1/01

OPERATION MANUAL

MANUAL NO. 057-561-00
REV. A

LAB-LINE®
AIR-JACKETED COMPACT
AUTOMATIC & FLO-THRU®
CO2 INCUBATORS

MODEL NO.

AUTOMATIC:
314, 314-1, 314-1CE
(Stainless Steel Interiors)

316, 316-1
(Copper Interiors)

FLO-THRU:
315, 315-1
(Stainless Steel Interiors)

317, 317-1
Copper Interiors)

DESIGNERS AND MANUFACTURERS
A SUBSIDIARY of Barnstead|Thermolyne
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PHONE: (319) 556-2241 or (800) 522-5463; FAX: (319) 589-0516

CE

[redacted]ABLE OF CONTENTS [redacted]

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1	Introduction
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	Warranty

BE ADVISED:

IT IS MOST IMPORTANT THAT THE USER FOLLOW INSTALLATION INSTRUCTIONS **EXACTLY AS WRITTEN**—FAILURE TO DO SO IS LIKELY TO LEAD TO IMPROPER OPERATION, ERRONEOUS CALIBRATIONS AND POSSIBLE DAMAGE TO THE EQUIPMENT. **UNDER NO CIRCUMSTANCES** SHOULD THE USER ATTEMPT OPERATION WITHOUT THIS INFORMATION.

THE FOLLOWING EQUIPMENT IS TO BE SUPPLIED BY THE USER:

- Dry CO_2 gas (research grade or better).
- A dual-stage regulator for the CO_2 tank.
- ¼" ID Flexible tubing (appropriate length from tank to incubators), and connected per local codes.
- Fyrite or similar chemical-based CO_2 analyzer.

BE ADVISED: INSTALLATION AND PRE-OPERATION PROCEDURE WILL TAKE AT LEAST 24 HOURS TO COMPLETE. **DO NOT** ATTEMPT TO RUSH THE PROCESS WITH SHORT CUTS TO THE PROCEDURES DESCRIBED IN THIS MANUAL.

CERTIFICATION OF DECONTAMINATION:

We cannot accept for service or credit a product that has been exposed to or contaminated with chemically or biologically toxic or infectious substances or subjected to radioactivity without first being certified as free from said contamination.

Please have your Medical and/or Safety Officer sign this form certifying that proper decontamination procedures have been followed to render the product safe and free from hazards.

Any product forwarded to us, not accompanied by this form and a proper Return Goods Authorization Number, will be returned to the sender. To obtain a Return Goods Authorization Number, contact the Customer Relations Department at (800) 522-5463.

We hereby certify that the LAB-LINE INSTRUMENTS, INC. product:

Model No. _____ and Serial No. _____,

which is being forwarded has been properly decontaminated and is free from all toxic hazards, infectious agents, radioactivity and/or other hazards.

Company/Institution Name:

Street Address: _____

City: _____ State_____ Zip_____

Name (please print): _____ Title _____

Signature: _____

Phone: _____

DECONTAMINATION PROCEDURE (Be Specific):

_____

_____

_____

Nature of Hazard That Required Decontamination:

_____

_____

_____

INTRODUCTION

THANK YOU

for selecting Lab-Line Instruments for your equipment needs. For maximum value and ease of start-up,

PLEASE PROCEED AS FOLLOWS:

- Inspect the carton and contents for shipping damage. Notify the carrier immediately if damage is found.
- Use the Accessory Checklist when unpacking to verify that the complete unit has been received. Do not discard packing materials until all is accounted for.
- Read this Operation Manual thoroughly *before* deciding upon an appropriate location for the unit: you will want to consider the availability of power and other unit requirements, as well as user convenience.
- Insist that every operator of this unit becomes familiar with the Operation Section of this manual.
- Be sure to fill out the Warranty Registration Card and mail it in to Lab-Line Instruments within seven (7) days after receiving the unit.

IF

after reading this manual you should have any difficulties with the installation or operation instructions, please call:

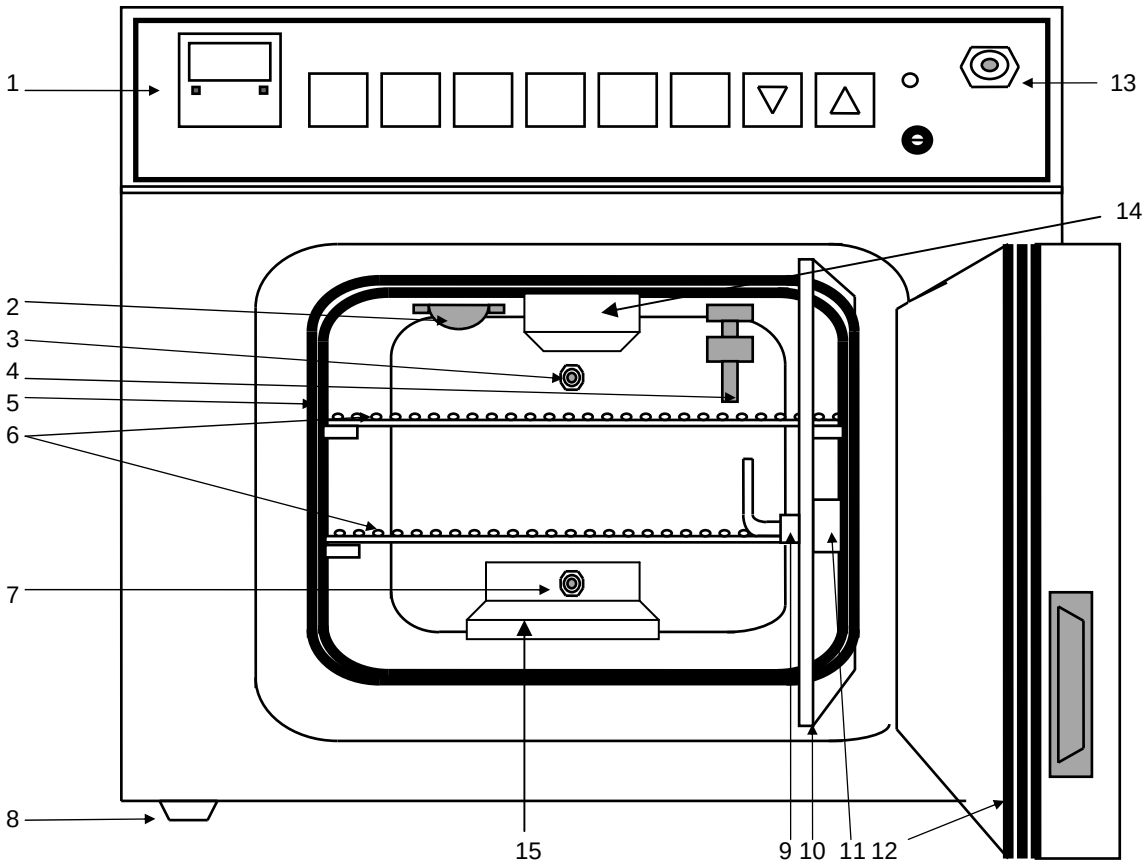
Lab-Line Customer Relations Department
(319) 556-2241 or (800) 522-5463

ALL RIGHT RESERVED
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DESCRIPTION

314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

BASIC COMPONENTS, AN INITIAL OVERVIEW:

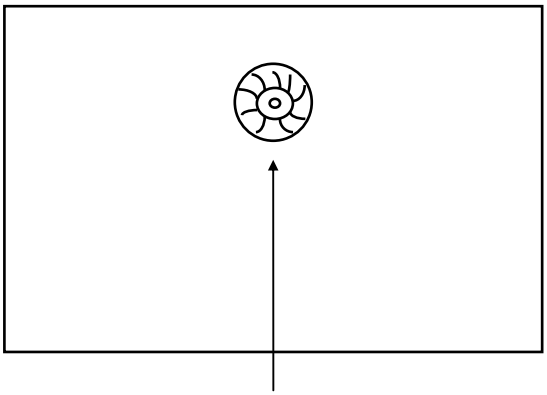


1. Control panel
2. CO_2 sensor
3. CO_2 inlet port
4. Temperature sensor
5. Chamber gasket
6. Chamber shelves
7. Sample port inlet
8. Leveling feet
9. Inner glass door, handle shaft
10. Inner glass door
11. Inner glass door, handle
12. Outer door gasket
13. CO_2 sample port
14. Fan Cover
15. Humidity Trough

DESCRIPTION: (Con't)

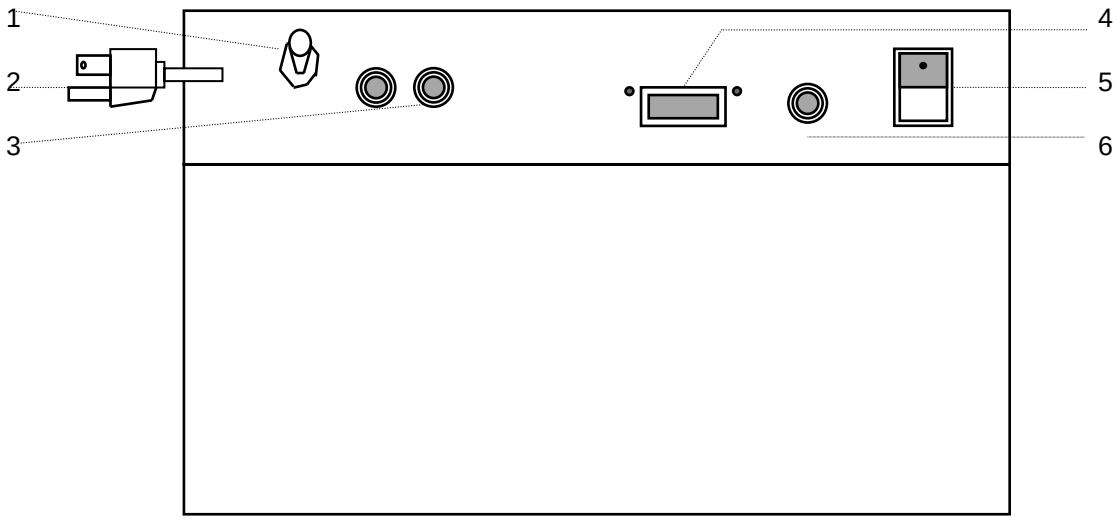
BASIC COMPONENTS, AN INITIAL OVERVIEW: (CON'T)

CHAMBER CEILING, INTERIOR



CIRCULATING FAN

REAR PANEL VIEW, EXTERIOR:



1. GAS INLET PORT
2. CORDSET
3. CIRCUIT BREAKERS
4. RS232 DATA PINS CONNECTOR
5. POWER SWITCH
6. OPTIONAL ALARM RELAY OUTPUT

DESCRIPTION: (Con't)

314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

CO_2 levels are automatically set at 5%. These units control CO_2 concentrations, as well as temperature, to create a growth environment ideal for tissue cultures, plants, cells, viruses and related organisms.

Incoming 100%, CO_2, from an external source provided by the user, passes into the gas inlet port located on the rear panel of the unit. Heated air is moved uniformly throughout the chamber by a circulating fan located in the top of the chamber. A CO_2 access port on the control panel permits sampling of the chamber atmosphere.

These incubators provide precise and reliable control of carbon dioxide through the use of a TC, thermal conductivity, sensor coupled with an easy-to-use command control console. All required operating commands are immediately accessible in a functional format on the front of the unit and permit rapid start-up, close monitoring and efficient control of incubation protocols.

Temperature is measured by a platinum RTD, resistance temperature detector, producing excellent control within the range, ±0.1ºC. This is combined with the exclusive SmartGas® algorithm method for controlling CO_2 within the range ±0.1%. The result is a chamber that produces excellent environmental conditions for the most sensitive of incubations.

