

# VAPBOX 4000

## > DLI\* CVD & ALD Vaporizer

High Performance, Compact, Precise, Innovative liquid and solid precursors Delivery and Vaporization System for ALD, CVD, MOCVD, PECVD, MLD and all gas phase processes.

The VAPBOX 4000 vaporizes pure liquid compounds and solid ones dissolved in a carrier liquid (organic solvent) up to 250°C.

The VAPBOX 4000 is able to handle and vaporize most of solid and liquid compounds including low vapor pressure, thermally labile and viscous ones.

The VAPBOX 4000 provides high and unmatched performances based on a pulsed injection of a mixture of liquid and carrier gas. That pulsed injection is performed by a proprietary Injection Head and allows a very fine atomization of the liquid to be vaporized. The liquid is flash vaporized and the generated vapors can be used for the synthesis by ALD and CVD of thin films, multilayers structures, nanoparticles and nano-objects of numerous complex functional materials such as for instance multi-metallic oxides (high-k dielectrics, magnetic and superconducting materials, ferroelectrics, piezoelectrics), various chalcogenides (PCRAM and CIS/CIGS photovoltaic materials) and transparent conductive oxides (TCO).

Because of its unique proprietary way to deliver and atomize the liquid inside the vaporizer the VAPBOX 4000 is able to achieve a real non-contact flash vaporization therefore generating particle free vapors.

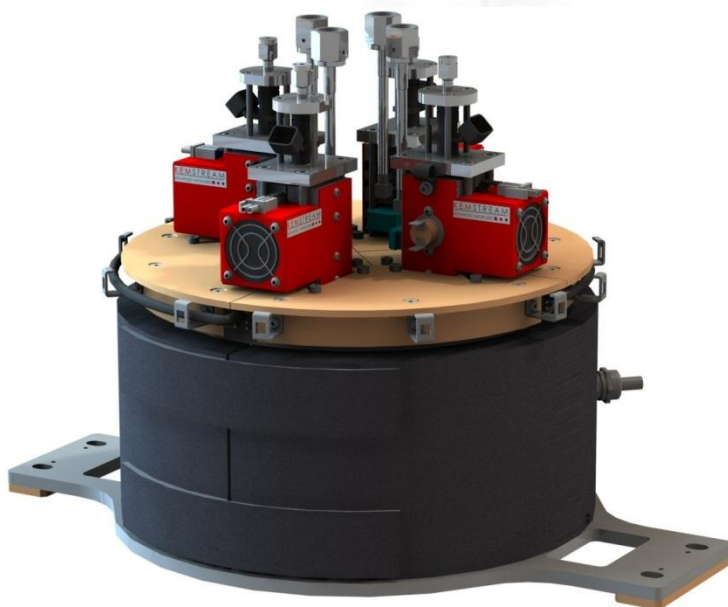
Indeed, the blasting of the carrier gas/liquid mixture inside the vaporizer allows generating an aerosol of droplets around 10 microns in diameter. Such very small droplets can be easily flash vaporized. Competitors' vaporizers are generating bigger liquid droplets that cannot be flash vaporized and clog the vaporizer.

The VAPBOX 4000 operates from vacuum to atmospheric pressure.

Thanks to delivering of accurate and stable liquid flows, the VAPBOX 4000 delivers accurate and stable vapor flows.

The VAPBOX 4000 can inject and vaporize up to 4 liquids or solutions simultaneously or sequentially.

\*DLI = Direct Liquid Injection



## > Technical specifications

### Injection Heads (liquid inlets)

> 1 to 4

### ICU (Injection Control Unit)

> 24 VDC remote and rackable 19" 2U unit (1 or 2)

### Heating:

> Six heating zones, up to 250°C, 2600 W

> 6 K type thermocouples: (1 per heating zone)

### Fittings:

> 1/8" compression type fitting for liquid inlet(s) (1-4)

> 1/4" female VCR fitting for carrier gas inlet(s) (1-4)

> 1/2" male VCR fitting for vapor outlet

### Versions:

> 230 VAC version and 115 VAC version

### Accessories:

> 1 Liquid flow controlling kit per Injection Head, including a Liquid Flow Meter (LFM)

> Liquid panel with 1 precursor tank per Injection Head and with an optional solvent tank

