User Manual

# VWR® Collection Model 10753-894

## Refrigerated Incubator - Microprocessor Controlled

Operating and Maintenance Manual 7013733 • Rev. 5

**Manual Number 7013733**

| Rev | ECR/ECN | Date | Description | By |
|---|---|---|---|---|
| 5 | ECNM-001496 | 06/01/21 | Added EMC Statements in Preface page iv. | TFI |
| 4 | ECNM-001460 | 04/27/21 | Added Warning statement in page 5-1. | TFI |
| 3 | ECNM-001372 | 04/05/21 | Updated information with the new Electrolux model FFFU20F2VW Freezer on on the following pages 1-1 to 1-4, 3-1, 3-6, 4-1, 4-3, 4-7, 7-1. | TFI |
| 2 | ECNM-000930 | 08/31/2020 | Updated to match the correct voltage specification, 115+/-5% in pages 1-3 and 4-7. Updated power line voltage and added Refrigerant, Insulation, Design pressure, Shipping and Storage Specification in page 7-1. | TFI |
| 1 | ECNM-000535 | 10/25/19 | Updated text in pages 1-2, 1-3, 2-2, 3-1, 3-2, added Function Menu Programming and Configuration to page 3-3, 3-4 and 3-5. Added Section 6 Options. | TFI |
| 0 | 40096 | 4/3/15 | Original - cabinet, cooling on/off switch, models | ccs |

**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. ▲

**Warning** If the incubator is not used in the manner specified in this operating manual, the protection provided by the equipment design may be impaired. ▲

**Warning** Depending on ambient temperature and settings, surface can become warm to touch (up to 60°C). ▲

Material in this manual is for information purposes only. The contents and the product it describes are subject to change without notice. VWR International makes no representations or warranties with respect to this manual. In no event shall VWR be held liable for any damages, direct or incidental, arising out of or related to the use of this manual.

**Caution** Risk of fire or explosion. Flammable refrigerant used. Consult repair manual/owner's guide before attempting to service this product. All safety precautions must be followed. ▲

**Caution** Risk of fire or explosion. Dispose of property in accordance with federal or local regulations. Flammable refrigerant used. ▲

**Caution** Risk of fire or explosion due to puncture of refrigerant tubing. Follow handling instructions carefully. Flammable refrigerant used. ▲

© 2021 VWR International, LLC. All rights reserved.

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

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

Power off (To indicate disconnection from the mains, for their positions).



Power On (To indicate Connection to the mains, for their positions).

It is intended to identify ground stud for protection against electric shock in case of a fault, or a protective earth (ground) stud.

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

Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2012/19/EU (WEEE) and the equipment that has been put on the market after 13 August 2005.

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the WEEE symbol. Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State European Country, and this product should be disposed of or recycled through them. Further information on Thermo's compliance with this directive, the recyclers in your country and information on Thermo Scientific products will be available at www.thermoscientific.com.

- ✔ 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.

# Regulatory Compliance

## Product Safety

### Product Testing

This product family has been tested to applicable product safety standards by Intertek, which is a Nationally Recognized Test Laboratory (NRTL). The product bears the following mark.

### Hydrocarbon Refrigerants

According to U.S. Code of Federal Regulation 40 Part 82, this freezer employs the natural hydrocarbon refrigerant R600a. Because of the nature of hydrocarbon refrigerants, for mechanical repair, such as recharge or compressor replacement, should only be carried out by a certified refrigeration technician. The safety of this equipment is listed by Underwriter Laboratory (UL) under Standard UL471, section SB - “natural refrigerant”.

## Additional Regulations and Markings

This product is not marked with a CE marking, as it does not operate in the voltage range to be sold to the EU Member States or European Economic area (EEA). Reach out to the manufacturer for questions regarding any additional regulatory conformity.

## EMC (Electro-Magnetic Compatibility)

This equipment has been tested and found to comply with the limits for a Class A digital device. Class A covers devices for usage in all establishments other than domestic and that are not directly connected to a low voltage power supply network, which supplies domestic environment.

### US (FCC Statement):

**Note** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### Canada Statement:

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à la norme NMB-001 du Canada.

# Table of Contents


**Section 1 Introduction . . . . . 1-1**

Unpacking and Damage . . . . . 1-1
General Information . . . . . 1-2
Performance Data . . . . . 1-2
Theory of Operation . . . . . 1-3
Explanation of Front Panel Controls . . . . . 1-3
Explanation of Auxiliary Panel . . . . . 1-4
Instrumentation Port . . . . . 1-6

**Section 2 Installation . . . . . 2-1**

Safety Precautions . . . . . 2-2

**Section 3 Operation and Calibration . . . . . 3-1**

Function Menu Programming and Configuration . . . . . 3-3

**Section 4 Service . . . . . 4-1**

Troubleshooting . . . . . 4-1
Symptoms and Possible Causes . . . . . 4-1
Possible Solutions . . . . . 4-3

**Section 5 Maintenance . . . . . 5-1**

General Cautions . . . . . 5-1

**Section 6 Options . . . . . 6-1**

**Section 7 Specifications . . . . . 7-1**

# Section 1 Introduction

Your satisfaction and safety are important to VWR and a complete understanding of this unit is necessary to attain these objectives.

**Warning** As a routine laboratory precaution, always wear safety glasses when working with this apparatus. ▲

This product is not intended, nor can it be used, as a sterile or patient connected device. In addition, this apparatus is not designed for use in Class I, II or III locations as defined by the National Electrical Code.

**Warning** If this equipment is not used as specified in this manual, the protection provided by the unit design may be impaired. ▲

## Unpacking and Damage

Save all packing material until unit is put into service. This merchandise was carefully packed and thoroughly inspected before leaving our factory.

Responsibility for safe delivery was assumed by the carrier upon acceptance of the shipment; therefore, claims for loss or damage sustained in transit must be made upon the carrier by the recipient as follows:

1. Visible Loss or Damage: Note any external evidence of loss or damage on the freight bill, or express receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusing to honor your damage claim. The form required to file such claim will be supplied by the carrier.
2. Concealed Loss or Damage: Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked and inspected. Should either occur, make a written request for inspection by carrier's agent within fifteen (15) days of the delivery date; then file a claim with the carrier since the damage is the carrier's responsibility.

If you follow the above instructions carefully, we will guarantee our full support of your claim to be compensated for loss or concealed damage.

**Note** Do not - for any reason - return this unit without first obtaining authorization. In any correspondence to VWR, supply the nameplate data, including catalog number and serial number. ▲

## General Information

This Refrigerated Incubator has been designed to provide the ultimate in temperature control. The user is assured of dependable and precise performance through the use of microprocessor technology in the temperature control circuitry. This incubator is operable in the range of -10° to 50°C. These temperature ranges will meet a wide variety of applications, such as BOD determination, general incubation, as well as the preservation of critical materials.

