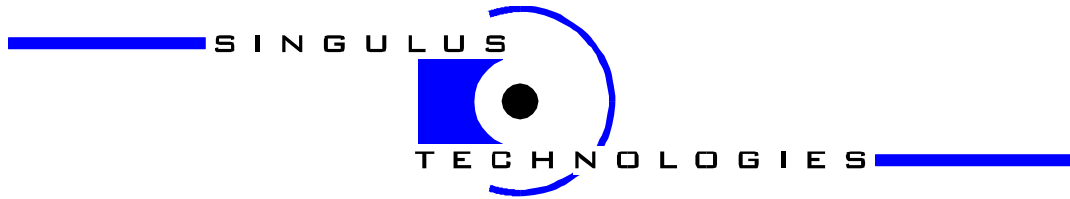


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TECHNICAL SPECIFICATION

SINGULUS III / 3

SPECIFICATION NO. 010696



**PRODUCTION SYSTEM
PREPARED FOR**

**SINGLE COMPACT DISC
METALLIZATION**

TYPE SINGULUS III / 3

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PRODUCTION SYSTEM FOR SINGLE DISC METALLIZATION
OF COMPACT DISCS TYPE SINGULUS III / 3

1 APPLICATION

The system is designed for single disc metallization of compact discs with aluminum.

The substrates are metallized by means of a high performance sputter cathode.

The main features of SINGULUS III / 3 are:

- can be integrated in all types of CD lines with one moulding machine due to the high metallization speed.
- unique high performance sputter cathode for higher target life resulting in lowest possible metallization cost per disc.
- disc handling by mechanical grippers eliminates downtimes usually caused by vacuum suckers
- keyboard with integrated flat panel makes operation and maintenance easy and safe
- interfaced to any replication system possible
- ideal for coating of the Al-layer or CuAl-layer.

2 TECHNICAL DATA

2.1 PRODUCTION DATA

- substrate compact discs
(polycarbonate)
- diameter of substrate 120 mm
(80 mm on request)
- thickness of substrate 1,2 mm + 0,3 / - 0,1 mm
- material for metallization Aluminium
- min. reflection 70 %
(measured through substrate)
- cycle time ≤ 3 s
- life time of target ≈ 200.000 discs, Al - coated with
approx. 55 nm film thickness
- target exchange time approx. 5 min.

2.2 MACHINE DATA

2.2.1 ELECTRICAL POWER

- machine line voltage 3 / PE / 400 V + 6 / - 10 %
50 or 60 Hz (to be specified)
- max. required power capacity approx. 12 kVA
- typical power consumption approx. 7 kW
- internal control voltage 24 VDC

2.2.2 COOLING WATER

- water pressure min./max. 5 - 6 bar
- outlet pressure min. 3 bar below incoming
pressure but max. 2 bar
- water throughput approx. 8 l/min.
- water inlet temperature range min. + 20° C
max. + 25° C
- water hardness 6 - 8 dH
- pH-range min./max. 7 - 9
- max. concentration of impurities 10 particles/cm³
- max. size of particles 200 µm
- max. content of Cl 20 mg/l
- max. content of CO₂ 15 mg/l
- max. conductivity 500 µ S/cm at 25° C

2.2.3 COMPRESSED AIR

- free from oil
- pressure min./max. 6 - 8 bar
- max. size of impurities 5 µm
- max. concentration of impurities 5 mg/m³
- dew point + 2° C
- consumption approx. 0.05 Nm³/h

2.2.4 PROCESS GAS

- argon without condensate residues in container 99,99 %
- consumption, approx. 30 sccm/min.
- inlet pressure 1.2 / \pm 0.2 bar abs.

2.2.5 AMBIENT CONDITIONS

- ambient temperature min. + 20° C
max. + 25° C
- relative humidity of air 50 % \pm 10 %

2.2.6 MASKING DIMENSIONS

Standard

- outer diameter 118 mm
- inner diameter 38 mm

other dimensions on request

2.2.7 LAYOUT OF THE SYSTEM AND DIMENSIONS

According to the attached layout drawing no. 2.000 4550

3 DESCRIPTION OF THE SYSTEM

3.1 VACUUM CHAMBER

The system includes a circular process vacuum chamber.

The disc turntable with positions for 3 discs of max. \varnothing 120 mm is located in the vacuum chamber and is rotated by a precision electromechanical sinusoidal cam drive.

During rotation of the turntable, the discs are actively held in position by mechanical grippers at the center hole.

The vacuum chamber corresponds to normal working height and the machine is equipped with all necessary components.

3.2 LOADING/UNLOADING

The machine is loaded and unloaded by a two-headed, electromechanically driven handling system, i. e. one metallized CD in the load lock station of the SINGULUS III and one unmetallized CD at the transfer station are picked up simultaneously by mechanical grippers located on the handling arm and rotated by 180 °.