Audible and visual alarms provide a signal to the user of any deviation in the chamber temperature of ±1.0ºC, or carbon dioxide of ±1.0% CO_2. In addition, other signals alert the user to power failures and door openings.

An independent, adjustable hydraulic high limit thermostat will limit the temperature in the event of a problem with the main temperature controller.

To conserve gas, the unit's CO_2 solenoid valve, as well as the circulating fan motor, shuts off automatically any time the door is opened.

A double-door system has a tempered glass inner door that provides unobstructed viewing of the entire chamber.

314 series chambers are constructed of seamless stainless steel for cleaning ease and maintenance; 2 stainless steel shelves are standard—a total capacity is 5 shelves. 316 series incubators feature a fungus and bacteria resistant copper chamber.

Both models have a stainless steel outer cabinet with a powder coated finish for easy cleaning.

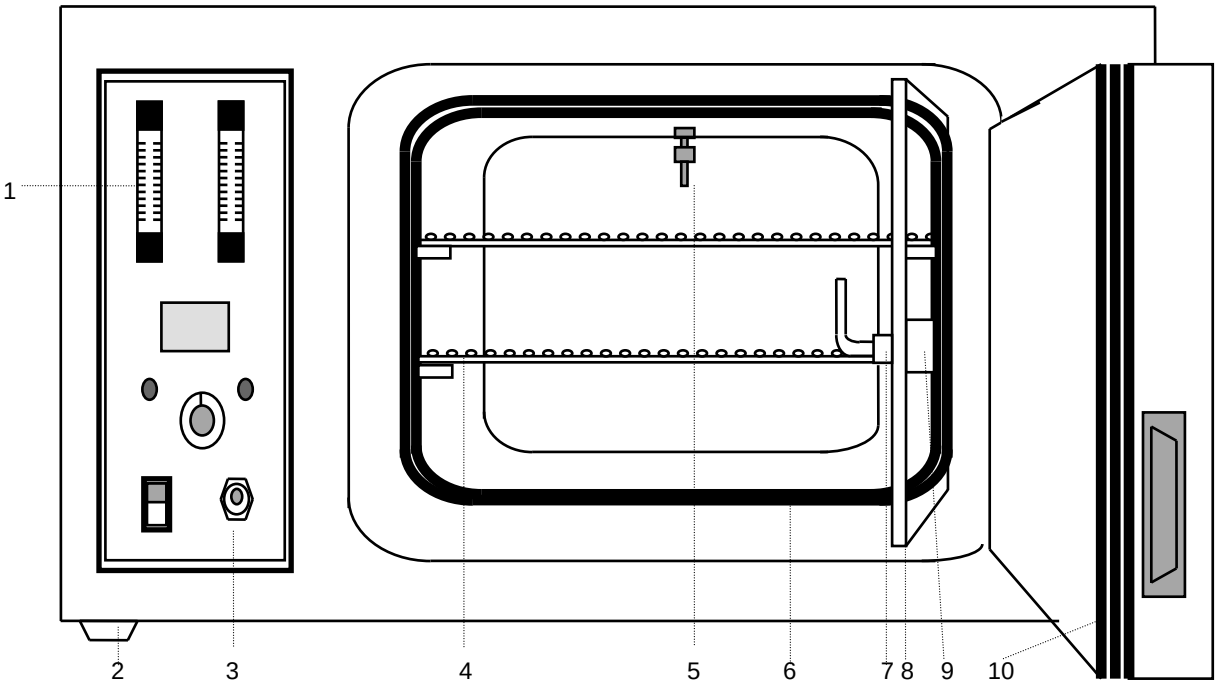
DOUBLE-DOOR CONSTRUCTION WITH INNER DOOR DEFOGGER: 314/316 MODELS:

A tempered glass inner door allows observation of a chamber without disturbing the chamber environment. Inside the steel outer door are heaters that can be turned on to defog the glass door when necessary. Each door seals to a one-piece gasket for a leak-tight environment.

DESCRIPTION: (Con't)

315/317 SERIES FLO-THRU CO_2 INCUBATORS:

BASIC COMPONENTS, AN INITIAL OVERVIEW:



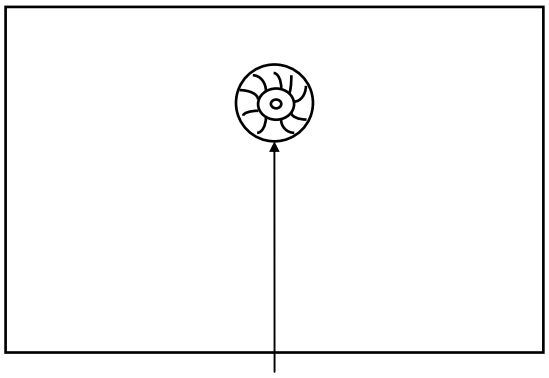
1. AIR & CO2 FLOWMETERS
2. UNIT FEET
3. CO2 ACCESS PORT
4. CHAMBER SHELVES
5. TEMPERATURE SENSOR
6. CHAMBER GASKET
7. INNER GLASS DOOR, HANDLE SHAFT
8. INNER GLASS DOOR
9. INNER GLASS DOOR, HANDLE
10. OUTER STEEL DOOR/GASKET

DESCRIPTION: (Con't)

315/317 SERIES FLO-THRU CO_2 INCUBATORS: (Con't)

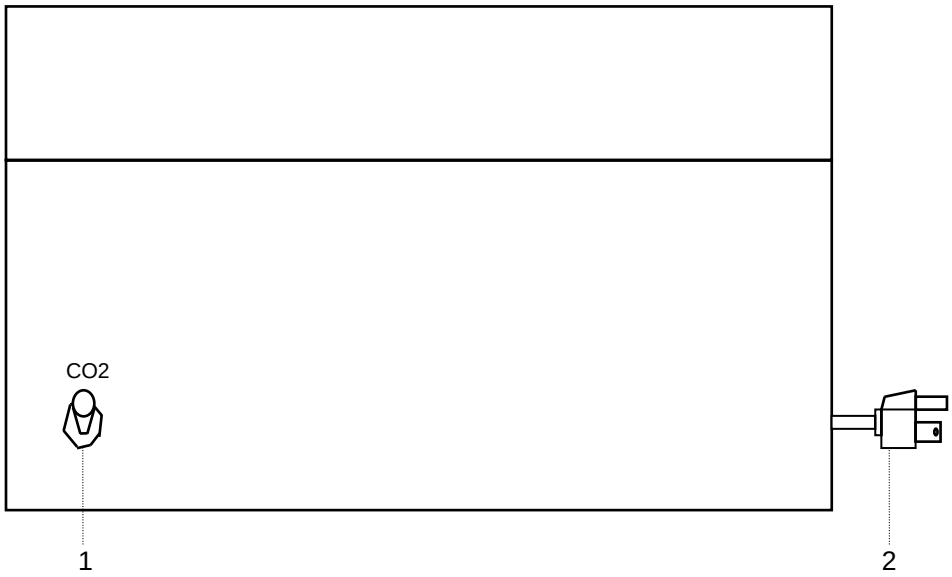
BASIC COMPONENTS, AN INITIAL OVERVIEW: (CON'T)

CHAMBER CEILING, INTERIOR



CIRCULATING FAN

REAR PANEL VIEW, EXTERIOR:



1. CO2 INLET PORT
2. CORDSET

DESCRIPTION: (Con't)

315/317 SERIES FLO-THRU CO_2 INCUBATORS:

CO_2 levels are manually adjusted utilizing flowmeters. Flo-Thru control of CO_2 concentrations and temperature create a growth environment ideal for tissue cultures, plants, cells, viruses and related organisms.

An incoming gas mixture passes through the plenum and is gently circulated throughout the chamber. Separate flowmeters adjust air and CO_2 rates and an access port on the control panel permits sampling of the chamber atmosphere.

2 hydraulic thermostats: one is an adjustable setpoint control unit, the other is a non-adjustable, over-temperature-limiting unit. It is factory pre-set to regulate temperature in order to protect the chamber.

Heaters on the outside of the chamber inner walls are positioned for uniform heat distribution, while high-density fiberglass insulation minimizes heat loss.

A double-door system has a tempered glass inner door that provides unobstructed viewing of the entire chamber.

Model 315 and 315-1 interiors are constructed of seamless stainless steel for cleaning ease and maintenance. 2 stainless steel shelves are standard—a total capacity is 5 shelves.

Models 317 and 317-1 have a seamless copper interior that acts to reduce the growth of fungus and bacteria thereby minimizing contamination of cultures. 2 copper shelves are standard with room for 3 additional shelves.

All models have a steel outer cabinet with a powder coated finish for easy cleaning.

SECTION 3

SPECIFICATIONS

314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

ELECTRICAL REQUIREMENTS:	
314, 316:	120 V, 60 Hz, 200 Watts, 1.7 Amps,
314-1, 316-1:	230/240 V, 50 Hz, 200 Watts, 0.8 Amps,
TEMPERATURE:	
RANGE:	Ambient +5ºC to 60ºC
CONTROL:	±0.1ºC at 37ºC.
UNIFORMITY IN CHAMBER:	Within the chamber, ±0.25ºC
ALGORITHM:	TEMPERATURE: PID CO_2: SmartGas®
CARBON DIOXIDE TENSION:	Range: 0% to 20% Control: ±0.1%
VOLUME:	1.2 cubic feet (34 liters)
EXTERIOR:	22½" W x 18" D x 19" H (57 x 46 x 48 cm)
INTERIOR:	14" W x 12" D x 12" H (36 x 31 x 31 cm)
SHELVES:	2 standard; space for 3 additional shelves.
DIMENSIONS:	13-3/8” (tapering back to) 12-1/8" W x 11½" D (34~30.7 x 29.2 cm)
SHIPPING WEIGHT:	70 lbs. (32 kg)

SPECIFICATIONS: (Con’t)

315/317 SERIES FLO-THRU CO_2 INCUBATORS:

ELECTRICAL REQUIREMENTS:

315, 317:	120 V, 60 Hz, 200 Watts, 1.7 Amps,
315-1, 317-1:	230/240 V, 50 Hz, 200 Watts, 0.8 Amps,
TEMPERATURE:	
RANGE:	Slightly above ambient to 60ºC.
CONTROL:	±0.5ºC.
UNIFORMITY:	±1.0ºC
CARBON DIOXIDE RANGE:	From 0 to 20% of the mixture.
VOLUME:	1.2 cubic feet (34 liters)
DIMENSIONS:	
EXTERIOR:	23½" W x 17" D x 15" H (60 x 43 x 38 cm)
INTERIOR:	14" W x 12" D x 12" H (36 x 31 x 31 cm)
SHELVES:	2 standard; space for 3 additional shelves.
DIMENSIONS:	11"W x 13½"D x 7"H (28 x 34 x 18 cm)
SHIPPING WEIGHT:	70 lbs. (32 kg)

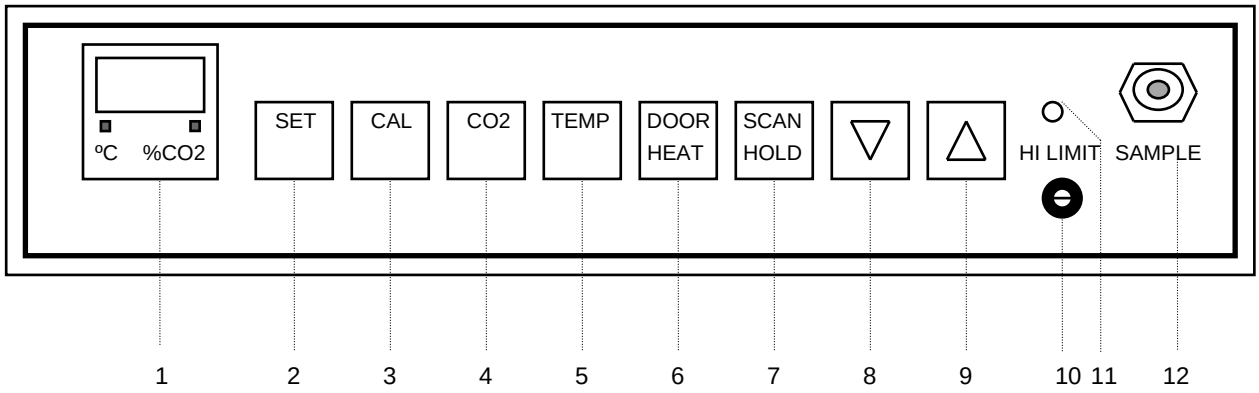
UNIT'S ENVIRONMENTAL OPERATING CONDITIONS:

POLLUTION DEGREE:	2
INSTALLATION CATEGORY:	II
ALTITUDE:	2000 Meters MSL (Mean Sea Level)
HUMIDITY:	80% maximum, non-condensing
ELECTRICAL SUPPLY:	120VAC or 240VAC
VOLTAGE TOLERANCE:	±10% of normal rated line
TEMPERATURE:	15ºC to 40ºC
PRODUCT USAGE:	This product is intended for use indoors **only**

FEATURES

314/316 series control panels have a series of command keys that enable users to enter set point values for temperature, carbon dioxide, door heat and to calibrate a unit as required. LED readout provides users with current status information regarding the foregoing parameters.

