

INSTALLATION AND OPERATING INSTRUCTIONS

BELCO CO2 INCUBATOR

Stock Numbers

7728-00115 115 Volt, SINGLE WINDOW DOOR

7728-00230 230 Volt, SINGLE WINDOW DOOR

7728-S0232 115V, SINGLE WINDOW DOOR, 4 PORTS

7728-S0234 230 Volt, SINGLE WINDOW DOOR WITH HUMIDITY PANS

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IS# 457
Rev: 08/20

WARNING:

Use of this equipment is limited to conventional laboratory applications. It is not intended for use in adverse environments outside the environmental conditions listed below. It is also not intended for use with corrosive or explosive solutions.

Environmental Conditions, operating: indoor use, pollution degree 2, 4° to 50° C
relative humidity 0-90% non-condensing

Environmental Conditions, non-operating: -10° to 60° C, relative humidity 95% maximum

SAFETY SYMBOL DEFINITIONS:



Electrical Hazard. Be extremely careful. Do not remove cover while the unit is connected to a power supply. There are voltages within the unit which could, if contacted, cause personal injury.



Protective Earth Ground (Ground): Do not operate if green screw is loose or missing. Screw provides an uninterruptible safety earth ground from the mains (power source)



Caution or Warning Note. Denotes a hazard. Included text gives proper procedures. Failure to follow directions could result in minor personal injury and/or property damage.



Do not modify the unit in any way if you are not a trained certified electrician. All user modifications and/or repairs must receive prior approval from Bellco Glass Service & Repair Department. Failure to do so not only voids the warranty, but also presents the risks of shock, fire and electrical damage.

GENERAL DESCRIPTION

Bellco CO2 Incubators have 40 cubic feet of volume and are designed for use with Bellco's Cell Production Roller Apparatus (CPRA). One internal convenience outlet on top allows simple connection to internally placed appliances such as CPRA, Roller Drums, Magnetic Stirrers, etc. Fans take air from the chamber top, pass it over the 1100 watt heater and re-inject it into the chamber on the back wall. A microprocessor temperature controller and membrane keypad allows simple setting and monitoring of chamber temperature. A safety thermostat is included to prevent over-temperature failures. Shelf brackets are included for mounting of optional shelves. A microprocessor CO2 controller allows simple setting and monitoring of chamber CO2 level. The control panel features indicating lights and dials for automatic control of temperature (**Reference Figure 3**).

SPECIFICATIONS

Power: 7728-00115 115±10VAC@ 60 Hz line voltage
15 Amp @ 115V, 60 Hz average power consumption
(Includes 3 amp convenience outlet load)
7728-00230 230±10VAC@ 50/60 Hz line voltage
10 Amp @ 115V, 50/60 Hz average power consumption
(Includes 3 amp convenience outlet load)

Watts: 1500

Dimensions:

	Width	Depth	Height
Exterior	40" (101.6cm)	31" (76cm)	86" (218.4cm)
Interior	35" (89cm)	26 5/8" (67.6cm)	77" (195.6cm)

Volume: 40 cubic ft (1132 L)

Shipping Weight: 700 lbs (318 kg)

Temperature Control Range: Ambient +9°C to 50°C

Temperature Uniformity: ±1.0° @ 37°C (or better)

CO2 Range: 0 – 20% Concentration

Output: 4 – 20 mA

Features

- Accommodates 52 positions, programmable Cell Production Roller Apparatus or 45 position standard Cell Production Roller Apparatus.
- Optional adjustable shelves accommodate Bellco Magnetic Stirrers, Rockers and other, bench top equipment.
- Forced air circulation facilitates even temperature distribution throughout the chamber.
- Accessory outlet in chamber provides power for supplemental equipment.
- Control panel features main power switch, convenience outlet power switch, safety thermostat, alarm horns, remote alarm jacks, alarm silence button, and digital microprocessor-based temperature and CO2 controllers.
- Accepts optional high/low Temperature Alarm and Temperature Recorder Modules.
- Left hand opening door is standard; Right hand opening door is optional.
- Special models available with ports, solid door and right hand opening door.

