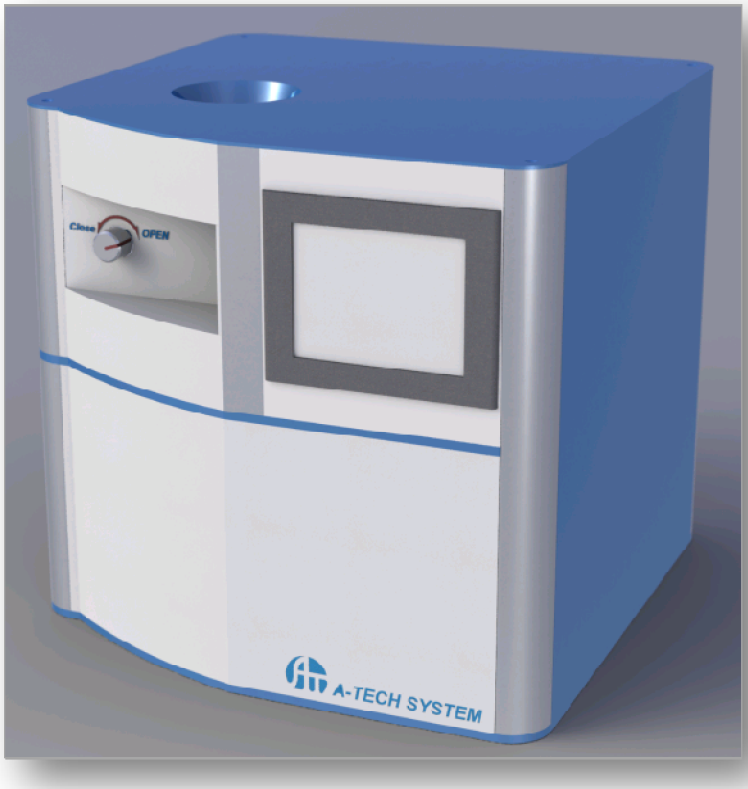
User Manual

Version 1



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Process Equipment Pioneer

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1. Checking points prior to operation
2. Sample loading
3. Pumping
4. Process pressure control
5. Sputtering process
6. Sample unloading
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Summary

1) Sputter source
Target size : 2in to 3in
Target cooling: Water-cooled
Shutter: equipped for preventing contamination
Applied power: dc/rf

2) Substrate holder
Substrate size : max. 4″
Substrate heating : max. 300°C

3) Pumping system
TMP : 51liter/sec
Oil rotary pump : 200liter/min
Main valve : optional
APC control part : optional

4) Control
PLC based touch screen
Auto pumping / auto venting
Setting power and time

5) Process gas
Ar, N_2, O_2(optional)

