

# adixen

by Alcatel Vacuum Technology

## ACP 40CV DRY ROUGHING PUMP



**iris**  
Convention

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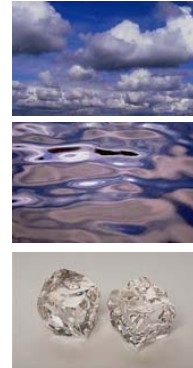
Brad Creamer  
Product Manager

ALCATEL

## Key points of vapor pumping (Example of Water vapor)

› Water exists in 3 phases :

- Gaseous (vapor, steam)
- Liquid
- Solid (ice)



› These 3 phases are driven by only 2 parameters :

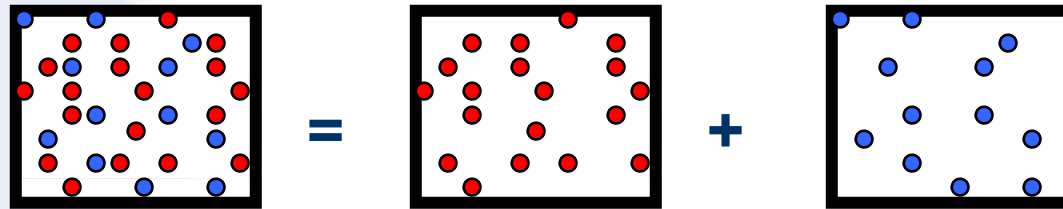
- Temperature
- Partial pressure (c.f. next slide)

› ACP pumps are only able to handle gases (**NO liquid**)

