

# Sputtering Equipment FHR.Line.1100.V

In-Line Sputtering Equipment vertical, 7° inclined to the front side for the deposition of Dielectric Coatings



# General Description

Sputtering machine for the deposition of metals, alloys or compound layers, preferably on planar substrates on carriers able to run in MF carrier transport is vertical, 7° inclined to the front side

The system is built of rectangular recipients (modules). The modules in the lock section are separated from each other by rectangular valves designed for a very low particle emission. Further process units with additional deposition sources can be created optional at a later time by adding additional modules.

The system is also equipped with two cross transportation modules used for loading and unloading of the substrates and a carrier return system.

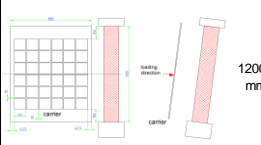













The Equipment consists of the following modules:

- Module 1: loading station
- Module 2: input load lock
- Module 3: buffer chamber 1
- Module 4: buffer chamber 2
- Module 5: sputtering pseudo reactive
- Module 6: buffer chamber as gas separation
- Module 7: sputtering reactive
- Module 8: output load lock
- Module 9: unloading station
- Module for substrate load/unload of carriers using 2 midsized Kuka robots

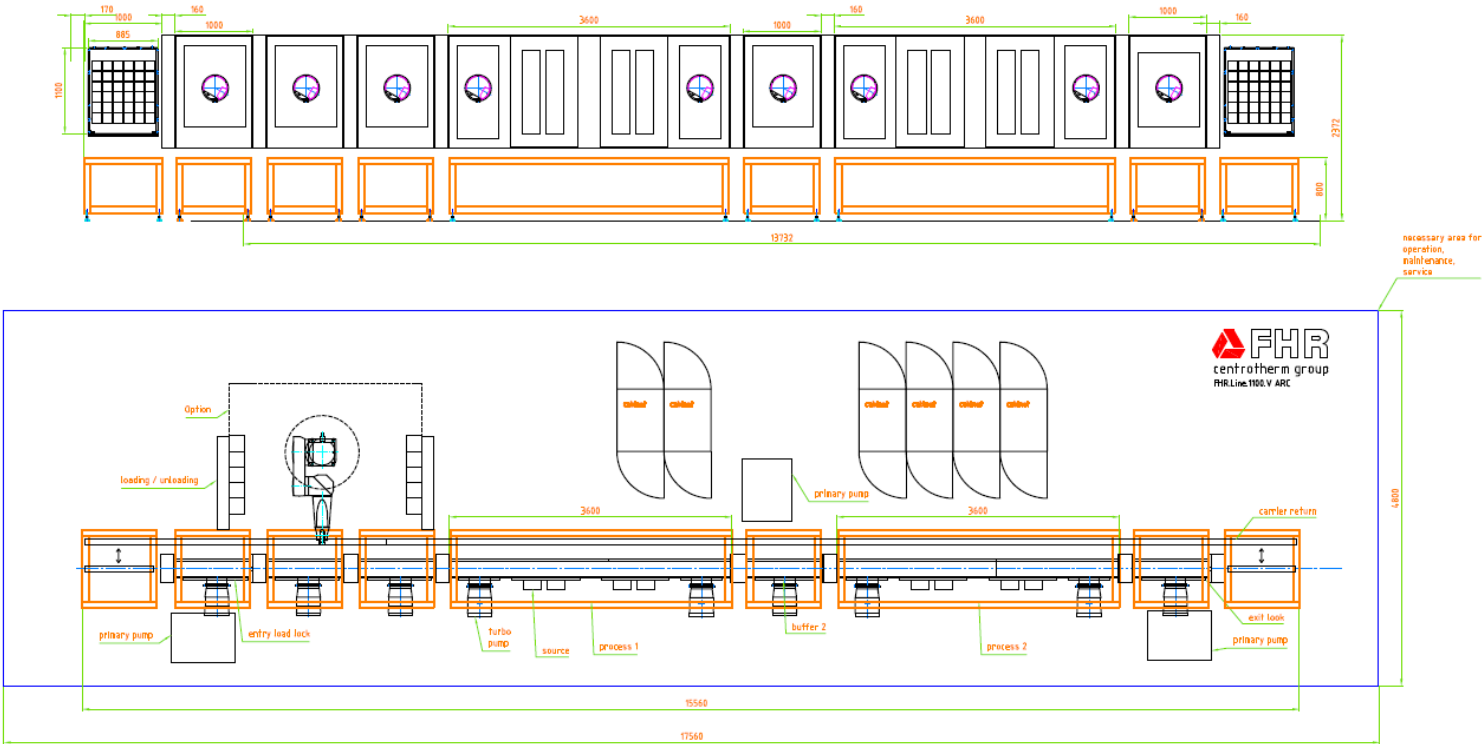
## Vacuum

|              |  |
|--------------|--|
| end pressure | $\leq 2 \times 10^{-6}$ mbar after 8 hours (Equipment was already pumped before and vented with CDA, opening time <30 min)   |
| end pressure | $\leq 1,5 \times 10^{-6}$ mbar after 12 hours (Equipment was already pumped before and vented with CDA, opening time <30min) |

