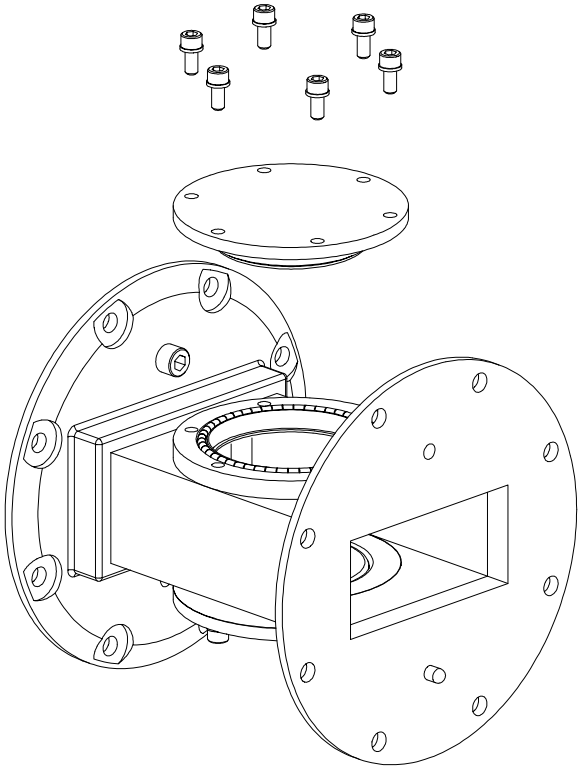
Product User Manual

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Model GA6001/GA6002
Universal Waveguide Applicator, WR284



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REVISION HISTORY			
REV.	**DESCRIPTION**	**DATE**	**APPROVAL**
2	ADDED ADAPTER DETAILS	03FEB05	JFG

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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.*

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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 GA600x series 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 (such as GAE model GA1204) for traveling wave heating applications or a sliding short circuit (such as GAE model GA1205) for resonant chamber heating. Depending on the application, typical configurations might also include directional couplers for power measurement (such as GAE model GA3103 or GA3104) and tuners for impedance matching (such as GAE model GA1009).

Applicator models are available with either a single adapter port on one broad wall or two ports on opposite broad 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.

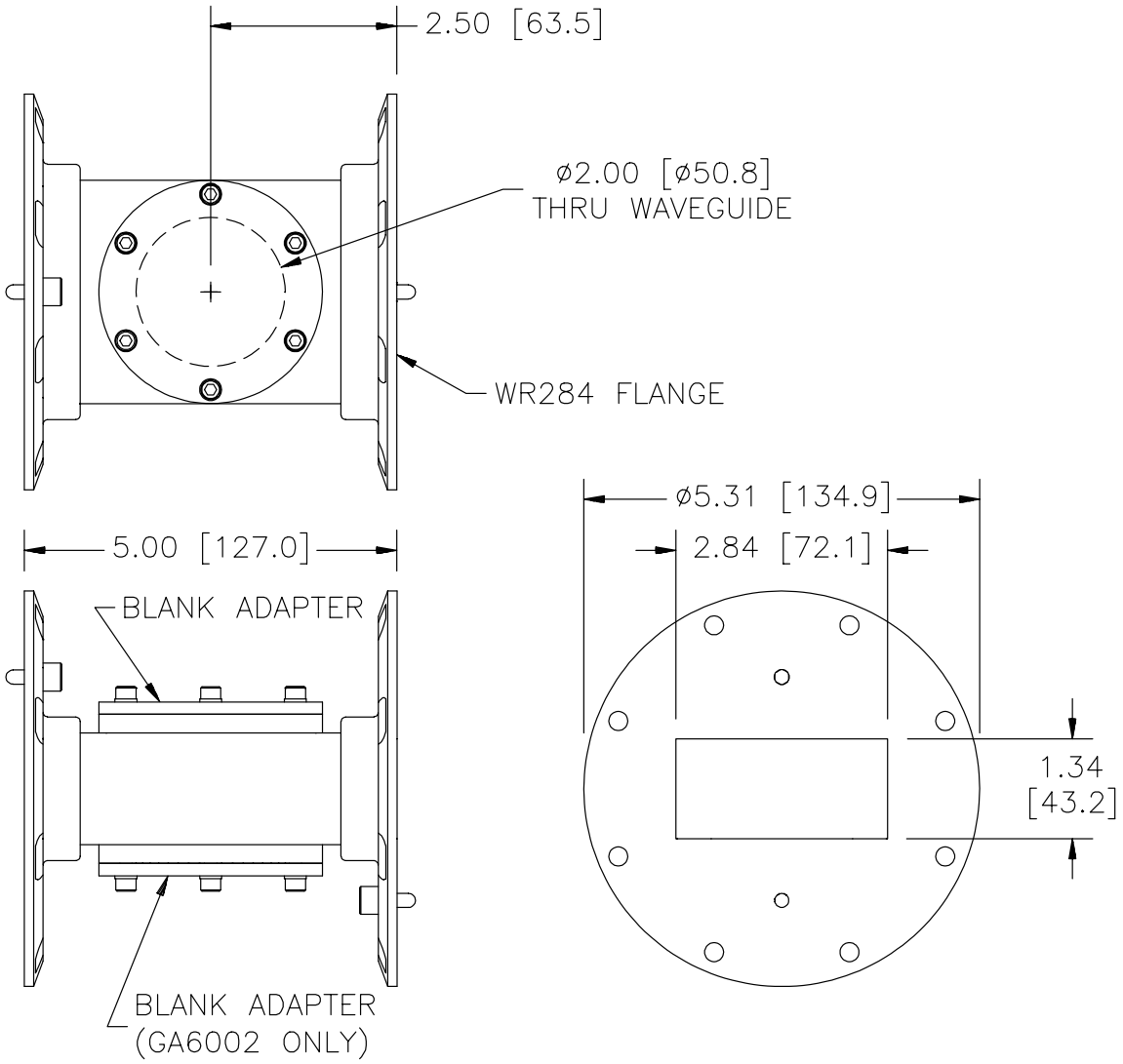
Models GA6001 and GA6002 feature the popular WR284 Q-D (quick-disconnect) round flange that uses the convenient single screw clamp (GAE model GA8401) for waveguide connections.

