH (approximately 7) and is the preferred water to use for humidification. High purity, ultra pure or milli-q water is considered an aggressive solvent and slightly acidic. While it may be used, it is not preferred. Chlorinated tap water, or additives containing chlorine, is not to be used as chlorine can deteriorate the stainless steel. Tap water may also have a high mineral content, which would produce a build-up of scale in the reservoir. Even high purity water can contain bacteria and organic contaminants. Water should always be sterilized or treated with a decontaminant, safe for use with stainless steel as well as safe for the product, prior to being introduced into the humidity pan.

**Caution** Use of chlorinated water, or decontamination products containing chlorine, will deteriorate the stainless steel and cause rust, voiding the warranty. ▲



## Section 1

### Installation and Start-Up

#### Filling the Humidity Pan (continued)

Fill the humidity pan to within 1/2 inch of the top with sterile, distilled water. Place the pan directly on the incubator floor to ensure optimum humidity and temperature response.

For applications requiring higher humidity conditions, the pan should be placed against the left side wall of the incubator. The ductwork has been modified for this purpose. Also, the CO<sub>2</sub> sample port may be capped to assist in achieving greater RH. In some ambients, this may cause condensation to form in the chamber.

Check the level and change the water frequently to avoid contamination. Do not allow the water level to fluctuate significantly. “Dry-outs” will have an adverse effect on the humidity level, as well as CO<sub>2</sub> calibration.

#### Connecting the CO<sub>2</sub> Gas Supply

**Warning** High concentrations of CO<sub>2</sub> gas can cause asphyxiation! OSHA Standards specify that employee exposure to carbon dioxide in any eight-hour shift of a 40-hour work week shall not exceed the eight-hour time weighted average of 5000 PPM (0.5% CO<sub>2</sub>). The short term exposure limit for 15 minutes or less is 30,000 PPM (3% CO<sub>2</sub>). Carbon dioxide monitors are recommended for confined areas where concentrations of carbon dioxide gas can accumulate. ▲

The CO<sub>2</sub> gas supply being connected should be industrial grade 99.5% pure and should not contain siphon tubes. Install a two-stage pressure regulator at the cylinder outlet. The high pressure gauge at the tank should have 0-2000 psig range and the low pressure gauge, at the incubator inlet, should have a 0-30 psig range. Input pressure to the incubator must be maintained at 15 psig (103.4 kPa), ±5 psig.

The incubator has a serrated fitting on the back of the cabinet to connect the gas supply. Refer to Figure 1-13. The fitting is labeled CO<sub>2</sub> Inlet. Make sure that the connection is secured with a clamp. Check fitting for leaks.

## **Connecting the CO<sub>2</sub> Gas Supply (cont.)**

**Warning** This incubator is designed to be operated with CO<sub>2</sub> gas only. Connecting a flammable or toxic gas can result in a hazardous condition. Gases other than CO<sub>2</sub> should not be connected to this equipment. CO<sub>2</sub> gas cylinders have UN1013 labeled on the cylinder and are equipped with a CGA 320 outlet valve. Check the gas cylinder for the proper identification labels. The CO<sub>2</sub> gas supply being connected to the incubator should be industrial grade, 99.5% pure. Do not use CO<sub>2</sub> gas cylinders equipped with siphon tubes. A siphon tube is used to extract liquid CO<sub>2</sub> from the cylinder, which can damage the pressure regulator. Consult with your gas supplier to ensure that the CO<sub>2</sub> cylinder does not contain a siphon tube. Gas cylinders should also be secured to a wall or other stationary object to prevent them from tipping.

A two-stage CO<sub>2</sub> pressure regulator is required to be installed on the outlet valve of the gas cylinder. Input pressure to the incubator must be maintained at 15 psig (103.4 kPa), ±5 psig, for proper performance of the CO<sub>2</sub> control system. (A single stage CO<sub>2</sub> pressure regulator will not maintain 15 psig.

