Product User Manual

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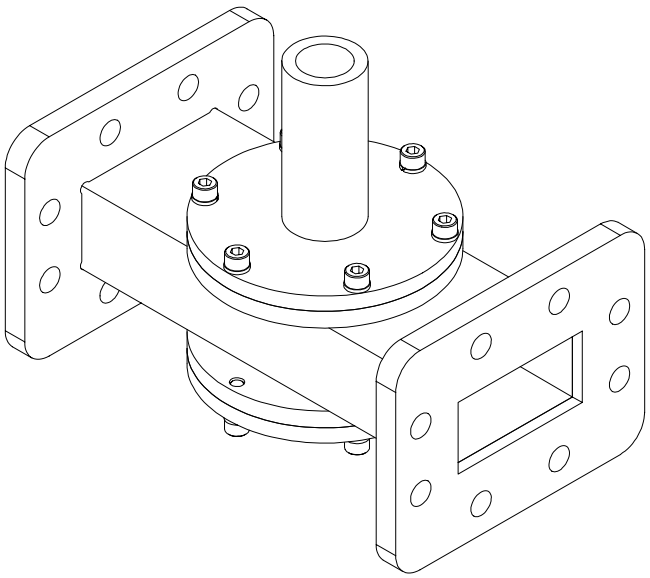
Model GA600x Series
Universal Waveguide Applicator, CPR159



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REVISION HISTORY			
REV.	**DESCRIPTION**	**DATE**	**APPROVAL**
1	PROTOTYPE RELEASE	15JAN04	JFG

WARRANTY

Products manufactured and sold by Gerling Applied Engineering, Inc. ("GAE") are warranted to be free of defects in materials and workmanship under normal use and service for a period of twelve (12) months from the date of original shipment. GAE's obligation under this warranty is limited to repairing or replacing, at GAE's option, all non-consumable component parts. Consumable parts are specifically excluded from this warranty and may include, but are not be limited to, magnetrons, fuses, lamps, seals, o-rings, v-belts, and fluids. All warranty repairs are to be done at GAE's facility or as otherwise authorized by GAE. All shipping charges for warranty repair or replacement are the purchaser's responsibility unless otherwise agreed to by GAE.

This warranty supercedes all other warranties, expressed or implied. No warranty is given covering the product for any particular purpose other than as covered by the applicable product specifications. GAE assumes no liability in any event for incidental or consequential damages, financial losses, penalties or other losses incurred in conjunction with the use of GAE products.

DOCUMENT CONVENTIONS

NOTE: *Means the reader should take note. Notes contain helpful information, suggestions, or references to other sections, chapters, or documents.*

CAUTION: *Means the reader should be careful. You are doing something that might result in equipment damage or loss of data.*

WARNING: *Means danger. A situation exists that could cause bodily injury or death. All personnel must be aware of the hazards involved with high voltage electrical circuitry and high power microwave devices.*

WARNING

All waveguide applicators manufactured by GAE, Inc. are intended for use with other equipment capable of producing a microwave field that is potentially hazardous to operating personnel. They must never be connected or operated in a manner that allows a field in excess of 10 milliwatts per square centimeter to be generated in an area accessible to operating personnel. Contact GAE, Inc. for technical support prior to installation and/or operation of these units if there is any question or concern about microwave leakage.

All waveguide flange and electrical cable connections throughout the system must be secure prior to operation. Never operate the microwave generator without a properly rated absorbing load attached. To ensure safe operation and prevent microwave leakage, the equipment must be periodically inspected and maintained as required or recommended.

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EQUIPMENT DESCRIPTION

GAE has designed the Universal Waveguide Applicator (UWA) as a cost-effective means to fulfill the needs of a wide variety of laboratory heating requirements. The standardized waveguide chamber of the UWA can be used with standard or custom adapters (ordered separately) specially designed for heating specific materials. Typical applications include test tube samples, slabs, rods, fluids and plasmas.

The basic design of the UWA is that of a typical broadwall type waveguide applicator. Microwave energy propagates in the TE_{10} mode which orients the electric field perpendicular to the adapter ports. The e-field varies symmetrically in a sinusoidal manner from a maximum at the center to zero at the side walls. Thus, heating is relatively uniform with respect to sample height but can vary for large widths.

The UWA can be used with a Dummy Load (model GA1221) for traveling wave heating applications or a Sliding Short Circuit (model GA1223) for resonant chamber heating. Depending on the application, typical configurations might also include directional couplers for power measurement (model GA3114 or GA3115) and tuners for impedance matching (model GA1019).

The model GA6005 applicator has a single adapter port on one broad wall, while the GA6006 has two ports on opposite walls. Blank adapters are provided for each port and can be modified by the customer for specific applications. Standard adapters for various applications are also available. Contact GAE for more information on the UWA and standard adapters or design assistance on custom adapters.

