

Abstract

The EG2001 automatic probing station can be found in many test labs throughout the semiconductor industry. While not designed for small geometry probing, the EG2001 can be used to verify production test failures and gather statistical data on larger DUTs. These applications, however, can sometimes require higher temperature ranges and lower leakage current levels than can normally be realized on standard EG2001 thermal chucks.



Figure 1 - The EG2001 probe station

In response to customer demand, Micromanipulator has developed an integration with our high performance model H1000 Thermal Chuck System for the EG2001 prober. By integrating the H1000 thermal chuck, the following advantages can be realized:

- Operation up to 400 degrees C.
- Rapid heating and cooling provided by cast-in elements.
- Long-term reliability of resistive heating elements over foil heaters.
- Kinematic mounting method which minimizes chuck surface expansion into the probes.
- Thermal systems with no noise generating Peltier cooling elements.
- Available guarded and fully triaxial thermal chuck systems for low chuck leakage.

Product summary

The addition of an H1000 Thermal Chuck System to an EG2001 prober requires the following:

A. Choose the correct integration kit for the prober:

- **SPP9812001:** EG2001 6" (150mm) system Integration for H1000 Thermal Chuck.
- **SPP9807010:** EG2001 8" (200mm) system Integration for H1000 Thermal Chuck.

B. Order a heavy duty Z stage

if required which supports heavier than standard objects (i.e., chucks like the H1000) use part number SPP9809010. This is required only if the station to be modified does not have either an EG PZ250 stage or a Probe Specialists PZSL stage.

C. Choose the H1000 thermal chuck desired. Options for the H1000 system include:

- AC or DC controllers.
- Cooling to ambient only or cooling to 0 degrees controllers.
- Coaxial, Advanced Coaxial (guarded), or full Triaxial Chucks (6 or 8"; 150-200mm) to match system).

Notes: The question has been raised as to how many "versions" of the EG200X exist. The answer to this is there are several, but the versions are

determined by software. For the most part, hardware has remained consistent, and the only consideration for this integration would be the "Z stage" model – see the Integration section of this guide for more information on Z stage versions.

Background information

Figure 1 shows the standard EG probe station. The terminology used by Electroglas when referencing parts of the 200X are different from the terminology used by Micromanipulator. The list below reviews the terminology used by EG, and relates those terms to the terminology employed by Micromanipulator.

Ring Carrier – Typically referred to as the platen by Micromanipulator. Electroglas refers to the ring carrier as the element that supports individual manipulators, probe cards, and their microscopes.

Ring Carrier Post – The ring carrier post supports the ring carrier in three locations. These are adjustable in height. Standard length is approximately 5" (127mm).

Forcer – This is referred to by Micromanipulator as the XY stage. On the EG prober, the forcer holds the chuck, "Z stage", and various drive electronics.



1555 Forrest Way
Carson City, NV 89706
info@micromanipulator.com
www.micromanipulator.com

Tel: 775-882-2400
Tel: 800-654-5659
Fax: 775-882-7694
Made in the USA

Platen – This is the “stage” that the forcer rests on. It contains the grid used by EG to position the stage in the XY directions.

PZ250 – A ‘Z’ stage drive motor, manufactured by Electroglas to facilitate heavier than standard objects on the standard EG2001 drive motor (i.e., chucks like the H1000).

PZSL – A ‘Z’ stage drive motor, manufactured by Probe Specialists to facilitate heavier than standard objects on the standard EG2001 drive motor (i.e., chucks like the H1000).

The Integration

The H1000 integration is field installable, but does require some field modification to the EG200X probe station. The H1000 integration includes the following.

A. Ring carrier posts modification.

It is necessary, in order to complete the integration of the H1000 to the EG2001 probe station, to change the standard ring carrier post out to a longer version. This requires changing out all three of the standard ring carrier posts. Figures 2 and 3 show two of the three ring carrier posts. New ring carrier posts are installed that have extended travel to allow clearance of the thicker H1000 chuck under the system ring carrier. These extended travel ring carrier posts are included in the integration kit.