⇒ **Our goal to pump vapor : stay in gaseous phase**

- > Partial pressure of gas is proportional to molecule number

$P_{\text{TOTAL air}} = 1013\text{mbar}$  at the sea level

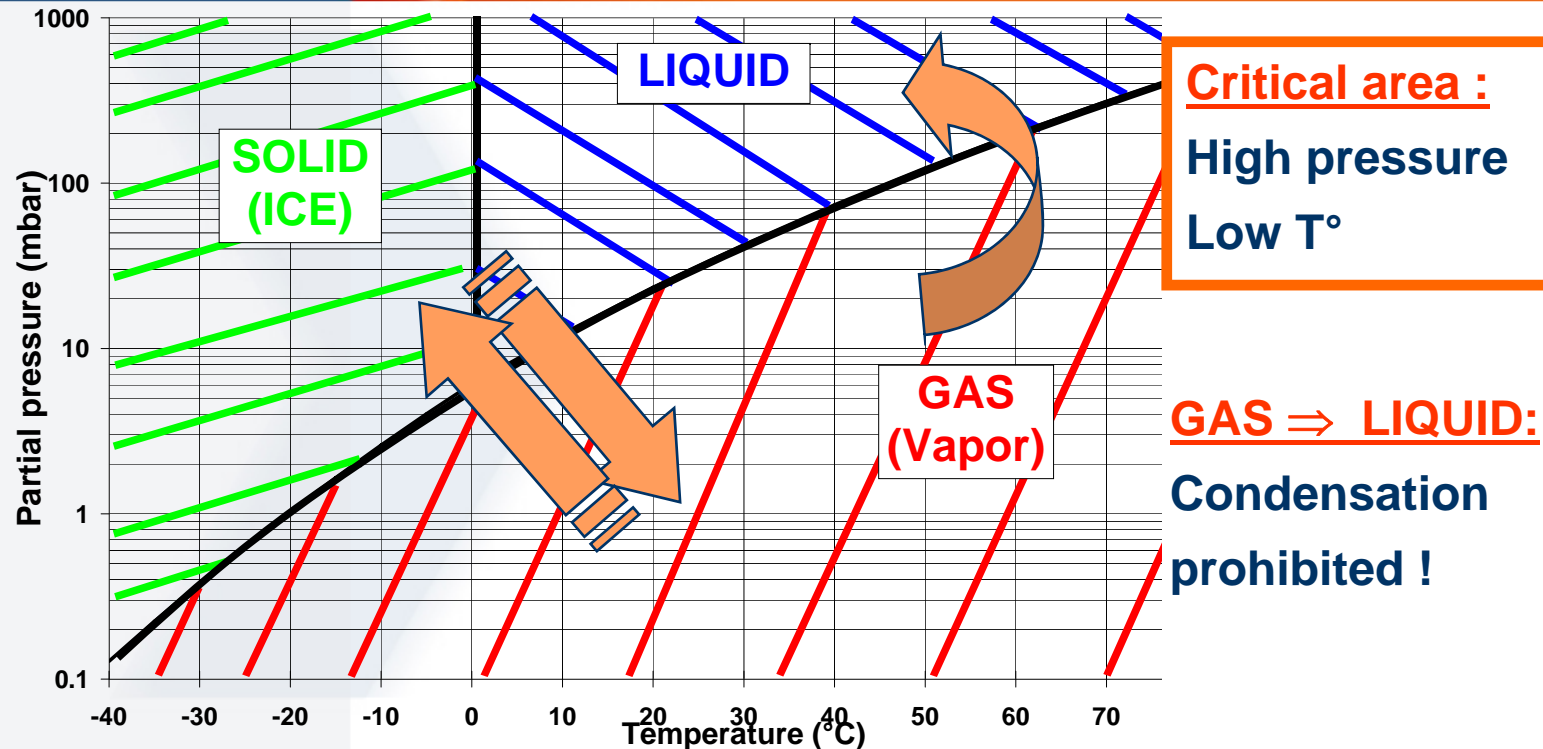


