

Operation Panel for NR-15 Type3 (PI rubbing)

Power	: Main power switch
Automatic & manual operation	: Allow initial manual setup of each operation.
Automatic	: Switch up to Cycle mode.
Manual	: Switch down for manual setup.
Start	: Start automatic operation.
Roller revolution	: To switch on/off the roller.
Clockwise/Counter Clockwise	: To change the direction of roller revolution. (CW/CCW)
Table Back & Forth movement	: Table moves Back & Forth.
Up/Down	: To set table up or down
Vacuum	: To control the vacuum air for holding the glass.
Revolution	: To set the roller revolution speed.
Forward	: To set the Table forward speed.
Monitor	: Emergency flashing light.
Roller Revolution	: Indicate the roller revolution speed.
Table Speed	: Indicate the Speed of Back & Forth Table movement.

Procedure:

To start operation, Reset switches positions as follows:

Manual: Down; Roller: Off; Table: Backward and Down

For Automatic operation, the initial condition settings are:

Table in Backward and Down position, Vacuum is On.

1. Preparation

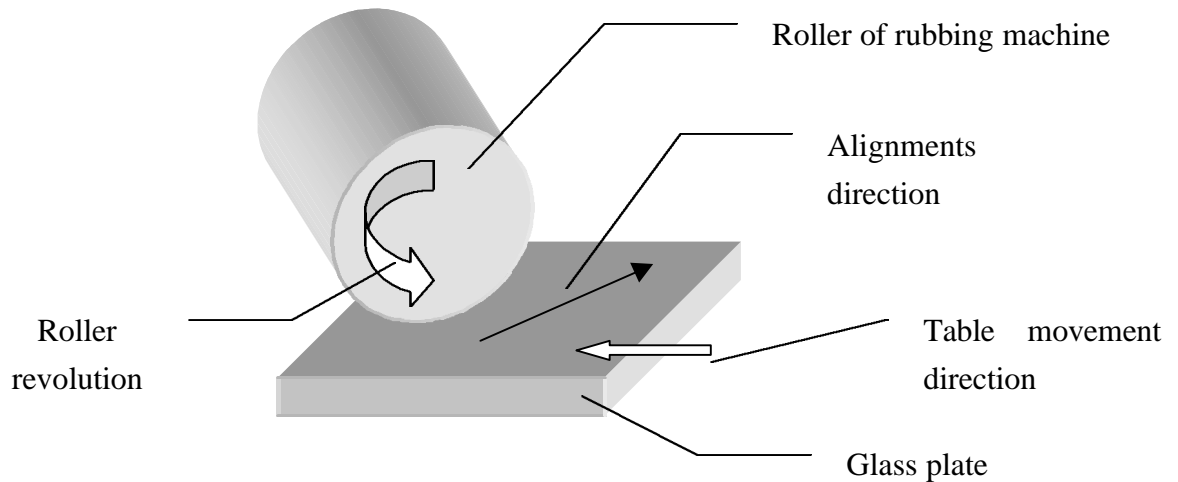
- a. Turn on the vacuum air supply.
- b. Open the shielding of NR-15 Type3 and set the adequate direction of the roller.
- c. Turn on the main power.
- d. Switch to “Manual” Mode.
- e. Set the table “DOWN”.
- f. Place a dummy glass on the table and switch on the vacuum.
- g. Set the roller revolution speed to about 1500rpm.
- h. Set the forward table speed to 25mm/s and backward speed to about 35mm/s.
- i. Set the adequate rotation direction of the roller. (clockwise or counterclockwise)
- j. Set back to “Auto” mode and turn on the vacuum. Then, switch “Start” up and the machine would run automatically. Check that all the motions are correct. (The table would move back & forth three times) If not, reset the parameters again as the machine stopped and test it again.
- k. Switch off the vacuum and ready for PI rubbing.

2. Rubbing

- a. Clean the table by the air gun.
- b. Place the PI coated glass on the table with the PI surface upward.
- c. Switch on the vacuum to fix the glass plate and use hand to test it to ensure it is really fixed.
- d. Switch the table “Up” and close the shielding of the machine.
- e. Switch “Start” up to start the rubbing process.
- f. As the process stopped, blow the glass with compressed air to remove furs from the roller, then turn off the vacuum and get back the rubbed glass. (There has a small white button under the lower right corner of the table to help to move the glass out.)
- g. Repeat the step above steps for another PI coated glass.
- h. Switch off the main power of machine and the supply of vacuum air when finished.

APPENDIX

After the PI Baking process, the glass plates needed to rub at an alignment angles on the PI coated glass surface. The direction of the alignments determines the twist angle. And the direction of the alignments is controlled by the revolution direction and the angle of the roller of the NR-15 Type3 rubbing machine.