6) Utilities
CDA pressure: 2.5-5.0 kg/cm^2
PCW: 2.5-5.0 kg/cm^2

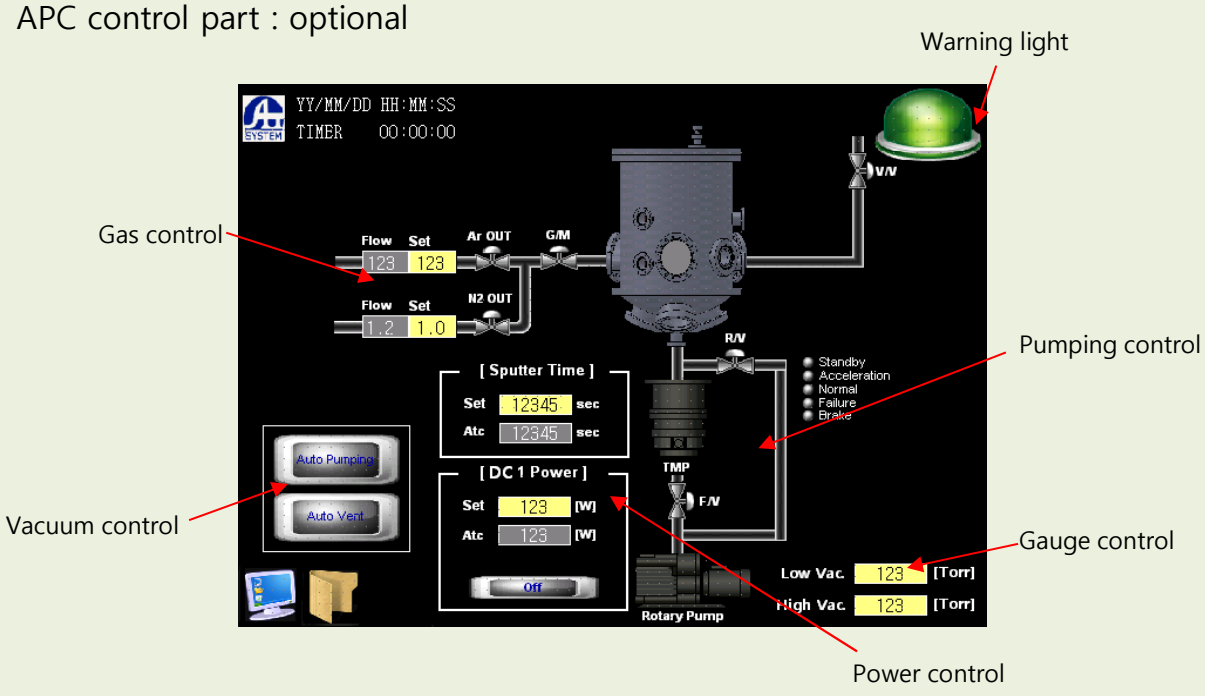


Figure 1. Control panel

1. Checking points prior to operation

Before system operation, following items should be checked.

1-1. Air pressure and water pressure

▶ Because air pressure is essential for valve operation, its supply state must be checked before system operation.

Air condition: CDA (Clean Dry Air)
Air pressure range: 2.5- 5kg/cm^2

▶ Because cooling water is essential for dissipating heat from sputter target and for cooling TMP, cooling water pressure, temperature and flow rate must be controlled in an appropriate range.

Cooling water temperature: <20^{o}C
Cooling water pressure: 1-2kg/cm^2
Cooling water flow rate: >20l/min

▶ The utilities for air and water pressures are prepared by user. But the connection ports are equipped on the sputter system by supplier.

Connection port for air : ¼" LOK type
Connection port for water: 3/8" LOK type

1-2. Checking of power connection

▶ It is essential that power source is well-connected and the main electric distribution board and the breaker in system are positioned in turn-on.

Electricity: 220V, single phase, 15A

▶ Electrical grounds in system must be independently secured and it is supplied by user.
▶ Power source connector must be externally connected through main breaker.

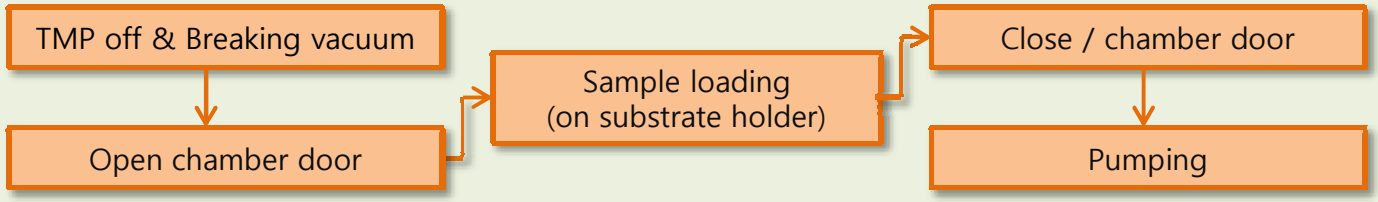
1-3. Process gas connections

▶ Argon and nitrogen gases are provided as main gases and their remaining amounts in bombes must be checked periodically for a continuous sputtering process. The process gases are prepared by users.

Gas pressure: >1.2kg/cm^2
Gas line: ¼" stainless steel (electro-polished)
Gas line finishing: ¼" LOK

2. Sample loading

Sample loading is manually done on touch panel according to following sequence



2-1. Manually vacuum-breaking

▶ If V/V is clicked on touch screen (red color rectangle), vacuum is sequentially being broken. At this time R/V, G/M and M/V must be kept in closed states. But safety interlock system prevents V/V from being opened under the open state of R/V and G/M. During vacuum breaking, TMP must be shut down, but it is acceptable for rotary pump to work with roughing valve close.

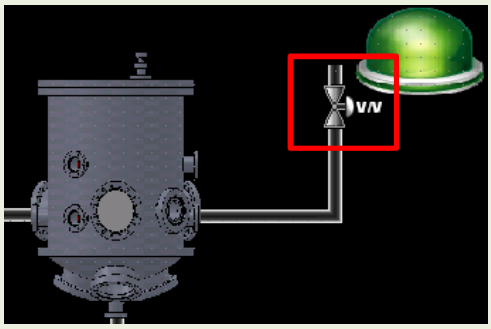


Figure 2. Breaking vacuum manually

2-2. Manually vacuum-breaking

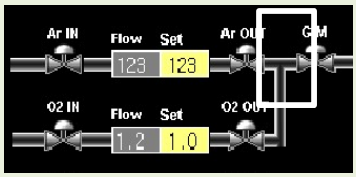


Figure 3. Gas introduction to chamber

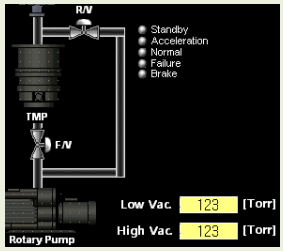


Figure 4. Configurations for pumping

2-3. Automatically vacuum-breaking

▶ If auto vent (in yellow rectangle) is touched, vacuum breaking is automatically processed through a proper sequence.