CONTROL PANEL, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:



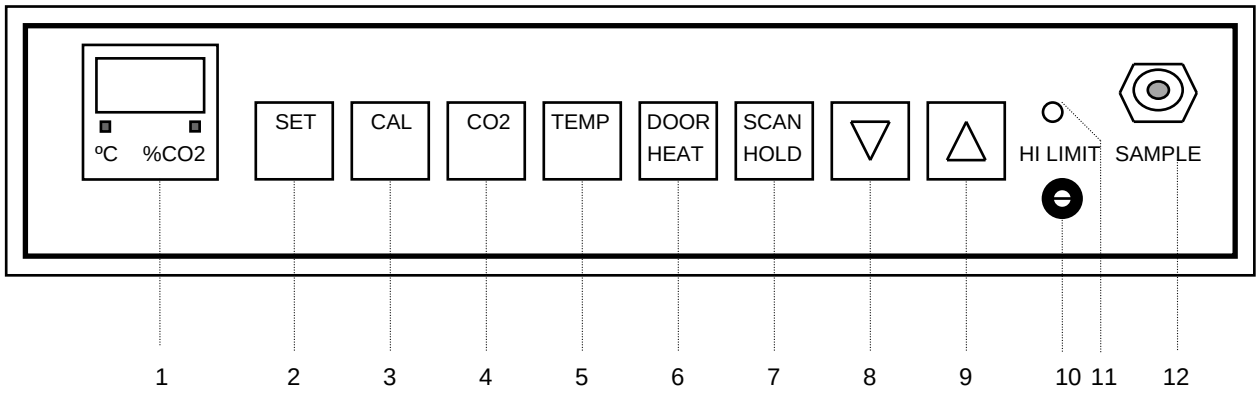
1. LED READOUT: The LED displays current CO_2 tension and temperature in the Incubator and, in the set mode, displays the set point values for these two parameters as well as door heat setting. It also enables the user to enter values necessary to calibrate temperature and CO_2. Indicating lights and legends serve to identify which parameter is being displayed.

2. SET COMMAND KEY: The **SET** key is the beginning point for and initiates subsequent actions of the other keys on the control panel.

3. CAL COMMAND KEY: The **CAL** key permits calibration of temperature and CO_2 when in this command mode. The Up and Down arrow keys are used to change the readout to correspond with the readings obtained from known standards of temperature or CO_2 measurement. Both temperature and CO_2 calibration use the zero-point shift method.

FEATURES: (Con't)

CONTROL PANEL: (Con't)



4. CO_2 COMMAND KEY: Pressing the **SET** key and then the **CO_2** key allows the user with the Up and Down keys to enter the desired carbon dioxide level in the Incubator.

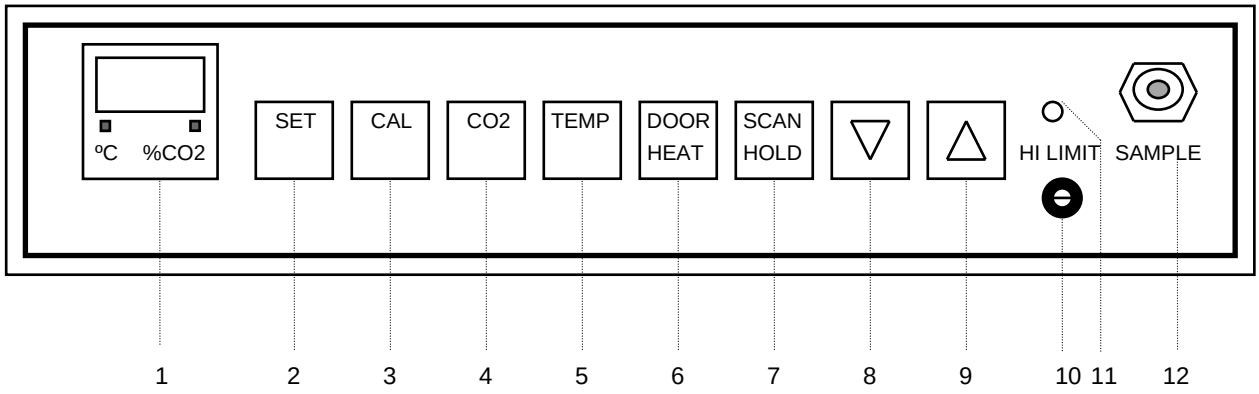
   - High and low limit alarm set points are factory set at ±1% above and below the user-established set point. In the event CO_2 exceeds the indicated limits, an audible alarm will sound and indicating light above the key will flash.

   - Pressing any key will silence the alarm for a period of one hour. The user should immediately investigate the reason for the alarm and take steps to correct the problem. Note that the indicating light continues to flash. If a problem is not solved the alarm resumes.

   - By pressing the CAL (#3) and CO_2 (#4) keys sequentially users can calibrate CO_2. The Up and Down arrow keys will change the readout to correspond with the readings obtained from known standards of CO_2 measurement.

FEATURES: (Con't)

CONTROL PANEL: (Con't)



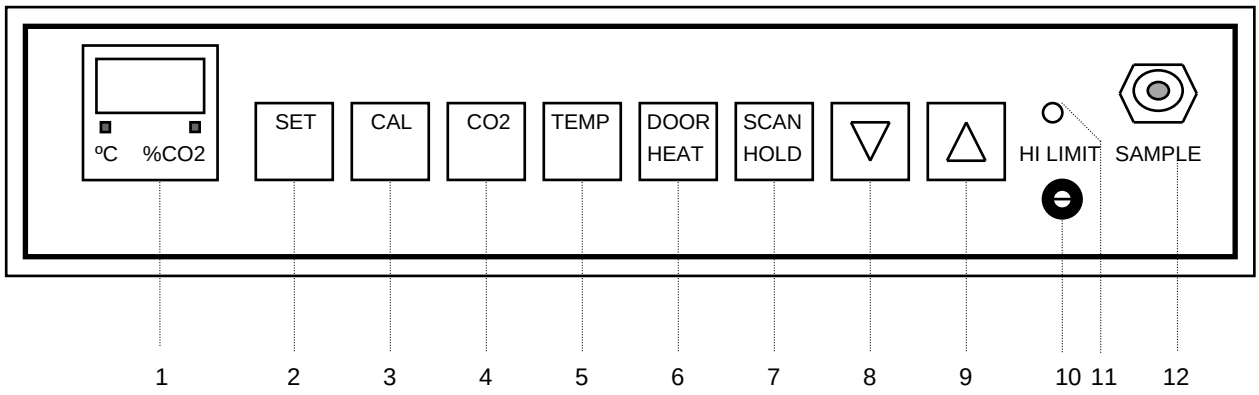
5. TEMP COMMAND KEY: Pressing the **SET** key and then the **TEMP** command key allows the user with the Up and Down arrow keys to establish the desired set point temperature in the Incubator.

- High and low limit alarm set points are factory-set at ±1ºC. If the temperature deviates from these limits, an audible alarm (continuous beep) will sound.
- While pressing any key will silence the alarm for a one-hour period, the user should immediately investigate the reason for the alarm and take steps to correct the problem. Note that indicating light continues to flash. If problem is not corrected, the alarm will resume after one hour has passed.
- By pressing the CAL (#3) and TEMP (#5) keys sequentially users can calibrate temperature. The Up and Down arrow keys will change the readout to correspond with the readings obtained from known standards of temperature measurement.

NOTE: DECREASES IN TEMPERATURE AND CO2 DUE TO NORMAL DOOR OPENINGS ARE TOLERATED WITHOUT INITIATING THE ALARMS.

FEATURES: (Con't)

CONTROL PANEL: (Con't)



6. DOOR HEAT COMMAND KEY:

   - When the **SET** key is pressed and then the **DOOR-HEAT** key, enter the level of heat with the Up and Down keys as a percentage value being applied to the inner glass door.
   - A flashing **DOOR-HEAT** indicator light above the key indicates that heat is being applied to the inner glass door.
   - A good starting point for the door heat control is 35%; if fogging still occurs, increase in 10% increments until fogging disappears.

7. SCAN/HOLD COMMAND KEY: Permits holding the value of a single parameter for continued viewing or scans alternately between the values of the two parameters on a 2-second interval.

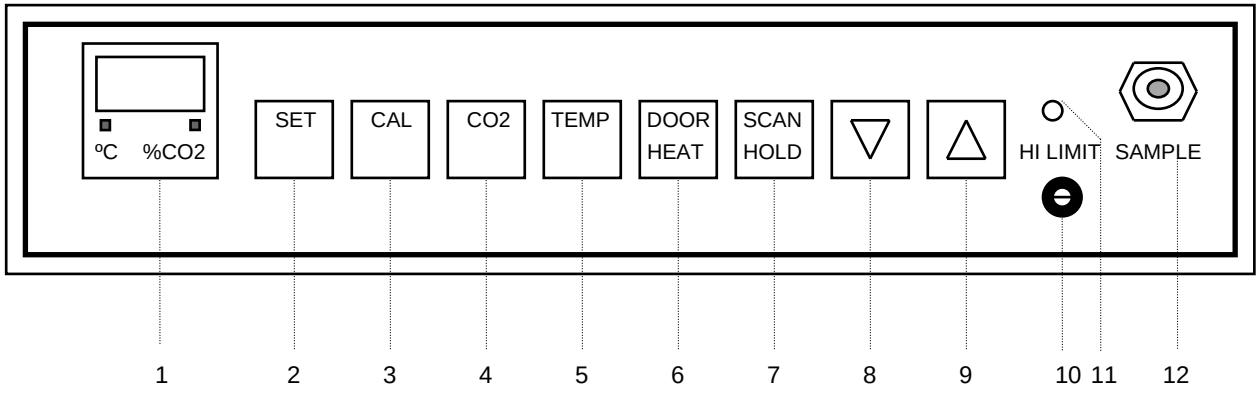
8. DOWN ARROW KEY: This key decreases numerical value of the parameter which has been accessed.

9. UP ARROW KEY: This key increases the numerical value of the accessed parameter.

NOTE: A 5 SECOND DELAY AFTER ANY FINAL ENTRY RESULTS IN **AUTOMATIC ENTRY** OF THAT CHANGE.

