

# Operating Instructions

## EVG620 Aligner

The tool uses 5” masks only. It can align to small pieces and up to a 4” wafer.

### Using the Tool for Top Side Alignment

1. Insure that the lamp is glowing by checking for illumination at porthole on the right side of the lamp housing.  
**NOTE:** If the lamp is not illuminated, contact CSSER staff.
2. Fill out the logbook with all necessary information. Failure to complete logbook will result in a written warning.
3. If computer in not on, continue thru steps 4 and 5. If computer is on, skip to step 6.
4. Turn on power at the **POWER** key switch on the upper right of the console of aligner. Now push the power button in on the CPU. The computer and Windows will boot up automatically. You should see “Starting Windows” scrolling across the bottom of the monitor.
5. Double-click on the EVG620 software icon.  
Be patient. It takes about 30 seconds to boot up.
6. Locate the keyboard behind the front panel of the EVG620.
7. On the top left of the computer screen, the Login menu should be active.  
**Login using:**
  - a) “Your personal User ID and Password”.
  - b) If you are training, CSSER Staff will provide you with a User ID/PW for login.
8. The tool will begin to initialize. About half way through initialization, it should say: “Move tray out to continue.”
  - a) Gently move the sample tray out. The tool will continue to initialize. When initialization is complete, the tool will report “Initialization okay.”

**NOTE:** The pull-down menus at the top of the computer screen should now be active.

9. You will have the choice to either open a recipe or create a new one.  
Under the “File” menu, pick a recipe by either:
  - a) Selecting “Open” or
  - b) Selecting “New” (for “New” recipes, you will be instructed to save and name your recipe).

**NOTE:** Refer to the Recipe Creation section of the Operating Instructions for details on which parameters are available.

10. Once a recipe has been selected and verified, press the “Run” button located in the lower left portion of the recipe screen.

**NOTE:** The optics should now become active and should produce an image. From this point on, the tool will give you instructions on how to proceed. **It is very important to follow all tool instructions.**

**11. Tool will instruct: “Begin of Process – Press “<Continue> or <Exit>”**

a) Press “<Continue>”

**12. Tool will instruct: “Insert Maskholder And Press <Continue>”**

a) Verify that the mask holder is installed by verifying the inscription on the frame: “↑ MASKHOLDER 5” ↑”. This mask holder should always be installed in the tool.

b) Press “<Continue>”

**13. Tool will instruct: “Insert Chuck, Connect Vacuum and Press <Continue>”.**

a) Decide which Chuck you will need to use. Place either the 2” Glass Chuck or 4” Wafer Chuck on stage.

b) Connect the vacuum hose to the chuck.

c) Press “<Continue>”

**14. Tool will instruct: “Insert Loadframe And Press <Continue>”.**

a) Place the load frame on the tray. The identifying sticker should read: “Loadingframe 5” BM620036A #11”.

b) Press “<Continue>”

**15. Tool will instruct: “Insert Mask And Press <Continue>”.**

a) Place a 5” mask between the three white plastic pins (chrome/mirror side up).

b) Press “<Continue>”

c) Gently “Move Tray In”; there should be **NO** resistance to pushing it in.

**16. Tool will instruct: “Move Stage to Center Position and Press <Continue>”**

a) Reset all three Micrometers to zero.

There is a long hash mark at 5 representing the zero position. Insure the zero mark is at the top of the number scale.

b) Press “<Continue>”

The tool will perform the Wedge Error Compensation (WEC).

The optics will move over the mask.

**17. Tool will instruct: “Adjust Mask And Press <Continue>”**

a) Adjust the focus by turning the upper portion of the joystick clockwise (to increase the number) or counter clockwise (to decrease the number).

**The focus should be approximately “Left side 1.8” and “Right side 2.3”.**

b) Use the joystick and micrometers to align the mask side-to-side. Refer to the Hardware Operation for more details.

c) Once the mask is aligned, press “<Continue>” The mask holder will come down and place a vacuum to the mask and onto the frame lifting it from the stage.

d) **IF NO ALIGNMENT NECESSARY, PRESS CONTINUE.**

**18. Tool will instruct: “Move Tray Out”**

a) Gently pull the tray out; there should be **NO** resistance to pulling the tray out.