INSTALLATION

These instructions will help you properly install your new Bellco CO2 Incubator. They explain the cabinet's features and provide helpful information for service and maintenance. If the cabinet is installed and maintained according to the information presented on the following pages, years of satisfactory, trouble-free performance should follow.

- A. Inspection** - Examine the incubator carefully before discarding the shipping crate. If any damage is found, contact the delivering carrier **IMMEDIATELY**, and have his agent make an inspection report for the purpose of filing a claim. **This is your responsibility.** If further instructions are necessary, contact Bellco Glass, Inc., Claims Department (856) 691-1075. See Warranty and Shipping section. There are no shipping bolts to loosen.
- B. Location** - In locating the incubator, consider all possible conditions that might affect its performance. Do not place near extreme heat (steam radiators, stoves, ovens, etc.). Avoid direct sun rays and rapidly moving air currents.
- C. Moving** - This unit should be moved upright on its original shipping pallet using a forklift or pallet jack. Care should be taken not to tilt the unit while on pallet. Slide unit into place.



**WARNING: Do not stand behind unit when pushing from pallet! Do not tip unit in excess of 20 degrees!
Push only on edges of door! Do not push on glass!**

- D. Power Source** - The supply circuit to this incubator must conform to all National and Local Electrical Codes. Consult the cabinet serial data plate for voltage, cycle, and amperage requirements before making connections.



VOLTAGE SHOULD NOT VARY MORE THAN 10 % FROM SERIAL DATA PLATE RATINGS.



WARNING: These units are CO2 incubators for professional, industrial or educational use where the preparation or testing of materials is done at approximately atmospheric pressure and no flammable, volatile or combustible materials are being heated. This unit is not intended for hazardous or household locations or use.

OPERATING INSTRUCTIONS



WARNING: Set temperatures before connecting CO₂ supply to incubator. Humidification of this unit is neither possible nor appropriate. Any attempt at humidification will destroy your incubator and void the warranty. The inner chamber and the outer body will rust.

SET TEMPERATURE CONTROLLER:

- A. Plug service cord securely into outlet. Turn on power switches (**Ref. Figure 3**).
- B. After starting, allow time for temperature to stabilize before using incubator. Stabilization will occur when the upper temperature display matches the lower (setpoint) display.
- C. Turn temperature knob marked "SAFETY" fully clockwise.
- D. Depress downward or upward setting key until the desired temperature is displayed. Let the incubator stabilize at the set temperature (**Reference Figure 2**).
- E. Take a reading from a calibrated thermometer under actual conditions of use (i.e. inside the incubator). Compare the temperature on the controller to the thermometer reading.
- F. If the temperature controller setpoint and the calibrated thermometer temperature aren't in agreement, see the **Temperature Corrections** instructions below.
- G. Very slowly bring safety counter clockwise until "SAFETY" light is on. Then rotate clockwise until light goes out.
- H. Under normal operation, the "SAFETY" light is OFF. If the "SAFETY" light is cycling ON and OFF, it generally means that the safety control is set too close to the primary control setting. To correct this situation, turn the safety control just slightly clockwise.

Temperature Correction Procedures:

All Temperature controllers are preprogrammed for general use; however there are some parameters which may be customized to suit specific applications. Refer to Figure 1 & 2 for all nomenclature used below:

1. Temperature Offset (To adjust the display temperature to coincide with the mean chamber temperature):

The temperature controller can be programmed to compensate for a consistent discrepancy. If the mean chamber temperature and the display do not agree after stabilization, correct the display as follows:

Note the display and mean chamber temperatures.

Now press the level key for 1 second to enter the adjustment level, L.Adj is displayed.

Press mode key (bent arrow button) twice, iNS is shown.

This is the input shift, corrections are made here.

The value in the lower display is the existing input shift value.

Subtract the displayed temperature from the main chamber temperature.

Adjust the input shift by this amount by pressing the up or down arrows.

2. Example:

The temperature displayed is 37.0°C, but the mean chamber temperature is 36.5°C. The difference is -0.5°C. With the input shift previously set to -1.5°C, you would use the down arrow to adjust the input shift to -2.0°C.