If higher purity CO<sub>2</sub> is desired inside the incubator (greater than 99.5% pure), the pressure regulator should be constructed with a stainless steel diaphragm along with specifying the purity of the CO<sub>2</sub> from the gas supplier. Follow the manufacturer's instructions to ensure proper and safe installation of the pressure regulator on the gas cylinder. Consult your facility safety officer to ensure that the equipment is installed in accordance with the codes and regulations that are applicable in your area. ▲

## **Incubator Start-Up**

Now that the incubator has been properly installed, connected to power, filled with water, humidity pan filled, and connected to gas supply, system setpoints can be entered. The following setpoints can be entered: temperature, over temperature, and CO<sub>2</sub>.

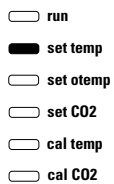
## Setting the Operating Temperature Setpoint

The temperature setpoint range is 10° to 55°C, settable to within 0.1°C. The lowest temperature the incubator can control is +5°C above the ambient temperature at the incubator's location.

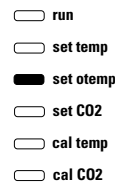
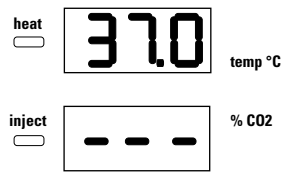
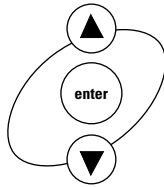
This incubator is shipped from the factory with a temperature setpoint of 10°C. At this setting, all heaters are turned off.

To change the temperature setpoint:

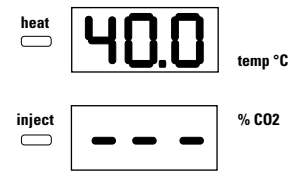
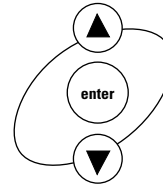
1. Press the Mode key until the Set Temp indicator lights.
2. Press the up/down arrow until the desired temperature setpoint is displayed.
3. Press Enter to save the setpoint.
4. Press the Mode key until the Run Indicator lights to go to Run mode.



Set Temp



Set Otemp



## Setting the Overtemp Setpoint

**Caution** The overtemp circuit is designed as a safety to protect the incubator only. It is not intended to protect or limit the maximum temperature of the cell cultures or customer's equipment inside the incubator if an overtemp condition occurs. ▲

The factory setting for the Overtemperature setpoint is 40°C. It can be set over a range of temp setpoint +0.5°C to 60°C. If the temperature setpoint is moved above the Overtemp setpoint, the Overtemp will automatically update to 1.0°C + the temp setpoint. It is recommended that the Overtemp setpoint be 1°C over the temp setpoint.

To set the Overtemp setpoint:

1. Press the Mode key until the Set Otemp indicator lights.
2. Press the up/down arrow until the desired Overtemp setpoint is displayed.
3. Press Enter to save the setpoint.
4. Press the Mode key until the Run Indicator lights to go to Run mode.

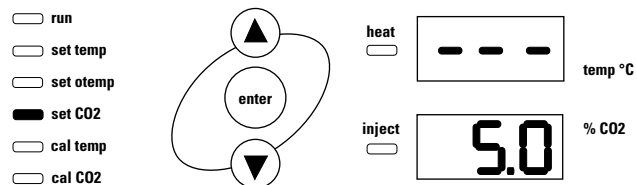
## Setting the CO<sub>2</sub> Setpoint

All T/C CO<sub>2</sub> cells are precalibrated at the factory at 37°C, high humidity, and 10% CO<sub>2</sub>, settable to within 0.1% CO<sub>2</sub>. Therefore, if a temperature setpoint of 37°C has been entered, the humidity pan filled, and the CO<sub>2</sub> control is to run between 0-10% with a T/C CO<sub>2</sub> sensor, the CO<sub>2</sub> setpoint may be entered immediately. Otherwise, it is important to allow the unit 12 hours to stabilize at the temperature setpoint before entering the CO<sub>2</sub> setpoint.