$$P_{\text{TOTAL air}} = P_{\text{N}_2+\text{O}_2} + P_{\text{H}_2\text{O}}$$

«Non Condensable»      «Condensable»

- > Total pressure of gas is the sum of all partial pressures

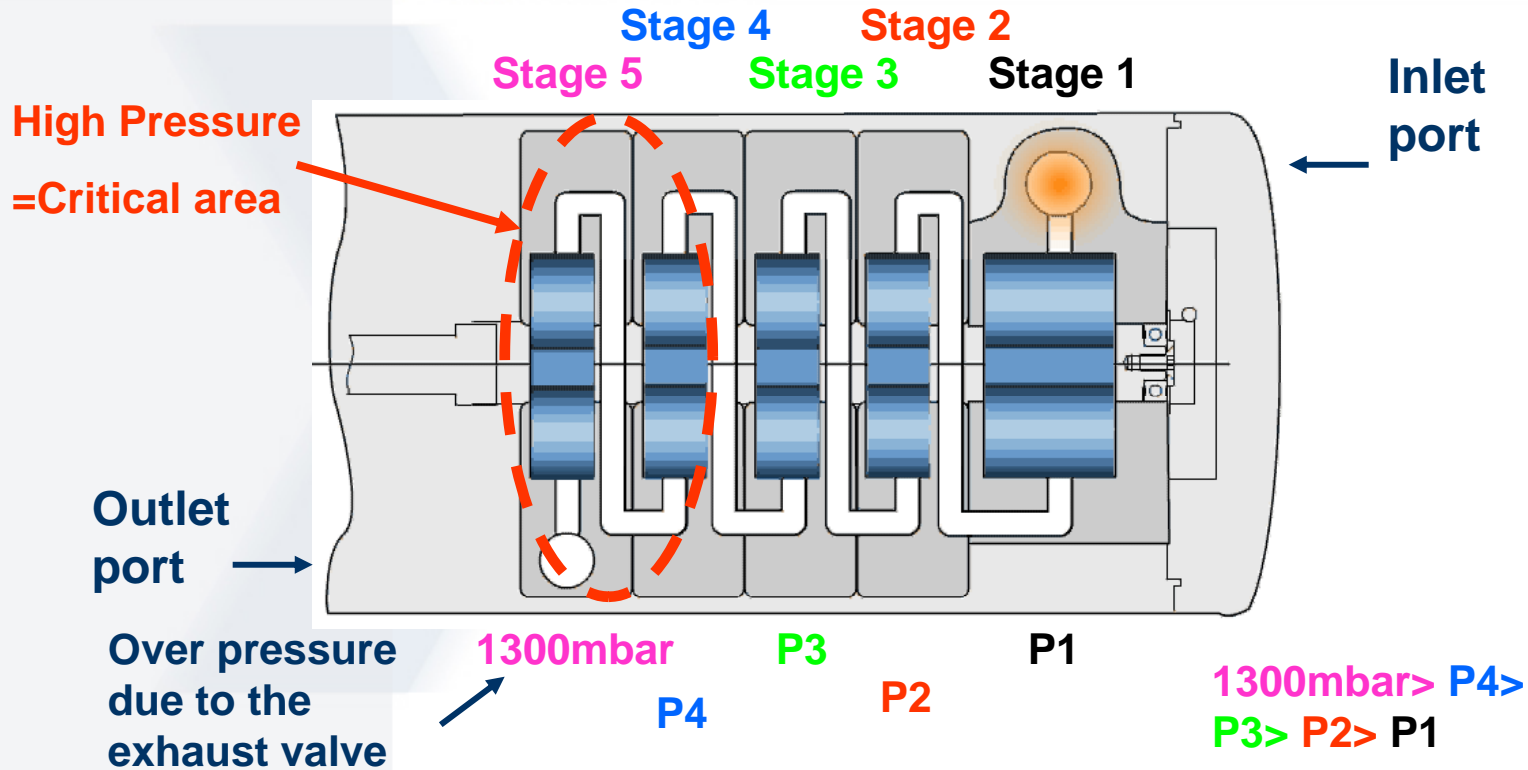
# Equilibrium of the three phases (Example of water vapor)