> Carrier gas panel with 1 carrier gas Mass Flow Meter (MFM) per Injection Head

> TCU (Temperature Control Unit): 19" remote and rackable 4U unit

### Flows range (per Injection Head):

> Typical carrier gas flow range = 150 to 7500 sccm

> Typical liquid flow range = 0.1 to 15 g/min

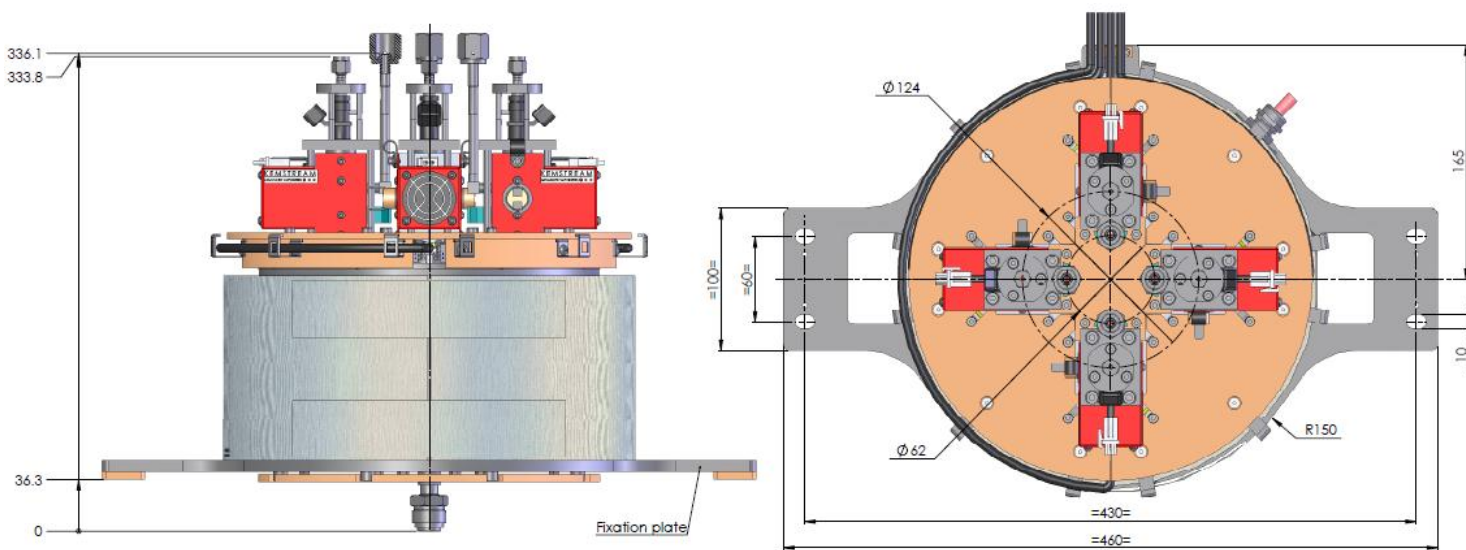
US patent pending and patents pending in other countries

[www.kemstream.com](http://www.kemstream.com)

**KEMSTREAM**  
ADVANCED VAPORIZERS

> Dimensions

VAPBOX 4000 with 4 Injection Heads



All dimensions are in mm

> Ordering information

Injection Head

HB4	-	S2V	F4V
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**Liquid inlet fitting**

<b>S2V</b>	Swagelok 1/8" (standard)
	other fittings upon request

**Carrier gas inlet fitting**

<b>F4V</b>	VCR 1/4" female (standard)
<b>M4V</b>	VCR 1/4" male
<b>S4V</b>	Swagelok 1/4"
<b>T4V</b>	1/4" OD tube

Vaporizer

V40	HBRs1	M8	V
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**Voltage (for heating)**

<b>HBRs1</b>	230 VAC
<b>LBRs1</b>	115 VAC

**Vapor outlet fitting**

<b>M8</b>	VCR 1/2" male (standard)
<b>M4</b>	VCR 1/4" male
<b>K1</b>	KF16
	other fittings upon request

**Vaporizer pressure (process P)**

<b>V</b>	from 0 to 1.5 bara
<b>A</b>	above 1.5 bara

If the vaporizer is equipped with 1 or 2 Injection Heads, one ICU (Injection Control Unit) is needed.  
If the vaporizer is equipped with 3 or 4 Injection Heads, 2 ICUs are needed.

For ordering information about the ICU please see the datasheet of the ICU