The CO<sub>2</sub> setpoint range is 0.0% to 20.0%. The incubator is shipped from the factory with a CO<sub>2</sub> setpoint of 0.0%. At this setting, all CO<sub>2</sub> control and alarms are turned off.

To change the CO<sub>2</sub> setpoint:

1. Press the Mode key until the Set CO<sub>2</sub> indicator lights.
2. Press the up/down arrow until the desired CO<sub>2</sub> setpoint is displayed.
3. Press Enter to save the setpoint.
4. Press the Mode key until the Run indicator lights to go to Run mode.



Set CO<sub>2</sub> Setpoint



## Section 2 Calibration

After the unit has stabilized, the air temperature and CO<sub>2</sub> display reading can be calibrated to reference instruments.

Calibration frequency is dependent on use, ambient conditions, and accuracy required. Good laboratory practice would require at least an annual calibration check. On new installations, all parameters should be checked after the stabilization period.

Prior to calibration, the user should be aware of the following system functions. While the unit is in Cal Temp Mode, temperature control is stopped so that chamber temperature remains stable. When the unit is in Cal CO<sub>2</sub> Mode, CO<sub>2</sub> control is stopped so that CO<sub>2</sub> levels remain stable. If no keys are pressed for approximately five minutes while in either of these two modes, the system resets to Run Mode so control can be reactivated.

**Caution** Before making an adjustment or calibration to the unit, it is imperative that all reference instruments be properly calibrated. ▲

### Calibrating the Temperature

Place the calibrated instrument in the center of the chamber. The instrument should be in the airflow, not against the shelf. Before calibration, allow the cabinet temperature to stabilize.

#### Temperature Stabilization Periods

**Start-Up** - Allow 12 hours for the temperature in the cabinet to stabilize before proceeding.

**Operating Unit** - Allow at least two hours after the display reaches setpoint for the temperature to stabilize before proceeding.

1. Press the Mode key until the Cal Temp indicator lights.
2. Press the up/down arrow to match the display to a calibrated instrument.
3. Press Enter to store the calibration into memory.
4. Press the Mode key to return to Run mode.

## Calibrating T/C CO<sub>2</sub> System

Model 3074 has a thermal conductivity (T/C) CO<sub>2</sub> sensor. Thermal conductivity of the incubator atmosphere is not only effected by the quantity of CO<sub>2</sub> present, but also by the air temperature and the water vapor present in the incubator atmosphere. In monitoring the effects of CO<sub>2</sub>, air temperature and absolute humidity must be held constant so any change in thermal conductivity is caused only by a change in CO<sub>2</sub> concentration.

Changing temperature or changing from elevated humidity levels to room ambient humidity levels would necessitate a recalibration of the CO<sub>2</sub> control.

### T/C CO<sub>2</sub> Sensor Stabilization Periods

**Note** Some T/C CO<sub>2</sub> sensors go through an aging period, especially on new installations. Calibration should be checked on a weekly basis, and adjusted as necessary. When stabilization occurs, checks may become less frequent. ▲

**Start-up** - The CO<sub>2</sub> sensor has been calibrated at the factory for 37°. Allow temperature, humidity, and CO<sub>2</sub> levels in the chamber to stabilize at least 12 hours before checking the CO<sub>2</sub> concentration with an independent instrument.

**Presently operating** - Make sure the chamber doors are closed. Allow at least 2 hours after the temperature and CO<sub>2</sub> displays reach their setpoints for chamber atmosphere stabilization.

1. Make sure stabilization periods outlined above are followed.
2. Sample the chamber atmosphere through the sample port with an independent instrument. Sample the atmosphere at least 3 times to ensure the accuracy of the instrument.
3. Press the Mode key until the Cal CO<sub>2</sub> indicator lights.
4. Press the up/down arrow to change the display to match the independent instrument.
5. Press Enter to store calibration.
6. Press the Mode key to return to Run Mode.

