Model H300
Temperature Humidity Chamber

with Watlow EZ-ZONE PM Controllers

Operation and User's Manual

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Introduction

The H300 is a simple to use, versatile temperature / humidity chamber. Its super compact design allows it to be placed on any table top. Its solid state design means low noise and low power operation. The solid state design also removes the need for user maintenance other that refilling water and desiccant.

The H300 comes in four configurations:

- **H300**: Simple set point control for temperature and humidity
- **H300RT**: Profiling control for temperature, simple set point control for humidity
- **H300RH**: Simple set point control for temperature, profiling control for humidity.
- **H300RTH**: Profiling control for both temperature and humidity.

A profiling controller allows the user to setup a program for the chamber to follow. For instance: Goto 50%RH at 1%RH per minute, stay at 50%RH for 30 minutes, go to 75%RH as fast as possible, stay at 75%RH for 1 hour, etc.

Safety Instructions

Follow all **CAUTION** notices to prevent damage to the chamber. Failure to follow all **CAUTION** notices may void your warranty.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

The safety alert symbol ⚠ precedes a general CAUTION or WARNING statement.

The electrical hazard symbol ⚠ precedes an electric shock hazard CAUTION or WARNING statement.

Installation Safety Notices

⚠ **WARNING**: The power cord is equipped with a NEMA 5-15P grounded GFCI plug. To prevent a shock hazard, DO NOT defeat the ground or GFCI features. This device MUST be plugged into a properly grounded receptacle.

⚠ **CAUTION**: The minimum clearance you should allow for proper ventilation around the chamber must be at least 6" from the rear, and 3'' from both the left and right side.

⚠ **CAUTION**: This chamber is designed for operation in a conditioned laboratory environment. Operation above 30°C (85°F) or below 16°C (60°F) ambient room temperature is NOT recommended.

Operation Safety Notices

⚠ **CAUTION**: The Watlow "EZ-ZONE PM User's Manual" is a general manual and is written for a wide variety of applications and configurations. Not all features or functions are applicable. Only the capabilities of model PM6C1CC-AAAAAAA or PM6R1CC-AAAAAAA, are applicable.

⚠ **CAUTION**: The EZ-ZONE PM Controllers have been properly configured at our factory to match the chamber's system requirements and to perform optimally over a wide range of operating conditions. Improper modifications to these setup values can result in erratic performance and unreliable operation. Do not attempt to modify the setup values, unless you thoroughly understand what you are doing. If there is any doubt, please contact the Folyon Technologies before proceeding.

⚠ **CAUTION**: Avoid touching the sensor assembly inside the chamber.

⚠ **WARNING**: Do NOT put items in the chamber that could burn or explode. This is NOT an explosion-proof chamber.

⚠ **WARNING**: Do NOT put items in the chamber which can emit corrosive vapors or substances.

⚠ **WARNING**: This chamber is NOT a curing oven. There are NO provisions for venting fumes.

⚠ **WARNING**: Always unplug the chamber from the outlet when filling the water reservoir with water. If water is spilled inside the chamber, do not plug in! Allow sufficient time (at least 24 hours) for the water to dry.

Installation Location

The chamber uses only about 120W of power. For optimum operation, the ambient room temperature should be between 85°F (30°C) and 60°F (16°C).

The chamber can be placed on any solid, level table top or work bench. For proper ventilation, allow a clearance of at least 6" from the rear and 3" from the right and the left side of the chamber.

Before powering ON the chamber, make sure there is sufficient water in the water reservoir. Filling the water reservoir is described in the Setup section below.

Moving and Shipping the Chamber

Caution must be observed when the chamber is moved while there is water in the water reservoir. The chamber is equipped with two recesses on each side for gripping. When moving the chamber, make sure the chamber is not tilted in such a way that water spills out. If any spillage occurs, leave the chamber unplugged for at least 24 hours to allow all the spilled water inside the chamber to dry.