General Specifications

Frequency	2450 MHz nominal
Power	3 kW
\Waveguide	WR284
Flanges	UG584/U
Construction	Dip brazed aluminum waveguide
Finish	Clear chemical film, black paint

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Outline Drawing



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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 GA6001, two for GA6002) with mounting hardware

c) Product User Manual

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.

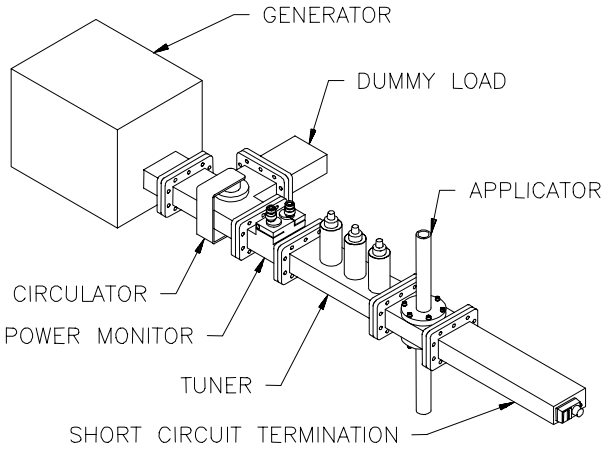


Figure 1 – Typical waveguide configuration for process heating.

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 prior to operation. Models GA6001 and GA6002 are available with flanges designed for used with the GA8401 Quick-Release clamp when connected to another similarly designed flange. These flanges can also be connected to

any other standard WR284 round flange (UG-584/U) using suitable fastener hardware.

Flange Alignment Pins

Each waveguide flange connection that uses a quick-release clamp requires two alignment pins for proper alignment of the adjacent waveguide sections. All GAE waveguide components include one alignment pin for each flange designed for use with quick-release clamps. Alignment pins can be installed into either of two threaded holes centered above and below the waveguide broadwalls. For obvious reasons, the pins must not be installed such that they are opposite each other on mating flanges.



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 Adapters

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.*

Custom load adapters can be designed for heating specific types of materials. The blank adapters provided with the system can be modified by the customer, or new adapters can manufactured. Figure 2 is a fabrication drawing of the blank adapter showing the

important design details of its mounting interface. Any new adapter must have the same design features.

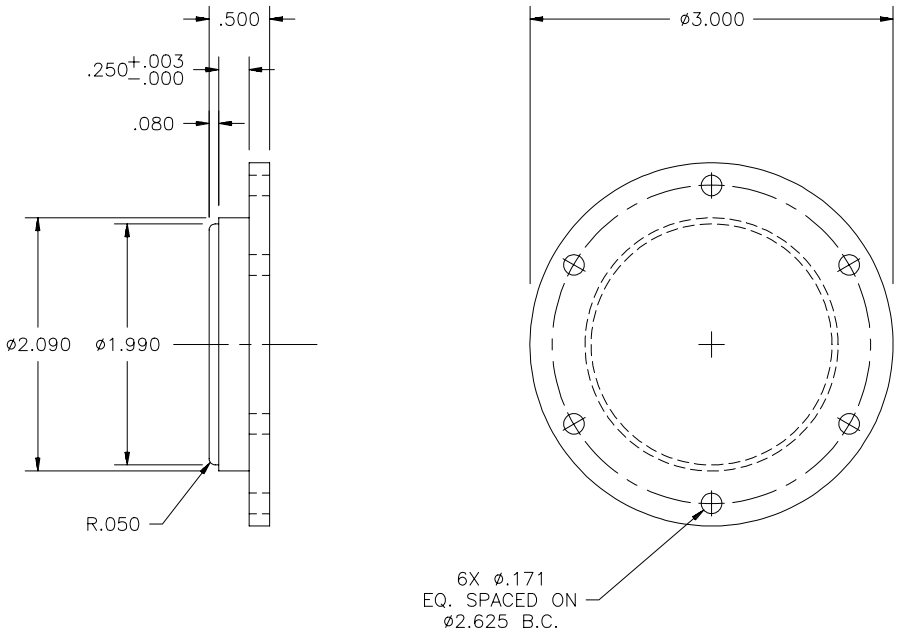


Figure 2 – Fabrication details of the blank load adapter for WR284 applicators.

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.*

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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.

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.

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