## Performance Data

| Set temperature | Uniformity values: Temperature deviation from set value, spatial (3 point measurement) | Uniformity values: Temperature deviation from set value, spatial (27 point measurement according to DIN 12880) | Temperature stability: Maximum temperature difference at chamber center point (1 point measurement) | Energy consumption | Heat up time / Cool down time from ambient temperature according to DIN 12880 | Recovery time after door opening according to DIN 12880 |
|---|---|---|---|---|---|---|
| -10°C* | ±0.6°C | ±1.2°C | ≤ ±0.25°C | ≤ 0.09 kW/Hr. | ≈81 min. | ≈13 min. |
| 20°C | ±0.15°C | ±0.3°C | ≤ ±0.15°C | ≤ 0.18 kW/Hr. | N/A | N/A. |
| 37°C | ±0.3°C | ±0.5°C | ≤ ±0.10°C | ≤ 0.04 kW/Hr. | ≈61 min. | ≈6 min. |
| 50°C | ±0.3°C | ±0.8°C | ≤ ±0.14°C | ≤ 0.06 kW/Hr. | ≈85 min. | ≈13 min. |

* Values refer to measurement with defrost not running.

**Note** The above performance figures are based upon the following operating conditions:

- Ambient temperature of 22°C +/-3°C
- Line voltage 115 V, ±5% (115 V version)

The following test protocols have been used:

3 point measurement test: 1 thermocouple sensor in center of each shelf - 1 shelf top position, 1 shelf lowest position, 1 shelf middle position.

27 point measurement test: 9 x thermocouples on each shelf - 1 shelf top position, 1 shelf lowest position, 1 shelf middle position (based on DIN 12880).

1 point measurement test: 1 thermocouple at chamber center point (temporal temperature variation characterized by the maximum temperature difference).

## Theory of Operation

The refrigeration system, defrost heater, and air circulating fan are used in conjunction with a microprocessor controlled proportioning circuit to achieve sensitive temperature control. An RTD (Resistance Temperature Detector) located in the airstream senses any temperature deviation from the control point, and heat is provided proportionally to maintain the desired temperature. Compressor operates continuously with cooling switch at "On" position and the set temperature less than or equal to 35°C. This constant operation alleviates component failures associated with cycle type operation.

The circulating fan provides even air distribution throughout the chamber and ensures temperature uniformity.

## Explanation of Front Panel Controls

**Heater On Lamp** - Illuminates when power is applied to the heater.

**LED Display** - Four digits are used to display the actual, set, calibrated, high limit / low limit and defrost value.

**Indicator Lamps** - There are five (5) green indicator lamps that are used to inform the user which parameter the display is indicating. The sixth indicator is for a high or low temperature alarm condition. An internal audible alarm will also operate when this alarm indicator illuminates.

**Power On/Off Switch** - The Power On/Off switch provides the main power to the incubator.

**Cooling On/Off Switch** - The Cooling On/Off Switch provides a better energy and temperature performance when setting a temperature greater than ambient +5°C.

**Warning** For better performance and product safety, cooling switch must be set to "Off" position when setting temperature is greater than ambient +5°C. Otherwise, the compressor is disabled when the set temperature is greater than 35°C. ▲

**Mute Key** - This key is used to silence the internal audible alarm and to also, deactivate the external alarm device if one is being used.

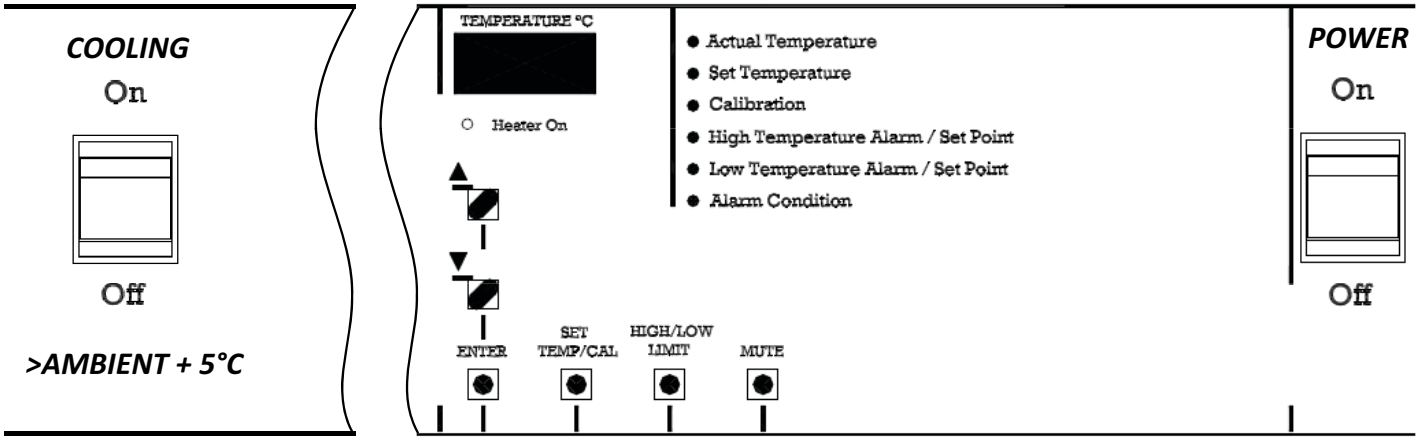



**Figure 1-1.** Front Panel

## Explanation of Front Panel Controls (cont.)

**High/Low Limit Key** - This key is used to view the high or low temperature alarm setpoint. The first depression of the key selects the high limit. The second depression selects the low limit. The respective green indicator lamp will light.

**Set Temp/Cal Key** - This key is used to view the operating setpoint temperature or calibrate the unit to a certified/traceable thermometer. The first depression of the key selects the operating setpoint and the second depression selects the calibration mode. The respective green indicator lamp will light.

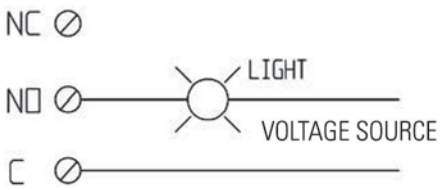
**Enter Key** - This key is used after any setpoint selection is made to enter the value into memory.