FEATURES: (Con't)

CONTROL PANEL: (Con't)



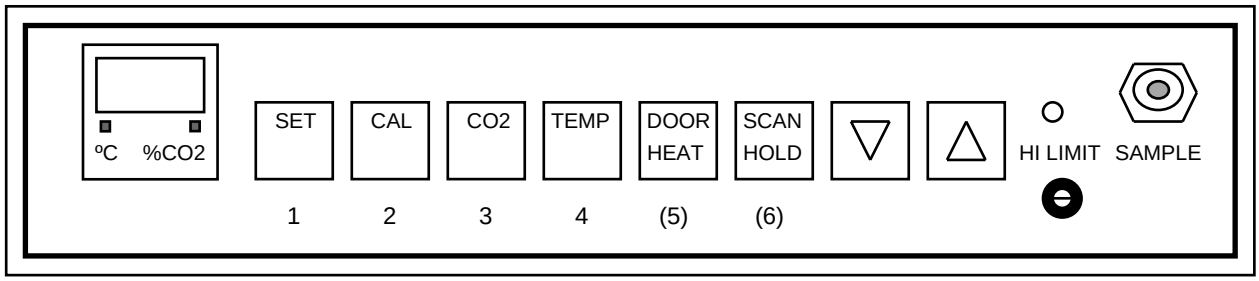
10. HIGH LIMIT THERMOSTAT: This is a back-up high limit temperature thermostat which functions should the microprocessor fail. The high limit thermostat will then control the temperature at slightly above the set point.

11. HIGH LIMIT STATUS LAMP: Indicates when the high limit is active.

12. SAMPLE PORT: This access port is available for sampling the atmosphere in the chamber when executing calibration procedure such as might be done using a Fyrite or similar chemical-based CO_2 analysis procedure.

FEATURES: (Con't)

CONTROL PANEL: (Con't)



PROPER SEQUENCING IMPORTANT IN OPERATING COMMAND KEYS:

To enter commands correctly, it is important to press the keys in **SEQUENCE**. Do not hold down one key and press another key—the action will not be accepted by the system. The following is the proper sequence in which to press the keys for the indicated actions:

SET(#1), TEMP(#4):	View existing value, retain or change set point using Up and Down keys.
SET(#1), CO_2 (#3):	View existing value, retain or change set point using Up and Down keys.
SET(#1), DOOR HEAT(#5):	View existing value, retain or change set point using Up and Down keys.
CAL(#2), TEMP(#4):	Calibrate temperature using Up and Down keys.
CAL(#2), CO_2 (#3):	Calibrate carbon dioxide using Up and Down keys.
CO_2 (#3), CAL(#2), SET(#1):	Install password using Up and Down keys.
TEMP(#4), CAL(#2): SET(#1):	Disable password using Up and Down keys
SCAN/HOLD(#6):	Each individual contact of key advances to one of 3 options: A) continuous viewing of temperature; B) continuous viewing of carbon dioxide; C) an alternating viewing of the two.

FEATURES: (Con't)

ALARMS, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

POWER OUTAGE: In the event of a power outage, the LED display will flash to alert the user to take corrective action. If the power outage is of a temporary nature, pressing any key will restore unit to operating status. Everything operates normally after a power outage.

DOOR AJAR WARNING: In case the door is inadvertently left open beyond a 5 minute period, an audible beep is sounded and is synchronized with the flashing of the DOOR-HEAT indicator light to warn the user to correct the condition.

AUDIBLE AND VISUAL ALARMS: The following table summarizes the audible and visual alarms that are initiated upon the occurrence of various events.

	AUDIBLE BEEP	FLASHING LIGHT ABOVE KEY	FLASHING LED DISPLAY
Temp (exceeds limits):	YES	YES	NO
CO_2 (exceeds limits):	YES	YES	NO
Door Ajar:	YES	YES	NO
Power Out:	NO	NO	YES

Press any key to silence alarm that will remain silent for a period of one hour. However, the flashing light will continue. If the condition initiating the alarm remains uncorrected at the end of that time, the audible alarm will resume.

PASSWORD, CONTROL PANEL, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

In the event that you want to prevent unauthorized access to the operation of the unit, a password feature is available

ADDITIONAL INCUBATOR FEATURES, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

- CO2 sensor (on thermal-conductivity units only).
- Mechanically convected airflow.
- 1.2 cubic feet, 304-stainless steel chamber; full-view heated glass door;
- 2 shelves

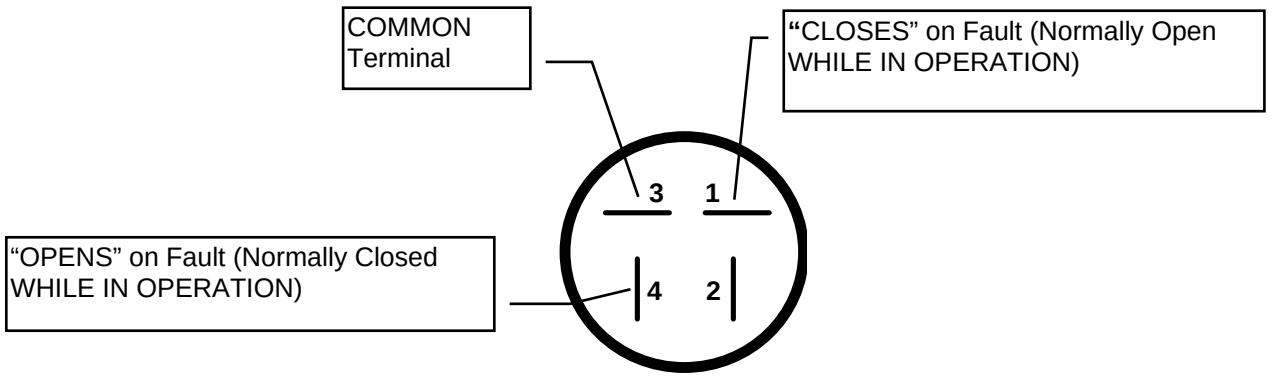
FEATURES: (Con't)

OPTIONAL ALARM RELAY OUTPUT: REAR OF UNIT, 314/316 SERIES AUTOMATIC CO2 INCUBATORS:

The incubator incorporates an output on the rear panel for use as a central alarm voltage-free ("dry contacts") connection port. This output may be tied in with any central alarm system to give notice of any alarm condition: High or Low Temperature, High or Low CO2, Power Outage or Door Opened.

A standard relay is used and is normally energized while the incubator is in operation. Common, Normally Open, and Normally Closed pin outputs are routed to the rear panel for user access. Enclosed with the incubator is **a mating connector** that can be customer-wired and used for interfacing with a Central Alarm. Note the connector is polarized. The rear panel outputs are as shown here:

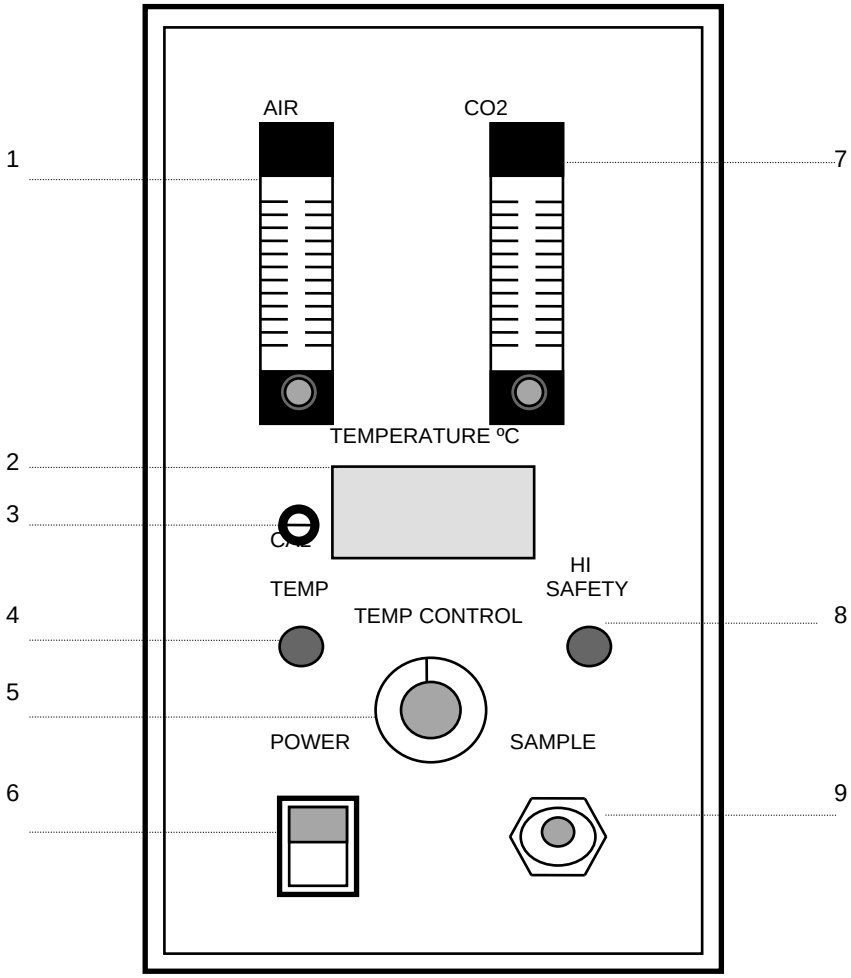
RELAY OUTPUTS LOCATED ON REAR PANEL



The following ratings are for connection purposes: **MAX 5A @ 34VDC or 34VAC**

FEATURES: (Con't)

CONTROL PANEL, 315/317 SERIES FLO-THRU CO_2 INCUBATORS:



1. AIR FLOWMETER: Controls the amount of incoming air by rotating its control knob.
2. LED DISPLAY: Displays current temperature.
3. CALIBRATION POTENTIOMETER: Using a jeweler's screwdriver, display can be adjusted.
4. TEMPERATURE STATUS LAMP: Lit when heaters are active.
5. TEMPERATURE CONTROL: Rotates to raise or lower temperatures.
6. POWER SWITCH: Turns the unit on and off.
7. CO2 FLOWMETER: Controls the amount of incoming CO2 by rotating its control knob.
8. HIGH SAFETY STATUS LAMP: Lights up when high limit set point temperature is exceeded.
9. CO2 SAMPLE INLET PORT: Used to determine the amount of CO2 inside the chamber.

INSTALLATION

SECTION 5

√*SHIPPING CARTON:*

This should be inspected upon delivery. When received, carefully examine for any shipping damage before unpacking. If damage is discovered, the delivering carrier should both specify and sign for the damage on your copy of the delivery receipt.

Open the carton carefully making certain that all parts are accounted for before packaging materials are discarded—after unpacking, if damage is found, promptly report it to the carrier and request a damage inspection promptly.

IMPORTANT: Failure to request an inspection of damage within a few days after receipt of shipment absolves the carrier from any liability for damage: you must call for a damage inspection promptly.

LOCATION:

Place the unit where it will be used, away from external vibration sources, drafts and wide variations in ambient temperature. To prevent damaging the tubing, allow at least 3" (8 cm) between the back of the incubator and wall. Choose a location near a power supply that matches the unit nameplate requirements.

CAUTION: THIS UNIT IS DESIGNED FOR USE WITH CO2 ONLY. DO NOT USE WITH ANY OTHER GASES. FAILURE TO OBSERVE THESE PRECAUTIONS CAN RESULT IN EXPLOSION AND/OR FIRE AND SERIOUS INJURY AND/OR DEATH AND PROPERTY DAMAGE.

ELECTRICAL REQUIREMENTS:

120 VAC models require a 120 VAC, 50/60 Hz power source. They are supplied with a 3-wire line cord. It should be plugged into an outlet designed for 3-prong plugs. If an extension cord is used, it also should be the 3-wire grounded type. For an outlet designed to accept 2-prong plugs (ungrounded), it is required that a qualified electrician replace the outlet with a new grounded type.

240 VAC models require a 240 VAC, 50/60 Hz power source. Because of the variety of plug configurations in use worldwide for 240 VAC power, the unit is furnished with the plug removed. The user must install a plug to conform with local code and configuration requirements.

