VCM600-300
SS-Scroll-2LTE2-1TS/400A6V
SQM-Srot1-Subcool-1Esh

Base pressure
9,5 x 10 $^{-7}$ mbar

2x LTE2 (OLED) + 1TS HT thermal sources
Thickness Monitor – Substrate rotation – Substrate cooling– E/M Shutter

Important

1) **You can not work with VCM600 without the correct water pressure (Water RED light “OFF”)**

2) **You can not make any evaporation before a certain vacuum level (factory preset) is reached.**
Reaching this level is indicated with the RED light “ON” near the source's current meters.

3) **Working procedure**
   - **A) Connect (turn on) the water**
   - **B) Start the procedure**
   - **C) Finish with the procedure**
   - **B) Turn water off**

LTE- Low temperature evaporation source is NOT OXYGEN COMPATIBLE.

Allow the source to cool down below 50 °C before venting the chamber

Dear Customer

Thank you for purchasing the VCM 600 Vacuum Thermal Evaporator.

VCM 600 is a simple, yet powerful, unit that can help you to create thin films from metals and other materials on your substrates, by vacuum evaporation.

The compact unit incorporates the following parts:

- HIGH Vacuum TURBO Pump with a full informative controller
- Pirani – Cold Plasma Penning Pressure measurement system
- Two low temperature OLED evaporation sources
- Two power supplies for the low-temperature thermal sources with PID controllers
- One high Temperature heating source
- One high-current power supply unit for up to 400A current intensity and soft thyristor current controller.
- Thin film thickness Monitor (Quartz microbalance) with oscillator
- Safety interlocks for TURBO pump, water line and protection of the sources.

The unit operates from an AC fused line with:

- Voltage : 220 VAC - 240 VAC / 50Hz – 60Hz
- Fuse : 16A
- Power : 2500W

You can vent the chamber with your choice of gas (recommended DRY Air or N2) connecting the gas line to the appropriate socket located on the back panel.

The supplied rough pump is connected to the appropriate port on the back panel of VCM600 and is controlled from the VCM 600.

Parts of the system

The system is separated in two parts.

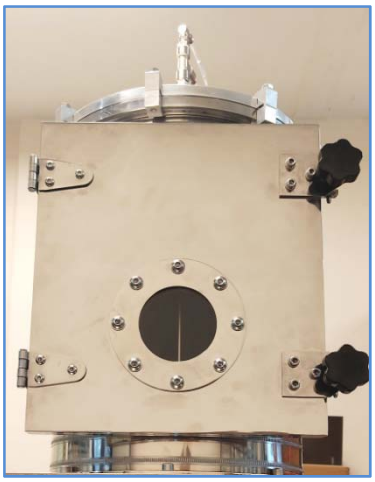
Part 1: Rack type Metal Base Unit

Inside the metallic base unit are all the components of the system:

- TURBO Vacuum Pump with pump controller
- Pirani – Cold Plasma Penning Head with controller
- Two, independent, PID controlled power supply units for LTE2 sources
- One Power supply unit for up to 400A current intensity
- Current regulators - Current indicators
- Thin film thickness Monitor (Quartz microbalance) with oscillator
- Vent Valve
- Shutter control
- Substrate rotation control
- Safety interlocks for TURBO and filament protection

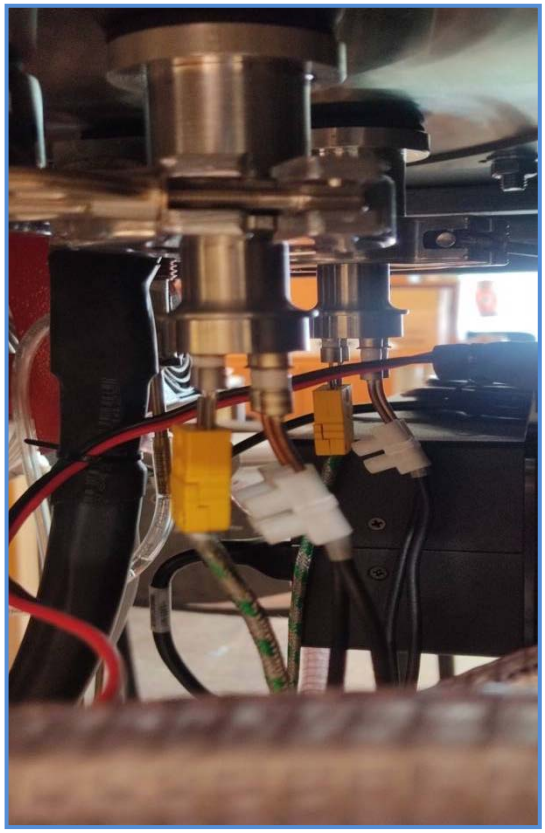
On top of the metallic base is the SS base plate with 2x high current, water-cooled OFHC copper electrodes, free ports and threaded holes.