Before the chamber is shipped to a different location, all water must be emptied from the water reservoir. The water can be emptied by tilting the chamber and emptying all the water into a bucket, through the filling tube.

Make sure the unplug the chamber before filling or emptying water.

Setup

Before the H300 can be used, it needs to have sufficient water and desiccant for proper operation. The chamber comes from the factory with the desiccant preloaded, but without any water.

Filling the Water Reservoir

Use only distilled water in the water chamber. Do not use tap water or bottled water that is not distilled (e.g. spring water). The impurities (salts) in regular water affect the vapor pressure and will limit the maximum humidity the chamber can reach.

The H300 chamber should be filled with distilled water when no water is visible in the filling tube.

To fill the water reservoir follow the simple procedure below:

- Unplug the H300 from the power source.
- Unscrew the plug at the top of the filling tube (shown below).

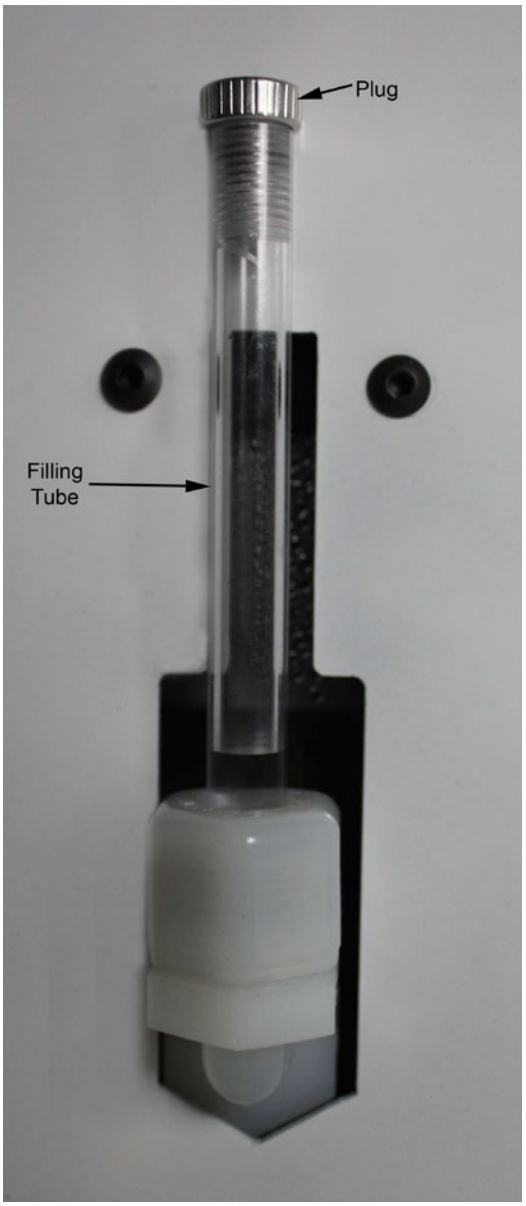

Figure 1: Water Filling Tube

- Using the supplied syringe, fill the water reservoir until there is about ½ to 1inch (1 ¼ cm to 2 ½ cm) of water visible in the filling tube. Replace the filling tube plug.

Desiccant Filling and Replacement

The desiccant is the drying agent of the H300 chamber. The recommended desiccant is the Regular Drierite 8 mesh desiccant.

The H300 comes preloaded with fresh desiccant. When the desiccant is fresh, it is blue. As the desiccant gets used up, it turns red. When the desiccant is all red, it should be replaced.

Always use gloves when handling the desiccant. Avoid inhaling the desiccant dust as it may irritate the lungs.

To replace the desiccant follow the procedure below.

- Turn off and unplug the H300 chamber.
- Remove the desiccant reservoir by gently spreading the holder clamps and pulling the reservoir away from the back of the chamber. As you pull the two connector hoses will extend.
- Pull until the hoses will not extend farther. Do not force the hoses to extend. Do not remove the hoses from the desiccant reservoir. See Figure 2 below.