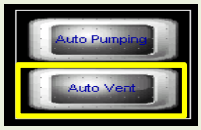
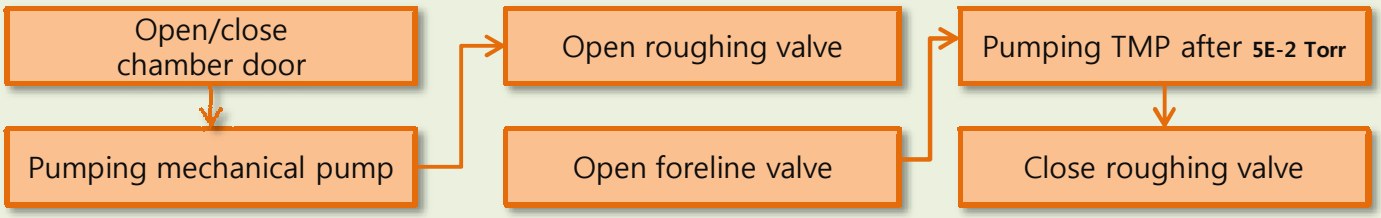


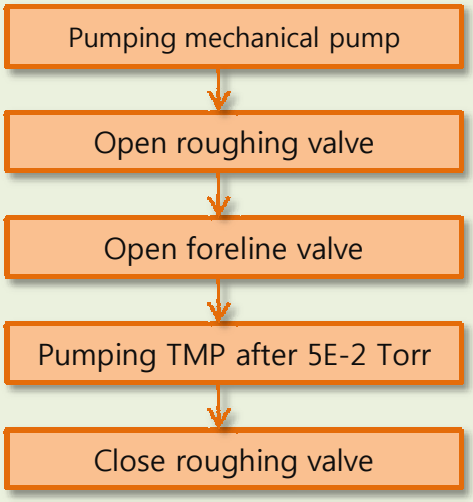
Figure 5. Automatic pumping

3. Pumping

▶ Pumping is processed in the order of rough vacuum pumping and high vacuum pumping as follows. All of these operation are done on touch screen.



3-1. Manually Pumping



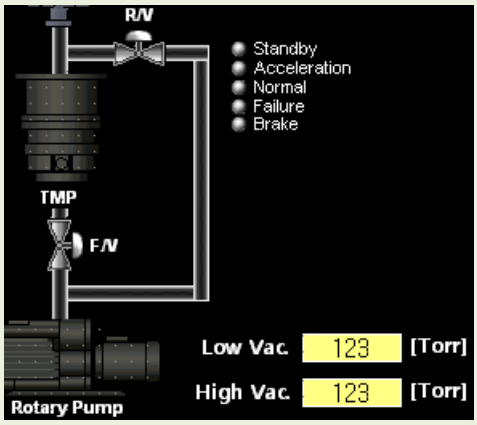


Figure 6. Pumping line

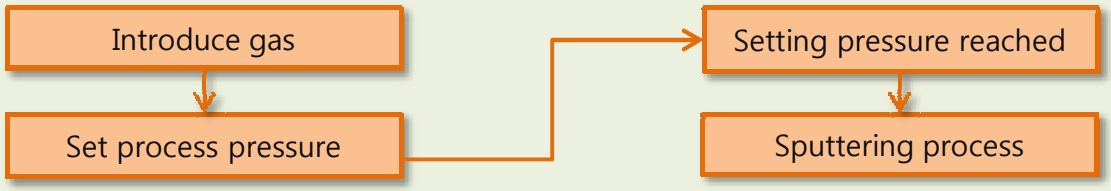
3-2. Automatically pumping

▶ Automatic pumping is processed by touching auto pumping menu (in yellow rectangle) on touch screen.