Basic equipment configuration

|  | Transfer table<br>(under<br>atmosphere) | Entry<br>lock<br><i>Module 2</i>  | Buffer 1<br><i>Module 3</i>   | Buffer 2<br><i>Module 4</i>   | Process chamber 1 <i>Module 5</i>   |   |   |   | Buffer 3<br><i>Module 6</i>   | Process chamber 2 <i>Module 7</i>   |   |   |   | Exit<br>lock<br><i>Module 8</i>   | Transfer table (under<br>atmosphere) |      |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------------------------|------|
|  | <i>Module 1</i><br>885 mm<br>1200 mm    |  |  |  |  |  |  |  |  |  |  |  |  |  | <i>Module 9</i>                      |      |
| Coater length  | 15560                                   | 1000  | 170   | 1000  | 170   | 1000  | 170   | 1000  | 170   | 1000  | 170   | 1000  | 170   | 1000  | 170                                  | 1000 |
| Process section  | 4                                       |   |   |   |   |   |   | 1   | 1   |   |   | 1   | 1   |   |                                      |      |
| Pump section   | 9                                       |   | 1   |   | 1   |   |   | 1   |   | 1   |   | 1   |   | 1   |                                      |      |
| Acceleration section   | 4                                       |   |   |   |   |   |   | 1   |   | 1   |   |   | 1   |   |                                      |      |
| Heaters  | 2                                       |   | 2   |   |   |   |   |   |   |   |   |   |   |   |                                      |      |
| Magnetrons dual  | 4                                       |   |   |   |   |   |   | 1   | 1   |   |   | 1   | 1   |   |                                      |      |
| AMS-DMS power supply   | 4                                       |   |   |   |   |   |   | 1   | 1   |   |   | 1   | 1   |   |                                      |      |
| Turbo pump   | 9                                       |   | 1   |   | 1   |   |   | 1   |   | 1   |   |   |   | 1   |                                      | 1    |
| Polycold   | 1                                       |   |   |   | 1   |   |   |   |   |   |   |   |   |   |                                      |      |
| VAT DN 250   | 3                                       |   | 1   |   |   |   |   |   | 1   |   |   |   |   |   | 1                                    |      |
| MFC  | 29                                      |   | 1   | 1   | 1   |   |   | 6   | 6   |   | 1   |   | 6   | 6   |                                      | 1    |
| Flap valve   | 8                                       |   | 1   |   | 1   |   |   |   | 1   | 1   | 1   |   |   |   | 1                                    | 1    |
| Rotary vane pump 250 m³/h  | 2                                       |   | 1   |   |   |   |   |   |   |   |   |   |   |   | 1                                    |      |
| Screw pump 300 m³/h  | 1                                       |   |   |   |   |   |   |   |   | 1   |   |   |   |   |                                      |      |
| Roots pump 1000 m³/h   | 3                                       |   | 1   |   |   |   |   |   | 1   |   |   |   |   |   | 1                                    |      |
| Carrier  | 15                                      |   | 1   |   | 1   |   |   | 3   |   | 1   |   | 3   |   | 1   |                                      | 4    |

Rough layout plan



## Technical data

- length approx. 18,500 mm (overall length)
- width approx. 4,800 mm (including maintenance area)
- height approx. 2,350 mm

## Substrate loading/unloading

loading station before load lock chamber for sequential manual loading/moving of carriers

unloading station after exit lock for sequential manual unloading of carriers

DN 250 ISO-K for turbo molecular pump

DN 63 ISO-K fore vacuum pump

view port DN 100

service flange in the front

additional flanges for heaters, vacuum gauges, rotary feedthroughs, reserve flanges

DN 16/25/40, etc.

## Chambers

vacuum chamber made of stainless steel.

chamber frame made of powder coated mild steel

pneumatic gate valves

## Modules include:

DN 250 ISO-K for turbo molecular pump

view port DN 100

service flange in the front

additional flanges for heaters, vacuum gauges, rotary feedthroughs, reserve flanges

DN 16/25/40, etc.

Flap valves VAT

rotary dry pumps 300 m<sup>3</sup>/h and 250 m<sup>3</sup>/h

roots pumps 1,000 m<sup>3</sup>/h

turbomolecular pumps approx.. 1,900 l s<sup>-1</sup> for N<sub>2</sub> and ca. 1,400 l/s for N<sub>2</sub>

gate valves DN 250

Meissner trap with cryo generator

6 x Pirani gauges fore vacuum sensors 1000mbar – 10<sup>-3</sup> mbar

8 x Penning high vacuum sensors 10<sup>-3</sup> mbar – 10<sup>-8</sup> mbar, to measure the end pressure

13 x Baratron MKS Typ 627 10<sup>-1</sup> mbar – 10<sup>-4</sup> mbar, for measuring the process pressure

pressure regulation “upstream” - changing of the gas flow with constant pumping

atmospheric pressure sensors

## Technology

### Rotatable sputtering cathodes

- number of cathodes for  $\text{TiO}_x$  8 (4 dual magnetrons)
- brand SCI MC-End block
- target length 1,100 mm
- backing tube diameter 133 mm
- target-substrate-distance 100 mm

### Gas admission system

MFCs for Ar for each sputtering source

all gas lines specified for 5N purity

### Power supplies

- 4 x MF bipolar power supplies (AMS-DMS from AE)\*

\*With one AMS-DMS combination one cathode can be run in some kHz unipolar mode.

### Control and visualization

- PC surface
- software based on Windows 7 Professional
- industrial PLC for general control (SIEMENS S7)
- software: visualisation of the whole equipment function
- parallel processing

### Electrical power

- aggregate connection 3/N/PE AC 380V/50Hz
- control voltage 24 V

### Cooling water

Power supplies (PSU), cathodes and cathode surrounds are cooled by water loops.

The following materials are used in the cooling circuits: stainless steel, copper, brass, plastics, nickel

### Guidelines

Guideline for machines 2006/42/EG

Low voltage guideline 2006/42/EG

Guideline for electromagnetic compatibility 2006/95/EG

The Equipment CE-mark

The main electrical cabinet will be compliant with UL electrical standards. Subsequent electrical cabinets will be in compliance with CE standards

### Automatization

The automatization consists of carrier return system with station for carriers to load/unload the carrier into the sputtering Equipment with **2 midsized Kuka robots**