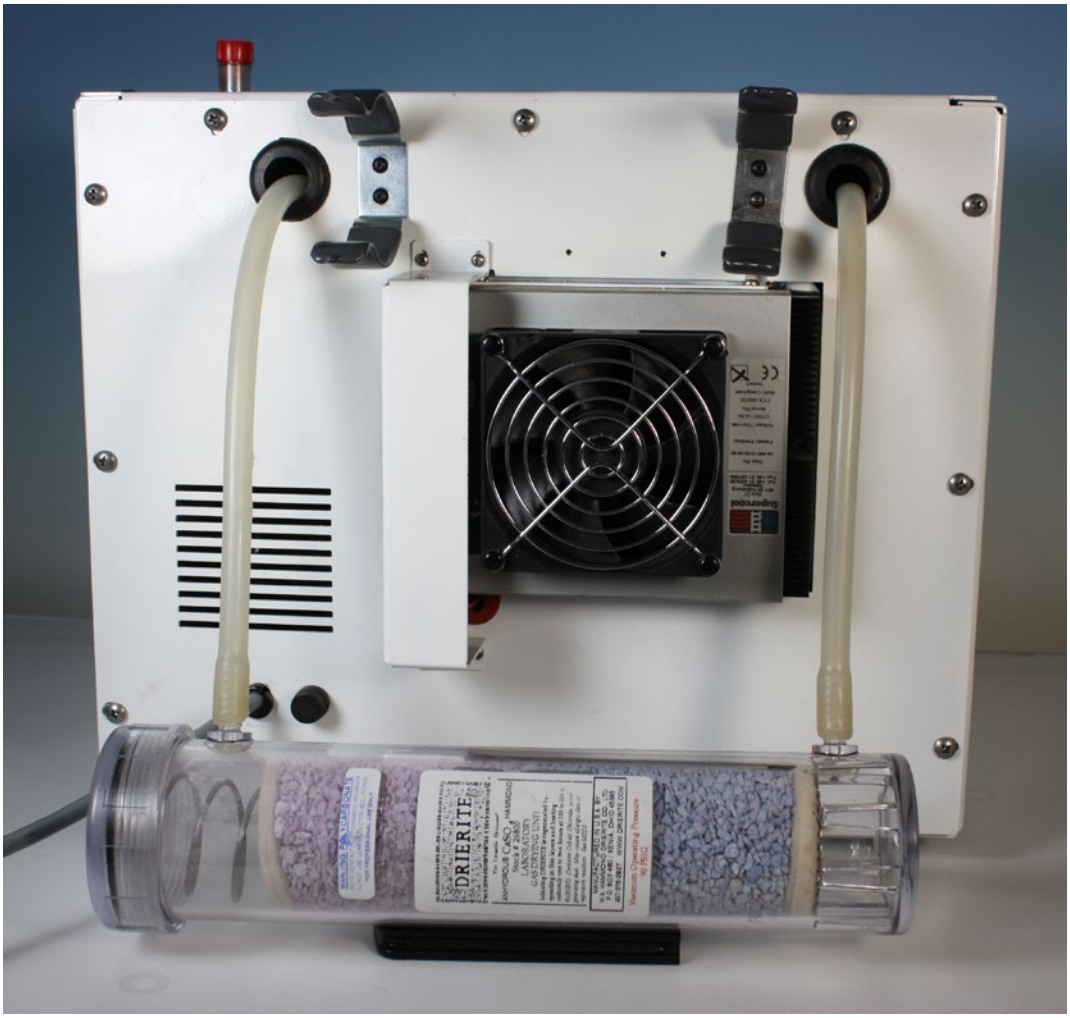

Figure 2: Desiccant Reservoir Pulled From H300

- Unscrew the reservoir plug and remove the spring, dust filter and metal mesh.
- Remove the used up desiccant. The used desiccant can be regenerated by heating it above 395°F (200°C) for one to two hours.
- Fill the reservoir with a fresh desiccant. Do not overfill or underfill.
- Replace the dust filter, followed by the metal mesh, followed by the spring.