B. Replacement of Electroglas “Z stage”

It may be necessary to replace the Electroglas 2001 Z stage with a Heavy Duty Z-stage.



Figure 2 – Left rear ring carrier post



Figure 3 – Front ring carrier post



Figure 4 – The EG forcer



Figure 5 – Bottom of forcer

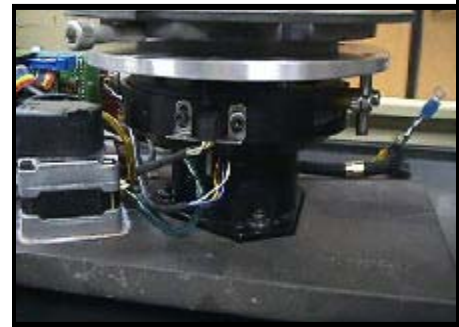


Figure 6 – PZSL Z stage and motor encoder

Whether or not the Z stage has to be replaced depends solely on the Z stage currently on the station. There are three possibilities:

1. Neither – The station does not have a heavy-duty Z-stage. One will need to be purchased to complete the integration. See Product Summary above.
2. PZSL – No modification will be required to mount the H1000.
3. PZ250 – No modification will be required to mount the H1000.

Replacement of the existing stage is illustrated by the following figures which show the “forcer” that holds not only the EG chuck, but also the Z stage drive mechanism, Z stage motor encoder, and the pulley set that exists between the encoder and the Z stage drive.

Figure 4 shows the forcer (lifted up from the platen surface and placed on the platen at a 90 degree angle). Figure 5 shows the bottom of the forcer, illustrating the pulley set between the motor encoder and Z stage. This pulley set determines the ratio between the motor encoder and the Z stage, and is the reason why a heavy-duty Z stage and motor encoder is needed.

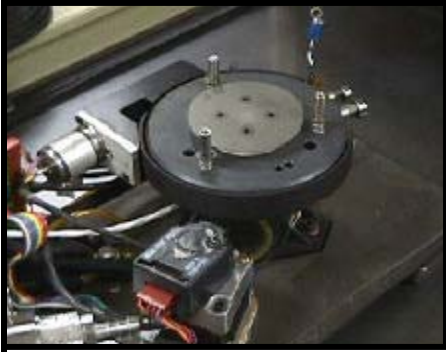


Figure 7 –
The heavy-duty
PZSL stage



Figure 8 –
EG to H1000
chuck adapter

Figure 6 shows a close up view of the heavy-duty PZSL stage and the motor encoder. The EG Z stage, and motor encoder must be replaced with a heavy-duty unit to continue the integration.

C. Installation of H1000 to EG2001X Integration Kit

The next sequence of pictures shows the components that are used to mount the H1000 chuck on the EG system. Everything mounts on the EG prober with a minimum amount of hardware. The design of the integration kit allows field installation of the H1000 thermal chuck to the EG2001X. No drilling will be required in order to mount to the prober.

The H1000 integration to the EG systems starts with the Z stage (i.e., PZSL or PZ250), as shown in fig. 7. Notice the three posts that are sticking out from the top of the Z stage, and two silver switch posts on the right side of the stage.

Figure 7 shows the heavy-duty PZSL stage and Figure 8 shows the next piece of the integration.

This plate is called the H1000 chuck adapter. Notice it resembles the standard chuck post of an 8000, 6000, or 6500 series probe station.

The chuck adapter has a guide pin that slips into the two silver switch posts seen in fig. 7. The remaining three posts can be seen coming through the surface of the chuck adapter. Figure 9 shows this from a side view.

Figure 10 shows a side view of the chuck adapter and how the chuck mounts. Mounting the chuck to the EG prober requires a minimal amount of time and tools.

Once the chuck is mounted to the Z stage, the interconnect hoses, and cable bundles are attached. Figure 11 shows the entire cable and hose assembly mounted to the EG prober.