## **Calibrating IR CO<sub>2</sub> System**

Model 3078 has an infra-red (IR) CO<sub>2</sub> sensor. Infra-red CO<sub>2</sub> sensors are not effected by chamber atmosphere temperature or humidity. However, the light detector in the sensor is effected by wide temperature changes. Therefore, changing temperature setpoints could necessitate a recalibration of the CO<sub>2</sub>. Chamber temperature should be allowed to stabilize before checking CO<sub>2</sub> concentrations with an independent instrument, especially on start-up.

Models equipped with an IR/CO<sub>2</sub> sensor have an automatic calibration that occurs every 24 hours, and lasts for 5 to 6 minutes. During automatic calibration, the CO<sub>2</sub> display is blanked out and HEPA filtered room air is pumped through the CO<sub>2</sub> sensor. A new CO<sub>2</sub> calibration value is stored in memory for use as the 0.0% CO<sub>2</sub> reference point. The keypad/ control panel is locked during calibration, with the message center reading CO<sub>2</sub> AUTO CAL.

**Start-up-** Allow the temperature and the CO<sub>2</sub> of the cabinet to stabilize at least 12 hours before proceeding.

**Operating Unit -** Allow CO<sub>2</sub> to stabilize at least 2 hours at setpoint before proceeding.

To ensure accurate calibration, the unit will not allow CO<sub>2</sub> to be spanned below 3%. If the cabinet does not contain at least 3% CO<sub>2</sub>, increase the setpoint and allow the unit to stabilize before completing this procedure.

1. Measure the CO<sub>2</sub> concentration in the chamber through the gas sample port with a Fyrite or other independent instrument. Several readings should be taken to ensure accuracy.
2. Press the Mode key until the CAL indicator lights.
3. Press the right arrow until IR CAL XX.X appears in the message center.
4. Press the up/down arrow to adjust the display to match the independent instrument reading.
5. Press Enter to store calibration.
6. After Enter is pressed, the unit will go into a calibration cycle that lasts 5 to 6 minutes. Control panel is locked during this calibration cycle.
7. Press the Mode key to return to Run Mode.





## Section 3 Alarms

The symphony incubator alarm system is shown in the table below. When an alarm is active, the LED next to the alarm condition flashes. Pressing Silence causes all active alarms to be silenced for the ringback period. However, the visual alarm continues until the incubator returns to a normal condition. The alarms are momentary alarms only. When an alarm condition occurs and then returns to normal, the incubator automatically clears the alarm condition.

Temperature alarms are disabled when the temp setpoint is 10.0°C. CO<sub>2</sub> alarms are disabled when the CO<sub>2</sub> setpoint is 0.0%. The Low Temp alarm delay is set to 9 hours automatically on system power-up. This allows the user to avoid nuisance alarms when the system is first turned on. If the temp comes within the alarm limits prior to the 9 hour delay, the alarms will be enabled.

**Table 3-1.** Alarms

Alarm	Description	Delay	Ring-back	Trips Remote Alarm Contacts
Over Temp	Temperature is greater than Over Temperature setpoint	0 min.	15 min.	Yes
Low Temp	Temperature is at least 1°C lower than the temperature setpoint	15 min.	15 min.	Yes
High CO <sub>2</sub>	CO <sub>2</sub> is at least 1% higher than the CO <sub>2</sub> setpoint	15 min.	15 min.	Yes
Low CO <sub>2</sub>	CO <sub>2</sub> is at least 1% lower than the CO <sub>2</sub> setpoint	15 min.	15 min.	Yes
Add Water	Water is low in jacket	0 min.	15 min.	No
Door Open	Inner glass door is open	15 min.	15 min.	No
*Temp Display Flashes (Run Mode)	Temperature sensor failure	0 min.	15 min.	No
*CO <sub>2</sub> Display Flashes (Run Mode)	CO <sub>2</sub> sensor failure	0 min.	15 min.	No

\* The microprocessor in the incubator continually scans the sensors to ensure they are operating properly. Should an error be detected, the affected display flashes and the alarm sounds. If such an alarm occurs, contact Technical Services.