- Screw the reservoir plug until tight. The spring should compress when the plug is tight.
- If the spring does not compress, there is not enough desiccant in the reservoir.
- If the spring compressed too much, so that it is excessively difficult to screw the reservoir plug, there is too much desiccant in the reservoir.

Principles of Operation

The H300 temperature humidity chamber controls the humidity by circulating the air inside the chamber through the desiccant to decrease humidity, or through a water vapor chamber to increase humidity.

Air entering the chamber from the desiccant is very close to 0%RH. Air entering the chamber from the vapor chamber is close to 100%RH. A fan inside the chamber mixes the dry or humid air to maintain uniform humidity level throughout the inside of the chamber.

The humidity is controlled by regulating the amount of dry or humid air that enters the chamber.

The temperature inside the chamber is controlled using a solid state Peltier element. The chamber does not contain any refrigerants.

Chamber Control and Operation

Summary of Operation

1. Turn the **CONT** switch OFF.
2. Turn the **POWER** switch ON.
3. Enter the desired setpoints (or profile) on the PM Controller, using the Up or Down keys.
4. Load your test sample in the chamber and close the chamber door.
5. Turn the CONT switch to ON.

Controls

The H300 chamber has three switch button controls:

POWER: Turns the chamber power On and Off.

CONT: Turn the chamber control On and Off.

LIGHT: Turns the LED lights inside the chamber On and Off.

The temperature and humidity set points are adjusted by setting the appropriate controller. Humidity is on the top, Temperature is on the bottom.

The **CONT** switch allows you to turn off both temperature and humidity control to the chamber without changing the target set point of either controller. Both controllers and the chamber will still be On, but no power will be supplied to the temperature and humidity control units inside the chamber. This switch is useful when you need to open the chamber door.

Figure 3: Chamber Controls

Chamber Door

The chamber door needs to be sealed for the chamber to maintain proper humidity and temperature. Tighten the three door nuts until the white rubber gaskets start to compress. Do not overtighten the nuts. It is unnecessary and will decrease the life of the door rubber gaskets.

Humidity Control

The water in the water reservoir inside the H300 is heated by an internal heater. Depending on the amount of water in the reservoir, it may take as much as 30 minutes for the water to reach its target temperature. The H300 chamber can be used before the temperature reaches its target in most cases. However, when trying to achieve high humidity (above 75%RH) at high temperatures (above 90°F, 32°C), you may have to wait for the water in the reservoir to heat up.

Note that the water in the reservoir will warm up whenever the H300 is ON, even if the CONT switch is turned to OFF.

Controlling High Humidity

When the chamber is controlling humidity above 80%RH, there is a limit on how high the humidity inside the chamber can climb. This limit mostly depends on the temperature inside the chamber. Approximate maximum humidity limits vs. chamber temperature are shown in Figure 4.