**Up/Down Arrow keys** - These keys are used to increase or decrease the desired setpoint value.

## Explanation of Auxiliary Panel

On the left side of the incubator control panel, there is an auxiliary panel which has the items shown in the illustration below. They are described as follows:

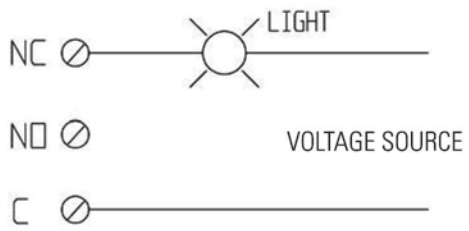
1) Fuse - This fuse is in line with the main power cord that comes into the incubator. The rating of this fuse is 5A SB 115V. It is standard time delay fuse. The physical size of this fuse is 5 mm x 20 mm.
2) Alarm Relay - This Alarm Relay output is provided to the user for the purpose of remotely monitoring the incubator in case of a high or low temperature alarm condition. This alarm relay will operate just as the audible alarm would. The contact itself is an isolated form C (normally open/normally closed) dry contact. This contact is to be used for low voltage class 2 connections only. The contact rating is 24 volts, 1.25 amps resistive. Typical usages of the output are shown below.




In the above configuration, the light will illuminate whenever the unit goes into an alarm condition...High or Low.

In the configuration below, the light will go off in a high or low temperature alarm condition.

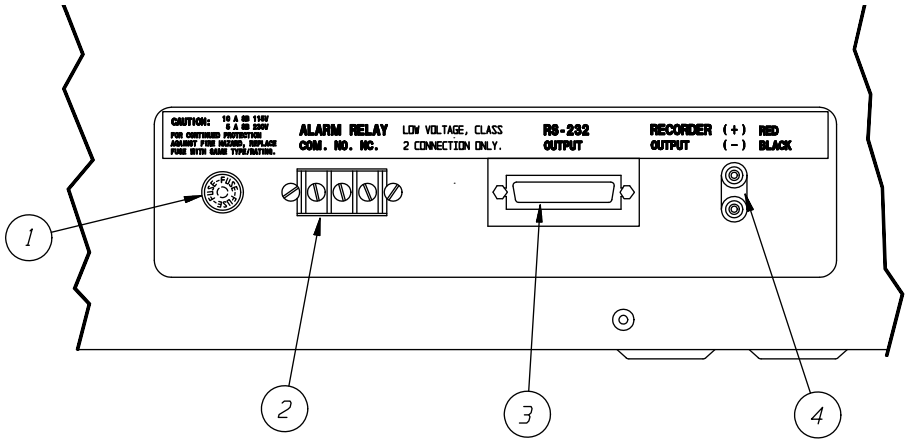
## Explanation of Auxiliary Panel (cont.)




**Warning** Wiring must conform to all local electrical codes. ▲

3) RS-232 Output (Optional Kit P/N 3166245) - This output is used for two way communications between the incubator and a personal computer. With the use of communications/modem software program, the user can record the temperature of the incubator at their selected time periods and store it in a file for use with a spreadsheet program. The user can also change the setpoint temperature from their personal computer and periodically monitor the actual temperature, setpoint temperature, and alarm status.

4) Recorder Output - This is a DC millivolt output which represents the temperature of the incubator. The recommended main use of this is with a chart recorder having an input impedance of at least 1 megohm. The scaled temperature output change is 10 millivolt/degree C. When the incubator is operating at a negative temperature, the chart recorder output is still positive. Use the chart below to relate temperature to output voltage.




| Temperature (Degree C) | Recorder Output (Millivolts) |
|---|---|
| -10 | 100 |
| 0 | 200 |
| 10 | 300 |
| 20 | 400 |
| 30 | 500 |
| 40 | 600 |
| 50 | 700 |

Located on the chart recorder printed circuit board is an offset potentiometer R3. If, for some reason, the recorder output voltage does not match the temperature as shown in the chart, this potentiometer can be used to tune it in.

When connecting a chart recorder to the recorder output connector, it is recommended to use a shielded cable with the shield grounded at the chart recorder and to keep the cable short as possible.

## Instrumentation Port

Located on the rear side of the incubator is an instrumentation port for the user to insert sensor wires, external meter leads, etc. into the chamber. The rubber plug provided must always be used in this port to insure the uniformity specifications. An extra plug is supplied for user convenience. Be sure to seal any gaps around the wire(s) going through the plug.

# Section 2 Installation

Use the proper lifting equipment when moving this unit. The shipping weight of the unit is 240 lbs. (108.9 kg).

To assure proper ventilation, allow a minimum of 4" of clearance between the rear, top, and sides of the incubator and adjacent walls. If two or more incubators are positioned side by side, allow a minimum of 8" between cabinets. Adjust the front leveling feet of the incubator so that the front is higher than the rear. This will assist in door closing. Choose a site free from rapidly changing ambient temperature conditions.

The power cord is the mains disconnect. Make sure the outlet and power cord are accessible at all times.

**Caution** The incubator should not be operated in an environment where the ambient temperature exceeds 90°F as the compressor thermo-overload will be tripped and will result in a wide band control cycle of approximately ±4°C. Such cycling should not be misinterpreted as a malfunction of the electronic controls. ▲

Radiators, air-conditioning outlets, other ventilating system outlets, and drafts can affect the operation of the incubator by a sudden inrush of air that is at a temperature different than operating conditions.

**Warning** For personal safety, this apparatus must be properly grounded. ▲

The power cord of this instrument is equipped with a three-prong (grounding) plug which mates with a standard three-prong (grounding) wall receptacle to minimize the possibility of electric shock hazard from this apparatus. The customer should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly grounded.

Where a two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three-prong wall receptacle.

**Warning** Do not - under any circumstances - cut or remove third (ground) prong from the power cord. Do not use a two-prong adapter plug. ▲

Determine the total amount of current presently being used by other apparatus connected to the circuit that will be used for this unit. It is critical that the added current demand and other equipment on the circuit not exceed the rating of the fuse or circuit breaker in use.

**Caution** Be sure the power supply is the same voltage as specified on the nameplate. ▲

When loading the incubator, a space of 1/2" must be allowed between adjacent items. This will allow maximum air circulation, which is necessary for proper temperature uniformity. The uniformity will be adversely affected if air circulation is obstructed.

Liquid containers should never be placed in the incubator without covers. The evaporation of moisture within the chamber will only add frost and hasten the need for defrosting. Therefore, this chamber has an automatic defrost function. It is recommended to activate this defrost function when setting working temperatures of 10°C or lower.

Excessive frost buildup on the evaporator coil located on the lower rear wall will also affect temperature uniformity.