**Mission :** stay in vapor phase

⇒ ↑ of T° of the pump

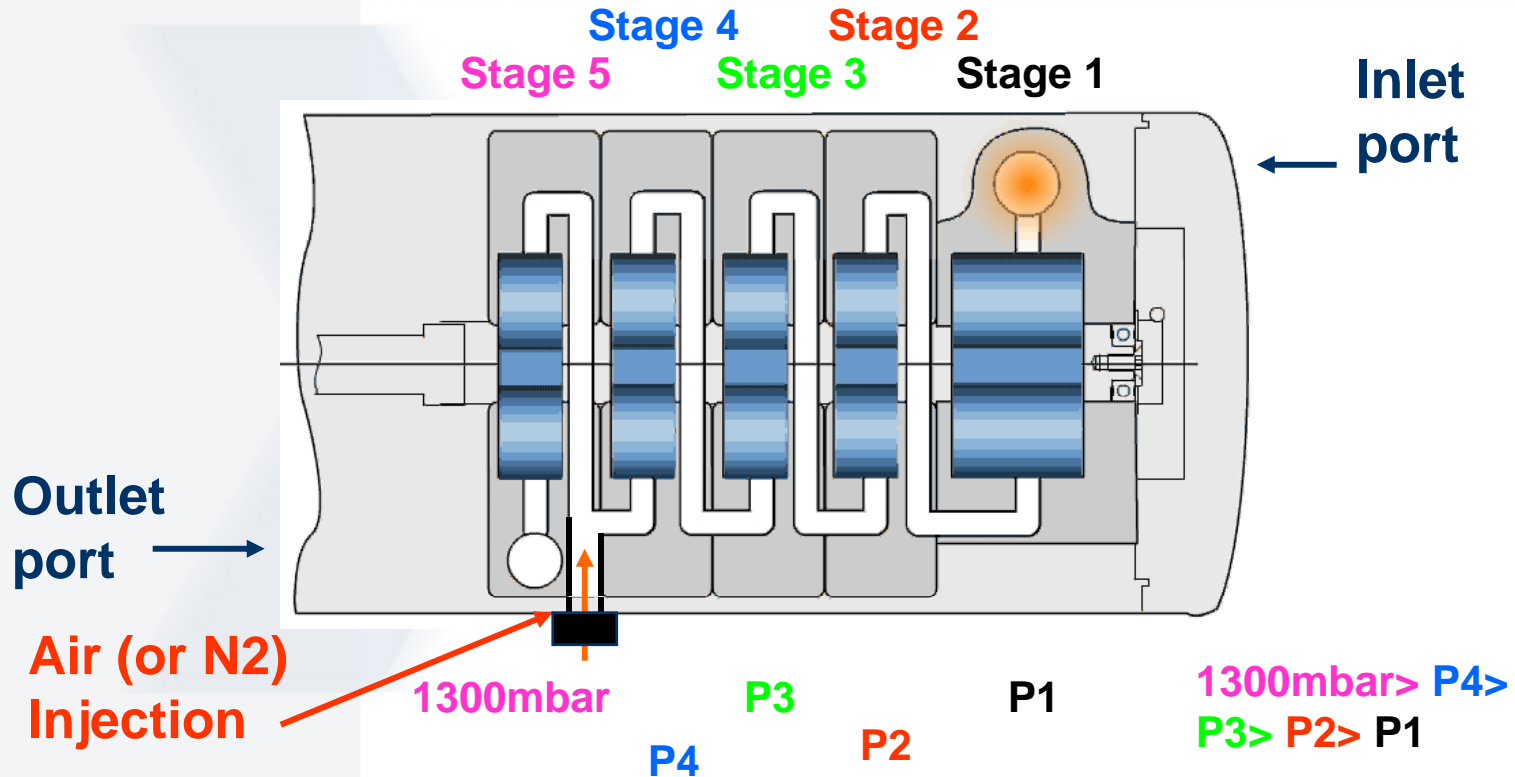
⇒ ↓ Partial Pressure of vapor



> Mission : stay in vapor phase in all stages  
of the pump

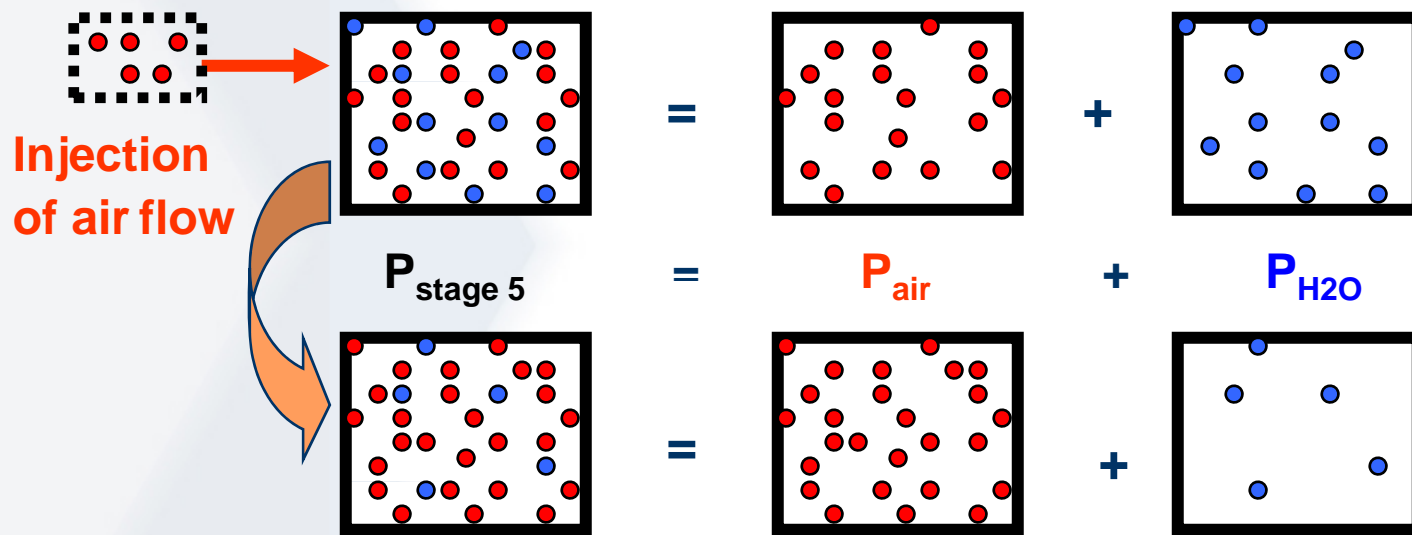
- › Increase the Pumping capacity of vapor requires :