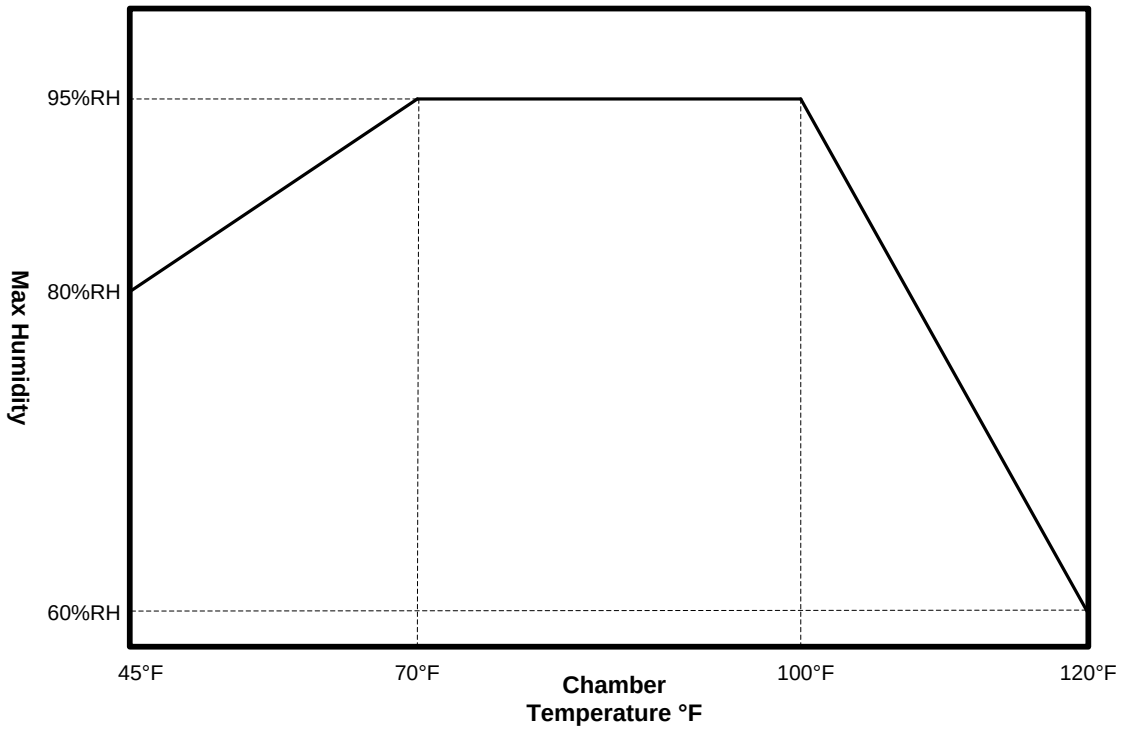

Figure 4: Maximum Chamber Humidity vs. Temperature

When operating the chamber below 70°F, some condensation inside the chamber is possible when the humidity inside the chamber is above 80%RH. As the chamber tries to increase humidity, it pumps warm vapor into the chamber. At the same time, it tries to control the temperature, causing the temperature control fins to cool and fall below the dew point. This causes condensation on the fins. Condensation will not harm the chamber, but will prevent humidity increasing above the limits shown in Figure 4.. Any condensation can be wiped off with a paper towel.

Make sure not to touch the sensor assembly at the top of the chamber when wiping off condensation.

Watlow EZ-ZONE PM Controllers

The H300 unit uses the Watlow EZ-ZONE PM controllers. The controller User's Manual has been provided with the H300 chamber. In general you should not need to reference this manual, unless you are setting up a profile.

Changing Temperature Units

To change the temperature controller units follow the procedure below:

- Press both the Up and down keys for 6 seconds, until the temperature controller show:
  A1
  SEt

  Note that the controller will first show
  A1
  oPEr
  continue to hold the Up and down keys until
  A1
  SEt
  is displayed.

- Press the Up key twice. The controller should show
  9LbL
  SEt

- Press the Advance Key once. The controller will show
  F or C
  C_F C_F

- Change the units using the Up or Down keys.

- Press the Infinity Key twice when done.

Changing the Set Point

To change the target set point, use the Up or Down keys until the desired set point is reached. The controller has a 3 second delay before a new set point becomes active.

Turning Temperature or Humidity Control OFF

To turn control off to both temperature and humidity, use the **CONT** button on the chamber Controls. You can also turn off control to either temperature or humidity individually using the appropriate PM controller, as follows:

- Press the Advance Key once. The controller will show
  AUto
  CM1

- Press the Up or Down keys until the controller shows
  oFF
  CM1

- Press the Infinity Key twice when done.

