

Specialty Coating Systems

Meniscus Cavex Coater
S/N 99407

Operations Manual

Electrical Schematic DN01365
Pneumatic Schematic DN01362
Panel Layout DN01396

Specialty Coating Systems
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Section 2: Installation

The Cavex Coater is self contained. It requires no assembly. Unpacking the unit and removing banding that holds the Pallet and Applicator Carriages is all that is required.

To get the Coater up and running, it must be positioned in the Facility where desired, and then leveled. There are leveling feet under the 4 corners of the unit. The leveling reference is the Pallet Vacuum Chuck surface.

220 VAC 1 Phase 10 Amp power is required. The unit is supplied with a cord and a plug.

Air or Nitrogen at 3.2 SCFM and 87 PSI is required to operate the Pneumatic Vacuum Pump that holds the Substrates to the Vacuum Chuck. The Coater provides a valve to turn on and off the Chuck, but a separate air disconnect or shutoff is to be provided by the Customer remote from the machine.

Section 3: Operation

The Cavex is designed to apply very thin films to user substrates. It does this with a meniscus, formed at the fluid interface between the fluid coming out of the porous tube and the lower surface of the substrate.

There are 2 Applicators on the Applicator Carriage. The Applicator Carriage is the lower plate, riding on linear bearings, to which are mounted the Applicators.

The Pallet holds the substrates. The Pallet is the top plate and carriage, which runs from one end of the machine to the other during operation. The Pallet has a vacuum pump operated by air flow. The Pallet is "up" to load the substrates. Then the vacuum is turned on before flipping the substrate over. This positions the substrate so that the Porous Tubes can pass very near to the substrate during the coating pass.

Getting Ready to Coat

This section describes setup procedures that are normally not required for coating operation. If the Cavex is known to be setup correctly, this section may be bypassed for the Normal Coating Sequence of Operations that follows.

This section is abbreviated compared to the Normal Sequence, and is written for those most familiar with the Cavex. It is recommended that the Normal Sequence section be read before performing any operations in this section.

The Cavex relies on the close spacing between the Porous Tube and the Substrate to establish and hold the meniscus. This spacing is adjusted by the COATING HEIGHT variable.

The applicators are raised into position by the stepper motors. The stepper motors are capable of extreme accuracy, but are referenced from a home switch. The homing accuracy of the stepper system is not as good as the repeatability of the system. Homing repeatability will be better than .005".

If the home switch is replaced or moved, the home reference point will change. This will require changing the COAT HEIGHT variables to compensate.

The COAT HEIGHT variable can be determined by calculation or by trial. To verify COAT HEIGHT, the SETUP routine allows testing of COAT HEIGHT and PULLBACK DISTANCE.

Sequence for Setup COATING HEIGHT and PULLBACK variables

- Step 1: Load and invert a substrate.
- Step 2: Power on the Cavex. Set first PULLBACK and then COATING HEIGHT to 0 for the selected Applicator.
- Step 3: Push CYCLE START.
- Step 4: Hit EMO when the PALLET is over the Applicator.
- Step 5: Wait 10 seconds. Twist out the EMO to again power on the CAVEX.

- Step 6: Select SETUP.
- Step 7: Set COATING HEIGHT to the desired value.
- Step 8: Select Go to COATING HEIGHT. This will home, and then raise the Applicator to COATING HEIGHT. Use caution to avoid wrecking the Applicator.
- Step 9: Progressively increase COATING HEIGHT until the desired separation is reached.
- Step 10: Enter and test the desired PULLBACK DISTANCE in the same fashion.
- Step 11: Exit SETUP. Save the variables.
- Now the Cavex will run the desired profile when CYCLE START is pressed.

Normal Coating Cycle Sequence of Operations

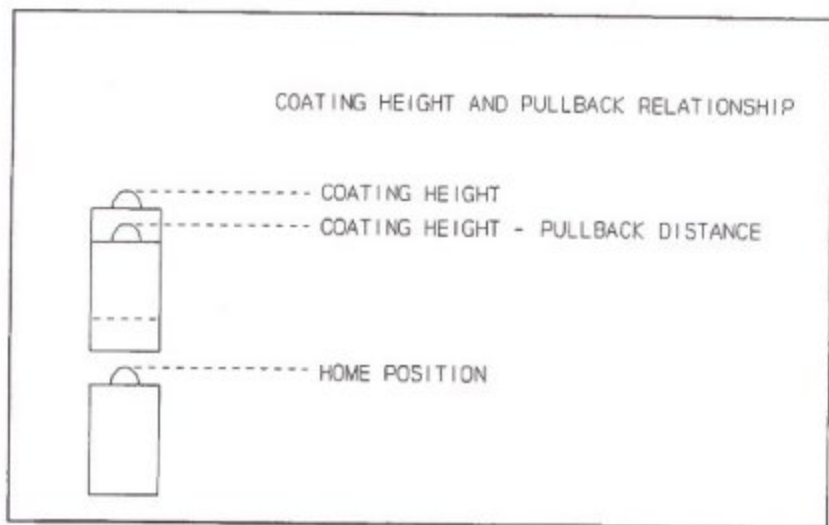
Step 1: Remove the selected Applicator Lid. Fill the applicator with the coating fluid. Clean up any spillage. See Section 4, Maintenance, for more detailed information.