General Specifications

Frequency	5.8 GHz +/- 75 MHz
Input Power	3 kW continuous max.
Waveguide	WR159 (RG344/U)
Input Flange	CPR159F (UG1731/U)
Construction	Aluminum
Finish	Chemical conversion coating; textured black paint

INSTALLATION

Preliminary Inspection

Upon arrival at the installation site the GA600x series applicator should be thoroughly inspected for damage or wear caused during shipping. Any visible damage to the packaging material or the applicator itself should be noted and reported immediately to the shipping company in accordance with standard claims procedures.

The following components are included:

a) GA600x series Universal Waveguide Applicator

b) Blank adapter plate (one for GA6005, two for GA6006) with mounting hardware

c) Product User Manual (this document)

Waveguide Configuration

The applicator can be connected to and used with any common waveguide component having a compatible flange (see below). Mounting can be in any convenient position and orientation with either flange positioned towards the microwave generator. Ideally, the applicator should be located as close to the tuner as possible. Figure 1 illustrates a typical waveguide configuration.

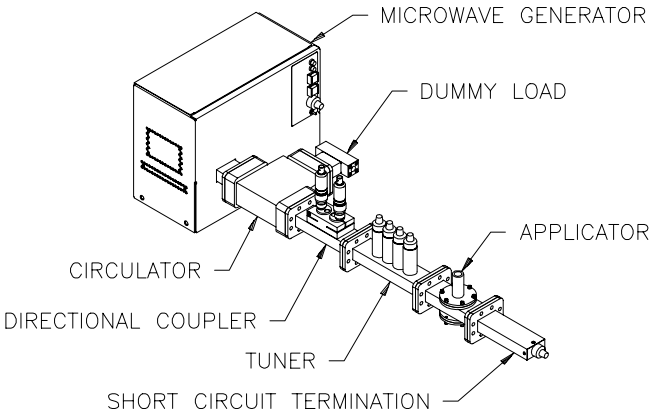

Figure 1. Typical waveguide configuration for process heating.

Flange Connections

Both flanges of the applicator must be properly connected to another waveguide component. Bolts and nuts must be installed at all flange bolt holes on both flanges and tightened securely prior to operation.

Microwave Leakage – Regulatory limits for microwave leakage relate to standards for human safety and interference with other

electronic devices. Standards for human safety as adopted by OSHA, the International Electrotechnical Commission (IEC) and other regulatory agencies limit leakage to 5 mW/cm^2 measured at 5 cm from the leakage source under normal operating conditions, and 10 mW/cm^2 at 5 cm from the source under abnormal operating conditions. The U.S. Federal Communications Commission (FCC) has established regulations limiting the emission of energy at frequencies outside the ISM bands. All GAE waveguide components meets these requirements when properly connected to another waveguide component.

Load Adapter Installation

The model GA600x series Universal Applicator is designed with ports on one or both sides which provide a means to insert a load into the applicator for heating. Blank adapter plates are provided to cover unused ports or for custom modification for special loads.

When installing the cover or load adapter, be sure the spiral gasket is in place inside the groove surrounding the port opening. The absence of or damage to this gasket can allow excessive microwave leakage. Ensure that all mounting screws are in place and tightened securely.

WARNING: *All ports of the Universal Waveguide Applicator must be covered prior to operation of the microwave generator. Failure to adequately cover all ports can result in injury or death due to excessive microwave radiation.*

WARNING: *Custom load adapters must be properly designed to avoid microwave radiation in excess of allowable and safe limits. Improperly designed adapters can cause injury or death due to excessive microwave radiation. Contact GAE for advice on custom adapter design and/or custom design services.*

OPERATION

Basic Operation

Once installed, the GA600x series applicator will operate without any need for operator involvement. No adjustments or settings are available or necessary, except as may be required by the load adapter or other process requirements.

It is advisable to ensure the presence of a suitable process load at all times during operation of the microwave generator. The amount of load material required depends on several factors such as the dielectric properties of the material, power level, heating rate. Consult GAE for advice on the heating of specific loads.

CAUTION: *Care must be taken to avoid operating the microwave generator at power levels exceeding the rating of the applicator. Excessive power levels can cause damage to the process load and/or load adapter.*

MAINTENANCE AND CALIBRATION

The GA600x series Universal Waveguide Applicator is designed to be maintenance free and does not require any user maintenance under normal operating conditions. No calibration is necessary.

However, the spiral gasket supplied with the GA600x Universal Waveguide Applicator may be subject to damage after repeated installations of the adapter. Replacement gaskets, GAE part number 420301-063, may be purchased by contacting GAE directly.

Although the GA600x series applicators are very rugged and stable devices, they can be subject to damage due to excessive power levels or mishandling. If damage occurs, the applicator should be returned to GAE for repair. Contact GAE for information on repair services.