NOTE: LEAVE UNIT DISCONNECTED WHEN NOT IN USE.

HUMIDIFICATION, 314/316 SERIES AUTOMATIC CO2 INCUBATORS:

The chamber is designed in such a way that a cold spot is formed causing moisture that is present in the chamber atmosphere to condensate. The condensation is diverted into a humidity trough that is attached to the rear wall of the chamber. Distilled water is not necessary to add since this water will be recirculated throughout the chamber.

WARNING: While the addition of a fungicide to the water will assist in controlling contaminant, it may also affect the results of experiments conducted with cells, viruses and other materials. These factors should be taken into account when deciding whether or not to use a fungicide.

INSTALLATION: (Con't)

INSTALLATION OF GAS FILTER INTERFACE ASSEMBLY KIT #018-514-00:

NOTE: Models 315, 315-1, 317, 317-1 require this assembly to be used for both CO_2 and air.

KIT #018-514-00 INCLUDES:

- 4, Hose Clamps (#250-331-00)
- 1, In-Line Filter (#525-034-00)
- 1, 10 ft. (4.57m) length of 1/4" (6.35mm) ID PVC tubing (#720-418-00)

INSTALLATION PROCEDURE:

See next page for illustration.

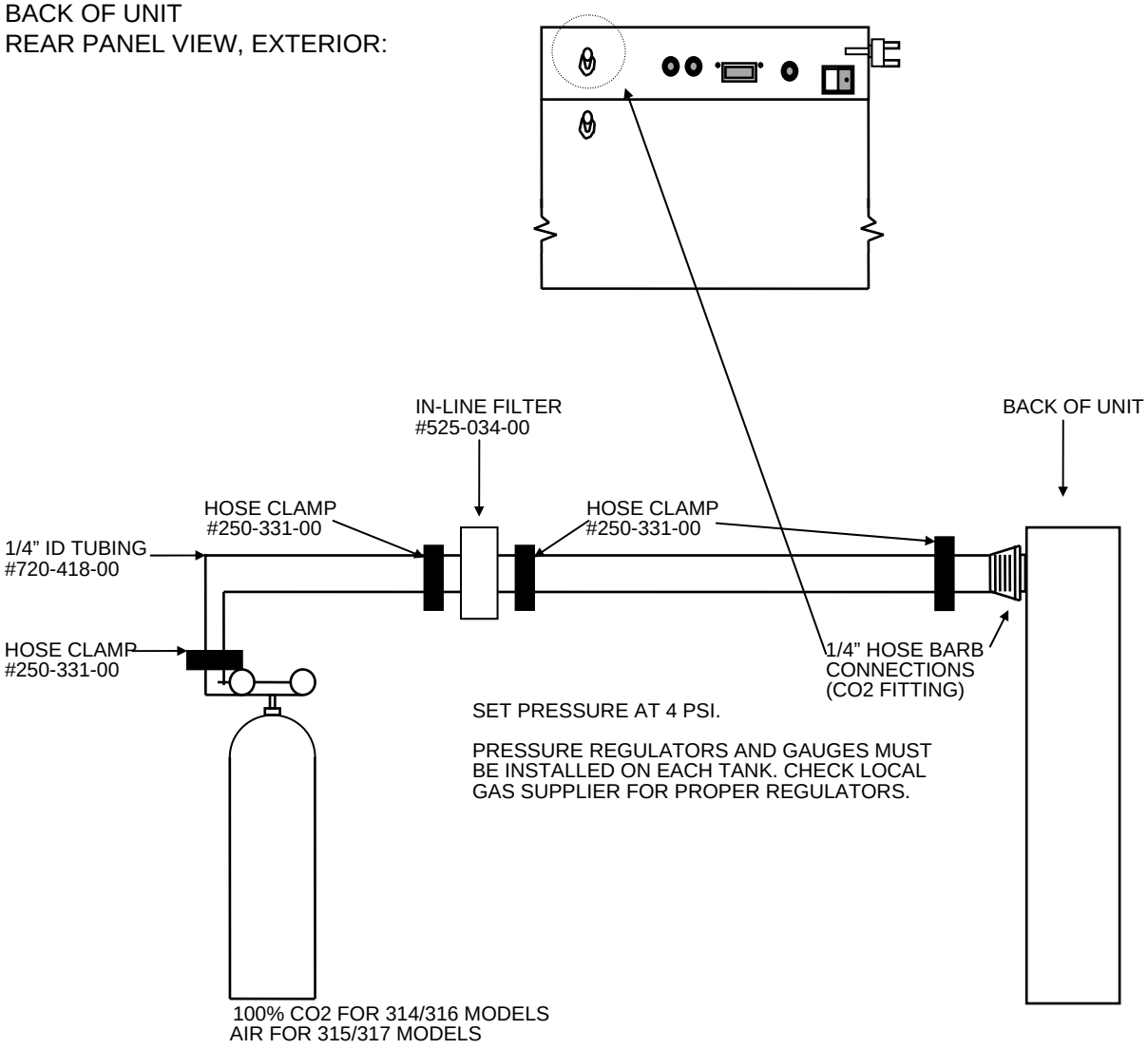
- Turn the unit power switch to the **OFF** position.
- Connect tubing to tank gas outlet.
- Connect 1/4" (6.35 mm) ID tubing to hose barb on one side of in-line filter and secure with hose clamp; connect tubing to in-line filter hose barb on its other side and secure with hose clamp.
- 314/316 series incubators, connect tubing with in-line filter in place to the appropriate gas inlet fitting on the back of the unit. 315/317 series incubators require this assembly to be connected to both air and gas inlet fittings.
- Set the supply regulators at 4 psi.
- Check all of the connections for leaks.
- Turn the unit power switch to the **ON** position.

WARNING: HIGH CONCENTRATIONS OF CARBON DIOXIDE PRODUCE METABOLIC ABNORMALITIES, DISTURBANCES OF THE CENTRAL NERVOUS SYSTEM AND CARDIAC INSTABILITY—UNCONSCIOUSNESS MAY OCCUR AT CONCENTRATIONS ABOVE 10%.

INSTALLATION: (Con't)

INSTALLATION OF GAS FILTER INTERFACE ASSEMBLY KIT #018-514-00: (Con't)

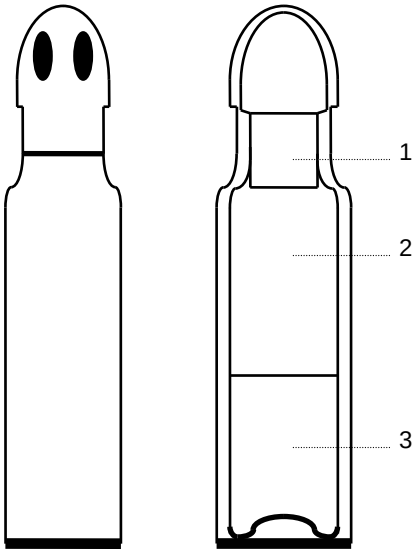
BACK OF UNIT
REAR PANEL VIEW, EXTERIOR:



INSTALLATION: (Con't)

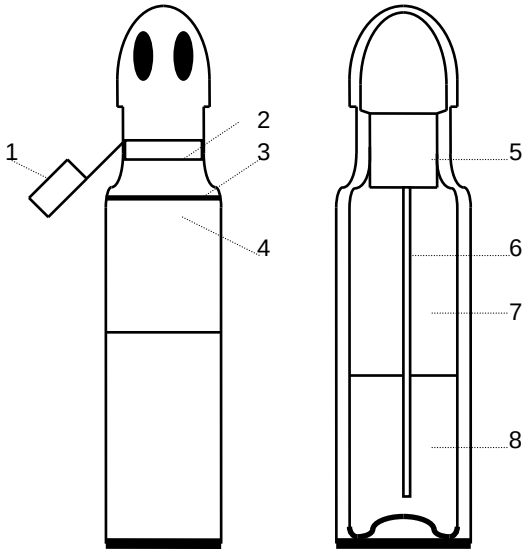
STANDARD AND SIPHON TYPE CO_2 GAS CYLINDERS

STANDARD TYPE (CORRECT)



1. Compressed Gas Association #320 connector.
2. Gas head space.
3. Liquid CO_2 filled to 68% equal weight of water that cylinder would hold at 60ºF.

SIPHON TYPE (INCORRECT)



1. Warning tag indicating that cylinder is siphoning type.
2* Aluminum ring.
3* Gold band.
4* Stamp or marking on cylinder: "Siphon" or "Eductor Tube".
5* Valve should be of special type for service.
6* Withdrawal tube draws up the liquid CO_2.
7* Gas head-space.
8* Liquid CO_2 filled to 68% equal weight of water that cylinder will hold at 60ºF.

***NOTE**: SOME GAS SUPPLIERS WILL HAVE NO MARKINGS TO INDICATE AN "EDUCTOR TUBE" OR "SIPHON" TYPE CYLINDER—BE SURE TO ORDER **DRY, LAB-GRADE CO2.**

Be sure to obtain a dual-stage regulator from the gas supplier for the CO_2 tank that is to be installed according to local codes. Connect ¼" ID (6.35 mm) flexible tubing to the regulator. Connect the other end of the tubing to the unit's CO_2 inlet (located on the back top panel). Insert tubing over hose barb and fasten with an appropriate clamp to assure a proper connection. Adjust the regulator for 5 psi when CO_2 is to be injected into chamber. For optimum results, do not exceed or reduce this pressure.

SECTION 6

OPERATION

DANGER: DO NOT USE IN THE PRESENCE OF FLAMMABLE OR COMBUSTIBLE MATERIALS OR EXPLOSIVE GASES. DO NOT USE IN THE PRESENCE OF PRESSURIZED OR SEALED CONTAINERS. FIRE OR EXPLOSION MAY RESULT, CAUSING DEATH OR SEVERE INJURY.

WARNING: DO NOT HEAT ANY SUBSTANCE ABOVE A TEMPERATURE THAT WILL CAUSE IT TO EMIT TOXIC FUMES—DEATH OR SEVERE INJURY MAY RESULT.

DANGER: USE ONLY CARBON DIOXIDE IN THE INCUBATOR. DO NOT **UNDER ANY CIRCUMSTANCE** INJECT OXYGEN OR OTHER EXPLOSIVE GAS OR MIXTURE INTO UNIT. FAILURE TO OBSERVE THESE PRECAUTIONS CAN RESULT IN EXPLOSION AND/OR FIRE AND SERIOUS INJURY OR DEATH TO PERSONNEL AND PROPERTY DAMAGE

START-UP, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

- Connect unit to power supply meeting the requirements as noted on the nameplate.
- Turn the power switch **ON**.

OPERATING BASICS, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

- Press the **SET** key first and then the parameter—**CO_2, TEMP, DOOR HEAT**—which is to be adjusted.
- Use the UP and DOWN arrow keys to enter the desired value.
- Wait 5 seconds and the value is entered automatically into the unit's nonvolatile memory. Storage is confirmed via two short beeps at the end of 5 seconds.
- If you access a parameter and initiate no action within the time frame of 10 seconds, the unit times out and returns to the prior state.
- Each press of the **SCAN/HOLD** key is programmed to follow a sequential pattern as follows: HOLD Temperature (for continuous viewing), HOLD CO_2 (for continuous viewing) and alternate scanning of temperature and CO_2.
- To view your previously established set point for any parameter, press **SET** and the **TEMP, CO2** or **DOOR HEAT** key(s).

OPERATION: (Con't)

PASSWORD FEATURE, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

To prevent unauthorized entry to values which have been set, a password feature is available with your unit.

- **SET**, **CAL**, **CO_2** and **TEMP** keys have the numbers **1**, **2**, **3** and **4** below that are used to enter or disable a password. Select a 3-digit password from 001 through 999 (note: 000 is not a valid password). After power up and after pressing any key, press **3**, **2** and **1** in sequence (i.e. CO_2, CAL and SET); enter your numerical password by using the Up or Down arrow key.