**19. Tool will instruct: “Remove Load Frame And Press <Continue>”**

- a) Remove the load frame and store it in a slot above the optics station.
- b) Press “<Continue>”

**20. Tool will instruct: “Insert Substrate for WEC And Press <Continue>”**

- a) Place sample onto the chuck. Position the sample so that it will align with the loaded mask as closely as possible. **For 4” wafers**, the three white pins should hold the wafer in the correct position. The wafer should seat flush against all three pins for proper loading position.
- b) Press “<Continue>”; vacuum will now hold the sample in place.

**21. Tool will instruct: “Move Tray In”**

- a) Gently push the tray in; there should be NO resistance to pushing it in. The tool will perform the Wedge Error Compensation (WEC). The optics will move over the mask

**22. Tool will instruct: “Adjust Substrate And Press <Continue>”**

- a) Adjust the focus by turning the upper portion of the joystick clockwise (to increase the number) or counter clockwise (to decrease the number).  
**The focus should be around “Left side 3.2” and “Right side 3.7”.**
- b) Use the joystick and micrometers to align the sample to the mask. Refer to the Hardware Operation for more details.
- c) Verify alignment by using the **con/sep** button.
- d) Confirm correct alignment by bringing sample into contact if a contact mode has been selected in the recipe.
- e) Press “<Continue>” This will bring the lamp housing over the sample and will perform the exposure.

**23. After exposure, tool will instruct; “Move Tray Out”.**

- a) Gently pull the tray out; there should be **NO** resistance to pulling the tray out.

**24. Tool will instruct: “Remove Substrate and Press <Continue>”**

- a) Press “<Continue>”

**25. Tool will instruct: “End of Process – Press “<Continue> or <Exit>”**

Pressing “<Exit>” will start the sequence for unloading the mask  
Pressing “<Continue>” will allow you to load another sample.

**To continue processing other samples:**

**1. Press “<Continue>”**

- a) Remove substrate from the chuck.

**2. Tool will instruct: “Insert Substrate And Press <Continue>”**

- a) Refer to above instructions for adjusting a substrate.
- b) Repeat sequence as needed until all samples are complete.
- c) Once all samples are processed, follow the instructions for unloading the mask and exiting the system.

**To end the process and unload the mask:**

**1. Press “<Exit>”**

2. Tool will instruct: **“Insert Load Frame And Press <Continue>”**
  - a) Place the “Load Frame” on the tray. The identifying sticker should read: “Loadingframe 5” BM620036A #11”.
  - b) Gently push the tray in; there should be NO resistance to pushing it in.
3. Tool will instruct: **“Move Stage to Center Position and Press <Continue>”**
  - a) Reset all three Micrometers to zero.  
There is a long hash mark at 5 representing the zero position. Insure the zero mark is at the top of the number scale.
  - b) Press “<Continue>”  
The stage will move down and release the mask to the load frame. The optics will retract away from the stage.
4. Tool will instruct: **“Move Tray Out”**
  - a) Gently pull the tray out; there should be NO resistance to pulling the tray out.
5. Tool will report: **“End of Process – Press <Continue> or <Exit>”**
  - a) Press “<Exit>”
6. Remove the mask from the load frame.
7. Remove the load frame from the tray and store properly in a slot above the optics station.
8. Close the recipe. Decide whether to save the changes or not and select a response accordingly.
9. **“Park Tray”!** From the menu at the top of the screen, pull down “Machine” and select “Park Tray.”
10. Tool will instruct: **“Press <Continue>To Park Tray”.**
  - a) Select “<Continue>”
11. Tool will instruct: **“Move tray in”**
  - a) Gently push the tray in; there should be NO resistance to pushing it in.
12. **“Logout”!** From the menu at the top of the screen, select “Logout”
13. If you are shutting down the computer and software, close the EVG620 software. Then, from “Start” menu at bottom left of computer, select “Shut Down” to shut down computer.
14. Wait until “No Signal” appears on screen then you can turn off power at the key switch on the upper right of the console of aligner.
15. Complete the logbook with all remaining information. Failure to complete logbook will result in a written warning.