## Safety Precautions

1. Do not place any explosive, combustible, or flammable materials in the chamber.
2. Do not place sealed containers in the chamber. Sealed containers, filled with materials do not provide room for expansion and can develop dangerous vapor pressure as the temperature increases.
3. Avoid spillage of liquids within the chamber.
4. Do not evaporate noxious fumes.

**Caution** Do not store containers filled with acidic or caustic solutions, as vapors from these materials will attack the evaporator and void the warranty. ▲

# Section 3 Operation and Calibration

Power up by depressing the ON/OFF switch. Immediately after turning on power, all the segments of the display and all of the indicators will be on. After one second the display will show the actual temperature and the actual temperature indicator light will be lit. If the setpoint temperature is greater than the actual temperature, then the heater on lamp will be on or start to flash. If it flashes, then the actual temperature is near setpoint temperature.

**To display any temperature value** - With the use of either the SET Temp/Cal key or the HIGH/LOW LIMIT key, any temperature value can be displayed. To view the set temperature, press the set Temp/Cal key once. The green indicator for the set temperature will light. If no other keys are pressed, within 5 seconds, the display will automatically return to the actual temperature. To view the calibrate temperature, press SET TEMP/ CAL twice while the display is showing the actual temperature. The same sequence of key operation is true for the use of the HIGH/LOW LIMIT key.

**To change the setpoint temperature** - Press the SET TEMP/CAL key once. Then press the UP or DOWN arrow key until the desired temperature is displayed. When continuously pressing either the UP or DOWN keys, the display will begin to change rapidly. With a little practice, one will become accustomed to this. After the desired set temperature is achieved, then press the ENTER key. The display will then return to showing the actual temperature. If the ENTER key is not pressed, the expected new set temperature will not be accepted, and the incubator will control at the previous set temperature.

If the setting temperature is over ambient temperature +5°C, the "compressor cooling function" isn't needed. Set the cooling switch to the “Off” position. Then the energy and temperature performance provides better values.

**Warning** For better performance and product safety, cooling switch must be set to "Off" position when setting temperature is greater than ambient +5°C. Otherwise, the compressor is disabled when the set temperature is greater than 35°C. ▲

The incubator is calibrated at the factory for use over a wide range of temperatures. Due to the slight non-linearities in the control system, it may be necessary to make the display match a calibrated thermometer's reading, even though the difference might be only a few tenths of a degree.

The CALIBRATE key should be used ONLY to match a stable incubator's actual temperature to the calibrated thermometer.

Place a calibrated thermometer or the probe of one at the center of the third shelf of the incubator. Select the SETPOINT desired. Allow the unit to run for at least an hour after it reaches the setpoint, before calibration is performed.

**Note** If possible, place the thermometer into a liquid for stability. ▲

**To perform calibration**, press the SET TEMP/CAL twice. The green calibration indicator should be lit. Then press either the UP or DOWN arrow keys to make the display match the noted thermometer reading. After the satisfied display is achieved, press the ENTER key. The display will then return to showing the newly calibrated actual temperature.

**To change the high temperature alarm/setpoint** - After selecting a setpoint temperature, the HIGH TEMPERATURE ALARM SETPOINT automatically defaults to 1° higher than the setpoint that was entered. This 1° default difference can be overridden if desired. The following paragraph describes this.

Press the HIGH/LOW LIMIT key once. The green "High Temperature Alarm/Set Point" indicator should be lit. Use the UP or DOWN arrow keys to select your limit value. Then press the ENTER key. If the HIGH LIMIT value you have selected is below the operating SETPOINT TEMPERATURE, the incubator alarm will activate.

**Caution** If the default high temperature alarm setpoint (1°C above setpoint) is increased, the new alarm temperature value will remain valid until power is removed from the unit (turning off the power switch, unplugging or power failure). When power is restored, the alarm setpoint will revert back to the default. ▲

**To change the low temperature alarm/setpoint** - After selecting a setpoint temperature, the LOW TEMPERATURE SETPOINT automatically defaults to 1° lower than the setpoint that was entered. This 1° default difference can be overridden if desired. The following paragraph describes this.

Press the High/Low Limit key twice. The green "Low Temperature Alarm/Setpoint" indicator should be lit. Use the UP or DOWN arrow keys to select your limit value. Then press the ENTER key. If the LOW LIMIT value you have selected is above the operating setpoint temperature, the incubator alarm will activate.

**Caution** If the default low temperature alarm setpoint (1°C above setpoint) is increased, the new alarm temperature value will remain valid until power is removed from the unit (turning off the power switch, unplugging or power failure). When power is restored, the alarm setpoint will revert back to the default. ▲

## Function Menu_Programming and Configuration

**RS232 Communication:** Optional connection kit required (Cat. No. 3166245)

Change BAUD Rate: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Display defaults to r 96, which indicates 9600 BAUD.
- Press UP or DOWN keys to select r 96 through r 03, for BAUD rates 9600 to 300.
- Press ENTER.

Change Status Update Time: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Press ENTER once.
- Display defaults to S 0.1, which indicates Status Update time in minutes.
- Press UP or DOWN keys to select S 0.1 through S 60 (means 1 to 60 mins), for updates in minutes.
- Press ENTER. (S 0.0 = Stop Update)

Change Display Type: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Press ENTER twice.
- Display defaults to D 00, which indicates status display type.
- Press UP or DOWN keys to select D 00 through D 02, change status display type.
- Press ENTER.

**Note:** Reference item 3 on page 6-4 for explanation of display types.

**Alarm Delay Period**

Change Power ON Alarm Delay: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Press ENTER three times.
- Display defaults to P 30, which indicates Power ON Alarm Delay of 30 minutes.
- Press UP or DOWN keys to select P 30 through P 60 (means 30 to 60 mins), to change Power ON Delay.
- Press ENTER.

## Function Menu_Programming and Configuration (cont.)

Change Alarm Enable Delay: Press **UP**, **DOWN** and **ENTER** keys simultaneously.

- Press ENTER four times.
- Display defaults to C 30, which indicates Alarm Enable Delay of 30 minutes.
- Press UP or DOWN keys to select C 30 through C 60 (means 30 to 60 mins), to change Alarm Enable Delay.
- Press ENTER.

## Automatic Evaporator Defrost Function

Enable Defrost Function: Press **UP**, **DOWN** and **ENTER** keys simultaneously.

- Press ENTER five times.
- Display defaults to F 00, which indicates Defrost Function is OFF.
- Press UP key to select F 01 to turn the Defrost Function ON.
- Press ENTER.

Set Defrost Interval: Press **UP**, **DOWN** and **ENTER** keys simultaneously.

- Press ENTER six times.
- Display defaults to I 12, which indicates Defrost is enabled every 12 hours.
- Press UP and DOWN keys to select I 06 through I 24 (means 6 to 24 hours), to set the Defrost Interval in hours.
- Press ENTER.