- Once your password is entered, wait 5 seconds and the unit will store this value in its nonvolatile memory. REMEMBER TO NOTE THE PASSWORD IN A PLACE FOR SAFEKEEPING AND ACCESSIBLE TO YOURSELF OR A COLLEAGUE.

- Subsequent access is denied unless the correct password is entered. Any keystroke will display **00** and YOU HAVE 5 SECONDS within which to enter the correct password using the Up or Down arrow key.

- To disable the password: enter the password, wait for - - - - to appear on the readout, enter **4, 2**, **1** (i.e. TEMP, CAL and SET) and the password is disabled.

SETTING OPERATING TEMPERATURE AND HIGH LIMIT SETPOINT, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

The unit is factory pre-set at 37ºC and 5.0% CO_2. To change these settings:

- Press the **SET** and **TEMP** keys sequentially and using the Up and Down arrow keys, select the set point temperature.

- Using a jeweler's screwdriver, rotate the high limit thermostat fully clockwise.

- Set CO_2 set point to zero—accuracy will not be achieved until the temperature has stabilized.

  • Press the **SET** and **CO2** keys sequentially and using the Up and Down arrow keys, adjust LED readout until a value of 00.0 is obtained.
  • Wait 5 seconds to finalize the selection.

- Allow sufficient time for the unit to reach and stabilize at the set point temperature, plus an additional hour or two for unit to cycle at the temperature—**4 HOUR TOTAL FOR SETTING 37ºC IS TYPICAL**.

OPERATION: (Con't)

SETTING OPERATING TEMPERATURE AND HIGH LIMIT SETPOINT, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS: (Con't)

- After sufficient time has elapsed, rotate the high limit thermostat counterclockwise while watching the red lamp. When the lamp is lit, you have adjusted the high limit set point to be equal to the operating set point.

- Now rotate the high limit thermostat clockwise 30º of rotation beyond the point where the lamp goes out. **This distance should be similar to the distance from the twelve o'clock to the one o'clock positions**. This establishes a buffer of a few degrees between the operating set point and the high limit temperature setpoint allowing PID control to function normally.

  BE ADVISED UNDER NORMAL OPERATING CONDITIONS, THE **High LIMIT LED SHOULD NEVER COME ON**. IF IT DOES, ROTATE THE HIGH LIMIT THERMOSTAT SLIGHTLY CLOCKWISE—MISOPERATION OF THE TEMPERATURE AND POSSIBLY CO2 CONTROL MAY OCCUR IF THE HIGH -LIMIT IS SET TOO CLOSE TO THE SETPOINT.

CONDENSATION ON INNER GLASS DOOR, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

- After the unit has been operating, you can determine what, if any, condensation is forming on the inner glass door. To dissipate condensation, press the **SET** and **DOOR HEAT** keys to access this function.

- Using the Up and Down arrow keys, select a value as a percentage of the heater output. The door heater is about 50 watts; complete control of how much effective heat will be applied is obtained by setting the door heat percentage; each 1% translates into 0.5 watts of door heat.

For example: 10 will produce 10% of the available heating capacity.

As experience is gained through trial and error, users are able to select more precisely the heating value required to remove any condensation.

As a general starting point, 30% at 37ºC may be selected.

- Correct setting of the door heat control depends on varying factors such as chamber temperature. In general, the setting should produce the minimal amount of heat necessary to eliminate glass door condensation and no more. If unsure of the amount of heat to produce, start at a low value and increment the setting by 5% every couple of hours until condensation is eliminated. Once set, the door heat percentage need not be changed again, unless you change the temperature set point requirements. The setting chosen is stored in nonvolatile RAM memory in case of power outages.

OPERATION: (Con't)

TEMPERATURE CALIBRATION, 314/316 SERIES AUTOMATIC CO_2 NCUBATORS:

The Incubator is calibrated at the factory. However, if required, the temperature readout may be calibrated by pressing the following keys in sequence: **CAL**, **TEMP**.

- Use of a calibrated indicating device positioned in the approximate geometric center of the chamber is critical to this procedure.
- Use the Up and Down arrow keys to correct the displayed temperature on the LED readout to match your chamber temperature reading. Wait 5 seconds and the adjustment is self-entering

OPERATION: (Con't)

LOADING THE INCUBATOR, 315/317 SERIES FLO-THRU CO_2 INCUBATORS:

Load the chamber, spacing the items as far apart as possible (for maximum air circulation).

AIR/GAS RATIO, 315/317 SERIES FLO-THRU CO_2 INCUBATORS:

Set the flowmeters to obtain the required air and CO_2 flow—using the lowest possible CO_2 flow rate will help to conserve gas.

Use one of the following formulas to find the desired air-to-gas ratio:

R = % CO_2 in the chamber atmosphere
A = Air flow in liters/minute
C = CO_2 flow in liters/minute

Equation 1 (to be used if air and CO_2 flow rates are known):

$$R = \frac{C}{A + C} \times 100$$

Equation 2 (to be used if air flow rate and % CO_2 are known):

$$C = \frac{RA}{100 - R} \text{ liters/min.}$$

Equation 3 (to be used if CO_2 flow rate and % CO_2 are known):

$$A = \frac{100C - RC}{R} \text{ liters/min.}$$

Example 1: If a CO_2 percentage of 15% is desired at a flow rate of 0.4 liters/min. of CO_2, use Equation 3:

$$A = \frac{100\,(0.4) - 15\,(0.4)}{15} = \frac{40 - 6}{15}$$

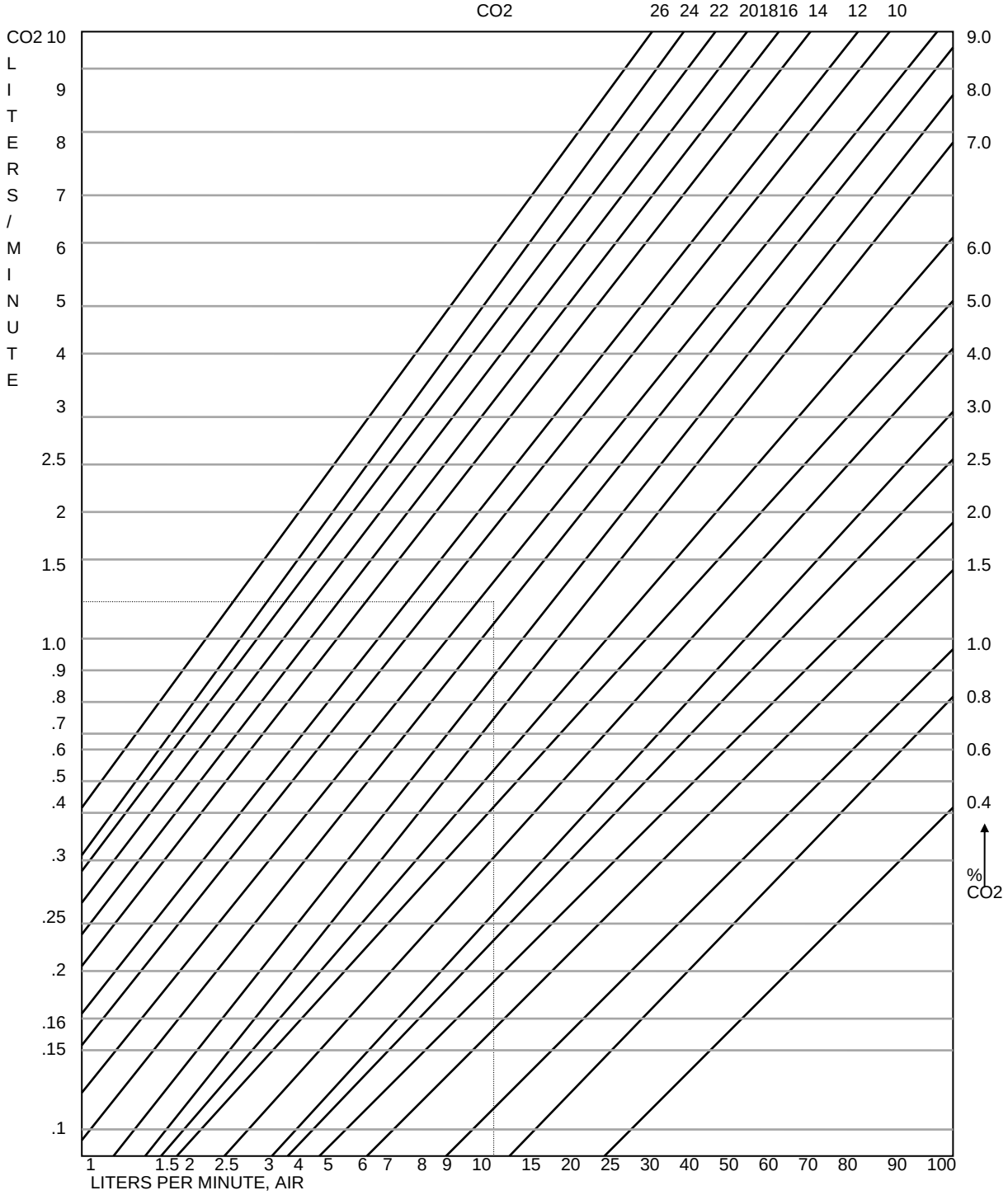
$$= 2.26 \text{ liters/min. of air}$$

Example 2: If flow rates are set 0.1 liters/min. of CO_2 and 3 liters/min. of air, use Equation 1 to find percentage of CO_2:

$$B = \frac{0.1}{3.0 + 0.1} \times 100 = 3.2\% \; CO_2 \text{ in chamber atmosphere}$$

OPERATION: (Con't)

CO_2/AIR FLOW NOMOGRAPH, 315/317 SERIES FLO-THRU CO_2 INCUBATORS:



1. DRAW A VERTICAL LINE FROM THE POINT THAT REPRESENTS THE AIR FLOW ON THE HORIZONTAL AXIS UNTIL IT INTERSECTS A DIAGONAL LINE INDICATING THE REQUIRED VOLUME (%) OF CO2 FLOW; 2. RUN A HORIZONTAL LINE TO THE VERTICAL AXIS TO FIND REQUIRED FLOW OF CO2 IN LITERS/MINUTE; 3. TO OBTAIN THE AIR FLOW (IF CO2 FLOW IN LITERS/MINUTE AND % CO2 ARE KNOWN), REVERSE PROCEDURE.

OPERATION: (Con't)

THERMOSTAT CONTROL, 315/317 SERIES FLO-THRU CO_2 INCUBATORS:

A hydraulic thermostat is utilized for set point control to protect chamber from over-temperature conditions.

OPERATING SUGGESTIONS, 315/317 SERIES FLO-THRU CO_2 INCUBATORS:

- In order to obtain and maintain the desired CO_2 gas pressure, periodically check the tightness and integrity of the gasket that secures the glass door to the chamber.
- To be sure of maintaining desired gas pressure, periodically check outflow pressure from gas supply source.
- If maintaining humidity conditions within the chamber, check level of water in pan and replenish as necessary.
- After power is disconnected to the unit, do not permit humidity water to remain in the unit. Remove any pans and/or dry the interior thoroughly.
- Insofar as possible, keep the incubator door closed in order to reduce the possibility of fungus growth starting from airborne organisms entering the chamber.

CO_2 SAMPLING/MEASUREMENT, 315/317 FLO-THRU CO_2 INCUBATORS:

Insert sample probe into the sample access port making sure that a tight seal is attained. Obtain a sample of CO_2 sufficiently large to meet the requirements of the analytical apparatus or procedure being used. Perform CO_2 analysis.

CO_2 CALIBRATION, 314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

In like manner, the CO_2 reading can be calibrated against a known standard such as the Fyrite method of analyzing CO_2. To access the correct command mode, press the **CAL**, **CO2** keys sequentially.