<b>Increase of pump T°</b>	<b>⇒ Use a high flow gas ballast</b>
<b>Decrease vapor partial Pressure</b>	<b>⇒ Use a high flow gas ballast</b>
<b>Decrease maximum total pressure</b>	<b>⇒ Use a special exhaust valve</b>
<b>Evacuation of vapor after exhaust valve</b>	<b>⇒ Use a drainable exhaust silencer</b>



> Effects : increase of pump T°, decrease of vapor partial pressure (dilution)

> For a total pressure fixed : 1300mbar in the 5<sup>th</sup> stage



> Injection of air flow  $\Rightarrow$   $\uparrow P_{air}$   $\Rightarrow$   $\downarrow P_{H2O}$



	ACP28/40G	ACP28/40
<b>Gas ballast</b>	NO	1.2m <sup>3</sup> /h
<b>Exhaust valve (over pressure)</b>	Standard (300mbar)	Standard (300mbar)
<b>Silencer</b>	Standard	Standard
<b>Ultimate pressure with purge or Gas ballast</b>	0.1mbar	0.1mbar
<b>Application</b>	Sensitive	Humidity



	ACP28/40G	ACP28/40	ACP40 CV
<b>Gas ballast</b>	NO	1.2m <sup>3</sup> /h	2.7m <sup>3</sup> /h
<b>Exhaust valve (over pressure)</b>	Standard (300mbar)	Standard (300mbar)	Special (100mbar)
<b>Silencer</b>	Standard	Standard	Drainable
<b>Ultimate pressure with purge or Gas ballast</b>	0.1mbar	0.1mbar	0.2mbar
<b>Application</b>	Sensitive	Humidity	Vapor

- › ACP40CV is a **special product** dedicated to applications with condensable gases