Setting Up a Profile (PM6R Only)

For instructions on how to set a profile, see the "EZ-ZONE PM User's Manual", Chapter 7: Profiling Page.

Setup Page Parameters

The setup page parameters below have been programmed into the temperature and humidity controllers at the factory. These parameters are for reference only and should not be modified.

Improper modifications to these setup values can result in erratic performance and unreliable operation. Do not attempt to modify the setup values, unless you thoroughly understand what you are doing.

These parameters were saved at the factory under User Settings 1. If these parameters are modified, they can be restored from the Global Setup Page, User Setting Restore (See the "EZ-ZONE PM User's Manual" for details.

A1
SEt

Analog Input Menu

Parameter	Display	Temperature	Humidity
Sensor Type	SEn	r0.1H	rmA
RTD Leads	rtL	2	
Units	Un it		rh
Scale Low	S.Lo		4.0
Scale High	S.h1		20.0
Range Low	r.Lo		0.0
Range High	r.h1		100.0
Process Error Enable	P.EE		oFF
Filter	F iL	0.5	0.5
Input Error Latching	iEr	oFF	oFF
Display Precision	dEC	0.0	0.0
Calibration Offset	iCA	0.0	0.0

Lnr
SEt

Linearization Menu

For the relative humidity controller there are no changes to controller default parameters. For the temperature controller, each H300 chamber is supplied with its own set of Linearization Menu settings. These settings are included in a document on the CD that comes with each chamber.

Pu

SEt **Process Value Menu**

No changes to controller default parameters.

LooP

SEt **Control Loop Menu**

Most of the parameters in the Control Loop Menu are specific to each H300 chamber. Each H300 chamber is supplied with its own set Control Loop Menu settings. These settings are included in a document on the CD that comes with each chamber.

otPt

SEt **Output Menu**

1

otPt ***Output 1***

Parameter	Display	Temperature	Humidity
Output Function	Fn	hEAt	hEAt
Output Control	o.Ct	Ftb	Ftb
Output Time Base	o.tb	1.0	3.0
Output Low Power Scale	o.Lo	0.0	0.0
Output High Power Scale	o.h ı	100	50

2

otPt ***Output 2***

Parameter	Display	Temperature	Humidity
Output Function	Fn	CooL	CooL
Output Control	o.Ct	Ftb	Ftb
Output Time Base	o.tb	1.0	3.0
Output Low Power Scale	o.Lo	0.0	0.0
Output High Power Scale	o.h ı	100	50

ALM

SEt **Alarm Set**

No changes to controller default parameters.

FUn

SEt **Function Key Menu**

No changes to controller default parameters.

9LbL

SEt **Global Menu**

Parameter	Display	Temperature	Humidity
Display Units	C_F	F	
AC Line Frequency	AC.LF	60	60
Zone	2onE	oFF	oFF
Channel	ChAn	on	on

CoM

SEt **Communication Menu**

Parameter	Display	Temperature	Humidity
Standard Bus Address	Ad.S	2	1

Troubleshooting

Symptom	Causes
Chamber does not control temperature and humidity	The CONT switch is in the OFF position.
Humidity does not increases fast enough, or does not increase above 75%RH	1. The water in the water reservoir is too low 2. The water in the water reservoir is too cold. Allow about 30 minutes for the water to warm up to normal operating temperature. 3. The chamber door is not properly sealed 4. The water in the reservoir is not distilled.
Humidity does not decrease fast enough	1. Desiccant is used up (red). Make sure some of the desiccant in the desiccant reservoir is blue. 2. Condensation in the chamber. 3. The chamber door is not properly sealed.