3.3 HIGH PERFORMANCE SPUTTER CATHODE AND MASKING UNIT

The system is equipped with an energy saving high performance „FOCUS“ sputter cathode.

With only one center screw the indirectly cooled target is bolted onto the water-cooled backing plate of the cathode. With the assistance of the water pressure a copper diaphragm is pressed against the back of the target ensuring maximum thermal transfer between the target and the cooling water. The masking units are resident at the sputter station.

They consist of an outer masking ring responsible for the outer metallization diameter and a separate center masking unit for the inner diameter. The inner mask mounting shaft moves freely in vertical direction guaranteeing complete contact with the disc under all conditions.

The outer mask is located freely and held by the cathode when closed. The inner mask is fixed with one screw. This ensures a simple and speedy mask exchange. The disc to be coated is lifted against the masking unit.

The cathode unit can be swivelled by 100° for easy access to change masking and/or target without disconnecting the supply units.

3.4 VACUUM PUMPING STATIONS

Process chamber and loading/unloading station are evacuated by separate pumping stations.

3.4.1 PROCESS CHAMBER

- (1) turbomolecular pump
- (1) rotary vane pump

3.4.2 LOADING/UNLOADING STATION

- (1) rotary vane pump

3.5 VACUUM MEASURING AND CONTROL DEVICES

- (1) Ionivac transmitter
- (1) Pirani transmitter

4 SCOPE OF DELIVERY

4.1 MECHANICAL EQUIPMENT

4.1.1 ONE VACUUM CHAMBER

One vacuum chamber made of Aluminium with loading/unloading station incl. one sputter cathode and one set of masks.

4.1.2 MASKING UNITS

one set of additional change masks.

4.2 VACUUM EQUIPMENT

4.2.1 VACUUM PUMPS

- (1) turbomolecular pump type TMP 361, pumping speed 360l/s (N₂)
- (1) rotary vane pump type D 10 E, pumping speed 10 m³/h (N₂)
- (1) rotary vane pump type S 16 B, pumping speed 16 m³/h (N₂)
with exhaust filter and oil feedback on the S 16 B

4.2.2 VACUUM MEASURING AND CONTROL DEVICES

- (1) Ionivac transmitter ITR 100 P
- (1) Thermovac transmitter TTR 211 S

4.3 ELECTRICAL EQUIPMENT

- (1) control cabinet including all control units
- (1) sputter power supply PINNACLE 8 kW
- (1) control panel with integrated flat panel display for operating the machine in automatic and manual mode

Sequential functionality of the complete system is achieved by the use of a SIEMENS S7-300 Programmable Logic Controller (PLC).

Complete wiring of the machine.

The main cable to connect the line voltage is not provided.

4.4 STANDARDS

According to CE - Standard

5 DOCUMENTATION

One set of technical documentation

6 ACCEPTANCE

6.1 PRELIMINARY ACCEPTANCE

Prior to delivery the system will be submitted to a preliminary acceptance test.

This test consists of the following items:

6.1.1 VACUUM TEST

Final pressure in clean, dry and empty vacuum chamber after a pumping time of 1 h better than: 5×10^{-5} mbar

6.1.2 PRODUCTION TEST

Uninterrupted production will be demonstrated for a time period of 1 h.

6.1.3 REFLECTIVITY

The reflectivity of the metallization is measured through the substrate at a wave length of 800 - 830 nm

better than: 70 %

absolute variation of reflectivity

less than: 3 %

6.1.4 CONTROL OF SCOPE OF DELIVERY

After successful execution of the test the system has to be considered as preliminarily accepted by the Buyer and an acceptance protocol will be signed.

If the Buyer declines to be present, the preliminary acceptance will be carried out by the Seller in the absence of the Buyer.

6.2 FINAL ACCEPTANCE

After the installation of the system at Buyer's site the acceptance test shall be repeated according to the items mentioned in 6.1.

7 OPTIONS

7.1 CHANGE-OVER UNIT

A change-over unit is available at the transfer position of the SINGULUS (see attached floor plan) where the metallized disc can be picked up and unmetallized disc can be transferred (by means of an external robot system).

The unit is equipped with a pneumatically driven cylinder to present the unmetallized disc to the handling arm in exchange for the metallized one.

The short machine cycle time of 3 s leaves 2 s for the external handling to exchange a metallized CD against a non metallized one.

7.2 SAFETY COVER

The safety cover is a protection shield made of plastics to cover the handling arm of the SINGULUS III. It is fitted to the machine by means of special adapters (see attached floor-plan).

THIS INFORMATION IS SUBJECT TO TECHNICAL ALTERATIONS