Using a Fyrite or similar device, obtain the actual CO_2 tension in the chamber via the front panel CO_2 sample port.

If there is a difference between the Fyrite reading and LED display of CO_2, press **CAL** and **CO2** in sequence and use the Up and Down arrow keys to adjust the displayed CO_2 value to match the value obtained with the Fyrite or device of comparable accuracy and reliability.

All internal CO_2 parameters automatically track this change: FOR OPTIMUM OPERATION OF YOUR INCUBATOR, CHECK CO_2 WITH FYRITE WEEKLY.

OPERATION: (Con't)

HINTS ON USING THE FYRITE*:

The following information is intended to supplement that found in the Fyrite manual and is based on experience working with users of our Incubators.

One of the most important aspects of using the Fyrite procedure and one that is frequently overlooked is the condition of the fluid. The Fyrite accepts a sample of the Incubator's environment into its own chamber where it is absorbed by the Fyrite fluid to determine the CO_2 percentage or tension. Of special importance is keeping outside air from the sample drawn from the Incubator. Any outside air contaminating the sample is detrimental to an accurate reading, and, more importantly, to the growth of your cells. Inspection of the fluid should be performed only with the user wearing protective gloves, as the Fyrite fluid is slightly corrosive. The inspection should review the following:

- THE DATE OF THE LAST FLUID CHANGE: Old fluid will not absorb as much CO_2 and will produce a false reading. This may lead the user to recalibrate the Incubator to higher CO_2 tensions that can prove lethal to cell cultures. Fyrite fluid should be changed after approximately 350 uses. This approximates a change of fluid once a year if the Fyrite procedure is carried out on a daily basis. Keep track of the number of uses and if the Fyrite is used with more than one Incubator. Experience shows that the color of the fluid is not as important as the age of fluid.

- CHECK THE CONTAINMENT VESSEL AND HOSES AT LEAST ONCE A MONTH: Make sure that there are no cracks in the vessel or leakage of fluid to the outside of the container. This can indicate a leaky seal or internal crack. Hoses should be stretched slightly and inspected for cracks or holes. This is critical as cracks and/or holes in the hoses can draw in outside ambient air and produce a false reading.

- CHECK THE FLUID DAILY AND ADJUST THE SLIDE GAUGE TO READ ZERO: If you have adjusted the slide gauge all the way down and the fluid level is still too low, place a couple of drops of distilled water into the plunger on the top of the Fyrite. Depress the plunger and the water will transfer into the Fyrite causing the fluid level to rise. Repeat this procedure until the fluid level reads correctly.

CAUTION: A LITTLE WATER GOES A LONG WAY. USE ONLY A COUPLE OF DROPS OF DISTILLED WATER AT A TIME.

CAUTION: DO NOT USE FYRITE FLUID TO ADJUST THE LEVEL OF FLUID USE DISTILLED WATER ONLY. THE ONLY TIME TO USE FRESH FYRITE FLUID IS WHEN YOU CHANGE IT DUE TO THE AGE OF THE FLUID.

*Trademark of Bacharach Instruments.

OPERATION: (Con't)

HINTS ON USING THE FYRITE: (Con't)

Inspect the Fyrite filter in the clear plastic casing between the hoses for any contamination or growth. Change it if necessary.

CAUTION: MAKE SURE THE FILTER IS MOIST BEFORE YOU TAKE YOUR READING. A MOIST FILTER IS A MUST FOR AN ACCURATE READING.

To moisten the filter, remove the end of the short hose without the squeeze bulb that connects to the Incubator. Add several drops of distilled water to the filter, replace the hose and squeeze the bulb. Release the bulb and the water will be drawn into the filter. Squeeze the bulb and quickly release it to remove any excess water. You will see this water (if any) come out of the end of hose that is closest to the squeeze bulb. This is the cupped end that is depressed onto the Fyrite.

TAKING A FYRITE READING:

It is recommended that Fyrite CO_2 and independent temperature tests be performed at intervals to be determined individually or as dictated by established protocol. Some laboratories conducting critical work may want to record CO_2 and temperature readings on a daily basis.

CAUTION: THE INCUBATOR MUST BE STABLE.

First, clear the Fyrite of any residue CO_2. Simply depress the plunger on the head or the top of the Fyrite taking care not to cover the hole—this introduces fresh ambient air into the Fyrite chamber. Release the plunger and turn the Fyrite upside down, holding it at a 45-degree angle until most of the bubbles surface and the fluid has filled the head. Even the smallest bubbles may contain CO_2, so that it is important to let most of the smaller bubbles surface.

Now turn it right side up and hold it at 45 degrees. Allow the fluid to fill the Fyrite and depress the plunger again—this clears the Fyrite of any CO_2 that might cause a false reading.

Next, attach the filter side of the hose to the Incubator's CO_2 sample port. Remove the brass tube, if present, from the Fyrite hose, as it is not needed and attach the hose to the CO_2 sample port. (The brass tube was once used with older Incubators that utilized a hole in the Incubator wall or door to measure CO_2 but this method proved to cause contamination problems.)

LOOK AT YOUR FYRITE GAUGE AND ADJUST THE ZERO IF NECESSARY.

Take the squeeze bulb end of the hose and with the hole of the cupped end facing down, place it onto the plunger of the Fyrite and hold it firmly in position.

IMPORTANT: ONCE YOU HAVE DEPRESSED THE PLUNGER OF THE FYRITE, IT IS CRITICAL THAT IT NOT BE RELEASED DURING THE FOLLOWING PROCEDURE.

OPERATION: (Con't)

TAKING A FYRITE READING: (Con't)

Depress the plunger and hold it down. It is very important not to allow the plunger to spring up—if this occurs, you will be repeating an already existing reading. It will not matter how many times you pump the squeeze bulb, as long as you hold the plunger down you will introduce only one sample to the Fyrite. But, by releasing the plunger and immediately pushing it back down, you will then be adding an additional sample to the Fyrite chamber causing the reading to double or triple. In the event that it is difficult to hold the plunger down while pumping the squeeze bulb, find a more suitable or comfortable position.

Without releasing the plunger, pump the squeeze bulb at least 20 times—this assures complete and thorough transfer of the sample to the Fyrite chamber. Once the bulb has been pumped the required number of times, **HOLD THE SQUEEZE BULB IN THE "SQUEEZED" POSITION** and release the pressure on the cup which will also release the plunger. This traps the sample from the Incubator in the Fyrite chamber and allows the fluid to absorb the CO_2.

With the plunger now released, turn the Fyrite upside down again and hold at a 45-degree angle to allow the smaller bubbles to surface while the fluid fills the chamber head. Reverse and turn Fyrite right side up and hold at a 45-degree angle to allow the same thing to happen. Repeat this procedure—hold upside down at 45-degree angle and right-side up at 45-degree angle. Finish by shaking the Fyrite slightly while holding at 45-degree angle to allow residue droplets of fluid to drain into the measuring tube.

Read the gauge: It should match or be close to your CO_2 set point. It is possible that you may be off as much as ±3%. If you read more than 8%, it is possible that you may have introduced two samples or the Incubator is way out of calibration. If a wide variation between the reading and CO_2 set point exists, it is recommended that the sampling and measurement procedure be repeated.

Once the possibility of any error in Fyrite reading has been eliminated, calibrate your Incubator to conform with the reading obtained.

SECTION 7

MAINTENANCE

BE ADVISED:

NOTE: MAKE NO ATTEMPT TO SERVICE OR REPAIR A LAB-LINE PRODUCT UNDER WARRANTY BEFORE CONSULTING YOUR LAB-LINE DEALER. AFTER THE WARRANTY PERIOD, SUCH CONSULTATION IS STILL ADVISED, ESPECIALLY WHEN THE REPAIR MAY BE TECHNICALLY SOPHISTICATED OR DIFFICULT.

IF ASSISTANCE IS NEEDED BEYOND WHAT THE DISTRIBUTOR CAN PROVIDE, PLEASE CALL THE LAB-LINE CUSTOMER RELATIONS DEPARTMENT AT (319) 556-2241 OR (800) 522-5463. NO MERCHANDISE, HOWEVER, SHOULD BE RETURNED DIRECTLY TO LAB-LINE WITHOUT PRIOR APPROVAL FROM LAB-LINE.

CAUTION: DISCONNECT PLUG FROM ELECTRICAL OUTLET BEFORE ATTEMPTING ANY MAINTENANCE OR REPAIR OF THIS UNIT.

CLEANING:

Every 6 months inspect the chamber. Clean the stainless steel interior with any good scale remover or dilute acetic acid and a synthetic scouring pad. DO NOT USE chlorine-based cleansers or bleach, scouring pads with metallic content, or harsh abrasives to clean any part of the Incubator.

CARE AND CLEANING OF STAINLESS STEEL:

CAUTION: DISCONNECT UNIT FROM POWER SOURCE PRIOR TO CLEANING. WE RECOMMEND ALL SERVICE BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.

WARNING: ELECTROLYSIS CAN DAMAGE STAINLESS STEEL. THIS OCCURS WHEN AN OBJECT IS ALLOWED TO REST DIRECTLY ON THE SURFACE OF STAINLESS STEEL, TRAPPING MOISTURE THAT BECOMES OXYGEN-STARVED, BUT IS SURROUNDED BY WATER-CONTAINING OXYGEN.

MAINTENANCE: (Con't)

THE ALLOY CALLED STAINLESS:

Stainless steel is an alloy of steel with chromium and nickel that increase the metal's resistance to rust and corrosion. Yet, if not properly cared for, stainless steel can rust and corrode.

Exposure to air provides the passivation, or oxide layer coating, for clean stainless by producing a thin, durable chromium-oxide film that forms rapidly on the alloy surface to give stainless its characteristic "stainless" quality. Also exposure of the surface to other oxidizing environments can produce a passivating film or coating.

However, if free oxygen is not available due to scale or contamination buildup the metal surface may become vulnerable to rusting and corrosion as well as pitting. But by maintaining neutral pH and conducting frequent cleanings with detergent and water, years of trouble-free service from stainless steel products can be obtained.

SOME STAINLESS GUIDELINES TO CONSIDER:

Distilled water is recommended. Please note, if this water is very pure, it may be corrosive to stainless. When filling a bath or incubator, ALWAYS ADD 2 to 40 PPM (20 TO 40 MG/LITER) DISODIUM PHOSPHATE OR SODIUM BICARBONATE, ADJUSTING DOSAGE TO PROVIDE A pH VALUE OF 7 TO 9.

If not available, use clean, aerated soft tap water provided the total solids concentration is < 500 PPM.

WE DO NOT RECOMMEND USING 18 MEG OHM DEIONIZED WATER. If this is the only source of treated water available—mix with regular tap water at a 50/50 ratio.

THE pH FACTOR:

Check pH regularly. If pH is <6.0, add disodium phosphate to increase pH to a 7 to 9 value. Sodium carbonate or sodium bicarbonate may be used but they tend to form scale that must be rinsed out regularly. If pH is >10.0, add sodium bisulfate to decrease pH to a 7 to 9 value. Avoid adding harsh alkalines or acids since these may cause localized corrosion and result in unstable pH.

SPECIAL STAINLESS CONSIDERATIONS:

WARNING: IF IT IS NECESSARY TO USE THE FOLLOWING CHEMICALS, LIMIT EXPOSURE TIME TO A MAXIMUM OF 3 HOURS—ALWAYS CLEAN SURFACES IMMEDIATELY AFTER USE.

Chemicals which should be limited to a 3 hour maximum exposure time to stainless steel are:

Aluminum chloride	E.D.T.A.	Potassium permanganate
Barium chloride	Ferrous chloride	Potassium thiocyanate
Calcium chloride	Lysol	Sodium hypochlorite
Chlorinated Lime	Mercury salts	Stannous chloride
Citric acid (boiling)	Phenol	Tartaric acid
Dakin's solution		

MAINTENANCE: (Con't)

BE ADVISED: NEVER USE THE FOLLOWING ON STAINLESS STEEL:

Aqua regia
Ferric chloride
Iodine
Sodium acid
Sodium azide

Chemical spills, especially those agents listed here, should be removed as soon as possible and the stainless steel surface cleaned with mild soapy water followed by a clean water rinse.