Press and hold the level key for at least one second.

The controller displays will change to initial setting (iN-t).

Press and hold the level key to return to operating mode.

SET CO2 CONTROLLER:

- A. Before you turn on the CO2 power switch read the below information.
- B. As stated at the beginning, do not connect the CO2 supply to the incubator until the temperatures have been set. Use only Medical Grade CO2 with an in-line filter from the tank to the incubator. These incubators use CO2 in small quantities. Precise metering of input is vital for maximum performance and only a two-stage CO2 pressure regulator is recommended. Note that some single-stage CO2 pressure regulators have two (2) gauges; be certain you are using only a two-stage regulator.
- C. The high-pressure stage of the regulator coming direct from the supply tank must have a range from 0 to at least 2000 PSI (actual tank pressure as read on the gauge). The low-pressure stage should have a range from 0 to at least 40 PSI. The low-pressure gauge indicates the actual CO2 pressure into the incubator. Connect the CO2 supply from the low-pressure stage of the regulator to the 1/4" inlet fitting on the left side of the unit marked CO2 to Chamber.

CAUTION: CO2 pressure to the incubator inlet is rated from 15 to 20 PSI. DO NOT exceed 20 PSI.

- D. The CO2 controller interprets the information from the CO2 sensor, displays the CO2 concentration directly on the digital display, reads the set point and controls the percentage of CO2 in the incubator chamber. The infrared (IR) sensor operates under the principle that a certain frequency of infrared light is absorbed by CO2. The more CO2 present in the chamber the more light is absorbed. The IR sensor is only sensitive to CO2, so its accuracy is consistent no matter what the conditions are in the incubator.
- E. Depress downward or upward setting key until the desired CO2 percentage is displayed. Let the incubator stabilize at the set CO2 level, allow several hours.
- F. During CO2 calibration it is important that the door not be opened for any reason and the CO2 has been stable for several hours. Use a Digital or CO2 Fyrite gas analyzer for testing.
- G. If there is an unacceptable difference between the display and the CO2 analyzer, this can be corrected by making the adjustments in the controller as follows:

NOTE: When using the CO2 analyzer, insure that gas is not being injected while the reading is being taken.

Note the display and the chamber CO2 percentages.

Now press the level key for 1 second to enter the adjustment level, L.Adj is displayed.

Press mode key (bent arrow button) twice, iNS is shown.

This is the input shift, corrections are made here.

The value in the lower display is the existing input shift value.

Subtract the displayed CO2 % from the main chamber CO2 %.

Adjust the input shift by this amount by pressing the up or down arrows.

2. Example:

The CO2 displayed is 5 %, but the mean chamber temperature is 4.5 %. The difference is -0.5 %. With the input shift previously set to -1.5 %, you would use the down arrow to adjust the input shift to -2.0 %.

Press and hold the level key for at least one second.

The controller displays will change to initial setting (iN-t).

Press and hold the level key to return to operating mode.

CLEANING

- A. The shelves and shelf clips may be taken out for cleaning.
- B. Wash the cabinet exterior with a mild soap and water solution. Rinse with clear water, then wipe dry.
- C. Sanitizing solution such as Roccal (National Laboratories) can be used to disinfect the interior.