Part 2: Stainless Steel Vacuum chamber with accessories



Parts of the system

The rack front face



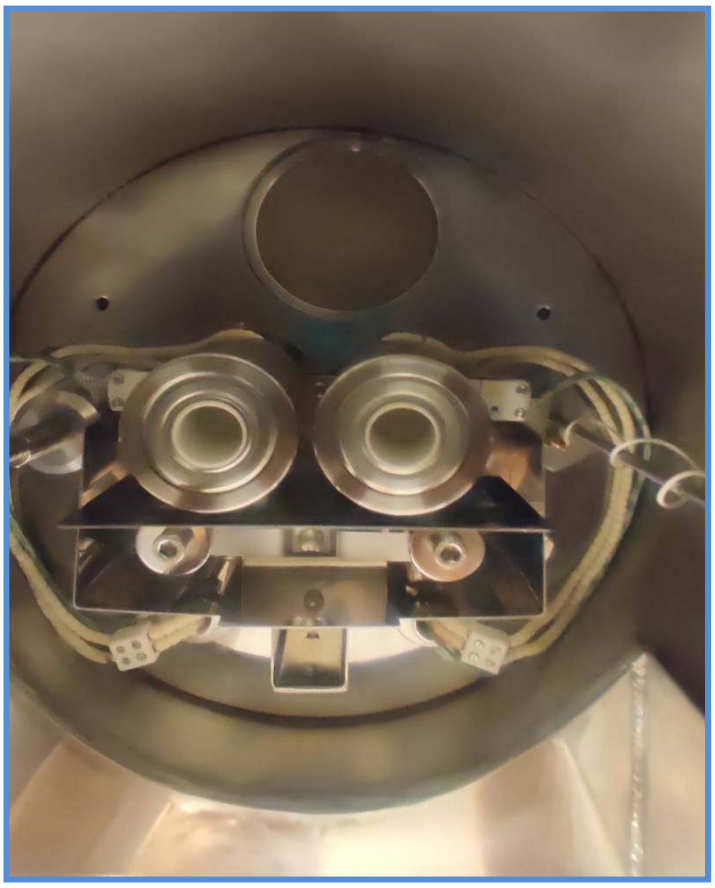
The rack inside

VCM600-300-SS

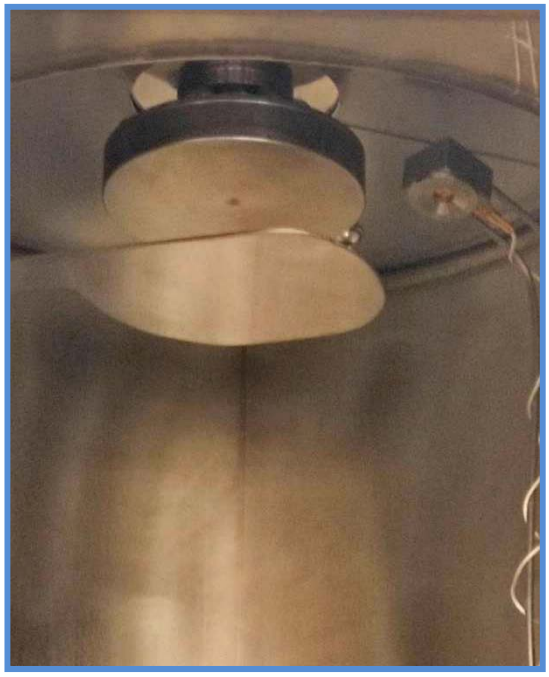
2LTE2-1TS/400A6V-SQM-Srot1-Subcool-1Esh

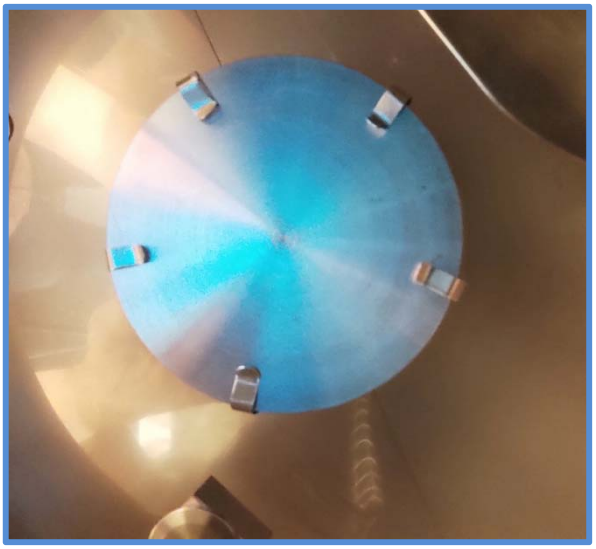
Rack type vacuum evaporator

Parts of the system



Base Plate with
1X High-Temp source
2X Low-Temp LTE source
and heat shield





Substrate holder
E/M shutter
Quartz crystal head

Controls and indicators on the front and the rear panel of the system

On the front panel the following controls are present:

- Main Power switch
- Heating power fuses
- Rough-pump switch
- Turbo-pump Start – Stop control (ON TURBO CONTROLLER)
- 1x HT source current control knob
- 2x LTE source power PID controller
- Thickness Monitor Controller
- Shutter Control switch
- Substrate rotation control
- Vent Valve control knob

The following indicators are present:

- Main Power Green Light
- Rough-pump power Green Light
- The screen on Vacuum system controller with information on Turbo-pump and Pressure value
- Evaporation Sources ON Red Light
- High Temp source current meter
- Thin film thickness on SQM160
- RED light (when ON indicates no water pressure)

On the rear panel of VCM 600 are:

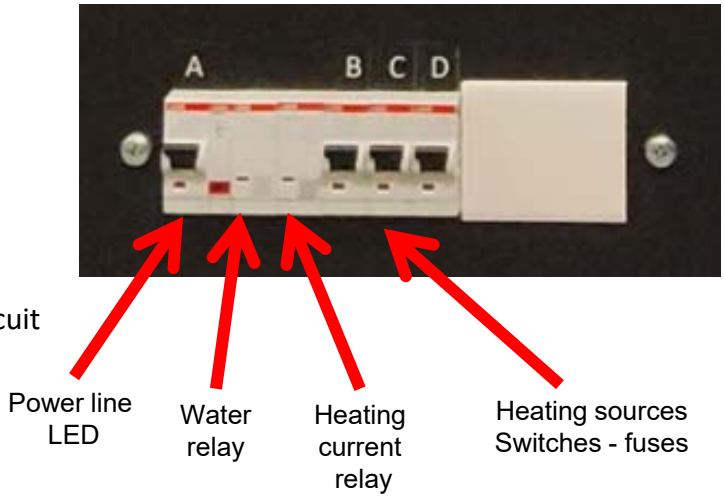
- The power cable
- The rough-pump power socket / power cable
- The rough-pump connection port
- The vent port
- The cooling water ports and the pressure regulator

The Relay and fuses bank

A Power Line fuse-switch

B, C, D Fuses-switches
for High-temp thermal sources

These switches-fuses allow
heating current in each heating circuit
Move A, B, C, D to the “UP” position
to allow the heating current in each circuit



Important

1) **You can not work with VCM600 without the correct water pressure**
2) **You can not make any evaporation before a certain vacuum level (factory preset) is reached.
Reaching this level is indicated with the RED light “ON” near the source's current meters.**

How to start the system

- Connect the water line and adjust the pressure (typ. 2.0bar, maximum 3 BAR)
- Connect the rough-pump to VCM
  Connect the vacuum tube to the appropriate port.
  Connect the power cable to the rough-pump
- Connect the VCM600 to the power network. The RED LED indicate presence of power.
- Turn the Main switch to “ON”.
- Allow Vacuum controller to boot
- VCM600 is ready for operation

To perform an evaporation with Hi-Temp source

- Connect the rough-pump to the rough-pump port
- Insert the rough-pump plug into the socket
- Place the aluminum pieces on the thermal source
- Place the sample on the substrate holder
- Connect VCM600 to the water line and adjust the pressure (typ 2,0bar Max 3bar)
- Start the system by turning the power switch on
- Start the rough pump by turning the rough pump switch on
- The green light indicates the existence of the power
- The pressure shown on the vacuum indicator moves to lower values
- As soon as the pressure falls lower than 7 mbar press START
  on TURBO Pump CONTROLLER and start the Turbopump
- As soon as the pressure falls below a preset pressure value,
  the POWER indicator lights up, and the heating section turns on
- This is an indication that a good vacuum level has been achieved to start the evaporation
- It is recommended to wait until the best possible Vacuum level achieved,
  as in this case, the quality of the film will be much better.

To perform the evaporation (cont.)

- VCM 600 can achieve, very fast, vacuum in the range of 1 X 10 EXP(-5) mbar, and after a short time, the system drops to 5 X 10 EXP(-6) mbar.
- By activating the current control knob, make sure that the correct current intensity passes through the source.
  The Current Meter displays the current value in Amps
- Soft SCR control of the current intensity allows control on the source's temperature and of the deposition rate, helping produce a high-quality film
- The maximum source temperature varies according to the material of the source from 1600 Celsius to 1800 Celsius

Upon finishing evaporation

- Minimize the current
- Turn OFF the Turbo Pump by pressing the STOP on TURBO controller
- Turn OFF Rough Pump
- Wait until TURBO PUMP stops completely
- Start venting the chamber, activating the Vent Valve.
  Turn vent valve knob 3 to 4 turns to the left.
- We recommend using Nitrogen for venting the chamber.
  This prevents the oxidation of Tungsten thermal elements and extends their life.
- Continue venting until the door opens
- Turn OFF the power switch
- Now, open the chamber and take out the coated sample.