*All alarm delays and ringback times are ±30 seconds.*



## Section 4 Specifications

\*Specifications are based on nominal voltages of 115V in ambients of 22°C to 25°C.

### Temperature

Control .....±0.1°C  
Range .....+5°C above ambient to +55°C (131°F)  
Uniformity .....±0.3°C @ +37°C  
Low Temp Tracking Alarm .. Fixed at 1.0°C below setpoint

### Temperature Safety

Sensor .....Precision thermistor  
Setability .....0.1°C

### CO<sub>2</sub>

CO<sub>2</sub> Control .....Better than ±0.1%  
CO<sub>2</sub> Range .....0-20%  
Inlet Pressure .....15 PSIG (1.034 bars), ±5 PSIG  
CO<sub>2</sub> Sensor .....T/C  
Readability .....0.1%  
Setability .....0.1%  
Low CO<sub>2</sub> Tracking Alarm .. Fixed at 1.0% below setpoint  
High CO<sub>2</sub> Tracking Alarm .. Fixed at 1.0% above setpoint

### Humidity

RH .....Ambient to 95% @ +37°C (98.6°F)  
Humidity Pan .....0.8 gal. (3 liters) standard

### Fittings

Fill Port .....3/8" barbed  
Drain Port .....1/4" barbed  
Access Port .. 1-1/4" (3.18cm) removable neoprene plug  
CO<sub>2</sub> Inlet .....1/4" hose barbed

Unit Heat Load

115V .....344 BTUH (100 Watt)

Shelves

Dimensions ....18.5" x 18.5" (47.0cm x 47.0cm)

Construction .....Stainless steel, perforated

Surface area .....2.4 sq. ft. (0.22 sq. m)

Max. per Chamber .....54.6 sp. Ft. (5.5 sq. m)

Loading .....35 lb. (16kg) slide in and out

50 lb. (23kg) stationary

Standard .....3

Maximum .....16

Construction

Water Jacket Volume .....11.7 gal. (43.5 liters)

Interior Volume .....6.5 cu. ft. (184.1 liters)

Interior .....Stainless steel

Exterior .18 gauge, cold rolled steel, powder coated

Outer Door Gasket . Four-sided, molded magnetic vinyl

Inner Door Gasket . Removable, cleanable, feather-edged, silicone

Electrical

115V ....90-125VAC, 50/60 Hz, 1 PH, 3.6 FLA

Circuit Breaker/Power Switch .....6 Amp/2 Pole

Alarm Contacts . Power interruption, deviation of temp., CO<sub>2</sub> customer connections through jack on back of unit. 30V, 1A max.

Installation Category .....Overvoltage Category II

Pollution Degree 2

Maximum Leakage Current With ground disconnected, 0.65mA

Maximum permissible leakage, 3.5mA

Dimensions

Interior .....21.3" W x 26.8" H x 20.0" F-B

.....(54.1cm x 68.1cm x 50.8cm)

Exterior .....26.3" W x 39.5" H x 25.0" F-B

.....(66.8cm x 100.3cm x 63.5cm)

Weight (per unit)

Net . . . . .	.265 lb. (120.2 kg)
Net Operational . . . . .	.365 lb. (165.6 kg)
Shipping . . . . .	.324 lb. (147.0 kg)

Safety Specifications

Altitude . . . . .	.2000 meters
Temperature . . . . .	.5°C to 40°C
Humidity . . . . .	.80% RH at or below 31°C, . . . . .decreasing linearly to 50% RH at 40°C
Mains Supply Fluctuations . .	Operating Voltage Range
Installation Category 2 <sup>1</sup>	
Pollution Degree 2 <sup>2</sup>	
Class of Equipment	

<sup>1</sup> Installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500V for a 230V supply and 1500V for a 120V supply.

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<sup>2</sup> Pollution Degree describes the amount of conductive pollution present in the operating environment. Pollution Degree 2 assumes that normally only non-conductive pollution such as dust occurs with the exception of occasional conductivity caused by condensation.



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