Specifications

Controlled Temperature Range	45°F to 140°F (7°C to 60°C) @ 77°F (25°C) ambient temperature
Minimum Controlled Humidity	5% over the supported temperature range
Maximum Controlled Humidity	95% between 70°F and 100°F (21°C and 38°C). See Figure 4 for full limits.
Humidity Accuracy	+/- 1.2%RH (10%RH to 90%RH)* @ 77°F (25°C), +/-2.5%RH across the operating temperature range.
Humidity Response Time	0.5%RH per second typical
Humidity Stability	+/- 0.1%RH
Chamber Humidity Uniformity	+/- 0.2%RH
Temperature Accuracy	+/-1°F (0.5°C)
Temperature Response Time	6°F (3°C) per minute typical
Temperature Stability	+- 0.1°F (0.1°C), depending on controller unit selection
Chamber Temperature Uniformity	+/- 0.2°F (0.1°C)
Input Power	120V A/C, 50/60Hz, 1A. 120 Watts.
Outside Dimensions	18”D x 15”W x 15”H 46cm D x 38cm W x 38cm H
Inside Workspace Dimensions	6” Diameter by 10” Deep Cylinder: 283 cu in (0.16 cu ft) 15.25 cm Diameter by 25.4cm Deep Cylinder: 4.6 L
Port Openings	3 openings, 1.25” (3.1 cm) diameter each
Weight	30 lb (13.6 Kg), fully loaded with water and desiccant
Desiccant Capacity	1 lb (454 g)
Water Capacity	10 oz (290 ml)

* Calibration certificate against an NIST certified instrument is provided. Accuracy is guaranteed for 12 months.

Folyon Technologies Inc. Limited Warranty

Folyon Technologies Inc. (Folyon) warrants the H300 Chambers (Equipment) manufactured by Folyon and supplied under this contract to be free from defects in materials and workmanship under normal use and proper maintenance.

Folyon will repair or replace any defective part for a period of ONE YEAR from the date of invoice. Folyon reserves the right to require the Equipment be returned, freight prepaid, to Folyon's factory or to inspect any defective part at the Purchaser's site. Folyon shall have sole discretion to determine whether any part is defective and whether any defective part will be repaired or replaced. This limited warranty shall extend to any standard chamber accessory and component part which is normally sold by Folyon. Non-standard accessories and component parts specified by the Purchaser shall be warranted only to the extent of the original manufacturer's warranty, if any exists. Purchaser shall notify Folyon in writing of any alleged defect within 10 days after its discovery within the warranty period.

The following parts are excluded from this limited warranty and are sold as-is or are considered expendable: paint and cosmetic surface finishes and treatments, port plugs, desiccant.

This limited warranty shall extend in full to Equipment installed within continental United States and Canada. For all other locations, Purchaser is responsible for all shipping costs associated with providing warranty service.

This limited warranty does not cover: (1) Defects or damages arising as the result of shipment by common carriers or private transportation, unless Folyon undertakes shipment and transportation of the Equipment to Purchaser's site or contractually assumes the risk of damage to the Equipment in shipment; (2) Defects or damages arising out of, or as the result, of mishandling, modification, or improper start up, installation or maintenance of the Equipment (including start up, installation or maintenance not in accordance with Folyon's written procedures); (3) Defects or damages resulting from, or arising out of, abuse, misuse, neglect, intentional damage, accident, fire, flood, earthquake, or any other act of God.

This warranty as to Equipment is LIMITED to repair or replacement of parts or Equipment in the determination of Folyon Technologies Inc. THE FORGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY. Folyon Technologies Inc. DISCLAIMS ANY LIABILITY FOR ANY DAMAGES RESULTING FROM DELAY OR LOSS OF USE IN SERVICE OR REPAIR, OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE EQUIPMENT, EXCEPT AS STATED IN THIS PARAGRAPH.

This limited warranty cannot be modified in any way except in writing by both Folyon and Purchaser. Invalidation of any one or more of the provisions of this limited warranty shall in no way affect any of the other provisions hereof, which remain in full force and effect.

This limited warranty shall be extended only to the first Purchaser of this Equipment and is not transferable.