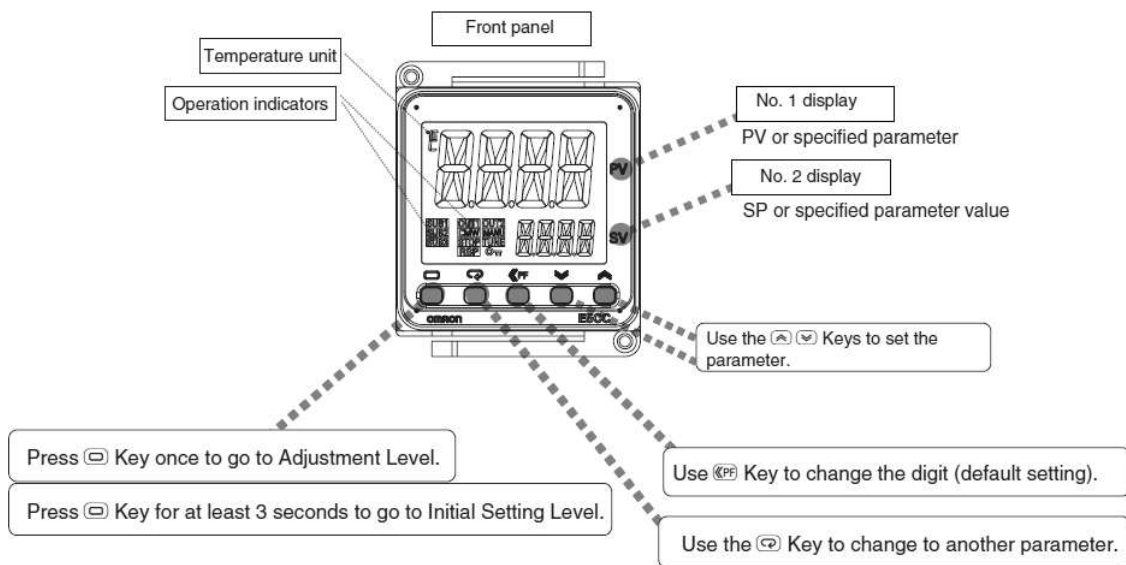
**FIGURE 1:
DISPLAY SYMBOLS**

This table shows the correspondence between the E5CC display symbols and alphabet characters.

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>	<i>J</i>	<i>K</i>	<i>L</i>	<i>M</i>
A	B	C	D	E	F	G	H	I	J	K	L	M

<i>N</i>	<i>O</i>	<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>U</i>	<i>V</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

**FIGURE 2:
TEMPERATURE CONTROL FEATURES
CO2 CONTROLLER FEATURES**



TROUBLE SHOOTING

⚡ WARNING: Disconnect the power cord before removing top cover or performing any service on the unit.

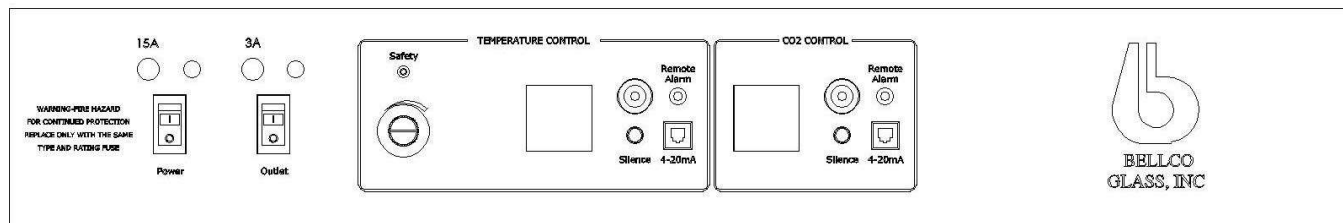
- A. In the event the incubator does not operate properly, check the following before calling for service:
1. Is electrical power reaching the unit? (Check for blown fuse.)
 2. Is service cord connected to outlet?
 3. Is door closed tightly?
- B. If this does not correct the difficulty, contact Belco Service Dept @ 1-800-257-7043 ext. 279.

REPLACEMENT PARTS

A421-17	Line Filter
A500-107	Power Switch, Convenience Outlet Switch 115V
A500-68	Power Switch, Convenience Outlet Switch 230V
A512-1089	Primary Fan Unit 115V
A512-1103	Primary Fan Unit 230V
A512-987	IR CO2 Sensor
A512-50	Safety Temperature Controller
A512-966	Pt 100 Temperature Sensor
A512-986	CO2 Valve
A512-1017	Temperature Controller
A512-991	CO2 Controller
A518-368	Solid State Relay
A432-6	AGC-3, 3 Amp Fuse 115V
A432-5	AGC-2, 2 Amp Fuse 230V
A432-10	AGC-15, 15 Amp Fuse 115V
A432-9	AGC-10, 10 Amp Fuse 230V
7728-40035	Shelf (Optional)
7728-40050	Ultra-Flow Shelf (Optional)