Figure 7. Automatic pumping control panel

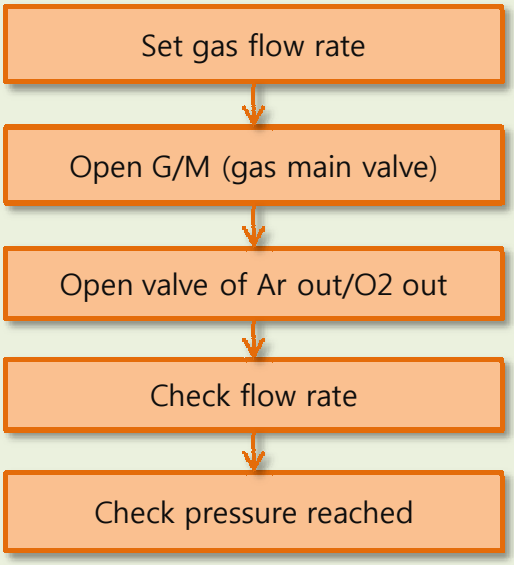
4. Process pressure control

▶ Process pressure is controlled by the combination with process gas, and low vacuum pump. The process pressure is set according to following flow chart sequence.



4-1. Manual process pressure control

▶ Vacuum-related menu is shown on touch panel as follows.



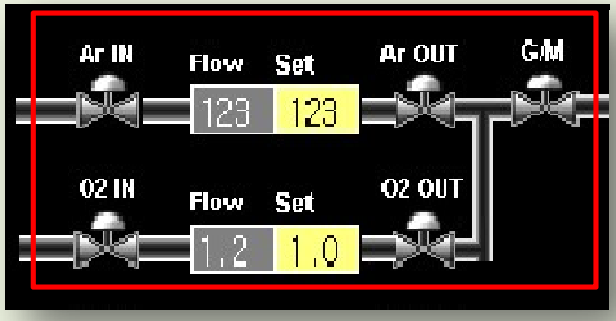


Figure 8. Schematic of gas introduction line

5. Sputtering process

▶ Sputtering is processed through plasma discharge by applying power on cathode after process pressure is set.

Control process pressure → Apply power on sputter cathode → Sputtering process

5-1. Target to substrate distance control

▶ Target to substrate distance is manually controlled over the range of 60mm to 100mm.

5-2. Sputtering process

▶ Sputtering is processed by setting process time and power in menu enclosed with red rectangle, as shown in following figure.9

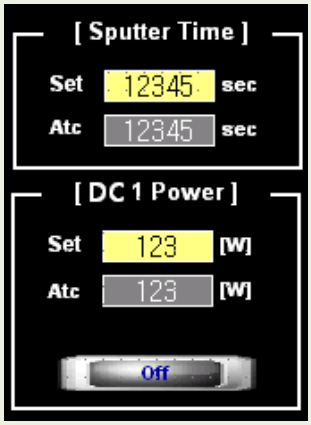


Figure 9. Sputtering power control panel

6. Sample unloading

▶ Processed sample is manually unloaded from substrate holder after coating sample as shown in following flow chart.

- Break vacuum
- Open chamber door
- Unload coated sample
- Close chamber door

7. Error checking

▶ The errors occurred in system are monitored and displayed with their messages such as cause, occurrence frequency, time and date, etc.
As icon in touch screen is clicked the pictures of error message or main control are repeatedly displayed.

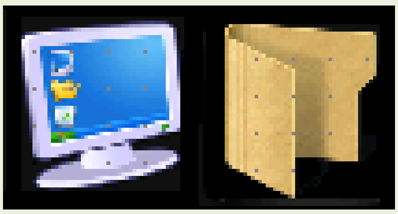


Figure. 10 Control part ions

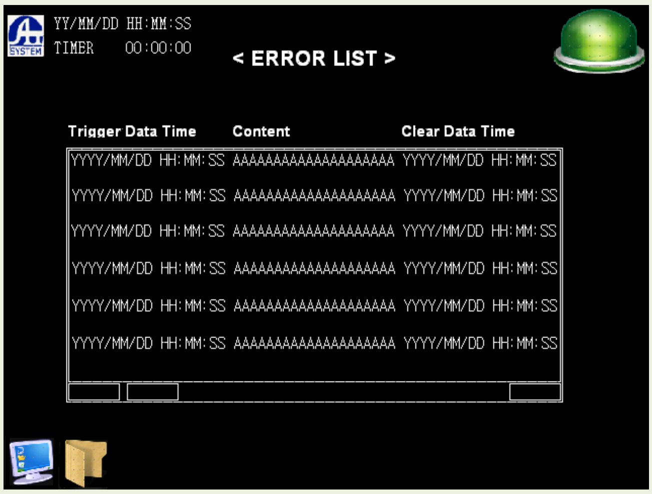


Figure 11. Error message picture