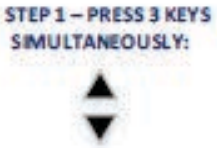
**Note** Decreasing the default defrost interval of 12 hours could be required if the chamber is opened very frequently, or for higher humidity applications. An indicator could be excessive ice development on the evaporator coils. The chamber might show unusual temperature readings in case of excessive ice on the evaporator coils. ▲

Set Defrost Duration: Press **UP**, **DOWN** and **ENTER** keys simultaneously.

- Press ENTER seven times.
- Display defaults to E 04, which indicates Defrost duration in minutes.
- Press UP and DOWN keys to select E 04 through E 59 (means 4 to 59 mins), to set the Defrost Duration in minutes.
- Press ENTER.

**Note** A defrost duration of X min is recommended. It is recommended to increase this duration in case the developed ice does not melt completely in this time period. ▲

# BOD Function's Programming and Configuration Flowchart



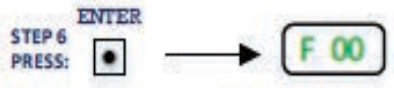
Display: Serial RS232 Baud rate (X 100); use ▲▼ keys to select 'r 96' through 'r 03' for BAUD rates '9600' through '300'.

Display: Serial RS232 Status Update Time (minutes); use ▲▼ keys to select 'S 0.1' through 'S 60.0' Status Update minutes (S 0.0 = Stop Update).

Display: Serial RS232 Status Display Type; use ▲▼ keys to select 'D 00', 'D 01', or 'D 02' Status Display Type.

Display Power ON Stabilization Time (minutes) before alarms are enabled; use ▲▼ keys to select 'P 15', 'P 30', 'P 45', or 'P 60' minutes.

Display: Alarm Enable Time (minutes) after alarm condition detected; use ▲▼ keys to select 'C 15', 'C 30', 'C 45', or 'C 60' minutes.




Display: Defrost Function set to OFF; use ▲ key to select '01' to set the Default function ON, if needed; otherwise DO NOT change.

Display: Defrost Interval in Hours; use ▲▼ keys to select 'I 06', 'I 12', 'I 18', or 'I 24' defrost interval hours, if defrost function is selected.

Display: Defrost Duration in minutes; use ▲▼ keys to select 'E 04' through 'E 59' for Defrost Duration in minutes, if defrost function is selected.

Press and hold ENTER for 5 seconds, or press no key for 5 seconds to Exit Menu.

# PREVENTIVE MAINTENANCE

Incubators

Your equipment has been thoroughly tested and calibrated before shipment. Regular preventive maintenance is important to keep your unit functioning properly. The operator should perform routine cleaning and maintenance on a regular basis. For maximum performance and efficiency, it is recommended the unit be checked and calibrated periodically by a qualified service technician.

The following is a condensed list of preventive maintenance requirements. See the specified section of the operating manual for further details.

We have qualified service technicians, using NIST traceable instruments, available in many areas. For more information on Preventive Maintenance or Extended Warranties, please contact us at the number listed below.

Cleaning and calibration adjustment intervals are dependent upon use, environmental conditions and accuracy required.

**Tips for all incubators:**

- Do NOT use bleach or any disinfectant that has high chlorine content.
- Use sterile, distilled or demineralized water.
- Do not use powdered gloves for tissue cultures.

401 Millcreek Road, Box 649 • Marietta, Ohio 45750 USA • 740-373-4763
USA and Canada 800-438-4851 • Telefax: 740-373-4189 • http://www.service.led.marietta@thermofisher.com

## Preventive Maintenance for Model 815 Incubators

| Refer to Manual Section | Action | Daily | Weekly | Yearly |
|---|---|---|---|---|
| 3 | Check temperature display versus setpoints, w/ independent instrument | | ✓ | |
| -- | Inspect door latch, hinges and door gasket seal. | | | ✓ |
| 3 | Verify and document temp calibration, as applicable. See Calibration section. | | | ✓ |
| 5 | Perform a complete decontamination procedure. Wipe down interior, shelves and side panels with disinfectant. Rinse everything well with sterile distilled water. | Between experiments *More frequent decontamination may be required, depending on use and environmental conditions* | | |

# Section 4 Service

**Warning** Service should be performed only by qualified service personnel. Exercise care as line voltage is present in the control compartment. ▲

If refrigeration service is required, after review of the Troubleshooting Section, contact Technical Services.

In any communication with VWR, include the model and serial numbers from both nameplates.

## Troubleshooting

Problems encountered with any constant temperature chamber will most frequently be related to temperature control. Before proceeding with detailed troubleshooting, be certain that the Low Limit and High Limit controls are adjusted properly. If the limit controls are set too close or beyond the operating temperature, the incubator may be consistently going into alarm. This will result in erratic temperature control. First, the symptoms and possible causes will be listed for quick reference. Solutions will be suggested later.

**Warning** Hazardous high voltage conditions exist inside the control panel. unplug line cord and turn "off" line switch before removing the cover. Only qualified electrical instrument personnel are authorized to perform troubleshooting and/or servicing. ▲

## Symptoms and Possible Causes

**Freeze-up or gradual drop in chamber temperature:**

No air circulation in chamber; inoperative fan (see Solution 1)

Heater (see Solution 2)

Power Supply PCB Assembly (see Solution 3)

RTD Temperature Probe (see Solution 3, Step D and/or Solution 4).

## Symptoms and Possible Causes (cont.)

**Temperature variations at set point (poor control):**

Excessive ambient temperature variations (see Solution 10)
Compressor Relay failure (see Solution 12)
No air circulation in chamber; inoperative fan (see Solution 1)
RTD Temperature Probe Location (see Solution 5)
Ice buildup on evaporator coils (see paragraph on "Defrosting")
RTD Temperature probe (see Solution 3, Step D and/or Solution 4).
Power Supply PCB Assembly (see Solution 3)

**Does not reach a high set point temperature:**

No air circulation in chamber; inoperative fan (see Solution 1)
Low line voltage, less than 110V (see Solution 9)
RTD Temperature Probe (see Solution 3, Step D and/or Solution 4).
Power Supply PCB Assembly (see Solution 3)
Overcharged compressor (see Solution 11)

**Differences between Temperature Set and Digital Temperature Readout: (see performance figures, page 3)**

RTD Temperature Probe (see Solution 3, Step D and/or Solution 4).
Malfunctioning Power Supply PCB assembly (see Solution 3)

**Takes an extremely long time to reach high temperature set point:**

No air circulation in chamber; inoperative fan (see Solution 1)
Low line voltage, less than 110V (see Solution 9)
Power Supply PCB assembly (see Solution 3)
Overcharged Compressor (see Solution 11)

**Display indicates ∩∩∩∩ or UUUU**

Malfunctioning RTD Temperature Probe (Solution 4)

## Possible Solutions

1. **Inoperative Fan:**

   Open the door. Place your hand near the grill at the top rear of the chamber and check for air circulation. If there is no air circulation, the fan motor is malfunctioning. Contact Technical Services.