Drainable  
Exhaust  
silencer

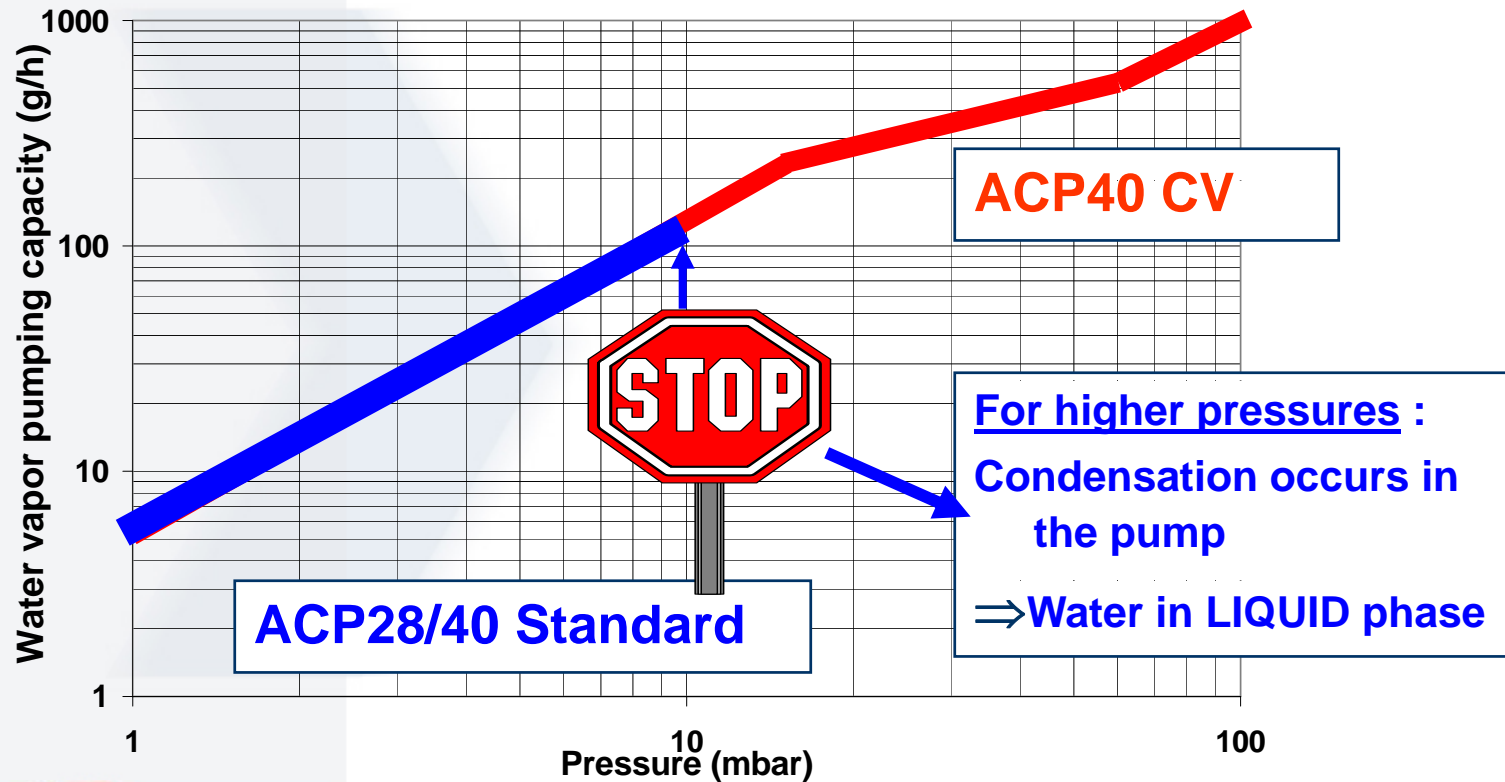
Outlet port



Gas Ballast



Inlet port



> 10 times better than Standard version

## Compare to oil lubricated pumps

	RVP1015	RVP2015	RVP2021	RVP2033	RVP2063	RV12 (Edwards)	<b>ACP 40CV</b>
<b>Pumping speed (air 50Hz)</b>	12.5m <sup>3</sup> /h	12m <sup>3</sup> /h	15.5m <sup>3</sup> /h	27m <sup>3</sup> /h	55m <sup>3</sup> /h	12m <sup>3</sup> /h	<b>40m<sup>3</sup>/h</b>
<b>Ultimate pressure (gas ballast)</b>	7mbar	0.01mbar	0.01mbar	0.02mbar	0.02mbar	0.06mbar	<b>0.2mbar</b>
<b>Max. vapor capacity</b>	370g/h	110g/h	90g/h	700g/h	1200g/h	290g/h	<b>1000g/h</b>
<b>Max vapor pressure</b>	30mbar	12mbar	7mbar	30mbar	25mbar	32mbar	<b>100mbar</b>



- › Key points for vapor pumping :
  - No liquid in the pump
  - Use a gas (dry is better) ballast and a drainable exhaust
  - Always start process with a hot pump (run the pump at least 30min with gas ballast open)
  - Always let the pump running after the process with gas ballast open (30min at least)