To order, contact Belco's Customer Service Department @ 1-800-257-7043

**FIGURE 3:
CONTROL PANEL**



4-20mA Port

The 4-20mA Port is provided for remote process monitoring (e.g. Computer). It provides real-time data output through an RJ-12 jack. The output is linear (4mA = 0°C, 20mA = 50.0°C for temperature and 4mA = 0%, 20mA = 20% for CO₂). It is designed to be used with standard laboratory networking software, but may also be used with any custom software that can utilize the signal. Bellco does not provide any software for this feature; it is the customers' responsibility to select a program suitable for their application(s).

Local Alarms

The alarm horn connected to the controller will sound when the temperature falls below 36.0C or rises above 38.0C. A yellow SUB1 or SUB2 light will illuminate on the Omron display to indicate an alarm.

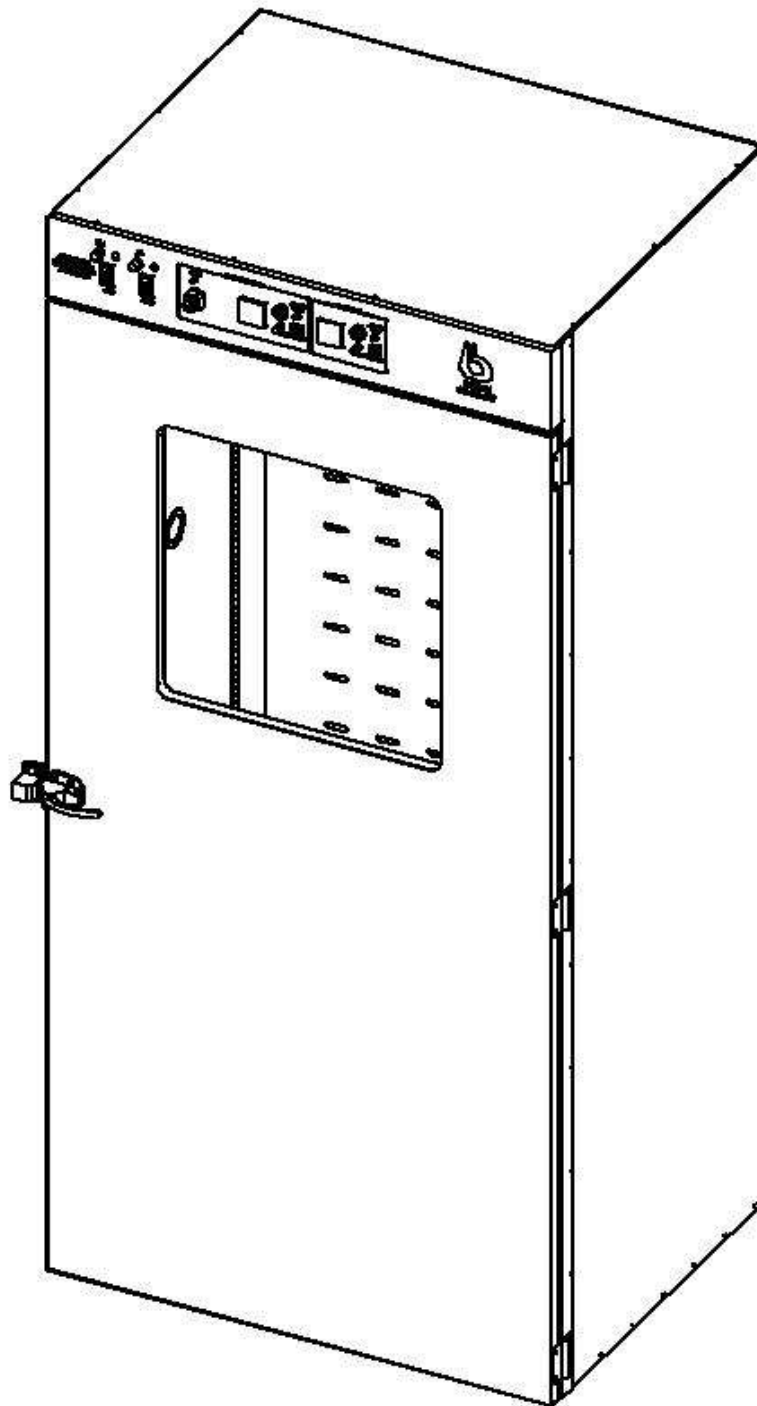
The alarm horn connected to the CO₂ controller will sound when the concentration falls below 4.0% or rises above 6.0%. A yellow SUB1 light will illuminate on the Omron display to indicate an alarm.