**NOTE: DO NOT TURN “RED POWER KEY”!!! FOR EMERGENCY USE ONLY!!! This will shut off lamp and the tool will be down!**

## Recipe Creation

There are several variables that can be selected in the recipes. There are also some parameters that are not available or tested on this tool.

When creating a new recipe, select "New" under the "File" menu. The program is now ready to run and process parameters can be selected.

### **General**

Maskholder Size (inch)	Should be set to 5".
Mask Thickness (mm)	Standard thickness is 2.3mm
Substrate Size (inch)	Give an estimate for the diameter of the sample.
Substrate Thickness (mm)	Give an estimate for the thickness of the sample. Standard thickness is 0.5mm.
Separation ( $\mu\text{m}$ )	This is the distance between sample and mask after Wedge Error Compensation (WEC). Increase the value for thicker resists such as SU-8. Suggested value for AZ photoresists is 30 $\mu\text{m}$ . For SU-8, 150 $\mu\text{m}$ can be used.
Process	Top Side
Process Mode	When using Top Side, only Transparent is available.
Exposure Mode	Constant Energy gives a set output in units of $\text{mJ}/\text{cm}^2$ . Other modes are available, but have not been used in CSSER. The desired output needs to be entered in the "Dose" section of the recipe.
Contact Mode	Proximity, Soft, Hard and Vacuum contact are available.
Mask ID	Customer dependent and optional.
Proximity	Select : " <b>Off</b> " (This DEFAULT is for nano imprint only). Not turning this " <b>OFF</b> " will result in your mask sticking to your wafer during alignment.
Stop After Contact	Check box if using vacuum contact or need 2nd verification on alignment.

### Contact Force

These parameters are editable for experienced users only.

Contact Force WEC (mbar):	The force exerted during WEC. Allowable values are 100-800.
Contact Force EXP (mbar):	The force exerted during exposure. Allowable values are 500-1200.

## **Hardware Operation**

### **Joystick**

The joystick serves two purposes. It moves the optics in the x-direction and the y-direction. It also focuses up and down by twisting the head of the joystick.

- Typical z-values for mask focus are 350-400.
- Typical z-values for substrate focus are 500-600.
- The optics move together in the y-direction but operate independently in the x-direction.

### **Number Pad**

On the black number pad next to the joystick, the “L” and “R” buttons toggle between the left and right optics.

### **Continue Button**

Executes the next process step.

### **Enter Button**

Confirms data input.

### **Micrometers**

Adjusts mask in theta direction during mask alignment. Adjusts substrate/sample in x, y, and theta directions during substrate alignment. Before mask load, sample load, and mask unload, the micrometers should all be reset to zero.

### **Sep/Con Button**

When the LED is ON, the wafer and mask ARE NOT in contact.  
When the LED is OFF, the wafer and mask ARE in contact.

### **Trackball**

This is used for PC control.

## **Load Frames and Sample Chucks**

The load frames and sample chucks are stored in slots above the optics station. There are only 5" mask frames available but two different types of sample chucks. Below is a brief description for each.

### **Maskholder**

- Identifying inscription reads: "↑ MASKHOLDER 5" ↑".
- This should be always installed in the tool.

### **Loadframe**

- Identifying sticker reads: "Loadingframe 5" BM620036A #11".
- Used for loading 5" masks into tool.

### **4" Chuck**

- Identifying sticker reads: "Wafer chuck 4" man. BM620044A #150".
- Used for samples that are greater than a ½ of a 4" wafer to a full-size 4" wafer.

### **2" Chuck**

- Identifying sticker reads: "Glass Chuck 2" C46200230 #161".
- Used for samples that are smaller than a ¼ of a 4" wafer to samples that are approximately 2cm square.

### **Deciding between using the 4" chuck and 2" chuck:**

The 2" chuck is typically used when the sample is small enough to place on top of the pedestal without overlapping the glass. If a sample overhangs the pedestal, there may be excessive pressure during WEC and exposure such that the sample breaks. Also, there may be reduced pressure in the areas overhanging the glass such that poor images are made. It is an engineering judgment decision as to which chuck to use for samples less than ½ of a 4" wafer but larger than the glass pedestal.