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Data Sheet

Balzers BAS 450 PM

- Up to 3 planar magnetron cathodes 5” x 10”
- Substrate Heating
- Capacity 24 3-inch substrates, 9 4-inch substrates, 8 125 mm Pseudo Square
- Traditional diffusion pump unit, option for turbo or cryo pumping

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A) SPECIFICATION OF THE BASIC UNIT

1) Cabinet
Section steel frame with doors and removable panels to provide optimum access to the pumping system and other components such as transformers, etc.

2) Processing chamber
The cylindrical processing chamber with a diameter of 445 mm and a height of 500 mm is made of stainless steel. The outside of the chamber is fitted with brazed-on half round pipes for heating and cooling. In addition to a sight glass in the front of the chamber, there are other ports for fitting the gas inlet and feedthroughs for the anodes. The processing chamber has 4 flanges for mounting the planar magnetron cathodes and the substrate heaters.

3) Lifting mechanism
The hydro-pneumatic lifting mechanism is for rising and lowering the substrate holder (drum) with rotary drive and processing chamber lid.
The modules EAU 201 for raising and lowering the substrate drum contain two push-buttons each for lowering and have one button between them for raising the substrate drum.

4) Pumping system

4.1. High vacuum diffusion pump DIF 200 three-stage, water cooled oil-diffusion pump; pumping speed for air at 10-4 mbar = 2000 l/s

4,2. Multi coolant baffle BFA 200MF Cooling by freon fridge or LN2. Conductance for air in high vacuum 2100 l/s.

4.3. Fore-vacuum pump DUO 030 A
Two-stage rotary vane pump, pumping speed at 1000 mbar = 30 m3/h,

4.4. High vacuum plate valve PVA 200P
To isolate the diffusion pump from the vacuum chamber, electro-pneumatically operated it closes automatically in the event of a breakdown of the electricity or compressed air supply.
During the sputtering process the valve is in a throttled position to maintain the sputtering pressure at reduced gas flows.

4.5. Fore-vacuum valves EVA 040 P
two electro-pneumatically operated angle valves in the fore-vacuum line and in the bypass line closing automatically in the event of a breakdown of the electricity or compressed-air supply.
Vent valve EVC 010 MF
solenoid operated angle valve, for venting the vacuum chamber

OPTIONAL PUMPING SYSTEMS
4.6. Cryopumping system with LN2 cooling. Using this system, the sputtering unit is equlpped with the cryopump RKP 200 (CTI 8) with pumping speed of 2800 l/s for air.

4.7. Turbomolecular pumping unit.
In this case, the plant is equipped with the turbomolecular pump TPH 510 with a pumping speed of 500 l/s.

5.) Pumping unit control with vacuum gauge DPA lO2
Partial rack panel with rack panel frame, containing all elements necessary for controlling the pumping system.
The DPA 102 is suitable both for automatic and manual operation. If the unit is operated manually, all valves as well as the fore-vacuum and the high vacuum pump can be switched independently by appropriate indicating buttons.
In automatic mode the system can be controlled by a multi-position switch, the positions of which are:

OFF	the pumping system is switched off
ON	the vacuum chamber is evacuated automatically to high vacuum
STANDBY	the pumping system is evacuated to high vacuum, the chamber can be vented.
VENT	the vent valve is open

The vacuum measuring and monitoring equipment integrated in the unit consists of two Pirani vacuum gauge heads TPR 010 (measuring range from 50 to 1 .10-3 mbar) and one cold cathode vacuum gauge head IKR 010(measuring range from 10-3 to 5 .10-8 mbar). The pressures are indicated on a double-scale meter, switching of the measuring ranges is done automatically.

6.) Water Battery
Consisting of water flow monitors and solenoid water valves with the necessary hoses. The water battery controls cooling and heating of the pumping unit, the vacuum chamber and the sputtering equipment. It also allows operation with a closed circuit.

7.) Power Distributor BNV 201
The power distributor BNV 201 connects the sputtering plant and the control system to the mains power supply. In addition to the main switch it also contains the necessary automatic breakers.