2. **Burned-out heater:**

   To check this, the control panel cover must be removed.

**Warning** Hazardous high voltage conditions exist inside control panel. Turn 'OFF' line switch on front panel and unplug line cord. ▲

Remove all screws that fasten the cover. Locate nylon connector J1 on the Limit/Alarm PCB Assembly. Depress both ears on the plug housing and gently pull out the connector.

With an Ohmmeter, measure the resistance between TB1-4 (Orange wire) and TB1-6 (Red wire).

The proper heater resistance is 58 ohms. If the heater is good, then the problem is directed towards the heater wires in the harness.
If the heater is bad, replace it.

3. **Malfunctioning Power Supply PCB assembly:**

   The Power Supply PCB Assembly has the triac (solid state AC voltage switch) on it which supplies the power to heater. This triac is "told" to operate, when need be, by the microprocessor.

## Possible Solutions (cont.)

There is another device known as an Optoisolator which serves as the high/low voltage isolator between the triac and the microprocessor.

When the incubator starts experiencing temperature problems and/or variations, due to known controller malfunctions, these two components become prime suspects. The reason being they are under higher operating stress than other components.

If the incubator starts experiencing temperature problems such as no heat, constant heat, or "creeping" upward heat, then follow the troubleshooting instructions below. These instructions require the use of a voltmeter being able to measure DC and AC voltages and preferably a digital voltmeter.

**Warning** The following troubleshooting instructions require that power be on. Only qualified service personnel should perform these procedures. ▲

A) Remove the control cover and familiarize yourself with the power supply assembly #3176814. Locate the Triac (Q2), the Opto-isolator (U1), resistor (R4). Also locate the test point #2 (TP2). The first measurements will be DC voltage measurement, so a DC scale of at least 10 volts should be selected. Connect the negative lead to TP2. This is DC ground. Also locate the terminal block (TB1).

B) This first section will be to verify the heater command is correct from the microprocessor, through the optoisolator, and through the Triac when the incubator is NOT requesting heat. The steps in this section must be followed in succession.

1. Select a setpoint temperature at least 10° below what the actual temperature is. The incubator should not be requesting heat as indicated by the "Heater On" indicator lamp on the front panel. It should not be on continuously or even flashing.

2. Measure the voltage at U1-Pin 2 with respect to TP2. It should be no less than 4 volts DC.

3. Measure the DC voltage across R4, since the incubator is not requesting heat, there should be no current flowing through this resistor, making the voltage drop equal to zero volts.

4. If the last two steps are not as stated, then most likely the CPU board is bad and should be replaced.

5. Switch the voltmeter to an "AC Volts" scale capable of reading 120 volts.

## Possible Solutions (cont.)

6. Measure the voltage between U1-Pin 4 and U1-Pin 6. It should be line voltage 110VAC to 120VAC.

7. If it is not, most likely the Optoisolator is bad and the power supply board will have to be replaced.

8. Measure the voltage TB1-4 (Orange wire) and TB1-6 (Red wire). It should be approximately 0VAC.

9. If it is not, then most likely the triac is bad, and the power supply board should be replaced.

C) This next section will be to verify the heater command is correct from the microprocessor, through the optoisolator, and through the Triac when the incubator is requesting heat. The steps in this section must be followed in succession.

1. Select a setpoint temperature at least 10° above what the actual temperature is. The incubator should be requesting heat as indicated by the "Heater On" indicator lamp on the front panel. It should be on continuously, not flashing.

2. Measure the voltage at U1-Pin 2 with respect to TP2. It should be no greater than 4 volts DC.

3. Measure the DC voltage across R4, since the incubator is requesting heat, there should be current flowing through this resistor, making the voltage drop equal to 3 volts ±0.5 volts.

4. If the last two steps are not as stated, then most likely the CPU board is bad and should be replaced.

5. Switch voltmeter to "AC Volts" scale capable of reading 120 volts.

6. Measure the voltage between U1-Pin 4 and U1-Pin 6. It should be less than 1VAC.

7. If it is not, most likely the optoisolator is bad and the power supply board should be replaced.

8. Measure the voltage between TB1-4 (Orange wire) and TB1-6 (Red wire). It should be line voltage. 110VAC to 120VAC.

9. If it is not, then most likely the triac is bad. The power supply board should be replaced.

## Possible Solutions (cont.)

D) Measure RTD temperature probe resistance at the connector after unplugging it from plug J302. The resistance between contacts, at various temperatures are as follows:

| TEMPERATURE | RESISTANCE |
|---|---|
| 0°C | 100 OHMS |
| 20°C | 108 OHMS |
| 37°C | 114 OHMS |
| 50°C | 119 OHMS |

**Note** Only 2 of the 3 connectors positions are used.

4. **Malfunctioning RTD Temperature probe:**

   The Control Board can detect if the temperature probe or the connection of the temperature probe to the circuit board is "OPEN" or "SHORTED". These two conditions are shown on the display as follows:

| DISPLAY | CONDITION |
|---|---|
| ∩∩∩∩ | OPEN CIRCUIT |
| UUUU | SHORT CIRCUIT |

Before coming to the conclusion that the probe is bad when one of these displays appear, check the connection of the probe to the circuit board.

5. **RTD Temperature Sensor Probe Location:**

   The proper RTD location is important. The RTD is supported by the stainless steel bracket attached on the rear wall and near the top of the chamber. Two tube shaped clips securely support the RTD probe into place. The RTD must be inserted fully into its support bracket.

6. **Constantly Experiencing Low Temperature Alarm:**

   If the incubator is constantly going into low temperature alarm, then most likely the setpoint temperature setting is too close to the low temperature alarm/setpoint setting. The setpoint temperature setting should be a minimum of 2° above the low temperature alarm setting. If the problem persists, then see Solution 3.

7. **Constantly Experiencing High Temperature alarm:**

   If the incubator is constantly going into high temperature alarm, then most likely the setpoint temperature setting is too close to the high temperature alarm/setpoint setting. The setpoint temperature setting should be a minimum of 2° below the high temperature alarm setting. If the problem persists, then see Solution 3.