WARNING: DO NOT FILL OR CLEAN UP SPILLS WITH POWER ON. If the fluid is conductive, possible shock hazards may result.

CAUTION: Do not run an applicator with the the lid on or it will contact the substrate.

- Step 2: Turn on the main disconnect switch
- Step 3: Push "POWER ON". The switch will light after internal checks. After a few seconds, the Display will say "SETUP OR CYCLE"
- Step 4: Turn on the Material Pump. Allow the Porous Tube to fill with material and any bubbles to dissipate.
- Step 5: Make sure the Pallet vacuum chuck is level, with the chuck facing "up", ready for loading. There is a lock pin that prevents the chuck from rotating. Pull back this pin to free the chuck for rotation. Place the substrate on the chuck. Align the substrate as required.
- Step 6: Turn on the Vacuum Valve. The substrate will be locked to the Pallet.
- Step 7: Pull the Lock Pin and rotate the Pallet (and substrate) to present the Substrate to the Porous Tubes. Make sure the Lock Pin is reengaged in the Pallet.
- Step 8: Select which applicator to run. Use the switch labeled "STA-1 STA-2". Position the Selector Pin on the Pallet in the proper hole.
- Step 9: If the Coating Height, Pullback Distance, or Dry Time must be adjusted or verified, place the AUTO/MANUAL selector switch in MANUAL, and select SETUP mode by pressing any key on the Display. If the setup is known to be correct, proceed to Step 12.

Step 10: The SETUP routine will allow entry of 3 parameters per applicator. Whichever applicator is selected by "STA-1 STA-2" switch will be configured. It is OK to configure either or both in any sequence. Units .001" or seconds, as noted.



COATING HEIGHT

Distance in .001" increments from home switch to establish meniscus. Must be 0 to 1280 (0" to 1.280")

Caution: Too high a coating distance can cause the Porous Tube to crash into the substrate. Test the COATING HEIGHT before using unattended. The machine will accept and run a "crashable" height, to avoid restrictions on applicator dimensions. For convenience, record max coating height here.

Applicator 1 max coating height _____

Applicator 2 max coating height _____

(Factory maximum 1280 = 1.280". Is full stroke of lifts)

PULLBACK DISTANCE Distance in .001" increments below COATING HEIGHT after initial establishment of meniscus. Must be less than COATING HEIGHT. Can be 0.000".

DRY TIME Time in seconds to hold coated substrate over hot plate. Can be 0 (in which case the Pallet returns without going to the Oven). Must be less than 30000.

The 3 parameters per applicator are configured via this process. The Display will print the current value of the parameter, followed by a prompt for the new value. To see the current value again, use the < key to scroll the display window. A new value must be entered to satisfy the program. If no change is desired, just reenter the same value.

Step 11: When satisfied with the configuration, select QUIT / SAVE. The Display will prompt with "PASS TO SAVE?". The machine is asking if the current values for both actuators are to be saved, to be run the next time the machine is powered up. If running a test, saving the current setup may not be desired. If not saved, the previous values will be reinstated on the next power cycle. (The current values, just entered, will be in effect until the power is cycled.)

To save the current setup, enter "123" for the "password". Display will say "SAVING".

To abort the save, and run the current setup only until power is cycled, enter an incorrect password, eg. "124".

The incorrect password must still be numeric to proceed.

If the setup is unacceptable, the Display will print an error message. It is necessary to use the < and > keys to view the entire message. The Enter key will return to the top of the setup function. Correct values must be entered to exit the setup routine.

The Display will again prompt with SETUP OR CYCLE.

- Step 12: Ensure the AUTO / MANUAL selector switch is in AUTO. Push "CYCLE START".
- Step 13: If the "nonselected" applicator is not on its home switch, it must first home. Then the selected Applicator will home.
- Step 14: The Pallet will be moved to rest on the switch at the load end (if not there already).
- Step 15: The Applicator Carriage will be moved to rest on the switch closest to the load end (if not there already).
- Step 16: The Pallet will advance to the Coat Position, verified by the Selector Pin contacting the Coat Position Switch.
- Step 17: The selected Applicator will raise to COATING HEIGHT. This establishes the meniscus between the porous tube and the substrate. Then the Applicator will drop PULLBACK DISTANCE.
- Step 18: The Applicator Carriage will advance to perform the Coating Pass.
- Step 19: The selected Applicator will lower to home position.
- Step 20: The Applicator Carriage will return, and the Pallet will advance to the DRY position for the selected applicator DRY TIME.
- If desired, to eliminate the Dry Step, push and hold the "RETURN PALLET" button for 2 seconds once the Pallet is in motion. (To automatically have no dry step just configure the DRY TIME to 0. See Step 11.)
- Step 21: The Pallet will return to the Load Position. The Display will say "CYCLE COMPLETE" and then say "SETUP OR CYCLE".
- Step 22: Return the Pallet vacuum chuck to the "up" position.
- Step 23: Turn off the Vacuum. Remove the Substrate.