CLEANSING AGENTS:

Anti-fungal and anti-bacterial additives are permissible to use as long as the pH of the aqueous solution is kept within the range of 7 to 9. These are available through laboratory distributors—but be sure to CONFIRM that they are not harmful to stainless steel.

STAINLESS CLEANING METHODS:

Do not use any metallic pads. Instead, for stubborn stains, use a plastic light-duty cleansing pad and rub GENTLY in the direction of the metal grain.

If stains continue to persist, use one of the following chemicals and methods.

CAUTION: EXTREME CARE MUST BE TAKEN WHEN HANDLING THESE MATERIALS. ALWAYS WORK IN AN AREA WITH ADEQUATE VENTILATION. USE THE PRECAUTIONS AS OUTLINED IN THE *MATERIAL SAFETY DATA SHEET* (MSDS) AND THE MANUFACTURER'S INSTRUCTIONS FOR THE PRODUCT BEING UTILIZED. ALSO, FOLLOW THE PERSONAL PROTECTION INDEX FOUND IN THE *HAZARDOUS MATERIALS INFORMATION SYSTEM* (HMIS) SECTION OF THE *MSDS*.

NOTE: THE USE AND DISPOSAL OF THESE CHEMICALS MAY BE REGULATED BY YOUR LOCAL CITY CODES; CONSULT THOSE REGULATIONS BEFORE OF DISPOSING OF THESE MATERIALS.

- Any of a variety of "scale removers" available at local supermarkets or hardware stores used for the cleaning of coffee marks, humidifiers or vaporizers.

- A 15% to 35% phosphoric acid solution available from laboratory supply distributors for scale and rust removal. Allow solution to soak the surface affected until rust and scale is loosened. Immediately follow with a clean water rise.

- Citric acid based cleaners.

MAINTENANCE: (Con't)

STAINLESS CLEANING METHODS: (Con't)

- Bathroom tub and tile cleaners.
- A mixture of 20% nitric acid and 1.5% hydrofluoric acid (or hyrochloric acid). Swab solution on surface allowing it to remain until rust is loosened. Immediately follow with a clean water rise. (This method should ONLY be used if SEVERE rust and scale stains are present.)
- Oxalic acid 2% to 5% in warm water. Swab solution on surface allowing it to remain until rust is loosened. Immediately follow with a clean water rise. (This method should ONLY be used if SEVERE rust and scale stains are present.)

Regardless of the approach utilized, ALWAYS follow the manufacturer's directions and allow the chemicals to do the cleaning with MINIMAL scrubbing. Always follow cleanings with a clean water rinse. Air dry.

MATERIALS EFFECTIVE IN DISINFECTING STAINLESS:

- Glutaraldehyde
- Alcohol

BE ADVISED: THIS INFORMATION IS INTENDED AS **GUIDELINES ONLY** AND LAB-LINE INSTRUMENTS, INC. MAKES NO CLAIM AS TO THE SUITABILITY TO ANY PARTICULAR SITUATION. CONSULT YOUR STAFF CHEMIST TO DETERMINE WHAT WOULD BE BEST FOR YOUR STAINLESS STEEL PRODUCT AND LABORATORY.

CLEANING COPPER SURFACES: FLO-THRU MODELS, 316/317 SERIES:

Copper surfaces can be cleaned using commercially available detergent preparations specifically indicated for copper use. Copper surfaces will not tarnish when washed with detergent solutions that contain small amounts of the chemical compound 1-, 2- or 3-benzotriazole. It is important, however, before using the detergents to determine any possible effect the presence of this compound and any other ingredients might have on the incubation work being conducted. Contact the manufacturers of the commercially available detergents and obtain all necessary information on the chemical and physical properties of the compositions.

TEMPERATURE READOUT CALIBRATION: ALL MODELS:

Place a scientifically accurate thermometer in the chamber, on a center shelf and allow the incubator to stabilize at some set temperature. If the digital temperature readout does not agree with the thermometer, take the trimmer pot tool, insert in calibration pot on control panel and adjust until readout matches the measured temperature.

UNIT REPAIRS:

In the event that your unit becomes inoperative, consult with your local dealer for assistance.

SECTION 8

REPLACEMENT PARTS

314/316 SERIES AUTOMATIC CO_2 INCUBATORS:

DESCRIPTION	PART NUMBER
Printed Circuit Board Assy:	018-478-00
CO_2 Sensor Assy:	018-646-00
Axial Fan:	160-136-00
Schematic 314:	228-553-30
Schematic 314-1:	228-553-29
Schematic, 316:	228-553-21
Schematic, 316-1:	228-553-22
Capacitor:	310-082-00
Circuit Breaker, 5 Amp:	330-118-00
Line Filter:	330-347-00
Fuse, 1 Amp (2):	330-369-00
Heater, 120V:	340-377-00
Heater, 120V:	340-377-01
Door Heater:	340-355-00
Tube Heater:	340-356-01
Glass Door:	540-228-00
Door Gasket:	530-248-00
Clear RTV Sealant:	120-024-00
Hi-Limit Status Lamp (red), 120V:	360-272-00
Hi-Limit Status Lamp (red), 240V:	360-290-00
Motor, 120V:	370-278-00
Motor, 240V:	370-279-00
RTD Sensor:	410-632-00
Rocker Switch, 120V:	440-359-00
Switch, 240V:	440-292-00
Transformer, 120V:	460-231-00
Transformer, 240V:	460-287-00
Line Cord:	470-105-00
In Line Filter:	525-034-00
Gasket (4.4 ft):	530-069-00
Leveling Foot With Pad (4):	790-391-00
Shelf, 314 Series (2):	810-424-02
Shelf, 316 Series (2):	810-424-01
Thermostat:	920-301-00
Solenoid Valve:	950-135-00
Dow Corning RTV Sealant:	120-053-00
Circuit Breaker, 10 Amp:	330-119-00

REPLACEMENT PARTS: (Con't)

315/317 SERIES FLO-THRU CO_2 INCUBATORS:

DESCRIPTION	PART NUMBER
Schematic 120V:	229-162-00
Schematic 240V:	229-163-00
Capacitor:	310-082-00
Heater, 120V:	340-372-00
Heater, 240V:	340-373-00
Front Body Heater:	340-376-00
Glass Door:	540-228-00
Door Gasket:	530-226-00
Line Cord:	470-187-00
In Line Filter:	525-034-00
Gasket (4 ft):	530-069-00
Foot (4):	790-225-00
Shelf, 315 series (2):	810-424-02
Shelf, 317 series (2):	810-424-01
Flowmeters	
Air:	660-044-00
CO_2:	660-043-00
Switch, 120V:	440-359-00
Switch, 240V:	440-292-00
Circuit Breaker:	330-118-00
Lens, Red:	360-234-00
Lens, Amber:	360-235-00
Thermostat:	920-301-00

NEED A PART? CALL THE LAB-LINE PARTS HOTLINE.
CALL: (319) 556-2241 or (800) 522-5463; FAX: (319) 589-0516.

LAB-LINE RESERVES THE RIGHT TO MAKE CHANGES TO SPECIFICATIONS WITHOUT PRIOR NOTICE.

WARRANTY

LAB-LINE INSTRUMENTS, INC. (“Lab-Line”) warrants that the product manufactured by Lab-Line shall be free of defects in materials and workmanship for a period of time defined on the following page from the first to occur of (i) the date the product is sold by Lab-Line or (ii) the date the product is purchased by the original retail customer (the “Commencement Date”). Except as expressly stated above,

LAB-LINE MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS AND EXPRESSLY DISCLAIMS ANY AND ALL WARRANTIES, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

An authorized representative of Lab-Line must perform all warranty inspections. In the event of a defect covered by Lab-Line’s warranty, Lab-Line shall, as its sole obligation and exclusive remedy, provide free replacement parts to remedy the defective product. In addition, for products sold by Lab-Line within the continental United States or Canada, Lab-Line shall provide free labor to repair the products with the replacement parts, but only for a period of ninety (90) days from the Commencement Date.

Lab-Line’s warranty provided hereunder shall be null and void and without further force or effect if there is any (i) repair made to the product by a party other than Lab-Line or its duly authorized service representative, (ii) misuse (including use inconsistent with written operating instructions for the product), mishandling, contamination, overheating, modification or alteration of the product by any customer or third party or (iii) use of replacement parts that are obtained from a party who is not an authorized dealer of Lab-Line.

IN NO EVENT SHALL LAB-LINE BE LIABLE TO ANY PARTY FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, OR FOR ANY DAMAGES RESULTING FROM LOSS OF USE OR PROFITS, ANTICIPATED OR OTHERWISE, ARISING OUT OF OR IN CONNECTION WITH THE SALE, USE OR PERFORMANCE OF ANY PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), ANY THEORY OF STRICT LIABILITY OR REGULATORY ACTION.

The name of your nearest authorized Lab-Line dealer may be obtained by calling 1-800-522-5463.

DESIGNERS AND MANUFACTURERS
A SUBSIDIARY of Barnstead|Thermolyne
1999 North 15th Ave., Melrose Park, IL 60160-1491 USA
PHONE: (319) 556-2241 or (800) 522-5463; FAX: (319) 589-0516

WARRANTY

12 MONTH PARTS WARRANTY:

- All Environmental Chambers
- Low Temperature B. O. D. Incubators
- Animal Study Chamber
- Controlled Environment Centers
- Biological Work Station
- Refrigerators, Freezers
- Chromatography Refrigerators (5 year parts warranty on compressor only)
- Large Capacity Refrigerators and Freezers (5 year parts warranty on compressor only)

24 MONTH PARTS WARRANTY:

- Frame Clamps, Frame Sets, Lab Jacks
- Saybolt Viscosimeter
- Timers, Samplers, Flasks
- Saf-T-Shield, Safety Tongs
- All Incubators & Ovens
- Dual Action Open Air Shaker
- Reciprocating Shakers (open air and water bath)
- Rockers and Rotators
- Low Cost Shakers
- Environ Blok Shaker
- Titer Plate Shaker
- Multi Wrist Shaker
- Water Baths (excluding Aquabaths), Ultrasonic Cleaners
- Slide Warmers
- Mixers, Stirrers, Hotplates
- Thermal Cyclers
- Blok Heaters
- Aquabaths, lifetime warranty on heaters

LIFETIME PARTS WARRANTY:

- All **ORBITAL** Shakers (not carrying a 24 month parts warranty) offer a lifetime parts warranty on the drive mechanism and a 5 year warranty on all other parts
- Refrigerated Orbital Shakers carry a lifetime warranty on the drive mechanism, 1 year parts warranty on the compressor, and a 5 year warranty on all other parts.



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RESEARCH AND EDUCATION
SINCE 1908.**

ACCESSORY CHECKLIST

The following loose parts and accessories are packed with this unit. Before discarding any packing materials, please make sure that nothing has been overlooked.

MODEL NO.: 314, 314-1, 314-1CE, 316, 316-1, 315, 315-1, 317, 317-1

CHECKED BY: _____

DATE: _____

PACKED BY: _____

CHECKED	ITEM	PART NUMBER	QUANTITY
_____	Shelves (314/315 Series)	810-424-02	2
_____	Shelves (316/317 Series)	810-424-01	2
_____	Gas Filter Interface Assy.	018-514-00	1~2
_____	Operation Manual	057-561-00	1
_____	Warranty Card	528-022-00	1
_____	Blue Caution Card (240 Volt)	528-009-00	1
_____	Mating Connector (314/316 Series)	420-006-00	1