8.) Substrate holder and rotary drive
The substrates are mounted on the vertical substrate drum. The drum is lifted with the rotary drive with the lift mechanism. The rotary ~ speed is variable from 10- 60 rpm and is controlled by the BSD 301 control unit. (Single pass drive for 1 x 360° rotation at 0,02- 0,2 RPM available as option.)

Capacity of the substrate holder:
24 3-inch substrates
9 4-inch substrates
8 125-mm Pseudo square

9.) Shutter
During the pre-sputtering process the cylindrical shutter is placed in front of the working cathode. The shutter is operated manually through the baseplate of the processing chamber.

10.) Automatic Gas Inlet
for gas flow control during the sputtering process, using an ionization gauge IMG 060 for precise setting.

B) SPUTTERING EQUIPMENT

11.) Planar Magnetrons
The planar magnetrons are flanged on the process chamber. 5 x 10 inch (127 x 254 mm) cathodes are used. The planar magnetrons have an electron trapping bias-anode to reduce the bombardment of the substrates with secondary electrons (option).

12.) Magnetron Power Supply MPS
The power supply consists of a thyristor controlled high voltage rectifier with all the necessary controls.
The system can be current or power controlled. The preset value of the current or power is controlled by a signal 0- 10 v.

Accuracy of regulation +/- 1 %
Reproducibility I or P +/- 1%
The following power supplies are available: 5* kW power supply MPS 105
10* kW power supply MPS 110
* peak output 7 and 14 kW respectively.

13.) Magnetron Control Unit MCU 105/110
The control unit MCU 105/110 is for the manual operation of the planar magnetrons. If the system is controlled with a separate process controller (pP-control), the manual control is automatically by-passed, then the MCU indicates only the current/power level.

OPTIONS

14.) Switching Unit MSU 100
This unit is used when several sources are operated in sequential mode. ! Only one source can be fed at a time. The MSU 100 switches on only when no high voltage is on. The system is interlocked to eliminate problems due to operator errors. r

15.) Substrate Heating
Substrate heating with quartz lamps can be mounted on a flange of the process chamber for front side heating or on the central feedthrough in the baseplate for rear side heating of the substrates. Up to 4 kW is available for heating with closed-loop temperature control. Can be interfaced with an automatic process controller.

16.) Automatic Gas Inlet for Reactive Sputtering
Can be upgraded with a multi gas inlet system (mfc) and controller.

17.) Power Control Unit
The power control unit is for the control of the sputtering power instead of the current control in the basic standard equipment.

18.) Bias Anode with Feedthrough for 10-inch Cathodes
The water cooled bias anode as an electron trap reducing the bombardment of the substrates with secondary electrons.
19.) Bias Power Supply Unit
It powers the bias anode and has outputs for 30 V, 40 V and 50 V.

20.) Meissner Trap with LN2-Supply

21.) Rate-Time Adder RTA 1OO
This unit has two functions:

a) The film thickness during sputtering can be evaluated by the energy consumed during sputtering. Reaching a preset film thickness, the sputtering process is stopped. Using this unit, the plant can be operated semi automatically without process controller.

b) The sputtering energy consumed during the life of a target indicates its status with respect to its lifetime. Reaching the energy level corresponding to the end of the target-1ifetime the unit stops the sputtering process. This interlock avoids damages on the cathode or sputtering of the cathode backplate material.

The Rate-Time Adder RTA 100 enables a control of up to six cathodes and the different energy levels are stored and interlocked against power failure.

CONNECTION DATA

Electrical:	Power input (vacuum system only): 3.5 kW
	Voltage: 3 x 380/220 V 3P + N + E .
	Frequency: 50 Hz
Compressed Air:	Pressure 4- 8 bar
	Hose nipple dia. 6 mm
Cooling Water:	pressure: 3- 4 bar (40- 130 psi)
	Input temperature: max. 20 oC
	consumption: appx. 60 l/h
	Hose nipple connection: dia 13 mm
Exhaust:	Hose nipple connection: dia 32 mm
Foundation:	None, free-standing on level floor
	should be accessible from all sides.

TECHNICAL DATA

Dimensions of vacuum system: 1200 mm x 800 mm x mm (height with substrate-holder in raised position)

See layout drawing

Information and specification reproduced from original Balzers data.