## Possible Solutions (cont.)

8. **Ice buildup on evaporator coils:**

   Excessive frost buildup is the result of the introduction of outside moisture. This may be caused by the evaporation of liquids placed in the chamber, or it may be the result of excessive opening of the door during high humidity conditions. The door gasket should also be examined for proper seal. If repairs are necessary, contact Technical Services.

9. **Excessive line voltage variation:**

   Incubator will operate within publisher specifications, over full temperature range (-10°C to 50°C) when line voltages vary from nominal voltage by -5% or +5%. Larger voltage variations may impair the Temperature Control. Correct as required.

10. **Excessive ambient temperature variation:**

    If the incubator is placed close to the air-conditioning outlet, hot radiators, or direct sunlight, or if the ambient temperature changes drastically, the chamber temperature will be affected. Correct as necessary.

**Caution** The incubator should not be operated in an environment where the ambient temperature exceeds 90°F, as the compressor thermo-overload will be tripped and will result in a wide band control cycle of approximately ±4°C. Such cycling should not be misinterpreted as a malfunction of the electronic controls.

11. **Overcharged compressor:**

    *This would happen only if compressor was overcharged after installation.* For correct charge, see nameplate located behind lower portion of door. If unit has more charge than shown, it will not reach 50°C. Compressor must be discharged and recharged correctly.

# Section 5 Maintenance

The design of the incubator is such that periodic maintenance is kept to a minimum. No lubrication is required. The following paragraphs cover the few minor procedures necessary for continuous operation.

**Warning** Turn off power switch and unplug line cord from power source before starting any maintenance procedure. ▲

If the chamber needs to be cleaned, a mild soap and water solution, or bicarbonate of soda (1tbsp./gallon of water), is recommended.

When the incubator is used frequently below ambient temperatures, or in any manner that increases moisture buildup within the chamber, it is recommended to activate the available automatic defrost function. The unit will then be defrosted regularly, moisture will collect in the drip pan beneath the incubator, and should evaporate over time.

**Warning** Do not open the back panel cover for any maintenance, cleaning or servicing. This should be performed by qualified service personnel only. ▲

## General Cautions

1) Overcharging a refrigeration system can cause excessive system pressure and can be dangerous.

2) The compressor terminal protective cover must be properly in place before applying electric power to the compressor.

3) Caution should be exercised by service personnel when servicing refrigeration system.

4) Service should be performed by a certified refrigeration technician only.

# Section 6 Options

## RS232

Instructions to install and operate the RS232 option follow.

1. Remove the eight (8) screws securing the control panel. There are four (4) on the top and 2 on each of the sides. Then remove the cover by sliding it towards the front of the incubator.

2. Slide open the auxiliary panel door and locate the mounting area of the RS232 board as shown in illustration following.

3. Mount the RS232 printed circuit board assembly using the screws or standoffs provided. See illustration below.

4. Connect one end of the cable to J304 located on the left edge of the left printed circuit board (p/n 3176707). Be careful of alignment.

5. Connect the other end of the cable to the cable connector on the RS232 PCB assembly (see illustration).

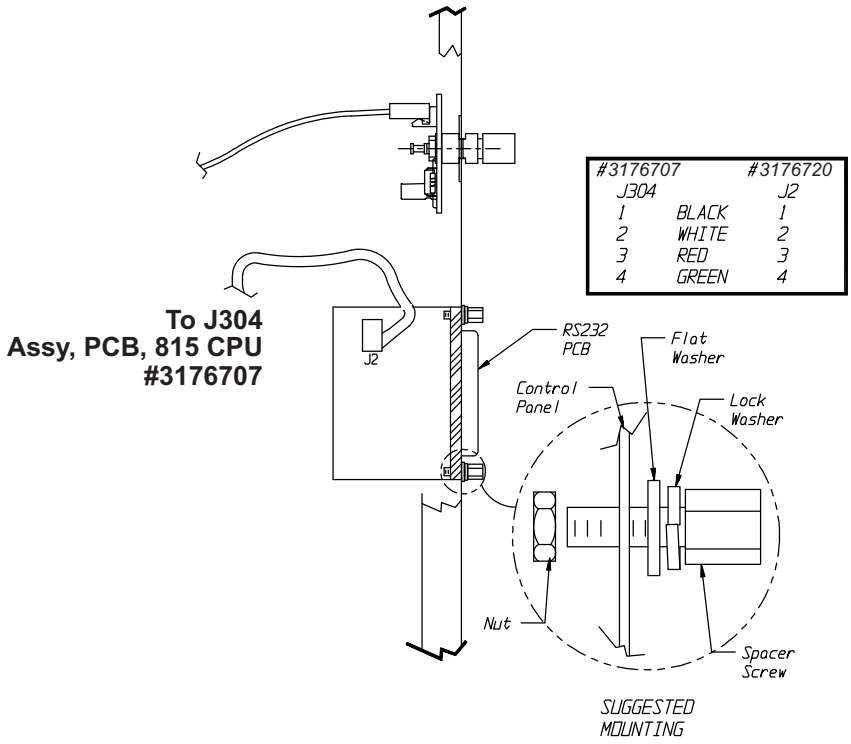
6. Replace the control panel and secure with the eight (8) screws.

The RS232 PCB provides a bi-directional communication port that will allow the user to monitor the performance or the change the operating valves of the incubator from a remote computer. RS232 Communication will require a communication program such as a modem program installed in your computer which will allow the storage of data within your files.

The RS232 PCB utilizes one of the user's computer serial ports, such as COM1 or COM2. The communication software must be configured to the selected port. The serial port is an IBM PC AT-style port. The cable that connects to it must end in a DB-25 (25-pin) male connector. The cable is a one-to-one wiring format. The pin assignments for the serial port are

| PIN | SIGNAL | DESCRIPTION |
|---|---|---|
| 2 | TXD | Serial Transmitted Data |
| 3 | RXD | Serial Received Data |
| 7 | GND | Signal Ground (OV) |

**TOP VIEW OF CONTROL PANEL**




## Setting Up the Incubator for Communication

Your incubator requires the selection of 3 parameters for communications:

- Baud Rate - This is the speed of communication between the incubator and computer. Whatever is selected for the incubator must also be selected in the communication software selected to be used.
- Status Update Time Interval - This is the time between information being sent from the incubator until it is received by the computer.
- Status Display Type - Selection of the format of data to be sent to your computer.

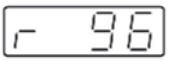
Read the following steps before performing any of them. It will allow you to familiarize yourself with the procedure and to determine the values you want beforehand.