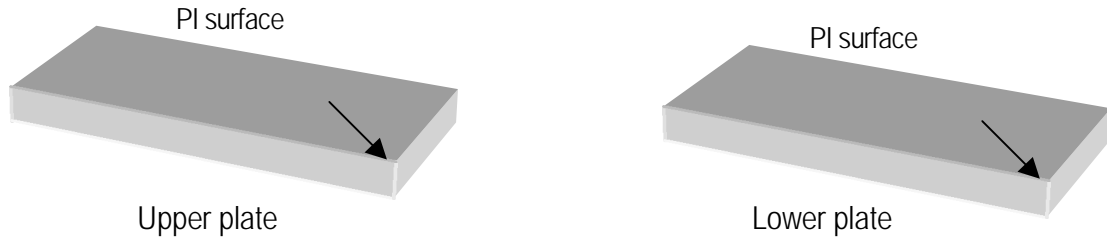
**Alignments direction by rubbing machine.**

Example for determining the rubbing direction:

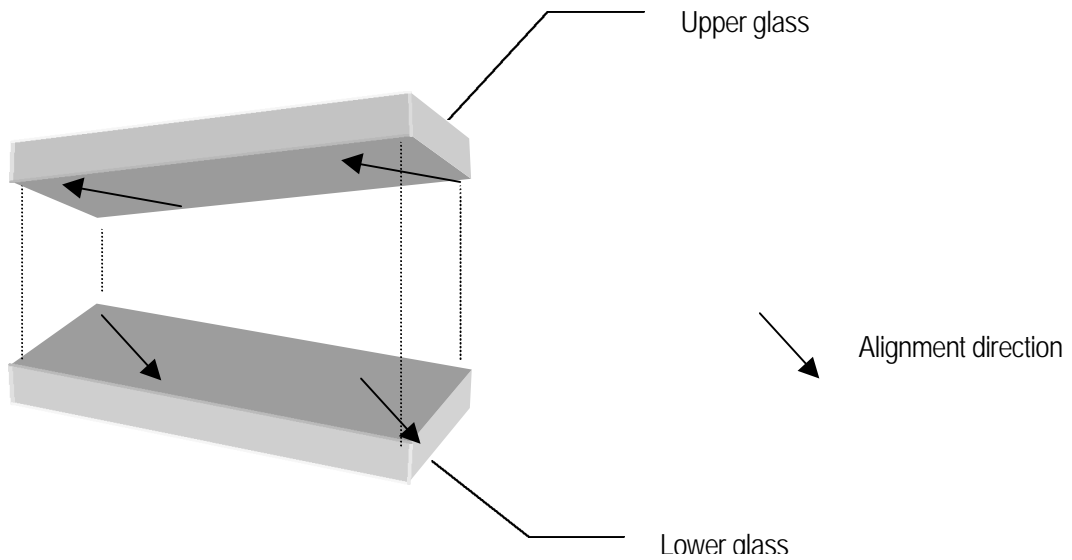
At the beginning, which type of LCs is determined would be used for the filling.

There are two types of LCs. One is for the left-handed twist and the other is for right-handed twist. Thus, different types of LCs need different direction of alignments for a twist angle. For a 90° TN-LCD, TN-0403 is right-handed twist.

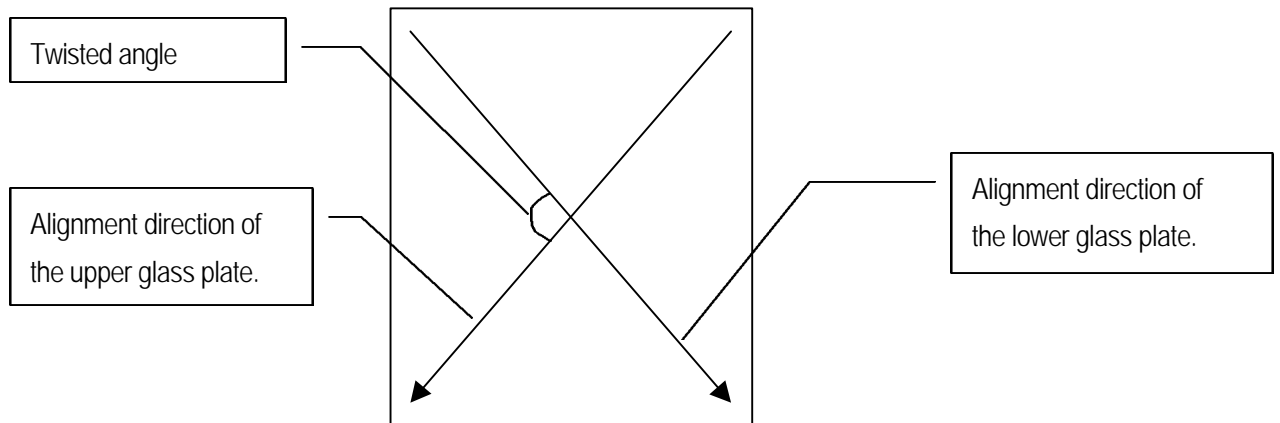
After rubbing the upper and lower glass plates for LCD cell, the direction of alignment should be:



The assembled cell:



As we see on the top of the LC cell:



The direction of alignments for 90° right-handed twist LCD.

The twisted angle is the angle between the arrowhead of the upper plate and the arrow tail of the lower plate. In this case, we can see that the twisted angle is 90° in the clockwise direction since we chose the right-handed twist Liquid Crystals (TN-0403)