The hose and cable bundle shown in fig. 11 is a one piece assembly. It mounts to the base of the EG prober using holes that already exist in the frame of the EG.

The one piece hose and cable assembly is also mounted to the EG forcer as shown in fig. 12.



Figure 9 –
Side view of EG
to H1000 adapter



Figure 10 –
Mounted chuck
adapter



Figure 11 –
Mounted hose
assembly

Figure 12 shows the attachment of the hose and cable assembly to the forcer being accomplished using “clips” that push up under the forcer. The “clip” can be seen directly under the quick connect in fig. 12.

Figures 13 and 14 show the hose connection plate. This would typically exist in the back of a Micromanipulator 8000 series probe station that has self-contained plumbing. It is installed by simply lifting the left rear corner of the EG2001 probe station and sliding the connector plate assembly under the probe station. Then, the assembly is clamped down to the EG2001 base plate.

In addition to hooking up the thermal chuck and cooling options during the integration, all of the ground connections are routed to a single point ground. A vacuum “T” is also installed which ties the standard H1000 vacuum connection and the vacuum sense line of the EG probe station together.

Figure 15 shows the complete kit mounted on an EG prober that has the ring carrier removed.

Adjustment of prober stage speed

To have full functionality with the H1000 installed on an EG2001 probe station, the prober stage X-Y velocity must be limited to a maximum of 2000 mps. This limit of velocity is needed due to the additional weight of the H1000 thermal chuck system. If the EG stage moves too fast, there is not enough force to hold the forcer in place when the H1000 is installed. We recommend a working velocity of 1500 mps as optimal, because it provides a high torque value. This velocity reduction is typically not a detriment to the performance of the system.

Figure 12 – Hose assembly mounted to forcer

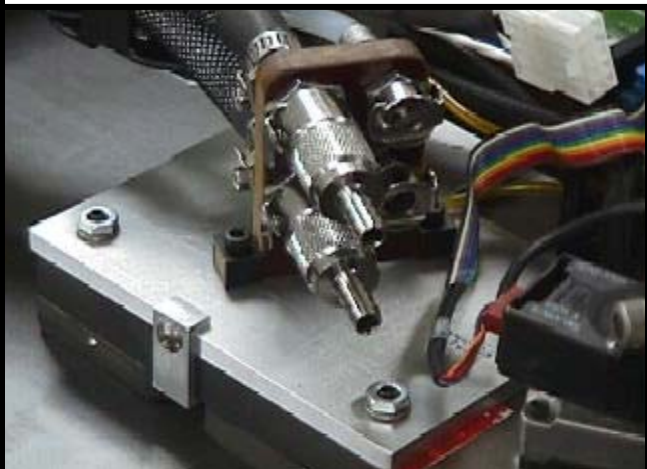


Figure 13 – Hose connection plate



Figure 14 – Rear of hose connection plate

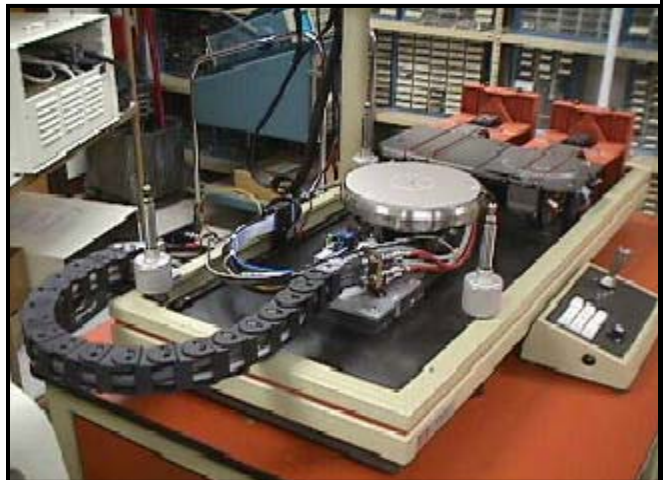


Figure 15– Kit installed on EG2001X