Hint

- You can use sources of different type and shape (Filament or Crucibles) or different materials Tungsten, Tantalum or Molybdenum according to VCM 600 Heating Power specifications (400 A, 6V).
- It is recommended to use TWO tools simultaneously, to change the heating element . One to Hold the Feed through and one to operate the top screw.

Working with Low Temperature source

Low Temperature
Thermal Evaporation sources are
NOT OXIGEN COMPATIBLE

Wait for LTE to cool down and the temperature
on the PID controller to be below 50 C
before start venting

Working with Low Temperature source (LTE)

Low Temperature Thermal Evaporation source is NOT OXIGEN COMPATIBLE

To make evaporation using a Low-Temperature Thermal source act as follows :

- Connect the rough-pump to the rough pump port (NW25 or NW16).
- Insert the rough-pump plug into the socket.
- Load the LTE thermal source with the desired material.
- Place the sample on the substrate holder
- Give power to the system by turning the power switch on . Green light ON
- Give power to the rough pump by turning the rough pump switch on . Green light ON
- We notice on the vacuum indicator that the pressure moves to lower values.
- As soon as the pressure falls below 7 mbar, start the Turbo pump.
  Press the START on TURBO Pump CONTROLLER
- As soon as the pressure falls below a preset vacuum level, the red light comes on and the POWER to the heating section turns on, an indication that we have achieved a **safe vacuum level** to start the evaporation.
- It is recommended to wait to achieve a better Vacuum level, as this improves thin film quality. VCM 600, quickly achieves vacuum in the range of 1 X 10 EXP(-5) mbar and after a short time, goes down to 5 X 10 EXP(-6) mbar.
- Working on the PID controller set the desired temperature and the controller will drive the LTE source.
- **Do NOT set final temperature at once.**
- **Use 50 Celsius steps and allow the PID controller to stabilize.**
- The maximum LTE source temperature is set to 600 Celsius.

Working with Low Temperature source (LTE)

Upon finishing evaporation

- Minimize the temperature on the PID controller.
- **Wait for the LTE thermal source to cool down and for the temperature on the PID controller to be below 50 Celsius**
- Turn OFF the Turbo Pump by pressing the STOP on TURBO controller
- STOP the rough pump using the rough pump switch
- Start venting the chamber, activating the Vent Valve
- **We recommend to use Nitrogen for venting the chamber.**
  This prevents the oxidation of Tungsten thermal elements and extents their life.
- Turn OFF the power switch
- Now, open the chamber and take out the coated sample.

Cleaning

To clean the Base Plate and the other parts of the chamber you can use **ISOPROPYL ALCOHOL** and a soft cloth with no remaining.

SERVICE

ONLY CERTIFIED PERSONNEL CAN HAVE ACCESS TO VCM 600 PARTS

The SERVICE of all parts has to be done according instructions in the supplied manuals

- **VCM600-300-SS-2LTE2-1TS/400A6V-SQM-Srot1-Subcool-1Esh**
  Specifications

High Vacuum Generation

- TURBO Pump 300 l/sec
- TURBO Pump Controller with full informative display
- TURBO protection well

Low Vacuum generator

HiScroll 6, DRY pump, 100 l/min, **1.5 x 10 EXP(-2) mbar**

Vacuum Measurement System

- Pirani – Cold Plasma Compact Measuring Head (1000 - 5.0 x 10^{-9} hPa)

Vent Valve

- Variable Leak Valve, Manual type

Heating Power Source

- 1x Thermal source High Temperature (1800 Celsius)
- 2x LTE2 OLED evaporation sources
- 1x High Current AC power supply 400A
- 1x Soft SCR current control, 1x digital current measuring instrument
- 2 x High Current OFHC Copper Feed through with Flexible Power Lines
- 2 x LTE power supply with PID controllers up to 600 Celsius

Thickness monitoring system

- SQM 160 controller (Inficon) with ONE quartz crystal head (water cooled)

Shutters

- ONE Electromagnetically controlled

Substrate rotation

- Electronically controlled system, 0-40 rpm, manually adjusted

General

- Leak Tested : He Leak Detector down to 1.5 X 10 EXP(-8) mbar . l /s
- Power line : 220V / 50Hz/ 2500W / 3000W
- Water line : Maximum 3 bar, Typical 1,5 bar
- Temperature : +10 to +30 Celsius

tecuum

applied vacuum technology

assembled by ISO 9001:2015 TÜV AUSTRIA HELLAS EN ISO 9001:2015 certified company

Tecuum AG

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