**Note** In the following setup mode, there is a five (5) second time-out feature that is active following each entry. If the five (5) seconds is exceeded, the unit will return to the normal operation mode. If the time-out occurs before the value was entered, start over. ▲

## Set Up the Incubator for Communications (cont.)

1. Change BAUD Rate: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Display defaults to r 96, which indicates 9600 BAUD.
- Press UP or DOWN keys to select r 96 through r 03, for BAUD rates 9600 to 300.
- Press ENTER.




2. Change Status Update Time: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Press ENTER once.
- Display defaults to S 0.1, which indicates Status Update time in minutes.
- Press UP or DOWN keys to select S 0.1 through S 60 (means 1 to 60 mins), for updates in minutes.
- Press ENTER. (S 0.0 = Stop Update)

3. Change Display Type: Press **UP, DOWN** and **ENTER** keys simultaneously.

- Press ENTER twice.
- Display defaults to D 00, which indicates status display type.
- Press UP or DOWN keys to select D 00 through D 02, change status display type.
- Press ENTER.

4. Allow the setup to time out.

The incubator is now ready to communicate with your computer.

## Setting up the Computer for Communication

Your communications software will most likely have a setup routine to set the parameters listed below. These are the values the incubator is using, so the computer parameters must match accordingly. Also, you will probably have to select the "COM" serial port you chose when you connected the cable from your computer to the incubator. The software may ask what format the data is in. You should choose "ASCII".

| Parameter | Settings |
|---|---|
| Baud Rate: | Baud Rate value selected earlier in Step 1. |
| Parity: | None (0) |
| Data Bits: | Eight (8) |
| Stop Bits: | One (1) |
| COM Port: | Selected by user |
| Format: | ASCII |

## Using the Communication

The incubator transmits information on its RS232 port as long as the status update time interval is not "0.0."

If you start your communication software with the incubator on, most likely you will see the error(s) messages as follows:

ERR

? VALUE IS READ ONLY

? ILLEGAL COMMAND

Wait for the Status Update Time duration you selected to complete, and the communications will correct itself.

Besides having the incubator transmit information in one of the three formats, the user can monitor other values or even change some of these from their computer.

## Using the Communication (cont.)

The following table lists the available commands for monitoring or controlling your unit.

| View Command: | Description: | Unit: | Range: | Change Command |
|---|---|---|---|---|
| A? | Actual Temperature | Degrees | -10 to 50 | Read Only |
| T? | Setpoint Temperature | Degrees | -10 to 50 | T10 thru T50 |
| R? | Baud Rate | - | 0 - 5 | R0 thru R5 |
| S? | Status Update Time | - | 0 - 8 | S0 thru S8 |
| V? | EPROM Version Number | - | Current Rev. | Read Only |
| D? | Status Display Type | - | 0 - 2 | D0 thru D2 |
| O? | Display the Alarm Status | - | 0 - 2 | Read Only |

To View Data: If Status Update Time is "0.0" no data will automatically be displayed. To view data within a particular command code, type that command code followed by the question mark (?) symbol and then ENTER (Return).

Example: To view Setpoint Temperature type: T? <CR>

To Change Data: To change the value within the command type the command code followed by the new value and ENTER (Return).

Example 1: To change Setpoint Temperature to 25.0°C type: T25.0 <CR>

Example 2: To change Setpoint Temperature to -0.8°C type: T-0.8 <CR>

(**A**) **Actual Temperature:** The actual temperature within the incubator.

(**T**) **Setpoint Temperature:** The temperature at which the user has selected the incubator to operate.

## Using the Communication (cont.)

(R) **Baud Rate:** The rate at which data is transmitted between the incubator and your computer.

0 = 300 Baud
1 = 600 Baud
2 = 1200 Baud
3 = 2400 Baud
4 = 4800 Baud
5 = 9600 Baud

(S) **Status Update Time Interval:** The time between data messages sent from the incubator to your computer.

0 = 0 Minutes, No report
1 = 0.1 Minutes (6 seconds)
2 = 0.5 Minutes (30 seconds)
3 = 1.0 Minutes
4 = 2.0 Minutes
5 = 5.0 Minutes
6 = 10.0 Minutes
7 = 30.0 Minutes
8 = 60.0 Minutes

(V) **EPROM Version Number:** The incubator software version level.

(D) **Status Display Type:** Selection of format that data is sent to your computer

0 = Used for a raw, one-line status output suitable for importing into a spreadsheet

1 = Used for a multi-line format with English headings

2 = Used for the format as "1" but preceded by a clear screen command used by terminals or computers running terminal software.

(O) **Display the Alarm Status:** The alarm has three (3) possible values:

0 = Normal, no alarms

1 = Low alarm

2 = High alarm

# Section 7 Specifications

| | |
|---|---|
| **Temperature Range** | -10°C to +50°C |
| **External dimensions D x W x H (mm/in)** | 718 x 827 x 1956 / 28.25 x 32.63 x 77.00 |
| **Internal dimensions D x W x H (mm/in)** | 489 x 692 x 1626 / 19.25 x 27.25 x 64.00 |
| **Chamber volume (L / cu ft)** | 566 / 20 |
| **Shelves (supplied / max)** | 4 / 10 |
| **Shelf size W x D (mm / in)** | 686 x 381 / 27.00 x 15.00 |
| **Loading capacity per shelf (kg / lbs)** | 22.6 / 50 |
| **Weight (kg / lbs)** | 91 / 200 |
| **Shipping weight (kg / lbs)** | 109 / 240 |
| **Power line voltage (±10%) / frequency** | 115V / 60Hz |
| **Power rating** | 300 W |
| **Max current** | 3.2 A |
| **Plug type** | 115 V / Nema 5-15 P |
| **Max. BTU output** | 1024 (300 W) |
| **Access port diameter (mm / in)** | 30 / 1.2 |
| **Refrigerant** | R600a (Isobutane), 50 Grams (1.8 oz.) |
| **Insulation** | Non CFC, Cyclopentane foam |
| **Design Pressure** | LS / PB 73 PSIG (503 KPa)<br>HS / PH 115 PSIG (793 KPa) |
| **Safety Specifications** | Indoor use |
| | Altitude: 2,000 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 Rated Voltage ±10% |
| | Installation Category II * |
| | Pollution Degree 2** |
| | Class of Equipment I |
| | For Shipping and Storage |
| | Temperature: 5°C to 40°C |
| | Relative Humidity ≤ 60% |

** 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 1500 V for a 120 V supply.*

*** 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.*

**** Measured at ambient temperature of 32°C (90°F).*

VWR International, LLC
Radnor Corporate Center, Building One, Suite 200
100 Matsonford Road
Radnor, Pennsylvania 19087
United States

(610) 386-1700

www.vwrsp.com