Omron Remote Alarm Jack

The remote alarm jack is a 1/4" phone jack located on the control panel (see Fig.2). The process (Omron) controller has two alarm set points which monitor the process value of the unit. The alarm output is a contact closure only; customer must provide his own alarm system. E.g. light, buzzer, power supply, etc. The contact limits are 1 amp at up to 125 VAC or DC. These alarm points are non-latching and non-failsafe, and are not intended to provide process monitoring. The AL-1 alarm set point is for upper deviation and the AL-2 alarm set point is for lower deviation based on the SP value. They are intended to provide a remote signal if the PV value exceeds the alarm set points during equipment operation. External connections may be made to the tip and ring circuits of the supplied phone jack. The shell (ground) connection is not used. To adjust the alarm set values, press the bent arrow key multiple times to reach AL-1 and AL-2 then use the up and down arrows.



**FIGURE 5:
ROLL-IN INCUBATOR ASSEMBLED VIEW**



BELCO WARRANTY AND LIMITATION OF LIABILITY

Bellco Glass, Inc. warrants to the original purchaser, its products to be free from defects in material and workmanship for a **period of one (1) year from the date of shipment, unless otherwise specified**. Our obligation under this warranty is limited to, at our option, repair, replace, or cause any necessary repairs to be made to, any defective part or parts, which shall be returned to us. **Belco takes no responsibility for damage to merchandise in transit**. All such claims must be submitted to the carrier. This warranty shall not apply to any equipment or parts which shall have been repaired or altered outside our factory, or subjected to misuse, negligence, accidents, faulty installation by other parties, or **unauthorized** repairs or modifications. In addition, Bellco Glass, Inc., shall not be responsible to the original purchaser or any other party or parties for bodily or property loss, damages, or injuries of any kind or nature through either direct or indirect use of the product. This warranty is made expressly in lieu of any and all other warranties, expressed or implied, or statutory as to the merchantability, fitness for purpose sold, description, quality, productiveness or any other matter. All other such warranties are specifically excluded.

The provisions of this warranty and limitation of liability may not be modified in any respect except in writing signed by a duly authorized officer of Bellco. The liability of Bellco, if any, for damages relating to any allegedly defective product shall, under any legal or equitable theory, be limited to the actual price paid by purchaser for such product and in no event include incidental or consequential damages of any kind.

SHIPMENTS

All items are shipped F.O.B. Vineland, New Jersey with the charges prepaid and added to the invoice. Special shipping instructions should accompany your order. We will select the best method if none is specified. Air shipments are available for an additional charge. Delivery of large products shall be to the customer's loading dock. **It is the customer's responsibility to arrange movement from the loading dock to the site of use, unless otherwise agreed to by Bellco Glass, Inc.** Products requiring special packaging or crating may incur additional handling fees.

Bellco takes every reasonable precaution to ensure that its products arrive without damage. However, occasionally damage will occur during the shipment of a product. For this reason, it is imperative that Purchaser examine each product **immediately** upon receipt in order to determine whether the product has arrived in proper condition. In the event Purchaser detects any damage to the product, Purchaser shall **immediately** notify Bellco and the carrier who delivered the product. **Failure to notify Bellco and the carrier of any damage within five (5) days of receipt of the product shall constitute a waiver of any claim for damage to the product.** The freight carrier shall be exclusively responsible for any damage which occurs during shipment.